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SALTO Guidelines

Guidelines for peer review of long term operation and ageing management of nuclear power plants

Vienna, December 2008

Services Series 17

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SALTO GUIDELINES: GUIDELINES FOR PEER REVIEW OF LONG TERM OPERATION AND AGEING MANAGEMENT OF NUCLEAR POWER PLANTS

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FOREWORD

The average age of nuclear power plants (NPPs) connected to the grid worldwide is increasing. About 20% of all the power reactors operating worldwide have been in operation for more than 30 years, and almost 50% have been in operation for 20 to 30 years, while a rather limited number of new NPPs are being put into operation. In view of this trend, 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) for NPPs is operation beyond the established time frame originally set forth by the license term, design limits, standards or regulations. LTO needs to be justified by a safety assessment considering life limiting processes and features for structures, systems and components. 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 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 before and in conjunction with the decision to enter LTO. Ageing management of NPPs deals with the physical ageing of structures, systems 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. An effective ageing management programme (AMP) is a key element of the safe and reliable operation of NPPs during the originally planned time frame originally planned for their operation, as well as for the period of LTO. In order to assist Member States in managing ageing effectively, the IAEA is developing related safety standards and guidance publications.

International peer review is a useful tool for Member States to exchange experience, learn from each other and apply good practices in dealing with LTO of NPPs. The peer review service 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 services that indirectly address some aspects of LTO, including safety review services for design, engineering, operation and external hazards. OSART (Operational Safety Review Team) services include some review of ageing management programmes. In addition, several Member States have requested AMAT (Ageing Management Assessment Team) missions. Through these activities and considering the increasing average age of NPPs connected to the grid worldwide, it was recognized that a comprehensive engineering safety review service on LTO would be very useful to Member States.

The Safe Long Term Operation (SALTO) peer review is a new comprehensive engineering safety review service directly addressing strategy and the key elements for safe LTO of NPPs, which includes AMAT objectives and complements OSART reviews. The SALTO peer review service is designed to assist NPP operators in adopting a proper approach to long term operation of their plants and in implementing complete and appropriate activities to ensure that plant safety will be maintained during the LTO period. The SALTO peer review service can be tailored to focus on AMPs and/or on other programmes related to LTO to support the Member State in enhancing the safety of its NPPs. The SALTO peer review service can also support regulators in establishing or improving regulatory and licensing strategies for LTO of NPPs.

These guidelines are primarily intended for members of the SALTO review team and they provide a basic structure and common reference for peer reviews of LTO. However, the guidelines could provide useful information to 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 and that the scope of the review can be tailored upon request of the mission recipient.

As mentioned above, the SALTO peer review includes AMAT objectives and therefore this publication supersedes the previous AMAT guidelines (IAEA Services Series No. 4).

The IAEA officer responsible for this publication was T. Inagaki of the Division of Nuclear Installation Safety.

EDITORIAL NOTE

CONTENTS

1. INTRODUCTION

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 (safe long term operation) peer review mission. As such, they are addressed principally to the SALTO peer review team, but they also provide guidance to the host organization (including an operating organization and technical support organizations) for preparation for a SALTO peer review mission. Publications referenced in these guidelines could provide additional useful information for staff of the host organization while preparing for the SALTO peer review.

The SALTO peer review of LTO and related plant programmes (AMP, maintenance, in-service inspection, etc.) is based on the following:

- General information describing the plant and its structures, systems and components (SSCs);
- Documents on reviews and assessments of the plant condition and plant programmes related to LTO that have been performed by the host organization itself;
- Written procedures applicable to the LTO related activities of the plant;
- Interviews and discussions with host organization personnel;
- Observations of plant material conditions and practices; and
- Plant records and reports.

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

The SALTO peer review service follows the IAEA Safety Report on Safe Long Term Operation of Nuclear Power Plants [1] that addresses the following areas:

- LTO feasibility;
- Scoping and screening of SSCs;
- Assessment and management of SSCs for ageing degradation for LTO; and
- Revalidation of safety analysis that used time limited assumptions.

A peer review service for reviewing ageing management and other relevant activities related to LTO can be carried out at any time during the lifetime of an NPP.

It is important to note that 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 and agreed during the preparation for the review.

The guidelines are intended to help each expert formulate his/her review in conjunction with his/her own experience. They are not exhaustive and should not limit the expert's

investigations, but rather should be considered as an illustration of the comprehensive requirements according to which the review is carried out. Reviewers should keep in mind that it is practically impossible, in the timeframe of a mission, to cover the whole scope of a given section of the guidelines to the same depth. Therefore, it is expected that, based on the review of the advance information package prepared by the host organization, the experts will apply their judgement to decide which topics need more in-depth evaluation.

1.2. OBJECTIVES OF THE SALTO PEER REVIEW

The SALTO peer review is a new comprehensive engineering safety review service directly addressing strategy and the key elements for safe LTO of NPPs, which includes AMAT objectives and complements OSART reviews [2].

The SALTO peer review is conducted by a team of international experts with direct experience applicable to the areas of review. Judgements of performance are made on the basis of IAEA safety standards and other IAEA publications (see references of this publication), 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 being followed.

The key objectives of the peer review are:

- To assess the current status of the plant's programmes for long term operation and ageing management;
- To identify existing or potential issues in respect of safe long term operation;
- To propose measures to address issues identified; and
- To facilitate exchange of experience.

In order to fulfil these objectives, the peer review aims:

- To provide the host organization with an objective view, with respect to international standards, of the status of the plant SSCs important to safety and their fitness for continued safe operation;
- To provide the host organization with recommendations and suggestions for improvement in areas where performance falls short of good international practices;
- To provide key staff at the host organization with an opportunity to discuss their practices with experts who have experience of other practices in the same field;
- To provide the host organization with information regarding good practices identified in the course of the review; and
- To provide experts of the host organization, expert reviewers from Member States and the IAEA staff with opportunities to broaden their experience and knowledge of their own field.

The scope of the SALTO peer review includes only the SSCs of the NPP and, unless there is a specific request, does not normally address for example:

- The environmental impact of LTO;
- Organizational and administrative aspects of LTO;
- Human factor(s);
- Economic assessment and long term investment strategies.

1.3. ORGANIZATION OF THE SALTO PEER REVIEW

1.3.1. Preparation

Preparation is the key element of all phases of a peer review. The three most important parts of the preparation phase are:

(1) Defining the scope with the host organization;

(2) Selecting a team of experts with appropriate experience; and

(3) Defining the mission schedule.

Preparation should begin not later than six months prior to the mission. This will enable each expert to plan for specific activities and to conduct the necessary research and study prior to the mission.

After a request for a SALTO mission has been received from a Member State, the IAEA designates a team leader. At the same time, the host organization nominates a contact person, the representative counterpart, with whom the team leader may correspond.

The IAEA team leader arranges for:

- Establishment of liaison contacts at the host organization;
- Preparatory activities, including a preparatory meeting and addressing:
  - The exact scope of the review based on areas listed in Refs [1, 3], reflecting the request of the host organization;
  - The composition of the review team;
  - The content of the advance information package;
  - The logistic support; and
  - The financial arrangements.
- Recruitment of external experts for the team and briefing of team members.

The IAEA team leader prepares draft terms of reference (ToR) for the peer review, which is discussed with the host organization during the preparatory meeting. The ToR contains the following items:

- Background;
- Objectives of the review;
- Date and place for the review;
- Name of team leader and representative counterpart;
- Names of external experts;
- Review basis and methodology;
- Review subjects;
- Work scope of each expert;
- Provisional schedule;
- Reporting; and
- Content of the advance information package.

The host organization should start preparing the advance information package (AIP) in time to be submitted at least two months in advance of the peer review mission. The AIP should, as a minimum, contain programmatic type information for each reviewed area and should be written in English. The suggested contents of the AIP are:

(1) Administrative arrangements;

(2) Summary information on the regulatory environment (overview of regulations and regulatory requirements to PSR, ageing management and LTO);

(3) The following plant specific information:

- General arrangement of the plant buildings;
- Design specifications of plant (site) and major safety systems;
- General flow diagrams which show major systems;
- List of abbreviations of major safety systems;
- Summary information on plant inspection maintenance and technical support activities, which includes information on activities relating to feedback of operational experience;
- Operational history (annual load factor, number of unplanned shutdowns, etc.) and major past operational events (recent five years);

- List of past safety improvement projects.

