

Working material

SALTO Missions Highlights

2018–2022

Long term operation safety practices in nuclear power plants

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FOREWORD

The IAEA Safety Aspects of Long Term Operation (SALTO) service provides advice and assistance to Member States considering extending the operating life of a nuclear power plant (NPP) beyond the original licensing term.

Careful design and high quality of construction, operation and maintenance are prerequisites for a safe NPP. However, a plant's safety depends ultimately on the ability and conscientiousness of the operating organization's personnel and on the plant programmes, processes and working methods. This also applies to all LTO related activities. The IAEA's SALTO peer review service compares a facility's LTO related activities and programmes against IAEA Safety Standards and proven good international practices.

SALTO peer review missions are available to all Member States considering LTO of their NPPs. Many Member States have participated in the programme by hosting one or more SALTO missions or by making experts available as reviewers. Preparedness for safe LTO can also be reviewed more generally as part of an Operational Safety Review mission (OSART) when a dedicated LTO area is included in the scope of the mission. Follow-up missions are standard parts of the SALTO programme and are conducted between 18 to 24 months after the original SALTO missions.

This report summarizes SALTO mission results from the period 2018 to 2022¹. The report also includes, where applicable, the results of LTO area reviews performed during OSART missions and their follow-up missions. It highlights the most significant findings while retaining as much of the vital background information as practicable. This report is divided into six Sections:

- Section 1: Provides an introduction to the SALTO peer review service;
- Section 2: Provides an overview of missions analysed in this document and wording used to group the results;
- Section 3: Provides a detailed assessment of mission results, area by area, based on issues and good practices that were identified in the period covered and the assessment of overall SALTO mission results. It also provides an assessment of follow-up mission results;
- Section 4: Summarizes the main areas for improvement identified during the missions between July 2018 and June 2022.
- Section 5: Provides a comparison of the 2018-2022 mission results with those from 2015-2018 and broader cross-cutting issues. Individual findings vary considerably in scope and significance. However, the findings do reflect some common strengths and opportunities for improvement;
- Section 6: Conclusions.

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¹ Similar summary reports were developed and are available at the IAEA website about the SALTO missions conducted in the periods 2007-2015 and 2015-2018.

1. INTRODUCTION

Many of the challenges faced by those responsible for ensuring the safe operation of NPPs are common throughout the world. The results of a SALTO peer review mission are, therefore, of interest and possibly applicable to many NPPs and not solely to the plant in which they were originally identified. The primary objective of this report is to enable the organizations that are operating or regulating NPPs, or providing technical support to them, to benefit from the experience gained from SALTO missions conducted during the period July 2018 to June 2022.

The IAEA started to develop guidance on NPP ageing management in the 1990s. Several reports on the subject were published, providing general guidance and more specific advice for selected major NPP components and structures. To support the increasing number of IAEA Member States that had decided to pursue LTO, the IAEA conducted an Extra-budgetary Programme on Safety Aspects of Long Term Operation of Water Moderated Reactors between 2003 and 2006. This led to the development of the SALTO peer review service. The methodology was verified during narrow-scope engineering review missions that included the objectives of an earlier IAEA review conducted by Ageing Management Assessment Teams. The approach was formalized in 2007 when the first full-scope SALTO missions took place.

By June 2022, 49 SALTO missions had been conducted at 21 NPPs in 17 Member States (including 8 pilot SALTO missions). There had also been 17 SALTO follow-up missions to review the implementation of previous SALTO recommendations and suggestions. Also, within this period, 11 NPPs had requested the LTO area to be included in OSART missions and in 5 OSART follow-up missions.

The SALTO peer review service is available to all Member States with NPPs by making a request to the IAEA. The methodology for conducting a SALTO mission is contained in the SALTO Guidelines, Service Series 26. This guideline was originally published in 2014 and then reviewed in 2021, among others, to include the review of research reactors in its scope.

SALTO peer review teams consist of senior expert reviewers from NPPs, technical support organizations and regulatory authorities in the various disciplines relevant to the mission. During technical discussions between reviewers and plant staff, LTO and ageing management programmes are examined in detail and their implementation performance is reviewed; strengths are identified as good practices, while areas for improvement can result in either recommendations or suggestions. The criteria used by the teams as they formulate their conclusions are based on IAEA Safety Standards and the best prevailing international practices and, therefore, may be more stringent than national requirements. SALTO peer reviews are neither regulatory inspections nor design reviews. Rather, they consider the effectiveness of LTO and ageing management programmes, and are more oriented to programme, process and management issues than to hardware. The performance or outcome of the various programmes receives particular attention. SALTO teams neither assess the adequacy of plant design nor compare or rank the safety performance of different plants.

The SALTO peer review service consists of the following elements:

- Workshops/seminars on IAEA safety standards, SALTO methodology and experience from LTO preparation;
- Preparatory meetings;
- Pre-SALTO mission (typically 10 to 2 years before LTO, and more than one Pre-SALTO can be conducted if required);
- SALTO mission (typically less than 2 years before LTO, and can also be repeated after 10 years, in the LTO period, if required);

- Follow-up SALTO mission (1.5-2 years after Pre-SALTO and SALTO mission).

A plant's preparedness for LTO can also be reviewed as an optional area of an OSART mission. In that case the review is performed by one expert and less time is available for the review of one area, which leads to less detailed review compared with a SALTO mission.

To meet the needs of all Member States and plants, Expert Missions that focuses on specific review areas of a standard SALTO peer review service have also been developed and conducted. The scope of these missions can be tailored according to the request of the host organization, but the methodology employed is the same as for SALTO missions.

A standard SALTO mission reviews the following areas:

- Area A - Organization of ageing management and LTO activities
- Area B - Scope setting, plant programmes and corrective action programme
- Area C - Ageing management of mechanical SSCs
- Area D - Ageing management of electrical and I&C SSCs
- Area E - Ageing management of civil SSCs
- Area F - Human resources, competence and knowledge management for LTO

These areas are further divided into sub-areas defined in the SALTO Guidelines and used to structure this report in its Sections 3 and 4.

Regarding the SALTO missions analysed in this report, those between 2018 to 2020 were performed in accordance with the SALTO Guidelines, Service Series 26, published in 2014, while those between 2021 and 2022 were performed in accordance with the SALTO Guidelines, Service Series 26, Rev.1 published in 2021.

The types of findings are defined as follows in the framework of SALTO peer reviews:

Recommendation

A recommendation is advice on what improvements in safety aspects of LTO should be made in that activity or programme that has been evaluated. It is based on IAEA Safety Standards, Safety Reports, or proven, good international practices and addresses the root causes rather than the symptoms of the identified concern. It illustrates a proven method of striving for excellence, which reaches beyond minimum requirements. Recommendations are specific, realistic and designed to result in tangible improvements. Absence of recommendations can be interpreted as performance corresponding with proven international practices.

Suggestion

A suggestion is either an additional proposal in conjunction with a recommendation or may stand on its own following a discussion of the pertinent background. It is based on IAEA Safety Standards, Safety Reports, or proven, good international practices and addresses the root causes rather than the symptoms of the identified concern. It may indirectly contribute to improvements in safety aspects of LTO but is primarily intended to make a good performance more effective, to indicate useful expansions to existing programmes and to point out possible superior alternatives to on-going work. In general, it is designed to stimulate the plant management and supporting staff to continue to consider ways and means for enhancing performance.

