Comments received from France

Thank you for distributing the new draft of the DS508 obtained after the last consultancy meeting in August. The current draft gathers lots of information and represents the result of a large work.

I have sent it to Emmanuel Wattelle, from IRSN, as he was deeply involved in the development of the practical elimination paragraph. He was also present during the NUSSC discussions for the definition of the scope of DPP for this document.

As neither Emmanuel nor me do not participate in the meeting this week, we want to provide our comments for your consideration.

Our concerns are related to:

- The consistency with the DPP: there were a lot of difficult discussions during the different steps that led to the final version of DPP and the DS 508 should not challenge the result of the achieved consensus. DS 508 shall comply with the scope of the DPP (cf. attached file).
- Complementary work is needed to reinforce the draft regarding:
  - The specificities of DEC-A and DEC-B approaches. Notably, the guidance should better explain how the accident sequences are identified for DEC-A, whilst DEC-B is more likely an approach regarding the phenomena to cope with,
  - Independence of level of DiD.

  We do not think that it is worthwhile to discuss the current version within the group and it may be a good idea that the authors of these parts complement them.

- Practical elimination: we were involved in the first version of this chapter and it has been modified without discussion. It would be better to discussed on the basis of the first version considering that, for this topic, the wording and the order of article are very sensitive.

In attached file, you will find the draft with some comments: they are not exhaustive and just intend to provide illustration regarding the general comments above.

As a conclusion, the group may need at least another meeting with a large participation to « finalize » the draft.

Comments from USA on an earlier draft of the guide
I appreciated an excellent week of discussion on DS508 and related topics. Truly an outstanding workshop. This experience certainly elevated my awareness of the context of DS508. From a senior executive’s perspective, I would hope there is some shared vision with IAEA leadership that DS508 has elevated importance beyond a typical safety guide and that it also serves as an enabling communication tool. DS508 can serve as a helpful guide for Member States, regulators and industry stakeholders, in crafting public messages regarding NPPs meeting or exceeding high level safety objectives.

On a separate matter, during the working session I noticed that the DS508 version we were reviewing had some changes made compared to the draft version that USNRC reviewed in early August. However, the version we reviewed this last week did not appear to reflect the USNRC comments/edits provided in August. I made a few assumptions as to why that might be the case and should have confirmed with you my understanding.

Please correct me if my assumption here is incorrect. My assumption is that our comments and proposed edits have yet to be incorporated/addressed because the working group on DS508 may not have had the opportunity to see that set of comments with the sensitivity that USNRC has not been actively participating in the working group meetings. That said, I did not raise this set of comments in front of the other member states. Again, I probably should have discussed this assumption of mine with you.

For convenience, I have attached our comments sent in August. These comments were based on our quick review and contain a mixture of edits for clarification or because the text was not compatible with US practices. The comments boxes should provide context for most of our proposed edits/changes. Now that IAEA has conducted the workshop, these detailed comments may simply be considered along with the general set of comments provided by member states this last week.

Looking forward to the NuSSC meeting in November and future revisions of DS508.

**Comments from Canada**

I’ve read the document and I’m impressed with how well you have edited the document is so short a time. I’m also pleased that many of my ‘contributions’ were of help to you. I should mention to you that from my perspective, any comment I make to you on the document is merely my suggestion. I never expect all comments to be accepted for the next update. You know the IAEA approach on the subject and the positions of individual member states and conglomerates such as ENRA, far better than I. Also, you have developed your own approach to writing such documents which you have acquired over years.
of experience. Let me just say that I very much appreciate this opportunity to work with you and learn from your experience and knowledge.

Just a few observations for your information.

a) Regarding the use of non-permanent equipment (2.26 – 2.35), little guidance is offered regarding the storage of non-permanent equipment, in particular if the storage facility is on-site or near the site of the NPP. It is my understanding that in European countries on-site or ‘near site’ storage facilities are seismically and otherwise qualified to give assurance that the equipment will be available for any postulated accident for which it is credited to help mitigate the consequences. I note that this is not necessarily the case in some other countries (Canada being one of them). Therefore, I suggest that consideration be given to include guidance for the storage of credited non-permanent equipment located on-site or ‘near site’ to withstand such environmental and other conditions as appropriate to give reasonable assurance that the non-permanent equipment will be available as credited in the safety case for the NPP.

b) DESIGN FOR PROTECTION OF THE PEOPLE AND THE ENVIRONMENT AGAINST HARMFUL EFFECTS OF IONIZING RADIATION

You did a nice job editing and restructuring this section. The addition of the background information (Requirement 5 and Figure 1) provides a good introduction. Together with the other editing this chapter now reads much better.

c) EXTREMELY UNLIKELY TO ARISE WITH A HIGH DEGREE OF CONFIDENCE

Another example of excellent editing, well done.

