Proposal to Amend the Convention on Nuclear Safety - Offsite Contamination

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Contents

- Canada’s approach to IAEA Safety Standards
- Convention on Nuclear Safety
- Requirement to avoid Offsite Contamination
- Canadian actions post-Fukushima
- Diplomatic Conference 2015
Canadian Nuclear Safety Commission

- Regulates the use of nuclear energy and materials to protect the health, safety and security of Canadians and the environment; and to implement Canada’s international commitments on the peaceful use of nuclear energy.
- The Commission is an independent Tribunal that makes licensing decisions.
- Staff support, advise and recommend.
- 3-S regulator – Safety, Security, Safeguards
Regulates All Nuclear Facilities and Activities

- Uranium mines and mills
- Uranium fuel fabricators and processing
- Nuclear power plants
- Waste management facilities
- Nuclear substance processing
- Industrial and medical applications
- Nuclear research and educational
- Export/import control
- Transportation
Licensing and Compliance - 1

- Authority derives from the Nuclear Safety and Control Act
- Twelve Regulations, including
  - NPPs
  - Mines and Mills
  - Radiation Protection
  - Packaging and Transport
  - Nuclear Substances
  - Security
  - Non-proliferation, import and export control
**Licensing and Compliance - 2**

- Commission issues Licences
- Standards are enforceable when referenced in a licence
- Fourteen Safety and Control Areas are used for complete coverage

<table>
<thead>
<tr>
<th>Management System</th>
<th>Conventional Health and Safety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Performance Management</td>
<td>Environmental Protection</td>
</tr>
<tr>
<td>Operating Performance</td>
<td>Emergency Management and Fire Protection</td>
</tr>
<tr>
<td>Safety Analysis</td>
<td>Waste Management</td>
</tr>
<tr>
<td>Physical Design</td>
<td>Security</td>
</tr>
<tr>
<td>Fitness for Service</td>
<td>Safeguards and Non-Proliferation</td>
</tr>
<tr>
<td>Radiation Protection</td>
<td>Packaging and Transport</td>
</tr>
</tbody>
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Canadian Approach

• Considers information on best regulatory practices from other countries and international standards, such as IAEA
  • Used in a manner consistent with CNSC’s overall regulatory approach
• CNSC has based many of its regulatory documents on IAEA Safety Standards and will continue to do so as they evolve
  • As core components of new draft documents
  • As best practice when updating current documents
  • As additional guidance on how to meet existing requirements
• CSA nuclear standards have also been influenced by IAEA
  • Are being integrated into the CNSC Regulatory Framework
  • Are listed on Regulatory Documents page on CNSC website
    • http://www.nuclearsafety.gc.ca/eng/acts-and-regulations/regulatory-documents/index.cfm#R1
Constitution on Nuclear Safety (CNS)

• “The Convention is an incentive instrument. It is not designed to ensure fulfillment of obligations by Parties through control and sanction but is based on their common interest to achieve higher levels of safety which will be developed and promoted through regular meetings of the Parties. The Convention obliges Parties to submit reports on the implementation of their obligations for "peer review" at meetings of the Parties to be held at the IAEA”

• http://www-ns.iaea.org/conventions/nuclear-safety.asp?s=6&l=41
39. “The displacement of people and the land contamination after the Fukushima Daiichi accident calls for all national regulators to identify provisions to prevent and mitigate the potential for severe accidents with off-site consequences.

1. Nuclear power plants should be designed, constructed and operated with the objectives of preventing accidents and, should an accident occur, mitigating its effects and avoiding off-site contamination.

2. The Contracting Parties also noted that regulatory authorities should ensure that these objectives are applied in order to identify and implement appropriate safety improvements at existing plants”.
C. Reporting article by article

Article 18 (1) ‘Implementation of defence in depth’:

- “Implementation of design measures or changes (plant modifications, backfitting) with the objective of preventing beyond design basis accidents and mitigating their radiological consequences if they were to occur (this applies to the entire nuclear installation including spent fuel pools);

- Implementation of particular measures to maintain, where appropriate, the integrity of the physical containment to avoid long term off-site contamination, in particular actions taken or planned to cope with natural hazards more severe than those considered in the design basis;”
Swiss Proposal to amend the CNS

- **Article 18. (Design and Construction), new para. iv.**
  - “Nuclear power plants shall be designed and constructed with the objectives of preventing accidents and, should an accident occur, mitigating its effects and avoiding releases of radionuclides causing long-term off-site contamination. In order to identify and implement appropriate safety improvements, these objectives shall also be applied at existing plants”.