(4) Summary of LTO activities at the plant.

1.3.2. Schedule

The length of the SALTO peer review mission is based on the request from the host organization and is normally one or two weeks (Annex IV provides an example of a schedule for a one week mission).

The team training/briefing for the review team takes place on the Sunday before the first week of the peer review mission.

Day one (normally Monday) starts with an entry meeting.

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

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

At the exit meeting, held on the last day of the mission, the experts present the main findings and conclusions.

The draft mission report is provided to the host organization at the exit meeting.

The final mission report is normally delivered to the host organization one or two months after the mission.

1.3.3. Review team composition and responsibilities

The team is composed of a team leader, who is an IAEA staff member, and up to six experts. A deputy team leader is assigned if necessary. The typical team composition includes a majority of external experts (usually senior experts from peer organizations) and one or two IAEA staff members (the team leader and the deputy team leader if applicable). No reviewer 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 expert 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 preparatory activities, such as acting as an official liaison with the host organization, selection and recruitment of experts, scheduling, initial training, pre-mission briefing, development and distribution of a template for presentation of technical notes, preparation of the mission draft report and issuing the final report.

The experts are responsible for preparing for the mission by studying relevant information provided by the host organization in the AIP (but not limited to this), preparing plans of 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 one-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 draft technical notes for their area of review on the basis of the template provided, discuss and agree upon 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 peer review service 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 host organization is responsible for designating a representative counterpart(s). During the review mission the representative counterpart(s) joins the daily team meeting and acts as a liaison officer between the host organization and the IAEA team. The representative counterpart(s) advises the IAEA team members when information may not be complete or correct; in cases of misunderstanding or where issues need further clarification, the representative counterpart(s) advises the IAEA team of the responsible or knowledgeable plant staff in specific areas who can provide clarification to clear the misunderstanding.

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).

1.3.4. Reporting and documenting

Daily reporting

Primary information gathered by the experts in the review should be documented in the form of daily notes (see Annex I), and presented to the review team during daily team meetings.

The daily notes are expanded into technical notes that contain identified concerns, which are discussed in the review team during daily meetings and are further developed into respective issues (see Annex III). The technical notes also contain the reviewer’s comments, and will form the basis of the mission report.

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

A template of the technical notes is distributed to experts during the team training.

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 technical notes.

The draft SALTO mission report is provided to the counterpart at the exit meeting for review, comments, and completion of the counterparts' views and measures in the issue sheets. It should be noted that the issues, recommendations/suggestions, and conclusions cannot be changed after the exit meeting. The final SALTO mission report is completed and issued after the mission, as defined in Section 1.3.2. 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 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, which includes the important findings of the mission, main conclusions and recommendations, the safety issues that were identified as result of the review as well as good practices.

- Introduction, describing the background for conducting the review, the scope and objectives of the review, the basis and references for the review, i.e. a list of the documents provided by the counterpart as well as the relevant IAEA safety standards and other reference documents used for the review, and a description of the conduct of the review.

- Technical issues documented in the issue sheets (see Section 2.3 and Annex III) that contain the issue description, comments, recommendations, and good practices.

A standard table of contents is provided in Annex II.

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 and combined expertise of the review team. This comparison may lead the review team to document in the final report comments and recommendations, suggestions, or good practices in accordance with the following definitions:

Comments

Comments are a summary of the findings of the review performed and of the discussions during the mission, and include conclusions on the status of the issue under consideration. Based on the comments, each reviewer develops issue sheets and drafts a description and recommendations/suggestions, and good practices.

Issues

An issue is an identified problem or an area of improvement, which has been identified on the basis of IAEA safety standards and other reference documents used for the review, and by the combined expertise of the team.

Recommendations

A recommendation is advice from the IAEA review team on what improvements with respect to the reviewed subject should be made in the activity or programme that has been evaluated, in order to resolve a deviation from good practices contained in IAEA Safety Standards, Safety Reports, Technical Reports and/or proven, good international practices. Recommendations are specific, realistic and designed, if implemented, to result in substantial improvements.

Suggestions

A suggestion either is an additional proposal in conjunction with a recommendation or may stand on its own following a discussion of the pertinent background. It may indirectly contribute to improvements in the reviewed subject but is primarily intended to make useful expansions to existing programmes (e.g. based on state of the art information published in IAEA TECDOCs) and to point out possible superior alternatives to ongoing work.

Note: Comments, recommendations and suggestions are explicitly used for the description of the issues contained in the issue sheets.

Note: If an item is not considered well based enough to meet the criteria of a '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 (e.g. "the team encouraged the operating organization to…").

Good practices

A good practice is an outstanding and proven performance, programme, activity or item of equipment in use that contributes directly or indirectly to operational safety and sustained good performance. A good practice is markedly superior to other practices observed elsewhere, not just in its fulfillment of current requirements or expectations. It should be sufficiently superior and have broad enough application to be brought to the attention of other NPPs and be worthy of their consideration in the general drive for excellence. A good practice has the following characteristics:

- It is novel;
- It has a proven benefit;
- It is replicable (it can be used at other plants);
- It does not contradict an issue.

The attributes 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 take note of. In this case it may be referred as 'good performance', and may be documented in the text of the report. A good performance is a superior objective that has been achieved or a good technique or programme that contributes directly or indirectly to operational safety and sustained good performance, that works well at the plant. However, it might not be necessary

to recommend its adoption by other NPPs, because of financial considerations, differences in design or other reasons.

1.4. FOLLOW-UP MISSION

To check the progress in solving issues and recommendations / suggestions, a follow-up mission is conducted. The team leader and one or two other members of the original review team take part in this mission.

The follow-up mission should typically take place 18 to 24 months after the main mission. The counterpart will send in advance to the IAEA all issue sheets from the main mission, having completed the recent status of issues and the response to recommendations / suggestions to the IAEA in advance. It takes typically three days to carry out the follow-up mission.

2. PEER REVIEW METHODOLOGY

The peer review addresses the following safety aspects of LTO:

- Organization and functions;
- Configuration/modification management;
- Current safety analysis report and other licensing basis documents;
- Identification of SSCs for LTO review;
- Existing plant programmes relevant for LTO;
- Review of ageing management programmes; and
- Revalidation of safety analyses that used time limited ageing assumptions.

Obtaining information during the peer review should be based on observations, interviews, document reviews, and plant walk downs. Information obtained through the above process becomes an important foundation for the overall review results.

2.1. REVIEW TECHNIQUES

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

These four steps are:

(1) Review of written material;
(2) Discussion and interviews;
(3) Direct observation of programme implementation and SSCs status; and
(4) Discussion of evaluations/tentative conclusions with counterparts.

Use of review techniques

The use of review techniques mentioned above should be planned in advance.

Arrangements should be made with the counterpart as to how to perform the discussions/ interviews and observations.

The IAEA review team has the daily meetings in which the experts present their actual findings, summarize their concerns developed during the day, and discuss actual issues. This creates an opportunity for other team members to contribute their views, further strengthening the experience base of the evaluation. It is important that each expert comes to the meeting prepared to make a concise statement of his findings, in order to allow the other review areas to be discussed at the same meeting. An example of the daily meeting form is shown in Annex I.

Formulation of recommendations and suggestions should be based on the identified issues. 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 technical notes in sufficient detail as to be readily understood.

Based upon the discussions and observations the reviewer can, if necessary, modify his preliminary view. More than one iteration may be required for document review, discussions, interviews, and observations in order to gain sufficient facts to form a judgment.

Review of written material

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 expert on site is set out in the appropriate section of these guidelines (see section 3).

Discussion and interviews

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

- Provide additional information not covered by the documentation;
- Answer questions, and satisfy concerns arising out of the documentation review;
- Obtain an in-depth clarification on sample programmes and activities; and
- Form a judgment of their understanding of the work processes and their own duties and responsibilities;

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

Direct observation of performance, status and activities

Direct observation of programme implementation and SSCs 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; and
  - Management control;
- Physical conditions of selected SSCs within the scope of LTO:
  - Walk down; and
  - 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;.and
- Physical conditions of selected SSCs within the scope of LTO (effectiveness of ageing management programmes).

