RULEMAKING ISSUE
COMMISSION MEETING

September 28, 2009 SECY-09-0140

FOR: The Commissioners

FROM: R. W. Borchardt
Executive Director for Operations

SUBJECT: RULEMAKING RELATED TO DECOUPLING AN ASSUMED LOSS OF OFFSITE POWER FROM A LOSS-OF-COOLANT ACCIDENT, 10 CFR PART 50, APPENDIX A, GENERAL DESIGN CRITERION 35 (RIN 3150-AH43)

PURPOSE:

To seek a Commission decision on the staff's recommended option to discontinue the rulemaking effort to decouple the analysis assumption that a loss of offsite power (LOOP) occurs coincident with a large-break loss-of-coolant accident (LOCA).

SUMMARY:

The Nuclear Regulatory Commission (NRC) staff recommends that the Commission discontinue the LOOP/LOCA rulemaking. The staff's recommendation is based on the lack of a fully developed regulatory basis and expenditures of staff time to develop one would not be expected to result in a quantifiable safety improvement. This recommendation is, to some extent, driven by a decision made by the Boiling Water Reactors Owners Group (BWROG) to withdraw a BWROG topical report that the NRC staff was using to develop the regulatory basis for a LOOP/LOCA rule.

BACKGROUND:

On March 31, 2003, in the staff requirements memorandum (SRM) responding to SECY-02-0057, "Update to SECY-01-0133, 'Fourth Status Report on Study of Risk-Informed Changes to the Technical Requirements of 10 CFR Part 50 (Option 3) and Recommendations on Risk-Informed Changes to 10 CFR 50.46 (ECCS Acceptance Criteria),'" the Commission

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directed the staff to proceed with rulemaking to risk-inform the emergency core cooling system (ECCS) functional reliability requirements in General Design Criterion (GDC) 35, "Emergency Core Cooling," of Appendix A, "General Design Criteria for Nuclear Power Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and thus relax the current analysis requirements for considering a LOOP to occur coincident with a large-break LOCA.

In SECY-04-0037, "Issues Related to Proposed Rulemaking to Risk-Inform Requirements Related to Large Break Loss-Of-Coolant Accident (LOCA) Break Size and Plans for Rulemaking on LOCA with Coincident Loss-of-Offsite Power," dated March 3, 2004, the staff proposed to review a topical report and pilot exemption request that would be submitted by the BWROG to relax the assumed coincident LOOP required for LOCA analysis. If found acceptable and approved by the NRC staff, this BWROG topical report was intended to substantially serve as the technical portion of the regulatory basis for the LOOP/LOCA rulemaking. The Commission approved this proposal in its subsequent SRM dated July 1, 2004.

In December 2007 (COMSECY-07-0041), the staff informed the Commission that if either the BWROG topical report NEDO-33148, "Separation of Loss of Offsite Power from Large Break LOCA" (Agencywide Documents Access and Management System (ADAMS) accession number ML041210900) or the 10 CFR 50.46a final rule are not approved, it would be unlikely that a LOOP/LOCA rule would be worth pursuing. In its February 4, 2008, response, the Commission approved the staff's request to defer the schedule for the LOOP/LOCA rulemaking and directed the staff to keep the existing Commission action on the rule open pending review of the decisions on the 10 CFR 50.46a final rule and the BWROG topical report.

The following timeline reflects the history of activities related to the review of the BWROG topical report:

April 27, 2004	BWROG submits licensing topical report NEDO-33148, "Separation of Loss of Offsite Power from Large Break LOCA."
July 20, 2004	NRC staff accepts NEDO-33148 for comprehensive review but twice defers start of review until January and then October 2005 because of resource limitations (ML042030516, ML050870389).
December 2, 2005	NRC issues requests for additional information (RAIs) (ML053330380).
February 14, 2006	NRC holds a public meeting to discuss the RAIs. BWROG decides to revise NEDO-33148 to be a methodology document with respect to the risk assessment, rather than a generic risk assessment intended to be referenced by licensees with minimal need to do plant-specific analyses (ML060550493).

April 20, 2006	NRC issues revisions to the December 2, 2005, RAIs based on the February 14, 2006, public meeting (ML061030403).
June 14, 2006	NRC holds a public meeting to discuss the revised RAIs (ML061790565).
August 25, 2006	BWROG submits NEDO-33148, Revision 2, as a methodology document rather than a generic result document (ML062480321).
June 15, 2007	NRC staff issue RAIs on NEDO-33148, Revision 2 (ML071630548).
July 25, 2007	NRC holds a public meeting to discuss the RAIs (ML072700668).
September 28, 2007	BWROG submits a response to the June 15, 2007, RAIs (ML072750041).
March 14, 2008	NRC staff issues additional RAIs (ML080720484).
March 24, 2008	NRC issues a letter of outstanding issues on NEDO-33148 to the BWROG. The letter includes proposed limitations and conditions for approval of NEDO-33148 (ML080230696).
June 12, 2008	BWROG withdraws NEDO-33148 from further NRC review and discontinues its effort, stating that "if ultimately approved in the form presently desired by NRC staff, adoption by licensees would most likely be prohibitively expensive" (ML081680048).
December 19, 2008	The Commission is notified of the withdrawal of NEDO-33148 and of the staff's plan to reassess the need for this rulemaking (ML082950233, currently nonpublic).

