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Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
AEP.com

August 31, 2005

AEP:NRC:5054-11
10 CFR 50.54(f)

Docket Nos: 50-315
50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

Donald C. Cook Nuclear Plant Units 1 and 2
NUCLEAR REGULATORY COMMISSION GENERIC LETTER 2004-02 – INFORMATION REQUESTED BY SEPTEMBER 1, 2005

Reference:

1. Nuclear Regulatory Commission (NRC) Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004 (ML042360586).

2. Letter from D. P. Fadel, Indiana Michigan Power Company (I&M), to NRC Document Control Desk, "90 Day Response to Nuclear Regulatory Commission Generic Letter 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," AEP:NRC:5054-04, dated March 4, 2005 (ML050750069).

By Reference 1, the NRC requested that addressees perform a mechanistic evaluation of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the emergency core cooling systems and containment spray systems. The NRC requested that, within 90 days of the date of the NRC safety evaluation report providing the guidance for performing the evaluation, addressees provide information regarding their planned actions and schedule to complete the evaluation. I&M's 90-day response for the Donald C. Cook Nuclear Plant (CNP) was provided by Reference 2.

The NRC also requested that, by September 1, 2005, addressees provide confirmation that recirculation functions are, or will be, in compliance with applicable regulatory requirements, a description of, and schedule for, associated plant modifications, a description of the methodology

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used to perform the evaluation, the results of the evaluation with respect to specific attributes, a schedule for any associated changes to the plant licensing basis, and a description of any associated programmatic controls.

Attachment 1 to this letter provides the information requested by September 1, 2005 for CNP. Attachment 2 identifies the regulatory commitments made in this letter.

Should you have any questions, please contact Mr. John A. Zwolinski, Safety Assurance Director, at (269) 466-2428.

Sincerely,

Joseph N. Jensen
Site Vice President

JW/rdw

Attachments:

1. NRC Generic Letter 2004-02 - Information requested by September 1, 2005
2. Regulatory Commitments

c: J. L. Caldwell, NRC Region III
K. D. Curry, Ft. Wayne AEP, w/o attachment
J. T. King, MPSC
MDEQ – WHMD/RPMWS
NRC Resident Inspector
D. W. Spaulding, NRC Washington, DC

AFFIRMATION

I, Joseph N. Jensen, 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 letter with the 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

Joseph N. Jensen
Site Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 31st DAY OF August, 2005

Regan D. Wendzel
Notary Public

My Commission Expires

REGAN D. WENDZEL
Notary Public, Berrien County, MI
My Commission Expires Jan. 21, 2009

ATTACHMENT 1 TO AEP:NRC:5054-11

NRC GENERIC LETTER 2004-02 – INFORMATION REQUESTED BY SEPTEMBER 1, 2005

References for this attachment are identified on Page 40 and Page 41.

In the Requested Action section of Generic Letter 2004-02 (Reference 1), the U. S. Nuclear Regulatory Commission (NRC) requested that addressees perform a mechanistic evaluation, using an NRC-approved methodology, of the potential for the adverse effects of post-accident debris blockage and operation with debris-laden fluids to impede or prevent the recirculation functions of the emergency core cooling systems (ECCS) and the containment spray system (CTS) in a pressurized water reactor (PWR).

In Requested Information Item 1 of the generic letter, the NRC requested that, within 90 days of the date of the NRC safety evaluation report providing the guidance for performing the evaluation, addressees provide information regarding their planned actions and schedule to complete the evaluation. I&M's 90-day response for the Donald C. Cook Nuclear Plant (CNP) was provided by Reference 2.

In Requested Information Item 2 of the generic letter, the NRC requested that, by September 1, 2005, addressees provide certain information regarding the results of the evaluation. This attachment provides Indiana Michigan Power Company's (I&M's) response to Requested Information Item 2 of the generic letter for CNP. In this response, reference is made to the GR (Guidance Report) and SER (Safety Evaluation Report). The GR and SER are, respectively, the Nuclear Energy Institute report, published in May 2004, providing guidance on evaluating PWR sump performance, and the NRC report, published in December 2004, that documented the NRC evaluation of the NEI guidance. The GR and SER were published jointly as Volume 1 and Volume 2 of Reference 3.

Requested Information Item 2(a)

Confirmation that the ECCS and CSS [containment spray system] recirculation functions under debris loading conditions are or will be in compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. This submittal should address the configuration of the plant that will exist once all modifications required for regulatory compliance have been made and this licensing basis has been updated to reflect the results of the analysis described above.

Response

Activities are currently in progress to ensure that the ECCS and CTS recirculation functions under debris loading conditions at CNP Units 1 and 2 will be in full compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of Generic Letter 2004-02 by December 31, 2007. I&M plans to achieve and

demonstrate full compliance through analysis, mechanistic evaluations, modifications to increase the available sump screen area, and other changes to the plant to reduce the potential debris loading of recirculation sump strainers. I&M plans to implement programmatic and process changes to ensure continued compliance. The analysis method being used to demonstrate compliance is the Alternate Evaluation methodology described in Chapter 6 of the GR and evaluated by the NRC in the SER. Further information regarding this approach is provided in the response to Requested Information Item 2(c).

By December 31, 2007, the existing recirculation sump strainer inside the crane wall will be replaced, and a new remote strainer will be installed in the annulus area between the crane wall and containment wall. The new remote strainer will be piped directly to the existing recirculation sump. These modifications will be performed for both Unit 1 and Unit 2. The modifications are based on the best available knowledge regarding the planned installation locations, potential debris generation and transport, and potential head loss across the screen.

To establish the planned strainer locations and sizes, several activities have been or will be completed in accordance with the guidance provided in the GR and SER, except as noted in this attachment. These activities are summarized below. Additional details are provided in the response to Requested Information Items 2(c), 2(d), and 2(f).

- Containment Walkdowns – I&M has begun containment walkdowns to assess potential debris sources. The walkdowns include sampling of latent debris, verification of insulation types and locations, and evaluation of potential sump strainer locations. The walkdowns are consistent with the guidelines provided in the GR, the SER, and NEI 02-01, (Reference 4).

- Debris Generation and Transport Analyses – Bounding (Unit 1 and Unit 2) debris generation and debris transport analyses were performed in support of a Baseline analysis. The Baseline evaluation was performed in accordance with the GR and SER except as described in the response to Requested Information Item 2(c). Review and acceptance of the debris generation and transport analyses is in progress.

- Calculation of Required and Available Net Positive Suction Head (NPSH) – The required NPSH and the available NPSH for a clean sump strainer head loss condition were previously determined for all ECCS and CTS pumps using industry accepted practices and applicable regulatory guidance.

- Determination of Strainer and Screen Requirements (and/or modifications planned) - I&M plans to replace existing sump strainers and install new strainers to assure compliance with applicable regulatory requirements. The existing screen area in each unit is approximately 85 square feet (ft^2). The total screen area of the replacement and new strainers has not yet been finalized but is expected to be 2000 ft^2 per unit, or

greater. The screens for the strainers will be of an advanced design and will have round openings with a maximum diameter of 1/8 inch. The design of these strainers will ensure that the available NPSH for the ECCS and CTS pumps will be in excess of the required NPSH.

- Evaluation of Other Potential Modifications - Other modifications currently planned or under consideration include installation of various debris interceptors, recirculation sump internal level instrumentation, removal of asbestos based calcium silicate insulation from the pressurizer relief tank (PRT) and the pressurizer safety and relief valve pipe that discharges to the PRT, and removal of unqualified labels from containment to the maximum extent possible.

- Strainer Structural Analysis – I&M will apply the CNP licensing basis leak-before-break (LBB) provisions for reactor coolant system (RCS) loop piping to the structural analysis for the replacement and new strainers.

- Implementation of Measures to Assure Continued Compliance – To assure continued compliance, I&M plans to review existing engineering design specifications, engineering design standards, engineering programs, modification and maintenance processes and procedures, and station operation processes and procedures to ensure the inputs and assumptions that support the analyses identified in this attachment are incorporated into the applicable documents.

- Downstream Effects Evaluation – A downstream effects evaluation, bounding both units, has been performed consistent with WCAP-16406-P, (Reference 5). These evaluations assessed the susceptibility for blockage of required flow areas and the potential for abrasive wear to detrimentally impact the required ECCS and CTS functions. Review and acceptance of the downstream effects evaluation is in progress.

- Upstream Effects Evaluation – I&M had previously determined the upstream effects to establish a minimum sump water level with consideration for potential holdup volumes, sump water flow areas, and flow paths to the recirculation sump. An additional review of the required flowpaths has been performed to determine if there are potential upstream blockage points.

As part of the modification and analysis process, I&M will change the CNP Updated Final Safety Analysis Report (UFSAR) to reflect the results of the modifications and analyses performed to achieve and demonstrate compliance with the applicable regulatory requirements. This update will be performed in accordance with the requirements of 10CFR50.71(e).

Requested Information Item 2(b)

A general description of and implementation schedule for all corrective actions, including any plant modifications, that you identified while responding to this generic letter. Efforts to implement the identified actions should be initiated no later than the first refueling outage starting after April 1, 2006. All actions should be completed by December 31, 2007. Provide justification for not implementing the identified actions during the first refueling outage starting after April 1, 2006. If all corrective actions will not be completed by December 31, 2007, describe how the regulatory requirements discussed in the Applicable Regulatory Requirements section will be met until the corrective actions are completed.

