Nuclear Safety Standards Committee

37th Meeting, 1 – 4 July 2014

Agenda item 3.4

DS487 DPP Draft Safety Guide: Design of Fuel Handling and Storage Systems for NPPs (revision of NS-G-1.4)

Ki Seob SIM, SAS/NSNI
Outline

• Background

• Purpose of the Revision

• Fukushima Implementations

• Comments and Disposition
Background

• Provides recommendations on how to meet the safety requirements, established in SSR-2/1, for the design of fuel handling and storage systems in NPP.

• Obsolete SG; produced in 2003 in accordance with NS-R-1 (superseded by SSR-2/1 in 2012).

• Currently, SSR-2/1 is under review for revision to reflect lessons learned from the Fukushima-Daiichi accident (project DS462).
Purpose of the Revision

• To maintain consistency with the upstream, safety requirements document SSR-2/1, and other relevant requirements (e.g., GRS Part 4, SSR-2/2) and Guides;

• To reflect lessons learned from the Fukushima-Daiichi accident.
Fukushima Implementations

• Taking into consideration revisions to DS462 (GSR Part 4, SSR-2/1, SSR-2/2), DS407 (SSG-27) and DS483 (NS-G-2.15);

• Feedback from International Experts’ Meeting (IEM) on Reactor and Spent Fuel Safety in the Light of the Accident at the Fukushima Daiichi Nuclear Power Plant, March 2012.
Scope of the Safety Guide

- Un-irradiated and irradiated fuel handling and storage systems in the NPP;
- Limited considerations for the handling and storage of certain core components (e.g., reactivity control devices);
- Physical protection associated with the safeguarding of nuclear material, for information.
Comments from NUSSC

- A total of 28 comments received:
  - Argentina (1); Finland (2); France (14); Germany (6); USA (5)
- Most comments were for clarification:
  - Clarification and technical editing (25); General (3).
- These comments were helpful in understanding MS’ expectations.
  - Most comments are accepted, except few comments for which the rationales are provided.
- Approved from NSGC on June 19;
- Approved from WASSC on June 25.
Argentina #1 (a) General Comment:
• Technical topics outside the scope (listed in section 4) are not minor and they should not just be mentioned, they also need updated guidance. The Secretariat should verify that they are effectively considered by other safety Guides; if it is not the case, new complementary or reviewed/revised at least Safety Guides should be produced for dealing with.

Disposition:
• The comment is accepted as follows:
  1) In-core fuel management and associated reactor physics considerations (refer to Safety Guide NS-G-2.4)
  2) The design of fuel handling system components that are irrelevant to fuel design;
  3) The design of transport casks (refer to Safety Guide SSG-15);
  4) Fuel storage over the long term, exceeding the design lifetime of the NPP;
  5) Loading of damaged fuel into transport casks with fuel exposed to coolant;
  6) Design of storage facilities for spent fuel, which are not an integral part of an operating NPP, although such facilities may be located on the same site (refer to Safety Guide SSG-15).
Other Comments re Scoping

France #5 Comment:
• Add “The removal of irradiated fuel from the spent fuel pool (for long term storage or reprocessing)” for clarification in the scope.
• **Disposition**: Accepted.

France #14 Comment & U.S.A #1 General Comment:
• Is there any actual need to provide recommendations on management system (Section 8)?
• The Table of Content lacks a Section on documentation, audit, and QA/QC. We suggest adding a Section in this regard to address handling issues, status, and inventory of nuclear fuel as such documentation is quite important for audit and inspection through the life cycle of nuclear fuel handling system.
• **Disposition**: No change; Section 8 is intended to cover QA and Documentation.
Comment:
• The target publication date seems realistic, but taking into account the wider scope post-Fukushima intended for the revised NS-G-1.4, the new version should be published as soon as possible.

Disposition:
• Comment is noted; the target date for the final publication remains unchanged, due to a long and uncertain process for Member States’ comment and disposition.
• Nevertheless, the actual implementation will be conducted to pursue early completion.
Comment:
• This is a design guide, and the sentence “In the past, analysis of severe accidents in spent fuel pool was not widely performed” can be deleted. The analysis of the accidents in spent fuel pool should be in the analysis guide.

Disposition:
• The comment is noted but not accepted, because
  ✓ Design covers all areas considered in the design process; safety assessment is a part of the design process (requirement 10, SSR-2/1);
  ✓ Safety analysis is one essential element considered for the safety assessment; therefore, safety assessment and analysis cannot be excluded from the Guide;
  ✓ Note: contradictory comment (U.S.A #2 comment) that requires a new section for “Design and Defense-in-Depth Evaluation”.
  ✓ Also note that “analysis of severe accidents” is reworded to read as “analysis of such accidents”, according to France #2 comment.
## Comments Re Table of Contents

<table>
<thead>
<tr>
<th>Original Contents</th>
<th>Finland #2</th>
<th>France #11</th>
<th>U.S.A #2</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>• General Considerations</td>
<td>• Practical Elimination of Severe Accidents</td>
<td>• Postulated Initiating Events and accident conditions</td>
<td></td>
<td>• General Considerations</td>
</tr>
<tr>
<td>• Operational States</td>
<td>• Extreme External Hazards</td>
<td>• Safety-Security Interface</td>
<td></td>
<td>• Operational States</td>
</tr>
<tr>
<td>• Postulated Initiating Events</td>
<td>• Safety-Security Interface</td>
<td></td>
<td></td>
<td>• Postulated Initiating Events</td>
</tr>
<tr>
<td>• Other Considerations</td>
<td></td>
<td></td>
<td></td>
<td>• Design Basis Accidents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Add Safety-Security Interface</td>
<td></td>
<td>• Extreme External Hazards [Finland #2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Practical Elimination of Severe Accidents [Finland #2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Safety Assessment [U.S.A #2]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Safety-Security Interface [Finland #2, France #11]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Other Considerations</td>
</tr>
<tr>
<td>NUSCC (France #8)</td>
<td>NSGC</td>
<td>Resolution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(France #1) Why is NSGC consultation “for information”?</td>
<td></td>
<td>Remove “(for information)”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(France #6): Rephrase: The physical protection of fuel or aspects associated with the safeguarding of nuclear material are also considered for information. The interfaces between nuclear safety and nuclear security will also be addressed.</td>
<td>(France #1): Rephrase: The physical protection of fuel or aspects associated with the safeguarding of nuclear material are also considered for information. The interfaces between nuclear safety and nuclear security will also be considered.</td>
<td>Accept France #6 comment; the first line (NSGC reviewer suggested to delete) is for safeguard, and it should remain.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(France #8): References of the relevant IAEA Nuclear security publications should be added.</td>
<td>(France #2): Reference to NSS 13 could be added.</td>
<td>NSS 13 is added.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Comment Re TRANSSC Review

U.S.A #3 Comment
- Add TRANSSC as a Review Committee.

Disposition
- The comment is accepted
  - The DPP will be submitted to TRANSSC for review in November.
France #3 Comment:
• For clarification, reword to read as
  “The transfer of unirradiated fuel into the reactor vessel”, and
  “The removal of irradiated fuel from the reactor vessel”
• Disposition:
  Reword to “reactor core” (a general term applicable to all reactor types)

France #12 & #13 Comments:
• Remove bullets “Safety Requirements” from Sections 4 and 5 in the Table of Contents
• Disposition: Reword “Safety requirements” to “General Considerations”
  ✔ The intention is to link to specific safety requirements established in SSR-2/1;
  ✔ Rewording is done to avoid confusion.
Comments & Questions?

...Thank you