DISCUSSION:

The LOOP/LOCA rulemaking has been pursued in parallel with the rulemaking for a new 10 CFR 50.46a, which presents a risk-informed redefinition of large-break LOCA ECCS analysis requirements. The 10 CFR 50.46a rule is currently available for public comment as a revised proposed rule. When promulgated as a final rule, the alternative 10 CFR 50.46a rule would allow both pressurized water reactors (PWRs) and boiling water reactors (BWRs) to decouple a LOOP from a LOCA for certain break sizes. For PWRs, this size is any break larger than about 11 inches in diameter; for BWRs, it is any break larger than about 21 inches. The NRC staff intended to derive a rule from NEDO-33148 to benefit BWR licensees by further decreasing the break size to about 10 inches in diameter. Such a rule would allow BWR licensees to make the following seven specific design changes (as sought after in NEDO-33148) that otherwise could not be made without exemptions from the current 10 CFR 50.46 or the new alternative 10 CFR 50.46a:

(1) optimized emergency diesel generator (EDG) loading;

(2) maintenance of one residual heat removal loop in a suppression pool cooling mode;

(3) elimination of loop select logic for the low-pressure coolant injection system;

(4) allowance for slow starting EDGs;

(5) allowance for starting EDGs only upon a LOOP;

(6) simplification of EDG startup; and

(7) increased stroke times for motor-operated valves.

The BWROG initially chose to pursue an approach that relied on a generic probabilistic risk assessment (PRA) and on other published reports, authored by both the NRC and industry, for justification of several important assumptions made in NEDO-33148 (e.g., large-break LOCA probability, consequential/delayed LOOP, and double sequencing[1] of electrical loads). The staff, however, expects topical reports to contain complete and detailed information on the specific subject presented. The staff also noted that many of the "other published reports" had not been reviewed by the NRC. The BWROG proposed to address these issues in Revision 2 of NEDO-33148 submitted on August 25, 2006. Revision 2 was modified to present the risk analyses as risk assessment methodologies rather than a generic risk assessment. Double sequencing and other issues were purportedly addressed through conservative assumptions. The staff's March 24, 2008, letter details the conditions and limitations that the staff concluded were required for approval of NEDO-33148. Some of the outstanding technical issues include LOOP/LOCA frequency determinations, seismic contributions to break frequency, the maintenance of defense in depth, and the treatment of delayed LOOP and double sequencing issues. These issues would need to be adequately addressed in order to complete a regulatory basis that could support a LOOP/LOCA rulemaking.

With regard to risk and safety, the NRC staff does not believe that the seven specific BWR design changes discussed in NEDO-33148 would result in either a quantifiable safety improvement or a significant increase in risk (i.e., they are essentially "risk neutral"), provided that the proposed conditions and limitations are met.

The BWROG's withdrawal letter stated that further development of NEDO-33148 "is no longer cost effective and, if ultimately approved in the form presently desired by NRC staff, adoption by licensees would most likely be prohibitively expensive." The withdrawal of NEDO-33148 and discontinued effort by the BWROG demonstrates a loss of industry support for a LOOP/LOCA rulemaking given the conditions and limitations required by the staff in its March 24, 2008, letter.

In both SECY-01-0133 and SECY-02-0057, the NRC staff recommended developing a possible risk-informed alternative to reliability requirements in 10 CFR 50.46/GDC 35. In support of this

[1] Double sequencing is defined as the unintended sequence of operations at a nuclear power plant during which safety and accident mitigation loads automatically start, shut down, and restart in rapid succession when called on to operate. Double sequences can have a range of detrimental effects from simple delay of function success because of restarts to causing unrecoverable failure of pumps and generators.

potential alternative to GDC 35, the staff performed substantial work in a number of technical areas, including LOCA frequency estimation and conditional probability of LOOP given a LOCA (see memorandum from A. Thadani to S. Collins, "Transmittal of Technical Work to Support Possible Rulemaking on a Risk-Informed Alternative to 10 CFR 50.46/GDC 35," dated July 31, 2002; ML022120661). As part of this work, the NRC staff identified a number of areas of uncertainty associated with estimating the conditional probability of a LOOP given occurrence of a LOCA (e.g., very limited data on major ECCS actuations and LOOPs after such actuations, incomplete knowledge about all of the factors that can impact the probability of consequential LOOP due to plant-centered or transient factors,[2] and the impact on offsite system voltage due to deregulation of the electric utility industry). With the withdrawal of NEDO-33148, in order to complete a fully developed regulatory basis for the LOOP/LOCA rulemaking, the staff would need to ensure that these areas of uncertainty are adequately addressed.

