Comments Report – Public Consultation
Draft Regulatory Document (RD) 337 version 2 – Design of New Nuclear Power Plants
Consultation Period: July 27 – October 4, 2012

#	Organization	Section	Comment	Suggested Change	CNSC Response
1.	Jerry Cuttler Cuttler&Assoc	Preface 1st para	How is risk determined? By the invalid LNT model of radiation carcinogens Change last sentence of first paragraph to read – It establishes a set of comprehensive design requirements that ~~are risk-informed~~ and align with ~~accepted~~ international **IAEA** codes and practices **to prevent significant releases of radioactivity**.		No change. While CNSC recognizes that there is some evidence that the Linear No Threshold assumption is over-conservative at low doses, ALARA remains the model recommended by the UNSCEAR and ICRP and is adopted by IAEA. CNSC will remain aligned with these agencies.
2.	Candu Energy Inc., Bruce Power, OPG	Table of Contents	Editorial: Titles of Sections 7.6.1.1 to 7.6.1.3 are missing from the table of contents.	Add titles for Sections 7.6.1.1 to 7.6.1.3 to the Table of Contents.	No change. Table of Contents does not include level 4 headings
3.	Candu Energy Inc., Bruce Power, OPG	2	"….**SSR 2/1, *Safety Requirements: Safety of Nuclear Power Plants: Design…*** " Editorial: The correct title of SSR-2/1 is "Specific Safety Requirements: Safety of Nuclear Power Plants: Design"	Suggest title of the document be corrected to: "… SSR-2/1, **Specific** Safety Requirements: Safety of Nuclear Power Plants: Design"	Text revised as follows: "… SSR-2/1, Safety of Nuclear Power Plants: Design". SSR is an acronym for "Specific Safety Requirements".
4.	Candu Energy Inc., Bruce Power	3	Bullet 5 The list of clauses from Section 5 and Section 6 of the Class I Nuclear Facilities Regulations appears to be incomplete. This version of RD-337 includes requirements that are applicable to clauses 5(k), 6(j) and 6(k), however these clauses are not listed.	Suggest that final version 2 of RD-337 be reviewed against the Class I Nuclear Facilities Regulations for completeness.	Agreed. Clauses 5(k), 6(j) and 6(k) from the *Class I Nuclear Facilities Regulations* added to list.
5.	Jerry Cuttler Cuttler&Assoc	4.1.1 1st para	Change word 'achievable' to 'safe'. Change ALARA to ALARS (ALARA is vague and not conservative as demonstrated at Fukushima. We should discontinue using ALARA		No change. See response to comment #1.
6.	Jerry Cuttler Cuttler&Assoc	4.1.3	1) Change word 'protect' to 'avoid releasing significant radioactivity into"		1) No change. Text is in line with NSCA.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			2) Add the word 'harmful' and remove words as indicated. The design shall include provisions to control, treat and monitor **harmful** releases to the environment ~~and shall minimize the generation of radioactive and hazardous wastes~~. This is anti-nuclear ideology – NPPs are not 'radioactive and hazardous waste producers.' Used fuel should and will be recycled, eventually.		2) No change. Radioactive and hazardous wastes must be controlled and the volume of wastes generated should be minimized. NPPs do produce radioactive and hazardous waste. Possible recycling of used fuel is beyond the scope of this document.
7.	Candu Energy Inc., Bruce Power	4.2	"Safety analyses **shall be** performed to confirm that these criteria, goals are met, to demonstrate effectiveness of measures for preventing accidents, and mitigating radiological consequences of accidents if they do occur." Editorial: Correction needed to add "and" between "criteria" and "goals".	Suggest changing the text to: "Safety analyses shall be performed to confirm that these criteria **and** goals are met, to demonstrate effectiveness of measures for preventing accidents, and mitigating radiological consequences of accidents if they do occur."	Agreed. Text revised as suggested.
8.	Jerry Cuttler Cuttler&Assoc	4.2.1	1) Remove words 'most at risk' 2) This dose **shall be** less than or equal to the dose acceptance criteria of: 1. 0.5 millisievert for any anticipated operational occurrence (AOO) or 2. 20 millisieverts for any design basis accident (DBA) Comment on above statement: Based on human data, an acute dose of 150 mSv is safe. A chronic dose of 700 mSv per year is also safe. Both are also beneficial.		1) No change. "Critical groups most at risk" refers to people such as children known to be more sensitive to the effects of radiation. 2) No change. While the CNSC recognizes that there is some evidence that the Linear No Threshold assumption is over-conservative at low doses, ALARA remains the model recommended by the UNSCEAR and ICRP and is adopted by IAEA. CNSC will remain aligned with these agencies.
9.	Jerry Cuttler	4.2.2	Qualitative safety goals, items 1 and 2.		No change.

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Cuttler&Assoc		Consider using US NRC 1986 public safety goals – 10 CFR 50 51 FR 30028 Aug. 21, 1986 which are quantitative. Small Release Frequency – 10^{15} becquerel of iodine-131 – What is the corresponding dose in a person for a 10^9 Bq amount of iodine-131? How does it compare with amount given to hyperthyroid patients? Large Release Frequency – 10^{14} becquerel of cesium-137 – Fukushima released 10×10^{15} Bq Cs-137 – No one was injured. Provide the radiobiological evidence to support these release limits for safety.		The CNSC has set surrogate safety goals that are designed to achieve the equivalent results to the referenced goals. These surrogate goals are established to avoid the need for the calculation of individual doses. The SRF and LRF correspond approximately to the need to temporary evacuation and long-term relocation of those affected. With regards to no injury in Fukushima, it is important to remember that the population was evacuated from the most contaminated region.
10.	Candu Energy Inc., Bruce Power	4.2.3	"4. beyond design basis accidents (BDBAs), including **design extension conditions (DECs) - DECs include some severe accident conditions** " The accepted terminology in use within the Canadian nuclear industry is "beyond design basis accidents". It is preferred that the IAEA term "design extension conditions" not be used. If the CNSC adopts the term "design extension conditions", it is suggested that the IAEA definition and use of the term "design extension conditions" from IAEA SSR-2/1 be adopted in its entirety. Also, the CNSC should use consistent terminology for DEC in RD-337; consistency with Sections 7.3 and 4.2.3, and the definitions provided in glossary are needed.	Suggest bullet 4 be changed to: "4. Beyond design basis accidents, which include severe accident conditions" If the IAEA terminology is adopted, then it is suggested to change the text to: "4. design extension condition (DECs), which could include severe accident conditions."	No change to use of DEC. BDBAs are all events less frequent than DBAs (IAEA definition). There is no lower frequency bound. DECs are a subset of BDBAs. In version 1 of RD-337 they were referred to as "selected BDBAs" or similar. DECs are only those BDBAs that are considered in the design. The definition of DECs has been changed to more closely match SSR-2/1. However, CNSC staff have not adopted all the clauses related to DECs from SSR-2/1 since they are not internally

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Note the definition in SSR-2/1 differs from the definition in this draft version 2 of RD-337; "*Accident conditions that are not considered for design basis accidents, but that are considered in the design process of the facility in accordance with best estimate methodology, and for which releases of radioactive material are kept within acceptable limits. Design extension conditions could include severe accident conditions."* If the term "design extension conditions" is adopted for new NPPs, GD-337 should provide explanations for the relationship between "design extension conditions" and "beyond design basis accidents."		consistent. See for example, paragraph 5.31 which refers to "DECs that have been practically eliminated". This should read "plant states that have been practically eliminated" to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are "practically eliminated." CNSC does not believe that SSR-2/1 intended this meaning.
11.	OPG	4.2.3	"4. beyond design basis accidents (BDBAs), including design extension conditions (DECs) - DECs include some severe accident conditions" Design Extension Conditions OPG and in other areas CNSC (and other jurisdictions) use the term Beyond Design Basis	How is this determined? Need some guidance. The preferred option would be to continue using the term Beyond Design Basis Accidents. However, if the term DEC is continued to be used, additional clarification is needed. See comment 11.	No change. See response to comment #10 above. Additional clarification on DECs has been provided in guidance portion of section 7.3.4.
12.	Jerry Cuttler Cuttler&Assoc	4.2.3	Replace word "including" with "specifically"		No change. DECs are a subset of BDBAs. See response to comment #11.

#	Organization	Section	Comment	Suggested Change	CNSC Response
13.	Jerry Cuttler Cuttler&Assoc	4.2.4	1st para Change as indicated: The design **shall** include provisions to '1)' ~~limit~~ prevent radiation exposure in normal operation and AOOs '2)' ~~to ALARA levels,~~ and to '3)' ~~minimize the likelihood of~~ prevent an accident '4)' ~~that could lead to the loss of normal control of the source of radiation.~~ However, given that '5)' ~~there is a remaining probability that~~ an accident may occur; measures **shall be** taken to mitigate the radiological consequences of accidents. ALARA is a vague term.		1) No change. Preventing radiation exposure is an unrealistic requirement. 2) No change. See response to comment #1 regarding use of ALARA. 3) and 4) No change. It is not possible to entirely prevent accidents. 5) No change. Text is clear.
14.	Candu Energy Inc.	4.3.1	"The aim of the first level of defence is to prevent deviations from normal operation, and to prevent failures of **structures, systems and components** (SSCs)." Defence in depth is applied to all safety related activities. Level one is about preventing failures of SSCs important to safety, not <u>all</u> SSCs. This aligns with IAEA SSR-2/1 article 2.13 (1).	Suggest changing the text to: "The aim of the first level of defence is to prevent deviations from normal operation, and to prevent failures of structures, systems and components (SSCs) **important to safety**."	Agreed. Text revised as suggested.
15.	Candu Energy Inc.	4.3.1	Suggest adding a sentence at the end of section 4.3.1, to send the reader to section 6.1 for further details (following the model of the new sentence added in Section 4.3.2).	Suggest adding the following sentence: "Application of the levels of defence is discussed in further detail in section 6.1."	Agreed. Text revised as suggested.
16.	Jerry Cuttler Cuttler&Assoc	4.3.1 4th para	Add blue text: The design shall provide all of the following five levels of defence…		Agreed. Text revised as suggested.
17.	Candu Energy Inc.	4.3.3	**OLC's shall include** **1. safety limits** **2. limiting settings for safety systems"** By introducing the text on OLCs from IAEA Safety Guide NS-G-2.2, it is also necessary to include an <u>explanation of the terminology</u>	No change to the text.	No change. Guidance in section 4.3.3 makes it clear that the designer must define a consistent terminology and adopt appropriate codes and standards. IAEA Safety Guide NS-G-2.2 is referenced for additional information. CNSC

#	Organization	Section	Comment	Suggested Change	CNSC Response
			of OLCs from NS-G-2.2. This explanation should be included in GD-337 to provide clarification.		accepts that slightly different approaches have been followed for different NPP designs based on their country of origin. CNSC staff does not require the designer to rewrite the OLCs to align with a specific Canadian approach.
18.	Bruce Power	4.3.3	"OLC's should include 1. safety limits 2. limiting settings for safety systems" By introducing the text on OLCs from IAEA Safety Guide NS-G-2.2, it is also necessary to include the definitions from NS-G-2.2. The explanations from IAEA NS-G-2.2 for the OLC terminology should also be included in GD-337 to provide clarification.		No change. Guidance in section 4.3.3 makes it clear that the designer must define a consistent terminology and adopt appropriate codes and standards. IAEA Safety Guide NS-G-2.2 is referenced for additional information. CNSC accepts that slightly different approaches have been followed for different NPP designs based on their country of origin. CNSC staff does not require the designer to rewrite the OLCs to align with a specific Canadian approach.
19.	Candu Energy Inc., Bruce Power, OPG	4.3.3	**"5. requirements for surveillance, maintenance, testing and inspection of the plant to ensure that SSCs function as intended in the design, to comply with the requirement for optimization by keeping radiation exposures as low as reasonably achievable (ALARA)"** The OLCs should be based on consistency with the safety analysis, not ALARA. Suggest deleting "**to comply with the requirement for optimization by keeping radiation exposures as low as reasonably achievable (ALARA)**".	Suggest changing the text to: "5. requirements for surveillance, maintenance, testing and inspection of the plant to ensure that SSCs function as intended in the design"	Partly agree. Change to "… function as intended in the design **and** comply with the requirement for optimization…" Both are important.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It is understood that ALARA must be included when developing the operator activities for performing surveillance, maintenance, testing and inspection of the plant.		
20.	Jerry Cuttler Cuttler&Assoc	4.3.3	Item 5 Change as indicated 5. requirements for surveillance, maintenance, testing and inspection of the plant to ensure that SSCs function as intended in the design~~**, to comply with the requirement for optimization by keeping radiation exposures as low as reasonably achievable (ALARA)**~~ **ALARA is a vague term.**		No change. See response to comment #1 regarding use of ALARA.
21.	Candu Energy Inc., Bruce Power, OPG	5.0	“**4. a safety management program that recognizes the importance of a healthy safety culture**” Editorial: 1) Suggest substituting “strong safety culture” for “healthy safety culture”, because the commonly used term in the nuclear industry is “strong safety culture”. 2) Suggest replacing “a safety management program” with “a management system” for consistency with section 5 text.	Suggest changing the text to: “4. a management **system** that recognizes the importance of a **strong** safety culture” OPG suggested a ‘healthy’ safety culture	1) No change. 2) Agreed. Text revised as suggested.
22.	Jerry Cuttler Cuttler&Assoc	5.0	Item 4 “Current safety practices” is vague? Change to 4. take into account current safety requirements in licence documents		1) No change. This is intended to ensure that the designer uses a safety management system that is commensurate with best current practices.
23.	Candu Energy	5.1	“The applicant **or licensee shall** confirm that	Suggest revising the text as	The meanings are equivalent.

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Inc., Bruce Power		the design authority has achieved the following objectives during the design phase." In most cases, much of the design of a nuclear power plant would have already been designed. Therefore any review would be a backward looking to assess if the objectives were met. The licensee may request changes in the design after such a review.	follows: "The applicant **or licensee shall** confirm that the design authority has achieved the following objectives for the **design**"	However, the text suggested by Candu Energy is clearer. Text changed.
24.	Jerry Cuttler Cuttler&Assoc	5.2	Item 8 Remove antinuclear environmental ideology. Replace with: 8. Used fuel and the radioactive waste are managed, including their storage in robust, sealed containers until long-term management is implemented.		No change. See response to comment #6.
25.	Candu Energy Inc., Bruce Power	5.2	"10. Physical protection systems are provided to address design basis threats." In addition to physical protection systems, cyber security programs are also provided to address design basis threats.	Suggest changing item 10 to: "Physical protection systems **and cyber security programs** are provided to address design basis threats."	Agreed. Text revised as suggested.
26.	Candu Energy Inc., Bruce Power, OPG	5.3	**"The computer software used for design and analysis calculations shall be qualified in accordance with applicable standards."** By using the term "qualified in accordance with applicable standards" some confusion may be introduced, because the nuclear industry is more familiar with the use of verified and validated software, as defined in CSA N286.7.	No change to the text.	No change. The guidance provides reference to N286.7.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			For clarification it is suggested that the definition of "qualified software" from CSA N286.7.1-09 be included in GD-337 to provide clarification and guidance on the intent of "shall be qualified in accordance with applicable standards", namely: "**Qualified software** — software that is considered qualified under CSA N286.7. Qualified software (a) is shown to be capable of addressing intended problems; (b) is adequately specified, which includes (i) documentation of requirements, design, characteristics, and limitations of use; and (ii) identification of all required tool components and their required attributes; (c) possesses attributes that have been demonstrated to satisfy all requirements; and (d) includes configuration management and change control."		
27.	Candu Energy Inc., Bruce Power	5.4	"Where needed, codes and standards **shall be** supplemented ~~or modified~~ to ensure that the final quality of the design is commensurate with the necessary safety functions." Changing from "may be" to "shall be" needs careful consideration. It is not always practical to add additional quality requirements beyond those called up in codes and standards. Consideration should be given to whether supplementing the codes and standards are practicable.	Suggest changing the text to: "Where needed **and practicable**, codes and standards **shall be** supplemented to ensure that the final quality of the design is commensurate with the necessary safety functions."	No change. It is important that the sufficiency of codes be reviewed to ensure that standards are consistent with proven engineering practices. It only applies as a requirement for the necessary safety functions.
28.	Jerry Cuttler Cuttler&Assoc	5.4 4th para	Change word 'proven' to 'demonstrated'		Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
29.	Candu Energy Inc., Bruce Power	5.7	"3. ~~system~~ **SSC** classifications" For clarity, suggest "SSC classifications" be expanded to "structure, system and component classifications".	Suggest changing the text to: "3. **structure, system and component** classifications".	Text revised to be consistent with 7.1. SSC is defined in abbreviation.
30.	Candu Energy Inc., Bruce Power	5.7	"5. security system design, including a description of physical security barriers" Cyber security programs should also be included here.	Suggest changing item 5 to: "security system design, including a description of physical security barriers **and cyber security programs**"	Agreed. Text revised as suggested.
31.	Candu Energy Inc., Bruce Power	6.1	"Level One: Achievement of defence in depth level one **requires** conservative design and high-quality construction to provide confidence that plant failures and deviations from normal operations are minimized and accidents are prevented." Suggest that the text be rephrased as a requirement.	Suggest changing the text to: "Achievement of defence in depth level one **shall include** conservative design and high-quality construction to provide confidence that plant failures and deviations from normal operations are minimized and accidents are prevented."	Agreed. Text revised as suggested.
32.	Jerry Cuttler Cuttler&Assoc	6.1 Level 4	2nd para Change wording. "Most importantly, adequate protection shall be provided for the confinement function by way of a robust containment design **with passive, filtered venting capability to remove radioactive particles when the internal pressure exceeds design limits.**		No change. If a venting system is necessary to protect the containment, then it is already required by the present wording. Note that a venting system is there to prevent pressure from exceeding design limits. The suggested text implies that the system only operates at above design pressure.
33.	Candu Energy Inc., Bruce Power	6.1.1	"To the extent practicable, the design ~~therefore~~ **shall** prevent: …. **4. the possibility of harmful consequences of errors in operation and maintenance**"	Suggest changing the text to. "To the extent practicable, the design shall prevent: …. 4. the possibility of failure of	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It is unclear how "the possibility of harmful consequences of errors in operation and maintenance" is considered to be a physical barrier. The intent should be to defend engineered barriers against human errors.	engineered barriers from errors in operation and maintenance that could result in harmful consequences”.	
34.	Candu Energy Inc.	6.2	“4. **shielding against radiation**” Changing the definitions of the fundamental safety functions requires additional clarification. The current draft GD-337 does not provide any context or clarification on "shielding against radiation" as a fundamental safety function. Suggest making the statement of the fundamental safety function more explicit to worker protection.	Suggest changing the text to: “4. shielding against radiation for worker access”	No change. Text is aligned with IAEA SSR 2/1.
35.	Bruce Power	6.2	“4. shielding against radiation” Changing the definitions of the fundamental safety functions requires additional clarification. The current draft GD-337 does not provide any context or clarification on "shielding against radiation" as a fundamental safety function. Furthermore, IAEA Safety Report Series 46 does not explicitly list "shielding against radiation" as a fundamental safety function. One could include a fundamental safety function that directly relates to the fundamental safety function to the Radiation Protection regulations.	Suggest changing the text to: “4. shielding against radiation for worker access”	No change. Text is aligned with IAEA SSR 2/1.
36.	OPG	6.2	“4. shielding against radiation” Context needs to be added. It is unclear what the requirements would be.	Suggest that part 4 be re-written as follows: “4. shielding against radiation for worker access”	No change. Text is aligned with IAEA SSR 2/1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
37.	Candu Energy Inc., Bruce Power	6.2	“This approach **shall** identify the need for such functions as reactor shutdown, emergency core cooling, containment, emergency heat removal and power systems etc.” Editorial: Suggest deleting “etc”.	Suggest changing the text to: “This approach shall identify the need for such functions as reactor shutdown, emergency core shutdown, emergency core cooling, containment, emergency heat removal and power systems.”	Agreed. Text revised as suggested.
38.	Jerry Cuttler Cuttler&Assoc	6.2	Item 5 - Change ‘substances’ to ‘exposures’		No change. See section 3 item 4 for statutory basis for this requirement.
39.	Jerry Cuttler Cuttler&Assoc	6.4	2nd para Replace ‘as low as reasonably achievable’ (vague, not conservative’) with “shall be **controlled**’ 4th para replace ‘overall risk’ with ‘overall radiation exposure’		No change. See response to comment #1 regarding use of ALARA.
40.	Jerry Cuttler Cuttler&Assoc	6.6	Item 2 Replace ‘minimize’ with ‘prevent unsafe’		No change. See response to comment #1 regarding use of ALARA.
41.	Candu Energy Inc., Bruce Power	6.6.1	“**The design shall take due account of challenges to a multi-unit site.**” The use of the term "multi-unit site" can lead to confusion. One can have a site with multiple units as part of a single build project, or the addition of one or more units to an existing site where one or more units are already in operation.	Suggest changing the text to: “The design shall take due account of challenges to multiple units at a site.”	Agreed. Text revised as suggested.
42.	Jerry Cuttler Cuttler&Assoc	6.6.1	Add ‘and benefits of’ The design shall take due account of challenges **and benefits** of a multi-unit site		No change. Demonstration of benefit is not a regulatory requirement.
43.	Candu Energy Inc., Bruce Power	7.1	“SSCs important to safety **shall** include:…. 2. complementary design features”	No change to the text.	No change. Temporary on site or offsite equipment and services used in severe accident management are considered as part

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Portable equipment – such as emergency mitigating equipment, and pumps should not necessarily constitute systems important to safety. More clarification is required on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for existing nuclear power plants. This additional clarification should be included in GD-337.		of complementary design features. Guidance section of document provides clarification.
44.	Candu Energy Inc., Bruce Power	7.1	"Appropriately designed interfaces **shall be provided** between SSCs of different classes **in order** to minimize the risk of having ~~an~~ SSCs less important to safety ~~from~~ adversely affecting the function or reliability of an SSCs of greater importance." Editorial: Change "…of an SSCs of …" to "… of SSCs of …".	Suggest changing the text to: "Appropriately designed interfaces shall be provided between SSCs of different classes in order to minimize the risk of having SSCs less important to safety adversely affecting the function or reliability of ~~an~~ SSCs of greater importance."	Agreed. Text revised as suggested.
45.	OPG	7.1	"SSCs important to safety shall include: 2. complementary design features" Portable equipment – such as emergency mitigating equipment, and pumps should not necessarily constitute systems important to safety. More clarification is required on positioning	No change to the text. More information needed in GD-337.	No change. Temporary on site or offsite equipment and services used in severe accident management are considered as part of complementary design features. Guidance section of document provides clarification.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for existing nuclear power plants. This additional clarification should be included in GD-337.		
46.	Candu Energy Inc., Bruce Power	7.2	"The design authority **shall** establish the plant design envelope, which comprises **all plant states considered in the design: normal operation, AOOs, DBAs and DECs, as shown in Figure 1**. The design basis **shall** specify the capabilities that are necessary for the plant **in operational states** and DBAs. Conservative design measures and sound engineering practices **shall be** applied in the design basis for **operational states** and DBAs. This **will** provide a high degree of assurance that no significant damage will occur to the reactor core, and that radiation doses will remain within established limits. Complementary design features address the performance of the plant in **DECs**. ~~including selected severe accidents.~~" The description in the current version of RD-337 follows a better logic: • plant design envelope covers the overall plant, • design basis and complementary design features make up the two subsets of the plant design envelope, and then • associating the applicable plant states	Suggest changing the text to: "The design authority shall establish the plant design envelope, which comprises: • the design basis, which shall specify the capabilities that are necessary for the plant in operational states, DBAs and some conditions from internal and external hazards, and • complementary design features, which shall address the performance of the plant in **DECs**. Conservative design measures and sound engineering practices **shall be** applied in the design basis for **operational states** and DBAs. This **will** provide a high degree of assurance that no significant damage will occur to the reactor core, and that radiation doses will remain within established limits." Suggest deleting Figure 1 from RD-337. Suggest adding the following text	No change. See response to comment #10 concerning DECs.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			with the design basis and the complementary design features. According to requirement 14 in IAEA SSR-2/1 (which is indicated by CNSC as a basis of RD-337 version 2), design basis specifies the capabilities necessary for operational states (NO & AOO), DBAs and internal and external hazard conditions. So RD-337 definition of design basis should include the internal & external hazard conditions, for clarity. However, RD-337 version 2 section 7.4.1 shows internal events can be classified as AOO, DBA or DEC; and RD-337 version 2 section 7.4.2 shows external events can be classified as DBA or DEC. This means that internal and external events can be considered either design basis (if classified AOO or DBA) or complementary design features (if classified as DEC). If this is true, then the proposed change has to include "some conditions from internal and external hazards". The criteria for classification of internal/external hazards as DBA or DEC are not clearly explained in GD-337. Since Figure 1 shows the plant states, it is more appropriate to include it in Section 7.3 of GD-337. It is also suggested that GD-337 could include a version of Figure 1 that also shows the design basis and complementary design features against the operational states and	to Section 7.3 GD-337 along with Figure 1: “The relationship between the plant design envelope and the plant states is shown in Figure 1.”	

