OSART Good Practices
LONG TERM OPERATION
Organization and functions

Paks, Hungary

Mission Date; 27 Oct.-13 Nov., 2014

Strong safe Long Term Operation programme.

The preparation of the Safe Long Term Operation programme at Paks NPP is carried out with strong support of the operational staff and with extensive use of best international practices, international peer reviews and IAEA standards.

The operational license of the four VVER-440/213 units at the Paks NPP, Hungary is limited to the design lifetime of 30 years. Extension by an additional 20 years of the original license is one of the challenging goals for the plant. In 2011, the HAEA issued the extended license for Unit 1 and the plant expects to receive the new license of the Unit 2 by the end of this year. By 2017 all the rest LRA are to be developed and submitted for approval to the HAEA.

During many LTO specific peer review missions the plant demonstrated its commitment to the safe long term operation. Each important stage of preparation has undergone an international peer review. These peer reviews were focused on the compliance with the IAEA Safety Standards for LTO:
- Review of the aging management activities of the plant including the applied Aging Management Programmes (AMPs), review the Time Limited Aging Analyses (TLAAs) including revalidation of the TLAAs for the term of license.
- Implementation of results of IAEA IGALL Extrabudgetary programme, with participation of more than 120 experts from more than 20 Countries.
- Ability of the recognition of the previously not experienced aging mechanisms;

The preparation for LTO was a complex activity for the plant staff, which required coordination between the appointed line organizations, e.g. operational, technical support, maintenance and safety departments. Among these departments, special responsibility was carried by the operational staff.

All the works relative to the development of the licensing documentation (LRA) and the necessary replacements and upgrading were conducted during the full-power operation, therefore the above-described plant activities did not result in longer outage periods.

Bruce B, Canada

Mission Date; 30 Nov.-17 Dec., 2015

Preparation for Major Component Replacement (MCR)

Learning from the refurbishment of units 1 and 2, the plant has adopted a fundamentally different approach to extending the safe operational life of the remaining six units on the Bruce Power site. The plant has developed an effective overall technical strategy and associated long term plan that includes proactive measures to manage reactor safety, generation and business risk. The approach is fully integrated into the existing plant processes and organizational structure.

The most reactor safety significant components (fuel channels, feeders and steam generators) form the backbone of planned MCR outages. The remaining components required for LTO will be managed, by online work programmes and maintenance outages, executed before and after the MCR outages. Some targeted LTO work will be executed in the MCR outages and executed in discrete maintenance windows focused on combining safety significant work programmes with reactor components to optimize scope completion between lead-in and lead-out activities. The plan has been developed well in advance of the first MCR, allowing the plant to critically challenge and enhance overall integration shutdown safety and outage safety assessment group reports including reactor safety risk profiles.

This approach to LTO has been integrated into the structure of the commercial Refurbishment Agreement signed with the System Operator, ensuring that the experienced staff, the schedule and the financial resources to execute the Plan have been secured for the projected LTO timeframe. The resulting long term Asset Management Plan will provide safe, reliable LTO in consideration of nuclear safety and in alignment with business goals.

Pickering, Canada

Mission Date; 19 Sep. -6 Oct, 2016

Obsolescence management taking into consideration the long term aging management assessments and transition to decommissioning requirements.

The plant is simultaneously planning for both an extension of operation for a number of years and for the stabilization and safe storage project that will follow. To facilitate the extended operations, integrated aging management scoping and screening are being updated and revised Condition Assessments (CAs) are being completed to determine any actions required to enable the plant to safely operate until its new shutdown date. A portion of the plant's Systems, Structures and Components (SSCs) will also be required to perform for several years after the shutdown date. For example, items supporting the irradiated fuel bays will have to operate at least 10 years after shutdown, while some other SSCs may be needed even longer. As a result, the plant's long term operations team (LTO) has developed a system transition boundary report which documents the required lifespan of the various systems of the plant. It includes input from the decommissioning/safe storage team, to ensure it reflects the post-shutdown requirements, that are being documented in system end state determination reports.

The plant's obsolescence management program is supporting the long term operation plans and the transition to decommissioning. This obsolescence team consists of 9 individuals dedicated to identification and resolution of obsolescence issues. These individuals implement obsolescence solutions by providing both procurement and design engineering support. This arrangement allows the plant to have a more focused and consistent approach and reduce the number of hand offs between various engineering work groups. This arrangement allows the team to look at wider application strategically to select the most cost effective solution. The co-operation between these groups with different mandates enables the preparation of Cas which considers full component life span needs. All this leads to improved safety when approaching the transition to final decommissioning.

Torness, UK

Mission Date; 22 Jan. - 8 feb, 2018

Torness NPS uses an integrated asset management system to manage and trend station risk and station investment.

Risk Management
The Risk Management System (Nuclear Generation Risk Log - NGRL) is used to monitor and control station risk. The system assigns a risk value based on the annualised probability of a risk occurrence multiplied by the impact of the risk should it occur. It monitors Nuclear Safety, Industrial Safety and Generation risks and ranks them to allow prioritisation and focus. Mitigations are then raised to reduce either the probability or the impact of the risk and these are monitored and driven over time to ensure risk reduction. This integrates with the investment management system and asset management.

Investment Management System (IMS)
The investment management system uses risk and mitigation information from NGRL and aligns this with a request for funding. The risk information is used to prioritise which station to invest in on a risk informed basis. IMS is then used to manage the investment until it is completed with the benefits being reflected back into the risk log.

During 2017 the station planned and executed work that reduced the stations lifetime risk by approximately £200M. In real terms, this related to avoidance of future output loss by planned work to mitigate identified safety and lifetime threats. An example is the gas circulator lifetime research project. This work cost £2.5M and justified through physical testing the suitability of the gas circulator windings for an extended life. This avoided early shutdown of Torness and Heysham 2 and hence delivered over £80M of risk/future output loss.

The Integrated Management system brings considerable benefits to the stations LTO programme. It has allowed for lifetime threats to be identified and mitigations/investments to be planned until end of life, rather than just the usual 5 year planning cycle. The station can predict investment requirements up to its current expected lifetime.