Good practice

A good practice is an outstanding and proven performance, programme, activity or equipment in use that contributes directly or indirectly to safe LTO and sustained good performance. A good practice is markedly superior to that observed elsewhere, not just the fulfilment of current

requirements or expectations. It should be superior enough and have broad application to warrant bringing it to the attention of other NPPs for their consideration in improving performance. 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 characteristics of a given ‘good practice’ (e.g. whether it is well implemented, or cost effective, or creative, or it has good results) should be explicitly stated in the description of the ‘good practice’.

2. OVERVIEW OF ANALYZED MISSIONS

During the period of July 2018 to June 2022, 11 SALTO missions and 2 Expert mission based on SALTO methodology were conducted around the world as listed in TABLE I. Safety aspects of LTO were reviewed in the frame of one OSART mission that included the LTO area, as listed in Table II.

TABLE I. EXPERT, PRE-SALTO AND SALTO MISSIONS²

SALTO Mission No.	Plant	Mission type	Country	Year
37	Karachi 1	EM (reduced scope in Areas A&B, and no Area F)	Pakistan	2018
38	Atucha 1	Pre-SALTO	Argentina	2018
39	Armenian 2	SALTO	Armenia	2018
40	Asco-Vandellos	Pre-SALTO	Spain	2019
41	Laguna Verde	SALTO	Mexico	2019
42	Forsmark 1 and 2	Pre-SALTO	Sweden	2019
43	Koeberg	Pre-SALTO	South Africa	2019
44	Oskarshamn	EM (Areas A, B and C)	Sweden	2019
45	Cernavoda 1	Pre-SALTO	Romania	2020
46	Kozloduy 5 and 6	SALTO	Bulgaria	2021
47	Asco 1 and 2	SALTO	Spain	2021
48	Krsko	Pre-SALTO	Slovenia	2021
50	Koeberg	SALTO	South Africa	2022

TABLE II. OSART MISSIONS INCLUDING THE LTO AREA

OSART Mission No.	Plant	Country	Year
214	Paluel	France	2021-09-20

² SALTO mission 49 to the South Ukrainian NPP planned in March 2022 was postponed.

This report summarizes the results of these missions, (good practices, recommendations, and suggestions) and provides a series of snapshots of the status of plants' activities to ensure safe LTO.

The amount and significance of recommendations and suggestions made during the SALTO missions correlates in principle with the level of compliance with the IAEA Safety Standards; the amount and significance of good practices indicates the level of implementation of the best international practices in the industry.

In most plants, the level of preparation for the review, the openness of the counterpart teams and their readiness to co-operate impressed the SALTO peer review teams.

While the nuclear industry has made significant advances in safety, there is always room for further improvement. SALTO peer review teams have identified many safety aspects of LTO where improvements are still needed. At the same time, the review teams and plants reviewed have provided the IAEA with valuable feedback that allows continuous improvement of the IAEA services aimed at safe LTO.

Table III shows the number of issues and the number of good practices identified during the 13 SALTO (including two Expert missions based on SALTO methodology) and one OSART missions. These findings formed the basis of the evaluation provided in Section 2 of this report. It should be noted that the depth of review and consequently the detail and number of issues arising from the 13 SALTO missions' issues is significantly higher than the level of detail and number of issues from the one LTO review during the OSART mission performed in the period.

TABLE III. SALTO FINDINGS OVERVIEW

	Area A	Area B	Area C	Area D	Area E	Area F	Total
Number of missions included the area							
SALTO	11	11	11	11	11	11	
SALTO based EM	1	2	2	1	1	0	
OSART	1	1	1	1	1	0	
Recommendations	19	14	13	14	14	8	82
Suggestions	16	15	19	20	13	13	96
Good Practices					1	1	2

The analysis used a grouping approach to evaluate and weight the mission results. The following wording was used to group the results:

- ‘In all plants’ or ‘in all cases’ was used when 10 or more issues were identified during the reviews (more than 90% of the cases);
- ‘In many plants’ or ‘frequently’ was used when 6 to 10 issues were identified during the reviews (from 45% to 90% of the cases);
- ‘In some plants’ was used when 2 to 6 issues were identified during the reviews (from 15% to 45% of the cases);
- ‘In a few plants’ was used when 2 or less issues were identified during the plant reviews (up to 15% of the cases).

3. ASSESSMENT OF THE SALTO MISSION RESULTS AREA BY AREA

This Section provides a detailed assessment of mission results area by area based on the issues and good practices that were identified during the missions shown in Tables I and II. Results are presented separately for each sub area.

Where the facts or findings of the SALTO missions address a common problem, the assessment is complemented by several examples of observations, and discussion on the weight of these findings is provided.

3.1. Organization of ageing management and LTO activities

TABLE IV. SUMMARY OF FINDINGS (AREA A)

Title		Rec.	Sugg.	GP	Total
1.1	Related regulatory requirements, codes and standards for AM and LTO and regulatory review	0	2	-	2
1.2	Principles and approach to AM and LTO	2	1	-	3
1.3	Organizational arrangements for AM and LTO	3	2	-	5
1.4	Periodic Safety Review	8	1	-	9
1.5	Programme for LTO	1	3	-	4
1.6	Configuration/modification management and design basis documentation	1	4	-	5
1.7	Safety Analysis Report	4	3	-	7
Total		19	16	-	35

3.1.1. Related regulatory requirements, codes and standards

Findings: 2 suggestions

Areas for improvement:

- In a few plants, there is an indication that not all essential elements of the LTO assessment are covered by the regulatory expectations (2/13).

IAEA Basis: SSR-2/2 (Rev.1): Req.1, 3.3, Req.16, 4.53; SSG-48: 1.10, 3.2, 3.6, 3.18, 7.2, 7.8, 7.39-7.40

Examples show that:

- Not all essential elements of the LTO assessment are submitted to the regulatory authority for review and approval.
- Reference basis used for the LTO assessments is not comprehensively identified.

It should be noted here that the objective of the SALTO peer review is to review the plant's activities for safe LTO and provide advice on improvements to the plant. Since the regulatory framework is developed and owned by the regulator, the regulator can also benefit from findings in this area.

Unclear regulatory expectations and unsuitable documentation related to requirements and guidance for LTO contribute to several issues identified in areas A and B directly and in other areas indirectly. Therefore, it is essential that regulatory requirements for LTO are clearly and timely established in Member States that intend to pursue LTO.

3.1.2. Principles and approach to AM and LTO

Findings: 2 recommendations, 1 suggestion

Areas for improvement:

- In some plants, policy and strategy for LTO are not fully established. (3/11).

IAEA Basis: GSR Part 2: Req. 9, 4.26; SSR-2/2 (Rev.1): Req.1, 3.2 a, b, Req.16, 4.53, 4.54; GS-G-3.1: 3.10-3.12, 5.10; SSG-25: 3.7, 3.10; SSG-48: 3.31, 5.1, 7.5-7.15

Examples show that:

- The plant has not established a suitable policy or organizational arrangements to prepare the plant for safe LTO in a timely manner.
- The plant LTO strategy is not fully comprehensive.

This area is directly linked to the next sub-section on organizational arrangements.

3.1.3. Organizational arrangements for AM and LTO

Findings: 3 recommendations, 2 suggestions

Areas for improvement:

- In some plants, the organizational arrangements, including tasks and responsibilities are not fully defined (3/11).

