



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 20, 2009

MEMORANDUM TO: Ralph Architzel, Senior Reactor Engineer
Safety Issue Resolution Branch, Division of Safety Systems
Office of Nuclear Reactor Regulation

FROM: R. W. Borchardt *R.W. Borchardt*
Executive Director for Operations

SUBJECT: DECISION ON DIFFERING PROFESSIONAL OPINION APPEAL
CONCERNING CLOSURE PROCESS FOR GENERIC SAFETY
ISSUE-191 (DPO-2008-001)

The purpose of this memorandum is to inform you of my considerations and conclusions regarding the appeal you submitted on June 18, 2009, on the subject differing professional opinion (DPO). The DPO and the appeal raised concern with the NRC closure process for Generic Safety Issue (GSI)-191, "Assessment of Debris Accumulation on PWR Sumps" and Generic Letter (GL) 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors."

I want to sincerely thank you for your active participation in the DPO process by raising your concerns through the DPO and subsequent appeal. An open and thorough exploration of how we carry out regulatory processes is essential to keeping these programs effective. Your willingness to raise concerns and seek improvements with your colleagues and managers and ensure that your concerns are heard and understood is admirable and vital to ensuring a healthy safety culture within the Agency.

Summary of Concerns

The regulations in 10 CFR 50.46(b)(5) requires power reactors to have the capability for long-term cooling after successful initiation and operation of the Emergency Core Cooling Systems (ECCS). The information in GSI-191 was developed to determine whether generation, transport, and accumulation of debris in Pressurized Water Reactor (PWR) containments following a Loss of Coolant Accident (LOCA) would impede the long term operation of ECCS and containment spray systems (CSS). To address GSI-191, NRC issued GL 2004-02, which required PWR licensees to perform plant specific analysis of debris generation and transport and perform modifications as necessary to assure the long term recirculation capability of the ECCS and CSS equipment. The Office of Nuclear Reactor Regulation (NRR) is continuing to assess licensee submittals related to the GL 2004-02 which, along with GSI-191, remains open.

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The following summary, developed and reviewed with you by my staff, was based on a detailed review of your DPO and appeal as well as several discussions with you. This summary describes your concerns as stated in the appeal regarding the closure process for GSI-191 and GL 2004-02. The issues you raise are:

- The original resolution to GSI-191, which authorized backfit caused most licensees to implement major modifications and make safety gains to the plants including installation of new sump screens, whereas the closure process for GL 2004-02 is effectively an unauthorized backfit that goes beyond the scope of the original concerns of GSI-191. The expansion in scope bypassed other stakeholders such as licensees and the public;
- Staff review guidelines used to evaluate testing and additional analysis for consideration for chemical effects and downstream (in-vessel and ex-vessel) effects to support closure of GSI-191 were not channeled through the Committee to Review Generic Requirements (CRGR) to ensure that these additional requirements are appropriately justified on the basis of NRC's rules and the Commission's backfit policy;
- The closure yardstick used by the staff to determine compliance was developed after the licensee implemented modifications, is compound bounding, takes into account unrealistic scenarios, and is unreasonable for determining residual, post initial modification risk. This is causing inefficiencies and is inconsistent with two Staff Requirement Memoranda related to the use of realistic scenarios and completing the reviews in a timely manner. You propose the use of a holistic methodology to determine residual risk, with practical solutions that do not necessarily evaluate all scenarios; and
- Determination of compliance with 10 CFR 50.46(b)(5) should be deferred to a later date and close out GSI-191. Subsequently, if needed and based on risk, the right set of plants should be pursued, (Boiling Water Reactors (BWRs) or/and PWRs), after making a required case to the CRGR, per established processes.