#	Organization	Section	Comment	Suggested Change	CNSC Response
			accident conditions.		
47.	OPG	7.2 7.3 7.4	The DECs was introduced as a new concept to cover the BDBAs range for which the design needs to provide mitigation capabilities. It is not clear what the relation of DEC is with the BDBAs and severe accidents as a subset of the BDBAs. The Notes on page 15 (Section 7.3.4) clarifies that DEC is a sub-set of BDBA. However, the document layout presents the Severe Accidents in section 7.3.4.1 as a subsection of 7.3.4 Design Extension Conditions. This seems to indicate that DECs include the severe accidents without providing a cut off point or threshold for what range of severe accidents are included in the DEC.	The preferred option would be to continue using the term Beyond Design Basis Accidents. However, if the term DEC is continued to be used, additional clarification is needed. How is design extension different than design basis for a new plant? Clarification is required.	No change. See response to comment #10 concerning DECs.
48.	Candu Energy Inc.	7.3	“Plant states **considered in the design are** grouped into the following four categories:” Editorial: Change to rephrase the text as a requirement.	Suggest changing text to: "The following four categories of plant states **shall be** considered in the design:"	Agreed. Text changed as per Bruce Power proposed wording in comment #49.
49.	Bruce Power	7.3	“Plant states considered in the design are grouped into the following four categories:” Editorial: Change to rephrase the text as a requirement.	Suggest changing text to: “Plant states considered in the design shall be grouped into the following four categories:”	Agreed. Text changed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
50.	Candu Energy Inc., Bruce Power	7.3	"4. **Design Extension Conditions— accident conditions, not considered design basis accidents, which are taken into account in the design of the facility. Note: DECs are a subset of beyond design basis accidents (BDBAs).** BDBAs are accident conditions less frequent and more severe than design basis accidents. A BDBA may or may not involve core degradation." 1) Use of Beyond Design Basis Accident is preferred because it is the commonly used term in the Canadian nuclear industry. 2) Also, since requirements for BDBAs have included severe accident conditions in the spent fuel bay to address the Fukushima lessons learned, it is suggested to replace "core degradation" with "core/fuel degradation". 3) If it is decided to adopt the "design extension conditions terminology from the IAEA, then the text regarding DECs should be the same as the IAEA use of the term "design extension conditions" in IAEA SSR 2/1. The IAEA definition for DECs does not consider DECs to be a subset of BDBAs. 4) Bullet 4 should be revised as suggested to make it consistent with IAEA SSR 2/1.	Suggest changing the text to: "4. Beyond Design Basis Accidents - accident conditions less frequent and more severe than a design basis accident. A BDBA may or may not involve core/fuel degradation." If "design extension conditions" is adopted, suggest changing text to: "4. Design Extension Conditions— accident conditions that are not considered for design basis accidents, but that are considered in the design process of the facility in accordance with best estimate methodology, and for which releases of radioactive material are kept within acceptable limits. Design extension conditions could include severe accident conditions."	1) No change. See response to comment #10 concerning DECs. 2) Text revised to provide greater clarity as follows: "a subset of beyond design basis accidents that are considered in the design process of the facility in accordance with best estimate methodology to keep releases of radioactive material within acceptable limits. Design extension conditions could include severe accident conditions". The definition of severe accident has been revised to include "severe fuel degradation in the reactor core or spent fuel pool." 3) The definition has been revised as shown above to more closely align with the IAEA and improved for clarity. 4) Agreed. Text revised as described above.
51.	Jerry Cuttler Cuttler&Assoc	7.3.1	Item 3 - Remove 'taking the ALARA principle into consideration" (ALARA is vague, not conservative)		No change. See response to comment #1 regarding use of ALARA.
52.	Candu Energy Inc., Bruce Power	7.3.3	"Provision **shall** also be made to support timely detection of, and manual response to, conditions where prompt action is not necessary."	Suggest changing text to: "Provision shall also be made to support timely detection of, and	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Editorial: Replace "where" with "when".	manual response to, conditions **when** prompt action is not necessary."	
53.	OPG	7.3.4	Design extension conditions Definition for design extension conditions is unclear. No guidance has been given for cut-off conditions (either probabilistic or judgement based).	A more comprehensive definition of DEC is required that provides a clear distinction between DBAs, DECs and BDBAs See comment below.	No change. See response to comment #10 concerning DECs. A list of DECs will depend on the design and is to be proposed by the designer for CNSC's review.
54.	Candu Energy Inc., Bruce Power, OPG	7.3.4	"**The design shall be such that plant states that could lead to significant radioactive releases are practically eliminated; if not, only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.**" The use of the term "practically eliminated" requires further clarification. This clarification is not provided in GD-337. The text should be revised to put it into context with respect to meeting the safety goals. The use of the phrase "only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public" requires further clarification. Is this phrase intended to make reference to the use of sheltering, evacuation and relocation? If so, it is suggested that the text be changed to be consistent with the idea of "implementation of offsite emergency measures".	Suggest changing the text to: "The design shall be such that plant states that could lead to significant radioactive releases are minimized such that the safety goals are met; if not, only protective measures that are capable of contributing to the reduction of radioactivity releases to allow sufficient time for the implementation of off-site emergency procedures shall be necessary."	No change. "Practically eliminated" is defined in Glossary. Protective measures may include sheltering, evacuation and relocation. These measures shall be of limited scope in terms of area and time. Wording is used to maintain alignment with IAEA SSR 2/1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
55.	Candu Energy Inc., Bruce Power	7.3.4	"…the design **shall** provide biological shielding of appropriate composition and thickness in order to protect operational personnel **during DECs, including DECs involving severe accidents.**" The phrase 'including DECs involving severe accidents' is an unnecessary addition – the DECs are supposed to be identified by the design authority per this section and the definition of DECs includes severe accidents. Also, use of the term BDBAs is preferred.	Suggest changing the text to: "…the design shall provide biological shielding of appropriate composition and thickness in order to protect operational personnel during BDBAs." Bruce Power's suggested text: "…the design shall provide biological shielding of appropriate composition and thickness in order to protect operational personnel during DECs."	Agreed. Text revised as suggested.
56.	Candu Energy Inc., Bruce Power	7.3.4	Discussion of the term "**Design Extension Conditions**" throughout this section. Use of the term BDBAs is preferred.	Suggest revising the text to discuss BDBAs rather than DECs.	No change. See response to comment #10 concerning DECs.
57.	Jerry Cuttler Cuttler&Assoc	7.3.4	1) Add to end of 1st para It is acknowledged that the safety of most operating NPPs is already excellent. The safety goals of clause 4.2.2 are met.		1) No change. Commenting on the status of operating NPPs is outside the scope of this regulatory document.
58.	Jerry Cuttler Cuttler&Assoc	7.3.4.1	1) 7th para Reposition paragraph to be 3rd para from bottom of section 7.3.4.1 2) and add the following **Provision shall be made for a controlled venting of containment. Provide overpressure protection, with filtering of radioactive particles.**		1) Agreed. Paragraph repositioned. 2) No change. If provision for controlled venting is necessary to protect containment, it is already required by the existing text in sections 7.3.4.1. See also section 8.6.12 which requires that unfiltered and uncontrolled releases are precluded.
59.	Candu Energy Inc., Bruce	7.3.4.1	"Early in the design process, the various potential barriers to core degradation **shall be**	Suggest changing text to:	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Power		identified, and features that can be incorporated to halt core degradation at those barriers **shall be provided**." The requirements in section 7.3.4.1 do not explicitly consider beyond design basis accidents for the spent fuel bays that include postulated significant fuel damage. Suggest replacing "core degradation" with "core/fuel degradation"	"Early in the design process, the various potential barriers to **core/fuel degradation shall be** identified, and features that can be incorporated to halt **core/fuel degradation** at those barriers **shall be provided."**	
60.	Candu Energy Inc., Bruce Power, OPG	7.3.4.1	"Containment **shall** also **prevent** uncontrolled releases of radioactivity after this period." For some low probability severe accidents (some including impairments of containment), this may not be possible. OPG stated: Indicating that containment shall prevent uncontrolled releases – but for some low probability severe accidents, (some including impairments of containment), this may not be possible.	Suggest changing the text to: "Containment **shall** also **prevent** uncontrolled releases of radioactivity after this period **to the extent practicable**".	No change. Such severe accidents must be practically eliminated and therefore not be part of DEC. Additional guidance is added to the document. Containment leakage in a severe accident should remain below the design leakage rate limit (as defined in section 8.6.4) for sufficient time to allow implementation of emergency measures. Beyond this time, gross leakage that would lead to exceeding the small and large release safety goals should be precluded. This may be achieved by provision of adequate filtered containment venting.

#	Organization	Section	Comment	Suggested Change	CNSC Response
61.	Candu Energy Inc., Bruce Power	7.3.4.1	“**The design shall include redundant connection points (paths) to provide for water and electrical power which may be needed to support severe accident management actions.**” Providing redundant connection points may mean introducing sharing of flow paths. Deleting "(paths)" will lead to less confusion.	Suggest changing text to: “The design shall include redundant connection points to provide for water and electrical power which may be needed to support severe accident management actions.”	Agreed. Text revised as suggested.
62.	Candu Energy Inc., Bruce Power	7.3.4.1	“The design authority **shall** establish initial severe accident management guidelines**,** taking into account the plant design features **including multi-unit requirements**, and the understanding of accident progression and associated phenomena.” The use of the term "multi-unit requirements" can lead to confusion. One can have a site with multiple units as part of a single build project, or the addition of one or more units to an existing site where one or more units are already in operation.	Suggest changing text to: “The design authority shall establish initial severe accident management guidelines**,** taking into account the plant design features **including requirements for multiple units at a site**, and the understanding of accident progression and associated phenomena.”	Agreed. Text revised as suggested.
63.	Candu Energy Inc., Bruce Power	7.4	“Postulated initiating events can lead to AOOs, **DBAs or BDBAs**, and include credible failures or malfunctions of SSCs, as well as operator errors, common-cause internal hazards, and external hazards.” Use of the term BDBAs is preferred. However, if the term “DECs” is adopted, then the text should be changed to replace “BDBAs” with “DECs”.	Suggest retaining BDBAs. If DECs is adopted, suggest changing text to: “Postulated initiating events can lead to AOOs, **DBAs or DECs**, and include credible failures or malfunctions of SSCs, as well as operator errors, common-cause internal hazards, and external hazards.”	No change. The term DEC was introduced to provide a clear distinction between those BDBAs that are considered in the design and those that are not. This regulatory document places physical design requirements for a subset of BDBAs. This subset is DECs. Furthermore, the term has been adopted by IAEA in SSR-2/1 and the change in terminology maintains the alignment with IAEA standards.

#	Organization	Section	Comment	Suggested Change	CNSC Response
					The definition of DECs has been changed to match SSR-2/1. However, CNSC staff have not adopted all the clauses related to DECs from SSR-2/1 since they are not internally consistent. See for example, paragraph 5.31 which refers to “DECs that have been practically eliminated”. This should read “plant states that have been practically eliminated” to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are “practically eliminated.” CNSC does not believe it is possible or necessary to make design provision against events that are practically eliminated. Furthermore CNSC does not believe that SSR-2/1 intended this meaning.
64.	Candu Energy Inc., Bruce Power	7.4	“**For a multi-unit site, the design shall take due account of the potential for specific hazards simultaneously impacting several units on the site.**” The use of the term "multi-unit site" can lead to confusion. One can have a site with multiple units as part of a single build	Suggest changing the text to: “**For a site with multiple units**, the design shall take due account of the potential for specific hazards simultaneously impacting several units on the site.”	Agreed. Text changed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			project, or the addition of one or more units to an existing site where one or more units are already in operation.		
65.	Jerry Cuttler Cuttler&Assoc	7.4.1	Remove word ‘pipe whip’. Remove 'pipe whip' or provide evidence that pipe whip has ever occurred in any nuclear plant that used pipes that comply with ASME codes or CSA N285 designed pipes.		No change. Since we postulate failure of pipes containing high energy fluid, pipe whip is assumed to be possible.
66.	Candu Energy Inc., Bruce Power, OPG	7.4.2	“Applicable natural external hazards **shall** include such events as earthquakes, droughts, floods, high winds, tornadoes, tsunami, and extreme meteorological conditions, **and shall consider the effects of climate change.**” Considering the effects of climate change during the design stage introduces too much uncertainty for the purposes of defining the design basis. The principle of maintaining appropriate design margin and considering the risks in the probabilistic safety assessments is more appropriate. Suggest deleting “**and shall consider the effects of climate change**”. The requirements in section 9.5 of RD-337 and in S-294 capture the considerations for changes in the frequencies of occurrence of extreme meteorological conditions, and hence, address consideration for the effects of climate change.	Suggest changing the text to: “Applicable natural external hazards shall include such events as earthquakes, droughts, floods, high winds, tornadoes, tsunami, and extreme meteorological conditions.”	No change. The requirement is to “consider the effects of climate change”. It is appropriate to consider the possible effects that may apply to the site. For effects that are evaluated as credible, the designer should make appropriate allowance, for example in terms of added design margins.

#	Organization	Section	Comment	Suggested Change	CNSC Response
67.	Jerry Cuttler Cuttler&Assoc	7.4.2	3rd para Applicable natural external hazards shall include such events as earthquakes, droughts, floods, high winds, tornadoes, tsunami, and extreme meteorological conditions, ~~and shall consider the effects of climate change~~. (remove) (There is no scientific evidence of climate change. We cannot design for this.)		No change. CNSC recognizes that not everyone accepts the reality of climate change. However, it is prudent to consider the possible effects in the design.
68.	Jerry Cuttler Cuttler&Assoc	7.6	1st para Changes as indicated – All SSCs important to safety **shall** be designed with sufficient ~~quality and~~ (*how much quality is sufficient?*) reliability to meet the design limits. A reliability analysis **shall** be performed for ~~each of these~~ appropriate SSCs to demonstrate that reliability targets have been met.		No change. The quality must be sufficient to meet the design limits. The proposed modification to the second sentence changes the scope of required reliability analysis.
69.	Candu Energy Inc., Bruce Power	7.6.1	"Failure of a number of devices or components to perform their functions may occur as a result of a single specific event or cause. Common-cause failures may also occur when multiple components of the same type fail at the same time. This may be caused by occurrences such as a change in ambient conditions, saturation of signals, repeated maintenance error or design deficiency." Suggest moving this text to GD-337, because it only contains clarification for the next paragraph and not requirements.	Suggest that this text be moved to GD-337.	Agreed. Text moved to guidance.

#	Organization	Section	Comment	Suggested Change	CNSC Response
70.	Candu Energy Inc., Bruce Power	7.6.1	“Such failures **may** simultaneously affect a number of different items important to safety. The event or cause may be a design deficiency, a manufacturing deficiency, an operating or maintenance error, a natural phenomenon, a human induced event, or an unintended cascading effect from any other operation or failure within the plant.” RD-337 version 2 preface indicates "may" is used to express an option or permission while "can" is used to express possibility or capability. Using "may" in the first sentence means that CNSC allows failures which affect a number of different ITS items, and I think this is not the intent. Using "could" instead of "may" in both sentences is preferred.	Suggest changing the text to: "Such failures **could** simultaneously affect a number of different items important to safety. The event or cause **could** be a design deficiency, a manufacturing deficiency, an operating or maintenance error, a natural phenomenon, a human induced event, or an unintended cascading effect from any other operation or failure within the plant."	Agreed. Text revised as suggested.
71.	Candu Energy Inc., Bruce Power	7.6.1.1	“Where space sharing is necessary, services for safety and for other important process systems **shall be** arranged in a manner that incorporates the following considerations:” Change “services for safety and for other important process systems” to “services for safety systems and for other process systems important to safety" to achieve improved clarity.	Suggest changing the text to: "Where space sharing is necessary, **services for safety systems and for other process systems important to safety** shall be arranged in a manner that incorporates the following considerations".	Agreed. Text revised as suggested.
72.	Candu Energy Inc.	7.6.2	“2. all identifiable but non-detectable failures, including those in the non-tested components” The inclusion of identifiable, but non-detectable failures, including those in non-tested components appears to exceed the definition and intent of “single failure criterion”, as described in IAEA Specific Safety Guide SSG-2, Deterministic Safety	Suggest deleting: “2. all identifiable but non-detectable failures, including those in the non-tested components”	No Change. IAEA SSG-2 does not indicate that item 2 should be excluded. Additional guidance is provided to indicate that the Safety group should still be functional when all identifiable but non-detectable failures happen, including those in the non-tested components.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Analysis for Nuclear Power plants. Suggest deleting this requirement or provide additional clarification on the expectations for meeting this requirement in GD-337.		
73.	Candu Energy Inc., Bruce Power	7.6.2	“Design documentation **shall include** ~~analytical~~ justification of such exemptions, by **analysis and testing**.” The requirement should allow the use of analysis, testing or a combination of analysis and testing.	Suggest changing the text to: “Design documentation shall include justification of such exemptions, by **analysis, testing or analysis and testing**.	Agreed. Text revised to: “Design documentation shall include justification of such exemptions, by **analysis, testing or a combination of analysis and testing”.**
74.	Candu Energy Inc., Bruce Power	7.8	"Equipment **and instrumentation** credited to operate **during DECs shall be demonstrated, with reasonable confidence, to be capable of performing ~~its~~ their** intended function under the expected environmental conditions." Editorial: add "safety" to function	Suggest changing text to: "Equipment and instrumentation credited to operate during DECs shall be demonstrated, with reasonable confidence, to be capable of performing their intended **safety** function under the expected environmental conditions."	Agreed. Text revised as suggested.
75.	Candu Energy Inc., Bruce Power	7.9.1	Section title: “**General ~~Consideration~~**” Editorial: Replace “consideration” with “requirements” in the section title	Suggest changing the Section title to: "General **requirements**".	No change. The title is “7.9.1 General”. The word “considerations” is removed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
76.	Candu Energy Inc., Bruce Power	7.9.2	“A top-down software development process **shall be** used to facilitate verification and validation activities. This approach **shall** include verification at each step of the development process to demonstrate that the respective product is correct, and validation to demonstrate that the resulting computer-based system or equipment meets its functional and performance requirements.” Editorial: Suggest revising the text to improve clarity.	Suggest changing the text to: “A top-down software development process shall be used to facilitate verification and validation activities. Verification at each step of the development process shall demonstrate that the respective product is correct, and validation shall demonstrate that the resulting computer-based system or equipment meets its functional and performance requirements.”	No change. Text is clear.
77.	Candu Energy Inc., Bruce Power	7.12.1	Section title: “**General provisions**” Editorial: Replace “provisions” with “requirements”.	Suggest changing the section title to: “General **requirements**”	Agreed. Text changed to “7.12.1 General” for consistency with rest of document.
78.	Jerry Cuttler Cuttler&Assoc	7.12.2	Item 2 Remove ‘decreased risk’ with ‘low probability’		Agreed. Text revised as suggested.
79.	Jerry Cuttler Cuttler&Assoc	7.12.3	Change as indicated: The design shall ~~minimize~~ prevent the release and dispersion of significant hazardous substances ~~or~~ and radioactive material to the environment. ~~and shall minimize~~ The design shall have provisions to mitigate the impact of any releases or dispersions, including those resulting from fire.		No change. Minimizing releases is complementary to ALARA. See response to comment #1.
80.	Candu Energy Inc.	7.13	Section title: “**Seismic qualification**” Editorial: Change section title to “Seismic design and qualification”, because section 7.13.1 addresses more than just seismic qualification.	Suggest changing the section title to: “Seismic **design and** qualification”	Agreed. Text changed to “Seismic qualification and design”
81.	Jerry Cuttler Cuttler&Assoc	7.13	Change as indicated: All SSCs shall meet the seismic qualification		No change. The proposed change implies that all SSCs must be