IAEA Basis: SSR-2/2 (Requirement 14 and 16, 4.5); SSG-48 (7.7-10), NS-G-2.12 (4.2)

Examples show that:

- The plant organization does not address all stages of LTO.
- The plant management does not provide adequate organization, processes or resources for integration and timely completion of all activities for safe LTO

This aspect has a broad overall impact on the LTO programme and its implementation effectiveness.

3.1.4. Periodic Safety Review

Findings: 8 recommendations, 1 suggestion

Areas for improvement:

- In many plants the content of PSR is not comprehensive for LTO. (6/11)
- In a few plants the methodology for PSR is not adequate. (2/11)

IAEA Basis: SSR-2/2 (Rev.1): Req.12, 4.44-4.47, 4.53, Req.14, 4.50, Req.16, 4.53; SSG-25: 2.3 - 2.4, 2.9, 3.2, 3.4, 3.5, 3.7, 3.8, 3.10, 4.5, 4.19, 4.22, 4.25 - 4.27, 5.4, 6.1, 6.6 - 6.9; SSG-48: 4.6-4.8, 7.15, 7.37, 7.38

Examples show that:

- The plant has only partially analysed and documented the review of relevant IAEA Safety Standards as a basis for PSR.
- The current PSR does not provide support in justification of safe LTO.

Since lack of a comprehensive PSR can lead to missed opportunity to identify and implement safety upgrades and physical modification for safe LTO, the review of the PSR supporting the LTO process was extended in the new version of the SALTO Guidelines (IAEA Service Series 26, Rev.1) in order to confirm the plant's activities in identifying safety improvements for the LTO period. The missions implemented in this assessment period have already applied the extended approach.

3.1.5. Programme for LTO

Findings: 1 recommendation, 3 suggestions

Areas for improvement:

- In some plants a comprehensive implementation programme to ensure that all LTO activities are performed in a timely manner is not in place or is not fully developed. (4/11)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 2.31, 3.31 - 3.32, 7.7 - 7.9, 7.16-7.19, 7.29, 7.41

Examples show that:

- The plant does not have a comprehensive LTO implementation programme.
- The plant's LTO project arrangements are not adequate to implement the ageing management related LTO assessments in a timely manner.

Effective arrangements to ensure implementation of LTO project results, commitments, documents updates, and activities need to be in place to ensure plant safety during LTO.

3.1.6. Configuration/modification management and design basis documentation

Findings: 1 recommendation, 4 suggestions

Areas for improvement:

- In some plants the configuration and modifications management process does not ensure timely update of plant documentation. (5/11)

IAEA Basis: SSR-2/1 (Rev.1): Req.14, 5.3; SSR-2/2 (Rev.1) – Req.10, 4.38; Req.11, 4.39 - 4.43; SSG-48: 4.1-4.2, 4.13-4.15

Examples show that:

- Documented information related to modifications is not always retrievable and traceable.
- Alignment of documentation and databases after modifications is not ensured for LTO preparation.

3.1.7. Safety Analysis Report

Findings: 4 recommendations, 3 suggestions

Areas for improvement:

- In many plants, the Safety Analysis Report (SAR) has not been updated with information from ageing management and LTO assessments. (7/11)

IAEA Basis: SSR-2/2 (Rev.1): 3.2e, GS-G-4.1: 4.1, 4.3-4.4; SSG-25: 3.9; SSG-48: 3.11, 4.1-4.5

Examples show that:

- The SAR has not been updated for LTO.
- The SAR does not contain information about ageing management or LTO assessments and results.

Plant programmes and analyses relevant to ageing management and evaluation for LTO should be properly documented in the safety analysis report or in other current licensing basis documents and should so become part of the licensing basis.

3.2. Scope setting, plant programmes and corrective action programme

TABLE V. SUMMARY OF FINDINGS (AREA B)

	Title	Rec.	Sug.	GP	Total
2.1	Methodology and criteria for scope setting of SSCs for AM LTO	10	6	-	16
2.2	Maintenance programme	3	6	-	9
2.3	In-service inspection programme	-	1	-	1
2.4	Surveillance programme	-	1	-	1
2.5	Water Chemistry Programme	-	-	-	-
2.6	Corrective action programme	1	1	-	2
	Total	14	15	-	29

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

Findings: 18 recommendations, 9 suggestions

Areas for improvement:

- In many plants, completeness of scope setting cannot be demonstrated. (10/14)
The following type of issues were identified during the reviews (some items occurred in the same plant, so the sum does not correlate with the above total number):
 - Incomplete or inadequate documentation on process/ results on scope setting (6/14);
 - The methodology for scope setting is not established or is not adequate (7/14);
 - Active and short-lived systems and components (SCs) are not included in scope of LTO and ageing is not properly managed (3/14).
 - Components needed to cope with design extension condition (DEC) or to mitigate consequences of severe accident are not included in scope (2/14)
 - The scoping methodology for ageing management is not consistently implemented (3/14)

IAEA Basis: SSR-2/2 (Rev.1): 4.54; SSG-48: 5.14-5.21, 7.20

Examples show that:

- Process and documentation for scoping for LTO is not adequate.
- The documentation of scope setting methodology for LTO does not provide for complete, justified and traceable scope setting results.
- The methodology for scope setting is not appropriately defined and documented.
- The methodology for scope setting for assessment of SSCs for LTO does not provide clear and unambiguous guidance and is not consistently applied.
- The scoping methodology for ageing management and LTO is not comprehensive and not properly implemented.
- Identification and labelling of in-scope SSCs for LTO is not comprehensive.

The plants should give adequate attention to the scope setting methodology, its appropriate and timely application, as well as to demonstrating the completeness of the outcome. Without a well-defined and justified scope, the plant cannot demonstrate that the ageing management of all safety relevant structures and components is adequate for LTO.

Other issues are related to inadequate use of commodity groups, data management and work management. These factors affect the correctness and accountability of the scope setting results.

3.2.2. Maintenance programme

Findings: 3 recommendations, 6 suggestions.

In the analysis of the findings of this sub-area it should be taken into account that some of the issues refers to several plant programmes but are classified in the sub-area of maintenance as most of the fact are related to maintenance programmes. It means at the same time, that these issues are not taken into account in the analysis of findings of the other plant programmes.

Areas for improvement:

- In some plants, existing maintenance programmes do not ensure adequate ageing management for LTO or their effectiveness for LTO has not been demonstrated. (4/14).
- In few plants, data management and documentation related to maintenance programmes is not adequately managed. (2/11)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54, Req.31, 8.1, 8.3-8.5, 8.15, 8.17; NS-G-2.6: 5.33 - 5.37, 7.6 - 7.8), 7.9 , 8.1 - 8.4 ; SSG-48: 3.21, 3.25, 3.33, 3.35, 4.16-4.22, 7.26-7.27

Examples show that:

- Documentation of the maintenance programme to support effective ageing management of SSCs is incomplete.

- Analysis and implementation of maintenance programmes for LTO is incomplete.
- The implemented maintenance programmes do not ensure effective management of potential ageing effects for LTO.

3.2.3. In-service inspection programme

Findings: 1 suggestion

Areas for improvement:

- In one plant it was found that the plant has not reviewed and implemented the existing plant programmes and AMPs to assure effective ageing management for LTO (1/14).

