



December 22, 1999

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50-316

U.S. Nuclear Regulatory Commission
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Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Units 1 and 2
REQUEST FOR MODIFICATION OF ORDER REGARDING
CONTAINMENT HYDROGEN MONITORS (NUREG-0737, Item II.F.1.6)

Indiana Michigan Power Company (I&M), the Licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2, requests a modification of the March 14, 1983, order pertaining to Facility Operating Licenses DPR-58 and DPR-74 for the NRC staff position presented in NUREG-0737, "Clarification of [Three Mile Island] TMI Action Plan Requirements." This request is made in accordance with NRC Memorandum, "Project Manager Guidance for Risk-Informed Confirmatory Orders on Post-Accident Hydrogen Monitoring," dated December 16, 1998. I&M proposes to extend the time available for placing the containment hydrogen monitor in service following initiation of safety injection from 30 minutes to 90 minutes.

This request is consistent with similar requests made by Duke Energy for Oconee Nuclear Station, Units 1, 2, and 3 (Oconee), and Entergy Operations for Arkansas Nuclear One, Units 1 and 2 (ANO). The NRC granted these requests by providing a confirmatory order modifying the post-TMI requirement pertaining to containment hydrogen monitors for Oconee and ANO by letters dated November 29, 1999, and September 28, 1998, respectively. I&M's commitment made in response to TMI Action Plan Item II.F.1, Attachment 6, is similar to those made for Oconee and ANO.

Through I&M letters to the staff dated January 8, February 8, and March 6, 1981, a commitment was made to provide post-accident containment

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hydrogen monitoring that complies with the design requirements of NUREG-0737, Item II.F.1, "Accident Monitoring," Attachment 6, "Containment Hydrogen Concentration." The I&M commitment regarding compliance with this TMI Action Item was the subject of a Confirmatory Order issued to CNP on March 14, 1983. The order modified the operating licenses for CNP Units 1 and 2 to require indication of hydrogen concentration in containment within 30 minutes following a safety injection as described in Attachment 6 to TMI Action Item II.F.1 in NUREG-0737.

I&M's proposed revision to the current post-accident hydrogen monitoring requirements and the basis for the modified confirmatory order are provided in the attachment. There are no new commitments made in this submittal. I&M requests approval of this request by February 26, 2000, in order to support Unit 2 restart.

Should you have any questions, please contact Mr. Robert C. Godley, Director of Regulatory Affairs, at (616) 466-2698.

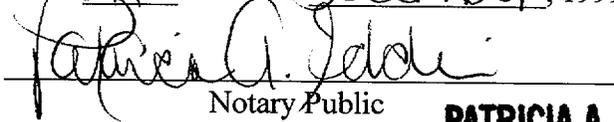
Sincerely,



R. P. Powers
Vice President

SWORN TO AND SUBSCRIBED BEFORE ME

THIS 22nd DAY OF December, 1999



Notary Public

My Commission Expires _____

PATRICIA A. EDDIE
NOTARY PUBLIC - BERRIEN CO. MICH
MY COMMISSION EXPIRES
NOVEMBER - 5 - 2000

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Attachment

c: J. E. Dyer
MDEQ - DW & RPD, w/o attachment
NRC Resident Inspector
R. Whale, w/o attachment

ATTACHMENT TO C1299-06

REQUEST FOR MODIFICATION OF ORDER

Indiana Michigan Power Company (I&M), the Licensee for Donald C. Cook Nuclear Plant (CNP) Units 1 and 2, requests a modification of the March 14, 1983, order pertaining to Facility Operating Licenses DPR-58 and DPR-74 for the NRC staff position presented in NUREG-0737, "Clarification of [Three Mile Island] TMI Action Plan Requirements." This request is made in accordance with NRC Memorandum, "Project Manager Guidance for Risk-Informed Confirmatory Orders on Post-Accident Hydrogen Monitoring," dated December 16, 1998. I&M proposes to extend the time available for placing the containment hydrogen monitor in service following initiation of safety injection from 30 minutes to 90 minutes.

The Confirmatory Order for NUREG-0737, Item II.F.1, "Accident Monitoring," Attachment 6, "Containment Hydrogen Concentration," issued to CNP Units 1 and 2 on March 14, 1983, required that "[i]f an indication is not available at all times, continuous indication and recording shall be functioning within 30 minutes of the initiation of safety injection." I&M proposes that this order requirement be modified to state the following:

The licensee may elect to either maintain the 30-minute time limit for monitoring of hydrogen in containment, as described by TMI Action Plan Item II.F.1, Attachment 6, in NUREG-0737 and required by the Confirmatory Order of March 14, 1983, or modify the time limit in the manner specified in the functional requirement described below:

Procedures shall be established for ensuring that monitoring of hydrogen concentration in the containment atmosphere is available in a sufficiently timely manner to support the implementation of the Donald C. Cook Nuclear Plant Emergency Plan (and related procedures) and related activities such as guidance for severe accident management. Hydrogen monitoring will be initiated based on: (1) the appropriate priority for establishing monitoring of hydrogen concentration within the containment in relation to other activities in the control room; (2) the use of the monitoring of hydrogen concentration by decision makers for severe accident management and emergency response; and (3) insights from experience or evaluation pertaining to possible scenarios that result in significant generation of hydrogen that would be indicative of core damage or a potential threat to the integrity of the containment building. Affected licensing basis documents and other related documents will be appropriately revised and/or updated in accordance with applicable NRC regulations.