Response

As stated in the response to Requested Information Item 2(a) above, CNP will be in full compliance with the regulatory requirements discussed in the Applicable Regulatory Requirements section of GL 2004-02 by December 31, 2007, including the implementation of all required corrective actions.

The table below provides a listing of all planned and completed actions taken related to the response to Generic Letter 2004-02 as well as the implementation schedule. Also identified are key predecessor activities that have the potential to impact the planned schedule.

Action Description	Implementation Date/Schedule
1. Containment walkdowns for determination and/or validation of debris sources including insulation and latent debris.	Unit 1 walkdowns were completed during the Spring 2005 refueling outage. Open items will be validated during the Fall 2006 refueling outage. Unit 2 walkdowns will be completed during the Spring 2006 refueling outage. Final containment walkdowns to be completed during Fall 2006 Unit 1 refueling outage and Fall 2007 Unit 2 refueling outage.

Action Description	Implementation Date/Schedule
2. Completion of actions to qualify and validate the design of the containment recirculation sump strainers.	Prior to September 30, 2006.
The key predecessor activities are:	Expected completion dates for key predecessor activities:
a. Head loss testing on the replacement strainer using the results of the site-specific debris generation and debris transport evaluations, including site-specific debris mix (or equivalent materials).	a. June 30, 2006
b. Site-specific chemical effects testing.	b. March 31, 2006
c. Testing to support the use of a zone of influence (ZOI) of five times the pipe break diameter (5D ZOI) for qualified coatings destruction pressure.	c. March 31, 2006
d. Testing to support other than 100 percent (%) fines generation for calcium silicate (Cal-Sil) insulation fragments.	d. March 31, 2006
e. Final review and acceptance of the downstream effects evaluations.	e. December 31, 2005
f. Strainer structural qualification.	f. June 30, 2006
g. Hydraulic analysis to support the strainer configuration described in Item 3 below.	g. August 15, 2006

Action Description	Implementation Date/Schedule
3. Replacement of containment recirculation sump strainers. This will involve removal of the existing woven wire screen/bar grating design (at the recirculation sump inside the crane wall) and replacing it with an advanced strainer design. Additional strainer modules will be installed in a remote strainer location in the annulus area between the crane wall and containment wall. Piping or flow ducts will connect the remote strainer to the existing recirculation sump. The strainer inside the crane wall will provide approximately 740 ft^2 of screen area with a maximum opening of 1/8 inch (compared to the current area of 85 ft^2 with a maximum opening of 1/4 inch). The strainer in the annulus will provide greater than 1260 ft^2 of screen area with a maximum opening of 1/8 inch. The key predecessor activity is: Finalize contract with strainer vendor.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage. Expected completion date for key predecessor activity: October 15, 2005

Action Description	Implementation Date/Schedule
4. Installation of debris interceptor / trash rack modifications at locations deemed appropriate by the computational fluid dynamics (CFD) analysis and the upstream effects evaluation. These include debris interceptors to protect: the drain paths from the containment equalization – hydrogen skimmer (CEQ) fan rooms, the existing flow holes from the loop compartment to the annulus through the vent well walls, the approach area to the strainer section in the annulus, and the area of the inlet nozzles for the containment wide range level instruments. Key predecessor activities include: a. Completion of refined analysis using debris generation break size (DGBS.) b. Completion of predecessor activities a. through d. from Item 2 above.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage. Expected completion dates for key predecessor activities: a. March 31, 2006 b. As identified in Item 2 above.
5. Installation of redundant, safety related level instruments inside the recirculation sump to provide early indication of sump blockage (and potentially alarm) in the control rooms.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.
6. Modification of recirculation sump vents to reduce debris screen openings to less than or equal to 1/8 inch diameter.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.

Action Description	Implementation Date/Schedule
7. Modification of the existing cross-over pipe from the recirculation sump to the adjacent lower containment sump to prevent debris greater than a nominal 1/8 inch diameter from bypassing the strainer screens.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.
8. Modification of the Unit 2 lower containment sump to ensure sufficient flow openings exist to allow water to drain from the CEQ Fan Rooms (Unit 1 drains to the pipe tunnel – annulus sump which has the necessary openings).	Unit 2: Prior to restart from Fall 2007 refueling outage.
9. Removal of the asbestos based Cal-Sil insulation currently installed on the PRT and the pressurizer relief valve discharge pipe from the pressurizer enclosure to the PRT.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.
10. Removal of unqualified labels inside containment, consisting of vinyl letters for cable tray and conduit identification, and asbestos or asbestos free labels on piping systems. The labels that could be exposed to a viable transport medium will be removed to the extent practical, since some may not be accessible without substantial personnel dose accumulation due to scaffold installation.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.
11. Removal of qualified labels inside containment within potential ZOIs that generate substantial quantities of debris.	Unit 1: Prior to restart from Fall 2006 refueling outage. Unit 2: Prior to restart from Fall 2007 refueling outage.

Action Description	Implementation Date/Schedule
12. Implementation of programmatic, process, and procedural changes (that are detailed in the response to Requested Information Item 2(f)). Key predecessor activities include: a. Review existing design specifications, standards and processes to identify those that require revision to capture the information necessary to assure inputs and assumptions are maintained. b. Revise Unit 1 specific items identified during the review described above. c. Revise Unit 2 specific items identified during the review described above. d. Revise common items identified during the review described above.	December 31, 2007 Expected completion dates for key predecessor activities: a. September 30, 2006. b. October 15, 2006 c. October 15, 2007 d. December 31, 2007
13. Update of UFSAR to reflect changes to licensing basis. Key predecessor activities include: a. Incorporation of unit specific UFSAR changes related to specific modifications. b. Incorporation of common UFSAR changes.	December 31, 2007 Expected completion dates for key predecessor activities: a. December 31, 2006 (Unit 1) December 31, 2007 (Unit 2) b. December 31, 2007

An update to this response will be submitted to the NRC no later than June 30, 2006. This date follows completion of the Unit 2 outage scheduled to start prior to April 1, 2006. The update will address the issues as identified in Attachment 2 to this letter. A final response will be submitted to the NRC by December 31, 2007 to provide a final status of actions requested by Generic Letter 2004-02.

Requested Information Item 2(c)

A description of the methodology that was used to perform the analysis of the susceptibility of the ECCS and CSS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluids. The submittal may reference a guidance document (e.g., Regulatory Guide 1.82, Rev. 3, industry guidance) or other methodology previously submitted to the NRC. (The submittal may also reference the response to Item 1 of the Requested Information described above. The documents to be submitted or referenced should include the results of any supporting containment walkdown surveillance performed to identify potential debris sources and other pertinent containment characteristics.)

Response

I&M has performed analyses to determine the susceptibility of the ECCS and CTS recirculation functions to the adverse effects of post-accident debris blockage and operation with debris-laden fluids. These analyses conform to the NEI 04-07 methodology, except for the refinements and exceptions noted in the paragraphs below. In some cases, these analyses are undergoing additional refinement. Specifically, analyses supporting debris transport using the planned strainer and other hardware modifications (described in Item 2(b) above) have not yet been completed. Specific sensitivity runs have yet to be completed for various debris and transport scenarios. Vendor specific testing of the sump strainer using CNP-specific debris mix has not started. Chemical effects testing using CNP-specific materials has not started. I&M expects these tests and analyses to be completed as stated in the response to Requested Information Item 2(b) above. An update on the status of these tests and analyses will be provided to the NRC no later than June 30, 2006.

Many of the analyses and evaluations identified in the response to NRC Requested Information Item 2(b) were performed by organizations under contract to I&M. The Utilities Services Alliance (USA), of which I&M is a member, selected a team led by Westinghouse Electric Corporation (Westinghouse) to supply these analyses and evaluations. The Westinghouse team included Westinghouse, Alion Science and Technology (Alion), and Enercon Services (Enercon). Westinghouse was responsible for performing the downstream effects component wear evaluation, reactor vessel blockage, and reactor fuel blockage evaluations. Alion was responsible for performing the debris

generation and debris transport evaluations and analyses and head loss calculation. Enercon was responsible for performing the downstream effects ECCS and CTS components blockage evaluation.

These analyses and evaluations are being performed under Westinghouse's 10CFR50 Appendix B Quality Assurance program. I&M has reviewed and provided comments on the various individual reports that have been prepared by the Westinghouse team thus far. Upon completion of the individual reports, Westinghouse will provide I&M with a summary report containing the individual reports. I&M will then perform an Owner's Acceptance Review of the summary report and enter the report into the CNP document control program. In Reference 2, I&M committed to have the final Westinghouse report and I&M acceptance reviews completed no later than September 1, 2005. I&M now expects this to be complete by December 31, 2005.

The following activities were included in the analyses to determine the susceptibility of the ECCS and CTS recirculation functions to the adverse effects of debris generation:

1. Break Selection
2. Debris Generation and Zone of Influence (Excluding Coatings)
3. Debris Characteristics (Excluding Coatings)
4. Latent Debris
5. Debris Transport
6. Coatings Evaluation
7. Head Loss
8. Chemical Effects
9. Upstream Effects
10. Downstream Effects

The specific approaches used for each of these activities is described below.