#	Organization	Section	Comment	Suggested Change	CNSC Response
			requirements of Canadian national or equivalent standards.		seismically qualified.
82.	Candu Energy Inc., Bruce Power, OPG	7.13.1	"**A beyond design basis earthquake shall be considered a DEC. SSCs credited to function during and after a beyond design basis earthquake shall be demonstrated to be capable of performing their intended function under the expected conditions. Such demonstration shall provide high confidence of low probability of failure under beyond design basis earthquake conditions for these SSCs.**" The statement "A beyond design basis earthquake shall be considered a DEC." appears to be redundant. By using the term "beyond design basis earthquake", the definition of "design extension conditions is already satisfied. If necessary, additional clarification can be included in GD-337 to explain that beyond design basis earthquakes are considered to be design extension conditions.	Suggest changing the text to: "SSCs credited to function during and after a beyond design basis earthquake shall be demonstrated to be capable of performing their intended function under the expected conditions. Such demonstration shall provide high confidence of low probability of failure under beyond design basis earthquake conditions for these SSCs."	Partly agree. First sentence changed to: "A beyond design basis earthquake shall be identified that meets the requirements for identification of DEC as described in section 7.3.4". The intention is to select the BDBE in the DEC range enabling DEC rules for analysis etc. (best estimate analysis, reasonable confidence).
83.	Candu Energy Inc., Bruce Power, OPG	7.13.1	"Seismic fragility levels **shall be** evaluated for SSCs important to safety by analysis or, where possible, by testing." Suggest adding to this clause that this should only apply to SSCs "that are credited to withstand a design basis earthquake (DBE)"	Suggest changing the text to: "Seismic fragility levels shall be evaluated for SSCs important to safety **that are credited to withstand a design basis earthquake** by analysis or, where possible, by testing."	No change. The concept of fragility applies to DBE as well as BDBE.
84.	Candu Energy Inc., Bruce Power	7.15.2	"The design **shall** enable implementation of periodic inspection programs for structures related to nuclear safety, **in order** to verify as-constructed conditions." Editorial: "structures related to nuclear	Suggest changing the text to: "The design shall enable implementation of periodic inspection programs for structures **important to safety**, in order to	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			safety" should be "structures important to safety" to be consistent with the terminology and requirements in section 7.1 of RD-337 version 2. Further clarity for "to verify as-constructed conditions" is needed.	verify that the as-constructed structures meet their functional and performance requirements."	
85.	Candu Energy Inc.	7.15.3	Section title: "**Lifting of large loads**" Editorial: Change "Lifting of large loads" to "Lifting and handling of large loads" to make the title more representative of the discussion in this section.	Suggest changing the section title to: "Lifting **and handling** of large loads"	Agreed. Text revised as suggested.
86.	Candu Energy Inc., Bruce Power	7.17	"**Additional requirements can be found in RD-334, Aging Management for Nuclear Power Plants.**" Not stated as a requirement. The sentence currently is included in GD-337.	Suggest deleting from RD-337.	Text changed to: "Additional requirements are provided in RD-334, Aging Management for Nuclear Power Plants."
87.	Candu Energy Inc., Bruce Power	8.1	"**All foreseeable reactor core configurations, for various appropriate operating schedules shall be considered in the core design.**" Need improved clarity.	Suggest changing the text to: "The design shall consider all foreseeable reactor core configurations for normal operation, AOOs and DBAs."	Agreed. Text changed to: "The design shall consider all foreseeable reactor core configurations for normal operation".
88.	Jerry Cuttler Cuttler&Assoc	8.1	Does anyone else know what crud is? – It means "Chalk River unidentified deposit." Is there a better word instead of crud?		Agreed. Text revised as suggested.
89.	Candu Energy Inc.	8.1.1	"Fuel assemblies **shall be** designed to permit adequate inspection of their structures and component parts prior to and following irradiation." Editorial: Change "component parts" to "components" to use terminology consistent with that used in RD-337.	Suggest changing the text to: "Fuel assemblies shall be designed to permit adequate inspection of their structures and components prior to and following irradiation."	*Note: section has been renumbered to 8.1.4* Agreed. Text revised as suggested.
90.	Candu Energy Inc.	8.2.1	"The components of the reactor coolant pressure boundary **shall** be designed,	Suggest changing the text to:	No change. Text is clear.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			manufactured, and arranged in a manner that permits adequate inspections and tests of the boundary, **support structures and components** throughout the lifetime of the plant." Editorial: Change "support structures and components" to "pressure retaining components and supports" to use terminology consistent with that commonly used for pressure-retaining systems, structures and components.	"The components of the reactor coolant pressure boundary shall be designed, manufactured, and arranged in a manner that permits adequate inspections and tests of the boundary, **pressure retaining components and supports** throughout the lifetime of the plant."	
91.	Candu Energy Inc.	8.2.2	"**Means of estimating the core coolant inventory in DECs shall be provided, to the extent practicable.**" The requirement for means of estimating the core coolant inventory in DECs should take into account whether the severe accident management guidelines are dependent on having this information to guide operator actions.	Suggest changing the text to: "**Where called upon in severe accident management guides,** means of estimating the core coolant inventory in DECs shall be provided, to the extent practicable."	No change. If no provision for inventory measurement is made, then the SAMGs will not call for it. Therefore measurement is not required. The argument becomes circular. Practicability is defined in the glossary and includes cost-benefit considerations. If the measurement is not useful then it is not required.
92.	Candu Energy Inc., Bruce Power	8.3.3	"The axes of the turbine generators **shall be** oriented in such a manner as to minimize the potential for any missiles ~~that~~ **which may** result from a turbine break-up striking the containment, or striking other SSCs important to safety." The requirement is technology specific and should be written to be technology neutral.	Suggest changing the text to: "The design of the nuclear plant shall be such as to minimize the potential of any missiles from a turbine break-up striking the containment, or striking other SSCs important to safety."	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
93.	Candu Energy Inc., Bruce Power, OPG	8.4	“**Means shall be provided to ensure that there is a capability to shut down the reactor in DECs, and that the shutdown condition can be maintained even for the most limiting conditions of the reactor core, including severe degradation of the reactor core.**” Does this include core melt? What does a “shutdown condition” mean in the context of a severe degradation of the reactor core? Does this relate to adequate cooling of a severely degraded core? Maintaining the reactor sub-critical is believed to be the intent of this section.	Suggest changing the text to: “Means shall be provided to ensure that there is a capability to shut down the reactor in DECs, **and maintaining the reactor subcritical** even for the most limiting conditions of the reactor core, including severe degradation of the reactor core.”	Agreed. Text changed to “Means shall be provided to ensure that there is a capability to shut down the reactor in DECs, **and to maintain the reactor subcritical** even for the most limiting conditions of the reactor core, including severe degradation of the reactor core.”
94.	Jerry Cuttler Cuttler&Assoc	8.4	7th para Replace ‘degree’ with ‘amount’ 'the maximum ~~degree~~ amount of positive reactivity'		Agreed. Text revised as suggested.
95.	Candu Energy Inc., Bruce Power	8.4.1	“There **shall** be no gap in trip coverage for any operating condition (such as power, temperature **or plant age**) within the OLCs.” ‘Plant age’ isn’t an operating condition. Suggest rewording as ‘such as power and temperature, and taking into account plant aging’.	Suggest changing the text to: “There shall be no gap in trip coverage for any operating condition (such as power, temperature **and taking into account plant aging)** within the OLCs.”	Agreed. Text changed to: “There shall be no gap in trip coverage within the OLCs for any operating condition (such as power, temperature), **taking into account plant aging**.”
96.	Candu Energy Inc., Bruce Power	8.4.1	“~~A different level of effectiveness may be acceptable for the additional trip parameters.~~” Version 2 of RD-337 has deleted “A different level of effectiveness may be acceptable for the additional trip parameters.” Clarification is needed to explain the CNSC staff’s decision to delete this statement from RD-337.	Suggest changing the text to restore the statement that was in RD-337 version 1: “A different level of effectiveness may be acceptable for the additional trip parameters.”	Text reinstated.

#	Organization	Section	Comment	Suggested Change	CNSC Response
97.	Candu Energy Inc., Bruce Power	8.6.1	"**In particular, the containment and its safety features shall be able to perform their credited functions during accident conditions, including melting of the reactor core.**" The first part of this paragraph states that containment is to minimize release of radioactive material during operational states and DBAs, and assist in mitigating the consequences of DECs. Assuming that 'melting of the reactor core' is covered under DBAs and DECs, there is no need for this sentence.	Suggest deleting: "In particular, the containment and its safety features shall be able to perform their credited functions during accident conditions, including melting of the reactor core."	No change. Text was added for emphasis and consistency with SSR-2/1.
98.	Jerry Cuttler Cuttler&Assoc	8.6.1	1st sentence – Change 'minimize' to 'control'		No change. See response to comment #1 regarding ALARA.
99.	Candu Energy Inc., Bruce Power	8.6.4	"To the extent practicable, penetrations **shall** be designed to allow individual testing of each penetration." This sentence is stating a technology specific design requirement. Also, Section 8.6.5 includes a similar, but not identical requirement "All penetrations **shall** be designed to allow for periodic inspection and testing."	Suggest deleting: "To the extent practicable, penetrations shall be designed to allow individual testing of each penetration."	Agreed. Text deleted to avoid duplication with section 8.6.5.
100	Candu Energy Inc., Bruce Power	8.6.5	"All containment penetrations **shall** be subject to the same design **requirements** as the containment structure itself, and **shall** be protected from reaction forces stemming from pipe movement or accidental loads, such as those due to missiles **generated by external or internal events**, jet forces, and pipe whip." Editorial: Change "jet forces" to "jet impact" to be consistent with the definition in the glossary and other sections of RD-337.	Suggest changing the text to: "All containment penetrations shall be subject to the same design requirements as the containment structure itself, and shall be protected from reaction forces stemming from pipe movement or accidental loads, such as those due to missiles generated by external or internal events, **jet impact**, and pipe whip."	Agreed. Text revised as suggested.
101	Candu Energy	8.6.6	"1. The design parameters are the same as	Suggest changing the text to:	Partly agree. Text change to

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Inc.		those for a piping extension to containment, and are subject to the requirements for metal penetrations of containment. 2. All piping and components that are open to the containment atmosphere are designed for a pressure greater than the containment design pressure. 3. The piping and components are housed in a confinement structure that prevents leakage of radioactivity to the environment and to adjacent structures. 4. This housing includes detection capability for leakage of radioactivity and the capability to return the radioactivity to the flow path." RD-337 should not state a specific design feature. The text needs to be reworded to state a requirement. It is not necessary to require that any radioactivity leaked from the flow path be returned to the flow path.	"1. The design parameters shall be the same as those for a piping extension to containment, and shall be subject to the requirements for metal penetrations of containment. 2. All piping and components that are open to the containment atmosphere shall be designed for a pressure greater than the containment design pressure. 3. The piping and components shall include design features to prevent uncontrolled and unfiltered leakage of radioactivity to the environment and to adjacent structures. 4. The piping and components shall include detection capability for leakage of radioactivity."	requirements. Item 4. It is agreed that the leakage does not necessarily need to be returned to the same flowpath. Changed end of sentence to "and shall include the capability to deal safely with the leakage."
102	Bruce Power	8.6.6	3. The piping and components are housed in a confinement structure that prevents leakage of radioactivity to the environment and to adjacent structures. 4. This housing includes detection capability for leakage of radioactivity and the capability to return the radioactivity to the flow path. " RD-337 should not state a specific design feature. The text needs to be reworded to state a requirement.	Suggest changing the text to: "3. The piping and components shall include design features to prevent uncontrolled and unfiltered leakage of radioactivity to the environment and to adjacent structures. 4. The piping and components shall include detection	Partly agree. Item 4. It is agreed that the leakage does not necessarily need to be returned to the same flowpath. Changed end of sentence to "and shall include the capability to deal safely with the leakage."

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It is not necessary to require that any radioactivity leaked from the flow path be returned to the flow path.	capability for leakage of radioactivity.”	
103	Candu Energy Inc.	8.6.6	“Where failure of a closed loop is assumed to be a PIE or the result of a PIE, the isolations for reactor coolant system auxiliaries **shall** apply.” This requirement should be written to take into consideration the safety significance of the closed loop, rather than arbitrarily imposing the requirements of the reactor coolant system auxiliaries on all closed loop systems that penetrate containment.	Suggest changing the text to: “Where failure of a closed loop is assumed to be a PIE or the result of a PIE, the isolations **appropriate to the system** shall apply.”	Agreed. Text revised as suggested.
104	Candu Energy Inc., Bruce Power	8.6.12	“Following onset of core damage, the containment boundary **shall** be capable of contributing to the reduction of radioactivity releases to allow sufficient time for the implementation of offsite emergency procedures. This **requirement** applies to ~~a representative set of severe accidents~~ **DECs with core damage**.” The second sentence is unnecessary; the first sentence lays out the containment requirement. Delete from RD-337 and move “This requirement applies to DECs with core damage” to GD-337, because it only provides clarification for the requirement.	Suggest deleting: “This requirement applies to DECs with core damage.”	Agreed. Sentence deleted.
105	Candu Energy Inc., Bruce Power, OPG	8.6.12	“4. **preclude unfiltered and uncontrolled release from containment**” Preclusion of unfiltered or uncontrolled releases from containment may not be possible, particularly for very low probability	Suggest changing the text to: “4. minimize to the extent practical unfiltered and uncontrolled release from containment”	No change. Extremely unlikely events are not included in the DEC set. See response to comment #104 above.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			events		
106	Candu Energy Inc.	8.8	“Where water is required for the EHRS, it **shall** come from a source that is independent of normal supplies.” Suggest the wording be revised to state the safety requirement, rather than requiring a specific design.	Suggest changing the text to: “Where water is required for the EHRS, it shall come from a source that is appropriately designed to function in the class of accidents for which it is credited.”	No change. Text is clear.
107	Candu Energy Inc. , Bruce Power, OPG	8.9.1	**"The design of the emergency power system shall take into account common-cause failures involving loss of normal power supply and standby power supply (if applicable). The emergency power system shall be electrically independent, physically separate and diverse from normal and standby power systems."** The second sentence of this statement contradicts the statement in section 8.9: “The requirements of both the standby and emergency power systems may be met by a single system.” The emergency power system would not be electrically independent, physically separate and diverse from the standby power system, if a single system is used.	Suggest changing the text to: "The design of the emergency power system shall take into account common-cause failures involving loss of normal power supply, and standby power supply (if applicable). The emergency power system shall be electrically independent, physically separate and diverse from normal and standby power systems supply **(if applicable)**."	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
108	Candu Energy Inc., Bruce Power, OPG	8.9.2	"**This is accomplished by the use of an onsite or offsite portable or transportable power sources, or a combination of these.**" The requirements for alternate AC power supplies should allow for use of onsite portable, transportable or fixed power sources or offsite portable or transportable power sources. Bruce Power and OPG stated: Alternate AC power supply (e.g. – Emergency Mitigating Equipment – portable or transportable) – but could be fixed in some designs.	Suggest changing the text to: "This is accomplished by the use of onsite portable, transportable or fixed power sources or offsite portable or transportable power sources, or a combination of these."	Agreed. Text revised as suggested.
109	Jerry Cuttler Cuttler&Assoc	8.10.1	5th para Change 'thermal' to 'temperature'		No change. Thermal includes more than temperature.

#	Organization	Section	Comment	Suggested Change	CNSC Response
110	Candu Energy Inc., Bruce Power, OPG	8.10.4	“3. following indication of the necessity for operator action inside the **control rooms**~~MCR~~, there is at least **30 minutes** available before the operator action is required 4. following indication of the necessity for operator action outside the **control rooms**~~MCR~~, there is a minimum of **1 hour** available before the operator action is required” The basis and justification for changing from an Industry standard of 15 minutes for operator action in the control room and 30 minutes for operator action outside of the control needs to be provided. This change does not appear to be consistent with IAEA guidance.	Suggest changing the text to: “3. following indication of the necessity for operator action inside the **control rooms**, there is at least **15 minutes** available before the operator action is required 4. following indication of the necessity for operator action outside the **control rooms**, there is a minimum of **30 minutes** available before the operator action is required” Bruce Power and OPG suggested changing the text to: “3. following indication of the necessity for operator action inside the control rooms MCR, there is at least 15 minutes available before the operator action is required 4. following indication of the necessity for operator action outside the control rooms MCR, there is a minimum of 30 minutes available before the operator action is required”	No change. IAEA SSR 2/1 5.2 provides high-level requirements such that sufficiently long time be available between detection and action times although it does not specify the values. UK, France and WENRA all ask for 30 min as a minimum period. Section 8.10.4 (the same section) allows for alternative times stating “Alternative action times may be used if justified…”
111	Jerry Cuttler Cuttler&Assoc	8.11	1st para Remove requirement for ALARA in the following sentence. (ALARA is vague, not conservative) The design shall include provisions to treat liquid and gaseous effluents in a manner that		No change. See response to comment #1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			will keep the quantities and concentrations of discharged contaminants within prescribed limits, ~~and that will support application of the ALARA principle.~~ 2nd para Replace 'minimize' with 'control'		No change. "Minimize" is the correct term in this context.
112	Jerry Cuttler Cuttler&Assoc	8.11.1	Remove reference to ALARA in the following sentence. (ALARA is vague, not conservative) To ensure that emissions and concentrations remain within prescribed limits, the design shall include suitable means for controlling liquid releases to the environment ~~in a manner that conforms to the ALARA principle.~~		No change. See response to comment #1.
113	Jerry Cuttler Cuttler&Assoc	8.11.2	Item 1 Remove reference to ALARA in the following sentence. (ALARA vague, not conservative) 1. controlling all gaseous contaminants so as to ~~conform to the ALARA principle and~~ ensure that concentrations remain within prescribed limits Second Item 3 Remove reference to ALARA in the following sentence. (ALARA is vague, not conservative) 3. keeping the level of airborne radioactive substances in the plant below prescribed limits, ~~applying the ALARA principle~~ in normal operation		No change. See response to comment #1.
114	Jerry Cuttler Cuttler&Assoc	8.11.3	Item 2 Remove item 2 '~~ensure conformation to the ALARA principle'~~		No change. See response to comment #1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
115	Candu Energy Inc., Bruce Power	8.12	"**The design shall provide barriers to prevent the insertion of incorrect, defective or damaged fuel into the reactor.** **The design shall include provisions to prevent contamination of the fuel and the reactor.**" The designer/licensee should be allowed to meet this requirement through either design and/or programmatic means such as pre fuel loading inspections and checks. The requirement should be stated in more general terms.	Suggest changing the text to: "There shall be barriers to prevent the insertion of incorrect, defective or damaged fuel into the reactor. There shall be provisions to prevent contamination of the fuel and the reactor."	Agreed. Text revised as suggested.
116	Candu Energy Inc.	8.12.2	"**4. providing hydrogen mitigation in the spent fuel pool area**" Hydrogen mitigation in the spent fuel bay area should only be required, if there is a credible event scenario for hydrogen production in the spent fuel bay area. Also, for consistency with standard terminology used in the Canadian nuclear industry, "spent fuel pool" should be "spent fuel bay".	Suggest changing the text to: "4. providing hydrogen mitigation in the spent fuel **bay area, if required**"	No change. Hydrogen mitigation is required in DEC which can not be practically eliminated. It is not necessary if practically eliminated. For clarification, the following text has been added to guidance: "Hydrogen mitigation in the spent fuel pool area is not required if draining of the pool beyond make-up capability can be precluded". Spent fuel pool is consistently used in this document.

#	Organization	Section	Comment	Suggested Change	CNSC Response
117	OPG	8.12.2	Requires provisions to deal with no shielding in the IFBs. By providing provisions to maintain water in the bays, a utility can effectively preclude the requirement for events with absence of pool water shielding.	Add provision for pool water addition to prevent event progression to situation where fuel is uncovered in bay.	Agreed. Text changed to: “5. ensuring that severe accident management actions related to the spent fuel pool can be carried out.” Note that there is the following requirement in 8.12.2: “The design of irradiated fuel storage pools shall include means for preventing the uncovering of fuel in the pool in operational states and accident conditions”.
118	Candu Energy Inc.	9.1	“**Radioactive sources other than the reactor core, such as the irradiated fuel bay, shall be considered. Multi-unit impacts, if applicable, shall be included.**” Suggest revising the first sentence to be consistent with the wording being proposed in the Omnibus changes for RD-310. Also, suggest changing “Multi-unit impacts” to “Impacts for multiple units at a site”.	Suggest changing the text to: “Radioactive sources other than the reactor core, such as the irradiated fuel bay and **fuel handling systems,** shall be considered. Impacts for multiple units at a site, if applicable, shall be included.”	Text revised to be consistent with the omnibus changes for RD-310: “Radioactive sources other than the reactor core, such as the **spent fuel pool** and fuel handling systems, shall be considered. Impacts for multiple units at a site if applicable, shall be included”. Spent fuel pool is consistently used in this document.
119	Bruce Power	9.1	“Radioactive sources other than the reactor core, such as the irradiated fuel bay, shall be considered….” Suggest “Radioactive sources other than the reactor core, such as the irradiated fuel bay and fuel handling systems, shall be considered….” for consistency with the wording being proposed in the Omnibus changes for RD-310.	Suggest changing the text to: “Radioactive sources other than the reactor core, such as the irradiated fuel bay and fuel handling systems, shall be considered….”	See comment #118 above.
120	Candu Energy	9.2	“**8. demonstrate that the design**	Suggest changing the text to:	Agreed. Text changed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Inc., Bruce Power, OPG		**incorporates sufficient safety margins to cliff-edge effects**” The term “cliff-edge effects” should not be used. The impact of this proposed wording requires further evaluation, particularly in light of the work and projects in progress to meet RD-310 requirements. The proposed revised wording is sufficient to capture the issues related to sensitivity analyses and overall safety margins.	“8. demonstrate that the design incorporates sufficient safety margins”	Requirements and guidance for analysis related to cliff-edge effects are in RD-310 and GD-310.
121	Candu Energy Inc., Bruce Power, OPG	9.4	“1. confirm that OLCs comply with the assumptions and intent of the design for normal operation of the plant” Safety analysis results are also often used to derive (as opposed to just confirm) the OLCs for the purpose of compliance. OLCs are derived based on limiting accident scenarios whereby safety objectives can still be demonstrated. The statement in question seems to lack clarity with respect to the safety significance of OLCs under accident conditions and can be misconstrued OLCs are applicable strictly to “normal” operation. Suggest revising this bullet to be consistent with RD-310.	Suggest changing the text to: “1. derive and confirm OLCs that are consistent with the design and safety requirements for the plant”	Agreed. Text revised as suggested.
122	Candu Energy Inc., Bruce Power	9.4	“4. compare the results of the analysis with dose acceptance criteria and design limits” The acceptability of results is usually judged by comparing against dose acceptance criteria and derived design acceptance criteria. Derived design acceptance criteria	Suggest changing the text to: “4. compare the result of the analysis with dose acceptance criteria and derived design acceptance criteria”	Agreed. Text changed to: “4. compare the result of the analysis with dose acceptance criteria and derived acceptance criteria”

#	Organization	Section	Comment	Suggested Change	CNSC Response
			may not necessarily be design limits as they often provide additional allowance for safety margins. Suggest revising this bullet to be consistent with RD-310.	Bruce Power's suggest changing the text to: "4. compare the result of the analysis with radiological dose limits and derived acceptance criteria"	
123	Candu Energy Inc., Bruce Power	9.4	"**7. demonstrate that DECs can be prevented or mitigated by complementary design features and prescribed operator actions**" RD-310 does not distinguish DECs amongst BDBAs with respect to deterministic analysis requirements. The requirements being called upon for DECs here are significantly more stringent than stipulated for BDBAs in RD-310; the new requirement appears to demand treatment of DECs closer to that of DBAs (i.e., deterministic) than BDBAs (i.e., probabilistic). In the case of existing CANDUs, the new requirements for DECs, if they cascade into RD-310, could translate into design changes, which Industry understands is not the intent of RD-310 implementation for existing CANDUs. The CNSC and Industry have been engaged on RD-310 implementation discussion for some time. The introduction of a new requirement for DECs (as part of BDBAs) is significant and has not been brought to the Industry's attention as part of pending changes to RD-310. Industry needs a clear	No change to the text with the understanding that implementation for a new nuclear power plant design can proceed while the Industry takes the necessary time to fully understand its implications on existing reactors and while RD-310 implementation discussions continue.	Text revised to: "demonstrate that significant radioactive releases caused by DECs can be prevented …" The usage here is not intended to extend the scope of safety analysis. Licensees and designers already do deterministic analysis for selected BDBAs and this is already required by RD-310.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			understanding of what this new requirement implies for existing reactors in order to assess the feasibility and approach to compliance.		
124	Candu Energy Inc., Bruce Power, OPG	10.2	Technological options for the design of cooling water systems **shall** consider ~~a closed-cycle~~ **the best available technology and techniques economically achievable (BATEA)** in order to minimize adverse environmental impact. ~~on aquatic biota~~. The introduction of the term "best available technology and techniques economically achievable" goes beyond the current Canadian environmental protection regulations. This is introducing new requirements that may not be consistent with the current Canadian Environmental Protection Act. Delete "the best available technology and techniques economically achievable (BATEA)".	Suggest changing the text to: "Technological options for the design of cooling water systems shall minimize impacts on the environment to the extent practicable, taking social and economic factors into consideration."	No change. The term BATEA is in alignment with the principles of pollution prevention and continuous improvement for sustainable development which is consistent with the principles of the Canadian Environmental Protection Act (CEPA). The term BATEA does not introduce new requirements that are inconsistent with CEPA. Furthermore, licensees are expected to have Environmental Protection Policies to uphold and abide by the principles of pollution prevention and continuous improvement.
125	Jerry Cuttler Cuttler&Assoc	10.2	1st para Remove ' to the ALARA principle' and replace with 'requirements'		No change. See response to comment #1.
126	Candu Energy Inc., Bruce Power, OPG	General	Version 1 had a reference section. So does GD-337 version 2. It is suggested that the reference section in RD-337 version 2 not be removed since not all readers will refer to GD-337.	Suggest not removing the reference section.	Guidance section of document provides a comprehensive set of references.
127	Jerry Cuttler Cuttler&Assoc	Abbreviations	Remove ALARA. What is reasonably? It is not measureable – Most applications of ALARA are **un**reasonable Add: DEC design extension condition		No change. See comment #1 concerning use of ALARA. DEC added to abbreviations.

