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AEP:NRC:6054-06
10 CFR 50.54(f)

Docket No: 50-315

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

Donald C. Cook Nuclear Plant Unit 1
REQUEST FOR EXTENSION OF COMPLETION DATE FOR UNIT 1 ACTIONS IN RESPONSE TO GENERIC LETTER 2004-02, "POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON EMERGENCY RECIRCULATION DURING DESIGN BASIS ACCIDENTS AT PRESSURIZED WATER REACTORS"

References:

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).

3. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Nuclear Regulatory Commission Generic Letter 2004-02 - Information Requested by September 1, 2005," AEP:NRC:5054-11, dated August 31, 2005 (ML052510512).

4. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Nuclear Regulatory Commission Generic Letter 2004-02 – Revision of Commitments" AEP:NRC:5054-14, dated December 19, 2005 (ML060030459).

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5. SECY-06-0078, from L. A. Reyes, NRC Executive Director for Operation, to NRC Commissioners, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris accumulation on PWR Sump Performance,' " dated March 31, 2006 (ML053620174).

This letter requests an extension of the completion date for activities needed for final resolution of recirculation sump related issues in Donald C. Cook Nuclear Plant (CNP) Unit 1.

By Generic Letter 2004-02 (Reference 1), the Nuclear Regulatory Commission (NRC) requested that pressurized water reactor licensees evaluate the potential for post-accident debris to impede or prevent the recirculation functions of emergency core cooling and containment spray systems. The NRC stated, in that generic letter, that all actions should be completed by December 31, 2007. Indiana Michigan Power Company's (I&M's) responses to the generic letter for CNP Unit 1 and Unit 2 were transmitted by References 2, 3, and 4. I&M stated, in Reference 3, that CNP would be in full compliance with the regulatory requirements discussed in the Applicable Regulatory Requirements section of the generic letter by December 31, 2007, including the implementation of all required corrective actions.

The actions being taken to address the issues identified in Generic Letter 2004-02 include numerous plant modifications. I&M had planned to complete these modifications on Unit 1 during its Fall 2006 refueling outage. However, as detailed in Attachment 1 to this letter, the design and implementation of some of these modifications is more challenging than originally anticipated. I&M is therefore requesting an extension of the completion date for activities needed for final resolution of recirculation sump related issues in CNP Unit 1 until the Spring 2008 refueling outage, currently scheduled to begin in March 2008. This extension would allow installation of several modifications, identified in Attachment 1, to be deferred until that outage. All other actions needed to achieve compliance with the requirements in the Applicable Requirements section of Generic Letter 2004-02 in Unit 1 will be completed by December 31, 2007. This request does not affect I&M's commitment to complete all actions needed to achieve full compliance in CNP Unit 2 by December 31, 2007.

Attachment 1 to this letter provides the technical basis for the proposed extension and describes the challenges to completion of the remote strainer(s) and waterway(s). The technical basis is consistent with the criteria for such extensions provided in SECY-06-0078 (Reference 5). Attachment 2 provides a sketch showing the location of the sump and the remote strainers following anticipated plant modifications, and provides a description of their function. Attachment 3 provides the new regulatory commitments made in this letter in tabular form. I&M requests approval of the proposed extension by August 17, 2006, to allow proper planning for the Fall 2006 Unit 1 outage.

Should you have any questions, please contact Ms. Susan D. Simpson, Regulatory Affairs Manager, at (269) 466-2428.

Sincerely,

Joseph N. Jensen
Site Support Services Vice President

JRW/rdw

Attachments:

1. Request for Extension of Completion Date for Actions in Response to Generic Letter 2004-02 for Donald C. Cook Nuclear Plant Unit 1
2. Sketch of Sump and Strainers Following Anticipated Modifications
3. Regulatory Commitments

c: J. L. Caldwell – NRC Region III
K. D. Curry – AEP Ft. Wayne
J. T. King – MPSC
MDEQ – WHMD/RPMWS
NRC Resident Inspector
P.S. Tam – NRC Washington, DC

AFFIRMATION

I, Joseph N. Jensen, being duly sworn, state that I am Site Support Services Vice President of Indiana Michigan Power Company (I&M), that I am authorized to sign and file this request 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 Support Services Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 27th DAY OF June, 2006

Regan D. Wendzel
Notary Public

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

My Commission Expires

ATTACHMENT 1 TO AEP:NRC:6054-06

Request for Extension of Completion Date for Actions in Response to Generic Letter 2004-02 for Donald C. Cook Nuclear Plant Unit 1

References for this attachment are identified on Pages 9 and 10.

