IAEA
International Atomic Energy Agency

SALTO Peer Review Guidelines

Guidelines for Peer Review of Safety Aspects of Long Term Operation of Nuclear Power Plants

Vienna, January 2014

Services Series 26

SALTO PEER REVIEW GUIDELINES

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IAEA SERVICES SERIES No. 26

SALTO PEER REVIEW GUIDELINES

GUIDELINES FOR PEER REVIEW OF SAFETY ASPECTS OF LONG TERM OPERATION OF NUCLEAR POWER PLANTS

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2014

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Printed by the IAEA in Austria
February 2014

SALTO PEER REVIEW GUIDELINES
IAEA, VIENNA, 2014
IAEA-SVS-26
ISSN 1816–9309
© IAEA, 2014
Printed by the IAEA in Austria
February 2014

FOREWORD

International peer review is a useful tool for Member States to exchange experiences, learn from each other and apply good practices in the long term operation (LTO) of nuclear power plants (NPPs). The peer review is also an important mechanism through which the IAEA supports Member States in enhancing the safety of NPPs. The IAEA has conducted various types of safety review that indirectly address aspects of LTO, including safety reviews for design, engineering, operation and external hazards. Operational Safety Review Team (OSART) services include review of ageing management programmes. In addition, several Member States have requested Ageing Management Assessment Team (AMAT) missions. Through these experiences, it was recognized that a comprehensive peer review on LTO would be very useful to Member States.

The Safety Aspects of Long Term Operation (SALTO) peer review addresses strategy and key elements for the safe LTO of NPPs, which includes AMAT objectives and complements OSART reviews. The SALTO peer review is designed to assist operating organizations in adopting a proper approach to LTP including implementing appropriate activities to ensure that plant safety will be maintained during the LTO period. The SALTO peer review can be tailored to focus on ageing management programmes (AMPs) or on other activities related to LTO to support the Member State in enhancing the safety of its NPPs. The SALTO peer review can also support regulators in establishing or improving regulatory and licensing strategies for the LTO of NPPs.

The guidelines in this publication are primarily intended for members of a SALTO review team and provide a basic structure and common reference for peer reviews of LTO. Additionally, the guidelines also provide useful information to the operating organizations of NPPs (or technical support organizations) for carrying out their own self-assessments or comprehensive programme reviews. The guidelines are intended to be generic, as there are differences between utilities and NPPs. The scope of the review can be tailored upon request of the host organization. These guidelines supersede the SALTO Guidelines published in 2008.

The IAEA officer responsible for this publication was R. Krivanek of the Division of Nuclear Installation Safety.

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1. INTRODUCTION

More than one third of all the power reactors operating worldwide have been in operation for more than 30 years, while a rather limited number of new NPPs are being put into operation. In view of these facts, many countries are giving a high priority to continuing the operation of NPPs beyond the time frame originally anticipated (e.g. 30 or 40 years).

Long term operation (LTO) of a nuclear power plant may be defined as operation beyond an established time frame set forth by, for example, licence term, design, standards, licence and/or regulations, which has been justified by safety assessment, with consideration given to life limiting processes and features of systems, structures and components (SSCs). Proper and safe LTO is based on the experience and practices of various countries in areas such as plant license renewal, life extension, continued operation and plant life management. Other activities, including periodic safety review, ageing management and plant modification, are also relevant to LTO.

Ageing management of an NPP is an important activity that must be considered in conjunction with the decision to pursue LTO. Ageing management of NPPs deals with the physical effects of ageing of systems, structures, and components (SSCs) that can result in the degradation of their performance characteristics. Thus ageing management helps ensure that SSCs important to safety remain capable of performing their required safety functions. Effective ageing management programmes (AMPs) are key elements in the safe and reliable operation of NPPs during the time frame originally planned for operation and for the period of LTO. In order to assist Member States in effectively managing the effects of ageing, the IAEA has developed related safety standards and guidance publications.

1.1. PURPOSE OF SALTO PEER REVIEW GUIDELINES

These guidelines provide a basic structure and common reference across the various areas covered by a SALTO (Safety Aspects of Long Term Operation) peer review. As such, they are addressed principally to SALTO peer review teams, but they also provide guidance to host organizations (including operating organizations and technical support organizations) for preparation for a SALTO peer review. Publications referenced in these guidelines could provide additional useful information for staff of a host organization while preparing for a SALTO peer review.

The SALTO peer review used information obtained from the following sources:

- Documentation describing the plant and its structures, systems and components (SSCs);
- Documents on reviews and assessments of the plant condition and plant programmes related to long term operation (LTO);
- Written procedures applicable to LTO related activities of the plant;
- Interviews and discussions with host organization personnel;
- Observations of plant material conditions;
- Observations of plant personnel performance;

- Plant records and reports.

The review focuses on performance in technical areas, related regulatory requirements, the managerial aspects of policy implementation, the control and coordination of related activities, continuous review and improvement of activities, and document control.

The SALTO peer review is based on Specific Safety Requirements on NPP operation SSR-2/2 [1] and follows the IAEA Safety Report on Safe Long Term Operation of Nuclear Power Plants [2] that addresses the following areas:

- LTO feasibility (feasibility studies, preconditions for LTO, plant programmes);
- Scoping and screening of systems, structures, and components (SSCs);
- Assessment and management of SCs for ageing degradation for LTO;
- Time limited ageing analyses (TLAA, also termed safety analyses that used time limited assumptions);
- Documentation.

Each of these areas is an essential part of areas ageing management related to long term operation and therefore the IAEA Safety Guide No. NS-G-2.12, Ageing Management for Nuclear Power Plants [3], is also used as a main reference document for some of the above mentioned topics.

A peer review for reviewing ageing management and other activities relevant to LTO can be carried out at any time during the lifetime of a nuclear power plant (NPP).

The review of activities and preparedness of `Human resources, competence and knowledge management for LTO` supplements the purpose of the review as an optional review area. The main purpose of this area is to review if the plant has sufficient competent staff to support the necessary LTO activities, appropriate knowledge management and knowledge transfer processes for LTO and recruitment, training and qualification processes for personnel involved in LTO activities. In this area, the team also reviews whether the plant`s broader human resources policy and strategy adequately support the potential needs for LTO.

The scope of the SALTO peer review does not address:

- Assessment or review of the plant design;
- Assessment of the environmental impact of LTO;
- Economic assessment and long term investment strategies.

A SALTO peer review is a flexible service and the review areas, and the depth of the review, can be tailored according to the request of the host organization as described in Sections 2 and agreed during preparation for the review.

The guidelines are intended to help each reviewer (team member) formulate his/her review plan in conjunction with his/her own experience. They are not exhaustive and should not limit the reviewers, but rather should be considered an illustration of the comprehensive standards against which the review is performed. It is difficult, in the timeframe of a mission, to cover the whole scope of a given section of the guidelines to its full depth. Therefore, it is expected that, based on the review of the advance information package

prepared by the host organization and also input from the intermediate results through the peer review process, the reviewers will apply their professional judgement to decide which topics need more in-depth evaluation.

1.2. OBJECTIVES OF THE SALTO PEER REVIEW

The SALTO peer review is a comprehensive safety review directly addressing strategy and key elements for safe LTO of NPPs, which complements OSART reviews [4].

The evaluation of programmes and performance is made on the basis of IAEA safety standards and other IAEA publications (see Annex VIII), and of the combined expertise of the international review team. The review is neither a regulatory inspection nor is it an audit against national codes and standards. Rather, it is a technical exchange of experiences and practices at the working level aimed at strengthening the programmes, procedures and practices implemented at the plant.

The key objectives of the peer review are to provide:

- the host organization with an objective assessment of the status of the preparedness for LTO with respect to international nuclear safety standards;
- the host organization with recommendations and suggestions for improvement in areas where performance falls short of international best practices;
- key staff at the host organization with an opportunity to discuss their practices with experts who have experience with related practices in the same field;
- Member States with information regarding good practices identified in the course of the review;
- reviewers and observers from Member States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field.

1.3. SALTO PEER REVIEW ELEMENTS

SALTO peer review consists of the following elements:

- Workshop/seminar on IAEA safety standards and SALTO review method;
- Pre-SALTO mission (more than one Pre-SALTO mission can be performed for one plant, if required);
- SALTO mission;
- Follow-up SALTO mission.

Further details are provided in Annex VII.

1.3.1. Pre-SALTO mission.

Pre-SALTO mission reviews existing plant programmes and LTO plans at an early stage of their preparation prior to the complete implementation of the LTO activities. Pre-SALTO mission should be conducted well in advance of entering the LTO period to facilitate

completion of necessary activities. This mission should review the completeness of the plant intended activities for preparation for safe LTO and the compliance of those activities with the IAEA standards and recommendations.

A Pre-SALTO mission is typically followed by a SALTO mission but the plant may ask for multiple Pre-SALTO missions before the SALTO mission.

This type of mission was originally called “Limited scope SALTO mission”.

1.3.2. SALTO mission.

The SALTO mission reviews the status of the LTO activities close to their completion or when completed, and prior to entering the LTO period.

This type of mission was originally called `Full scope SALTO mission`.

1.3.3. Follow-up SALTO mission.

To check the progress in implementing recommendations and suggestions to resolve issues, a follow-up mission is conducted. The team leader and one to three other members of the original review team take part in this mission.

The follow-up mission typically takes place 18 - 24 months after the Pre-SALTO or SALTO mission. In the case that the SALTO mission or the second Pre-SALTO mission is held within 24 months after the first Pre-SALTO mission, this mission also functions as a follow-up mission for the first Pre-SALTO mission.

At least 30 days before review team arrival at the plant, the counterpart will send to the IAEA all issue sheets from the main mission, having documented the status of issues (section 4 of issue sheets) and the responses to recommendations and suggestions. It takes typically four days to carry out the follow-up mission.

1.4. EXPERT MISSIONS BASED ON SALTO GUIDELINES

In addition to the above mentioned missions, the host organization can request an expert mission that focuses on specific review areas related to LTO. Review process and methods are in accordance with the SALTO guidelines.

The scope of this mission can be tailored based on the organization needs. The results of those missions are provided in experts` mission report, but not in a SALTO mission report format.

1.5. LTO MODULE OF OSART MISSION

The plant’s preparedness for LTO can also be reviewed as an optional area of an OSART mission. In this case, the LTO area is reviewed by one dedicated expert, using SALTO

Guidelines and Working Note Outlines as guidance. One full time reviewer is reviewing the subject, and therefore the large scope of the area allows only programme-level assessment with a limited depth of review. For a deeper review (e.g. of scoping and screening, ageing management of mechanical, electrical and I&C components, and civil structures), a Pre-SALTO and a SALTO mission should be conducted.

1.6. ORGANIZATION OF THE SALTO PEER REVIEW

1.6.1. Preparation.

On receipt of a request for a SALTO mission, an IAEA team leader will be assigned to carry out the following:

- Establishment of liaison contacts at the host organization;
- Arrangement of a preparatory meeting with the plant management and other organizations involved;
- Recruitment of external experts for the team.

At the same time, the host organization should nominate a contact person with whom the team leader may correspond.

The preparatory meeting, usually attended by the team leader and the deputy team leader, if necessary, is held at the host organization (approximately 6 months prior to the mission) to allow plant management, counterparts and other organizations involved to participate. The meeting covers:

- The main features of the SALTO mission;
- The exact scope of the review, reflecting requests of the host organization;
- Plant management's preparation for the review;
- Preparation of the advance information package;
- Logistic support required;
- Financial arrangements.

Following the meeting, the IAEA will recruit experts as reviewers and the plant management should designate one counterpart with good English language skills (or counterpart with interpreter) for each area of review, who will be the contact person for the corresponding team member during the review. The plant can propose experts from specific countries or reactor types for the IAEA team leader’s consideration.

The host organization should designate a host plant peer with the following characteristics, roles and responsibilities:

- The host plant peer is a hosting organization staff member with good overall knowledge of plant, programmes and plant staff and with good English language skills;
- During the entire mission the host plant peer does not have any plant duties;
- His/her main role is to act as a liaison between the host organization and the IAEA team;
- The host plant peer participates in the SALTO team meetings and advises the SALTO team members when information may not be complete or correct. At the same time the host plant peer is not an IAEA team reviewer;

- In case of misunderstanding or issues needing further clarification, the host plant peer identifies to the SALTO team the responsible or knowledgeable plant staff in specific areas that could provide clarification to resolve the misunderstandings.