#	Organization	Section	Comment	Suggested Change	CNSC Response
128	Candu Energy Inc., Bruce Power	Glossary	**anticipated operational occurrence** An operational process deviating from normal operation, which is expected to occur at least once during the operating lifetime of a facility, but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety or lead to accident conditions. The definition of anticipated operational occurrences is not identical to the definition provided in the glossary in RD-310. The definition should be consistent in both documents.	Suggest revising the definition in this document to be consistent with that provided in RD-310: "An operational process deviating from normal operation that is expected to occur once or several times during the operating lifetime of the NPP but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety nor lead to accident conditions."	Agreed. Text revised as suggested.
129	Candu Energy Inc., Bruce Power	Glossary	**"cliff-edge effect** **A large increase in the severity of consequences caused by a small change of conditions. Note: cliff-edges can be caused by changes in the characteristics of the environment, the event or changes in the plant response."** The term "cliff edge effects" should not be used. The impact of this proposed wording requires further evaluation, particularly in light of the work and projects in progress to meet RD-310 requirements. Bruce Power added: The proposed wording is sufficient to capture the issues related to sensitivity analyses and overall safety margins.	Suggest that this term be deleted from RD-337 pending further evaluation.	The term "cliff edge effect" has been removed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
130	Candu Energy Inc., Bruce Power	Glossary	**"complementary design feature A design feature added to the design as a stand-alone structure, system or component (SSC) or added capability to an existing SSC to cope with design extension conditions."** For new nuclear power plants, more clarification is required with respect to whether portable equipment should be listed under systems important to safety as complementary design features for new nuclear power plants. For existing nuclear power plants it is noted that portable equipment is not considered to be systems important to safety. This additional clarification should be included in GD-337. Bruce Power added: More clarification is required on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for existing nuclear power plants. This additional clarification should be included in GD-337.	No change to text.	Agree. Additional guidance is provided for equipment credited in management of DECs including severe accidents. This applies to Complementary Design Features and also to existing "design basis" equipment that may be used in DECs.
131	Candu Energy Inc., Bruce Power	Glossary	**"management arrangements** The means by which an organization functions to achieve its objectives, including:" Since "management system" has been replaced with "management arrangements" in RD-337 version 2, this definition is no longer needed.	Suggest deleting the term "management arrangements" from the glossary.	Agree. Text deleted. The term "management arrangements" is no longer used in the document.

#	Organization	Section	Comment	Suggested Change	CNSC Response
132	Jerry Cuttler Cuttler&Assoc	Glossary	Remove the word 'including' from management arrangements Management arrangements The means by which an organization functions to achieve its objectives. ~~including:~~		Entire definition is deleted. The term "management arrangements" is no longer used in document.
133	Candu Energy Inc., Bruce Power	Glossary	**mission time** The duration of time within which a system or component is required to operate or be available to operate and fulfill its function following an event. Editorial: For clarity, suggest adding "safety" before "function" and allowing for multiple safety functions.	Suggest changing the text to: "mission time The duration of time within which a system or component is required to operate or be available to operate and fulfill its **safety** function**(s)** following an event."	Agreed. Text revised as suggested.
134	Candu Energy Inc., Bruce Power	Glossary	**"probabilistic safety assessment** A comprehensive and integrated assessment of the safety of the nuclear power plant. **The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the nuclear power plant, as follows:** 1. **a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel failures** 2. **a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment** 3. **a Level 3 PSA starts from the Level 2 results and analyses the distribution of**	Suggest replacing the definition in RD-337 version 2 with the definition provided in S-294: "probabilistic safety assessment For a NPP or a fission nuclear reactor, a comprehensive and integrated assessment of the safety of the plant or reactor. The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the plant or reactor, as follows: 1. a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			radionuclides in the environment and evaluates the resulting effect on public health.“ The definition of **probabilistic safety assessment** is not identical to that provided in the glossary in S-294. Consistency is required.	failures 2. a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment 3. a Level 3 PSA starts from the Level 2 results and analyses the distribution of radionuclides in the environment and evaluates the resulting effect on public health. A PSA may also be referred to as a Probabilistic Risk Assessment (PRA).”	
135	Candu Energy Inc., Bruce Power	Glossary	**“severe accident** **Accident conditions more severe than a design basis accident and involving significant core degradation.”** As written, the definition of severe accident does not encompass beyond design basis accidents involving the spent fuel bay where significant fuel degradation would be a postulated scenario. Suggest replacing “significant core degradation” with “significant fuel degradation” to encompass BDBAs for the spent fuel bay. This change would not have an impact on the intent of the definition of severe accident when applied to the reactor core.	Suggest changing the text to: “Accident conditions more severe than a design basis accident and involving significant **fuel** degradation.”	Definition revised as follows: “Accidents more severe than a design basis accident and involving severe fuel degradation in the reactor core or spent fuel pool”.

#	Organization	Section	Comment	Suggested Change	CNSC Response
136	Candu Energy Inc., Bruce Power	Glossary	"shutdown state A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems could be blocked and support systems may remain in abnormal configurations." Replace "actuation of safety systems could be blocked" to "actuation of safety systems **may** be blocked". This suggestion is to make the definition consistent with the use of "may" and "can" from the preface. Any blocking of safety system actuation is only permissible within the limits of the regulatory requirements.	Suggest changing the text to: "shutdown state A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems **may** be blocked and support systems may remain in abnormal configurations."	Agreed. Text revised as suggested.
137	Candu Energy Inc., Bruce Power, OPG	Glossary	**"station blackout A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power."** Suggest identifying this is also "extended loss of AC power event" – consistent with use of term in industry.	Suggest changing the text to: "station blackout (also known as extended loss of AC power event) A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power."	Agreed. Text revised as suggested. Added note: "station blackout is also known as an extended loss of AC power event".

#	Organization	Section	Comment	Suggested Change	CNSC Response
138	Candu Energy Inc.	Glossary	**"ultimate heat sink A medium to which the residual heat can always be transferred and is normally an inexhaustible natural body of water or the atmosphere."** Suggest using the IAEA definition, rather than paraphrasing the IAEA definition.	Suggest changing the text to: "ultimate heat sink A medium into which the transferred *residual heat* can always be accepted, even if all other means of removing the heat have been lost or are insufficient. This medium is normally a body of water or the atmosphere."	Agreed. Text revised as suggested.

Comments Report – Public Consultation
Draft Regulatory Guidance Document (GD) 337 – Design of New Nuclear Power Plants
Consultation Period: September 18 – November 20, 2012

#	Organization	Section	Comment	Suggested Change	CNSC Response
1.	George Vayssier	General - Severe accidents	Overall, I believe, it is a very good document. But I believe it could be stronger in terms of defending against severe accidents, also in view of the lessons learned after Fukushima. Now, the whole world is revising its policy in this matter, so that is not surprising. I missed also a clear reference to what has been achieved in various modern designs, such as the EPR, AP1000, etc. The GD-337 is there very cautious, where I believe stronger wording could be applied. Of course, it is hooked on RD-337, which is already somewhat older, at least pre-Fukushima.		The document contains revisions specifically aimed at strengthening certain aspects identified in CNSC's Fukushima Task Force Report. Guidance provided in the document takes those changes into account. Note that this document is technology neutral and not intended to refer to specific designs.
2.	George Vayssier	General - DBA-BDBA	Further, I have added remarks on the transition DBA-BDBA, which you also addressed during the meeting. The solution seems to be in shifting the traditional DBA somewhat in the direction of the DECs, plus a fully risk-oriented approach, as has been proposed by Commissioner Apostolakis and is also supported by the ASME 'New Safety Construct' and the NTTF-report. Personally, I believe we could even go further, as one of the major goals of new designs should be that they should never cause a societal disruption, as we have seen occurring at Fukushima. ASME mentions this, but Apostolakis does not yet go that far. I have worded this carefully, as the separation between DBAs and BDBAs/DECs is somewhat a religion		No change. CNSC staff agrees that a goal for new designs is that they should not cause societal disruption. However, it is not believed that the likelihood can be reduced to zero. The safety goals are intended to ensure that societal disruption is extremely infrequent. The CNSC is committed to continue benchmarking international activities as part of the Fukushima action plan.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			in nuclear safety - not easy to convert the believers... I send you per separate mail also my comments to Commissioner Apostolakis, as he gave me his (only) paper copy which he had with him at the meeting. I felt I should do more than just saying 'thank you'. Some of this may also be of interest to you.		
3.	George Vayssier	General	There are a number of items of more 'classical' nature, such as system classification, QA, etc. These you will find in the section with specific comments. I attach the system classification of the EPR (through the mail to Apostolakis), which I believe is quite advanced. I also attach here my own recent publication on SAMG - so that you also know some of my ideas. Andrei, I could not read all relevant documents - so some of my comments are covered by reports which I did not or did not fully read. And I am not familiar with Canadian regulatory documents - some concerns may be alleviated if I would better know these. I have not tried to be 'nice and friendly' - you are not served by praise, but by what might be improved.		Comment noted.
4.	Bruce Power	General	It does not seem appropriate to have this guidance document out for public comment before the associated regulatory document has been finalized and approved by the Commission.	Update GD-337 after RD-337 has been finalized and approved, and then issue it again for public consultation.	Comment noted. The two documents are combined and issued under the new modernized regulatory framework and nomenclature. The changes made in RD-337 after public comments are related to those necessary for clarification only.

#	Organization	Section	Comment	Suggested Change	CNSC Response
5.	Bruce Power	General	The CNSC should take into consideration comments submitted on RD-337 for revisions to GD-337.	Use comments provided during the public consultation phase of RD-337 to update GD-337.	Agreed. A number of comments received in the public comment phase of RD-337 have led to additional guidance being added to the guidance portion of the merged document.
6.	OPG	General	The timing of the public consultation for comments on RD-337 has not allowed sufficient time for them to be incorporated into GD-337.	OPG (and others) have submitted detailed comments for RD-337 version 2. These comments have not yet been considered for incorporation into GD-337. OPG’s comments from RD-337 should be reviewed by the CNSC to determine applicability to GD-337. With respect to "design extension conditions" and "complementary design features", this document should be revised throughout to be consistent with the resolution of OPG's comments regarding such terms in its review of the draft RD-337 version 2.	Comment noted. The two documents are combined and issued under the new modernized regulatory framework and nomenclature.
7.	Bruce Power	General All of GD-337	If it is decided to combine RD-337 with GD-337, following the model of RD/GD-360 (Long term operation management for NPP, currently in public review), the combined RD/GD-337 must be clearly structured to differentiate between the requirements that may be used as part of the licensing basis for a regulated facility or activity by reference in a licence and the expectations and guidance on how to meet the requirements.	If it is decided to combine RD-337 with GD-337, it is suggested that the requirements be identified as “normative” to define the statements as mandatory and the “expectations and guidance” be identified as “informative” to define the statements as a means to meet the requirements.	Comment noted. Agreed that there must be a clear distinction between requirements and guidance. To that effect, a statement has been included in the preface with respect to the use of mandatory and discretionary terms.
8.	Bruce Power	General	The term “Design Extension Conditions” is used throughout the document, the use of the term “Beyond Design Basis Accidents” is preferred by industry.	If the term "design extension conditions" is adopted for new NPPs, GD-337 should provide explanations for the relationship between "design extension conditions" and "beyond design basis accidents."	The term DEC was introduced to provide a clear distinction between those BDBAs that are considered in the design and those that are not. The document

#	Organization	Section	Comment	Suggested Change	CNSC Response
			The accepted terminology in use within the Canadian nuclear industry is “beyond design basis accidents”. It is preferred that the IAEA term “design extension conditions not be used. If the CNSC adopts the term "design extension conditions", it is suggested that the IAEA definition and use of "design extension conditions from IAEA SSR 2/1 be adopted in its entirety. Also, the CNSC should use consistent terminology for DEC in RD-337; consistency with Section 7.3, 4.2.3 and definitions provided in glossary are needed.	The CNSC should provide guidance on the principles and guidelines for applying engineering design rules to SSCs that are included in the nuclear power plant design to provide safety functions for “design extension conditions”. The CNSC should also provide guidance on the principles and guidelines for performing deterministic safety analyses for “design extension conditions”.	places physical design requirements for a subset of BDBAs. This subset is DECs. Furthermore, the term has been adopted by IAEA in SSR-2/1 and the change in terminology maintains the alignment with IAEA standards. The definition of DECs has been changed to more closely match SSR-2/1. However, the CNSC has not adopted all the clauses related to DECs from SSR-2/1 since they are not internally consistent. See for example, paragraph 5.31 of SSR-2/1 which refers to “DECs that have been practically eliminated”. This should read “plant states that have been practically eliminated” to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are “practically eliminated.” CNSC does not believe it is possible or necessary to make design provision against events that are practically eliminated.

#	Organization	Section	Comment	Suggested Change	CNSC Response
					Furthermore CNSC does not believe that SSR-2/1 intended this meaning.
9.	Bruce Power	General	The “Additional Information” sections in the document are very helpful as they identify standards acceptable to the CNSC for ensuring compliance.	It is recommended that this practice be carried forward for other GDs & RD/GDs	Comment noted. Agreed it is a practice used with regulatory documents.
10.	Bruce Power	General	Many standards with the edition dates are referenced throughout the document. This is not a good practice, because newer editions of the standards will be issued between revisions to GD-337.	It is suggested that the edition dates not be included or to included a statement regarding the use of more recent editions of the standards.	CNSC practice is to reference the date of the publication. This implies that it is that specific publication – future publications may include statements that are inconsistent with the requirements of this document.
11.	Candu Energy	General	If it is decided to combine RD-337 with GD-337, following the model of RD/GD-360 (“Long Term Operation Management for NPP”, currently open for consultation), the combined RD/GD-337 must be clearly structured to differentiate between: 1. the requirements that may be used as part of the licensing basis for a regulated facility or activity by reference in a licence; and the expectations and guidance on how to meet the requirements.	If it is decided to combine RD-337 with GD-337, it is suggested that: 1. the requirements be identified as “normative” to define the statements as mandatory; and the “expectations and guidance” be identified as “informative” to define the statements as a means to meet the requirements.	Comment noted. Agreed that there must be a clear distinction between requirements and guidance.
12.	Candu Energy	General	It does not seem appropriate to have this guidance document out for public comment before the associated regulatory document has been finalized and approved by the Commission.	It is suggested that GD-337 be revised after RD-337 has been finalized and approved, and then issued again for public consultation.	Comment noted. The two documents are combined and issued under the new modernized framework and nomenclature.
13.	Candu Energy	General	The comments made on draft RD-337 version 2 should be taken into consideration for revisions to GD-337.	The comments provided during the public consultation phase of draft RD-337 version 2 should be considered for revision to GD-337.	Agreed. A number of comments received in the public comment phase of RD-337 have led to additional guidance being added to the guidance portion of the merged document.

#	Organization	Section	Comment	Suggested Change	CNSC Response
14.	Candu Energy	General	The term “Design Extension Conditions” is used throughout the document; the use of the term “Beyond Design Basis Accidents” is preferred by industry. The accepted terminology in use within the Canadian nuclear industry is “beyond design basis accidents”. It is preferred that the IAEA term “design extension conditions” not be used. If the CNSC adopts the term “design extension conditions”, it is suggested that the IAEA definition and use of “design extension conditions” from IAEA SSR-2/1 be adopted in its entirety. Additionally, consistent terminology for DEC should be used in RD-337. In particular, consistency between Sections 4.2.3, 7.3 and the definitions provided in the glossary are needed.	If the term "design extension conditions" is adopted for new NPPs, GD-337 should provide explanations for the relationship between "design extension conditions" and “beyond design basis accidents”. The CNSC should provide guidance on the principles and guidelines for applying engineering design rules to SSCs that are included in the nuclear power plant design to provide safety functions for “design extension conditions”. The CNSC should also provide guidance on the principles and guidelines for performing deterministic safety analyses for “design extension conditions”.	The term DEC was introduced to provide a clear distinction between those BDBAs that are considered in the design and those that are not. The document places physical design requirements for a subset of BDBAs. This subset is DECs. Furthermore, the term has been adopted by IAEA in SSR-2/1 and the change in terminology maintains the alignment with IAEA standards. The definition of DECs has been changed to more closely match SSR-2/1. However, the CNSC has not adopted all the clauses related to DECs from SSR-2/1 since they are not internally consistent. See for example, paragraph 5.31 which refers to “DECs that have been practically eliminated”. This should read “plant states that have been practically eliminated” to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are “practically eliminated.”

#	Organization	Section	Comment	Suggested Change	CNSC Response
					CNSC does not believe it is possible or necessary to make design provision against events that are practically eliminated. Furthermore CNSC does not believe that SSR-2/1 intended this meaning.
15.	Candu Energy	General	The "Additional Information" sections in the document are very helpful as they identify standards acceptable to the CNSC for ensuring compliance.	It is recommended that the practice of including "Additional Information" sections be carried forward for other GDs & RD/GDs.	Comment noted. Agreed it is a practice used with regulatory documents.
16.	Candu Energy	General	Many standards are referenced throughout the document, with the applicable edition dates. This is not recommended practice, because newer editions of the standards may be issued between revisions to GD-337.	It is suggested that the applicable edition dates not be included, or a statement be included regarding the use of the most recent editions of the standards.	CNSC's practice is to reference the date of the publication. This implies that it is that specific publication – future publications may include statements that are inconsistent with the requirements of this document.
17.	Bruce Power	Preface and Section 2	Editorial: The correct title of SSR-2/1 is "Specific Safety Requirements: Safety of Nuclear Power Plants: Design"	Suggest title of the document be corrected to: "… SSR-2/1, **Specific** Safety Requirements: Safety of Nuclear Power Plants: Design"	Text revised as follows: SSR-2/1 Safety of Nuclear Power Plants: Design SSR is the acronym for "specific safety requirements.
18.	Candu Energy	Preface and Section 2	"...SSR 2/1, Safety of Nuclear Power Plants: Design…" Editorial: The correct title of SSR-2/1 is "Specific Safety Requirements: Safety of Nuclear Power Plants: Design"	It is suggested that the title of the document be corrected to: "… SSR-2/1, **Specific Safety Requirements:** Safety of Nuclear Power Plants: Design..."	Text revised as follows: SSR-2/1 Safety of Nuclear Power Plants: Design SSR is the acronym for "specific safety requirements.
19.	OPG	Preface and Purpose	Suggest deleting the word "expectations". This document is intended to provide "guidance", not "requirements". However, the term "expectations" may be construed to	Change text as follows: Preface "This document provides guidance on how to meet the requirements set out in	Comment noted. Text revised to indicate that merged document provides both requirements and guidance.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			mean "requirements" and should therefore be omitted.	regulatory document RD-337 version 2, Design of New Nuclear Power Plants." Purpose "This document provides guidance on how to meet the requirements set out in regulatory document RD-337 version 2, Design of New Nuclear Power Plants."	
20.	George Vayssier	1.0 Overall Comments	1.1. The draft is a comprehensive guidance to meet the requirements of RD-337 and, as such, a useful guide for users who wish to apply RD-337. It is good to see that there are ample references to IAEA documents, which includes that further experience is obtained in applying IAEA standards which will, in turn, also benefit the IAEA and, thereby, the international nuclear safety community. Some questions here, however, remain (see below).		Comment noted.
21.	George Vayssier	1.0 Overall Comments	1.2. In a number of cases reference is made to other documents, e.g. the IAEA documents, as mentioned. It is not clear whether these documents are endorsed by the CNSC, i.e. if the applicant refers to these in his application, his application will be approved. The Preface speaks about 'adoption of principles set forth in SSR 2/1', which is not identical as endorsing SSR 2/1, after adaptation to the national Canadian requirements. In addition, if reference is made to a Safety Guide, it should be realised that automatically the underlying requirements are included, as the Safety Guide only describes one method to		No change. CNSC does not endorse IAEA Safety Standards. However, they are used as the basis for a number of documents; including this document. Version 1 of RD-337 was based on NS-R-1 and version 2 has been modified to take account of SSR-2/1 which replaced NS-R-1. IAEA documents (and others) are referenced in this document because they provide useful information or guidance on the topic at hand. This document contains national

#	Organization	Section	Comment	Suggested Change	CNSC Response
			meet the requirements. From the text in GD-337 it is not clear whether this indeed is meant, as sometimes a Safety Guide is mentioned, followed separately and only later by the Safety Requirements (e.g. sec. 5, GS-G-3.5, followed later by GS-R-3). It should be noted that IAEA documents often refer to national criteria, e.g. acceptance criteria for design extension conditions (DECs) and, hence, a reference to such documents should include identification and quantification of such statements (in this case, acceptance criteria are not defined, but safety goals instead; the difference being acceptance criteria being mandatory, whereas safety goals are targets, values that should be reached, if possible). Note: the IAEA definition of acceptance criteria is not useful, as it contains a loop (it requires understanding of another term, the definition of which depends again on understanding the meaning of ‘acceptance criteria’).		criteria. CNSC considers the safety goals to be mandatory. Paragraph 1 of s. 9.1 makes this clear. Note also, that most modern designs are claimed by the vendors to meet the safety goals quite comfortably.
22.	George Vayssier	1.0 Overall Comments	1.3. In a number of cases ‘additional information’ is mentioned, plus a document where this information can be found. The status of such documents is not fully clear. Are they endorsed by the CNSC for application? If not, what use should the applicant make of such documents? A specific case is sec. 5.6, where IAEA GSR Part 4 is mentioned. This is a very detailed and comprehensive document, which		No change. Documents are referenced in the “additional information” if CNSC considers that they contain useful guidance or possible means of meeting the requirements of this document. Note that in many instances only those parts of the document that apply are those relevant to the context of the guidance section in which they are quoted. The text

#	Organization	Section	Comment	Suggested Change	CNSC Response
			describes in detail how the safety assessment of an NPP must be performed (must, i.e. it is a requirement, a 'shall' statement). Does CNSC follow indeed this document, either in whole or in part? If so, then many other paragraphs of GD-337 become redundant, as the GSR Part 4 treats these subjects. As said, GSR Part 4 is no guidance document, it is a requirements document, so it is of other nature and at a higher level.		will be revised to make it clear that the additional information documents are to be used to provide guidance.
23.	George Vayssier	1.0 Overall Comments	1.4. Similarly, where reference is made to e.g. US-standards, it should be noted that these have originated in and refer to the US regulatory environment (e.g. IEEE, ASME standards). It has not been specified to what extent these foreign regulations have been endorsed by the CNSC.		No change. Specific standards become mandatory if they are: - referenced in Canadian Regulations, - quoted directly in a licence, - referenced as a requirement in a regulatory document that is incorporated by a licence.
24.	George Vayssier	1.0 Overall Comments	1.5. A Safety Guide is a document, providing guidance how Requirements are met, not more, not less. In principle, therefore, each paragraph should contain a 'should' statement. 'Information only' paragraphs have, in principle, no place in such a guide. You can see this in practice in the IAEA Safety Guides, which almost exclusively use the word 'should' in each paragraph. The IAEA has also information documents, but these are of different character (Tecdocs, Safety Series Reports, etc.). Alternatively, 'information only' parts could be placed in footnotes, annexes, etc. Mixing them with the main guidance text may cause misunderstanding of		No change. The inclusion of "information only" text makes a guide more readable. It would be an unnecessary burden to maintain a separate document for related information.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			their use.		
25.	George Vayssier	1.0 Overall Comments	1.6. It seems that post-Fukushima lessons are not yet processed in GD-337. For example, there is no reference to the Canadian Fukushima Task Force Report, INFO-0824, which gives a number of fairly strong recommendations. There are other reports about the lessons learned, such as the USNRC SECY 12-0095, and the ASME Presidential Report 'Forging a New Safety Construct', June 2012 (sec. 6.7), as well as the French 'hard safety core' approach. For example, a severe accident does not only cause radiological consequences for people and the environment, but may also cause societal disruption, i.e. a widely-spread disruption of normal life in a society. Examples are thousands of people who must evacuate their livings in the mid of the night, with the perspective of never being able to return to their homes. And/or contamination of an industrial area, causing a widely-spread loss of economic activity and loss of jobs. If a harbour is struck, also the hinterland can be severely struck, as transport of food and goods via that harbour may come to a complete standstill. Societal disruption is also addressed in the ASME-report mentioned. The Gd-337 does not treat such consequences. The underlying problem is that the RD-337 does not contain these either.		No change. The document includes changes made as a result of the CNSC Fukushima Task Force recommendations. Note that there are changes to provide additional guidance arising from specific comments. CNSC has participated in a number of international activities and finds that the changes made in Canada as a result of lessons learned from Fukushima are comparable with most other countries. In the CNSC's view, the ASME New Safety Construct appears to lack specificity. Note that dealing with societal disruption is outside the scope of this document which deals with NPP design. The only role played by this document is to ensure, through the safety goals, that societal disruption is extremely unlikely. Treating the effects of societal disruption is, in large measure, beyond the mandate of CNSC and concerns many more causes than nuclear accidents. The CNSC has little detail so far on the French "hardened safety core" approach. We will continue to track international efforts and,

