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to: R. Prato, RES/DRASP/PRA/RA, MS T10F13

from: S. Burns, Org. 6762, MS 0748

subject: Technical concerns relating to the SOARCA mitigated accident scenario definitions

The attached list provides a concise description of Sandia's technical concerns with regard to some of the mitigated accident sequence definitions that have been examined as part of the State-of-the-Art Reactor Consequence Analysis (SOARCA) project. Although the issues described here relate specifically to the Peach Bottom long term station blackout scenario, similar concerns also exist with regard to the mitigated Surry site blackout scenarios. These issues have been discussed at various venues over the last several months including teleconferences and through e-mail dialogs. The purpose of this memo is to provide as concise a summary as possible of the remaining issues from Sandia's standpoint.

Credit should be given to the NRC staff for their efforts to resolve these technical issues through ongoing discussions with the licensee and system experts within the NRC. As should be apparent from this memo, however, resolution of these technical issues is not amenable to inquiries directed to the licensee. Sandia believes that adequate resolution of these issues will require more formal human reliability analysis and probabilistic risk analysis which is beyond the scope of the SOARCA project.

The difficulty involved in addressing these technical issues within the SOARCA project has lead Sandia to advocate presenting both the unmitigated and mitigated scenarios in the final SOARCA documentation (see, for example, the e-mail from S. Burns to R. Prato et al. dated August 17, 2007). Sandia believes this approach will have the virtue of demonstrating the modeling advances achieved over the past 20 years through the unmitigated scenario results as well as showing the potential benefits of B.5.b procedures through the mitigated scenario results. It can be argued that this approach is consistent with the desire of the NRC staff to present a single result for each scenario since the mitigated and unmitigated results represent distinct accident sequences.

Peach Bottom

1. To date, the proposed equipment needed to implement the B.5.b mitigation actions has not been procured at Peach Bottom and the details of their integration with other plant equipment are not fully specified. This makes it difficult to perform even a qualitative assessment of the steps necessary to stage and actuate this equipment during the postulated accident scenario.

2. The principal initiating event for the Long Term Site Blackout (LTSBO) is a seismic event of sufficiently large magnitude (1g) to cause massive and distributed structural failures, including destruction of the hydro dam that forms the ultimate heat sink for the plant, collapse of the turbine building and disruption of access to the reactor building. The realism of relocating relatively large and heavy mitigation equipment (e.g., portable electrical generator and a portable pump) from their storage location(s) through rubble and other obstacles to their connection points in the plant is difficult to support. Similar questions would apply to the other plausible initiating events, including massive internal flood or large internal fire.

3. The level of damage after an earthquake of this magnitude also raises questions about the viability of long-term water supplies for (portable) pump suction. The B.5.b mitigation assessment concludes the river basin is unavailable due recession of the river away from the plant due to failure of the Conowingo dam; the condensate storage tank (CST) is likely to fail, spilling its contents into the earthen dike (which might also be damaged), leaving the cooling tower basins as the only remaining water supply. Although this is a very large supply of water, it's at least credible that fissures and other damage to the basin would cause this water supply to be unavailable.

4. Assuming the portable generator can be moved to the electrical hook-up needed to supply the dc power inverter for S/RV control, minimal instrumentation, etc., the ability to make this connection in a way that provides a reliable and continuous power supply to active equipment has not been demonstrated. Interruption of dc power to open safety relief valve(s) and reactor core isolation cooling (RCIC) would cause these components to automatically isolate, perturbing plant conditions in a way that could lead to additional system failure (e.g., reactor overfill and flooding of main steam lines).

5. Licensee comments about the viability of manual, mechanical start-up and control of RCIC after emergency dc power supplies are exhausted indicate this process is not failsafe. Although procedures are in place, which describe how this process would be performed, the actions themselves have never been tested. Anecdotal evidence (from operator experience) of the difficulty of manual start-up and control of Terry turbine systems at other plants (including steam-driven auxiliary feed systems in pressurized water reactors) suggests the process may not be 100% reliable.

6. The discussion with the Licensee regarding options for opening a containment vent path during the "Bus E-12" scenario did not provide much confidence that this process could be accomplished within a short time frame using proposed portable equipment. For example, it was not clear that electrical power to isolation valve solenoids would be available from the remote shutdown panel, which would be supplied by the portable generator. Considerable discussion and debate among licensee personnel about which of the available vent pathways could be opened indicated an incomplete consideration of support equipment needs for containment venting.

It should be emphasized that the list of technical issues presented here does not reflect a deep exploration of risk assessment techniques. Much more substantial cross examination of the mitigated scenarios might be expected from skeptical stake holder organizations with a sophisticated understanding of plant procedures, human reliability and risk analysis.

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