By Generic Letter 2004-02 (Reference 1), the Nuclear Regulatory Commission (NRC) requested that pressurized water reactor licensees evaluate the potential for post-accident debris to impede or prevent the recirculation functions of emergency core cooling and containment spray systems. The NRC stated, in that generic letter, that all actions should be completed by December 31, 2007. Indiana Michigan Power Company's (I&M's) responses to the generic letter for Donald C. Cook Nuclear Plant (CNP) Unit 1 and Unit 2 were transmitted by References 2, 3, and 4. I&M stated, in Reference 3, that CNP would be in full compliance with the regulatory requirements discussed in the Applicable Regulatory Requirements section of the generic letter by December 31, 2007, including the implementation of all required corrective actions.

The actions that are being taken to address the issues identified in Generic Letter 2004-02 include anticipated plant modifications (see Attachment 2) to:

- Replace the existing recirculation sump strainer with a larger, new design strainer,
- Install one or two remote strainers with waterways connecting to the existing recirculation sump,
- Create additional openings in the overflow wall and modify associated radiation shields,
- Remove calcium silicate insulation from the pressurizer relief tank and associated piping,
- Install additional level instrumentation,
- Install debris interceptors, and
- Remove certain labels within containment.

I&M is providing details of these modifications in an update to Reference 3 which will be submitted to the NRC prior to June 30, 2006. I&M had planned to complete these modifications on Unit 1 during its Fall 2006 refueling outage. However, the design and implementation of the remote strainer(s) and waterway(s) is more challenging than originally anticipated.

I&M is requesting an extension of the completion date for activities needed for final resolution of recirculation sump related issues in CNP Unit 1 until the Spring 2008 refueling outage, currently scheduled to begin in March 2008. This extension will allow installation of remote strainer(s) and waterway(s) in Unit 1 to be deferred until that outage. The creation of additional openings in the overflow wall, modification of associated radiation shields, and installation of annulus and overflow wall debris interceptors, would also be deferred until the Unit 1 Spring 2008 refueling outage, since they would serve no function without the remote strainers and waterway(s). The technical basis for the proposed extension is provided below, followed by a

description of the specific challenges to design and installation of the remote strainer(s) and waterway(s).

Technical Basis for Proposed Extension

As described in the following sections, the technical basis for the requested extension meets the criteria established by the NRC for such extensions, is consistent with the basis for continued operation documented in Generic Letter 2004-02, and is consistent with precedent regulatory actions.

NRC Extension Criteria in SECY-06-007

I&M considers that the conditions at CNP meet the criteria identified in SECY-06-0078 (Reference 8) for extensions beyond the December 31, 2007 date specified in NRC Generic Letter 2004-02. These criteria are restated below:

Proposed extensions to permit changes at the next outage of opportunity after December 2007 may be acceptable if, based on the licensee's request, the staff determines that:

- *the licensee has a plant-specific technical/experimental plan with milestones and schedule to address outstanding technical issues with enough margin to account for uncertainties and*
- *the licensee identifies mitigative measures to be put in place prior to December 31, 2007, and adequately describes how these mitigative measures will minimize the risk of degraded ECCS and CSS [containment spray system] functions during the extension period.*

For proposed extensions beyond several months, a licensee's request will more likely be accepted if the proposed mitigative measures include temporary physical improvements to the ECCS sump or materials inside containment to better ensure a high level of ECCS sump performance.

These criteria are met as described below.

Plant-Specific Technical/Experimental Plan

I&M has developed a plant-specific technical/experimental plan, with milestones and schedule to address outstanding technical issues including margin to account for uncertainties. The key elements of the plan are summarized below.

- Additional containment walkdowns will be performed during the Unit 1 Fall 2006 refueling outage and the Unit 2 Fall 2007 refueling outage to confirm information regarding debris sources including insulation and latent debris.

