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

December 23, 2010

SECRETARY

COMMISSION VOTING RECORD

DECISION ITEM: SECY-10-0113

TITLE: CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE - 191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

The Commission approved the Staff Requirements Memorandum (SRM) of December 23, 2010.

This Record contains a summary of voting on this matter together with the individual vote sheets, views and comments of the Commission.

Annette L. Vietti-Cook
Secretary of the Commission

Attachments:
1. Voting Summary
2. Commissioner Vote Sheets

cc: Chairman Jaczko
Commissioner Svinicki
Commissioner Apostolakis
Commissioner Magwood
Commissioner Ostendorff
OGC
EDO
PDR

VOTING SUMMARY - SECY-10-0113

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. JACZKO	X				X	11/2/10
COMR. SVINICKI	X				X	11/19/10
COMR. APOSTOLAKIS	X				X	10/29/10
COMR. MAGWOOD	X		X		X	11/23/10
COMR. OSTENDORFF	X				X	10/29/10

COMMENT RESOLUTION

The comments of the Commission were incorporated into the guidance to staff as reflected in the SRM issued on December 23, 2010.

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Chairman Gregory B. Jaczko

SUBJECT: SECY-10-0113 – CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE -191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

Approved __X___ Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _X__ None ___

SIGNATURE

11/2/10

DATE

Entered on "STARS" Yes ___ No ___

Chairman Jaczko's Comments on SECY-10-0113,
"CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE – 191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE"

I approve the staff's recommendation for resolution of Generic Safety Issue -191 (GSI-191). I commend the staff for providing this comprehensive paper in the relative short period since the last Commission Meeting in April 2010. I would also like to express my appreciation to the ACRS for fitting in an independent review into their busy schedule.

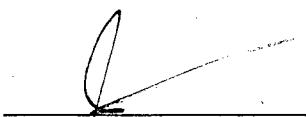
GSI-191, the potential for debris blockage of emergency core cooling systems, is an important safety issue that should be resolved in the best possible manner without needless delay. It has been over 30 years since the staff first raised concerns in 1979 concerning sump designs in Unresolved Safety Issue A-43, "Containment Emergency Sump Performance." Following upgrades to resolve boiling water reactor strainer clogging, the staff identified new concerns in the late 1990's with debris generated following a design basis loss of coolant accident. To address this issue, the staff developed GL 2004-02, "Potential Impact of Debris Blockage on Emergency Recirculation during Design Basis Accidents at Pressurized Water Reactors." While much has been done by the staff and licensees to make physical modifications to their sump screens, resulting in significant safety improvements, the agency needs to provide clear and decisive guidance to finally resolve this issue.

I support the staff's ongoing efforts as outlined in Option 1. To date, 48 of 69 plants have sufficiently demonstrated their plans for closure to the staff, and I believe the remaining plants can do so as well. While I fully support Option 1, I agree with Commissioner Apostolakis to approve Option 1.b in combination with Option 2 as an additional viable path forward.

I also believe it is important to develop a schedule for closure. Recognizing the uncertainty with in-vessel effects testing, and the need to refine risk informed guidance, I agree with Commissioner Apostolakis' proposed timeline for resolving this issue. This would allow more than sufficient time for licensees to identify and complete any potential modifications.

I also agree with the staff and ACRS that leak-before-break should not be used to resolve this issue. This option would result in a reduction in defense-in-depth due to the potential for core damage and degradation of mitigation due to the single failure of clogging the emergency core cooling sumps, independent of any additional independent failures. There is no perceived safety benefit for its use in this issue. The staff and ACRS have evaluated the option numerous times, and I think it is best to follow their technical expertise.

While GSI-191 has been a challenging issue and the staff and industry have worked hard to find solutions, this important safety issue needs to be finally resolved.



