EXECUTIVE SUMMARY

Upon the invitation of the State Office for Nuclear Safety in Czech Republic, a peer review mission on safe long term operation (SALTO) was provided to review programmes/activities of Dukovany Nuclear Power Plant (NPP).

The Dukovany NPP (hereinafter the plant) is the first nuclear power station operated in the Czech Republic, and belongs to the largest, highly reliable and economically profitable power resources of ČEZ, a. s. Four pressurized-water reactors (PWR) are installed in the Dukovany NPP. Design marking of these reactors is WWER 440/213. Each of these reactors has the heat capacity of 1375 MW and electric capacity of 440 MW. Annual production of electric energy is 13 TWhr, approximately, this represents about 20 % of the total consumption of the electricity in the Czech Republic.

In 2015, the Unit 1 of Dukovany NPP reaches the end of its design lifetime. Renewal of the permission for further operation of the plant will be connected not only with the certificate of ability of the nuclear power plant to maintain the required safety level in the future, but also with documentation of the method of monitoring and corrections (mitigation) of equipment ageing effects on the safety of the nuclear power plant and with setting-up all relevant programmes so that the ageing effects are effectively managed over the entire period of the anticipated operation of the nuclear power plant.

The plant conducted a technical and economical study for long term operation to investigate feasibility of long term operation The study was finished in 2006. The plant is now performing an engineering study for SALTO and establishing ageing management programmes (AMPs) for SSCs important to safety and a plant life management programme (PLIMP).

The mission reviewed activities performed by the plant related to SALTO and ageing management of systems, structures and components (SSCs) important to safety.

The IAEA team found that comprehensive plans are being prepared and extensive engineering work has been launched to review ageing degradations and implement ageing management programmes. In addition, the team noticed good practices and good performances in areas such as follows:

- Corrective measures based of Safety Issues defined by the IAEA for the WWER 440;
- On going cable ageing management programme;
- The analysis using the database on I&C reliability recording;
- The INFOZ database;
- Seismic re-qualification for piping and components;
- Design fatigue analyses, its update and the tool DIALIFE;
- Fatigue monitoring;
- Data management tool for erosion corrosion;
- Post annealing re-embrittlement evaluation.

Taking into account of the above mentioned points, the team recognized that the plant approaches and initial preparation work for safe long term operation are in line with international practices.

Nevertheless the team also noticed that actual plant activities were in the initial phase. The team suggested to the plant management to facilitate early implementation of related activities. In addition, the team raised some areas which are to be improved or have a room for further improvement and raised 19 issues including:

- Plant/company policy documents;

- Selection of SSCs for LTO;
- Equipment Qualification;
- Ageing Management of Electrical Equipment;
- Proactive management of degradation;
- Data bases for maintenance and RPV ageing management;
- Time limited ageing analysis including environmentally assisted fatigue;
- Safety analyses in FSAR and PSR;
- Ageing management for thermal fatigue; and
- Erosion corrosion of welds.

The summary conclusion of the review was presented to the Dukovany NPP plant management during the exit meeting held on 25 April 2008.

This report includes the detailed recommendations issued by the Team.

FOLLOW-UP MISSION

Follow-up visit took place during 8 – 10 November 2011 and the Follow-up team consisted of one IAEA staff member and two external experts. The participating expert from Sweden was member of the original SALTO team and also one expert from Belgium was taking part in the visit. The follow up visit was organized in accordance with results of the main SALTO mission and under IAEA TC Programme CZR/0/006 The SALTO Follow-up report is the original report from the main mission maintained where plant is requested to prepare self-assessment regarding recommendations and suggestions of each issue. This is reviewed by the Follow-up team prior to the Follow-up visit and confirmed in the field during the visit. "IAEA comments" are then added in light of the Follow-up visit and an IAEA conclusion is produced according to the relevant conclusion definitions. This resulting document is therefore an overall report of both the original mission and the Follow-up visit.

The policy documents for LTO and PLIM have been authorized at company level and have been used in following work in this area.

The plant has developed draft of an internal document reflecting the recommendations given and based on the LTO strategy status in 2009. However, the issue in this area is still not solved completely as the decision has been taken to the plant strategy for LTO to be partially based on the implementation of EPRI AP-913 methodology. This is changing the original conditions of PLIM–LTO activities as there were discussed during the main mission in 2008.

As a consequence of the original SALTO mission, the plant adapted the format of the protocol forms to bring all essential information together e.g. the test data for extension from 30 to 40 years.

However, the team still suggests to reevaluate the application of this methodology for the electrolytic capacitors. For the long term it cannot be excluded that a lifetime limit suggested by the supplier will be reached. Even monitoring the failure rate is not preventing a potential guaranteed "end of life".

International experience demonstrates a maximum lifetime for this type of components is reality and this should be taken into account, even if it is not a threat at the short term.

The decision has been taken to establish an appropriate approach to PLIM and aging management of SSC, based on information from aging management review (AMR), the required level of safety and to document the chosen approach. Currently, for equipment category 2, the work has been stopped temporarily as the decision has been taken on AP-913 implementation. For equipment category 1, a programme exists but AP-913 will probably impact the final solution. As a consequence of this, a necessity to solve the original issue still exists. Nowadays, the solution should be a part of new overall strategy of PLIM and reliability centered maintenance concept, based on AP-913.

The plant has decided recently to launch a project for implementation AP-913. This initiative has been taken to improve the reliability of the plant. This approach is based on trending and monitoring performance while LTO assessment takes, as a starting point, a reflection on all potential failure mechanisms. This should be thoroughly evaluated in connection to the AP-913 methodology implementation having in mind experience in such approach worldwide (besides the existing maintenance rule application, an independent LTO process exists).

In the area of TLAA, a project „Revalidation of TLAA“ has been prepared and is approved including initiation of contracts on external support of revalidation. The revalidation plan is approved and continuously monitored with the target date of revalidation intended for 2015. The plant complex approach has been based on carefully performed analyses of all available data and information relevant to assessment of the scope of equipment and its impact on safety. Other measures taken in this area successfully covered and solved the issues presented in the main SALTO mission report.

A report on the conceptual design of the Surface Temperature Measurement Program Evaluation of the surface temperature measurement on 1 and 2 Units has been prepared. It has been taken as the basis for implementation of the Surface Temperature Measurement Program. The work is ongoing with an originally expected completion date of November 2011. However, remaining part in relocation of thermal sensors is to be finalized before 2015. The data are already regularly evaluated by the Institute of Applied Mechanic and results are used for assessment of the plant status concerning thermal fatigue loads.