

**GENERIC ISSUE MANAGEMENT CONTROL SYSTEM REPORT
FOR FISCAL YEAR 2012 4th QUARTER**

OFFICE OF NUCLEAR REGULATORY RESEARCH

Generic Issue Management Control System

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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 non-reactor issues were documented in the Office of Nuclear Material Safety and Safeguards (NMSS) Policy and Procedures Letter 1-57, Revision 1, "NMSS Generic Issues Program," dated October 1997. In 1999, Management Directive (MD) 6.4, "Generic Issues Program," was initiated for the processing of new GIs. For reactor issues, the Office of Nuclear Regulatory Research (RES), Office Instruction TEC-002, "Procedures for Processing Generic Issues," provides guidance to the RES staff.

NRC policy document SECY-07-0022, dated January 30, 2007, describes a revised GI process. An update of MD 6.4 (issued November 2009) reflects the revised GI process. MD 6.4 provides acceptance criteria for proposed issues being processed by the GI program. A separate report on proposed GIs is issued periodically.

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 Pilot MD 6.4, dated July 21, 1999, prioritization of GIs was replaced by the screening process, in which a determination is made to either establish the proposed issue as a bona fide 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.

Generic Issue Management Control System

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

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Legend (continued)

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

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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 Name of assigned individual responsible for resolution
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)

Generic Issue Management Control System

Data Elements (continued)

- | | | |
|-----|---|---|
| 13. | <u>Regulation and Guidance Issuance</u> | The date and status associated with completion of the regulation and guidance issuance activity (when applicable) |
| 14. | <u>Safety Risk Assessment</u> | The date and status associated with completion of the safety risk assessment activity (when applicable) |
| 15. | <u>Regulatory Assessment</u> | The date and status associated with completion of the regulatory assessment activity (when applicable) |
| 16. | <u>Transfer to Regulatory Office for Action</u> | The date and status associated with transfer of the issue to a regulatory office for action |
| 17. | <u>Completion of Verification</u> | The date and status associated with completion of verification activities |
| 18. | <u>Closure</u> | The date and status associated with agency closure of the GI |
| 19. | <u>Work Authorization</u> | Who or what authorized work to be done on the issue |
| 20. | <u>Work Scope</u> | Describes the problem and the technical work necessary to address or resolve the generic issue |
| 21. | <u>Status</u> | Describes current status of work while also retaining an accurate running narrative discussion of major activities, milestones, and decision points |
| 22. | <u>Affected Documents</u> | Identifies documents into which the technical resolution will be incorporated |
| 23. | <u>Problem/Resolution</u> | 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. | <u>Reasons for Schedule Changes</u> | Narrative discussion associated with schedule changes |
| 25. | <u>Milestones</u> | 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 0189

Type: GI

Office/Division/Branch: NRR/DSS/SBPB

Title: Susceptibility of Ice Condenser and Mark III Containments to Early Failure from Hydrogen Combustion during a Severe Accident

Resolution Status: In progress

Identification Date: 5/17/2001

Generic Issue Acceptance Date:

Action Level: Regulatory Office Implementation

Task Manager: Steve Jones

TAC Number: MB7245

Technical Assessment: 12/15/2002 (Actual/Complete)

Regulation and Guidance Development: 4/23/2007 (Actual/Complete)

Regulation and Guidance Issuance: 6/30/2007 (Actual/Complete)

Transfer to Regulatory Office for Action:

Completion of Verification: 12/15/2009 (Actual/Complete)

Closure: 2/28/2013 (Planned/Projected)

Work Authorization: Memo from J. Zwolinski to F. Eltawila, "Resolution Process for Generic Safety Issue 189: "Post-Accident Combustible Gas Control in Pressure Suppression Containments"

DESCRIPTION:

NUREG/CR-6427, "Assessment of the Direct Containment Heat (DCH) Issue for Plants with Ice Condenser Containments," showed that the early containment failure probability of ice condenser containments is dominated by non-DCH hydrogen combustion events. The staff subsequently extended the issue to include BWR MARK III containments because their relatively low free volume and strength are comparable to PWR ice condensers.

WORK SCOPE:

The staff conducted studies to determine whether providing an independent power supply for the igniter systems provides a substantial increase in the overall protection of the public health and safety with implementation costs that are justified in view of the increased protection.

