

POLICY ISSUE
(Information)

August 27, 2004

SECY-04-0156

FOR: The Commissioners

FROM: Luis A. Reyes
Executive Director for Operations /RA/

SUBJECT: SUMMARY OF ACTIVITIES RELATED TO GENERIC SAFETY ISSUES

PURPOSE:

To present the annual summary of activities related to Generic Safety Issues (GSIs).

BACKGROUND:

Since 1983, the staff of the U.S. Nuclear Regulatory Commission (NRC) has adhered to the practice of providing the Commission with an annual update of the progress made in resolving GSIs. The Commission reinforced this practice in a staff requirements memorandum (SRM) dated May 8, 1998, in response to SECY-98-030, "Implementation of [Direction-Setting Issue] DSI-22 Research," in which the Commission directed the staff to provide an annual summary of activities related to open reactor and non-reactor GSIs.

Management Directive (MD) 6.4, "Generic Issues Program," dated December 2001, delineates the NRC's program for addressing reactor and non-reactor generic issues. Specifically, the program described in MD 6.4 comprises seven stages, including (1) identification, (2) initial screening, (3) technical assessment, (4) regulation and guidance development, (5) regulation and guidance issuance, (6) implementation, and (7) verification. Candidate generic issues may be identified by organizations or individuals either within or external to the NRC.

CONTACT: Ronald C. Emrit, RES
(301) 415-6447

Generally, safety concerns associated with operating events, research results, or risk assessments form the basis for the identification of generic issues (GI) by the staff, the Advisory Committee on Reactor Safeguards (ACRS), the nuclear industry, or the public. After an issue is identified, the staff conducts an initial screening exercise to determine whether it should be processed as a generic safety issue (GSI), excluded from further analysis, or sent to another NRC program for review. In the technical assessment stage, the staff renders a determination as to whether the issue involves adequate protection, safety enhancement, or burden reduction. In addition, the staff's related technical findings become the basis for developing or revising agency rules, guidance, and programs. In the final three stages, the agency issues new or revised regulations or guidance, which are then implemented by licensees and/or certificate holders, and verified by the NRC. GSIs identified after March 1999 have been processed in accordance with MD 6.4.

The NRC's Office of Nuclear Regulatory Research (RES) tracks the status of all generic issues in the agencywide Generic Issue Management Control System (GIMCS) and documents the technical assessments and dispositions of all issues in NUREG-0933, "A Prioritization of Generic Safety Issues."

DISCUSSION:

Reactor GSIs

For generic issues associated with nuclear reactor power plants, the RES staff is responsible for screening all new generic issues and performing the technical assessments of GSIs. In addition, the Office of Nuclear Reactor Regulation (NRR) is responsible for developing and issuing regulations or guidance that may be recommended in the technical assessments, and subsequently verifies the implementation of the resultant regulation or guidance by licensees and/or certificate holders. The staff also conducts an "adequate protection evaluation" for each newly identified GSI to determine whether plants should continue operating while the issue is being resolved. Since the inception of the generic issues program in 1976, the staff has closed 836 of the 847 identified reactor generic issues. A description of the 11 reactor GSIs that remain open at this time as well as a summary of the status of their various stages of initial screening, technical assessment, or regulation and guidance development are attached. The following is a summary of the activities related to reactor GSIs since the staff issued its last report to the Commission in SECY-03-0124 on July 24, 2003.

Identification

The staff identified two new GIs for initial screening:

- 196 Boral Degradation
- 197 Iodine Spiking Phenomena

Initial Screening

The staff completed the initial screening of the following four GIs:

- 186 Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants

- 193 Boiling-Water Reactor (BWR) Emergency Core Cooling System (ECCS) Suction Concerns
- 194 Implications of Updated Probabilistic Seismic Hazard Estimates
- 195 Hydrogen Combustion in Foreign BWR Piping

Technical Assessment

The following seven GSIs are undergoing technical assessment:

