GENERIC ISSUE MANAGEMENT CONTROL SYSTEM REPORT
FOR FISCAL YEAR 2014 4th QUARTER

OFFICE OF NUCLEAR REGULATORY RESEARCH

Enclosure

TABLE OF CONTENTS

Generic Issue Management Control System

Description

The Generic Issue Management Control System (GIMCS) provides information relevant to the management and resolution of generic issues (GIs). The resolution of any GI may lead to safety enhancements and the promulgation of new or revised requirements or guidance. The GIMCS is designed to facilitate management of GIs from issue identification through resolution (development of new criteria, management review and approval, public comments, and incorporation into the regulations, as appropriate).

The procedures for processing GIs are contained in Management Directive (MD) 6.4, “Generic Issues Program,” and the Office of Nuclear Regulatory Research (RES), Office Instruction TEC-002, "Procedures for Processing Generic Issues." Other program offices may have instructions for handling GIs specific to their organization.

In accordance with 10 CFR 52.47(a)(21), applications for design certification must contain “Proposed technical resolutions of those Unresolved Safety Issues and medium- and high-priority generic safety issues which are identified in the version of NUREG-0933 current on the date up to 6 months before the docket date of the application and which are technically relevant to the design.” Similarly, in accordance with 10 CFR 52.79(a)(20), applications for combined licenses must contain “Proposed technical resolutions of those Unresolved Safety Issues and medium- and high-priority generic safety issues which are identified in the version of NUREG-0933 current on the date up to 6 months before the docket date of the application and which are technically relevant to the design.” As indicated in MD 6.4, prioritization of GIs was replaced by the screening process, in which a determination is made to either establish the proposed issue as a GI or not accept the issue into the program. For the purposes of 10 CFR 52.47(a)(21) and 10 CFR 52.79(a)(20), any GI established by the MD 6.4 screening process is considered equivalent to a HIGH-Priority GI.

Legend

ACRS - Advisory Committee on Reactor Safeguards
ASME - American Society of Mechanical Engineers
BNL - Brookhaven National Laboratory
BWR - Boiling-Water Reactor
BWROG - Boiling Water Reactor Owners Group
CDF - Core Damage Frequency
DCH - Direct Containment Heat
DE - Division of Engineering
DRA - Division of Risk Analysis
DSA - Division of Systems Analysis
DSS - Division of Safety Systems
CEUS - Central and Eastern United States
CRGR - Committee to Review Generic Requirements
ECCS - Emergency Core Cooling System
EDO - Executive Director of Operations
EPRI - Electric Power Research Institute
ESP - Early Site Permit
GI - Generic Issue (same meaning as GSI)
GIMCS - Generic Issue Management Control System
GL - Generic Letter
GR - Guidance Report
GSI - Generic Safety Issue
HPCS - High Pressure Core Spray
IN - Information Notice
IPEEE - Individual Plant Examination of External Events
LOCA - Loss of Coolant Accident
MD - Management Directive
MPVF - Maximum Potential Void Fraction
NEI - Nuclear Energy Institute
NPSH - Net Positive Suction Head
NRC - U.S. Nuclear Regulatory Commission
NRO - Office of New Reactors
NRR - Office of Nuclear Reactor Regulation
NSIR - Office of Nuclear Security and Incident Response
OEGIB - Operating Experience and Generic Issues Branch
OGC - Office of General Counsel
PUMA - Purdue University Multi-dimensional Integral Test Assembly
PWR - Pressurized-Water Reactor
RES - Office of Nuclear Regulatory Research
RIS - Regulatory Issue Summary
SBO - Station Blackout
SBPB - Balance-of-Plant Branch
SE - Safety Evaluation
SOW - Statement of Work
SRM - Staff Requirements Memorandum
SRP - Standard Review Plan
SSE - Safe Shutdown Earthquake
SSIB - Safety Issue Resolution Branch
TAC - Task Action Control

Legend (continued)

TAP	- Task Action Plan
TBD	- To Be Determined
TI	- Temporary Instruction
TVA	- Tennessee Valley Authority
USI	- Unresolved Safety Issue

Data Elements

Management and control indicators used in GIMCS are defined as follows:

1.	Issue Number	A unique number assigned to each generic issue
2.	Title	Generic issue title
3.	Type	Type designation (generic issue, unresolved safety issue, etc.)
4.	Office/Division /Branch	The Office, Division, and Branch of the task manager who has lead responsibility for resolving the issue
5.	Task Manager	The person leading the efforts to resolve the generic issue.
6.	Action Level	Active – The GI involves actions under the Generic Issues Program Inactive – No technical assistance funds appropriated for resolution, no task manager assigned, or task manager assigned to other work Transferred – Issue has been transferred out of the Generic Issues Program for additional research or scoping study Completed – All necessary work associated with the GI has been completed by the agency Regulatory Office Implementation – The GI has exited the formal GIP but actions outside the GIP remain, RES actions of safety/risk assessment or regulatory assessment are complete, and remaining actions reside with program offices
7.	TAC Number	Task Action Control (TAC) number assigned to the issue
8.	Resolution Status	In progress, resolved with requirements, or resolved with no requirements
9.	Identification Date	Date the issue was identified
10.	Generic Issue Acceptance Date	Date the issue was designated as a generic issue
11.	Technical Assessment	The date and status associated with completion of the technical assessment activity (when applicable)
12.	Regulation and Guidance Development	The date and status associated with completion of the regulation and guidance development activity (when applicable)

Data Elements (continued)

13.	Regulation and Guidance Issuance	The date and status associated with completion of the regulation and guidance issuance activity (when applicable)
14.	Safety Risk Assessment	The date and status associated with completion of the safety risk assessment activity (when applicable)
15.	Regulatory Assessment	The date and status associated with completion of the regulatory assessment activity (when applicable)
16.	Transfer to Regulatory Office for Action	The date and status associated with transfer of the issue to a regulatory office for action
17.	Completion of Verification	The date and status associated with completion of verification activities
18.	Closure	The date and status associated with agency closure of the GI
19.	Work Authorization	Who or what authorized work to be done on the issue
20.	Work Scope	Describes the problem and the technical work necessary to address or resolve the generic issue
21.	Status	Describes current status of work while also retaining an accurate running narrative discussion of major activities, milestones, and decision points
22.	Affected Documents	Identifies documents into which the technical resolution will be incorporated
23.	Problem/Resolution	Identifies current problem areas and describes what actions are necessary to resolve them. Note: Discussions of previous problems and resolutions are incorporated into the status narrative, as appropriate.
24.	Reasons for Schedule Changes	Narrative discussion associated with schedule changes
25.	Milestones	Selected significant dates Original – Scheduled dates reflected in the original Task Action Plan, plus additional original milestone dates added During resolution of the GI Current – Revised expected date of completion if the original date has changed Actual – The actual date the milestone was completed

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0191 **Type:** GI **Office/Division/Branch:** NRR/DPR/PGCB

