IAEA-SALTO-OSS
Original: English
Distribution:

INTERNATIONAL ATOMIC ENERGY AGENCY

REPORT

PEER REVIEW SERVICE ON SAFE LONG TERM OPERATION (SALTO PEER REVIEW SERVICE)

"PEER REVIEW MISSION FOR BORSSELE NUCLEAR POWER PLANT IN THE NETHERLANDS"

(FULL SCOPE)

Borssele, the Netherlands
2 – 11 May 2012

"SAFE LONG TERM OPERATION REVIEW SERVICES (SALTO)"

DEPARTMENT OF NUCLEAR SAFETY
AND SECURITY
Division of Nuclear Installation Safety

REPORT

PEER REVIEW SERVICE ON SAFE LONG TERM OPERATION (SALTO)

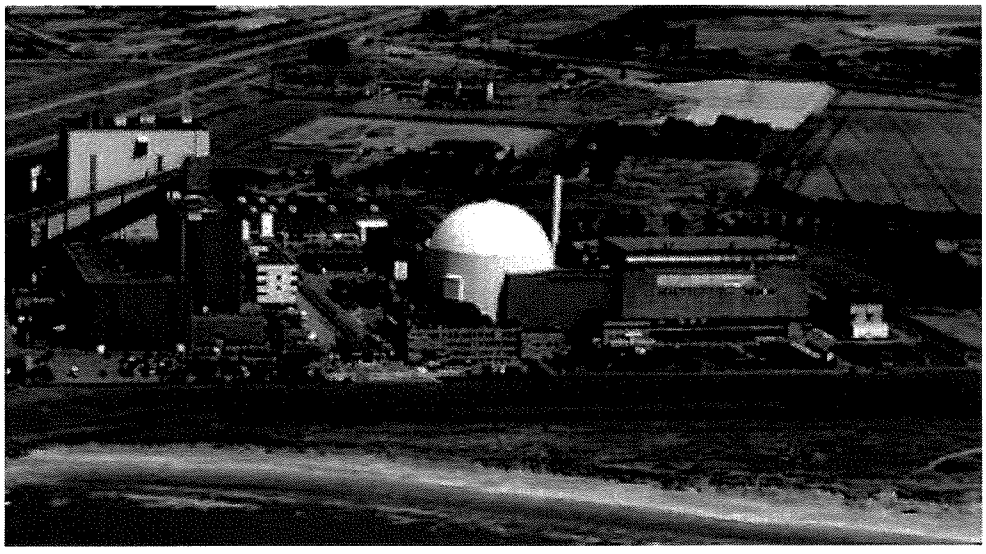
"PEER REVIEW MISSION FOR BORSSELE NUCLEAR POWER PLANT IN THE NETHERLANDS"

(FULL SCOPE)

REPORT TO

THE GOVERNMENT OF THE NETHERLANDS

Borssele NPP, the Netherlands
2 – 11 May 2012



REPORT

PEER REVIEW SERVICE ON SAFE LONG TERM OPERATION (SALTO)

"PEER REVIEW MISSION FOR BORSSELE NUCLEAR POWER PLANT IN THE NETHERLANDS"

(FULL SCOPE)

Mission date: 02 – 11 May 2012

Location: Borssele, the Netherlands

Facility: Borssele Nuclear Power Plant,

Organized by: International Atomic Energy Agency (IAEA)
Borssele Nuclear Power Plant

IAEA Review Team:

(IAEA/NSNI/OSS, Team Leader)
(IAEA/ NSNI/OSS, Dep. Team Leader)
(IAEA/NSNI/OSS)
(Sweden, Swedish Radiation Safety Authority)
(Czech Republic, RESCO)
(USA, Becht Nuclear Services)
(Spain, Iberdrola Ingeniería)
(IAEA/ NE/NPES)

(Sweden, Ringhals NPP, Observer)
(South Korea, Wolsong NPP, Observer)

"Findings, conclusions and recommendations resulting from the IAEA Programme are intended only to assist national decision makers who have the sole responsibility for the regulation and the safe operation of their nuclear power plants. Moreover, they do not replace a comprehensive safety assessment which needs to be performed in the framework of the national licensing process."

IAEA-2012

Issue date: 2012-06-21

CONTENTS

EXECUTIVE SUMMARY

Upon the invitation of the Inspectorate of the Ministry of Economic Affairs, Agriculture and Innovation (EL&I), a peer review mission on safe long term operation (SALTO) was provided to review programmes/activities of the Borssele Nuclear Power Plant (NPP).

The Borssele Nuclear Power Plant (in Dutch: Kernenergie Centrale Borssele or KCB) is located on the estuary of the Schelde River in the south of the Netherlands. The NPP lies just behind a sea dyke in the industrial area Vlissingen-Oost. The Borssele NPP is located near the village of Borssele in the Borsele municipality. The plant is owned and operated by N.V. Elektriciteits–Produktiemaatschappij Zuid-Nederland (EPZ), which has received its NPP operating license, on the basis of the Nuclear Energy Law from the Ministry of VROM and other Ministries in The Hague.

The Nuclear Power Plant Borssele (KCB) was designed and built by Kraftwerk Union (KWU) and is owned by NV EPZ.

The plant has been in operation since October 1973. Its main nuclear components were assumed to have a 40 year operating life in the original design. In 1997 a comprehensive modernization project was performed at the plant in which also some design modifications were implemented. Components impacted by this project were shown to have safety margins warranting operation until at least the end of 2013 (that is, consistent with the original design life of the rest of the plant).

In 2003 the Borssele NPP finalized its second 10-year periodic safety review (PSR). The evaluation process was started by the licensee and regulator defining and agreeing to the scope of the evaluation. The first phase of that evaluation resulted in a list of specific items to be addressed in the evaluation, and since that time almost all of these items have been completed.

In October 2013 the Borssele NPP will reach the original design lifetime of 40 years. The current license of the Borssele NPP is unlimited in time. Every ten years NV EPZ has to perform a PSR. An agreement between the stakeholders of the power plant and the Dutch government was signed which allows the NPP to extend its operation until 2034 subject to a number of conditions.

Borselle NPP is required to perform an LTO assessment to demonstrate the safety of the plant for 60 years of operation. This SALTO mission is in support of and has reviewed details related to this LTO assessment. The scope of the SALTO mission was agreed to and defined in Terms of Reference issued in July 2009. Preparatory meetings were held in July 2011 and March 2012. Further details were specified in Preparatory Meeting Minutes. According to these the review team was organized, and is constituted of four IAEA staff members and four external experts covering all disciplines involved in the ToR and Preparatory Meeting Minutes.

The mission reviewed the planned, started and performed plant activities related to LTO and ageing management of systems, structures and components (SSCs) important to safety within the framework of a full-scope SALTO Peer Review. Upon request of the Dutch regulator, the

scope was extended with the Management, Organization and Administration (MOA) OSART module. Moreover, the progress in the areas in the issue sheets of the limited-scope IAEA Mission of 2009 was reviewed.

The IAEA team found that plans are being prepared and extensive engineering work has been done to review ageing degradation mechanisms, and to review/implement ageing management programmes with the goal of justifying safe continued operation beyond October 2013 with an operational life time horizon of 60 years. In addition, the team noticed good practices and good performance in areas as follows:

Good Practice

- Use of risk matrix

Good performance

- Evaluation of training effectiveness
- Use of colour coding in the Periodic Safety Review - 10EVA13
- TLAAs revalidation
- Chemistry programme
- Component chain
- Civil structure integration into equipment database

Taking into account the above mentioned points, the team recognized that the plant approach and preparatory work for safe long term operation generally follows international practices.

The team identified areas which are to be improved upon or have room for further improvement. Fifteen issues were raised including:

- Human performance improvement.
- Corrective actions for issues identified in evaluation of Safety Factors 10 and 12.
- Lack of guidance document, in respect of the Regulator licensing conditions rules (NVR-rules), related to Ageing Management and to some degree also for Long Term Operation.
- Lack of Organizational structures, Staffing dispositions and Management system documents properly suited for managing Long Term Operation including Ageing Management.
- Practices Surrounding Parts Substitutions and Modifications Require Improvement.
- Practices Surrounding Acceptance of Vendor Engineering Documentation.
- Assessment of active components for LTO.
- Scoping and Screening for LTO.
- Implementation issues in applying the attributes of an effective ageing management program.
- Ageing Management Catalogue of Ageing Mechanisms for Mechanical components should include cavitation.
- Plant programmes for ageing management are not documented in a systematic way

1. INTRODUCTION

1.1. SUMMARY OF IAEA SALTO PEER REVIEW SERVICE

IAEA Member States give high priority to the safe, continuing operation of NPPs beyond their original anticipated time frame (e.g. 30 or 40 years) as an alternative to decommissioning. In this respect Long Term Operation (LTO) is defined as nuclear power plant operation beyond an established time frame originally set forth by the licensing term, design limits, standards or regulations. LTO is justified by a safety assessment that considers life limiting processes and features for structures, systems and components.

The peer review approach has been proven to be a very effective mechanism to perform safety reviews of complex issues, and to evaluate the safety performance of an entire NPP organization. This is confirmed by on-going good experiences with OSART (Operational Safety Review Team) Reviews.

The Agency has conducted various types of safety review services, including those for design, engineering, operation and external hazards. Several Member States have requested AMAT (Ageing Management Assessment Team) missions. Through these activities, it was recognized that a comprehensive engineering safety review service related to LTO would be very useful for Member States.

The Safe Long Term Operation (SALTO) peer review is a comprehensive engineering safety review service addressing the strategy and the key elements for safe LTO of NPPs. This includes the original AMAT objectives and complements OSART reviews.

1.2. SUMMARY INFORMATION ON BORSSELE NUCLEAR POWER PLANT

The Borssele NPP is located near the village of Borssele in the Borssele municipality. The cities Vlissingen, Middelburg, Goes and Terneuzen are at a distance of respectively 10, 10, 14 and 13 km from the power plant.

The plant is owned and operated by N.V. Elektriciteits–Produktiemaatschappij Zuid-Nederland (EPZ). Construction started in 1969, with first electricity production in 1973. The plant is a single unit two-loop PWR of KWU design, with a net capacity of 487 Megawatts. The EPZ organization consists of 450 persons, with approximateky 120 of these dedicated to operating the 427 MWe capacity fossil fired plant on an adjacent site.

The Borssele NPP has the following characteristics:

Net electrical output 487 MW
Gross electrical output 515 MW
Rated thermal power 1365.6 MW
Design pressure 176 bar
Normal (operating) pressure 155 bar
Core outlet temperature 317.5°C
Core inlet temperature 292.5°C

The operation license for the Borssele nuclear power plant was issued in 1973 and does not contain a predetermined expiration date. This means that as long as the requirements (as stated in the regulations and the license) are fulfilled, the plant is allowed to operate. The regulatory body is charged with the monitoring and control of these requirements and will intervene if necessary.

Following political pressure to shut down the plant (first by the end of 2003, later by the end of 2013) and in consideration of the new tasks and responsibilities of the Government in the now liberalized energy production market, the desirability of a clearly predefined expiration date for the license was recognized by the Government. It has also been recognized that it is technically possible to continue to operate the Borssele NPP safely after 2013, and that continued operation can help reduce greenhouse gas emissions.

An agreement with the owners of the Borssele NPP and its shareholders (EPZ, Essent and Delta) was therefore pursued, by which several issues could be settled and from which both the Government and plant owners could benefit. This resulted in the 'Borssele Nuclear Power Plant Covenant', which was signed in June 2006 by the Dutch government and the owners of the plant. In the covenant they agreed upon extending the operating life of the plant to no later than December 31st 2033 and the conditions which should be met during the remaining operating life. The agreements in the covenant are in addition to the requirements of the operation license, which remains in full force.

The main agreements, besides the closing date, include the following: 1) an extra incentive for more sustainable energy management in relation to the closing date of the Borssele plant; 2) funding of decommissioning costs; and 3) a so-called 'safety-benchmark'.

In 1997 the utility operating the Borssele NPP (which was 20 years old at the time) embarked on a € 200 million modification programme. The new safety concept was largely based on a comparison of the plant's design basis at that time with national and international deterministic nuclear safety rules, deterministic studies of the plant, insights gained from similar designs, operating experience and, last but not least, insights derived from the German Risk Study (DRS-B). A plant-specific PSA was performed in parallel with the activities for the conceptual design. This PSA played a major role in the later stages of the modification programme. Once the safety concept had been finalized, it was translated into a 'safety plan'. This plan consisted of a package of modification proposals for plant systems, structures and components.

Modifications due to the second 10-yearly periodic safety review

In 2003 the Borssele NPP finalized its second 10-year periodic safety review. The evaluation process was started with the definition and agreement by licensee and regulator of the scope of the evaluation. The first phase of the evaluation resulted in a list of concrete items to be addressed in the evaluation. In the meantime almost all of these have been completely implemented.

Evaluation items were then grouped into improvement issues. Safety interests related to the improvement issues have been estimated from nuclear safety and radiation protection points of view. The safety interests were characterized according to a method whereby

both deterministic and probabilistic considerations were used. Additionally, expert judgment was used as part of this method.

In 2004 the licensee presented a preliminary version of its improvement plan as the final result of the evaluation process, which was to be implemented in the following years.

1.3. OBJECTIVES

The objective of this service is to review the current status of activities for the safe long term operation programmes performed at the Borssele NPP based on related IAEA Safety Standards and guidance documents, and internationally accepted practices. It was decided during a preparatory meeting held on 14-15 July 2011 in Vienna [12], in contrast to the original Terms of Reference for the Peer Review mission for Borssele Nuclear Power Plant in the Netherlands, IAEA, Vienna, Austria, 26–27 March 2009 [11], that this peer review will be a full scope SALTO mission entitled "Safe Long Term Operation (SALTO) for Borssele Nuclear Power Plant in the Netherlands".

1.4. SCOPE

As agreed during a preparatory meeting held on 21 March 2012 in Borssele NPP [13] the full scope SALTO peer review service for Borssele NPP focuses on the following areas:

1) scope of the standard SALTO peer review service, which should include areas according to chapter 3 of IAEA SALTO Guidelines [10] divided as the follows:
   - Organization and Functions, Configuration/Modification management,
   - Safety analysis reports and existing plant programmes relevant for LTO,
   - Review of ageing management programmes and related TLAAs divide to
     - Mechanical SCs
     - Electrical, I&C SCs
     - Civil SCs

2) The standard scope of Management, Organization and Administration (MOA) OSART module

3) Review of progress done by the plant in areas described in the issue sheets of the IAEA report "Peer Review Mission for Borssele Nuclear Power Plant in the Netherlands" (IAEA, November 2009)

1.5. CONDUCT OF THE MISSION

1.5.1. IAEA Review Team and preparatory work before the mission

Taking into account the objectives and the scope of the mission, as indicated above in Sections 1.3 and 1.4, it was agreed with the counterpart that the IAEA Review Team be constituted by four (4) IAEA staff members and four (4) external experts covering all disciplines involved in the studies. In this regard, the review scopes of the reviewers were as follows:

Reviewer A (Mr.)

Management, Organization and Administration OSART Module

Reviewer B (Mr.) + Observer 2 (Mr.)

Organization and Functions, Configuration/ Modification Management:

- Related regulatory requirements and guidelines;
- Organizational structure for LTO;
- Plant policy (LTO, scope of SSCs for LTO);
- Plant implementation programme for LTO;
- Configuration/ modification management.

Reviewer C (Mr.)

Safety analysis reports and existing plant programmes relevant for LTO:

- Current safety analysis report and other licensing basis documents;
- Existing plant programmes relevant for LTO: Maintenance, EQ, ISI, Surveillance and monitoring, Chemical regimes as preconditions for LTO;
- ISI programme;
- Methodology and criteria for scoping and screening of SSCs for LTO;
- Completeness of SSCs scoping for LTO;
- Status of 2009 SALTO Mission issues – A-1, A-2, A-3, C-1, C-3.

Reviewers D (Mr.)

Review of ageing management programmes and related TLAAs for mechanical SCs:

- Scoping and screening of SSCs for LTO;
- Review of Ageing management programmes;
- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Chemistry and Surveillance programmes;
- Data collection and record keeping;
- Status of 2009 SALTO Mission issues – C-2, D-1, D-2, D-3.

Reviewers E (Mr.) + Observer 1 (Mr.)

Review of ageing management programmes and related TLAAs for electrical and I&C components:

- Scoping and screening of SSCs for LTO;
- Review of Ageing management programmes;
- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Cable AMP, Equipment Qualification /as one of TLAAs;
- Data collection and record keeping;
- Status of 2009 SALTO Mission issues – B-1.

Reviewers F (Mr.)

Review of ageing management programmes and related TLAAs for civil structures and components:

- Scoping and screening of SSCs for LTO;
- Review of Ageing management programmes;

- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Maintenance programme;
- Concrete ageing;
- Data collection and record keeping.

Team Leader –

Deputy Team Leader –

In preparation for the peer review, an electronic advanced information package (AIP) was provided by the counterpart approximately one month prior to the mission.

1.5.2. Basis for the review and review methodology

The IAEA Safety Guide and Safety Report on the procedure to be followed for ageing management programmes and LTO [1-3, 10] were used as support materials for the peer review. In addition, a large number of IAEA existing documents related to basic safety concepts that could be relevant to life extension programmes were utilized. A Safety Guide on "Periodic Safety Review" [4] addresses some aspects of the preconditions to LTO. A draft Safety Guide on "Periodic Safety Review" [14] was also used as a reference document for this Mission, since it was used by the counterpart as a basic document for performing of the current periodic safety review. Other technical documents present technical aspects of ageing management [5] and equipment qualification [6].

The following documents and information were used as a basis for the review:

- IAEA Safety Guides and relevant application documents
- IAEA Safety Reports and Review Guidelines
- Advance Information Package [17]
- State-of-the-art practices in other Member States (MS)

Final programme report of the IAEA Extra Budgetary Programme on Safety Aspects of Long Term Operation of Water Moderated Reactors (EBP) [3] was used as a generic, useful reference to the practice in some countries.

1.5.3. Conduct of the mission

The list of participants in the mission and their functions and contact information is given in Appendix I, while the programme of the mission is presented in Appendix II of this report.

The mission was conducted through meetings and discussions of the IAEA Review Team with counterpart specialists from the plant and technical support organizations. The meetings were held at the plant. Short plant walk-downs were also arranged as a part of the mission.

Plenary sessions and parallel discussions were organized as needed. The discussions were conducted in parallel for all the areas assigned to the experts. Each expert had an assigned counterpart from the plant responsible for the area of the peer review. Other specialists were invited from plant technical support organization suppliers such as AREVA and NRG.

2. MAIN CONCLUSIONS AND RECOMMENDATIONS

2.1. GENERAL CONCLUSION

KCB plans to extend its operating life with 20 years until 2034. EPZ has started the project LTO "bewijsvoering" (LTO Justification - ENT2034.1) in order to meet the requirements of the Dutch regulator. The outline of the project is based on IAEA safety guide 57 "Safe Long Term Operation of Nuclear Power Plants". The contents and coherence of the different parts of the project and how these respond to the IAEA guidelines on LTO are described in a conceptual document [15]. The goal of the project LTO "bewijsvoering" is to ensure that safety and safety relevant systems, structures and components continue to perform their intended functions during long term operation. The outcome of the project LTO "bewijsvoering" will be used for a license change application. This will be submitted to the Dutch regulator KFD for approval of prolonged operation of KCB after 2013.

Four other related projects were also started prior to 2013. These include:

- Feasibility study on the modernization of I&C of the NPP (ENT2034.2).
- Feasibility study on the replacement of all other SSC outside of I&C (ENT20034.3).
- Program to improve human performance and safety culture (ENT2034.4).
- Project to obtain a license to make use of a modified fuel type (ENT2034.5)

For LTO the following conditions have to be met:

- Safe operation has to be demonstrated;
- A license change will have to be issued to allow operation after 2013.

In order to meet these requirements EPZ has started assessment project LTO "bewijsvoering" (LTO "Justification"). The basis for the project LTO "bewijsvoering" is formed by the IAEA guidelines on LTO. To evaluate the project, the Dutch regulator (KFD) makes use of external specialists from GRS in Germany and IAEA SALTO peer reviews. As a result of comments in the first IAEA SALTO peer review in 2009, the scope of the project was extended to the assessment of active components. Additional requests have also been made by the Dutch regulator with respect to non-technical requirements (PSR project 10EVA13 - organisation & administration and human factors). The license change application will be done via a separate project and is based on the outcome of LTO "bewijsvoering" and specific parts of 10EVA13 which fill in the additional requests of the regulator.

The project is structured in accordance with IAEA safety guide 57 "Safe Long Term Operation of Nuclear Power Plants" [2]. Some activities are in a very advanced stage, as assessment of preconditions for LTO, scoping and screening methodology, AMR of passive components, assessment of TLAAs.
Some activities, such as assessment of active components, implementation of state-of-the-art software for database, transfer of supplier LTO project documents into plant documentation, are still in an initial phase. During this full scope SALTO Peer Review, for these initial-phase activities only draft methodologies and the planned activities were presented.

Based on counterpart requirements, the standard scope of Management, Organization and Administration (MOA) OSART module was also carried out by the team with a special focus on PSR Safety Factors No. 10 and 12.

Assessment of those specific areas is reflected in issue sheets developed by the team. Good practices/performances are described in chapter 2.3 of this report.

Through the review of available documents, which included the AIP and presentations delivered by contractors in charge of the above tasks, and discussions with counterparts as well as with other staff of the NPP, the IAEA team confirmed that plant has done extensive work in the field of LTO and ageing management. EPZ's plan to complete activities related to LTO, in conjunction with the implementation of IAEA recommendations and suggestions, will, if implemented in a rigorous manner, place the plant in a good position to enter the LTO period in compliance with the IAEA safety standards and international good practices.

During the review the team identified the following good practices/performances:

- Use of risk matrix
- Evaluation of training effectiveness
- Use of colour coding in the Periodic Safety Review - 10EVA13
- TLAAs revalidation
- Chemistry programme
- Component chain
- Civil structure integration into equipment database

Taking into account of the above mentioned points, the team recognized that plant activities and planned actions for safe long term operation are principally following and are in line with international practices as implemented by various countries in accordance with their respective regulatory regimes.

Nevertheless, the team also noticed that actual plant activities for LTO are not finalized. The team would suggest that plant management facilitate early implementation of all related activities. The LTO project documents should be integrated into the plant management system documentation as soon as possible. Implementation of actual activities on the planned schedule is important. In addition, there are some areas which should be improved or have room for further improvement beyond the international good practice level. Fifteen issues have been raised in the following areas:

- Human performance improvement.
- Corrective actions for issues identified in evaluation of Safety Factors 10 and 12.
- Lack of guidance document, in respect of the Regulator licensing conditions rules (NVR-rules), related to Ageing Management and to some degree, Long Term Operation.
- Lack of Organizational structures, Staffing dispositions and Management system documents properly suited for managing Long Term Operation including Ageing Management.
- Practices Surrounding Parts Substitutions and Modifications Require Improvement.
- Practices Surrounding Acceptance of Vendor Engineering Documentation.
- Assessment of active components for LTO.

- Scoping and Screening for LTO.
- Implementation issues in applying the attributes of an effective ageing management program.
- Ageing Management Catalogue of Ageing Mechanisms for Mechanical components should include cavitation.
- Plant programmes for ageing management are not documented in a systematic way
- Establish final Documentation of revalidation analyses.
- Ageing analyses not always proved to be conservative.
- Discrepancies within Civil Ageing Management Review and Degradation Mechanism Project Catalogue.
- Lack of Centralized Oversight of System / Component Programs.

Issue details and corresponding recommendations and suggestions are shown in the subsequent subsections. Individual issue sheets are presented in Appendix III. Additional comments of the team related to the areas observed are contained within the relevant subsections of the report below.

The progress done by the plant in areas described in the issue sheets of the IAEA SALTO Mission in 2009 [16] was reviewed by the team. Current status of issues was also assessed by the team with the following resolution degree:

- **No action** (No progress in the resolution of the issue, or unsatisfactory resolution) - 1 issue
- **Action under way** (The issue was identified by the Counterpart and work has started to resolve it) - 2 issues
- **Issue partially resolved** (The implemented actions meet partially the intent of recommendations of previous IAEA review) - 3 issues
- **Issue resolved** (The intent of recommendations of previous IAEA review is fully met. Issue closed) - 4 issues.

The solution of **one recommendation** was carried over to a new issue sheet. **One** new **suggestion** was carried over to a new issue sheet:

- SSCs and applicable safety class boundaries identification should be incorporated into the plant's documentation and maintained as living document (updated as required).

This report includes in Appendix IV Team comments and conclusions related to the status of issue from the IAEA 2009 SALTO Mission.