The staff briefed the ACRS on June 6, 2002, and again on November 13, 2002. The ACRS recommended that the form of regulatory action should be through the plant-specific severe accident management guidelines. RES provided its technical assessment for resolving GI-189 to NRR in a memorandum dated December 17, 2002. RES concluded that further action to provide back-up to one train of igniters is warranted for both ice condenser and MARK III plants.

On January 30, 2003, NRR outlined the next steps in the resolution of this GI. NRR prepared a Task Action Plan to complete MD 6.4, Stage 4, Regulation and Guidance Development, based on a preliminary decision to issue an Order. The staff reviewed the proposed regulatory actions and associated draft documents with senior management and the Office of General Council. Senior management decided to pursue Rulemaking rather than an Order. The staff held a public meeting on June 18, 2003, to receive feedback from licensees and other stakeholders regarding the need to provide a backup power supply to the hydrogen igniters and NRR's consideration of rulemaking for the resolution of GI-189. NRR staff briefed the ACRS on November 6, 2003, and recommended providing a backup power supply to the hydrogen igniters. On November 17, 2003, the ACRS Chairman wrote the NRC Chairman recommending the NRC proceed with rulemaking to require a backup power supply to the hydrogen igniters for PWR ice-condenser and BWR MARK III plants. The ACRS recommended that rulemaking include a small pre-staged generator with installed cables, conduit, panels, and breakers, or an equivalent diverse power supply. The ACRS also recommended that the rulemaking be accompanied by guidance specifying the design requirements.

NRR developed draft design criteria for the backup power supply, and administered a contract to merge and enhance the existing technical assessment into a regulatory analysis. NRR held a public meeting on September 21, 2004, to get external stakeholders' input on the draft design criteria. The BWR owners group agreed to provide additional information regarding implementation cost for the pre-staged generator and relative risk contribution of SBO events at each of the four Mark III plants. The BWR owners indicated a willingness to make modifications to supply power from the existing HPCS diesel generator. Duke power, representing two PWR ice condenser sites, Catawba 1 & 2, McGuire 1 & 2, indicated a willingness to make modifications to an existing safe shutdown diesel generator that could be manually connected to provide backup power as needed. American Electric Power representatives indicated a willingness to provide backup power for D. C. Cook 1 & 2 from the large diesel generators intended to support an increased allowed outage time for the emergency diesel

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generators. TVA, representing two PWR ice condenser sites, Sequoyah 1 & 2, Watts Bar 1, also indicated a willingness to provide backup power from a supplemental diesel generator. In November 2004, the staff reached consensus to evaluate the proposed voluntary initiatives and pursue that path as a preferential solution.

In February and early March 2005, NRR staff met with representatives of RES, NSIR, and OEDO to develop an understanding of newly identified safety/security interface issues and actions that could impact the solution to the issue. On March 30, 2005, the staff met with senior representatives of the six affected utilities to present security-related insights.

On June 14, 2005, the EDO issued a memorandum to the Commissioners on the regulatory analysis results and recent staff activities related to GI-189. The regulatory analysis indicated that the backup power modification may provide a substantial safety benefit at a justifiable cost for the PWRs with an ice-condenser containment, and the proposed voluntary actions provide the majority of that benefit. The costs exceed the benefits for all BWR regulatory options, and none of the options for the BWRs provide a substantial increase in the overall protection of public health and safety. However, external events and security insights were not fully evaluated in the regulatory analysis, and defense-in-depth considerations related to improving the balance between accident prevention and mitigation provide an additional un-quantified benefit for both containment types.

Based on an understanding that many voluntary physical modifications were complete, the staff delayed seeking specific commitments while security-related reviews of the facilities were ongoing. On March 1, 2006, the EDO issued a memo informing the Commission of the staff's intent to delay the request for commitments until after the security-related reviews were completed in September 2006. Because this issue was not incorporated in the scope of security-related modifications, the staff held closed meetings in December 2006 and January 2007 to further consider security insights with respect to the proposed design modifications.

The staff received industry proposals for modifications (that incorporated security insights) in late February and early March 2007. The staff concluded that the industry proposed modifications would resolve GI-189 and provide benefit for some security scenarios. On April 23, 2007, the EDO issued a memo informing the Commission of the staff's intent to accept the commitments and perform verification inspections at the affected sites. On June 15, 2007, the NRC staff issued letters to affected licensees accepting the commitments. The NRC staff notified licensees of the intent to perform verification inspections at the affected sites and clarified the scope of the inspection relative to the commitments.

