Bruce Power Comments on Discussion Paper 14-01: Design Extension Conditions for Nuclear Power Plants

#	Document/ Excerpt of Section	Industry Issue	Suggested Change (*if applicable*)	Major Comment/ Request for Clarification	Impact on Industry, *if major comment*
1.	**S1**	Q1: Have DECs been characterized in a manner that is clear and logical?	A1: Yes, DECs have been characterised in a manner that is clear and logical and consistent with other CNSC documentation. The characterisation is consistent with the concept of DECs as described in IAEA documentation. . See comments below for suggested clarifications. Industry will work with the CNSC and the Canadian Standards Association (CSA) to produce a standard, including CSA N290.16 - Requirements for Beyond Design Basis Accidents, which will provide further detailed guidance on how to identify DECs and the associated requirements.	--	
2.	**S2.**	Q2: Are the items included for the purposes of identifying DECs clear, logical, sufficient and/or required?	A2: Yes, the items included for the purposes of identifying DECs are clear and logical. Industry will work with the CNSC and the Canadian Standards Association (CSA) to produce a standard, including CSA N290.16 - Requirements for Beyond Design Basis Accidents, which will provide further detailed guidance on how to identify DECs and the associated requirements.	--	
3.	**S3.**	Q3: Does the above accurately define and cover the elements that should be included in the design objectives and requirements for DECs?	A3: Yes. See detailed comments below for suggested clarifications. For radiation limits, see comments provided separately on DIS-13-01, Proposals to Amend the Radiation Protection Regulations.	--	

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4.	**S4.**	Q4: Are there other Canadian nuclear facilities, besides NPPs, that could potentially benefit from the application of DECs?	A4: Yes. There can be some benefit to facilities such as research reactors and uranium mines as defence in depth measures. The application should be consistent with the risk. The timing may be adjusted to allow time to refine the application to NPP and translate that experience to other facilities.	--	
5.	**S5 & 6**	Q5: Should the CNSC consider revising its regulatory documents to account for DECs? If yes, should they be expanded to explicitly cover equipment and procedures that may be used in DECs?	A5: No. The understanding, application, and implementation of DEC requirements is an evolutionary process. The DEC concept has been included in the recent REGDOC 2.4.1, 2.5.2 and 2.3.2. Industry and national and international organizations continue to refine and apply the concepts and as experience is gained, this guidance can be incorporated into operational documents and CSA standards (specifically. CSA N290.16). . As noted in Section 4.2 of DIS-14-01, this may occur after several years of application. Equipment and procedures that may be used in DECs – supported by design basis equipment and additional safety features / complementary design features are also discussed in existing REGDOCs and, again, through application, experience with these will be gained and incorporated as appropriate.	--	
6.	General	Alignment with the CNSC.	Bruce Power is aligned with the CNSC on DEC concepts and application. The approach is also consistent with international practice.	--	

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7.	General	Continued Dialogue Required: Application of DEC to NPP operation.	Industry requests the opportunity to continue to engage in a meaningful dialogue with the CNSC to ensure consistent understanding in the application of DEC and other accident management concepts. The CNSC had indicated their support for such dialogue in the recent public meetings leading to the issuance of the REGDOC 2.3.2 on Accident Management. Continued dialogue in industry/regulatory meetings would facilitate a common understanding of expectations and application of the beyond design basis concepts introduced in the recent REGDOCs and discussion papers. This would also facilitate continued interface with international organizations such as IAEA who are engaged in the similar developments.	--	
8.	General	The document seems to emphasize containment functions. There is no mention of emergency cooling function to mitigate accident progression to severe accidents. Cooling irradiated fuel, is as important as containment to prevent significant releases.	Examples could be balanced between cool and contain functionality.	*Request for Clarification*	