The IAEA team leader prepares a draft of Terms of Reference (ToR) document for the peer review, which is discussed with the host organization during the preparatory meeting. The ToR document includes the following items:

- Background;
- Objectives of the review;
- Date and place for the review;
- Name of team leader and host plant peer;
- Review basis and methodology;
- Review subjects;
- Work scope of each expert;
- Provisional schedule;
- Reporting;
- Content of the advance information package;
- Administrative subjects and logistics.

The advance information package (AIP) is prepared by the host organization and is used to convey relevant information to the SALTO team members for preparation for their review.

The package should contain adequate information and data to understand the overall organizational structures and current operating practices. It should also include an overview of the regulatory basis and the plant approach to Long Term Operation (LTO), specifically, the key approach to LTO and the organizational structure to implement the approach. While the contents of the package should cover the essential plant features, it should also be concise.

The workload in preparing the package should be minimized. The compilation of the information should be based on and utilize existing documents such as routinely prepared reports. Focus on the content with limited effort on editing is encouraged. The package should be in English as this is the SALTO working language.

To the extent possible, the format of the AIP should follow the suggested table of contents provided in Annex I, which is based on the format of the SALTO Guidelines.

Since the SALTO team members should grasp overall plant conditions and trends towards LTO, the full package will be received by all team members. The standard approach is that the plant sends the AIP in an electronic format to the IAEA at least 30 days before their arrival at the plant.

1.6.2. Schedule.

The length of the SALTO mission is based on the mission scope and is normally from seven to ten working days. Annex V provides an example of a typical schedule.

The team briefing for the review team takes place on the first day (normally Monday) of the first week of the mission.

Day two (normally Tuesday) starts with team training and an entrance meeting.

A team meeting is conducted at the end of each working day.

The day before the exit meeting, the experts develop draft issue sheets (issues with corresponding recommendations and suggestions), which have been discussed with the counterpart.

At the exit meeting, held on the last day of the mission, the experts present the main findings and conclusions as a position of the entire IAEA review team.

The draft mission report is provided to the host organization at the exit meeting. After the exit meeting, the host organization reviews the draft and sends editorial comments within two weeks to the IAEA.

The final SALTO mission report is normally delivered to the host organization within two months after the mission.

1.6.3. Review team composition and responsibilities.

The SALTO peer review is conducted by a team of international experts with experience applicable to the areas of review. The typical team composition includes a majority of external experts (experienced experts from utilities, regulatory authorities or support organizations) and IAEA staff members (including the team leader and the deputy team leader if applicable). No one from the country to which the host organization belongs should be included in the team.

Team members are selected to ensure that a variety of national approaches to ageing management and safe LTO are represented. Each reviewer has, in addition to his/her particular area of expertise, knowledge of some other national approaches and some other relevant areas. Coupling this knowledge with the IAEA safety standards and other IAEA guidance publications allows good international practices to be identified.

The team leader is responsible for scheduling, pre-mission briefing, team training, leading of daily meetings, conducting of meetings with plant management, control of issue development, preparation of the mission draft report, issuing the final SALTO mission report, interface with public and the media.

The reviewers are responsible for preparing for the mission by studying relevant information provided by the host organization in the AIP (but not limited to this), performing training

course, preparing plans for their review, and formulating questions and comments prior to commencing the mission.

Immediately preceding the review, team members are required to attend a training of about a half day duration led by the team leader. This provides an opportunity for them to meet and resolve any questions not covered in these guidelines. A short meeting with the counterparts should also be arranged at that occasion.

During the mission, the experts will conduct interviews and site walk-downs, develop working notes for their area of review on the basis of the template provided, discuss issues and recommendations/ suggestions with the counterpart, and draft their own part of the mission report. They should also present main findings and conclusions for their area of review at the exit meeting.

If the team leader and the counterpart agree, an observer(s) can join the review team. Normally an observer is either an IAEA staff member who needs to be trained for subsequent SALTO mission or a person from an organization that is going to request a SALTO peer review. The observer(s) will assist the experts during the review.

The team members are also requested to provide feedback on the application of the IAEA safety standards (e.g. which parts need to be updated, what issues could not be referenced to the standards).

1.6.4. Reporting and documenting.

1.6.4.1.Daily report

Primary information gathered by the reviewers during the review should be documented in the form of daily reports (see Annex II), and presented to the review team during daily team meetings. A new daily report is prepared each day.

1.6.4.2. Working notes

The daily reports are expanded into working notes that contain identified concerns, which were discussed within the review team during daily meetings. If agreed by the review team, they are further developed into issues (see Annex III). The working notes also contain the reviewer’s comments, references to reviewed documents, interview notes, references to the IAEA documents; and will form the basis of the mission report. Each reviewer develops the working notes beginning with the first day of the review and adds information on a daily basis.

The working notes are the 'field notes' of the individual reviewers and are considered by the IAEA to be restricted documents. As such they are not released to the public.

A template of the working notes is distributed to reviewers during the team training.

1.6.4.3. Mission report

On completion of the review, the team members, under guidance and instruction of the team leader, will prepare the respective parts of the SALTO mission report, based on the working notes.
The draft SALTO mission report is provided to the host organization at the exit meeting for review and comment. The issues, recommendations and suggestions, and conclusions should not be changed after the exit meeting. The final SALTO mission report is completed and issued after the mission, as defined in Section 1.6.2. The final SALTO mission report is submitted through official channels to the Member State. The IAEA restricts initial distribution to itself and to members of the review team for the initial 90 days after issuance of the final SALTO mission report. After this period the mission report will be derestricted unless, within this 90 days period, the host organization or the Member State sends a written request to the IAEA requesting that the report remain restricted. Further distribution is at the discretion of the Member State concerned.

The SALTO mission report contains the following information:

- Executive summary;
- Introduction, describing the background for conducting the review, the scope and objectives of the review, and a description of the conduct of the review;
- Mission results containing general conclusions, detail conclusions and good practices;
- Processing and presentation of issue sheets;
- Issue sheets (see Annex III) that contain the issue description, facts and recommendations and suggestions.

A standard table of contents is provided in Annex IV.

The day before completing the mission, the experts should provide the team leader with the electronic file of their contributions to the draft report.

The peer review compares observed LTO related activities with reference documents based on the combined expertise of the review team. This comparison may lead the review team to document in the final SALTO mission report facts, recommendations, suggestions, or good practices in accordance with the following definitions:

Issues

An issue is an identified problem or an area of improvement, which has been identified on the basis of IAEA safety standards or other reference documents used for the review (see Annex VIII).

Facts

A fact is an evidence of deficiency in programmes or performance. Based on the grouping of facts of same nature, each reviewer develops an issue stated as a fundamental overall problem which can have a safety consequence.

Fundamental overall problem

A fundamental overall problem is a generic deficiency in programmes or performance which can lead to a safety consequence.

Safety consequence

A safety consequence is an adverse effect on safety that could result from deficient programmes or poor performance.

Recommendation

A recommendation is advice on what improvements in safety aspects of LTO should be made in the activity or programme that has been evaluated. It is based on IAEA Safety Standards, Safety Reports or proven, good international practices and addresses the causes rather than the symptoms of the identified concern. It illustrates a proven method of striving for excellence, which reaches beyond minimum requirements. Recommendations are specific, realistic and designed to result in tangible improvements without proposing any specific solutions of the issue. Absence of recommendations can be interpreted as performance corresponding with proven international practices.

Suggestion

A suggestion is either 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 safety aspects of LTO but is primarily intended to make a good performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to on-going work. In general, it is designed to stimulate the plant management and supporting staff to continue to consider ways and means for enhancing performance. It is also based on IAEA Safety Standards, Safety Reports or proven, good international practices and addresses the causes rather than the symptoms of the identified concern.

Note: If an item is not well based enough to meet the criteria of a “recommendation” or ”suggestion”, but the expert or the team feels that mentioning it is still desirable, the given topic may be described in the text of the report using the phrase ‘encouragement’ (e.g. the team encouraged the plant to…).

Note: Facts are explicitly used to support the issues described in the issue sheets. Recommendations and suggestions are explicitly used to address the issues contained in the issue sheets.

Good practice

A good practice is outstanding and proven performance, programme, activity or equipment in use that contributes directly or indirectly to safe LTO and sustained good performance. A good practice is markedly superior to that observed elsewhere, not just the fulfilment of minimum requirements or expectations. It should be superior enough and have broad

enough application to warrant bringing it to the attention of other nuclear power plants for their consideration in improving performance. A good practice has the following characteristics:

- Novel;
- Has a proven benefit;
- Replicable (it can be used at other plants);
- Does not contradict an issue.

The characteristics of a given "good practice" (e.g. whether it is well implemented, or cost effective, or creative, or it has good results) should be explicitly stated in the description of the good practice.

Note: An item may not meet all the criteria of a "good practice", but still be worthy to note. In this case it may be referred to as a "good performance," and may be documented in the text of the report. A good performance is a superior result that has been achieved or a good technique or programme that contributes directly or indirectly to safe LTO and that works well at the plant. However, it might not be appropriate to recommend its adoption by other nuclear power plants, because of financial considerations, differences in design or other reasons.

1.6.5 Definition and discussion of "programme" as used in this guideline.

LTO programme – overall LTO project plan for performing the evaluations and assessments necessary to justify LTO.

This programme should integrate all similar long-term issues arising from different types of reviews such as OSART and other IAEA missions, WANO missions, PSR or regulatory requirements.

Plant programme – programme for minimizing or detecting the adverse effects of ageing, for example, control of preventive and predictive maintenance, equipment qualification (EQ), in-service inspection (ISI), surveillance and monitoring, and monitoring of chemical regimes. Plant programmes are suitable for comparison to the nine attributes of effective AMP. In US license renewal practice, the ageing management programs documented in Appendix B of a license renewal application constitute the "plant programmes" as defined herein. Plant programmes consist of actual field activities performed in accordance with relevant plant procedures to monitor plant SCs or to establish and maintain environmental conditions to minimize the effects of ageing. Plant programmes should be described in terms of the nine attributes presented in [6].

Ageing management programme (AMP) – results of an evaluation of SSCs to determine the ageing effects requiring management and the ageing management activities necessary to manage the effects of ageing. Credited ageing management activities may be "plant

programmes." In US license renewal practice, the ageing management review results documented in Chapter 3 of a license renewal application constitute the "ageing management programme" as defined herein.

LTO implementation programme (Refer to Section 3.1.4) – overall plan for implementing plant-wide activities necessary as the result of the evaluations documented in the "ageing management programmes" defined herein. The LTO implementation programme should include actions/measures identified on the basis of review of AMPs and revalidation of time limited ageing analyses. This programme should cover modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring necessary safety margins during the LTO period. This programme can be part of the PLiM programme.

2. REVIEW METHODOLOGY

The review addresses the following areas:

- A: Organization and functions, current licensing basis (CLB), configuration/ modification management;
- B: Scoping and screening and plant programmes relevant to LTO;
- C: Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for mechanical components;
- D: Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for electrical and I&C components;
- E: Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for civil structures;
- F: Human resources, competence and knowledge management for LTO (optional area).

Further areas related to LTO may be optionally covered if requested:

- Management, organization and administration, Training and Qualification, Technical support, etc.

2.1. REVIEW TECHNIQUES

The SALTO peer review team uses four steps to acquire the information needed to develop their recommendations and suggestions, as set out in the expert's working notes.

These four steps are:

- Review of written material and databases;
- Discussion and interviews;
- Direct observation of performance, status and activities;
- Discussion of evaluations and tentative conclusions within the team and with counterparts.

The use of review techniques mentioned above should be planned in advance for each day. Arrangements should be made with the counterpart regarding how to perform the discussions, interviews and observations.

The IAEA review team has daily meetings in which the reviewers present their findings, summarize their concerns developed during the day, and discuss potential issues. This creates an opportunity for other team members to contribute their views, further strengthening the experience basis of the review team used for the evaluation. It is important that each reviewer comes to the meeting prepared to make a concise statement of his/her findings, in order to allow the other review areas to be discussed at the same meeting. A template of the daily report is shown in Annex II.