- Actions to qualify and validate the design of all strainers will be completed by December 31, 2007.
- The majority of the Unit 1 plant modifications to address the issues identified in Generic Letter 2004-02 will be implemented during the Fall 2006 refueling outage. The specific modifications that will be performed in the Fall 2006 refueling outage are identified below, under "Mitigative Measures."

Additional details are provided in Reference 3.

Mitigative Measures

The following describes the mitigative measures that will minimize the risk of degraded ECCS and CTS functions during the extension period.

I&M anticipates that, during the Unit 1 Fall 2006 refueling outage, the existing recirculation sump strainer will be replaced with a larger, new design strainer, designated as the main strainer (see Attachment 2). Installation of the new strainer would result in a surface area increase from the current value of approximately 85 square feet (ft^2) to approximately 900 ft^2. The available flow area through the existing strainer is approximately 37 ft^2. The available flow area through the replacement strainer is approximately 270 ft^2.

The new strainers will provide increased margin for ECCS and CTS pump suction head. The Unit 1 pump with the most limiting suction head requirements is the West Residual Heat Removal Pump. The maximum acceptable strainer head loss for this pump has been determined to be approximately 9.1 feet of water. However, for CNP, vortexing is more limiting than suction head. The maximum acceptable strainer head loss for vortexing has been determined to be approximately 3.2 feet of water. Based on testing of an approximately 2000 ft^2 area strainer, using actual or simulated plant materials, replacement of the existing strainer with a larger, new design, 900 ft^2 strainer, would result in an estimated head loss of approximately 1.7 feet of water for a double ended guillotine break, and approximately 0.06 feet of water for the debris generation break size (defined in Reference 9). Therefore, replacement of the existing recirculation sump strainer with a larger, new design strainer would provide margin with respect to both suction head and vortexing.

The new strainers will provide increased margin against blockage or excessive wear of downstream components due to debris in the water. The existing strainer consists of nominal 1/4 inch openings in a vertical screen and grating arrangement. The replacement strainer has nominal 1/12 inch openings. The reduction in opening size represents a 300 percent improvement in filtration capability. The baseline downstream effects evaluation assumed a nominal opening size of 1/8 inch and other extremely conservative assumptions, e.g., an assumption of worst case debris combined from multiple break locations. The analysis identified a potential for blockage of the reactor core. However, I&M expects that more realistic assumptions will demonstrate that core blockage is not a concern for CNP. The

downstream effects evaluation determined that other systems and components necessary to support the recirculation function would function for the 30 day mission time.

The new strainers will provide increased margin against formation of a thin bed of fibrous debris. The new design consists of a pocket style strainer. The complex geometry of this type strainer precludes the formation of a thin bed that could significantly increase head loss across the strainer.

I&M anticipates that the following additional plant modifications will be completed during the Unit 1 Fall 2006 refueling outage.

- Removal of calcium silicate insulation from the pressurizer relief tank, pressurizer safety and relief valve pipe, and pressurizer relief tank drain piping inside the crane wall. This will remove 100 percent of the calcium silicate insulation assumed removed in the baseline analysis. No removal of fiberglass insulation is planned since the CNP containments are essentially fiberglass free.
- Removal of qualified and unqualified labels within potential ZOIs inside containment, and removal of a significant number of the unqualified labels inside containment. I&M estimates that approximately 200 ft^2 of qualified and unqualified labels would be removed.
- Extension of the front recirculation sump vents using collector boxes. These would be connected to the existing 6 inch vent line that comes from the rear recirculation sump area and vents above the maximum flood level of the containment. The vent path will be reconfigured to remove the current flat plate design. These changes will provide margin against downstream effects by removing potential strainer bypass areas that currently have a nominal 1/4 inch opening. After modification, the openings will be smaller than the 1/12 inch opening of the replacement strainer. Reconfiguration of the front cover vent will ensure that any air that would attempt to pocket in this section of the sump will be vented out of the sump.
- Installation of redundant, safety related level instruments inside the recirculation sump to provide early indication of strainer blockage. An associated alarm would be installed in the control room. This additional instrumentation would facilitate identification of recirculation sump blockage earlier than the currently available indications of ECCS and CTS pump flow rate oscillations and motor amperage swings. The operators can then take action in accordance with the Emergency Operating Procedures to reduce the appropriate flow, thus reducing the head loss across the strainer.
- Installation of debris interceptors to protect the drain path from the containment equalization - hydrogen skimmer fan rooms. This would reduce the potential for debris blockage of these design flow routes.
- Installation of debris interceptors at the wide range containment level instrumentation. These would prevent plugging the bottom opening of the stilling well piping to ensure reliability of the level instruments.

