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PDR: per R. Emmit

MEMORANDUM FOR:

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FROM:

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SUBJECT

REQUEST FOR PRIORITIZATION OF NEW GENERIC  
SAFETY ISSUE "LOSS OF ESSENTIAL SERVICE WATER  
IN LWRs".

The subject issue proposed for prioritization has been identified during the evaluation of Generic Issue 130, "Essential Service Water System Failures at Multiplant Sites." GI-130 is concerned with the failure of the essential service water (ESW) system in those multi-unit sites that have only two ESW pumps per unit and count on a backup crosstie capability. We have identified fourteen reactor units (seven reactor sites) in this GI-130 category. In the absence of the availability of the unit 2 FSW system via crosstie between the two units, the core damage frequency vulnerability increases sharply for unit 1. As part of the resolution of GI-130 a study was conducted at BNL to investigate the generic implications of shared service water systems to this particular class of multi-unit sites.

The design of the ESW system is highly plant-specific regarding plant equipment, crosstie capability, operational and functional requirements. The ESW system typically supports many of the frontline safety systems that are required for safe shutdown of the plant. Examples include those systems and components shown in the attached table (Enclosure 1). The ESW system in most plants also provides cooling water to non-safety related components and systems during normal plant operations. Only one train is required to operate to satisfy all safety-related cooling requirements. In the event of a LOCA or other emergency mode of operation, the ESW pump supply lines to the non-safety related equipment are normally isolated by automatic closure of isolation valves.

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Preliminary results and insights gained from a recent BNL study<sup>(2)</sup> show that the core damage frequency (CDF) due to loss of ESW could be substantial, on the order of  $4.0E-04/\text{RY}$  for a two-unit station with two ESW pumps per unit and a crosstie capability between the two units. The dominant risk contributor associated with the loss of ESW is a small LOCA resulting from the reactor coolant pump (RCP) seal failures. RCP seal vulnerability studies are also being covered by Generic Issues 23, "Reactor Coolant Pump Seal Failures", which is in its proposed draft resolution stage (not yet approved by NRC management).

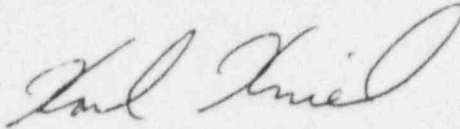
However, the resolution of GI-130 and GI-23 could still leave a substantial residual risk due to loss of ESW for plants not covered by GI-130. While this residual risk depends on the ESW configuration of individual plant designs, insights gained in studying the seven reactor sites addressed in GI-130 present the question of whether ESW risks are acceptable in the rest of the industry. For example, a study of the operating experience from the 1970's to current day indicates that common mode failure potential may be higher than originally expected.

In addition, the initial PRA model for the enclosed BNL study was derived from a single unit configuration. While it is expected that the ESW vulnerability of the single unit modeled (Byron...prior to later modifications) would be plant-unique, it is judged that the value of CDF ( $7.0E-4/\text{RY}$ ) due to loss of ESW is sufficiently high to cause concern on even the more reliable ESW systems, both single unit stations and multi-unit stations not covered in GI-130 (see Table 2.1 of the enclosed report). The potential new generic safety issue study must also factor in the reduction of risk derived from the GI-23 modifications expected to be approved in the near future. As noted in Enclosure 3, the reduction in CDF (due to loss of RCP seals) credited to an improvement in RCP seal cooling capability is on the order of  $1E-5/\text{RY}$ .

The BNL study draft report (Enclosure 2) has identified a number of potential cost/effective options for corrective measures that may be capable of reducing the associated risk in the seven GI-130 reactor sites by as much as an order of magnitude. These and possibly other options for corrective measures should be analyzed in some detail for their cost-benefit effectiveness for plants not covered in GI-130.

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If you have any questions regarding this issue please contact  
Vincent Leung or Demetrios Basdekas.



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References/Enclosures:

1. List of Frontline Safety Related Systems and Components Supported by ESWS.
2. P. Kohut, et. al "Analysis of Risk Reduction Measures Applied to Shared Essential Service Water Systems at Multiplant Sites", NUREG/CR-5526, Brookhaven National Laboratory, January 1990 (Draft).
3. S. K. Shaukat and D. F. Thatcher, "Regulatory Analysis for Generic Issue 23, 'Reactor Coolant Pump Seal Failures'", Draft Report for Comment, U.S. Nuclear Regulatory Commission, December 1989.

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