

January 30, 2002

MEMORANDUM TO: Joel Munday, Acting Chief  
Section 1  
Project Directorate 1  
Division of Licensing and Project Management

FROM: Robert Hagar, Acting Chief/**RA**/  
Design Review Section  
Plant Systems Branch  
Division of Systems Safety and Analysis

SUBJECT: OPERATING LICENSE AMENDMENT REQUEST INVOLVING THE  
POST-LOCA CONTAINMENT HYDROGEN MONITORING SYSTEM

Plant Name: Nine Mile Point Unit 2  
Utility: Constellation Nuclear  
Docket No. 50-410  
TAC No. MB3040  
Project Manager Peter Tam  
Review Branch: SPLB/DSSA  
Review Status: Completed

The Plant Systems Branch (SPLB) has completed its review of the Nine Mile Point Unit 2 revised request and prepared the attached safety evaluation covering those areas for which we have primary responsibility.

The revised request changes an additional condition requiring the operating licensee to be capable of establishing containment hydrogen monitoring within 90 minutes of initiating emergency core cooling (safety injection) following a loss of coolant accident.

Our safety evaluation is provided in the attachment and concluded the proposed amendment to the operating license evaluated by SPLB are within regulatory guidelines and are therefore acceptable.

This completes our effort on TAC No. MB3040.

Attachment: As stated

Contact: Vincent Klco, SPLB/DSSA/NRR  
(301)-415-8348

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The Office of Nuclear Reactor Regulation  
Division of Systems Safety and Analysis  
Plant systems branch  
Operating License Amendment  
Nine Mile Point Unit 2  
Docket Number 50-410

Safety Evaluation Report

1.0 Introduction

By letter dated January 4, 2002, Constellation Nuclear asked to revise its initial request for an amendment to the Nine Mile Point Unit 2 (NMP2) operating license regarding the containment hydrogen monitoring system.

The initial submittal, provided by letter dated October 5, 2001, was an amendment request that would change the licensing basis requirement for establishing containment hydrogen monitoring from "within 30 minutes" to "within 3 hours" of initiating emergency core cooling (safety injection) following a loss of coolant accident (LOCA).

As a result of subsequent discussions with the NRC staff, NMP2 has revised its previous request to establish containment hydrogen monitoring within 90 minutes of initiating emergency core cooling following a LOCA. The revised NMP2 license amendment request is consistent with the requirement previously approved for Vogtle and Arkansas Nuclear One.

The hydrogen/oxygen analyzer units currently installed in the NMP2 containment monitoring system (CMS) have a history of chronic failure and require excessive maintenance. The licensee proposed replacing the existing hydrogen/oxygen analyzer units with an improved design. The utility plans to implement this modification during the next refueling outage which begins in March 2002.

2.0 Background

As a result of the accident at Three Mile Island (TMI), the NRC issued NUREG-0737, "Clarification of TMI Action Plan Requirements" (November 1980). Generic letters were issued in 1982 requesting the licensees of operating power reactors to furnish information pertaining to their implementation of specific TMI action plan items described in NUREG-0737.

Table 1.9 of the NMP2 updated safety analysis report (USAR) commits NMP2 to comply with the acceptance criteria of NUREG-0800 (Standard Review Plan), Section 6.2.5 and states:

"The containment hydrogen monitor shall meet the requirements of item II.F.1 of NUREG-0737 and NUREG-0718, and the Appendix of Regulatory Guide 1.97."

Section II.F.1, Attachment 6, of NUREG-0737 states, “a continuous indication of hydrogen concentration in the containment atmosphere shall be provided in the control room.” It also contains a note (2) that reads:

“(2) The continuous indication of hydrogen concentration is not required during normal operations.

If an indication is not available at all times, continuous indication and recording shall be functioning within 30 minutes of the initiation of safety injection.”

Based on the Standard Review Plan and NUREG-0737 commitments, the current NMP2 licensing basis requires hydrogen monitoring to begin within 30 minutes after initiation of emergency core cooling (safety injection).

### 3.0 Evaluation

By letter dated January 4, 2002, Constellation Nuclear requested an amendment change to the NMP2 operating license regarding containment hydrogen monitoring. Specifically, the Licensee requested changing additional condition 3 to the NMP2 operating license to state, “The operating licensee shall be capable of establishing containment hydrogen monitoring within 90 minutes of initiating emergency core cooling (safety injection) following a loss of coolant accident.” This 90-minute requirement takes into account:

- 60 minutes for plant operators to complete initial assessment and accident mitigation tasks and strategies.
- 30 minutes for the monitors to provide reliable measurements after the system mode changes from “standby” to “analyze”.
- Consistency with previously approved hydrogen monitoring requirements at other stations.