2.2. SOURCES OF INFORMATION

2.2.1. Background information

The peer review is implemented along with this publication. The Safety Report on Safe Long Term Operation [1] specifically provides useful references for conducting the peer review.[1] The final report of EBP SALTO "Recommendations on the Scope and Content of Programmes for Safe Long Term Operation" [3] and Technical Report No.448 "Plant Life Management for Long Term Operation of Light Water Reactors" [4] contain detailed technical information on the practices in Member States.

In order to provide for common understanding among the plant, regulator and peer reviewer, the following terms and definitions have been identified:

Ageing management is defined as engineering, operations and maintenance actions to control within acceptable limits ageing degradation and wear out of structures, systems and components (SSCs).

Long Term Operation (LTO) is defined as operation beyond an established timeframe set forth by license term, design standards and/or regulations etc., which was derived considering life limiting processes and features.

Plant Lifetime Management (PLiM) the integration of ageing management with economic planning: (1) to optimize the operation, maintenance and service life of structures, systems and components; (2) to maintain an acceptable level of performance and safety; and (3) to maximize the return on investment over the service life of the facility.

[1] An IAEA Safety Guide on ageing management is in preparation will also provide review basis.

2.2.2. Information provided by the counterpart

Main information sources provided by the counterpart are as follows:

- Advance Information Package;
- Design basis documentation (if it exists);
- Final Safety Analysis Report (FSAR);
- Original safety analyses involving time limited ageing assumptions;
- Plant programmes related to long term operation;
- PLiM programme (if it exists);
- Programme for modifications and replacements;
- Implementation programme for LTO (if exist);
- Periodic Safety Review (PSR) report; and
- License renewal documentations (if relevant).

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

The FSAR could be considered as a useful information source if it complies with current plant configuration.

The design basis information should be available separately, if it is not integrated in the FSAR.

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

A well established PLiM programme could therefore cover all activities related to safety aspects of long-term operation. PLiM is an umbrella covering all plant items and practically all plant activities. A core part of the PLiM is measures which focus on the assurance of safety of long-term operation (in an economic optimised way). If the Member State established a PLiM programme, the documentation prepared within the programme should be considered as a basic source of information.

The programme for modification and replacement could be part of PLiM or separate programme.

If the Periodic Safety Review (PSR) is an established process in the Member State, the report on the PSR and the resulting action plan are the most 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 and the review of AMPs along established attributes and also the review and revalidation of calculations, safety analyses and qualifications analyses involving time limited ageing

assumptions. The programme of corrective actions defined on the basis of PSR contains 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 should be considered a basic source of information.

In some Member States, there are two basic regulatory concepts combined, PSR and license renewal. 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 contain the justification of LTO. The SALTO review should consider LTO relevant measures actions defined on the basis of PSR.

2.3. DEVELOPMENT OF FINDINGS AND ISSUES

Development of findings and issues is based on the expert's detailed technical notes. Experts should log a time when taking notes, and indicate an information reference, as well as other reference information for follow-up.

During the course of the peer review, after each daily meeting, each team member writes detailed technical notes on his observations and conclusions, including drafts of possible concerns that are further developed into recommendations, suggestions or good practices. In writing the technical notes, the following should be taken into account:

- Emphasis should be given to the reviewers' observations, with minimum description and clear conclusions;
- Wherever possible, reference to IAEA safety standards and other reference documents should be provided;
- 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; and
- Abbreviations or acronyms shall be introduced upon their first use.

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

The identified concerns are discussed among the review team, and if the concern is found relevant, the issue is developed and documented on the Issue Sheet. The outline of the Issue Sheet is described below. A sample Issue Sheet is provided in Annex III.

Issue Sheet

Based on the findings shown in the technical notes, each reviewer is requested to create "*issue sheets"*.

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

For the first review mission on the subject:

(1) Issue Identification;

(2) Issue Clarification;

(3) Counterpart views and measures (self assessment by the counterpart); and

(4) Assessment by the Review Team

For the follow-up missions on the same subject (clarification: for each follow-up mission, a new section is added, comprised of-5 and 6 below, with sequential numbering):

(5) Counterpart actions; and

(6) Assessment by the Review Team at the date of the follow up mission.

In the Issue Clarification section (2 above) of each "*issue sheet*", a clear reference to the IAEA safety standards or other documents used for the review should be indicated.

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.

Comments on Sections 3 and 5 of an "Issue Sheet"

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

Comments on Sections 4 and 6 of an "Issue Sheet"

The purposes of Sections 4 and 6 of the Issue Sheets are to reflect the discussions with the Counterpart experts, to record the conclusions, to issue possible recommendations and to synthesize the expert's judgment on the resolution of the safety issue under discussion. The issues and recommendations from previous missions to other plants are also taken as a basic reference for the review. In these sections, the findings, comments and recommendations are included, resulting from the assessment performed by the review team during the mission.

Recommendations and suggestions are numbered in sequential order for further reference. The reviewed documents — corresponding specifically to the safety issue under consideration are also listed.

Each recommendation and suggestion, whenever possible, is referenced to the relevant requirement/recommendation of respective IAEA safety standard, and other reference documents.

Resolution degree of the safety issues

The status of the safety issue under consideration is assessed and the respective "*resolution degree*" (RD) is assigned to reflects the judgment of the IAEA review team. The degree is scaled from 1 to 4, as indicated in the following table.

The urgency degree (UD) of the issue resolution should also be evaluated and indicated in the corresponding part of the issue sheet. Promptness in the resolution of the issue may be

assessed through a scale of the UD, from I to II in relation to a specific deadline or critical event.

The first date in the RD and UD tables is the date when the issue is developed. The second date in the tables is the date when the status of the issue is checked during the follow-up mission.

A full format of the issue sheet is shown in Annex III.

STATUS OF THE ISSUE			**Date: D1/M1/Y1**	**Date: D2/M2/Y2**
1 – Resolution Degree (RD):				
1	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*	**X**	**n.a.**
		No progress in the resolution of the issue, or unsatisfactory resolution.		**Y**
2	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA safety standards.*	**X**	**n.a**
		The issue was identified by the Counterpart and work has started to resolve it.		**Y**
3	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no final results are available yet.*	**X**	**n.a.**
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		**Y**
4	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*	**X**	**n.a.**
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		**Y**

2 – Urgency degree (UD):			
I	*The issue should be addressed urgently, before (indicate a key date)*	**X**	
II	*The issue should be addressed before (indicate a key date)*		

2.4. WORK WITH THE COUNTERPART

Besides the interviews and meetings with the counterpart described in section 2.1, the work with the counterpart on site involve the following activities:

- Entry meeting;
- Daily arrangements (meeting with the counterpart, summary team meetings, etc.); and
- Exit meeting.

During the entry meeting with the counterpart, the organization and performance of the review should be presented and working teams for every area should be established. The working teams in each area consist of the IAEA expert, counterpart experts and their technical support. It is advisable to have a short daily meeting of all participants to discuss the actual organizational issues for the working day.

The review team members will plan their schedules such that a primary and an alternate objective are always scheduled. Schedule of activities should be updated daily and discussed with the counterpart.

The counterpart should be informed on a daily basis of the preliminary findings and recommendations made by the review team. An agreement has to be reached between the review team and counterpart on every finding and recommendation. Representative of the counterparts attend the daily team meeting.

The day before the exit meeting, experts should deliver their part of the mission report as already agreed upon with the counterpart.

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

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:

- Organization and functions;
- Configuration/modification management;
- Current safety analysis report and other licensing basis documents;
- Existing plant programmes relevant for LTO;
- Review of aging management programmes;
- Revalidation of safety analyses that used time limited ageing assumptions.

3.1. ORGANIZATION AND FUNCTIONS

3.1.1. Existence of and interface with regulatory requirements

Expectations

The establishment of a stable regulatory regime based on hierarchical legal system (laws, regulations, guides) has been a crucial precondition for the development of activities in the nuclear industry and particularly the counterpart regulatory regime should provide for regulatory tools and processes for control of the safety of a plant to be operated in long term.

The requirements for LTO of existing NPPs should be specified within a regulatory framework.