EDO Appeal Decision

I arrived at my decision after reviewing the DPO you submitted on October 1, 2008, the DPO Panel report issued on March 19, 2009, the NRR Office Director's decision on the DPO issued on May 27, 2009, your appeal dated June 18, 2009, and the Statement of Views, dated July 9, 2009, provided by the Office Director regarding your appeal. I also met with you on October 19, 2009, to better understand your concerns regarding the NRC closure process for GSI-191 and GL 2004-02. A member of my staff met with you on several occasions to gather needed information for my decision. Discussions were also held with NRR and Advisory Committee for Reactor Safeguards (ACRS) staff and managers to gather background information and current status on the issue.

Foremost, I am not pleased with the timeliness associated with the resolution and closeout of GSI-191. Like you, I believe that significant safety gains were made by licensees as a result of the initial modifications involving the installation of new containment sump screens implemented at PWRs to address concerns raised by GSI-191. I support the previous review and decision that the closure process for GL 2004-02 is not an unauthorized backfit. With regard to the legal issue you raised associated with this backfit, I ensured that we are within established agency process and policy for backfit.

As you are aware, the technical issues involved in the resolution of GSI-191 and the closure of GL 2004-02 are complex. We have had to adjust the scope of our review and acceptance criteria regarding licensee submittals as we gained a better understanding of the various attributes affecting debris generation, transport, and accumulation that affect the capability for long-term cooling after successful initiation and operation of the ECCS in PWR containments following a LOCA. Specifically, with regard to staff review guidelines used to evaluate testing and additional analysis for consideration for chemical effects and downstream (in-vessel and ex-vessel) effects to support closure of GSI-191, you assert that they were not channeled through the CRGR to ensure that these additional requirements are appropriately justified on the basis of NRC's rules and the Commission's backfit policy. As we gained a better understanding of the issues that could impact long term cooling, it became clear that the impact due to chemical and downstream effects needed to be evaluated by licensees. While this did represent an expansion in scope, a specific backfit analysis or CRGR involvement was not required by our backfit policy as this was still related to the issue of long term cooling. Also, the Office of Research and the ACRS have remained informed and engaged throughout this review and closure process. The delays and inefficiencies caused, both to the licensees and NRC, due to the inclusion of the chemical and downstream effects have been less than ideal, leaving room for lessons to learn on our part.

In your appeal you discuss that the closure yardstick is compound bounding, based on unrealistic scenarios, and unreasonable for determining residual, post initial modification risk. As you are aware, the technical issues involved in the review are complex and have large uncertainties. I do not view being conservative in our overall approach to be unrealistic. While difficult, the staff could improve the holistic determination methodology by making more realistic and reasonable assumptions during the individual attribute review (i.e., at the individual reviewer level). I appreciate that you are a senior member of the Integrated Review Team (IRT) having the responsibility for determining adequacy of licensee submittals and providing recommendations as to whether each licensee has adequately addressed the sump performance issue. As a member of the IRT, I encourage you along with other staff on the IRT to provide your sound engineering judgment while acknowledging the need for solid technical basis during the review process. The agency and the licensees continue to make significant progress towards the closure. The interactive approach that the staff has adopted in better communicating agency expectations has improved our overall process in determining licensee compliance with 10 CFR 50.46(b)(5).

You suggest that the NRC should defer compliance determination for both PWRs and BWRs until a later date and that GSI-191 should be effectively closed. Post accident debris generation, transport, and accumulation and consequent sump degradation present unique challenges for PWRs and BWRs. GSI-191 and GL 2004-02 were issued specifically to address PWR sump issues. I understand your position that the modifications completed to date have clearly mitigated the safety risk in many plants. However, compliance verification is an important attribute to the closeout of GSI-191 and GL 2004-02. After carefully weighing the options presented by you and given the circumstances and the resources invested by the licensees and the NRC, I see no compelling reason to change course in the current methodology in resolving GSI-191. The agency and the licensees have made significant progress towards the closure. As for BWRs sump issues, the NRC is engaged with the licensees in determining the best course of action.