STATUS:

Licensee implementation and NRC verification inspections performed pursuant to NRC TI 2515/174, "Hydrogen Igniter Backup Power Verification," were completed at all 9 affected sites as of December 2009. In November 2010, the staff received a commitment from the Tennessee Valley Authority to implement measures at Watts Bar Unit 2 equivalent to those measures verified to have been implemented at Watts Bar Unit 1.

The reactor events in Japan are relevant to this issue because the events involved a station blackout condition and core damage leading to hydrogen detonations outside the primary containment. The Near-Term Task Force review of insights from the Fukushima Dai-ichi accident identified specific recommendations associated with control of combustible gas during station blackout events. These recommendations included: (1) establishment of a minimum coping time of 8 hours for operation of at least one train of hydrogen igniters at BWR facilities with Mark III containments and PWR facilities with ice condenser containments, (2) establish the equipment, procedures, and training necessary to implement an "extended loss of all ac" coping time of 72 hours for the same scope of functions as defined for the 8 hour coping period, and (3) preplan and pre-stage offsite resources to support uninterrupted core and spent fuel pool cooling, and reactor coolant system and containment integrity as needed. In SECY 11-0137, the staff recommended that SBO mitigation capability be strengthened, consistent with the Near-Term Task Force recommendation and without unnecessary delay, through the rulemaking process. The Commission approved the staff's prioritization of the recommendations in Staff Requirements Memorandum 11-0137. Therefore, the additional information derived from the events in Japan related to combustible gas control during station blackout will be adequately incorporated into future rulemaking, and closure of GI-189 is appropriate.

AFFECTED DOCUMENTS:

10 CFR 50.44

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10 CFR 50.34

PROBLEM/RESOLUTION:

The costs exceeded the benefits for all BWR regulatory options, and none of the options for the BWRs provide a substantial increase in the overall protection of public health and safety. However, external events and security insights were not fully evaluated in the regulatory analysis, and defense-in-depth considerations in improving the balance between accident prevention and mitigation provide an additional un-quantified benefit for both containment types. With consideration of security insights, all affected licensees have proposed modifications that adequately address the identified safety issue.

The 2011 reactor events in Japan provided insights into defense-in-depth, station blackout, and combustible gas control that may relate to this Generic Issue. The staff has developed appropriate avenues for consideration of these insights outside this Generic Issue.

REASONS FOR SCHEDULE CHANGES:

Final closeout was extended to accommodate resource limitations, to address the technical issue in the licensing review for Watts Bar Unit 2, and to assess the impact of the reactor events in Japan.

Milestone	Original Date	Current Date	Actual Date
Draft Technical Assessment	5/1/2002		5/1/2002
Meet with ACRS	6/1/2002		6/6/2002
Second Meeting on Technical Assessment with ACRS Sub-Committee	10/1/2002		11/5/2002
Final Technical Assessment	11/1/2002		11/10/2002
Meet with ACRS Full Committee	11/1/2002		11/13/2002
Transfer GI to NRR	12/1/2002		12/17/2002
Public Meeting with Stakeholders	2/28/2003		2/28/2003
Determine Best Course of Action	2/28/2003		2/28/2003
Review RES Technical Assessment	2/28/2003		2/28/2003
Prepare Guidance and Provide Results to NRR Management	3/26/2003		3/26/2003
Distribute Draft Order and SECY Paper	3/26/2003		3/26/2003
Finalize CRGR Package	3/26/2003		3/26/2003
Provide Draft Order to OGC and Draft SECY to EDO	3/28/2003		3/28/2003
Meet with Rulemaking Committee	5/5/2003		5/5/2003
Conduct Public Meeting	6/18/2003		6/18/2003
Meet with OPA to Develop Communication Plan	6/24/2003		6/24/2003