Gregory B. Jaczko 11/2/10
Date

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

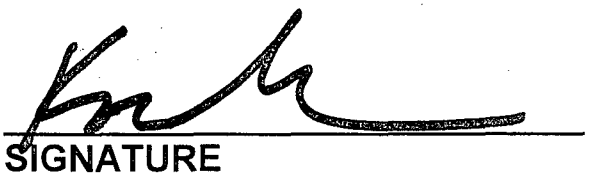
FROM: COMMISSIONER SVINICKI

SUBJECT: SECY-10-0113 – CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE -191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

Approved __X___ Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached _X__ None ___



SIGNATURE

11/9/10

DATE

Entered on "STARS" Yes ✓ No ___

Commissioner Svinicki's Comments on SECY-10-0113
Closure Options for Generic Safety Issue 191,
Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance

I approve the staff's recommendation to move forward on Generic Safety Issue (GSI) 191 through a combination of the Options 1.b and 2 contained within SECY-10-0113, as further modified in this vote. I approve Option 2's development of additional, risk-informed implementing guidance for GSI-191, but the staff should also continue the integrated resolution process described under Option 1, with an implementation schedule that is risk-informed and takes into account the amount of planning time and effort required for licensees to implement any resulting actions. I disapprove the use of 50.54(f) letters to licensees for GSI-191 matters without prior Commission approval. I agree with Commissioners Apostolakis and Ostendorff that the resolution of this complex issue calls for careful weighing of the safety significance and public risk against occupational dose and other risk-informed considerations.

I support Commissioner Apostolakis' proposal that the staff investigate the use of human reliability analysis methods in resolving GSI-191. Doing so has the potential to add realism to the approach to resolving this issue while maintaining the appropriate conservatisms where our knowledge is limited. In addition, I support Commissioner Ostendorff's proposal that the staff assess the policy and technical implications of a "no *de minimus*" pipe break size in which debris fouling would be treated as a beyond design-basis event, yet would require mitigation capability to prevent large, early release. These evaluations should be provided to the Commission in a status report 18 months after the SRM on SECY-10-0113 is issued.

Although I seek an orderly path to closure of GSI-191, I do not believe it to be indicative of a deficiency in adequate protection of public health and safety. As most Commissioners have had the opportunity to observe during plant visits, large, advanced strainers have been installed in many containments and other compensatory measures have been taken. These measures, coupled with the low probability of the pipe breaks analyzed in the accident scenarios, demonstrate that adequate defense-in-depth is currently being maintained.

There continues to be a considerable difference between the staff and industry occupational radiation dose estimates associated with undertaking plant modifications related to removal of insulation. I believe the Commission would benefit from further evaluation of these differences. For example, staff acknowledges in SECY-10-0113 that its estimates are lower because they come from doses received during less extensive modification projects. How much less extensive? Is there some extrapolation that can be done to reconcile these estimates or get them within the ballpark of each other? The discussion in SECY-10-0113 is not sufficient in light of the doses the Commission could potentially be compelling nuclear workers to receive as a result of this decision.

The draft press release and letters announcing the Commission's decision should be revised to reflect the Commission's final decision in this matter.

Kristine L. Svinicki 11/9/10

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Commissioner Apostolakis

SUBJECT: SECY-10-0113 – CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE -191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

Approved XX **Disapproved** _____ **Abstain** _____

Not Participating _____

COMMENTS: **Below** XX **Attached** ___ **None** ___

I agree that in-vessel effects should not be treated as a separate generic issue.

I approve Option 2 in combination with Option 1.b. I do not believe that 10 CFR 50.54(f) letters are necessary to establish schedules at this time. The implementation schedule should be risk-informed and take into account the amount of planning and effort required for licensee implementation. The staff should use additional regulatory measures, as appropriate, for those licensees that have not shown adequate strainer performance for LOCAs less than the transition break size within two refueling outages after the staff issues its safety evaluation for in-vessel effects. For LOCAs greater than the TBS, the staff should develop guidance to implement Option 2 within one year after the Commission makes a decision to either approve or disapprove 50.46(a).

