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

December 14, 2012

SECRETARY

COMMISSION VOTING RECORD

DECISION ITEM: SECY-12-0093

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

The Commission (with all Commissioners agreeing) approved the subject paper as recorded in the Staff Requirements Memorandum (SRM) of December 14, 2012.

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 Macfarlane
Commissioner Svinicki
Commissioner Apostolakis
Commissioner Magwood
Commissioner Ostendorff
OGC
EDO
PDR

VOTING SUMMARY - SECY-12-0093

RECORDED VOTES

	APRVD	DISAPRVD	ABSTAIN	NOT PARTICIP	COMMENTS	DATE
CHRM. MACFARLANE	X				X	10/24/12
COMR. SVINICKI	X				X	11/15/12
COMR. APOSTOLAKIS	X				X	10/31/12
COMR. MAGWOOD	X				X	9/25/12
COMR. OSTENDORFF	X				X	10/12/12

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: Chairman Allison M. Macfarlane

SUBJECT: SECY-12-0093 – 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

10/24/12

DATE

Entered on "STARS" Yes __X__ No ___

Chairman Macfarlane's Comments on SECY-12-0093, "Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"

I approve the staff's recommendation in SECY-12-0093 to allow licensees the flexibility to choose any of the options discussed in the paper to resolve Generic Safety Issue (GSI)-191.

Research on pressurized-water reactor emergency core cooling system sump recirculation has covered a lot of ground since it began in 1997 and GSI-191 was opened in 2001. While initially opened to address sump clogging during emergency core cooling system recirculation following a loss-of-coolant accident, GSI-191 has evolved to include: (1) chemical effects, the potential for chemicals in the containment to interact with materials to potentially impede flow through the sump strainer; (2) downstream effects, the potential for materials that bypass the strainer to impact downstream components like valves, pumps, and the reactor core; and (3) in-vessel effects, the potential buildup of debris in the core.

As a relative newcomer to this issue, I can understand how some might question why GSI-191 has remained an open issue for such a remarkably long time. As noted by Commissioner Magwood, while initially an issue of sump clogging, GSI-191 has evolved as new challenges surfaced. While the overall issue of recirculation following an accident is the unifying theme that holds GSI-191 open, its individual aspects each have unique implementation challenges, which have required research and testing. Looking back, while I believe that appropriate steps have been pursued to address these issues in concert with one another, and specific safety enhancements have been made at each plant, how longstanding generic issues impact challenging public confidence in our processes is something I am concerned about.

I am encouraged by the improvement effort currently underway, as outlined in SECY-12-0105, "Summary of Activities Related to the Generic Issues Program," which builds on previous enhancements to the Generic Issues Program, implemented in 2009, and proposes further refinements to efficiently resolve safety issues and more effectively communicate their progress. The staff is evaluating improvements in areas such as internal collaboration and knowledge transfer, expectation of timely processing and management of issues exiting the program, and process changes that enhance external communication. I look forward to the staff's report upon the completion of this effort.

With respect to a path forward, the nuclear industry continues its testing program to evaluate the in-vessel effects of debris accumulation. I join Commissioners Magwood and Ostendorff in suggesting the staff remain flexible with respect to plant-specific implementation dates as the schedule proposed in SECY-12-0093 may present challenges with respect to the completion of industry-led testing and subsequent NRC review and approval. However, allowing that flexibility should be contingent upon industry efforts to accelerate their testing program. I also join my colleagues in requesting a status paper from the staff in one year.

I've been impressed by the staff's work to address the relevant issues as I've been reviewing the history of GSI-191. The NRC staff continues to make safety-focused progress and I share their desire to reach closure on these challenging technical issues.

[signature] 10/24/12

Allison M. Macfarlane — Date

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER SVINICKI

SUBJECT: SECY-12-0093 – 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 ___ Attached XX None ___

SIGNATURE

11/15/12

DATE

Entered on "STARS" Yes ✓ No ___

Commissioner Svinicki's Comments on SECY-12-0093
Closure Options for Generic Safety Issue – 191
Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance

I approve the staff's recommendation to allow licensees the flexibility to choose any of the three viable paths for resolution of Generic Safety Issue – 191, laid out as Options 1, 2, and 3 in SECY-12-0093, subject to the modifications noted here. I join other members of the Commission in recognizing the tremendous body of work – by the NRC staff, industry organizations, and various research institutes – that has advanced our knowledge of this issue. This SECY paper also contains, in my view, one of the best descriptions (the concise history found in Enclosure 1) of GSI-191 that I have read since coming to the Commission and I thank those who produced it.