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Milestone	Original Date	Current Date	Actual Date
Complete Communication Plan	7/10/2003		7/10/2003
NRR Meeting with ACRS	11/6/2003		11/6/2003
Public Meeting to Address Design Criteria	11/6/2003		11/6/2003
Public Meeting with Stakeholders	2/3/2004		2/3/2004
Brief Commissioner Merrifield	3/4/2004		3/4/2004
Public Meeting with Stakeholders	3/31/2004		3/31/2004
Issue Draft Design Criteria for Comment	8/13/2004		8/13/2004
Public Meeting with Stakeholders	9/21/2004		9/21/2004
Internal Meeting to Discuss Pursuit of Rulemaking	11/2/2004		11/2/2004
Perform Sensitivity Analysis to Determine Whether 2-Hour Startup Time for BWRs is Acceptable	11/30/2004		11/30/2004
Decision on Voluntary Licensee Initiatives as Alternative to Rulemaking	11/30/2004		11/30/2004
Finalize Design Criteria	11/30/2004		11/30/2004
Evaluate Safety/Security Interface	3/31/2005		3/30/2005
Issue Status Paper to Commission	5/31/2005		6/14/2005
Brief Commissioner Jaczko on Regulatory Analysis Results and Safety Significance	7/18/2005		7/18/2005
Meet with Owners to Discuss Safety-Security Interface Issues	8/3/2005		8/3/2005
Update Commission Regarding Licensee Plans for Voluntary Measures	3/1/2006		3/1/2006
Seek Commitment for Implementation of Voluntary Initiatives	8/31/2005		3/9/2007
Request Information from Owners on Voluntary Actions Implemented	12/31/2005		3/9/2007
Complete Regulation and Guidance Development	6/30/2006		4/23/2007
Clarify Commitments to Resolve Any Remaining Issues	12/31/2007		6/15/2007
Complete Implementation	6/30/2008		12/15/2009
Complete Verification	6/30/2009		12/15/2009
Close Out Issue with Memo to the EDO	6/30/2010	2/28/2013	

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Issue Number 0191

Type: GI

Office/Division/Branch: NRR/DSS/SSIB

Title: Assessment of Debris Accumulation on PWR Sump Performance

Resolution Status: In progress

Identification Date: 9/1/1996

Generic Issue Acceptance Date:

Action Level: Regulatory Office Implementation

Task Manager: Stewart Bailey

TAC Number: MA6454, MB4864

Technical Assessment: 9/15/2001 (Actual/Complete)

Regulation and Guidance Development: 9/24/2004 (Actual/Complete)

Regulation and Guidance Issuance: 9/30/2004 (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.

WORK SCOPE:

The goals of the NRC's reassessment are to: (1) determine if the transport and accumulation of debris in containment following a LOCA could impede the operation of the ECCS in operating PWRs; (2) if it is shown that debris accumulation could impede ECCS operation, develop the technical basis for revising NRC's regulations, or guidance, and provide NRC technical reviewers with sufficient information on phenomena involved to facilitate the review of any changes to plants that may be warranted; and (3) issue Generic Communication 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 for 69 cases. These 69 cases were representative of, but not identical to, 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 09/2001, 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 has evaluated the technical assessment, and prepared a Task Action Plan for developing appropriate regulatory guidance and resolution of GI-191.

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 and candidate operator actions that would be implemented. The NRC 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 Division of Reactor Licensing 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 the plant specific evaluations. The staff reviewed the GR and issued a draft SE, which supplemented the GR. The final SE was issued in December 2004, resulting in an NRC-approved evaluation methodology.

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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 to document the actions planned by the licensees to perform the sump evaluation, and the proposed schedule for completion. All PWR licensees responded to the GL on schedule in September 2005. All PWR licensees committed to modify their containment sump strainer, except for three plants who had modified their containment sump strainers within the previous five years. 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.

To address concerns regarding 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 and 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 ice condenser containments 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 26, 2006 to specifically provide additional information regarding test results related to chemical effects in environments containing dissolved phosphate.

NRR expected that recipients 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 on: (1) the thermodynamic simulation of containment sump pool chemical constituents, to predict the chemical reactions/byproducts in the pools; (2) the pressure loss across containment sump screens due to fiber insulation, chemical precipitates, and coating debris; and (3) a literature survey to summarize the knowledge base to date on the potential contribution of material leached from containment coatings to the chemical products formed in the containment sump pool, after a loss-of-coolant accident. 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.

Planned strainer modifications have been 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 have been performed; no additional full-scope audits are planned. 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 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 additional 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

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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. The PWR Owners Group had expected to complete the testing by the end of 2009. However, the NRC staff also requested further testing as some of the tests yielded unexpected results. Further evaluation and testing were performed, and the NRC expects to issue a safety evaluation on the topical report in 2012. The safety evaluation will provide guidance to licensees regarding use of the industry-developed test results and the topical report. Licensees will be expected to evaluate the potential for in-vessel effects on a plant-specific basis

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 has not concluded that the reduced generation assumptions are valid. The NRC staff informed the industry in March 2010 that it did not accept the testing, to which the industry responded that it would conduct a new testing campaign to address the staff's concerns, with the intent of still crediting reduced debris generation. The industry completed this testing in 2011, and the results are still under staff review.