2.1.1. Management, Organization and Administration OSART Module

During the preparatory meeting for the SALTO mission the IAEA was requested to perform a peer review of the self-evaluation by Borssele NPP of safety factor 10 "Organization, management system and safety culture" and safety factor 12 "The human factor" as outlined in DS426. The self-evaluation was performed following the new draft specific safety guide DS426

"Periodic Safety Review of Nuclear Power Plants" which is being prepared as the revision of IAEA Safety Standards Series No. NS-G-2.10.

The next section is produced to summarize the findings in the review scope, according to chapter 3.1 on Management, Organisation an Administration of the OSART Guidelines 2005 edition (IAEA Services Series No. 12). The text reflects only those areas where the team considers that a Recommendation, a Suggestion, an Encouragement, a Good Practice or a Good Performance is appropriate. In all other areas of the review scope, where the review did not reveal further safety conclusions at the time of the review, no text is included. This is reflected in the report by the omission of some paragraph numbers and subtitles where no text is required.

Organization and Administration

Functions and responsibilities

The concept of integrated management system is not fully implemented yet at the plant. The financial activities are only planned to be incorporated into the integrated management system. The concept of continuous improvement could be better integrated into plant processes. The plant is encouraged to continue work in this direction.

Staffing Policy

Back in the past in 2003 a staff reduction programme was initiated and a target staffing level for the Nuclear Operations (NO) part of EPZ was set at 227 in the assumption that plant decommissioning will take place in 2013. This is a low staffing level in an international comparison for a single unit nuclear utility and created shortage of human resources for some tasks. Since then the opportunity for long term operation was opened and it was also realised that human resources have to be expanded in order to cover needs of day-to-day operation and the projects aiming at extended operation. After several studies at the end of 2010 a decision was made to increase the staff of NO by 50 full time equivalent (FTE) staff members.

The process of hiring new staff has been completed in the beginning of 2012. The authorised and actual staffing of NO at present is about 330 FTE. This includes capacity to cope with projects, classroom and on-the-job training of the extra amount of new recruitment and with reduced working time of staff above age of 60. However some of the new staff are still in training. Hiring and 'adoption' into the organisation took more time than envisaged at the time of decision to implement the capacity expansion plan. Therefore the 2011 Annual Report on Operating Experience noted that the effect of staff reinforcement has not been evident in every area. On the other hand new staff coming from other industries brought fresh views and new ways of thinking to the plant what is a positive result. The plant was able to achieve in practice a better ratio of new staff with academic degree of education than the 30% goal set when the capacity expansion plan was approved.

Staffing after adding 50 FTE is considered by department heads and plant management as sufficient for normal daily tasks and projects known today. If there will be a need to initiate new projects in the frame of the long term operation project or due to other reasons, there will be a possibility to employ the additional staff from the budget of those projects. It is expected that the new projects in the coming ten years will result in about twice as much value and scope of

investment than the 'normal' investment in the past. The organization will have to be able to 'absorb' and provide the required conditions for installing the new equipment at the plant.

Management of organizational changes

The process of organizational change is clearly set out in a procedure under the main process of management. However some lessons could be drawn from the recently implemented organizational changes based on the opinion of department heads:

- 'adopting' new staff into the organization is a cultural change for the new staff but also for the existing workforce;
- better timing of advertising newly established job positions could decrease the pressure on organizational units from where applicants were to leave;
- better coordination of organizational changes and process changes (adoption of INPO AP928, introduction of Asset Suite and eSOMS) could reduce the overload of the organization and staff.

Management activities

Communication

Management expectations are set out in a booklet with department specific part. The booklets are easy to use and well-illustrated by visual information. This enables each staff member to easily understand what are the management expectations relating to his job position and working environment. However for the Technical Support (KT) department the development of management expectations specific to them is still in progress.

The plant has identified in the 2010 Annual Report on Operating Experience that work related discussions between employees of different departments does not yet occur naturally. Managers and supervisors need to continue stressing the importance of communication and cooperation.

Human factors management

Concerning safety culture self-assessment, methodologies proposed by VGB and Veritas were considered by the plant but were found to be inappropriate for local conditions. The project "ON-LIME" on cultural improvement process 4-5 years ago brought improvement, however it is not recalled by most of management staff when asked about the subject. The regulatory body was planning to organise external evaluation of safety culture, but due to different reasons it was not implemented. In PSR (10EVA13) the safety culture will be explicitly evaluated. This evaluation will be based on the coming WANO Peer Review scheduled for September 2012, as agreed with the regulatory body. Further considerations on this subject are included in the issue about the improvement in human performance.

Risk informed management

Risk Matrix developed at EPZ is used for identifying corporate risks for strategic goals of EPZ (safety, availability, finance, motivation of staff and compliance). The Risk Matrix is also used for prioritizing safety issues and other purposes. The team identified the use of the Risk Matrix as a Good Practice.

Management of safety

Monitoring and assessment of safety performance

The team concluded that the plant's efforts in the recent years to improve human performance have not resulted in tangible improvement. The team recommended the plant to apply a more effective approach to improve human performance. This subject also includes the initiative to improve safety culture which influences human performance.

In response to the request of EL&I the plant prepared evaluations of safety factors 10 (Organization, the management system and safety culture) and 12 (Human factors) as outlined in DS426. These evaluations will be handled in the frame of the license renewal process. The team suggested that the plant should consider proposing corrective actions including deadline for their implementation for the "points requiring attention" identified in the evaluation of safety factors 10 and 12.

Learning organization

The team considered the evaluation of the effectiveness of training sessions as a good performance.

The plant has recognized the importance of knowledge management as outflow of people due to retirement and recruitment of new staff to cover the resource requirements of multiple new projects became more intense. Internal movement of staff within the organization due to organizational changes and establishment of projects is also a significant factor in this respect. For example in the Maintenance department there are about 30 new staff and about 20 staff is working in a new position.

It is generally known that knowledge management should be used to capture knowledge (both tacit and explicit) from individuals before they leave the organization, so that it can be retained and transferred to others who need the knowledge for the performance of their jobs or tasks. The plant has made it a practice that there is an overlap in time when the new and the outgoing staff filing in a supervisory position are working in parallel. It allows transfer of knowledge and experience. However there is no system in place to ensure that outgoing staff captures their knowledge not reflected in plant documentation before they leave the organization.

Quality Assurance Programme

The once existing certification of EPZ's management system according to ISO 14000 expired but renewal was not asked by EPZ because of insufficient progress on outstanding non-conformities. The reason for this was the workload in 2011 associated with organizational changes and with the Fukushima accident. It was also connected to the proposal of the independent auditor to obtain a joint certificate for the nuclear and the coal fired plant. The nuclear plant has identified this situation as highly significant and the certification is expected to be renewed by the end of 2012 or in 2013. Although a corrective action program at the plant is known to exist. It was not apparent to reviewers that it was integrated into daily activities.

Document and Records Management

Some documents reviewed by the team were found to be not updated. The Organisational chart included old name for the organisational units KTE and KQ. It was explained that the organisational chart is frequently updated and probably the relevant supervisor or manager has not initiated the update. Maintenance procedure HP-N12 is 2 years late with the updating and maintenance sub-procedure PU-N12-19 has passed the due date by 2 months. It was told that maintenance staff is occupied with the document review which is being performed to introduce INPO AP928 on work management process.

2.1.2. Organization and Functions, Configuration/ Modification Management

The review area covered:

- Related regulatory requirements and guidelines;
- Organizational structure for LTO;
- Plant policy (LTO, scope of SSCs for LTO);
- Plant implementation programme for LTO;
- Configuration/ modification management.

The following topics were presented and discussed:

Regulatory framework regarding LTO and associated areas like Equipment Qualification and Ageing Management as well as PSR, FSAR-update and QA/CM

The plant operation is governed by a licence from the regulator. The current licence conditions are based on the original licence conditions and a series of amendments which the regulator has issued from time to time. Included in the licence conditions are a number of "NVR-rules" many of which are based on IAEA guides. The latest amendments were issued by the regulator at the end of year 2011 and incorporates nearly sixty (60) new "NVR-rules" which are identical to and named after corresponding IAEA standards and guides, incorporating several important for LTO and associated areas (among them NS-R-1, NS-R-2, GS-R-3, NS-G-2.10 and NS-G-2.12).

The plant document KEW-vergrunning BS-30 version 9 dated 2 April 2012, which relates a compilation of the current licence conditions including a list of the "NVR-rules", was presented and discussed. The previous version (8) of this document, dated 1 Feb 2006, which refers to several older IAEA guides (e.g. guides named 50-SG-xx), was also presented.

No documented transition rule is currently given by or agreed with the regulator when and how the new NVR-rules should be applied.

The Organisational flowchart and Management system documents for areas like policies, authority duties and required staff numbers and qualification, in view of the suitability to handle LTO

The plant Management system includes organisational flowcharts, with the overall name "Organogram EPZ", which are detailed down to a level where names of individuals. The sheets appear to correctly reflect the current situation (including number of personnel). However, the formal due date of the document has been over-run by more than 2 years.

Several of the sheets starting from the EPZ director organisational level down to the levels relevant for nuclear operation was presented and discussed. The Nuclear Operation section NO is directly under the director and has five departments; KM (Reactor physics), KT (Technical support), KP (Operation), KO (Maintenance) and KQ (Projects).

The overall tasks and numeral of the "Technical" department KT and the sub-departments KTC (Construction) KTE (Engineering) and KTO (Design) was presented and discussed in more detail.

A Management system steering document pointing out the responsibility of LTO-activities does not exist. But 5 persons in the department KTE, assisted by from time to time up to 25 consultants, has been working with the LTO and AMP issues. The work has been headed by the KTE manager. KTE also has the lead of In Service Inspections and responsibilities including Quality Control and the Ageing Management Programme.
In reviewing some of the Management system steering documents related to maintenance and AMP, two documents was discovered to have passed the due-date for revision. One document with 2 month and one document with 2 years.

KTO has amongst others responsibility for the FSAR (part of the SAR available for the public), Technical Specifications and the Technical Information Package (part of the SAR not available for the public).
KTC main responsibility is the initiation of modifications involving creating documents like Modification Plans and Investment Proposals.

The project department KQ has project managers and project support which takes over the responsibility for executing the agreed modifications defined by KTC.

Exploring the Management system steering document a formal responsibility for Ageing Management feedback was found as a sub-document (ref doc. PU-N12-19) to the tasks description for the Maintenance department KO (ref doc. HP-N12). However, responsibility for the doc. PU-N12-19 is department KTE (approved by head of dept. KT). Also a few other maintenance steering documents, related to AM feedback and LTO-assessment, are within the responsibility of dept. KTE. Both experiences from actual occurrences in the Borssele plant and other plants (e.g. through VGB) is taken care of and assessed. It appears though that the time available for the few personnel of KTE to deal with Proactive AM, on top of the current LTO related activities, is not enough. As an example (and as a possible consequence of the limitation) no personnel from EPZ is participating in, and thus learning from, the IGALL work.

Plant policies regarding LTO, Ageing Management and Scoping and Screening

The review has found no documents within the EPZ Management system describing the strategy for neither implementing nor maintaining an AMP. However, such strategy documents exist for Surveillance, ISI and Maintenance, but not explicitly for AM. Further, no documents within the Management system, describing the integration of the AMP within the LTO program, were found.

What regards scoping and screening of SSCs the EPZ has the intention to adopt part of the US NRC "maintenance rule" (US NRC 10CFR50 §50.65 (a)(4) and/or US NRC RG 1.160 and RG 1.182) for the assessment of active components. However, no document describing the result of this work is available.

The Scoping and Screening reports, AREVA Work Report NEPS-G/2008/en/0056 and AREVA Work Report NTCM-G/2009/en/0144 was reviewed. It became clear that the methodology of scoping relies heavily on that the classification methodology (not part of the AREVA...0056 report) is correct. No evidence was found for that the classification methodology takes into account all the acceptance criteria and subsequent rules presented in the scoping report e.g. rule "h)" relevant for SC3 SSCs (which says that SCs beneficial for accident control, but not necessary, shall be scoped in). Also rule "i)" (which says that SCs whose failure may significantly increase the frequency of challenging safety systems shall be scoped in).

Also, a methodology for scoping of civil structures is missing (the AREVA...0056 report section 4 Column C-G does not reference the civil structure classification handbook).

It was also found that the content of the reviewed Scoping and Screening reports has not yet been transferred to the Management system in EPZ. This is also supported by findings from reviver F (John).
Further the AREVA Work Report PESS-G/2011/en/0147, regarding detailed screening of mechanical components, is not yet finished (and not in the EPZ Management system).

Reviving the screening report tables an error was spotted in relation to the system for "personnel airlock" plant id code XC. The table showed no electrical penetration (to containment) coupled with this system. The counterpart confirmed that there actually are electrical containment penetrations within the XC system.

No process for accepting contractor's documents, like the scoping and screening reports, was found.

The LTO program and procedures for its updating as well as corrective measures as a result of PSR and implementation programmes

The review of this area confirmed that no real complete program (including internal procedures) for implementation of actions / measures identified on the basis of review of AMPs and relevant safety analysis exists.

The review also found that:

- That the program NT 2034 contains feasibility studies for various improvements but actions like a revalidation of SAR (to be done within the PSR up to 2013), that involves time limited ageing assumptions, is not done yet.
- Subsequently no program for reconstruction is launched yet.
- Neither internal (Management system) steering documents exists that holds together LTO, including AMP, nor procedures for the implementation of such documents.
- A "Conceptual Document LTO "Bevwijsvoering" KCB" exists but this is only a project document.

- Result of a PSR is scheduled for end of 2013, so the need for possible corrective measures has not been identified yet.

Plant FSAR requirements, procedures, criteria and experience, related to plant Modifications

The EPZ main document HP-N13, relevant for configuration management and change management, was explained by the counterpart. Also some sub-documents e.g. PU-N13-05 and PU-N13-30 were looked at. The review found that the main processes seem to be in place.

Some deficiencies were however encountered in the interview:

- The procedure for reviewing detailed design, done by the engineering department KTC, lacks the requirement of having a formalized release and authorization of a detailed design (or part of a design, e.g. a detailed design package).
- The procedure for reviewing commissioning programs was lacking the review of the engineering department KTC which is responsible for basic engineering (i.e. responsible for the design requirements).
- Also, the use of creating performance indicators for various processes, like the CM procedure, and which is called for in the Management system is not in reality in use.

It was also found, as a more or less direct result of that several procedures linked to LTO is not formalized within the Management system, that these procedures also lacks formal ways of taking care of modifications to plant equipment or the procedures them self.

Reviewed procedures with this deficiency are:

- Procedure for handling EQDBA, as lined out in AIP document "NRG-22701/10.103460" Figure 8.
- Scoping report AREVA Work Report NEPS-G/2008/en/0056, including methodology and resulting tables.
- Screening report AREVA Work Report NTCM-G/2009/en/0144, including methodology and resulting tables.

The ground for configuration management and change management in the regulatory framework and within the EPZ QA manual was also explored.

The current version of the QA manual (handbook) consists of several parts (e.g. documents) KHB-2, KHB-4 and KHB-5, which were looked at and partly explained. The KHB-2 document points at the H-N13 document regarding configuration. The KHB-5 document links a set of specific regulator NVR-rules to the H-N13 document. Thus the regulator requirements were found to be formally coupled as drivers for the H-N13 document requirements (and its sub-documents).

However, it must be noted that the NVR-rules referred to is not updated in the QA manual as per the latest license condition. This work will be one of the outcomes of the PSR review scheduled for end of year 2012 (as discussed above in this section).

Presentation and interviews about following projects and activities connected with LTO were carried out:

- Review of regulatory requirement in respect of LTO;
- Review of organisational aspects focusing on the capability to handle LTO;
- Review of Management systems documentation aspects focusing on their suitability in respect of LTO;
- The LTO demonstration and compliance project;
- Integrating Ageing Management in LTO;
- Completeness of Scoping and Screening;
- Maintenance planning and surveillance (done under review area "F");
- Conduct of Plant modifications.

Beside the scope the team has the following observations and comments: n/a

After the review the team found that the following areas need enhancements:

- Regarding the recommended documentation (issue B-1, recommendation R1), on the EPZ position, in respect to the NVR-rules, the plant is encouraged to place such documents in the plant FSAR;

- The plant is also encouraged to carefully observe CM/DM procedures relating to documents which are based on the application of NVR-rules. As many of the NVR-rules have not yet been assessed, any documents based on a non-approved application of the rules will need to be re-verified, once the formal EPZ position is formally established;

- A number of documents reviewed had passed the due-date, one being more than 2 years over-due;

- No personnel from the plant have participated in the IGALL work. The knowledge exchange from participation in IGALL (both ways) is regarded highly relevant and the plant is therefor encouraged to create this opportunity for at least one staff member;

- Regarding review of Scoping and Screening the plant is encouraged to include plant operational personnel in the review team, in order to, in the best way, reflect Scoping and Screening concerns which are based on the way that the plant is currently operated. This point is also relavant for future reviews in light of possible equipment modifications or modification in operation procedures;

- Processes and practises surrounding the implementation of plant modifications appear to be applied inconsistently. Examples of parts substitution being performed as part of routine maintenance wthout following the small modification process were noted, and a counterpart described certain issues related to software version control. There appear to be different standards regarding the threshold for invoking the modification process, with "gray areas" implicitly tolerated. The plant is encouraged to look in to these areas and improve the working practice;

- The modification process when applied does not ensure that key station programs such as ageing management are updated to ensure safe, long term operation of the power plant. The plant is encouraged to look in to these areas and improve the working practice;

- Processes reviewed do not provide linkage back to ensure that these programs are updated. The plant is encouraged to review and correct the relevant processes from this point of view;

- There is no process to formally document acceptance or concurrence of engineering or technical documents completed on behalf of EPZ by an external company. Status of such documents within the EPZ design basis is unclear. During several discussions EPZ indicated that they had commented extensively on contractor documents, however this review process and the status of contractor-signed documents is not apparent. The plant is encouraged to review and correct the relevant processes from the above points of view;

- There appear to be different working practices regarding the creation and use of performance indicators for various processes, although this is mandatory according to the Management system documents. The plant is encouraged to look in to these areas and improve the working practice;

During the review the team identified the following good practices: n/a

As good performance Area B reviewers supports the recognition of the Area C good performance "PSR result visualisation".

Documents and information used during the review were:

- Mod Checklist PO-N13-30
- Small Mod Procedure PO-N13-26 Rev. 11 "Klein wijzigingen"
- Typical Modification Plan WP # WP-30-1737
- Modification Implementation Procedure PU-N13-05 Rev. 11 "Initiatie, beoordeling en realisatie van wijzigingen"
- Work package for PI replacement (supplied by Mtce Mgr).
- Draft Monthly Mtce Report March 2012 "Maandrapport KO maart 2012" : KO/SCHOO/LKL/R122067
- PU-N07-02 Plant Walkdowns
- Organization Chart "Organogram EPZ" (intranet based document).
- KEW-vergunning BS30 version 9, dated 2 April 2012
- Conceptual Document LTO "Bewijsvoering"KCB, NRG-22701/10.103460, dated 9 September 2012
- AREVA Work Report NEPS-G/2008/en/0056, dated 27 February 2011
- AREVA Work, Report NTCM-G/2009/en/0144, dated 6 November 2011
- Maintenance, main procedure HP-N12
- Maintenance, sub-procedures, PU-N12-19, PU-N12-76, PU-N12-78 and PU-N12-80
- Configuration Management, main procedures HP-N13

- Configuration Management, main sub-procedures PU-N13-01, PU-N13-02 and PU-N13-05,
- Quality manual, sections KHB-2, KHB-4 and KHB-5

2.1.3. Safety analysis reports and existing plant programmes relevant for LTO

The review area covered:

- Current safety analysis report and other licensing basis documents;
- Existing plant programmes relevant for LTO: Maintenance, EQ, ISI, Surveillance and monitoring, Chemical regimes as preconditions for LTO;
- ISI programme;
- Methodology and criteria for scoping and screening of SSCs for LTO;
- Completeness of SSCs scoping for LTO;
- Status of 2009 SALTO Mission issues – A-1, A-2, A-3, C-1, C-3.

The following topics were presented and discussed:

FSAR

The plant operation is based on a License according to the Dutch Nuclear Act (KEW).

It was clarified that the FSAR equivalent is termed "Technical Information Package" (TIP). The TIP format and contents is based on the US NRC RG 1.70. The TIP is complemented by a document titled Technical System Description, which deals with operational aspects.

TIP and Technical System Description will be combined into one document by the end of 2013 (in connection with the current PSR).

Changes and updates to the TIP and Technical System Description are provided for information to the regulatory body but not for approval.

The document "Technical Specification" (TS) follows the US format and is approved by the regulatory body. In addition to the TS, there is a document providing additional information, "Operational Technical Specification" (Bedrijfstechnische Specificaties, BTS), that is approved internally at the plant only, and deals with fire protection systems, communication, accident management, etc.

The Safety Report (SR) is a "summary" document that is structured similarly like the TIP according to the US NRC RG 1.70. It is an integral part of the plant license and is public. It does not contain detailed information.

Changes to SR are approved by the regulatory body.

It is planned to issue a new license for the plant, since the existing one contains a large number of amendments; in this connection the SR will be also revised completely.

PSR

The current PSR "10EVA13" is performed on the basis of the IAEA Safety Guide NS-G-2.10, resp. its revision draft DS426 (under development, draft 3 dated 27.11.2009). The 10EVA13 is guided by the "Basic Document" (BD), developed by the plant and agreed with the regulatory body. The BD describes PSR methodology, acceptance criteria (that are based on Dutch regulatory documents NVR that are in turn based on IAEA Safety Standards modified by

replacing "should" in Safety Guides by "shall"), activities for each SF, and includes also discussion of LTO interfaces (such as the Scoping and Screening results, etc.).

At present the review in the areas of individual SFs is under way. The review includes mechanism to consider and address the outcomes of other projects performed at the plant.

The review includes benchmarking against current safety requirements, modern plant designs (such as EPR), practices, etc. The results identify the differences between the plant and the state of the art information. This difference is used as a basis for the design of various safety improvement activities, dealt with in the Global Assessment.

10EVA13 aims at obtaining all significant documentation relating to the original design basis as well as modifications implemented. Intensive cooperation with the original plant designer is ongoing, see also the report of the SALTO PR, 2009.

SFs 1-4, 10, and 12 are primarily related to LTO and directly consider the LTO scope. Colour coding used facilitates easy identification of relationships with other projects and activities.

PSR also serves the purpose of gap/overlap analysis and provides inputs to the TIP.

The 10EVA13 will be completed end 2013. It was stated that subsequently the plant license will be revised in 2015 following the LTO and the Safety Report are completely revised.

Existing plant programmes relevant for LTO

The plant LTO project is described in the report Conceptual document LTO "bewijsvoering" KCB, NRG-22701/10.103460. The report also describes the existing plant programmes on maintenance, surveillance, in-service inspection, equipment qualification, and water chemistry. Combination of these plant programmes' elements constitutes in principle AMPs. Therefore in this part of the review the programmes are addressed from the point of view of preconditions. It was noted that the plant programmes discussed are not yet based on the IAEA Safety Guide NS-G-2.6 that is included in the current license, but on earlier version of IAEA Safety Standards.

Maintenance programme requirements are provided in the Dutch regulation NVR 2.2.7. Based on the regulation, Maintenance Strategy and Maintenance Programme were developed. The Maintenance Strategy is based on supplier recommendations and operating experience. The scope of maintenance is based on safety classification and on the results of PSA.

Different types of maintenance are in place (condition-, time-, failure-based). Preventive maintenance is mandatory for safety related components.

The maintenance information is contained in several databases (ISH, ISO, DMS, AM database "VOB", etc.). Maintenance programme include trend analysis and evaluate degradation mechanisms. Maintenance programme is being verified for meeting the intent of the "Maintenance Rule" for the in-scope items in the LTO project 'Assessment of active components'.

Plan for improving maintenance programmes is based on plant self-assessment and in line with good international practices exists.

Maintenance programme was evaluated for compliance with 9 attributes of an effective AMP as recommended in SRS No.57 and the evaluation is summarized in the respective plant report KTE/AdJ/RBn/R106151.

Equipment qualification was evaluated for compliance with the 9 attributes of an effective AMP as recommended in SRS No.57 and the evaluation is summarized in the respective plant report IAEA Safety Report 57-Verification of preconditions-Equipment Qualification. KTE/AdJ/Rnh/R106190, 2011.

In-service inspection follows the requirements provided in the Dutch regulation NVR 2.2.7, the Dutch Steam Law, ASME Code Section XI, and considers the equipment manufacturer specification.

The ISI program was reviewed for compliance with the 9 attributes of the effective AMP (SRS No.57). The review is summarized in a plant report IAEA Safety Report 57-Verification of preconditions-ISI. KTE/AdJ/RBn/R106153, 2011.

