

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number 0156.6.1 **Type:** GSI **Office/Division/Branch:** RES/DRASP/OEGIB
Title: PIPE BREAK EFFECTS ON SYSTEMS AND COMPONENTS

| | | |
|--|---|--|
| Priority H | Action Level ACTIVE | Resolution Status: |
| Task Manager: H. Vandermolten | TAC Number: | |
| Identification: 02/1991 | Prioritization/Screen: 07/1999 | Technical Assessment: 12/2007 |
| Identification Status: Complete | Priority/Screen Status: Complete | Technical Assessment Status: |
| Regulation and Guidance Development: | | Regulation and Guidance Issuance Status: |
| Regulation and Guidance Development Status: TBD | | Regulation and Guidance Development Status: TBD |
| Implementation: | Verification: | Closure: 12/2007 |
| Implementation Status: TBD | Verification Status: TBD | Closure Status: |
| Work Authorization: Memo from A. Thadani to E. Rossi dated July 16, 1999. | | |

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|--------------------------------------|------------|----------------|-----------------|
| Y6406 | ISL | | \$195.00 |
| Total Resources Expended (K): | | | \$195.00 |

WORK SCOPE:

Description

GDC 4 is the primary regulatory requirement of concern. It requires, in part, that structures, systems and components important to safety be appropriately protected against the environmental and dynamic effects that may result from equipment failures, including the effects of pipe whipping and discharging fluids. Several possible scenarios for plants that do not have adequate protection against pipe whip were identified as a result of research.

Work Scope

The objective of the attached TAP is to determine through analysis if: (1) a high energy pipe break inside a BWR Mark I containment has the potential to perforate the drywell shell and possibly disable accident mitigation systems; and (2) a high energy pipe break inside a BWR Mark I or Mark II containment can disable the control rod drive (CRD) scram system. The TAP is a follow-on to NUREG/CR-6395, "Enhanced Prioritization of Generic Safety Issue 156.6.1 Pipe Break Effects on Systems and Components Inside Containment," which was performed by the Idaho National Engineering and Environmental Laboratory (INEEL) and issued in November 1999, and the screening evaluation, "A Screening Evaluation of GSI-80 Pipe Break Effects on Control Rod Drive Hydraulic Lines in the Drywell of BWR Mark I and II Containments" attached to the February 14, 2003 memorandum from Thadani to Collins concerning GSI-80. Individual TAP section reports will be issued when analysis information is obtained. All TAP sections are not required to be completed if a bounding analysis finds the associated risk to be inconsequential.

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STATUS:

A letter was sent from F. Eltawila (NRC) to W. Glenn Warren (BWROG) expressing concerns related to the GSI. The BWROG responded on 01-10-2001 that a committee was formed to coordinate the response to the ACRS. There are a total of 16 SEP III BWRs. A Task Action Plan for resolving the issue was approved in May 2001. The previous Task Manager (Stuart Rubin) was reassigned to the Advanced Reactors Group in REAHFB/DSARE/RES in July 2001. New Task Manager (Ron Lloyd) was assigned in January 2002.

Task 4 of Contract Y6406 (NRC-04-01-67) was issued to Information Systems Laboratories (ISL). ISL issued a draft report in September addressing many of the BWROG peer review comments on the prioritization done by INEEL (issued in 1999). The ISL report has been reviewed and comments have been made. In December 2002, ISL completed its review of technical comments made by the BWROG on the INEEL 's "Enhanced Prioritization of Generic Safety Issue 156.6.1 Pipe Break Effects on Systems and Components Inside Containment." ISL concluded that, in general, INEEL's analysis was overly conservative in its risk estimates, and simplistic in accident sequence development. A followup meeting was held on 1/15/03 to discuss potential options for resolution of differences. A meeting to discuss options was held on March 19, 2003. The ongoing reevaluation of 10 CFR 50.46, "Acceptance Criteria for Emergency Core Cooling Systems for Light-Water Nuclear Power Plants," will be considered in the technical assessment of this GSI.

The Task Action Plan for the partial resolution of GSI 156.6.1, "Pipe Break Effects on Systems and Components Inside Containment," and GSI-80, "Pipe Break Effects on Control Rod Drive Hydraulic Lines in the Drywells of BWR Mark I and II Containments," was approved on February 3, 2004 (ML040340549). Prior to his departure from the NRC, Task Manager Ron Lloyd completed a technical evaluation of the effects of postulated pipe breaks inside BWR Mark I and Mark II containments in July 2004. The ANSYS finite element code was used to perform nonlinear transient analysis to determine the impact of impulsive loads due to pipe breaks in feedwater, main steam, and recirculation system piping on drywell steel shell and control rod drive (CRD) bundles. The results of the analysis indicated that the structural integrity and leak-tightness of the drywell steel shell will not be compromised due to pipe impact. The calculations indicate that: (1) the drywell steel shell will yield locally at the point of impact but will not perforate and cause an over-pressure in the annular space between the steel shell and concrete shield wall; (2) the CRD bundles will not be impacted by breaks in recirculation, steam, and feedwater system piping after a postulated break. The next step is to confirm the staff's findings with inspections at a minimum of 3 PWR plants.

In October 2005, DSARE conducted a review of 37 operating plants as part of its selection of certain plants for plant walkdowns. In November 2005, DSARE identified 16 plants (23 reactors) that needed to be reviewed. In April 2006, DRASP requested NRR assistance in gathering detailed plant layout information. A survey of the layout of those plants affected by the issue was completed by the Office of Nuclear Reactor Regulation (NRR) in September 2006. The GIP review of piping configurations to identify the most vulnerable plants is complete. One site for which there was insufficient information to form a conclusion may have a vulnerability. This condition appears to be site specific and as such RES and NRR will work together to determine a path forward to resolve this possible site issue.

Staff Resources Expended: 760 hours

AFFECTED DOCUMENTS:

To be determined.

PROBLEM/RESOLUTION:

The entire list of plants has been examined. One site may have a vulnerability. However, if this applies to a single site, then this issue is not generically applicable.

REASONS FOR SCHEDULE CHANGES:

Arrangement for plant visits was delayed to pursue design drawings that would preclude walkdowns.

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| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Task Action Plan Approved | 5/1/2001 | | 5/30/2001 |
| Task Manager Reassigned to Other Duties | 7/1/2001 | | 7/1/2001 |
| New Task Manager Assigned | 1/1/2002 | | 1/1/2002 |
| Draft Contractor Report | 9/1/2002 | | 12/31/2002 |
| Meeting to Discuss Options | 3/19/2003 | | 3/19/2003 |
| Complete Draft Task Action Plan | 11/1/2002 | | 7/31/2003 |
| Decision to Integrate GSI-80 into Technical Assessment of GSI-156.6.1 | 10/2/2003 | | 10/2/2003 |
| Approval of Task Action Plan | 11/30/2003 | | 2/3/2004 |
| High Energy Piping Interactions with BWR Mark I Drywell Shells | 3/31/2004 | | 3/31/2004 |
| Analysis and Documentation of Calculation Results | 6/30/2004 | | 7/31/2004 |
| Identify Plants to be Visited | 11/30/2005 | | 11/30/2005 |
| Select PWRs for Site Visits | 9/30/2005 | | 6/8/2006 |
| Complete NRR PMs Survey of Affected Plants | 3/31/2006 | | 9/30/2006 |
| Complete GIP Review of Piping Configurations at PWR Plants | 9/30/2005 | 12/31/2006 | 10/17/2006 |
| Perform Assessment of Plants Based on Specific Piping Configurations | 4/30/2007 | 4/30/2007 | 3/30/2007 |
| Draft Recommendations | 8/31/2004 | 6/30/2007 | |
| Meet with ACRS | 2/28/2006 | 9/30/2007 | |
| Close Out Issue with Memo to the EDO | 6/30/2006 | 12/31/2007 | |

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ensuring SG tube integrity.)

On December 1, 1997, the industry informed the staff of an industry initiative, NEI 97-06, "Steam Generator Tube Integrity Guidelines," which paralleled the above draft regulatory guide and which all PWR licensees had committed (among themselves) to implement. NEI 97-06 provides a programmatic, performance based approach to ensuring SG tube integrity. With commission approval, the staff put the above generic letter initiative on hold and worked with the industry to identify revised technical specifications which would be aligned with the NEI 97-06 initiative and which would ensure that all PWR licensee's are implementing programs which ensure that SG tube integrity will be maintained. This effort was completed in May 2005 with the staff's approval of the TSTF-449, Rev 4 which includes a new standard technical specification template governing SG tube integrity.

