40th Nuclear Safety Standards Committee
1 - 3 December 2015

Agenda item 1.10(a)

Results of the review of SSG-25 to reflect the Vienna Declaration on Nuclear Safety

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Outline

• Vienna Declaration on Nuclear Safety

• Principle 2 (existing installations)
  • Applicable Safety Requirements
  • Safety Guide SSG-25 on PSR

• Guidance evolution
  • Implications from the Fukushima Daiichi NPP accident

• Conclusion
Vienna Declaration (1)  
The Contracting Parties to the CNS  

have adopted the following **principles** to guide them, as appropriate, in the implementation of the **objective** of the CNS to **prevent accidents with radiological consequences and mitigate such consequences** should they occur:

1. **New** NPPs are to be designed, sited, and constructed, consistent with the objective of **preventing** accidents in the commissioning and operation and, should an accident occur, **mitigating** possible releases of radionuclides causing long-term off site contamination and avoiding early radioactive releases or radioactive releases large enough to require long-term protective measures and actions

*[Applicable IAEA Safety Requirements (BoG): SSR-2/1]*
2. Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner

[Applicable IAEA Safety Requirements (BoG): SSR-2/2, R9, R12 / GSR Part 1 (para. 4.39a)]
3. **National requirements and regulations** for addressing this **objective** throughout the lifetime of NPPs are to take into account the relevant IAEA Safety Standards and, as appropriate, **other good practices** as identified inter alia in the Review Meetings of the CNS.
The Contracting Parties to the CNS request the IAEA Director General

a. transmit this Declaration to the IAEA Commission on Safety Standards for its consideration with the four safety standards committees under its aegis, of the technical elements contained therein with a view to incorporating them as appropriate into the relevant IAEA Safety Standards; and

b. (…) [publish]
Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime

- to identify safety improvements that are oriented to meet the above objective
- Reasonably practicable or achievable safety improvements are to be implemented in a timely manner
Req. 9: Monitoring and review of safety performance

The Operating Organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization. (with paragraphs 4.33-4.37)

Requirement 12: Periodic safety review

Systematic safety assessments of the plant, in accordance with the regulatory requirements, shall be performed by the Operating Organization throughout the plant’s operating lifetime, with due account taken of operating experience and significant new safety related information from all relevant sources. (with paragraphs 4.44 to 4.47)
SCOPES.

(…)

1.8. **Stages** in the lifetime of a facility or activity where a **safety assessment** is carried out, **updated** and used by the designers, the Operating Organization and the regulatory body **include**:

(a) ...

(h) Periodic safety reviews;

(i)…
Requirement 4: Purpose of the safety assessment

The primary purposes of the safety assessment shall be to determine whether an adequate level of safety has been achieved for a facility or activity and whether the basic safety objectives and safety criteria established by the designer, the operating organization and the regulatory body, in compliance with the requirements for protection and safety as established in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources [4], have been fulfilled (parags. 4.3 to 4.15)

4.8. The frequency at which the Safety Assessment shall be updated is related to the radiation risks associated with the facility or activity, and the extent to which changes are made to the facility or activity. As a minimum, the Safety Assessment shall be updated in the periodic safety review carried out at predefined intervals in accordance with regulatory requirements. Continuation of operation of such facilities or conduct of such activities is subject to being able to demonstrate in the reassessment, to the satisfaction of the operating organization and the regulatory body, that the safety measures in place remain adequate.
Requirement 8: Assessment of site characteristics
4.23. (...) The site assessment shall be reviewed periodically over the lifetime of the facility or activity …

Requirement 24: Maintenance of the safety assessment
The Safety Assessment shall be periodically reviewed and updated. (With paragraphs 5.1 to 5.10)

5.10. The Safety Assessment shall be periodically reviewed and updated at predefined intervals in accordance with regulatory requirements. Periodic review may need to be carried out more frequently to take into account:
(a) Any changes that may significantly affect the safety of the facility or activity;
(b) Significant developments in knowledge and understanding (such as developments arising from research or operating experience);
(c) Emerging safety issues due to a regulatory concern or a significant incident;
(d) Safety significant modifications to the computer codes, or changes in the input data used in the safety analysis.
SSG-25 supports

- “Fundamental Safety Principles”, 2006 and the
- Safety Requirements on “Safety of NPPs: Commissioning and Operation”, 2011 (SSR-2/2)
- and “Safety Assessment for Facilities and Activities, 2009” (GSR Part 4).

SSR-2/2: R9, R12
GSR Part 4: Scope, R4, R8, R24]
PSR include an assessment of plant design and operation against applicable current safety standards and operating practices, and has the objective of ensuring a high level of safety throughout the plant’s operating lifetime.

Complementary to the routine and special safety reviews conducted at NPPs and does not replace them.
Objective of PSR

**Objective of PSR** is to determine with a comprehensive assessment:

- Adequacy and effectiveness of the *arrangements* and the *SSCs* (equipment) to ensure plant safety until the next PSR or until the end of planned operation (EOL <10y);
- The extent to which the plant conforms to current national and/or international *safety standards* and *operating practices*;
- *Safety improvements* and timescales for their implementation;
- The extent to which the safety *documentation*, including the licensing basis, remains valid.

A PSR can be used for various purposes:

- Systematic safety assessment carried out at regular intervals (SSR-2/2);
- In support of the decision making process for *licence renewal*;
- In support of the decision making process for long term operation.
Scope of PSR (SSG-25)

• PSR is a comprehensive safety review of all important aspects of safety, carried out at regular intervals, typically every ten years.

• May be used in support of decision making process for licence renewal or long term operation, or for restart of a NPP following a prolonged shutdown.

• SSG-25 review process is valid for NPPs of any age and may have a wider applicability (graded approach).