Formulation of recommendations and suggestions should be based on identified facts. Similarly, good practices discovered during the process of the review that should be documented for the benefit of other Member States are described in the working notes in detail sufficient to be readily understood.

Based upon the discussions and observations, the reviewer can, if necessary, modify his/her preliminary view. One or more iterations may be required for document review, discussions, interviews, and observations in order to gain sufficient facts to form a judgment.

2.1.1. Review of written material and databases.

Documents of general interest to the whole team are included in the AIP.

Specific information on a given area that is to be reviewed by the responsible reviewer on site is set out in the appropriate section of these guidelines (see section 3).

2.1.2. Discussion and interviews.

The SALTO team will conduct discussions and interviews with the counterpart with the aim to:

- Obtain additional information not covered by the documentation;
- Get answers on questions, and clarify concerns arising out of the documentation review;
- Obtain an in-depth clarification on sample programmes and activities;
- Understand the work processes, duties and responsibilities.

The discussions and interviews are also used to provide the opportunity for exchanging important information between reviewers and counterparts, and therefore should be held at the working level between peers. These interviews should be a 'give and take' discussion based on open questions and not an interrogation of the counterparts by the reviewers. Properly conducted, these discussions and interviews are possibly the most important part of the SALTO mission.

2.1.3. Direct observation of performance, status and activities.

Direct observation of plant programme implementation and SSC status means on-site observation of the following:

- Implementation of plant programmes:
    - Use of procedures and instructions;
    - Regular and specific reporting requirements;
    - Quality assurance and quality control programmes;
    - Collection, storage and retrieval of data;
    - Record keeping and trend monitoring;

- Arrangement for monitoring of effectiveness of the programme and feedback;
- Management control;

– Physical conditions of selected SSCs within the scope of LTO:

- Walk down;
- Inspection reports.

From these observations, the reviewer will form a position on:

– The management policy and commitment on LTO;
– Systematic ageing management programme;
– The commitment of the staff;
– Capability of the staff in terms of resources and technical knowledge and skills;
– Physical conditions of selected SSCs within the scope of LTO (effectiveness of ageing management programmes).

2.1.4. Discussion of evaluations and tentative conclusions with counterparts.

Based on facts identified during previous review steps, the reviewer develops tentative conclusions (e.g. preliminary recommendations and suggestions, good practices) which are to be discussed and clarified with counterpart.

2.2. SOURCES OF INFORMATION

2.2.1. IAEA Basis.

The peer review is implemented based on this publication and the IAEA references [1], [2] and [3].

Further IAEA related requirements, recommendations and good practices are shown in documents listed in Annex VIII.

2.2.2. Information provided by the counterpart.

Main information sources provided by the counterpart are as follows:

– Advance Information Package;
– Related national regulatory requirements (that provide the basis for LTO);
– Design basis documentation;
– Final Safety Analyses Report (FSAR);
– Ageing management programmes;
– Time limited ageing analyses;
– Plant programmes related to long term operation;

- Plant Life Management (PLiM) programme;
- Programme for modifications and replacements;
- Implementation programme for LTO;
- Periodic Safety Review (PSR) report;
- License renewal documentation;
- Plant databases (such as system and equipment list, set-point list);
- Plant procedures relevant to LTO (such as scoping and screening procedures);
- Operating feedback relevant to LTO.

Documentation of the plant programmes as defined in Section 3 of this Guideline should be made available.

If the Periodic Safety Review (PSR) is an established process in the Member State, the report on the PSR and the resulting action plan is another important source of information.

There are Member States where the PSR [5] is the only process for justification of the safety of plant operation in the long term. In this case, the PSR should cover the scope of LTO, ageing management review, review of ageing management programmes and also revalidation of time limited ageing analyses. The programme of corrective actions defined on the basis of PSR should contain the necessary actions ensuring safety and feasibility of LTO.

If the Member State has established a license renewal process, the documentation prepared during this process could be considered a basic source of information.

In some Member States, an integrated regulatory approach which combines PSR and license renewal is adopted. In this case the PSR is used as a source for overall assessment of safety including aspects related to ageing, plant status, environmental qualification, adequacy of plant programmes, and formal licence renewal documents containing the justification for LTO. The SALTO review should consider LTO relevant measures defined on the basis of the PSR.

The exact scope of information sources should be defined and agreed in the terms of reference prepared as part of the AIP.

2.3. DEVELOPMENT OF ISSUES

2.3.1. Daily Report.

Development of issues and good practices is based on the reviewer’s daily reports that are consolidated into working notes (see template in Annex II.)

2.3.2. Working Notes.

During the course of the peer review, after each daily meeting, each team member writes detailed working notes on his/her observations and conclusions. They are the basis for

potential further development into recommendations, suggestions or good practices. Working notes should contain:

- The reviewers' observations on a factual basis, with minimum description and clear conclusions;
- References to reviewed documents, databases and performed interviews;
- References to IAEA safety standards and other reference documents should be provided.

In writing the working notes, the following should be taken into account:

- Language should be clear, concise, objective and impersonal;
- Short, direct sentences aid understanding;
- Official names should be used to designate organizational units, positions and systems;
- Abbreviations or acronyms should be introduced upon their first use.

The working notes should be written in English, day-to-day from the first day of peer review, and modified and supplemented, as necessary, through the entire period of the review.

2.3.3. Issue Sheets.

The reviewer should group facts and make conclusions with the aim of defining fundamental overall problems. If agreed by the review team, the issue is further developed by the reviewer and documented on the Issue Sheet. The outline of the Issue Sheet is described below. A template of the Issue Sheet is provided in Annex III.

Each "issue sheet" consists of the following sections.

For the limited scope or full scope mission on the subject:

- (1) Issue Identification;
- (2) Issue Clarification;
- (3) Assessment by the IAEA Review Team.

In the Issue Clarification, Section 2, of each "issue sheet," a fundamental overall problem is defined and a clear reference to the IAEA safety standards or other reference documents used for the review is indicated.

The purpose of Section 3 of each issue sheets is to reflect the discussions with the counterpart`s experts, to record the facts, discuss safety consequences, issue possible recommendations and suggestions and record documents reviewed.

For follow-up missions on the same subject, information is added pertaining to:

- (4) Counterpart actions;
- (5) Follow-up Assessment by the IAEA Review Team.

The purpose of Section 4 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.

The purpose of Section 5 of the Issue Sheets is to reflect the discussions with the counterpart`s experts, to record the facts, to record documents reviewed and decide on resolution degree at the time of the follow-up mission. The status of the issue is assessed and the respective "resolution degree" is assigned to reflect the judgment of the IAEA review team. The degree is scaled from 1 to 3 as follows.

- Insufficient progress to date: Actions taken, or planned do not lead to the conclusion that the issue will be resolved in a reasonable time frame. This category applies to recommendations on which no action or inadequate action has been taken.

- Satisfactory progress to date: The implemented actions partially meet the intent of the recommendation or suggestion of previous SALTO mission.

- Issue resolved: The intent of the recommendation or suggestion of previous SALTO mission is fully met. Issue closed.

If, as an outcome of a follow-up mission, a new safety issue appears with respect to the previous ones, a new "issue sheet" should be generated.
Issue sheets are numbered in sequential order for further reference.

2.4. WORK WITH THE COUNTERPART

The work with the counterpart in the plant involves the following activities:

- Entrance meeting;
- Daily planning;
- Daily review sessions;
- Debriefing;
- Exit meeting.

During the entrance meeting with the counterpart, the organization and plans for conducting the review should be presented and working teams for every area should be established. The working teams in each area consist of the IAEA reviewer and counterparts. It is advisable to have a short daily meeting of all participants in each area to discuss plans for the next working day.

The reviewers will plan their schedules such that a primary and an alternate objective are always established. To maintain review efficiency, review efforts can be directed to the

day’s alternate objective if unable to proceed with activities supporting the primary objective. Schedule of activities should be updated daily and discussed with the counterpart.

The counterpart should be informed on a daily basis of the review team’s preliminary findings. The reviewer and counterpart should reach an agreement on each fact observed. As already mentioned in 1.6, the host plant peer attends the daily team meetings.

The day before the exit meeting, reviewers should deliver to the team leader their parts of the mission report already discussed with the counterpart.

A formal exit meeting is held on the last day of the mission. At the exit meeting, all the team members provide short conclusive statements summarizing recommendations, suggestions, encouragements, good practices and good performances.

3. PRACTICAL GUIDANCE FOR CONDUCTING PEER REVIEW

In this section, detailed review guidance is provided to the review team focusing on areas relevant to LTO as follows.

A - Organization and functions, current licensing basis (CLB), configuration/ modification management (section 3.1):

- Related regulatory requirements, codes and standards;
- Organizational structure for LTO;
- Plant policy for LTO;
- LTO implementation programme;
- Current safety analyses report and other current licensing basis documents;
- Configuration/modification management including design basis documentation (DBD).

B - Scoping and screening and plant programmes relevant to LTO (section 3.2):

- Methodology and criteria for scoping and screening of SSCs for LTO;
- Plant programmes relevant to LTO (Maintenance, equipment qualification (EQ), in-service inspection (ISI), Surveillance and monitoring, Monitoring of chemical regimes etc.)

C - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for mechanical components (section 3.3):

- Area-specific scoping and screening of SSCs for LTO;
- Ageing management review;
- Review of ageing management programmes;
- Obsolescence management programme;
- Existing time limited ageing analyses;
- Revalidation of time limited ageing analyses;
- Data collection and record keeping.

D - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for electrical and I&C components (section 3.3):

- Area-specific scoping and screening of SSCs for LTO;
- Ageing management review;
- Review of ageing management programmes;
- Obsolescence management programme (particularly for I&C systems and components);
- Existing time limited ageing analyses;
- Revalidation of time limited ageing analyses (including EQ);
- Data collection and record keeping.

E - Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for civil structures (section 3.3):

- Area-specific scoping and screening of SSCs for LTO;
- Ageing management review;
- Review of ageing management programmes;
- Obsolescence management programme;
- Existing time limited ageing analyses;
- Revalidation of time limited ageing analyses;
- Data collection and record keeping.

F - Human resources, competence and knowledge management for LTO (section 3.4):

- Human resources policy and strategy to support LTO;
- Competence management for LTO and recruitment, training, and qualification processes for personnel involved in LTO activities;
- Knowledge management and knowledge transfer for LTO.

3.1. AREA “A”: ORGANIZATION AND FUNCTIONS, CURRENT LICENSING BASIS, CONFIGURATION/ MODIFICATION MANAGEMENT

3.1.1. Related regulatory requirements, codes and standards.

3.1.1.1. Expectations

The operating organization should identify, from the existing national legal framework, a consistent and complete set of regulatory requirements, codes and standards, related to long term operation and ageing management.

The identified set of regulatory requirements, codes and standards should provide a basis for developing the LTO programme.

3.1.1.2. Examples of documents for the review

- Requirements on LTO and LTO relevant aspects of plant activities;
- Requirements related on plant programmes related to LTO;
- Requirements on equipment qualification;
- Requirements on ageing management;
- Requirements on license renewal (if existing);
- Requirements on PSR (if existing and relevant);
- Requirements on FSAR updating, and on design basis;
- Requirements on quality assurance;
- Requirements on configuration management;
- Requirements on control of the LTO evaluation process;
- LTO programme documentation.

3.1.1.3. Evaluation

The review will focus on the following.

- Verify if a complete and consistent set of regulatory requirements, codes and standards related to LTO and ageing management have been identified;
- Check if the regulatory requirements, codes and standards are consistent with the IAEA requirements and recommendations and whether the gaps, if applicable, are addressed by the plant in the LTO programme;
- Verify if the LTO programme meets the intent of the applicable regulatory requirements, codes and standards, IAEA requirements and recommendations, and best international practices.

3.1.2. Organizational structure for LTO.

3.1.1.2. Expectations

The operating organization should establish an organizational plan for activities connected to long term operation and ageing management.

The plan should indicate the general policies, lines of responsibility and authority, lines of communication, duties and number of staff and their required qualifications needed to conduct the necessary activities.

The plant should adopt a suitable organizational structure and dedicate the necessary resources for preparation and implementation of the LTO programme.