Regarding the DPO, its nature evolved considerably in the years subsequent to 1991, adding additional concerns relating to alternate tube repair criteria, iodine spiking assumptions for radiological analysis, severe accidents, and many other concerns. The staff prepared a DPO consideration document which it provided to the EDO on September 1, 1999. At the EDO's request, the ACRS served as an equivalent ad hoc panel to review the DPO issues. The ACRS met with the DPO author and other members of the NRC staff and reviewed the documentation related to the DPO issues. The ACRS issued NUREG-1740 on February 1, 2001 documenting its conclusions and recommendations. By memorandum dated May 11, 2001, NRR and RES developed a joint action plan to address the conclusions and recommendations in the ACRS report. This action plan and resolution of GSI 163 was later incorporated into the NRC Steam Generator Action Plan, the status of which was presented to the Commission in SECY-03-0080 and discussed at a Commission meeting on May 19, 2003. (A copy of the NRC SG Action Plan, milestones, schedule, and current status can be found on the NRC public web page.)

The scope of the DPO issues and followup SG Action Plan tasks relevant to GSI 163 are those which could potentially impact needed SG tube inspection, maintenance and repair activities. In contrast, any needed actions to address containment bypass scenarios due to tube failure during severe accidents would likely involve changes to accident management procedures and perhaps hardware modifications not involving the steam generators and, therefore, are outside the scope of GSI-163. Similarly, iodine spiking and radiological assessment issues are outside the scope of GSI-163. DPO issues outside the scope of GSI-163 will continue to be managed under the SG Action Plan umbrella.

STATUS:

In response to NRC Generic Letter 2006-01, "Steam Generator Tube Integrity and Associated Technical Specifications," all PWR licensees have submitted license amendment applications to change their technical specifications in accordance with TSTF-449. The staff has approved and issued amendments for 48 PWRs. The staff has targeted December 31, 2007 for issuing amendments for the remaining PWRs.

SG Action Plan tasks relevant to resolution of GSI-163 have been completed with the exception of task 3.1.k. SG Action Plan task 3.1.k involves evaluation of the conditional probabilities of multiple tube failures for risk assessment pertaining to SG alternate repair criteria. To support the needs of the GSI, the staff is actually performing this task from the broad standpoint of the integrity of the overall tube rather than being narrowly focused on tube locations with alternate repair criteria. The staff has targeted January 31, 2008 for completing this task.

The staff is targeting April 30, 2009 for issuing memorandum to the EDO documenting the resolution of GSI-163 and the supporting technical bases.

Staff Resources Expended: 1800 hours

AFFECTED DOCUMENTS:

NUREGs 1430 - 1432 regarding Standard Technical Specifications
NRC Generic Letter 2006-01
plant specific technical specifications for PWRs

PROBLEM/RESOLUTION:

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Lessons learned from work completed so far have necessitated several modifications and additions to tasks. These are being formalized in the RES Operating Plan and the SG Action Plan.

REASONS FOR SCHEDULE CHANGES:

1. As approved by the Commission in an SRM dated December 21, 1998, development of new technical specifications for ensuring SG tube integrity involved a cooperative effort between the NRC staff and the industry. That it took seven years to reach agreement with the industry is attributable to the complexity of the issues involved and that consensus building within the industry itself proved to be a time consuming process.
2. ACRS findings in NUREG-1740 necessitated followup tasks relating to GSI-163, the last of which is not scheduled for completion until January 2008.

| Milestone | Original Date | Current Dat | Actual Date |
|--|---------------|-------------|-------------|
| Regulatory Analysis | 5/1/1997 | | 5/1/1997 |
| Proposed GL Package | 6/1/1997 | | 10/1/1997 |
| ACRS Endorsement | 6/1/1997 | | 10/1/1997 |
| GL Package Placed in Concurrence | 10/1/1997 | | 10/1/1997 |
| NEI 97-06 Submitted | 12/1/1997 | | 12/1/1997 |
| GL Package Sent to CRGR by NRR | 7/1/1997 | | 4/1/1998 |
| CRGR Meeting on GL Package | 6/1/1998 | | 6/1/1998 |
| CRGR Meeting on Proposed GL | 7/1/1998 | | 7/1/1998 |
| NRR Memo to EDO Putting GL on Hold | 9/1/1998 | | 9/1/1998 |
| Commission Paper Recommending Hold on Issuance of GL | 11/1/1998 | | 10/1/1998 |
| SRM on SECY-98-248 | 12/1/1998 | | 12/1/1998 |
| DPO Consideration Document to the EDO | 9/1/1999 | | 9/1/1999 |
| EDO Establishes an Independent Panel to Review the DPO | 2/1/2000 | | 5/1/2000 |
| ACRS to Perform DPO Review Panel Function | 10/1/2000 | | 10/1/2000 |
| ACRS to Provide Conclusions and Recommendations | 12/1/2000 | | 2/1/2001 |
| NRR & RES Issue Joint Action Plan | 5/31/2001 | | 5/31/2001 |
| Approve TSTF-449 | 5/31/2005 | | 5/31/2005 |

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| Milestone | Original Date | Current Dat | Actual Date |
|--|----------------------|--------------------|--------------------|
| Issue Generic Letter 2006-01 | 1/20/2006 | | 1/20/2006 |
| Issue Revised Technical Specifications - All PWRs | 12/31/2007 | | |
| Completion of GSI-Related Joint Action Plan Issues | 3/31/2005 | 1/31/2008 | |
| Brief ACRS on Proposed GSI Resolution | 11/30/2008 | | |
| Close Out Issue with Memo to the EDO | 2/28/2001 | 4/30/2009 | |

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good practices for crane operations and load movements. Continue to assess implementation of heavy load controls in safety-significant applications through the Reactor Oversight Process. (4) Evaluate the need to establish standardized load drop calculation methodologies for heavy load drops.

STATUS:

The report on the potential risk and consequences of heavy load drops in nuclear power plants was completed in June 2003, after NRR comments were addressed by RES. The publication of the report, NUREG-1774, "A Survey of Crane Operating Experience at U.S. Nuclear Power Plants from 1968 Through 2002," in July 2003 completed the initial screening stage of the issue. The proposed recommendations resulting from the technical assessment of the issue were discussed with the ACRS Full Committee on September 11, 2003. Three of the RES recommendations on regulation and guidance development were sent to NRR on November 12, 2003. By letter dated February 4, 2004, NRR informed RES that these three recommendations would be implemented through issuance of a Regulatory Issue Summary that clarifies and reemphasizes existing regulatory guidance for control of heavy loads. The remaining recommendation was sent to DET/RES on November 21, 2003.

The staff has been participating with the American Society of Mechanical Engineers (ASME) Cranes for Nuclear Facilities Committee in comparing the provisions of the industry crane standard, ASME NOG-1, "Rules for Construction of Overhead and Gantry Cranes," with the NRC guidelines contained in NUREG-0554, "Single Failure-Proof Cranes for Nuclear Power Plants," in support of future endorsement of the industry standard. In September 2004, NRR reported that the Committee action in support of NRC endorsement was delayed. In April 2005, the staff identified an emergent concern with the adequacy of evaluations of heavy load drops. NRR issued Regulatory Issue Summary (RIS) 2005-25 on October 31, 2005, to clarify and reemphasize existing regulatory guidance for the control of heavy loads.

Completion of the ASME Committee action in support of NRC endorsement of the industry crane standard NOG-1 has continued to be delayed. However, through its work with the Committee, the NRR staff has concluded that the industry standard provides improved guidance for construction of new single-failure-proof cranes. Therefore, the staff elected to endorse the ASME NOG-1, 2004, through the Standard Review Plan Update Program in March 2007. The staff also modified the guidelines for slings used with single-failure-proof handling systems in the Standard Review Plan (NUREG-0800), Section 9.1.5, "Overhead Heavy Load Handling Systems," based on a review of operating experience issues. The staff also intends to issue further clarification of regulatory positions related to load drop analyses. The staff and is developing Supplement 1 to RIS 2005-25 to notify industry of the changes to SRP Section 9.1.5 and further clarify existing regulatory positions.

Staff Resources Expended: 3,000 hours

AFFECTED DOCUMENTS:

NUREG-1774
Standard Review Plan (NUREG-0800), Section 9.1.5

PROBLEM/RESOLUTION:

Recent operating experience suggests continuing issues related to load drop analyses. The staff intends to further clarify existing regulatory positions in this area.