The issue was classified in this sub-area as most of the facts were related to the in-service inspection programme.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54, Req.31, 8.1, 8.3-8.5, 8.15, 8.17; NS-G-2.6: 5.33 - 5.37, 7.6 - 7.8), 7.9 , 8.1 - 8.4 ; SSG-48: 3.21, 3.25, 3.33, 3.35, 4.16-4.22, 7.26-7.27

3.2.4. Surveillance programme

Findings: 1 suggestion

Areas for improvement:

- In one plant it was found that the plant has not completed the evaluation of the effectiveness of existing plant programme's effectiveness for managing ageing for LTO. (1/14).

The issue was classified in this sub-area as most of the facts were related to the surveillance programme.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54, Req.31, 8.1, 8.3-8.5, 8.15, 8.17; NS-G-2.6: 5.33 - 5.37, 7.6 - 7.8), 7.9 , 8.1 - 8.4 ; SSG-48: 3.21, 3.25, 3.33, 3.35, 4.16-4.22, 7.26-7.27

3.2.5. Water Chemistry Programme

No individual issues were identified for the water chemistry programme however, some individual facts were added to broader issues addressing the adequacy of plant programmes for LTO from a more general aspect.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54, Req.29, 7.13-7.17; SSG-13: 2.6, 2.9, 2.11, 2.21 - 2.23, 3.4, 4.4; SSG-48: 3.21-3.22, 3.33, 3.35, 4.16-4.18, 4.45-4.48, 7.26-7.27

3.2.6 Corrective action programme

Findings: 1 recommendation, 1 suggestion

Areas for improvement:

- In few plants was find that the corrective action programme is not appropriately used in support of ageing management and LTO (2/14).

IAEA Basis: GSR Part 2: Req.13, 6.1-6.8, 4.20; SSR-2/2 (Rev.1): Req.1, 3.2e, f, 4.37, Req.9, 4.37; SSG-48: 4.49-4.53

3.3. Ageing management of mechanical SSCs

TABLE VI. SUMMARY OF FINDINGS (AREA C)

Title		Rec.	Sug.	GP	Total
3.1	AMR of mechanical SSCs	6	7	-	13
3.2	AMPs of mechanical SSCs	4	5	-	9
3.3	TLAAs of mechanical SSCs	2	5	-	7
3.4	Scope setting results verification for mechanical SSCs	-	-		-
3.5	Data collection and record keeping	0	2		2
3.6	Documentation of AM and documentation in support of LTO for mechanical SSCs	1	0		1
Total		13	19	-	32

3.3.1. AMR of mechanical SSCs

Findings: 6 recommendations, 7 suggestions

In the analysis of the findings of this sub-area it should be taken into account that some of the issues refer to findings on AMR for mechanical, electrical and I&C components, but are classified in the sub-area of mechanical as most of the facts are related to mechanical SSCs. At the same time this means that these issues are not taken into account in the analysis for electrical and I&C components and civil structures.

Areas for improvement:

- In some plants, the ageing management review is not supported by a condition assessment of all in-scope SCs. (4/14)
- In few plants, the ageing management review methodology is not adequate. (2/14)
- In some plants, the ageing management review is not complete. (4/14)

Examples show that:

- Commodity grouping for in-scope mechanical, electrical and I&C SSCs for LTO is not adequate to ensure a complete AMR;
- AMR of Mechanical, Electrical and I&C and Civil SSCs. Is incomplete

- AMR of mechanical SSCs does not provide complete demonstration that ageing effects are effectively managed.
- Ageing management review for mechanical components is not complete.
- Condition assessment of in-scope mechanical SSCs is not adequate for LTO.
- Review of operating experience of mechanical, electrical, I&C and civil SSCs for LTO is not complete and is not considered in AMR.

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51, Req.16, 4.53, 4.54; SSG-48: 3.3, 3.4, 3.20, 3.26, 3.30, 3.32, 3.35, 3.40, 5.22-5.36, 7.21-7.24

3.3.2. AMPs of mechanical SSCs

Findings: 4 recommendations, 5 suggestions.

Areas for improvement:

- In some plants, AMPs for mechanical SCs are not adequately developed (e.g. gaps in identification of managed ageing effects, trending, acceptance criteria, corrective actions, documentation). (4/14).
- In some plants, AMPs for mechanical SCs are not fully implemented. (5/14).

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51; SSG-48: 3.33, 3.35, 3.37-3.39, 5.37-5.63, 7.26

Examples show that:

- AMPs for mechanical SSCs are not fully implemented and documented for LTO.
- Ageing management for mechanical components is not comprehensive to support reliable operation of SSCs for LTO.
- Development and implementation of the AMPs for mechanical components is not finalized.

3.3.3. TLAAs of mechanical SSCs

Findings: 2 recommendations, 5 suggestions

Areas for improvement:

- In many plants, identification or revalidation of TLAAs for mechanical SCs is not complete or systematic. (7/14)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 3.34, 5.64-5.69, 7.14, 7.18, 7.28

Examples show that:

- Identification and revalidation of TLAAAs for mechanical SSCs is not in place for justification of safe LTO.
- The plant has not identified, developed and revalidated TLAAAs.
- The TLAAAs development and implementation for mechanical SSCs is not completed.

3.3.4. Scope setting results verification for mechanical SSCs

There was no separate scope setting issues in this area, however, some individual facts were added into broader issues referred to scope setting for ageing management and LTO as part of sub-area B1.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 5.16-5.21

3.3.5. Data collection and record keeping

Findings: 2 suggestions

In the analysis of the findings of this sub-area it should be taken into account that some of the issues refer to findings on databases for mechanical, electrical and I&C components, but are classified in the sub-area of mechanical as most of the facts are related to mechanical SSCs.

Areas for improvement:

- In few plants, data management for ageing management of mechanical components was not adequate (2/14).

IAEA Basis: SSR-2/2 (Rev.1): Req.15, 4.52; SSG-48: 3.13-3.19, 3.23, 5.9-5.13

Examples show that:

- Data management for ageing management and LTO is inadequate.
- Databases for in-scope mechanical, electrical and I&C SSCs is not comprehensive.

3.3.6. Documentation of AM and documentation in support of LTO for mechanical SSCs

Findings: 1 recommendation

Areas for improvement:

- In one plant, consistency and completeness of databases used for the assessment of the SSCs in LTO scope is not ensured. (1/14)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.53; SSG-48: 5.70-5.74, 7.29-7.38

3.4. Ageing Management of electrical and I&C SSCs

TABLE VII. SUMMARY OF FINDINGS (AREA D)

Title		Rec.	Sug.	GP	Total
4.1	AMR of electrical and I&C SSCs	1	2		3
4.2	AMPs of electrical and I&C SSCs	3	4		7
4.3	Equipment qualification programme for all SSCs	9	4		13
4.4	Technological obsolescence management for all SSCs	1	9		10
4.5	Scope setting results verification for electrical and I&C 1 SSCs	0	1		1
4.6	Data collection and record keeping	-	-		-
4.7	Documentation of AM and documentation in support of LTO for electrical and I&C SSCs	-	-		-
Total		14	20	-	34

3.4.1. AMR of electrical and I&C SSCs

Findings: 1 recommendation, 2 suggestions

Areas for improvement:

- In some plants, the AMR of electrical and I&C SSCs for LTO is not complete or comprehensive. (3/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51, Req.16, 4.53, 4.54; SSG-48: 3.3, 3.4, 3.20, 3.26, 3.30, 3.32, 3.35, 3.40, 5.22-5.36, 7.21-7.24

Examples show that:

- Traceability of results of ageing management review for electrical and I&C components is not ensured.
- The AMR for electrical and I&C SSCs is not complete.
- The AMR content and action implementation plans for in-scope electrical and I&C SCs are incomplete.