#	Organization	Section	Comment	Suggested Change	CNSC Response
					if necessary, make further changes when this document is next updated.
26.	George Vayssier	1.0 Overall Comments	1.7. Finally, the GD-337 stays with the traditional approach of designing against design basis accidents (DBAs) and 'having something available' for accidents beyond (BDBAs/DECs) In this area, no hard criteria are defined, but safety goals. Although this exceeds the role of GD-337, it may be time to upgrade the DBA by including some DECs (e.g. ATWS, SBO, Loss of Ultimate Heat Sink - LUHS) into the DBA and placing firm requirements on DECs involving core melts. These could include defined measures against steam generator tube creep rupture, against fuel bundle meltthrough, against (calandria) vessel meltthrough, against possible fuel-concrete interaction, against the threat of hydrogen combustion for the containment integrity, and against overpressure of the containment by non-condensable gases. In short, by defining safety functions typically needed to mitigate severe accidents, and requiring measures to fulfill them. For GD-337, this - at present - necessarily must take the form of recommendations, as the underlying RD-337 does not require such functions to be fulfilled inside predefined acceptance criteria. An example of such requirements is in USNRC SECY 93-087, added upon by various SECY-docs (e.g. latest now is		No change. CNSC considers that the requirements in this document, including safety goals and requirements for complementary design features provide protection appropriate to the risk. CNSC does not currently intend to expand the design basis to include events with core melt, though such events are included in the "design envelope". This document has requirements for DECs that will ensure that practicable means are provided to prevent and/or mitigate severe accidents beyond the design basis. We believe this is comparable to the intent of SSR-2/1. CNSC's approach is, as far as possible, technology neutral. To make such specific requirements as are suggested here would be to take on part of the responsibility of the design authority. Our view is that the designer is responsible for identifying all relevant events and classifying them into DBA or DEC and also for providing appropriate protection for these events. CNSC verifies that the designer's work meets requirements. The specific

#	Organization	Section	Comment	Suggested Change	CNSC Response
			SECY 12-0095, with reference to earlier ones) following the Fukushima accident. Also the NRC study revealed the at present 'scattered regulatory approach' of some BDBA, as ATWS, SBO, etc. For widening the DBA and including BDBA/DEC into the 'safety construct', a good reference is also the ASME-report already mentioned about 'forging a new safety construct'. The document proposes an all-risk treatment of both DBA and BDBA/DEC, which is also proposed by an NRC-task force, led by Commissioner Apostolakis: A Proposed Risk Management Regulatory Framework, April 2012.		events, and the appropriate design features will vary between reactor designs.
27.	OPG	Section 2	Codes and standards referenced in the guide refer to specific revisions. It is unlikely GD-337 will be updated with the frequency necessary reflect the most recent version of all relevant codes and standards going forward. Suggest adding text to indicate that information can be found in the codes and standards listed or latest codes and standards as applicable, as appropriately agreed.	Change text as follows: "Further guidance can be obtained from relevant Canadian codes and standards, as well as, appropriate international standards, such as IAEA publications. It should be confirmed that the codes and standards used in the design of a new nuclear plant are the applicable codes and standards, as agreed to by the regulator."	CNSC practice is to reference the date of the publication. This implies that it is that specific publication – future publications may include statements that are inconsistent with the requirements of this document.
28.	Bruce Power	Section 3 Bullet 5	The list of clauses from Section 5 and Section 6 of the Class I Nuclear Facilities Regulations appears to be incomplete. This version of GD-337 includes guidance that is applicable to clauses 5(k), 6(j) and 6(k), however these clauses are not listed.	Suggest that final version of GD-337 be reviewed against the Class I Nuclear Facilities Regulations for completeness.	Agreed. Text changed.
29.	Candu Energy	Section 3 Bullet 5	The list of paragraphs from Section 5 and Section 6 of the Class I Nuclear Facilities Regulations appears to be	It is suggested that the final version of GD-337 be reviewed against the Class I Nuclear Facilities Regulations for	Agreed. Text changed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			incomplete. This version of GD-337 includes guidance that is applicable to paragraphs 5(k), 6(j) and 6(k), however these are not listed.	completeness.	
30.	George Vayssier	4.2.4	Sec. 4.2.4 (accident management) should also refer to the CNSC guide GD-306, ‘Severe Accident Management Programs for Nuclear Reactors, and the IAEA NS-G-2.15, ‘Safety Guide on Severe Accident Management’. The assessment of the accident management program by the CNSC could follow the IAEA Services Series Report SVS-9, ‘Guidelines for the Review of Accident Management Programs in NPPs’. For information (if that part is retained in the Guide), a useful document is IAEA Safety Report Series SRS 32, ‘Implementation of Accident Management Programs in NPPs’. Accident management starts, of course, with Emergency Operating Procedures. A useful document is the Safety Reports Series SRS 48, ‘Development and Review of Plant Specific Emergency Operating Procedures’ (this is not a Safety Guide). Note that the field of EOPs-SAMG is strongly in motion after Fukushima: in the US, the FLEX approach is advocated, augmented with Extensive Damage Mitigation Guidelines (EDMGs), which re-establish command and control after an event where a large part of the plant area is destroyed (possibly through violent actions by third parties). A similar approach is		Agreed. Reference to G-306 has been added. IAEA NS-G-2.15 added as “Additional Information”.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			followed in France, through the 'hard core approach'. The whole series of accident procedures then becomes then: AOP (Abnormal Operating Procedures), EOPs, FLEX , EDMG, SAMG. Note: a certain consideration of portable equipment (FLEX) is given in the last paragraph of sec. 7.3.4.1. Robustness against severe accidents for new plants is described in SECY 93-087. The CNSC approach should be compared whether it is equivalent. It should also be compared with the findings of the NRC post-Fukushima NTTF recommendations.		
31.	Bruce Power	4.3.3	The text in Section 4.3.3 of GD-337 does not provide any guidance on the definitions of "safety limits" and "limiting settings for safety systems", which are used in Section 4.3.3 of draft RD-337 version 2. By introducing the text on OLCs from IAEA Safety Guide NS-G-2.2 in Section 4.3.3 of draft RD-337 version 2, it is also necessary to include an explanation of the terminology of OLCs from NS-G-2.2.		No change. Section 4.3.3 of the document makes it clear that the designer must define a consistent terminology and adopt appropriate codes and standards. IAEA Safety Guide NS-G-2.2 is referenced for additional information. CNSC accepts that slightly different approaches have been followed for different NPP designs based on their country of origin. CNSC does not require the designer to rewrite the OLCs to align with a specific Canadian approach.
32.	George Vayssier	5.0	Sec. 5 (management systems) refers to IAEA GS-R-3. A widely used standard is ASME NQA-1; there exist also an IAEA comparison document on GS-R-3 and NQA-1-2008 and NQA-1a-2009 addenda, which describes inter alia		Agreed. ASME NQA-1 added to "Additional information" in section 5.3: No formal comparison document between CSA N286-05 and

#	Organization	Section	Comment	Suggested Change	CNSC Response
			what elements are in NQA-1 which are missing in R-3, and vice versa (Safety Reports Series SRS 70). Note: I did not see a comparison document between CSA N286-05 and ASME NQA-1, it may exist.		ASME NQA-1 is known to exist. However, the second paragraph following the bulleted list in section 5.3 recommends the user map other standards to CSA N286-05.
33.	Bruce Power	5.3	The bullets do not follow a "chronological" order. The design control measures listed here should follow in order how the design activities progress from initiation to being ready for implementation, as described in CSA N286-05. Also note that CSA N286 June 2012 has been issued and may supersede CSA N286-05. Some bullets are partially included in other bullets. As example, planning of design activities is mentioned in both 1st and 4th bullets. The bullet "management of the design and control of design changes" is included in the bullet "configuration management". The bullet "conducting conceptual analysis" should be more specific about the type of analysis (safety, stress??). CSA N286 clearly indicates a conceptual safety analysis to assess the preferred design concept. The bullet "selection of suitably qualified and experienced staff" may suggest that only experienced staff can perform design activities, while CSA N286-05 requirement is for personnel competent to do the design work assigned to them (competence includes education, training, skills, experience and ability).	Suggest changing the text to: "• design initiation, including identification of scope • work control and planning of design activities • selection competent staff • identification and control of design inputs • establishing design requirements • evaluation of design concepts and selection of preferred concept • selection of design tools and computer software • conducting conceptual safety analysis to assess preferred design concept • conducting detailed design and production of design documentation and records • conducting detailed safety analysis to prove adequacy of detailed design • defining any limiting conditions for safe operation • carrying out design verification and validation • configuration management • identification and control of design interfaces"	Agreed. Text revised.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It is suggested that all bullets in GD section 5.3 follow CSA N286-05.		
34.	OPG	5.3 page 6 and elsewhere	Reference to CSA N286-05 should be changed to CSA N286-12.	Replace "CSA N286-05" with "CSA N286-12" throughout.	The use of CSA N286-12 has not yet been endorsed by the CNSC. Until then CSA N286-05 remains the applicable standard. Should N286-12 be endorsed before this regulatory document is issued, the reference will be updated.
35.	Bruce Power	5.3	RD-337 version 2 states "**The computer software used for design and analysis calculations shall be qualified in accordance with applicable standards**." By using the term "qualified in accordance with applicable standards" some confusion may be introduced, because the nuclear industry is more familiar with the use of verified and validated software, as defined in CSA N286.7. For clarification it is suggested that the definition of "qualified software" from CSA N286.7.1-09 be included in GD-337 to provide clarification and guidance on the intent of "shall be qualified in accordance with applicable standards".	Suggest adding the following text: "As stated in RD-337, "The computer software used for design and analysis calculations shall be qualified in accordance with applicable standards. This is achieved by following industry standards for software, such as CSA N286.7, where qualified software: (a) is shown to be capable of addressing intended problems; (b) is adequately specified, which includes (i) documentation of requirements, design, characteristics, and limitations of use; and (ii) identification of all required tool components and their required attributes; (c) possesses attributes that have been demonstrated to satisfy all requirements; and (d) includes configuration management and change control."	G-149 has been added to section 5.3. Text from CSA N286.7.1-09 is not included as the standard is already referenced.
36.	Candu Energy	5.3	"Design control measures, in the form of processes, procedures and practices, include: • design initiation, specification	Suggest revising the text as follows: "Design control measures, in the form of processes, procedures and practices, include:	Agreed. Text revised.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			of scope and planning • specification of design requirements • selection of suitably qualified and experienced staff • work control and planning of design activities • specification and control of design inputs • review of design concepts and selection • selection of design tools and computer software • conducting conceptual analysis • conducting detailed design and production of design documentation and records • conducting detailed safety analysis • defining any limiting conditions for safe operation • carrying out design verification and validation • independence of individuals or groups performing verifications, validations and approvals • configuration management • management of the design and control of design changes • identification and control of design interfaces” The bullets do not follow a “chronological” order. The design control measures listed here should follow the order in which the design	1. design initiation, including identification of scope 2. work control and planning of design activities 3. selection of competent staff 4. identification and control of design inputs 5. establishing design requirements 6. evaluation of design concepts and selection of preferred concept 7. selection of design tools and computer software 8. conducting conceptual safety analysis to assess preferred design concept 9. conducting detailed design and production of design documentation and records 10. conducting detailed safety analysis to prove adequacy of detailed design 11. defining any limiting conditions for safe operation 12. carrying out design verification and validation 13. configuration management identification and control of design interfaces”	

#	Organization	Section	Comment	Suggested Change	CNSC Response
			activities progress from initiation to being ready for implementation, as described in CSA N286-05 (it should be noted that CSA N286 June 2012 has been issued and may supersede CSA N286-05). Some activities are addressed in multiple bullets. For example, planning of design activities is mentioned in both the 1st and 4th bullets. The activity described in the bullet “management of the design and control of design changes” is also addressed in the bullet “configuration management”. In the bullet “conducting conceptual analysis”, the type of analysis should be specified (i.e. safety, stress??). CSA N286 clearly indicates a conceptual safety analysis should be performed to assess the preferred design concept. The bullet “selection of suitably qualified and experienced staff” may suggest that only experienced staff can perform design activities, whereas the CSA N286-05 requirement is for competent personnel to perform the design work assigned to them (competence includes, in addition to experience, education, training, skills and ability). It is suggested that all bullets in this section follow the same order as in CSA N286-05.		
37.	Candu Energy	5.3	Draft RD-337 version 2 states “**The**	Suggest adding the following text to	G-149 has been added to section

#	Organization	Section	Comment	Suggested Change	CNSC Response
			computer software used for design and analysis calculations shall be qualified in accordance with applicable standards." By using the term "qualified in accordance with applicable standards" some confusion may be introduced, because the nuclear industry is more familiar with the use of verified and validated software, as defined in CSA N286.7. For clarification it is suggested that the definition of "qualified software" from CSA N286.7.1-09 be included in GD-337 to provide clarification and guidance on the intent of "shall be qualified in accordance with applicable standards".	Section 5.3: "The computer software used for design and analysis calculations shall be qualified in accordance with applicable standards. This shall be achieved by following industry standards for software, such as CSA N286.7, where qualified software: (a) is shown to be capable of addressing intended problems; (b) is adequately specified, which includes (i) documentation of requirements, design, characteristics, and limitations of use; and (ii) identification of all required tool components and their required attributes; (c) possesses attributes that have been demonstrated to satisfy all requirements; and (d) includes configuration management and change control."	5.3. Text from CSA N286.7.1-09 is not included as the standard is already referenced.
38.	Bruce Power	6.1.1	"For independent effectiveness of the different levels of defence, any design features that aim at preventing an accident should not belong to the same level of defence as the design features that aim at mitigating the consequences of the accident." This paragraph more properly belongs at the end of Section 6.1, rather than at the end of Section 6.1.1. Section 6.1.1 is about the physical barriers, whereas this paragraph is applicable to the design features for all levels of defence-	Suggest moving this paragraph to the end of Section 6.1.	Agreed. Text moved.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			in-depth.		
39.	Candu Energy	6.1.1	"For independent effectiveness of the different levels of defence, any design features that aim at preventing an accident should not belong to the same level of defence as the design features that aim at mitigating the consequences of the accident." This paragraph would be more appropriate at the end of Section 6.1, rather than at the end of Section 6.1.1. Section 6.1.1 discusses the physical barriers, whereas this paragraph is applicable to the design features for all levels of defence-in-depth.	It is suggested that this paragraph be moved to the end of Section 6.1.	Agreed. Text moved.
40.	Bruce Power	6.5	"Generally, a larger exclusion zone would require more emergency response time and capability." A larger exclusion zone should allow for somewhat more relaxed response time, since the public is further from the source of the radiological hazard. It is not clear that a greater emergency response capability is necessary for a larger exclusion zone.	Suggest changing the text to: "Generally, a larger exclusion zone would allow for more emergency response time."	Comment noted. Sentence deleted.
41.	Candu Energy	6.5	"Generally, a larger exclusion zone would require more emergency response time and capability." A larger exclusion zone should allow for somewhat more relaxed response time, since the public is further from the source of the radiological hazard. A larger exclusion zone may not require more emergency response capability.	Suggest that the text be revised as follows: "Generally, a larger exclusion zone would allow for more emergency response time."	Comment noted. Sentence deleted.
42.	Candu Energy	6.5	"Evacuation needs"	Suggest that the following text be added:	Agreed. Text added.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Environmental factors also affect evacuation times (i.e. precipitation = slower evacuation). Environmental factors are not specifically addressed in this section, although they are taken into consideration in the nuclear emergency response plans.	"Environmental factors which can affect the response times should be taken into consideration."	
43.	Bruce Power	6.5	Environmental factors also affect evacuation times (precipitation = slower evacuation). This is not specifically mentioned here, although consideration of this usually appears in the nuclear emergency response plans.	Suggest adding the following text: "Environmental factors which can affect the response times should be taken into consideration."	Agreed. Text added.
44.	Bruce Power	6.6.1	"As stated in RD-337 version 2, "*the design shall take due account of challenges to a multi-unit site*." The use of the term "multi-unit site" can lead to confusion. One can have a site with multiple units as part of a single build project, or the addition of one or more units to an existing site where one or more units are already in operation.	Suggest changing all use of: multi-unit site" to "multiple units at a site".	Agreed. Text changed. .
45.	Candu Energy	6.6.1	"As stated in draft RD-337 version 2, "*the design shall take due account of challenges to a multi-unit site*." The use of the term "multi-unit site" can lead to confusion. One can have a site with multiple units as part of a single build project, or the addition of one or more units to an existing site where one or more units are already in operation.	It is suggested that the term "multi-unit site" be replaced with "multiple units at a site" throughout this document.	Agreed. Text changed.
46.	George Vayssier	6.6.1	Sec. 6.6.1 (multi-unit site) should possibly take into account lessons from		No change. The lessons learned from Fukushima have already

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Fukushima, inter alia a common cause failure, damaging more than one unit simultaneously		been incorporated into RD-337 and GD-337.
47.	Bruce Power	7.1	"The method for classifying the safety significance of SSCs important to safety should be based primarily on deterministic methodologies, complemented (where appropriate) by probabilistic methods." The use of engineering judgement in the safety classification process should be acknowledged.	Suggest changing the text to: "The method for classifying the safety significance of SSCs important to safety should be based primarily on deterministic methodologies, complemented (where appropriate) by probabilistic methods and engineering judgement."	Agreed. Text changed.
48.	Bruce Power	7.1	"The SSC classification process should include the following activities: • identification of engineering design rules for classified SSCs" The SSC classification process should not include the identification of engineering design rules for classified SSCs. Once a safety class has been assigned to an SSC, the appropriate engineering design rules should be applied to the SSC. The basic concept should be that the SSC is designed such that: • the most frequent occurrences yield little or no adverse consequences to the public, and the improbable extreme situation, having the potential for the greatest consequences to the public, have a low probability of occurrence.	Suggest changing the text by replacing the bullet "identification of engineering design rules for classified SSCs" with the following paragraph: "Once the safety class of SSCs is established, corresponding engineering design rules should be specified and applied. These engineering design rules should ensure that the SSCs possess all the design features necessary to achieve the required ability to perform its designated safety function with a sufficiently low failure rate consistent with the safety analysis. The SSCs should be designed with sufficient robustness to ensure that no operational loads caused by postulated initiating events will adversely affect the ability of the SSCs to perform their designated safety functions."	No change. The engineering design rules are not always straightforward and unique for each safety class, therefore how to identify these rules is an essential and important step in the SSC classification process. The remaining proposed wording is already captured by section 7.5 and safety analysis requirements.
49.	Bruce Power	7.1	"if a particular SSC contributes to the performance of several safety functions of different categories, it should be assigned to the class corresponding to	Suggest changing the text to" "if a particular SSC contributes to the performance of several safety functions	Agreed conceptually. Text revised. "If a particular SSC contributes

#	Organization	Section	Comment	Suggested Change	CNSC Response
			the highest safety category, requiring the most conservative design rules” The selection of engineering design rules should be commensurate with the principles of achieving the required level of: • ability to perform its designated safety function with a sufficiently low failure rate consistent with the safety analysis, and • robustness to ensure that no operational loads caused by postulated initiating events will adversely affect the ability of the SSCs to perform their designated safety functions. This does not necessarily mean requiring the most conservative design rules.	of different categories, it should be assigned to the class corresponding to the highest safety category, requiring the commensurate design rules”	to the performance of several safety functions of different categories, it should be assigned to the class corresponding to the highest category of those safety functions, requiring the commensurate design rules”.
50.	Bruce Power	7.1	“Although the probability of SSCs being called upon during DECs is very low, the failure of safety functions for the mitigation of DECs may lead to high severity consequences. Therefore, these safety functions should be considered a high safety category.” The phrase “these safety functions should be considered a high safety category” needs clarification. The term “high safety category” is not well defined and different readers can arrive at different conclusions. In terms of safety significance, safety	Suggest changing the text to: “Although the probability of SSCs being called upon during DECs is very low, the failure of safety functions for the mitigation of DECs may lead to high severity consequences. Therefore, these safety functions should be assigned a safety category commensurate with the safety significance.”	Agreed. Text revised.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			functions required to mitigate the consequences of design extension conditions should be ranked lower than: • safety functions required to be performed immediately to control or mitigate the consequences of anticipated operational occurrences or design basis accidents, and safety functions required to reach and maintain a stable safe shutdown condition.		
51.	Bruce Power	7.1	"as a general rule, supporting SSCs should be assigned to the same class as that of the frontline SSCs to be supported" This statement does not appropriately account for whether the failure of the supporting SSC has the same consequence on the frontline SSC as a failure of the frontline SSC.	Suggest deleting the text.	Text revised to make it clear. "as a general rule, if the supporting SSCs are essential to achieve the safety function of the frontline SSCs to be supported, then they should be assigned to the same class as that of the frontline SSCs"
52.	Bruce Power	7.1	RD-337 states that complementary design features are included in the list of systems important to safety. Portable equipment – such as emergency mitigating equipment, and pumps should not necessarily constitute systems important to safety. More clarification is required on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for		Comment noted. Text in section 7.3.4 revised as follows: "The portable equipment credited for DECs are considered part of complementary design features. Therefore, they belong to SSCs important to safety. Portable equipment should be classified based on its safety importance. There may be different options available to fulfill the fundamental safety functions during DECs. However, when called upon the portable onsite or

#	Organization	Section	Comment	Suggested Change	CNSC Response
			existing nuclear power plants. This additional clarification should be included in GD-337.		offsite equipment credited is expected to be effective with reasonable confidence. Portable onsite or offsite equipment is expected to support Severe Accident Management Guidelines".
53.	Candu Energy	7.1	"The method for classifying the safety significance of SSCs important to safety should be based primarily on deterministic methodologies, complemented (where appropriate) by probabilistic methods." The SSC classification process should not include the identification of engineering design rules for classified SSCs. Once a safety class has been assigned to an SSC, the appropriate engineering design rules should be applied to the SSC. The basic concept should be that the SSC is designed such that: • the most frequent occurrences yield little or no adverse consequences to the public, and the improbable extreme situation, having the potential for the greatest consequences to the public, have a low probability of occurrence.	Suggest revising the text by replacing the bullet "identification of engineering design rules for classified SSCs" with the following paragraph: "Once the safety classification of SSCs is established, corresponding engineering design rules should be specified and applied. These engineering design rules should ensure that the SSCs possess all the design features necessary to achieve the required ability to perform their designated safety function with a sufficiently low failure rate consistent with the safety analysis. The SSCs should be designed with sufficient robustness to ensure that no operational loads caused by postulated initiating events will adversely affect the ability of the SSCs to perform their designated safety functions."	No change. The engineering design rules are not always straightforward and unique for each safety class, therefore how to identify these rules is an essential and important step in the SSC classification process. The remaining proposed wording is already captured by section 7.5 and safety analysis requirements.