The surveillance and monitoring program is based on Dutch regulation NVR 2.2.8, ASME XI 1986 edition and KTA rules. Based on these requirements, the plant Surveillance Strategy document was developed and serves as a basis for In-service Testing Program and Data that feed into several database systems (that are not interconnected: ISH, ISO, ISO4).

Surveillance program was evaluated for compliance with 9 attributes of an effective AMP (KTE/AdJ/Rnh/R106188).

Chemical regimes (Chemistry Programme) at the plant are based primarily on the VGB Guidelines VGB R 401 J, that are used to develop the Chemistry Strategy (Chemistry Handbook). The Chemistry Programme consists of 3 level of documents (hierarchy).

The assessment of plant chemistry including trending is carried out and reported regularly. The chemistry surveillance includes also various diagnostic parameters. Impact of water chemistry on plant SSCs is carefully considered.

The Chemistry Programme has been reviewed for consistency with the 9 attributes of an effective AMP given in Ref. [SRS No.57]. The review is summarized in the plant report IAEA Safety Report 57-Verification of preconditions-Water chemistry, KTE/AdJ/RBn/R106155, 2011.

In-service Inspection

The In-service Inspection (ISI) is based on results compiled from the very beginning and includes manufacturer inspection results as per applicable German rules at that time. Manufacturer documents are available at the plant for replacement components.

KCB performed pre-service inspection for primary circuit components (not mandatory at that time). Initially the ISI was based on Dutch "Steam Law". KCB license from 1975 refers to ASME XI. As of 2010 the ISI is performed based on ASME XI (2007 edition, for nuclear part) and on PED (European code, for conventional part).

The plant has taken various measures to establish a "fingerprint".

ALARA principle is considered in planning the ISI; e.g. for RPV and PRZ the ISI is carried out in 2 intervals instead of 3.

SG heat exchange tubing is inspected every 3 years, 60% is required, almost 100% performed. Approx. 80 of 4500 SG tubes were plugged.

The surge line NDE was discussed in detail as an example. The NDE includes volumetric examination of the connecting welds (to PRZ and MCL), 2 longitudinal welds and 1 circumferential weld of the surge line elbow next to MCL. In 1997 all surge line welds were

inspected in connection with the LBB application. Examples of the procedures used and the results obtained were presented (including e.g. TJ for respective NDE qualification, etc.). The information was also presented in the related plant databases (ISI database, ISO4 database).

It was noted that the NDE results stored in the plant database were not readable since they were black and white scans of colour pictures (NDE results).

The ISI is a part of the maintenance programme.

The NDE for primary components is qualified according to ENIQ. The plant has established a co-operation in this area with Goessgen plant (sharing test blocks, etc.).

Risk-informed ISI is not used at the plant.

ISI database, and ISO4 databases were developed for 40 years of operation. The databases are not interconnected and information needs to be entered in both manually. New database system will be implemented next year. The new database system should integrate the information provided in different isolated databases at present.

The ISI plant staff has been reviewing the LTO project documents thus ensuring the ISI covers the LTO scope. However, a dedicated verification of the LTO scope against the current scope of ISI programmes was not performed.

Scoping and Screening

The scoping methodology and results are described in the AREVA NP report "Definition of the scope of KCB systems, structures, and components to be taken into consideration for the LTO process", NEPS-G/2008/en/0056, Rev.B. The report revision takes into account, among other aspects, the recommendations of the SALTO PR carried out in 2009.

The scoping was carried out based on a list of all plant systems and their safety classification. The starting point for the safety classification was the existing KCB classification system that implements the IAEA Safety Guide 50-SG-D1. This starting point was replaced by a new approach based on the IAEA Draft Safety Guide DS367, complemented by KCB and AREVA experts' engineering judgement and including specific design aspects of KCB and other KWU plants.

The scoping process resulted in a list of plant subsystems safety classification according to the methodology described in the report. The results are divided in 3 tables for mechanical, electrical and I&C, and civil. For each subsystem considered it is indicated if it is within the LTO scope (or not).

The screening methodology and results are described in the AREVA NP report "Screening of relevant structures, and components in the frame of the KCB LTO process", NTCM-G/2009/en/0144, Rev.B. The report revision takes into account, among other aspects, the recommendations of the SALTO PR carried out in 2009.

The report deals with passive and active structures and components at the level of commodity groups. For each subsystem identified to be within the scope of LTO assessment, applicable commodity groups are identified.

The information provided in the report is complemented by information given in several other AMR reports, which are outlined in Fig.5 of the NRG report Conceptual document LTO "bewijsvoering" KCB, NRG-22701/10.103460. In particular the safety class boundaries are identified for mechanical part in each of the 14 AMR reports (prepared by AREVA NP, for

example PESS-G/2010/en/0044) by colour coding on respective P&IDs (supplemented by the information provided in the AREVA NP report AMR Methodology Report, PESS-G/2010/en/0041).

It was noted that the report deals, in the sense of the IAEA SRS No.57, with scoping rather than with screening.

The actual screening (as per the IAEA terminology) is described in the AREVA NP draft report on "Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process", PESS-G/2011/en/0147 Rev.A. The report deals with both passive and active mechanical components.

The results of the screening are provided in the Appendices of the report.

It was noted that the draft report on "Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process" is not considered or referred to in the Conceptual document LTO "bewijswoering" KCB, NRG-22701/10.103460, see e.g. Fig.5; the conceptual document should be revised.

It was stated that the plant intends, after finalizing all LTO project documents (that are mainly contractors documents) will develop LTO plant documentation, and maintain it as a "living document".

LTO assessment

The LTO assessment is performed separately for passive and active components.

For passive components the approach outlined e.g. in Fig. 5 of the NRG report Conceptual document LTO "bewijsvoering" KCB, NRG-22701/10.103460 is used.

For the assessment of active components the approach described in Section 4 and outlined in Fig.9 of the NRG report Conceptual document LTO "bewijswoering" KCB, NRG-22701/10.103460 is used. The approach is based on a methodology described in a draft KCB report "Assessment of active components with regards to LTO", without number yet.

The scope of the assessment is based on the report "Screening ...", NTCM-G/2009/en/0144, Rev.B, and on the draft report "Detailed Screening ...", PESS-G/2011/en/0147 Rev.A output (based on "safety categories"). The plant approach, in order to enable comparison with the "Maintenance Rule", follows ASME OM Code and should also ensure that it includes components relied upon in EOPs and SAMGs.

The objective of the assessment is to demonstrate that the KCB maintenance and testing of components (in scope of the LTO assessment) are adequate to ensure accomplishment of required safety functions. The acceptance criteria, in general terms, are meeting the intent of the US NRC Maintenance Rule. Meeting the acceptance criteria will ensure operability and reliability of active components and structures.

To verify the approach to scoping and screening, and to the assessment in general, an example the surge line was discussed in detail, starting from scoping, and proceeding through screening, detailed screening to ageing management review. The pilot example led to the recommended actions, in this case fatigue assessment and NDE for ISI. The fatigue assessment was reviewed in detail in the respective TLAA, the ISI in the frame of the discussion on ISI.

After the review the team found that the following areas need enhancements:

- ISI database-black and white scans of colour pictures result in unreadable records of NDE results;
- documentation of scoping and screening processes and of the whole LTO concept;
- methodology for the assessment of active components and its implementation.

Documents and information used during the review were:

- Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011.
- IAEA Safety Report 57-Verification of preconditions-Maintenance. KTE/AdJ/RBn/R106151, 2011.
- IAEA Safety Report 57-Verification of preconditions-Surveillance and Monitoring. KTE/AdJ/Rnh/R106188, 2011.
- IAEA Safety Report 57-Verification of preconditions-Water chemistry. KTE/AdJ/RBn/R106155, 2011.
- IAEA Safety Report 57-Verification of preconditions-ISI. KTE/AdJ/RBn/R106153, 2011.
- IAEA Safety Report 57-Verification of preconditions-Equipment Qualification. KTE/AdJ/Rnh/R106190, 2011.
- Definition of the scope of KCB systems, structures, and components to be taken into consideration for the LTO process, NEPS-G/2008/en/0056, Rev.B, 2011.
- Screening of relevant structures, and components in the frame of the KCB LTO process, NTCM-G/2009/en/0144, Rev.B, 2011.
- Draft Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process, PESS-G/2011/en/0147 Rev.A, 2012.
- AMR PESS-G/2010/en/0044
- AMR Methodology Report, PESS-G/2010/en/0041.
- Draft report Assessment of active components with regards to LTO. No number yet.

2.1.4. Review of ageing management programmes and related TLAAs for mechanical SCs

The review area covered:

- Review of Ageing management programmes;
- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Chemical regimes and Surveillance programmes;
- Data collection and record keeping;
- Status of 2009 SALTO Mission issues – C-2, D-1, D-2, D-3.

The following topics were presented and discussed:

- Ageing Management Review for Steam Generator, KCB Primary Component Supports, Ageing, TLAA Summary Assessment, Chemistry, and Surveillance programs.

Due to the volume of materials provided the review approach utilized spot verification of various programs. For ageing management each of the nine Generic Attributes of an effective ageing management programme were verified. All attributes were confirmed in the Chemistry programme. The Surveillance programme attributes were spot checked, but time was insufficient to thoroughly review its implementation.

The TLAA program fatigue analyses were reviewed for status of revalidation. In the area of updating plant transient cycle counts and implementation of on-line fatigue/transient monitoring EPZ has made substantial progress. The use of FAMOS for re-verification and updating of thermal transients is recognized as moving in the right direction. Data from FAMOS was provided for the first year of monitoring. Five years of data were established as necessary to provide a basis to update operating transients. This is under way and will be completed after entry into LTO. All TLAA fatigue analyses have been revalidated with update cycles as reported in LTO Demonstration of Fatigue TLAAs. The summary table identifies those analyses that are not demonstrated at this time to have a usage less than 1.0 for the full period of the LTO. EPZ has in place, with the use of FAMOS, a method to refine the analyses to determine if further actions are necessary during the period of LTO for specific components. This plan is recognized below as a good performance in this area.

The ageing management review included checking that ageing mechanisms were identified and assessed within the plant programs. The Ageing management reviews for the Steam Generator and the Primary Component supports and the Mechanical Ageing Management Catalog were selected for more detailed review.

The Mechanical Ageing Mechanism catalog is an excellent document that is very thorough. The reviewer identified the addition of a known mechanism to the catalog based upon his experiences in use of risk informed ISI programs and plant operational experience. This was agreed upon by the counterparts.

For the implementation aspects of ageing management two items were selected for further review. The EPZ approach to ageing management of damage mechanism is to utilize existing plant processes and not create separate programs such as the chemistry and surveillance programs. The Steam Generator Ageing Management Review and the draft Summary Ageing Report had identified FAC as a mechanism for the main steam and feedwater nozzles and piping. A request was made for documents that demonstrated the implementation attributes of the program, for example past data, baseline inspections, and trending from the plant FAC program. These documents were not made available to the reviewer. It was determined at the end of the mission, these mechanisms were identified, but a commitment or resolution of the method for dealing with the mechanism was not yet determined and EPZ had no tracking system to identify this open item. The late revelation of this lack of implementation data prevented selecting an alternative mechanism for implementation assessment.

As part of this mission, the SALTO peer review team was requested to review the follow-up activities of the previous 2009 mission. Item C-2 of that mission had noted an issue with the main RPV support inspection. This item was evaluated in the main component support ageing management review. Two mechanisms were identified as applicable in the review. The review for support clearances that was completed in 1993 was credited as a basis for not doing a follow-

up inspection. In addition, the draft summary report did not capture the requirement to inspect for boric acid corrosion.

Since it is 20 years since the last inspection and new techniques for examination are available today it is the reviewer opinion that this inspection removal should be re-evaluated in light of the time period anticipated for extended operation, 20 years. An alternative inspection may be possible and thus the elimination today may not be justified given the critical nature of the support. At a minimum the plant implementation program should inspect for Boric Acid corrosion as identified in the Ageing review documents.

Based upon these reviews Issue D-1 was documented to note that a review of damage mechanisms identified in the applicable ageing management documents, should be conducted to assure that applicable inspections are implemented. This is identified as a potential program weakness.

Presentation and interviews about following projects and activities connected with LTO were carried out:

- Chemistry Program
- Surveillance Program
- Reactor Vessel Safety Assessment Program
- TLAA Revalidation Program
- Ageing Management Reviews

Beside the scope the team has the following observations and comments: n/a

After the review the team found that the following areas need enhancements:

In the area of ageing management two issues were identified for enhancement. The first issue identified covers a potential weakness in taking an identified ageing management identified degradation mechanism and implementing inspection and tracking in the plant. It is noted that the summary report ageing management review is still in draft stage. During final discussions with the plant staff it was determined that some identified items are to be addressed in the future, but no master tracking list of open items was provided for review. Significant review time during this SALTO was spent determining status of inspection activities. The summary of this issue is documented in issue D-1.

As part of the review of the mechanical ageing management catalog, the reviewer identified a potential damage mechanism that should be included in the assessment of internal piping systems. The plant staff noted this mechanism was not identified in the GALL report, but agreed it would be a potential mechanism to be evaluated. This suggestion is documented in issue D-2.

During the review the team identified the following good practices: n/a

As good performances team recognized TLAAs revalidation and handling of chemistry program.

Documents and information used during the review were:

- PESS-G/2010/en/0041, Ageing Management Review- Methodology, Rev A, dated 2011-08-11.
- PTCM-G/2010/en/0043, Catalog of Ageing Mechanisms for Mechanical Components (CAM-MC), Rev A, 04.05.2011
- PESS-G/2010/en/0044, Ageing Management Review to Support Long- Term Opeation for KCB Steam Generators, Rev A, 07.10.2011
- PESS-G/2010/en/0049, revision A, 22.12.2011, Ageing Management Review to Support Long Term Operation of KCB Nuclear Safety Systems.
- PEER-G/2011/en/0071, Ageing Management Review to Support Long Term Operation for KCB Primary Component Supports.
- GEN-07-001 revision 0, "Flow-Accelerated Corrosion" (FAC), ook wel Erosie Corrosie (EC) genoemd.
- KTE/AdJ/RBn/R106155, IAEA Safety Report 57- Verification of preconditions-Water Chemistry
- NRG-22503/11.109273, Draft Summary report Ageing Management Review, April 2012
- N04-22-001, Specificatielijst Systeemparameters KMC Conventioneel + KMC Nucleair, verie 29, 1-6-2102.
- NRC-224888/11.106369, LTO Demonstration of Fatigue TLAAs, LTO of NPP Borssele, 01 May 2012.
- NRG-22503/11.109273, Summary Report Ageing Management Review: Draft B1.
- NRC-224888/11.106369, LTO Demonstration of Fatigue TLAAs, LTO of NPP Borssele, 01 May 2012
- NRG-22488-11.106371, Revision 1, Assessment of Fatigue TLAAs, 01 May 2012.
- NRG-22981/12.113224, Fatigue Assessment of Spray Nozzles of Main Spray Lines of NPP Borssele, 28 March 2012.
- KTE/ADJ/Rnh/R106188, IAEA Safety Report 57- Verifications of preconditions-Surveillance and Monitoring, 21 January 2011.

2.1.5. Review of ageing management programmes and related TLAAs for electrical and I&C components

The review area covered:

- Scoping and screening of SSCs for LTO;
- Review of Ageing management programmes;
- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Cable AMP, Equipment Qualification /as one of TLAAs;
- Data collection and record keeping;
- Status of 2009 SALTO Mission issues – B-1.

The following topics were presented and discussed:

- Historic review of environmental qualification activities performed at KCB
- Scoping and screening of SSCs to be environmental qualified for harsh environment
- Environmental conditions in the plant during normal operation
- Environmental qualification database Calculation qualified lifetime
- Results of the revalidation analyses for TLAA.
- Consistency between the EQDB and Components Systems Database.
- Updating of the EQDB.
- Ageing related experience feedback (VOB database).
- Aging management review
- Scope of the current Equipment Qualification Program.
- EQ Spare Parts Policy.

The result of the reviewing of these topics is summarized in the following points:

Scoping and screening process

The report NEPS-G/2008/en/0056 defines the process to select the systems in the scope of LTO. This procedure takes into account the rules recommended in Safety Report Series, it includes the safety categories (S1, S2, S3) and also the rules applicable to each one. These categories and rules are in accordance with the IAEA Draft Safety Guide DS367, and define the functions to take into account during the scope process. Despite this, in some of the presentations referenced below, was indicated that this process rely in the previous Safety Classification, this fact could have as a result that not take into account all the rules mentioned previously.

The results of the analysis are included in the report and shows if the systems are in/out of the scope of LTO and also the safety category in which any of the systems belong. The Scope of LTO described in NEPS-G/2008/en/0056, take into account passive and active components. The criteria for selecting passive and active components follow the NEI-95-10.

The whole screening process is described in the report NTCM-G/2009/en/0144 and it is based on 10CFR50.54. The screening process has been performed for passive and active Structures and Components (SCs) on the level of the commodity groups. The passive (SCs) identified will be assessed through the Ageing Management Review (AMR) and as a result of the screening process, have been identified seven (7) passive commodity groups.

The active SCs will be addressed as indicated in the Conceptual document NRG-22701/10.103460. The objective of the assessment is to demonstrate that the KCB maintenance and testing of components are adequate to ensure accomplishment of required safety functions. The acceptance criteria, in general terms, are meeting the intent of the US NRC Maintenance Rule. This activity is not finalized yet, due this, has not been possible the review during this mission.

Ageing management review

The Report PLTQ-G/2010/en/0038 "Ageing Management Review to support LTO of KCB Electrical and I&C SSCs" describes for all the commodity groups, the service conditions, materials and design values directly related with the stressors identified. The report defines the stressors that could degrade any of the materials and combined with the Report PTLQ-

G/2010/en/0031 demonstrates why some of the materials and stressors have to be considered in the AMR and justify the stressors that are considered negligible for any of the materials. It is an important document that will help to the plant to manage the aging of the components if it is correctly implemented. In the current status of the LTO project, KCB has not developed specific AMPs for the different commodity groups mentioned above, this fact has been identified as an issue E-1. Nevertheless the plant has developed the report KTE/AdJ/RBn/R106151 to demonstrate that the existing plan programmes are consistent with the nine attributes, but it is a general document that doesn't cover the requirements of the Safety Standards to do an effective Aging Management Review.

The cables are one of the most important commodity groups in the scope of the AMR, and the state of the art shows that temperature and radiation are important stressors to take into account during the LTO period in order to manage adequately the ageing of this components. The temperature that should be considered for a correct AMR, depends on the rooms for which the cables have been routed but, this information is not available for the plant. Some of the assumptions in the report PLTQ-G/2010/en/0038 require a revision in order to be more conservative to compensate that the cable routing are out of the control of the plant. This is considered as an issue E-3.

Revalidation of TLAA

The list of the specific safety analyses that uses time limited assumption are all the Safety Related components that are installed in harsh environment. The detailed list of these components is in the EQDBA, the methodology to create this Database is described in Report KTE/AdJ/SAL/R106299 "Qualification of Design Base Accident resistant electrical Equipment", in paragraph 2.2 is indicated that the qualification requirements are according to the KTA and IEEE rules and reported in WV/Bge/R4284.

The report KTE/Adj/Rnh/R106190 - Verification of preconditions - Equipment Qualification, concludes that "Monitoring of the environmental conditions to which the SSCs are exposed is an important input for ageing management", although the revalidation of the analysis is based on a comprehensive program to ensure temperature and radiation during normal operation in the plant, is recommended an environmental monitoring program to detect change in environmental conditions that could affect to the TLAA revalidation analysis. This is considered as an issue E-3.

The LTOB-EQDBA contains the results of the revalidation of TLAA. The analysis has been projected to the end of the intended period of LTO (2034 as indicated in KTE/AdJ/SAL/R106299). For the components for which the residual lifetime is lesser than the intended period of LTO, should be correctly managed trough the Report PTLQ/2011/en/0018 in which is described the components that has a residual lifetime lesser than five years. Prior to this time, the plant should decide the corrective or compensatory measures to take. The Report KTC/MC/FN/R116317 establishes the list of components that the plant has decided to replace in the next five years. The rest of the components described in the Report PTLQ/2011/en/0018, are under the reanalysis process.

The EQDBA not only consider the end components also consider the complete component chain which has been identified as a good practice and is described below.

The result of the revalidation includes Technical Terms of Reference (EQDBA), justification of the computational model used (NGLE/2004/de/0032, NLTQ-G/2009/de/0068, NTLQ-G/2009/de/0065), calculation of the residual lifetime (Aurest DataBase) and conclusions for the components that required additional actions in the next five years (KTC/MC/FN/R116317, PRQ/2001/en/0018).

Although the revalidation analyses have been finalized the whole of the results is not in a final report as required by the IAEA Safety Standards, related to this topic has been identified a suggestion which is described as an issue E-2.

The plant has implemented the VOB Database which contains the ageing related experience feedback, this database is currently working and as example, is considered the special program to replace the capacitors (RPT-99-001) in the circuit boards in panels installed in the plant and as spare part. This program is under the maintenance department.

Finally, the follow up issue from previous mission, issue B1, is partially resolved.

The qualified life for 1E component installed in harsh environment has been revalidated and the recommendation R1 is closed. The EQDBA contains the results of this revalidation.

Regarding to the recommendation R2, the plant is working on it and has initiated a special program to replace capacitors on circuit boards, as described in RPT-99-001. The preventive maintenance program for active components is not finalized yet, and is not possible to know the whole replacement programs required to close this recommendation.

Presentation and interviews about following projects and activities connected with LTO were carried out:

- LTOB-EQDBA, Long Term Operation Bewijsvoering Equipment Qualification Design Basis Accidents.[EPZ].
- KCB Ageing Management Review. Catalog of Ageing Mechanism for Electrical Components (CAM-EC). [AREVA]. (PTLQ-G/2010/en/0031)
- KCB Ageing Management Review. Ageing Management Review to support Long Term Operation of KCB Electrical and I&C Systems, Structures and Components. [AREVA]. (PLTQ-G/2010/en/0038)
- Identification of components to be environmental qualified for harsh environment
- Survey of environmental conditions in the plant during normal operation
- Environmental qualification database including information about functional chains
- Method used to calculate qualified lifetime, AUREST-database
- Retrieval of data for material in installed components
- Identification of ageing mechanisms
- The Experience feedback system. VOB Database.
- LTOB-AMR. Long Term Operation Bewijsvoering. Ageing Managemet Review electrical. [EPZ].
- Description of the AMR Process for passive electrical components.(PESS-G/2010/en/0041)
- Identification of the stressors to be considered during the AMR.
- Development of LTO-AMR component Database.
- Description of the Scope and Screening process. (NPES-G/2008/en/0056), (NTCM-G/2009/en/0144).

- Identification of the passive commodity groups in the scope of the AMR.
- Identification of the components included in the LTO-AMR Database.
- Equipment Qualification. [EPZ).

Beside the scope the team has the following observations and comments:

Although in general terms the LTOB-projecs and AMR-electrical have been addressing with high performance, some activities should be highlighted:

- Some AMPs, although planned, have not been developed yet.
- A secure routine in the control of the environmental conditions in some specifics rooms have been required in order to ensure that the TLAA analyses remain valid during the entire period of the LTO.
- The plant has finished the Revalidation of TLAA analyses appropiately; the results of this work should be included in a verifiable and traceable report.

After the review the team found that the following areas need enhancements:

- Improve QA-process of the EQ Database.

As good performance the team recognized the methodology for Environmental Qualification based in Component Chain that actually is implemented in EQ-DB.

Documents and information used during the review were:

- PLTQ-G/2010/en/0038 "Ageing Management Review to support LTO of KCB Electrical and I&C SSCs"
- PTLQ-G/2010/en/0031 "Catalog of Ageing Mechanisms for electrical Components (CAM-EC)"
- PESS-G/2010/en/0041 "Ageing Management Review. Methodology Report"
- KTE/AdJ/RBn/R106151 "Verification of preconditions. Maintenance"
- KTE/Adj/Rnh/R106190 "Verification of preconditions. Equipment Qualification"
- KTE/AdJ/SAL/R106299 "Qualification of Design Base Accident resistant electrical Equipment"
- WV/Bge/R4284 "Vergellijking van de Kwalificatie-Beproevingsmethode van IEEE en KTA MET de Condities Van BS30"
- NGLE/2004/de/0032 "Beschrebung der im Funktionsketten-Tool der Aurest DatenBank verwendeten Berechnungsalgorithmen".
- PTLQ-G/2011/en/0018 "Berechungsergebnisse der Aurest-DatenBank"
- NLTQ-G/2009/de/0068 (not available)
- NTLQ-G/2009/de/0065 (not available)
- KTC/MCR/FN/FR116317 "Wijzigingsvoorstel. Verganging ongelvalsbestendige E&I componenten"
- NTCM-G/2009/en/0144 "Screening of relevant Structures and Components in the frame of the KCB LTO".
- PESS-G/2010/en/0051 "Ageing Management Review to Support Long Term Operation for KCB Safety-Related Auxiliary Systems"-

- NEPS-G/2008/en/0056 "Definition of the Scope of KCB Systems, Structures and components to be taken into consideration for the LTO."
- RPT-99-001 "Verdampen elektrolytische condensatoren"
- STRAT-KWAL "Strategie voor kwalificatie van veiligheidsrelevante componenten"
- N13-51-001 "E&I Veiligheidsklassering Kernenergiecentrale Borssele"
- EQ Database, VOB Database, LTOB-AMR Component, Aurest Database, BRS Database.
- Procedures and instructions (PU-A05-04, PO–A05.32, A05-32.001, PO-N12-81, PU-N01-07, PU-N12-19, PO-N12-77)
- Counterpart presentation and interview
- Plant Walk down.