Title: Assessment of Debris Accumulation on PWR Sump Performance

Resolution Status: In progress **Identification Date:** 09/01/1996 **Generic Issue Acceptance Date:**

Action Level: Regulatory Office Implementation **Task Manager:** Serita Sanders **TAC Number:** MC9003

Technical Assessment: 09/15/2001 (Actual/Complete) **Regulation and Guidance Development:** 09/24/2004 (Actual/Complete)

Regulation and Guidance Issuance: 09/30/2004 (Actual/Complete) **Transfer to Regulatory Office for Action:** 12/31/2007 (Actual/Complete)

Completion of Verification: **Closure:** 12/31/2018 (Estimated)

Work Authorization: Memo to D. Morrison from W. Russell, "Third Supplemental User Need Request...Accident Generated Debris," 12/07/95

DESCRIPTION:

This issue concerns the possibility that debris accumulating on the ECCS sump screen in PWRs may result in a loss of the net positive suction head (NPSH) margin. Loss of NPSH margin could impede or prevent the flow of water from the sump such that the system would not meet the criteria of 10 CFR 50.46. The screening assessment did not identify any immediate safety concerns.

WORK SCOPE:

The goals of the NRC's assessment were to: (1) determine if the transport and accumulation of debris in containment, following a LOCA, which could impede the operation of the ECCS in operating PWRs; (2) develop the technical basis for revising NRC's regulations or guidance as necessary; (3) provide NRC technical reviewers with sufficient information on phenomena involved to facilitate the review of any changes to plants that may be warranted; and (4) issue Generic Communications and work with industry to evaluate and resolve GI-191 for all PWRs.

Preliminary parametric calculations were completed in July 2001 indicating the potential for debris accumulation at operating PWRs. These calculations were representative of the operating PWR population. The staff's Technical Assessment concluded that GI-191 was a credible concern for the population of domestic PWRs, and that detailed plant-specific evaluations were needed to determine the susceptibility of each U.S.-licensed PWR to ECCS sump blockage. Following the ACRS review of the staff's Technical Assessment of the issue in September 2001, the issue was forwarded to NRR in a memorandum dated September 28, 2001. NRR has the lead for Stages 4 through 6 of the Generic Issues Process for GI-191. NRR evaluated the technical assessment and prepared a Task Action Plan for developing appropriate regulatory guidance and resolution of GI-191. NRR is currently working toward closure of the issue with all licensees.

STATUS:

The NRC issued Bulletin 2003-01 to PWR licensees on June 9, 2003, requesting them to: (1) confirm their compliance with 10 CFR 50.46 (b)(5) and other existing applicable regulatory requirements, or (2) describe any compensatory measures that have been implemented to reduce the potential risk due to post-accident debris blockage, as evaluations to determine compliance proceed. All PWR licensees provided a response to the Bulletin, indicating interim compensatory measures that would be implemented. The NRR Safety Issue Resolution Branch (SSIB) reviewed and evaluated the information provided, and determined that the licensees' actions were responsive and consistent with the guidance of Bulletin 2003-01. The NRR Division of Operating Reactor Licensing (DORL) issued close-out letters to the PWR licensees as these reviews were completed. Generic close-out of Bulletin 2003-01 was completed in December 2005.

NEI provided a Guidance Report (GR) to the staff in May 2004 containing the industry's proposed evaluation methodology for performing plant specific evaluations. The staff reviewed the GR and issued a draft SE, which resulted in a supplement to the GR. The final SE was issued in December 2004, resulting

in an NRC- approved methodology for evaluating the potential effects of debris on the ECCS strainers.

Generic Letter (GL) 2004-02 was issued in September 2004, requesting licensees to perform plant-specific mechanistic evaluations of sump performance following LOCA and high-energy line break events, and to implement corrective actions as required to ensure compliance with regulatory requirements. GL 2004-02 required licensees to respond within 90 days with their plans for performing the sump evaluation, including the proposed schedule for completion. All PWR licensees responded to the GL on schedule in September 2005. All PWR licensees committed to perform the required mechanistic evaluation of the ECCS strainers and modify their plants as necessary to ensure compliance with regulations. The staff evaluated all 90-day responses to Generic Letter 2004-02 and in early 2006 issued comments to licensees to be addressed in their final response submittals.

One issue that needed to be addressed was the potential for chemical precipitates and corrosion products to significantly block a fiber bed and increase the head loss across an ECCS sump screen. A joint NRC/Industry Integrated Chemical Effects Testing program was started in 2004 to address these concerns, and was completed in August 2005. Chemical precipitation products were identified during the test program, and follow-up testing and analyses were conducted to address the effect on head loss. Information Notice (IN) 2005-26, "Results of Chemical Effects Head Loss Tests in a Simulated PWR Sump Pool Environment," was issued on September 16, 2005.

The NRC conducted additional research in certain areas to support evaluation efforts and provide confirmatory information. These areas include research on chemical effects to determine if the pressurized-water reactor sump pool environment generates byproducts which contribute to sump clogging, research on pump head losses caused by accumulation of containment materials and chemical byproducts, and research to predict the chemical species that may form in these environments. The staff completed reports regarding chemical effects on one type of PWR post-LOCA pool chemistry on January, 13, 2006 (ML053550433), and regarding other PWR containments on January 26, 2006 (ML060190713). Supplement 1 to IN 2005-26 was issued on January 20, 2006, to specifically provide additional information regarding test results related to chemical effects in environments containing dissolved phosphate. NRR expected that recipients of the notice would review the information for applicability to their facilities and consider taking actions, as appropriate, to avoid similar issues. Research was also conducted and documented on the transportability of coating chips in containment pool environments, and on the effect of ingested debris on downstream valve performance.

Between July and September 2006, the staff completed research including the following topics: (1) thermodynamic simulations of containment sump pool chemical constituents, to predict the chemical reactions/byproducts in the pools; (2) pressure loss across containment sump screens due to fiber insulation, chemical precipitates, and coating debris; and (3) a literature survey to determine the potential contribution of material leached from containment coatings to the chemical products formed in the containment sump pool. Additional research activities included development of a revised head-loss correlation and completion of a peer review of the NRC's chemical effects research program. All planned NRC-sponsored research activities for GI-191 have been completed and documented.

Strainer modifications were completed at all PWRs. These modifications typically increased strainer size by one to two orders of magnitude. The NRC believes these modifications have significantly reduced the risk of strainer clogging.

To confirm adequate implementation and resolution of GI-191, the NRC conducted detailed plant audits examining the analyses and design changes used to address the issues. Two pilot audits were performed in 2005 (Crystal River Unit 3 and Fort Calhoun) to provide opportunities to exercise and improve the NRC evaluation process. Nine full-scope plant audits were also performed. To support the audits, the NRC staff also visited sump strainer vendor facilities to observe head loss and chemical effects testing. Additional limited-scope audits were conducted in 2008 and 2009 to address chemical effects.