In April 2010, the staff and industry briefed the Commission regarding the status of resolution of GI-191. Representatives from industry summarized their actions 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 that the issue remains of concern for plants with relatively high fibrous insulation loading 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 GSI-191 and to present them to the Commission by mid 2012. The staff provided the Commission with a notation vote paper, in July 2012, with options for the path forward to resolve GI-191.

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, as schedules allow and developments regarding issue resolution indicate the need for an interaction. 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
- (3) Generic Letter 85-22
- (4) Bulletin 2003-01
- (5) Generic Letter 2004-02

PROBLEM/RESOLUTION:

Licensees have submitted supplemental responses to GL 2004-02 in 2008 and 2009. The staff's initial review of GL 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. An innovative new issue resolution process has to date resulted in resolution of sump performance issues for approximately 2/3 of the 69 PWRs (with the exception of in-vessel effects). Progress continues to resolve issues for the remaining PWRs.

REASONS FOR SCHEDULE CHANGES:

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The currently expected closure date of December 31, 2012, with modifications completed by December 31, 2018, may change depending on further direction from the Commission. Another condition that could affect the issue closure date is further delays in the ongoing testing and evaluation for in-vessel effects. The NRC plans to close GI-191 when all PWRs have completed testing and evaluation of sump performance using NRC-accepted methods. After issue closure, the NRC staff will track all committed modifications to completion.

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	12/1/1995		12/1/1995
User Need Request Assigned to GSIB/RES	1/1/1996		1/1/1996
Reassessment Declared a New GSI	9/1/1996		9/1/1996
Issue SOW for Evaluation of GSI A-43	11/1/1996		11/1/1996
Complete Evaluation of GSI A-43	4/1/1997		3/1/1997
Issue SOW for Reassessment of Debris Blockages in PWR Containments Impact on ECCS Performance	9/1/1998		9/1/1998
Complete Collection and Review of PWR Containment and Sump Design and Operation Data	12/1/1999		12/1/1999
Complete All Debris Transport Tests	9/1/2000		8/1/2000
Complete Parametric Evaluation	7/1/2001		7/31/2001
Proposed Recommendations to the ACRS	8/31/2001		8/31/2001
ACRS Review Completed	9/30/2001		9/14/2001
Issue Transferred from RES to NRR	9/28/2001		9/28/2001
Complete Reassessment of Debris Blockages in PWR Containments Impact on ECCS Performance	9/30/2001		9/28/2001
Prepare Memo Discussing Proposed Recommendations (End of Technical Assessment Stage of Generic Issue Process)	4/1/2002		9/28/2001
Complete Estimate of Average CDF Reduction, Benefits, and Costs	4/1/2002		9/28/2001
Issue Bulletin 2003-01	5/1/2003		6/1/2003
Complete Development of Models and Methods for Analyzing Impact of Debris Blockages in PWR Containments on ECCS Performance	4/1/2001		6/9/2003

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Milestone	Original Date	Current Date	Actual Date
Discuss Reg. Guide 1.82, Rev. 3 with ACRS SubCommittee on Thermal-Hydraulic Phenomena	8/20/2003		8/20/2003
Present Final Version of Reg. Guide 1.82, Rev. 3 to ACRS Full Committee	9/11/2003		9/11/2003
ACRS Letter on Final Version of Reg. Guide 1.82, Rev. 3	9/30/2003		9/30/2003
Draft Industry Guidance for Plant-Specific Analyses	10/30/2003		10/31/2003
Issue Reg. Guide 1.82, Rev.3	9/30/2003		11/30/2003
NRC Meeting with Stakeholders	3/23/2004		3/23/2004
NRC Meeting with Stakeholders	5/25/2004		5/25/2004
Receive Industry Guidance for Plant-Specific Analyses	9/30/2003		5/28/2004
NRC Meeting with Stakeholders	6/17/2004		6/17/2004
Brief ACRS SubCommittee on Proposed Generic Letter	6/22/2004		6/22/2004
NRC Meeting with Stakeholders	6/29/2004		6/29/2004
Develop Generic Letter for Resolution of GI	7/7/2004		7/7/2004
Brief Full ACRS Committee on Proposed Generic Letter	7/7/2004		7/7/2004
Meet with CRGR on Proposed Generic Letter	8/10/2004		8/10/2004
Issue Generic Letter 2004-02	9/13/2004		9/13/2004
Meet with ACRS on Safety Evaluation of NEI 04-07	10/7/2004		10/7/2004
ACRS Response on Safety Evaluation of NEI 04-07	10/18/2004		10/18/2004
Brief Commissioners Jaczko and Lyons on Status	7/18/2005		7/18/2005
EDO Briefing of ACRS on Status	9/9/2005		9/9/2005
Receive All GL Responses Addressing Plant-Specific Analyses	5/31/2005		9/15/2005
Issue Information Notice 2005-26	9/16/2005		9/16/2005
Issue Supplement 1 to IN 2005-26	1/20/2006		1/20/2006
Complete Review of Licensee Responses to GL 2004-02	1/20/2006		1/20/2006
Complete Research Programs Evaluating Coating Transportability and Surrogate Throttle Valve Debris Ingestion	2/28/2006		2/28/2006
Brief ACRS on Staff Evaluation of Licensee Responses to GL 2004-02 and	3/9/2006		3/9/2006