The adoption of the function requirements would result in extending the time requirement for establishing continuous indication and recording from the containment hydrogen concentration monitoring system from 30 minutes to 90 minutes after the initiation of safety injection. Upon modification of the order, I&M will operate and maintain the containment hydrogen monitors for CNP Units 1 and 2 in accordance with the applicable functional requirements described above.

Basis for Modified Confirmatory Order

At CNP, the post-accident containment hydrogen monitoring system (PACHMS) operates in standby during normal plant operation. Monitoring of the post-accident hydrogen concentration of the containment atmosphere must be manually initiated following an accident. I&M has determined that the actions necessary to comply with the 30-minute time limit to establish post-accident containment hydrogen monitoring indication and recording capability are a distraction for control room operators from more important tasks during the initial response to an event and that the information provided by the monitors is not needed or used until later stages of responding to an accident.

The more immediate actions required of the operating crews are to assure that safety systems are functioning properly and critical safety functions are being accomplished in response to an accident. It is appropriate to delay the operator actions necessary to initiate hydrogen monitoring until the accident assessment and mitigation actions are complete. These accident assessment and mitigation actions can typically be accomplished within 60 minutes from the start of an accident.

Post-accident hydrogen concentrations are measured by the PACHMS. The PACHMS can take samples from nine locations within the reactor containment atmosphere (seven in the upper containment and two in the lower containment). Each unit's PACHMS is comprised of two sampling-analyzing-control trains. The primary function of the hydrogen monitoring system is to identify when to actuate the hydrogen recombiners during design basis accidents based on the containment hydrogen concentration.

Following a design basis loss-of-coolant accident (LOCA), hydrogen may be generated inside the containment by the mechanisms of: (1) metal-water reaction of the zirconium clad at high temperatures; (2) chemical corrosion of aluminum with the alkaline containment spray; and (3) radiation-induced decomposition of water in the core and sump. The hydrogen generation due to metal-water reaction is assumed to be completed during the first day following the LOCA, and includes a factor of 5 conservatism as prescribed in 10 CFR 50.44, "Standards for Combustible Gas Control System in Light-Water Reactors." The other hydrogen generation mechanisms of chemical corrosion and radiolysis of reactor coolant and containment sump water are slow processes. The CNP hydrogen generation analysis was performed in accordance with 10 CFR 50.44 and Regulatory Guide (RG) 1.7, "Control of Combustible Gas Concentrations in Containment Following a Loss-of-Coolant Accident," Revision 0. As discussed in RG 1.7, a hydrogen concentration slightly above 4 percent is generally accepted as a lower flammability limit. The I&M analysis determined that for the limiting case, the time dependent bulk hydrogen concentration in the containment atmosphere would reach the regulatory limit of 4 volume percent in approximately 29 hours. This analysis did not take credit for the operation of the distributed ignition system (DIS) in reducing hydrogen levels inside containment.

Extending the 30-minute requirement to 90 minutes will have no adverse impact on implementation of the emergency plan or emergency operating procedures. Other indications, such as core exit thermocouples, reactor coolant system pressure and temperature, containment radiation monitoring, containment pressure and temperature, reactor vessel level, and excore detectors are readily available without operator action for use in recognizing and classifying emergencies and issuing protective action recommendations to offsite authorities. Indication of hydrogen concentrations within containment would only be confirmatory to other available information. Thus, modification of the order to delay when the containment hydrogen monitoring would be required to be operable will still provide a reasonable margin for the operators to complete the accident assessment and mitigation duties before redirecting their attention to relatively longer term recovery actions such as actuating the hydrogen recombiners. This will have a positive impact on the ability of the operators to concentrate on their more immediate actions while having no negative impact on the much longer-term actions. Therefore, this change results in an improvement in public health and safety.

The NRC has reviewed (and approved) other commercial nuclear power plant licensee submittals on this matter and considered the lessons learned since the TMI Unit 2 accident pertaining to severe accident management and emergency planning. As documented in the modified order issued to Arkansas Nuclear One (ANO), dated September 28, 1998, the NRC has established that the appropriate balance between control room activities and longer-term management of the response to severe accidents can best be determined by the individual commercial nuclear power plant licensees. This modified order also presents the staff conclusion that licensees should have the flexibility and assume the responsibility for determining the appropriate time limit for indication of hydrogen concentration in containment, such that control room personnel are not distracted from more important tasks in the early phases of accident mitigation, and decision makers, mostly outside the control room, are able to benefit from having useful information on hydrogen concentration.

Based on the above, and in keeping with the NRC's commitment to improve regulatory oversight efficiency, the staff has determined that a licensee may elect to adopt a risk-informed functional requirement in lieu of the current 30-minute time limit for indication of hydrogen concentration imposed in the order. This position was documented in an NRC memorandum, "Project Manager Guidance for Risk-Informed Confirmatory Orders on Post-Accident Hydrogen Monitoring," dated December 16, 1998. This memorandum also instructed Office of Nuclear Reactor Regulation Project Managers to make the September 28, 1998, modified order on this subject issued to ANO available to other licensees for their use in pursuing the same order modifications, as appropriate. Modification of the order in place for CNP to permit the use of the functional requirement would allow indication and recording of containment hydrogen concentration to be available to operators within 90 minutes of initiating safety injection following a LOCA.