The staff states in SECY-10-0113 that one reason continued operation of non-complying plants is allowed is because "smaller LOCAs proceed more slowly allowing time for additional mitigation and operator intervention that may not be credited in design basis analyses." It would be useful to have a detailed evaluation of operator intervention and the possibility of better water management for breaks smaller than the TBS as part of the resolution of GSI-191. I acknowledge that allowing operator intervention for small breaks is a departure from strict design-basis analyses. Many people are uncomfortable with the perceived large uncertainties associated with the probabilities of operator actions. However, the agency has expended considerable resources developing guidance for the evaluation of operator actions; see, for example, NUREG-1792 on "good practices" and NUREG-1842 on the evaluation of human reliability analysis methods (HRA) vs. good practices. On the Commission's direction, RES and the industry are currently working on specifying a consensus HRA method the use of which would improve the validity, consistency, transparency and traceability of human error evaluations. Lessons learned from a series of experiments conducted at the Halden simulator

in Norway are an input to this effort. I suggest that it's time we utilized this wealth of information and investigated its potential use in resolving GSI-191.

SIGNATURE

10/29/10

DATE

Entered on "STARS" Yes X No ___

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSION MAGWOOD

SUBJECT: SECY-10-0113 – CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE -191, ASSESSSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

Approved X Disapproved X Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached X None ___

SIGNATURE

23 November 2010
DATE

Entered on "STARS" Yes X No ___

Commissioner Magwood's Comments on SECY-10-0113
Closure Options for Generic Safety Issue 191,
Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance

GSI-191 is unquestionably a very complex issue the NRC and the industry have been striving to resolve for quite some time. I agree with the Chairman that this issue should be resolved in the best possible manner without needless delay and I appreciate his efforts to keep the agenda focused on this important matter. But I also believe, as Commissioner Ostendorff points out in his vote, that as responsible regulators it is necessary that our regulatory actions and impacts be commensurate with the degree of risk reduction they achieve. Commissioner Ostendorff also indicates that a 2010 plant specific probabilistic risk assessment (PRA) study revealed that reducing the risk of sump clogging for large pipe breaks had a reduction in the core damage frequency (CDF) of about 1 in 30,000,000 and yet the modifications to replace piping insulation could result in radiation worker dose of approximately 80 person-REM per plant. While I recognize that there are varying estimates of the doses involved, it is quite clear that the worker exposures are not insignificant. It is, therefore, necessary that we move cautiously.

The long history of this issue has been characterized by a series of regulatory orders and licensee actions that have been implemented to close this issue, only to have further analysis reveal that additional steps are required. I believe this agency, our licensees, and the workers who will be needed to implement any decision will be best served by our best effort to get this right. While there would be some satisfaction in quick action, I believe we must take the time required to consider all of the tools at our disposal.

I believe one of the reasons it has taken so long to resolve this issue has been our inflexibility to think outside of the box; to consider other ways that GSI-191 might be brought to closure. As explained by Commissioner Apostolakis, we should expect that plant operators will be in a position to observe what is happening in their plants during a loss of coolant event and take any number of measures to respond. Likely operator actions, including their use of the water inventories available to them, can be analyzed and applied to develop a realistic and appropriate regulatory response to GSI-191.

We have the time to do this right. As Commissioners Svinicki and Ostendorff indicate, under the present circumstances, GSI-191 does not raise any issue regarding the adequate protection of public health and safety. While they have not fully resolved this issue, the measures taken thus far in response to the sump-clogging issue have contributed greatly to the safety of U.S. nuclear power plants. Given the installation of greatly enlarged strainers and compensatory measures already taken at many plants, adequate defense-in-depth is currently being maintained and safety is not being jeopardized.

With that in mind, I approve a portion of the staff's recommendation subject to the following:

- I disapprove the use of 50.54(f) letters to licensees for GSI-191 matters without prior Commission approval.

- No further actions should be required of licensees pending resolution of all remaining testing and analysis. This includes the remaining tests and analyses regarding zone-of-influence for debris generation, debris settling, vendor specific strainer performance, and in-vessel effects.