Notwithstanding, there are clearly a number of lessons to be learned on efficiency, timeliness, early identification of scope, and effective communication of our expectations as they apply to agency reviews and ultimately closure of generic issues. I am therefore tasking the Director, NRR, to take the lessons learned, as stated in this letter, into consideration for the closure process for GSI-191, other generic safety issues, and GL 2004-02. This review should also incorporate lessons learned in managing challenges associated with the expanding scope of backfit due to evolving technology and knowledge base during resolution of future generic issues.

Conclusion

In conclusion, agency performance during the resolution of GSI-191 and GL 2004-02 could clearly have been better and there are lessons on efficiency, timelines, and scope management to be learned. We continue to make progress towards the ultimate closure of GS-191 and GL 2004-02 and I find no compelling reason to change agency course at this juncture. I do want to thank you again for raising your concerns to my attention. Your perseverance in raising these concerns demonstrates your dedication and passion to public health and safety. Your willingness to use the DPO process has identified issues that will aid the agency improve the generic issue resolution process.

In accordance with NRC Management Directive (MD) 10.159, a summary of this DPO appeal decision will be included in the Weekly Information Report posted on the NRC's public web site to advise interested employees and members of the public of the outcome.

Enclosure: As stated

Background

1. Chronology

- DPO submitted on October 1, 2008
- Nuclear Reactor Regulation (NRR) Director established a DPO ad-Hoc Panel (The Panel) in November 2008.
- Panel submitted a report to the NRR Director on March 19, 2009
- The DPO submitter was informed of the Panel's report as well as the enhancement recommendations by the NRR Director on May 27, 2009.
- DPO Appeal filed on June 18, 2009
- NRR Director provided a statement of views (SOVs) on July 9, 2009 regarding the appeal.

2. DPO Panel Report (March 29, 2009)

The DPO panel was formed on November 4, 2008 and, after completing their reviews, including discussions with the DPO submitter on November 26, 2008, issued a report on March 19, 2009.

With regard to the DPO submitter's concern regarding staff's "unnecessary" focus on compliance rather than the underlying safety issue, the Panel agreed that the staff's approach for resolving ECCS performance was focused on compliance (with 10 CFR 50.46 (b) (5)). The Panel determined this approach to be appropriate as compliance with regulatory requirements presumptively assures that adequate safety is maintained.

Concerning the DPO submitter's suggestion that the staff's current approach would not likely be justified by a regulatory analysis to evaluate the appropriateness of backfit measures, the Panel identified that the staff was in fact operating under the premise that this issue falls under the compliance exception of the backfit rule. The Panel determined that it was not pertinent to conduct a regulatory analysis because licensees are required to comply with the regulations regardless of backfit considerations. Given the uncertainties and complexity of the issue, it would be challenging to perform a rigorous regulatory analysis with sufficient accuracy to evaluate backfit considerations.

The Panel did not agree with the DPO submitter's concern that the staff was inconsistent with the Commission guidance provided in two SRMs, specifically those on staff's use of realistic scenarios rather than all possible scenarios. The Panel determined that the staff was not assessing the GL in context of all possible scenarios. The Panel noted that the staff had balanced conservative and non-conservative margins and that bounding assumptions were made to simplify this very complex issue to minimize the number of scenarios considered. The assessment by the staff is qualitative and relies on engineering judgment.

The Panel agreed with the DPO submitter that the process utilized by the staff is inefficient and could focus on non-safety significant issues. Though inefficient, the strategy has resulted in improved plant safety. The strategy in the resolution of ECCS performance issues has been approached in a non-traditional way. Normally, plant modifications are made to meet specifically developed technical bases. In this case, licensees initially modified the plants to enact initial, rapid safety improvements to address the risk associated with potentially inadequate ECCS and CSS performance before completing the evaluation to demonstrate the adequacy of modifications.

The DPO Panel reviewed the proposed alternative approach of using risk assessment to determine if plants have adequately addressed ECCS performance concerns. The Panel concluded that such an approach would be extremely difficult given the complexities and uncertainties associated with the tests and analysis and may ultimately result in more licensee modifications.