REASONS FOR SCHEDULE CHANGES:

The issuance of Supplement 1 to RIS 2005-025 has been delayed to notify industry of changes to regulatory positions included in a revision to SRP Section 9.1.5 and to further clarify existing regulatory positions related to load drop analyses.

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|--|---------------|-------------|-------------|
| Publish NUREG-1774 | 6/30/2003 | | 6/30/2003 |
| Meet with ACRS Full Committee | 9/1/2003 | | 9/11/2003 |
| ACRS Memo to the EDO on Staff Recommendations | 9/24/2003 | | 9/24/2003 |
| Complete Technical Assessment and Transfer Issue to NRR for Regulation and Guidance Development | 10/31/2003 | | 11/12/2003 |
| DSARE/RES Memo to DET/RES Requesting Industry Code Committee Evaluation | 11/21/2003 | | 11/21/2003 |
| Issue RIS 2005-25 to Clarify and Reemphasize Existing Regulatory Guidance for Control of Heavy Loads | 12/31/2004 | | 10/31/2005 |
| Issue RIS 2005-25, Supplement 1 to Address Endorsement of Industry Standard | 2/28/2006 | 4/30/2007 | |
| Brief ACRS on Implementation of Recommendations | 11/30/2004 | 7/31/2007 | |
| Issue Closeout Memo to the EDO | 8/31/2005 | 10/31/2007 | |

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On January 30, 2003, NRR prepared a reply memorandum that 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 OGC, and 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 that specifies the design requirements.

STATUS:

NRR developed design criteria for the backup power supply, and administered a contract with ICF to merge and enhance the existing technical assessment into a regulatory analysis. NRR/DRIP is performing a cost/benefit analysis to support a possible rulemaking effort. The NRR held a public meeting with the public and industry on September 21, 2004, to get external stakeholders' input on the draft design criteria. The BWR owners indicated a willingness to make modifications to supply power from the existing HPCS diesel generator, and 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. 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 manually connect to provide backup power source as needed. American Electric Power representatives indicated a willingness to provide backup power source for D. C. Cook 1 & 2 from the large diesel generators intended to support an increased allowed outage time for the emergency diesel generators. TVA, representing two PWR ice condenser sites, Sequoyah 1 & 2, Watts Bar-I, also indicated a willingness to provide a backup power source from a supplemental diesel generator. In November 2004, the staff reached a consensus to evaluate the proposed voluntary initiatives and pursue that path as a preferential solution.

In February and early March 2005, the NRR staff met with representatives of RES, NSIR, and OEDO to develop an understanding of newly identified safety/security interface issues and actions initiated in the security arena that could impact the solution of 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 to inform the Commission of the regulatory analysis results and recent staff activities on GSI-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 the benefit. The costs exceed the benefits for all BWR regulatory options, and none of the options for the BWRs provides 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 among accident prevention and mitigation provide an additional un-quantified benefit for both containment types.

Based on an understanding that many of the voluntary physical modifications had been completed, the staff elected to delay 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 staffs 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 has held closed meetings in December 2006 and January 2007 to further explore the proper consideration of security insights in the design of the modifications. On January 30, 2007, the EDO issued a memo summarizing the outcome of the meetings. The staff received industry proposals for modifications that incorporate security insights in late February and early March 2007. The staff is evaluating these voluntary proposals.

Staff Resources Expended: 8,000 hours

AFFECTED DOCUMENTS:

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10 CFR 50.44
10 CFR 50.34

PROBLEM/RESOLUTION:

The costs exceed the benefits for all BWR regulatory options, and none of the options for the BWRs provides 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 among 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.

REASONS FOR SCHEDULE CHANGES:

Based on an understanding that many of the voluntary physical modifications had been completed, the staff elected to delay seeking specific commitments while security-related reviews of the facilities were ongoing. Because this issue was not incorporated in the scope of industry-wide security-related modifications, the staff has held closed meetings in December 2006 and January 2007 to further explore the proper consideration of security insights in the design of the modifications. On January 30, 2007, the EDO issued a memo summarizing the outcome of the meetings. The staff received initial industry proposals for modifications that incorporate security insights in late February and early March 2007. The staff is reviewing the industry proposals and expects to resolve any remaining safety, security, and regulatory issues by December 2007. Based on industry proposals, the staff expects full implementation of the modifications to be completed by June 2008 at nearly all affected units, with two units delayed as late as early 2010 for more complex modifications.

| Milestone | Original Date | Current Dat | 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 GSI to NRR | 12/1/2002 | | 12/17/2002 |
| Determine Best Course of Action | 2/28/2003 | | 2/28/2003 |
| Public Meeting with Stakeholders | 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 |

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|--|---------------|-------------|-------------|
| 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 |
| Complete Communication Plan | 7/10/2003 | | 7/10/2003 |
| Public Meeting to Address Design Criteria | 11/6/2003 | | 11/6/2003 |
| NRR Meeting with ACRS | 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 | 10/31/2006 | 3/9/2007 |
| Request Information from Owners on Voluntary Actions Implemented | 12/31/2005 | 10/31/2006 | 3/9/2007 |
| Complete Regulation and Guidance Development | 6/30/2006 | 4/30/2007 | |

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| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Clarify Commitments to Resolve Any Remaining Issues | 12/31/2007 | 12/31/2007 | |
| Complete Implementation | 6/30/2008 | 1/31/2010 | |
| Close Out Issue with Memo to the EDO | 6/30/2010 | 6/30/2010 | |
| Complete Verification | 6/30/2009 | 6/30/2010 | |

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ECCS operation to facilitate the review of any changes to plants that may be warranted; and (4) issue Generic Communication and work with the industry plan to evaluate and resolve GSI-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 GSI-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 agreement with the staff's Technical Assessment of the issue in 09/2001, the issue was forwarded to NRR in a memorandum dated September 28, 2001. Consistent with Management Directive 6.4, NRR has the lead for Stages 4 through 6 of the Generic Issues Process for GSI-191. NRR has evaluated the technical assessment, and prepared a Task Action Plan for developing appropriate regulatory guidance and resolution of GSI-191.

STATUS:

Following meetings with stakeholders on March 5 and April 29, 2003, the NRC issued Bulletin 2003-01 to PWR licensees on June 9, 2003 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 Safety Issues Resolution Branch (SSIB) reviewed and evaluated the information provided and determined that the licensee's actions were responsive, and met the requirements of Bulletin 2003-01. The Division of 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.

Generic Letter (GL) 2004-02 was issued in September 2004 requesting licensees to perform plant-specific mechanistic evaluations of sump performance following LOCA and HELB events, and to implement corrective actions as required to ensure compliance with regulatory requirements. The Nuclear Energy Institute (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 Safety Evaluation (SE), which supplemented the GR. The staff presented the SE to CRGR, and to the ACRS Subcommittee and Full Committee in September and October 2004, respectively. The final SE was issued in December 2004, resulting in an NRC-approved evaluation methodology. In January and April 2005, the staff held public meetings with NEI and owners to discuss the GL and SE, and to address questions as the evaluations were performed using the SE and GR.

Generic Letter 2004-02 required licensees to respond within 90 days to document the actions planned by the licensee 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 last five years. The staff evaluated all 90-day responses to Generic Letter 2004-02 and in January 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 will be needed to address the effect on head loss. 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 on the chemical effects on ice condenser containments on 01/13/2006 (ML053550433), and on PWR containments on 01/20/2006 (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 (e.g., from trisodium phosphate) and dissolved calcium.

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NRR anticipates that recipients will review the information for applicability to their facilities and consider taking actions, as appropriate, to avoid similar issues. Research was also conducted on the transportability of coating chips in containment pool environments, and on the effect of ingested debris on downstream valve performance. Draft test reports have been issued for these items; final issuance is expected in FY07.

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 GSI-191 are now complete and documented, though information obtained as the staff reviews industry activities to support issue closure may indicate the need for additional NRC-sponsored research.

As part of the plan to confirm adequate implementation and resolution of GSI-191, the NRC is conducting detailed plant audits examining the analyses and design changes used to address the technical issues. Visits to strainer vendor test facilities will also be included as part of this audit process. 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. Currently, 10 plant audits are planned. Audit reports will be posted on the NRC's ADAMS document control system as they become available. Audit activity in the 2nd Quarter of FY-2007 included completion of the Watts Bar audit, continuation of the San Onofre and Prairie Island audits, and visits to Millstone and Oconee to initiate an audit. To support the audits, the NRC staff also made some visits to sump strainer vendor facilities to observe ongoing head loss and chemical effects testing.