Regarding the CANDU contribution for the Annex, I find that my initial approach was a bit too detailed and other Member States would just disregard it as a “CANDU thing” not applicable to them. However, it really serves as an example of what should be done for any situation where a designer decides to ‘add another system’ to practically eliminate an event that could threaten containment and potentially result in very large releases. So I’m going to attempt to restructure it in a manner that would more likely grab the attention of others into what is required if one wants to go this route.

Comments from Canada (continuation)

The regulatory requirements for shutdown system design for all modern CANDU reactors built in Canada and internationally are given in AECB Regulatory Document R-8. These requirements are specific to CANDU reactors and well reflect the intent to have two fully independent and fully effective shutdown systems of robust design and high reliability to render failure of shutdown for any AOO or DBA to be “practically eliminated”.

Since the completion of the latest CANDU station in Canada (Darlington NGS), one of the Canadian utilities proposed to give opportunity to PWR and BWR vendors to join the bidding on a new reactor project. However, PWR and BWR reactors, as currently designed, do not meet all the R-8 requirements. At the utility’s request the CNSC undertook a study of international practices for
various power reactor types, and decided to modify the R-8 requirements to make them “design neutral” and in line with international practice. Many requirements specific for CANDU plants were retained, but certain features unique to the CANDU design and which added significantly to its robustness compared to other types of reactors, were removed. The new requirements are contained in CNSC REGDOC 2.5.2.

So, this brings me to my dilemma. Should the example that I give reflect what has actually been installed in current CANDUs (in accordance with R-8), or should the example reflect what would be done under today’s requirements (REGDOC 2.5.2). I opted to indicate what was done under R-8 where R-8 and 2.5.2 agree. Otherwise, I have used 2.5.2 requirements. If you prefer a different approach, please let me know.

I’m also not sure if the way I have written this section fits very well with the others in the Annex. For example, it contains some history to give perspective to the Canadian approach. I leave that to you to decide. You can tell me what changes you would like and I’ll do my best to accommodate your request. If you think it’s not appropriate for the Annex and would rather not include it, that’s fine too. After all, it’s just a proposal.

Comments from CANDU Owners Group

The main body of the document seems very useful, but Annex I is entirely LWR-specific. I have some comments, as follows:

Comment 1

Annex I, paragraphs A.7 through A.10 are very LWR-specific. The closest thing a CANDU reactor has to a reactivity accident is a Large LOCA. Our design measures that result in practical elimination of an uncontrolled reactivity excursion as a result of a Large Break LOCA are:

- At DiD Level 1, the application of well-established technical standards in the design of HTS components, such that a large break is extremely unlikely
- The limitation by design of the HTS of the magnitude of voiding of the core that can occur (Level 1)
- Provision of ECC (Level 3) to prevent full core voiding
- The nature of the inherent nuclear feedback characteristics (Level 1) of the CANDU (specifically the small size of our reactivity coefficients and our long prompt neutron lifetime. This differs from the single inherent nuclear feedback characteristics that LWRs depend on: their large negative power coefficient of reactivity)
- The practical elimination of a failure of the shutdown safety function provided by the existence of two fully independent, fast-acting shutdown systems (at Level 3), plus the fully independent RRS capability to shut down the reactor (at Level 2)
The discussion in Annex I focusses on LWR reactors’ dependence on their negative power coefficient of reactivity and design measures to promote homogeneity in their reactor coolant. These measures are inapplicable and irrelevant in a CANDU.

Comment 2

Annex I, paragraphs A.11 through A.14 also does not apply to CANDU: direct containment heating is not possible in the CANDU design: the PT design feature makes dedicated depressurization systems unnecessary.

Comment 3

Annex I “Large Steam Explosion”. Discussion of steam explosion uses terminology such as “lower head” which is not technology-neutral. There is no discussion of CANDU’s in-vessel retention approach which depends on water in either the calandria vessel or in the vault to cool corium. Prevention of steam explosions during the process of multiple channel failure and the maintenance of vessel integrity are the physical phenomena relevant for us.

Comment 4

Annex I “Hydrogen Detonation”. CANDU, like PWRs, use passive catalytic recombiners or other devices. CANDU’s in-vessel retention approach provides benefits similar to the discussion of core catchers in A.21.

Comments from EDF on behalf of ENISS

I tried to review most of the document, but I faced issues with the doc so I cut/paste it into a blank template. See my comments and modifications in the attached document. Some may be written a bit quickly, so we’ll have to discuss them to be sure we are on the same page.