Examples of documents for review:

- Regulations on LTO and LTO relevant aspects of plant activities;
- Regulation related on plant programmes related to LTO;
- Regulation on equipment qualification;
- Regulation on ageing management;
- Regulation on license renewal (if existing);
- Regulation on PSR (if existing and relevant);
- Regulatory requirements related to update of FSAR, and design basis;
- Regulatory requirements on quality assurance and configuration management.
- Regulatory requirements for control of the LTO process.

Evaluation

The review is focused only on establishing the existence of national regulations and not assessing the regulations itself.

3.1.2. Organizational structure

Expectations

The operating organization should establish an organizational plan for activities connected to ageing and long term operation as requested in licensing and regulatory requirements and by necessities to solve ageing and other issues of such character generated through period of plant operation, required by current licensing basis and conditions, etc.

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 run such activities.

The organizational structure in the plant (operating organization or TSO organizations) should be set up in respect of LTO programme of NPP.

The plant should adopt suitable organizational structure for preparation and implementation of LTO programme.

Special LTO oriented project team or similar organizational arrangements should be introduced in the plant.

Examples of documents to be made available for review during the mission:

- Organizational flowcharts; and
- Internal procedures describing organizational structure in the plant.

Evaluation

The peer review will focus on:

- Whether the responsibility for LTO is well defined;
- Whether the plant has adopted suitable organizational structure for preparation and implementation of LTO programme;
- Check if the plant has established special LTO oriented project team or similar organizational arrangements dealing with such 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);
- Evaluate if number of staff and their required qualifications needed to run the activities is adequate to the scope of work and the duties;
- Whether this organizational structure has potential to manage LTO programme with long-term perspective; and

- Confirm that management system and organizational matters address necessary quality assurance of processes related to ageing management and long term operation.

3.1.3. Plant policy (LTO, scope of SSCs for LTO)

Expectations

The plant should have a plant level documentation describing general conception and approach for preparation and implementation of LTO programme. It is also important to document methodology and criteria for scoping of SSCs for LTO. SSCs in the scope should be documented and relevant data should be accessible. Responsibilities in development, updating and implementation of LTO programme should be described in internal procedures.

In a broader sense, plant programmes such as surveillance, inspection and maintenance as well as consideration of feedback on operating experience should have an essential role in ensuring the safe operation of NPPs in the current design period and in supporting operation beyond such limits going over to continued or long term operation (LTO). It is expected that the approach to LTO would be based upon the following principles:

- The existing regulatory process is adequate to maintain safe operation of the NPP for the current authorized period and focuses on the effects of ageing that need to be properly managed for the planned period of LTO.
- The current licensing basis (CLB)[2] provides an acceptable level of safety (INSAG 8) for the current authorized period and is continued over 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 have been put for LTO and possible upgrading of the CLB done on a one-time basis or in the context of the PSR (usually every 10 years).
- Existing NPP programmes should be credited for use in LTO provided they are consistent with the nine elements described (in chapter 3.5.2 Review of Aging Management Programs) further.

A systematic process for identification of SSCs that are to be included in the scope of the LTO evaluation should be developed and implemented. For SSCs determined to be within the scope of LTO evaluation, a screening assessment to determine which structures and components (SCs) are subject to revalidation of analyses that involved time limited ageing assumptions, and which SCs require evaluation of programmes for managing ageing, should be performed.

The processes for scoping and screening should ensure that SSCs that perform required safety functions are evaluated for 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. It may be convenient for a plant to scope SSCs using more than one method. A system based scoping approach may be used for mechanical systems, and a component or commodity based scoping approach may be used for electrical systems.

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[2] In many cases, current licensing basis (CLB) means the licensing basis of the time when the NPP was constructed.

Examples of documents to be made available for review during the mission:

- Plant level documentation for LTO;
- LTO programme documentation;
- Methodology and criteria for scoping of SCs;
- Documentation of SCs scoping process; and
- Internal procedures for development, updating and implementation of LTO programme.

Evaluation

The peer review will focus on:

- Verify if a clear policy exists for activities related to long term operation and ageing;
- Whether the plant has plant level documentation covering LTO conception and approach;
- Whether the methodology and criteria for scoping of SCs is clearly defined;
- Whether SCs in the scope are documented and relevant data are accessible; and
- Verify, that the results of the scoping and screening processes are documented, in a manner that complies with the requirements of the quality assurance programme, and that the documentation includes (1) identification of the plant structures, systems and components that meet the description above; and (2) the information sources used to accomplish the scoping and screening and any discussion needed to clarify their use.

Note: Regardless of the method for selecting SCs that has been used, the team should review whether the SCs within the scope of LTO are those that perform the following fundamental safety functions [6]:

(1) Control of the reactivity;

(2) Removal of heat from the core; and

(3) Confinement of radioactive materials and control of operational discharges, as well as limitation of accidental releases.

Further, all SCs whose failure may impact fundamental safety functions as defined above should be also included.

Some national regulations also require that all SCs that are credited in the safety analysis to perform a function that mitigates certain types of events should also be included in the scope of reviews for LTO. The events which appeared to be the major contributors to risk profile

assessed by a plant-specific PSA should be taken into account in the process.[3] Some examples of these events include:

- Fires and floods;
- Extreme weather conditions;
- Earthquake;
- Pressurized thermal shock;
- Anticipated transient without scram (ATWS); and
- Station blackout.

3.1.4. Plant implementation programme for LTO

Expectations

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

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

Examples of documents to be made available for review during the mission:

- List or database of issues with supporting information originated from the AMP and reviews of safety analyses that involve time limited ageing assumptions;
- LTO programme, or programmes for reconstructions, replacement;
- Internal procedures for development and updating of given programmes;
- Plans of actions, corrective measures defined as result of PSR (if exists); and
- Internal procedures for the implementation of given programmes.

[3] A Safety Requirements publication on safety assessment and verification and Safety Guides on Level 1 and Level 2 PSA and on deterministic safety analysis for NPPs are in preparation.

Evaluation

The peer review will focus on:

- Whether the plant has programme(s) or action plan for the resolution of issues identified during the review of AMPs and safety analyses that involve time limited ageing assumptions;
- Whether the plant has programme for major refurbishment and scheduled replacements;
- Confirm that a plan exists for activities connected to ageing and long term operation and compare it with licensing and regulatory requirements;
- Verify principally that process of evaluation of the existing NPP programmes and documentation was performed. Confirm that process should be basis for developing the foundation for successful LTO;
- Review if assessment was done that the existing plant programmes and practices will ensure that they will remain effective for the planned period of LTO. This assessment would identify if modifications and/or new programmes necessary to ensure that SSCs are in place and able to perform their designated safety function for the planned period of LTO;
- Check how the plant had applied the measures taken in connection to identified issues and how they are incorporated in a relevant programme. Verify if this programme covers activities such as modifications, major reconstructions and scheduled replacements, and other plant commitments needed for assuring the safety during LTO;
- Review how and to which extent the programme is supported by safety analysis and business evaluation, and how coordination of the plan activities is done in respect of an overall plant life management programme; and
- Verify if recommendations and other suggestions arising from different types of reviews are incorporated into the plan activities.

3.2. CONFIGURATION MANAGEMENT AND MODIFICATION MANAGEMENT

Expectations

The plant should have a configuration management and modification management programme encompassing all intended changes of SSCs, process software of power plant, operational limits and conditions, and instructions and procedures. Management system / QA should contain the processes and activities related to configuration management and modification management programme.

Examples of documents to be available for review:

- Database or records on permanent modifications;
- FSAR sections with requirements on plant modifications;
- Modification control procedure;

- QA manual section on document control modification requirements;
- Configuration management manual or procedures and configuration management performance indicators; and
- Report on PSR on the assessment of management of modifications (if exists).

Evaluations

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 responsibility for plant modifications are well defined;
- Whether the impact of the modification on plant safety is properly assed;
- 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 analysis 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 and in extend necessary for assurance of all plant modifications and design changes during the current operational period as well as period of LTO; and
- Determine specifically that plant quality assurance plan is dealing with configuration management to such extent which guarantee necessary input for LTO analyses.

3.3. CURRENT SAFETY ANALYSIS REPORT AND OTHER LICENSING BASIS DOCUMENTS

Expectations

The safety of the plant should be justified and documented according to the current configuration and conditions. Depending on the counterpart regulation, this could be done either by regular updating of FSAR, or via PSR. If the FSAR does not contain design basis information, the plant should also have adequate design basis documentation.