3.4.2. AMPs of electrical and I&C SSCs

Findings: 3 recommendations, 2 suggestions

Areas for improvement:

- In some plants, AMPs for electrical and I&C components are not adequate for LTO. (3/13).
- In some plants, AMPs for cables are not adequate for LTO. (2/13).

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51; SSG-48: 3.33, 3.35, 3.37-3.39, 5.37-5.63, 7.26

Examples show that:

- Management of in-scope electrical and I&C SSCs' ageing is not complete for LTO.
- A systematic cable ageing management programme with adequate technical justification is not fully in place.

3.4.3. Equipment qualification programme for all SSCs

Findings: 9 recommendations, 4 suggestions.

Areas for improvement:

- In many plants, the equipment qualification programme is not adequate or not comprehensive for LTO. (8/13).
- In some plants, the equipment qualification programme is not fully implemented, and revalidation of qualified equipment is not complete. (4/13).

IAEA Basis: SSR-2/1 (Rev.1): Req.30, 5.48-5.50; SSR-2/2 (Rev.1): Req.13, 4.48-4.49; Req.16, 4.54; SSG-48: 3.12, 3.16, 3.17, 3.21, 3.33-3.35, 4.16-4.18, 4.23-4.31, 5.67-5.69, 7.26-7.28; NS-G-2.13: 2.21, 3.1, 3.9, 3.11, 3.20; SSG-69: 2.14, 2.21, 2.26-2.33, 3.1, 3.12, 3.24, 4.18, 4.23-4.33, 4.34, 5.1, 5.2, 5.7, 5.9, 5.10, 5.11, 5.15, 5.23, 5.31, 5.43, 5.48, 6.1, 6.4, 6.5, 7.1, 7.2.

Examples show that:

- The plant has not fully implemented the EQ programme and has not revalidated the EQ TLAA.
- The revalidation of qualified life of equipment for the LTO period is not comprehensive.
- The environmental qualification of in-scope SSCs is not preserved.

3.4.4. Technological obsolescence management for all SSCs

Findings: 1 recommendation, 9 suggestions,

Areas for improvement:

- In many plants, a proactive programme for managing technological obsolescence is not developed/ fully established. (10/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.10, 4.38; Req.16, 4.54; SSG-48: 3.20-3.21, 3.27-3.28, 3.33, 6.1-6.12

Examples show that:

- Technological obsolescence of SSCs is not managed in a timely and comprehensive manner.
- The obsolescence management programme has not been timely and completely implemented.
- A proactive technological obsolescence programme is not fully implemented.

3.4.5. Scope setting results verification for electrical and I&C SSCs

Findings: 1 suggestion.

Areas for improvement:

- In one plant, the scope of electrical and I&C systems and components for assessment for LTO is incomplete.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 5.16-5.21

3.4.6. Data collection and record keeping for electrical and I&C SSCs

No issue was identified in this sub-area, however, some individual facts were added into broader issues referred to data management.

IAEA Basis: SSR-2/2 (Rev.1): Req.15, 4.52; SSG-48: 3.13-3.19, 3.23, 5.9-5.13

3.4.7. Documentation of AM and documentation in support of LTO for electrical and I&C SSCs

No issue was identified in this sub-area, however, some individual facts were added into broader issues referred to data management.

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.53; SSG-48: 5.70-5.74, 7.29-7.38

3.5. Ageing Management of civil SSCs

TABLE VIII. SUMMARY OF FINDINGS (AREA E)

Title		Rec.	Sug.	GP	Total
5.1	AMR of civil SSCs	2	2		4
5.2	AMPs of civil SSCs	10	6		16
5.3	TLAAs of civil SSCs	2	1	1	3
5.4	Scope setting results verification for civil SSCs	-	2		2
5.5	Data collection and record keeping	-	-		-
5.6	Documentation of AM and documentation in support of LTO for civil SSCs	-	2		2
Total		14	13	1	27

3.5.1. AMR of Civil SSCs

Findings: 2 recommendations, 2 suggestions.

Areas for improvement:

- In some plants, the ageing management review is not complete. (4/14)

Examples show that:

- Ageing management review for civil SCs has not been properly performed to support LTO.
- The plant has not completed a comprehensive ageing management review for civil SCs for LTO.

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51, Req.16, 4.53, 4.54; SSG-48: 3.3, 3.4, 3.20, 3.26, 3.30, 3.32, 3.35, 3.40, 5.22-5.36, 7.21-7.24

3.5.2. AMPs of civil SSCs

Findings: 10 recommendations, 6 suggestions.

Areas for improvement:

- In some plants, AMPs for civil SCs are not adequately developed (e.g. there were gaps in identification of managed ageing effects, trending, acceptance criteria, corrective actions, documentation) (6/13).
- In some plants, AMPs for civil SCs are not fully implemented. (6/13)
- In some plants, significant gaps were identified for one specific AMP or safety related structures. (4/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.14, 4.50, 4.51; SSG-48: 3.33, 3.35, 3.37-3.39, 5.37-5.63, 7.26

Examples show that:

- The plant does not have adequate AMPs to address all in-scope civil structures.
- The plant has not completed the development and implementation of the ageing management programmes for civil SCs for LTO.
- Planning and implementation of cathodic protection including tests with a mock-up is not adequate.
- The ageing management of the spent fuel pit is not comprehensive.

3.5.3. TLAAs of civil SSCs

Findings: 2 recommendations, 1 suggestion, 1 good practice

Areas for improvement:

- In some plants, identification or revalidation of TLAAs for civil SCs is not complete or systematic. (3/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 3.34, 5.64-5.69, 7.14, 7.18, 7.28

The identified good practice referred to a detailed surveillance programme on soil movements data, and its use in ageing management assessments using IGALL results.

3.5.4. Scope setting results verification for civil SSCs

Findings: 2 suggestions

Areas for improvement:

- In few plants, scope setting of civil SSCs for ageing management and LTO is not comprehensive. (2/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.54; SSG-48: 5.16-5.21

3.5.5. Data collection and record keeping

No issue was identified in this sub-area, however, some individual facts were added into broader issues referred to data management.

IAEA Basis: SSR-2/2 (Rev.1): Req.15, 4.52; SSG-48: 3.13-3.19, 3.23, 5.9-5.13

3.5.6. Documentation of AM and documentation in support of LTO for mechanical SSCs

Findings: 2 suggestions

Areas for improvement:

- In few plants, documentation used for the assessment of the civil SSCs in LTO scope is not adequate. (2/13)

IAEA Basis: SSR-2/2 (Rev.1): Req.16, 4.53; SSG-48: 5.70-5.74, 7.29-7.38

3.6. Human resources, competence and knowledge management for LTO

TABLE IX. SUMMARY OF FINDINGS (AREA F)

	Title	Rec.	Sug.	GP	Total
6.1	Human resources policy and strategy to support LTO	3	5	1	8
6.2	Competence management for LTO and recruitment, training, and qualification processes for personnel involved in LTO activities	-	6		6
6.3	Knowledge management and knowledge transfer for LTO	5	2	-	7
	Total	8	13	1	21

3.6.1. Human resources policy and strategy to support LTO

Findings: 3 recommendations, 5 suggestion, 1 good practice

Areas for improvement:

- In many plants, human resources policy and strategy to support LTO is not adequate or not fully developed. (8/11).