In addition to the plant audits identified above, the staff reviewed licensee responses to GL 2004-02 (received in 2008 and 2009) and items identified from NRC Regional inspections that were performed using Temporary Instruction TI-2515/166. These reviews identified the need for additional information from most licensees in order for the NRC to conclude that the licensees have fully addressed the sump issues. Licensee responses to these requests for additional information and subsequent NRC staff reviews of the responses are ongoing.

An emergent issue that needs to be resolved to close GI-191 involves in-vessel downstream effects - the potential for debris to bypass the sump strainers and enter the core. The NRC staff determined in 2008 that additional industry-sponsored testing was necessary to support resolution of this issue. The testing resulted in submittal of a topical report to the NRC in April 2009. The staff determined that additional testing was needed to support the topical report

conclusions. The PWR Owners Group funded additional testing and expected it to be completed by the end of 2009. However, the NRC staff identified the need for further testing as some of the tests yielded unexpected results. Further evaluation and testing were performed. On July 20, 2012, the Pressurized Water Reactor Owners Group (PWROG) submitted to the NRC for review and approval Topical Report (TR)-WCAP-16793-NP-A, "Evaluation of Long-Term Cooling Considering Particulate, Fibrous and Chemical Debris in the Recirculating Fluid," Revision 2 (ADAMS Accession No. ML13239A114) to address the effects of debris on the reactor core. The TR guidance and acceptance bases were developed through analyses and flow testing using representative fuel assemblies and ECCS flow rates. On April 8, 2013 (ADAMS Accession No. ML13084A152), the NRC staff issued a SE on TR WCAP-16793-NP, Revision 2, finding it an acceptable model for assessing the effect of sump strainer bypassed fibrous, particulate, and chemical debris on core cooling in PWRs. Licensees may use the topical report and associated staff SE to evaluate the effects of debris that reach the core.

Another emergent regulatory issue involved some licensees taking credit for certain vendor testing as a basis for assuming reduced generation of debris following a LOCA. The NRC staff reviewed the report of this testing and developed a number of questions regarding it. Despite numerous interactions with the industry on these questions, the NRC staff could not conclude that the reduced debris generation assumptions were valid. The NRC staff informed the industry in March 2010 that it did not accept the testing. The industry responded that it would conduct a new testing effort to address the staff's concerns, with the intent of still crediting reduced debris generation. The industry completed this testing in 2011. The industry report has not been formally submitted for staff review, but the staff has performed a review of the testing and associated debris generation evaluations. No plant has referenced the report. If the report is referenced by plants in the future, the NRC staff will determine the acceptability of its application to each plant specific condition.

In April 2010, the staff and industry briefed the Commission regarding the status of resolution of GI-191. Representatives from industry summarized the actions taken to address the issue and suggested that these actions have resolved the safety implications of this GI. The industry representatives further recommended resolution and closure via the application of 10 CFR 50, Appendix A, General Design Criterion 4 (GDC-4). This criterion allows crediting, for certain purposes, the high likelihood that a reactor coolant leak would be detected before a major piping rupture would occur; the NRC staff has not heretofore allowed this credit for resolving sump performance issues. The staff acknowledged the industry's actions to address this issue. However, the staff stated its position is that the issue remains of concern for plants that have not demonstrated adequate sump performance using methods acceptable to the NRC. Based on the information presented, the Commission directed the staff to provide information on potential approaches for bringing GI-191 to closure. The staff provided this information in SECY-10-0113, "Closure Options for Generic Safety Issue - 191, Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance," dated August 26, 2010. The Commission issued its staff requirements memorandum (SRM) in December 2010. The Commission determined that it was prudent to allow the nuclear industry to complete testing on in-vessel effects and zone of influence in 2011, and to develop a path forward by mid-2012. The SRM directed the staff to evaluate alternative approaches, including risk-informed approaches, for resolving GI-191 and to present them to the Commission by mid-2012.

Based on the interactions with stakeholders and the results of the industry testing, the NRC staff developed three options to resolve GI-191. These options were documented and proposed to the Commission in SECY-12-0093, "Closure Options for Generic Safety Issue 191, 'Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance,'" dated July 9, 2012 (ADAMS Accession No. ML121310648). All options would require licensees to demonstrate compliance with 10 CFR 50.46, "Acceptance criteria for emergency core cooling systems for light-water nuclear power reactors." The options are summarized as follows:

Option 1 allows the use of approved models and test methods. Licensees choosing this option will have relatively low fiber plants that can demonstrate that less than 15 grams of fiber per fuel assembly can reach the reactor core.

Option 2 requires implementation of additional mitigative measures until resolution is completed and allows additional time for licensees to resolve issues through further industry testing or use of a risk informed approach. Licensees choosing this option generally have more problematic materials in containment or desire additional margin for their in-vessel debris limits.

Option 2A Deterministic: Industry to perform more testing and analysis and submit TR WCAP for NRC review and approval (in-vessel only).

Option 2B Risk Informed: Industry to develop a risk informed approach to quantify the risk associated with GI-191 and submit a license amendment request for NRC review and approval.

Option 3 involves separating the regulatory treatment of the sump strainer and in vessel effects. The ECCS strainers will be evaluated using currently approved models while in-vessel will be addressed using a risk-informed approach.

The options allowed industry alternative approaches for resolving GI-191. The Commission issued a Staff Requirement Memorandum on December 14, 2012 (ADAMS Accession No. ML12349A378), approving all three options for closure of GI-191.

Current Status of Staff Reviews:

Option 1 Plants:

Catawba Units 1 and 2*
McGuire Units 1 and 2*
Oconee Units 1, 2 and 3*
Salem Units 1 and 2*
Bryon Units 1 and 2
Braidwood Units 1 and 2
Sequoyah Units 1 and 2
Prairie Island Units 1 and 2
Watts Bar Unit 1

*The staff has issued closeout GL 2004-02 documentation for these Option 1 plants. The review of Sequoyah Units 1 and 2 is in final concurrence. The staff is waiting for documentation from all other Option 1 plants to complete its final review. Although Watts Bar Unit 2 is still under construction and the operating license application is still under review, the plant provided its response to GL 2004-02 and the staff has issued its closeout GL 2004-02 documentation for Watts Bar Unit 2.

Option 2 Plants:

Option 2A Deterministic Plants:

ANO Units 1 and 2
Beaver Valley Units 1 and 2
Callaway
Calvert Cliffs Units 1 and 2
Comanche Peak Units 1 and 2
Davis Besse
D. C. Cook Units 1 and 2
Farley Units 1 and 2
Fort Calhoun
Harris
Indian Point Units 2 and 3
Millstone Units 2 and 3
North Anna Units 1 and 2
Palo Verde Units 1,2,and 3
Robinson
Surry Units 1 and 2
TMI 1
V. C. Summer
Waterford 3

With respect to the Option 2A plants, public meetings were held in the spring of 2014 with the PWROG to discuss the testing and analyses being proposed. The staff completed an audit at the Westinghouse Offices in September 2014. The PWROG is planning to submit a new TR-WCAP-17788 in the spring of 2015 that is intended to justify higher fiber limits than currently approved by the staff. The NRC anticipates a one year review time.