In addition to the plant audits identified above, the staff will use inputs from review of licensee responses to GL 2004-02 and items identified from Regional inspections using Temporary Instruction TI-2515/166 to support closure of GSI-191. Review of final licensee GL responses will begin after they are submitted, which is expected to occur by the December 31, 2007 due date specified in the GL. Inspections by regional staff will verify proper implementation of planned modifications.

Some plant-specific issues (e.g., outage schedule availability, steam generator replacement scheduled) have led to some licensees identifying a need to request an extension beyond the NRC-identified date of December 31, 2007 for completion of certain corrective actions for GL 2004-02. Because they are plant-specific, these extension requests must be evaluated on a case-by-case basis. As of March 2007, 12 extension requests have been approved based on, for example, strong sets of interim compensatory measures, significant interim or final sump screen areas, fibrous insulation removal or lack of fibrous insulation issues, installation of debris interceptors, and short periods of extension. Four additional extension requests are currently under review.

To provide open communication on NRC activities associated with GSI-191 resolution, public meetings with NEI and industry representatives continue to be held regularly, as schedules allow. Briefings of ACRS have been scheduled periodically to provide opportunities for communication on technical issues and additional public involvement. The going forward project schedule for resolution of GSI-191 includes public meetings with industry on a regular basis (approximately 2 per quarter) and briefings for the ACRS (approximately 2 per year). Experience has shown that flexibility in meeting/briefing scheduling is beneficial to allow milestones to be complete prior to meeting/briefing occurrence.

AFFECTED DOCUMENTS:

- (1) Regulatory Guide 1.82, Rev. 3
- (2) NUREG-0800
- (3) Generic Letter 85-22
- (4) Bulletin 2003-01
- (5) Generic Letter 2004-02

PROBLEM/RESOLUTION:

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Complexities associated with chemical effects are making it difficult for licensees to design modified sump screens, and for the NRC to evaluate the adequacy of the modified screens. Data are being generated both by the industry and RES to address this issue.

REASONS FOR SCHEDULE CHANGES:

Although licensees GL submittals are still due by December 31, 2007, activities will occur in 2008 that are needed to support issue closure. The final staff audit will be complete in spring 2008. The staff's review of GL responses is expected to be complete in July 2008. Completion reports for TI-2515/166 will also be due in summer 2008. Integrating these activities to support final issue closure, including ACRS and management reviews, results in planned closure of the GSI in September 2008.

Complexities associated with the impact of chemical effects on sump strainer performance continue to be challenging. With chemical effects testing ongoing, there is the possibility that additional time may be needed to fully address this aspect of the GSI. The likelihood of such an outcome should be clearer in about six months.

| Milestone | Original Date | Current Dat | 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 | 4/1/2002 | | 9/28/2001 |

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| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Assessment Stage of Generic Issue Process) | | | |
| 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 |
| 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 GSI | 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 |

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| Milestone | Original Date | Current Dat | Actual Date |
|--|---------------|-------------|-------------|
| Issue Information Notice 2005-26 | 9/16/2005 | | 9/16/2005 |
| Complete Review of Licensee Responses to GL 2004-02 | 1/20/2006 | | 1/20/2006 |
| Issue Supplement 1 to IN 2005-26 | 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 Results of Chemical Effects Tests | 3/9/2006 | | 3/9/2006 |
| 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 |
| Licensees Complete GSI-191 Activities, Including All Modifications | 1/31/2007 | 12/31/2007 | |
| Complete Last Audit Report | 5/23/2008 | | |
| Complete NRC Evaluation of Licensees GSI-191 Activities and Modifications | | 6/30/2008 | |
| Regions Complete TI Inspections | 6/30/2008 | | |
| Complete Review of Licensee GL 2004-02 Responses for Adequacy | 12/31/2007 | 7/24/2008 | |
| Receive Last TI Verifications From Regions | 8/11/2008 | | |
| Complete Review of TI Verifications | 8/25/2008 | | |
| Prepare Closure Memo for GL-04-02 Responses and TI Verifications | 9/23/2008 | | |
| Prepare GI-191 Closure Memo to EDO | 9/30/2008 | | |
| Complete NRR Review and Approval of GI and GL Closure Memos | 10/28/2008 | | |
| Complete GIP and RES Review and Approval of GI Closure Memo | 11/25/2008 | | |
| Close Issue with Memo to the EDO | 3/2/1987 | 11/28/2008 | |

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The TAP to resolve this GSI involves a three part evaluation of suppression pool designs, dynamics of air entrainment in the suppression pool, and the impact on ECCS pump performance. Part A reviewed wetwell and suppression pool designs to establish bounding parameters and values. Part B reviewed relevant experiments on pool dynamics to identify available data. Part C originally intended to use information from Parts A and B to estimate the void fraction at the suction strainers as a function of the time after accident initiation, to assess the plausibility of air ingress into the ECCS strainers and intake piping, and to forecast the potential impact on the ECCS pumps' ability to fulfill their design function. Part C has been modified to involve industry in assessing this issue, as appropriate. This applies the approach to resolving generic safety issues described in SECY-07-022, "STATUS REPORT ON PROPOSED IMPROVEMENTS TO THE GENERIC ISSUES PROGRAM."

STATUS:

Staff completed parts A and B of the work scope and continues to work on part C of the work scope as described below.

A proposal for performing technical analyses was received from BNL in June 2005, in response to an RFP issued by the NRC in April 2005. In September 2005, information on suppression pool experiments was requested from the Technical Research Center of Finland and experimental results on thermal hydraulic phenomena from one plant were evaluated. A literature search was completed for two specific thermal-hydraulic phenomena: liquid gas jet; and bubble breakup.

During the 4th Quarter of FY-2006, discussions were initiated with NRR regarding commonality of concerns between GI-193 and those being addressed in a proposed Generic Letter addressing gas accumulation in ECCS suction piping covering all reactors. It was decided initially that the resolution of GI-193 would be pursued by RES independently, but with appropriate coordination with the NRR activities on gas management issues. After consideration of a research project to model the central issue in GI-193 (i.e., ability of Mark-1 BWR ECCS pumps to tolerate short periods of high void fraction operation), RES reached a decision in favor of working with NRR to issue an appropriate generic communication to affected licensees and revised milestones accordingly. Discussions with NRR ensued on the specifics of the generic communication and the schedule for its issuance.

By March 2007, the continuing discussions between RES and NRR about including this GI in the scope of the NRR proposed Generic Letter (GL) resulted in agreement not to include this GI in the GL. Inclusion was deemed impractical because the proposed the GI was sufficiently different and the proposed GL was substantially developed such that including the GI would have resulted in substantial rework. Accordingly, in March 2007, RES and NRR (the Generic Communication and Power Uprate Branch) decided to collaborate on obtaining BWR Owners Group cooperation to support the ongoing assessment of this GI. This approach is consistent with the principles described in SECY-07-022, "STATUS REPORT ON PROPOSED IMPROVEMENTS TO THE GENERIC ISSUES PROGRAM."

NRR made preliminary contact with the BWROG in March 2007 and requested information to support this GI. The plan is to hold a meeting with BWROG by June 2007 to discuss their input and identify alternatives for completing part C of the work scope. Any resulting decisions on regulatory actions, implementation, and verification depend on the outcome of part C.

Staff Resources Expended: Estimated at 2,000 hours.

AFFECTED DOCUMENTS:

To be determined.

PROBLEM/RESOLUTION:

Engage the BWROG through the Generic Communication and Power Uprate Branch of NRR to participate in further evaluation of this GI for completing part C of the proposed work scope. (See ADAMS ML070920154 for e-mail between NRR and BWROG representatives on this collaborative effort.) Any resulting

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decisions on regulatory actions, implementation, and verification depend on the outcome of part C.

REASONS FOR SCHEDULE CHANGES:

The previous Task Manager left the NRC in December 2005. The new Task Manager was assigned in May 2006.

REASONS FOR SCHEDULE CHANGES:

Initial intent to include this issue in the scope of the GL on the topic of gas accumulation in suction piping of ECCS pumps being developed by NRR proved to be impractical based on the differences and development status of this GL.

| Milestone | Original Date | Current Dat | 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 RFP to BNL for Technical Assistance | 4/26/2005 | | 4/26/2005 |
| 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 | | |
| Review BWROG Data and Determine Regulatory Action | 9/30/2007 | | |
| Initiate Appropriate Action Commensurate With Risk-Significance | 12/31/2007 | | |
| Close Out Issue with Memo to the EDO | 3/31/2007 | 3/31/2008 | |

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In accordance with the guidance contained in Management Directive 6.4, "Generic Issues Program," in August 2006, the staff submitted the technical assessment for review and endorsement of the Advisory Committee on Nuclear Waste (ACNW) recommending that the GI be closed out without imposing new requirements. The staff briefed the Committee in December 2006. Following the ACNW endorsement of the staff's recommendation, dated December 13, 2006, (ML063520459), a memorandum was issued on February 22, 2007, informing the EDO of the staff's rationale and decision to close out GI-196 (ML070090182).

