Appendix B
Generic Letter 2004-02 Information Matrix

B.1 GL 2004-02

GL 2004-02 was issued to PWR licensees of operating plants requesting that they demonstrate that corrective actions taken to address GSI-191 are adequate.

Additionally, GL 2004-02 requested the licensee provide information to assess the potential impact of debris blockage on emergency recirculation during design basis events.

Table B.1 provides U.S. EPR sump recirculation information in response to requested information outlined in GL 2004-02.

Table B.1 GL 2004-02 Information Matrix

GL 2004-02	Potential Impact of Debris Blockage on Emergency Recirculation During design Basis Accidents At Pressurized-Water Reactors	
	Requested Information	**Observation/Comment**
2.(d)(i)	The minimum available NPSH margin for the ECCS and CSS pumps with an unblocked screen.	The minimum available NPSH margin for the ECCS pumps is detailed in the U.S. EPR Safety Injection Systems Analysis for Design Certification. The U.S. EPR design does not take credit for the CSS.
2.(d)(ii)	The submerged area of the sump screen at this time and the percent of submergence of the sump screen (i.e., partial or full) at the time of switchover to sump recirculation	Switchover is not part of the U.S. EPR design. However, the U.S. EPR design is such that the ECCS sump screens remain completely and continuously submerged. (Refer to Section 3.2)
2.(d)(iii)	The maximum head loss postulated from debris accumulation on the submerged sump screen, and a description of the primary constituents of the debris bed that result in this head loss. In addition to debris generated by jet forces, from the pipe rupture, debris created by the resulting containment environment (thermal and chemical) and CSS washdown should be considered in the analyses. Examples of this type of debris are disbonded coatings in the form of chips and particulates and chemical precipitants caused by chemical reactions in the pool.	Section 3.2 provides the maximum head loss for the ECCS pumps. The performance of the U.S. EPR ECCS strainers is based upon studies and strainer validation testing. The testing included a mix of particulates, micro-porous insulating material, paint chips, latent debris, etc., as defined in the U.S. EPR debris evaluation. Approved coatings will be used.
2.(d)(iv)	The basis for concluding that the water inventory required to ensure adequate ECCS and CSS recirculation would not be held up or diverted by debris blockage at choke points in containment recirculation sump return flowpaths.	The minimum IRWST water level for ECCS recirculation is -10.2 ft. This level considers the initial IRWST water inventory prior to the LOCA event, return water from the LOCA, quantities of water in containment that do not return to the IRWST (pooled water on the containment floor, atmospheric steam, wetted areas, trapped water pockets at various locations). The return flow path to the IRWST is via 4 large heavy floor openings that are each provided with a weir and trash rack.

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	Requested Information	**Observation/Comment**
2.(d)(v)	The basis for concluding that inadequate core or containment cooling would not result due to debris blockage at flow restrictions in the ECCS and CSS flowpaths downstream of the sump screen, (e.g., a HPSI throttle valve, pump bearings and seals, fuel assembly inlet debris screen or containment spray nozzles). The discussion should consider the adequacy of the sump screen's mesh spacing and state the basis for concluding that adverse gaps or breaches are not present on the screen surface.	An assessment of debris blockage of the fuel assemblies is not included in this report The valve size in the ECCS flow path ranges from 2 inches (isolation valve in small miniflow line for pump protection) to 16 inches (inlet of ECCS inlet pipe). These sizes are larger than the largest expected debris size (strainer hole size of strainer). The post-LOCA debris will not clog the ECCS valves per NUREG/CR-6902. Vendors for valves, pipes, and orifices will provide tests or evaluations to verify adequate performance during operation with post-LOCA fluid.
2.(d)(vi)	Verification that close-tolerance subcomponents in pumps, valves and other ECCS and CSS components are not susceptible to plugging or excessive wear due to extended post-accident operation with debris-laden fluids.	Based on the ex-vessel downstream effects evaluation, the following ECCS components will be evaluated to verify post-LOCA operation for a minimum of 30 days: 1. The LHSI and MHSI pumps. 2. The LHSI heat exchanger. The evaluation will address the items identified in Appendix G.
2.(d)(vii)	Verification that the strength of the trash racks is adequate to protect the debris screens from missiles and other large debris. The submittal should also provide verification that the trash racks and sump screens are capable of withstanding the loads imposed by expanding jets, missiles, the accumulation of debris, and pressure differentials caused by post-LOCA blockage under predicted flow conditions.	The 6.6 ft thick RCS loop area heavy floor and the heavy duty trash racks that cover the floor openings prevent missiles, large debris, and expanding jets from impacting the retaining baskets or the ECCS screens. The floor openings are located on the periphery of the RCS loops, thereby reducing the trash rack profile for a majority of break locations. The trash racks are significantly robust to prevent major debris from falling through the opening into the retaining baskets. They are safety-related Seismic Category I components. The retaining baskets and the ECCS sump screens rely on the

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	Requested Information	**Observation/Comment**
		6.6 ft thick heavy floor, the trash racks and distance for protection from jet impingement and missiles. Nevertheless, they are designed for the maximum expected debris loading and the corresponding differential pressure. The ECCS sump screen design head loss is approximately 2.2 psi. Based on testing, the maximum differential pressure resulting from debris across the strainer screen is approximately 0 feet of water.
2.(d)(viii)	If an active approach (e.g., backflushing, powered screens) is selected in lieu of or in addition to a passive approach to mitigate the effects of the debris blockage, describe the approach and associated analyses.	The U.S. EPR design does not take credit for an active approach to reduce/eliminate the effects of debris blockage.