IAEA Basis: GSR Part 2: Req.7, 4.15, Req.8, 4.16, Req.9, 4.21-4.27, Req.10, 4.29; SSR-2/2 (Rev.1): Req.4, 3.10-3.11; GS-G-3.1: 2.31, 2.53, 2.54, 2.23, 2.36, 3.2, 3.11-3.12, 4.1-4.12, 4.29, 4.6, 4.7, 5.11, 5.21, 5.59, 5.60, 6.3, 6.32; NS-G-2.4: 2.3, 2.7, 2.11, 3.1, 3.2(5) (9), 3.4, 3.7, 3.15, 4.5-4.10, 5.10, 6.1, 6.2, 6.11-6.15, 6.29, 6.30; NS-G-2.8: 2.2, 4.1, 4.44, 4.11)

Examples show that:

- Human resources policy and strategy is inadequate for the LTO period.
- The plant's human resources policy and strategy is incomplete for LTO.
- The human resources policy and strategy is not effectively implemented to support all future human resources-related challenges for LTO.
- LTO staffing policy, objectives and associated strategies for human resources are not fully established and implemented.

The good practice is related to implementation of a process for effectivity assessment of safety-related organizational changes.

3.6.2. Competence management for LTO and recruitment, training, and qualification processes for personnel involved in LTO activities

Findings: 6 suggestions

Areas for improvement:

- In some plants, competence management is not adequate or fully implemented (5/11).

IAEA Basis: GSR Part 2: Req.9, 4.21, 4.23, 4.24, Req.10, 4.28, Req.13, 6.1-6.5, 6.7; SSR-2/2 (Rev.1): Req.2, 3.4-3.7, Req.3, 3.8-3.9, Req.4, 3.10-3.11, Req.5, 4.1-4.3, Req.7, 4.21-4.22; GS-G-3.1: 3.4, 4.6-4.9, 4.18, 4.20, 4.21, 6.8, 6.16; GS-G-3.5: 3.30, 4.12, 6.23; NS-G-2.4: 2.14, 2.15, 3.7; NS-G-2.8: 2.2, 2.4, 2.8, 2.12-2.14, 2.18, 3.1, 3.2, 3.31, 4.1, 4.4, 4.10, 4.13, 4.14, 4.15(b), 4.31, 4.45, 5.6, 5.24, 5.9, 5.35, 5.37, 6.5, Appendix I; SSG-50: 2.18-2.19, 2.71

Examples show that:

- The plant has not finalised the process for ensuring plant personnel knowledge and competences related to ageing management activities.
- The plant has insufficient information technology to manage information and records to support the organizational objectives, strategies and needs for LTO with regards to human resources development.
- Process for securing all competences required for safe LTO is incomplete.

3.6.3. Knowledge management and knowledge transfer for LTO

Findings: 5 recommendations, 2 suggestions.

Areas for improvement:

- In many plants, knowledge management or knowledge transfer processes for LTO are not adequate or fully implemented (7/11).

IAEA Basis: GSR Part 2: Req.4, 4.3, Req.8, 4.16-4.17, Req.8, 4.20, Req.9, 4.21-4.27, Req.13, 6.1-6.2; SSR-2/1 (Rev.1):2.17; SSR-2/2 (Rev.1): Req. 3, 3.8, Req.7, 4.21, Req.24, 5.28-5.32, 8.4; GS-G-3.1: 2.4, 2.5, 2.28-2.31, 3.1, 3.11, 3.16, 4.1, 4.2, 4.4, 4.6, 4.7, 4.20, 5.6, 5.14; NS-G-2.3: 11.6; NS-G-2.4: 3.2, 3.3, 3.18; NS-G-2.6: 2.16, 3.6, 3.10-3.12, 6.1, 9.45, 10.45; NS-G-2.8: 4.48, 5.35-5.37; SSG-25: 5.7, 5.103-110, 8.13, 9.5; SSG-48: 2.21, 2.26, 2.29, 2.31, 2.7, 3.3-3.5, 3.10, 3.13-3.14, 3.16-3.18, 3.20, 3.30, 4.1-4.2, 4.8-4.10, 4.13-4.14, 5.8, 6.1-6.3, 7.16, 7.18

Examples show that:

- Knowledge management is not fully effective to support LTO.
- The plant does not have an integrated and systematic programme for managing critical knowledge for LTO.
- Knowledge management implementation is incomplete to support LTO.

3.7. SALTO and OSART LTO area follow-up

SALTO follow-up missions are an integral part of the peer review service and take place approximately 2 years after the main missions. In the period July 2018 to June 2022 there were 8 SALTO follow-up missions to review the implementation of previous SALTO results. Issues from 2 OSART LTO area were reviewed during the OSART follow-up mission in this period.

TABLE X. SALTO FOLLOW-UP MISSIONS

SALTO Mission No.	Plant	Country	Year
31F	Qinshan	China	2019
30F	Doel	Belgium	2019
33F	Ringhals	Sweden	2020
39F	Armenian	Armenia	2021
42F	Forsmark	Sweden	2021
38F	Atucha	Argentina	2021
35F	Angra	Brazil	2022
41F	Laguna Verde	Mexico	2022-

TABLE XI. OSART FOLLOW-UP MISSIONS WITH LTO AREA

OSART Mission No.	Plant	Country	Year
197	Bugey	France	2019
193	Olkiluoto	Finland	2019

The following are the results of the follow-up missions regarding the resolution of the findings (totally 132 issues):

TABLE XII. RESOLUTION OF ISSUES

Status of issues	Issues	%
Resolved	42	31.8
Satisfactory progress	77	58.3
Insufficient progress	13	9.8

The results of the follow-up missions demonstrate the effectiveness of the SALTO programme and in particular the commitment of NPP personnel to implement improvements identified by SALTO teams. The IAEA Operational Safety Section also offers supporting activities (i.e. workshops, supports missions) after the individual missions.

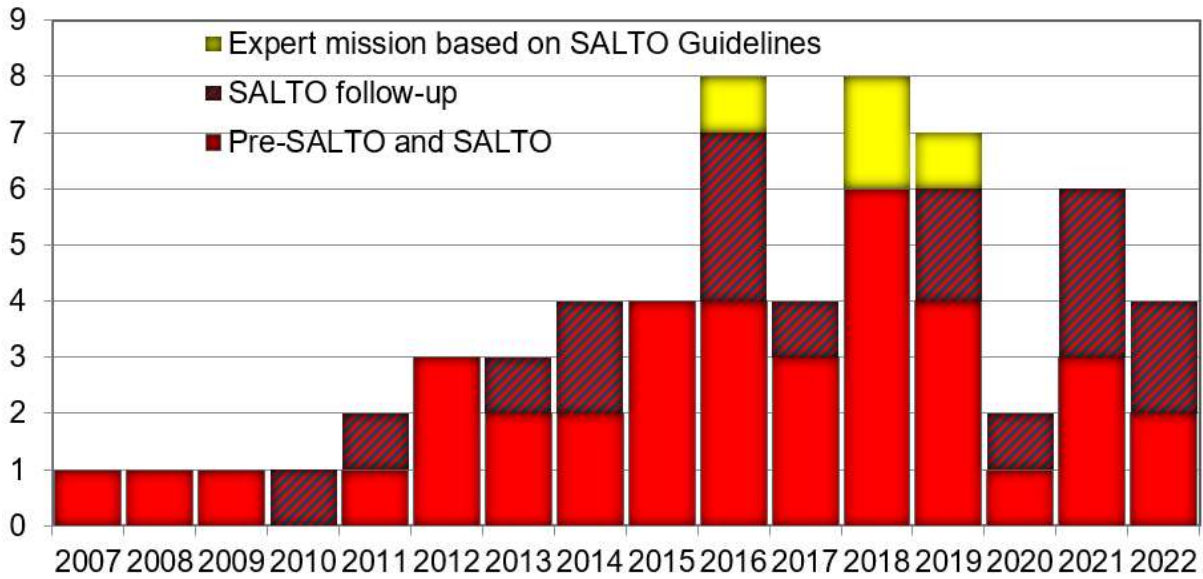
4. ASSESSMENT OF OVERALL SALTO MISSIONS TRENDS