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. plant design, actual condition of SSCs, EQ, ageing). 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 radiological protection, emergency planning and radiological impact on the environment. For the SALTO mission, it is important to be focused on the relevant issues in the PSR to the LTO.

Examples of documents to be available for review:

- FSAR;
- PSR report;
- Design basis documentation.

Evaluation

The peer review will focus on:

- Whether the plant has current documented justification of safety (compliance with safety standards, check the table of contents, contents of LTO related chapters);
- Whether the plant has design basis documentation;
- Whether the plant launched the programme of reconstitution of design basis, if necessary;
- If available, review the results of a PSR or similar safety assessment with focus on chapters relevant to ageing and LTO. Verify how the current licensing bases are reflected in the report; and
- Confirm that FSAR is regularly updated and verify to which extent the results of activities on ageing and LTO are implemented and reflected in FSAR updates.

3.4. EXISTING PLANT PROGRAMMES RELEVANT FOR LTO

Plant programmes listed below should be complete, implemented properly and effective. These plant programmes should be 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 impact all structures, systems and components of the NPP.

The peer review will check the completeness of the programmes from view points of LTO and on the 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 programmes in the plant are being properly implemented from LTO points of view.

The detail guidance for review of adequacy and effectiveness of these plant programmes (also called Ageing Management Programmes) is provided in section 3.5.2.

Maintenance

Expectations

Maintenance programmes should be reviewed and evaluated for effectiveness in maintaining the intended function of each SSC in the scope of LTO. The review provides a technical basis that demonstrates whether the degradation mechanisms will be adequately managed with the proposed activities.

Maintenance programmes should have clearly identified links with ageing management programmes, including the frequency of maintenance activities and specific information on the tasks, the records and their evaluation and storage. Existing maintenance programmes credited for LTO are evaluated against the nine elements listed in Section 3.5.2.

Obsolescence of components in the life of a power plant including the proposed period of LTO should be also addressed. A programme to address obsolescence could be a part of the normal plant maintenance programme.

Maintenance programmes for structures based on standard preventive maintenance may not be adequate to support an LTO programme.

Existing maintenance programmes credited for LTO should be evaluated against the ten (seven) elements listed in [1].

The plant approach to maintenance should be systematic.

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

Example of documents for the review

- Preventive and corrective maintenance programmes;
- Report on PSR (if exists);
- Documents on assessment of effectiveness of the maintenance programmes.

Evaluation

The peer review will focus on:

- Whether the programmes cover the scope of SCs for LTO;
- Whether the plant has reviewed adequacy of the given programme;
- Effectiveness of maintenance in detecting and characterizing degradation mechanisms;
- Documentation including all maintenance activities;
- Systematic approach to maintenance addressing technical aspects such as development of acceptance criteria, reliability centred maintenance, condition based maintenance and risk informed methods;
- Review if plant maintenance programmes consider feedback from operating experience. Also investigate to which extent the programmes are basically supporting safe operation of NPPs in the current design period as well as in supporting operation beyond such period;
- Determine if regulatory requirements, suppliers' recommendations, and related operational experience have been appropriately considered in the maintenance programmes;
- Check that 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, their evaluation and storage. Check that the evaluation of the collected data also includes trend analysis;
- Verify that the results of the scoping and screening processes are adequately considered in the maintenance programme;
- Verify that the maintenance programmes have 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 with the proposed inspection or monitoring. Check if attributes of the programmes are clearly defined and include target performance goals, identification of functional failure, feedback of operational experience etc. (ten or seven attributes [1]);
- Check if the maintenance programme also addresses obsolescence of components including the proposed period of LTO;
- Check if the maintenance programmes for SSCs within the scope of LTO are also focused on monitoring their own effectiveness, i.e. are condition based (standard preventive maintenance may not be suitable for LTO);
- Verify that systematic approach to maintenance programmes with respect to LTO, addressing weaknesses identified, and including technical development such as development of acceptance criteria, reliability centered and condition based maintenance, use of risk informed technology is available at the plant; and

- Check if a database that documents the effectiveness of maintenance in detecting and characterizing degradation mechanisms, and provides technical references to support findings and conclusions is available. The documentation should include all maintenance activities such as instrumentation and control, pumps, valves, and sensors.

Equipment qualification

Expectation

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/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, requalified under a comprehensive programme, or replaced.

The equipment qualification documentation should be adequately documented [7].

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; and
- Report on PSR (if exists).

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:

- Whether the programmes cover the scope of SCs for LTO;
- Whether the plant has reviewed the adequacy of the given programme;
- Whether the plant has properly established the scope of equipment for which EQ is required in accordance with LTO needs;

- Whether the environmental and seismic qualification of equipment will remain valid over the expected period of LTO as a result of above mentioned plant activities;
- Whether the plant has an upgrade programme for original EQ results of equipment designed according to earlier standards;
- Whether the timely replacement of equipment that cannot be qualified for the planned period of LTO is ensured;
- Whether a quality assurance programme of manufacturers and products needed for plant modifications exists;
- Check if the EQ programme considers all structures and components within the scope of LTO;
- Verify that the EQ has been reviewed for adequacy;
- Check that it is demonstrated that environmental and seismic qualification will remain valid over the expected period of LTO or that corrective measures have been developed and implemented. The demonstration should support the technical justification that the material degradation and 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 and electrical 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 instrumentation and control 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 design basis accident 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 retrievability of the EQ documentation, which should be ensured for the whole period of LTO; and
- On selected examples verify that the specific EQ programmes meet completely their intent.

In-service inspection

Expectation

In-service inspection (ISI) programmes should be in place and able to detect degradations for each structure and component.

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 [8].

Risk informed ISI (RI-ISI) programmes can be used for the planned period of LTO, in accordance with the applicable regulatory requirements and approach, available experience, and, considering existing limitations.

ISI results should be correctly documented, e.g. in a database. The database should provide the technical basis to support findings and conclusions necessary for LTO.

Example of documents for the review:

- ISI programmes as they exists at a given plant:
- Report on PSR (if it exists).

Evaluation

The peer review will check the completeness of the ISI programmes and on a sample basis review the technical content and adequacy.

The peer review will focus on:

- Whether the programmes cover the scope of SCs for LTO;
- Whether the plant has reviewed the adequacy of the given programme;
- Whether the ageing phenomena will be adequately detected by the proposed inspection or monitoring activities before they affect required safety functions of SCs;
- If risk informed ISI (RI-ISI) programmes are used for the planned period of LTO, what justification is performed and regulatory approval received;
- Qualification of methodology, equipment and personnel performing the ISI;

- Whether the ISI results are correctly documented and a database exists and is properly maintained;
- Whether the database provides the technical bases to support the justification for LTO;
- Review if plant in-service inspection programmes consider feedback from operating experience. Also investigate in which extend the programmes are basically supporting safe operation of NPPs in the current design period as well as in supporting operation beyond such period;
- Determine if regulatory requirements, suppliers' recommendations, and related operational experience have been appropriately considered in the in-service inspection programme;
- Check that in-service inspection programme for SSCs in the scope of LTO clearly identifies the type of inspection, the links with ageing management programmes, the frequency, tasks, records, their evaluation and storage;
- Verify that the results of the scoping and screening processes are adequately considered in the in-service inspection programme;
- Verify that the in-service inspection 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 with the proposed inspection. Check if attributes of the programmes are clearly defined;
- Verify that the methodology, equipment, and personnel, which are part of the in-service inspection process, have been qualified according to national standards, regulatory requirements, and IAEA recommendations [8];
- Determine, if the ISI qualification includes requirements that provide a quantitative measure of effectiveness (e.g. UT detection capability and UT flaw characterization error) through blind (and/or open) trials on test blocks;
- Verify the justification of the risk informed in-service inspection for the planned period of LTO if used. Check if the effectiveness of RI-ISI has been evaluated, considering limited operational experience of RI-ISI programmes, and the limitations of the underlying probabilistic analyses of RI-ISI; and
- Check if in-service inspection results are properly documented (database) so that a comparative analysis of the inspection results obtained during inspection can be performed and the data provide technical basis to support justification of LTO (findings and conclusions).

Surveillance and monitoring

Expectation

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

The surveillance programme should confirm the provisions for safe operation that were considered in design, checked in construction and commissioning, and verified through continuing operation. The programme should continue to supply data to be used for assessing the service life of SSCs for the planned period of LTO, e.g. through existing or additionally installed diagnostic systems.