Option 2B Risk Informed

South Texas Project (STP) Units 1 and 2
Diablo Canyon Units 1 and 2
Palisades
Seabrook
St Lucie Units 1 and 2
Turkey Point Units 2 and 4
Vogtle Units 1 and 2
Wolf Creek

STP is the pilot for Option 2B. STP submitted an application for staff review On November 13, 2013. The staff is currently reviewing the application and has issued requests for additional information (RAIs). The licensee has responded to the RAIs and the staff is currently reviewing the responses. The staff and the licensee met with ACRS Subcommittees on Thermal-Hydraulics Phenomena and Reliability and Probabilistic Risk Assessment (PRA) on September 3, 2014. More ACRS subcommittee meetings and a ACRS full committee meeting are planned prior to the NRC completing its review of the application. The staff anticipates completion of the review in fall of 2015. All other plants choosing Option 2B will submit applications in a staggered schedule after STP is approved.

Option 3 Plants

Point Beach Units 1 and 2

The staff is currently developing guidance for an Option 3 review. The preparation of the guidance will be informed by NRC staff review of the STP risk-informed submittal. The staff anticipates submittal of the Point Beach application after the staff completes the STP review.

The NRC staff is also coordinating the development of a risk-informed proposed rulemaking, 10CFR50.46c, with the review of the Option 2B plants. The Commission directed the staff to develop a risk-informed option to 10CFR50.46 long term core cooling requirement with respect to debris. Lessons learned from the review of the Option 2B plants will be incorporated into regulatory guidance for implementation of this rule.

To provide open communication on NRC activities associated with GI-191 resolution, public meetings and/or conference calls with NEI and industry representatives continue to be held regularly. Briefings of ACRS have been scheduled periodically to provide opportunities for communication on technical issues and additional public involvement.

AFFECTED DOCUMENTS:

(1) Regulatory Guide 1.82
(2) NUREG-0800 (Sections 6.2.2 and 6.3)
(3) Bulletin 2003-01
(4) Generic Letter 2004-02
(5) Information Notice 2005-26 and supplement 1

PROBLEM/RESOLUTION:

Licensees submitted supplemental responses to GL 2004-02 in 2008 to the present. The staff's initial review of these responses is complete. However, reviews completed to date have identified the need for more information from some licensees. Staff reviews of the additional information will continue.

REASONS FOR SCHEDULE CHANGES:

The NRC plans to close GI-191 when the staff has completed all reviews of GL 2004-02.

RES changed the status of GI-191 to Regulatory Office Implementation (see ML071630094) as part of improvements to the GI Program described in SECY-07-0022, "Status Report on Proposed Improvements to the Generic Issues Program," (ML063460239). This improvement obviates the need for milestones specifically associated with the GI Program after the implementation phase begins. Issue closure will occur in accordance with applicable NRR Office programs as indicated in the remaining milestones.

Milestone	Original Date	Current Date	Actual Date
NRR User Need Request Sent to RES	12/01/1995		12/01/1995
User Need Request Assigned to GSIB/RES	01/01/1996		01/01/1996
Reassessment Declared a New GSI	09/01/1996		09/01/1996
Issue SOW for Evaluation of GSI A-43	11/01/1996		11/01/1996
Complete Evaluation of GSI A-43	04/01/1997		03/01/1997
Issue SOW for Reassessment of Debris Blockages in PWR Containments Impact on ECCS Performance	09/01/1998		09/01/1998
Complete Collection and Review of PWR Containment and Sump Design and Operation Data	12/01/1999		12/01/1999
Complete All Debris Transport Tests	09/01/2000		08/01/2000
Complete Parametric Evaluation	07/01/2001		07/31/2001
Proposed Recommendations to the ACRS	08/31/2001		08/31/2001
ACRS Review Completed	09/30/2001		09/14/2001
Issue Transferred from RES to NRR	09/28/2001		09/28/2001
Complete Reassessment of Debris Blockages in PWR Containments Impact on ECCS Performance	09/30/2001		09/28/2001
Prepare Memo Discussing Proposed Recommendations (End of Technical Assessment Stage of Generic Issue Process)	04/01/2002		09/28/2001
Complete Estimate of Average CDF Reduction, Benefits, and Costs	04/01/2002		09/28/2001
Issue Bulletin 2003-01	05/01/2003		06/01/2003

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Milestone	Original Date	Current Date	Actual Date
Complete Development of Models and Methods for Analyzing Impact of Debris Blockages in PWR Containments on ECCS Performance	04/01/2001		06/09/2003
Discuss Reg. Guide 1.82, Rev. 3 with ACRS SubCommittee on Thermal-Hydraulic Phenomena	08/20/2003		08/20/2003
Present Final Version of Reg. Guide 1.82, Rev. 3 to ACRS Full Committee	09/11/2003		09/11/2003
ACRS Letter on Final Version of Reg. Guide 1.82, Rev. 3	09/30/2003		09/30/2003
Draft Industry Guidance for Plant-Specific Analyses	10/30/2003		10/31/2003
Issue Reg. Guide 1.82, Rev.3	09/30/2003		11/30/2003
NRC Meeting with Stakeholders	03/23/2004		03/23/2004
NRC Meeting with Stakeholders	05/25/2004		05/25/2004
Receive Industry Guidance for Plant-Specific Analyses	09/30/2003		05/28/2004
NRC Meeting with Stakeholders	06/17/2004		06/17/2004
Brief ACRS SubCommittee on Proposed Generic Letter	06/22/2004		06/22/2004
NRC Meeting with Stakeholders	06/29/2004		06/29/2004
Develop Generic Letter for Resolution of GI	07/07/2004		07/07/2004
Brief Full ACRS Committee on Proposed Generic Letter	07/07/2004		07/07/2004
Meet with CRGR on Proposed Generic Letter	08/10/2004		08/10/2004
Issue Generic Letter 2004-02	09/13/2004		09/13/2004
Meet with ACRS on Safety Evaluation of NEI 04-07	10/07/2004		10/07/2004
ACRS Response on Safety Evaluation of NEI 04-07	10/18/2004		10/18/2004
Brief Commissioners Jaczko and Lyons on Status	07/18/2005		07/18/2005
EDO Briefing of ACRS on Status	09/09/2005		09/09/2005
Receive All GL Responses Addressing Plant-Specific Analyses	05/31/2005		09/15/2005
Issue Information Notice 2005-26	09/16/2005		09/16/2005
Issue Supplement 1 to IN 2005-26	01/20/2006		01/20/2006
Complete Review of Licensee Responses to GL 2004-02	01/20/2006		01/20/2006
Complete Research Programs Evaluating Coating Transportability and	02/28/2006		02/28/2006