The complex history of this generic issue has been remarked upon by others, in their votes. This history could serve as a cautionary tale of the failure to definitively scope, investigate, act upon, and close a technical issue. The fact is that although the investigation being conducted today has its origins in concerns about the adequacy of pressurized water reactor (PWR) recirculation sump designs, the underlying phenomena being researched today, related to in-vessel effects, are far afield of the original issue's scope. To my simple way of thinking, once a generic issue has been defined, investigated, a regulatory response has been ordered, actions have been taken, and those actions have been accepted – the original generic issue has been closed. If ancillary concerns are identified along the way, they should be resolved under their own generic issues, investigated, acted upon, and tracked to closure. Perhaps this is nothing more than hindsight, but the caution remains. In allowing a generic issue to meander in this way, NRC creates the perception that it has merely been spinning its wheels, when, in truth, substantial action has been taken. The original strainer at every PWR has been replaced with a larger strainer, many of advanced design, sensitive to the clogging issue, with a median size of the new screens being a factor of 32 increase over the old screens.

I join Commissioner Apostolakis in observing that the Staff Requirements Memorandum (SRM) arising from the Commission's most recent vote on GSI-191 (SRM-SECY-10-0113) contains direction that is still very much operative, as the staff moves forward on the actions in the SECY paper before us now. This direction should either be acknowledged, or incorporated by reference, in the SRM issued for SECY-12-0093.

For instance, in SRM-SECY-10-0113, the Commission noted that, "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 vastly enlarged advanced strainers installed, compensatory measures already taken, and the low probability of challenging pipe breaks, adequate defense-in-depth is currently being maintained." The Commission also directed that the staff "should be receptive to plant-specific implementation schedules for the execution of required GSI-191 actions in consideration of the cumulative effects of other required regulatory actions, licensee planned outages, critical modifications, maintenance activities and occupational dose." In the face of this standing direction, I do not approve the staff's proposed schedule conditions and join my colleagues in remarking that the staff's proposed timetables do not recognize that the compounding conservatisms of the

analyses, coupled with uncertainties associated with research yet unfinished, cast doubt on the timetables linked to refueling outages. For example, licensees have commented that the schedule presented for the deterministic approach of Option 2 would result in plants with outages planned in 2013 having significantly less time to incorporate testing results compared to plants with outages planned in 2014.

As directed by the Commission in SRM-SECY-10-0113, "The resolution of this complex issue calls for careful weighing of its safety significance, occupational dose, and other relevant risk-informed considerations." The staff has acknowledged in this SECY (Enclosure 4), "At this time, the staff is unable to provide a sound and independent estimate of the additional total occupational dose associated with insulation removal to close out GSI-191." Industry has provided updated dose estimates of 80 to 525 person-rem. Staff concludes that "given the uncertainties in scope and site-specific factors such as source term and hazardous materials, the staff does not have a basis to believe that the industry estimates are unreasonable."

Given this range of occupational doses, it is prudent that licensees have an opportunity to scrupulously plan this work – with a goal of reducing dose to workers. Also, since submittals for in-vessel effects and boron precipitation are not expected until May and June of 2014, respectively, plants with refueling outages in 2012 and 18 month fuel cycles could not invoke the new test plan and still meet the schedule outlined in SECY-12-0093. For Option 1 and the deterministic prong of Option 2, the resolution period should begin after testing is completed and has been reviewed by the staff. I disapprove triggering this period from the artificial date of January 1, 2013. For the risk-informed prong of Option 2 and for Option 3, the resolution period should encompass two refueling outages after issuance of NRC's safety evaluation report on the South Texas Project (STP) risk-informed GSI-191 resolution pilot. Consequently, the staff should develop completion schedules on a plant-specific basis using an approach that is linked to the completion of necessary testing (or the STP pilot, in the case of the risk-informed approach) and the issuance of staff's evaluation of the results, followed by – at a minimum -- one refueling outage to identify, engineer, and source the required materials for any necessary plant modifications and a second refueling outage to carry out those modifications.

