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The Canadian Society for Senior Engineers
La Société canadienne des ingénieurs séniors

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A Member Society of: The Engineering Institute of Canada
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September 23, 2011 By Email to: interventions@cnsc-ccsn.gc.ca

Canadian Nuclear Safety Commission
280 Slater Street
P.O. Box 1046, Station B
Ottawa, ON
K1P 5S9

Re: CSSE-SCIS Input to GD 310 "Guidance of Safety Analysis for Nuclear Power Plants"

Dear Commissioners:

This submission of the Canadian Society of Senior Engineers (CSSE) was prepared with input from a number of Canada's eminent senior engineers with career-long knowledge and experience in health, safety and regulatory aspects of Canada's nuclear industry.

The Canadian Society for Senior Engineers (CSSE) is a Member Society of the Engineering Institute of Canada (EIC), together with nine other Member Societies that represent specific engineering disciplines. The CSSE reflects all engineering disciplines. It has full voting privileges and the opportunity to represent its members within the EIC on national engineering issues. The CSSE is a charitable organization registered by the Canada Customs and Revenue Agency.

Among its objectives, the CSSE endeavours to assist in the broad field of engineering education for youth and to maintain an active role in expressing learned opinions, either alone or in concert with other Canadian engineering organizations, on issues of national or regional interest relating to Canadian engineering and multidisciplinary technologies.

The CSSE believes that the following **observations on the content of draft CNSC GD-310: "Guidance of Safety Analysis for Nuclear Power Plants", June 15, 2011** will be useful to the Commission.

Some observations on the content of draft CNSC GD-310: "Guidance of Safety Analysis for Nuclear Power Plants", June 15, 2011.

The much more detailed CNSC GD-310 has been prepared to support and facilitate the application of CNSC RD-310, which was published in February 2008, under the title, "Safety Analysis for Nuclear Power Plants".

Introductory statement

It is noted that the CNSC moved very quickly in Canada - on March 17, 2011, only 6-days following the beginning of the difficulties at the Fukushima Dai-Ichi power station in Japan - to address formally its own nuclear power plant licensees with a request that they undertake station safety case reviews, and account for the "initial lessons learned" from Fukushima ,and report back. Indeed, the CNSC has en train a still-operative, energetic national program which is apparently aimed at ensuring that nothing is being missed or goes unaccounted for in Canada with respect to the lessons learned from the March 11, 2011, events at the Japanese power station. Moreover, the institution is very actively engaged with the IAEA and its multi-facetted response to the various upsets and consequences of the earthquake and tsunami at Dai-Ichi, and through its numerous Memoranda of Understanding, the CNSC has the ready opportunity to remain informed of the individual stances of the various regulatory agencies within the international nuclear community. For example, the Memoranda almost certainly facilitate CNSC access to the reactor "stress-test" methodologies that are being followed by European Community member states as well as the specifications for those tests issued by the ENSREG (European Nuclear Safety Regulators Group). There is much more that might be mentioned on the subject but this is enough here to make the point that the CNSC cannot be unaware of the Fukushima-related shortfalls that are referred to in the following Observations. Nonetheless, the latter are being filed as invited by the CNSC in its public announcement of June 15, 2011.

Observations

1. GD-310 (referred to in the following as the Guide) is a substantial, 60-page document replete with information that should greatly assist applicants and licensees in carrying out nuclear power plant safety analyses that will meet the more broadly stated regulatory expectations contained in RD-310 (a 13-page document).

2. Although in its Section 5.2.2.4, the Guide – like the RD it supports – properly identifies the need for deterministic analysis of a plant's ability to respond adequately to "earthquake", and to "floods occurring outside the plant", and later on in Section 5.2.3.3, to the need to account for events described as Beyond Design Basis Accidents, the document should be further developed and strengthened in these respects in light of the events that transpired on March 11, 2011, at the Fukushima Dai-Ichi nuclear power plant located in north-eastern Japan.

3. One specific aspect of Observation 2 is that the Guide should press for safety analyses to account for the arguably greater potential for the creation of cliff edge scenarios arising from extreme external flooding (including tsunamis) than from earthquake-driven structural damage, and the need to account for this in the plant's engineering and layout. Another related one is that applicants and licensees should demonstrate the designed-in physical robustness and adequacy of the safety margins of their plants to ensure they can survive the challenges that will be presented during an extreme event.

4. Also linked to Observation 2, it is noted that while Appendix B of the Guide provides very useful information in its Tables B.1 and B.2 on Acceptance Criteria for Anticipated Operational Occurrences and Design Basis Accidents*, respectively, the Appendix is silent on the important matter of accidents which are Beyond Design Basis Accidents*. The Appendix (and the Guide) would be rendered yet more helpful if it was expanded to cover extreme events, too.

5. Although it is not presently directly under comment as GD-310 is, it is evident that RD-310 should also be scheduled for review and revision at some point to take account of the lessons that have been learned from an up-to-date understanding of the causes and consequences of the Fukushima Dai-Ichi event, and to harmonize its content with that of a revised GD-310.

Respectfully,

Colin Smith, P.Eng., FEC, FCSSE
Chair, Advocacy Committee
Canadian Society for Senior Engineers

Cc: Andy Jones, P.Eng., FCSSE
CSSE-SCIS President

*Footnote.
Since at least the year 1980, the examination of a set of extreme events - now referred to as Beyond Design Basis Accidents - was routinely included in submissions from Ontario Hydro (now Ontario Power Generation) to the AECB, the forerunner to the now CNSC. At that time those events were identified as being of lower frequency of occurrence than the ones defined in the dual failure category by the AECB in its regulatory requirements (see Hurst, G.G. and Boyd, F.C., "Reactor licensing and safety requirements", AECB-1059/1972). The wisdom of this longstanding Canadian regulatory insistence that extreme events be analysed has been amply demonstrated by what took place at the Fukushima Dai-Ichi station on March 11, 2011, and before that, the occurrence in the Ukraine on April 26, 1986, of the catastrophic accident at Unit IV of the Chernobyl power plant.