42nd Meeting of the Waste Safety Standards Committee

28 November – 1 December 2016

Agenda item W 3.2
DS485 Ageing Management and Development of a Programme for LTO for NPPs

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Safety Guide NS-G-2.12 (DS485)

NS-G-2.12
Safety Guide
“Ageing Management for Nuclear Power Plants”
Current revision (DS485)
Background

• The previous guide published in 2009

• Related safety standards were revised since then (SSR 2/1, SSR2/2, SSG-25)
  – SSR2/2, Requirement 16 on “Programme for Long Term Operation” is not supported by any Safety Guide

• New supporting SRS 82 IGALL published
  – 120 participants from 25 MS - proven practices in Long Term Operation (LTO) preparation from Member States need to be addressed
Objectives of NS-G-2.12 revision

- As defined in DPP, to fulfill task arising from "Long term structure of the IAEA Safety Standards" – a new safety guide "…will also address the issues related to long term operation …"

- Provide comprehensive guidance on recommended ways of fulfillment of SSR-2/2
  - Requirement 14: Ageing management, and
  - Requirement 16: Programme for long term operation

- Assure consistency of terminology with SSR-2/2 and a new IGALL Safety Report
Objectives of NS-G-2.12 revision

• Provide definitions and comprehensive guidance for physical ageing and technological obsolescence.

• Update outdated sections and incorporate a current state-of-the-art industry practices
### Status of Safety Guideline Revision

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tr>
<td>Approval of DPP by WASSC and NUSSC</td>
<td>July 2014</td>
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<tr>
<td>Approval of DPP by CSS</td>
<td>October 2014</td>
</tr>
<tr>
<td>Preparation of Draft</td>
<td>February 2015</td>
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<tr>
<td>NUSSC/WASSC draft approval for submission to MS for comments</td>
<td>July 2015</td>
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<tr>
<td>Approval by NUSSC/WASSC for submission to CSS</td>
<td>November 2016</td>
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<tr>
<td>Endorsement by CSS</td>
<td>March 2017</td>
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<td>Target publication date</td>
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The following 6 NUSSC members have responded to the draft:

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<th>Member State</th>
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Comments Received - statistic

Vast majority of the comments were fully implemented and helped to improve the guide – thank you!

Reasons of rejections of comments were communicated with MS and can be summarized as follows:

• Changes in titles of SG and sections of SG not consistent with SSR 2/2
• Adding recommendations which are already present in other parts of the guide
• Adding national references
• Formatting changes
Requested Action

Approval by NUSSC for submission to CSS
Thank you!
Back up
Rejected comments – France

- 33 out of 39 comments fully incorporated;

- Changes in titles of SG and sections not consistent with titles approved by NUSSC and WASSC after MS comments and not consistent with SSR 2/2 (4);

- Deletion of recommendations on design basis which are essential for TLAA revalidation and for appropriate evaluation of safety improvements for LTO and are not covered by any other Safety Guide (1);

- Formatting change (1).
Rejected comments - USA

- 28 out of 32 comments fully incorporated;
- Use of NUREG documents as references (1);
- Adding LTO aspects into section 5 on AM (1);
- Adding new paras in section 7 which are already part of this section (2).
Rejected comments – France

Changes in titles of SG and sections:

1) Title - Ageing Management, including for the Development of a Programme for Long Term Operation of Nuclear Power Plants

2) Section 7 - AGEING MANAGEMENT WITHIN A PROGRAMME FOR LONG TERM OPERATION

3) Subsection in section 7 - DEVELOPMENT OF AN AGEING MANAGEMENT PROGRAMME FOR LONG TERM OPERATION

4) Subsection in section 7 - REVIEW OF PLANT PROGRAMMES FOR AGEING MANAGEMENT PROGRAMMES FOR LONG TERM OPERATION
SSR-2/2 Requirement 14: Ageing management

The operating organization shall ensure that an effective ageing management programme is implemented to ensure that required safety functions of systems, structures and components are fulfilled over the entire operating lifetime of the plant.

- 4.50. The ageing management programme shall determine the consequences of ageing and the activities necessary to maintain the operability and reliability of structures, systems and components. The ageing management programme shall be coordinated with, and be consistent with, other relevant programmes, including the programme for periodic safety review. A systematic approach shall be taken to provide for the development, implementation and continuous improvement of ageing management programmes.

- 4.51. Long term effects arising from operational and environmental conditions (i.e. temperature conditions, radiation conditions, corrosion effects or other degradations in the plant that may affect the long term reliability of plant equipment or structures) shall be evaluated and assessed as part of the ageing management programme. Account shall be taken in the programme of the safety relevance of structures, systems and components.
SSR-2/2 Requirement 16: Programme for long term operation

4.54. The comprehensive programme for long term operation shall address:
(a) Preconditions (including the current licensing basis, safety upgrading and verification, and operational programmes);
(b) Setting the scope for all structures, systems and components important to safety;
(c) Categorization of structures, systems and components with regard to degradation and ageing processes;
(d) Revalidation of safety analyses made on the basis of time limited assumptions;
(e) Review of ageing management programmes in accordance with national regulations;
(f) The implementation programme for long term operation.
Chapter 3.1 Long term operation should be justified by safety assessment, with consideration given to the life limiting processes and features of SSCs important to safety [*].