In May 2002, the NRC received a petition for rulemaking (PRM) related to this topic. The petition, docketed as PRM-50-77 in June 2002 (67 FR 40622), requested that the NRC amend its regulations in Appendix A to 10 CFR Part 50 to eliminate the requirement to assume a LOOP coincident with postulated accidents. The petition was resolved by a decision to consider its issues within this rulemaking activity (NUREG-0936, Vol. 26, No. 2), but the petition remained open because of the ongoing developments related to this rule. However, in late 2007, the NRC Executive Director for Operations approved changes to the PRM process to enhance the efficiency and effectiveness of PRM dispositions. As a result, the NRC closed this petition in April 2009 (74 FR 16802) with a commitment to follow through with the original resolution to consider it within the LOOP/LOCA rulemaking. Therefore, if the Commission decides to discontinue this rulemaking, the NRC must publish a document in the *Federal Register* that addresses why the agency did not adopt the petitioner's requested rulemaking changes. The NRC communicated this possibility to the petitioner and to the public when it closed the PRM docket. Because the petition did not present any technical information beyond what the NRC staff has already considered, the basis for a decision on the rulemaking should be the same basis for a final disposition of the petition's requested changes.

REQUESTED ACTION:

The NRC staff requests that the Commission choose one of the following rulemaking options.

OPTIONS:

Option 1: Discontinue the rulemaking

Pros: The NRC would take definitive action on the rule.

The NRC staff would not incur the significant resource expenditures needed to independently complete the development of a regulatory basis that, in the end, might be "prohibitively expensive" for licensees to implement.

Cons: The significant industry and NRC resources already expended to develop and to review

[2] As used here, transient factors include the electrical disturbance triggered by the LOCA and the conditions of the offsite transmission system grid.

NEDO-33148 would not result in a regulatory change.

The NRC would not develop a complete regulatory basis to support LOOP/LOCA rulemaking for the smaller break size LOCAs for BWRs.

Option 2: Proceed with the rulemaking

Pros: The expended resources and lessons learned during the review of NEDO-33148 would supplement the previous staff efforts in support of a potential risk-informed alternative to GDC 35 and produce a regulatory change.

Cons: This option requires the NRC to expend significant additional resources to complete a fully developed regulatory basis to support the rule.

The rule is expected to be essentially "risk neutral."

The rule would be an alternative regulatory approach that licensees might not choose to adopt since it might not provide licensees with cost-effective operational benefits.

Option 3: Defer the decision until the 10 CFR 50.46a rule is implemented (estimated to be late 2012)

Pros: This option allows time to obtain feedback on the implementation of 10 CFR 50.46a and to determine if there is sufficient incremental benefit to be obtained from a separate LOOP/LOCA rulemaking.

Cons: This option delays the decision on the rulemaking.

The NRC would not develop a complete regulatory basis to support LOOP/LOCA rulemaking for the smaller break size LOCAs for BWRs.

This option would not alleviate the Cons under Option 2.

RECOMMENDATION:

The staff recommends that the Commission approve Option 1 to discontinue the LOOP/LOCA rulemaking.

Option 1 is recommended because the lack of a fully-developed regulatory basis and apparent loss of industry support does not justify continued NRC effort on this rulemaking. The rule would be an alternative regulatory approach, and its implementation would not be expected to result in either a quantifiable safety improvement or a significant increase in risk (i.e., it is essentially "risk neutral"), provided that the proposed conditions and limitations are met. There is currently no technical concern with the existing rule. When the 10 CFR 50.46a rule is promulgated as a final rule, licensees will then have the opportunity to decouple LOOP from a large-break LOCA. Finally, the staff believes that a LOOP/LOCA rule is unlikely to be widely adopted because of the BWROG's belief that it would be "prohibitively expensive" to do so.

Under Option 2, completion of a regulatory basis would necessitate a significant expenditure of staff resources to fully define and address areas of uncertainty associated with the issues identified in the staff's March 24, 2008, letter to the BWROG. The staff estimates that the regulatory basis development and rulemaking process would take approximately 5 to 6 FTE (including any necessary contract support) assuming a standard three-year period for these activities. Approval of Option 2 may still not result in the timely development of the rule because of the low priority status it was accorded by the NRC's rulemaking common prioritization methodology and the lack of resources currently allocated to this project.

Given the BWROG's decision to no longer support the initiative, Option 3 now appears to have little incremental regulatory benefit. As currently proposed, the alternative 10 CFR 50.46a rule would not address the LOOP/LOCA issue for the smaller break size LOCAs for BWRs. Therefore, a LOOP/LOCA regulatory basis would have to be independently developed by the staff even if the 10 CFR 50.46a rule is approved.

Based on the foregoing discussion, the staff recommends that the Commission approve Option 1 to discontinue the LOOP/LOCA rulemaking. The staff would support resumption of LOOP/LOCA rulemaking in the future if licensees should express new interest and support for such an effort.

RESOURCES:

There are currently no resources funded or budgeted for this rulemaking. If either Option 1 or Option 3 is chosen, then no new resources would need to be budgeted. However, if Option 2 is chosen, the staff estimates that approximately 5 to 6 FTE would need to be budgeted and funded over a three-year period to support regulatory basis development and the rulemaking process.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The current resource implications do not meet the threshold for review by the Office of the Chief Financial Officer.

/RA Bruce S. Mallett for/

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