A special LTO oriented project team or similar organizational arrangement should be established.

3.1.1.3. Examples of documents for the review

- Organizational flowcharts and job descriptions; and
- Plant procedures describing organizational structure in the plant.

3.1.1.4. Evaluation

The peer review will focus on:

- Whether the responsibility for LTO preparation is well defined;
- Whether the plant has adopted suitable organizational structure for preparation and implementation of LTO programme;
- Whether the plant has established a special LTO oriented project team or similar organizational arrangements dealing with LTO activities and that it has responsibilities and duties as well as authorities defined within organizational policy and quality assurance system (including control of contractors and TSOs);
- Whether the number of staff and their required qualifications are adequate for the scope of work and the assigned duties;
- Whether staff involved in LTO activities have specific job descriptions/task responsibilities;
- Whether the plant managers have the appropriate resources to carry out their assigned responsibilities and accountabilities regarding LTO preparations;
- Whether the organizational structure has capability to manage LTO programme with long term perspective;
- Whether the management system and organizational matters address the necessary quality assurance of processes related to long term operation and ageing management.

Note: The review of the organizational structure for LTO should be coordinated with review of area F.

3.1.3. Plant policy for LTO.

3.1.3.1. Expectations

The plant should have plant level documentation describing the general concepts and approach for preparation and implementation of the LTO programme. Responsibilities in development, updating and implementing the LTO programme should be described in plant procedures.

In a broader sense, plant programmes such as surveillance, inspection and maintenance as well as evaluation of operating experience feedback should have an essential role in ensuring the safe operation of NPPs in the original design period and during the planned period of LTO. The plant approach to LTO should be based upon the following principles:

- The existing regulatory process is adequate to maintain safe operation of the NPP for the current authorized operating period and LTO programme activities focus on the effects of ageing that need to be properly managed for the planned period of LTO.
- The current licensing basis (CLB) provides an acceptable level of safety for the original design period and is carried over to the planned period of LTO in the same manner and to the same extent, with the exception of any changes specific to LTO. Complementary requirements may apply for LTO and possible upgrading of the CLB on a one-time basis or in the context of the PSR (usually every 10 years).
- Plant programmes credited for use in LTO should be consistent with the nine attributes shown in [6].

3.1.3.2. Examples of documents for the review

- Plant level documentation for LTO;
- LTO programme documentation;
- Internal procedures for development, updating and implementation of LTO programme.

3.1.3.3. Evaluation

The peer review will focus on:

- Verify if a clear policy exists for activities related to long term operation and ageing management;
- Whether the plant has plant level documentation covering LTO concept and approach;
- Whether the plant policy is consistent with and meets the intent of related IAEA Safety Standards;
- Whether the plant staff is familiar with and understands the policy.

3.1.4. LTO implementation programme.

3.1.4.1. Expectations

The plant should have a programme of actions/measures identified on the basis of review of AMPs and revalidation of time limited ageing analyses. This programme should cover modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring necessary safety margins during the LTO period. This programme should be supported by safety analyses, and it can be part of the PLiM programme.

This programme should integrate all similar long-term issues arising from different types of reviews such as OSART and other IAEA missions, WANO missions, PSR or regulatory requirements.

3.1.4.2. Examples of documents for the review

- List or database of issues with supporting information originating from the AMPs, EQ programme and reviews of time limited ageing analyses;
- LTO programme document, including description of programmes for modifications, reconstructions and replacement;
- Internal procedures for development and updating of ageing management programmes and plant programmes;
- Plans of actions, corrective measures defined as result of PSR or other safety reassessment;
- Internal procedures for the implementation of ageing management programmes and plant programmes.

3.1.4.3. Evaluation

The peer review will focus on:

- Whether the plant has programme(s) or action plan for the resolution of issues identified during the development of AMPs, EQ programme and time limited ageing analyses;
- Whether the plant has programmes for major modifications, reconstructions and replacements;
- Verify that evaluation of the plant programmes and documentation was performed. Confirm that evaluation results are a sound basis for successful LTO and will remain effective for the planned period of LTO. This evaluation would determine if modifications or new plant programmes are necessary to ensure that SSCs are available and qualified to perform their intended function for the planned period of LTO;
- Check how the plant had applied the measures taken in connection with identified issues and how they are incorporated into a relevant plant programme. Verify if the LTO implementation programme covers activities such as modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring plant safety during LTO;

- Review how and to what extent the LTO implementation programme is supported by safety analyses and if applicable by business evaluations, and how coordination of the plant activities is done in respect to an overall programme for LTO;
- Verify that relevant operating experience and research findings are taken into account;
- Verify if recommendations and other suggestions arising from different types of reviews are incorporated into the plan activities.

3.1.5. Current safety analyses report and other current licensing basis documents.

3.1.5.1. Expectations

The CLB is a collection of documents or technical criteria that provides the basis upon which the regulatory body issues a licence valid for the given period.
Justification of LTO should be properly documented in the CLB, in particular in documents like FSAR, PSR report or in other licensing basis documents.

Note: Depending on the national regulations, PSR may have an important role in justification of LTO. The objective of a PSR is to determine the safety of NPP by means of a comprehensive assessment. There are aspects of PSR which are directly linked to the justification of LTO (e.g. actual condition of SSCs, EQ, ageing management). The scope of a PSR includes all nuclear safety aspects of an NPP. For this purpose, a plant consists of all facilities and SSCs on the site covered by the operating licence (including, for example, waste management facilities and on-site simulators) and their operation, together with the staff and its organization. The review also covers radiation protection, emergency planning and radiological impact on the environment. For the SALTO mission, it is important to focus on the LTO relevant issues.

3.1.5.2. Examples of documents for the review

- FSAR;
- PSR report;
- Other current licensing basis documents.

3.1.5.3. Evaluation

The peer review will focus on:

- Whether the justification for plant safety during the planned period of LTO is properly documented in e.g. FSAR and/or PSR report;
- If available, review the results of the PSR report or similar safety assessment with focus on chapters relevant to LTO and ageing management;
- Review trends of reported events in PSR and assess their possible connection with degradation of SSCs;
- Whether the FSAR is updated to reflect the results of activities to justify safe LTO (preconditions for LTO, AMR, review of AMPs, TLAAs).

3.1.6. Configuration management and modification management including design basis documentation.

3.1.6.1. Expectations

The plant should have a configuration management and modification management programme encompassing the status of the plant and all modifications of SSCs, releases of process software, operational limits and conditions, set-points, instructions and procedures. Management/QA systems should contain the processes and activities related to the configuration management and modification management programme.
The plant should also have adequate design basis documentation reflecting all the design changes and planned LTO.

Original design basis should be collected and documented in the plant. Design basis should contain design basis requirements and supporting design information. Design basis should be updated according to the current configuration and conditions. Design basis information can be part of FSAR or separate design basis documentation. If design basis documentation is not complete or obsolete, an appropriate design basis reconstitution programme should be in place.

3.1.6.2. Examples of documents for the review

- Database or records on permanent modifications;
- Database or records on set-points;
- FSAR sections with plant modifications;
- FSAR sections with design basis information;
- Modification control procedure;
- QA manual section on document control modification requirements;
- Configuration management manual or procedures and configuration management performance indicators;
- Report on PSR on the assessment of management of modifications (if exists)
- Methodology for design basis collecting, maintaining and reconstitution;
- Design basis documentation;
- Databases/documentation containing design basis information.

3.1.6.3. Evaluation

The peer review will focus on:

- Whether the plant activities are effectively managed to verify that the plant physical configuration and operation conform to design requirements and to design documents all the time;
- Whether the configuration management programme is established and implemented at the plant;
- Whether the design authority exists;
- Whether the plant has design basis documentation;
- Whether the plant launched a design basis reconstitution programme, if necessary;

- Whether the responsibility for plant modifications and set-points are well defined;
- Whether the impact of the modification on plant safety is properly assessed;
- Whether the operational limits and conditions are reassessed and revised, as necessary, following any safety related modifications at the plant or any changes to the safety analyses report, and also on the basis of accumulated experience and technological developments;
- Whether QA involvement is in place during the modification process to ensure that all updating of controlled drawings, documents and required training was completed before the actual operation of the modified system or equipment;
- Determine if QA programme deals with configuration management issues to the extent necessary for assurance of all plant modifications and design changes during the current operational period as well as period of LTO;
- Determine specifically that plant quality assurance plan is dealing with configuration management to an extent that assures availability of the necessary input for LTO analyses;
- Whether the plant has design basis documentation which contains design basis requirements and supporting design information or if alternative arrangements are in place, which compensate for the lack of complete design basis documentation at the plant;
- Whether design basis also contains design requirements and supporting design information.

3.2. AREA “B”: SCOPING AND SCREENING AND PLANT PROGRAMMES RELEVANT TO LTO

3.2.1. Methodology and criteria for scoping and screening of SSCs for LTO.

3.2.1.1. Expectations

The plant should have the following elements necessary for the scoping and screening processes:

- a basic policy on the scope of LTO, a systematic process and criteria to identify SCs within the scope including boundary conditions (in scope/out of scope),
- a systematic method and criteria to determine which SCs within the scope of LTO are subject to revalidation of time limited ageing analyses, and which SCs require evaluation of programmes for managing ageing.

The plant staff should have a clear understanding on safety functions and safety classification of SSCs. These safety functions should not be limited to those for design basis events but also include those to prevent/ mitigate design extension conditions [1].

The plant should have a clear definition of SCs not important to safety within the scope of LTO and methodology to identify those SCs. Plant walk-downs, the insights from deterministic safety analyses and/or the plant specific PSA results (if available) should be used to determine those SCs not important to safety in the scope of LTO assessment.

The above mentioned policy, methods for scoping and screening and their criteria should be documented in plant procedures and relevant data should be accessible.

The processes for scoping and screening should ensure that SSCs that perform required safety functions are identified for evaluation of their suitability for LTO. The scoping process is carried out at the structure, system and component level, and the screening process at the structure and component level. Those processes should be carried out specifically for mechanical, electrical and I&C and civil SCs.

The plant should demonstrate that the effects of ageing on all SCs within the scope of LTO are covered by plant programmes, newly established ageing management programmes or revalidation of time limited ageing analyses.

3.2.1.2. Examples of documents for the review

- Document for safety classification of SSCs (usually included in FSAR);
- Plant policy document on the scope of LTO;
- Plant procedure providing method to identify the SCs in scope of LTO;
- Documentation on definition and identification of SCs not important to safety within the scope of LTO;
- Drawings which show boundaries of the scope (normally P&I diagrams with colour identifications);
- List/ database of SCs within the scope of LTO;
- Plant procedure prescribing method for SCs screening;

– List/table/database of SCs which shows the result of the screening.

3.2.1.3. Evaluation

The peer review will focus on:

– Whether the plant has a clear policy on the scope of LTO which includes:
  - Relation to safety classification system;
  - Criteria for scoping including boundary conditions;
  - Definition of SCs not important to safety within the scope;
– Whether the plant includes SCs to prevent/ mitigate design extension conditions in the scope of LTO;
– Whether an appropriate method has been used for identifying SCs within the scope of LTO, especially for identifying SCs not important to safety within the scope;
– Whether this method meets the intent of the recommendations provided in [2] or is in line with other proven best international practices;
– Whether the scoping method and SCs within the scope are properly documented, and relevant data are accessible (indicating e.g. intended function, safety class, other scoping criteria, etc.);
– Whether the plant has a clear division of SCs which include interfaces between different areas (mechanical, electrical, I&C and civil structures) like control valves;
– Whether the plant has prepared a procedure on screening of SCs within the scope of LTO;
– Whether and how the SC commodity groups (group of components/ structures which have similar functions, similar materials or are in similar environment) have been defined;
– Whether the results of the scoping and screening processes are documented, in a manner that complies with the requirements of the quality assurance programme:
– Whether the plant has verified if SCs within the scope of LTO are subjected to appropriate programmes such as AMPs, revalidation of time limited ageing analyses or other plant programmes;
– Verify if the plant uses risk based information (e.g. PSA) to extend the scope for LTO (PSA results should not be used to exclude SCs from the scope of LTO.)