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9.	**General**	**There is a large and growing number of regulatory and guidance documents being implemented by the CNSC. The review and implementation of these documents is resulting in significant challenges and additional resource demands on licensees.** **Central to the establishment of regulatory documents must be the assurance that new and significantly revised regulatory documents provide the greatest overall benefit to Canadians.**	**Industry recommends that that prior to going forward with the development of a new Regulatory Document or significant changes to an existing document, that the CNSC assess the potential impacts to health and safety, security, the environment, and the social and economic well-being of Canadians, and undertake discussions with stakeholders to discuss benefit and cost implications.** **Once a decision is made to proceed, that the CNSC use a process to evaluate and document the regulatory impact which clearly states: what is being addressed, what is intended to be achieved, and what are the benefits and costs.**	**Major Comment**	**Lack of a rigorous process for evaluating the benefit and costs of new regulatory documents or significant changes to regulatory documents could negatively impact licensees by re-directing resources to address requirements that may have a lower safety benefit for the resources expended.**
10.	General	The industry has established design objectives and requirements for equipment and systems that may be required to operate during a DEC event. This experience should be captured.	Industry intends to capture established design objectives and requirements for equipment and systems that may be required to operate during a DEC, in a COG document (COG –JP4426-0022''Generic Generic Guide to BDBA Modifications" . This COG document should be referenced for any REGDOC that is created or updated as a result of this discussion paper.	*Request for Clarification*	
11.	Exec Summary	Point of Clarification: Some DEC may result in the use of Additional Safety Features or Complementary Design Features, which could lead to a particular condition that becomes now "practically eliminated".	Clarify that application of measures to protect against DEC may lead to a particular event sequence becoming practically eliminated.	*Request for Clarification*	

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12.	Exec Summary, Para. 4	DECs are not limited to conditions "beyond those considered during the initial design of nuclear facilities". A new plant would have design basis and DEC identified with additional provisions (may not be safety grade) and may be evaluated using best estimate techniques. This would be considered during the design of the new plants per REGDOC 2.5.2.	Suggested change: "...prevention and mitigation strategies for accident situations and scenarios beyond those considered ~~during the initial design~~ *within the design basis* of nuclear facilities. These accident scenarios are termed..."	*Request for Clarification*	
13.	1, Para. 3	Potential confusion. DECs do not encompass all "unlikely accidents".	Suggested change: "...unlikely accidents (Beyond Design Basis Accidents (BDBA))..."	*Request for Clarification*	
14.	**2.3**	**The term "reasonably high confidence" in the ability to perform as designed is potentially onerous in consideration that DECs are intended to address a generally low residual risk that is not addressed by the plant design basis.**	**It is recommended that the term "reasonable high confidence" be replaced by "reasonable confidence." This wording is consistent with REGDOC 2.5.2 which uses the term reasonable confidence when describing DECs.**	**Major Comment**	**If relief is not provided in the specification of confidence, then the design requirements for systems or equipment that mitigate DEC events could potentially lead to intractable conservatisms owing to uncertainties in rare event magnitudes discussed above.**

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15.	2.4	The discussion of "significant release" here appears to tone down the importance of small release for which regulatory documents (REGDOC 2.4.2, 2.5.2) unconditionally recognize as a major release and for which plant safety goals limits are prescribed.	It may be useful to recognize the two impacts, potential health effects (small release) and societal disruption (large release) without discussion of which is considered more significant.	*Request for Clarification*	
16.	2.6	Additional Safety Features or Complementary Design Features to support DECs may also support the response to accidents more severe than DECs.	Suggested change: Add a bullet that the complementary design features supporting response to a DEC may also support the response to other, perhaps more severe, accidents.	*Request for Clarification*	
17.	2.6	Accident Sequence Quantification (ASQ) may be informative in the identification of DECs.	Suggested change: Add a bullet that ASQ from the PSAs could be used as a means to support identification of DECs.	*Request for Clarification*	

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18.	**3.1.2**	**As previously noted in industry comments submitted for REGDOC 2.5.2, industry remains concerned regarding the potential change in definitions and application of terms such as safety classification.** **CNSC and industry will have to work together to ensure understanding and alignment on the application of Safety Classification, Systems Important to Safety, and Safety Related Systems for the potential to include DEC equipment and systems in the classification and associated design activities. Moreover, industry has established design objectives and requirements for equipment and systems that may be required to operate during a DEC event. The term "safety classification" is not used for DEC functions, rather DEC functions are divided into 4 categories, and a graded approach to defining design, maintenance, and testing requirements is used.**	**Suggested change:** **Replace the term "Safety Classification" with "DEC Classification."** **Continued interface with the CNSC will be required on the application of proposed definitions. In some cases, it would be beneficial to allow existing stations to maintain current definitions if it can be shown that an equivalent safety benefit can be achieved.**	**Major Comment**	**Changes to definitions may have significant impact on the design of systems, reporting and station governance without significant safety benefit.** **The considerations or requirements such as cooling and power sources for DECs should be consistent with their role of addressing a generally low residual plant risk and should be less stringent and rigorous than that of design basis systems.**