Staff Resources Expended: 500 Hours

AFFECTED DOCUMENTS:

None.

PROBLEM/RESOLUTION:

None.

| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Develop Task Action Plan for the Technical Assessment of the GSI | 2/28/2005 | | 3/31/2005 |
| Review the NMSS-Supplied Literature and Other Information for Evaluating Effects of Boral Degradation and Their Impact on Potential Inadvertent Criticality | 9/30/2005 | | 9/30/2005 |
| Expand Literature Review and Prepare Report | 12/31/2005 | | 11/30/2005 |
| Obtain Funding for Peer Review of Staff Report | 4/20/2006 | | 4/20/2006 |
| Peer Review Completed by ORNL | 5/31/2006 | | 8/31/2006 |
| Complete Technical Assessment | 6/30/2006 | | 8/31/2006 |
| Transmit Technical Assessment to the ACRS/ACNW | 8/31/2006 | | 8/31/2006 |
| Meet with ACRS/ACNW | 12/15/2006 | 12/15/2006 | 12/13/2006 |
| Receive ACRS/ACNW Comments | 1/31/2007 | 1/31/2007 | 12/13/2006 |
| Resolve ACRS/ACNW Comments | 2/28/2007 | 2/28/2007 | 2/22/2007 |
| Close Out Issue with Memo to the EDO | 6/30/2006 | 2/28/2007 | 2/22/2007 |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number 0198 **Type:** GSI **Office/Division/Branch:** RES/DRASP/OEGIB
Title: HYDROGEN COMBUSTION IN PWR PIPING

| | | |
|---|---|--|
| Priority | Action Level ACTIVE | Resolution Status: |
| Task Manager: H. Vandermolten | TAC Number: K81095 | |
| Identification: 02/2004 | Prioritization/Screen: 02/2007 | Technical Assessment: |
| Identification Status: Complete | Priority/Screen Status: Incomplete | Technical Assessment Status: TBD |
| Regulation and Guidance Development: | | Regulation and Guidance Issuance Status: |
| Regulation and Guidance Development Status: TBD | | Regulation and Guidance Development Status: TBD |
| Implementation: | Verification: | Closure: 02/2007 |
| Implementation Status: TBD | Verification Status: TBD | Closure Status: |
| Work Authorization: Memo from John Flack to Ashok Thadani, "Results of Initial Screening of Generic Issue 195, "Hydrogen Combustion in Foreign BWR Piping, dated February 23, 2004 | | |

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|--------------------------------------|------------|----------------|----------------|
| | None | | \$0.00 |
| Total Resources Expended (K): | | | \$0.00 |

WORK SCOPE:

Description

Under some circumstances, an hydrogen explosion in the primary system piping and equipment could lead to an "unisolatable" LOCA. The effect on PWR plant safety of a hydrogen detonation is to either cause a pipe break or damage a safety or relief valve. In either case, the effect is to cause a loss of coolant from the primary system. Additionally, there have been some instances of personnel injury and fatalities stemming from hydrogen explosions. These, however, have not posed significant risk to the public, but instead are of significance for occupational safety and health.

Work Scope.

Perform issue screening in accordance with MD 6.4, "Generic Issues Program," Stage 2.

STATUS:

Staff completed the screening analysis in May 2006 and convened a screening panel meeting to review the screening analysis on February 8, 2007. The screening panel concluded that this issue should not be pursued further as a generic issue because of its very low likelihood of leading to a severe accident.

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The panel's conclusion was based on: (1) the limited number of places where non-condensable gases can accumulate in the primary system of a PWR, which is largely liquid-filled, (2) the lack of any observed precursor events in any PWR, and (3) the low frequency of such events based on the extrapolation of the BWR experience described in the analysis of GI-195, "Hydrogen Combustion in BWR Piping."

In a memorandum to the RES Office Director dated March 22, 2007, the screening panel recommended RES Office Director approval that the GI be dropped from further pursuit, which the RES Office Director approved on March 22, 2007 (ML070580447).

Staff Resources Expended: 600 Hours

AFFECTED DOCUMENTS:

None Identified.

PROBLEM/RESOLUTION:

The panel meeting was delayed pending completion of review of the screening analysis by OERA/RES in January 2007.

REASONS FOR SCHEDULE CHANGES:

The panel meeting was delayed pending completion of review of the screening analysis by OERA/RES in January 2007.

| Milestone | Original Date | Current Dat | Actual Date |
|---|----------------------|--------------------|--------------------|
| Complete Screening Analysis | 5/15/2006 | | 5/15/2006 |
| Convene Panel for Review of Analysis | 6/30/2006 | 11/15/2006 | 2/8/2007 |
| Resolve Panel Comments and Complete Screening of Issue | 9/30/2006 | 2/28/2007 | 2/8/2007 |
| Obtain RES Office Director Approval of Screening Panel Recommendation for Closing Issue | 3/22/2007 | | 3/22/2007 |

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Active Only: All Issue(s)

Issue Number 0199

Type: GSI

Office/Division/Branch: RES/DRASP/OERA

Title: IMPLICATIONS OF UPDATED PROBABILISTIC SEISMIC HAZARD ESTIMATES IN CENTRAL AND EASTERN UNITED STATES FOR EXISTING

Priority

Action Level ACTIVE

Resolution Status:

Task Manager: T. Mitts

TAC Number: K81095

Identification: 05/2005

Prioritization/Screen: 12/2006

Technical Assessment:

Identification Status: Complete

Priority/Screen Status: Incomplete

Technical Assessment Status: TBD

Regulation and Guidance Development:

Regulation and Guidance Issuance Status:

Regulation and Guidance Development Status: TBD

Regulation and Guidance Development Status: TBD

Implementation:

Verification:

Closure:

Implementation Status: TBD

Verification Status: TBD

Closure Status:

Work Authorization:

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|--------------------------------------|------------|--|----------------|
| Y6912 | ISL | Assistance for Screening Analysis of Generic Issue 199 | \$25.00 |
| Total Resources Expended (K): | | | \$25.00 |

WORK SCOPE:

Description

Regulatory Guide 1.165, developed in the early 1990s, specifies a reference probability for exceedance of a safe shutdown earthquake (SSE) ground motion, i.e., seismic hazard, at a median annual value of 10E-5. This reference probability value is based on the annual probability of exceeding the SSEs for 29 Central and Eastern United States nuclear power sites and is used to establish the SSEs for future nuclear facilities. Preliminary results from a 2004 USGS report indicated that the reference probability for the 29 CEUS is now about 6 to 7 x 10E-5. The increase in the reference probability value is primarily due to recent developments in the modeling of earthquake ground motion in the CEUS. No new plants have applied for a construction permit or ESP since 10 CFR Part 100 was revised and Regulatory Guide 1.165 was issued in 1997. Therefore, the impact of the revised regulation and the regulatory guide as they relate to future plants and operating reactors was not realized until the staff began its review of the ESP applications.

It is apparent from staff's review of the ESP applications with support from the USGS letter report that the perception of seismic hazard for operating plants in the CEUS region has increased. The staff has determined, based on the evaluations of the IPEEE Program, that seismic designs of operating plants in the CEUS still provide an adequate level of protection. At the same time, the staff also recognizes that the probability of exceeding the SSE at some of the currently operating sites in the CEUS is higher than previously understood. Therefore, this GI is to assess the impact of higher seismic hazard on current nuclear power plants in the CEUS region.

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Work Scope

This GI is in Stage 2 (Screening) of the MD 6.4 process.

STATUS:

A contract for technical assistance was awarded to ISL in August 2005. The objective of this task is to develop a probabilistic screening analysis of GI-199, to address the concern for the higher seismic hazard on current nuclear power plants in the Central and Eastern United States. The contractor shall use the information provided by the NRC to develop a probabilistic screening analysis (prioritization) 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."

Specifically, the contractor will develop an estimate of the change in core damage frequency resulting from new, larger probabilities of exceedance of the safe shutdown earthquake ground motion reported by the United States Geological Survey for 29 reactor sites in the central and eastern United States. The increase in the reference probability value is primarily due to recent developments in the modeling of earthquake ground motion in the central and eastern US. The NRC/RES staff will supply this information.