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Milestone	Original Date	Current Date	Actual Date
Results of Chemical Effects Tests			
Complete Testing and Analysis Associated with Initial Phase of Chemical Effects Research	5/30/2006		5/30/2006
Complete Containment Material Head Loss Testing	6/15/2006		6/15/2006
Complete Thermodynamic Simulation of Containment Sump Pool Chemical Constituents	9/30/2006		9/30/2006
Complete Last Audit Report	5/23/2008		6/19/2008
Regions Complete TI Inspections	6/30/2008		6/30/2008
Receive Last TI Verifications From Regions	8/11/2008		8/11/2008
Complete Review of TI Verifications	8/25/2008		6/30/2009
Licensees Complete GL-2004-02 Activities (TBD)	1/31/2007		
Complete Review of Licensee GL 2004-02 Responses for Adequacy (except in-vessel downstream effects)(TBD)	12/31/2007		
Prepare Closure Memo for GL-2004-02 Responses(TBD)	11/23/2008		
Complete NRR Review and Approval of GL Closure Memo(TBD)	12/28/2008		
Complete Review of Licensee GL 2004-02 Responses for in-vessel downstream effects(TBD)	3/31/2010		
Issue final safety evaluation for in-vessel downstream effects	6/30/2009	10/31/2012	

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0193

Type: GI

Office/Division/Branch: RES/DRA/OEGIB

Title: BWR ECCS Suction Concerns

Resolution Status: In progress

Identification Date: 5/10/2002

Generic Issue Acceptance Date: 10/16/2003

Action Level: Active

Task Manager: John C. Lane

TAC Number: KC0140

Safety Risk Assessment: 1/31/2013 (Planned/Projected)

Regulatory Assessment: 5/31/2013 (Planned/Projected)

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, large quantities of entrained gas in the suction piping from suppression pools in BWR Mark I, II, and III containments during LOCA conditions that could cause gas binding, vapor locking, or cavitation.

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). Staff completed a literature search for information on ECCS pump performance during intake conditions at high voiding in March 2005 (ML050910465). Staff also found experimental evidence that gas may reach the ECCS pumps during a loss-of-coolant accident. Although it appears the pumps can recover given a limited amount of void fraction, the impact of voiding on the operation of the pumps is a concern.

The TAP to resolve this GI involves an evaluation of suppression pool designs, the dynamics of air entrainment in the suppression pool, and the impact on ECCS pump performance. A review of wetwell and suppression pool designs was made to establish bounding parameters. Relevant experiments on pool dynamics were reviewed to identify pre-existing sources of data.

Completed portions of the TAP resulted in a basic understanding of the overall phenomena and a preliminary assessment that continued work on the GI is warranted. The next phase will involve a multi-step estimation of the maximum potential void fraction (MPVF) occurring at different stages of a Large and Medium LOCA and will attempt to quantify an upper bound for voids present at the ECCS pump suction strainer in the wetwell. The MPVF appears to be influenced by a number of phenomena, many of which overlap in time, such as the gas/liquid jet coming from the downcomer and non-condensable gas injection from the drywell. An estimate of the MPVF (based on a simplified, worst-case scenario for a generic containment) will be made. Ultimately, it is expected that this may provide licensees with insight on how to calculate the MPVF based on their plant-specific geometrical and operational characteristics. Initial emphasis will be placed on the calculations for the Mark I containment.

STATUS:

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. The BWROG provided references to two research reports from the Lappeenranta University of Technology laboratory in Finland (ML071640273 and ML071640280).

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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.

