

## EXECUTIVE SUMMARY

Upon the invitation of Ringhals AB, Sweden, a peer review mission on safe long term operation (SALTO) was provided to review programmes/ activities of Ringhals nuclear power plant units 1 and 2 (further referred as “the plant”).

Unit 1 is an Asea-Atom designed boiling-water reactor (BWR) put into commercial operation in 1976 while unit 2 is a Westinghouse designed pressurized-water reactor (PWR) put into commercial operation in 1975.

The design lifetime of both plants is 40 years. Swedish nuclear power plants operating licenses have no time limits; however a periodic safety review (PSR) shall be conducted every 10 years. Both plants are aiming for 50 years of operation as a current target lifetime.

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

Through the review of information obtained from available documents, programmes, presentations, and discussions with counterparts and other members of the plant staff, the IAEA team found that the plant has initiated activities for LTO preparation. This was done rather late to enter the LTO period with all tasks fulfilled. Based upon the observations of this SALTO review, the team concluded that the plant has yet to complete a significant part of the activities important for safe LTO.

The SALTO team concluded that plant management is committed to improving plant preparedness for LTO. In addition, the team noticed the following good practices:

- Expert system for in-service inspection management;
- Specialist Programme.

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.

The team identified areas for further improvement. Sixteen issues were raised:

- There is no complete and consistent set of requirements related to LTO;
- The roles and responsibilities, organization and interfaces concerning the preparation and implementation of the LTO project are not appropriately defined;
- The methodology for scoping and screening is not appropriately defined and part of the safety relevant SC`s scope is screened out of the LTO assessment;
- There is a lack of expectations/ agreements with all information holders relevant to performing the LTO assessment;
- The existing methodology, schedule and available resources do not assure timely implementation of the LTO programme;
- The LTO approach is not consistent for all mechanical components;

- The existing plant documentation does not fully cover all attributes of effective AMP and the effective conversion of the existing SUPs and DOSs into AMR reports is not properly described;
- There is no fully implemented proactive obsolescence management programme in place;
- Existing practices in maintaining some electrical and I&C equipment do not assure its qualification and functionality during the period of LTO;
- The practice of storing equipment and furniture in close proximity to electrical and I&C safety equipment is inconsistent with the LTO preconditions and may jeopardize operability during and after a seismic event;
- The process for incorporating external operating experience consideration for LTO is not effective;
- There are several lists of SCs relevant for LTO which are not coordinated;
- The plant has not demonstrated that assessment of the unit 1 grouted containment tendons operability is valid for the period of LTO;
- Tendon surveillance programme has not demonstrated that the unit 2 containment prestressing tendons can maintain their design function during LTO;
- The plant has not demonstrated that the unit 2 spent fuel pool can maintain its structural integrity during LTO;
- Various human resource (HR), competence (CM) and knowledge management (KM) processes and procedures for LTO are not consistently implemented.

A summary of the review was presented to the plant management during the exit meeting held on 13 March 2014. The plant management expressed a determination to address the areas identified for improvement, and indicated the intention to invite a “SALTO peer review mission” in 2016 to continue the review of the plant preparation for LTO. This mission will also review progress in solving issues raised during this mission.

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

## FOLLOW-UP MISSION

Due to changes in a company strategy for operation of Ringhals units and adjusted implementation schedule for LTO activities, it was agreed between the IAEA and the plant to postpone a SALTO mission to Q1 2018 and organize a SALTO follow-up mission in February 2016 instead of originally planned SALTO mission. A SALTO mission in Q1 2018 will focus on Ringhals unit 3 as it was decided to shut down unit 1 and 2 in 2020 and 2019 respectively.

A follow-up mission was organized from 16 to 19 February 2016 and the team consisted of one IAEA staff member, three external experts and one observer. Participating experts from France, USA and Switzerland were members of the original SALTO team in 2014. One observer from Germany was also actively contributing member of the follow-up team. The SALTO follow-up report is the original report from the main SALTO mission supplemented with the “counterpart actions” and “follow-up assessment by the IAEA review team”. The

“counterpart actions” provided in issue sheets` section 4 are reviewed by the follow-up IAEA review team prior to the follow-up mission and confirmed in the field during the visit. “Follow-up Assessment by the IAEA Review Team” is then added in light of the follow-up mission into issue sheets` section 5. The IAEA conclusion is produced in issue sheets` section “Resolution Degree”. “Status at follow-up SALTO mission” is prepared by the IAEA team for each review area. This resulting document is therefore an overall report of both the original mission and the follow-up mission.

During the Pre-SALTO peer review mission in 2014, sixteen issues were defined in six reviewed areas. The follow-up team reviewed the progress in issues solving separately for each of these issues separately.

The team has concluded that the plant has progressed in solution of majority of issues but significant efforts should be still devoted to complete resolution of most of the issues. The resolution degree was determined by the team for each issue sheet separately with results as follows:

- 3 issue - insufficient progress to date;
- 11 issues - satisfactory progress to date;
- 2 issues - issue resolved.

The detailed evaluation of plant actions is provided in Appendix III of this report in a section 5 of each individual issue sheet. Additional evaluation is provided for each review area in a “Status at follow-up SALTO mission” subsection of each review area.