Milestone	Original Date	Current Date	Actual Date
Surrogate Throttle Valve Debris Ingestion			
Brief ACRS on Staff Evaluation of Licensee Responses to GL 2004-02 and Results of Chemical Effects Tests	03/09/2006		03/09/2006
Complete Testing and Analysis Associated with Initial Phase of Chemical Effects Research	05/30/2006		05/30/2006
Complete Containment Material Head Loss Testing	06/15/2006		06/15/2006
Complete Thermodynamic Simulation of Containment Sump Pool Chemical Constituents	09/30/2006		09/30/2006
Complete Last Audit Report	05/23/2008		06/19/2008
Regions Complete TI Inspections	06/30/2008		06/30/2008
Receive Last TI Verifications From Regions	08/11/2008		08/11/2008
Complete Review of TI Verifications	08/25/2008		06/30/2009
Staff Issue SECY-12-0093	07/09/2012		07/09/2012
PWROG Submitt WCAP 16793 In-Vessel Downstream Effects (Complete)	07/20/2012		07/20/2012
Staff Issue Final Safety Evaluation For In-Vessel Downstream Effects On WCAP 16793	04/08/2013		04/08/2013
STP Submit Pilot Application for Risk Inform Option 2B for Closure of GL 2004-02	11/13/2013		11/13/2013
PWROG submitted WCAP 17788 for Option 2A Plants	06/20/2015		
Staff Review and Approval of the STP Application	11/30/2015		
Issue Closure of All Option 1 Plants	12/31/2015		
Staff Review and Issuance of SE Approving WCAP 17788	06/19/2016		
Industry submit in a staggered basis all other Option 2B Applications	11/30/2016		
Staff review and closure of all Option 2A plants for GL 2004	12/31/2016		
Staff Review and Approval of Option 2B Plants	11/30/2017		
Staff Review and Approval of Option 3 Plants	11/30/2017		
Staff issue closure memo for GI-191	12/31/2018		

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0193 **Type:** GI **Office/Division/Branch:** RES/DSA/RSAB

Title: BWR ECCS Suction Concerns

Resolution Status: In progress **Identification Date:** 05/10/2002 **Generic Issue Acceptance Date:** 10/16/2003

Action Level: Active **Task Manager:** William Krotiuk **TAC Number:** KC0140

Safety Risk Assessment: 01/31/2015 (Planned/Projected) **Regulatory Assessment:** (TBD)

Transfer to Regulatory Office for Action (TBD) **Completion of Verification:**

Closure Date: (TBD)

Work Authorization: Memorandum to A. Thadani from F. Eltawila, "Results of Initial Screening of Generic Safety Issue 193, 'BWR ECCS Suction Concerns,'" October 16, 2003

DESCRIPTION:

GI-193, "BWR ECCS Suction Concerns", evaluates possible failure of the ECCS pumps (or degraded performance) due to unanticipated quantities of noncondensible gas in the suction piping that could cause gas binding, vapor locking, or cavitation. Noncondensible gas can be present in the suppression pools in BWR Mark I, II, and III containments during LOCA conditions following downcomer flow from the drywell into the suppression pool. The screening assessment did not identify any immediate safety concerns.

WORK SCOPE:

Evaluate the dynamics of gas bubbles in the suppression pool, and the impact on ECCS pump performance.

Quantify the gas void fraction present at different locations in the suppression pool as a function of time following a LOCA. Provide licensees with insight on how to calculate the post-LOCA suppression pool ECCS pump suction strainer "exclusion zone" and the suppression pool void fraction distribution based on their plant-specific geometrical and operational characteristics. The "Exclusion zone" is defined as the volume below or around the downcomer exhaust, which is expected to contain a large concentration of noncondensable gas from the drywell. The "exclusion zone" will help define boundary zones such that if a suction strainer is located in a boundary zone, the ECCS pump may be vulnerable.

STATUS:

As a result of the initial screening (ML032940708) completed in October 2003, a Task Action Plan (TAP) for the technical assessment of this issue was approved in May 2004 (ML041450208). The staff completed a literature search for information on ECCS pump performance and suppression pool behavior following downcomer flow in the suppression pool in March 2005 (ML050910465). The literature search was updated in January 2013 and is summarized in a draft document (ML13079A396). This search identified several experimental test programs that addressed the concerns of this generic issue. The staff found experimental evidence that gas may reach the ECCS pumps during a loss-of-coolant accident. The experiments showed that the tested pumps recovered after exposure to noncondensible gas below a particular void fraction for a limited time period. The next phase will attempt to quantify the gas void fraction present at different locations in the suppression pool as a function of time following a LOCA.

Discussions were initiated in NRC regarding commonality between GI-193 and a proposed Generic Letter (later issued as GL 08-01) addressing gas accumulation in ECCS suction piping covering all reactors. RES began work with NRR to issue an appropriate generic communication to affected licensees. In 2007, RES and NRR agreed not to include this activity in GL 08-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems." Also in 2007, RES and NRR requested BWR Owners Group cooperation to support the ongoing assessment of this GI. Based on a staff request (ML092920376 and ML092920023), the BWROG agreed to provide voluntary input which would provide insights into the characteristics of

LOCA phenomena at the earliest stages of the postulated accidents plus general information about wetwell geometries in relation to ECCS suction strainers. This proprietary input was received on October 29, 2009.

Computational fluid dynamics (CFD) models and analyses have been completed for several tests performed at the PUMA and Finnish test facilities. (Geometry and data only supported the CFD model development for two tests facilities; documentation from the German GKSS test facility did not provide sufficient information to support CFD model development and did not provide sufficiently detailed test data). A scaling methodology using data from the considered tests is being used to refine a method to scale the test results to full scale geometry. An initial scaling analysis was completed in February of 2014. The developed scaling method is being applied to test facilities and to an idealized full scale suppression pool geometry, and is being compared to the CFD analysis of test facilities and of an idealized full scale suppression pool geometry. The initial scaling analysis provided valuable insights that helped in the selection of parameters for the CFD runs, and the analysis will be refined as more CDF results become available. The CFD model for the full scale suppression pool geometry is also being developed and will be completed as soon as a satisfactory comparison between the scaling and the CDF results is accomplished. Ultimately, the results of these analyses will be used to identify a reasonable suppression pool ECCS pump suction strainer "exclusion zone" for post LOCA conditions. The "Exclusion zone" is defined as the volume below or around the downcomer exhaust, which is expected to contain a large concentration of noncondensable gas from the drywell. The "exclusion zone" will help define boundary zones such that if a suction strainer is located in a boundary zone, the ECCS pump may be vulnerable.

AFFECTED DOCUMENTS:

(1) GE Topical Report NEDO-33526, "Assessment of NRC Generic Issues, GI-193," October 29, 2009.
(2) NUREG/CR-7186, "Experimental Measurement of Suppression Pool Void Distribution During Blowdown in Support of Generic Issue 193," September 2014.