3.2.2. Plant Programmes Relevant for LTO.

Plant programmes listed below should be complete, implemented properly and effective.
Relevant plant policy, procedures, documents and databases to these plant programmes should be made available for the review.

List of plant programmes for the review:

– Maintenance;
– Equipment qualification;
– In-service inspection;
– Surveillance and monitoring;
– Chemical regimes.

These plant programmes are selected for review because they are important to maintain intended function of structures, systems and components of the plant.

The peer review will check the completeness of the plant programmes from viewpoints of LTO and on a sample basis review technical content and adequacy of the most important parts of the programmes for LTO.

The objective of the review is to check whether the above listed plant programmes are being properly implemented from LTO points of view.

The detail guidance for review of adequacy and effectiveness of these plant programmes is provided in [6].

3.2.2.1. Maintenance

3.2.2.1.1 Expectations

Maintenance activities should be conducted to maintain availability of structures, systems and components during plant operation by controlling degradation and preventing failures.

An appropriate maintenance programme, e.g. preventive or predictive maintenance, should be applied to SCs according to safety class and past maintenance history.

Actual and potential ageing mechanisms should be taken into account in preventive and predictive maintenance programmes for SCs important to safety to determine a suitable maintenance method, e.g. overhaul maintenance and condition based maintenance, and an appropriate maintenance frequency.

Preventive and predictive maintenance programmes should be periodically evaluated based on past maintenance history, dose received during maintenance and new knowledge and research findings.

Maintenance programmes, such as predictive and preventive maintenance programmes, used to manage the effects of ageing on SCs within the scope of LTO should be evaluated against the nine attributes shown in [6] and the result should be properly documented. The review provides a technical basis that demonstrates the programmes manage the ageing effects and are effective in maintaining the intended function of each SC.

The effectiveness of maintenance in detecting and characterizing degradation mechanisms should be assessed.

Maintenance programmes should have links with ageing management programmes, specify the frequency of maintenance activities and provide specific information on the tasks, the associated records and their storage. Existing preventive and predictive maintenance programmes for LTO should be evaluated against the nine attributes shown in [6] and the result should be properly documented.

Obsolescence of SSCs during the operating period of a plant including the proposed period of LTO should also be addressed. A programme to address obsolescence could be part of the normal plant maintenance programme.

3.2.2.1.2. Example of documents for the review

- Procedures and reports on maintenance;
- Procedures and reports on reliability centred maintenance including FMECA;
- Report on PSR (if exists);
- Documents on assessment of effectiveness of the maintenance programmes and evaluation against the nine attributes.

3.2.2.1.3. Evaluation

The peer review will check the completeness of the maintenance programmes from conceptual level points of view and review the technical content and adequacy on a sample basis.

The peer review will focus on:

- Whether an appropriate maintenance programme, e.g. preventive, predictive and corrective maintenance, is applied to each SC taking its safety class and past maintenance history into account;
- Whether actual and potential ageing mechanisms are taken into account in preventive and predictive maintenance programmes for SCs important to safety to determine a suitable maintenance method, e.g. overhaul maintenance and condition based maintenance, and interval frequency for the maintenance;
- Whether the plant has a systematic approach to maintenance addressing technical aspects such as development of acceptance criteria, reliability centred maintenance, condition based maintenance and risk informed methods;
- Whether preventive and predictive maintenance programmes are periodically evaluated based on past maintenance history and new knowledge and research findings;
- Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing preventive and predictive maintenance programmes;
- Whether the plant has a process to evaluate existing preventive and predictive maintenance programmes used to manage ageing of SCs within the scope of LTO against the nine attributes;
- Whether plant maintenance programmes consider regulatory requirements, suppliers' recommendations, feedback from related operational experience and research results and findings. Also investigate to what extent the programmes are supporting safe operation of NPPs in the current operating period as well as in the period of LTO;
- Whether maintenance programmes for SSCs in the scope of LTO clearly identify the type of maintenance, the links with ageing management programmes, the frequency, tasks, records and storage;

- Whether the evaluation of the collected data also includes trend analysis;
- Whether maintenance programmes also addresses obsolescence of SSCs including the proposed period of LTO;
- Whether a process and a database exist that support the evaluation of effectiveness of maintenance programmes in detecting and characterizing degradation mechanisms, and provide technical references to support findings and conclusions. The documentation should include records of maintenance activities of components.

3.2.2.2. Equipment qualification

3.2.2.2.1. Expectations

Plant should have programme for maintaining qualified status of SCs within the scope of LTO.

Equipment qualification establishes that equipment, while being subject to environmental conditions, is capable of performing its intended safety function or that it will be replaced or repaired so that its intended design functions will not be compromised during the planned period of LTO.

The environmental and seismic qualification of equipment should be reviewed with respect to the expected period of LTO.

Equipment designed according to earlier standards should be reviewed, and, if necessary, re-qualified under a comprehensive programme, or replaced.

The equipment qualification should be adequately documented.

3.2.2.2.2. Example of documents for the review

- Documentation on EQ;
- Programme for monitoring the environmental conditions;
- Programme for monitoring and maintaining the equipment conditions;
- Re-qualification programme;
- Scheduled equipment replacement programme;
- Report on PSR (if it exists).

3.2.2.2.3. Evaluation

The peer review will check the completeness of the EQ programmes and on a sample basis review technical content and adequacy of the most important parts of the programmes for LTO.

The peer review will focus on:

- Verify that the results of the ageing management review, scoping and screening and TLAA revalidations for LTO are adequately used to update EQ programmes;
- Verify that all environmentally qualified equipment to be addressed in the frame of LTO is included in the existing plant EQ programme;

- Whether the plant has evaluated the EQ programme for LTO for consistency with the nine attributes;
- Whether environmental and seismic qualification will remain valid over the expected period of LTO or whether corrective measures have been developed and implemented. The conclusion should support the technical justification that the material degradation ageing effects will be managed effectively;
- Verify if EQ status is preserved and updated through surveillance, maintenance, modifications and replacement, environment and equipment condition monitoring and configuration management and that adequate interfaces with related programmes are in place;
- Check that the re-qualification programme for equipment within the scope of LTO, which was designed to earlier standards is focused on ensuring that the equipment can perform its function under current design basis condition;
- Verify if timely replacement of equipment that cannot be qualified for the planned period of LTO is adequately considered. Verify if a specific programme for replacement of mechanical, electrical and I&C equipment with qualified or stated lifetimes less than the planned LTO period has been developed and is implemented;
- Check that the availability of qualified manufacturers and products needed for plant modifications for LTO has been considered;
- Qualification results on safety related electric and I&C equipment located in the containment should be verified. The qualification results should specify whether the equipment has been qualified to perform its safety functions in environmental conditions equivalent to DBA conditions for the planned period of LTO;
- A plant specific list that specifies environmentally qualified cables and connectors on safety related equipment, as well as cables and connectors on non-safety related equipment that has an impact on performance of safety related systems, should be updated regularly;
- Verify the availability and retrieving ability of the EQ documentation, which should be ensured for the whole period of LTO;
- As to the seismic qualification, whether the plant uses appropriate seismic motions based on the latest knowledge, operational experience and research findings. Verify that possible ageing effects are taken into account in the seismic qualification.

3.2.2.3. In-service Inspection

3.2.2.3.1. Expectations

Over the plant's operating lifetime, the operating organization should examine SSCs for possible deterioration so as to determine whether they are acceptable for continued safe operation or whether remedial measures are necessary.

ISI programme should be available and properly implemented for applicable SSCs in the scope of LTO (including SCs not important to safety within the scope of LTO).

SCs of the plant should be examined for possible ageing effects so as to assess whether they are acceptable for LTO or whether remedial measures should be taken.

ISI programmes should be reviewed for effectiveness in detecting degradations for each SC in the scope of LTO.

The methodology, equipment and personnel that are part of the ISI process should be qualified according to national standards, regulatory requirements and IAEA recommendations where applicable.

ISI results should be correctly documented, e.g. in a database, starting from the baseline data from pre-service inspection. The database should provide the technical basis to support findings and conclusions necessary for LTO (evaluation of effectiveness, trending, etc.)

3.2.2.3.2. Example of documents for the review

- ISI programmes as they exists at a given plant;
- AMPs connected to ISI;
- Report on PSR (if it exists).

3.2.2.3.3. Evaluation

The peer review will check the completeness of the ISI programmes from conceptual level points of view and review the technical content and adequacy on a sample basis.

The peer review will focus on:

- Check if the plant has a process to ensure that ageing mechanisms identified from operating experience and research findings are considered to determine a suitable ISI method in the ISI programmes for SCs important to safety;
- Check if ISI programmes are periodically evaluated based on past ISI results, operating experience, new knowledge and research findings;
- Verify that the results of the scoping and screening and review of ageing management for LTO are adequately reflected into the existing ISI programmes;
- Whether the plant has evaluated the existing ISI programme for LTO for consistency with the nine attributes;
- Whether the ISI results are correctly documented (e.g. in a properly maintained database) and provide the technical bases to support the justification for LTO;
- Check that ISI programme for SSCs in the scope of LTO clearly identifies the inspection method, the links with ageing management programmes, the frequency, tasks, records and storage;
- Verify that the ISI programme has been reviewed and evaluated for effectiveness in detecting and characterizing the degradation mechanisms for SSCs within the scope of LTO. The evaluation should provide a technical basis to justify that the ageing phenomena will be detected in a timely manner with the proposed inspection;
- Verify that the methodology, equipment, and personnel, which are part of the ISI process, have been qualified according to national standards, regulatory requirements, and IAEA recommendations [7] where applicable;
- If the plant is using risk informed ISI, verify the related justification. Check if the effectiveness of risk informed ISI has been evaluated, considering limited

operational experience of risk informed ISI programmes, and the limitations of the underlying probabilistic analyses of risk informed ISI.

3.2.2.4. Surveillance and Monitoring

3.2.2.4.1. Expectations

The surveillance and monitoring programmes should be available and properly implemented for the applicable SSCs in the scope of LTO. Surveillance programmes using representative material samples should address degradation mechanisms relevant for LTO.

The surveillance programme should confirm the provisions for safe operation that were considered in design. The programme should continue to supply data to be used for assessing the service life of SCs for the planned period of LTO, e.g. through existing or newly installed diagnostic systems.

The programme should detect ageing and degradation trends. The programme should also verify that the expected safety margins are maintained during the LTO period.

Surveillance programmes using representative material samples addressing degradation mechanisms should be extended or supplemented for LTO, if necessary.

3.2.2.4.2. Example of documents for the review

- Surveillance and monitoring programmes as they exist at a given plant;
- AMPs connected to surveillance and monitoring;
- Report on PSR (if it exists).

3.2.2.4.3. Evaluation

The peer review will check the completeness of the surveillance and monitoring programmes from conceptual level points of view and review the technical content and adequacy on a sample basis.

The peer review will focus on:

- Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing surveillance and monitoring programmes;
- Whether the plant has evaluated the existing surveillance and monitoring programme for LTO for consistency with the nine attributes;
- Whether the programmes confirm the provisions for safe operation that were considered in design;
- Whether the surveillance and monitoring programmes remain effective for assessing the service life of SSCs and supporting safe LTO;
- Review if plant surveillance and monitoring programmes consider feedback on operating experience and research results and findings;
- Whether the plant implemented supplementary LTO related surveillance programme, such as reactor pressure vessel supplementary surveillance

programme, controlled ageing management programmes for cables, surveillance programme of concrete etc.

3.2.2.5. Monitoring of chemical regimes

3.2.2.5.1. Expectations

Controlling chemistry is important and should be used to minimize the harmful effects of chemicals, chemical impurities and corrosion on plant systems for LTO. The operating organization should review its water chemistry programme to ensure that it is effective in maintaining water quality as required by technical specifications and is consistent with the nine attributes.

The chemistry programme should specify scheduling, analytic methods used to monitor chemistry and verification of the effectiveness of the chemistry programme.

The chemistry programme should also provide the necessary chemical and radiochemical assistance to ensure safe operation, the integrity of SCs during the original design lifetime and planned period of LTO, and control and reduction of radiation levels in working areas.

3.2.2.5.2. Example of documents for the review

- The water chemistry programme at the plant;
- AMPs connected to water chemistry;
- Report on PSR (if it exists).