The programme should detect ageing and degradation trends and should also verify that the expected safety margins and high tolerance of SSCs within the scope of LTO for anticipated operational occurrences are not deteriorated due to ageing.

Particular attention is paid to the following aspects:

- Integrity of the barriers between radioactive materials and the environment (reactor coolant pressure boundary and containment);
- Availability of safety systems such as the protection system, the safety system actuation systems and the safety system support features [8]; and
- Availability of items whose failure could adversely affect safety.

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

Example of documents for the review

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

Evaluation

The peer review will focus on:

- Whether the programmes cover the scope of SSCs for LTO;
- Whether the plant has reviewed the adequacy of the given programme;
- Whether the programmes confirm the provisions for safe operation that were considered in design, checked in construction and commissioning, and verified through continuing operation;
- Whether the programmes remain effective for assessing the service life of SSCs for the planned period of LTO;
- Whether the plant, in case of necessity has supplementary surveillance programme;
- Review if plant surveillance and monitoring programmes consider feedback on operating experience. Also investigate in which extend the programmes are basically supporting safe operation of NPPs in the current design period as well as in supporting operation beyond such period;

- Verify that surveillance programme has been reviewed with respect to the expected period of LTO and related aspects; and
- Check supplementary LTO related surveillance programme, such as reactor pressure vessel supplementary surveillance programme, controlled ageing programmes for cables.

Monitoring of chemical regimes

Expectations

The plant should have an established water chemistry programme for minimising the harmful effects of chemicals, chemical impurities and corrosion on plant systems for LTO.[4]

Controlling water 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 ten (seven) elements listed [1].

The water chemistry programme should specify scheduling, analytic methods used to monitor chemistry (some programmes use automated online monitoring equipment, while others use wet chemical methods) and verification of the effectiveness of the chemistry programme. The water chemistry programme should also provide the necessary chemical and radiochemical assistance to ensure safe operation, the long term integrity of SSCs, and control and reduction of radiation levels in working areas.

Example of documents for the review:

- The water chemistry programme as they exist at given plant;
- Report on PSR (if exists).

Evaluation

The peer review will focus on:

- Whether the programmes cover the scope of SSCs for LTO;
- Whether the plant has reviewed the adequacy of the given programme;
- Whether the experience feedback justifies the implemented water chemistry programme;
- Check if the plant water chemistry programme has been reviewed with respect to LTO and modified if applicable.
- Verify that assessments of plant chemistry performance are carried out and reported to involved plant groups including management. Check that chemistry specifications as

[4] A Safety Guide on water chemistry is in preparation.

well as technical specifications are well known by other related groups (operations) and the adequacy of speed with which abnormal chemical conditions are brought to the attention of the operations;

- Verify that chemistry staff is aware of implications of water 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, etc. of SCs within the scope of LTO);
- Determine if new findings and conclusions coming from e.g. surveillance and ageing management are being considered in updating plant water chemistry programme and appropriate interface is established;
- Determine whether the water chemistry practices approaches the aim of minimizing the degradation mechanisms of SCs within the scope of LTO;
- Determine whether the water 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 surveillance programme includes not only chemical parameters that are subject of the technical specifications but also the diagnostic parameters that provide useful information for determining and preventing the cause of out-of-normal specific situations;
- Check that sampling plans provide timely detection of chemistry trends. Check that trend analysis is carried out to identify adverse trends in plant chemistry and take effective corrective measures; and
- Determine if the chemistry facilities and equipment are adequate.

3.5. REVIEW OF AGING MANAGEMENT PROGRAMMES

3.5.1. Screening of SSCs for LTO

Expectations

A systematic process should be used for determining which SCs are to be included in the scope for LTO. SCs determined to be within the scope of LTO should be subject to a screening assessment to determine which SCs are subject to revalidation of analyses involving time limited ageing assumptions, and which SC's require evaluation of programmes for managing ageing. Those processes should be carried out specifically for mechanical, electrical and civil SCs.

The insights from deterministic safety assessment and/or the plant specific PSA results (if available) should be be used to determine non-safety related SSCs failure of which may impact on safety functions.

Examples of documents to be available for review:

- Document for safety classification of SSCs (usually included in FSAR);

- Documentation on methodology of SCs screening;
- List / database of SCs within the scope of LTO.

Evaluation

The peer review will focus on:

- What method has been used for selecting SCs for LTO;
- Whether this method is along with the Safety Report on Safe Long Term Operation [1] or other proven good international practices;
- Whether it is properly documented;
- Whether and how the SCs groups (group of components/structures which have similar functions, similar materials or are in similar environment) have been defined;
- Whether the plant has considered in its selection process failure of the non-safety related SSCs which may impact on safety functions;
- Verify if SCs within the scope of LTO are subjected to appropriate programmes such as AMPs, revalidation of safety analyses involving time limited ageing assumptions or maintenance rule.

3.5.2. Review of aging management programmes

Expectations

For the 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.

For the SCs necessary for safe LTO, assessment of the conditions and justification their physical status should be managed for the planned period of LTO. Process, with focus on plant ageing management, should normally contain identification of possible ageing degradation effects and assessment of the current physical status of SCs. Demonstration of the effectiveness of ageing management should be done through existing and new proposed plant programmes for ageing management.

The operating organization should keep documentation of the evaluation and demonstration that the effects of ageing are managed for the planned period of LTO.

Examples of documents to be available for review:

- Ageing management programmes;
- Report on PSR (if it exists); and
- Existing plant programmes listed in Section 3.4 (these are reviewed as preconditions).

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:

- Whether the operating organization concludes, after reviewing the existing plant programmes and/or ageing management programmes, that the management of ageing effects is not adequate. In this case, whether the operating organization modifies the existing programme or develops a new programme or inspection mechanism for the purpose of LTO;
- Whether the new programme or inspection mechanism includes a methodology for analysing the results of the inspection against applicable acceptance criteria and whether the methodology is capable of determining the ability of the structure or component to perform its intended function for the planned period of LTO under design conditions required by the regulator;
- Confirmation that there is a documented and verifiable selection process for the screening of SSCs for ageing management review;
- Confirmation that efficient data collection and record-keeping systems are in place so that trend analyses can readily be performed to predict SSC performance;
- Confirmation that appropriate ageing management reviews and condition assessments have been performed for SSCs subject to AMPs;
- Confirmation that operation, inspection/monitoring and maintenance programmes are well coordinated by AMPs;
- Verify if demonstration was done that the effects of ageing will continue to be identified and managed for each SC for the planned period of LTO; and
- Review if assessment was performed to confirm that SCs within the scope of LTO have a programme to ensure that the effects of ageing are managed properly so that the SC is capable of performing its designated safety function. Verify if the assessment includes technical aspects of the management of ageing effects for each SC identified and demonstration that the intended function of the SC will be maintained throughout the planned period of LTO.

Data for assessment of the current physical status of the plant

- Determine if all the important input design data such as design description, design bases 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.

- Determine that operational data are collected with focus on transients and events, generic operating experience. Also information such as power uprating, modification and replacement, surveillance and any trend curves are important to be available for the overall assessment.

Identification of ageing degradation effects

- Check that a procedure exists for the structure, component or commodity grouping to assess degradation effects into the detail.

- Confirm that the assessment includes activities leading to assembling of information relating to the SCs status. Further it should be confirmed that the process of assessment identify the ageing effects potentially affecting the ability of structures and components to perform their intended functions throughout the whole period of LTO. Determine if SCs are reviewed to identify certain ageing effects and that analysis were done to show that no affect to the capability of the SCs for the period of extended operation were observed. Check specifically if the analyses are dealing with parameters such as corrosion allowance, fatigue cycles, loading conditions, fracture toughness, tensile strength, dielectric strength, radiation exposure and environmental exposure.

- Confirm that review and assessment of the operating and maintenance history for the 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 whatever examination of repairs, modifications or replacements relevant to ageing considerations are included in the analysis of the SCs.

- Determine if the operating organization considered and addressed the materials, environment and stressors that are associated with each structure, component, or commodity grouping in the process of identification of ageing degradation effects.

- Based on the analyses a comprehensive and adequately documented programme for management of ageing degradation effects should be established.