- No consensus to amend at 6th RM, nor to hold a Diplomatic Conference to discuss
- Majority voted at 6th RM to hold a Diplomatic Conference
  - To start 9 February 2015
NUSSC Discussion on SSR-2/1

- November 2012 - NUSSC34 - DPP tabled
- March 2013 - NUSSC Working Group 1 - Detailed discussions
- July 2013 - NUSSC35 - Draft approved for MS review
- October 2013 - NUSSC36 - DPP approved to revise Safety Guide on Reactor Containment Systems for NPPs
- February 2014 - NUSSC Working Group 2 - Dispositioned comments from MS review
- July 2014 - NUSSC37 - submitted to CSS
- October 2014 - CSS approved for publication
2.13 (part) The purpose of the fourth level of defence is to mitigate the consequences of accidents that result from failure of the third level of defence in depth. This is achieved by preventing the progression of the accident and mitigating the consequences of a severe accident. The safety objective in the case of a severe accident is that only protective measures that are limited in terms of times and areas of application would be necessary and that off-site contamination would be avoided or minimized. Sequences that lead to large or early radioactive releases are required to be ‘practically eliminated’.
• Requirement 20 - Design Extension Conditions

  5.31. “The design shall be such that the possibility of conditions arising that could lead to early or to large radioactive releases is ‘practically eliminated’.”

  • (‘Large radioactive release’: a release for which off-site protective measures limited in terms of times and areas of application are insufficient to protect people and the environment. ‘Early radioactive release’: release for which off-site protective measures are necessary but are unlikely to be fully effective in due time.)

  5.31a “The design shall be such that for design extension conditions protective measures that are limited in terms of times and areas of application shall be sufficient for the protection of the public, and sufficient time shall be made available to take such measures.”
• **Requirement 58: Control of containment conditions**
  
  • 6.28a. Design provision shall be made to prevent the loss of the containment structural integrity in all plant states. The use of this provision shall not lead to early or to large radioactive releases.
  
  • 6.28b. For defence in depth, the design shall include features to enable the safe use of non-permanent equipment for restoring the capability to remove heat from the containment.
SSR-2/1 Design Extension Conditions

plant states (considered in design)

<table>
<thead>
<tr>
<th>Operational states</th>
<th>Accident conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal operation</td>
<td>Design basis accidents</td>
</tr>
<tr>
<td>Anticipated operational occurrences</td>
<td>Design extension conditions</td>
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<tr>
<td></td>
<td>No core melt</td>
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<td></td>
<td>Severe Accidents (Core melt)</td>
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(a) Conditions practically eliminated

The possibility of certain conditions occurring is considered to have been practically eliminated if it is physically impossible for the conditions to occur or if the conditions can be considered with a high level of confidence to be extremely unlikely to arise.
Canadian Fukushima Task Force

- Thirteen recommendations in four areas
- Thirty-six actions placed on licensees
  - Almost all now complete
- Improved response to containment challenge/performance
  - Emergency Filtered Containment Venting
    - Installation of filtered containment vent system
  - Control capabilities for hydrogen concentration
    - Installation of passive hydrogen recombiners (PARS)
  - Adequate overpressure relief capacity for beyond design basis events
Containment Integrity Protection
Canadian Safety Objectives and Goals

- Likelihood of accidents with serious radiological consequences is extremely low, and
- Potential radiological consequences from severe accidents are limited as far as practicable
- Accident prevention
  - No release (SCDF)
    - Severe core degradation < 1E-05
- Accident prevention and mitigation
  - Release triggering evacuation (SRF)
    - Small Release 1E+15 Bq I-131 < 1E-05
  - Release triggering long-term relocation (LRF)
    - Large Release 1E+14 Bq Cs-137 < 1E-06
Diplomatic Conference February 2015

- Sole purpose is to discuss the Swiss proposal to amend the CNS
- The ability of the DC to revise the proposal is limited
  - Cannot change the wording to the extent that it becomes a new amendment
  - May be nil (remains to be decided)
- Amended EU Nuclear Safety Directive may be behind the proposal to amend
  - Will not be possible to reword the amendment to resemble this
“The CNS, amended or otherwise, creates no legal obligations on its signatory states, but they would have to report on their efforts to live up to the new language at the convention’s triennial review meetings. And in the somewhat rarefied world where diplomats and nuclear regulators intersect, this creates a potentially loaded situation, particularly for recalcitrant members”  
(Nuclear Intelligence Weekly, November 2014)
Conclusion

• Avoiding off site contamination is a concept, not an achievable technical requirement
• Technical requirements exist in SSR-2/1
  • In terms of protective measures to protect the public
  • Releases against which the public cannot be protected are to be ‘practically eliminated’
• Diplomatic Conference in February will attempt to seek consensus on amending the Convention
  • If no consensus, may be a vote
    • Two-thirds majority of all CPs is required (52/77)
    • Ratification by three-fourths of CPs then required to be in force (58/77)
  • Alternative outcomes may be sought.
  • Sensitive discussions continue in the lead-up