Chang, Richard

From: Chang, Richard
Sent: Tuesday, November 16, 2010 7:22 AM
To: Schaperow, Jason
Subject: FW: SOARCA

Jason,

Pat Santiago asked me to take a peek at this...but I believe it is something that you have been working on. Please let me know if it is something different.

Thanks,
Richard

From: Santiago, Patricia
Sent: Monday, November 15, 2010 5:18 PM
To: Chang, Richard
Subject: SOARCA

State-of-the-Art Reactor Consequence Analysis

Background

The U.S. Nuclear Regulatory Commission (NRC) is conducting research to estimate the possible public health and safety consequences in the unlikely event of a commercial nuclear power plant accident releasing radioactive material into the environment. The agency has used accident assessment tools since its creation in the 1970s to help focus attention on the reactor design and operational features that are most important to safety. The State-of-the-Art Reactor Consequence Analysis (SOARCA) takes maximum advantage of hundreds of millions of dollars of national and international reactor safety research and reflects improved plant design, operation, and accident management implemented over the past 25 years. Using computer models and simulation tools, the NRC is developing a set of realistic consequence estimates of very unlikely accidents at an initial set of two U.S. reactor sites representative of different reactor and containment designs used in the United States. This kind of research into accident phenomena, such as core damage and containment performance, has provided the basis for industry procedures to mitigate such accidents.

Approach

SOARCA Plant-Specific Basis

Researchers from the NRC and Sandia National Laboratory are analyzing accident progression and consequences for two reactor and containment designs in use in the United States: a General Electric boiling-water reactor (BWR) with a Mark I containment (Peach Bottom) and a Westinghouse pressurized-water reactor (PWR) with a dry, subatmospheric containment (Surry).

SOARCA Process And Schedule

This study uses state-of-the-art information and calculation tools to develop best estimates of radioactive material released into the environment based on the reactor and containment classes.

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The study assesses those releases to determine best estimates of offsite radiological consequences, including uncertainties in those results.

These new assessments consider areas such as: (1) designspecific reactor accident sequence progression; (2) design-specific containment failure timing, location, and size; (3) site-specific emergency planning assumptions, including evacuation and sheltering; (4) credit for operator actions; and (5) site-specific meteorological conditions and updated population data.

The project uses standardized plant analysis risk models or other available probabilistic risk analyses to determine the sequences and initiating events (internal and external) that should be considered for inclusion in the study. Scenario selection is based on an estimated core damage frequency of greater than 10-6 per reactor-year (one in 1 million) or greater than 10 7 per reactor-year (one in 10 million) for accidents which may bypass containment features. The project also incorporates insights gained from NRC research programs on containment performance and severe accident phenomena. Researchers are using a computer code that models accident progression (MELCOR) to estimate the radioactive material released into the environment for each scenario. Finally, MELCOR Accident Consequence Code System, Version 2 (MACCS2) is a computer code that models offsite consequences. MACCS2 is being used to generate site-specific consequence estimates that account for site-specific weather conditions, population distribution, and emergency planning assumptions.

SOARCA Status

Of the initial scope of no more than eight plants, the NRC staff was able to secure three volunteers: Peach Bottom, Surry, and Sequoyah. (Analysis for Sequoyah began but was then deferred until completion of analyses for Peach Bottom and Surry.) Analyses have now been completed for Peach Bottom and Surry, and an external peer-review of the results has been completed. The NRC plans to initiate an uncertainty study in 2010 and expects to release the results from these two plants in early 2011 for public review and comment. Preliminary results shown in Figure 3.1 demonstrate that current predictions differ dramatically from those of previous studies.

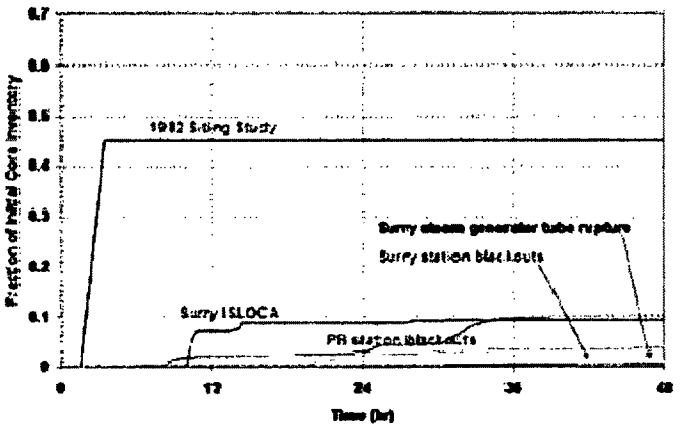

Figure 3.1 Iodine release for unmitigated cases

For More Information

Contact Jonathan Barr, RES/DSA, at 301-251-7538 or Jonathan.Barr@nrc.gov.

Thanks,

Pat

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