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Program Review Meeting. NRC staff discussed program status with SNL staff during a series of meetings held at SNL on January 27-30, 2003. On Monday 27 January, Stephanie Bush-Goddard met with the SNL consequence modeling team to discuss consequence modeling issues. On Tuesday and Wednesday, 28 and 29 January, Charles Interrante, Bernie White, Jack Guttman, Stephanie Bush Goddard, and Dave Dancer attended the first meeting of the external review panel for the Source Term Guidance document. On Wednesday afternoon and Thursday 29 and 30 January, Bernie White, Mahendra Shaw, Ron Parkhill, and Robert Shewmaker discussed structural modeling issues with the SNL staff conducting the jetliner impact analyses, and Chris Bajwa and Antonio Dias discussed thermal modeling issues with the SNL staff conducting the jet fuel pool fire analyses. Topics discussed at individual meetings are presented in the topic area summaries presented below.

Jetliner Impact Draft Report. Revision of Section 2 on jetliner impact (e.g., preparation of a summary table of material properties) in response to NRC comments continued.

Discussions of Structural Topics. Before the structural meetings were held, NRC requested that the following topics be covered during their visit on 29 and 30 January:

- A review of the work and a discussion of how we will proceed and expect to wrap it up.
- An explanation of how we planned to finish the work on the first storage and transportation cask. This was to include a brief explanation/review of all the analyses we have done.
- A discussion of the planned approach on the future casks, particularly the NUMOMS.

The discussion on Wednesday afternoon began with an overview of the calculations. This included a presentation by Marlin Kipp and was followed by a discussion. During the discussion of these analyses, it was decided that the influence, if any, of cask tie-downs on cask damage should be examined. Next the general status of the analysis of jetliner impact onto the HI-STORM and NAC-UMS casks was discussed. Bernie White began these discussions by presenting NRC's picture of the state of the analyses and the work needed to complete this task.

The discussion of jetliner impact analyses continued on Thursday. Jeff Smith gave an informal vu-graph presentation that summarized the global jetliner impact and jetliner hard component calculations that had been performed and the calculations that remained to be completed. On Thursday afternoon, SNL plans for the analysis of the NUHOMS-24P, TN-68, and VSC-24 casks were presented by Greg Bessette, and Dave Stevens of ARA described his preliminary ANSY/LS-DYNA work on the NUHOMS cask. During the ensuing discussions, NRC recommended (1) that SNL proceed to 3D analyses of these casks as rapidly as possible, and (2) that if problems modeling concrete with CTH continued, pressure loads predicted by the CTH calculations be used as input for PRONTO damage calculations for concrete storage casks. Following this discussion most of the NRC structural staff went to Kenneth Gwinn's office and reviewed the PRONTO analyses of the HI-STORM storage cask.

Global Jetliner Impact Calculations. A plan for the analysis of the global impact of a jetliner onto the NUHOMS-32P spent fuel storage cask was prepared and discussed with NRC staff. During these discussions, application of the approach to the TN-68 and VSC-24 casks was discussed. Construction of CTH models of the TN-68 and VSC-24 casks continued.

Jetliner Component Impact Calculations. Modeling using PRONTO of the impact of a jetliner engine onto the HI-STORM cask was begun. The calculation of the damage caused by the impact of a jetliner landing gear strut onto the lid of the HI-STORM cask was temporarily placed on hold because of contact and material stretching problems encountered when a model of the MPC was added to the calculation.

Small Plane Survey. No work done this week.

Calculations. No work done this week.

Jet Fuel Pool Fire Calculations. The following pool fire modeling topics were discussed with NRC staff during

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their visit to SNL on 29 and 30 January: CAFE-P/Thermal results for the HI-STORM cask, jet fuel pool fire durations, the thermal-mechanical response of storage cask canisters, and comparison of fire temperatures predicted by VULCAN and CAFE. Review of the SAR for TN-68 cask continued in order to develop the data (dimensions, thermophysical properties etc) needed to model the thermal behavior of this cask using the P/Thermal code.

Calculations. SCAP code input needed to model a sabotage attack that uses a () is being developed.

Fission Product Release. Development of a FORTRAN model of a volumetric heat source, that could be used to model a thermite sabotage scenario, was begun. Once developed, the model will be used by the MELCOR code, to calculate fission product release and transport during sabotage scenarios that involve large thermal loadings on the cask contents.

Consequence Modeling. The SNL consequence modeling team met with Stephanie Bush-Goddard and discussed issues related to the modeling of the radiological consequences that would be caused by RAM package sabotage scenario source terms. The following issues were discussed:

- Modeling the economic costs of radioactive releases
- Updating the MACCS input developed for NUREG-1150 and documented in NUREG/CR-4551, Vol 2, Part 7, Evaluation of Severe Accident Risks: Quantification of Major Input Parameters, MACCS Input
- Developing input data that is package or location specific
- Estimation of near-field ground contamination.

The following agreements or conclusions were reached:

- Consequence calculations for storage site sabotage scenarios will be done using MACCS2; those for transportation cask sabotage scenarios, with RADTRAN. The sabotage scenarios that should be analyzed first were identified.
- The cleanup cost data in SAND96-0957, Site Restoration: Estimates of Attributable Costs from Plutonium-Dispersal Accidents, by Chanin and Murfin would be adjusted by expert judgement and simple hand calculations to account for inflation and for the presence in the release of fission products.
- The SNL consequence modeling team will review the MACCS input data in NUREG/CR-4551, Vol 2, Part 7 that does not depend on the package attacked or the attack location, and will update the input data as seems appropriate.
- Population data for MACCS calculations will be developed by performing POPSEC calculations using 2000 census data.
- Meteorological data will be obtained from two sources: (a) from wind rose for the site or for a near-by facility (e.g., airport) and (b) from the MACCS MET file for the nearest National Weather Service Station.
- Because the sabotage attack may cause radioactive materials to be released to the environment before an emergency evacuation can be carried out, possible emergency response actions will be reviewed to develop MACCS emergency response input.
- Sabotage accident source terms will be developed by other tasks being performed for NRC's RAM Package Vulnerability Study.
- Near-Field ground contamination will be examined, if possible, by a ballistic calculation that examines the gravitational settling of radioactive solids (large particles, chunks) too large to become entrained in fire plumes or blast plumes. Such an analysis will be possible only if an initial velocity distribution (or at least an average initial velocity) and a particle size distribution for the particles and chunks can be developed. It was noted that this task is beyond the scope of the tasks specified in the current program 189 and thus will require formal approval of task initiation by NRC.