PROBLEM/RESOLUTION:

As described above, some elements of the original TAP were deferred in favor of staff attempts to pursue other avenues of resolution. For example, the staff attempted to incorporate a request for licensee input via inclusion in GL 08-01, "Managing Gas Accumulation in Emergency Core Cooling, Decay Heat Removal, and Containment Spray Systems." Ultimately, this approach was not chosen due to dissimilarities in the phenomenology involved. Due to the complexity of bubble formation, transport and its impact on pump performance the staff supplemented the analytical approach with a focused, experimental program. The purpose of the program, completed in 2011 at the PUMA test facility, was to provide clarification as to the potential for bubbles formed from simulated LOCA blowdown to be transported in the wetwell to the ECCS pump inlets and, consequently, to be ingested into ECCS pump impellers. The updated literature review completed in January 2013 provides a recommendation for a void fraction range at the ECCS pump intake that would result in acceptable pump operation and the void fraction range that would result in unacceptable pump operation. Criteria for acceptable pump recovery following noncondensable gas injection which results in unacceptable pump operation are also provided.

REASONS FOR SCHEDULE CHANGES:

GI-193 is in the Assessment stage and a technical assessment of the issue is being developed. NRC staff developed independent verification of the test data from the two previously performed test programs and is performing CFD modeling and geometry scaling. A scaling methodology, using data from the test programs, is being used to refine a method to scale the test results to full scale geometry. Simultaneously, computational fluid dynamic (CFD) models and analyses for several tests from the two test programs are being performed. Following completion of the scaling activities, the scaling method will be applied to extend the test data to full scale geometry, and compared to the CFD analysis of the full scale suppression pool geometry.

Milestone	Original Date	Current Date	Actual Date
Complete Task Action Plan for a Technical Assessment	03/31/2004		05/24/2004
ECCS Pump Performance Literature Search	03/31/2005		03/31/2005

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Milestone	Original Date	Current Date	Actual Date
Issue Request for Proposal to BNL for Technical Assistance	04/26/2005		04/26/2005
Receive Proposal for Technical Assistance from BNL	06/03/2005		06/03/2005
Request Information from Technical Research Center of Finland	09/12/2005		09/12/2005
Complete Literature Search for Two Specific Thermal-Hydraulic Phenomena	09/30/2005		09/30/2005
Evaluate Experimental Results on Thermal-Hydraulic Phenomena	09/30/2005		09/30/2005
Assign New Task Manager	05/15/2006		05/15/2006
RES Decision to Work with NRR on Generic Communication	08/31/2006		08/31/2006
Arrange Meeting with BWROG and Obtain Their Input	06/30/2007		06/06/2007
Review BWROG Data and Determine Regulatory Action	09/30/2007		12/31/2007
Assign New Task Manager	04/15/2008		04/15/2008
Query BWROG for background information	09/04/2008		09/04/2008
Query Finnish researchers to share current information	11/30/2008		01/30/2009
Establish workscope for experimental program at Purdue University to study void transport phenomena	05/01/2009		09/01/2009
Receive BWROG response to staff information request	12/31/2008		10/29/2009
Propose and Develop Draft Experimental Test Plan	02/01/2010		03/01/2010
Finalize Experimental Test Plan	04/01/2010		06/01/2010
Begin steady state and transient tests	11/01/2009		06/15/2010
Receive Draft Report from University Contractor	12/30/2009		12/15/2010
Conclude Steady State and Transient Tests	12/31/2010		12/31/2010
Receive Final Report from University Contractor	03/31/2011		03/31/2011
Staff Evaluation of (PUMA)Test Findings	07/31/2011		02/29/2012
Develop next step activities to determine if safety concern exists and assessment method and criteria to be applied to plant geometries	01/31/2013		01/31/2013
Update literature search	01/31/2013		01/31/2013
Update BWR chronological scenario	01/31/2013		01/31/2013
Review applicability of PUMA test facility	01/31/2013		01/31/2013

Milestone	Original Date	Current Date	Actual Date
Perform computational fluid dynamics (CFD) analyses of two test facilities (Purdue U. and Lappeenranta U.)	11/25/2013	01/31/2014	01/31/2014
Perform scaling assessment of two test facilities (Purdue U. and Lappeenranta U.)	09/13/2013	01/31/2014	02/28/2014
Compare CFD and scaling analyses to improve calculation methods and verify techniques. Compare scaled results to the calculated CFD results for an idealized full scale suppression pool.	12/06/2013	09/30/2014	
Apply CFD and scaling approaches to plant conditions. Qualitatively compare scaled results to the calculated CFD results for a full scale suppression pool.	04/25/2014	10/31/2014	
Document assessment approach for plant geometries to define suppression pool area where gas injection in ECCS pump could pose problems. Prepare draft report providing assessment approach for plant geometries	06/06/2014	12/31/2014	

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0199 **Type:** GI **Office/Division/Branch:** NRO/DSEA/

Title: Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern U.S. on Existing Plants

Resolution Status: In progress **Identification Date:** 05/25/2005 **Generic Issue Acceptance Date:** 02/01/2008

Action Level: Regulatory Office Implementation **Task Manager:** Clifford Munson **TAC Number:**

Safety Risk Assessment: 09/02/2010 (Actual/Complete) **Regulatory Assessment:**

Transfer to Regulatory Office for Action 09/02/2010 (Actual/Complete) **Completion of Verification:**

Closure Date:

Work Authorization:

DESCRIPTION:

Newer data and models indicate that estimates of the potential for earthquake hazards for some nuclear power plants in the Central and Eastern United States (CEUS) may be larger than previous estimates. While it has been determined that currently operating plants remain safe, the newer seismic data and models warrant further study and analysis. The analysis will allow the NRC to better understand margins at operating plants for earthquakes. The screening assessment did not identify any immediate safety concerns.

WORK SCOPE:

NRR staff review of the first early site permit (ESP) applications found that the proposed safe shutdown earthquake (SSE) ground motions for some of the new sites exceeded the SSE ground motion for the co-located operating units. This resulted from the application of more recent seismic hazard models for the ESP applications, which estimated higher seismic hazards for some regions of the CEUS.

Based on the evaluations conducted under the Individual Plant Examination of External Events (IPEEE) Program in the 1990s, the staff determined that seismic designs of operating plants in the CEUS provided an adequate level of protection. However, in light of the staff's review of the ESP applications and confirmatory analysis using the United States Geological Survey (USGS) seismic models, the staff recognized that the probability of exceeding the SSE at some currently operating sites in the CEUS may be higher than previously understood. Therefore, the staff initiated this GI to assess the impact of increased seismic hazard estimates on selected nuclear power plants in the CEUS region.

STATUS:

In August 2005, RES issued a task order for a contractor to develop a probabilistic screening analysis for exceedance of the safe-shutdown earthquake ground motion on nuclear power plants in the CEUS. The contractor was to use information provided by the NRC to perform this task in accordance with guidelines of Section 3.3 and Appendix B.3.2 of NUREG-1489, "A Review of NRC Staff Uses of Probabilistic Risk Assessment." The information to be provided by the NRC included EPRI Report NP-6395-D, "Probabilistic Seismic Hazard Evaluations at Nuclear Power Plant Sites in the Central and Eastern United States: Resolution of the Charleston Earthquake Issue," April 1989. In May 2007, the NRC and the contractor agreed to stop work on this task order because the NRC and EPRI had not resolved issues with releasing the copyrighted EPRI Report NP-6395-D to the NRC contractor for performing this task.