- The Commission must have the opportunity to review how a revision of 10 CFR 50.46a might impact this issue.

- I join Commissioners Ostendorff and Svinicki in proposing that for GSI-191 only, the staff should assess the policy and technical implications of a "no *de minimis*" pipe break size approach (*i.e.*, no transition break size). I believe the staff must assess the potential of risk-informing all pipe breaks, not simply the large LOCAs.

- The staff should consider licensee PRA information, if provided, that assesses the full spectrum of applicable pipe break sizes, plant-specific compensatory measures, and design features that reduce sump clogging risk.

- As noted earlier, I join Commissioner Apostolakis in his proposal that the staff investigate the allowance of operator action in resolving GSI-191.

- I support Commissioner Apostolakis in his suggestion that staff evaluate greater use of water management as a mitigation strategy.

The staff should send a progress report to the Commission within 18 months after the SRM on SECY-10-0113 is issued.

11/23/10

William D. Magwood IV Date

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER OSTENDORFF

SUBJECT: SECY-10-0113 – CLOSURE OPTIONS FOR GENERIC SAFETY ISSUE -191, ASSESSMENT OF DEBRIS ACCUMULATION ON PRESSURIZED WATER REACTOR SUMP PERFORMANCE

Approved X Disapproved _____ Abstain _____

Not Participating _____

COMMENTS: Below ___ Attached X None ___

SIGNATURE

10/29/10
DATE

Entered on "STARS" Yes X No ___

Commissioner Ostendorff's Comments on SECY 10-0113
"Closure Options for Generic Safety Issue – 191,
Assessment of Debris Accumulation on Pressurized Water Reactor Sump Performance"

I approve the staff's recommended path forward (combination of Options 1 and 2) to resolve GSI-191, subject to the following changes. There seems to be ubiquitous stakeholder support for risk-informing the GSI-191 resolution process under Option 2 which I fully support. The staff should also continue to use the review process as described under Option 1 for deterministic reviews but use a flexible plant-specific closure approach as outlined below. In addition, no further actions should be required of licensees pending resolution of all remaining testing and analysis. I disapprove the use of 50.54(f) letters to licensees for GSI-191 matters without prior Commission approval. Timely resolution is desirable for this issue. However, Commission policy on the resolution path for this inherently complex issue requires consideration of safety significance and public risk, resolution of remaining testing and analysis, viable alternative risk informed treatment, and proper consideration of regulatory impacts to lend stability to nuclear plant operational and planning processes.

First, I do appreciate the staff's comprehensive paper to address the Commission's SRM from the April 15, 2010 Commission meeting. I have observed a staff that has exhibited a questioning attitude and attention-to-detail that is critical to a conservative decision-making safety climate. The staff has demonstrated exceptional engineering and technical aptitude. To this end, the staff has acquired substantial technical knowledge in working with stakeholders to address potential emergency core cooling systems (ECCS) and containment spray systems (CSS) sump strainer clogging. The staff's efforts have advanced the state-of-knowledge on this subject and have improved reactor safety. In addition, I commend the ACRS's past recommendation for expanding the scope of GSI-191 calling for a more complete assessment of in-vessel effects and potential core flow blockage.

Regarding the regulatory process to resolve GSI-191, I view the issue as it stands today as a matter relevant to safety but do not view the current circumstances as an adequate protection of public health and safety issue given the large advanced strainers installed, compensatory measures already taken, and the low probability of challenging pipe breaks. Hence, adequate defense-in-depth is currently being maintained. The staff and stakeholders have not presented sufficient information that rebuts the presumption of adequate protection (e.g., core damage frequency (CDF) on the order of 10^{-3}/year, strong evidence that defense-in-depth has not been maintained) for continued PWR plant operation. However, I do understand the staff's rationale for continuing to pursue GSI-191 as a matter of licensees demonstrating compliance as noted in the staff's paper and to address the remaining residual risk associated with GSI-191 to reduce uncertainties with long-term core cooling reliability.