#	Organization	Section	Comment	Suggested Change	CNSC Response
54.	Candu Energy	7.1	"Some specific SSCs classification guidelines are given below:.... • as a general rule, supporting SSCs should be assigned to the same class as that of the frontline SSCs to be supported......." This statement does not appropriately account for whether the failure of the supporting SSC has the same consequence on the frontline SSC as a failure of the frontline SSC.	Suggest deleting the text.	Text revised to make it clearer. "as a general rule, if the supporting SSCs are essential to achieve the safety function of the frontline SSCs to be supported, then they should be assigned to the same class as that of the frontline SSCs".
55.	Candu Energy	7.1	"Some specific SSCs classification guidelines are given below:... if a particular SSC contributes to the performance of several safety functions of different categories, it should be assigned to the class corresponding to the highest safety category, requiring the most conservative design rules..." The selection of engineering design rules for a SSC should be commensurate with the principles of achieving the required level of: • ability to perform its designated safety function with a sufficiently low failure rate consistent with the safety analysis, and • robustness to ensure that no operational loads caused by postulated initiating events will adversely affect the ability of the SSCs to perform their designated safety functions. This does not necessarily mean	Suggest revising the text as follows: "Some specific SSCs classification guidelines are given below:... • if a particular SSC contributes to the performance of several safety functions of different categories, it should be assigned to the class corresponding to the highest safety category, requiring the **commensurate** design rules..."	Agreed conceptually. Text revised as follows: "if a particular SSC contributes to the performance of several safety functions of different categories, it should be assigned to the class corresponding to the highest category of those safety functions, requiring the commensurate design rules".

#	Organization	Section	Comment	Suggested Change	CNSC Response
			requiring the most conservative design rules.		
56.	Candu Energy	7.1	“Although the probability of SSCs being called upon during DECs is very low, the failure of safety functions for the mitigation of DECs may lead to high severity consequences. Therefore, these safety functions should be considered a high safety category.” The phrase “these safety functions should be considered a high safety category” needs clarification. The term “high safety category” is not well defined and different readers can arrive at different conclusions. In terms of safety significance, safety functions required to mitigate the consequences of design extension conditions should be ranked lower than: In terms of safety significance, safety functions required to mitigate the consequences of design extension conditions should be ranked lower than: • safety functions required to be performed immediately to control or mitigate the consequences of anticipated operational occurrences or design basis accidents; and safety functions required to reach and maintain a stable safe shutdown condition.	Suggest revising the text as follows: “Although the probability of SSCs being called upon during DECs is very low, the failure of safety functions for the mitigation of DECs may lead to high severity consequences. Therefore, these safety functions should be **assigned a safety category commensurate with the safety significance.**”	Comment noted. Text in section 7.3.4 revised as follows: “The portable equipment credited for DECs are considered part of complementary design features. Therefore, they belong to SSCs important to safety. Portable equipment should be classified based on its safety importance. There may be different options available to fulfill the fundamental safety functions during DECs. However, when called upon the portable onsite or offsite equipment credited is expected to be effective with reasonable confidence. Portable onsite or offsite equipment is expected to support Severe Accident Management Guidelines”.
57.	Candu Energy	7.1	Draft RD-337 version 2 states that complementary design features are included in the list of systems important to safety.	It is suggested that a clear explanation of the classification of internal/external hazards as DBA or DEC be provided in GD-337.	Comment noted. Text in section 7.3.4 revised as follows: “The portable equipment credited

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Portable equipment – such as emergency mitigating equipment, and pumps should not necessarily constitute systems important to safety. More clarification is required on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for existing nuclear power plants.		for DECs are considered part of complementary design features. Therefore, they belong to SSCs important to safety. Portable equipment should be classified based on its safety importance. There may be different options available to fulfill the fundamental safety functions during DECs. However, when called upon the portable onsite or offsite equipment credited is expected to be effective with reasonable confidence. Portable onsite or offsite equipment is expected to support Severe Accident Management Guidelines".
58.	George Vayssier	7.1	(1) Sec. 7.1 (safety system classification) seems to 'borrow' items from the draft IAEA Safety Guide DS 367, such as the concept of 'preventive and mitigative' safety functions. The concept of 'preventive' safety functions, unique in the IAEA draft guide, was not welcomed by industry - it does not reflect industry practices. At present, the safety guide is still in draft form. In addition, an overall classification of both pressure retaining components and components fulfilling safety functions (e.g., ECCS) has been abandoned by e.g. US and French industry, after such a system had been set up in earlier versions of safety classification. ANS		(1) Text revised to remove the disputable concepts.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			58.14 (1993) describes this process in an Appendix. Now there are various classification schemes: for safety, for pressure integrity, for electrical, for seismic, for environmental loads and for QA. A possible inter-linkage between them is presented in ANS 58.14 (1993), Table 7.1. (2) Although it is not the function of this document to comment the requirements of RD-337, it should be noted that they allow declassification if the probability that the safety function will be called upon is low. Most safety classification schemes assign the safety class only to the safety function of a component, irrespective of the probability that the safety function is called upon. For example, ECCS is a safety function, irrespective of the quality of the primary pressure boundary, whose failure will cause the ECCS to operate. Improving the quality of the primary pressure boundary has no effect on the quality of the design of the ECCS. Where RD-337 allows this, the guide GD-337 should make clear that such declassification is not acceptable. There should also be no more safety classes than there are industry codes that define the design requirements for particular components. Otherwise, the classification loses much of its meaning. (3) A very mature safety classification		(2) No change. As stated in the beginning of this section, the process is primarily based on deterministic methodologies, therefore declassification solely by PSA is not allowed. By following this document, ECCS will be a high safety class regardless of the quality of pressure boundary. (3) No change. This section

#	Organization	Section	Comment	Suggested Change	CNSC Response
			system is that of the EPR, which defines also classification for systems that mitigate DECs. For DECs w/o core melt this is Risk Reduction Catagory A (RRC-A) and for DECs including core melt this is RRC-B. GD-337 mentions for such systems only that they should have a 'high' safety classification, w/o specifying what that should be. Note: in the draft DS 367, systems mitigating DECs are classified one class lower than the systems mitigating DBAs. Is this what the CNSC would agree on? The GD-337 should clearly define what is: - a preventive safety function, - a mitigative (mitigatory) safety function, - the iterative process of safety classification, as these are not obvious in the context of the document or defined in the glossary. Note: 'preventive / mitigative functions' do not appear in IAEA SSR2/1, neither in the IAEA safety glossary. 'Safety group' is defined both in the IAEA glossary and the GD-337 glossary up to and including DBAs, not for DECs.		provides guidance at a high level. CNSC does not prescribe a particular classification scheme. The definition of safety group is in line with IAEA.
59.	Bruce Power	7.2	The criteria for classification of internal/external hazards as DBA or DEC are not clearly explained in GD-337.		No change. Section 7.3 of the document addresses all plant states considered in the design. RD-310 and GD-310 addressed how to

#	Organization	Section	Comment	Suggested Change	CNSC Response
					classify PIEs. Those documents are referred to in the guidance in section 7.3. The document places physical design requirements up to DECs which are subset of BDBAs. Beyond DEC should be practically eliminated.
60.	Candu Energy	7.2	Draft RD-337 version 2 section 7.4.1 shows internal events can be classified as AOO, DBA or DEC; and RD-337 version 2 section 7.4.2 shows external events can be classified as DBA or DEC. This means that internal and external events can be considered either design basis (if classified AOO or DBA) or complementary design features (if classified as DEC). The criteria for classification of internal/external hazards as DBA or DEC are not addressed in GD-337.	It is suggested that a clear explanation of the classification of internal/external hazards as DBA or DEC be provided in GD-337.	No change. Section 7.3 of the document addresses all plant states considered in the design. RD-310 and GD-310 addressed how to classify PIEs. Those documents are referred to in the guidance in section 7.3. The document places physical design requirements up to DECs which are subset of BDBAs. Beyond DECs are considered the ones that are practically eliminated.
61.	Bruce Power	7.3	Since Figure 1 of RD-337 version 2 shows the plant states, it is more appropriate to include it in Section 7.3 of GD-337. It is also suggested that GD-337 could include a version of Figure 1 that also shows the design basis and complementary design features against the operational states and accident conditions.	Suggest adding the following text to Section 7.3 GD-337 along with Figure 1 from RD-337 version 2: “The relationship between the plant design envelope and the plant states is shown in Figure 1.”	Comment noted. Documents RD-337 and GD-337 are combined.
62.	Candu Energy	7.3	Since Figure 1 in Section 7.2 of draft RD-337 version 2 shows the plant states, it is more appropriate to include it in Section 7.3 of GD-337.	It is suggested that Figure 1 from Section 7.2 of draft RD-337 be added to Section 7.3. It is further suggested that GD-337 include a version of Figure 1 that also	Comment noted. Documents RD-337 and GD-337 are combined.

#	Organization	Section	Comment	Suggested Change	CNSC Response
				shows the design basis and complementary design features against the operational states and accident conditions. It is also suggested that the following statement be added to describe Figure 1: "The relationship between the plant design envelope and the plant states is shown in Figure 1."	
63.	Candu Energy	7.3	"The design should include the following:... final safe configurations after AOOs, DBAs, and DECs" Use of Beyond Design Basis Accident is preferred because it is the commonly used term in the Canadian nuclear industry.	Suggest revising the text as follows: "The design should include the following: final safe configurations after AOOs, DBAs, and **BDBAs**"	No change. The term DEC was introduced to provide a clear distinction between those BDBAs that are considered in the design and those that are not. The document places physical design requirements for a subset of BDBAs. This subset is DECs. Furthermore, the term has been adopted by IAEA in SSR-2/1 and the change in terminology maintains the alignment with IAEA standards. The definition of DECs has been changed to more closely match SSR-2/1. However, CNSC has not adopted all the clauses related to DECs from SSR-2/1 since they are not internally consistent. See for example, paragraph 5.31 which refers to "DECs that have been practically eliminated". This should read "plant states that have been

#	Organization	Section	Comment	Suggested Change	CNSC Response
					practically eliminated" to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are "practically eliminated." CNSC does not believe it is possible or necessary to make design provision against events that are practically eliminated. Furthermore CNSC does not believe that SSR-2/1 intended this meaning.
64.	Bruce Power	7.3.1	"shutdown in a refuelling mode or other maintenance condition that opens the reactor coolant or containment boundary" Editorial: The text needs rephrasing to achieve greater clarity. Also, it would be useful to explicitly identify guaranteed shutdown state as a normal operating mode.	Suggest changing the text to: • "refuelling or other maintenance condition that opens the reactor coolant or containment boundary while in a shutdown mode (i.e., Guaranteed shutdown state)…"	No change. This sentence is consistent with RD/GD-369 and IAEA GS-G-4.1
65.	Candu Energy	7.3.1	"Operating configurations for normal operation are addressed by the OLCs.....These typically include:... shutdown in a refuelling mode or other maintenance condition that opens the reactor coolant or containment boundary…"	Suggest revising the text as follows: "Operating configurations for normal operation are addressed by the OLCs.....These typically include:... "**refuelling or other maintenance condition that opens the reactor coolant or containment boundary while**	No change. This sentence is consistent with RD/GD-369 and IAEA GS-G-4.1

#	Organization	Section	Comment	Suggested Change	CNSC Response
			Editorial: The text should be rephrased to achieve greater clarity. Also, it would be useful to explicitly identify guaranteed shutdown state as a normal operating mode.	**in a shutdown mode (i.e., Guaranteed shutdown state)…**”	
66.	Bruce Power	7.3.2	“core temperature” The core temperature is not a directly measured plant parameter. The inlet temperature to the core and the average outlet temperature from the core are directly measured plant parameters.	Suggest changing the text to: “core temperature (based on the difference between measured core inlet and core outlet temperatures)”’	No change. This list provides typical examples at a high level. CNSC does not prescribe a particular method to measure core temperature.
67.	Candu Energy	7.3.2	“The plant parameters that are important to the outcome of the safety analysis should be identified. These parameters would typically include:... core temperature...” The core temperature is not a directly measured plant parameter. The inlet temperature to the core and the average outlet temperature from the core are directly measured plant parameters.	Suggest revising the text as follows: The plant parameters that are important to the outcome of the safety analysis should be identified. These parameters would typically include:... “core temperature **(based on the difference between measured core inlet and core outlet temperatures)**”	No change. This list provides typical examples at a high level. CNSC does not prescribe a particular method to measure core temperature.
68.	Candu Energy	7.3.2	“The plant parameters that are important to the outcome of the safety analysis should be identified. These parameters would typically include:... temperatures and flows…” Editorial: The text should be rephrased to achieve greater clarity.	Suggest revising the text as follows: “The plant parameters that are important to the outcome of the safety analysis should be identified. These parameters would typically include:... “temperatures and flows **for process systems involved in the PIEs**”	No change. This applies to more than process systems involved in the PIEs. This sentence is consistent with RD/GD-369 and IAEA GS-G-4.1.
69.	Bruce Power	7.3.4	RD-337 version 2 states “The design shall be such that plant states that could lead to significant radioactive releases are practically eliminated; if not, only protective measures that are of limited		No change. “Practically eliminated” is defined in Glossary. Protective measures may include sheltering,

#	Organization	Section	Comment	Suggested Change	CNSC Response
			scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures.” GD-337 defines practically eliminated in the Glossary, but does not make reference to the term in the body of the document. The use of the term “practically eliminated” requires further clarification. This clarification is not provided in GD-337. The text should be revised to put it into context with respect to meeting the safety goals. The use of the phrase “only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public” requires further clarification. Is this phrase intended to make reference to the use of sheltering, evacuation and relocation? If so, it is suggested that the text be changed to be consistent with the idea of “implementation of offsite emergency measures”.		evacuation and relocation. These measures shall be of limited scope in terms of area and time. Wording is used to maintain alignment with IAEA SSR 2/1.
70.	Bruce Power	7.3.4	“take credit for realistic system action and performance beyond original intended functions, including systems not important to safety” Editorial: The text needs rephrasing to achieve greater clarity with respect to the definition of “realistic system action and performance beyond original	Suggest changing the text to: “take credit for physically possible system action and performance beyond original intended functions, including systems not important to safety”	No change. The list provides one of the ways of analyzing DECs.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			intended functions". Perhaps using "physically possible" rather than "realistic" can communicate the intent better, Nevertheless, there is a need for greater clarity on the principles and guidelines to use when analyzing design extension conditions.		
71.	Candu Energy	7.3.4	Section 7.3.4 of draft RD-337 version 2 states "**The design shall be such that plant states that could lead to significant radioactive releases are practically eliminated; if not, only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public, and sufficient time shall be made available to implement these measures**." GD-337 defines "practically eliminated" in the Glossary, but does not make reference to the term in the body of the document. The use of the term "practically eliminated" requires further clarification. This clarification is not provided in GD-337. The use of the phrase "only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public" requires further clarification. Is this phrase intended to make reference to the use of sheltering, evacuation and relocation? If so, it is suggested that the text be revised to be consistent with	It is suggested that further clarification regarding the term "practically eliminated" be provided in Section 7.3.4. It is suggested that further clarification be provided regarding the phrase "only protective measures that are of limited scope in terms of area and time shall be necessary for protection of the public". If applicable, it is suggested that the text be revised to be consistent with the idea of "implementation of offsite emergency measures".	Additional guidance on the term "practically eliminated has been provided. Protective measures may include sheltering, evacuation and relocation. These measures shall be of limited scope in terms of area and time. Wording is used to maintain alignment with IAEA SSR 2/1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			the idea of "implementation of offsite emergency measures".		
72.	Candu Energy	7.3.4	"Accidents in this category are, typically, sequences involving more than one failure....The analysis of those accidents may:.... take credit for realistic system action and performance beyond original intended functions, including systems not important to safety" Editorial: The text should be rephrased to achieve greater clarity with respect to the definition of "realistic system action and performance beyond original intended functions". It is suggested that the term "physically possible" replace the term "realistic" in order to better communicate the intent. Nevertheless, there is a need for greater clarity on the principles and guidelines to use when analyzing design extension conditions.	Suggest revising the text as follows: "Accidents in this category are, typically, sequences involving more than one failure....The analysis of those accidents may:.... take credit for **physically possible** system action and performance beyond original intended functions, including systems not important to safety"	No change. The list provides one of the ways of analyzing DECs.
73.	Candu Energy	7.3.4.1	"Detailed analysis should be performed and documented to identify and characterize accidents that can lead to significant core damage or offsite releases of radioactive material (severe accidents)." This statement does not consider BDBAs for the spent fuel bays that include postulated significant fuel damage.	Suggest revising the text as follows: "Detailed analysis should be performed and documented to identify and characterize accidents that can lead to significant **core/fuel** damage or offsite releases of radioactive material (severe accidents)."	Agreed. Text changed as follows: "Detailed analysis should be performed and documented to identify and characterize accidents that can lead to significant **fuel** damage or offsite releases of radioactive material (severe accidents)".
74.	OPG	7.4.2	"Natural external hazards considered in	Change text as follows:	Text revised for clarity as

#	Organization	Section	Comment	Suggested Change	CNSC Response
			the design include" As noted earlier in this section, hazards are evaluated and may be screened out based on extremely low probability. The statement in question implies no such screening (as may be the case for the listed "geomagnetic storm").	"Natural external hazards considered in the evaluation include..."	follows: "Natural external hazards considered in the design process include..."
75.	Bruce Power	7.6.1	To provide guidance on the requirement in Section 7.6.1 of RD-337 version 2, it is suggested that the following text be moved from RD-337 to GD-337: "Failure of a number of devices or components to perform their functions may occur as a result of a single specific event or cause. Common-cause failures may also occur when multiple components of the same type fail at the same time. This may be caused by occurrences such as a change in ambient conditions, saturation of signals, repeated maintenance error or design deficiency."	Suggest adding the following text: "Failure of a number of devices or components to perform their functions may occur as a result of a single specific event or cause. Common-cause failures may also occur when multiple components of the same type fail at the same time. This may be caused by occurrences such as a change in ambient conditions, saturation of signals, repeated maintenance error or design deficiency."	Agreed. Text moved to the guidance portion of section 7.6.1. Text reads as follows: "Failure of a number of devices or components to perform their functions could occur as a result of a single specific event or cause. CCF could also occur when multiple components of the same type fail at the same time. This could be caused by occurrences such as a change in ambient conditions, saturation of signals, repeated maintenance error or design deficiency".
76.	Candu Energy	7.6.1	To provide guidance on the requirement in Section 7.6.1 of draft RD-337 version 2, it is suggested that the following text be moved from RD-337 to GD-337: "Failure of a number of devices or components to perform their functions may occur as a result of a single specific event or cause. Common-cause failures may also occur when multiple components of the same type fail at the	Suggest adding the following text (originally from Section 7.6.1 of draft RD-337 version 2) to GD-337: "Failure of a number of devices or components to perform their functions may occur as a result of a single specific event or cause. Common-cause failures may also occur when multiple components of the same type fail at the same time. This may be caused by occurrences such as a change in ambient	No change. Although these are not requirements, they do have value to be kept in the document as minimum background information.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			same time. This may be caused by occurrences such as a change in ambient conditions, saturation of signals, repeated maintenance error or design deficiency.”	conditions, saturation of signals, repeated maintenance error or design deficiency.”	
77.	Bruce Power	7.6.1.2	“human diversity” Editorial: The text needs rephrasing to achieve greater clarity.	Suggest changing the text to: “human factor engineering diversity”	Agreed. Text revised as suggested.
78.	Candu Energy	7.6.1.2	“The design should implement adequate diversity in safety systems, such as: human diversity” Editorial: The text should be revised to achieve greater clarity.	Suggest revising the text as follows: “The design should implement adequate diversity in safety systems, such as: human factor engineering diversity”	Agreed. Text revised as suggested.
79.	Bruce Power	7.6.2	RD-337 version 2 states “2. all identifiable but non-detectable failures, including those in the non-tested components”. The inclusion of identifiable, but non-detectable failures, including those in non-tested components appears to exceed the definition and intent of “single failure criterion”, as described in IAEA Specific Safety Guide SSG-2, Deterministic Safety Analysis for Nuclear Power plants. If this requirement is not removed from RD-337, then additional clarification on the expectations for meeting this requirement is needed in GD-337.		More guidance added as follows: “To deal with identifiable but non-detectable failures, the following action should be considered: - *Preferred action:* The system or the test scheme should be redesigned to make the failure detectable. - *Alternative action:* When analyzing the effect of each single failure, all identified nondetectable failures should be assumed to have occurred. Therefore, the design should take appropriate measures to address these non-detectable failures, such as adequate redundancy and diversity”. Please note that IAEA SSG-2 does not address this specifically

#	Organization	Section	Comment	Suggested Change	CNSC Response
					and the existing document is in line with IEEE-379-2000.
80.	Candu Energy	7.6.2	Draft RD-337 version 2 states “2. all identifiable but non-detectable failures, including those in the non-tested components”. The inclusion of identifiable, but non-detectable failures, including those in non-tested components appears to exceed the definition and intent of “single failure criterion”, as described in IAEA Specific Safety Guide SSG-2, Deterministic Safety Analysis for Nuclear Power plants. In the comments provided for draft RD-337 version 2, it was suggested that this requirement be deleted. If it is decided that this requirement will not be deleted, then additional clarification on the expectations for meeting this requirement should be provided in GD-337.	If it is decided that the requirement regarding “all identifiable but non-detectable failures, including those in non-tested components” is not going to be deleted from RD-337 (as suggested in the comments provided for draft RD-337 version 2), then it is suggested that additional clarification on the expectations for meeting this requirement be provided in GD-337.	More guidance added as follows: “To deal with identifiable but non-detectable failures, the following action should be considered: - *Preferred action:* The system or the test scheme should be redesigned to make the failure detectable. - *Alternative action:* When analyzing the effect of each single failure, all identified nondetectable failures should be assumed to have occurred. Therefore, the design should take appropriate measures to address these non-detectable failures, such as adequate redundancy and diversity”. Please note that IAEA SSG-2 does not address this specifically and the existing document is in line with IEEE-379-2000.
81.	George Vayssier	7.6.2	Sec. 7.6.2 (single failure, SF) hooks the SF, as in IAEA documents, on the performance of a safety group. Where the safety group is the assembly of equipment to mitigate a given PIE. If we take as an example SBLOCA, we need shutdown, ECCS, containment isolation, containment cooling and containment atmosphere cleanup. This total equipment then constitutes the safety group. The SF principle as		No change. The definition of safety group is in line with IAEA. Based on this definition, single failure is applied to each safety group to meet the safety limits for its corresponding AOO or DBA, which is caused by a certain PIE. This single failure could happen randomly in any component of