- Capping of the existing 8 inch diameter crossover pipe between the recirculation sump and the lower containment sump. This would prevent unfiltered water from bypassing the recirculation sump strainers and entering the recirculation sump. This change will provide margin against downstream effects by removing a potential strainer bypass that currently has a nominal 1/4 inch opening.

The following planned and in-progress testing, analyses, and calculations are expected to demonstrate that there are significant margins available beyond the criteria identified in Nuclear Energy Institute (NEI) 04-07 (Reference 9). These will be completed prior to December 31, 2007.

- Reference 9 requires assumption of a ZOI for coatings of 10 times the diameter of the pipe break (10D). Results of testing that was performed to establish a ZOI criterion of less than 10D are being evaluated. ZOIs of 5D and 10D were assumed in the CNP baseline analysis. For the coating system (Carboguard 890) used at CNP within ZOI areas, test results have demonstrated that the ZOI could be reduced to approximately 1.4D. A reduction in ZOI would significantly reduce the quantity of particulates in the debris load at the recirculation sump strainer because the quantity of coating debris is a function of the square of the diameter. This would result in a significant increase in head loss margin.
- In the CNP baseline analysis, the calcium silicate debris generated during an accident was assumed to result in 100 percent fines. I&M expects that debris generation analysis will support much less than 100 percent fines generation for calcium silicate insulation fragments. This would represent a significant increase in the margin associated with calcium silicate insulation fines.
- I&M expects that refined debris transport calculations will support a reduced loading at the recirculation sump strainer due to debris settling and conservatism in the overall baseline analysis.

I&M has implemented a number of actions to enhance containment cleanliness, which will minimize miscellaneous debris sources within containment. These actions are based on guidance provided in NEI 02-01 (Reference 10). Provided below is a summary of the activities for which controls will be evaluated and, if appropriate, further improved by December 31, 2007. These will serve as mitigative measures, in addition to the plant modifications described above, to minimize the risk of degraded ECCS and CTS functions during the extension period.

- Introduction of materials into containment.
- Selection of materials in containment.
- Work activities and evaluations that either directly or indirectly affect containment, ECCS or CTS.
- Maintenance of containment cleanliness.
- Containment access and containment closeout.

- Identification, evaluation, and resolution of degraded or questionable coating conditions.
- Insulation configuration control.

The following programs, processes, and standards will be reviewed and modified as necessary to implement the appropriate controls for minimizing post accident debris:

- Containment Coatings Program.
- Containment Inspection and Surveillance Programs.
- Change Management Processes.
- Engineering design specifications and standards.
- Maintenance planning and work control program.
- Materials Control Program.

The following describes how strainer head loss due to certain recognized chemical interactions would be precluded at CNP.

- At CNP, sodium hydroxide is added to the CTS water during the injection phase of an accident. Additionally, CNP uses sodium tetraborate in the ice contained within the ice condenser. Integrated Chemical Effects Testing (ICET) 4 used sodium hydroxide with both fiberglass and calcium silicate insulation. ICET 5 utilized sodium tetraborate with fiberglass insulation. In ICET 4, a dissolved aluminum concentration at or above 100 parts per million resulted in an increase in head loss in the associated test loop. ICET 4 used an aluminum surface area per volume of sump water of 3.5 ft^2/ft^3, with 5 percent of the aluminum assumed to be submerged and 95 percent unsubmerged. Using a very conservative estimate of the aluminum surface area, the surface area to volume of sump water at CNP would be nearly a factor of 100 lower than that assumed during ICET 4. Therefore, aluminum in the CNP containment would result in a very minimal impact on strainer head loss. ICET 5 demonstrated that sodium tetraborate does not create a significant impact to recirculation sump strainer head loss.
- Information Notice (IN) 2005-26 (Reference 11) informed licensees of test results that demonstrated the potential for significant head loss across recirculation sump strainers for plants that have calcium silicate insulation in containment and utilize trisodium phosphate (TSP) as a pH buffering agent. CNP is not susceptible to the chemical effects identified in the IN because CNP uses sodium hydroxide in the initial CTS injection water and sodium tetraborate in the ice condenser as a pH buffering agent. CNP does not use TSP.