An experimental testing program was proposed in 2009 to help assess the complex phenomenology involved with bubble creation, injection, and transport into the containment wetwell. Modifications to the experimental facility at Purdue University began in the fall of 2009 in order to simulate the creation and behavior of voids following their injection into a BWR Mark I suppression pool. The testing program, underway during 2010, was completed at Purdue University to promote understanding of complex void-transport phenomena (ML092920025). The final report was received in March 2011. The results of the experimental program have shed light on the behavior of voids in the BWR Mark I wetwell design in regards to the potential transport of bubbles resulting from the LOCA blowdown. This information will be valuable in assessing the capability of bubbles to be transported to the suction strainer of ECCS pumps.

AFFECTED DOCUMENTS:

GE Topical Report NEDO-33526, "Assessment of NRC Generic Issues, GI-193," October 29, 2009.

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. Similarly, the staff attempted to consider test results from Finland as supportive of a resolution. This approach also did not meet with the success originally envisioned, as the test results were not conclusive of pump survival and performance. 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.

REASONS FOR SCHEDULE CHANGES:

The simulated blowdown tests represented a major attempt to demonstrate representative flows through Mark I wetwell downcomers of the steam and drywell inert gases resulting from postulated loss of coolant accidents. Bubbles formed and transported as a result of these flows were tracked to determine the extent to which they might be available to be ingested into ECCS suction lines. The staff expects that these tests will help in determining the extent to which these bubbles could potentially challenge ECCS performance ultimately by causing air binding in the ECCS pumps [the overall test plan is contained in an attachment (ML100750236) to a letter sent to the BWROG (ML100750232) which also contained a description of the PUMA test facility (ML100750240)]. The staff is evaluating the results to determine what insights could be gained from them. In particular, the staff is attempting to determine if there is sufficient evidence to propose a potential downcomer exclusion zone, which would be a region where the bubble formation and transport pose the most significant challenge to the ECCS. In the process of this evaluation, the staff expects to compare the documented test results with analytical results obtained exclusively using computational fluid dynamics.

Milestone	Original Date	Current Date	Actual Date
Complete Task Action Plan for a Technical Assessment	3/31/2004		5/24/2004
ECCS Pump Performance Literature Search	3/31/2005		3/31/2005
Issue Request for Proposal to BNL for Technical Assistance	4/26/2005		4/26/2005

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Milestone	Original Date	Current Date	Actual Date
Receive Proposal for Technical Assistance from BNL	6/3/2005		6/3/2005
Request Information from Technical Research Center of Finland	9/12/2005		9/12/2005
Complete Literature Search for Two Specific Thermal-Hydraulic Phenomena	9/30/2005		9/30/2005
Evaluate Experimental Results on Thermal-Hydraulic Phenomena	9/30/2005		9/30/2005
Assign New Task Manager	5/15/2006		5/15/2006
RES Decision to Work with NRR on Generic Communication	8/31/2006		8/31/2006
Arrange Meeting with BWROG and Obtain Their Input	6/30/2007		6/6/2007
Review BWROG Data and Determine Regulatory Action	9/30/2007		12/31/2007
Assign New Task Manager	4/15/2008		4/15/2008
Query BWROG for background information	9/4/2008		9/4/2008
Query Finnish researchers to share current information	11/30/2008		1/30/2009
Establish workscope for experimental program at Purdue University to study void transport phenomena	5/1/2009		9/1/2009
Receive BWROG response to staff information request	12/31/2008		10/29/2009
Propose and Develop Draft Experimental Test Plan	2/1/2010		3/1/2010
Finalize Experimental Test Plan	4/1/2010		6/1/2010
Begin steady state and transient tests	11/1/2009		6/15/2010
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	3/31/2011		3/31/2011
Staff Evaluation of (PUMA)Test Findings	7/31/2011		2/29/2012
Complete Safety/Risk Assessment	9/30/2010	1/31/2013	
Complete Regulatory Assessment	7/30/2012	5/31/2013	
Develop plan for potential follow-on actions or proceed to issue closure.	10/31/2012	9/30/2013	
Begin Follow-On Actions Commensurate with Risk Significance if required	12/31/2012	12/31/2013	

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0199

Type: GI

Office/Division/Branch: NRR/JLD/

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

Resolution Status: In progress

Identification Date: 5/25/2005

Generic Issue Acceptance Date: 2/1/2008

Action Level: Regulatory Office Implementation

Task Manager: Clifford Munson

TAC Number:

Safety Risk Assessment: 9/2/2010 (Actual/Complete)

Regulatory Assessment:

Transfer to Regulatory Office for Action 9/2/2010 (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.