I also understand that the staff's safety evaluation (SE) of WCAP-16793, Revision 2, "Evaluation of Long-term Core Cooling Considering Particulate Fibrous and Chemical Debris in the Recirculating Fluid," will be issued at least three months later than the previously projected schedule. Since the SE is a necessary input to licensee selection of a resolution path for closure of GSI-191, it is expected that licensee submittals previously on track for December 2012 will now be pushed into 2013. Also, the current staff assigned to review risk-informed license applications reports that they are fully loaded on a number of significant applications, including National Fire Protection Association standard 805 activities. The staff also reports that it is attempting to recruit additional probabilistic risk assessment experts to be able to support these reviews, but there is limited risk expertise available, both inside and outside the agency. The staff also cautions that there will be additional time needed to qualify and train new staff assigned to these reviews. These uncertainties would appear to reveal further the potential impediments to adopting the proposed schedule conditions for closure outlined in SECY-12-0093. Therefore, as this issue proceeds down the path of resolution, the staff should remain open to staggering licensee submittals and the associated NRC reviews to accommodate the availability of staff and licensee resources.

I also support Commissioner Ostendorff's proposal that the staff be directed to include in the proposed rule modifying 10 CFR 50.46, a provision allowing NRC licensees to request a license amendment, on a case-by-case basis, to use risk-informed alternatives to the licensing basis for

long-term emergency core cooling system sump clogging issues, arising from Option 3. I also support the proposal that the staff be directed to work expeditiously to develop clear guidance that details how Option 3 should be implemented and will be evaluated. The clarity and insights provided by such guidance will be essential to licensees in evaluating their resolution path for GSI-191.

Finally, the staff should provide the Commission an information SECY paper with a status update on GSI-191 activities no later than one year from the date of the SRM on this paper.

Kristine L. Svinicki 11/15/12

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER APOSTOLAKIS

SUBJECT: SECY-12-0093 – 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

10/31/12

DATE

Entered on "STARS" Yes __x_ No ___

Commissioner Apostolakis' Comments on SECY-12-0093
Closure Options for Generic Safety Issue – 191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance

I approve the staff's recommendation to allow licensees the flexibility to choose any of the three options presented in SECY-12-0093 for resolving GSI-191. A sizeable amount of work has been done to resolve this long-standing generic issue since the staff last sought Commission direction in 2010; however, much work remains ahead. Considerable progress has been made by STP Nuclear Operating Company in its pursuit of a risk-informed resolution path for GSI-191 and it appears that interest in following a similar approach is growing among the industry. I am encouraged that the industry and NRC staff are seriously pursuing risk-informed resolutions to GSI-191. I join Commissioner Magwood in applauding this initiative and encouraging continued pursuit of risk-informed solutions to regulatory issues.

Industry testing to date has not proved helpful in resolving issues related to in-vessel effects and more tests are planned. In-vessel effects are likely to be the limiting factor in resolving GSI-191 for many licensees. Consistent with the staff's recommendation at the time, I stated in my vote for SECY-10-0113 that in-vessel effects should not be treated as a separate generic issue. The staff has revisited this option in SECY-12-0093 (Option 3) with the benefit of additional information that the staff has gathered in the intervening two years. Option 3 would maintain defense in depth for strainers by requiring strainer operability to be demonstrated using conservative deterministic methods while allowing in-vessel effects to be treated in a risk-informed manner. The staff states that it will seek volunteers to pilot this process and develop the necessary technical bases and guidance. Based on the current information provided by the staff, I support the inclusion of Option 3 as a possible means for resolving GSI-191. I agree with Commissioners Magwood and Ostendorff that it is important that the staff develop clear guidance for the implementation of this option.