#	Organization	Section	Comment	Suggested Change	CNSC Response
			defined for the group then requires only one failure to be considered in the whole group. In practice, however, containment isolation is redundant, i.e. SF-proof, as is the ECCS and the shutdown. Hence, the usual design is stronger than the regulation requires. Possibly, the SF should not be hooked on the safety group, but on each individual safety function. This is also the approach taken in ANS 58.14 (either 1993 or 2011 version). Sometimes people understand the safety group concept in another way, as a safety system comprises more equipment than the safety function requires. For example, an ECCS has jockey pumps, which are not classified for safety, as they are not required during the PIE. Hence, another interpretation of safety group is to consider only those parts of the system which have a safety function during the PIE for which they are designed. In that case, the SF definition for safety groups is valid and does not underrate present designs. Note 1: present good practice in many designs is to have three of four redundancies for relevant safety equipment (e.g., 4 x 100 % ECCS, 3 x 100 % diesels, etc.). To cover this issue, one could recommend that the SF is also fulfilled during periods of testing and inspection. Note 2: this is formally now only required in Germany in what is called SF+. (single failure plus).		the safety group. In SBLOCA example, based on the existing requirements set out in section 7.6.2, the assembly of SSCs credited (which is the safety group for the SBLOCA, according to definition in this document) shall meet the single failure criteria if the safety functions performed by these SSCs are required to meet the limits of SBLOCA. This document already asks the safety group to meet single failure criteria under maintenance, testing and inspection conditions.
82.	George	7.7	(1)Sec. 7.7 (codes for pressure retaining		(1) Agreed. Text changed as

#	Organization	Section	Comment	Suggested Change	CNSC Response
	Vayssier		components) refers to CSA N285-0-08 and ASME BPVC. To require (formally 'recommend') these codes as a minimum is, I believe, an extremely important statement. Nevertheless, these codes do not themselves classify SSC, that is part of the safety classification. For example, see ANS 58.14, where ASME III classes are assigned to various safety classes. I believe, therefore, that sec. 7.7. should refer back to the safety classification. (2) Leak-before-break (LBB): there is no clear recommendation to apply the concept of LBB. This is, I believe, below the present design of new reactors, which have at least LBB. In addition, some applications go beyond that and require a no-break philosophy (such as in the UK, France and Germany). In France, this has been included in the newest RCC-M (the 'French ASME-code') and in Germany in KTA 3206 (at present draft), 'Analysis Regarding Rupture Preclusion for Pressure Retaining Components'. I see no reason to deviate for new reactors from this new international standard.		follows: "For the design of pressure-retaining systems and components, the design authority should ensure that the selection of codes and standards is **commensurate with the safety class and** adequate to provide confidence that plant failures are minimized". (2) No change. Text for leak-before-break is provided in the document. Break preclusion is allowed if the designer can demonstrate that failure is "practically eliminated".
83.	George Vayssier	7.8	Sec. 7.8 (equipment qualification). Also here a reference to safety classification would be useful. Sec. 7.8.4. does not include a recommendation that the equipment should be qualified for DECs. NS-G-2.15 recommends even dedicated equipment to mitigate DECs.		No change. CSA N290.13 is referenced in this section, which asks to consider safety classification in its section 4.1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			The increased weight of mitigating severe accidents after Fukushima apparently has not been considered while writing this paragraph		For the comment regarding 7.8.4, the document (see section 7.3.4 about complementary design features) and NS-G-2.15 recommends dedicated equipment to mitigate DECs. The document requires "equipment and instrumentation credited to operate during DECs shall be demonstrated, with reasonable confidence, to be capable of performing their intended safety function under the expected environmental conditions" and provides guidance in meeting this requirement.
84.	George Vayssier	7.9	Sec. 7.9 should include a reference to safety system classification. See ANS 58.14 (1993), Table 7.1.	Change text as follows: "The monitoring should not be limited to process variables of safety and safety-related systems. It should extend to the monitoring of radiation, hydrogen, seismic, and vibration."	If IAEA publishes DS367 it will be included in the additional information of section 7.1 of the document. Section 7.1 provides high level methodology which captures the intent of ANS 58.14.
85.	OPG	7.9.1	"The monitoring should not be limited to process variables of safety and safety-related systems. It should extend to the monitoring of radiation, hydrogen, seismic, loose parts, vibration, and fatigue." Installation of I&C equipment to monitor for loose parts and fatigue is not practical. Suggest removing these items from the recommended list of parameters to be monitored.		Text revised as follows: "The monitoring should not be limited to process variables of safety and safety-related systems. It **should include** the monitoring of radiation, hydrogen, seismic, vibration, **and as applicable**, loose parts and fatigue."
86.	Bruce Power	7.9.2	"The standards and codes used for computer-based systems or equipment	Suggest changing the text to:	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			are identified prior to the design.” Replace codes with practices as per RD-337 version 2, because there are no codes applied for computer-based systems and equipment, only standards.	“The standards and practices used for computer-based systems or equipment are identified prior to the design.”	
87.	Bruce Power	7.9.2	“The verification and validation activities should be identified and use a top-down approach.” A bottom up approach should also be allowed and recognized. Verification testing is generally perform using a bottom-up approach (e.g., unit test and then subsystem/integration testing).	Suggest changing the text to: “The verification and validation activities should be identified and use appropriate engineering approaches, e.g., either a top-down or bottom-up approach.”	Agreed. Text revised as follows: “These activities should be identified and use appropriate engineering approaches, e.g., a top-down or bottom-up approach”.
88.	Bruce Power	7.9.2	“The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented. The relationship between lifecycle and verification and validation activities should be stated.” Editorial: Improved clarity is needed for “The relationship between lifecycle and verification and validation activities should be stated.” Lifecycle consists of design, verification and validation activities.	Suggest changing the text to: “The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented. The lifecycle should identify when design verification and validation activities are performed in relation to the stages in the design processes.”	Text revised as follows: “**The instrumentation and control development lifecycle includes verification and validation activities.** These activities should be identified and use appropriate engineering approaches, e.g., a top-down or bottom-up approach. The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented.”
89.	Candu Energy	7.9.2	“The standards and codes used for computer-based systems or equipment are identified prior to the design.” Verification testing is generally performed using a bottom-up approach	Suggest revising the text as follows: “The verification and validation activities should be identified and use appropriate engineering approaches, e.g., either a top-down or bottom-up approach.”	Agreed. Text revised as follows: “These activities should be identified and use appropriate engineering approaches, e.g., a top-down or bottom-up

#	Organization	Section	Comment	Suggested Change	CNSC Response
			(e.g., unit test and then subsystem/integration testing). Therefore a bottom- up approach should also be allowed and recognized.		approach”.
90.	Candu Energy	7.9.2	“The verification and validation activities should be identified and use a top-down approach.” Verification testing is generally performed using a bottom-up approach (e.g., unit test and then subsystem/integration testing). Therefore a bottom- up approach should also be allowed and recognized.	Suggest revising the text as follows: “The verification and validation activities should be identified and use appropriate engineering approaches, e.g., either a top-down or bottom-up approach.”	Agreed. Text revised as follows: “These activities should be identified and use appropriate engineering approaches, e.g., a top-down or bottom-up approach”.
91.	Candu Energy	7.9.2	“The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented. The relationship between lifecycle and verification and validation activities should be stated.” Editorial: Improved clarity is needed for “The relationship between lifecycle and verification and validation activities should be stated.” Lifecycle consists of design, verification and validation activities.	Suggest revising the text as follows: “The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented. **The lifecycle should identify when design verification and validation activities are performed in relation to the stages in the design processes**.”	Text revised as follows: “**The instrumentation and control development lifecycle includes verification and validation activities.** These activities should be identified and use appropriate engineering approaches, e.g., a top-down or bottom-up approach. The relationship between design and verification and validation should be indicated and the outcome of verification and validation activities should be documented”.
92.	OPG	7.9.2 3rd para	“The software provided by a third-party should have the same level of qualification as for software that is written specifically for the application. The qualification of software should be verified through the national or international standards relevant to the	Add a sentence at the end of the paragraph: “...When the third-party software was not developed to equivalent standards, a qualification plan and qualification report should be prepared to demonstrate that	Agreed. Text revised as follows: “When the pre-developed software was not developed to equivalent standards, they may be used to implement IEC 61226 category B and C functions.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			qualification activities of pre-developed software.” In some cases, widely used and proven third-party software was not developed to standards equivalent to those used for software written specifically for the application.	this software is fit for its intended purpose.”	However, a qualification plan and qualification report should be prepared to demonstrate that this software is fit for its intended purpose and meet the requirements in IEC 62138”. The above wording is in agreement with N290.14-07 and IEC 60880, Clause 15.
93.	OPG	7.9.2 last bullet	- verifiability should refer to the extent to which the development processes and outputs have been created to facilitate verification using both static methods and testing Editorial inconsistency. Change “should refer” to “refers”.	Change text as follows: “Verifiability refers to the extent to which the development processes and outputs have been created to facilitate verification using both static methods and testing”	Agreed. Text revised as suggested.
94.	OPG	7.9.3	“Instrumentation is also provided for recording vital plant parameters and variables, including:” Suggest to characterize the shown list of vital plant parameters as examples (i.e., "such as") rather than "including". The licensee should determine and justify the vital parameters to be recorded for accident monitoring. Also, "hydrogen concentration" may be inferred rather than directly measured.	Change text as follows: “Instrumentation is also provided for recording vital plant parameters and variables, such as:”	Agreed. Text revised as suggested.
95.	Bruce Power	7.10	“Pre-installed equipment can be credited after 30 minutes where only control room actions are needed or after 1 hour if field actions are needed.” The basis and justification for changing from an Industry standard of 15 minutes for operator action in the control room	Suggest changing the text to: “Pre-installed equipment can be credited after 15 minutes where only control room actions are needed or after 30 minutes if field actions are needed.”	No change. CNSC requirements are aligned with current international practice. IAEA SSR 2/1 5.2 provides high-level requirements such that sufficiently long time be available between detection and

#	Organization	Section	Comment	Suggested Change	CNSC Response
			and 30 minutes for operator action outside of the control needs to be provided. This change does not appear to be consistent with IAEA guidance.		action times although it does not specify the values. UK, France and WENRA all require 30 min as a minimum period for control room action. ANSI/ANS-58.8-1994 is used by many countries and requires a minimum of 20 minutes for diagnosis + 5 minutes for implementation for plant conditions equivalent to DBA and some DEC. ANSI/ANS-58.8 requires an additional 30 minutes for actions outside the control rooms. Section 8.10.4 (the same section) allows for alternative times stating “Alternative action times may be used if justified…”
96.	Candu Energy	7.10	“Pre-installed equipment can be credited after 30 minutes where only control room actions are needed or after 1 hour if field actions are needed.” The basis and justification for changing from an Industry standard of 15 minutes for operator action in the control room and 30 minutes for operator action outside of the control needs to be provided. This change does not appear to be consistent with IAEA guidance.	Suggest revising the text as follows: “Pre-installed equipment can be credited after **15 minutes** where only control room actions are needed or after **30 minutes** if field actions are needed.”	No change. CNSC requirements are aligned with current international practice. IAEA SSR 2/1 5.2 provides high-level requirements such that sufficiently long time be available between detection and action times although it does not specify the values. UK, France and WENRA all require 30 min as a minimum period for control room action. ANSI/ANS-58.8-1994 is used by many countries and requires a

#	Organization	Section	Comment	Suggested Change	CNSC Response
					minimum of 20 minutes for diagnosis + 5 minutes for implementation for plant conditions equivalent to DBA and some DEC. ANSI/ANS-58.8 requires an additional 30 minutes for actions outside the control rooms. ANSI/ANS-58.8 is used by many countries. Section 8.10.4 (the same section) allows for alternative times stating "Alternative action times may be used if justified…"
97.	OPG	7.10	"Pre-installed equipment can be credited after 30 minutes where only control room actions are needed or after 1 hour if field actions are needed." The Industry standard of 15 minutes for operator action in the control room and 30 minutes for operator action outside of the control is reasonable and has been validated. The basis and justification for changing from the current industry standard practice needs to be provided. This proposed change could also unnecessarily increase the cost and complexity of plant design.	Change text as follows: "Pre-installed equipment can only be credited after a minimum of 15 minutes where only control room actions are needed, or after a minimum of 30 minutes, if field actions are needed."	No change. CNSC requirements are aligned with current international practice. IAEA SSR 2/1 5.2 provides high-level requirements such that sufficiently long time be available between detection and action times although it does not specify the values. UK, France and WENRA all require 30 min as a minimum period for control room action. ANSI/ANS-58.8-1994 requires a minimum of 20 minutes for diagnosis + 5 minutes for implementation for plant conditions equivalent to DBA and some DEC.

#	Organization	Section	Comment	Suggested Change	CNSC Response
					ANSI/ANS-58.8 requires an additional 30 minutes for actions outside the control rooms. ANSI/ANS-58.8 is used by many countries. Section 8.10.4 (the same section) allows for alternative times stating "Alternative action times may be used if justified…"
98.	OPG	7.10 last sentence	The reference to section 7.3.4 is unclear. Please clarify or remove this reference.	Clarity is required for the purpose of connection within the design.	Text changed to point to section 7.3.4.1
99.	OPG	7.13.1	"a plant level HCLPF being at least 1.67 times the design basis earthquake" Recommend that the basis for a plant level HCLPF at 1.67 times the DBE be explained or referenced.	Basis for a plant level HCLPF at 1.67 times the DBE be explained or referenced.	No change. The approach follows international practices including US-NRC.
100.	OPG	7.13.1	Are the two acceptance criteria bullets in addition to the safety goal criteria for BDBE?	Clarity is required	Comment noted. Text revised for clarity as follows: "To support meeting the safety goals, the acceptance criterion for beyond design basis earthquake should demonstrate that the plant HCLPF is at least 1.67 times the design basis earthquake."
101.	OPG	7.13.1	"The acceptance criteria for beyond design basis earthquake should be: - the containment integrity in the case of beyond design basis earthquake"	Change text as follows: " There is an appropriate level of confidence that containment integrity can be maintained in the case of a BDBE"	Text deleted.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It is unclear. Is this to say that containment cannot fail for BDBEs?		
102.	Bruce Power	7.13.1	“Design and beyond design load categories are defined to demonstrate structural performance in operational states and accident conditions.” Editorial: The text needs rephrasing to achieve greater clarity.	Suggest changing the text to: “Design load categories are defined to demonstrate structural performance in operational states and design basis accident conditions. In addition, beyond design load categories are considered for structural performance in design extension conditions.”	Agreed. Text changed to: “Design and beyond design load categories are defined to demonstrate structural performance in operational states and accident conditions. In addition, beyond design load categories are considered for structural performance in design extension conditions”.
103.	Bruce Power	7.13.1	“CSA N289.3-10, *Design procedures for seismic qualification of nuclear power plants*, clause 5.2.2” Editorial: clause 5.2.2 should be clause 5.2.3.	Suggest changing the text to: “CSA N289.3-10, *Design procedures for seismic qualification of nuclear power plants*, clause 5.2.3”	Agreed. Text revised as suggested.
104.	Bruce Power	7.13.1	“Damping ratios for structural systems and sub-systems should be taken into account according to ASCE 43-05.” The guidance should not be restricting the use of damping ratios to just ASCE 43-05. The damping ratio in CSA N289.3-2010 Table 4 should also be allowed.	Suggest changing the text to: Damping ratios for structural systems and sub-systems should be taken into account according to recognized standards such as ASCE 43-05 and CSA N289.3.”	Agreed. Text revised as suggested.
105.	Candu Energy	7.13.1	“Design and beyond design load categories are defined to demonstrate structural performance in operational states and accident conditions.” Editorial: The text should be revised to achieve greater clarity. In particular, the different types of accident conditions should be addressed.	Suggest revising the text as follows: “Design load categories are defined to demonstrate structural performance in operational states and design basis accident conditions. In addition, beyond design load categories are considered for structural performance in design extension conditions.”	Agreed. Text revised as follows: “Design and beyond design load categories are defined to demonstrate structural performance in operational states and accident conditions. In addition, beyond design load categories are considered for structural performance in design

#	Organization	Section	Comment	Suggested Change	CNSC Response
					extension conditions".
106.	Candu Energy	7.13.1	"….CSA N289.3-10, *Design procedures for seismic qualification of nuclear power plants*, clause 5.2.2" Editorial: Clause 5.2.2 should be replaced with clause 5.2.3.	Suggest revising the text as follows: "…..CSA N289.3-10, *Design procedures for seismic qualification of nuclear power plants*, clause **5.2.3**"	Agreed. Text revised as suggested.
107.	Candu Energy	7.13.1	"Damping ratios for structural systems and sub-systems should be taken into account according to ASCE 43-05." The guidance should not be restricting the use of damping ratios to just ASCE 43-05. The damping ratio in CSA N289.3-2010 Table 4 should also be allowed.	Suggest revising the text as follows: Damping ratios for structural systems and sub-systems should be taken into account according to **recognized standards such as ASCE 43-05 and CSA N289.3.**"	Agreed. Text revised as suggested.
108.	George Vayssier	7.13.1	Sec. 7.13.1 (seismic design and classification): it is not clear whether a DBA and an SSE (safe shutdown earthquake) need to be combined, as is done in many countries. Hence, SSE is not a DBA, but a complication of the DBA (such as LBLOCA). The reason is that an SSE can occur during the whole plant life, not excluding moments where the DBA is postulated to occur. Other countries take a probabilistic approach and believe than SSE and DBA do not occur simultaneously. I never heard of a country assuming the occurrence of a DBA being greater during an SSE and, therefore, possibly combining these on probabilistic grounds.		No change. Comment is not clear. The document does not use the term Safe Shutdown Earthquake.
109.	OPG	7.21 Human factors Analysis, 2nd last para	"The design should also provide research or study reports for any work carried out as part of the process of developing and testing any new human-	Delete this paragraph. "The design should also provide research or study reports for any work carried out	No change. If it's already covered by HFE program, then this guidance will be met. This guidance emphasizes this in case

#	Organization	Section	Comment	Suggested Change	CNSC Response
			system interface technologies (i.e., displays and controls) that are new to NPP applications and that may have a bearing on safety." As earlier stated, there are already HFE Program Plans and HFE Verification and Validation Plans and associated V&V reports. Any study reports regarding use of new HMI technologies would be covered by these.	as part of the process of developing and testing any new human-system interface technologies (i.e., displays and controls) that are new to NPP applications and that may have a bearing on safety."	the HFE program does not cover it.
110.	OPG	7.21 Human factors, Operating personnel, 2nd paragraph	"Formal interfaces should be defined between the HF in design group(s) and the various design engineering groups involved in the design process; this facilitates the interactions and sharing of information to achieve good integration of HF considerations in the design." There should not be a presumption of a particular design organization.	Delete this paragraph. "Formal interfaces should be defined between the HF in design group(s) and the various design engineering groups involved in the design process; this facilitates the interactions and sharing of information to achieve good integration of HF considerations in the design."	No change. This guidance does not presume the structure of a particular design organization. Design groups and design engineering groups should not be interpreted as a particular design organization.
111.	OPG	7.21 Human factors	"There should be a sufficient number of trained, qualified and experienced HF specialists to carry out the HF in design activities." There should be a graded approach with respect to HF in design such that for simple HMI issues, use of an HF specialist is not necessary.	Change text to: "There should be a sufficient number of trained, qualified and experienced HF specialists to carry out the HF in design activities where these meet established criteria pertaining to system complexity and importance to safety."	Agreed. Text revised as follows: "There should be a sufficient number of trained, qualified and experienced HF specialists to carry out the HF in design activities provided that established criteria pertaining to system complexity and importance to safety are met."
112.	Bruce Power	7.22.3 Table 1	Ductility ratios Editorial: Clarification is needed to explain that the values of ductility ratios in Table 1 are the same for both DBT/DBA and BDBT/BDBA	Suggest adding a note to Table 1: "These ductility ratios are equally applicable for DBT/DBA and BDBT/BDBA conditions."	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			conditions.		Ductility values are provided only for shear. Support rotations are provided for flexure. It should be noted that DBT and BDBT are treated separately from DBA and BDBA in this document.
113.	Bruce Power	7.22.3 Table 1	"Ductility ratios and support rotations" Editorial: Clarification is needed that both the ductility ratios and support rotations shall be met at the same time, as specified in CSA S850-12, i.e., it fails when either of the ductility ratio or first tier BDBT rotation or second tier BDBT rotation exceeds its corresponding criteria.	Suggest adding a note to Table 1: "The ductility ratios and support rotations shall be met at the same time, as specified in CSA S850-12, i.e., it fails when either of the ductility ratio or first tier BDBT rotation or second tier BDBT rotation exceeds its corresponding criteria."	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. Ductility values are provided only for shear. Support rotations are provided for flexure.
114.	Bruce Power	7.22.3 Table 1	"Support rotations for DBT" DBT support rotations: it is unclear how to design SSCs being "essentially elastic." In Note (6), the strain 1% for reinforcement implies the steel bars are much more beyond yield point; and 0.35% concrete compression strain means over concrete peak strength point and is almost crushed. This seems not to correspond to the elastic response of reinforced/prestressed structures/members. Please clarify this.	Suggest providing clarification for Note (6) or revising Note (6).	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. The behaviour is defined as "essentially elastic". The strain design criteria fro DBT are ultimate limit state criteria and they are the same as for any other accidental loading condition (e.g. Design Basis Earthquake).
115.	Bruce Power	7.22.3 Table 1	"Failure criteria for DBT" Since "essentially elastic" response is not a specific rotation, it is hard to directly use it in the design process. Using this DBT in the column cannot provide insight to engineers in design	Suggest deleting the DBT column from Table 1.	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. For "essentially elastics"

#	Organization	Section	Comment	Suggested Change	CNSC Response
			against DBA/DBT events. It is suggested to remove this column (DBT) since it will be automatically governed by the ductility ratio for this condition. The ductility ratios such as those in CSA N287.3 or ACI 349-06 are well developed for application to DBA events. Thus, for DBT conditions, the current ductility criteria should be used.		behaviour there is no need to provide the acceptance criteria in terms of support rotations or ductility. Ultimate limit state criteria for strains are the same as for any other design accidents loading condition (e.g. DBE). It should be noted that DBT and BDBT are treated separately from DBA and BDBA in this document.
116.	Bruce Power	7.22.3 Table 1	"Support rotations for BDBT" Clarification is needed for when the UFC 3-340-02 criteria apply to nuclear containment structures with controllable leak tightness. The support rotations are based on the experimental results of the concrete members, which might have significantly different cross sections compared to those in nuclear civil structures.	Suggest adding further clarification to Table 1 regarding the use of the criteria for support rotations for BDBT.	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. For the leak tightness requirement there is a need to have a steel liner. The concrete alone can not be leak tight. The DBT and BDBT Tier 1 acceptance criteria for concrete are such that steel liner can follow concrete deflections All acceptance criteria for concrete structures are based on one third or one quarter scale tests and it is assumed that they are directly applicable to full scale structures. This is a standard civil engineering assumption.
117.	Bruce Power	7.22.3	"BDBT support rotations for shell-type containment" Clarification is needed on the definition	Suggest adding text to clarify the CNSC expectations for "support rotation" for various types of structures such as dome or cylindrical shells.	*Note: figure 2 is now located in appendix A.* Figure 2 added to the document

#	Organization	Section	Comment	Suggested Change	CNSC Response
			of the term "support rotation" for various types of structures such as dome or cylindrical shells. For various types of containment structures, the criteria for support rotations may be easier to apply to beam/column/wall-panel members, when simplified as SDOF systems as described in CSA S850-12.		to illustrate the concept. The support rotations should be measured from the point or line of inflection. An example with a containment building dome is provided in figure 1.
118.	Bruce Power	7.22.3 Table 1	BDBT acceptance criteria" Use of permissible strain limits in the nonlinear 3D finite element analyses, such as in the analysis of Ultimate Pressure Capacity (UPC), provides practical engineering rules. From some test results for nuclear containments, the permissible strain limits specified in US NRC RG 1.216 and/or NUREG/CR-6906 may be applicable to the BDBT events for the corresponding loading conditions.	Suggest adding text to allow for alternative BDBT failure acceptance criteria to facilitate practical analysis and design against blast and impact loading on civil structures in nuclear industry.	*Note: table 1 is now located in appendix A.* No change. The acceptance criteria provide a means of meeting the requirements of the document.
119.	Candu Energy	7.22.3 Table 1	"Ductility ratios" Editorial: Clarification is needed to explain that the values of ductility ratios in Table 1 are the same for both DBT/DBA and BDBT/BDBA conditions.	Suggest adding the following note to Table 1: "These ductility ratios are equally applicable for DBT/DBA and BDBT/BDBA conditions."	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. Ductility values are provided only for shear. Support rotations are provided for flexure.
120.	Candu Energy	7.22.3 Table 1	"Ductility ratios and supporting rotations" Editorial: It needs to be clarified whether both the ductility ratios and support rotations shall be met at the same time, as specified in CSA S850-	Suggest adding the following note to Table 1: "The ductility ratios and support rotations shall be met at the same time, as specified in CSA S850-12 (i.e., it fails when either of the ductility ratio or first tier BDBT	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. Ductility values are provided

