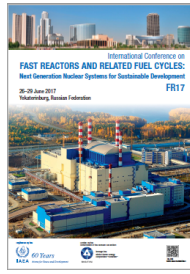


International Conference on Fast Reactors and Related Fuel Cycles: Next Generation Nuclear Systems for Sustainable Development (FR17)



Contribution ID: 102

Type: ORAL

Numerical –experimental research in justification of fire (sodium) safety of sodium cooled fast reactors

Tuesday, June 27, 2017 1:30 PM (20 minutes)

On the basis of the normative documents requirements on fire safety of nuclear power facilities the build concept and the composition of fire protective system in fast reactors premises with sodium equipment are presented. The main purpose of sodium fire safety system is to protect the technological areas of nuclear power plants with sodium cooled fast reactors from hazards of sodium fire. The hazards of sodium fire are: increasing the pressure and temperature of gas environment in emergency rooms, raise of building structures temperatures upon burning of sodium. Another hazard of sodium fire is spreading of sodium aerosols in the premises of the plant which are harmful to human health.

The numerical justification of the sodium fire extinguishing system effectiveness in case of possible accidents with sodium burning in certain areas of fast reactor is performed.

During the formation of the fire safety conception on sodium cooled fast reactors the special attention is focused on the nature of the outflow and sodium burning and on the sodium leakage limitation.

The numerical and experimental researches aimed at the performance possibility and efficiency of system for early detection of leaks and sodium burning based on automatic smoke fire detectors VESDA are performed. The issues of jet outflow and spray burning of the sodium coolant and related problem with increasing of the gas pressure and temperature in the room are considered. In the framework of these issues the results of experimental works for sodium spray burning made by French experts are considered. The results of the analysis and processing of experimental data are presented. The method is developed for the gas pressure raising calculation in the room based on processing of experimental data.

The main experimental results with sodium flow through the defects in the pipeline under the insulation are presented. A possibility is shown for safe localization of the jet outflow and sodium spray burning in the presence of pipelines and equipment insulation and cladding based on this experimental data.

Country/Int. Organization

Russian Federation

Primary author: Mr MYAZDRIKOVA, Olga (Leypunsky Institute for Physics and Power Engineering (IPPE))

Co-authors: Mr KAMAEV, ALEKSEY (Leypunsky Institute for Physics and Power Engineering (IPPE)); Mr DROBISHEV, ANATOLIY (Leypunsky Institute for Physics and Power Engineering (IPPE)); Mr PAKHOMOV, ILYA (Leypunsky Institute for Physics and Power Engineering (IPPE)); Mr KOCHETKOV, LEONID (Leypunsky Institute for Physics and Power Engineering (IPPE)); Ms MARTIANOVA, NATALIYA (Leypunsky Institute for Physics and Power Engineering (IPPE))

Presenter: Mr MYAZDRIKOVA, Olga (Leypunsky Institute for Physics and Power Engineering (IPPE))

Session Classification: 3.4 Sodium leak/fire and other safety issues

Track Classification: Track 3. Fast Reactor Safety