3.2.2.5.3. Evaluation

The peer review will check the completeness of the chemistry programme from conceptual level points of view and review the technical content and adequacy on a sample basis.

The peer review will focus on:

- Verify that the results of the ageing management review and scoping and screening for LTO are adequately reflected into the existing chemistry programme;
- Whether the plant has evaluated the chemistry programme for LTO for consistency with the nine attributes;
- Whether feedback of operational experience and research results / findings justifies the chemistry programme;
- Check if the plant chemistry programme has been reviewed with respect to LTO and modified if applicable;
- Verify that chemistry staff is aware of implications of chemistry parameters on known aspects which could adversely impact safety during LTO (such as corrosion, erosion, inter-granular stress corrosion cracking, primary water stress corrosion cracking of SCs within the scope of LTO);
- Whether new findings and conclusions coming from e.g. surveillance and ageing management are being considered in updating plant chemistry programme and appropriate interface is established;

- Whether the chemistry practices are in compliance with technical specifications, consistent with international good practices and take into account the materials concept appropriately;
- Confirm that the chemistry programme includes the diagnostic parameters that provide useful information for determining and preventing the cause of unexpected ageing.

3.3. AREA “C - E”: AGEING MANAGEMENT REVIEW, REVIEW OF AGEING MANAGEMENT PROGRAMMES AND REVALIDATION OF TIME LIMITED AGEING ANALYSES

3.3.1. Area-specific scoping and screening of SSCs for LTO.

3.3.1.1. Expectations

A systematic process should be used to determine which SCs are to be included in the scope of evaluation for LTO. SCs determined to be within the scope of LTO should be subject to a screening process to determine which SCs are subject to revalidation of time limited ageing analyses and which SC’s are subject to ageing management review.

The plant should establish specific screening methods for mechanical components, electrical and I&C components and civil structures.

A complete list of SCs in the scope of LTO should exist and determine boundaries between mechanical, electrical, I&C components and civil structures.

The insights from deterministic safety analyses and the plant specific PSA results (if available) should be used to determine SSCs not important to safety failure of which may impact safety functions. Other methods used to identify those SSCs include plant walk-downs and identification of compartments that house safety and non-safety related equipment.

3.3.1.2. Examples of documents for the review

- Plant procedures on methodology of SCs scoping and screening;
- Plant procedure to identify SCs not important to safety within the scope;
- List of SCs classification;
- List/ database of SCs within the scope of LTO;
- List/ table / database of SCs which shows the result of the screening;
- Drawings which show boundaries of the scope (normally piping and instrument diagrams (P&IDs) with colour identifications).

3.3.1.3. Evaluation

The peer review will focus on:

- Verify if the master list of plant SCs is available and identify all items in scope of LTO and out of scope of LTO;
- Verify if the scope of SCs for LTO is complete, documented and fulfilling scoping criteria;
- Verify if SCs to prevent/ mitigate design extension conditions are within the scope of LTO;
- If scoping and screening data is distributed into more than one database, check that the data consistency is assured;

- Whether SCs not important to safety which may impact on safety functions are in the scope;
- Whether and how the SCs commodity groups (group of components and structures which have similar functions and similar materials) have been defined;
- Verify if SCs within the scope of LTO are subjected to an appropriate ageing management review and evaluation of time limited ageing analyses;
- Whether there is a documented and verifiable methodology for the screening of SCs for ageing management review.

3.3.2. Ageing management review.

3.3.2.1. Expectations

The physical status of SCs in scope of LTO should be assessed.

For SCs determined to be within the scope of LTO, the plant should have adequate programmes for managing the effects of ageing degradation for the period of LTO.

The plant ageing management review should identify for each SC in scope of LTO possible ageing effects and degradation mechanisms, critical locations/ parts, material, environment and ageing management programmes, see also IGALL AMR tables [6].

The plant should maintain documentation of LTO evaluations and demonstration that the effects of ageing are managed during the planned period of LTO.

The plant should demonstrate that ageing effects and degradation of all SCs within the scope of LTO are covered by appropriate plant programmes, newly established ageing management programmes and revalidation of time limited ageing analyses, if applicable.

If some SSCs cannot be inspected (e.g. due to inaccessibility) or assessed, justification for such SSCs to continue in service is necessary.

3.3.2.2. Examples of documents for the review

- Programmes for managing the effects of ageing;
- Report on PSR (if it exists);
- Past corrective actions resulting in enhancement of AMPs;
- Existing plant programmes listed in Section 3.2.2 (these are reviewed as preconditions).

3.3.2.3. Evaluation

The peer review will check the completeness of the programmes and on a sample basis review technical content and adequacy of the most important parts of the programmes for LTO.

The peer review will focus on:

Assessment of the current physical status of the plant

- Confirm that appropriate ageing management reviews and condition assessments have been performed for SCs subject to ageing management review;
- Determine if all the important input design data such as design description, design basis including loads and other parameters necessary for evaluation of safety are available or accessible for the plant;
- Check that information on maintenance history starting with time of commissioning and basic data from fabrication of components including material properties and service conditions is kept and managed in a proper way;
- Confirm that review and assessment of the operating and maintenance history for each structure or component is part of the analyses accounting for such parameters as operational transients, past failures, or unusual conditions that affected the performance or condition of the structure or component. Confirm that examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs;
- Determine that operational data are collected with a focus on transients and events and on generic operating experience. Also information relevant to power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.

Identification of ageing effects and degradation mechanisms

- Check that a procedure exists for the structure, component or commodity grouping to assess ageing effects in detail;
- Verify the plant ageing management review process identifies possible ageing effects/mechanisms, critical locations/ parts, material, environment and ageing management programmes addressing these subjects for SCs in the scope of LTO;
- Determine if materials, environment and stressors that are associated with each, component, or commodity grouping were considered in the process of identification of ageing effects;
- Check if operating experience and research findings and results were adequately considered;
- For selected examples, check consistency with IGALL AMR tables [6].

Documentation of the evaluation and demonstration for management of ageing effects

- Verify if demonstration was done that the effects of ageing will continue to be identified and managed such that the intended function of the SC will be maintained throughout the planned period of LTO;
- Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for effective management of ageing effects;
- Confirm that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance;
- Verify that the following information is available in the documents demonstrating management of the ageing effects:
    - Clear identification of the ageing effects requiring management;

- Identification of the specific programmes or activities that will manage the effects of ageing for each structure, component, or commodity grouping listed;
- Description of how the programmes and activities will manage the effects of ageing;
- List of substantiating references and source documents;
- Discussion of any assumptions or special conditions used in applying or interpreting the source documents;
- Description of existing and new programmes for LTO.

3.3.3. Review of ageing management programmes.

3.3.3.1. Expectations

Ageing management programmes should be evaluated against the nine attributes [6]. For selected AMPs, detailed description of the attributes is provided in IGALL.

Existing programmes and newly developed ageing management programmes should incorporate insights and results of ageing management review.

3.3.3.2. Examples of documents for the review

- Ageing management programmes (procedures for implementation of SC-specific AMPs);
- Other plant programmes for managing the effects of ageing degradation;
- Report on PSR (if it exists); and
- Existing plant programmes listed in section 3.2.2 (these are reviewed as preconditions).

3.3.3.3. Evaluation

The peer review will focus on:

- Verify that existing and proposed plant programmes that supports LTO were reviewed for meeting the nine attributes [6];
- Verify/ review specific sample of existing and new AMPs for consistency with IGALL AMPs with respect to meeting the intent of IGALL AMPs, i.e. meeting the SC-specific nine attributes;
- Whether the plant concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate in some cases. In this case, whether the plant modifies the existing programme or develops a new programme for the purpose of LTO;
- Confirm that operation, inspection/monitoring and maintenance programmes are well-coordinated by AMPs.

3.3.4. Obsolescence management programme.

3.3.4.1. Expectations

- The plant should demonstrate that technological obsolescence is properly managed;
- Management of obsolescence should be a continuous activity addressing both the maintenance and performance of SSCs;
- A programme to address obsolescence could be a part of normal plant programmes (e.g. maintenance);
- Responsibility for programme implementation should be clearly assigned within the organization of the plant.

3.3.4.2. Examples of documents for the review

- Procedures for the management of technological obsolescence;
- Documentation to support SSC obsolescence and replacement;
- List of spare parts;
- Maintenance records;
- Long term investment programme for classified equipment and systems.

3.3.4.3. Evaluation

The peer review will check the completeness of the programmes and on a sample basis review technical content and adequacy of the most important parts of the programmes for LTO.

The peer review will focus on:

- Confirm that appropriate technological obsolescence management reviews and assessments have been performed for SCs;
- Verify if demonstration was done that the effects of obsolescence will be continuously identified and managed such that the intended function of SCs will be maintained throughout the planned period of LTO;
- Whether the plant is reviewing efficiency of the existing obsolescence programmes on a regular basis;
- Whether management of technological obsolescence of SSCs such as I&C equipment and systems, sensors, medium voltage cables, uninterruptable emergency power supply (UPS) is in place.

3.3.5. Existing time limited ageing analyses.

3.3.5.1. Expectations

The plant should identify existing time limited ageing analyses regarding period of operation and design considerations or licence terms.

3.3.5.2. Examples of documents for the review

- List of time limited ageing analyses;
- FSAR;
- EQ documentation;
- Design supporting documents (such as PTS analyses, fatigue calculations, etc.);
- Other licensing documents.

3.3.5.3. Evaluation

The peer review will focus on:

- Whether the existing time limited ageing analyses (e.g. from FSAR) are properly documented in the current safety analyses report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for plant operation;
- Whether the plant identified list of existing time limited ageing analyses;
- Whether the plant identified missing time limited ageing analyses based on results of screening;
- Whether the plant has launched time limited ageing analyses reconstitutions if needed.

3.3.6. Revalidation of time limited ageing analyses.

3.3.6.1. Expectations

The capability of some SCs within the scope of LTO to accomplish intended function should be verified by plant specific time limited ageing analyses.

The plant should demonstrate that all necessary design basis information is accessible.

The revalidation of these analyses should be done with respect to the assumed period of LTO. The revalidation should confirm function and safety margins necessary for the whole period of LTO.

Newly identified time limited ageing analyses should be valid for intended period of LTO.

If a TLAA cannot be revalidated, appropriate corrective or compensatory measures should be proposed for managing ageing effects of SSCs during LTO.

3.3.6.2. Examples of documents for the review

- List of time limited ageing analyses;
- FSAR;
- Design supporting documents;
- List of equipment with time limited EQ;
- SSCs test and inspection records;

- SSCs failure reports (including, where appropriate, root cause analysis);
- Operational history and records on load cycles;
- Statistical data of SSCs failures and failure rates;
- Revalidation reports.

3.3.6.3. Evaluation

The peer review will focus on:

- Whether all necessary design basis information, applicable codes and regulatory requirements, fabrication records, operational and maintenance history and results of inspections are accessible;
- Whether these calculations/ analyses are properly documented;
- Which kind of methods and criteria have been used for revalidation of time limited ageing analyses;
- Whether the reviewed time limited ageing analyses justify safe operation for LTO;
- Whether the implications of revalidation are considered in the plant operational limits and conditions;
- Whether the qualification of SCs covered by the EQ programme has been satisfactorily established and maintained for LTO;
- What corrective or compensatory measures are taken, if the analyses cannot be revalidated;
- Verify if evaluation was done to demonstrate that the safety analyses meet one of the following criteria:
    - The analysis remains valid for the intended period of LTO;
    - The analysis has been projected to the end of the intended period of LTO; and
    - The effects of ageing on the intended function(s) of the structure or component will be adequately managed for the intended period of LTO.
- Check if the revalidation of time limited ageing analyses is documented in an update to the safety analyses report;
- Also check if typical time limited ageing analyses are part of the safety analyses such as:
    - Irradiation embrittlement of the reactor pressure vessel;
    - Thermal and mechanical fatigue;
    - Thermal ageing;
    - Loss of preload;
    - Loss of material.
- Verify that selected plant TLAAs are consistent with and meet the intent of the IGALL TLAAs.

Operational limits and conditions

- Determine if the stressors given in the design specifications or Current Licensing Basis have been used for assessment of SCs and their supports;
- Check if data from surveillance programmes and diagnostic systems were applied in the analyses;
- Verify if limits established in the design specifications or current licensing basis were used.