WORK SCOPE:

NRR staff review of the first ESP applications found that the proposed 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 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 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.

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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 IN 2010-18 was issued on September 2, 2010, to nuclear power plants and independent fuel storage installations. Information Notice IN 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 Generic Letter will request needed data from power reactor licensees. This GI is in Regulatory Office Implementation.

GI-199 activities in NRR are being addressed in the recently issued 50.54(f) letters on items 2.1 and 2.3 of the Japanese NTF recommendations. The Japanese Lessons Learned Directorate will address the issues.

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:

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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 meeting 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	7/7/2005		7/7/2005
Receive Proposal from ISL	8/11/2005		8/11/2005
Generate Screening Analysis	10/31/2006		7/27/2007
Screening Panel Meeting	11/30/2006		9/12/2007
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		1/11/2008
Provide Screening Panel Recommendation Memo for RES Director Approval	1/31/2007		1/25/2008
Issue RES Director Approved Screening Analysis and Panel Recommendation	12/31/2006		2/1/2008
Receive Seismic Hazard Update Results for Selected CEUS Plants from USGS	10/30/2007		10/15/2008
Receive Information from EPRI	5/30/2008		12/3/2008
Schedule and Conduct Safety/Risk Assessment Panel	9/30/2008		8/31/2009
GI-199 transferred to NRR for Regulatory Office Implementation	6/30/2009		9/2/2010
Issue RES Director Approved Safety/Risk Assessment and Panel Recommendation	1/31/2010		9/2/2010
Information Notice IN 2010-18 issued	9/2/2010		9/2/2010

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Milestone	Original Date	Current Date	Actual Date
Information Notice IN 2010-19 issued	9/16/2010		9/16/2010
Conduct Public Meeting	6/30/2009		10/6/2010
Presentation to ACRS Subcommittee	11/5/2009		11/30/2010
Presentation to CRGR	6/30/2011		8/2/2011
Issue draft Generic Letter for public comment	7/31/2011		9/1/2011
Transfer activities to the Japanese Lessons Learned Project Directorate (JLD)			3/8/2012
Response from licensees performing seismic PRA and margin assessments (TBD)			
Presentation to ACRS Subcommittee (TBD)	10/31/2011		
Presentation to ACRS Full Committee (TBD)	10/31/2011		

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Issue Number 0204

Type: GI

Office/Division/Branch: RES/DRA/OEGIB

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

Resolution Status: In progress

Identification Date: 7/19/2010

Generic Issue Acceptance Date: 2/29/2012

Action Level: Active

Task Manager: Chris Cook

TAC Number:

Safety Risk Assessment:

Regulatory Assessment:

Transfer to Regulatory Office for Action 3/6/2012

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 and completed an initial screening assessment in July 2011.

While this screening did not identify any immediate safety concerns, inspections or other reviews at individual plants have led to those plants taking actions regarding flooding scenarios. Based on the screening, the NRC staff recommended that flooding from upstream dam failure be further evaluated as part of implementing recommendations from the agency's Japan Near-Term Task Force (NTTF).

While the NTTF used preliminary information from the screening and mentioned flooding in its July 2011 report (ADAMS accession number ML111861807), the upstream dam issue came to the staff's attention long before the current interest in natural disasters raised by the Japan earthquake/tsunami and reactor accident. 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. Assessing flooding from upstream dam failure was merged with NRC's concurrent actions on NTTF Recommendation 2. This recommendation is evaluating the effects of flooding from all hazard mechanisms at nuclear power plant sites (note: sites undergoing decommissioning, which are part of the generic issue, are not included). Letters sent by the NRC requesting information related to NTTF Recommendation 2 were sent to all licensees in March 2012.

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 the Agencywide Documents Access and Management System (ADAMS). The July 2011 screening assessment 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 letters related to NTTF Recommendation 2 are available in ADAMS under accession number ML12053A340. Finally, the May 2012 letter stating the flood hazard reevaluation due dates are available in ADAMS under accession number ML12097A509. This letter describes the criteria used to place each site into one of three completion date categories. All

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hazard reevaluations are due to the NRC by March 12, 2015.

Milestone	Original Date	Current Date	Actual Date
Issue is Declared a Generic Issue			2/29/2012
Transfer activities to to the Japan Lessons Learned Project Directorate			3/6/2012
Licensee flooding hazard reevaluations	3/15/2015		