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## **POLICY ISSUE** (Information)

November 1996

SECY-96-231

**FOR:** The Commissioners

**FROM:** James M. Taylor  
Executive Director for Operations

**SUBJECT:** PROPOSED NRC GENERIC LETTER 96-xx, "LOSS OF REACTOR COOLANT INVENTORY AND ASSOCIATED POTENTIAL FOR LOSS OF EMERGENCY MITIGATION FUNCTIONS WHILE IN A SHUTDOWN CONDITION"

### **PURPOSE:**

To inform the Commission of the staff's intent to issue the subject generic letter. In the generic letter, the staff requests that the licensees of all pressurized-water reactors submit to the NRC certain information [pursuant to Section 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.54(f))] regarding the subject matter of this generic letter. This information is needed to verify licensees' compliance with the current licensing bases for their facilities; in particular, to assess whether the addressees are maintaining the residual heat removal safety function to transfer fission product decay heat and other residual heat from the reactor core, in accordance with 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 34, and the emergency core cooling system (ECCS) to provide abundant emergency core cooling when required, in accordance with 10 CFR Part 50, Appendix A, GDC 35. The licensees are expected to implement actions, as appropriate, to address these issues, and all addressees are required to submit a written response to the NRC regarding implementation of the requested actions. A copy of the proposed generic letter is attached.

### **DISCUSSION:**

The staff is proposing to issue this generic letter to request that all addressees determine if their ECCSs are susceptible to common-cause failure as a result of events similar to the Wolf Creek reactor coolant system draindown event of September 17, 1994. If an addressee's ECCS is found to be susceptible to such common-cause failure, they are expected to take corrective

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**NOTE:** TO BE MADE PUBLICLY AVAILABLE IN 5  
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action, as appropriate, in accordance with Section XVI of Appendix B to 10 CFR Part 50, to ensure compliance with the regulatory guidance provided in GDCs 34 and 35.

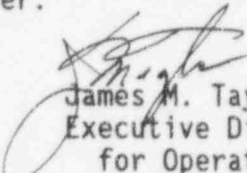
The staff issued Information Notice (IN) 95-03, "Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition," on January 12, 1995, to alert addressees to an incident at Wolf Creek involving the loss of reactor coolant inventory while the reactor was in a shutdown condition. On March 25, 1996, the staff issued a supplement to IN 95-03 that further analyzed the event. The draindown event at Wolf Creek represents a shutdown vulnerability that was not previously recognized. Events of this nature are considered particularly safety significant because they can result in a loss of emergency core cooling capability and also involve the potential for containment bypass. Another important feature of this event is the short time available for corrective action.

A notice of opportunity for public comment was not published in the *Federal Register* because the NRC staff has determined that the imposition of any additional time period to obtain public comments should be avoided to facilitate the resolution of this compliance based issue. However, comments on the information requested and the technical issues addressed by this generic letter may be sent to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001.

The Committee To Review Generic Requirements (CRGR) reviewed the proposed draft generic letter during its meeting (Number 291) on September 11, 1996. The staff incorporated the comments provided by the CRGR at that meeting. The CRGR has endorsed the proposed final generic letter without formal review.

The Office of the General Counsel reviewed this generic letter and has no legal objections to its content.

The staff intends to issue this generic letter approximately 5 working days after the date of this information paper.

  
James M. Taylor  
Executive Director  
for Operations

Attachment: Proposed Generic Letter, "Loss of Reactor Coolant Inventory and Associated Potential for Loss of Emergency Mitigation Functions While in a Shutdown Condition"

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UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR REACTOR REGULATION  
WASHINGTON, D.C. 20555-0001

November xx, 1996

NRC GENERIC LETTER 96-xx: LOSS OF REACTOR COOLANT INVENTORY AND ASSOCIATED  
POTENTIAL FOR LOSS OF EMERGENCY MITIGATION  
FUNCTIONS WHILE IN A SHUTDOWN CONDITION

Addressees

All holders of operating licenses (except those that have been amended to a possession-only status) for pressurized-water reactors (PWRs).

