

Drafted 10/8

October xx, 2002

MEMORANDUM TO: Samuel Collins, Director,
Office of Nuclear Reactor Regulation

FROM: Ashok Thadani, Director
Office of Nuclear Regulatory Research

SUBJECT: COMMENTS ON DRAFT, "RESPONSE TO REQUEST FOR
TECHNICAL ASSISTANCE - RISK ASSESSMENT OF DAVIS-BESSE
REACTOR HEAD DEGRADATION"

The OERAB and MEB Staff reviewed your undated draft of the subject report. In general, we are very concerned that this TIA is, as you state ". . . unconstrained by the details of the significance determination procedures (SDP) for the new Reactor Oversight Process." RES relies on NRR taking disciplined approach to SDP since we will address differences between the SDP and the Accident Sequence Precursor (ASP) risk analyses.

The attached comments detail our concerns about NRR's analysis of the risk of potential rupture of the as-found cladding and of the potential CRDM ejection. These concerns are generally based on the availability of information on the metallurgical phenomena associated with the degraded reactor vessel head. RES plans to expand these analyses and better characterize the uncertainties as more analytic and test information becomes available.

The approach that NRR has taken to estimate the risk of a large LOCA from the section of the cladding exposed by a hypothetical expanded wastage area appears to create alternate life "scenarios" for Davis-Besse. This approach is not consistent with ASP analyses or, to the best of our knowledge, PRA applications in the nuclear field. RES is looking into several promising approaches to create probability distributions of possible corrosion rates, leakage start dates and failure modes of the cladding.

The attachments contains specific comments and suggestions for expanding the approach. Please let me know if you have any questions about our comments. Gary DeMoss (x6225) is the RES/DRAA/OERAB and xxxxx is the RES/DET/MEB contact for this matter.

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ATTACHMENT 1:
OERAB Comments on Davis-Besse TIA

Per your request, OERAB staff have performed an informal review of the draft Response to Request for Technical Assistance - Risk Assessment of Davis-Besse Reactor Head Degradation. In general, we are very concerned that this TIA is, as you state "... unconstrained by the details of the significance determination procedures (SDP) for the new Reactor Oversight Process (ROP)."

We have comments in four areas, all of which can lead to significant differences in risk estimates between the Accident Sequence Precursor (ASP) program and SDP. The first three areas are the accident sequences that can contribute to increased risk, and the fourth is the preliminary information from the existing PRA models.

1. *Medium LOCA from the as-found exposed section of clad* - We agree with your statement presented under specific request 5 that the use of the tails of a probability distribution centered on a flawless plate rupture pressure of 7600 psig is essentially meaningless. The NRC needs to conduct a better probabilistic analysis that explicitly uses the analytically determined characteristics of the clad to examine the probability of that clad failing in the 2000 to 2550 psig range. As with the SDP, the ASP analysis will use the best available information at the time the analysis is completed. We will also characterize uncertainties associated with the analysis.

2. *Large LOCA from the section of clad exposed by an expanded wastage area* - We do not feel that the TIA approach to estimate the risk of this issue is appropriate for an SDP. It is not consistent with ASP analyses or, to the best of our knowledge, with PRA applications in the nuclear field. The approach creates probability distributions from two factors - plant availability and start-up date - to calculate the chance of Davis-Besse having spent more time at high temperature.

- We do not agree with the use of a distribution based on the increased availability factor at Davis-Besse because a different availability factor implies different management and operation practices. The possible effects of different management on the corrosion history are not quantifiable, and it is not correct to use availability factors from other B&W plants to quantify these effects. For example, improved management practices at Davis-Besse could have led to higher availability factors (more operation time) and early detection and correction of the leakage issues.
- We do not agree with the use of other possible start-up dates based on B&W plants. Davis-Besse was constructed and its management was authorized to operate on July 31, 1978. The times at which other B&W plants began to operate are easily quantifiable, but not relevant to the condition at Davis-Besse.

This approach appears to create alternate life "scenarios". Moreover, the uncertainty associated with this approach is unknown due to the incompleteness in alternate life scenario modeling. RES is looking into several promising approaches to create probability distributions of possible corrosion rates, corrosion start dates and failures following different amounts of corrosion.

3. *Medium LOCA from CRDM ejection* - We are reasonably comfortable with the general conceptual structure of the approach, which determines the annual probability of CRDM ejection given an annulus wetted from an axial crack. However, it should be recognized that the reference analysis used to estimate these CRDM ejection probabilities has not been widely circulated or reviewed. We will want to perform a more rigorous review of this aspect of the analysis before fully endorsing it because of the large number of upcoming ASP events that involve CRDM cracking.

4. *Conditional Core Damage Probabilities* - The SDP is using licensee-provided sequence Conditional Core Damage Probabilities (CCDPs) shown in the table below. The licensee's recalculated MLOCA CCDP is essentially the same as the current SPAR model. The SPAR model CCDP for LLOCA is about twice as high the licensee's estimate. We don't have enough detail to determine the reason, but we will follow this up during the course of our ASP analysis of this condition.

Source	LOCA CCDPs		
	SLOCA	MLOCA	LLOCA
DB IPE	not provided	6.87×10^{-3}	1.08×10^{-2}
DB Recalculated for size of the exposed clad area	N/A	2.91×10^{-3}	N/A
SPAR 3i (MLOCA range is 2" to 5")	3.47×10^{-4}	2.54×10^{-3}	2.11×10^{-2}

Note: SLOCA is not in use, but provided for information.

The SPAR models used for the ASP analysis will include GSI-191 issues related to the probability of the sump plugging with debris. We don't know what the effect will be, but we expect that the LLOCA CCDP will most likely be affected by this consideration.

**ATTACHMENT 2:
MEB Comments on Davis-Besse TIA**