2.1.6. Review of ageing management programmes and related TLAAs for civil structures and components

The review area covered:

Ageing management programmes for civil structures and related TLAAs:

- Scoping and screening of SSCs for LTO;
- Review of Ageing management programmes;
- Original TLAAs;
- Design Basis information;
- Revalidation of TLAAs;
- Maintenance programme;
- Concrete ageing;
- Data collection and record keeping.

The following topics were presented and discussed:

- The process by which the current Ageing Management review for LTO is taking place.

  This is described in more detail above in section 2.1.3.

- Status of the LTO Ageing Management Review project

  This is described in more detail above in section 2.1.3.

- Content of various plant and contractor technical documents related to the LTO Ageing Management Review project.

  General program documents are described in more detail above in section 2.1.3. For the civil area the documents specific to civil structure were reviewed in some detail. These were primarily AREVA Technical Report PESS-G/2010/en/0048 Rev. A : Ageing Management Review to Support Long-Term Operation for KCB Steel Containment Structure, AREVA Technical Report PEEC-G/2010/en/0083 Rev. A : Ageing Management Review to Support Long-Term Operation for KCB Structural

Scope, AREVA Technical Report PEEC-G/2010/en/0084 Rev. A : Catalog of Ageing Mechansims for Structural Components (CAM-SC), and EPZ Civil Frequency Substantiation Report N12-77-ONDC Rev. 8 "Onderbouwingsrapport van het civiele onderhoud". These documents were found to be substantial in nature and contained much pertinent information regarding ageing degradation mechanisms at Borselle and how they are addressed. In some cases discrepancies or omissions between documents were encountered, which the Counterpart was in general agreement with and indicated would be fixed in the next revision. The complete process for the LTO review had not been fully completed at the time of the mission, which may have accounted for some of the discrepancies.

Inspections related to civil structure ageing are primarily visual, as is the practice in most utilities.There does not appear a specific training program in place for inspectors or engineering staff re result interpretation.

- Recent technical issues related to civil/structural components

These were discussed in some detail with the Counterpart(s) and also the subject of the plant walkdown. Some major issues the plant had been dealing with (and are now completed) are:

- Need to refurbish the reactor concrete exterior wall and ventilation stacks (redoing of a repair done previously that did not last; the Counterpart indicated that there is better technology available today to effect such repaires)
- Repair to anchors in powerhouse basement
- Repairs to a oil pipe chase that had chronic leaks

Counterparts appear quite knowledge regarding the subject repairs and could produce inspection reports covering the history of the subject problem areas. There did not appear to be an integrated summary of all current issues and their status for the civil / structural area, nor an indication whether system health was getting better or worse.

- Conduct of Maintenance Program

A review of some recent maintenance practises and work packages was performed with the counterpart. The counterpart explained how surveillance is performed at the station, and how maintenance feedback is delivered to technical staff (mainly via morning meeting process). Monthly maintenance trend reports were jointly reviewed and discussed. It was noted that these trend reports primarily focussed on maintenance backlogs and not individual system health. The Counterparts indicated that EPZ was cosidering moving to an INPO AP-913 maintenance process but this was not yet confirmed by station management (was planned to be discussed in June). When reviewing a maintenance package, a non-safety related part substitution was described as being completed in the field. When question as to what engineering approvals had been obtained, the Counterpart indicated that since it was a simple change no engineering approval was needed. A separate Counterpart indicated later that upon review the minor change process should have been followed for that change.

- Population of Equipment Database for civil/structural components

  A Counterpart demonstrated in some detail how civil structures had been incorporated into the EPZ equipment database. Each civil structure component (wall, floor, etc.) has been input into the database using a unique equipment identification number. This allows for individual tracking of maintenance items and repairs.
  It was apparent that this database is use to initiate regular inspections of key structures. Time did not permit analysis of the extent to which this has been used as a surveillance tool (trending and tracking of program details), however as a mimimum the plant has been set up to be able to perform such tasks.

- Issues and processes related to plant modifications (this subject is discussed in review area "B", with the maintenance substitution issue being incorporated)

Presentation and interviews about following projects and activities connected with LTO were carried out:

- Ageing Management Overview (May 2, 2012)
- LTO Assessment : Scoping and Screening (May 3, 2012)
- Maintenance program (with Electrical Manager) (May 4, 2012). Typical work packages were reviewed, a description of the assessment and surveillance program was given, and a typical monthly maintenance package was reviewed. An issue with a parts substitution was uncovered that is described more fully under review area "B".
- Plant Walkdown – recent civil structural issues areas plus general familiarization (May 4, 2012). Notable areas reviewed were:
  - reactor building containment and ventilation stack rehabilitation repairs performed in 2007 to 2009 timeframe (followed earlier repair work done in 1998 that was not as long lasting/successful as anticipated)
  - Turbine Building Anchor failures brittle fracture
  - Turbine building oil pipe duct leak repairs
- Lifting beam rating identification
- Population and content of Equipment Database for Civil/Structural components
- Use of database for location of related procedures, frequencies, and technical data related to civil/structural inspections

Beside the scope the team has the following observations and comments:

Plant personnel interviewed in the civil / structural area appeared to have good working knowledge of civil structural technical issues and plant history.

After the review the team found that the following areas need enhancements:

1) Certain discrepancies were noted within the EPZ degradation mechanism project catalogue PEEC-G/2010/en/0084 and Ageing Management Reviews PEEC-G/2010/en/0083 and PESS-G/2010/en/0048 related to the civil/structural area.

   Certain degradation mechanisms appeared missing, degradation mechanisms for the spent fuel pool could be better described, implementation of a groundwater monitoring program was not yet in place, how hot spots were managed in the civil area was not clear, and OPEX reviews in some areas could have provided clearer conclusions.

2) There is a lack of centralized oversight for a system or component group (i.e. no System Engineer and/or Component Engineer role). This hinders the ability to ensure completeness of programs within a given area. This observation was not specific to the civil/structural area.

   Station procedures do not require engineering walkdowns by systems or component groups to be performed regularly. There is no central engineering oversight function in place on a system or component group basis that reviews performance trends, maintenance trends, ageing program implementation etc. of a given system or component grouping. Maintenance trending focuses on work management process metrics and not broad system health issues. Previous audits have identified a need for more detailed lower level reporting for issues that would be enhanced by system or component level oversight.

As good performance the team recognized that EPZ has made recent efforts to input its civil structures into the Borssele equipment database in a meaningful way.

Documents and information used during the review were:

- NRG Summary Report Ageing Management Review, NRG-22503/11.109273 Draft B1
- AREVA Technical Report PESS-G/2010/en/0041 Rev. A: Ageing Management Review Methodology Report
- AREVA Technical Report PESS-G/2010/en/0048 Rev. A: Ageing Management Review to Support Long-Term Operation for KCB Steel Containment Structure
- AREVA Technical Report PEEC-G/2010/en/0083 Rev. A: Ageing Management Review to Support Long-Term Operation for KCB Structural Scope
- AREVA Technical Report PEEC-G/2010/en/0084 Rev. A: Catalog of Ageing Mechansims for Structural Components (CAM-SC)
- AREVA Technical Report PESS-G/2010/en/0110 Rev. A: Ageing Management Review to Support Long-Term Operation for Remaining In-Scope Supports and Hangers
- EPZ Civil Frequency Substantiation Report N12-77-ONDC Rev. 8 "Onderbouwingsrapport van het civiele onderhoud"
- NRG Conceptual Document LTO "Bewijsvoering" KCB
- Mod Checklist PO-N13-30
- Small Mod Procedure PO-N13-26 Rev. 11 "Klein wijzigingen"
- Typical Modification Plan WP # WP-30-1737
- Modification Implementation Procedure PU-N13-05 Rev. 11 "Initiatie, beoordeing en realisatie van wijzigingen"

- Work package for PI replacement (supplied by Mtce Mgr).
- Various maintenance procedures related to pump lubrication, oil sampling, rebuild, logic testing (PB-TJ-004 Rev 19, WNW-TJ-011 Rev 3, PB-TJ-204 Rev 2, PB-PC-616 Rev 3)
- Draft Monthly Mtce Report March 2012 "Maandrapport KO maart 2012": KO/SCHOO/LKL/R122067
- Preventative Maintenance Strategy Document STRAT-OHD Rev. 7 "Strategierapport preventief onderhoud Kernenergiecentrale Borsele"
- PU-N07-02 Plant Walkdowns
- KEMA Report 50662488-TOS/DTI 06-5639, 2007-05-01, "Statusrapport 2006" (Inspection Report of Reactor Containment Building / Recommendations)
- Organization Chart "Organogram EPZ".

2.2. SPECIFIC RECOMMENDATIONS / SUGGESTIONS

2.2.1. Recommendations

- The plant should apply a more effective approach to improve human performance in a tangible manner.

- The team recommends to the plant that a documentation of the EPZ positions, in respect of the NVR-rules applicable to Long Term Operation and Ageing Management, are created. These documented positions shall be approved by EPZ.

- The team recommends to the plant that the Organizational structure and Staffing disposition, including numerals and knowledge, is reviewed and enhanced in order to be well adapted and developed for the proper handling of the work associated with Long Term Operation and Ageing Management

- The team recommends to the plant that the Management system documents, including all documents required to perform the Scoping and Screening work, are reviewed and amended in order to be well adapted and developed to handle all the issues involved in managing Long Term Operation and Ageing

- Define a managed process within the EPZ management system to address processing of technical documents prepared by external companies

- The plant should finalize the methodology for the assessment of active components for the LTO in line with the LTO B project schedule. SSR-2/2 (4.53-4.54), SSR No.57 (4).

- The plant should implement the methodology for the assessment of active components for the LTO before entering the LTO. SSR-2/2 (4.53-4.54), SSR No.57 (4).

- The scoping report should be revised to address comments C1 through C4 (a described in the C-2 issue sheet).

- The conceptual document NRG-22701/10.103460 should be revised and include actual information on the LTO process, such as the report "Detailed screening...". In this

connection the plant may also consider clarifying the scoping and screening reports titles in line with the IAEA recommendations, (SRS No.57, Section 4).

- A formal procedure should be followed to assess and modify ageing management program changes from the evaluation to the impact on the plant components.
- A review should be conducted to determine if other identified ageing mechanisms from the ageing management review have been removed from evaluation or been missed in implementation
- Implement a programme for monitoring environmental conditions that secure that the temperatures used in the ageing analyses over time stay conservative.
- Additional measures should be taken to prevent that ageing analyses of cables is performed with conservative temperature
- Perform revision of PEEC-G/2010/en/0084 or otherwise document a complete list of civil structural degradation mechanisms for use in EPZ LTO assessments. Perform specific spent fuel pool and security related degradation mechanisms ageing management review in PEEC-G/2010/en/0083 or other suitable document. Review methodology and report to disposition hot spot issue.
- Perform review, revision, and roll out of Borssele modification processes ensuring the following:
    - clear instructions exist for clarifying boundaries between parts substitutions, small modifications, temporary modifications, and large modification.
    - appropriate design oversight is applied to parts subsitutions and modifications (including temporary modifications) to ensure station design requirements, codes, standards, and program requirements are met,
    - modification processes ensure that required revisions to Borssele ageing management and other key site programs are assessed and implemented.

2.2.2. Suggestions

- The plant should consider proposing corrective actions including deadline for their implementation for the "points requiring attention" identified in the evaluation of safety factors 10 and 12.
- Suggestion is given to the plant to establish a common documented understanding with the regulator which NVR-rules should be selected and in what time perspective these different documented EPZ positions should be ready
- The team suggests to the plant to implement a document within the Management system which describes the Ageing Management strategy.

- Suggestion is given to the plant to develop a document within the Management system that describes the integration of the Ageing Management within the Long Term Operation
- INPO AP 913 represents a good international practice; the plant should consider its implementation in close coordination with LTO, in particular considering that the maintenance programme constitutes an essential part of ageing management at the plant
- The plant equipment database should have ageing management programs/mechanisms
- Add cavitation to the Ageing Management Catalogue of Ageing Mechanisms for Mechanical components and screen to determine if there are any susceptible components.
- Prepare AMPs for the passive commodity groups in line with the nine attributes.
- Prepare a report with the results of the revalidation analyses of the LTOB-EQDBA project.
- Consider implementing regular groundwater monitoring program or otherwise address implicit assumption that it is being done to detect potential degradation mechanism as per PEEC-G/2010/en/0084 section 4.3.1.4.
- Consider expediting implementation of AP-913 or similar process at Borssele for equipment, component, and programme surveillance.
- Further develop current metrics for maintenance oversight to allow for benchmarking other utilities/plants.

2.3. GOOD PRACTICES AND PERFORMANCE

2.3.1. Good practice

2.3. 1. 1. Use of risk matrix

A risk matrix developed at EPZ is used for identifying corporate risks related to EPZ strategic goals (safety, availability, finance, motivation of staff and compliance). Every quarter a report is prepared related to main corporate risks.

The Risk Matrix is also used for prioritizing safety issues. This enables the plant to optimally allocate resources and use available resources efficiently in resolving safety issues. Examples of other applications of the Risk Matrix or the risk assessment concept are:

- initial screening of events to determine the type of analysis;
- analysis Mixed Oxide fuel project;
- assessment of the modification of the service water system;
- assessment of the project on modifications related to three large plant cranes;
- assessment of an administration IT project;
- analysis of an event related to a high pressure injection pump (not formalised in matrix).

2.3.2 Good performance

2.3.2.1. Evaluation of training effectiveness

Training on human performance tools and safety culture uses a broad scope of case studies (other industry, external NNP experience, EPZ experience) to allow focus on actual tasks relating to work practices. Effectiveness of training sessions is evaluated in a comprehensive manner; the results of the evaluation are used to improve training.

2.3.2.2. Use of colour coding in the Periodic Safety Review - 10EVA13

Plant utilized comprehensive colour coding to visualize PSR results, illustrating and summarizing principal points of the project. Similar colour codes are used in documents to highlight safety importance of equipment, activities or focus areas, e.g. use of a risk monitor to quantify nuclear safety relevance and a colour scheme for license related codes & guides. The same colour code is used to show the functional relationships with other projects like LTO and IPSART, showing overlaps or deltas. This adds to the focus and coordination with respect to an important project such as the PSR.

2.3.2.3. TLAAs revalidation

The plant has made a substantial investment in revalidation of safety analyses that used time limited assumptions. The plant staff have a complete listing of applicable safety analyses and the updated results for the current and projected plant cycles. They have identified areas where they cannot demonstrate that the analyses meet the acceptance criteria for operation to 2034, but have a plan in place to address needed actions. Implementation of the FAMOS system will provide them with data to assist in demonstrating TLAA acceptability and will provide them with a tool to study plant operation and make improvements in ageing of components.

2.3.2.4. Chemistry programme

The chemistry programme review was handled very well. The plant staff were capable of demonstrating the recommended attributes of an effective ageing management programme. The interviewer determined that he would spot check acceptance criteria, operating experience, and trending. Plant staff were able to retrieve applicable documentation and had a good understanding of program implementation.

2.3.2.5. Component chain

In the EQ DataBase, not only the end component is registered with its environmental requirement, environmental data and qualification documentation information, but also all subcomponents such as connectors, connection cables, connection boxes, cable bushings, connection terminals, etc. are registered. The practice to register the complete component chain together with the end component is a comprehensive way to visualise all items needed to fulfil the required function during a DBA.

2.3.2.6. Civil structure integration into equipment database

EPZ has made recent efforts to input its civil structures into the Borssele equipment database in a meaningful way that supports maintenance, monitoring, and records. Each structure such as a floor, wall or door is input with unique equipment tag identification. Moreover equipment parameters such as seismic status (Yes/No), thickness, load bearing capacity, and others are loaded into the database, providing easy access to such data by station personnel. Such a level of detail is not found at all NPPs, with such information typically needing to be derived from other sources (design drawings, etc.)

3. ASSESSMENT OF THE SAFETY ISSUES

3.1.PRESENTATION AND TREATMENT OF THE SAFETY ISSUES

3.1.1. General

In this section of the report, the technical safety issues of the peer review performed by the IAEA Review Team, are presented in detail, following a standard format for all Engineering Safety Review Services.

The safety issues are presented in sequence and numbered, with an "*issue sheet*" specific for each safety issue. Basically, each "*issue sheet*" consists of the following sections:

For the first review mission on the subject:

(1) Issue Identification
(2) Issue Clarification
(3) Counterpart views and measures (self assessment by the counterpart)
(4) Assessment by the Review Team.

For the follow-up missions on the same subject (clarification: for each follow-up mission, new sections as 5 and 6 below are added, with sequential numbering):

(5) Counterpart actions
(6) Follow-up assessment by the IAEA Review Team.

In the Issue Clarification section of each "*issue sheet*", a clear reference to the relevant corresponding paragraph in the IAEA Safety Standards used in the review is indicated, as it was used for the review.

If, as an outcome of a follow-up mission, a new safety issue appears with respect to the previous ones, a new "*issue sheet*" will be generated.

3.1.2. Comments on Sections 3and 5 of "Issue Sheet"

The purpose of Sections 3 and 5 of the Issue Sheets is to reflect the views of and the measures taken by the Counterpart for the issue resolution, including the self-assessment.

3.1.3. Comments on Sections 4 and 6 of "Issue Sheet"

The purpose of Sections 4 and 6 of the Issue Sheets is to reflect the discussions with the Counterpart experts, to record the conclusions, to issue possible recommendations and to

synthesize the expert's judgment on the resolution of the safety issue under discussion. In the present mission, the issues and recommendations from previous missions are considered as basic reference for the review.

Therefore, in these sections, included are the comments, recommendations/suggestions and documents reviewed by the IAEA Review Team, resulting from the assessment performed during the mission. As a result of such assessment, "comments", "recommendations" and "suggestions" are provided on the basis of the following criteria;

Comments: They are a summary of the findings of the review performed and of the discussions during the mission, including at the end the conclusions on the status of the issue under consideration.

Recommendation: This gives advice of the external experts of the IAEA Review Team, provided in order to resolve a deviation from the IAEA Safety Standards and/or from the international recognized practice in the subject.

Suggestion: A suggestion either is an additional proposal in conjunction with a recommendation or may stand on its own following a discussion of the pertinent background. It may indirectly contribute to improvements in the reviewed subject but is primarily intended to make useful expansions to existing programmes and to point out possible superior alternatives to ongoing work.

Comments, recommendations and suggestions are numbered in a sequential order for further reference. The reviewed documents, corresponding specifically to the safety issue under consideration, are also listed.
Each recommendation and suggestion, whenever possible, is referenced to the relevant requirement/recommendation of respective IAEA safety standard, and other reference documents.

3.1.4. Resolution degree of the safety issues

The status of the safety issue under consideration is assessed and the respective "*resolution degree*" (RD) is assigned to reflects the judgment of the IAEA review team. The degree is scaled from 1 to 4, as indicated in the issue sheet form.
The urgency degree (UD) of the issue resolution should also be evaluated and indicated in the corresponding part of the issue sheet. Promptness in the resolution of the issue may be assessed through a scale of the UD, from I to II in relation to a specific deadline or critical event.
The first date in the RD and UD tables is the date when the issue is developed. The second date in the tables is the date when the status of the issue is checked during the follow-up mission.

3.1.5. Main structure for the reviewed issues

The following six (6) main "*Reviewed Areas*" are considered to group the issues identified during the IAEA Safety Review Missions, as follows:

Reviewed Area: A Management, Organization and Administration OSART Module

Reviewed Area: B Organization and Functions, Configuration/ Modification Management

Reviewed Area: C Safety analysis reports and existing plant programmes relevant for LTO

Reviewed Area: D Review of ageing management programmes and related TLAAs for mechanical SCs

Reviewed Area: E Review of ageing management programmes and related TLAAs for electrical and I&C components

Reviewed Area: F Review of ageing management programmes and related TLAAs for civil structures and components

The following table summarizes the situation of the issues:

Issue No.	**Issue Title**	**Rec.**	**Sug.**
Reviewed Area A: Management, Organization and Administration OSART Module			
A-1	Human performance improvement	**1**	-
A-2	Corrective actions for issues identified in evaluation of Safety Factors 10 and 12	-	**1**
Reviewed Area B: Organization and Functions, Configuration/ Modification Management			
B-1	Lack of guidance document, in respect of the Regulator licensing conditions rules (NVR-rules), related to Ageing Management and to some degree also for Long Term Operation.	**1**	**1**
B-2	Lack of Organizational structures, Staffing dispositions and Management system documents properly suited for managing Long Term Operation including Ageing Management	**2**	**2**
B-3	Practices Surrounding Parts Substitutions and Modifications Require Improvement.	**1**	-
B-4	Practices Surrounding Acceptance of Vendor Engineering Documentation.	**1**	-
Reviewed Area C: Safety analysis reports and existing plant programmes relevant for LTO			
C-1	Assessment of active components for LTO.	**2**	**1**

C-2	Scoping and Screening for LTO.	**2**	-
Reviewed Area D: Review of ageing management programmes and related TLAAs for mechanical SCs			
D-1	Implementation issues in applying the attributes of an effective ageing management program.	**2**	**1**
D-2	Ageing Management Catalogue of Ageing Mechanisms for Mechanical components should include cavitation.	-	**1**
Reviewed Area E: Review of ageing management programmes and related TLAAs for electrical and I&C components			
E-1	Plant programmes for ageing management is not documented in a systematic way	**1**	-
E-2	Establish final Documentation of revalidation analyses.	-	**1**
E-3	Ageing analyses not always proved to be conservative.	**2**	-
Reviewed Area F: Review of ageing management programmes and related TLAAs for civil structures and components			
F-1	Discrepancies Within Civil Ageing Management Review and Degradation Mechanism Project Catalogue.	**1**	**1**
F-2	Lack of Centralized Oversight of System / Component Programs.	-	**2**

All the new issue sheets are collected in Appendix III. It was a strong requirement of the counterpart that the "Urgency degree" should be assessed for the new issue sheets. Key dates for this assessment were provided by the counterpart.

All the issue sheets from the previous SALTO Mission in 2009 are collected in Appendix IV. They contain also "Counterpart actions" in section 5 and "Follow-up assessment by the IAEA Review Team" in section 6. "Status of the Issue" was not assessed during the SALTO Mission in 2009. That is why the "Resolution degree" is assessed only for a date of this Mission.

REFERENCES

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Ageing Management for Nuclear Power Plants, Safety Standards Series Safety Guide No. NS-G-2.12, IAEA, Vienna (2009).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Report Series No. 57, Safe long term operation of nuclear power plants, IAEA, Vienna (2008).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Final Report of the Programme on Safety Aspects of Long Term Operation of Water Moderated Reactors, IAEA, Vienna (2007).

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review of Nuclear Power Plants, Safety Standards Series Safety Guide No. NS-G-2.10, IAEA, Vienna (2003).

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, "Plant Life Management for Long Term Operation of Light Water Reactors", Technical Report Series No.448, IAEA, Vienna (2006).

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Equipment Qualification in Operational Nuclear Power Plants: Upgrading, Preserving and Reviewing, Safety Report Series No. 3, IAEA, Vienna (1998).

[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Design, Specific Safety Requirements No. SSR-2/1, IAEA, Vienna (2012).

[8] INTERNATIONAL ATOMIC ENERGY AGENCY, MSI, Safety Standards Series Safety Guide No. NS-G-2.6, IAEA, Vienna (2002).

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Chemistry Programme for Water Cooled Nuclear Power Plants, Specific Safety Guide No. SSG-13, IAEA Vienna (2012).

[10] INTERNATIONAL ATOMIC ENERGY AGENCY, SALTO Guidelines, Guidelines for peer review of long term operation and ageing management of nuclear power plants, IAEA Services Series No. 17, IAEA, Vienna (2008).

[11] Preparatory Meeting Report, Terms of Reference for Peer Review mission for Borssele Nuclear Power Plant in the Netherlands, IAEA, Vienna, Austria, 26–27 March 2009.