In reviewing the SRM for SECY-10-0113, I find that much of the Commission direction from that SRM remains applicable today. In particular, I continue to support the notion that implementation schedules for licensee resolution of GSI-191 should be risk-informed and that the staff should be receptive to plant-specific implementation schedules that consider the cumulative effects of other required regulatory actions, licensee planned outages, critical modifications, maintenance activities, and occupational doses. I agree with Commissioner Ostendorff that the staff should consider PRA insights provided by licensees to inform implementation schedules. This approach will help to ensure that the most risk-significant issues at a given site are getting the most attention.

Finally, I support the recommendation by Commissioners Magwood and Ostendorff, as well as Chairman Macfarlane, that the staff provide the Commission with a status update no later than one year from the date of the SRM on SECY-12-0093.

George Apostolakis
10/31/12

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER MAGWOOD

SUBJECT: SECY-12-0093 – 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

25 September 2012
DATE

Entered on "STARS" Yes X No ___

Commissioner Magwood's Comments on SECY-12-0093,
"Closure Options for Generic Safety Issue 191, Assessment of
Debris Accumulation on Pressurized Water Reactor Sump Performance"

The agency has dealt with GSI-191 for many years and resolving this matter has proven to be an extraordinarily complex and, at times, frustrating process. Part of the reason for this frustration is a decision made quite some time ago to continually expand the definition of the issue to capture concerns that are related to but in some cases quite different from the original sump-clogging challenge. With the benefit of hindsight, this was clearly a mistake. In particular, it would have been far better to have opened a new, separate generic issue to address in-vessel effects rather than to keep this concern linked to sump-clogging—which could have been closed out years ago. Again, this is hindsight, but I recommend that staff consider this lesson-learned carefully and assure that future generic issues are and remain well-defined and avoid the mission creep experienced by GSI-191.

Both the Commission and the staff have acknowledged that given the advanced, vastly expanded strainer systems installed in U.S. plants, compensatory measures taken, and the low probability of challenging pipe breaks, adequate defense-in-depth and safety is currently being maintained. However, because of the uncertainties associated with the mechanics of LOCAs as they relate to GSI-191, our analysis of the issue has been characterized by highly conservative assumptions which sometimes lead to worst-case scenarios of debatable likelihood. Thus while we are confident in the safety of U.S. plants, the closure of this issue has remained elusive.

As we have pursued resolution of GSI-191, many tests have been performed to obtain data regarding how much material would be set in motion during a LOCA and how the resulting debris would behave, as well as how these materials and chemicals in coolant would interact. Despite the considerable testing already performed, we are today informed that yet more testing is needed. It is clear that for many plants, the deterministic approach, with its conservatisms and uncertainties, will continue to pose significant challenges.

In order to move this matter toward resolution, the Commission issued SRM SECY-10-0113 in which staff was encouraged to approach GSI-191 using risk-informed approaches rather than relying upon deterministic analyses. Industry has taken a leadership role in fulfilling this vision by developing PRA-based methodologies to resolve remaining questions. I applaud this initiative by licensees and hope that they find additional ways to apply modern PRA tools to important questions of nuclear safety.

Moreover, staff, in SECY-12-0093, has also taken a more creative approach to GSI-191 and has recommended to the Commission that the agency take a "cafeteria" approach which offers licensees three options to proceed—including the option to apply PRA-based analyses to the issue. Given the varied challenges and attributes of the many licensee facilities, I find this flexibility sensible as it allows for the recognition of unique, site-specific conditions.

If approved, staff's approach would allow plants that are well-positioned to apply deterministic approaches to resolve some or all of the issue will be able to do so; licensees that have the technical capabilities to develop PRA-based approaches may take that path. This strategy represents considerable evolution in staff's approach to this issue and it has now provided the Commission with a responsible and practical path to resolve this contentious issue. I congratulate the staff for this creative approach and, therefore, approve staff's recommendation subject to the following comments.

My first comment is associated with the projected timetable for resolution. If staff hoped to recognize site-specific conditions by allowing licensees flexibility to select the options most appropriate for their plants, some of this benefit is lost by the restrictive schedules in SECY-12-0093. Rather than the inflexible schedules presented in the paper, I recommend that staff remain receptive to plant-specific implementation schedules that reflect the full range of regulatory actions that must be completed at each site. Staff should also weigh the toll paid in terms of worker dose as schedules are crafted.