As responsible regulators, it is necessary that our regulatory actions and impacts be commensurate with the degree of risk reduction they achieve. The NRC also has a responsibility to eliminate unnecessary regulatory burdens on licensees. That said, there has been very little done in recent years to better risk-inform the GSI-191 review process. In 2010, the industry used a plant-specific probabilistic risk assessment (PRA) to illustrate that reducing the risk of sump clogging for large pipe breaks had a reduction in the CDF of approximately 1 in 30,000,000 and yet the modifications to replace piping insulation could result in an approximately 80 person REM of radiation worker dose per plant. The substantial plant-worker dose involved and the very small reduction in public risk when compared to other risks that society is generally exposed to reminds me of why the Commission has a long-standing policy statement on reactor safety goals. The Commission's "Policy Statement on Safety Goals for the Operation of Nuclear Power Plants," issued in 1986 and the 1995 policy statement on use of PRA, present a risk philosophy to help strengthen the NRC's regulatory decision-making process which I will not repeat here. It is unfortunate that the Commission does not have the benefit of PRA insights with a modern reactor accident consequence analysis for the full

spectrum of pipe breaks that reflects use of licensee compensatory measures and plant features so that the Commission is better informed in its decision-making on GSI-191.

I am concerned that the staff's described approach under Option 2b is unnecessarily restrictive in the treatment of smaller breaks. For GSI-191 application only, the staff should assess the policy and technical implications of a no de minimis pipe break size approach (i.e., no transition break size) where debris fouling is treated as a beyond design basis event or severe accident but requires mitigation capability to prevent a large early release. The approach would allow for realistic assessment of plant design features and operator actions that reduce sump clogging likelihood (e.g., strainer backwashing) or reduce plant dependence on sump recirculation for long-term cooling (e.g. refill of the RWST, cross tie to another RWST if available, manage use of containment spray). The approach could factor licensee proposed commitments that have an overall mutual safety benefit for GSI-191 risk and other accident scenarios identified in a plant-specific PRA. For example, a licensee could propose crediting[1] B.5.b equipment to mitigate the consequences of sump-clogging scenarios and also credit the equipment for scenarios that mimic station blackout scenarios. The above assessment should be sent to the Commission in the next 60 days via a Commissioner's Assistant note.

Paramount to regulatory clarity and reliability and given the void of comprehensive risk information, all remaining testing and analysis to address GSI-191 should be completed prior to additional licensee actions. In this context, stakeholders and staff have outlined the remaining tests and analyses regarding zone-of-influence for debris generation, vendor specific strainer performance, and in-vessel effects that are underway or scheduled to be done in the near future to support plant-specific actions . No further actions should be required of operating reactor licensees pending completion of these tests and analyses. The staff should not use 50.54(f) letters to licensees for remaining GSI-191 activities without prior Commission approval.

Regarding closure schedules, risk-informing the review schedule sounds viable and the staff should account for aggregate impacts of all regulatory activities on a plant-specific basis including consideration of licensee planned plant outage critical modifications and maintenance activities. To better inform timelines to implement plant modifications, if required, individual plant close-out schedules should reflect consideration of PRA information. The staff should consider licensee PRA information, if provided by licensees, that assess the full spectrum of applicable pipe break sizes, plant-specific compensatory measures, and design features that reduce sump clogging risk. Once the above actions are completed including all remaining testing and analysis and development of risk guidance for the Option 2 approach, the staff should send a progress report to the Commission, with plant-specific close-out plans, in approximately 18 months.

Lastly, the staff should continue its current efforts unabated to resolve the issue without delay as timely resolution is relevant to both operating reactors and licensing of new reactors.

[1] Regulatory Issue Summary 2008-15, "NRC Staff Position on Crediting Mitigating Strategies Implemented in Response to Security Orders in Risk-Informed Licensing Actions and in the Significance Determination Process," June 25, 2008 (ML080630025)