Chapter 3.2 PSR is considered an effective way to obtain an overall view of actual plant safety, and to determine reasonable and practicable modifications that should be made in order to ensure that a high level of safety is maintained during continued operation. PSR can also be used to identify life limiting features of the plant in order to determine if there is a need to modify, refurbish or replace certain SSCs for the purpose of extending the operating lifetime of the nuclear power plant.

* SSR 2/2, NS-G-2.12
Chapter 3.3 The intent of this Safety Guide is not to provide recommendations for the activities performed during long term operation of a nuclear power plant. However, a PSR and its findings can be used to support the decision making process for LTO or licence renewal.

Chapter 3.5 Where the PSR is to be used to support the decision making process prior to entering long term operation (see Ref. [*]), any necessary safety improvements to ensure that the licensing basis remains valid during the period of long term operation should be specifically identified. Such improvements might include refurbishment, the provision of additional SSCs and/or additional safety analysis and engineering justifications.

* SRS No. 57
• Chapter 3.6 In addition, the scope of the review of the safety factors should be adapted to determine the feasibility of LTO. For example, the scope of the safety factor relating to ageing should be expanded to include an evaluation of the TLAAs and assessments of ageing effects. In the review, increased importance should be given to ageing mechanisms and ageing management programmes.

• Chapter 3.7 If the PSR is to be used to justify LTO or licence renewal, the entire planned period of LTO should be considered, and not just the ten years until the next PSR. Furthermore, if long term operation or licence renewal is approved, PSR should continue to be performed in a ten year cycle or at a frequency as required by the national regulatory body.
Chapter 3.8 Where the PSR is to be used in decision making for long term operation or licence renewal, the review should pay particular attention to the following plant programmes and documentation, as these are of significant importance for continued safe operation:

- Plant programmes to support the safety factors relating to plant design, the actual condition of SSCs important to safety, equipment qualification and ageing;
- A management system that addresses quality management and configuration management;
- Safety analyses involving time limiting assumptions relating to the proposed lifetime;
- Programmes for promoting safety culture focused on the pursuit of excellence in all aspects of safety management and human factors.
Safety Guide on PSR SSG-25

• Chapter 3.9. The programmes and documentation listed in para. 3.7 should be properly documented in an updated final safety analysis report for long term operation and/or in other licensing basis documents, and a clear and adequate description should be provided of the current licensing documents or the current design basis requirements for operation of the nuclear power plant.

• Chapter 3.10. The safety improvements identified in the PSR should be used as inputs to the decision as to whether to approve long term operation.
1. INTRODUCTION

• Para 1.12. This Safety Guide focuses mainly on managing the physical ageing of SSCs within the scope of ageing management (‘in-scope SSCs’). It also provides recommendations on safety aspects of managing technological obsolescence and recommendations on the programme for safe long term operation of nuclear power plants for its ageing management related activities.

• Para 1.13. Other aspects relating to safe long term operation, such as obsolescence of knowledge (knowledge management and human resources) and compliance with current codes, standards and regulations, as well as plant design, the environmental impact of long term operation, economic assessment and long term investment strategies, are outside of the scope of this Safety Guide. They are addressed in other IAEA safety standards, e.g. Refs [1, 7, 8].

• Ref. 7 – SSG-25
2. BASIC CONCEPTS

• Para 2.29. Conceptual aspects of obsolescence, such as obsolescence of knowledge and compliance with current regulations, codes and standards, are addressed in Requirements 5 and 12 of SSR-2/2 (Rev. 1) [2], which deal with safety policy and periodic safety review and safety factors 2 and 8 of SSG-25 [7], which deal with actual conditions of SSCs important to safety and safety performance. Recommendations on these aspects are not provided in this Safety Guide.

• Para 2.30. ... Long term operation should be justified by safety assessment and, depending on the State, this justification may take place within a broader regulatory process such as licence renewal or a periodic safety review [7]. …
7. PROGRAMME FOR LONG TERM OPERATION

• Para 7.2. Requirements for long term operation should be specified within the national regulatory framework. They should cover, as appropriate, interfaces with the requirements for periodic safety review [7].

• Para 7.15. The approach to an assessment for long term operation should also account for the licensing processes and other license related requirements, such as the performance of a periodic safety review [7]. This is to ensure that any safety improvements required for long term operation will be addressed as part of LTO preparation.

• Para 7.40. ... The justification should include trends of expected ageing effects during the period of long term operation based on past studies, such as studies undertaken in past periodic safety reviews, and, when appropriate, the plant modifications to be implemented to improve safety.