- 80 Pipe Break Effects on Control Rod Drive (CRD) Hydraulic Lines in the Drywells of BWR MARK I and II Containments
- 156.6.1 Pipe Break Effects on Systems and Components
- 163 Multiple Steam Generator Tube Leakage
- 185 Control of Recriticality Following Small-Break LOCAs in Pressurized-Water Reactors (PWRs)
- 186 Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants
- 188 Steam Generator Tube Leaks/Ruptures Concurrent with Containment Bypass
- 193 Boiling-Water Reactor (BWR) Emergency Core Cooling System (ECCS) Suction Concerns

Regulation and Guidance Development

Regulation and guidance development continued on the following three GSIs:

- 186 Potential Risk and Consequences of Heavy Load Drops
- 189 Susceptibility of Ice Condenser and MARK III Containments to Early Failure from Hydrogen Combustion During a Severe Accident
- 191 Assessment of Debris Accumulation on PWR Sump Performance

Closed

The staff closed the following GSI during this reporting period:

- 168 Environmental Qualification of Electrical Equipment

Non-Reactor GSIs

The NRC's Office of Nuclear Material Safety and Safeguards (NMSS) has the primary responsibility for processing non-reactor GSIs through all stages of MD 6.4, and RES tracks the status of the unresolved non-reactor GSIs in the quarterly updates of GIMCS. A description of the 3 non-reactor GSIs that remain open at this time as well as a summary of the status of their various stages of technical assessment or regulation and guidance development are attached. The following is a summary of the activities related to non-reactor GSIs since the staff issued its last report to the Commission in SECY-03-0124 on July 24, 2003.

Identification

The staff did not identify any new GSI for screening.

Initial Screening

No initial screening activities were warranted during this reporting period.

Technical Assessment

The following is the status of the ongoing technical assessment of two GSIs:

NMSS-7 Criticality Benchmarks Greater than 5% Enrichment
NMSS-14 Surety Estimates for Groundwater Restoration at In Situ Leach Facilities

Regulation and Guidance Development

Regulation and guidance development continued on the following GSI:

NMSS-16 Adequacy of 0.05 Weight Percent Limit in 10 CFR Part 40

CONCLUSION:

Since the staff issued its last report to the Commission on July 24, 2003, two GSIs were dropped from further pursuit, one GSI was closed, and another 14 GSIs remain to be resolved as the staff continued to implement the MD 6.4 process of identifying and resolving reactor and non-reactor GSIs. The staff will continue to provide annual updates to the Commission on GSI-related activities and will inform the Commission of any significant developments.

/RA/

Luis A. Reyes
Executive Director
for Operations

Attachment: Description and Status of Open
GSIs as of August 16, 2004

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
80	Pipe Break Effects on Control Rod Drive Hydraulic Lines in the Drywells of BWR MARK I and II Containments	RES	This issue addresses a concern regarding the likelihood and effects of a LOCA, which could cause interactions with the CRD hydraulic lines in a manner that could prevent rod insertion and create the potential for recriticality when the reactor core is reflooded.	The staff's action plan for the combined technical assessment of GSIs 80 and 156.6.1 (see below) was approved in February 2004 and, since that time, the staff has completed studies of the high-energy piping interactions with CRD piping bundles in MARK I and II drywells with no adverse findings. The staff's draft recommendations are scheduled to be finalized in October 2004.
156.6.1	Pipe Break Effects on Systems and Components	RES	This issue addresses a safety concern regarding whether the designs of some plants have adequately addressed the effects of pipe breaks inside containments.	See status of GSI 80 above.
163	Multiple Steam Generator Tube Leakage	NRR	This issue addresses a safety concern regarding multiple steam generator tube leaks during a main steam line break that cannot be isolated.	This issue is an integral part of the NRC's Steam Generator Action Plan (Items 3.1, 3.7, 3.8, and 3.9). The staff is developing a more technically robust position on the treatment of radionuclide releases for use in the safety analyses of design-basis events. Technical assessment of the issue is scheduled for completion by September 2005.
168	Environmental Qualification of Electrical Equipment	NRR	Accelerated aging tests on electrical equipment showed that some environmentally qualified cables either failed or exhibited marginal insulation resistance. Failure of these cables during or following a design-basis event could affect the performance of safety functions.	After review and analysis of six LOCA tests, condition-monitoring tests on instrumentation and control (I&C) cables, and information provided by the nuclear industry, the staff concluded that the existing equipment qualification process is adequate to ensure that I&C cables will perform their intended function. The staff, therefore, issued Regulatory Issue Summary 2003-09 on May 2, 2003, and closed the issue in August 2003 with no new requirements for licensees.

