

REQUEST FOR ADDITIONAL INFORMATION 832-6034 REVISION 3

9/27/2011

US-APWR Design Certification

Mitsubishi Heavy Industries

Docket No. 52-021

SRP Section: 19 - Probabilistic Risk Assessment and Severe Accident Evaluation
Application Section: 19

QUESTIONS for PRA and Severe Accidents Branch (SPRA)

19-550

The staff reviewed the uncertainty results for POSs 4-3 and 8-1 in Chapter 19 of the DCD. It does not appear that uncertainty from human errors, which often drives shutdown risk, was quantified in the results. The error factors (the square root of the ratio of the 95th percentile to the 5th percentile) are estimated as 4.3 and 4.2 respectively. Based on Chapter 9 of the PRA which describes the human reliability assessment, the error factors for all human error probabilities are assumed to be five. In some shutdown cutsets, there are 3 human errors. Also, the staff noted that the applicant did not develop a table for documenting how key sources of uncertainty were addressed in the low power and shutdown PRA. Therefore, the staff requests the applicant to:

1. Requantify the low power and shutdown results (including internal and external) including the uncertainty from human errors and document the results in Chapter 19 of the DCD and the low power and shutdown PRA.
2. Add a table in Chapter 19 of the DCD listing the key sources of uncertainty in the low power and shutdown PRA (including internal and external events) and how these sources of uncertainty were addressed in the PRA. Potential sources of uncertainty include: human error probabilities, the duration in hours of POS 4-3 and POS 8-1, the frequency of low power initiating events, and equipment outages (such as safety injection, charging, etc.)

19-551

The staffs requests information on how the automatic isolation of low pressure letdown (a key risk feature) was incorporated into the risk importance analyses. The initiating frequency of loss of RHR due to OVDR was evaluated by considering the automatic isolation failure of the low-pressure letdown line. It is estimated by quantifying the failure of the the loop level level signal and failure of the air operated valve to close.

Since it appears that low power and shutdown initiating events were not included in the risk achievement worth analyses (RAW), the staff is concerned that the RAW value of the automatic isolation feature is greater than reported. Thus, the staff requests MHI to add low power and shutdown initiating events to the RAW analyses reported in Chapter 19 of the DCD and PRA. Also, the staff requests MHI to add components included in the initiating event frequency calculations to the RAW analyses (e.g. RCS loop low-level signal and failure of an air-operated valve to close).