[12] The Meeting Minutes of The preparatory meeting between IAEA and Dutch counterparts for IAEA Peer Review activities on "Safe Long Term Operation (SALTO) for Borssele Nuclear Power Plant in The Netherlands (Second part)", IAEA, Vienna, Austria, 14–15 July 2011.

[13] The Meeting Minutes of The preparatory meeting between IAEA and Dutch counterparts for IAEA Peer Review activities on "Safe Long Term Operation (SALTO) for Borssele Nuclear Power Plant in The Netherlands (Second part)", Borssele NPP, Borssele, the Netherlands, 21 March, 2012.

[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review of Nuclear Power Plants, Draft Safety Standards Series Safety Guide DS426 Draft3, IAEA, Vienna, 27/11/2009.

[15] NRG-22701/10.103460 Conceptual Documents LTO "Bewijsvoering" KCB, NRG, 2011.

[16] INTERNATIONAL ATOMIC ENERGY AGENCY, Report, Peer Review Service on Safe Long Term Operation (SALTO Peer Review Service), "Peer Review Mission for Borssele NPP in the Netherlands", Borssele, the Netherlands, 8-13 November 2009.

[17] INFORMATION PACKAGE IAEA-SALTO PEER REVIEW 2012, Borssele NPP, Borssele, the Netherlands, March, 2012

[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants:, Commissioning and Operation, Specific Safety Requirements No. SSR-2/2, IAEA, Vienna (2011).

4. ABBREVIATIONS AND GLOSSARY FOR THE MISSION

AMAT	Ageing Management Review Team
AMP	Ageing management programme
AMR	Ageing management review
AREVA	Global nuclear power industry supplier which covers the fuel cycle, reactor design and construction, and related services
CFR	US Code of Federal Regulations
EBP	Extra budgetary fund of the IAEA (joined on voluntary basis)
EQ	Equipment Qualification
GALL	Generic Ageing Lessons Learned
IAEA	International Atomic Energy Agency
ISI	In-Service Inspection
I&C	Instrumentation & Control
KTA	Kerntechnisher Ausschuss – the German Nuclear Standard Commission
KWU	Kraftwek Union (former Siemens subsidiary)
LBB	Leak Before Break concept
LR	License Renewal
LTO	Long Term Operation
MOV	Motor Operated Valve
MS&I	Maintenance, Surveillance and Inspection
NEI	Nuclear Energy Institute
NPP	Nuclear Power Plant
NRC	Nuclear Regulatory Commission
P&ID	Piping and instrumentation diagram
PV&P	Pressure vessel and piping
PSR	Periodic Safety Review
RCM	Reliability Centred Maintenance
RPV	Reactor Pressure Vessel
RTD	Resistance Temperature Detector
SALTO	Safety aspects of LTO
SSC	Systems, structures and components
SC	Structures and components
SOV	Solenoid Operated Valve
TLAA	Analysis using time limiting assumptions (Time limited ageing analysis)

Ageing

General process in which characteristics of a structure, system or component gradually change with time or use.

Ageing Management

Engineering, operations and maintenance actions to control within acceptable limits ageing degradation and wear out of structures, systems or components.

- Examples of engineering actions include design, qualification, and failure analysis. Examples of operations actions include surveillance, carrying out operational procedures within specified limits, and performing environmental measurements.
- life management (or life cycle management) is the integration of ageing management with economic planning to: (1) optimize the operation, maintenance and service life of structures, systems and components; (2) maintain an acceptable level of performance and safety; and (3) maximize return on investment over the service life of the facility.

Design Basis

The range of conditions and events taken explicitly into account in the design of a facility, according to established criteria, such that the facility can withstand them without exceeding authorized limits by the planned operation of safety systems.

Design life

Period during which a System, Structure or Component is expected to function within criteria

Licensing Basis

A set of regulatory requirements, applicable to a nuclear facility.

Periodic Safety Review

A systematic reassessment of the safety of a nuclear power plant carried out at regular intervals to deal with the cumulative effects of ageing, modifications, operating experience, technical developments and site aspects that are aimed at ensuring a high level of safety throughout plant service life.

Analysis using time limited assumptions (TLAA)

Plant specific calculations and safety analysis (Time Limited Ageing Analysis or Residual Life Assessment) using time limited assumptions that are based on an explicitly assumed time of plant operation or design life. The licensee calculations and analyses:

- Involve systems, structures, and components within the scope of license renewal or life extension;
- Consider the effects of ageing;
- Involve time-limited assumptions defined by the current operating term, for example, 40 years;
- Were determined to be relevant by the licensee in making a safety determination;
- Involve conclusions or provide the basis for conclusions related to the capability of the system, structure, and component to perform its intended functions; and
- Are contained or incorporated by reference in the Current Licensing Basis.

APPENDIX II MISSION PROGRAMME

Day 1, Tuesday **01 May**	**PM**	Arrival of team members to airport. Transportation to the hotel from airport. Accommodation IAEA team briefing, preparatory activities Pre-meeting with counterparts (main counterparts)
Day 2, Wednesday **02 May**	**AM**	8:00 Departure from the hotel 8:30 – 9:30 Entrance procedure 09:30 – 12:30 IAEA team training
	PM	12:30 – 13:30 Lunch in NPP 13:30 Entry meeting Opening of the mission – representative counterpart Regulatory body expectations NPP manager - NPP expectations Objective and schedule – Team Leader Introduction of participants – both sides Methodology of review – Team Leader NPP – operational results, LTO activities – representative counterpart Initial Working Group meeting. Counterpart presentations 18:00 Departure to the hotel Official dinner with counterpart
Day 3, Thursday **03May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Parallel sessions- Groups A - F (review)
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 16:00 Parallel sessions - Groups A - F – interview and discussion 16:00 – 16:30 Preparation for Team meeting 16:30 – 17:30 Team Meeting with main counterpart (NPP+ELI) 18:00 Departure to the hotel
Day 4, Friday **04 May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Parallel sessions - Groups A - F – interview and discussion
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 14:00 Preparation for Team meeting 14:00 – 14:30 Team Meeting with main counterpart (NPP+ELI) 14:30 – 18:00 All the groups - Plant Walk-down (in 3 groups) 18:00 Departure to the hotel
Day 5, Saturday **05 May**	**AM**	Work day – Team meeting - discussion of interim review results Start draft Technical Notes,
	PM	Plant Organizes Social Activities
Day 6, Sunday **06 May**		Drafting of Technical Notes, bilateral discussions of team members, Team Meeting

Day 7, Monday **07 May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Parallel sessions - Groups A - F – interview and discussion
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 16:00 Parallel sessions - Groups A - F – interview and discussion 16:00 – 16:30 Preparation for Team meeting 16:30 – 17:30 Team Meeting with main counterpart (NPP+ELI) 18:00 Departure to the hotel
Day 8, Tuesday **08 May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Parallel sessions - Groups A - F – interview and discussion
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 16:00 Parallel sessions - Groups A - F – interview and discussion 16:00 – 16:30 Preparation for Team meeting 16:30 – 17:30 Team Meeting with main counterpart (NPP+ELI) - discussion of the overall findings 18:00 Departure to the hotel
Day 9, Wednesday **09 May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Team Meeting - Discussion of the draft report within the team
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 16:30 Preparation of the mission report 16:30 – 17:30 Team Meeting with main counterpart (NPP+ELI) 18:00 Departure to the hotel
Day10, Thursday **10 May**	**AM**	8:00 Departure from the hotel 8:30 – 12:30 Preparation of the mission report, counterparts review the draft simultaneously
	PM	12:30 – 13:30 Lunch in NPP 13:30 – 15:00 Discussion of the draft report with counterparts 15:00 – 16:30 Revision of the draft based on counterpart's comments 16:30 – 17:30 Agree the issues and recommendations/suggestions between the team and the counterparts 18:00 Departure to the hotel
Day 11, Friday **11 May**	**AM**	8:00 Departure from the hotel 8:30 – 10:30 Concluding session (all Counterparts/ IAEA team members) 10:30 – 11:30 Exit meeting - (including plant management, regulatory body and TSO) Opening by the host organization Overall conclusion of the review (Team Leader+DTL): 10 minutes Major findings (each reviewer): 6 * 5 (30) minutes Counterpart's remark (comparison against initial expectation - the representative counterpart): 10 minutes Speech by a plant management level: 5 minutes Speech by a regulatory body: 5 minutes Closing by the host organization Total about 60 minutes

	PM	12:00 – 13:00 Lunch in NPP 13:00 Transportation to the airport

Reference timetable:
AM: 8:30-12:00
PM: 13:00-16:00
Preparation for team meeting including arrangement for the next day with counterpart: 16:00-16:30
Daily IAEA team meeting with representative counterpart (max. 2 persons): 16:30-17:30

APPENDIX III - ISSUE SHEETS

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	A – 1
NPP: Borssele		
Unit: 1		
Reviewed Area: Management, organisation and administration		
Issue Title: Human performance improvement		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

The plant's efforts in the recent years to improve human performance have not resulted in tangible improvement.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

NS-G-2.11

II.10. Human performance is greatly affected by the management systems that are put in place to help workers perform well (e.g. in the planning and scheduling of work, training, supervision, work practices, written instructions and the work environment). When there are latent weaknesses in any of these systems, conditions may exist that are likely to lead to errors.

III.15.The analysis of events relating to human characteristics should include the causes and circumstances of any problems with human performance that contributed to the event. ...There may have been errors and human performance related issues in the areas of procedures, training, communication, engineering for human factors and the human–machine interface, management and supervision. The analysis should be sufficient to categorize the human performance issues.

I–19. The purpose of an analysis of the human factor aspects of an event is ... to understand the contributory and influencing factors that have led to an error.

GS-G-3.5

2.22. In developing a process for continually improving the safety culture in an organization, the following steps should be considered:

(c) Describing the desired safety culture;

(d) Assessing the existing culture;

(e) Communicating the results of the assessment to all personnel in the organization;

2.24. Once the desired future state is well understood, the present state of the safety culture should be assessed. The assessment should yield information on how the existing safety culture may help in achieving the desired new way of working and thinking. It should also identify any safety culture issues that could hinder the achievement of goals or the fulfilment of strategies, plans and objectives. A specific programme of change for the safety culture should then be designed to deal with these issues.

NS-G-2.8

5.24. Maintenance personnel should have access to mock-ups and models for training in those maintenance activities that have to be carried out quickly and cannot be practised with actual equipment.

4.5. The training needs for duties important to safety should be considered a priority ... For these critical duties, the training environment should be as realistic as possible, to promote positive carry-over from the training environment to the actual job environment.

4.15 (d) Training mock-ups and models should be provided for activities that have to be carried out quickly and skilfully and which cannot be practised with actual equipment. Training mock-ups should be full scale if practicable.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

The plant recognizes the issue and agrees on it. The comments will help to formulate an action plan to solve the recommendation.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Human error was the cause for 65% of plant events in 2011. The operating experience indicates that 27% of analysed events and even higher ratio of low level events and near misses have "personal work practices" as dominant contributor in 2011. Addressing this contributor could lead to efficient reduction of events with human performance related cause. Nevertheless the evaluation of human performance in Safety Factor 12 does not identify this situation as a point requiring attention. (The evaluation of training in safety culture in Safety Factor 10 concluded that "Continuous attention is to be paid to safety culture and instilled among employees in order to reduce the number of plant events with 'human performance' as the cause" however no analysis has identified that the major contributor to human errors

would be safety culture.)

The 2011 Annual Report on Operating Experience concluded: "Since 2004 it is realized that improvements are necessary in the area of work practice. It can be concluded that the work practice did not visibly improve in 2011. The events that occurred in 2011 did not present (structural) improvements in the general way of working."

C2) The WANO peer Review in 2008 concluded that plant management does not ensure that site events, low level events and adverse trends are rigorously identified, analysed and corrected. The stream analysis performed in the same year concluded that this area for improvement is almost a "driver", meaning that focusing on resolving this area the plant will also resolve several other areas for improvement which are symptomatic. The WANO Peer Review Follow up in 2010 concluded that in this problem has not received the appropriate level of priority. Lack of resources was told to be the cause of this situation. Human resources for event analysis were increased and backlog of event analysis has been reduced since then.

C3) The Annual Report on Operating Experience in 2009 and 2010 indicated that the most significant contributors to inappropriate personal work practices are: inattention to detail, lack of questioning attitude, task not adequately researched prior start and inadvertent bumping, stepping on or damage to equipment. The 2010 report first time included the full breakdown of contributors to inappropriate personal work practices along 18 causal categories. However this information on causal contributors to inappropriate personal work practices is not well known within the plant.

C4) The department heads of the plant expressed the following opinion how human performance could be improved:

- Better work preparation (implementation of the new work management process following INPO 928 will improve the situation);
- Reduced time pressure in work scheduling;
- Increased of supervisory monitoring at worksite;
- Implementation of work simulator.

C5) The training programme on improving work practices and safety culture includes modules on general safety awareness, situation awareness, communication, teamwork, monitoring/providing feedback and leadership. This is a comprehensive approach to manage improvement. However if analysis results concerning cause contributors (or root causes) of inappropriate personal work practices were better known within the plant, training on human performance tools and safety culture could be more focused and targeted on the most important contributors of inappropriate performance. The present practice is that line managers determine based on their experience which training modules have to be covered by which staff member.

C6) Implementing and/or improving practical training on actual tasks relating to working practices was identified by the plant self-assessment as a point requiring attention having medium safety significance. A potential improvement could be the establishment of a work practice simulator "loop flow simulator" with real equipment simulating realistic work

conditions. This could complement theoretical training with practice of work in realistic environment.

Audit point T-11/6 in the 2009-2011 biannual self-evaluation identifies lack of practical training facilities. The associated action is "purchase loop flow simulator". The action is considered to be closed, since maintenance and training departments have evaluated the subject and "investment plan was drafted and the investment is included into the investment list of 2012". However this initiative is only in the first phase of development, namely modification proposal.

C7) Safety culture self-assessment, independent assessment or survey has not been done at the plant, although continuous attention to be paid to safety culture is an issue identified in SF 10 as having high safety significance. Safety culture has not been identified as a cause for low level events and near misses and in negligible occasions for analysed events in 2011.

Audit point T-11-S5 in the 2009-2011 biannual self-evaluation concluded that "EPZ will consider the possibility to implement performance indicators to measure safety culture". This point was decided to be addressed jointly with point T-11/7 (referring to performance indicators at management level) by Technical Support (KD) Department by 31 December 2012. Limiting the assessment of safety culture to aspects of measuring and applying performance indicators would reduce the potential gain from this effort.

4.2 – RECOMMENDATIONS/SUGGESTION:

R1) The plant should apply a more effective approach to improve human performance in a tangible manner.

4.3 – DOCUMENTS REVIEWED:

Application to amend nuclear energy permit, Draft 20 March 2012

Borssele SALTO Information Package, section 14 Operational Experience

IAEA OSART Follow up mission report, 2007

WANO Stream Analysis REPORT, 2008

WANO Peer Review Follow up report, 2010

Training programme on improving work practices and safety culture, A11-23-N007, 20 February 2012

Operating Experience Annual Report 2009, 2010 and 2011

Self-evaluation for the 2009-2011 period

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.

II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**A - 2**
NPP: Borssele		
Unit: 1		
Reviewed Area: Management, organisation and administration		
Issue Title: Corrective actions for issues identified in evaluation of Safety Factors 10 and 12		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Corrective actions including deadline for their implementation for "points requiring attention" (issues) identified in evaluation of Safety Factors 10 (Organization, the management system and safety culture) and 12 (Human factors) are currently not available.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

GS-G-3.5

6.19. Managers should verify that issues for resolution that are identified in the self-assessment process are promptly entered into the corrective action programme or other tracking systems, to ensure that the resolution of issues is timely and is prioritized on the basis of their potential consequences for safety and reliability.

6.46. All forms of assessment, such as independent assessments, external assessments, assessments by the regulatory body and self-assessments, together with feedback from operating experience, are methods for the identification of issues, and they provide input to the corrective action process. The process can also be used to track issues that have been identified by any other means.

DS426

4.21. Findings from the reviews of safety factors should be evaluated and the timing of any proposed safety improvements should be determined. The proposed plan should recognize the need to implement safety improvements as soon as reasonable and practicable in accordance with the global assessment of safety at the plant (Section 6). 6.7. ... The safety improvements proposed in the global assessment should be included in the integrated implementation plan.

6.10. As part of the global assessment, the following matters should be examined:

- The time necessary for implementing corrective actions and/or safety improvements.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

The plant recognizes the issue and agrees on it. As part of the licensing procedure for LTO, the plant will propose a plan on how to deal with the 'points requiring attention' that have been identified during the evaluation of SF10 and 12. For prioritization use will be made of the risk matrix and the urgency.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) KFD requested the evaluations of Safety Factors 10 (Organization, the management system and safety culture) and 12 (Human factors) to be handled in the frame of the license renewal process. The evaluation report on SF 10 was already submitted to KFD, two points requiring attention are categorized as having high and four points as having medium safety significance. The evaluation report on SF 12 will be submitted to KFD in May 2012. The application for licence renewal is planned to be submitted in September 2012. Based on common sense such application in principle has to demonstrate, from the human and organisational point of view, the organisation's readiness to operate the plant for an extended period. This assumes identification of issues and indication of how they will be resolved. However corrective actions including deadline for their implementation for "points requiring attention" identified in evaluation of Safety Factors 10 (Organization, the management system and safety culture) and 12 (Human factors) are currently not available.

C2) For some points requiring attention (e.g. re-establishment of certification according to ISO 14000, improving quality of audits) plan for corrective action is being prepared in the plant and identifying the responsible organisation is quite obvious. However other points requiring attention, which are cross-cutting in the organisation (e.g. improving the effectiveness of management, management of change process, prioritising safety issues and improving safety culture), require more complex improvement effort and allocating responsibility and defining the reasonable timeframe for implementing the improvement is not a simple task.

C3) If the plant does not proceed with proposing corrective actions the resolution of the issues might be delayed and the plant may lose the initiative in selecting optimal corrective actions.

4.2 – RECOMMENDATIONS/SUGGESTIONS:
S1) The plant should consider proposing corrective actions including deadline for their implementation for the "points requiring attention" identified in the evaluation of safety factors 10 and 12.
4.3 – DOCUMENTS REVIEWED:
Application to amend nuclear energy permit, Draft 20 March 2012 Self-evaluation for the 2009-2011 period

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.

2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**B – 1**
NPP: Borssele		
Unit: 1		
Reviewed Area: Organization and Functions, Configuration/Modification Management		
Issue Title: Lack of guidance document, in respect of the Regulator licensing conditions rules (NVR-rules), related to Ageing Management and to some degree also for Long Term Operation		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

There is a lack of guidance document how EPZ intend to apply the Regulator licensing conditions rules (NVR-rules) in general and in particular for rules related to Ageing Management and to some degree also for Long Term Operation.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA-GS-R-3: 2.3, 2.18

IAEA-GS-G-3.1: 3.9, 3.13, 5.3

IAEA-GS-G-3.5: 2.1

IAEA-NS-G-2.12: 3.2

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

This observation is correct. The implementation of the newly released NVRs is not ready yet but will be done within the ongoing PSR project. The regulator informally agreed with this process and its timeline but this agreement has not been formally documented until now.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) An essential part of the interface with the Regulator is to establish application guides in respect of the Regulator license conditions, including rules and documents which are pointed out by the Regulator.
However there is a lack of EPZ guidance document which applies in general to the Regulator licensing conditions rules (NVR-rules) and in particular, within the interest of the team, to the rules related to Ageing Management and to some degree also for Long Term Operation. A large number of such rules were added in the latest license conditions (end of 2011) and most of these rules are more or less blue-prints of IAEA standards and guides. There is currently the plan to assess and clarify EPZ's position in relation to the rules, within the on-going PSR work (to be finished at the end of 2013).
However, as only a conceptual guidance or position clarification document [2] exists today for Long Term Operation and none for Ageing Management, there is no solid base for the proper handling of these issues.
The current license conditions situation is compiled in an EPZ document [1] where many IAEA standards and guides are shown to be incorporated as NVR-rules, several of them relevant to Long Term Operation and Ageing Management.

C2) The current license conditions are, based on a review of [1] thus deemed by the SALTO peer review team, to contain a sufficient regulatory base for a proper implementation of Long

Term Operation and Ageing Management. However, it is deemed necessary to establish a common documented understanding of EPZ's position, in respect of the relevant NVR-rules, in order to be able to create a base for the development of Management system documents and Technical documents for the proper handling of Long Term Operation and Ageing Management. Such documents are currently not in place for Ageing Management. Regarding Long Term Operation only a conceptual document [2] is in place.
4.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** The team recommends to the plant that a documentation of the EPZ positions, in respect of the NVR-rules applicable to Long Term Operation and Ageing Management, are created. These documented positions shall be approved by EPZ. **S1)** Suggestion is given to the plant to establish a common documented understanding with the regulator which NVR-rules should be selected and in what time perspective these different documented EPZ positions should be ready.
4.3 – DOCUMENTS REVIEWED: 1. KEW-vergunning BS30 version 9, dated 2 April 2012 2. Conceptual Document LTO "Bewijsvoering"KCB, NRG-22701/10.103460, dated 9 September 2012

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			Date: 11/05/2012	Date: D2/M2/Y2
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**B – 2**

NPP: Borssele
Unit: 1
Reviewed Area: Organization and Functions, Configuration/Modification Management
Issue Title: Lack of Organizational structures, Staffing dispositions and Management system documents properly suited for managing Long Term Operation including Ageing Management.

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

There is in general a lack of Organizational structures, Staffing dispositions and Management system documents which are well adapted and developed for the proper handling of all the issues involved in managing Long Term Operation Ageing Management. The issue of not having all documents in place applies also specifically to the handling Ageing Management and Scoping and Screening.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA-GS-G-3.1: 2.42

IAEA-GS-G-3.5: 3.1

IAEA-NS-G-2.11: 4.2, 4.4, 4.6

IAEA-NS-G-2.11: 2.6, 2.8

IAEA-SSR-2/2: 3.2, 4.50, 4.53

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

This observation is correct. The basis for the missing Management system documents has been defined within the LTO project. These recommendations and suggestions support the work that still has to be performed in order to structure it within the organization and the management system.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Essential parts necessary for the proper management of Long Term Operation, including the Ageing Management, are that responsibilities and duties are clearly described in the Management system documents and that the Organization is well adopted in terms of

structure and staffed with enough personnel having the appropriate qualifications.

C2) The present Organizational structure [1] and Staffing disposition results in that the work associated with Long Term Operation and Ageing Management is too spread out and inadequate in order to enable a good focus on these issues. The concern is acknowledged by the EPZ management but so far no actions have been initiated to correct these shortcomings.
Examples are:
-The capability of the "Engineering" department to deal with all Long Term Operation issues, including Ageing Management, is handled only by five (5) people. Additional outside contractors and other personnel with specific knowledge from other departments, has to be utilized to a large degree.
-Specification for plant modifications, including change management, are performed both by "Construction" department (for larger changes) and by the "Maintenance" department (for smaller changes).
-Review of detail design (made internally or externally) is similarly spread out. The limited capability of the "Construction" department to perform design reviews results in the need to use also other departments.

C3) The Management system documents are not well adapted and developed to handle all the issues involved in managing Long Term Operation Ageing Management.
Examples are:
-The formal responsibility for Ageing Management feedback was found in a sub-document (ref doc. PU-N12-19) to the tasks description for the Maintenance department KO (ref doc. HP-N12). However, responsibility for the doc. PU-N12-19 is department KTE (approved by head of dept. KT). Also a few other maintenance Management system documents, related to Ageing Management feedback and LTO-assessment, are within the responsibility of dept. KTE.
- The procedure for reviewing detailed design, done by the engineering department KTC, lacks the requirement of having a formalized release and authorization of a detailed design (or part of a design, e.g. a detailed design package).
-The procedure for reviewing commissioning programs was lacking the review of the engineering department KTC which is responsible for basic engineering (i.e. responsible for the design requirements).

C4) In order to properly handle specifically the Ageing Management issues (being part of handling Long Term Operation issues) a documented strategy for Ageing Management should be in place. However, no documents exist within the Management system describing the strategy for neither implementing nor maintaining an Ageing Management strategy.
Such strategy documents exist for Surveillance, In Service Inspection and Maintenance, but not explicitly for Ageing Management.

C5) An integrated view and management attention has to be put on the integration of Ageing Management within Long Term Operation.
However, no documents, within the Management system, describing the integration of the Ageing Management within the Long Term Operation exists.

