KNOWN UNRESOLVED POTENTIALLY SIGNIFICANT GSI-191 QUESTIONS/ISSUES APPLICABLE TO MULTIPLE PLANTS (PRELIMINARY)
6/19/09

Issue Description	Set of Affected Plants	Potential Significance	Status	Proposed Path Forward	Potential Need for Retesting? *
1. WCAP ZOI reduction test scaling and prototypicality issues	Approximately 1/3 to 1/2 of PWRs	This testing has resulted in significantly reduced debris loadings in strainer analyses (e.g., order of magnitude difference), but may not be prototypical	Identified fall 2008 through staff-sponsored review of industry technical reports. Staff is issuing RAIs to affected plants and is engaging PWROG on general test protocol issues	Continue series of interactions with PWROG; decision point in July regarding whether process likely to be fruitful. Staff will review licensee responses concerning plant-specific issues	Significant potential for either additional ZOI testing or plant-specific strainer testing with increased debris loading
2. SE Appendix II calcium silicate ZOI methodology	At least 3 plants and likely several others	Approaches based on SE Appendix II could result in an underestimate of fine calcium silicate debris	Identified spring 2009 in staff review of plant RAI responses. Staff is evaluating the significance of this issue and backfit implications	Staff evaluating	Staff evaluating
3. Assuming baseline debris size distributions for reduced ZOIs	Some plants that used reduced ZOIs	Assumption could non-prototypically result in reduced quantities of fine debris that is more prone to transport to strainer and cause head loss	Covered in existing guidance. Staff issuing RAIs to plants where issue appears to exist	Licensees should verify that the debris size distributions used are appropriate for the assumed ZOI radius	Potential for some licensees to re-perform strainer testing if debris loading cannot be shown to be bounding
4. Issues with Alion debris erosion testing	Approximately 1/3 to 1/2 of PWRs	Staff review of data indicates that the quantity of eroded fibrous fines is underestimated, which can be a significant contributor to strainer head loss	Identified fall 2008 in staff review of plant RAI responses. Staff is issuing RAIs to licensees that appear to be relying on debris erosion testing	Staff interact with vendor and affected licensees concerning adequacy of previous testing and any next steps	Significant potential for either additional erosion testing or plant-specific strainer testing with increased debris

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5. Flow modeling issues (e.g., with velocity and turbulence) in strainer tests that credit debris settlement	Plants that credited debris settlement in strainer testing	If flow is not prototypically modeled, flume transport and strainer head loss may be underestimated by testing	Part of ongoing discussions with vendors and licensees since 2007. Staff is issuing RAIs to licensees crediting debris settlement in strainer tests to verify the flume flow characteristics are prototypical of plant flow characteristics	Staff interact with groups of licensees and vendors to resolve conceptual parts of issues / review licensee responses concerning plant-specific issues	Potential for some licensees to re-perform strainer testing if flow modeling cannot be shown to be prototypical
6. Introduction of debris during head loss testing with pump stopped	Plants that credited debris settling using PCI test procedure	This testing practice may result in non-prototypical reductions in debris transport since containment pool is typically not quiescent during fill-up	Identified in winter 2008 during testing observations. Staff is reviewing each licensee's submittal to determine whether non-conservative debris introduction occurred during testing and issuing RAIs as appropriate	Licensees should verify that they did not use this type of debris introduction technique or provide justification that it did not result in non-conservatism in the head loss testing.	Potential for some licensees to re-perform strainer testing if adding debris prior to starting pump affected test result significantly
7. Erosion of settled debris during head loss testing	Plants that credited debris settlement in strainer testing	Quantity of fines reaching strainer may be underestimated since erosion was not considered for small and large debris that settled in flume	Identified in winter 2008 during testing observations. Staff issuing RAIs to licensees crediting debris settlement in strainer tests	Licensees should verify that a conservative quantity of fines was introduced during strainer testing with consideration of erosion	Potential for some licensees to re-perform strainer testing if not considering these eroded fines could have significantly affected test result

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8. Evaluation of flashing in the debris bed and containment accident pressure	Over half of units currently need accident pressure credit; 8–12 units do not credit it but appear to need to	Flashing can significantly increase the debris bed head loss	Covered in existing guidance. Staff is reviewing each licensee's submittal to determine whether flashing has been adequately evaluated and whether containment accident pressure is being credited, issuing RAIs as appropriate	Licensees should evaluate the extent of accident pressure required to prevent flashing. A plant-specific evaluation should be performed to verify that flashing will not occur in the debris bed	No, since issue is not directly related to testing
9. Increase in $NPSH_R$ due to deaeration	Unknown; may affect plants with high head loss and low submergence	Per RG 1.82, presence of air entrained in the liquid entering a pump increases its $NPSH_R$	Identified spring 2009 in review of licensee submittal. Most plants have not recognized the issue (e.g., have only considered air ingestion due to vortexing, and not deaeration due to the debris bed pressure drop)	Staff plans to send RAIs to licensees that have not evaluated the issue. Licensees should determine plant-specific deaeration	No, since issue is not directly related to testing
10. In-Vessel Downstream Testing in support of WCAP-16793	Most PWRs	NRC staff has technical concerns with the WCAP-16793 approach that many plants are relying upon to evaluate in-vessel concerns	The staff is currently reviewing the recently submitted Revision 1 to WCAP-16793. and believes the testing performed to date is not sufficient to justify conclusions made in the topical report	PWROG should address staff concerns with WCAP-16793 so that PWRs can complete the in-vessel downstream effects part of sump analyses	Significant potential for performing additional fuel assembly head loss tests

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11. Potential debris blockage of refueling canal/ refueling cavity drains	Approximately 1/3 to 1/2 of PWRs (especially those with large debris quantities and small drains without trash racks)	If the flowpath becomes blocked by debris, the amount of water held-up in the refueling cavity can reduce the inventory of water available for the sump.	Many plants have addressed the issue either by installing trash racks over their drains or by assuming drains become clogged and accounting for water hold-up. However, some plants without trash racks have not adequately analyzed the potential for drain blockage, thus potentially underestimating the amount of water that could be held-up.	Staff continue current review process and issue RAIs as appropriate	No, since issue is not directly related to testing
12. Refinements to the WCAP-16530 chemical base model	Approximately 5-9	Some licensees have taken credit for refinements to the WCAP-16530 base model to reduce the quantity of chemical precipitates without providing sufficient justification in supplemental responses	Staff issuing RAIs to licensees that have not provided adequate justification to support refinements to the base model	Licensees should provide the basis for concluding that refinements taken to the base model are adequately justified	Potential for some licensees to re-perform strainer testing or other chemical testing if refined precipitate loading cannot be justified

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13. Prototypicality of debris interceptor testing	At least 2 plants and potentially several others	If debris interceptor tests are not conducted prototypically, credit for debris capture may be overestimated	Issue identified during GL 2004-02 supplemental response reviews. Staff has issued RAIs as appropriate	Licensees should address RAIs and demonstrate that the debris interceptor testing was adequate or consider alternate approaches (e.g., retesting and/or insulation removal)	Significant potential for either additional interceptor testing or strainer testing with increased debris

* Expectations regarding need to retest are based on NRC staff review progress for each issue, rather than on final conclusions from completed reviews. These expectations do not reflect the possibility that, absent other significant nonconservatisms, a staff review might reach a holistic conclusion of compliance.