The Panel agreed with the submitter that risks associated with BWR ECCS performance should be reassessed. The staff should continue internal evaluation as well as interaction with the BWR community.

Overall, the Panel found the staff's approach for resolving GSI-191 to be appropriately focused on compliance and consistent with Commission guidance. The Panel also concluded that the staff should continue with the planned GL review process and that the proposed alternate approach by the DPO submitter was not preferable.

The Panel also recommended that the staff consider two additional activities to ensure that the risk associated with GSI-191 related issues is acceptable. The recommendation was for the staff to perform an integrated review of the test results from all licensees to ensure that the results are as consistent as practical, given the differences in testing, and that the staff assess the consequences associated with strainer blockage.

3. DPO Decision (May 27, 2009)

On April 13, 2009, the Director, Office of Nuclear Reactor Regulation (NRR) provided a copy of the Panel report and discussed the content with the DPO submitter. Additional insights were provided by the DPO submitter during the meeting. The Director of NRR issued a decision regarding the DPO to the submitter in a letter dated May 27, 2009.

The NRR Director agreed with the DPO submitter's concern about the staff's focus on compliance. The NRR Director concurred with the Panel that compliance with regulatory requirements will provide reasonable assurance of safety.

The NRR Director did not agree with the DPO submitter's concern that the staff was inconsistent with its implementation of Commission guidance provided in two SRMs, specifically those on staff's use of realistic scenarios rather than all possible scenarios. The NRR Director concurred with the Panel which determined that the staff was not assessing the GL in context of all possible scenarios. The Director specified that through the establishment of an integrated review team (IRT), of which the DPO submitter is a member, a holistic review is being conducted on a plant-by-plant basis, balancing the safety margins among the various technical review areas where possible. However, the Director also determined that it was appropriate for the staff to re-evaluate its approach to determine whether excluding scenarios based on low probability or risk is feasible.

Regarding the concern that the process utilized by the staff is inefficient and at times could focus on non-safety significant issues, the Director, as the Panel, agreed with the DPO submitter and expressed that the NRC process should be improved from lessons learned as a result of the reviews of PWR sump performance. The NRR Director highlighted that the SRM would be adhered to during the review of in-vessel down stream effects. The NRR Director also stated that though inefficient, the strategy has resulted in improved plant safety.

The NRR director did agree with the submitter that to the extent feasible, it was important to determine the risks imposed by sump/strainer performance issues for BWRs and PWRs such that resources can be focused on the most safety significant aspects of the issue.

The Director, NRR, assigned the following tasks to the Director, Division of Safety Systems (DSS) in consultation with appropriate staff and management in NRR and RES.

- A. Review and revise as necessary and appropriate, NRC's guidance to its technical review of issues relating to GSI-191 to ensure that the guidance follows the intent of the Commission's direction in the SRMs. In particular, evaluate how focus can be increased on realistic scenarios, for example, by using risk tools,
- B. Conduct an interim lessons learned from the staff's review of GSI-191 to date, to determine improvements to the process that can be incorporated into the ongoing review of PWR sump issues and in future review of BWR sump performance.
- C. Consider the Panel's recommendation that the staff perform an integrated review of the test results from all licensees to ensure that the results are as consistent as practical given differences in testing approaches.

The Director, NRR, thanked the submitter for participating in the DPO process and stated that an open and thorough debate about how we carry out our regulatory programs is essential to keeping these programs effective.