Generic Letter Basis for Continued Operation

In Generic Letter 2004-02, the NRC staff provided the basis for concluding that pressurized-water reactors may continue to operate through December 31, 2007, while licensees implement the required corrective actions. The basis for continued operation provided in Generic Letter 2004-02 included the factors listed below. These factors would remain applicable

to CNP during the period of the proposed extension. CNP-specific information is provided where appropriate.

- There is an extremely low probability of the most severe initiating event (i.e., large and intermediate break loss of coolant accidents (LOCAs)).
- Small LOCAs (which are still low probability events) would require less ECCS flow, take more time to use up the water inventory in the refueling water storage tank, and in some cases may not even require recirculation.
- PWRs typically do not need to switch over to recirculation from the sump during a large break LOCA until greater than 20-30 minutes after LOCA initiation, and the elapsed time for all LOCAs will allow time for some of the debris to settle in other places within the containment. For CNP, the switchover to recirculation would occur 18 to 20 minutes after the event, which still allows for debris settling.
- Coating debris, which is a major contributor to the latent debris in containment, would have a significant amount of time to settle.
- All PWRs have received approval by the staff to credit leak-before-break for their largest reactor coolant system primary coolant piping. For CNP, Reference 5 documented NRC approval to credit the leak-before-break methodology to eliminate the dynamic effects (pipe whip and jet impingement) of postulated reactor coolant loop piping ruptures from the design basis of the plant. While leak-before-break is not being used to establish the design basis load on the recirculation sump strainer, it does provide a basis for continued safe operation.
- It has been shown that low pressure ECCS pumps would be able to continue operating in many cases for some time under cavitation conditions.
- In response to Bulletin 2003-01 (Reference 6), addressees have implemented or will implement interim compensatory measures to reduce the risk. For CNP, significant interim compensatory measures have been implemented in response to the concerns identified in Bulletin 2003-01. The NRC staff has reviewed these measures (Reference 7), and concluded that I&M was responsive to, and met the intent of the bulletin. The compensatory measures implemented by I&M included operator training on indications of and responses to recirculation sump clogging, more aggressive containment cleaning and increased foreign material controls, ensuring containment drainage paths are unblocked, and ensuring recirculation sump screens are free of adverse gaps and breaches. I&M will maintain these compensatory measures throughout the proposed extension period.

Potential Safety Enhancements from Extending the Post-LOCA Injection Phase

Industry representatives and NRC staff have recently discussed potential safety enhancements from extending the post-LOCA injection phase, i.e., delaying the onset of the containment recirculation phase. Extending the injection phase would give operators more time to establish a reliable recirculation path, would reduce the debris reaching the containment recirculation sump screen, would reduce downstream effects resulting from containment recirculation, and would extend the time for mitigative actions. This could be achieved by minimizing the use of containment spray (possibly by eliminating automatic spray initiation), which could make

significantly more water available for injection into the core. I&M has been engaged in discussions with the NRC staff regarding the potential for implementing such changes at CNP. I&M has expressed an interest in establishing CNP as a pilot plant for a water management initiative that would eliminate automatic containment spray actuation.