C6) In order to be able to properly handle specifically Scoping and Screening, all documents required to perform the Scoping and Screening work has to be in place, as part of the plant Management system documents. However, the existing important Scoping and Screening

documents [2] and [3] are only project documents and not even all the project documents intended to be issued are in place.
Examples of such documents are the document for detailed screening of mechanical components [4], and a document [5] relating the intended conformity check with US NRC "maintenance rule" (US NRC 10CFR50 §50.65 (a)(4) and/or US NRC RG 1.160 and RG 1.182), for the assessment of active components.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1). The team recommends to the plant that the Organizational structure and Staffing disposition, including numerals and knowledge, is reviewed and enhanced in order to be well adapted and developed for the proper handling of the work associated with Long Term Operation and Ageing Management.

R2). The team recommends to the plant that the Management system documents, including all documents required to perform the Scoping and Screening work, are reviewed and amended in order to be well adapted and developed to handle all the issues involved in managing Long Term Operation and Ageing.

S1). The team suggests to the plant to implement a document within the Management system which describes the Ageing Management strategy.

S2). Suggestion is given to the plant to develop a document within the Management system that describes the integration of the Ageing Management within the Long Term Operation.

4.3 – DOCUMENTS REVIEWED:

1. Organogram EPZ (intranet based document)
2. AREVA Work Report NEPS-G/2008/en/0056, dated 27 February 2011
3. AREVA Work Report NTCM-G/2009/en/0144, dated 6 November 2011
4. AREVA Work Report PESS-G/2011/en/0147 rev A, not yet released
5. Assessment of Active Components with regard to Long Term Operation preliminary draft not yet released

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		

6.2 – RECOMMENDATIONS/SUGGESTIONS:
R1) n.a.
S1) n.a.
6.3 – DOCUMENTS REVIEWED:
n.a.

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	B – 3
NPP: Borssele		
Unit: 1		
Reviewed Area: Organization and Functions, Configuration/Modification Management		
Issue Title: Practices Surrounding Parts Substitutions and Modifications Require Improvement		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Processes and practises surrounding the implementation of plant modifications appear to be applied inconsistently. The modification process when applied does not ensure that key station programs such as ageing management are updated to ensure safe, long term operation of the power plant.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA Safety Standard Safety Guide No. NS-G-2.3

4.8. An initial safety assessment should be carried out before starting a modification to determine whether the proposed modification has any consequences for safety and whether it is within the regulatory constraints for the plant design and operation.

IAEA Safety Standard Safety Guide No. NS-G-2.12 Section 3

3.7 Appropriate measure should be taken or design features should be introduced in the design stage to facilitate effective ageing management throughout the lifetime of the plant...
3.8 In the design:
...All potential ageing mechanisms for passive and active SSCs should be identified, evaluated and taken in account.

IAEA Safety Standard Safety Guide No. NS-G-2.12 Section 6.4

Requirements for modifications of existing plant programmes and development of any new programmes should be identified and implemented.

IAEA Safety Reports Series No. 57 Section 7.

Documentation supporting LTO includes:

(g) Revisions to exisiting plant programs and procedures, and any new plant programmes identified as being required to support safe LTO

IAEA Safety Reports Series No. 57 Section 5.4.

A proper LTO assessment demonstrates whether the effects of ageing will be adequately managed...."

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

The modification process should be enhanced. This was already noticed by EPZ before the peer review mission. The establishment of two new departments (KTC and KQ) during the last year proves this. EPZ was also already redefining tasks, responsibilities and processes to enhance the management of modifications in a way that fits the new organizational structure. The recommendation made by the SALTO team in respect to modification management supports this ongoing work.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Inconsistencies were noted with respect to practices and approvals required for parts substitutions during discussions with counterparts. Some examples are noted below. It should be noted that there may be a human performance element at work in some examples, however the existance of procedural ambiguity is a potential contributer and may in fact have been the cause of the HP error(s).

-substitution of a pressure indicator (PI) by Maintenance with a different make/model on non-safety related system without following small modification process

-description by counterpart of case where Maintenance organization replaced a ventilation system fan with a heavier model without following a modification process

-indication by counterpart that examples of software version changes and/or setpoint changes have entered the plant without modification process having been followed (especially for non-safety related equipment)

C2) Temporary modification process used by the station is not considered part of the plant configuration management program (is wholly owned by Operations without formal design oversight).

C3) There is no link between the modification processes and revisions to key station programs such as ageing management (e.g. Modification Planning Checklist PO-N13-30 does not contain linkages).

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Perform review, revision, and roll out of Borssele modification processes ensuring the following:

-clear instructions exist for clarifying boundaries between parts substitutions, small

modifications, temporary modifications, and large modification. -appropriate design oversight is applied to parts subsitutions and modifications (including temporary modifications) to ensure station design requirements, codes, standards, and program requirements are met, -modification processes ensure that required revisions to Borssele ageing management and other key site programs are assessed and implemented.
4.3 – DOCUMENTS REVIEWED: • Mod Checklist PO-N13-30 • Small Mod Procedure PO-N13-26 • Typical Modification Plan WP # WP-30-1737 • Modification Implementation Procedure PU-N13-05 • Work package for PI replacement (supplied by Mtce Mgr).

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE	**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**

1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**B - 4**
NPP: Borssele		
Unit: 1		
Reviewed Area: Organization & Functions, Configuration/Modification Management		

Issue Title: Practices Surrounding Acceptance of Vendor Engineering Documentation

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

There is no process to formally document acceptance or concurrence of engineering or technical documents completed on behalf of EPZ by an external company. Status of such documents within the EPZ design basis is thus unclear.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA Safety Reports Series No. 57 Section 7 Documentation

The documents are subject to the approval of senior plant management....

IAEA Safety Standard SSR-2.1 Safety of Nuclear Power Plants : Design

2.16. The prime responsibility for safety rests with the person or organization responsible for facilities and activities that give rise to radiation risks (i.e. the operating organization)

2.18. The management system requirements that are placed on this formally designated entity would also apply to the responsible designers. However, the overall responsibility for maintaining the integrity of design of the plant would rest with the formally designated entity, and hence, ultimately, with the operating organization.

IAEA Safety Report No 65. Application of Configuration Management in Nuclear Power Plants

3.2.1 .....The nuclear plant must bear in mind that they are the design authority for all plant modifications, with final responsibility for plant safety and operation, regardless of utilizing outside vendors or contractors. .....

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

The observation is correct, there is no formalized process to document reviews and acceptance of documents that have been issued by contractors on behalf of EPZ. It was already identified by the EPZ before that the review of the detailed engineering documents must be formalized.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) There appears to be no process to formally document acceptance or concurrence of engineering or technical documents completed on behalf of EPZ by an external company. External engineering support personnel may not have sufficient plant knowledge or experience to perform such work to the required quality level without the involvement of EPZ staff. There is evidence that EPZ staff members are involved in document reviews but it is unclear at which stages and by which personnel. In the absence of a formal technical acceptance process, the status of documents approved outside of EPZ is unclear (may be a design basis document or not etc.)

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Define a managed process within the EPZ management system to address processing of technical documents prepared by external companies.

4.3 – DOCUMENTS REVIEWED:

Note: documents below were reviewed. Counterpart has indicated that an EPZ review process did occur for these LTO related documents. It is not apparent from the documents themselves however who did the review and how this process was implemented.

AREVA Technical Report PESS-G/2010/en/0110

AREVA Technical Report PESS-G/2010/en/0048

NRG Conceptual Document LTO "Bewijsvoering" KCB

5. COUNTERPART ACTIONS	Date:	

n.a.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	

6.1 – COMMENTS:

C1) n.a.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

n.a.

6.3 – DOCUMENTS REVIEWED:

n.a.

STATUS OF THE ISSUE			**Date: 11/05/2012**	**Date: D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	C - 1
NPP: Borssele		
Unit: 1		
Reviewed Area: SAR and existing plant programmes relevant for LTO		
Issue Title: Assessment of active components for LTO		

2. ISSUE CLARIFICATION
2.1 - ISSUE DESCRIPTION The methodology to assess active components for LTO has not been finalized and implemented by the plant.
2.2 - REFERENCE TO IAEA SAFETY STANDARDS • IAEA Safety Standards, Specific Safety Requirements, Safety of Nuclear Power Plants: Commissioning and Operation, SSR-2/2 • IAEA Safety Report No. 57 – Safe LTO on NPPs • IAEA NS-G-2-12 – Ageing management for NPPs
3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)
EPZ agrees with this issue and its comments.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) The plant is developing a methodology for the assessment of active components for the LTO. At present the methodology is available only as a first draft. The draft methodology, in particularly its objective and approach, appears to address the issue. The plan to finalize the draft methodology is ambitious and the associated schedule with respect to LTO application deadline rather tight.

C2) The plant intends to implement the methodology for assessing the active components for the LTO after its finalization. This appears to be even more demanding task than the methodology finalization (considering that the plant will enter LTO at the end of 2013).

C3) The plant intends to implement the equipment reliability work process. The INPO AP913 is considered as a guideline for this activity.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) The plant should finalize the methodology for the assessment of active components for the LTO in line with the LTO B project schedule. SSR-2/2 (4.53-4.54), SSR No.57 (4).

R2) The plant should implement the methodology for the assessment of active components for the LTO before entering the LTO. SSR-2/2 (4.53-4.54), SSR No.57 (4).

S1) INPO AP 913 represents a good international practice; the plant should consider its implementation in close coordination with LTO, in particular considering that the maintenance programme constitutes an essential part of ageing management at the plant.

4.3 – DOCUMENTS REVIEWED:

Conceptual document LTO "bewijswoering" KCB, NRG-22701/10.103460, 2011.

Screening of relevant structures, and components in the frame of the KCB LTO process, NTCM-G/2009/en/0144, Rev.B, 2011.

Draft Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process, PESS-G/2011/en/0147 Rev.A, 2012.

Draft report Assessment of active components with regards to LTO. No number yet.

5. COUNTERPART ACTIONS	Date:	

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*		
		No progress in the resolution of the issue, or unsatisfactory resolution.		
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	X	
		The issue was identified by the Counterpart and work has started to resolve it.		
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.

III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**C - 2**
NPP: Borssele		
Unit: 1		
Reviewed Area: SAR and existing plant programmes relevant for LTO		
Issue Title: Scoping and Screening for LTO		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

The scoping methodology appears incomplete with respect to the criteria provided in the IAEA recommendations, in particular with respect to electrical and I&C, and civil items. The conceptual document NRG-22701/10.103460 developed does not describe the scoping and screening process correctly.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

- IAEA Safety Standards, Specific Safety Requirements, Safety of Nuclear Power Plants: Commissioning and Operation, SSR-2/2
- IAEA Safety Report No. 57 – Safe LTO on NPPs
- IAEA NS-G-2-12 – Ageing management for NPPs

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

Update of relevant LTO-B documents will be initiated, taking care that it becomes clear that the applied methodology did comply with the IAEA Safety Report No. 57 scoping criteria. Information that was lost in the preparation phase of the scoping documents will also be incorporated.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) The scoping procedure does not describe the approach used for scoping of civil components and structures but provides only a table of buildings scoped in without any explanation. It is not indicated in the text describing scoping of SSCs, if e.g. the table includes all plant buildings and no reference is made to Ref [4] of the scoping report NEPS-G/2008/en/0056, Rev.B that deals with the subject.

C2) The results of the scoping for electrical and I&C items provided in the Appendix 2 of the report appear incomplete. Only items in class 1E and 1A appear to be considered. For example, process computers are not considered in the scoping report NEPS-G/2008/en/0056, Rev.B, steam generator level control is not included in the scope in the scoping report NEPS-G/2008/en/0056, Rev.B, even though it should be as per item S3i.

C3) It appears that the scoping and screening is based rather on safety classification methodology than on dedicated scoping criteria developed for LTO assessment for the electrical and I&C SSCs.

C4) The report does not provide conclusions stating that the scoping criteria used provide for equivalent scope as outlined in the IAEA SRS No.57, i.e. the basic safety functions, non-safety related SSCs failure of which may impact on the basic safety function, and SSCs that are credited in safety analysis to mitigate certain type of events, and, justifying differences if applicable.

C5) The conceptual document NRG-22701/10.103460 does not incorporate the draft report "Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process", PESS-G/2011/en/0147 Rev.A in the description of the LTO process.

C6) The report "Screening of relevant structures, and components in the frame of the KCB LTO process", NTCM-G/2009/en/0144, Rev.B deals, in the sense of the IAEA SRS No.57, with scoping rather than with screening. The actual screening as per the the IAEA SRS No.57 IAEA is described in the draft report on "Detailed Screening ...", PESS-G/2011/en/0147 Rev.A that deals with both passive and active mechanical components.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) The scoping report should be revised to address comments C1 through C4.

R2) The conceptual document NRG-22701/10.103460 should be revised and include actual information on the LTO process, such as the report "Detailed screening...". In this connection the plant may also consider clarifying the scoping and screening reports titles in line with the IAEA recommendations, (SRS No.57, Section 4).

4.3 – DOCUMENTS REVIEWED:

- Conceptual document LTO "bewijswoering" KCB, NRG-22701/10.103460, 2011.
- Definition of the scope of KCB systems, structures, and components to be taken into consideration for the LTO process, NEPS-G/2008/en/0056, Rev.B, 2011.
- Screening of relevant structures, and components in the frame of the KCB LTO process, NTCM-G/2009/en/0144, Rev.B, 2011.
- Draft Detailed Screening of relevant mechanical Structures and Components in the frame of the KCB Long-Term Operation Process, PESS-G/2011/en/0147 Rev.A, 2012.
- AMR PESS-G/2010/en/0044
- AMR Methodology Report, PESS-G/2010/en/0041

5. COUNTERPART ACTIONS	Date:	

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	X	
		No progress in the resolution of the issue, or unsatisfactory resolution.		

2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		
		The issue was identified by the Counterpart and work has started to resolve it.		
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**D - 1**
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for mechanical SCs		
Issue Title: Implementation issues in applying the attributes of an effective ageing management program.		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

EPZ has only a limited number of ageing management programs identified. The remaining ageing programs are implemented within the normal plant operational structure. This implementation method provides opportunities for errors of omission to be introduced through multiple responsible individuals/organizations.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

NS-G-2.12- Reference paragraphs noted below.

4.26 The results of ageing management review should be documented in a report. Application of recommendations should be provided in review of operation, maintenance and design.

4.35 The operating organization should be made responsible for implementing ageing management programs.

4.37 Implementation should include periodic reporting on the performance of structures.

4.38 Appropriate data should be collected and recorded to provide a basis for decisions on the type and timing of ageing management actions.

4.39 The life of equipment should be reassessed during its lifetime with account taken of the progress in knowledge.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

To our opinion this issue is related to a misunderstanding of the AMR review and the procedure how to handle recommendations coming from the AMR review.

Remark on C1)

In reference 1 can indeed be found that FAC is identified as relevant ageing mechanism for feedwater nozzle. Based on a comprehensive AMR (reviewed by EPZ) AREVA recommends to do a FAC screening analysis for this location. On the basis of the result of this analysis it can be determined if this location should be included in the scope of the existing FAC-program. EPZ acknowledges this AREVA recommendation as can be seen in the (draft) AMR summary report (reference 2) were it is confirmed that and how EPZ will implement this recommendation. The final AMR summary report will be delivered to the regulator and all the recommendations together with possible extra recommendations based on regulatory review, will result in a list of obligations which have to be fulfilled in respect of the LTO license change application. Because we are still in the middle of a regulatory review and this is no urgent action (as stated in reference 1), this recommendaton (FAC screening-analysis) is not fulfilled yet.

Remark on C2)

To our opinion the suggestion of SALTO PR of 2009 is fulfilled ("Consideration should be given by the plant to thoroughly determine significance of possible ageing degradation for the

RPV support. Justification of the determination should be described in the AMR report. This suggestion should be applied to SCs which can not be directly inspected.").

In the mentioned AMR report (PEER-G/2011/en/0071, Ageing Management Review to Support Long-Term Operation for KCB Primary Component Supports, Rev A, 22.12.2011.) the technical basis for not doing an inspection is given on page 93. The argument is given why the (high-dose) inspection can be safely excluded. This inspection-issue is discussed in the AMR regarding the ageing mechanism 'concrete shrinkage'. Because of the fact that no recommendation is given to do the inspection this inspection is also not mentioned in the (draft) AMR summary report.

To our opinion a transparant and thorough AMR and following implementation process is ongoing.

We don't recognize weaknesses based on the two comments, and therefore don't agree on the recommendations R1 and R2.

The recommendations from the AMR will be implemented and will be part of the LTO license application.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) EPZ has only a limited number of ageing management programs identified. The remaining ageing programs are implemented within the normal plant operational structure. In checking the effectiveness of this structure a sample FAC mechanism and location were identified to evaluate the effectiveness of the process. For the purpose of this review, the feedwater nozzle and pipe were selected. Reference 1 below (Ageing Management Review) indentified FAC as an ageing mechanism for these locations. This mechanism and location were also confirmed within Ref. 2. Thus with the mechanism identified, the EPZ staff was asked to provide a history of inspections with the corresponding results including baseline inspections, and on-going trending. This item was identified early in the assessment of ageing management implementation. No document was provided until that summarized the assessment status such that another implementation activity could be chosen. The tracking of implementation could not be demonstrated for this mechanism. Late in the review through discussion with plant staff it was determined that this program is an open item that will be determined later. The staff provided verbal discussion that it had concluded based upon chemistry control FAC inspection was not necessary previously, but would be dealt with in LTO. No open item list was available for review to show the tracking of the open item. This shows a lack of systematic assessment of the implementation of required inspections.

C2) Follow-up on finding C-2 from 2009.

The 2009 SALTO review had identified a similar issue with identification of an ageing mechanisms and then the required inspection that was not implemented. In the 2009 instance

a basis was provided to justify not requiring the inspection. The elimination of the inspection was continued during the LTO in document 1 for the reactor support. Since this was previously identified in 2009 SALTO some effort to resolve should have been documented.

Quote from the 2009 SALTO Issue follows "Consideration should be given by the plant to thoroughly determine significance of possible ageing degradation for the RPV support. Justification of the determination should be described in the AMR report. This suggestion should be applied to SCs which can not be directly inspected."

For the current SALTO review a follow-up review of past issues was conducted by review of the program documents. The ageing management review, ref. 1 (6.7.1.2) identifies Boric Acid Corrosion as a relevant ageing mechanism for surfaces of the primary RPV support. In ref. 1 (6.1) Concrete shrinkage is identified as a relevant mechanism for the primary supports.

Ref. 1, (7.2.2) Notes that an inspection was performed in 1993 showed that no unequal expansion had taken place.

Ref. 1 (8.2.1) States for loss of clearance, It is also recommended to check the clearance of primary component support guides and whip restraints during cold and operating conditions. Later in the paragraph it notes that the inspection is extremely difficult due to inaccessibility and high dose rate. It states that checking of clearances in not recommended.

Reference 2 reflects the elimination of the RPV support inspection. The summary table for RPV list the support block welds, but does not include the clearance check or does not list Boric acid corrosion inspection.

It light of the twenty year period since the last inspection and the improved inspection tools and methods, this elimination of inspection of the clearance inspection should be re-evaluated. The basis for elimination of the inspection as documented is weak and shows a lack of questioning attitude and a willingness to accept writing off a critical inspection without consideration of alternate means of accomplishing the task. In addition the inspection for boric acid corrosion that was identified in the ageing management review for the component seems to have been lost in the process. This inspection should be listed as an ageing mechanism for the reactor support.

There appears to be a weakness in the plant process from the identification of an applicable degradation mechanism to the implementation of the appropriate ageing management inspections and may be susceptible to missing required inspections, trending, and documentation.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) A formal procedure should be followed to assess and modify ageing management program changes from the evaluation to the impact on the plant components.

R2) A review should be conducted to determine if other identified ageing mechanisms from the ageing management review have been removed from evaluation or been missed in implementation.

S1) The plant equipment database should have ageing management programs/mechanisms identified and tracked for required inspections.

4.3 – DOCUMENTS REVIEWED:

1. PESS-G/2010/en/0044, Ageing Management Review to Support Long- Term Opeation for KCB Steam Generators, Rev A, 07.10.2011
2. NRG-22503/11.109273, Draft Summary report Ageing Management Review, April 2012
3. Plant staff written summary of response to request for applicable program data.

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.

3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**D - 2**
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for mechanical SCs		
Issue Title: Ageing Management Catalog of Ageing Mechanisms for Mechanical components should include cavitation		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Localized wall thinning due to cavitation is not identified as a mechanical ageing mechanism. This mechanism has caused localized thinning and through wall leakage near pumps and flow orifices.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

NS-G-2.12

4.20 Ageing of structures and components should address materials, stressors, and the environment, ageing mechanisms of concern, and sites of degradation available, etc for predicting future degradation.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

EPZ agrees on the issue.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Cavitation is a local wall thinning mechanism that may occur near throttle valves or pumps. It has caused through wall leaks in cooling systems with carbon steel piping. It may be considered as one type of FAC mechanism in the mechanical ageing review report, reference 1 below.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Add cavitation to the Ageing Management Catalogue of Ageing Mechanisms for Mechanical components and screen to determine if there are any susceptible components.

4.3 – DOCUMENTS REVIEWED:

1. PTCM-G/2010/en/0043, Catalog of Ageing Mechanisms for Mechanical Components (CAM-MC), Rev A, 04.05.2011
2. NRG-22503/11.109273, Draft Summary report Ageing Management Review, April 2012

5. COUNTERPART ACTIONS	Date:	

n.a.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.

II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**E - 1**
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for electrical and I&C components.		
Issue Title: Plant programmes for ageing management is not documented in a systematic way		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Currently the ageing management for the different commodity groups is described in different maintenance procedures, in order to get the ageing management more auditable specific AMP should be developed for the passive commodity groups.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA NS-G-2.12 "Ageing Management for NPP" 4.31 Development of AMPs

4.31. A specific programme for the ageing management of each structure, component or group of structures and components selected by the screening process should be developed and documented. The ageing management programme should identify: (a) effective and appropriate actions and practices for managing ageing that provide for timely detection and mitigation of ageing effects in the structure or component; and (b) indicators of the effectiveness of the programme. Thus the effectiveness of current practices should be confirmed in light of applicable ageing evaluations and condition assessments. and/or improvements to current practices should be recommended, as appropriate

IAEA NS-G-2.12 "Ageing Management for NPP" 4.35 Implementation of AMP 4.35. The operating organization should be made responsible for implementing ageing management programmes.
3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)
EPZ recognizes the issue: Ageing Management is divided over several departments. EPZ has planned to improve the Ageing Management process.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012
4.1 – COMMENTS: **C1)** As a result of the scope and screening process reviewed in the reports NTCM-G/2009/en/0144 and NEPS-G/2008/en/0056 seven (7) passive commodity groups have been identified. The report KTE/AdJ/RBn/R106151 justify that all the nine attributes for an effective ageing management are covered by the actual maintenance practices, but no specific written AMPs for these commodity groups are in place.		
4.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** Prepare AMPs for the passive commodity groups in line with the nine attributes.		
4.3 – DOCUMENTS REVIEWED: • Counterpart interview • KTE/AdJ/RBn/R106151 • KTE/ADJ/Rnh/R106190		

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS:		

R1) n.a. **S1)** n.a.
6.3 – DOCUMENTS REVIEWED: n.a.

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.		n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.		n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	E - 2
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for electrical and I&C components.		
Issue Title: Establish final Documentation of revalidation analyses.		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

The plant has finished the Revalidation of TLAA analyses, the results of this work are in Aurest Database, and partially in some reports. It is difficult to have a complete picture of the results.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

Safety Report Series No. 57 , (6.1.4 Documentation of revalidation)

6.1.4. Documentation of revalidation

The documentation of analysis covers, as a minimum, the following elements as applicable:

(a) Technical terms of reference;

(b) Justification of the computational model used;

(c) Calculation of the stresses, strains and temperature fields;

(d) Calculation of the residual lifetime throughout the intended period of LTO;

(e) Conclusions and recommendation of measures for LTO.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

Revalidation of TLAAs of electrical and I&C components is performed in the LTOB-EQDBA project. The final report of this project will contain all the relevant information.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) The Aurest DataBase contains the results of the analyses. The analysis has been projected to the end of the intended period of LTO (2034) as indicated in KTE/AdJ/SAL/R106299 .The Report PTLQ-G/2011/en/0018 describe the components that has a residual lifetime < 5 years. Prior to this time the plant should address the corrective or compensatory measures to take. The Report KTC/MC/FN/R116317 described the list of components that the plant has decided to replace in the next five years. The rest of the components described in the Report PTLQ-G/2011/en/0018, are under study to decide how to proceed. A detailed list of the components that require additional measurements after the revalidation process could help to manage and follow up the status of these measurements in the LTO period.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Prepare a report with the results of the revalidation analyses of the LTOB-EQDBA project.

4.3 – DOCUMENTS REVIEWED:

- (EQDB)
- NGLE/2004/de/0032,
- NLTQ-G/2009/de/0068,
- NTLQ-G/2009/de/0065),
- Aurest DataBase
- KTC/MC/FN/R116317
- PTLQ-G/2001/en/0018)

5. COUNTERPART ACTIONS	Date:	

n.a.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	

6.1 – COMMENTS:

C1) n.a.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) n.a.