The ISL work has been delayed since awarding this contract pending release of information by EPRI. OGC advised RES against paying for EPRI NP-6395-D which is needed for ISL to complete its Task. Discussions continued among EPRI, RES, and NRC Division of Contracts on making the report available to ISL. The NRC OGC considers EPRI's suggested non-disclosure agreement process for releasing NP-6395-D to ISL as potentially in conflict with laws governing release of information under FOIA and the Sunshine Act. The NRC's established process for designating information as proprietary and therefore exempt from release under FOIA and Sunshine Act would require EPRI to prepare an affidavit at their cost. EPRI has no requirement or incentive to follow this process.

On March 14, 2007, EPRI and the NRC Office of RES signed a Memorandum of Understanding (MOU) on Cooperative Nuclear Safety Research. To date, this MOU and ongoing discussion between EPRI, RES, NRC Division of Contracts, and OGC have not resulted in release of NP-6395-D for ISL use on the task for screening analysis of GI-199. Since this task expired in December 2006, it would need to be renewed prior to ISL proceeding with the requested screening analysis.

Staff Resources Expended: 160 staff-hours

AFFECTED DOCUMENTS:

None Identified.

PROBLEM/RESOLUTION:

The ISL analysis has been delayed pending resolution of the cost of procuring EPRI NP-6395-D.

To overcome this issue, RES will engage the stakeholders to identify clear alternatives for proceeding with assessment of GI-199 in accordance with MD 6.4 and SECY-07-0022, "Status Report on Proposed Improvements to the Generic Issues Program," dated January 30, 2007 (ML063460239). Based on the outcome of these discussions, RES will prepare a plan for proceeding with assessment of GI-199, including new milestones, as appropriate.

REASONS FOR SCHEDULE CHANGES:

Schedule delays are caused by not identifying an amenable solution for EPRI release of NP-6395-D to ISL for performing the screening analysis task, and

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also not identifying or pursuing any possible workable alternate solutions for proceeding with screening assessment of GI-199.

| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Issue RFP to ISL for Technical Assistance | 7/7/2005 | | 7/7/2005 |
| Receive Proposal from ISL | 8/11/2005 | | 8/11/2005 |
| Receive Technical Information from ISL | 7/31/2006 | 4/30/2007 | |
| Generate Screening Analysis | 10/31/2006 | 6/30/2007 | |
| Screening Panel Meeting | 11/30/2006 | 7/31/2007 | |
| Complete Screening | 1/31/2007 | 8/31/2007 | |
| Issue Panel Report to RES Director | 12/31/2006 | 9/30/2007 | |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

require either dissolution of the metal or the presence of an electric field. The theory is that whiskers are caused by compressive stress buildup during the plating process.

Work Scope

Work on this GI was limited to a screening analysis in accordance with MD 6.4.

STATUS:

A review of pertinent literature was completed by the staff to collect information needed for the screening of the GI. The screening analysis for this GI was completed and sent to the screening panel in October 2006. The panel met on November 29, 2006, and agreed to eliminate the GI from further pursuit since it was deemed to a compliance issue. On January 26, 2007 the RES Office Director approved the panel's recommendation to close out GI-200.

Staff Resources Expended: 160 Hours

AFFECTED DOCUMENTS:

None.

PROBLEM/RESOLUTION:

None.

| Milestone | Original Date | Current Dat | Actual Date |
|--|----------------------|--------------------|--------------------|
| Select Panel Members | 9/8/2006 | | 9/8/2006 |
| Develop Draft Report with Rationale for Review | 9/15/2006 | | 9/15/2006 |
| Issue Request for Management Approval of Panel Member | 9/15/2006 | | 9/15/2006 |
| Issue Screening Report to Panel | 10/27/2006 | 10/27/2006 | 10/27/2006 |
| Screening Panel Meeting | 1/31/2007 | 11/20/2006 | 11/29/2006 |
| Receive Panel Comments | 12/4/2006 | 12/4/2006 | 12/4/2006 |
| Finalize Screening Analysis for RES Director Approval | 12/18/2006 | 12/18/2006 | 12/18/2006 |
| Close Out Issue | | | 1/26/2007 |
| Complete Screening With Approval of Panel Report by RES Director | 2/28/2007 | 2/28/2007 | 1/26/2007 |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number 0201

Type: GSI

Office/Division/Branch: RES/OERA/GSIT

Title: SMALL-BREAK LOCA AND LOSS OF OFFSITE POWER

Priority U

Action Level ACTIVE

Resolution Status:

Task Manager: A. Salomon

TAC Number:

Identification: 08/2006

Prioritization/Screen:

Technical Assessment:

Identification Status: Complete

Priority/Screen Status: Incomplete

Technical Assessment Status:

Regulation and Guidance Development:

Regulation and Guidance Issuance Status:

Regulation and Guidance Development Status:

Regulation and Guidance Development Status:

Implementation:

Verification:

Closure:

Implementation Status:

Verification Status:

Closure Status:

Work Authorization:

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|------------|------------|----------------|----------------|
|------------|------------|----------------|----------------|

WORK SCOPE:

Description

This GI was originated in August 2006 as a follow-up action from the NRC's Allegation Team review of an allegation from a private citizen submitted on March 14, 2006.

The GI involves a postulated small-break loss of coolant accident (LOCA) and loss of offsite power (LOOP) scenario. In the event of a LOCA in a pressurized water reactor (PWR), approximately 300,000 gallons of water are available in the refueling water storage tank (RWST) for post LOCA injection. Eventually a switchover to the recirculation mode is necessary after a LOCA as the RWST inventory is depleted. The timing of the switchover to recirculation mode depends on the size of the break, due to the flow from the centrifugal high pressure injection (HPI) pumps – increasing as the pressure decreases. For large breaks, the maximum injection pressure of the low pressure injection (LPI) pumps will be reached relatively quickly, and the HPI pumps are not needed for recirculation. The HPI pumps are needed during recirculation for small breaks. The scenario of interest is an SBLOCA event where the RWST is depleted and the emergency core cooling system (ECCS) is aligned in the HPI recirculation mode, approximately 4 hours into the event. At this lineup the LPI pumps provide suction head to intermediate/or high head pumps, depending on the design. The potential safety concern is (the possibility) that if a loss of offsite power (LOOP) occurs in this situation the HPI pumps may be sequenced onto the emergency diesel generators (EDG) prior to the sequencing of the low head pumps. This would result in the HPI pumps being restarted with inadequate suction head – likely causing pump damage. Note, there are potentially other scenarios, such as a transient relying upon primary system feed and bleed, that result in conditions similar to the SBLOCA-LOOP scenario of interest.

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Work Scope

This GI was screened by staff in RES in accordance with Management Directive (MD) 6.4, Generic Issues Program. The screening analysis for this GI is performed for sequences that require high pressure recirculation for continued core cooling during an SBLOCA event. The LOOP occurs during or after switchover to recirculation mode. The LPI system and the HPI system are designed to permit the recirculation mode at various system pressures following a LOCA. If the LPI pump loads before the HPI pump, the LPI discharge provides suction to the HPI in "piggyback" mode for higher RCS pressures which may exist following a small break. Therefore there will be no pump runout and the HPI will have adequate suction flow. This concern is also applicable in sequences involving "feed and bleed" and stuck open power-operated relief valves (PORVs) since plant behavior is equivalent to SBLOCA-initiated sequences.

STATUS:

Results from the screening analysis determined the scenario of this GI (a small-break loss-of-coolant accident (SBLOCA) and LOOP) involves a negligible increase in core-damage frequency (i.e., bounding estimate of 4E-8). Therefore, this GI is not a good candidate GI for the expenditure of resources when compared to those that specifically meet the requirements set out in NRC's Management Directive 6.4. "Generic Issues Program." Because this issue does not meet the criteria for further analysis set forth in MD 6.4, RES recommends that it be closed out in the GI program.

The screening review panel agreed with the screening analysis and recommended dropping this GI from further pursuit. This recommendation and the RES Office Director's approval is documented in memorandum dated March 29, 2007 (ML070820124).

Staff Resources Expended: Not Applicable.

AFFECTED DOCUMENTS:

None.

PROBLEM/RESOLUTION:

None.

REASONS FOR SCHEDULE CHANGES:

None

| Milestone | Original Date | Current Dat | Actual Date |
|----------------------------|---------------|-------------|-------------|
| Complete Initial Screening | 3/31/2007 | | 3/29/2007 |
| Issue GI Close Out Memo | 3/31/2007 | | 3/29/2007 |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Staff Resources Expended: Approximately 160 person-hours.