Challenges to Design and Installation of Remote Strainer(s) and Waterway(s)

Design and installation of the remote strainer(s) and waterway(s) that channel coolant from the remote strainer(s) to the recirculation sump have resulted in the following challenges:

- The installation of remote strainer(s) would result in additional equipment in an ice condenser containment that is already congested. This limits the size of the remote strainer(s) that can be installed. Because resolution of issues regarding chemical effects, insulation fines, and zone-of-influence (ZOI) for qualified coatings, is still in progress, the required size and quantity of the remote strainer(s) and waterway(s) cannot be finalized. Therefore, installation of remote strainer(s) and waterway(s) during the Fall 2006 Unit 1 outage, prior to resolution of those issues, would have to be performed "at-risk." The refined overall analysis may subsequently determine that additional plant modifications are necessary to assure proper emergency core cooling system (ECCS) and containment spray system (CTS) recirculation functions.
- Several other licensees plan to use the same type of strainer as I&M plans to use for the CNP remote strainer(s). Fabrication of the strainers by the manufacturer is behind schedule.
- As a result of the containment congestion, the waterway(s) cannot follow a straight path between the remote strainer(s) and the recirculation sump. Design of the waterway(s) has, therefore, required significant additional analysis to address the associated hydraulic and structural issues.
- The additional waterway hydraulic analysis has delayed completion of the refined overall analysis.
- The waterway(s) would be unique in the industry. Industry experience is not available to address the various design and analysis issues.
- Installation of the remote strainer(s) and waterway(s) would require relocating a number of existing components, necessitating additional resources to complete the design and modification process.
- Installation of the waterway(s) requires cutting through the containment crane wall, which is a reinforced structural element that supports the containment polar crane and other significant loads. This is a specialized task and associated resources have limited availability within the construction industry.
- Because of the congested containment, CNP has traditionally had to coordinate work in the containment far in advance of the refueling outage. The uncertainty regarding design and installation of the remote strainer(s) and waterway(s) has significantly increased the complexity in coordinating their installation with other major projects to be conducted in containment during the Fall 2006 Unit 1 refueling outage, such as reactor vessel head

replacement, reactor coolant resistance temperature detector bypass removal, reactor coolant pump replacement, and pressurizer piping connection weld overlays.

It is because of these challenges that I&M is requesting an extension of the completion date for activities needed for final resolution of recirculation sump related issues in CNP Unit 1 until the Spring 2008 refueling outage.

Precedent Regulatory Actions

The NRC has approved similar extensions for the Beaver Valley Power Station (Reference 12), Calvert Cliffs Nuclear Power Plant (Reference 13), Seabrook Station (Reference 14), and Turkey Point Plant (Reference 15).

References

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, 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).

3. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Nuclear Regulatory Commission Generic Letter 2004-02 - Information Requested by September 1, 2005," AEP:NRC:5054-11, dated August 31, 2005 (ML052510512).

4. Letter from J. N. Jensen, I&M, to NRC Document Control Desk, "Nuclear Regulatory Commission Generic Letter 2004-02 – Revision of Commitments" AEP:NRC:5054-14, dated December 19, 2005 (ML060030459).

5. Letter from S. A. Varga, NRC, to J. Dolan, I&M, issuing License Amendment No. 76 to Facility Operating License No. DPR-74, dated November 22, 1985.

6. NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated June 9, 2003 (ML031600259).

7. Letter from D. W. Spaulding, NRC, to M. K. Nazar, I&M, "Donald C. Cook Nuclear Plant, Units 1 and 2 - Response to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors," dated October 13, 2005 (ML052720004).

8. SECY-06-0078, from L. A. Reyes, NRC Executive Director for Operation, to NRC Commissioners, "Status of Resolution of GSI-191, 'Assessment of [Effect of] Debris Accumulation on PWR Sump Performance,' " dated March 31, 2006 (ML053620174).

9. NEI 04-07, "Pressurized Water Reactor Sump Performance Methodology," including associated NRC Safety Evaluation Report, dated December 2004 (ML041550332).

10. NEI 02-01, Revision 1, "Condition Assessment Guidelines; Debris Sources Inside PWR Containments," dated September 2002 (ML030420318).

11. Letter from P. L. Hiland, NRC, to holders of operating licenses for pressurized water reactors, Information Notice 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," dated September 16, 2005 (ML052570220).

12. Letter from T. G. Colburn, NRC, to J. H. Lash, FirstEnergy Nuclear Operating Company, "Beaver Valley Power Station, Unit No. 2 (BVPS-2) - Request for Schedular Extension from Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors" (TAC NO. MC4666)," dated May 18, 2006 (ML061380273).