S1) n.a.

6.3 – DOCUMENTS REVIEWED:

n.a.

STATUS OF THE ISSUE			**Date: 11/05/2012**	**Date: D2/M2/Y2**
1 – Resolution Degree:				
1.	**No Action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*		n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.		n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.		n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	X	n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	E - 3
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for electrical and I&C components.		
Issue Title: Ageing analyses not always proved to be conservative.		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

The monitoring of the environmental condition, on a regular basis, for SSCs in the scope of the EQ program is an important input for ageing management in order to secure that the ageing analyses over time stay conservative.

The ageing analyses of cables may not be conservative since the ageing temperature used may be to low. The routing of the cables is not completely known, this makes it difficult to monitor the environment to be used in the analyses.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

Safety Report Series No. 57, (6 Revalidation of Safety Analyses that used TLAA.

Safety Report Series No. 57, (5.2 Identification of ageing degradation effects).

5.2. IDENTIFICATION OF AGEING DEGRADATION EFFECTS
There are various techniques used to identify and assess ageing effects.For some SCs, design margins and/or material properties are known and can be reviewed. In such cases, an analysis may be sufficient to demonstrate whether the effects of ageing are ....
../..
For example, the process used to perform an ageing management review of a component or commodity group for a specific environmental stressor is as follows:
(a) Identification of all component or commodity group construction materials that have potential ageing effects when exposed to the environmental stressor.
(b) Determination of the value of the bounding environmental parameter to which the components in the area to be reviewed are exposed.
(c) Estimation of the ageing characteristics of the identified materials within

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

EPZ recognizes the issue. The environmental conditions will be trended to ensure that the

qualified life analysis remain valid for LTO.

Regarding to the AMR of commodity group cables, the plant design gives reasonable security that the hotspot of the cable will be near the end component of the functional chain. Nevertheless EPZ will perform additional actions to assure that the assessment is valid.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) In report KTE/Adj/Rnh/R106190 IAEA Safety Report 57 - Verification of preconditions - Equipment Qualification, it is concluded "Monitoring of the environmental conditions to which the SSCs are exposed is an important input for ageing management." A comprehensive program to measure temperature and radiation during normal operation have been performed Radiation levels are regularly measured and reported but no routine secure that changed radiation conditions are taken into account in the equipment qualification program. Temperatures in the plant are also monitored but also in this case no routine secure that changed conditions are taken into account in the equipment qualification program.

C2) In report PLTQ-G/2010/en/0038 "Aging Management Review to support Long Term Operation of KCB Electrical and I&C Systems, Structures and Components" the methods to evaluate ageing of cables is described, the temperature in the area of the end component is used as ageing temperature also for the cable, although it is not proved that no cables run thro areas with higher temperature.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Implement a programme for monitoring environmental conditions that secure that the temperatures used in the ageing analyses over time stay conservative.

R2) Additional measures should be taken to prevent that ageing analyses of cables are performed with conservative temperature.

4.3 – DOCUMENTS REVIEWED:

Interview with Counterpart/Areva.

KTE/Adj/Rnh/R106190

PLTQ-G/2010/en/0038

5. COUNTERPART ACTIONS	Date:	

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)**		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a. **S1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.		n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.		n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.

II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	**F - 1**
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for Civil structures and components		
Issue Title: Discrepancies Within Civil Ageing Management Review and Degradation Mechanism Project Catalogue		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Certain discrepancies were noted within the EPZ degradation mechanism project catalogue PEEC-G/2010/en/0084 and Ageing Management Reviews PEEC-G/2010/en/0083 and PESS-G/2010/en/0048.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA Safety Reports Series No. 57 Section 5.2.

As appropriate, the assessment includes the following activities:

...(b) Identification of the ageing effects potentially affecting the ability of SCs to perform their intended functions.

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

The discrepancies in documents PEEC-G/2010/en/0084 and PEEC-G/2010/en/0083 were already encountered by EPZ. The mentioned discrepancy in report PEEC-G/2010/en/0048 is

an unclear description in a report by AREVA.

C1 and C2 are already in the schedule for revision of these two documents CAM-SC and AMR on civil structures. Irradiation of concrete structures is mentioned in the CAM-SC on page 19.
We know from the fluence calculations that the international established thresholds will not be reached after 60 years of operation. This was not explicit mentioned in the CAM and AMR report on civil structures. As explained during the SALTO Peer Review this omission is one of the issues that were foreseen for the already scheduled revision "B" of these reports

C3 Groundwater measurements are performed but the specific groundwater measurement for pH, Chlorides and Sulfates has been executed once. We agree that this should be evaluated further.

C4 This should be made clearer in the revision "B" of the report.

C5 The way it was done was explained by EPZ: AREVA has no access to the World wide information. AREVA uses the US-GALL report revision 2, assisted by US specialists and they used the OPEX information of EPZ containing WANO, VGB, GRS and AREVA information. The WANO part of the information consist of all OPEX info from the Paris, Atlanta, Moscow and Tokyo offices. This should be made clearer in the revision "B" of the report.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Potential civil structural degradation mechanisms as described in IAEA-EBP-SALTO document (July 2007) are not all included in EPZ degradation mechanism project catalogue PEEC-G/2010/en/0084. For example in PEEC-G/2010/en/0084 irradiation is only identified as impacting reinforcing steel but not necessary steel liners. Counterpart acknowledged during site interview that this was a known condition that requires correction.

C2) Spent fuel pool degradations mechanisms for liner appear have not been specifically considered/dispositioned as part of PEEC-G/2010/en/0083. SFP has some particular differences in normal state and usage that other concrete structures at the NPP (e.g. is water filled). Counterpart has indicated that this particular structure is not an issue for degradation at Borssele, however this should be specifically documented as part of the LTO review.

C3) Report PEEC-G/2010/en/0084 4.3.1.4 indicates that groundwater monitoring is being done that would detect the presence of any future degradation mechanisms (e.g. chloride/sulfate/acid attack) originating from groundwater. It was found however that this was a one time activity that is not repeated routinely.

C4) Catalogue of civil ageing mechanisms PEEC-G/2010/en/0084 section 4.2 indicates that hot spots may exist within indoor air environments and will be addressed in the Ageing Management Review PEEC-G/2010/en/0083. The AMR document does not appear to address hot spots. There appears to be no specific room conditions manual, monitoring program, or

records for hotspots outside of general indoor or outdoor temperature ranges.

C5) AMR Document for Steel Containment PESS-G/2010/en/0048 section 5.6.1 documents generic external OPEX with respect to steel containment ageing, however makes no conclusion as to whether this OPEX is applicable to the Borssele NPP. Section 5.6.2 of the same document indicates that the contractor could not perform a review of worldwide industry OPEX within the frame of the AMR report, but used US GALL report information (NUREG-1801) as applicable. EPZ is noted to have access to worldwide OPEX information, and has indicated verbally that they have provided such information to the contractor for inclusion in this report, however the report is not clear on this.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Perform revision of PEEC-G/2010/en/0084 or otherwise document a complete list of civil structural degradation mechanisms for use in EPZ LTO assessments. Perform specific spent fuel pool and security related degradation mechanisms ageing management review in PEEC-G/2010/en/0083 or other suitable document. Review methodology and report to disposition hot spot issue.

S1) Consider implementing regular groundwater monitoring program or otherwise address implicit assumption that it is being done to detect potential degradation mechanism as per PEEC-G/2010/en/0084 section 4.3.1.4.

4.3 – DOCUMENTS REVIEWED:

PESS-G/2010/en/0048 AMR for Steel Containment

PEEC-G/2010/en/0083 AMR for Structural Scope

PEEC-G/2010/en/0084 Catalog of Ageing Mechansims for Structural Components (CAM-SC)

Draft Ageing Management Summary Report NRG-22503/11.109273

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS:		
C1) n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS:		
R1) n.a.		

S1) n.a.
6.3 – DOCUMENTS REVIEWED: n.a.

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)	X	n.a.
III	The issue should be addressed before (*indicate a key date*), but has no direct impact on the license application nor on the LTO process		n.a.

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:	F - 2
NPP: Borssele		
Unit: 1		
Reviewed Area: Review of ageing management programmes and related TLAAs for civil structures and components		
Issue Title: Lack of Centralized Oversight of System / Component Programs		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

There is a lack of centralized oversight for a system or component group (i.e. System Engineer and/or Component Engineer). This hinders the ability to ensure completeness of programs within a given area.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA SALTO Guidelines , 3.1.2 Organizational Structure

The organization structure in the plant should be set up in respect of LTO programme of NPP.

IAEA SALTO Guidelines , 3.1.4 Plant Implementation Programme for LTO

The programme should integrate all similar long-term issues arising from different types of reviews..

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

EPZ agrees with this issue. EPZ intends to implement an equipment reliability workprocess and to formulate metrics (Performance Indicators) for benchmarking within the WANO community.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

4.1 – COMMENTS:

C1) Station documents rely on Operations and Management to perform station walkdowns to detect adverse conditions. There is no requirement for engineering walkdowns per system or component groups. Dependence on Operations and plant management for surveillance without a formal engineering walkdown program is not per best international practises. An operator walkdown will tend to focus on a specific plant region, while engineering walkdowns will tend to review individual systems or components groups throughout the entire plant.

C2) Site organization charts and discussions with counterparts indicate that there is no central engineering oversight function in place on a system or component group basis that is reviewing performance trends, maintenance trends, ageing program implementation etc. of a given system or component grouping. Although many of the aspects of good programs were in place at a detailed level, the lack of a single point of contact or focal point can lead to omissions or gaps in programs, and a lack of awareness of trends.

C3) Maintenance trending was observed to be evident for some issues relevant to the ageing program, especially with respect to work order backlogs and the work management process. The trend report reviewed was not granular to a system or component group specific level, and the Maintenance Counterpart indicated that is has not yet been developed to the point where it can be benchmarked against other utilities.

The Counterpart has indicated that the plant is considering implementing the INPO AP-913 process for equipment reliability. Discussions have been held at a management level in March 2012 with further discussions to follow in June. That process requires among other things dedicated system and component performance monitoring.

C4) From area "A" (Management, Organization, and Administration), the WANO peer Review in 2008 concluded that plant management does not ensure that site events, low level events and adverse trends are rigorously identified, analysed and corrected. The stream analysis performed in the same year concluded that this area for improvement is almost a "driver", meaning that focusing on resolving this area the plant will also resolve several other areas for improvement which are symptomatic. The WANO Peer Review Follow up in 2008 concluded that in this problem has not received the appropriate level of priority. Having System and Component Engineers would enhance capability for trending and analysis.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Consider expediting implementation of AP-913 or similar process at Borssele for equipment, component, and programme surveillance.

S2) Further develop current metrics for maintenance oversight to allow for benchmarking other utilities/plants.

4.3 – DOCUMENTS REVIEWED:

- Organization chart "Organogram EPZ".
- Draft Maintenance Trend Report, March 2012 KO/SCHOO/LKL/R122067
- Draft Ageing Management Summary Report NRG-22503/11.109273
- PU-N07-02 Plant Walkdowns

5. COUNTERPART ACTIONS	Date:	
n.a.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	
6.1 – COMMENTS: **C1)** n.a.		
6.2 – RECOMMENDATIONS/SUGGESTIONS: **R1)** n.a.		
6.3 – DOCUMENTS REVIEWED: n.a.		

STATUS OF THE ISSUE			**Date:** **11/05/2012**	**Date:** **D2/M2/Y2**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	X	n.a.
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	n.a.
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		n.a.
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	n.a.

3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		n.a.
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	n.a.
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	n.a.
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	n.a.

2 – Urgency degree:			
I	The issue should be addressed before the license application (September 1st, 2012)		n.a.
II	The issue should be addressed before the actual date of the LTO (January 1st, 2014)		n.a.
III	The issue should be addressed before 2015, but has no direct impact on the license application nor on the LTO process	X	n.a.

n.a.: not applicable for the present mission.

APPENDIX IV - ISSUE SHEETS FROM SALTO PEER REVIEW MISSION IN 2009

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	A - 1
NPP:	**BORSSELE**		
Unit:			
Reviewed Area:	**Identification of SSCs and assessment methodology**		
Issue Title:	**Scoping and screening process**		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Current scoping and screening process do not give a clear picture how to evaluate all SSCs related to safety from LTO point of view. The intention was presented to perform ageing management review of active and short-lived passive components within the frame of PSR, which is not a generally applied practice.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

- IAEA Safety Report No. 57 – Safe LTO on NPPs (Section 2.1(d))
- IAEA NS-G-2-12 – Ageing management for NPPs (Section 6.2)

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

We understand the need to have a conceptual document which describes the complete scope of SRS 57 and we have started the work on this. In the project we will incorporate the part 'prior to LTO assessment' with the important topic 'Verification of Preconditions'. In this Verification of Preconditions we are planning to incorporate the active (and short-lived passive) safety relevant SCs.

If the ageing management of active (and short-lived passive) components should be part of the AMR for LTO, the current version of SRS 57 seems not the right reference for the SALTO Peer Review. SR 57 is in principle based on the US LR process in which the AMR is performed for long-lived passive components. In SRS 57 the aspect of Maintenance Rule is according to our interpretation addressed by the Verification of the Preconditions.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	13/11/2009

4.1 – COMMENTS:

C1) The plant is required by the regulatory authority to follow the IAEA guidance. Scoping process is done very thoroughly in accordance with AREVA document covering IAEA SR-57 procedure. However, the process of screening out the active and short-live passive components should be clarified and justified as discussed in par. 2.1.1 of the report. Reference to US regulation 10 CFR 54 and NEI 95-10 screening out active components and short-lived passive components seems to be not relevant as maintenance rule (10 CFR 50.65) is not applied to Borssele NPP.

C2) Ageing of active and short-lived passive components is planned to be reviewed by PSR. However, the way to evaluate these SSCs has not been clarified yet.

C3) As a result of proposed procedure, only passive long-lived SCs stay in scope of AMR. Active and short-lived passive components do not enter to AMR.

C4) All reviewed documents were AREVA documents, two listed in 4.3 in final version, other covering AMR in very initial version. NPP should have written conceptual document describing scoping and screening process and AMR and revalidation of TLAAs as part of a preparation for LTO.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Plant should develop a conceptual document describing the ageing management review for all the safety and safety related SCs. The document should cover all the safety and safety related components in accordance with the document "NEPS-G/2008/en/0056".

S1) Consideration should be given by the plant that in a case that the ageing of active and short-lived passive components will be reviewed by PSR, it is suggested be clearly stated in a conceptual document on NPP level that it will be done above the regular scope of PSR and describe the procedure.

4.3 – DOCUMENTS REVIEWED:

- "Definition of the scope…", NEPS-G/2008/en/0056
- "Screening of relevant Structures and Components…", NTCM-G/2009/en/0144

5. COUNTERPART ACTIONS	Date:	31/03/2012

R1) Based on this recommendation, EPZ did extend the scope of 'LTO Bewijsvoering' so that it comprises all the safety and safety related SSC. This means that also active and short-lived passive components are now part of the scope. All this is addressed in a conceptual document [Blom F.J., Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011] which is part of the AIP for the SALTO PR May 2012.

S1) See answer of R-1.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) The Conceptual Document LTO "Bewijsvoering" KCB was developed by NRG. The document describes the whole LTO project and the role of its individual activities/documents.

C2) Assessment of active components for LTO is addressed in the Conceptual Document and will be performed using a specially developed methodology. The activities in this direction were initiated but need to be completed.

C3) In several places a need to revise the conceptual document was identified. This is, however, addressed in the Issue C-2 of the SALTO PR May 2012.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

6.3 – DOCUMENTS REVIEWED:

Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011

Draft Methodology Assessment of Active Components with regard to Long Term Operation, without number

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	

	resolved	*The intent of recommendations of previous IAEA review is fully met. Issue closed.*	n.a.	X
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**A – 2**
NPP:	**BORSSELE**		
Unit:			
Reviewed Area:	**Identification of SSCs and assessment methodology**		
Issue Title:	**Overview of activities for LTO**		

2. ISSUE CLARIFICATION		
2.1 – ISSUE DESCRIPTION		
Feasibility study for LTO has been carried out in 2005. LTO assessment started in 2007, however, verification of preconditions is planned to be done as a part of PSR that is to be performed from 2010 to 2013.		
2.2 – REFERENCE TO IAEA SAFETY STANDARDS		
IAEA Safety Report No. 57 – Safe LTO on NPPs – figure 1, page 4.		
3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)		
We agree on the suggestion, see our comment on A-1.		
4. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:**	**13/11/2009**

4.1 – COMMENTS:

C1) In accordance with Figure 1 in the IAEA SR-57, verification of preconditions for LTO should be done prior to LTO assessment. LTO assessment should be done following the verification of preconditions.

C2) Verification of preconditions under the PSR could be possible, but the PSR's original purpose is different.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Consideration should be given by the plant to start with the verification of preconditions as soon as possible because it is an important step for an effective ageing management review. In case that the intention is to use the PSR activities for the verification of preconditions for LTO, such plans are suggested to be described in a conceptual document.

4.3 – DOCUMENTS REVIEWED:

- "Definition of the scope…", NEPS-G/2008/en/0056
- "Screening of relevant Structures and Components…", NTCM-G/2009/en/0144

5. COUNTERPART ACTIONS	Date:	**31/03/2012**

S1) Based on this suggestion, verification of preconditions has been incorporated in the scope of 'LTO Bewijsvoering'. That means that the Phase Prior to LTO assessment has been incorporated. This is reported in the conceptual document [Blom F.J., Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011].

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) The verification of preconditions is described in the Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011. For each plant programme, the evaluation of its compliance with the 9 elements of IAEA SRS No.57 was performed and is described in plant reports.

6.2 – RECOMMENDATIONS/SUGGESTIONS

6.3 – DOCUMENTS REVIEWED:

Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011.

IAEA Safety Report 57-Verification of preconditions-Maintenance. KTE/AdJ/RBn/R106151, 2011.

IAEA Safety Report 57-Verification of preconditions-Surveillance and Monitoring. KTE/AdJ/Rnh/R106188, 2011.

IAEA Safety Report 57-Verification of preconditions-Water chemistry. KTE/AdJ/RBn/R106155, 2011. IAEA Safety Report 57-Verification of preconditions-ISI. KTE/AdJ/RBn/R106153, 2011. IAEA Safety Report 57-Verification of preconditions-Equipment Qualification. KTE/AdJ/Rnh/R106190, 2011.				
STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	X
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**A – 3**
NPP:	**BORSSELE**		

Unit:	-
Reviewed Area:	**Identification of SSCs and assessment methodology**
Issue Title:	**Identification of SSCs for LTO – data collection and record keeping**

2. ISSUE CLARIFICATION

2.1 – ISSUE DESCRIPTION

Consolidation of data stored in different databases to avoid the incompleteness and inconsistency of data was recognized.

2.2 – REFERENCE TO IAEA SAFETY STANDARDS

IAEA NS-G-2-12 – Ageing management for NPPs – article 4.10 to 4.13

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

We understand this issue and we will take this into consideration.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:**	**13/11/2009**

4.1 – COMMENTS:

C1) There are many standalone databases, such as AM database (operational feedback and external event feedback related to ageing issues) called VOB-DB, RCM database, AUREST database (EQ), maintenance database. It is also not clear whether they cover all safety equipment in scope for LTO or not.

C2) Some data in different databases are redundant as an example in component database BRS (AS-400), EQ-database and AUREST database (MS Access).

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Consideration should be given by the plant to store all necessary information for LTO assessment in a database. The data should be stored in one place and be accessible for all associated parties.

4.3 – DOCUMENTS REVIEWED:

- ENT 2034.1 (passive long-lived SCs).
- ENT 2034.2 (IaC exchange of printed boards).
- ENT 2034.3 (exchange of other M,E and C components).
- Current maintenance programme.
- AUREST database for equipment qualification programme.

5. COUNTERPART ACTIONS	Date:	31/03/2012
S1) To store all the necessary information for the LTO assessment EPZ has decided to implement a specific software tool from AREVA NP: COMSY. A contract has been signed with AREVA NP to help EPZ on implementing all LTO SSC data in the COMSY database. EPZ wants to use this database as an important tool for ageing management.		
6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**
6.1 – COMMENTS: **C1)** Surveillance tests results are recorded on paper and later, by another person, are manually transmitted to computer DB, which may cause to errors or lose of information. **C2)** Paper reports of surveillance tests have several corrections, missing signatures, not all chapters are filled in, which may impact quality of data transmission to the computer database. **C3)** Paper reports are collected on weekly basis in 60 mm. folders. The folders do not have list of content, to facilitate search of necessary programme and to review whether all the programs are in place. **C4)** Work orders database (ISO) developed in 1996, very old, which may impact its integration with more modern DBs. **C5)** ISO and ISH data bases are isolated, to check all data related to a specific surveillance test it is necessary to perform manual entry in one DB and then into another. **C6)** In the interview Plant personnel explained, that Plant is planning purchasing a new computer database allowing integration of Plant databases according to recommendations of 2009 SALTO mission.		
6.2 – RECOMMENDATIONS/SUGGESTIONS:		
6.3 – DOCUMENTS REVIEWED: 1) Weekly surveillance tests folder (week 29, 2011). 2) Overview of Plant surveillance programme. 3) NVR NS-G-2.6; surveillance: In-service inspection, Testing, monitoring and calibration. **4)** Plant databases ISO and ISH.		
STATUS OF THE ISSUE	**Date:** **13/11/2009**	**Date:** **11/05/2012**
1 – Resolution Degree:		

1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	X
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**B – 1**
NPP:	**BORSSELE**		
Unit:			
Reviewed Area:	**Environmental qualification for electrical and I&C components**		
Issue Title:	**Replacement of electrical equipment with a short qualified life**		

2. ISSUE CLARIFICATION
2.1 – ISSUE DESCRIPTION

Shorter-than-the-original qualified lifetime of equipment in a hot spot area.

Some equipment or parts susceptible to ageing have a qualified lifetime much shorter than 40 years.

2.2 – REFERENCE TO IAEA SAFETY STANDARDS

- IAEA-SR-3, Section 2.4

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

To our opinion recommendation 1 is the project we are doing at the moment within LTO Bewijsvoering. In this project the aim is to revalidate the qualified life for all components with a harsh environment requirement. The mentioned hot spots, actually area's with a relatively high environmental temperature, are found as a result of the environmental monitoring program for the components with a hars environment requirement.

Recommendation 2 is outside the scope of the current LTO-project, but we will discuss this issue with the maintenance department and if necessary measures will be taken.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	13/11/2009

4.1 – COMMENTS:

C1) Results of presentation of analysis done by AREVA show the presence/existence of hot spots. If a temperature is higher than in the qualified life calculation, the life time is reduced.

C2) Ageing susceptible equipment, such as capacitors and energised coils from magnetic valves, relay and contactor, have a qualified life much shorter than 40 years. Maintenance programme does not address timely replacement of such type of equipment.. It might be possible that some class 1E components in harsh environment could be in service for longer period than their qualified life.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) For class 1E components in harsh environment (Stoerfall matrix) and hot spot, it is recommended to revalidate their qualified life.

R2) For class 1E components with short qualified life, it is recommended to screen their service life against their qualified life. When the qualified life is shorter than service life, a replacement programme should be considered.

4.3 – DOCUMENTS REVIEWED:

- Maintenance procedure magnetic valves, MOV and I&C

5. COUNTERPART ACTIONS	Date:	31/03/2012

R1) The revalidation of class 1E components in harsh environment is addressed in the EQBDA subproject in 'LTO Bewijsvoering'. More information can be found in paragraph 3.4.4 of the conceptual document [Blom F.J., Conceptual Document LTO "Bewijsvoering" KCB, NRG-22701/10.103460, 2011] and in a specific report on this topic which has been send to the regulator [Lievense S.A., Methodology and approach of the "Long Term Operation Bewijsvoering subproject: Qualification of Design Base Accident resistant electrical Equipment", EPZ report KTE/AdJ/SAL/R106299].

R2) For class 1E components the ageing management actions are improved. Where possible and relevant, qualified life is taken into account.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

6.1 – COMMENTS:

C1) The issue have been addressed in the LTO-EQDBA project. A revalidation is performed with help of the AUREST tool developed by AREVA.

The AUREST DataBase contains the results of the analyses. The analysis has been projected to

the end of the intended period of LTO (2034) as indicated in KTE/AdJ/SAL/R106299.

The Report PTLQ-G/2011/en/0018 describes the components that has a residual lifetime < 5 years and have to be managed during this period. New calculations will be performed yearly to identify components to be handled during the next 5 years.

The computational model used in the AUREST DataBase and described in report NGLE/2004/de/0032, NLTQ-G/2009/de/0068 and NTLQ-G/2009/de/0065 fulfil the requirements.