1. Break Selection

   The selection of pipe breaks to be included in the analyses was performed based on two considerations. The first consideration was that a determination of the worst break location with respect to maximum debris generation and transport was necessary to support performance of a Baseline evaluation. The second consideration was that, since CNP has a small containment (relative to non-ice condenser pressurized water reactors) in which to install a large strainer, the use of the Alternate Evaluation methodology allowed by the GR and SER appeared advantageous. Accordingly, I&M elected to use the Alternate Evaluation methodology, which required determination of the break location of the largest piping attached to the RCS that resulted in the worst combination of debris generation and transport to the sump. The approach used for break selection is summarized as follows.

Break selection consisted of determining the size and location of the high energy line breaks (HELBs) that would produce debris and potentially challenge the performance of the sump strainer. The break selection process required evaluating a number of potential break locations in order to identify the location that was likely to present the greatest challenge to post-accident sump performance. The debris inventory and the transport path associated with the break location were both considered when making this determination.

Section 3.3.4.1 of the GR documents a recommendation that a sufficient number of breaks in each high-pressure system that rely on recirculation be considered to ensure that the breaks that bound variations in debris generation by the size, quantity, and type of debris are identified. To meet this recommendation, the following break locations were considered:

Break No. 1:	Breaks in the RCS with the largest potential for debris.
Break No. 2:	Large breaks with two or more different types of debris.
Break No. 3:	Breaks in the most direct path to the sump.
Break No. 4:	Large breaks with the largest potential particulate debris to insulation ratio by weight.
Break No. 5:	Breaks that generate a thin bed effect identified in the GR, i.e., a large amount of particulate debris with thin (1/8 inch) fiber bed.

Only those breaks that would require recirculation were evaluated. Therefore, accident analyses and operational procedures were reviewed to identify the scenarios that would require the CTS and ECCS to take suction from the recirculation sump. It was determined that large break loss of coolant accidents (LBLOCAs) and certain small break loss of coolant accidents (SBLOCAs) would require sump recirculation. It was also determined that sump operation would not be required for secondary system pipe breaks.

The break selection process identified the breaks that produce the maximum amount of debris and also the worst combination of debris with the possibility of being transported to the recirculation sump strainer. From Section 3.3.4.1, Item 7, of the SER, piping under 2 inches in diameter was excluded when determining the limiting break conditions.

LBLOCAs

As documented in Section 14.3 of the CNP UFSAR, LBLOCAs are defined as breaks having greater than a 1.0 ft^2 cross sectional area, which corresponds to a pipe with a 14 inch inside diameter (ID).

Flow diagrams associated with the RCS were reviewed to identify piping with an ID greater than or equal to 14 inches, directly attached to the RCS (up to the isolation point, i.e., the first normally closed manual isolation valve, second automatic isolation valve, or first check valve).

The review identified the following LBLOCA piping locations:

- 31 inch diameter RCS cross-over.
- 29 inch diameter RCS hot leg .
- 27.5 inch diameter RCS cold leg .
- 14 inch diameter pressurizer surge line.
- 14 inch diameter residual heat removal (RHR) system cooldown pipe to RCS Loop No. 2. This pipe contains a remotely operated isolation valve which is normally closed with all motive sources removed in accordance with CNP operating procedures. In this condition, the valve is considered to be passive, and was treated as an isolation boundary for this pipe.

SBLOCAs

As documented in Sections 14.3.2 and 14.3.9 of the CNP UFSAR, SBLOCAs are defined as the break of any RCS piping in excess of one centrifugal charging pump capacity (which corresponds to a break approximately 0.375 inches in diameter) but less than 1.0 ft^2 cross sectional area. Since SBLOCAs may not be isolable and may necessitate sump recirculation, they must be considered in evaluating debris generation. Consistent with the SER and the CNP UFSAR, only SBLOCA piping from 2 inches to 14 inches in diameter, up to the first isolation point, (as defined above under "LBLOCA") were included in this evaluation.

Review of flow diagrams associated with the RCS identified the following SBLOCA piping locations:

- 10 inch diameter RHR piping from the cold leg injection location inside the crane wall to the first accumulator check valve at each of the four RCS loops.
- 10 inch diameter safety injection (SI) system piping from the accumulator injection pipes near the cold legs, to the check valves near the cold legs.
- 6 inch diameter SI system, piping from hot legs inside the crane wall to check valves near the loop piping.
- 6 inch diameter pressurizer safety relief piping to the safety valves, located at the top of the pressurizer inside the pressurizer enclosure area. A break at this location would be mitigated by operator actions to cooldown, depressurize, and lower pressurizer level below the break location prior to recirculation being required. Therefore, analysis of this break was not required.

- 6 inch diameter piping between the pressurizer and the three pressurizer power operated relief valves (PORVs), located at the top of the pressurizer inside the pressurizer vault area. A break at this location would be mitigated by operator actions to cooldown, depressurize, and lower pressurizer level below the break location prior to recirculation being required. Therefore, analysis of this break was not required.
- 4 inch diameter pressurizer spray piping between the top of the pressurizer and RCS Loop 3 and Loop 4 cold legs piping inside the crane wall.
- 3 inch diameter chemical and volume control system (CVCS) letdown and charging piping from RCS Loop 1 and Loop 4 cold legs inside the crane wall to two CVCS check valves and one CVCS letdown line isolation valve inside the crane wall.
- 2 inch diameter CVCS piping from auxiliary pressurizer spray piping at the top of the pressurizer to a CVCS check valve inside the crane wall.
- 2 and 3 inch diameter RCS hot leg bypass piping from the discharge of the RCPs to the respective RCS loop hot leg resistance temperature detector manifold.
- 2 inch diameter RCS loop drain piping up to the first normally closed manual isolation valves.

Other HELB Scenarios

In addition to LOCAs, other HELB scenarios, i.e., secondary system pipe breaks, were evaluated to determine whether they would result in debris generation followed by the need for ECCS recirculation. As long as the RCS remains intact, decay heat removal via at least one steam generator (SG) will be possible. Therefore, analyses in the UFSAR do not explicitly describe a sequence of events that shows ECCS recirculation is reached for accidents or events other than LOCAs.

I&M also considered the potential need for recirculation to support containment heat removal following a secondary system pipe break. As described below, I&M determined that secondary system pipe breaks need not be evaluated for debris generation and transport because recirculation of containment spray would not be needed.

Section 14.3.4.1.3.2 and Section 14.3.4.4 of the UFSAR document an analysis of the containment response to the mass and energy release for postulated secondary pipe breaks inside containment. The analysis shows that containment spray from the RWST and the ice condenser provide initial mitigation of the overall mass and energy release. The analysis includes an assumption that only a single train of the CTS is operating. With only one CTS train in operation, the RWST would be available for over 60 minutes. With two CTS trains in operation, the RWST would be available for at least 30 minutes. The cases evaluated address various break sizes and initial power levels. In all evaluated cases, the analysis was terminated at approximately 10

minutes, with the analysis indicating that containment temperature and pressures would be significantly reduced and trending down. The basis for termination of the analysis was that the mass and energy release would have ended. With feed flow terminated to the faulted steam generator, no further energy release to containment would occur once the faulted steam generator is empty.

Based on this analysis, mitigation of the containment pressure transient does not require sump recirculation. Therefore, secondary system breaks were not assumed to result in containment sump recirculation and secondary system breaks were not included in the break selection process.

Exception(s) Taken to GR and SER for Break Selection

The only criteria in the GR and SER for which an exception was taken was the requirement in Section 3.3.5.2 of the SER that breaks be assumed to occur every five feet. Due to the small volume and configuration of the CNP ice condenser containment, the overlapping ZOIs that would result from this requirement essentially covered the same locations. The approach used for CNP was to determine the limiting debris generation locations (based on the ZOI) and then determine the break location that would provide this debris. This simplification of the process did not reduce the debris generation potential for the worst case conditions as described in Section 3.3 of the GR and the SER.

2. Debris Generation and ZOI (Excluding Coatings)

The debris generation evaluation consisted of two primary steps:

- Determine the ZOI in which debris is generated.
- Identify the characteristics (i.e., size distribution) of the destroyed debris.

The ZOI is the volume about the break in which the jet pressure is greater than or equal to the destruction damage pressure of the insulation, coatings, and other materials impacted by the break jet. Both the GR and the SER characterize the ZOI as spherical and centered at the break site or location. The radius of the sphere is determined by the pipe diameter and the destruction pressures of the potential target insulation or debris material. All potentially important debris sources (insulation, coatings, etc.) within the ZOI were evaluated in the CNP analysis.

Section 4 of the GR allowed for the development of target-based ZOIs using the destruction pressure of individual materials. Consistent with the GR, the CNP evaluation used multiple ZOIs at the specific break locations dependent upon the target debris. The destruction pressures and associated ZOI radii for common PWR materials were taken from Table 3-2 of the SER.

Materials for which applicable experimental data or documentation was unavailable were conservatively assumed to have the lowest destruction pressure adopted. That destruction pressure is equivalent to a ZOI of 28.6 times the diameter of the pipe break.

Robust barriers consisting of structures and equipment that are impervious to jet impingement were credited in the evaluation. These barriers included the primary shield wall, the refueling cavity walls, and the lower lateral restraints for the steam generators. In accordance with the guidance given in Section 3.4.2.3 of the SER, when a spherical ZOI extends beyond a robust barrier, the barriers may prevent further expansion of the break jet but they can also cause deflection and reflection. In the same section, the SER states that when a spherical ZOI extends beyond robust barriers such as walls or encompasses large components such as tanks and steam generators, the extended volume may be conservatively truncated. The SER also stipulates that "shadowed" surfaces of these components should be included in the analysis. These approaches were used in the CNP evaluation.