In April 2007, the NRC Office of RES decided to complete the USGS update of seismic hazard assessment of CEUS plants and use this information to perform the screening analysis for this GI. In May 2007, the staff developed a plan to complete the screening analysis for GI-199 by February 2008 and began work on initial tasks described in this plan. In June 2007, the staff decided to focus the screening analysis efforts on using existing USGS seismic hazard information to address the seven criteria for screening GIs described in SECY-07-0022, "Status Report on Proposed Improvements to the Generic Issues Program," dated January 30, 2007 (ML063460239). In July 2007, the staff completed their preliminary screening analysis and, in August 2007,

provided it to the screening analysis review panel.

In October 2007, the staff determined that the screening analysis should consider seismic hazard data and models besides those available from the USGS. This determination was based on the staff's ongoing interactions with stakeholders to develop a new performance-based approach for assessing seismic hazards for new reactors as described in a memorandum to the Commission, "A Performance-Based Approach to Define the Safe Shutdown Earthquake Ground Motion," dated July 26, 2006 (ADAMS Accession No. ML052360044).

The staff completed the screening analysis using guidance contained in MD 6.4 and SECY-07-0022 in December 2007, and reconvened the screening panel in January 2008. On February 1, 2008, the RES Director approved the screening panel recommendation (ML073400477) to begin the Safety/Risk Assessment Stage of the Generic Issue Process. On February 6, 2008, the staff met with the public and stakeholders to discuss the results of the Screening Stage of Generic Issue 199. The meeting took place at NRC headquarters located in Rockville, MD.

EPRI performed an independent evaluation of the implications of changes in seismic hazard estimates. The staff interacted with EPRI (under a Memorandum of Understanding) to discuss data, methodology, and their conclusions.

In June 2009, the staff completed the review and analysis of seismic data in support of the Safety/Risk Assessment. Several Safety/Risk Assessment Panel meetings were held in July and August 2009. From November 2009 through March 2010, RES staff held internal briefings with NRR, NRO, and NRC regional offices. The Safety/Risk Assessment Panel reconvened in March 2010 and in June 2010 to review their recommendations. The Safety/Risk Assessment Panel Report was issued on September 2, 2010. The panel recommended transferring lead responsibility for subsequent GI-199 actions to NRR for regulatory office implementation, and that further actions be taken to address GI-199 outside the GI Program (i.e., obtain information and develop methods, as needed, to complete plant-specific value impact analyses of potential backfits to reduce seismic risk). The issue was transferred to NRR on September 2, 2010, for Regulatory Office Implementation.

Information Notices were issued to inform stakeholders of the GI-199 Safety/Risk Assessment report and results. Information Notice 2010-18 was issued on September 2, 2010, to nuclear power plants and independent fuel storage installations. Information Notice 2010-19 was issued September 16, 2010, to fuel cycle facilities. A public meeting was held on October 6, 2010, and a presentation to the ACRS Siting Subcommittee was held November 30, 2010. NRR developed a draft Generic Letter GL-2011-XX "Seismic Risk Evaluation for Operating Reactors" that was issued on September 15, 2011 for public comments. The public comment period ended on December 15, 2011. The agency incorporated GI-199 into the work done by the Japan Lessons-Learned Project Directorate in response to the March 2011 Japan nuclear event. GI-199 activities in NRR are being addressed in the 50.54(f) letters on items 2.1 and 2.3 of the Japanese NTTF recommendations.

The NRC has requested that all nuclear power plants reevaluate seismic hazards using present-day guidance and methods. For plants in the central and eastern United States (CEUS), the seismic hazard reevaluations were submitted in March 2014. Plants in the western United States (WUS) will complete their seismic hazard reevaluations by March 2015. Depending on the comparison between the reevaluated seismic hazard and the design basis, the resulting outcome is either no further risk evaluation for the plant (screened out) or perform a plant risk assessment if the reevaluated hazard exceeds the plant's design basis (screened in). The NRC performed a screening and prioritization of the March 2014 CEUS site submittals. The NRC determined which licensees screened in for further analysis and sorted those, licensees into different priority groups with different due dates for submitting the risk evaluations to the NRC. The NRC is now performing a more comprehensive review of the reevaluated hazard submittals. The priority for the subsequent completion of the risk assessments by nuclear power plants was determined by the NRC based on the following factors: (1) the extent to which the reevaluated hazard exceeds the current design basis, (2) the absolute seismic hazard based on an examination of the probabilistic seismic hazard curves for the site, and (3) previous estimates of plant capacity (e.g., IPEEE insights). If required, the risk evaluations are due in 2017, 2019, or 2020, depending on the priority.

While the risk evaluations are ongoing, plants will also perform near-term expedited seismic evaluations of key equipment needed to protect the reactor core following a beyond design-basis seismic event. The expedited seismic evaluations for CEUS plants will be completed by December 2014 and by January 2016 for WUS plants. As a result of the expedited seismic evaluations, plant upgrades not requiring an outage will be completed by December 2016 for CEUS plants and by June 2018 for WUS plants.

AFFECTED DOCUMENTS:

IN 2010-18
IN 2010-19

PROBLEM/RESOLUTION:

The screening analysis was delayed when the copyrighted EPRI Report NP-6395-D was not released to the NRC contractor. RES considered alternatives for proceeding with the screening assessment of GI-199 in accordance with MD 6.4 and SECY-07-0022. From April 2007 through September 2007, staff performed the initial screening analysis of GI-199 using currently available seismic hazard information from the USGS. In October 2007, the staff determined that the screening analysis should consider seismic hazard data and models besides those available from the USGS. The RES staff worked with technical experts from NRR and NRO to complete a screening analysis and develop an approach for the Safety/Risk Assessment Stage. The NRC staff considers the previous problems to be resolved.

REASONS FOR SCHEDULE CHANGES:

Schedule delays involving the initial screening analysis were caused by not identifying an amenable solution for EPRI release of NP-6395-D to the NRC contractor for performing the screening analysis task. Based on discussions with the USGS, the staff determined the time frame for obtaining current seismic hazard update information for CEUS plant sites would be mid-2008 as opposed to October 2007. Accordingly, the staff changed the date for the milestone: "Receive Seismic Hazard Update Results for Selected CEUS Plants from USGS," from October 30, 2007 to June 30, 2008. In support of completing the screening analysis, consistent with timeliness targets described in SECY-07-0022, the staff decided to base the screening analysis on currently available seismic hazard information from the USGS. Following this approach, the staff completed the milestone: "Generate Screening Analysis," on July 27, 2007, and then completed the milestone: "Screening Panel Meeting," on September 12, 2007.

