

EXECUTIVE SUMMARY

Upon the invitation of Kozloduy Nuclear Power Plant (NPP), a peer review mission on safe long term operation (Pre-SALTO) was conducted to review programmes/ activities of the plant.

The Kozloduy NPP is the only operating NPP in the Republic of Bulgaria located in the northwest part of the country in proximity to the town of Kozloduy.

6 units have been constructed on the site of Kozloduy NPP with Russian design pressurized water reactors (PWR) with a total electric power output of 3760 MW.

The construction and commissioning of the nuclear units was conducted in three stages:

Stage I: 1970 – 1975. Construction and commissioning of Units 1 and 2 with WWER-440 reactors, B-230 model.

Stage II: 1973 – 1982. Construction and commissioning of Units 3 and 4 with WWER-440 reactors, improved B-230 model.

Stage III: 1980 – 1991. Construction and commissioning of Units 5 and 6 with WWER-1000 reactors, B-320 model.

Kozloduy NPP ceased operation of the first four units before the expiration of their design lifetime to fulfill commitments of Bulgaria related to the European Union accession. Units 1-4, which are in the course of decommissioning, have been transferred for management to the State Enterprise Radioactive Waste (SERAW).

Units 5 and 6, which are in commercial operation, are operated by Kozloduy NPP Plc., a company 100% owned by the Bulgarian state. Currently, Kozloduy NPP Plc. is a subsidiary of the Bulgarian Energy Holding Plc. (BEH EAD).

This Pre-SALTO mission reviewed the status of plant activities for the safe long term operation (LTO) assessment of Unit 5 (further referred to as “the plant”). A preparatory meeting was held in November 2015. The scope of the Pre-SALTO mission was agreed and defined in the Terms of Reference (ToR) issued in November 2015. The ToR also outlined the review team comprising two IAEA staff members, five external experts and four observers covering Areas A to E of the standard scope of a Pre-SALTO mission.

The mission reviewed completed, in-progress and planned plant activities related to LTO, including activities involving the ageing management (AM) of systems, structures and components (SSCs) important to safety and revalidation of time limited ageing analyses (TLAAs).

Through the review of available documents, including the Advance Information Package, plant documents, contractors` documents, presentations and discussions with counterparts as well as with other members of the plant staff, the IAEA team concluded that the plant has worked extensively in the field of LTO and ageing management. The LTO project covers many of the topics recommended by the Agency. A lot of sound technical work has already been performed by the plant staff and contractors to demonstrate preparedness for safe LTO. Nevertheless, the team concluded that it would be beneficial for the plant to have better

overall control of LTO deliverables by defining precise objectives, approach and methodologies for each LTO activity.

Walk-downs showed that the plant is in good condition. The team recognized successful implementation of a large-scale modernization programme which is based on the IAEA document on the safety issues and their ranking for WWER-1000 Model 320 Nuclear Power Plants (IAEA- EBP-WWER-05, 1996). The completion of the programme is an important basis for the plant LTO and provides for the compliance of the plant design with contemporary requirements to safety.

The team has found the plant staff professional, open and very receptive to suggestions for improvement. The Pre-SALTO team concluded that plant management is committed to improving plant preparedness for LTO. In addition, the team noticed the following good practice:

- Comprehensive vibration monitoring of rotating equipment.

Taking into account the above mentioned points, the team recognised that the plant approach and preparatory work for safe LTO generally follows the IAEA Safety Standards and international practices.

However, the team identified some fundamental areas for further improvement. Eleven issues were raised:

- The plant documents developed to provide requirements and guidance on AM and LTO are not comprehensive;
- The methodology for scoping and screening is not appropriately defined and documented and a part of the safety relevant SCs is screened out of the LTO assessment without clearly documented criteria;
- A proactive obsolescence programme is not in place;
- Plant programmes relevant to ageing management and LTO, i.e. maintenance, in service inspection (ISI) and surveillance are not adequately coordinated with ageing management and LTO;
- Scoping and screening for LTO, ageing management review (AMR) and ageing management programmes (AMPs) for mechanical SSCs are not comprehensively implemented;
- The ageing management review and ageing management programmes for mechanical SSCs are not comprehensive;
- The plant has not completed identification and revalidation of TLAs for mechanical SSCs in the LTO scope;
- Screening out of newly installed electric and I&C components from the scope for LTO evaluations, with respect to time of installation only, does not assure appropriate scope of SSCs for LTO evaluation;
- Validity of environmental qualification of some equipment is not adequately controlled;
- The existing list of degradation mechanisms and ageing effects for AMR and AMP for civil structures and components is not complete;

- Some routine inspections of civil structures and components are being carried out without comparison of the observed structural behaviour with its predicted design behaviour at the time of inspection (acceptance criteria).

A summary of the review was presented to plant management during the exit meeting held on 3 August 2016. The plant management expressed a determination to address the areas identified for improvement, and indicated the intention to invite a “Pre-SALTO peer review mission” for Unit 6 in June or September 2018 to continue in the review of the plant preparation for LTO.

Appendix III of this report includes the team’s detailed recommendations and suggestions arising from this mission.