As stated above, the debris generation evaluation consisted of identifying a HELB location, establishing the corresponding ZOI, mapping the ZOI volume over the spatial layout of insulated piping, and calculating the volume of insulation and coatings within that ZOI. As discussed in the GR, a sufficient number of breaks in each high-pressure system that would result in recirculation should be evaluated to ensure the most limiting quantity of debris is generated and transported to the sump.

Consistent with the GR guidance, the following break categories were considered:

Break No. 1: Breaks with the largest potential for debris.
Break No. 2: Large breaks with two or more different types of debris.
Break No. 3: Breaks in the most direct path to the sump.
Break No. 4: Large breaks with the largest potential particulate debris to fibrous debris ratio by weight.
Break No. 5: Breaks that generate a "thin bed" (high amount of particulate with a 1/8 inch fiber bed)

There were several breaks within the RCS that had the potential to generate the largest quantity of debris. The following breaks were evaluated under the Break No. 1 category:

- 31 inch diameter RCS cross-over piping at the steam generator (LBLOCA).
- 29 inch diameter RCS hot leg piping at the reactor vessel nozzle (LBLOCA).
- 14 inch diameter pressurizer surge line (LBLOCA)

The 31 inch cross-over pipe enveloped all other breaks in that it generated the greatest amount of debris because of the break size and the resultant size of the ZOIs for the debris type. The cross-over pipe also is located near the steam generators and other RCS equipment that have a variety of insulation types.

The debris generated by the most limiting cases in the Break No. 1 category bound those in the Break No. 2 category because each of the breaks in the Break No. 1 category create at least two different types of debris. The sump is located inside the crane wall close to the RCS Loop 2 piping. A break in the Break No. 1 category at the cross-over pipe near the sump was specifically evaluated since it could provide the greatest potential for debris transport to the sump and could provide the greatest quantity of debris. The ice condenser containment design at CNP is essentially an open floor and is mostly un-compartmentalized inside the crane wall. There were no breaks postulated outside the crane wall since there is no susceptible piping in that area. Therefore the large breaks inside the crane wall bounded the small breaks with respect to debris transport. All four RCS loop breaks were analyzed to determine the maximum debris load.

The breaks in the Break No. 1 category also enveloped those in the Break No. 3 category since the RCS Loop 2 piping has the most direct path to the sump. The Break No. 4 category was included since it generates the largest insulation particulate debris combination of calcium silicate, Min-K and Marinite. Therefore, only Break categories 1, 4 and 5 were determined to be applicable and included in the analysis.

The results of the analysis determined that an RCS cross-over pipe break at the Loop 4 piping near the inlet to the RCP was the most limiting break location for generation and transport of debris to the sump.

The approach being taken for design basis debris generation is in accordance with the Alternate Evaluation methodology given in Chapter 6 of the GR and the SER. For mitigative capability, as defined in the GR and the SER, the Loop 4 cross-over break debris generation values are being used. For the debris generation break size (DGBS), the pressurizer surge line break debris generation is being used. In both of these cases, the calcium silicate insulation material governed the potential impact to the sump strainer.

Exception(s) Taken to the GR and SER for Debris Generation and ZOI

I&M does not anticipate taking any exceptions to the GR or the SER guidance regarding debris generation and ZOI except as described in the section titled "Break Selection" above.

3. Debris Characteristics (Excluding Coatings)

The actions taken to document and quantify the location and types of debris present in the CNP containments included:

- Review of existing insulation isometric drawings.
- Review of past maintenance job orders for activities performed that modified or replaced insulation.
- Confirmatory walkdowns of the Unit 1 containment in April 2005 to validate information obtained during the above reviews.

The results of these activities were compiled into a report used in performing the applicable analyses and evaluations. I&M plans to perform containment walkdowns to validate this information for Unit 2 during the Spring 2006 refueling outage.

The insulation types, general locations, and potential debris quantities that were used in the evaluations and analyses for CNP Unit 1 and Unit 2 are in the following tables: (Transco, DP, Marinite, Min-K, and Rubatex are brand names. RMI refers to reflective metallic insulation.)

UNIT 1							
Location in Containment	**Transco RMI**	**DP RMI**	**Cal-Sil**	**Fiber-glass**	**Marinite**	**Min-K**	**Rubatex**
Lower Containment – Inside Crane Wall – RCS Loop 1 Area	37,892 ft^2	11,910 ft^2	210 ft^3	0	0.94 ft^3	0	12 ft^3
Lower Containment – Inside Crane Wall – RCS Loop 2 Area	37,892 ft^2	13,915 ft^2	190 ft^3	0	0.94 ft^3	0.18 ft^3	13 ft^3
Lower Containment – Inside Crane Wall – RCS Loop 3 Area	37,892 ft^2	15,739 ft^2	219 ft^3	0	0.24 ft^3	0.08 ft^3	11 ft^3

UNIT 1							
Location in Containment	**Transco RMI**	**DP RMI**	**Cal-Sil**	**Fiber-glass**	**Marinite**	**Min-K**	**Rubatex**
Lower Containment – Inside Crane Wall – RCS Loop 4 Area	37,892 ft^2	12,132 ft^2	251 ft^3	0	0.24 ft^3	0	12 ft^3
Lower Containment – Inside Crane Wall – Pressurizer Area	150 ft^2	20,703 ft^2	117 ft^3	0	0	0	0
Reactor Cavity	19,792 ft^2	0	0	5 ft^3	0	0	0
Lower Containment Annulus Area – Outside Crane Wall	1,829 ft^2	6,319 ft^2	398 ft^3	212 ft^3	7.38 ft^3	0.80 ft^3	40 ft^3
Total	**173,339 ft^2**	**80,718 ft^2**	**1385 ft^3**	**217 ft^3**	**9.74 ft^3**	**1.06 ft^3**	**88 ft^3**

UNIT 2							
Location in Containment	**Transco RMI**	**DP RMI**	**Cal-Sil**	**Fiber-glass**	**Marinite**	**Min-K**	**Rubatex**
Lower Containment – Inside Crane Wall – RCS Loop 1 Area	0	41,465 ft^2	348 ft^3	0	5.8 ft^3	0	14 ft^3
Lower Containment – Inside Crane Wall – RCS Loop 2 Area	0	44,587 ft^2	326 ft^3	0	5.8 ft^3	0.18 ft^3	13 ft^3
Lower Containment – Inside Crane Wall – RCS Loop 3 Area	0	46,096 ft^2	352 ft^3	0	1.45 ft^3	0.08 ft^3	14 ft^3

UNIT 2							
Location in Containment	**Transco RMI**	**DP RMI**	**Cal-Sil**	**Fiber-glass**	**Marinite**	**Min-K**	**Rubatex**
Lower Containment – Inside Crane Wall – RCS Loop 4 Area	0	41,524 ft^2	401 ft^3	0	1.45 ft^3	0	13 ft^3
Lower Containment – Inside Crane Wall – Pressurizer Area	0	17,934 ft^2	121 ft^3	0	0	0	0
Reactor Cavity	19,802 ft^2	0	0	5 ft^3	0	0	0
Lower Containment Annulus Area – Outside Crane Wall	0 ft^2	220ft^2	556 ft^3	212 ft^3	14.75 ft^3	0.80 ft^3	48 ft^3
Total	**19,802 ft^2**	**191,826 ft^2**	**2104 ft^3**	**217 ft^3**	**29.25 ft^3**	**1.06 ft^3**	**102 ft^3**

CNP used the guidance contained in the GR for classifying destroyed insulation debris into two categories: small fines and large pieces. Small fines include individual fibers and small pieces less than 4 inches by 4 inches, and large pieces include material 4 inches and larger. I&M also used the recommended size distributions in Table 3-3, Section 3.4.3.3 of the SER for materials in a ZOI. An assumed maximum destruction, producing 100% fines, was used to conservatively estimate debris size for materials for which sufficient debris generation data was not readily available.

As previously stated in the response to Item 2(b), Cal-Sil insulation will be removed from the PRT and a portion of the pipe leading from the pressurizer relief and safety valves to the PRT. The values for this insulation are not included in the insulation debris tables provided above.

Exception(s) Taken to the GR and SER for Debris Characteristics

For the Baseline evaluation, no exceptions were taken to the GR or the SER. For refined analysis, I&M anticipates that exceptions will be taken with regard to the size distribution of calcium silicate insulation within the ZOI and the calcium silicate and Marinite insulation pieces that may be subjected to erosion within the transport pool. I&M plans to have testing performed to determine the appropriate size distribution to be used in the refined analysis. The results of this testing will be provided to the NRC in the June 30, 2006 update. Information from this testing will be coupled with that from testing performed by Ontario Power Generation, as identified in the GR and the SER. That testing provided information regarding the expected size distribution of Cal-Sil following a jet blast.

4. Latent Debris

I&M has elected to use a bounding value of 200 pounds-mass (lbm) for the amount of latent debris in containment. To qualify the use of that value, containment walkdowns were performed in Unit 1 during the Spring 2005 refueling outage to collect and quantify the existing latent debris. Subsequent to those walkdowns, a calculation was performed to conservatively quantify the latent debris that could exist in Unit 1. This calculation conservatively determined the debris loading to be approximately 175 lbm.

