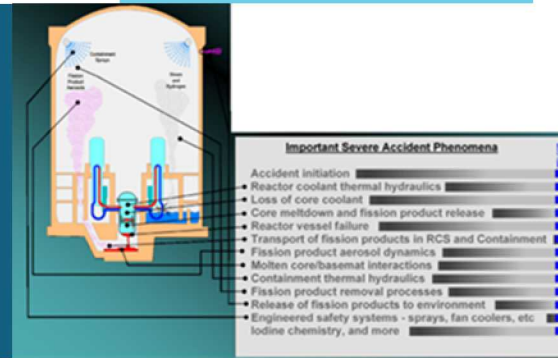


CNWG Collaborative Research – SNL and JAEA – FY19



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DOE NE-52 Advanced Reactor Technologies Fast Reactor Program – Review

December 18, 2019

SAND2019-xxxx PE



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Collaborative Area

- Sodium fire research
- Computer code development exchange
- JAEA staff at Sandia starts to use MELCOR for its sodium fire capability
- Collaborative research continues in FY20

Sodium Fire Research

- 2 expert meetings were held in FY19
 - May 2019 at JAEA
 - Sodium fire research exchange on pool fire model improvement for MELCOR
 - JAEA sodium fire research, including touring the experimental facilities that cover the sodium concrete reaction and aerosol behavior
 - October 2019 at Sandia
 - Research exchange on sodium concrete reaction (SCR) from JAEA and Sandia
 - Experiment research exchange
 - Sandia provided the information on the sodium reaction experiments with limestone concrete
 - JAEA provided their recent experiments (SCR) on siliceous and perlite concretes
 - SCR Modeling approach by Sandia
 - The sodium limestone ablation model (SLAM) created from the SCR experiments will be implemented into MELCOR
 - Sandia has no plan to add any SCR into MELCOR in the near future
 - JAEA is developing a severe accident code that will include many physics models for sodium fire
 - Publish a join final report on the collaborative effort for FY2019

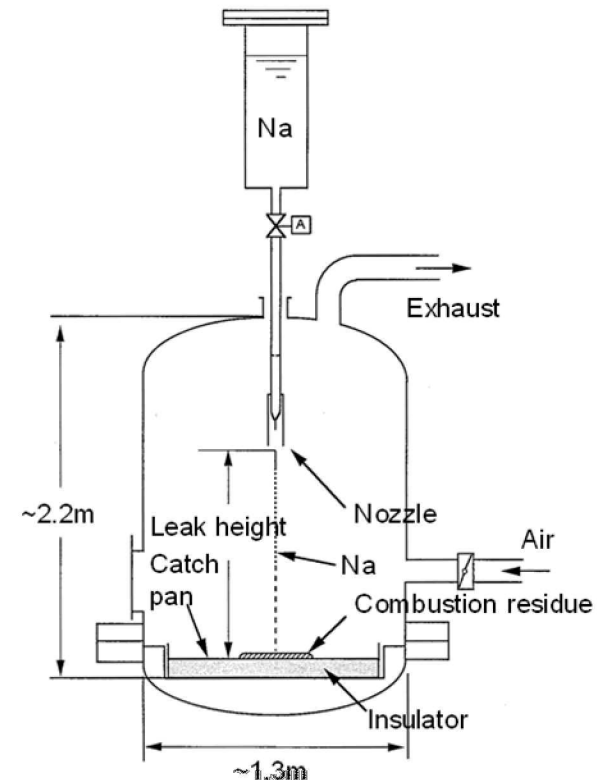
Code-to-Code Comparison Exchange

- Sandia Code – MELCOR, developed for NRC
 - Over 30 years plus in light water reactor severe accident applications
 - Over 1000 licensed users
 - MELCOR capabilities expanded to model advanced reactors
 - Sodium fast reactors
 - High temperature gas reactors
 - Molten salt reactors
 - Heat pipe reactors
 - For this CNWG collaborative work, we only focus on the sodium fire models
- JAEA code – SPHINCS, AQUA-SF
 - SPINCS: lumped parameter codes for sodium fires
 - AQUA-SF: CFD code
 - BISHOP – chemical reactions
 - ABC-INTG – aerosol behavior
 - New integrated severe accident code being developed
- Code models shared between Sandia and JAEA
 - Improve Sandia's and JAEA's code(s)

JAEA Visiting Researcher in FY20

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- Continue to carry out MELCOR simulations for modeling the JAEA's F7-1 pool experiment
 - A better MELCOR input model is being developed to simulate the experiment more accurately
 - Use the better heat transfer model for liquid sodium and catch pan
 - Segment the catch pan heat structure
 - Develop SNAP post-processing display for MELCOR results
- Perform additional MELCOR simulations, such as ABCOVE AB5 (upward spray) and AB1 (pool fire) experiments.
- Share the thermal radiation model in AQUA-SF
 - Sandia will also provide thermal radiation models, such the net closure model, which will better characterize the radiative exchange
- Share fire capabilities of Sandia's SIERRA engineered tool –Fuego (CFD)
- Request to participate and observe upcoming sodium experiments at Sandia for solar power applications.
- Request Sandia to provide risk assessment and dynamic PRA training for SFR applications



Main Collaborative Topic in FY20



- Complete the validation study using MELCOR to model JAEA's F7-1 test
 - Sandia will provide assistance and code improvement
 - JAEA will continue to test and validate existing models in MELCOR for SFRs
- Expand validation basis of MELCOR sodium pool fire model
- Continue participation in expert meetings:
 - May 2020 at JAEA in conjunction with 2020 CNWG meeting
 - October 2020 at Sandia
- Identify future collaborative research area beyond 2020

Acknowledgement

This work is supported by DOE Work Package: AT-19SN02030402