Significant improvements have been achieved since the TMI-2 accident in the areas of understanding risks associated with nuclear plant operations and developing better strategies for managing the response to potentially severe accidents at nuclear plants. Recent insights pertaining to plant risks and alternate severe accident assessment tools have led the NRC staff to conclude that some TMI Action Plan items can be revised without reducing, and perhaps enhancing, the ability of licensees to respond to severe accidents. The NRC’s efforts to oversee the risks associated with nuclear technology more effectively and to eliminate undue regulatory costs to licensees and the public have prompted the NRC’s decision to revise the post-TMI requirement related to establishing indication of hydrogen concentration in containment.

The proposed extension in the time requirement for hydrogen monitoring from 30 minutes to 90 minutes after initiation of safety injection, following an LOCA is justified based on the below considerations:

- In SECY-2000-198, dated September 14, 2000, the NRC staff noted that for Mark II containments (such as the NMP2 containment), combustible gases are not a significant

challenge to containment integrity in the early stages of a core-melt accident because of an inerted containment atmosphere. Subsequently, hydrogen monitors have a limited significance in mitigating the threat to the containment in the early stages of an accident.

- The proposed hydrogen monitoring time limit uses the basis from the Arkansas Nuclear One confirmatory order issued on September 28, 1998. Here, the NRC staff acknowledged that, based on recent insights pertaining to plant risk, certain TMI action plan items can be revised without reducing, and perhaps enhancing, the ability of licensees to respond to severe accidents. The staff also considers that licensees should have the flexibility to determine the appropriate time limit for indication of hydrogen concentration in the containment. This would assure the control room personnel are not distracted from more important tasks in the early phases of accident mitigation. The staff notes that when using simulator scenarios, plants have reported completing these more important accident mitigation actions within approximately 60 minutes.
- The guidance for establishing post-LOCA containment hydrogen monitoring at NMP2 is contained in the emergency operating procedure flowchart for primary containment control. This step follows those preliminary actions required to monitor and control the LOCA event and verify proper operation of essential safety systems. Considering the safety significance of preliminary actions to assure that safety systems are functioning properly and critical safety functions are being accomplished, it is appropriate to allow a delay in the operator's actions necessary to initiate hydrogen monitoring.
- The monitors are also used to support core damage assessment and the plant's severe accident management guidelines. The 90 minute time delays are appropriate to support personnel in the technical support center performing such assessments and management functions.

#### 4.0 Conclusion

The proposed NMP2 extension in the time requirement for establishing hydrogen monitoring is justified based on the safety significance of hydrogen monitoring, the immediate actions required of plant operators after a LOCA, and the operational characteristics of the hydrogen analyzers that are planned to be installed in the next refueling outage.

Based on the licensees risked informed technical justification, the NRC staff finds that the licensee's request for an amendment to the operating license is within regulatory guidelines and acceptable. The staff further concludes that with this change to the operating license and with the planned modification to the hydrogen monitoring system, the plant's overall safety is reasonably assured by providing a more reliable monitoring system and eliminating a possible operator distraction during the early phases of accident mitigation.

## 5.0 References

1. A letter from Entergy Operations to USNRC dated March 2, 1998 and titled, "NUREG-0737 Item II.F.1.6 Containment Hydrogen Monitor."
2. A letter from USNRC to Northeast Nuclear Energy Company dated October 28, 1997 and titled, "Withdrawal of Deviation Request for NUREG-0737, Item II.F.1.6, Containment Hydrogen Monitors-Millstone nuclear Power Station, Unit No. 2 (TAC No. M99296)."
3. A letter form USNRC to Entergy Operations dated September 28. 1998 and titled, "Confirmatory Order Modifying Post-TMI Requirements Pertaining to Containment Hydrogen Monitors for Arkansas Nuclear One, Units 1 and 2 (TAC Nos. MA1267 and 1268)."
4. USNRC memorandums to all NRC project directors and project managers dated December 16, 1998 and titled, "Project Manager Guidance for Risk-Informed Confirmatory Orders on Post-Accident Hydrogen Monitoring."
5. BWROG submittal of NEDO-33003 dated June 22, 2001 and titled, "Regulatory Relaxation for the Hydrogen/Oxygen Monitors and Combustible Gas Control System."
6. A letter from Nigra Mohawk to USNRC dated October 5, 2001 and titled, "Post-LOCA Containment Hydrogen Monitoring (TAC No. MB3040)."
7. A letter form Constellation Nuclear to USNRC dated January 4, 2002 and titled, "Post-LOCA Containment Hydrogen Monitoring (TAC No. MB3040)."