The walkdowns also determined that there were numerous unqualified vinyl labels in containment. As previously stated in the response to Item 2(b), the labels that could be exposed to a viable transport medium or path will be removed to the maximum extent possible. If any unqualified labels cannot be removed, then the total surface area of the remaining labels will be considered for potential contribution to the debris laden head loss across the sump strainers. No unqualified labels will be allowed to remain within a break location ZOI.

In addition to the unqualified labels, I&M plans to remove all qualified labels from within break location ZOIs, since the qualification process for the labels did not include consideration of the jet impingement effects from a high energy break.

The walkdowns also determined that fireproofing tape is applied where necessary to provide train separation for electrical components. This tape was assumed to fail within a ZOI as a result of jet impingement. The quantity of this tape was conservatively estimated based on after-walkdown review of photographs. Validation of the quantity used in the debris generation analysis will be confirmed during the Fall 2006 Unit 1 refueling outage.

Latent debris data for Unit 2 will be collected during a series of walkdowns during the Spring 2006 refueling outage. The data from these walkdowns will be validated against the assumptions used in the evaluations and analyses performed in support of resolution of this issue.

Exception(s) Taken to the GR and SER for Latent Debris

The methodology for establishing debris sample locations at CNP differed from that provided in Section 3.5 of the SER. The method used by I&M was to identify those areas not routinely cleaned as part of containment cleanliness efforts and obtain latent debris samples from those areas. There were also samples taken of areas that were potentially normally cleaned following an outage. The methods used for sample collection (masslin wipes, etc.) and debris characterization were consistent with those identified in the GR and the SER.

A detailed calculation was developed that used the samples to determine a worst case debris loading. To make this determination, conservative requirements were imposed on the calculation methodology. One of these requirements was that the oily debris samples collected beneath two of the RCPs would be assumed to exist on all vertical and horizontal surfaces in the cylinder that is formed from the lower portion of the RCP motor down to the loop compartment floor. Additionally, the diameter of this cylinder was increased to provide a larger surface area. This same oily debris was also assumed to exist on the horizontal and vertical surfaces associated with the polar crane trolley beam rails. Both of these locations have the potential to contain oily latent debris.

The remainder of the latent debris samples was assumed to exist at the location from which they were obtained, i.e., upper containment or lower containment, on all horizontal surfaces regardless of the component. The totals from each of these areas were then combined to determine the total debris loading. Although this approach differs from that stated in the SER, I&M considers it to be conservative in that it will tend to overestimate the quantity of latent debris.

5. Debris Transport

The methodology used in the debris transport analysis for the Baseline evaluation was based on the GR methodology for refined analyses as modified by Section 3.6 of the SER, as well as the refined methodologies suggested in Appendices III, IV, and VI of the SER. The specific effect of each mode of transport was analyzed for each type of debris generated, and a logic tree was developed to determine the total amount transported to the sump screen. The purpose of this approach was to break a complicated transport problem down into specific smaller problems that could be more easily analyzed.

The basic methodology used for the CNP Baseline transport analysis is described below:

- A three dimensional model of the CNP containment was built using computer aided design (CAD) software, based on design drawings.
- A review was made of the drawings and CAD model to determine transport flow paths. Potential upstream blockage points were addressed, including screens, fences, grating, drains, etc. that could lead to water holdup.
- Debris types and size distributions were obtained from the debris generation calculation for each postulated break location.
- The fraction of debris blown into the ice condenser was determined based on the flow of steam during the blowdown.
- The quantity of debris washed down by ice melt and spray flow was conservatively determined.
- The quantity of debris transported to inactive areas or directly to the sump screen was calculated based on the volume of the inactive and sump cavities proportional to the water volume at the time these cavities would be filled.
- Using conservative assumptions, the locations of each type and size of debris at the beginning of recirculation was determined.
- A CFD model was developed to simulate the flow patterns that would occur during recirculation.

  - The mesh in the CFD model was nodalized to sufficiently resolve the features of the CAD model, but keep the cell count low enough for the simulation to run in a reasonable amount of time.
  - The boundary conditions for the CFD model were set based on the CNP configuration during the recirculation phase.
  - The ice melt and containment spray flows were included in the CFD calculation with the appropriate flow rate and kinetic energy to accurately model the effects on the containment pool.
  - At the postulated LOCA break location, a mass source was added to the model to introduce the appropriate flow rate and kinetic energies associated with the break flow.
  - A negative mass source was added at the sump location with a total flow rate equal to the sum of the spray flow and break flow.
  - An appropriate turbulence model was selected for the CFD calculations.
  - After running the CFD calculations, the mean kinetic energy was checked to verify that the model had been run long enough to reach steady-state conditions.
  - Transport metrics were determined based on relevant tests and calculations for each significant debris type present in the containment.

- A graphical determination of the transport fraction of each type of debris was made using the velocity and turbulent kinetic energy profiles from the CFD model output, along with the determined initial distribution of debris.
- The recirculation transport fractions from the CFD analysis were gathered for input into the logic trees.
- The quantity of debris that could experience erosion due to the break flow, spray flow, or ice melt drainage was determined.
- The overall transport fraction for each type of debris was determined by combining each of the previous steps in logic trees.

The CFD calculation for recirculation flow in the CNP containment pool was performed using the Flow-3D® Version 8.2 program. The CFD used a minimum sump level of 5.9 ft above the floor of the volume inside the crane wall, also referred to as the loop compartment. This sump level occurs following the switchover to recirculation (at which time the pool depth is greater than the 5.9 ft level) as a result of flow through openings in the primary shield wall into the reactor cavity. For information, the loop compartment floor elevation is 598 ft, 9-3/8 inch. The approach curb to the sump is 7 inches high. The top of the screen area is at the 603 ft, 11-3/8 inch elevation (5.17 ft above the floor).

Based on the results of the debris generation analysis, the worst case break location was determined to be a break in the cross-over pipe of RCS Loop 4 (farthest break from the sump) due to a much larger quantity of Cal-Sil debris generated by a break at that location than at any of the other break locations. Since the transport fraction for Cal-Sil fines was expected to be near unity, and Cal-Sil is a problematic insulation in terms of head loss, a break in the cross-over pipe of RCS Loop 4 was also determined to be the worst case combination of debris generation and transport. Since the transport of RMI debris from this location is likely to be lower than other locations, and since a break in RCS Loop 2 would produce the most turbulence, CFD calculations were run for both RCS Loop 2 and RCS Loop 4 to conservatively bound the transport of all debris types and sizes.

Tables 1 through 4 summarize the CNP debris transport results for the five LBLOCA cases analyzed:

Case 1—a break in the Loop 1 cross-over pipe,
Case 2—a break in the Loop 2 cross-over pipe,
Case 3—a break in the Loop 3 cross-over pipe,
Case 4—a break in the Loop 4 cross-over pipe, and
Case 5—an RCS break in the reactor cavity.

The percentages shown are the fractions of the total quantity (fines, small pieces, and large pieces) of each type of debris generated that would reach the sump screen.

For Case 4, besides the RMI debris shown to settle in the pool, an additional 333 ft^2 of RMI would be trapped by the sump curb.

Table 1 – Cases 1 and 3 Overall Debris Transport Fractions

Debris Type	Debris Transport Fraction
Stainless Steel RMI	49%
Min-K™	92%
Cal-Sil and Marinite	92%
Epoxy Paint (inside ZOI)	92%
Epoxy Paint (outside ZOI)	100%
Inorganic Zinc Paint (outside ZOI)	100%
Alkyd Paint (outside ZOI)	100%
Dirt and Dust	100%
Latent Fiber	89%

Table 2 – Case 2 Overall Debris Transport Fractions

Debris Type	Debris Transport Fraction
Stainless Steel RMI	49%
Min-K™	92%
Cal-Sil and Marinite	92%
Epoxy Paint (inside ZOI)	92%
Epoxy Paint (outside ZOI)	100%
Inorganic Zinc Paint (outside ZOI)	100%
Alkyd Paint (outside ZOI)	100%
Dirt and Dust	100%
Latent Fiber	89%

Table 3 – Case 4 Overall Debris Transport Fractions

Debris Type	Debris Transport Fraction
Stainless Steel RMI	9%
Min-K™	92%
Cal-Sil and Marinite	92%
Epoxy Paint (inside ZOI)	92%
Epoxy Paint (outside ZOI)	100%
Inorganic Zinc Paint (outside ZOI)	100%
Alkyd Paint (outside ZOI)	100%
Dirt and Dust	100%
Latent Fiber	89%

Table 4 – Case 5 Overall Debris Transport Fractions

Debris Type	Debris Transport Fraction
Stainless Steel RMI	49%
Owens Corning Fiberglass	89%*
Epoxy Paint (inside ZOI)	100%
Epoxy Paint (outside ZOI)	100%
Inorganic Zinc Paint (outside ZOI)	100%
Alkyd Paint (outside ZOI)	100%
Dirt and Dust	100%
Latent Fiber	89%

* This value is currently being re-evaluated. The fiberglass is in the reactor cavity and would most realistically remain in the cavity with only a small amount carried over once the cavity fills above the overflow wall, which is approximately 6 ft above the assumed recirculation pool level.

The information presented above represents the debris transport that would have to be considered for mitigative capability as defined in Section 6.1 of the SER.

The debris transport analysis, including the CFD, has not yet been completed for the DGBS in support of the Alternate Evaluation methodology given in Chapter 6 of the GR and the SER. Completion of the analysis is contingent upon final determination of the total strainer screen area for both strainers. The results of the completed analysis will be included in the previously committed update scheduled for June 30, 2006.