4.1 Number of missions

Figure I show the evolution of implemented SALTO missions, SALTO follow-up missions and expert missions from 2007 to 2022. Before Covid-19³ there was a clear growing need for missions from the Member States, and the following period indicates the persisting high demand after the in-person meetings became possible again.

³ During 2020 and most of 2021 the travels were restricted due to the Covid-19 and missions could not be implemented except one follow up mission in the second half of 2020.

FIGURE I. NUMBER OF MISSIONS BETWEEN 2007 AND 2022



Within the periods examined in the SALTO Highlights analysis the following number of missions were implemented:

TABLE XIII. OVERVIEW OF NUMBER OF MISSIONS PER HIGHLIGHTS PERIODS

Period	SALTO	SALTO FU	OSART	OSART FU
July 2018 – June 2022	13	8	1	2
July 2015 – June 2018	14	4	9	1
July 2007 – June 2015	13	5	1	2

4.2 Comparison of mission results with ‘SALTO Missions Highlights 2005-2015’

Table XIV (same as TABLE III) shows the number of findings (issues and good practices) identified during the eleven SALTO missions, two expert missions and one OSART mission between July 2018 and June 2022.

TABLE XIV. FINDINGS OVERVIEW (missions during July 2018-June 2022)

	Area A	Area B	Area C	Area D	Area E	Area F	Total
Recommendations	19	14	13	14	14	8	82
Suggestions	16	15	19	20	13	13	96
Good Practices					1	1	2
Missions	11+1+1	11+2+1	11+2+1	11+1+1	11+1+1	11	-

Table XV shows the number of findings identified during the 14 SALTO and 9 OSART missions between July 2015 and June 2018.

TABLE XV. FINDINGS OVERVIEW (missions during July 2015-June 2018)

	Area A	Area B	Area C	Area D	Area E	Area F	Total
Recommendations	16	31	20	24	22	17	130
Suggestions	26	17	17	16	7	8	91
Good Practices	2	5	3	3	1	2	16
Missions	14+9	14+9	14+9	14+9	14+9	12	-

Table XVI shows the number of findings identified during the 13 SALTO and 2 OSART missions between July 2007 and June 2015.

TABLE XVI. FINDINGS OVERVIEW (missions during July 2007- June 2015)

	Area A	Area B	Area C	Area D	Area E	Area F	Total
Recommendations	16	25	25	18	21	4	120
Suggestions	22	13	28	11	11	4	88
Good Practices	1	1	6	6	0	3	17
Missions	13+2	13+2	13+2	13+2	13+2	5	-

Table XVII shows the average number of issues per mission per area. The number of issues decreased from the period 2005-2015 to the period 2015-2018 except for Area F. In the period 2018 to 2022 the average number of issues increased in all the areas with the exception of B and F. This increase could be attributable to several reasons:

- There is better reference and clearer guidance in IAEA Standards, as new standards on ageing management and LTO were published in the period (SSG-48 and SSG-69) and the plants became more knowledgeable of them (this latter may be a result of the IAEA activities in this area via workshops and support missions).
- The review Periodic Safety Review in Area A was extended, and this deeper review resulted in additional issues.
- The reviewers are more experienced and consequently the review in some areas is deeper and goes into more technical details resulting in more specific technical issues in higher number. Figure III shows the average experience of the experts in the period 2015-2018 compared with the period 2018-2022. The average number of previous missions per expert raise from 2.3 to 3.1. The numbers mean the missions performed by the reviewers before the given mission and so this characterizes average review experience of the teams during the given mission. This can mean that the reviewers have more routine in identifying and developing issues. At the same time taking into account that the quality of the reviews has

a correlation with the reviewers' experience, the conclusion can be that the IAEA activities in developing and broadening the expert basis of SALTO missions are successful.

TABLE XVII. FINDINGS OVERVIEW Number of issues per mission per area

	2005-2015	2015-2018	2018-2022
Area A	2.53	1.83	2.69
Area B	2.53	2.09	2.07
Area C	3.53	1.61	2.29
Area D	1.93	1.74	2.62
Area E	2.13	1.26	2.08
Area F	1.60	2.08	1.91

FIGURE II. FINDINGS OVERVIEW Number of issues per mission per area

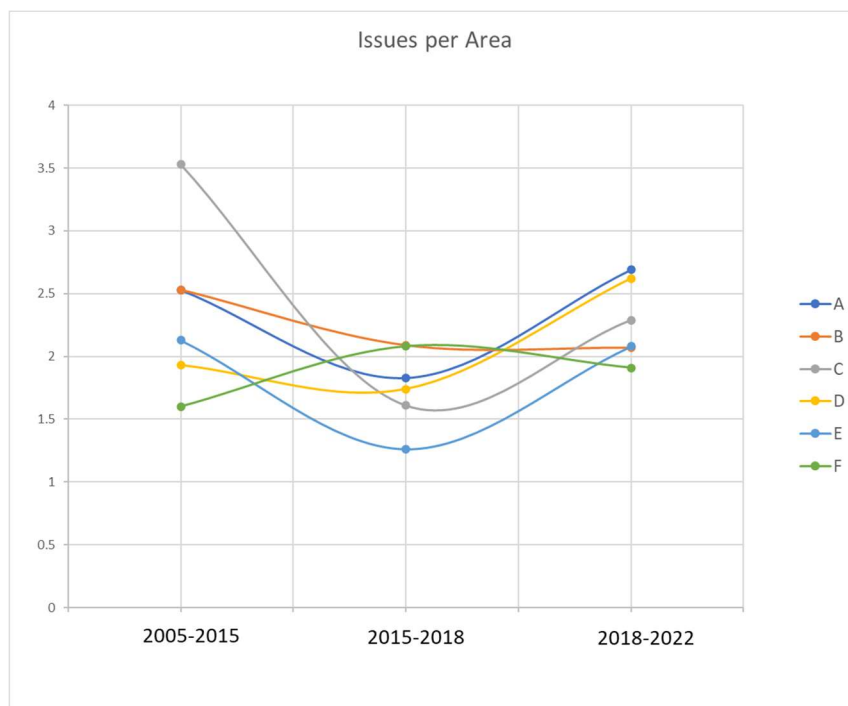
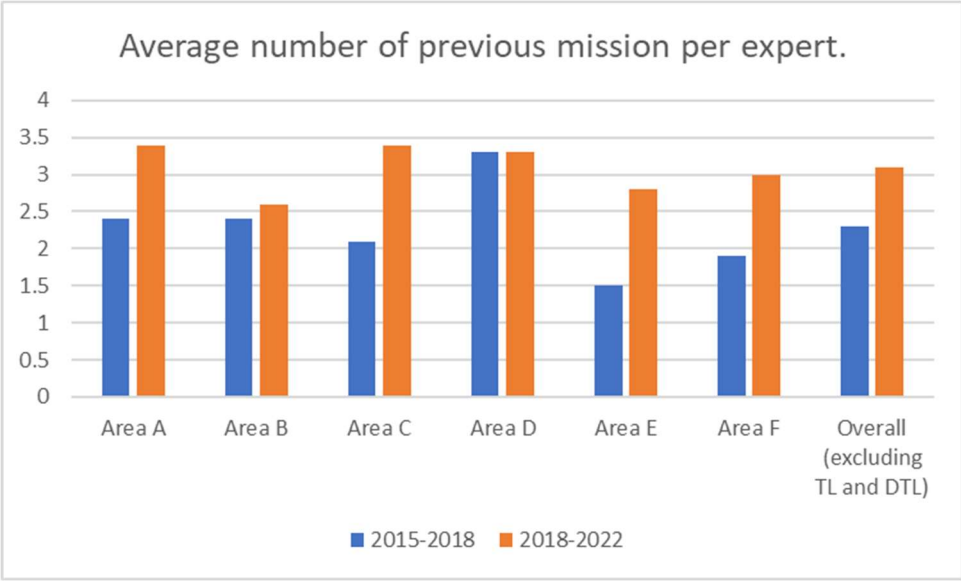