13. Letter from P. D. Milano, NRC, to J. A. Spina, Calvert Cliffs Nuclear Power Plant, Inc., "Calvert Cliffs Nuclear Power Plant, Unit No. 1 - Approval of Extension Request for Completion of Corrective Actions in Response to Generic Letter 2004-02 (TAC NO. MC4672)," dated April 12, 2006 (ML060950051).

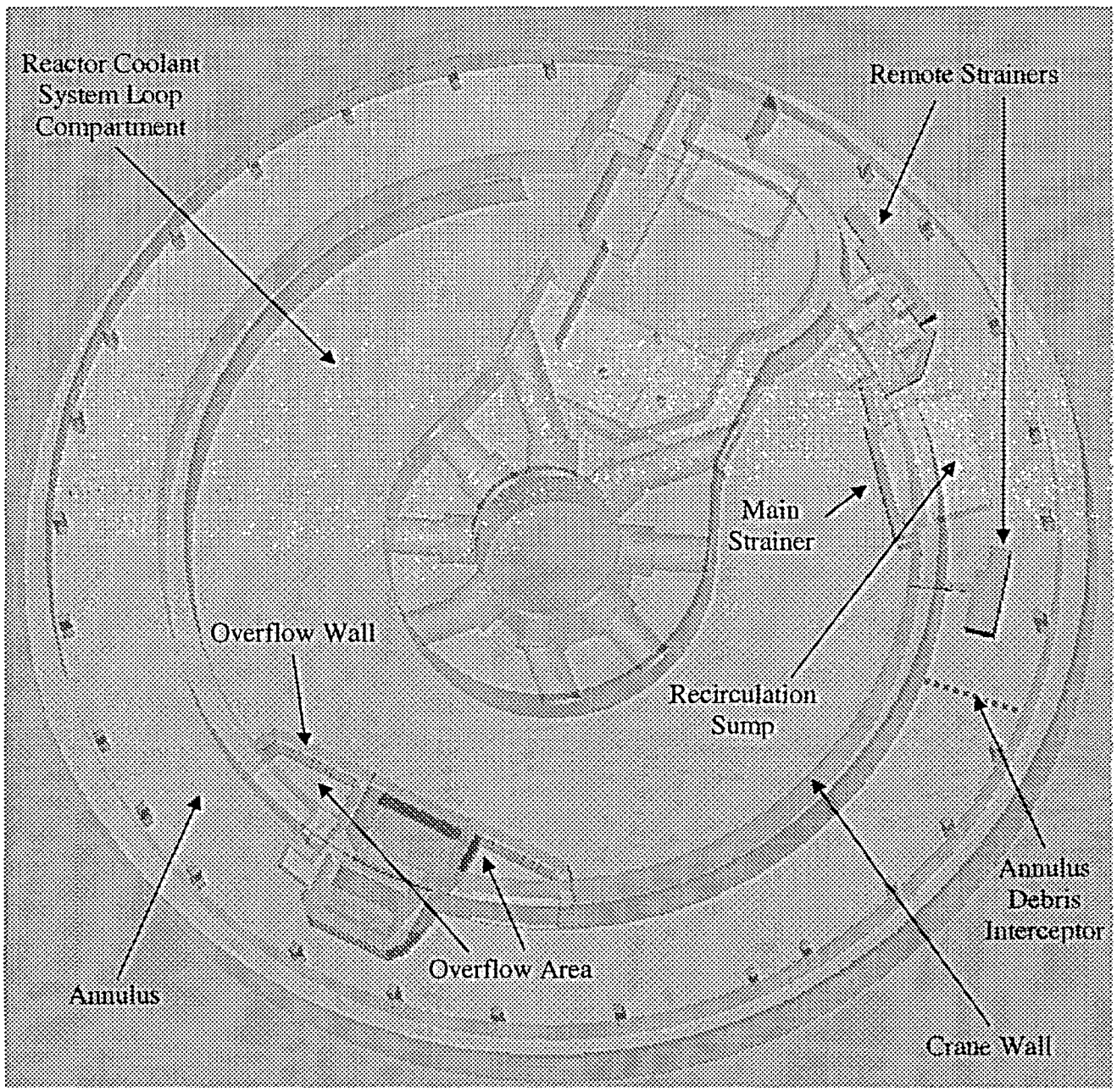
14. Letter from G. E. Miller, NRC, to G. F. St. Pierre, FLP Energy Seabrook, LLC, "Seabrook Station, Unit No. 1 - Requested Extension of Completion Schedule For NRC Generic Letter 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation During Design Basis Accidents at Pressurized Water Reactors" (TAC NO. MC4716)," dated April 11, 2006 (ML060890398).

