YALINA-features

Answering ECATS-questionnaire:

1. Qualification of sub-criticality monitoring,

2. Validation of generic dynamic behaviour of an ADS in a wide range of sub-critical levels, sub-criticality safety margins and thermal feedback effects,

3. Validation of the core power/beam current relationship,

4. Start-up and shut-down procedures, Instrumentation validation and specific dedicated experimentation,

5. Interpretation and validation of experimental data, Benchmarking and code validation activities etc

6. Qualification of the proton beam reliability and the beam transport line, Pb-Bi or Pb-spallation target design in association with relevant proton beam and the effects of spallation residues including that of polonium,

7. Safety and licensing issues of different component parts as well as that of the inte-grated system as a whole,

Answers:

1. In the steady state of the facility operation the subcriticality monitoring is provided by periodic measurement of k_{ef} by means of different techniques. During nuclear fuel loading process the subcriticality monitoring is provided by means of Reciprocal Counting Method and Source Jerk Method after the next portion of fissionable material is loaded.
2. The estimated value of reactivity effect caused by core heating from 20 to 200°C is about Δk=-1.4%. The theoretical simulation of an accident caused by interference of different events including human errors, equipment failures and complete flooding of the assembly by water have shown that hazardous situation is impossible due to the presence of inherent safety mechanisms envisaged.
3. By the reason of ambiguity of relation of neutron yield from neutron-producing target with ion current of neutron generator (target non-uniformity, it's irregular "burn up" and ^{3}H losses from the target surface by thermal stress) it is presumed to make the channel for monitoring of 14 MeV neutrons yield directly from the target. In this

case the relation of neutron yield from the target with assembly power will be defined by multiplying properties of the assembly (by the level of subcriticality). The relation of power of the assembly driven by neutron generator with accelerated deuterons current is ambiguous by nature.

4. Start up preparation procedure will take about 90 min. Shutdown and recurring start up with attaining necessary operation conditions will take a few minutes. For the measurement of subcritical assembly kinetic parameters the time analyzer TURBO MCS® of ORTEC, preamplifiers of CANBERRA firm for passive and active methods of investigations (with quick recovery after overload), multipurpose fast-acting amplifier&discriminator of 7820 type of CANBERRA firm with current mode of neutron detectors switching on (for the measurements of fast running processes in highly intensive neutron fields under the disturbing external conditions), small size fission chambers with ^{235}U, ^{238}U, ^{232}Th, small size detectors on the basis of ^{3}He and ^{10}B high performance neutron detectors on the basis of ^{3}He and ^{235}U.

   For the in-core measurements the same detectors are used coupled with neutronics instrumentation and neutron flux control system.
5. The analysis of the sequence of the experimental data will be performed with application of MCNP code and different neutron data libraries (JENDL, ENDFB etc.). The comparison of experimental and calculated results will be performed. Some benchmarking/validation activities have been already performed (e.g. blind test on number of fuel elements to reach certain level of subcriticality) under IAEA umbrella and there are many options to continue those activities.
6. N/A
7. The state authority license (Belarus) was issued. There is a license of the reviewing authorities for the facility maintenance. It is not clear that any experinces from this process are “transferable” to other countries.