One of the approaches that will be explored as part of the DGBS evaluation is consideration of a passive "sacrificial" strainer concept. Since I&M will be modifying the existing recirculation sump strainer (increasing its effective screen area from approximately 85 ft^2 to approximately 740 ft^2), and installing a new remote strainer (greater than 1260 ft^2) in the annulus area between the crane wall and containment wall, the hydraulics associated with the installation may lend itself to the "sacrificial" passive strainer concept.

Since the majority of the debris is generated and transported to the volume of containment inside the crane wall, the preferential transport of that debris will be toward the strainer in this volume. As this strainer starts to load up with debris, the remote strainer, which will have a design head loss associated with its connecting piping, will then start supplying more of the water to the ECCS and CTS. As water starts to flow from the volume inside the crane wall to the volume outside the crane wall, the currently planned debris interceptors in conjunction with the currently installed design curbs and debris interceptors, with an expected low velocity transport flow, should result in a significantly reduced debris fraction reaching the remote strainer. As the remote strainer starts to load with debris, there will be a proportional flow redistribution between the two strainer locations. Since the majority of the debris will be in the volume inside the crane wall, it is expected that the strainer outside the crane wall will remain in a nearly "clean strainer" condition. These assumptions will be validated, and updated information regarding this approach will be provided in the June 30, 2006 update.

<u>Exception(s) Taken to the GR and SER for Debris Transport</u>

As previously discussed in the debris generation section, I&M plans to perform testing to determine the transport capability of Cal-Sil and Marinite fragments, and their potential for erosion in a transport pool flow stream. This phenomena may reduce the transport predicted by the analysis. Additionally, based on final design and location of the sump strainers, the concept of a completely passive sacrificial strainer was not reviewed or discussed in the GR or SER.

I&M plans to use the results, when issued, of the Electric Power Research Institute (EPRI) testing performed for unqualified materials in accordance with Reference 6. Based on the expected very low transport and approach velocities, consideration is being given to determining the fraction of unqualified coatings that could fail as chips that would, via a Stokes settling velocity determination, settle out in the transport pool prior to reaching the sump strainer. This value would be conservatively derived based on an assumption that 100% of the coatings would fail. No credit would be taken for those coatings that remained intact during the testing. The other consideration that would be taken is the point of introduction into the sump pool. If a Stokes evaluation predicted that the coating chip would settle, the entrance point to

the pool would be factored in to account for a potential non-direct settling potential. This will not be known until the EPRI report is available and the ongoing evaluations near completion. Final information for both of these items will be included in the June 30, 2006 update.

6. Coatings Evaluation

Consistent with Sections 3.4.3.3.3 and 3.4.3.3.4 of the GR, qualified and unqualified coatings within the coating ZOI were assumed to fail and all unqualified coatings outside the coating ZOI were assumed to fail. Based on recommendations in the associated SER, all coatings inside and outside the ZOI were assumed to fail as 10 micron spherical particles. EPRI is currently testing unqualified coating systems to determine debris characteristics. This EPRI data may be used when the information becomes available. If I&M elects to use this data, the manner in which it is used will be described in the June 30, 2006 update. In accordance with the GR, unqualified coatings that are under intact insulation were not considered to fail.

The ZOI for qualified coatings that was assumed for CNP is 5 times the diameter of the pipe break (referred to as a 5D ZOI). The Utilities Service Alliance has contracted with Westinghouse to have qualified coatings tested under two phase flow conditions to determine appropriate ZOI for assuming that 100% of the coatings will fail. I&M is one of the utilities participating in this effort and has initiated a contract for Westinghouse to perform this testing. Qualified coatings will be tested under two phase flow conditions to determine appropriate ZOI for assuming that 100% of the coatings will fail. It is expected that the results of this testing will support the 5D ZOI assumed for the generation of qualified coatings debris. A sensitivity case for head loss determination will also be made for a 10D ZOI to identify and quantify the differences between the two head loss effects.

The following table presents a summary of the distribution of unqualified coatings in containment at CNP:

Unqualified Containment Coatings (ft^2)

Location	Unit 1	Unit 2
Lower Containment	1246	1263
Upper Containment	1748	1752
Annulus	1584	1236
Total	4578	4251

The value for Unit 1, 4578 ft^2, was used for the bounding evaluations and analyses.

Exception(s) Taken to the GR and SER for Coatings Evaluation

As previously described in the section discussing debris transport, an exception to the GR and SER may be taken with regard to size of the debris caused by failure of unqualified coatings, based on data from planned EPRI testing. Additionally, an exception to the GR and SER Section 3.4.2.1 regarding the qualified coatings ZOI is being taken based on the results of planned confirmatory testing. These exceptions will be discussed further in the June 30, 2006 update.

7. Head Loss

The head loss evaluation performed for CNP is currently in draft status. The draft evaluation used the HLOSS program identified in Appendix V of the SER, and was performed in accordance with the recommendations of the GR and the SER. The head loss evaluation considered five different break scenarios, including the DGBS described in Chapter 6 of the GR and the SER. For all head loss evaluations, a 5D ZOI was used for qualified coatings. The inputs for the head loss evaluation came from the debris generation and transport analyses described above.

For the limiting double ended guillotine break (DEGB) at the Loop 4 cross-over pipe, the limiting debris constituent was determined to be Cal-Sil. The draft head loss evaluation determined that the recommended minimum flat plate strainer size necessary to prevent formation of a Cal-Sil thin bed of 1/16 inch is 4570 ft^2. Since the draft head loss evaluation is based on the NUREG/CR 6224 (Reference 7) correlations and information available regarding the behavior of Cal-Sil on a flat plate, sump strainer vendor testing will be performed to determine the impact of CNP-specific debris on strainer head loss. Preliminary information from a potential vendor indicates that the actual advance design strainer size required for this quantity of Cal-Sil could be reduced to approximately 1830 ft^2. This will be validated by the planned testing, which will be performed at the strainer vendor's facility using CNP-specific debris mix and sump pool parameters.

For the DGBS at the pressurizer surge line, the limiting debris constituents are Cal-Sil combined with latent fibers. For this break size, assuming both trains of ECCS and CTS are in service, the draft head loss evaluation determined the minimum flat plate strainer size to prevent formation of a uniform 1/16 inch Cal-Sil thin bed to be 1420 ft^2. For all of the cases analyzed in the head loss evaluation, the assumption was made that the maximum screen area for the sump strainers was 2000 ft^2.

The maximum predicted head loss for the DGBS was 8.17 ft. I&M expects that the site-specific sump strainer testing described above will demonstrate this value to be

overly conservative. Additional information regarding the head loss determination will be provided in the June 30, 2006 update.

Exception(s) Taken to the GR and SER for Head Loss

There were no specific exceptions taken to the completion of the head loss analysis as described in the GR and SER.

8. Chemical Effects

Since there have not been any tests that adequately model the CNP accident sequence and sump pool chemistry, I&M will perform site-specific chemical effects testing to validate a minimal impact assumption. I&M anticipates that this testing will confirm that chemical effects in the sump pool would not have a significant impact to sump strainer head loss. I&M's overall approach will provide substantial margin to account for any unexpected impact of the chemical test results. This margin is provided by:

Use of Alternate Evaluation Methodology

Use of the Alternate Evaluation methodology has tentatively determined that the minimum flat plate screen size necessary to assure acceptable head loss is as previously stated, 1420 ft^2. Since I&M expects that actual strainer testing will further reduce the required screen area and the planned advanced design strainer installation surface area is expected to be 2000 ft^2 or greater, the planned design is expected to provide a greater than 40% margin, not including the margin provided by the advanced design.

As required for the use of the Alternate Evaluation criteria, I&M will also demonstrate the mitigative capability of the planned strainer size for the debris that would be generated for the limiting DEGB. The calculated flat plate strainer size required to mitigate the limiting DEGB is currently estimated at 4570 ft^2. I&M expects that site-specific debris sump strainer testing will demonstrate a significant reduction to approximately 1830 ft^2. However the DEGB minimum required strainer size will still be significantly larger than the DGBS minimum required strainer size. The difference between the minimum required strainer sizes represents margin available to cope with unknown effects, including chemical effects.

Sump Strainer Design Locations

As previously described, I&M currently plans to increase the surface area of the existing sump strainer (inside the crane wall) and install a larger, remote strainer in a low debris area of the containment (outside the crane wall). The remote

strainer will have a design head loss associated with it that will hydraulically force the initial, highly debris laden, water flow to the existing strainer. This will minimize the quantity of debris available to be transported to the remote strainer, thus providing available margin for unknown effects, including chemical effects.

Industry and NRC Sponsored Integrated Chemical Effects Test Program

In a collaborative effort, the NRC and the nuclear industry developed an integrated chemical effects test (ICET) program. The testing characterizes chemical reaction products, including possible gelatinous materials, which may develop in a representative plant post-LOCA PWR environment. ICET program Test Number 5 has recently concluded (August 25, 2005). A visual, qualitative evaluation performed of the test loop, material samples, and debris accumulation determined that those plants that use Sodium Tetraborate as a pH buffering agent (such as CNP) do not experience significant chemical constituent formation that could lead to significant impact to sump strainer head loss. Since CNP also uses NaOH during the injection phase of the accident, and has Cal-Sil as the predominant interacting debris source, this determination also requires consideration of ICET program Test Number 4 that used NaOH with Cal-Sil. Based on the general observations of ICET 4, the potential for chemical constituents to significantly impact sump head loss does not appear to be a significant concern for CNP. I&M plans to perform site-specific chemical effects testing to demonstrate that significant margin is not necessary for dealing with chemical effects.