- Check if in addition to assessment of materials, environment, and stressors the operating organization considered and addressed the plant specific CLB, plant and industry operating experience and existing engineering evaluations in order to identify the ageing effects requiring management for the structure or component subject to an ageing management programme.

- Determine if the operating organization had demonstrated by the analyses that it is not possible for the identified ageing effects to result in a loss of the intended function of the structures or components under design basis conditions. The demonstration should confirm that there is a reasonable assurance that the Current Licensing Bases will be maintained for the planned period of LTO.

Existing and proposed plant programmes for ageing management

Ageing management is a cross-cutting activity that involves maintenance, surveillance, equipment qualification, in-service inspection and other relevant plant programmes. It provides a methodical process to detect and mitigate ageing degradation. This process is used as part of the justification for safe LTO.

- Check if any existing and new plant programme that supports LTO and manages the ageing effects identified for LTO were reviewed to determine whether it includes the nine attributes as follows [1]:

  - **A defined programme scope**

    The scope of the programme defines the specific structures and components subject to an ageing management review;

  - **Identification of preventive and mitigation actions and parameters to be monitored or inspected**

    Actions to prevent or mitigate ageing degradation and parameters to be monitored or inspected for the intended function(s) of the particular structure or component are identified;

  - **Detection of ageing degradation/effects**

    Ageing effects need to be detected before there is a loss of the intended function(s) of a structure or component. The method or technique (i.e. visual, volumetric, surface inspection), frequency, sample size, data collection and timing of new/one-time inspections need to be addressed to ensure timely detection of ageing effects;

  - **Monitoring and trending including frequency and methodologies**

    Monitoring and trending provide predictability of the extent of degradation, and make possible timely corrective or mitigation actions;

  - **Acceptance criteria**

    The need for corrective action is evaluated against acceptance criteria, to ensure that the intended function(s) of a structure or component are maintained under all current licensing basis (CLB) conditions throughout the planned period of LTO;

  - **Corrective actions if a component fails to meet the acceptance criteria**

    Corrective actions, including root cause determination and prevention of recurrences, need to be timely;

  - **Confirmation that required actions have been taken**

    Confirmation processes ensures that preventive actions are adequate and that appropriate corrective actions have been completed and are effective;

  - **Administrative controls that document the programme's implementation and actions taken**

    Administrative controls provide a formal review and approval process;

  - **Operating experience feedback**

    Operating experience of the ageing management programme, including past corrective actions resulting in programme enhancements or additional programmes, provide objective evidence to support the conclusion that the effects of ageing will be managed adequately so that the intended function(s) of a structure or component will be maintained throughout the planned period of LTO;

- Verify if acceptance criteria were established for the new/modified programme. Also check if the methodology is capable of determining the ability of the structure or

component to perform its intended function for the planned period of LTO under design conditions required by the regulatory authority.

Documentation of the evaluation and demonstration for management of ageing effects

- Verify that the operating organization develops and retains in an auditable and retrievable form all information and documentation necessary for an effective management of ageing effects.
- 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; and
  - Description of existing and new programmes for LTO.

If the PSR has been used for the assessment and to prove adequacy of AMPs, the SALTO peer review will focus on the completeness of the scope of AMPs and attributes applied for the qualification of AMPs within the PSR process.

3.6. REVALIDATION OF SAFETY ANALYSES THAT USED TIME LIMITED AGEING ASSUMPTIONS

3.6.1. Original safety analyses involving time limited ageing assumptions

Expectations

The plant should identify in the FSAR and design supporting documentations original calculations / analysis with time limited ageing assumptions regarding period of operation and design considerations or licence terms (such safety analyses are sometimes termed ‘time limited ageing analysis’ or ‘residual life assessment’). These analyses and calculations should determine the design life of plant specific structures and components.

Examples of documents to be available for review:

- FSAR;
- EQ documentation; and
- Design supporting documents (such as PTS analyses, fatigue calculations, etc.).

Evaluation

The peer review will focus on:

- Whether the original safety analyses involving time limited ageing assumptions (e.g. from FSAR) are properly documented in the current safety analysis report or other licensing basis documents and clearly and adequately describe the current licensing basis or the current design basis requirements for NPP operation;
- Whether the plant identified list of safety analyses involving time limited ageing assumptions in accordance with current licensing requirements;
- Whether the plant compared the list of original and required safety analyses involving time limited ageing assumptions; and
- Whether the plant has launched safety analyses involving time limited ageing assumptions reconstitutions if needed.
- Whether the analyses have been reviewed by an independent organization or Regulatory Body.

3.6.2. Design basis information

Expectations

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.

Examples of documents to be available for review:

- Methodology for design basis collecting, maintaining and reconstitution;
- FSAR, if contains design basis; and
- Databases/documentation containing design basis.

Evaluation

The peer review will focus on:

- Whether the plant has design basis documentation which contains design basis requirements and supporting design information;
- Whether the plant launched the programme of reconstitution of design basis, if necessary; and
- Whether design basis contains also design requirements and supporting design information.

3.6.3. Revalidation of safety analyses involving time limited ageing assumptions

Expectations

Integrity and functional capability of some SCs within the scope of LTO are verified by plant specific safety analyses that involve time limited ageing assumptions.

Revalidation of these analyses should be done with respect to the assumed period LTO, because original time limited ageing assumptions are based upon an initially assumed period of operation and design considerations or license terms. The revalidation should confirm function and safety margins necessary for the whole period of LTO.

Note: Safety analyses that are to be revalidated for LTO are those that:

(1) Involve structures, systems and components within the scope of LTO;

(2) Consider the effects of ageing degradation;

(3) Involve time limited ageing assumptions defined by the current operating term;

(4) Were determined to be relevant in making safety determinations as required by national regulations;

(5) Involve conclusions or provide the basis for conclusions related to the capability of the structure, system or component to perform its intended function(s); and

(6) Are contained or incorporated by reference in the CLB.

New Safety Standards on safety assessment that are in preparation can be used in relation to deterministic and probabilistic safety assessment issues.

Examples of documents to be available for review:

- 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; and
- Revalidation reports.

Evaluation

The peer review will focus on:

- What regulations and codes has been followed when identifying the list of specific safety analyses that involve time limited ageing assumptions;
- Whether these calculations / analyses are properly documented;
- What methods and criteria have been used for revalidation of original safety analyses that involve time limited ageing assumptions;
- Whether the reviewed safety analyses that involve time limited ageing assumptions justify safe operation for LTO;
- Whether the revalidated calculations / analyses are documented in an updated safety analysis report;
- Whether the consequences 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;
- Whether the plant specific safety analyses that involve time limited ageing assumptions are complying with relevant recommendations of the Safety Report [1]; and
- 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 safety analyses that involve time limited ageing assumptions is documented in an update to the safety analysis report.
- Also check if typical time limited ageing assumptions are part of the safety analyses such as:
  - Irradiation embrittlement of the reactor pressure vessel;
  - Thermal and mechanical fatigue;
  - Thermal ageing;

- Loss of preload; and
- Loss of material.

- Check how possible combinations of several degradation mechanisms were handled in the analysis. Check how ratio of gradual degradation material properties was taken into account to guarantee conservatism and to evaluate possible synergy of ageing effects.

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.
- In case than the necessary limits were not given in the design specifications, verify if the limits given in the appropriate regulatory documents or safety reports were applied.

Assessment

- Check the evaluation results and conclusions of safety analysis revalidation where the lifetime of the SCs should be based on the shortest lifetime determined by assessments performed.
- Verify how the process was conducted in case if the period is shorter than the assumed period of LTO.

Documentation of revalidation

- Check if the documentation of analysis covers, as a minimum, the following elements as applicable:
  - Technical terms of reference;
  - Justification of the computational model used;
  - Calculation of the stresses, strains and temperature fields;
  - Calculation of residual lifetime throughout the intended period of LTO; and
  - Conclusions and recommendation of measures for LTO.

REFERENCES

[1] INTERNATIONAL ATOMIC ENERGY AGENCY, Safe Long Term Operation of Nuclear Power Plants, Safety Reports Series No. 57, IAEA, Vienna (2008).

[2] INTERNATIONAL ATOMIC ENERGY AGENCY, OSART Guidelines: 2005 Edition, Services Series No. 12, IAEA, Vienna (2005).