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
185	Control of Recriticality Following Small-Break LOCA in PWRs	RES	This issue addresses small-break LOCA scenarios in PWRs that involve steam generation in the core and condensation in the steam generators, which may cause deborated water to accumulate in part of the reactor coolant system (RCS). In such scenarios, restarting the RCS circulation may cause a recriticality event (reactivity excursion) by moving the deborated water into the core.	In March 2004, the staff completed a draft report describing an assessment of recriticality from the transport of boron-diluted water from loop seals to the core during small-break LOCAs in PWRs. The staff will complete its technical assessment of this issue after all feedback is received. Technical assessment of the issue is scheduled for completion by September 2005.
186	Potential Risk and Consequences of Heavy Load Drops in Nuclear Power Plants	RES	This issue resulted from a staff review of licensees' programs for handling heavy loads, which revealed that dropping a heavy load has a substantially greater potential for severe consequences than the industry previously envisioned.	Initial screening of the issue was completed in August 2003 and resulted in the recommendation to continue work on a technical assessment. The staff prepared NUREG-1774, "A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 through 2002," dated July 2003. The staff subsequently completed its related technical assessment in November 2003 and provided recommendations for the development of regulatory guidance for licensees. The staff is currently developing a regulatory issue summary, which will be issued to licensees to clarify and reemphasize existing regulatory guidance for the control of heavy loads.

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
188	Steam Generator Tube Leaks/Ruptures Concurrent with Containment Bypass	RES	This issue addresses the effects on the validity of steam generator tube leak and rupture analyses of resonance vibrations in steam generator tubes during steam line break depressurization.	The issue is an integral part of Item 3.1 of the NRC's Steam Generator Action Plan (SGAP). The staff conducted tests of degraded tubes under pressure and with axial and bending loads to validate analytical results from other SGAP items. Results of the tests showed that dynamic loads associated with a main steam line break will have little impact on the integrity of steam generator tubes unless extensive circumferential cracking is present. The staff is finalizing its draft report and plans to discuss its findings with the ACRS in September 2004.
189	Susceptibility of Ice Condenser and MARK III Containments to Early Failure from Hydrogen Combustion During a Severe Accident	NRR	NUREG/CR-6427, "Assessment of the Direct Containment Heat (DCH) Issue for Plants with Ice Condenser Containments," highlighted this issue with the discovery that the early containment failure probability in ice condensers 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.	The staff concluded that regulatory guidance for providing backup power to one train of hydrogen igniters is warranted for plants with ice condenser or MARK III containments. In November 2003, the ACRS recommended that the staff should proceed with rulemaking to achieve this objective. In pursuing rulemaking, the staff subsequently met with stakeholders in February and March 2004 in its efforts to develop industry guidance that specifies the design criteria for a backup power supply to igniters. A kickoff meeting with the contractor who will perform the regulatory analysis is scheduled for the first week in August 2004. Regulation and guidance development is scheduled to be completed by June 2010.

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
191	Assessment of Debris Accumulation on PWR Sump Performance	NRR	This issue addresses the possibility of debris accumulating on the ECCS sump screen, which may result in a loss of the net positive suction head (NPSH) margin. This loss of NPSH margin could impede or prevent the flow of water from the sump, which is necessary to meet the criteria of 10 CFR 50.46.	The staff issued a bulletin to request licensees to confirm regulatory compliance, in light of the new concerns, or describe interim compensatory actions that were taken or will be taken to reduce risk until a plant-specific analysis can be completed. The staff also published Revision 3 of Regulatory Guide 1.82, "Water Sources for Long-Term Recirculation Cooling Following a Loss-of-Coolant Accident," dated November 2003. The staff is working with the industry to develop acceptable guidance for plant-specific analyses, and is currently developing a generic letter for issuance to licensees which will reference this industry guidance, and also request licensees to reanalyze their sumps and perform necessary modifications. Regulation and guidance development is scheduled to be completed by March 2007.
193	BWR ECCS Suction Concerns	RES	This issue addresses a concern regarding the possible failure of the ECCS caused by unanticipated, large quantities of entrained gas in the suction piping from BWR suppression pools. The issue applies to MARK I, II, and III containments during large- and medium-break loss-of-coolant accidents (LOCAs), and could potentially result in pump failure or degraded performance as a result of gas binding, vapor locking, or cavitation.	Initial screening of this GSI was completed in October 2003 and resulted in the recommendation to continue work on a technical assessment. The staff's action plan for the technical assessment of this issue was approved in May 2004. The staff has since begun investigating the key issues that were conservatively treated in the initial screening (e.g., air entrainment in the suppression pool and pump failure probabilities).