AFFECTED DOCUMENTS:

None identified.

PROBLEM/RESOLUTION:

None.

REASONS FOR SCHEDULE CHANGES:

Need to identify review experts from RES and NRR and obtain commitment from their management to review the screening analysis.

| Milestone | Original Date | Current Dat | Actual Date |
|--|----------------------|--------------------|--------------------|
| Prepare Initial Screening Analysis | 1/30/2007 | | 1/30/2007 |
| Complete RES and NRR Reviews of Screening Analysis | 4/16/2007 | 4/16/2007 | |
| Close Out GI-202 | 5/30/2007 | 5/30/2007 | |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number 0203

Type:

Office/Division/Branch: RES/DRASP/OEGIB

Title: Potential Safety Issues with Cranes that Lift Spent Fuel Casks

Priority

Action Level ACTIVE

Resolution Status:

Task Manager: T. Mitts

TAC Number:

Identification: 01/2007

Prioritization/Screen:

Technical Assessment:

Identification Status: Incomplete

Priority/Screen Status: Incomplete

Technical Assessment Status:

Regulation and Guidance Development:

Regulation and Guidance Issuance Status:

Regulation and Guidance Development Status:

Regulation and Guidance Development Status:

Implementation:

Verification:

Closure:

Implementation Status:

Verification Status:

Closure Status:

Work Authorization:

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|------------|------------|----------------|----------------|
|------------|------------|----------------|----------------|

DESCRIPTION:

Problem

An NRC Safety Engineer from the Rules, Inspections and Operations Branch in the Division of Spent Fuel Storage and Transportation of the Office of Nuclear Material Safety and Safeguards submitted an e-mail to the Generic Issues Program (GIP) on December 21, 2006 that described concerns about potential safety issues with cranes used to lift spent fuel casks at nuclear power plants. The employee's concern considered for further assessment under the GIP involve the four conditions of cranes used to lift spent fuel casks stated below.

(1) Cranes that do not conform to original design specifications: load drop analysis is not part of design basis, inadequate design basis documentation / information from parts vendors, and NRC inspection responsibilities for review of load drop analysis are unclear.

(2) Cranes that licensees modified without performing safety evaluation reviews required by 10 CFR 50.59, which may indicate some licensee's assume that these reviews are not required.

(3) Cranes that have had inadequate maintenance: overlooks important operating experience, invalidates single-failure proof capability, and tolerated by deficient NRC requirements for maintenance.

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

(4) Cranes that are not single-failure proof or lack credible validation for single-failure proof status have been used without adequate load path protection, or other mitigative measures, and this condition is not adequately considered in NRC's probabilistic risk assessment of crane events.

Work Scope

Evaluate the concerns and related information identified for the four conditions of cranes used to lift spent fuel casks stated above and discussed during meetings with the employee that submitted requested GI-203 to assess their suitability for further consideration under the GIP per MD 6.4.

Provide formal response to the employee that submitted requested GI-203 that identifies the concerns that are suitable for consideration under the GIP and those concerns that are not suitable for consideration under the GIP per MD 6.4 and provides the corresponding basis.

STATUS:

The requested GI-203 described concerns about potential safety issues with cranes used to lift spent fuel casks at nuclear power plants. On January 11, 2007, the GIP assigned this requested GI number 203. On January 11 and 18, 2007, GIP representatives met with the employee that submitted requested GI-203 and their supervisor to discuss the concerns with crane safety at nuclear power plants. The purpose of these meetings was to obtain a clear understanding of the scope of the requested GI by identifying specific concerns to include, and any to exclude, from consideration under the GIP. Meeting minutes dated January 29, 2007, (ADAMS ML070230133), called for GIP representatives to determine the suitability of the concerns for further consideration under the GIP per Management Directive (MD) 6.4, provide the basis for this determination, and provide a formal response to the employee that submitted requested GI-203.

The GIP representatives' review of these concerns, which included input from NRR and NMSS management, determined they represent licensee compliance issues and as such are not suitable for further consideration under the GIP per Management Directive (MD) 6.4. The areas of concern involve questions about the technical adequacy or programmatic effectiveness of existing regulatory programs and activities that are implemented through the reactor oversight process (ROP). The concern was entered into the ROP Feedback Program as ROP Feedback Form Item Number 60854-1-1113.

Requested GI-203 was closed by issuing memorandum from Jack Foster, Branch Chief, Operating Experience and Generic Issues Branch, Operating Experience and Risk Analysis, Division of Risk Assessment and Special Projects, Office of Nuclear Regulatory Research to the employee submitting the request, "Requested Generic Issue (GI)-203, Potential Safety Issues With Cranes That Lift Spent Fuel Casks," dated March 6, 2007 (ADAMS ML070400565).

Staff Resources Expended: Estimated 150 person-hours.

AFFECTED DOCUMENTS:

None Identified.

PROBLEM/RESOLUTION:

Not Applicable, GI-203 closed during issue screening review.

REASONS FOR SCHEDULE CHANGES:

Not Applicable.

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Individual Staff Member Submitted Requested GI-203 | 12/21/2006 | | 12/21/2006 |
| Meet With Requestor to Clarify GI Scope. | 1/18/2007 | | 1/18/2007 |
| Issue Meeting Minutes Defining Issue Scope Considered for GI Screening | 1/29/2007 | | 1/29/2007 |
| Issue Memo Documenting Results of Screening Assessment and Closing Requested GI | 3/6/2007 | | 3/6/2007 |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number NMSS-0007 **Type:** GSI **Office/Division/Branch:** NMSS/FCSS/SPTS
Title: CRITICALITY BENCHMARKS GREATER THAN 5% ENRICHMENT

Priority H **Action Level** ACTIVE **Resolution Status:**
Task Manager: C. Hrabal **TAC Number:**

Identification: 05/1998 **Prioritization/Screen:** 05/1998 **Technical Assessment:** 05/1998
Identification Status: Complete **Priority/Screen Status:** Complete **Technical Assessment Status:** C

Regulation and Guidance Development: 03/2007 **Regulation and Guidance Issuance Status:** 03/2007
Regulation and Guidance Development Status: **Regulation and Guidance Development Status:**

Implementation: **Verification:** **Closure:** 05/2007
Implementation Status: TBD **Verification Status:** TBD **Closure Status:**

Work Authorization:

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|--------------------------------------|------------|----------------|-----------------|
| | ORNL | | \$600.00 |
| Total Resources Expended (K): | | | \$600.00 |

WORK SCOPE:

Description

The importance of software (methods and data) in establishing the criticality safety of systems with fissile material is increasing as licensees work to optimize facilities and storage/transport packages at the same time that access to experimental data is decreasing. Available experimental data are insufficient to validate nuclear criticality safety evaluations for all required configurations at U-235 enrichments in the range of 5-20%.

Work Scope

The purpose of this project is to develop and confirm the adequacy of methods, analytical tools, and guidance for criticality safety software to be used in licensing nuclear facilities. The contractor will develop and test methods to estimate trends in calculational bias and uncertainty (thus extending the range of applicability) using sensitivity analysis techniques that: relate the importance of the system parameters to the calculated neutron multiplication factor; provide expert guidance on assessing the adequacy of the parameter phase space used in the validation process and the resulting bias and uncertainty; and illustrate use of the guidance by application to a regime of experimental phase space (such as 5-10% U-235 and degree of moderation) that has limited measured data but extensive interest in terms of current and planned safety evaluations.

STATUS:

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

The final reports for the sensitivity/uncertainty (S/U) methods were published in November 1999 as Volumes 1 and 2 of NUREG/CR-6655. The reports covered the following subjects: (1) methodology for defining range of applicability including extensions of enrichments from 5% to 11%; (2) test applications and results of the method; (3) test application for higher enrichments using foreign experiments; (4) feasibility study for extending the method to multidimensional analyses, such as transport casks and reactor fuel.

Results of the test applications of the ORNL methods showed that, for simple geometries with neutron spectra that are well moderated (high H/X), benchmark experiments at 5% enrichment are applicable to calculations up to 11% enrichment. On the other hand, these test applications also showed that benchmark experiments at intermediate and higher H/X values are not applicable to calculations at very low H/X. There are relatively few benchmarks at these very low H/X values for many compositions of interest to LEU licensees.