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this generic letter to request that all addressees submit to the NRC certain information [pursuant to Section 50.54(f) of Title 10 of the *Code of Federal Regulations* (10 CFR 50.54(f))] regarding the subject matter of this generic letter. This information is needed to verify licensees' compliance with the current licensing bases for their facilities; in particular, to assess whether the addressees are maintaining the residual heat removal (RHR) safety function to transfer fission product decay heat and other residual heat from the reactor core, in accordance with 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 34, and the emergency core cooling system (ECCS) to provide abundant emergency core cooling when required, in accordance with 10 CFR Part 50, Appendix A, GDC 35. The licensees are expected to implement actions, as appropriate, to address these issues; and all addressees are required to submit a written response to the NRC regarding implementation of the requested actions.

Background

The NRC issued Information Notice (IN) 95-03, "Loss of Reactor Coolant Inventory and Potential Loss of Emergency Mitigation Functions While in a Shutdown Condition," on January 12, 1995, to alert addressees to an incident at the Wolf Creek Plant involving the loss of reactor coolant inventory while the reactor was in a shutdown condition. In that event, operators were attempting to reborate RHR train B while at the same time maintenance personnel were repacking a RHR train A to train B crossover isolation valve. Train B is reborated by recirculating water through a loop that contains the RHR system piping, the refueling water storage tank (RWST), a containment spray pump, a manual RWST isolation valve, and a RHR system crossover line. When the storage tank isolation valve was opened for the reboration process and the train A to train B crossover isolation valve was opened for stroke testing, a drain-down path was inadvertently created from the reactor coolant system (RCS) to the RWST. This drain-down path included a suction header common to all ECCS pumps.

Attachment

Events of this nature are considered particularly significant because they can result in loss of emergency core cooling capability and involve the potential for containment bypass. On February 25, 1996, the staff issued a supplement to IN 95-03 that further analyzed the event. The NRC has also issued a number of other communications describing events at reactor facilities involving inadvertent loss of reactor coolant inventory while the reactor was in a shutdown condition. The Office for Analysis and Evaluation of Operational Data (AEOD) published AEOD/E704, "Discharge of Primary Coolant Outside of Containment at PWRs While on RHR Cooling," in March 1987, in which it documented six events involving RCS backflow into the RWST. In Generic Letter (GL) 88-17, "Loss of Decay Heat Removal (DHR) 10 CFR 50.54(f)," dated October 17, 1988, the NRC requested several actions to address loss-of-DHR events that occurred while reactors were in a shutdown condition. In IN 91-42, "Plant Outage Events Involving Poor Coordination Between Operations and Maintenance Personnel During Valve Testing and Manipulations," dated June 27, 1991, the NRC discussed inadvertent loss-of-inventory events.

#### Discussion

At Wolf Creek, all ECCS pump suction lines are tied into a common suction header. When the draindown event occurred at Wolf Creek, hot RCS water was introduced into this common suction header between the RWST and the ECCS pumps. This hot water flashed to steam, resulting in a steam/water mixture in the header. In the event of an ECCS actuation, this mixture would have been introduced into the suction of the ECCS pumps. If operators had not been able to terminate the event, the hot water in the RWST suction piping might have led to steam binding, which could have affected all pumps in both ECCS trains. In addition, water flashing to steam in the header and the RWST could have caused serious mechanical damage to the RHR piping and the RWST as a result of water hammer. Finally, steaming through the RWST establishes a containment bypass path.

The licensee estimated (using actual plant conditions) that for an unmitigated event, the reactor vessel water level could have drained to the bottom of the hot leg within 5 minutes and, as a consequence, RHR pump A would have lost suction, cavitated, and failed. Shortly thereafter, the common ECCS suction header could have reached a 90-percent steam/water ratio. The licensee also estimated that continued boil-off could have caused the pressure vessel water level to drop to the point of core uncover in less than 1 hour.

The AEOD report "Reactor Coolant System Blowdown at Wolf Creek on September 17, 1994," (AEOD/S95-01), dated March 1995, noted 19 events in which RCS water was transferred to the RWST. On the basis of this history and the potential for containment bypass, the staff has concluded that additional information is required to confirm the adequacy of existing ECCS configuration control and operating practices regarding residual heat removal.