Documentation of revalidation

– Verify that the plant develops and maintains in an auditable and retrievable form all information and documentation necessary for revalidation of time limited ageing analyses.

3.4. AREA “F”: HUMAN RESOURCES, COMPETENCE AND KNOWLEDGE MANAGEMENT FOR LTO

3.4.1. Human resources policy and strategy to support LTO.

3.4.1.1. Expectations

The plant should have human resources policy and strategy in place to enable necessary LTO activities and cover intended period of LTO.

The plant should be staffed with an adequate number of qualified and experienced personnel and competent managers who are duly aware of the technical and administrative requirements for LTO.

The plant should provide reasonable amount of time overlap when personnel are to be replaced, so that replacement personnel can acquire an understanding of their new duties and responsibilities as well as knowledge and experience prior to assuming their positions.

3.4.1.2. Examples of documents for the review

- Human resource management procedures, guidelines and flowcharts;
- Plant procedures describing recruiting, succession planning and retirement;
- Human resource planning and staffing databases;
- Organizational flowcharts and job descriptions;
- Plant procedures describing organizational structure in the plant;
- Task and job descriptions related to LTO;
- Human resource statistics from past and plans for future (e.g. recruitment and retirement numbers).

3.4.1.3. Evaluation

The peer review will focus on:

- Check if the plant human resources policy and strategy reflects LTO requirements;
- Check and verify whether the management manuals and job descriptions determine roles, responsibilities and delegations of authority for all managers in key positions related to LTO;
- Find out if good coordination is maintained among different plant groups, among the site organizations and contractors involved in LTO;
- Check whether the staffing and resources are sufficient to accomplish the tasks assigned;
- Check whether the staffing policy is directed to retaining a pool of experienced and knowledgeable staff;
- Check whether the long-term staffing policy objectives for human resources are established and maintained;
- Confirm that specific competence requirements for LTO related positions have been identified and these are used in the recruitment/selection process for these positions;
- Check whether the long term succession planning is established and implemented;

– Check and verify whether the plant managers have the appropriate resources to carry out their assigned LTO responsibilities and accountabilities.

3.4.2. Competence management for LTO and recruitment and training/ qualification processes for personnel involved in LTO activities.

3.4.2.1. Expectations

The plant should have process in place to ensure competent human resources for LTO.

The process for identification, recruitment and training of staff for LTO related activities should be consistent with normal HR processes, ensuring full job descriptions, training and qualification requirements etc. are available.

All personnel assigned to LTO duties that can affect safety should have a sufficient understanding of the plant and its safety features.

In addition to competence requirements for individual roles, the operating organization should consider the needs for organizational competences by setting team level objectives and ensuring effective and interdisciplinary teamwork. During the LTO decision process, refurbishments and transition period there will be new demands for the organizational competencies, skill types and levels.

Plant should consider enhancement of training programmes for staff at ageing plants to compensate for losses of personnel due to retirement or job changes and for other reasons. Training programmes should also be adapted to accommodate the special technical, administrative and operational needs for LTO.

The recruitment and selection policy at the plant should be aimed at retaining a pool of experienced staff for LTO. A broad distribution of both age and experience should be established to ensure that the necessary pool of knowledge, skills and safety expertise is sustained and that long term objectives of human resources policy are met.

Suitably qualified personnel should be selected and recruited in accordance with needs of LTO.

3.4.2.2. Examples of documents for the review

– Competence management procedures and guidelines and flowcharts;
– Training records and/or databases;
– Training programme descriptions;
– Resources related to training;
– On-job-training programmes and records;
– Trainee assessment records.

3.4.2.3. Evaluation

The peer review will focus on:

- Check if the plant has process to ensure competent human resources for LTO including external support;
- Verify that the plant has adequate process for assessing and meeting the organizational competency requirements to support LTO;
- Confirm that all key technical competences for LTO activities have been identified and all involved staff meet these requirements;
- Check if personnel assigned to LTO duties that can affect safety has a sufficient understanding of the plant and its safety features;
- Check and verify if plant management have the necessary management skills, experience and knowledge needed to manage the safe LTO;
- Check and verify if the opportunity is given to the managers and plant personnel to learn from external peer organizations and their lessons learned;
- Check if the plant has appropriate plant recruitment policy for LTO;
- Whether the policy and role of plant management supports training needs and allocates sufficient resources;
- Check and verify if staff involved in LTO activities are well trained through on-job-training and other appropriate processes.

3.4.3. Knowledge management and knowledge transfer for LTO.

3.4.3.1. Expectations

In the plant knowledge should be managed as a resource. This should be applied to LTO as well.

A knowledge management (KM) plan and processes should be in place to support the LTO activities.

KM needs to be a part of the long term strategy of the operating organization. Especially when considering LTO of NPP's, the plant should include knowledge-loss risk management in its KM practices.

The plant should ensure that all relevant design, modification and maintenance data is documented and accessible for the LTO.

The plant should have systematic approaches for receiving and evaluating research findings and knowledge from the LTO related processes from other power plants.

The plant should identify the organization's knowledge needs (i.e. internal and external knowledge sources, utilization of knowledge, knowledge sharing, and preservation of organizational knowledge and capture of tacit knowledge).

The plant should ensure that there is a clear ownership and commitment of KM processes and issues.

Management should communicate the KM policy and processes and involve individuals in implementation and improvement of the KM processes.

3.4.3.2. Examples of documents for the review

- KM policy and strategy;
- Descriptions of KM process, procedures, guidelines and flowcharts;
- Description of the process for collecting and distributing operational experience;
- Documents related to knowledge-loss risk assessment;
- Report on PSR assessment on use of experience from other plants and research findings (if exists);
- Work processes, methodologies and procedures for life extension decision;
- Descriptions of IT and IS processes;
- Description of the process for managing records, reports and date related to maintenance, surveillance and inspections.

3.4.3.3. Evaluation

The peer review will focus on:

- Check that an appropriate KM policy exists*;*
- Check that the KM principles and practices are embedded in the integrated management system*;*
- Verify that KM is a part of the operating organization's long term strategy;
- Check that there is a clear ownership of KM processes and issues*;*
- Confirm that KM principles and practices are embedded in the organization*;*
- Verify that the plant has embedded KM principles and practices in its process for collecting and using operating experience feedback;
- Verify that the plant has implemented adequate processes for learning from the LTO experiences of other plants;
- Confirm that the plant has a process for knowledge-loss risk assessment and mitigation for suppliers, TSOs and outside service providers*;*
- Confirm that the plant has established adequate processes for transferring knowledge, information and data to/from the vendor, critical equipment/component suppliers, outsourced services and TSOs*;*
- Confirm that the IT/IS processes support managing information and records and their availability;
- Confirm that the plant retains records of traceability, rationale and assumptions of why and how operational, maintenance and design changes (corporate memory) have been made.

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ANNEX I

STANDARD REQUIREMENTS FOR THE STRUCTURE AND CONTENTS OF AN ADVANCE INFORMATION PACKAGE

I-1. ADMINISTRATIVE INFORMATION

1. Arrival logistics (airport, hotel, plant)
2. Transportation airport-hotel, hotel-plant
3. Hotel accommodation information (name, telephone number, website address, availability of internet)
4. Contact points at the plant and list of the counterparts
    a. (names, e-mailing addresses, telephone numbers)
5. Site accommodation (site access control, controlled area access, meeting rooms, SALTO offices, clerical/interpretation support, office machines and lunch arrangements)
6. Summary of site specific radiological, industrial and fire safety rules, and emergency response provisions.

I-2. GENERAL INFORMATION

1. Plant Description
    - Overall site, plant description and which units are to be reviewed;
    - Brief plant operating history;
    - Current utility/plant organizational charts;
    - Arrangement of major plant structures and buildings (layout schematics).

2. Design information
    - Major process and safety systems;
    - Key design parameters;
    - Unique safety features.

3. External organizations
    Brief description of main functions, structure and interaction of external organizations with the nuclear power plant:

    - Utility headquarters;
    - Industry organizations;
    - Regulatory authorities;
    - Main suppliers and sub-contractors;
    - Contractors supporting plant maintenance.

I-3. TECHNICAL INFORMATION

- Outline of operating license;
- Proposal of detailed review schedule for each area;

- List of abbreviations and acronyms used in the plant;
- Plant colour coding system identification and labelling system.

I-4. INFORMATION FOR AREA REVIEWERS' PREPARATION

1. Organization and functions, CLB, configuration/ modification management.

   - Related regulatory requirements, codes and standards;
   - Organizational structure for LTO;
   - Plant policy for LTO:
     - LTO feasibility study;
     - LTO related internal procedures.
   - LTO implementation programme.
   - Current safety analyses report and other current licensing basis documents:
     - LTO related FSAR updates;
     - PSR LTO related results;
     - Safety classification;
     - Statistics on staff turnover and current age profile.
   - Configuration/ modification management including DBD.
     - Availability and scope of design basis documentation;
     - Brief description of quality management system including document control system;
     - Configuration management manual or procedures and configuration management performance indicators;
     - Modification control procedure;
     - QA manual section on documentation control of modifications (equipment, documents, set-points etc.);
     - FSAR sections with requirements on plant modifications;
     - PSR sections dealing with modifications.

2. Scoping and screening and plant programmes relevant to LTO

   - Methodology and criteria for scoping and screening of SSCs for LTO.
     - Methodology for scoping and screening of SSCs for LTO;
     - Methodology for ageing management review.
   - Plant programmes relevant for LTO (Maintenance, EQ, ISI, Surveillance and monitoring, Monitoring of chemical regimes etc.).
     - Scope of SSCs;
     - Procedures;
     - Methods;
     - Programme effectiveness assessment;
     - Results of programmes review for LTO;
     - PSR sections;
     - Operating experience feedback relevant to LTO.

3. Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for mechanical components

   - Area-specific scoping and screening of SSCs for LTO;

– Ageing management review;
– Review of ageing management programmes,
– Obsolescence management programme;
– Existing time limited ageing analyses;
– Revalidation of time limited ageing analyses;
– Data collection and record keeping.

4. Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for electrical and I&C components

   – Area-specific scoping and screening of SSCs for LTO;
   – Ageing management review;
   – Review of ageing management programmes;
   – Obsolescence management programme (particularly for I&C system and components);
   – Existing time limited ageing analyses;
   – Revalidation of time limited ageing analyses (including EQ);
   – Data collection and record keeping.

5. Ageing management review, review of ageing management programmes and revalidation of time limited ageing analyses for civil structures:

   – Area-specific scoping and screening of SSCs for LTO;
   – Ageing management review;
   – Review of ageing management programmes;
   – Obsolescence management programme;
   – Existing time limited ageing analyses;
   – Revalidation of time limited ageing analyses;
   – Data collection and record keeping.

6. Human resources, competence and knowledge management for LTO (optional)

   – Human resources policy and strategy to support LTO;
   – Competence management for LTO and recruitment and training/ qualification processes for personnel involved in LTO activities;
   – Knowledge management and knowledge transfer for LTO.

ANNEX II

DAILY REPORT TEMPLATE

[PLANT]* SALTO *[YEAR]

Daily Team Meeting – Review Status

Reviewer:	
Review Area:	
Date:	
Discussed with counterpart	**Yes / No**
Concerns/ facts:	•
Good Ideas / Performance:	•
Other Remarks (interfaces)	•
Reminder: Before the daily meeting, provide daily report to team leader.	

