From: Vonna Ordaz
To: Working Group
Date: Fri, Apr 23, 1999 9:47 AM
Subject: **Working Group Technical Basis Outline & More**

Working Group Members,

Attached is the latest outline of our risk-informed technical basis. Please review your areas and provide any comments to me on the outline as soon as possible.

As you know from our Working Group milestones, the **draft writeups for Output #1 are due today**. When you provide your input, please use the same format on the attached outline.

I'm in the process of rescheduling our Working Group meeting next week from Monday to either Tuesday or Thursday since quite a few people are unable to attend on Monday. Please let me know if you have conflicts on either Tuesday or Thursday. I want to make sure everybody is present at the next meeting, if possible, because I plan to go through the outline to check the status of where everybody is in their specific areas, then we are going to have a brainstorming session on the overall criteria that we are developing based on what we know so far.

I appreciate your participation and your continued support!

Vonna

CC: Eric Weiss, Farouk Eltawila, Gary Holahan, Geor...

M/17

Last update: April 23, 1999

Working Group
Technical Basis Outline

I. Introduction (Ordaz/Jackson)

II. Spent Fuel Pool (SFP) Accident Scenarios (SPSB)
  A. Identification of initiating events that could lead to spent fuel uncovery (Including qualitative screening of events that are not risk significant)
    1. Internal events (e.g., LOSP, loss of UHS, loss of CCW/SW, loss of coolant flow, fire, etc.)
    2. External events (e.g., seismic, tornado/high winds, aircraft impact)
    3. Errors of commission (e.g., heavy load drop, maintenance errors leading to draining of pool, etc.)
  B. Identification of available systems for the mitigation of the initiating event (plant configuration, system alignment, backup systems available, etc.)
  C. Identification of potential operator recovery actions (availability of alarms, instrumentation, procedures, staffing, etc.)
  D. Formulation of accident sequences
    1. Success criteria (timing, system flow rates, etc.)
    2. Accident sequence progression using event trees
    3. System modeling and recovery actions using fault trees
  E. Description of the initiating events under Section II.A. (Jackson)

III. Quantification of Accident Frequency
  A. Estimate frequency of initiating events that could lead to spent fuel uncovery (For each event identified, but not qualitatively screen out it item II.A.)
    1. Existing data (e.g., for LOSP) (SPSB)
    2. Literature search (e.g., site specific hazard curves, load drops, aircraft impact, tornados) (SPSB)
    3. Seismic hazard curves for Susquehanna & Pilgrim in III.A.2. (Bagchi)
    4. Fault tree analysis for loss of support system initiating events (SPSB)
    5. HRA for errors of commission (Throm)
  B. Estimate equipment failure probability for active and passive components/systems. Estimate availability of backup systems. (SPSB)
    1. Information from plant walkdowns
    2. AEOD data
    3. Information from literature search
  C. Perform a human reliability analysis to estimate error probabilities for recovery actions.(SPSB)
  D. Quantify fault trees and event trees using best estimate data. Discuss quantification uncertainty in a qualitative sense. (SPSB)

IV. Consequences of SFP accident scenarios
  A. Inventory discussion on reduction of consequences over time (Jackson)
  ✓ B. Evaluation of release fraction due to a zircaloy fire. (Schaperow)
  ✓ C. Evaluation of inventories of each radionuclide. (Schaperow)

D. Dose assessments for time-dependent offsite consequences for a zircaloy fire [based on Millstone 1, and a fire that covers 3 cores of spent fuel]. (Schaperow)
   1. 30 days with offsite EP and without offsite EP
   2. 90 days with offsite EP and without offsite EP
   3. One year with offsite EP and without offsite EP

E. Identification of consequences (e.g., early fatalities, cancer fatalities, total population dose) (Schaperow)

F. Consequences of other SFP accident scenarios (e.g., loss of cooling) (Jackson)

G. Evaluation of existing accident dose assessments to determine if they represent current operating and storage practices and if they are applicable to decommissioned plants. (O'Brien)

V. Overall Risk of SFP accidents at Decommissioned Plants (SPSB)
   A. Risk at 30 days with offsite EP and without offsite EP
   B. Risk at 90 days with offsite EP and without offsite EP
   C. Risk at one year with offsite EP and without offsite EP

VI. Spent Fuel Pool Heatup Analysis Following Loss of Water
   A. Evaluation of the phenomena of a zircaloy fire (Connell/Eaton)
      1. Literature search
         a. NRC documentation on zirc fires
         b. UM library for zirc & similar metal fire data
         c. NIST FIREDOC database for zirc & similar metal fire data
         d. Contact DOE for data & experience w/fuel cladding fires
         e. Contact foreign entities for experience/research w/zirc fires
      2. Evaluation of whether to model the zircaloy fire (e.g., fire/yr) (Connell)
   B. Fuel Failure Criteria (Staudenmeier)
      1. Evaluation of 565 degrees C as an appropriate acceptance criterion for analysis and/or,
      2. Recommendation on an appropriate temperature
   C. Evaluation of existing spent fuel heat up analyses (Jackson/Staudenmeier)
      1. Evaluation of GSI-82, SHARP Code, and NUREG-6451
      2. Determine if they represent current operating and storage practices, and if they are applicable to decommissioned plants
   D. Heatup Calculation Uncertainties and Sensitivities (Staudenmeier)
      1. Evaluation of existing computer codes (e.g., SHARP, etc.)
      2. Determine if they could be used to analyze the heat up of the SFP
   E. Critical Decay Times for Reaching a Zirc Fire (Staudenmeier/Boyd)
      1. Perform a 2 year/4 year decay time simulation of a generic BWR using the Fluent Code
      2. Evaluation of the generic decay times associated with SFP configurations
   F. Evaluation of potential fire protection mitigating controls (e.g., high expansion foam, unattended nozzle, etc.) (Connell/Eaton)

VII. Structural integrity of the SFP structure (Bagchi)

VIII. Potential for criticality (Kopp)

- A. Evaluation of the potential for criticality from accidents
- B. Evaluation of the potential for criticality from personnel actions in response to an accident
- C. Evaluation of the worst case criticality scenario (i.e., no boral)
- D. Evaluation of potential for criticality at older plants

IX. Effects of other Programs (Scott)

- A. Maintenance Rule
    1. Identification of maintenance rule concepts at decommissioned plants
    2. Identification of potential systems, equipment, functions at decommissioned plants (Obtain info. from Kelly's site visits)
    3. Evaluation of what maintenance rule means to decommissioned plant oversight.
- B. Quality Assurance (QA) Programs
    1. Identification of QA concepts at decommissioned plants
    2. Identification of potential QA programs at decommissioned plants
    3. Evaluation of how QA applies to decommissioned plant oversight.

X. Comparison of design considerations for Wet-Basin ISFSIs (Jackson)

- A. Defense-in-depth
- B. Minimum decay time
- C. Design events
- D. Controls

XI. Technical basis for reviewing SFP accidents for exemption requests that can be applied to emergency preparedness, safeguards, and insurance indemnity at decommissioned plants. (ALL)

- A. Identify risk-informed criteria
- B. Recommend any administrative or other controls (i.e., enhanced Tss for level, temperature, etc.), if necessary

XII. Follow up research or other technical support which need to be performed to address any large uncertainties in the available information. (ALL)

- A. NRC work (NRR, NMSS, RES or contractors, such as INEL, PNNL, etc.)
- B. External to the NRC (i.e., NEI, Owner's Groups, etc.)