Required Flow Rates and Available Sump Pool Level

Following a DEGB or DGBS, the flow required to maintain the necessary core cooling decreases significantly after about the first 24 hours of the event. This allows for a significant reduction from the flow that is assumed to be creating the head loss across the strainer. As the flow decreases, the head loss also decreases, thus minimizing the impact of a debris laden strainer. For CNP, the minimum sump level assumed is 5.9 feet above the containment floor (which occurs approximately 10 hours after the event). At the time of switchover from the injection phase to the recirculation phase, the level is calculated to be 7.5 feet. After approximately 10 hours, the sump pool level begins to increase again. The sump pool level will continue to increase since there is more than about 1.3 million pounds of ice remaining in the ice condenser which will continue to melt. This will result in a substantial increase in sump pool level, resulting in an equivalently significant increase in available NPSH for the operating ECCS and CTS pumps.

Exception(s) Taken to the GR and SER for Chemical Effects

At this time, I&M does not expect to take any exceptions to the GR and SER recommendations regarding chemical effects. I&M will provide additional information on the potential impact of chemical effects in the June 30, 2006 update.

9. Upstream Effects

I&M previously performed an upstream effects evaluation to determine flow paths, hold up volumes, and restricted flow areas. This evaluation was performed as part of the resolution of a SBLOCA recirculation sump capability issue, and was submitted to the NRC in support of License Amendment Nos. 234 and 217 (Reference 8) to the CNP Unit 1 and Unit 2 operating licenses, respectively.

In accordance with the guidance in the GR and the SER, I&M reviewed the previous evaluation and determined that there were two potential upstream effects that required resolution. These effects are the potential blockage of floor drains in the Unit 1 and Unit 2 CEQ fan rooms and the potential blockage associated with the drainage of the Unit 2 CEQ fan room drains to the lower containment sump. These potential upstream effects conditions will be resolved by the modifications described in the response to NRC Requested Item 2(b).

Exception(s) Taken to the GR and SER for Upstream Effects

At this time, I&M does not expect to take any exceptions to the GR or the SER recommendations regarding upstream effects.

10. Downstream Effects

As previously described in Item 2(a) above, a downstream effects evaluation has been performed for CNP. Review and acceptance of the downstream effects evaluation is in progress. However, the results described below are not expected to change significantly.

The methodology used for performing this evaluation was in accordance with the recommendations and guidance contained within the GR and the SER, and WCAP-16406-P (Reference 5). The approach used in this evaluation was:

- Identify the ECCS and CTS flow paths, including all intervening components, that are required following a LOCA and subsequent transfer to recirculation.

- Calculate the quantity of debris that would be expected to pass through the strainer based on the expected sump strainer screen opening of less than or equal to 1/8 inch.
- Determine the characteristics of the debris that was determined to pass through the strainer.
- Evaluate the previously identified flow path components to determine if they could potentially become blocked as a result of the debris in the ECCS or CTS fluid.
- Evaluate the potential wear of critical components to determine if their design basis functions could be maintained for the required mission time of 30 days.

The blockage evaluation determined that there are no required components or flow paths that are susceptible to blockage by debris downstream of the sump strainer. The wear evaluation determined that the backup seals installed on the ECCS pumps could potentially be impacted by abrasive wear from the debris laden fluid. However, since the backup seal is not relied upon for mitigation of a passive failure of the primary seal, modification or replacement of the seal is not necessary. The CTS pumps have a different seal design. The status and results of the downstream effects evaluation will be provided in the June 30, 2006 update.

Exception(s) Taken to NEI the GR and SER for Downstream Effects

I&M does not expect to take any exceptions to the GR or the SER recommendations regarding downstream effects.

Requested Information Item 2(d)

The submittal should include, at a minimum, the following information:

(i) The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked sump screen.

Response

The NPSH available ($NPSH_A$) and NPSH required ($NPSH_R$) are provided below:

	RHR Pumps	CTS Pumps
$NPSH_A$ (ft)	26.21	28.73
$NPSH_R$ (ft)	18.78	14.5
NPSH Margin (ft)	**7.43**	**14.23**

(ii) The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of the switchover to sump recirculation.

Response

The design sump screen area following planned modifications has not been finalized. The expected minimum sump strainer screen area will be 2000 ft^2 or greater. The final design will ensure that, for each of the conditions requested, 100% of the sump screen area will be submerged.

(iii) The maximum head loss postulated from debris accumulation on the submerged sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitants caused by chemical reactions in the pool.

Response

The containment thermal and chemical contribution to head loss will be determined as described in the response to Item 2(c), discussion of Item 8, "Chemical Effects." As described in the response to Requested Information Item 2(c), discussion of Item 7, "Head Loss," the maximum predicted head loss for the DGBS is 8.17 ft. As also described in that response, the principal constituents that contribute to this head loss are Cal-Sil insulation and latent debris fibers.

(iv) The basis for concluding that the water inventory required to ensure adequate ECCS or CSS recirculation would not be held up or diverted by debris blockage at choke-points in containment recirculation sump return flowpaths.

Response

As described in response to Requested Information Item 2(a) and Item 2(c), discussion of Item 9, "Upstream Effects," an extensive evaluation of the containment recirculation sump return flowpaths was previously performed. This evaluation was performed during the CNP extended shutdown in 1997 to 2000 to support closure of issues associated with the volume of water in containment needed for the recirculation function. This evaluation has been supplemented by additional reviews. These additional reviews have identified the need to provide debris interceptors (trash racks or screens) for the floor drains in the CEQ fan rooms and provide an opening in

the Unit 2 lower containment sump enclosure to ensure that containment spray runoff water that enters the CEQ fan rooms can return to the recirculation sump.

The refueling canal drains have been determined not to be potential blockage points for returning containment spray runoff to the sump pool. CNP has three drain lines. Two of the drain lines are 12 inch diameter and one is 10 inch diameter. Calculations have determined that any two of these three drains are fully capable of passing the necessary flow to return containment spray runoff to the sump pool.

(v) The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g., a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen, or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface.

Response

As previously described in response to Requested Information Item 2(a) and Item 2(c) discussion of Item 10, "Downstream Effects," a downstream effects evaluation has been performed for CNP. Although review and acceptance of this evaluation is in progress, the results are not expected to change. The evaluation determined that there are no areas where blockage would develop which could result in an inadequate core cooling or containment cooling condition. These evaluations were based on a maximum sump strainer screen opening diameter of 1/8 inch, which is consistent with the planned modifications described in the response to Requested Information Item 2(a). The modification design will ensure that there are no openings or gaps in the strainer larger than 1/8 inch. Additionally, the inspections necessary to ensure continuing compliance with this requirement will be established.

(vi) Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids.

Response

As described in the response to Requested Information Item 2(a) and Item 2(c), discussion of Item 10, "Downstream Effects," a downstream effects evaluation has determined that the ECCS and CTS components are not susceptible to blockage for the stated mission time of 30 days with debris-laden fluids, and will not exhibit excessive wear from this debris-laden fluid.

(vii) Verification that the strength of the trash racks is adequate to protect the debris screens from missiles and other large debris. The submittal should also provide verification that the trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions.

Response

A leak-before-break (LBB) analysis of the RCS loop piping was approved for CNP in Reference 9. Therefore structures, systems, and components (e.g., the existing recirculation strainer and the planned new recirculation strainer) need not be protected against dynamic effects, including the effects of missiles, pipe whip, and discharging fluids, that may result from failure of the RCS loop piping.

The recirculation sump is a continuously vented design. Therefore, the maximum hydraulic load that could be imposed on the strainer is that force equivalent to a height of water of approximately 15 feet. This height is the maximum predicted flood elevation of slightly less than 614 feet, minus the elevation of the lowest point on the existing and planned strainers, 599 feet 4 3/4 inches. The strainer designs will be able to meet this maximum loading, with substantial margin.

CNP's current licensing basis requires that any equipment that is installed in containment, whether it is safety related or non-safety related, must demonstrate that its installation would not result in a safety related structure, system, or component being impacted by a failure of that component. One of the methods used to maintain this compliance is that the installed items demonstrate compliance with Seismic Class I requirements. The planned sump strainer will be designed and installed to meet seismic requirements applicable to CNP. Finally, the calculated transport velocity in the sump pool is sufficiently low that any debris of neutral buoyancy would not impact the strainer with enough force to cause damage.

(viii) If an active approach (e.g., backflushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses.

Response

I&M does not plan to install an active strainer design.

Requested Information Item 2(e)

A general description of and planned schedule for any changes to the plant licensing bases resulting from any analysis or plant modifications made to ensure compliance with the regulatory requirements listed in the Applicable Regulatory Requirements section of this generic letter. Any licensing actions or exemption requests needed to support changes to the plant licensing basis should be included.

Response

I&M has identified the following potential changes to the plant licensing bases and potential license amendments that may result from the analyses or plant modifications made to ensure compliance with the applicable regulatory requirements.