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19.	3.2	There may be no merit in performing deterministic analysis for the limiting "event leading to the highest challenge to maintaining the containment function". Consistent with Probabilistic Safety Assessment methodologies, it would be prudent to limit the sequences analysed to those levels that are deemed within plausible limits of probability.	Suggested change: "Deterministic analysis should be performed to establish the containment function response to limiting plausible accident sequences, with consideration of event sequence probability." It should also be noted that currently deterministic analysis only provides consequence data for accident sequences resulting in limited core damage. For sequences resulting in severe core damage, analysis is performed in level 2 PSAs.	*Request for Clarification*	
20.	3.3	RD/GD-210 on Maintenance Programs and RD/GD-98 on Reliability Programs provide limited specific information on provisions with respect to DEC mitigation features.	As noted in the industry comments on REGDOC 2.5.2, it will be important for alignment of the regulatory documents.	*Request for Clarification*	
21.	3.4	Consistent with REGDOC 2.3.2, it would be prudent to acknowledge the industry Emergency Mitigating Equipment Guidelines.	Suggested change: Add EMEG to the list of documents (Paragraph 2 and Paragraph 3).	*Request for Clarification*	
22.	3.4	Third paragraph notes that training requirements and plans may be contained in EOPs and SAMGs. The training requirements would be derived from these documents and they may also include Emergency Mitigating Equipment Guidelines.	Suggested change: "Additional training requirements and plans may be derived from associated EOPs, SAMGs and EMEGs."	*Request for Clarification*	

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23.	4.2	The paper indicates that for existing plants, the focus of the review against REGDOC-2.5.2 entails "ensuring no vulnerability of the containment system...". This should be clarified.	Suggested change to second bullet: "ensuring *robustness* of the containment system, in conjunction with the accident management program."	*Request for Clarification*	
24.	4.2 Para. 2 2nd sentence	It should also be noted that industry has made many upgrades to existing NPPs over the years based on OPEX and continual improvement processes. E.g. TMI led to enhancements to trip coverage for secondary side events. Chernobyl led to improvements in fire protection provisions, etc.	Suggested change: "These upgrades are a result of continuing plant improvements based on industry operating experience, safety reviews performed at the time of refurbishment or following the Fukushima accident."	*Request for Clarification*	
25.	6.	As noted in the response to CNSC Question 4 on the topic, the application of DECs can extend to all nuclear facilities. There would be safety benefits in doing so. Other programs to maintain quality and safety (e.g. CSA N286) apply equally to all nuclear facilities.	The DEC concept can be extended to all nuclear facilities.	*Request for Clarification*	

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26.	Appendix A	Figure 2 – Should be revised to align with the Figure from the recently issued REGDOC 2.3.2 and REGDOC 2.10.1. This is for consistency and correctness. For example, limited off-site response is required for some DBA (shows here only for BDBA). Operational documents should include AIM/EOP/EMEG/SAMG. Design extension conditions could involve severe fuel degradation (e.g. for CFVS design.)	Suggested Change: Figure 2 should be updated to align with the Figure in REGDOC 2.3.2 and 2.10.1.	*Request for Clarification*	
27.	Appendix A	Figure 2 – Additional suggested updates for clarification.	Probabilistic Acceptance Criteria, suggested change: For AOO / Normal operation – rather than no criteria – should indicate that this is included in the Safety Goals. (The safety goals encompass the spectrum.)	*Request for Clarification*	
28.	Appendix A	Figure 2 – Additional suggested updates for clarification.	Radiological Acceptance Criteria, suggested change: For BDBA, rather than “No criteria”, should indicate “Included in Safety Goals”. This would acknowledge the radiological aspects included in the probability values and release limits for large and small releases.	*Request for Clarification*	

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29.	Appendix B	This Appendix provides a useful international perspective. Also note that other jurisdictions have also considered the DEC (RCC) concept and are evolving requirements in this area. Examples include the UK and the Western European Nuclear Regulators Association (WENRA).	Suggested change: For completeness, could consider including other jurisdictions or perhaps add a note that other jurisdictions are also including DEC concepts in their nuclear regulatory and nuclear design programs.	*Request for Clarification*	
30.	Appendix C	The suggested process for identification of DEC proposed in this document is one means. Other means may be proposed by the design authorities. It may also be that certain DEC and complementary design features are added for a specific scenario based on review of accident sequences. For example, the Emergency Mitigating Equipment was added to support response to a Total Loss of Heat Sink scenario resulting from an Extended Loss of all AC Power.	Appendix C acknowledges that the design authority would prescribe the method(s) for identification of DECs and complementary design features. Suggest clarifying that the technique presented here is one example technique only. In paragraph 1, suggest adding a sentence following the second sentence: “A sample technique is suggested in this Appendix.”	*Request for Clarification*	