15. Letter from B. T. Moroney, NRC, to J. A. Stall, Florida Power and Light Company, "Turkey Point Plant Unit No. 4 – Approval of GSI-191/GL 2002 Extension Request (TAC NO. MC4726)," dated April 13, 2006 (ML060950574).

ATTACHMENT 2 TO AEP:NRC:6054-05

SKETCH OF SUMP AND STRAINERS FOLLOWING ANTICIPATED MODIFICATIONS

Note that either one or two remote strainers may be installed.
See next page for description of function.



Function of Modifications

The anticipated plant modifications described in Attachment 1 to this letter and shown on the preceding sketch would function as follows.

During the injection phase of a loss of coolant accident, debris laden water would begin to flow through the main strainer to the recirculation sump. When the water in the recirculation sump reaches floor level, the water would begin to flow through the waterways towards the remote strainer(s). Since this water had passed through the main strainer, it would be essentially debris free. When the loop compartment water level rose to sufficient height, water would begin backflowing out of the remote strainer(s) into the annulus. As a result of this flow path, a significant quantity of debris would be left on the main strainer.

Additionally, water would flow from inside the loop compartment to the annulus through debris interceptors and the 10-inch diameter flow holes in the overflow wall. The only debris that would be generated in the annulus region and transported to the remote strainer(s) would be latent debris, unqualified coatings, and fine debris that travels from the loop compartment to the annulus region through the debris interceptors and through existing openings in the crane wall. The remote strainer(s) would be essentially debris free.

These two flow paths into the annulus would continue until the containment water level reached approximately 7.7 feet above the floor, at which time recirculation flow would begin. Once recirculation flow begins, the reverse flow through the remote strainer(s) would cease. There would be a head loss associated with the waterway(s) connecting the remote strainer(s) to the main strainer. Until the time that the main strainer becomes substantially blocked by debris, the preferential flow path would be through the main strainer. The division of flow between the main and remote strainers would be a function of the head loss through the associated strainer and waterway elements.

A preliminary computational fluid dynamics (CFD) analysis was performed that demonstrated that, even with the main strainer completely blocked, there would be sufficient flow through the remote strainer(s), to maintain water level inside the recirculation sump to support one train of core and containment cooling. However, due to the pocket strainer design, it is not expected that the main strainer would become completely blocked with debris. A sensitivity CFD analysis was performed demonstrating that even with only 10 percent of the main strainer available for flow, water level inside the recirculation sump would remain substantially above the calculated vortex limit.

ATTACHMENT 3 TO AEP:NRC:6054-06

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
All actions, other than installation of one or two remote strainers with waterways connecting to the existing recirculation sump, creation of additional openings in the overflow wall, modification of associated radiation shields, and installation of debris interceptors in the new overflow wall openings and in the annulus, needed to achieve full compliance with the requirements in the Applicable Requirements section of Generic Letter 2004-02 in Unit 1 will be completed.	By December 31, 2007
The planned and in-progress testing, analyses, and calculations identified on page 6 of Attachment 1 to this letter will be completed.	By December 31, 2007
Controls for the containment cleanliness activities listed on page 6 and 7 of Attachment 1 to this letter will be evaluated and, if appropriate, further improved.	By December 31, 2007
The programs, processes, and standards listed on page 7 of Attachment 1 to this letter will be reviewed and modified as necessary to implement the appropriate controls for minimizing post accident debris.	By December 31, 2007
I&M will maintain the compensatory measures taken in response to NRC Bulletin 2003-01.	Until the start of the Spring 2008 Unit 1 refueling outage.
Full compliance with the requirements in the Applicable Requirements section of Generic Letter 2004-02 will be achieved for Unit 1.	Prior to entry into Mode 4 at the end of the Spring 2008 Unit 1 refueling outage.