In October 2007, the staff determined that the screening analysis should consider seismic hazard data and models besides those available from the USGS. This determination is based on the staff's ongoing interactions with stakeholders to develop a new performance-based approach for assessing seismic hazards for new reactors as described in a memorandum to the Commission, "A Performance-Based Approach to Define the Safe Shutdown Earthquake Ground Motion," dated July 26, 2006 (ADAMS Accession No. ML052360044). The staff's ongoing work on this performance-based approach resulted in issuance of NRC Regulatory Guide 1.208, "A Performance-Based Approach to Define the Site-Specific Earthquake Ground Motion," dated March 2007 that endorses the performance-based approach. After the Director of RES approved the Screening Panel's recommendation (ML073400477) to conduct a Safety/Risk Assessment Stage, a milestone was added for completion of this stage.

The Safety/Risk Assessment panel was extended because of the complexity of additional evaluations and the desire for internal and external stakeholder agreement. The RES Director approved the Safety/Risk Assessment and panel recommendation September 2, 2010.

Milestone	Original Date	Current Date	Actual Date
Issue Request for Proposal to contractor (ISL) for Technical Assistance	07/07/2005		07/07/2005
Receive Proposal from ISL	08/11/2005		08/11/2005
Generate Screening Analysis	10/31/2006		07/27/2007
Screening Panel Meeting	11/30/2006		09/12/2007
Prepare Screening Analysis Applying Criteria from MD 6.4 and SECY-07-0022	12/15/2007		12/31/2007
Reconvene Screening Panel	12/15/2007		01/11/2008

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Milestone	Original Date	Current Date	Actual Date
Provide Screening Panel Recommendation Memo for RES Director Approval	01/31/2007		01/25/2008
Issue RES Director Approved Screening Analysis and Panel Recommendation	12/31/2006		02/01/2008
Receive Seismic Hazard Update Results for Selected CEUS Plants from USGS	10/30/2007		10/15/2008
Receive Information from EPRI	05/30/2008		12/03/2008
Schedule and Conduct Safety/Risk Assessment Panel	09/30/2008		08/31/2009
GI-199 transferred to NRR for Regulatory Office Implementation	06/30/2009		09/02/2010
Issue RES Director Approved Safety/Risk Assessment and Panel Recommendation	01/31/2010		09/02/2010
Information Notice 2010-18 issued	09/02/2010		09/02/2010
Information Notice 2010-19 issued	09/16/2010		09/16/2010
Conduct Public Meeting	06/30/2009		10/06/2010
Presentation to ACRS Subcommittee	11/05/2009		11/30/2010
Presentation to CRGR	06/30/2011		08/02/2011
Issue draft Generic Letter for public comment	07/31/2011		09/01/2011
Presentation to ACRS Subcommittee	10/13/2011		10/13/2011
Presentation to ACRS Subcommittee	10/31/2011		11/08/2011
Transfer activities to the Japanese Lessons Learned Project Directorate (JLD)	03/08/2012		03/08/2012
Response from licensees performing seismic PRA and margin assessments (TBD)			

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0204 **Type:** GI **Office/Division/Branch:** NRO/DSEA/

Title: Flooding of Nuclear Power Plant Sites Following Upstream Dam Failures

Resolution Status: In progress **Identification Date:** 07/19/2010 **Generic Issue Acceptance Date:** 02/29/2012

Action Level: Regulatory Office Implementation **Task Manager:** Chris Cook **TAC Number:**

Safety Risk Assessment: **Regulatory Assessment:**

Transfer to Regulatory Office for Action 03/06/2012 **Completion of Verification:**

Closure Date: (To Be Determined)

Work Authorization:

DESCRIPTION:

The Nuclear Regulatory Commission has started a formal evaluation of potential generic safety implications for dam failures upstream of U.S. commercial nuclear power plants. The complete scope of the generic issue includes the effects of flooding from upstream dam failures on nuclear power plants sites, spent fuel pools, and sites undergoing decommissioning with spent fuel stored in spent fuel pools. The NRC began examining this issue after inspection findings at two plants. Staff completed a draft of the screening analysis in July 2011. The issue was officially declared as Generic Issue (GI) 204 in February 2012.

While this screening analysis did not identify any immediate safety concerns, inspections or other reviews at individual plants have led to those plants taking actions regarding flooding scenarios on site-specific basis. Generic Issue 204 has been subsumed as part of the implementation of the recommendations from the agency's Japan Near-Term Task Force (NTTF), which was assembled in response to the earthquake/tsunami and reactor accident at the Fukushima Dai-ichi site.

While the NTTF used preliminary information from the generic issue screening analysis and discussed flooding in its July 2011 report (Agencywide Documents Access and Management System (ADAMS) accession number ML111861807), the issue related to flooding from the upstream dam failure came to the staff's attention long before the earthquake/tsunami and reactor accident at the Fukushima Dai-ichi site. New sources of information on this issue have accumulated over the past few years. This information includes inspections of flood protection and related procedures, as well as recent re-evaluations of dam failure frequencies and possible flood heights at some U.S. nuclear power plants, suggesting that flooding effects in some cases may be greater than previously expected.

The NTTF's review of the Fukushima accident led to recommendations regarding the potential for flooding from all hazard mechanisms at operating reactors. In March 2012, letters were sent by the NRC to holders of operating licenses and construction permits, which requested the reevaluation of all floods hazards (including dam failures) using present-day guidance and methodologies. (Note: Sites undergoing decommissioning, which are part of the generic issue, are not included in the NRC's activities related to reevaluation of flood hazards.)

Nuclear power plant designs include protection against serious but very rare flooding events, including flooding from dam failure scenarios. Dam failures can occur as a consequence of earthquakes, overtopping, and other mechanisms such as internal erosion and operational failures. A dam failure could potentially cause flooding at a nuclear power plant site depending on a number of factors including the location of the dam, reservoir volume, dam properties, flood routing and site characteristics.

Documentation related to the Generic Issue can be found in ADAMS. The July 2011 screening analysis of potential nuclear plant safety issues from upstream dam failures is available in ADAMS under accession number ML113500495. The March 2012 transfer of the Generic Issue from the Office of Research to the Office of Nuclear Reactor Regulation for regulatory office implementation is available in ADAMS under accession number ML120261155. The March 2012

request for information letter related to the reevaluation of flood hazards is available in ADAMS under accession number ML12053A340. Finally, the May 2012 letter stating the flood hazard reevaluation due dates is available in ADAMS under accession number ML12097A509. This letter describes the criteria used to place each site into one of three completion date categories. As of June 2014, approximately half of all sites have completed flood hazard reevaluations in response to the March 2012 request. Some sites have requested and been granted extensions, if appropriate. The flood hazard reevaluations for the remaining sites are due by March 2015.

Milestone	Original Date	Current Date	Actual Date
Issue is Declared a Generic Issue			02/29/2012
Transfer activities to the Japan Lessons Learned Project Directorate			03/06/2012
Licensee flooding hazard reevaluations	03/15/2015		