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
194	Implications of Updated Probabilistic Seismic Hazard Estimates	RES	This issue addressed a concern regarding the seismic design bases of all nuclear power plants in and around the East Tennessee Seismic Zone, based on the new composite seismicity model for the region.	Initial screening of this GSI was completed in September 2003. The staff found that existing NRC programs adequately addressed the safety concern, and the issue was dropped from further pursuit.
195	Hydrogen Combustion in Foreign BWR Piping	RES	This issue addressed the accumulation of combustible gas mixtures in piping. In several foreign events, hydrogen and oxygen gases apparently accumulated to a combustible level, which then damaged the piping systems.	Initial screening of this GSI was completed in February 2004. The staff's analysis indicated that the events posed a low risk to the public, and the issue was dropped from further pursuit.
196	Boral Degradation	RES	This issue addresses a concern regarding degradation mechanisms that could impair the effectiveness of Boral as a neutron absorber in spent fuel casks.	This issue was identified in November 2003. The screening panel met on July 26, 2004, and initial screening issue is scheduled to be completed in August 2004.
197	Iodine Spiking Phenomena	RES	This issue addresses the ACRS concern for the conservative, empirical fashion in which iodine spiking is being treated in accident consequence analyses. The ACRS recommended that the staff develop a mechanistic understanding of iodine spiking phenomena so that analyses would reflect current plant operations and the capabilities of modern fuel rods (to prevent coolant contamination).	This issue was identified in July 2004, and initial screening is scheduled to be completed by January 2005.

Description and Status of Open GSIs as of August 16, 2004

GSI Number	Title	Lead Office	Description	Status
NMSS-07	Criticality Benchmarks Greater than 5% Enrichment	NMSS	This issue requires the development and confirmation of the adequacy of methods, analytical tools, and guidance for criticality safety software for validating criticality calculations, including requests to process higher enrichments, in the licensing of nuclear facilities.	In June 2004, the staff was provided with, and trained on, sensitivity/uncertainty computer codes available in the SCALE 5.0 modular code system. The acceptability of new methods is scheduled to be communicated to licensees in December 2004. Technical assessment of the issue is scheduled for completion by October 2005.
NMSS-14	Surety Estimates for Groundwater Restoration at In-Situ Leach Facilities	NMSS	This issue addresses the development of methodologies to (1) calculate surety for groundwater restoration activities at in situ leach uranium extraction facilities, and (2) monitor the post-restoration stability of groundwater quality.	Under contract to the NRC, the U.S. Geological Survey (USGS) submitted a draft report, entitled "Consideration of Geochemical Issues in Groundwater Restoration at Uranium In Situ Leach Mining Facilities," dated August 2003. USGS revised its draft report to incorporate additional information provided by the industry and submitted it to the NRC in August 2004. Technical assessment of the issue is scheduled for completion by December 2004.
NMSS-16	Adequacy of 0.05 Weight Percent Limit in Part 40	NMSS	In SECY-00-0201, dated September 2000, the staff forwarded to the Commission a discussion of available options for proceeding with jurisdictional and technical issues concerning the regulation of source material.	On June 24, 2003, the staff notified the Commission in SECY-03-0106 that it planned to postpone work on a Rule until the Commission had an opportunity to review and direct the staff regarding other related issues that could impact the action taken in the final rule. The Commission subsequently issued an SRM in October 2003 in which it responded to SECY-03-0106 by directing the staff to continue reviewing transfers of materials containing less than 0.05 Wt% uranium and thorium using previous Commission guidance.