- A potential license amendment to change the Technical Specification (TS) Surveillance Requirement (SR) that requires verification, by visual inspection, that each ECCS train containment sump suction inlet is not restricted by debris, and that the suction inlet trash racks and screens show no evidence of structural distress or abnormal corrosion. This SR may be changed to recognize the planned modifications once the design of these modifications are final.

- A potential licensing basis change to UFSAR Section 6.1 to establish the Alternate Evaluation methodology as the sump strainer design basis criteria for mitigating the effects of a design basis LOCA.

- A potential licensing basis change to UFSAR Section 6.1 to eliminate the overly conservative assumption of a -1.5 pound per square inch-gauge (psig) containment pressure penalty that is currently used for establishing the available NPSH for the ECCS and CTS pumps.

- A potential licensing basis change to UFSAR Section 6.2.2 to reflect potential modifications to the lower containment sump, which is adjacent to the recirculation sump.

I&M will continue to evaluate the need for a license amendment and licensing basis changes as the associated analyses and modifications are finalized. I&M will complete these evaluations and submit any required license amendment requests by December 31, 2005.

Requested Information Item 2(f)

A description of the existing or planned programmatic controls that will ensure that potential sources of debris introduced into containment (e.g., insulations, signs, coatings, and foreign materials) will be assessed for potential adverse effects on the ECCS and CSS recirculation functions. Addressees may reference their responses to GL 98-04, "Potential for Degradation of the Emergency Core Cooling System and the Containment Spray System after a Loss-of-Coolant Accident Because of Construction and Protective Coating Deficiencies and Foreign Material in Containment," to the extent that their responses address these specific foreign material control issues.

Response

Although a significant effort was undertaken, during the 1997 to 2000 extended shutdown, to establish programmatic controls to ensure that potential sources of debris introduced into containment were assessed for possible adverse effects on the ECCS and CTS recirculation functions, I&M will review and revise as necessary the following programs and procedures:

- Engineering design specifications and standards will be reviewed to ensure that the necessary controls exist to prevent introduction of materials into containment unless the required evaluations have been completed. Existing specifications will be reviewed to ensure that there are no provisions that would allow circumvention of containment criteria considerations. These changes will also include reinforcing the existing criteria for selection of materials inside containment to include the information learned from industry experience regarding recirculation sump blockage issues.

- Plant change processes and procedures will be reviewed to ensure the necessary controls and evaluation tools are provided to prevent actions contrary to the intent or outcome of the analyses and evaluations described in this attachment. This will provide a systematic approach for the change management processes to ensure the correct and necessary evaluations are performed when considering a change to the plant that either directly or indirectly affects containment, ECCS or CTS.

- Maintenance planning and work control procedures and processes will be reviewed to ensure:

  Necessary links are established to design requirements to provide the job planners with the tools necessary to correctly plan work activities associated with containment, ECCS, and CTS.

The current requirements for performing work in containment while the unit is operating include provisions for obtaining engineering evaluations for complex evolutions.

Links to containment inspection requirements are included in job planner's guides to ensure the necessary information is provided in the work packages for implementation in the field.

- Containment inspection and surveillance procedures and processes will be reviewed to ensure:

  Procedures for containment access and containment closeout contain the necessary controls to ensure that containment will remain in a configuration that fully supports the inputs and assumptions associated with the analyses and design changes described in the responses to Requested Information Items 2(a) and 2(c).

  Procedures for containment inspections contain the necessary attributes to ensure the inputs and assumptions associated with analyses and design described in the responses to Requested Information Items 2(a) and 2(c) are maintained. This includes attributes such as coatings, insulation, and latent debris.

- Containment coatings inspection and evaluation procedures will be reviewed to ensure:

  The inspection procedure provides direction that each location of degraded or questionable condition of qualified or non-qualified coatings be promptly entered into the CNP corrective action program.

  Engineering evaluations are performed for each coating discrepancy to establish the extent of condition of the identified failure, and the probable cause for the failure.

  Engineering determines the necessary additional evaluations that may be necessary to fully bound the extent of condition of each coating discrepancy, including, as appropriate, performance of expanded visual coatings inspections and performance of pull tests or cross-hatch tests.

  Personnel performing initial coating visual inspections or extent-of-condition visual inspections be qualified to the applicable ANSI requirements.

  Identified degraded or questionable coatings are remediated prior to plant heat up following a refueling or maintenance outage. This remediation may include

recoating the affected area with a qualified coating system, or removal of the degraded or questionable condition coatings to a sound and tightly adhered area.

Applicable controlled documents will be changed to include the information that was used as design input for the analyses and modifications described in the responses to Requested Information Items 2(a) and 2(c). Examples of the types of information that will be documented and the planned methods of maintaining this information are:

- An insulation drawing database will be maintained to ensure that maintenance activities do not change the analysis and modification input assumptions without an appropriate engineering evaluation.

- The debris generation, debris transport, and head loss analyses inputs and assumptions will be documented in an approved engineering document or database (subject to the requirements of 10CFR50 Appendix B) to facilitate evaluation of conditions that may be contrary to analysis and modification input assumptions, and to ensure that future changes to the plant can be readily evaluated against these design and licensing basis criteria.

- The inputs and assumptions for the upstream and downstream effect analyses will be captured in an approved engineering document or database to facilitate evaluation of conditions that may be contrary to these inputs and assumptions, and to ensure that future changes to the plant can be readily evaluated against these design and licensing basis criteria.

The programmatic, process, and procedural changes described above will be implemented in stages as previously described in response to item 2(b).

References for this Attachment

1. NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," dated September 13, 2004 (ML042360586).

2. Letter from D. P. Fadel, Indiana Michigan Power Company (I&M), to U. S. Nuclear Regulatory Commission (NRC) Document Control Desk, "90 Day Response to Nuclear Regulatory Commission Generic Letter 2004-02: Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized-Water Reactors," AEP:NRC:5054-04, dated March 4, 2005 (ML050750069).

3. Nuclear Energy Institute report NEI 04-07, "Pressurized Water Reactor Sump Performance Methodology," dated December 2004.

4. Nuclear Energy Institute report NEI 02-01, "Condition Assessment Guidelines: Debris Sources Inside PWR Containments," dated September 2002.

5. Westinghouse document WCAP-16406-P, "Evaluation of downstream Sump Debris Effects in Support of GSI-191," dated June 2005.

6. EPRI Report "Analysis of Pressurized Waters Reactor Unqualified Original Equipment Manufacturers Coating," dated March 2005.

7. NUREG/CR 6224, "Parametric Study of the Potential for BWR ECCS Strainer Blockage Due to LOCA Generated Debris," Final Report Dated October 1, 1995.

8. Letter from J. F. Stang, NRC, to R. P. Powers, I&M, "Issuance of Amendments – Donald C. Cook Nuclear Plant, Units 1 and 2 (TAC Nos. MA6766 and MA6767)," dated December 13, 1999.

9. Letter from S. A. Varga, NRC, to J. Dolan, I&M, issuing License Amendment No. 76 to Facility Operating License No. DPR-74 and Safety Evaluation the I&M responses to Generic Letter 84-04, dated November 22, 1985.

ATTACHMENT 2 TO AEP:NRC:5054-11

REGULATORY COMMITMENTS

The following table identifies those actions committed to by Indiana Michigan Power Company (I&M) in this document. Any other actions discussed in this submittal represent intended or planned actions by I&M. They are described to the Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

Commitment	Date
I&M will complete the final acceptance reviews of the Westinghouse summary report.	December 31, 2005
I&M will complete evaluations and submit any required license amendment requests.	December 31, 2005
An update to this response will be submitted to the NRC. The update will include the following: The status and results (if available) of analyses supporting debris transport using the planned strainer and other hardware modifications The status and results (if available) of sensitivity for various debris and transport scenarios. The status and results (if available) of vendor specific testing of the sump strainer using Donald C. Cook Nuclear Plant (CNP) specific debris mix The status and results (if available) of chemical effects testing using CNP-specific materials. The results of testing to determine the appropriate size distribution of calcium silicate insulation within the zone of influence (ZOI) and the size distribution of the calcium silicate and Marinite insulation pieces that may be subjected to erosion within the transport pool. The results of the completed debris transport analysis, including the computational fluid dynamics analysis, for the debris generation break size in support of the Alternate Evaluation methodology	June 30, 2006

Commitment	Date
given in Chapter 6 of the Nuclear Energy Institute Guidance Report (GR) and the associated NRC Safety Evaluation Report (SER). Information on validation of assumptions regarding proportional flow distribution between the strainer inside the crane wall and the strainer outside the crane wall. Whether the results of Electric Power Research Institute (EPRI) testing performed for unqualified materials will be used to determine the fraction of unqualified coatings that could fail as chips that would, via a Stokes settling velocity determination, settle out in the transport pool prior to reaching the sump strainer. Whether the entrance point of a coating chip into the pool will be factored in to account for a potential non-direct settling potential. The manner in which data from EPRI testing of unqualified coating systems will be used to determine debris characteristics. Additional information pertaining to a potential exception to the GR and SER regarding the size of the debris caused by failure of unqualified coatings, based on data from EPRI testing. Additional information pertaining to a potential exception to the GR and SER regarding the qualified coatings ZOI based on the results of planned confirmatory testing. Additional information regarding the head loss determiniation. Additional information on the potential impact of chemical effects. The status and results (if available) of the downstream effects evaluation.	

Commitment	Date
A final response will be submitted to the NRC to provide a final status of actions requested by Generic Letter 2004-02.	December 31, 2007