Safety Challenges for New Russian NPPs

Dmitrii Sviridov
Head of Laboratory,
NPP Safety Division

Vienna, June 22-25, 2015
Evolvement of NPPs

- New technologies
- New results of scientific researches
- Operational experience feedback (including the analysis of NPP abnormal operational occurrences)
- New understanding of safety issues

Response to challenges

- Protection of public interests

Regulatory body
Legal and regulatory framework for conduct of safety review

- ✔ Statute of Rostechnadzor
- ✔ Provision on Licensing of Activities in the Field of Atomic Energy Use
- ✔ Administrative Regulations on Licensing of Activities in the Field of Atomic Energy Use
Safety reviews for new NPPs

✅ Commissioning

- Beloyarsk NPP-4 (BN-800)
- Rostov NPP-3 (VVER-1000)

✅ Construction

- NVNPP-2 (AES-2006, Moscow design)
- LNPP-2 (AES-2006, St. Petersburg design)

✅ Basic Design of NPP

- VVER-TOI
AES-2006 design – evolvement of VVER units
Distinguishing aspects (insufficient reference)

- Safety systems’ design concept
  - Double-train structure of active safety systems, backed up by passive systems

- New design solutions for safety systems
  - Passive heat removal systems
  - Passive core flooding system
  - Ejector-pump unit
  - Core catcher
  - Programmable hardware I&C systems important to safety
Review results revealed the necessity to update the design

- Emergency make-up system for the primary circuit and spent fuel pool

Initial lay-out

Updated lay-out

Check valves were introduced

Place of the leak

Dependent failure

Single failure – DG failure
Supplementary calculated experimental activities

- General view of one of the experimental facilities

- The experimental test bench developed by the Licensee to verify the flowrate and service life characteristics of the ejector-pump unit
Review results revealed the necessity to get insight into the design.

Automated process control system (I&C system)
Recommendations on safety review of new NPPs

- Focus the review on those design solutions that lack sufficient reference;

- Pay attention to those new design solutions, which significantly impact NPP safety, integrity of physical barriers and protective measures for such barriers;

- Start safety review of new NPPs with the analysis of the sufficiency of the existing regulatory requirements.
Thank you for attention!