C2) It has not been possible to in a systematic way check the completeness of this recommendation since the check of preventive maintenance programs of active components is not completed. Examples of components that have been screened and preventive actions initiated exists, e.g. exchange of capacitors on circuit boards (both in the plant and in the warehouse) and exchange of medium voltage cables. The check of preventive maintenance programs on active components is to be finalised and identified replacement programmes implemented.

6.2 – RECOMMENDATIONS/SUGGESTIONS

6.3 – DOCUMENTS REVIEWED:

KTE/AdJ/SAL/R106299

PTLQ-G/2011/en/0018

NGLE/2004/de/0032

NLTQ-G/2009/de/0068

NTLQ-G/2009/de/0065

RPT-99-001

AUREST database

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA	n.a.	X

	resolved	*review.*		
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**C - 1**
NPP:	BORSSELE		
Unit:	-		
Reviewed Area:	**Assessment and management of SCs for ageing degradation for LTO**		
Issue Title:	**Evaluation of effectiveness of AMPs and justification to use AMPs shown in the US GALL report**		

2. ISSUE CLARIFICATION
2.1 - ISSUE DESCRIPTION
Policy and methodology to demonstrate effectiveness of AMPs, which include the current programmes to manage ageing effects and those newly introduced from other national/international practices such as US-GALL report, have not been established by the plant.
2.2 - REFERENCE TO IAEA SAFETY STANDARDS

- [1, NS-G-2.12; 4.32, 6.2 and Tab.2]
- [2, Safety Report Series No. 57, 5.3]*

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

We will incorporate this suggestion in the AMR-project. At the moment of the SALTO PR we were in a very initial phase and therefore we were not fully able to clarify these topics.

Regarding comment C3: EPZ doesn't take credit on AMP's of the US-GALL report. IAEA attributes on AM will be used to demonstrate effectiveness of AMP's.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	13/11/2009

4.1 – COMMENTS:

C1) The AMR activity is in an initial phase and content of the AMR reports have not been completed.

C2) The proposed table of contents of the AMR report for Mechanical Category A SCs does not show the details on "Identification of relevant Ageing Mechanisms" and "Evaluation of long term operation – Ageing Mitigation".

C3) The current draft AMR report for commodity groups, which have not been reviewed by the plant staff, does not show effectiveness of AMPs. It was explained that the AMP shown in the report were simply copied from the US-GALL report so far. If the plant uses AMPs shown in the US-GALL report, evaluation of their effectiveness is required.

C4) In some countries, it is requested by the regulatory body that the AMR reports explain effectiveness of the current programmes to manage ageing effects. Otherwise an additional programme is required.

C5) It can be useful for this issue if reports on effective prevention/mitigation measures against relevant ageing mechanisms are prepared.

4.2 – RECOMMENDATIONS AND/OR SUGGESTIONS:

S1) Consideration should be given by the plant to clarify and document how to perform AMR and demonstrate effectiveness of AMPs, which include current programmes to manage ageing effects and newly introduced programmes, based on the AMP attributes shown in the IAEA Safety Guide on Ageing Management.

4.3 – DOCUMENTS REVIEWED:

- Presentation provided by AREVA.
- Draft report on AMR for commodity groups presented by AREVA.

5. COUNTERPART ACTIONS	Date:	31/03/2012

S1) For the clarification of the performance of the AMR, and the way in which the EPZ ageing management activities are assessed, the Methodology Report has been written [Leilich J., Ageing Management Review – Methodology Report, PESS-G/2010/en/0041, 2011]. This report explains the whole framework and the methodology of the AMR including for instance the use of catalogues of relevant ageing mechanisms for the assessment of EPZ ageing management activities. Documents with descriptions of current plant programs and activities for specific activities to manage ageing effects, based on the AMP attributes in IAEA NS-G-2.12, were prepared and used in the AMR.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

6.1 – COMMENTS:

C1). The Plant personnel stated that AMR reports prepared by AREVA identify relevant ageing mechanisms by making use of a catalogue of ageing mechanisms and assess the applicability to the plant. They then identify existing ageing management activities and consequently assess the effectiveness of these activities. A conclusion for each relevant ageing mechanism is drawn, concluding if the ageing mechanism is adequately managed or if additional measures need to be taken for the activities to be effective during LTO. EPZ does not take credit on AMPs of the US-GALL report for the management of ageing mechanisms, but implements appropriate measures using existing programs and procedures. Ageing related issues are identified using internal and external experience, and then evaluated by the Ageing Management Team (AMT) who propose relevant ageing management activities to be implemented in the existing plant programs including ISI, operational, chemistry and repair and replacement activities (procedure PU-N12-19). But review did not find evidence that Borssele NPP included the results of this effort in plant documents, describing what indicators were used to assess effectiveness of the AMPs for specific SSCs and evidence that assessment of effectiveness of the AMPs is incorporated in permanent Plant activities.

C2). All the reviewed reports: (AMR Methodology report PESS-C/2010/en/0041 and the others listed in p. 6.3) were prepared by AREVA, the documents are not converted into Plant documentation, no traces that they are subject of Plant documentation control system are present in the documents.

C3). Summary Ageing Management Review report (Ref. NRG-22503/11.109273) is only under preparation by a subcontracting Company, NRG, now.

C4). Reviewed, the latest revision of the Summary Ageing Management Review report, contains chapters 3, 4 and 5 describing results of AMR for Mechanical, I&C components and Civil Structures, and Chapter 6 related to implementation of AMR recommendation, but at a summary level only. Consequently, this document can not serve for assessment of effectiveness of specific AMPs.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

R1)

S1)

6.3 – DOCUMENTS REVIEWED:

1. Presentation provided by AREVA.
2. AMR Methodology report PESS-G/2010/en/0041.
3. Ageing Management Review to support Long Term Operation for KCB Steam Generators, PESS-G/2010/en/0044.
4. Ageing Management Review to support Long Term Operation for KCB Main Coolant Pumps, PESS-G/2010/en/0045.
5. Catalogue of Ageing Mechanisms for Mechanical Components (CAM-MC), PESS-G/2010/en/0043.
6. Summary report Ageing Management Review, NRG (Draft B1, dated 04.04.2012)

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	X
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**C - 2**
NPP:	BORSSELE		
Unit:	-		
Reviewed Area:	**Assessment and management of SCs for ageing degradation for LTO**		
Issue Title:	**Significance of possible ageing degradations for the RPV support**		

2. ISSUE CLARIFICATION		
2.1 - ISSUE DESCRIPTION		
Due to limited accessibility of RPV support, it is required to determine significance of possible ageing degradation.		
2.2 - REFERENCE TO IAEA SAFETY STANDARDS		
- [1, NS-G-2.12; 4.32, 6.2 and Tab.2], [2, Safety Report Series No. 57, 5.3];		
3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)		
The assessment of ageing degradation of the RPV support will be performed in the AMR. Taking into account this suggestion, we will thoroughly consider all possible ageing degradation of the RPV support.		
4. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:**	**13/11/2009**
4.1 – COMMENTS: **C1)** In some countries, neutron embrittlement, damage due to gamma radiation and wearing of the pad are identified as possible mechanisms for the RPV support and their significance is quantitatively evaluated in the AMR report. **C2)** Since a direct inspection or maintenance is difficult for the RPV support, thorough consideration about significance of possible ageing degradations is requested before excluding them from detailed evaluation		
4.2 – RECOMMENDATIONS AND/OR SUGGESTIONS: **S1)** Consideration should be given by the plant to thoroughly determine significance of possible ageing degradation for the RPV support. Justification of the determination should be described in the AMR report. This suggestion should be applied to SCs which can not be directly inspected.		
4.3 – DOCUMENTS REVIEWED: - TOR - AIP - Discussion with the counterparts and engineers from AREVA.		
5. COUNTERPART ACTIONS	Date:	**31/03/2012**
S1) The RPV supports are dealt in the AMR. The parts welded to the RPV are dealt in the Mechanical A RPV AMR report. The other parts of the support are dealt in the AMR report for Primary Supports. Considerations for the inaccessibility of the RPV supports were included.		

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	11/05/2012

6.1 – COMMENTS:

C1) The inspection of the RPV support is eliminated due to a one time inspection in 1993. There is not sufficient technical basis provided for the elimination of a one-time inspection for LTO.(page 89, 7.2.2 of reference below.) This item was discussed with EPZ staff. The basis for elimination of the inspection for the two identified mechanisms should be re-evaluated in light of current inspection methodologies and given that twenty years have passed since the last inspection.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) Note resolution of this item is carried over to this SALTO review in issue D-1.

6.3 – DOCUMENTS REVIEWED:

PEER-G/2011/en/0071, Ageing Management Review to Support Long-Term Operation for KCB Primary Component Supports, Rev A, 22.12.2011.

STATUS OF THE ISSUE			Date: 13/11/2009	Date: 11/05/2012
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	X
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I		*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*	n.a.	

II	*The issue should be addressed before . . .*	n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**C - 3**
NPP:	BORSSELE		
Unit:	-		
Reviewed Area:	**Assessment and management of SCs for ageing degradation for LTO**		
Issue Title:	**Identification of SCs on the boundary for the scope of the LTO assessment**		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Currently there is no project document which describes procedure on how to identify SSCs and their LTO boundary drawing (P&ID).

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

- [1, NS-G-2.12; 4.15]
- [2, Safety Report Series No. 57, 4.1]

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

A project document will be written which incorporates the procedure on how to identify SSCs and their LTO boundary.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:**	**13/11/2009**

4.1 – COMMENTS:

C1) The plant has not yet prepared its own document on setting scope and screening of SCs subjected to the LTO assessment.

C2) A clear instruction for inclusion of parts of valves on the boundary of the LTO scope has not been established.

- Although valves on the scope boundary are included in the scope, it has not been clarified if the valve disk and seat are within the scope or not, in the case the valve is required a sealing function.
- Since this depends on how to define the function of these parts, i.e. passive or active, and differs from country to country, the plant should simply establish a instruction and share it with the plant and manufacturer staff members.

4.2 – RECOMMENDATIONS AND/OR SUGGESTIOS:

R1) The plant should prepare a project document, which describes procedure on how to identify SSCs and their LTO boundary drawing (P&ID).

4.3 – DOCUMENTS REVIEWED:

- No documents (only discussion with the counterparts and engineers from AREVA).

5. COUNTERPART ACTIONS	Date:	**31/03/2012**

R1) For 'LTO Bewijsvoering', a scoping and a screening report have been written. These documents have been revised in 2011. A very important revision was the incorporation of active components. Also a detailed screening report was written for mechanical components to address screening on component level including screening criteria. The final version of this report is now under internal review. A color scheme is used on the P&IDs to clearly identify the in-scope SSCs. In the AMR methodology report [Leilich J., Ageing Management Review – Methodology Report, PESS-G/2010/en/0041, 2011] the color scheme used to mark the scope on the P&IDs is explained. The colored P&IDs were used to identify the boundaries of the AMR scope. It is described in the methodology and the screening reports that only the valve bodies are regarded to form part of the AMR evaluation of passive SCs. Valve disks and seats are always regarded as the active subcomponents of valves, even if the valves have a passive function. The assessment of active components is addressed in a separate part of the project (see A-1 R1).

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) It is clearly described in the AMR methodology report how the SSCs and their boundaries are identified. AMR reports for particular components contain P&IDs, which precisely define the scope of the SSCs and their boundaries – e.g. PESS-G/2010/en/0049. The colour scheme key is provided in the AMR methodology report.

C2) SSCs and applicable safety class boundaries identification in P&IDs exist only in LTO project documentation developed by AREVA NP.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) SSCs and applicable safety class boundaries identification should be incorporated into the plant's documentation and maintained as living document (updated as required). This is addressed in issue B-2 of the 2012 SALTO PR.

6.3 – DOCUMENTS REVIEWED:

Leilich J., Ageing Management Review – Methodology Report, PESS-G/2010/en/0041, 2011

AMR reports for particular components – e.g. PESS-G/2010/en/0049

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	X
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	D - 1
NPP:	BORSSELE		
Unit:			
Reviewed Area:	**Revalidation of safety analyses that used time limited ageing assumptions**		
Issue Title:	**Mixing different pressure vessel & piping codes and standards in the stress analysis.**		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

The plant piping Design Code of Record is based on the German pressure vessel & piping (PV&P) codes and standards KTA. During the review of the fatigue analysis, it was discovered that the utility is also using ASME Code Section III in the same calculation without any Code Reconciliations.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA SALTO Guideline Services Series 17, December 17

IAEA Safety Report Series No. 57 (2008), Section 6.1.3, 6.1.4

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

We understand that mixing of codes can lead to non-conservative results. In the mentioned case in C1 however, different codes are used but this was both from technical point of view as from regulatory point of view valid and documented.

For the revalidation of the fatigue analyses we will use an assessment methodology including the use of codes. This methodology will be reviewed by the regulator. Complete code reconciliation might not be possible and is to our opinion also not necessary.

We will consider to provide trainings on PV&P Codes and Standards for Engineering staff. .

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	13/11/2009

4.1 – COMMENTS:

C1) In the calculation performed by Stork Engineers & Contractors (61908-RP-001: 3-D Stress analysis of the 30RL feedwater nozzle of steam generator 30YB, W. de Koning, 15-10-1997), on page 28 of 31, the ASME Code allowable for Criterion DC.3 (Pl+Pb load cases) was exceeded. The stress analyst utilized the Dutch Code for non-nuclear vessel Code to re-qualify the nozzle.

C2) To maintain nuclear pressure vessel and piping systems, components and structures design fidelity and pressure boundary integrity, mixing of pressure vessel Codes may lead into non-conservative results. The design, material specification, inspections, fabrications, and installation requirements for each code and standard are different from each others.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

S1) Consideration should be given to code reconciliation between the original design and the codes which will be used for revalidation of fatigue analyses, or other calculations to be performed in order to revalidate TLAAs.

S2) Consideration should be given to provide trainings on the use of applicable nuclear PV&P Codes and Standards for Engineering staff involved with the plant design, modifications, and analysis related activities.

4.3 – DOCUMENTS REVIEWED:

- 61908-RP-001: 3-D Stress analysis of the 30RL feedwater nozzle of steam generator 30YB, W. de Koning, 15-10-1997.
- S611/92/027 KWU: Bewertung der Hauptkühlmittelleitung einschließlich Volumenausgleichsleitung im Hinblick auf Bruchausschluß, Zusammenfassende Bewertung, 30.10.92, revisie a
- S514/92/e016 KWU: Siemens-Work-Report, Topical Report on Break Preclusion Concept including the Leak-Before-Break-Approach for New Plants, 09.03.92
- NDM2/94/075 KWU: Bewertung von HKL und VAL im Hinblick auf Bruchausschluß; Ergänzende Nachweise und zusammenfassende Bewertung, 24.05.94
- E121/91/097 KWU: Bruchmechanische Bewertung der Hauptkühlmittel- und Volumenausgleichsleitung hinsichtlich Leck-vor-Bruch, 26.10.92, revision a
- KWU NT13/94/128 a: Leck-vor-Bruch-Bewertung der Volumenausgleichsleitung (einschlieslich Schichtung), 10.11.1994.
- Stork Engineers & Contractors 61908-RP-001: 3-D Stress analysis of the 30RL feedwater nozzle of steamgenerator 30YB, W. de Koning, 15-10-1997.
- NT13/96/022 KWU:KCB. Leck-vor-Bruch Nachweis der auszutauscheden RA und RLLeitung;
29 april 1997, revisie a

5. COUNTERPART ACTIONS	Date:	**31/03/2012**

S1) Complete code reconciliation for the fatigue analyses or other calculations seems, to our opinion, not necessary and might also be very difficult or impossible. In the TLAA fatigue project, the original design codes (mostly ASME III and KTA, which are familiar on this issue) are used as a basis for revalidation. In addition, for the issue of environmental fatigue a specific

part of KTA (3201.2) is used which prescribes threshold values for the calculated cumulative usage factors (CUF). In case of CUFs exceeding these thresholds specific actions are required. This doesn't mean that the we deviate from the original design code. More information on this topic can be found in the report 'LTO Demonstration of Fatigue TLAAs' [Blom F.J., LTO Demonstration of Fatigue TLAAs, NRG report NRG-22488/11.106369, 2011].

S2) Also based on this suggestion, we intend to organize trainings for old and new EPZ engineers for the use of applicable nuclear PV&P Codes and Standards. Last year we already made a start and organized a short internal overview course for engineers on this subject.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) The EPZ response regarding requirement to reconcile the two design codes is acceptable. International work has been done in this area with no conclusion that either Code is unacceptable. In addition, the Codes provide similar results when utilized. EPZ has stated that for the current TLAA the Code utilized in the original design fatigue analysis was used and therefore updated fatigue analysis remained consistent with the original design basis code.

The EPZ response regarding requirement to reconcile the two design codes is acceptable. International work has been done in this area with no conclusion that either Code is unacceptable. EPZ uses the Code utilized in the original design fatigue analysis and therefore has remained consistent with the original design basis.

EPZ staff provided a training record to demonstrate that training on classifications and specifications was provided.

Based upon the above observations the issue is closed.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

6.3 – DOCUMENTS REVIEWED:

STATUS OF THE ISSUE			**Date:** **13/11/2009**	**Date:** **11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	

3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	X

2 – Urgency degree:			
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*	n.a.	
II	*The issue should be addressed before . . .*	n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**D - 2**
NPP:	BORSSELE		
Unit:			
Reviewed Area:	**Revalidation of safety analyses that used time limited ageing assumptions**		
Issue Title:	**Start up and shut down transients in the primary system design specification and calculations**		

2. ISSUE CLARIFICATION
2.1 - ISSUE DESCRIPTION
Primary system design specification start up and shut down transients occurrences (number of cycles) are not consistent within design calculations and design specification.
2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA SALTO Guideline Services Series 17, December 17

IAEA Safety Report Series No. 57 (2008), Section 6.1.3., 6.1.4

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

In the project to revalidate fatigue analyses also the delivery of a new load catalogue (valid until 2034) is incorporated in which we will revalidate plant transients and their occurrences. If necessary we will reconcile and update affected documents on this. In the revalidation of fatigue analyses we will take this recommendation also in account.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**13/11/2009**

4.1 – COMMENTS:

C1) During the review of numerous primary system nozzle and piping system stress reports and the reactor pressure vessel design specification, the start up and shut down transient occurrences are documented as 150 cycles while the annual transient report and load catalogue list the number of cycles as 155.

C2) Design Load Specification RE-L-319, Calculation Z0903968-001-01 (30682-B-008), and RPV Design Specification list the number of start up and shut down transients occurrences (number of cycles) as 150.

C3) The annual transient report (KTE/Adj/PHu/R086039 (Feb 8, 2008) and the load catalogue (KWU E411/93/2005 b, dated April 24, 1995) list the number of cycles as 155.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) The plant should revalidate the plant transients and their occurrences (number of cycles).

R2) The plant should reconcile and update the affected documents that contained plant transients occurrences (i.e. design specifications and calculations, etc.)

4.3 – DOCUMENTS REVIEWED:

- Design Load Specification RE-L-319, Calculation Z0903968-001-01 (30682-B-008).
- RPV Design Specification.
- The Annual Transient Report (KTE/Adj/PHu/R086039 (Feb 8, 2008).
- The Load Catalog (KWU E411/93/2005 b, dated April 24, 1995).

5. COUNTERPART ACTIONS	Date:	**31/03/2012**

R1) Revalidation of plant transients and occurrences is integrated in the TLAA fatigue project. For the purpose of revalidation regarding the LTO license change application, a load catalogue based on a projected number of cycles is used to show that crack initiation by fatigue is very unlikely during the whole operation until 2034. In the TLAA fatigue project a new fatigue basis will be delivered in which also data retrieved from the in 2010 installed fatigue monitoring system FAMOS is used. This new basis will comprise a revalidation of plant transients and their occurrences. More detailed information on this topic can be found in the report 'LTO

Demonstration of Fatigue TLAAs' [12].

R2) See also the answer on R1. While setting up a new fatigue bases, underlying documents will be studied and if necessary reconciled or updated too (i.e. updated load specifications are set-up for new analyses where FAMOS measurement results are used).

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) EPZ LTO demonstration of fatigue TLAAs has caused the actual and projected cycles to be updated and the implementation of the FAMOS software has allowed for monitoring of actual transients. The required monitoring has provided partial implementation of the five years of cycle tracking recommended by AREVA for utilizing FAMOS data for revalidation of actual transients. The efforts as noted above address the recommendations of the previous SALTO mission. It will take additional time to fully implement the activity.

In conclusion the counterpart measures are going in the right direction and this item may be closed.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

6.3 – DOCUMENTS REVIEWED:

1. FAMOS Cycle Record for 2010/2011, NRG-22981/12.113571.

2. LTO Demonstration of Fatigue TLAAs, LTO of NPP Borssele, NRG-22488/11.106369, Revision 1.

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken toresolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	X
4.	**Issue**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue*	n.a.	

	resolved	*closed.*		
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		n.a.	
II	*The issue should be addressed before . . .*		n.a.	

n.a.: not applicable for the present mission.

ISSUE SHEET

1. ISSUE IDENTIFICATION		Issue Number:	**D - 3**
NPP:	BORSSELE		
Unit:			
Reviewed Area:	**Revalidation of safety analyses that used time limited ageing assumptions**		
Issue Title:	**Differences between the design and the accumulated number of occurrences in the plant annual transient report.**		

2. ISSUE CLARIFICATION

2.1 - ISSUE DESCRIPTION

Differences between the total number of occurrences of transients for the power increase and power decrease. There are also differences between the design and the actual accumulated cycles.

2.2 - REFERENCE TO IAEA SAFETY STANDARDS

IAEA SALTO Guideline Services Series 17, December 17
IAEA Safety Report Series No. 57 (2008), Section 6.1.3, 6.1.4

3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

To our opinion the appropriate transients are compared to the plant design transients on a conservative way, but we were not able to show this clearly in the SALTO Peer Review. Translating actual transients to the (very rough) design transients in the load catalogue is a task which requires engineering judgement.

The large differences between design and the actual accumulated cycles are caused by the conservative design assumption of a load following NPP instead of the actual base load NPP as Borssele is.

The margins/differences will be considered in the new load catalogue (see D-2).

Based on the new load catalogue we will consider the updating of the annual transient report.

4. ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**13/11/2009**

4.1 – COMMENTS:

C1) This is a concern for fatigue monitoring programme effectiveness if Borssele NPP is not comparing the appropriate transients to the plant design transients (Annual transient report: KTE/Adj/PHu/R086039, Feb 8, 2008).

C2) Plant power history was reviewed and it could not be concluded which actual transient to be compared to the design transients.

4.2 – RECOMMENDATIONS/SUGGESTIONS:

R1) The plant should review, and if necessary, revalidate the plant transients and determine the appropriate plant power transient from the plant computer data base.

S1) Consideration should be given to update the Annual transient report after determining and reconciling the differences between the design and actual cycles.

4.3 – DOCUMENTS REVIEWED:

- The Annual Transient Report (KTE/Adj/PHu/R086039 (Feb 8, 2008)

5. COUNTERPART ACTIONS	Date:	**31/03/2012**

R1) See answer on D-2 R1

S1) See answer on D-2 R1. The annual transient report will be updated based on the new fatigue basis forthcoming from the TLAA fatigue project.

6. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	Date:	**11/05/2012**

6.1 – COMMENTS:

C1) EPZ LTO demonstration of fatigue TLAAs has caused the actual and projected cycles to be updated and the implementation of the FAMOS software has allowed for monitoring of actual transients. The required monitoring has provided partial implementation of the five years of

cycle tracking recommended by AREVA for utilizing FAMOS data for revalidation of actual transients. The efforts as noted above address the recommendations of the previous SALTO mission. It will take additional time to fully implement the activity.

6.2 – RECOMMENDATIONS/SUGGESTIONS:

6.3 – DOCUMENTS REVIEWED:

1. Assessment of Fatigue TLAAs, LTO of NPP Borssele, NRG-22488-11.106371 Revision 1
2. FAMOS Cycle Record for 2010/2011, NRG-22981/12.113571.

STATUS OF THE ISSUE			**Date: 13/11/2009**	**Date: 11/05/2012**
1 – Resolution Degree:				
1.	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	n.a.	
		No progress in the resolution of the issue, or unsatisfactory resolution.	n.a.	
2.	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*	n.a.	
		The issue was identified by the Counterpart and work has started to resolve it.	n.a.	
3.	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*	n.a.	
		The implemented actions meet partially the intent of recommendations of previous IAEA review.	n.a.	X
4.	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	n.a.	
		The intent of recommendations of previous IAEA review is fully met. Issue closed.	n.a.	
2 – Urgency degree:				
I		*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*	n.a.	
II		*The issue should be addressed before . . .*	n.a.	

n.a.: not applicable for the present mission.