[3] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety Aspects of Long Term Operation of Water Moderated Reactors: Recommendations on the Scope and Content of Programmes for Safe Long Term Operation, IAEA-EBP-SALTO, Vienna (2007).

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

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

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Safety of Nuclear Power Plants: Design, IAEA Safety Standards Series No. NS-R-1, IAEA, Vienna (2000).

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

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

Annex I

SAMPLE OF SALTO PEER REVIEW SERVICE TECHNICAL NOTE DAILY TEAM MEETING – REVIEW STATUS

REVIEWER: **REVIEW AREA:** **DATE:**

Discussed with counterpart? **YES**

Concerns:

- The programme for ageing management and life time extension is very ambitious in the part of scope of equipment moreover in requirements to details of collected data. However, it is completely missing basic strategy and philosophy of preparation of a list of SSCs which should be part of such programme. Any parameters and criteria for process of scoping are established, only references to NAEK standard programme where such principles are missing as well. As consequence the list of equipment can be extremely long without to assure that critical and safety important components are included.

Good Ideas/Performance

- Very good orders in archive of Reactor Dept. Unit 3 – required documents concerning testing of tendons (pre-stressed concrete) of confinement were available including records and protocol.

Other Remarks (related to other review areas):

Reminder: make copies — one for each team member prior to the team meeting

Annex II

STANDARD TABLE OF CONTENTS OF THE MISSION REPORT

Annex III

ISSUE SHEET FORMAT

ISSUE SHEET

1. ISSUE IDENTIFICATION	Issue Number:
NPP:	
Unit:	
Reviewed Area:	
Issue Title:	

2. ISSUE CLARIFICATION
2.1 - ISSUE DESCRIPTION
2.2 - REFERENCE TO IAEA SAFETY STANDARDS
3. COUNTERPART VIEWS AND MEASURES (self assessment by the Counterpart)

4. ASSESSMENT BY THE IAEA REVIEW TEAM	**Date:**	
4.1 – COMMENTS: **C1)**		
4.2 – RECOMMENDATIONS: **R1)**		
4.3 – DOCUMENTS REVIEWED:		

5. COUNTERPART ACTIONS	Date:	

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

STATUS OF THE ISSUE			**Date: D1/M1/Y1**	**Date: D2/M2/Y2**
1 – Resolution Degree:				
1	**No action**	*The issue was not identified by the Counterpart, or having been identified, no action was taken to resolve it.*		
		No progress in the resolution of the issue, or unsatisfactory resolution.		
2	**Action under way**	*The issue was identified by the Counterpart, but the actions did not comply with IAEA SSS.*		
		The issue was identified by the Counterpart and work has started to resolve it.		
3	**Issue partially resolved**	*The issue was identified by the Counterpart and actions are underway but no results are available yet.*		
		The implemented actions meet partially the intent of recommendations of previous IAEA review.		

4	**Issue resolved**	*The issue was identified by the Counterpart and the solution provided is fully satisfactory. Issue closed.*		
		The intent of recommendations of previous IAEA review is fully met. Issue closed.		

2 – Urgency degree:			
I	*The issue should be addressed urgently, before continuing the PSHA and seismic PSA project.*		
II	*The issue should be addressed before . . .*		

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

Annex IV

EXAMPLE OF SCHEDULE OF SALTO PEER REVIEW MISSION

Review areas		SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
3.1. Organization and functions 3.2. CM 3.3. Current safety analysis report	AM	IAEA team briefing Preparatory activities	Entry meeting Initial Working Groups meeting.	Review activities	Interviews and discussions	Discussions draft issue sheets with counterpart Drafting of report	Concluding session with counterpart Exit meeting
	PM	IAEA team training Pre-meeting with counterparts	Review activities Daily arrangement with counterpart Daily team meeting	Plant Walk-down Daily arrangement with counterpart Daily team meeting	Interviews and discussions Develop draft issue sheets Daily arrangement with counterpart Daily team meeting	Preparation of statements for exit meeting Final discussion with counterparts Drafting of report Daily team meeting	Adjourn
Mechanical Part: 3.4. Existing plant programmes 3.5. Review of AMPs	AM	IAEA team briefing Preparatory activities	Entry meeting Initial Working Groups meeting.	Review activities	Interviews and discussions	Discussions draft issue sheets with counterpart Drafting of report	Concluding session with counterpart Exit meeting
	PM	IAEA team training Pre-meeting with counterparts	Review activities Daily arrangement with counterpart Daily team meeting	Plant Walk-down Daily arrangement with counterpart Daily team meeting (incl. a host plant peer)	Interviews and discussions Develop draft issue sheets Daily arrangement with counterpart Daily team meeting	Preparation of statements for exit meeting Final discussion with counterparts Drafting of report Daily team meeting	Adjourn

Electrical part 3.4. Existing plant programmes 3.5. Review of AMPs	AM	IAEA team briefing Preparatory activities	Entry meeting Initial Working Groups meeting.	Review activities	Interviews and discussions	Discussions draft issue sheets with counterpart Drafting of report	Concluding session with counterpart Exit meeting
	PM	IAEA team training Pre-meeting with counterparts	Review activities Daily arrangement with counterpart Daily team meeting	Plant Walk-down Daily arrangement with counterpart Daily team meeting	Interviews and discussions Develop draft issue sheets Daily arrangement with counterpart Daily team meeting (incl. a host plant peer)	Preparation of statements for exit meeting Final discussion with counterparts Drafting of report Daily team meeting (incl. a host plant peer)	Adjourn
Civil structures: 3.4. Existing plant programmes 3.5. Review of AMPs	AM	IAEA team briefing Preparatory activities	Entry meeting Initial Working Groups meeting.	Review activities	Interviews and discussions	Discussions draft issue sheets with counterpart Drafting of report	Concluding session with counterpart Exit meeting
	PM	IAEA team training Pre-meeting with counterparts	Review activities Daily arrangement with counterpart Daily team meeting	Plant Walk-down Daily arrangement with counterpart Daily team meeting	Interviews and discussions Develop draft issue sheets Daily arrangement with counterpart Daily team meeting	Preparation of statements for exit meeting Final discussion with counterparts Drafting of report Daily team meeting	Adjourn
3.6. Revalidation of TLAAs	AM	IAEA team briefing Preparatory activities	Entry meeting Initial Working Groups meeting.	Review activities	Interviews and discussions	Discussions draft issue sheets with counterpart Drafting of report	Concluding session with counterpart Exit meeting
	PM	IAEA team training Pre-meeting with counterparts	Review activities Daily arrangement with counterpart Daily team meeting	Plant Walk-down Daily arrangement with counterpart Daily team meeting	Interviews and discussions Develop draft issue sheets Daily arrangement with counterpart Daily team meeting	Preparation of statements for exit meeting Final discussion with counterparts Drafting of report Daily team meeting	Adjourn

LIST OF ABBREVIATIONS

AIP: advanced information package

AMAT: Ageing Management Assessment Team

AMP: ageing management programme

ATWS: anticipated transient without scram

CLB: current licensing basis

FSAR: final safety analysis report

ISI: in-service inspection

LTO: long term operation

NPP: nuclear power plant

OSART: Operational Safety Review Team

PLiM: plant life management

PSA: probabilistic safety assessment

PSR: periodic safety review

PTS: pressurized thermal shock

RD: resolution degree

RI-ISI: risk informed in-service inspection

SALTO: Safe Long Term Operation

SCs: structures and components

SSCs: structures, systems and components

ToR: terms of reference

TRS: technical reports

UD: urgency degree

CONTRIBUTORS TO DRAFTING AND REVIEW

Duchac, A.	European Commission Joint Research Centre, Netherlands
Gosselin, S.	Pacific Northwest National Laboratory, United States of America
Havel, R.	Consultant, Czech Republic
Inagaki, T.	International Atomic Energy Agency
Katona, T.	Paks Nuclear Power Plant, Hungary
Kearney, M.	International Atomic Energy Agency
Krivanek, R.	Dukovany Nuclear Power Plant, Czech Republic
Kupca, L.	International Atomic Energy Agency
Liszka, E.	Swedish Nuclear Power Inspectorate, Sweden
Song, J.H.	International Atomic Energy Agency
Wang, L.	International Atomic Energy Agency