Santos, Cayetano

From:	Hossein Nourbakhsh-ACRE
Sent:	Thursday, April 10, 2008 2:53 PM
To:	Jessie Delgado
Cc:	Cayetano Santos; Frank Gillespie
Subject:	Reconciliation Memo on SOARCA
Attachments:	Reconciliation-SOARCA.doc

Jessie,

Attached is my reconciliation memo

Thanks

C/34

APRIL 9, 2008

MEMORANDUM TO: William J. Shack

FROM: H. P. Nourbakhsh, Senior Staff Engineer

SUBJECT: ANALYSIS OF EDO RESPONSE TO ACRS REPORT ON STATE-OF-THE-ART REACTOR CONSEQUENCE ANALYSES (SOARCA) PROJECT

Attached for your perusal is a copy of the EDO's April 7, 2008 letter, responding to ACRS's February 22, 2008 report to the Commission concerning State-of-the-Art Reactor Consequence Analyses (SOARCA) Project. A copy of the Committee's February 22, 2008, report to the Commission is also attached.

Committee Report

In its report to the Commission, the Committee summarized its recommendations and comments on State-of-the-Art Reactor Consequence Analyses (SOARCA) Project. Following are the Committee's specific recommendations:

- Level-3 probabilistic risk assessments (PRAs) should be performed for the pilot plants before extending the analyses to other plants. The PRAs should address the impact of mitigative measures using realistic evaluations of accident progression and offsite consequences. The core damage frequency (CDF) should not be the basis for screening accident sequences.

- The process for selecting the external event sequences in SOARCA needs to be made more comprehensive. The impacts from these events on containment mitigation systems, operator actions, and offsite emergency responses should be evaluated realistically.

- Consequences should be expressed in terms of ranges calculated using the threshold recommended by the Health Physics Society Position Statement and some lower thresholds. A calculation with linear, no-threshold (LNT) should also be performed, which would facilitate comparison with historical results.

EDO Response

The EDO's response, dated April 8, 2008, touched on the February 22, 2008 Committee's report to the Commission concerning State-of-the-Art Reactor Consequence Analyses (SOARCA) Project. Following are the staff's responses to the Committee's recommendations:

- While a level-3 PRA may provide the consequences for more scenarios, the staff does not believe these scenarios will drive the risk. The staff's approach focuses on the detailed integral analyses of relatively important scenarios which have been consistently identified in PRAs as important contributors to core damage and offsite release. Using the SOARCA approach, the staff believes it can most effectively demonstrate the benefits of the significant research and detailed accident progression modeling as well as the benefits from plant improvements. The staff does not believe that conducting level-3 PRAs will substantially affect the conclusion of the study. It is important to recall that the primary purpose of SOARCA is to demonstrate how our current understanding of severe accident progression and phenomenology and plant configurations would affect the timing and magnitude of offsite releases and the resultant offsite health effects, compared to previous analyses. SOARCA is also intended to examine how mitigation may influence our understanding of important core damage events and important containment failure modes.

- Staff selected external events to be representative of those that might arise due to seismic, fire or internal flooding initiators. These sequences were derived from insights gained from a review of previous studies such as NUREG-1150, "Severe Accident Risks: An Assessment for Five Nuclear Power Plants," and NUREG 1742, "Perspective Gained from the Individual Plant Examination of External Events (IPEEE) Program," as well as from results of licensee PRAs and NRC's SPAR models for external events. Consistent with the SOARCA strategy, when assessing sequences, the staff focused on the functional characteristics of the sequences, the implications for accident progression and releases, and ultimately the means for mitigating the sequences. In order to further specify these sequences for the purpose of the analysis, seismically initiated sequences were chosen as representative of external event sequences. The seismic scenarios were loss of offsite power sequences and were functionally very similar to the other severe external event scenarios resulting from fires, high winds, or floods. In general, seismically initiated sequences are more restrictive in terms of the ability to successfully recover equipment or to implement onsite mitigative measures and offsite protective actions. The seismically initiated sequences were judged to be dominant contributors to the external event core damage and release frequencies. In addition, within the SOARCA, the staff will perform an evaluation of the seismic effects on infrastructure and emergency response. If a sensitivity analysis shows a significant effect on consequences a more detailed analysis may be necessary.

- The staff considered the Committee's recommendation as it prepared options for Commission consideration. The staff, in SECY-08-0029, "State-of-the-Art Reactor Consequence Analyses—Reporting Offsite Health Consequences," dated March 4, 2008, proposed six options for projecting latent cancer health effects in SOARCA. Included in those options were several to present single values of latent cancer fatalities (LCF) for various truncation values and LNT as recommended by the Committee. However, in consideration of the potential issues that could be associated with trying to properly communicate the results, the staff chose a metric that was not previously presented to the Committee. This metric is the mean likelihood of LCF for a population-weighted, age and gender-averaged individual living within various distances from the facility. The results would be reported both for the LNT model and for truncation at 100 microsieverts

(10 millirem). This option has several advantages. Notably, it will facilitate public risk communication by providing a likelihood of consequences. These consequences can be compared with the occurrence of LCFs in the general population from causes other than a reactor accident. This metric is also consistent with the approach used in the development of the safety goal and is the same metric used in environmental impact statements.

The EDO response noted that the staff will discuss its response at the upcoming ACRS meetings. The EDO response also noted that the staff appreciates the insights provided by the Committee on the SOARCA project and believes that these observations will improve the outcomes of the project. The EDO response further noted that the staff understands the need to address both scientific and communication issues in the presentation of the SOARCA results to stakeholders.

Analysis

The staff did not agree with most of ACRS recommendations. The staff restated its justifications for the current SOARCA approach which is mainly based on its "belief" that it "can reliably identify any high consequence scenarios that should be included in SOARCA that have a probability of occurrence lower than screening criteria." The staff did not agree to perform Level-3 probabilistic risk assessments for the pilot plants before extending the analyses to other plants. Such integrated evaluation (which, contrary to the staff's belief, does not need consideration of meteor strikes!) adds more credibility to the SOARCA process by removing the need for relying solely on beliefs for intermediate screening and scenario grouping.

Attachments: As Stated

cc w/o attach (via E-mail):
ACRS Members
F. Gillespie
J. Flack
C. Santos
S. Duraiswamy
ACRS Technical Staff