Next, while I find Option 3 to be a practical and interesting approach that appears to attempt a correction to the troubled history of GSI-191, this option requires further development before it can serve as a viable alternative. Staff should work expeditiously to develop clear guidance that details how Option 3 should be implemented and will be evaluated. Among the options in SECY-12-0093, Option 3 is the one that most requires clarity from the staff in terms of its expectations from licensees.

Finally, I recommend that staff provide the Commission with a status update no later than one year from the date of the SRM on this paper.

Once again, I congratulate the staff for producing the current recommendation. I also thank the many members of the staff who have wrestled with this important and challenging safety issue over the years. Their efforts have led to continual enhancements to plant safety since the time GSI-191 was initiated and have paved the way for the current progress.

9/25/12

William D. Magwood IV **Date**

NOTATION VOTE

RESPONSE SHEET

TO: Annette Vietti-Cook, Secretary

FROM: COMMISSIONER OSTENDORFF

SUBJECT: SECY-12-0093 – 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

10/12/12
DATE

Entered on "STARS" Yes _X__ No ___

Commissioner Ostendorff's Vote Comments on SECY-12-0093, "Closure Options for Generic Safety Issue-191, Assessment of Debris Accumulation on Pressurized-Water Reactor Sump Performance"

I approve the staff's recommendation to allow licensees the flexibility to choose any of the options discussed in SECY-12-0093. This three-track closure approach appropriately considers many different factors while also providing a viable management process. I commend the staff for proposing this integrated management approach to resolve GSI-191. Regarding the regulatory process to resolve GSI-191, as expressed in my vote on SECY-10-0113, I continue to view the issue as a matter relevant to safety but not as a matter of adequate protection of public health and safety. Simply stated, sufficient defense-in-depth is still being maintained.

Regarding closure schedules, I join Commissioner Magwood's proposed direction that the staff should "remain receptive to plant-specific implementation schedules." Consistent with my vote on SECY-10-0113, the staff should be mindful of aggregate impacts of regulatory activities on a plant-specific basis including consideration of planned plant-outage critical modifications and maintenance activities. For risk management purposes, I would be concerned if GSI-191 modifications unjustifiably received priority over plant modifications that reduce fire risk (e.g., NFPA-0805) or station blackout risk (e.g., post-Fukushima lessons learned). To better inform implementation schedules for plant modifications, if necessary, staff should consider PRA insights if a licensee electively provides such information. The staff should provide the Commission a status paper within a year from issuance of the SRM on SECY-12-0093.

For in-vessel debris-effects testing, the previous single fuel assembly tests illustrate the bounding-assumptions philosophy that is rooted in the origins of § 50.46. This philosophy can result in a cascade of conservatisms yielding unreasonable results. In a good faith effort to address uncertainties, bounding test conditions and assumptions may have driven results that overstate the debris effect on core cooling. It is unfortunate that it has taken almost 18 months to realize that the single fuel assembly tests would not be a success path for in-vessel issues. Nevertheless, additional testing is needed to establish reasonable acceptance criteria for in-vessel effects.

Lastly, I am encouraged by the Option 3 risk-informed approach. The South Texas Project has undertaken a GSI-191 pilot program using probabilistic techniques to model debris generation and transport, which is incorporated in a plant-specific PRA. I note that Option 3 relies on a license exemption from § 50.46. Although the exemption process is an acceptable regulatory vehicle, regulating by exemption is not ideal for regulatory clarity or efficiency. As a matter of policy, the Commission should also seek to clarify its regulations. This clarification could codify a Commission expectation that allows risk-informed alternatives to resolve GSI-191. The forthcoming § 50.46c proposed rulemaking, which is designed to overhaul § 50.46, now affords the NRC an opportunity to seek public comments. Therefore, consistent with my vote on § 50.46c, the proposed rule should contain a provision allowing NRC licensees to request a license amendment, on a case-by-case basis, to use risk-informed alternatives. The license amendment process would be used to reconstitute the long-term core cooling licensing basis. Stakeholder comments should be solicited on the proposed provision. In addition, I support Commissioner Magwood's proposal that staff should develop clear guidance on Option 3.