Although the ORNL method must be applied by licensees to each individual process to determine an acceptable subcritical margin, the preliminary results indicated that there may be situations where there are no applicable benchmarks. In these cases, the method does provide sensitivity and uncertainty information to aid designers in allowing adequately large margins to cover the lack of benchmark validation.

Based on the ORNL work, it was recognized that a new statement of work was needed to make the computer codes for S/U methods readily available for use by the industry. It was decided that this could best be handled by incorporating the S/U methods into the release of SCALE 5.0. A User Need Memo to RES dated 04/17/2001 requested assistance for that work.

The 04/17/2001 User Need Memo from NMSS to RES was canceled by NMSS by memo dated 06/24/2004, because RES had not been able to fund the contract due to higher priority work. However, independent of RES, NMSS used an existing contract with ORNL to complete most of the work, which involved providing the NRC with a pre-release of the S/U computer codes in SCALE 5.0 (via the TSUNAMI computer code), along with training. SCALE 5.0 was released to the industry in June 2004. Training was also completed in June 2004 by non-NRC funded ORNL tutorials at the 2004 Annual American Nuclear Society Meeting and NMSS funded training for NRC. Additional training on interpreting the results of TSUNAMI was provided in August 2005 and September 2006.

To communicate the acceptability of using TSUNAMI as one method for determining subcriticality margins, the NRC prepared Interim Staff Guidance (ISG)-10, "Justification for Minimum Margin of Subcriticality for Safety," which was finalized in June 2006. The TSUNAMI code in SCALE 5.0 is one such method for systematically quantifying the degree of similarity between a set of critical experiments and applications. For those applications where few benchmarks exist, as described previously for low H/X values, the TSUNAMI code can be used to apply adequately large margins to ensure the application is properly validated by SCALE 5.0. However, if lower margins are wanted for certain applications, further benchmarks will be needed. The development and funding of additional benchmarks are not in the scope of this GSI.

Staff Resources Expended: 2,200 hours

AFFECTED DOCUMENTS:

ISG-10

PROBLEM/RESOLUTION:

There has been some question as to whether benchmark experiments from 5 to 10 enrichment should be part of this GSI. These experiments are not required for validation, unless an applicant wants reduced margins, and thus should be part of a different GSI or other vehicle for development of the requisite benchmarks.

REASONS FOR SCHEDULE CHANGES:

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Milestone, "Close Out Issue," has been changed to 8/31/07 to ensure a plan for closing out the GSI is in place. The milestones below are assuming only a closeout memorandum is needed and no further work needs to be performed (i.e., changing the scope of the GSI to include benchmark experiments). The milestone, "Determine If User Needs Have Been Met," has been deleted, since it is not required to close out this GSI.

| Milestone | Original Date | Current Dat | Actual Date |
|---|---------------|-------------|-------------|
| Development of Generalized Sensitivity Methods | 12/1/1997 | | 12/1/1997 |
| Acquisition and Documentation of Russian Data | 5/1/1998 | | 5/1/1998 |
| Development of Guidance for Defining Ranges of Applicability | 7/1/1998 | | 11/1/1998 |
| Application of Guidance to Extend Low Enrichment Range | 9/30/1998 | | 11/30/1998 |
| Technical Assistance and Project Planning | 3/1/1999 | | 3/1/1999 |
| Receive Final ORNL Contract Reports | 3/1/1999 | | 10/1/1999 |
| Publish Final ORNL Contract Reports | 10/1/1999 | | 11/1/1999 |
| User Need Request Memo to RES | 12/1/2000 | | 6/1/2001 |
| Make New Computer Codes Available Through Scale 5.0 Release | 3/1/2001 | | 6/30/2004 |
| Training to NRC Staff and Licensees on S/U Methods in SCALE 5.0 | 9/1/2002 | | 6/30/2004 |
| Cancel User Need Request Memo to RES | 6/30/2004 | | 6/30/2004 |
| Issue Staff Guidance (ISG-10) | 10/1/2000 | 10/31/2006 | 6/15/2006 |
| Close Out Issue | 3/31/2003 | 8/31/2007 | |

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

Issue Number NMSS-0014 **Type:** GSI **Office/Division/Branch:** FSME/DWMEP/

Title: SURETY ESTIMATES FOR GROUNDWATER RESTORATION AT IN-SITU LEACH FACILITY

| | | |
|--|---|--|
| Priority M | Action Level ACTIVE | Resolution Status: |
| Task Manager: R. Weller | TAC Number: | |
| Identification: 06/1998 | Prioritization/Screen: 07/1998 | Technical Assessment: 02/2007 |
| Identification Status: Complete | Priority/Screen Status: Complete | Technical Assessment Status: |
| Regulation and Guidance Development: | | Regulation and Guidance Issuance Status: |
| Regulation and Guidance Development Status: N | | Regulation and Guidance Development Status: N |
| Implementation: | Verification: | Closure: 02/2007 |
| Implementation Status: N | Verification Status: N | Closure Status: |
| Work Authorization: NMSS Operational Events Briefing on 06-08-98. | | |

| FIN NUMBER | CONTRACTOR | CONTRACT TITLE | EXPENDED (\$k) |
|--------------------------------------|------------|----------------|-----------------|
| None. | | | \$613.00 |
| Total Resources Expended (K): | | | \$613.00 |

WORK SCOPE:

Description

This issue was identified by NMSS to pursue research to provide a methodology to calculate sureties for groundwater restoration activities at in situ leach uranium extraction facilities and develop a post-restoration groundwater quality stability monitoring methodology. The following tasks were envisioned: (1) review approaches used to estimate pore volumes and to calculate surety amounts and obtain data to evaluate these approaches; (2) develop a pore volume estimation methodology and document it in a NUREG report; (3) develop cost estimation methodology for use in evaluating the level of financial surety required; (4) brief regulators on the surety methodology; (5) review the existing approaches used to determine an appropriate time period for post-restoration monitoring period and obtain datasets to evaluate the methodologies; (6) use the datasets to develop and test the methodologies; (7) develop a robust methodology; and (8) transfer the methodology to regulators through briefings and a NUREG report.

Work Scope

This research will provide a methodology to calculate sureties for groundwater restoration activities at in situ leach uranium extraction facilities and estimate a post-restoration groundwater quality stability monitoring period. The research will be conducted by an RES contractor.

STATUS:

GENERIC ISSUE MANAGEMENT CONTROL SYSTEM

Active Only: All Issue(s)

RES developed a contract Statement of Work for this effort in July 2001. The scheduled completion of this GSI was delayed due to requests by the NRC contractor (USGS) for additional information. The NRC contractor, USGS, has finished the sub-tasks and has completed the draft report "Consideration of Geochemical Issues in Groundwater Restoration at Uranium In-Situ Leach Mining Facilities." NRC staff requested additional information on October 2003. The NRC contractor has incorporated additional information provided by the industry and comments from the staff. A revised draft NUREG was published in June 2005. The draft NUREG/CR-6870, "Consideration of Geochemical Issues in Groundwater Restoration at Uranium In Situ Leach Mining Facilities," was issued for public comment in June 2005 and the comment period closed on August 31, 2005. RES worked with the contractor to address the comments received, and NUREG/CR-6870 was finalized and published in January 2007.

Staff Resources Expended: 200 hours

AFFECTED DOCUMENTS:

- (1) SRP for In Situ Leach Uranium Extraction License Applications, NUREG-1569
- (2) BTP on Financial Assurances for Reclamation, Decommissioning, and Long Term Surveillance and Control of Uranium Recovery Facilities

PROBLEM/RESOLUTION:

None.

REASONS FOR SCHEDULE CHANGES:

Issue close out date delayed pending final issuance of NUREG/CR-6870.

| Milestone | Original Date | Current Dat | Actual Date |
|--|---------------|-------------|-------------|
| Pore Volume - Data Evaluation (Task 1) | 12/1/1997 | | 6/30/1998 |
| Commission Response to SECY-99-013 | 8/1/1999 | | 7/1/2000 |
| Complete Statement of Work | 6/1/2001 | | 7/1/2001 |
| Draft NUREG to Staff for Comment | 8/31/2002 | | 8/1/2003 |
| Revised Draft NUREG | 4/30/2004 | | 12/31/2004 |
| Draft NUREG/CR-6870 Issued for Public Comment | 9/30/2002 | | 6/30/2005 |
| Receive Public Comments on Draft NUREG/CR-6870 | 8/31/2005 | | 8/31/2005 |
| Issue Final NUREG/CR-6870 | 9/30/2002 | 11/30/2006 | 1/30/2007 |
| Close Issue | 5/31/2006 | 4/30/2007 | |