#### Requested Action(s)

Addressees are requested to determine whether their ECCSs are susceptible to common-cause failure as a result of events similar to the Wolf Creek RCS draindown event of September 17, 1994.

If ECCSs are found to be susceptible to such common-cause failure, addressees are expected to take corrective action, as appropriate, in accordance with the requirements stated in Section XVI of Appendix B to 10 CFR Part 50, to ensure compliance with the regulatory guidance provided in GDCs 34 and 35.

#### Requested Information

Within 120 days of the date of this generic letter, addressees are requested to submit a written summary report stating actions taken in response to the requested actions noted above, conclusions that were reached relative to susceptibility to an RCS draindown with a potential for consequential common-cause ECCS failure, and corrective actions that were implemented or are planned to be implemented. If systems were found to be susceptible to the conditions that are discussed in this generic letter, describe potential draindown flow paths, the pipe sizes involved, the valves in the flow path and their normal position, interlocks, control room position indication, potential valve testing manipulations or use, and administrative controls used to control valve manipulations such that draindowns are precluded.

#### Required Response

Within 30 days of the date of this generic letter, addressees are required to submit a written response indicating (1) whether or not the requested actions will be taken, (2) whether or not the requested information will be submitted, and (3) whether or not the requested information will be submitted within the requested time period. Addressees who choose not to complete the requested actions, or choose not to submit the requested information, or are unable to satisfy the requested completion date must describe in their response any alternative course of action that is proposed to be taken, including the basis for establishing the acceptability of the proposed alternative course of action and the basis for continued operability of affected systems and components, as applicable.

Address the required written reports to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, under oath or affirmation under the provisions of Section 182a of the Atomic Energy Act of 1954, as amended, and 10 CFR 50.54(f). In addition, submit a copy to the appropriate regional administrator.

#### Backfit Discussion

This generic letter requests information from the addressees under the provisions of 10 CFR 50.54(f). In view of the Wolf Creek draindown event, this information is needed to verify licensees' compliance with the current

licensing bases for their facilities; in particular, to assess whether the addressees are maintaining the RHR safety function to transfer fission product decay heat and other residual heat from the reactor core, 10 CFR Part 50, Appendix A, GDC 34, and the ECCS to provide abundant emergency core cooling when required, 10 CFR Part 50, Appendix A, GDC 35.

The requested actions specified in this generic letter are considered compliance backfits under the provisions of 10 CFR 50.109(a)(4)(i), and existing NRC procedures to ensure that protection against an RCS draindown with potential for consequential common-cause ECCS failure will be provided. In accordance with the provisions of 10 CFR 50.109 regarding compliance backfits, a full backfit analysis was not performed for this proposed action; but the staff performed a documented evaluation that stated the objectives of and reasons for the requested actions and the basis for invoking the compliance exception. A copy of this evaluation will be placed in the NRC Public Document Room.

#### Federal Register Notification

A notice of opportunity for public comment was not published in the *Federal Register* because the NRC staff has determined that the imposition of any additional time period to obtain public comments should be avoided to facilitate the resolution of this compliance based issue. However, comments on the information requested and the technical issues addressed by this generic letter may be sent to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001.

#### Paperwork Reduction Act Statement

This generic letter contains information collections that are subject to the Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.). These information collections were approved by the Office of Management and Budget (OMB), approval number 3150-0011, which expires July 31, 1997.

The public reporting burden for this collection of information is estimated to average 80 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. The U.S. Nuclear Regulatory Commission is seeking public comment on the potential impact of the collection of information contained in the generic letter and on the following issues:

1. Is the proposed collection of information necessary for the proper performance of the functions of the NRC, including whether the information will have practical utility?
2. Is the estimate of burden accurate?

3. Is there a way to enhance the quality, utility, and clarity of the information to be collected?
4. How can the burden of the collection of information be minimized, including the use of automated collection techniques?

Send comments on any aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch, T-6 F33, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0011), Office of Management and Budget, Washington, D.C. 20503.

The NRC may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

If you have any questions about this matter, please contact the technical contact listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

Thomas T. Martin, Director  
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Office of Nuclear Reactor Regulation

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Attachment:  
List of Recently Issued NRC Generic Letters