E U R O S A F E

Towards Convergence of
Technical Nuclear Safety Practices in Europe

Improvement safety of Russian WWER in post Fukushima period

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One of post-Fukushima conclusions is «Severe accident prevention shall be ensured as far as possible and reasonable, however the readiness for mitigation of severe accident, if it occurs (in spite of low probability) should be also provided. The most important shortcoming and the general directions for safety improvement in this field for WWER

Many safety problems were widely discussed in a post Fukushima period and were overcame in Russia after Chernobyl

- Federal laws establish main responsibilities. State licensing system covers all aspects of NPP safety. Regulatory requirements are periodically reviewed, taking into account the approaches adopted by the international community;
- Fundamental safety principles (DID, safety culture operator responsibility) were implemented in the regulatory documents;
- National, multilevel system of the emergency response was developed, implemented and supported at the ready state;
- Investigation in SA area was started (RASPLAV, MASKA).

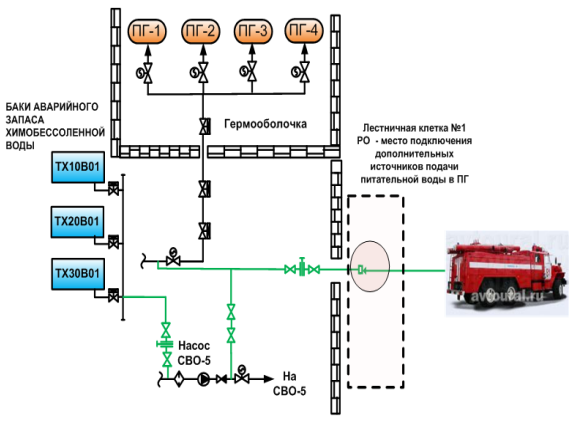
Main shortcomings from post Fukushima study:

Design (additional technical means should be foreseen to cope with long blackout accident and to cope with severe core damage, if occurred);

Investigations (additional severe accident analyses are necessary as a basis for SAMGs development);

Emergency preparedness (SAMGs are not implemented at all operated NPPs, harmonization of the existent procedures is desirable);

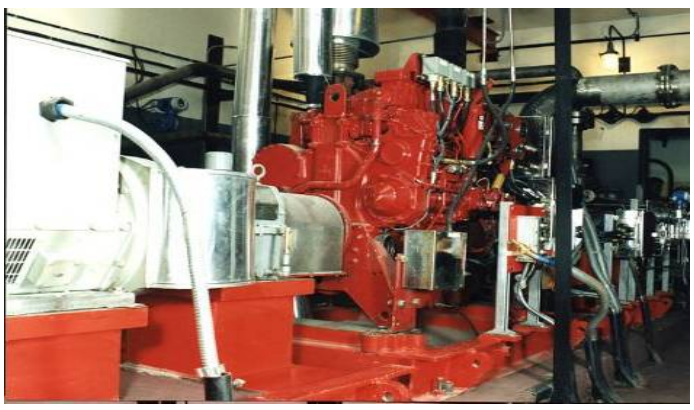
Regulatory requirements (additional requirements related to AM and special technical means).



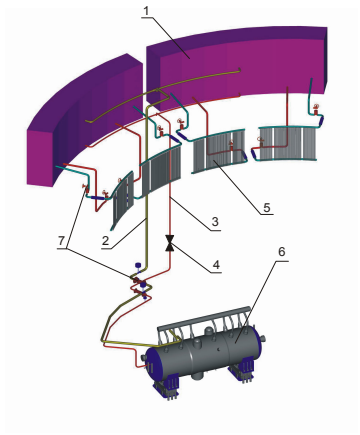
Water supply to SGs from the external sources (fire fighting vehicles, motor pumps)

Design (operated units)

- mobile AC power supply systems have already been installed at all operated NPPs;
- alternative connection to the external water and energy sources;
- diverse cooling of the DG;
- enlarge capacity of the DC sources;
- development and implementation of filtered containment system;
- implementation of passive recombiners at all NNps;
- modernization of I&C system.



Diesel-driven pump of the system for emergency feedwater supply to steam generators at Kola NPP



Passive heat removal system from SG

Design (new generation - AES-2006, WWER-TOI)

External impacts

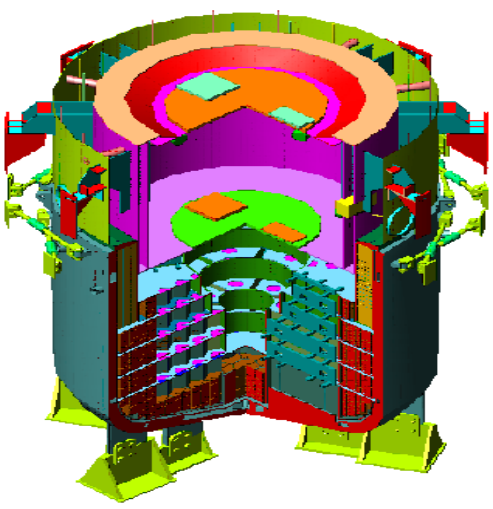
- Earthquake, MSK-64 magnitude- 8, ground acceleration 0.25 m/s2;
- Plane crash (20 t, 215m/s, (DBA); 400t, 150 m/s (BDBA));
- Shock wave,30 KPa, 1 s maximum velocity of wind, 56 m/s.

Safety systems

- Optimal combination of active and passive safety systems (it provides stable core cooling at least for 72 hours in case of loss of all sources of AC).

Severe accident management

- Implementation of ex-vessel melt retention.



Core catcher

Investigations	Emergency preparedness	Improvement of regulatory documents
• Performance of a systematic BDBA (SA) analyses;	• Optimisation the frequency of exercises and drills;	Design • Additional requirements for classification of special technical means for BDBA management; • Additional requirements related to design of the localization systems are foreseen concerning controlled relief from the containment;
• SAMGs development for all operated power units;	• Ensuring the coordination between on-site and off-site activity during the emergencies;	
• Harmonization of all emergency procedures and guidelines;	• Providing the operators with the auxiliary personal protektion equipment;	Development of Guidelines on: • accident analysis; • SAMGs.
• Performance of Level 2 PSA for all operated power units	• Development and implementation of severe accident model at full scale simulator.	

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