• PSR is an important input for decommissioning but not an appropriate means for identifying safety issues in that phase.
1. INTRODUCTION

2. RATIONALE, OBJECTIVE AND GENERAL RECOMMENDATIONS FOR PSR

3. INPUT FROM THE PSR IN ASSESSING LONG TERM OPERATION OR LICENCE RENEWAL

4. REVIEW OF STRATEGY AND GENERAL METHODOLOGY

5. SAFETY FACTORS IN A PSR

6. GLOBAL ASSESSMENT

7. ROLES AND RESPONSIBILITIES
8. THE REVIEW PROCESS
• Introduction
• Activities of the operating organization
• Activities of the regulatory body

9. POST-REVIEW ACTIVITIES

Appendix I: INTERFACES BETWEEN SAFETY FACTORS

Appendix II: DOCUMENTATION OF THE PSR

Annex: TYPICAL INPUTS, OUTPUTS AND RELEVANT PUBLICATIONS FOR THE REVIEW OF SAFETY FACTORS
Safety factors recommended in SSG-25

Safety factors relating to the plant
(1) Plant design;
(2) Actual condition of SSCs important to safety;
(3) Equipment qualification;
(4) Ageing.

Safety factors relating to safety analysis
(5) Deterministic safety analysis;
(6) Probabilistic safety assessment;
(7) Hazard analysis.

Safety factors relating to performance and feedback of experience
(8) Safety performance;
(9) Use of experience from other plants and research findings.

Safety factors relating to management
(10) Organization, the management system and safety culture;
(11) Procedures;
(12) Human factors;
(13) Emergency planning.

Safety factors relating to the environment
(14) Radiological impact on the environment.

(Objective / Scope and Tasks / Methodology)
(Annex) Ex. Safety Factor 4: Ageing

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
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<tbody>
<tr>
<td><strong>Standards and requirements:</strong></td>
<td>The review of ageing may lead to findings in some of the following areas:</td>
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<tr>
<td>• Current national and international ageing management standards;</td>
<td>• The rapidity of the ageing process;</td>
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<td>• Relevant guidance on the management of plant ageing and record keeping.</td>
<td>• Plant design review.</td>
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<tr>
<td><strong>Plant specific documents:</strong></td>
<td>Examples of outputs are:</td>
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<tr>
<td>• Manuals on ageing management used by the operating organization;</td>
<td>• Proposals for replacement of particular SSCs important to safety;</td>
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<tr>
<td>• Documentation on the method and criteria for identifying SSCs important to safety covered by the ageing management programme;</td>
<td>• Improvements to the maintenance programme;</td>
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<tr>
<td>• The list of SSCs important to safety covered by the ageing management programme and records that provide information in support of the management of ageing; (…)</td>
<td>• Improvements to the ageing management programme.</td>
</tr>
</tbody>
</table>

Results from the review of this safety factor may provide inputs for other safety factors (see Appendix I).
(Annex) Ex. Safety Factor 4: Ageing

RELEVANT IAEA PUBLICATIONS [10]


- (etc)
The phases may overlap or be further subdivided:

• **Preparation** of the PSR project (it include an agreement with the regulatory body)

• **Conduct** of the PSR to identify findings (strengths or deviations) and should lead to proposals for safety improvements

• **Regulatory review** of the PSR to determine whether the licensing basis for the NPP remains valid.

• Finalization of the **integrated implementation** plan

The phase following PSR in which the safety improvements are implemented is not considered part of PSR and so is not addressed in detail in SSG-25

**Item 2 of VD:** Comprehensive and systematic safety assessments are to be carried out periodically and regularly for existing installations throughout their lifetime in order to identify safety improvements that are oriented to meet the above objective. Reasonably practicable or achievable safety improvements are to be implemented in a timely manner
Requirement 4: Purpose of the safety assessment
The primary purposes of the safety assessment shall be to determine whether an adequate level of safety has been achieved for a facility or activity and whether the basic safety objectives and safety criteria established by the designer, the operating organization and the regulatory body, in compliance with the requirements for protection and safety as established in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources: Radiation Protection and Safety of Radiation Sources, IAEA Safety Standards Series No. GSR Part 3, have been fulfilled (parags. 4.3 to 4.15)

No relevant changes incorporated in the paragraphs
Implications from Fukushima Daiichi NPP accident

Implementation of national regulations adopted after the accident and corresponding lessons learned have been taken into account in the Revision 1 of the IAEA Safety Requirements.

Specific aspects addressed include:

- Independence and effectiveness of the levels of DiD
- Consideration of Design Extension Conditions
- Design robustness against extreme external hazards
- Practical elimination of sequences leading to early or large radioactive releases
- Emergency power supply
- Reliability of the heat transfer to the UHS
Implications from the revision of SSR-2/2 and GSR Part 4 (Rev. 1 for both)

SSR-2/2 Rev. 1
Req. 9: Monitoring and review of safety performance
Req. 12: Periodic safety review
No relevant changes incorporated

GSR Part 4 Rev. 1
SCOPE, para. 1.8.
Req. 8: Assessment of site characteristics (para. 4.23.)
Req. 24: Maintenance of the safety assessment
No other relevant changes incorporated

[Req. 4: Purpose of the safety assessment, Ref. to GSR Part 3 ]
Conclusion

- Guidance on PSR provided by SSG-25 covers the relevant part of Principle 2 of Vienna Declaration

- SSG-25 (2013) takes into account the applicable IAEA Safety Requirements established in SSR-2/2 (2011) and GSR Part 4 (2009)
  - Rev. 1 of both SSR-2/2 and GSR Part 4 doesn’t incorporate relevant changes in Safety Requirements related to PSR
  - PSR performed according to SSG-25 has to take into account guidance evolution of the interfaces identified
Thank you for your attention