FIGURE III. REVIEWER’S EXPERIENCE



Number of good practices per mission has decreased (0.17 good practices per mission in 2018-2022 vs. 0.70 good practices per mission in 2015-2018 vs. 1.13 good practices per mission in 2005-2015).

It should be noted that since the criteria of good practices is very strict, in addition to good solutions, cost-effectiveness and tangible results from the application, it also has to be novel. This means that a good practice can be identified only once and so it is natural that the opportunities to identify a good practice is decreasing by the number of implemented missions. In order to develop balanced reports, the review teams recognize a number of good performances that can be similar to good practices identified during former missions. As the SALTO peer review service is more mature, the cumulative experience of the reviewer and the database of good practices are broader, and it is then more difficult to find a practice considered novel. On the other hand, looking at the very strong decreasing trend of good practices, a conclusion can be that the review teams need to make more efforts to identify good practices during the review.

4.3 Comparison follow-up mission results with ‘SALTO Missions Highlights 2005-2015 and 2015-2018

Table XIX shows the results of the follow-up missions regarding the resolution of the findings (total 132 issues) after the 8 SALTO follow-up missions and 2 OSART follow-up missions in this period compared with the periods 2007-2015 and 2015-2018.

TABLE XIX. RESOLUTION OF ISSUES

Status of issues	2007-2015		2015-2018		2018-2022		Historical average
	Issues	%	Issues	%	Issues	%	%
Resolved	37	48.1	16	32	42	31.8	36.8
Satisfactory progress	35	45.5	27	54	77	58.3	53.9
Insufficient progress	4	5.2	7	14	13	9.8	9.3

Share of ‘resolved’ issues has decreased from 48% in 2007-2015 to 32% in 2015-2018 and become stable for the period 2018-2022. The share of ‘insufficient progress’ issues has increased from 5% in 2007-2015 to 14% in 2015-2018 and decreased to 9.8 % in 2018-2022. The rate of ‘satisfactory progress’ raised from 45.5% to 54 then to 58.3 %. The percentage of ‘insufficient progress’ in the latest period was in many cases explained by delays in implementation of LTO programmes in several NPPs, due to COVID restrictions, and in some other cases due to political decisions on LTO and/or reorganization in utilities. However, the rate of ‘insufficient progress’ status decreased in the last period which means that the plants made stronger efforts in resolution of SALTO mission findings and at least partly it can be attributable to the targeted supporting activities of the IAEA performed after many SALTO missions. This is regarded as positive feedback on these activities.

4.4 Classification considering cross-cutting issues over areas

Table XX shows the results of classification by broader categories of all 178 issues raised during the review period of July 2018 to June 2022 (SALTO and LTO areas of OSART). The analysis was performed by utilizing results of SALMIR (SALTO Mission Results database).

TABLE XX. FINDINGS OVERVIEW (classified by broader categories)

Categories	Original Area in SALMIR	issues	%
1 Ageing management programmes	[3.2, 4.2, 5.2]	32	18.0
2 Design and safety analysis	[1.4, 1.6, 1.7]	21	11.8
3 Human resources and knowledge/ competence management	[6.1-6.3]	21	11.8
4. Ageing management review	[3.1, 4.1, 5.1]	20	11.2
5. Scope setting	[2.1,3.4, 4.5, 5.4]	19	10.7

6. Overall management	[1.1, 1.2, 1.3, 1.5]	14	7.9
7. EQ	[4.3]	13	7.3
8. Plant Programmes	[2.2-2.6]	13	7.3
9. Time limited ageing analysis	[3.3, 5.3]	10	5.6
10. Obsolescence	[4.4]	10	5.6

Table XX shows following trends:

- The category that contributes with the largest number of issues is related to AMPs with 18% of the total number.
- The number of issues belonging to categories 2-5 is roughly similar (11-12%).
- Issues on SALTO missions core topics (scope setting, AMR, AMP, TLAA and EQ) account for approximately 53% of all issues.
- Other than the core topics, the most important categories are Human Resources, and Design and Safety analysis.

5. CONCLUSIONS

The SALTO peer review service was launched in 2005. The first mission which can be considered full-scope Pre-SALTO/ SALTO mission was conducted in 2007. Since then, the IAEA has significantly improved the methodology and efficiency of the SALTO peer review service, trained a large pool of SALTO reviewers and performed many SALTO and other ageing management and LTO oriented workshops and support missions. The IAEA Safety Standards have been also significantly improved.

The increased number of issues per mission per area over the last four years it related to better trained and more experienced reviewers, enlarged scope of SALTO missions, and more detailed guidance on IAEA Safety Standards.

The number of issues with “insufficient progress to date” decreased compared with the previous period, and despite the delays and restriction of resources due to the COVID pandemic, the sum of issues “resolved” or with “satisfactory progress” increased and covers about 90% of the issues. This demonstrates that the plants take effective actions to deal with the findings of the missions and take advantage of IAEA support prior to and between the missions through workshops, support missions and participation of plant experts as observers and reviewers in SALTO missions and in the IGALL (International Generic Ageing Lessons Learned) Programme.

The decreasing number of good practices per mission and increasing number of good performances (not shown in this report) also demonstrates improved information exchange and sharing of experience which is strongly supported by the IAEA. The IGALL Programme, launched in 2010, plays a key role in this regard. On the other hand, the review teams need to extend the attempts to identify good practices and share it on the international level.

There are some areas with a very high frequency of identified issues as AMPs, knowledge management and equipment qualification, are examples of topics where the IAEA support may

be increased. The plants' attention during the preparation for SALTO missions and the opportunities for supporting activities can be drawn to these areas that can lead to a decrease of problems identified in these areas.

The experts participating in SALTO mission are more experienced, the average number of previous missions per expert raise from 2.3 to 3.1. The pool of expert has been expanded to incorporate more experts to the review teams. The number of experienced experts increased on the period 2018-2022 compared to 2015-2018 in all the areas with exception of Area D.