ANNEX III

ISSUE SHEET TEMPLATE

1. ISSUE IDENTIFICATION	**Issue Number:**
NPP:	**Unit:**
Reviewed Area:	
Issue Title:	
2. ISSUE CLARIFICATION	
2.1 – FUNDAMENTAL OVERALL PROBLEM:	
2.2 – IAEA BASIS:	
3. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:** D1/M1/YYY1
3.1 – FACTS: **F1)** **F2)** **F3)** **F4)**	
3.2 – SAFETY CONSEQUENCE:	
3.3 – RECOMMENDATION/SUGGESTION: **R)** … should…. **S)** Consideration should be given to **…**	
3.4 – DOCUMENTS REVIEWED:	

4. COUNTERPART ACTIONS	**Date:** D2/M2/ YYY2
n.a.	
5. FOLLOW-UP ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:** D3/M3/ YYY3
5.1 – FACTS: **F1)** n.a.	
5.2 – DOCUMENTS REVIEWED: n.a.	
5.3 – RESOLUTION DEGREE:	

1.	**Insufficient progress to date**	
2.	**Satisfactory progress to date**	
3.	**Issue resolved**	

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

ANNEX IV

TYPICAL TABLE OF CONTENTS OF THE MISSION REPORT

EXECUTIVE SUMMARY

ANNEX V

TYPICAL SALTO MISSION PROGRAMME

[Plant] MISSION PROGRAMME ([DD Month – DD Month, YYYY])

Day 1, Mon	**PM**	Arrival of team members to the airport 16:00 Transportation from the airport to the hotel organized by counterpart 19:00 IAEA team briefing in the hotel, preparatory activities Pre-meeting with counterparts
Day 2, Tue	**AM**	07:30 Departure from the hotel 08:00 – 09:00 Entrance procedure in NPP 09:30 – 12:30 **IAEA team training**
	PM	14:00 – 16:00 **Entrance meeting** Opening of the mission – host plant peer NPP expectations - plant manager Objective and schedule – team leader Introduction of participants – both sides Methodology of review – team leader LTO activities – host plant peer 16:00 – 18:00 **Initial sessions in review areas** – general presentations of counterparts, planning with counterparts for Wednesday 18:00 Departure to the hotel
Day 3, Wed	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:30 – 16:00 **Parallel sessions in review areas** – interview and discussion 16:00 – 16:30 Debrief with counterpart and preparation for Team meeting 16:30 – 17:30 **Team Meeting** with host plant peer 18:00 Departure to the hotel
Day 4, Thu	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:30 – 16:00 All the groups **- Plant Walk-down** (in 4 groups) 16:00 – 16:30 Debrief with counterpart and preparation for Team meeting 16:30 – 17:30 **Team Meeting** with host plant peer 18:00 Departure to the hotel
Day 5, Fri	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:30 – 16:00 **Parallel sessions in review areas** – interview and discussion 16:00 – 16:30 Debrief with counterpart and preparation for Team meeting 16:30 – 17:30 **Team Meeting** with host plant peer 18:00 Departure to the hotel 20:00 **Team training in the hotel** – development of issues and good practices
Day 6, Sat		**Free day - Social activities** organized by counterpart

Day 7, Sun	**AM**	08:00 – 11:00 **Team meeting in the hotel -** discussion of potential issues and good practices 11:00 – 12:00 **Team training in the hotel** – development of evaluative section of report
	PM	13:00 – 18:00 **Drafting of** Working Notes, issues, good practices and evaluative section of report – bilateral discussions with TL
Day 8, Mon	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:30 – 16:00 **Finalizing of draft issues, preparation of evaluative part of report** 16:00 – 16:30 Debrief with counterpart and preparation for Team meeting 16:30 – 17:30 **Team Meeting** with host plant peer - discussion of draft issues 18:00 Departure to the hotel 20:00 **Team training in the hotel** - exit speeches Consultation with TL in the hotel – development of issues, good practices and evaluative section of report
Day 9, Tue	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Team meeting** with host plant peer – issues, good practices and evaluative section of report presentation, discussion and agreement by team - counterparts review the issues, good practices and evaluative section of report simultaneously
	PM	13:30 – 15:00 **Discussion of** issues, good practices and evaluative part of report **with counterparts** 14:00 – 14:30 Information meeting of PM and TL 15:00 – 16:00 Revision of the draft based on counterpart's comments 16:00 – 17:00 Agree the issues, good practices and evaluative section of report with counterparts 17:00 Deadline for any changes in draft report 17:00 – 18:00 Preparation of exit meeting speeches 18:00 Departure to the hotel
Day 10, Wed	**AM**	07:30 Departure from the hotel 08:00 – 10:00 **Rehearsal of exit meeting speeches**, "cleaning" of offices 10:30 – 11:30 **Exit meeting -** (including plant management) Opening by the host plant peer Description of Mission scope - team leader – 2 minutes Detail findings (each reviewer): 6 * 5 (30) minutes Observers remarks and lesson learned: 2 * 3 (6) minutes Main finding and conclusions - team leader – 5 minutes Host plant peer's remarks (comparison against initial expectation): 10 minutes Speech by a plant manager: 5 minutes Closing by the plant manager
	PM	13:00 Transportation of the team to the airport organized by counterpart

Note: This is a typical Pre-SALTO mission programme. For SALTO mission, one or two days for parallel sessions in review areas (in extend of day 3) are supplemented. SALTO mission is closed by exit meeting on Thursday or Friday of the second week.

ANNEX VI

TYPICAL FOLLOW-UP SALTO MISSION PROGRAMME

[Plant] MISSION PROGRAMME ([DD Month – DD Month, YYYY])

Day 1, Mon	**PM**	Arrival of team members to the airport 16:00 Transportation from the airport to the hotel organized by counterpart 19:00 IAEA team briefing in the hotel, preparatory activities Pre-meeting with counterparts
Day 2, Tue	**AM**	07:30 Departure from the hotel 08:00 – 09:00 Entrance procedure in NPP 09:00 – 10:00 **IAEA team training** 10:00 – 11:00 **Entrance meeting** Opening of the mission – host plant peer NPP manager - NPP expectations Objective and schedule – Team Leader Introduction of participants – both sides LTO activities – host plant peer 11:00 – 12:30 Presentation of implemented corrective measures, details planning of review activities - in groups
	PM	13:30 – 17:00 **Parallel sessions** – reviewers and counterparts 17:00 – 17:15 Preparation for Team meeting 17:15 – 18:00 **Team Meeting** with host plant peer 18:00 Departure to the hotel
Day 3, Wed	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:00 – 17:00 **Parallel sessions** – reviewers and counterparts 17:00 – 17:15 Preparation for Team meeting 17:15 – 18:00 **Team Meeting** with host plant peer 18:00 Departure to the hotel
Day 4, Thu	**AM**	07:30 Departure from the hotel 08:00 – 12:30 **Parallel sessions in review areas** – interview and discussion 11:00 – 11:30 Information meeting of PM and TL
	PM	13:30 – 14:30 **Updating of issue sheets** 14:30 – 15:30 **Agree the updated issues with counterparts** 15:30 – 18:00 Finalization of draft report 18:00 Departure to the hotel
Day 5, Fri	**AM**	07:30 Departure from the hotel 08:00 – 09:00 Finalization of draft report 09:00 Deadline for any changes in draft report 09:00 – 10:00 Preparation of exit meeting speeches 10:00 – 10:30 **Rehearsal of exit meeting speeches**, “cleaning” of offices 11:00 – 11:45 **Exit meeting -** (including plant management) Opening by the host plant peer Description of Mission scope - team leader – 2 minutes Detail findings (each reviewer): 3 * 5 (15) minutes Observers remarks and lesson learned: 2 * 3 (6) minutes

Main finding and conclusions - team leader – 5 minutes
Host plant peer’s remarks (comparison against initial expectation): 10 minutes
Speech by a plant manager: 5 minutes
Closing by the plant manager

PM 13:00 Transportation of the team to the airport organized by counterpart

ANNEX VII

SALTO PEER REVIEW STEPS

VII-1. SALTO peer review steps

- Workshop/seminar on IAEA safety standards and SALTO methodology
- Preparatory meeting 1
- Pre-SALTO mission (more than one Pre-SALTO mission can be performed for one plant if required)
- Preparatory meeting 2
- SALTO mission
- Follow-up SALTO mission

VII-2. Duration

- Workshop/seminar: 3-4 days
- Preparatory meeting 1: 2-3 days
- Pre-SALTO mission: 7-8 days
- Preparatory meeting 2: 2-3 days
- SALTO mission: 2 weeks
- Follow-up SALTO mission: 4 days

VII-3. Time schedule

- Workshop/seminar: whenever
- Preparatory meeting 1: 6 months before the mission
- Pre-SALTO mission: more than 2 years before entering LTO
- Preparatory meeting 2: 6 months before the mission
- SALTO mission: less than 2 years before entering LTO
- Follow-up SALTO mission: 18 – 24 months after SALTO Mission

ANNEX VIII

LIST OF PUBLICATION USED AS AN IAEA BASIS FOR SALTO PEER REVIEW

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

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

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: The Management system for Facilities and Activities, Specific Safety Requirements No. GS-R-3, IAEA, Vienna (2006).

[4] INTERNATIONAL ATOMIC ENERGY AGENCY, Application of Management system for Facilities and Activities, Safety Guide No. GS-G-3.1, IAEA, Vienna (2006).

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Management System for Nuclear Installations, Safety Guide No. GS-G-3.5, IAEA, Vienna (2009)

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Managing Human Resources in the Field of Nuclear Energy, Nuclear Energy Guide No. NG-G-2.1, IAEA, Vienna (2000).

[7] INTERNATIONAL ATOMIC ENERGY AGENCY, Modifications to Nuclear Power Plants, Safety Guide No. NS-G-2.3, IAEA, Vienna (2001)

[8] INTERNATIONAL ATOMIC ENERGY AGENCY, The Operating Organization for Nuclear Power Plants, Safety Guide No. NS-G-2.4, IAEA, Vienna (2001).

[9] INTERNATIONAL ATOMIC ENERGY AGENCY, Maintenance, Surveillance and In-service Inspection of Nuclear Power Plants, Safety Standards Series Safety Guide No. NS-G-2.6, IAEA, Vienna (2002).

[10] INTERNATIONAL ATOMIC ENERGY AGENCY, Recruitment, Qualification and Training of Personnel for Nuclear Power Plants, Safety Guide No. NS-G-2.8, IAEA, Vienna (2002).

[11] INTERNATIONAL ATOMIC ENERGY AGENCY, Periodic Safety Review of Nuclear Power Plants, Safety Standards Series No. SSG-25, IAEA, Vienna (2013).

[12] INTERNATIONAL ATOMIC ENERGY AGENCY, A system for the Feedback of Experience from Events in Nuclear Installations, Safety Guide No. NS-G-2.11, IAEA, Vienna (2006).

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

[14] INTERNATIONAL ATOMIC ENERGY AGENCY, Conduct of Operations at Nuclear Power Plants, Safety Guide No. NS-G-2.14, IAEA, Vienna (2008).

[15] INTERNATIONAL ATOMIC ENERGY AGENCY, Dispersion of Radioactive Material in Air and Water and Consideration of Population Distribution in Site Evaluation for Nuclear Power Plants, Safety Standards Series Safety Guide No. NS-G-3.2, IAEA, Vienna (2002).

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

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

[18] INTERNATIONAL ATOMIC ENERGY AGENCY, Safe Long Term Operation of Nuclear Power Plants, Safety Report Series No. 57, IAEA, Vienna (2008).
[19] INTERNATIONAL ATOMIC ENERGY AGENCY, Proactive Management of Ageing for Nuclear Power Plants, Safety Report Series No. 62, IAEA, Vienna (2009).
[20] INTERNATIONAL ATOMIC ENERGY AGENCY, Ageing Management for Nuclear Power Plants: International Generic Ageing Lessons Learned, Safety Report Series DD1085, IAEA, Vienna (intended publication in 2014).

LIST OF ABBREVIATIONS

AIP	advance information package
AMAT	ageing management assessment team
AMP	ageing management programme
AMR	ageing management review
ATWS	anticipated transient without scram
CLB	current licensing basis
DBD	design basis documentation
EQ	equipment qualification
FSAR	final safety analyses report
I&C	instrumentation and control
ISI	in-service inspection
LTO	long term operation
NPP	nuclear power plant
OSART	Operational Safety Review Team
P&ID	piping and instrumentation diagram
PLiM	plant life management
PSA	probabilistic safety assessment
PSR	periodic safety review
PTS	pressurized thermal shock
QA	quality assurance
RI-ISI	risk-informed in-service inspection
SALTO	Safety Aspects of Long Term Operation
SCs	structures and components
SSCs	structures, systems and components
TLAA	time limited ageing analyses
ToR	terms of reference
TSO	technical support organizations
WANO	World Association of Nuclear Operators

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14-01471

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