



RIC 2012 State-of-the-Art Reactor Consequence Analyses (SOARCA) Results and Conclusions

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Peach Bottom Station Blackout

- Revised analysis in response to peer review and licensee comments
 - SRV failure criterion
 - RCIC blackstart timing
 - Potential for containment bypass via traversing in-core probe (TIP) system
- Extensive sensitivities performed
- Radiological release reduced or roughly equivalent

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Surry ISLOCA

- ISLOCA analysis required complete revision
 - Licensee review identified penetration sealant in a release pathway which had afforded significant deposition
 - Site visit and plant walkdown – January 2011
 - Developed new detailed model of Safeguards Area, Containment Spray Pump Area and Main Steam Valve House
 - Developed detailed ventilation system model
 - Developed low head safety injection piping model
 - Added new models to MELCOR – aerosol deposition in pipes
- Results
 - Core damage begins in 13 hours (previously estimated 9 hours)
 - Iodine and cesium releases of 16% and 2%, respectively (previously estimated 9% for both iodine and cesium)

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Conclusions for SOARCA Pilot Plants (1 of 4)

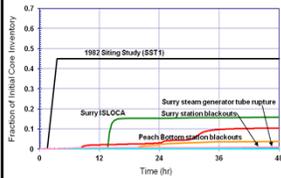
- When operators are successful in using available onsite equipment during the accidents analyzed in SOARCA, they can prevent the reactor from melting, or delay or reduce releases of radioactive material to the environment.
- SOARCA analyses indicate that all modeled accident scenarios, even if operators are unsuccessful in stopping the accident, progress more slowly and release much smaller amounts of radioactive material than calculated in earlier studies.

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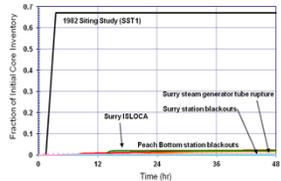


Conclusions for SOARCA Pilot Plants (2 of 4)

Iodine Release (Unmitigated Scenarios)



Cesium Release (Unmitigated Scenarios)



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Conclusions for SOARCA Pilot Plants (3 of 4)

- As a result, public health consequences from severe nuclear power plant accidents modeled in SOARCA are smaller than previously calculated.
- The delayed releases calculated provide more time for emergency response actions such as evacuating or sheltering for affected populations. For the scenarios analyzed, SOARCA shows that emergency response programs, if implemented as planned and practiced, reduce the risk of public health consequences.
- Both mitigated (operator actions are successful) and unmitigated (operator actions are unsuccessful) cases of all modeled severe accident scenarios in SOARCA cause essentially no risk of death during or shortly after the accident.
- SOARCA's calculated longer term cancer fatality risks for the accident scenarios analyzed are millions of times lower than the general U.S. cancer fatality risk.

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Conclusions for SOARCA Pilot Plants (4 of 4)



Note: Comparisons of SOARCA's calculated long-term cancer fatality risks to the NRC Safety Goal and the average annual U.S. cancer fatality risk from all causes are provided to give context. Relative to the safety goal comparison, the safety goal is intended to encompass all accident scenarios. SOARCA does not examine all scenarios typically considered in PRA.

* The 1982 Siting Study did not calculate the risk of long-term cancer deaths. Therefore, to compare the 1982 Siting Study SST1 results to SOARCA's results for risk of long-term cancer death, the SST1 release was put into the MACCS2 code files for Peach Bottom and Surry unmitigated STSBO calculations.

SOARCA Report Appendix on Fukushima

- Review of Fukushima included as appendix to SOARCA draft NUREG-1935
 - Operation of RCIC system
 - 5 hours for SOARCA unmitigated LTSBO; longer at Fukushima
 - Hydrogen release and combustion
 - SOARCA calculates hydrogen release and combustion
 - 48-hour truncation of releases in SOARCA
 - Reactor building flooding; additional offsite resources
 - Multi-unit risk
 - Site Level 3 PRA project
 - Spent fuel pool risk
 - Separate spent fuel pool scoping study