4. DPO Appeal Submittal (June 18, 2009).

In your Appeal dated June 18, 2009, you made the following points:

- The guidance available to reviewers for determining licensee responses to GL 2004-02 came after licensees were expected to have completed all actions to address GSI 191. The licensee made their compliance decisions at the time of their implementation of the modifications.
- NRC review process of each submittal involves a detailed area review followed by a "consolidated" review by an IRT. The IRT then determines a) if applicable regulations are met, b) the need for RAIs, and c) the recommendation should be deferred. There is provision for a minority opinion in the IRT review. The appeal highlights that most IRTs conducted thus far have resulted in RAIs. These RAIs are the result of NRC reviews that are unnecessarily focused on compliance versus a determination that the underlying safety issue has been satisfactorily addressed. Further, the attributes for determining compliance with GL 2004-02 were developed after the issuance of GL 2004-02.
- NRC approach does not align with the Commission SRM regarding resolving PWR sump issues with a practical solution within a reasonable period of time, focusing on evaluating realistic scenarios.
- On several licensee submittals, the DPO submitter was comfortable concluding a "no need for RAIs" and finding the licensee packages acceptable, meeting all rules and regulations based on a holistic approach. These cases were "best cases" for licensee having adequately resolved GSI-191, yet the NRC process led to RAIs.
- Reviewers should have a role in the alternate holistic method versus leaving that decision up to senior reviewers, thus holding them accountable for the overall outcome.

- A slight change in the appeal was that the submitter proposed that a compliance determination should be deferred to a later time. These determinations should be revisited when the BWR head loss and testing issues are reviewed. Vulnerability for BWR sumps is projected in the appeal and the appeal questions the "logic" of pursuing compliance questions for PWRs, yet not BWRs.
- The appeal states that if GSI-191 is viewed in context of backfit/cost benefit, any additional modifications or changes to modifications already completed would be difficult to justify.
- The DPO appeal states that GSI-191 should be closed similar to the closure of the NRC Bulletin in 1996 involving BWRs, which was based on a qualitative assessment using holistic judgment by staff. Here licensee "statements of compliance" were accepted and staff detailed reviewers played a more active role in the holistic judgment. This point was not addressed by the Panel, but was not critical to the DPO according to the submitter.
- The appeal re-states that GSI-191 should be closed based on licensees completing the sump modifications. The submitter believes that only vulnerable plants should be reassessed. The appeal suggests that the current test to successful methods expected in the submittals is random in nature and the resulting modifications relative to retest and analysis could result in un-quantified safety benefits.
- The DPO appeal submitter states that contrary to the Panel report, he never concurred on a "statement of concerns" which states that the risk of sump failure and downstream and chemical effects is insignificant. The submitter's position is that the improvements have mitigated the most risk significant issues related to GSI-191. The submitter questions the impact of this on the DPO Panel report. The DPO submitter goes on to say that there is not a strong relationship between the Panel report and the DPO.

5. Office Director Views on DPO Appeal (July 9, 2009)

The Office Director, NRR, following a review of the appeal, submitted a Statement of Views that concluded that the submitter had not included any new information that would alter the decision of the DPO. Therefore, he found no reason to change any decision or take additional actions than those in the closeout memorandum dated May 27, 2009.

Notwithstanding, there are clearly a number of lessons to be learned on efficiency, timeliness, early identification of scope, and effective communication of our expectations as they apply to agency reviews and ultimately closure of generic issues. I am therefore tasking the Director, NRR, to take the lessons learned, as stated in this letter, into consideration for the closure process for GSI-191, other generic safety issues, and GL 2004-02. This review should also incorporate lessons learned in managing challenges associated with the expanding scope of backfit due to evolving technology and knowledge base during resolution of future generic issues.

Conclusion

In conclusion, agency performance during the resolution of GSI-191 and GL 2004-02 could clearly have been better and there are clearly lessons on efficiency, timelines, and scope management that we have learned. We continue to make progress towards the ultimate closure of GS-191 and GL 2004-02 and I find no compelling reason to change agency course at this juncture. I do want to thank you again for raising your concerns to my attention. Your perseverance in raising these concerns demonstrates your dedication and passion to public health and safety. Your willingness to use the DPO Program has identified issues that will aid the agency in resolving future generic issues.

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