#	Organization	Section	Comment	Suggested Change	CNSC Response
			12 (i.e., it fails when either of the ductility ratio or first tier BDBT rotation or second tier BDBT rotation exceeds its corresponding criteria).	rotation or second tier BDBT rotation exceeds its corresponding criteria).”	only for shear. Support rotations are provided for flexure.
121.	Candu Energy	7.22.3 Table 1	“Support rotations for DBT” It is unclear how to design SSCs being “essentially elastic.” In Note (6), the strain 1% for reinforcement implies the steel bars are much more beyond yield point; and 0.35% concrete compression strain means over concrete peak strength point and is almost crushed. This does not seem to correspond to the elastic response of reinforced/pre-stressed structures/members. Clarification is needed.	Suggest providing clarification for Note (6) or revising Note (6).	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. The behaviour is defined as “essentially elastic”. The strain design criteria fro DBT are ultimate limit state criteria and they are the same as for any other accidental loading condition (e.g. Design Basis Earthquake).
122.	Candu Energy	7.22.3 Table 1	“Failure criteria for DBT” Since “essentially elastic” response is not a specific rotation, it is hard to directly use it in the design process. Using the support rotation in the DBT column cannot provide insight to engineers in design against DBA/DBT events. It is suggested that the DBT column be removed since it will be automatically governed by the ductility ratio for this condition. The ductility ratios such as those in CSA N287.3 or ACI 349-06 are well developed for application to DBA events. Thus, for DBT conditions, the current ductility criteria should be used.	Suggest deleting the DBT column from Table 1.	*Note: table 1 is now located in appendix A.* Table 1 revised for greater clarity. For “essentially elastics” behaviour there is no need to provide the acceptance criteria in terms of support rotations or ductility. Ultimate limit state criteria for strains are the same as for any other design accidents loading condition (e.g. DBE).
123.	Candu Energy	7.22.3 Table 1	“Support rotations for BDBT” Clarification is needed for when the	Suggest adding further clarification to Table 1 regarding the use of the criteria for support rotations for BDBT.	*Note: table 1 is now located in appendix A.*

#	Organization	Section	Comment	Suggested Change	CNSC Response
			UFC 3-340-02 criteria apply to nuclear containment structures with controllable leak tightness. The support rotations are based on the experimental results of the concrete members, which might have significantly different cross sections compared to those in nuclear civil structures.		Table 1 revised for greater clarity. For the leak tightness requirement there is a need to have a steel liner. The concrete alone can not be leak tight. The DBT and BDBT Tier 1 acceptance criteria for concrete are such that steel liner can follow concrete deflections All acceptance criteria for concrete structures are based on one third or one quarter scale tests and it is assumed that they are directly applicable to full scale structures. This is a standard civil engineering assumption.
124.	Candu Energy	7.22.3 Table 1	“BDBT support rotations for shell-type containment” Clarification is needed regarding the definition of the term “support rotation” for various types of structures such as dome or cylindrical shells. For various types of containment structures, the criteria for support rotations may be easier to apply to beam/column/wall-panel members, when simplified as SDOF systems as described in CSA S850-12.	Suggest adding text to clarify the CNSC expectations for “support rotation” for various types of structures such as dome or cylindrical shells.	*Note: table 1 and figure 2 are now located in appendix A.* Figure 2 added to the document to illustrate the concept. The support rotations should be measured from the point or line of inflection. An example with a containment building dome is provided in figure 1.
125.	Candu Energy	7.22.3 Table 1	“BDBT acceptance criteria” Use of permissible strain limits in the nonlinear 3D finite element analyses, such as in the analysis of Ultimate Pressure Capacity (UPC), provides	Suggest adding text to allow for alternative BDBT failure acceptance criteria to facilitate practical analysis and design against blast and impact loading on civil structures in nuclear industry.	*Note: table 1 is now located in appendix A.* No change. The acceptance criteria provide the suggested means of meeting the

#	Organization	Section	Comment	Suggested Change	CNSC Response
			practical engineering rules. From some test results for nuclear containments, the permissible strain limits specified in US NRC RG 1.216 and/or NUREG/CR-6906 may be applicable to the BDBT events for the corresponding loading conditions.		requirements of the document.
126.	Bruce Power	7.22.3 Table 2	"Failure criteria of steel reinforcement for concrete structures" Table 2 specifies permissible strains for reinforce steel and post-tensioning steel. Clarification is needed on the use of the criteria for the permissible strains of reinforcing steel in Table 2 with respect to the ductility ratios and support rotations in Table 1.	Add clarification as notes to Table 2 for the relationship between the acceptance criteria in Tables 1 and 2.	*Note: table 2 is now located in appendix A.* Text corrected. The table 2 notes now refer to table 1.
127.	Bruce Power	7.22.3 Table 2	"Steel failure criteria" Due to the nature of impact and impulsive loading, the steel allowable strains based on NEI 07-13 may be applicable, but these values are significant greater than those from Sandia tests for UPC. The reason for the differences are likely due to the dynamic versus static responses to the impact and impulsive loadings.	The rationale for the suggested values to be applied in design should be included.	*Note: table 2 is now located in appendix A.* No change. Rationale for tier 1 is in NEI 07-13. The figures for DBTs are well established in current codes and standards.
128.	Candu Energy	7.22.3 Table 2	"Failure criteria of steel reinforcement for concrete structures" Table 2 specifies permissible strains for reinforced steel and post-tensioning steel. Clarification is needed on the use of the criteria for the permissible strains of reinforcing steel in Table 2 with respect to the ductility ratios and support rotations in Table 1.	Suggest adding notes to Table 2 to provide clarification regarding the relationship between the acceptance criteria in Tables 1 and 2.	*Note: table 2 is now located in appendix A.* Text corrected. The table 2 notes now refer to table 1.

#	Organization	Section	Comment	Suggested Change	CNSC Response
129.	Candu Energy	7.22.3 Table 2	"Steel failure criteria" Due to the nature of impact and impulsive loading, the steel allowable strains based on NEI 07-13 may be applicable, but these values are significantly greater than those from Sandia tests for UPC. The reason for the differences are likely due to the dynamic versus static responses to the impact and impulsive loadings.	The rationale for the suggested values to be applied in design should be included.	*Note: table 2 is now located in appendix A.* No change. Rationale for tier 1 is in NEI 07-13. The figures for DBTs are well established in current codes and standards.
130.	OPG	7.22.4 last set of bullets page 53	The 4th of 5 bullets is excessive since the key systems requiring protection are already covered by the first and fifth bullets.	Delete the 4th bullet. "• any computer-based system, either autonomous or non-autonomous, should be protected "	Text revised to: " ~~any~~ , either autonomous or non-autonomous computer-based systems **or components subject to cyber security,** should be protected". This clause is to address the connection configuration of a computer-based system with other systems, i.e, autonomous system (not-connected with other system) or non-autonomous system (connected with other system), not the function of the system.
131.	OPG	7.22.4 first set of bullets page 54	• communication of plant data between the plant and the emergency control centre (either onsite or offsite) should be via unidirectional link In the last bullet, the use of the word "unidirectional" may be counter-productive. Change "unidirectional links" to	Change text as follows: "• communication of plant data between the plant and the emergency control centre (either onsite or offsite) should be via *secure protocols* "	Agreed. Text revised with further clarification. "**dedicated** communication of plant data between the plant and the emergency **support facilities** (either onsite or offsite) should be provided **and** via *secure protocols."*

#	Organization	Section	Comment	Suggested Change	CNSC Response
			"secure protocols".		
132.	OPG	7.22.4 last set of bullets page 54	• implementation should not impact performance, including response time, effectiveness or operation of safety functions The first bullet is unrealistic and does not focus on adverse impacts, which is what we should be concerned with. Change "should not impact" to "should not adversely impact".	Change text as follows: "• implementation should not *adversely* impact performance, including response time, effectiveness or operation of safety functions "	Agreed. Text revised as suggested.
133.	George Vayssier	8.1.0.1	Sec. 8.1.0.1 (nuclear design) seems to accept a positive feedback during accidents. Although this was acceptable in Canada during the past, due to the inherent positive reactivity feedback during LOCAs, there exists ample technology to avoid such positive feedback. It is recommended to make this a clear recommendation in GD-337: avoid positive reactivity feedback during accidents (e.g. during LOCA) or compensate it through inherent reactor characteristics (e.g. during steam line break). No engineered safety features should be needed for new reactors to mitigate positive reactivity feedback. Note 1: this may need enriched fuel, but there is no defendable case to increase risk by abstaining from enriched uranium. Note 2: reactivity coefficients may be different during start-up. This should also be considered in analysing reactivity coefficients (sometimes the moderator temperature coefficient is		*Note: this section has been renumbered to 8.1.1* No change. The document is developed as a technology neutral document. It contains a broad range of requirements related to reactor core design, including two fast-acting, fully effective, independent shutdown means for reactors with positive reactivity feedback. CNSC does not dictate design choices but sets high level safety requirements. This is consistent with IAEA SSR-2/1 which does not prohibit positive reactivity coefficients. Safety analysis, as in RD-310, addresses the worst conditions through the reactor lifecycle, including reactivity coefficients.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			positive).		
134.	Bruce Power	Section 8.1.0.3	"The reactor internal components designated as ASME Code, Section III, *Core Support Structures* should be designed, fabricated, and examined in accordance with the provisions of Section III, subsection NG, of the ASME Code." The terminology is not according to ASME Code. Note that Subsection NG of the code does not apply to components (see ASME definition of component in NCA-9000), applies to core support structures and internal structures. The suggested change is in accordance with the ASME terminology.	Suggest changing the text to: "The reactor internals classified as Core Support Structures according to ASME BPVC Section III Division 1 NG-1121, should be designed, fabricated, and examined in accordance with the provisions of ASME BPVC Section III Division 1, subsection NG."	*Note: this section has been renumbered to 8.1.3.* Agreed. Text changed.
135.	Bruce Power	Section 8.1.0.3	"Those reactor internals components not designated as ASME Code, Section III, Core Support Structures should be designated as internal structures in accordance with ASME Code, Section III, Subsection NG-1122. The design criteria, loading conditions, and analyses that provide the basis for the design of reactor internals (other than the core support structures) should meet the guidelines of ASME Code, Section III, Subsection NG-3000, and constructed so as to not adversely affect the integrity of the core support structures. If other guidelines (e.g., manufacturer standards or empirical methods based on field experience and testing) are the bases for the stress, deformation, and fatigue criteria, those guidelines should be identified and their	Suggest changing the text to: "For those reactor internals classified as internal structures in accordance with ASME Code, Section III, Division 1, Subsection NG-1122, the design criteria, loading conditions, and analyses that provide the basis for their design requirements of ASME Code, Section III, Division 1, Subsection NG-3000, and they should be constructed so as not to adversely affect the integrity of the core support structures. If other guidelines (e.g., manufacturer standards or empirical methods based on field experience and testing) are the bases for the stress, deformation, and fatigue criteria, those guidelines should be identified and their use justified in the design."	*Note: this section has been renumbered to 8.1.3.* Text clarified. "Those reactor internals not classified as ASME Code, Section III, *Core Support Structures* should be classified as internal structures in accordance with ASME Code, Section III, Subsection NG-1122. The design criteria, loading conditions, and analyses that provide the basis for the design of reactor internals (other than the core support structures) should meet the guidelines of ASME Code, Section III, Subsection NG-3000, and be constructed so as to not

#	Organization	Section	Comment	Suggested Change	CNSC Response
			use justified in the design.” The terminology is not according to ASME Code. Note that Subsection NG of the code does not apply to components (see ASME definition of component in NCA-9000), applies to core support structures and internal structures. See ASME BPVC Section III, NG-1121 and NG-1122 for definitions of core support structures and internal structures, and applicability of NG subsection to both of them. The suggested change is in accordance with the ASME terminology.		adversely affect the integrity of the core support structures.”
136.	Bruce Power	Section 8.1.0.3	“For non-ASME code structures and components, design margins presented for allowable stress, deformation, and fatigue should be equal to or greater than margins for other plants of similar design with successful operating experience. Any decreases in design margins should be justified.” This sentence should be applicable to anything else except for what the ASME code covers, which means anything else than pressure retaining components or supports, core support structures and internal structures. Supports were not included in the sentence.	Suggest changing the text to: “For non-ASME code structures, components and supports, design margins presented for allowable stress, deformation, and fatigue should be equal to or greater than margins for other plants of similar design with successful operating experience. Any decreases in design margins should be justified.”	*Note: this section has been renumbered to 8.1.3.* Agreed. Text changed.
137.	Bruce Power	Section 8.1.0.3	“Specific reactor internals components designated as Class 1, Class 2, and Class 3 should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as	Suggest changing the text to: “Specific reactor internals components or supports classified as Class 1, Class 2, and Class 3 in accordance with ASME	*Note: this section has been renumbered to 8.1.3.* Agreed. Text revised for clarity.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			ASME Section III for light water reactors (LWR), and CSA N285.0, General requirements for pressure-retaining systems and components in CANDU nuclear power plants for CANDU." Rephrase according to ASME terminology. I suggest to move this paragraph for Class 1/2/3 pressure retaining components and supports at the beginning of the subsection "Reactor internals".	BPVC Section III Division 1, Subsection NCA-2000, should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as ASME BPVC Section III for light water reactors (LWR), and CSA N285.0, General requirements for pressure-retaining systems and components in CANDU nuclear power plants for CANDU."	"Specific reactor internals ~~components designated~~ **classified** as Class 1, Class 2, and Class 3 should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as ASME Section III for light water reactors (LWR), and CSA N285.0, General requirements for pressure-retaining systems and components in CANDU nuclear power plants for CANDU".
138.	Candu Energy	8.1.0.3	"The reactor internal components designated as ASME Code, Section III, *Core Support Structures* should be designed, fabricated, and examined in accordance with the provisions of Section III, subsection NG, of the ASME Code." The terminology used in this statement is not in accordance with the ASME Code. It should be noted that subsection NG of the code does not apply to components (refer to ASME definition of component in NCA-9000); it applies to core support structures and internal structures. The suggested change is in accordance with the ASME terminology.	Suggest revising the text as follows: "The reactor **internals classified as Core Support Structures according to ASME BPVC Section III Division 1 NG-1121,** should be designed, fabricated, and examined in accordance with the provisions of **ASME BPVC Section III Division 1, subsection NG**."	*Note: this section has been renumbered to 8.1.3.* Agreed. Text changed.
139.	Candu Energy	8.1.0.3	"Those reactor internals components not designated as ASME Code, Section III, *Core Support Structures* should be designated as internal structures in accordance with ASME Code, Section	Suggest revising the text as follows: "**For those reactor internals classified as internal structures in accordance with ASME Code, Section III, Division 1, Subsection NG-1122, the design**	*Note: this section has been renumbered to 8.1.3.* Text clarified.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			III, Subsection NG-1122. The design criteria, loading conditions, and analyses that provide the basis for the design of reactor internals (other than the core support structures) should meet the guidelines of ASME Code, Section III, Subsection NG-3000, and constructed so as to not adversely affect the integrity of the core support structures. If other guidelines (e.g., manufacturer standards or empirical methods based on field experience and testing) are the bases for the stress, deformation, and fatigue criteria, those guidelines should be identified and their use justified in the design." The terminology used in this paragraph is not in accordance with the ASME Code. It should be noted that Subsection NG of the code does not apply to components (refer to ASME definition of component in NCA-9000); it applies to core support structures and internal structures. Please refer to ASME BPVC Section III, NG-1121 and NG-1122 for definitions of core support structures and internal structures, and the applicability of the NG subsection to both of these structures. The suggested change is in accordance with the ASME terminology.	**criteria, loading conditions, and analyses that provide the basis for their design requirements should meet the guidelines of ASME Code, Section III, Division 1, Subsection NG-3000, and they should be constructed so as not to adversely affect the integrity of the core support structures**. If other guidelines (e.g., manufacturer standards or empirical methods based on field experience and testing) are the bases for the stress, deformation, and fatigue criteria, those guidelines should be identified and their use justified in the design."	"Those reactor internals not classified as ASME Code, Section III, *Core Support Structures* should be classified as internal structures in accordance with ASME Code, Section III, Subsection NG-1122. The design criteria, loading conditions, and analyses that provide the basis for the design of reactor internals (other than the core support structures) should meet the guidelines of ASME Code, Section III, Subsection NG-3000, and be constructed so as to not adversely affect the integrity of the core support structures."
140.	Candu Energy	8.1.0.3	"For non-ASME code structures and components, design margins presented for allowable stress, deformation, and fatigue should be equal to or greater	Suggest revising the text as follows: "For non-ASME code **structures, components and supports**, design margins presented for allowable stress,	*Note: this section has been renumbered to 8.1.3.* Agreed. Text changed.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			than margins for other plants of similar design with successful operating experience. Any decreases in design margins should be justified." This sentence should be applicable to reactor internals other than those which the ASME code covers (i.e. anything other than pressure retaining components or supports, core support structures and internal structures). Supports have not been addressed in this sentence.	deformation, and fatigue should be equal to or greater than margins for other plants of similar design with successful operating experience. Any decreases in design margins should be justified."	
141.	Candu Energy	8.1.0.3	"Specific reactor internals components designated as Class 1, Class 2, and Class 3 should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as ASME Section III for light water reactors (LWR), and CSA N285.0, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants* for CANDU." This paragraph should be revised in accordance with ASME terminology. It should be noted that Subsection NG of the code does not apply to components (refer to ASME definition of component in NCA-9000); it applies to core support structures and internal structures. It is further suggested that this paragraph be moved to the beginning of the subsection.	Suggest moving this paragraph to the beginning of the subsection and revising the text as follows: "Specific reactor **internal or core support structures classified as Class 1, Class 2, and Class 3 in accordance with ASME BPVC Section III Division 1, Subsection NCA-2000**, should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as ASME **BPVC** Section III for light water reactors (LWR), and CSA N285.0, *General requirements for pressure-retaining systems and components in CANDU nuclear power plants* for CANDU."	*Note: this section has been renumbered to 8.1.3.* No change for moving and text revised for clarity. "Specific reactor internals ~~components designated~~ **classified** as Class 1, Class 2, and Class 3 should be designed, fabricated, and examined in accordance with the applicable codes and standards, such as ASME Section III for light water reactors (LWR), and CSA N285.0, General requirements for pressure-retaining systems and components in CANDU nuclear power plants for CANDU." Reactor internals include core support structures.
142.	Dirk Oh	8.1.1.1	Here is my two cents on Section 8.1.1.1		*Note: this section has been*

#	Organization	Section	Comment	Suggested Change	CNSC Response
			of GD-337. It is suggested to add the yellow-highlighted/underlined part or similar ones for clarification. 8.1.1.1 Fuel design Acceptance criteria should be established for fuel damage, fuel rod failure, and fuel coolability. These criteria should be derived from experiments that identify the limitations of the material properties of the fuel and fuel assembly, and related analyses with the fuel design. The fuel design criteria and other design considerations are provided below. Fuel damage Fuel damage criteria should be included for all known damage mechanisms ~~normal operation~~ in operational states (normal operation and AOOs). The damage criteria should assure that fuel dimensions remains within operational tolerances, and that functional capabilities are not reduced below those assumed in the safety analysis. When applicable, the fuel damage criteria should consider high burn-up effects based on irradiated material properties data. The criteria should include stress, strain or loading limits, the cumulative number of strain fatigue cycles, fretting wear, oxidation, hydriding (deuteriding in CANDU reactors), build-up of corrosion products, dimensional changes, rod internal gas pressures, worst-case hydraulic loads, and LWR control rod reactivity and insertability.		*renumbered to 8.1.4.1.* 1. Agreed. Text revised as follows: "…and from analyses related with the fuel design" 2. Agreed. Text revised as suggested

#	Organization	Section	Comment	Suggested Change	CNSC Response
143.	Bruce Power	8.2	“control of pressure via heaters, sprays or coolers” Pressure control can also be done by steam bleeding	Suggest changing the text to: “control of pressure via heaters, sprays, coolers or steam bleeding”	Agreed. Text revised as suggested.
144.	Candu Energy	8.2	“For designs that include a pressurizer, the design authority should demonstrate the adequacy of the following:… control of pressure via heaters, sprays or coolers” Pressure can also be controlled by steam bleeding.	Suggest revising the text as follows: “For designs that include a pressurizer, the design authority should demonstrate the adequacy of the following:… • control of pressure via heaters, sprays, coolers or **steam bleeding**”	Agreed. Text revised as suggested.
145.	George Vayssier	8.2	Sec. 8.2. (Pressuriser design). The volume of the pressuriser and the pressuriser pressure control system should be such that secondary transients do not (or seldom) lead to opening of the primary pressure relief valves.		Agreed. Text revised to: “volume and capability to accommodate load changes, **and to accommodate secondary side transients without the need for pressure relief to the containment to the extent practicable”.**
146.	George Vayssier	8.3.2	Sec. 8.3.2 (steam and feedwater piping). Modern designs often use LBB for steam lines. In addition, the steam lines outside the containment up to the first anchor are often designed for break exclusion, to prevent SG blowdown outside containment and to protect the containment against pipe whip (see e.g. USNRC Branch Technical Position 3-4).		No change. Section 8.6.2 of the document requires containment to be protected from dynamic effects such as missile generation and reaction forces. Break preclusion is likely to be an effective way to meet such a requirement. However, the document allows for design choices, including LBB, or break preclusion. Guidance is provided for LBB in section 7.7.
147.	Bruce Power	8.4	For LWRs, a control rod ejection is a possible postulated initiating event.		No change. Section 8.4 already requires capability for a fast

#	Organization	Section	Comment	Suggested Change	CNSC Response
			The text should include guidance on the means of shutdown to account for this type of event.		shutdown for any AOO or DBA. This includes rod ejection in designs where this is credible. LWRs typically include rod ejection as part of the safety analysis.
148.	Candu Energy	8.4	For LWRs, a control rod ejection is a possible postulated initiating event. The text should include guidance on the means of shutdown to account for this type of event.	It is suggested that this section be revised to provide guidance on the means of shutdown to account for possible control rod ejection.	No change. Section 8.4 already requires capability for a fast shutdown for any AOO or DBA. This includes rod ejection in designs where this is credible. LWRs typically include rod ejection as part of the safety analysis.
149.	Jerry Cuttler Cuttler&Assoc	8.4	Means of Shutdown I read through DRAFT GD-337 hoping to find clarification on the requirements that appear in RD-337 version 2, Section 8.4 on Means of Shutdown. 1. I understand the following requirements: "The design shall provide means of reactor shutdown capable of reducing reactor power to a low value, and maintaining that power for the required duration, when the reactor power control system and the inherent characteristics are insufficient or incapable of maintaining reactor power within the requirements of the OLCs. The design shall include two separate, independent, and diverse means of shutting down the reactor. At least one means of shutdown shall		1) No change. Failure of the fast acting shutdown means may not have serious consequences and is expected to be a very low probability event. Therefore, the other shutdown means does not need the same performance capabilities.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			be independently capable of rendering the reactor subcritical from normal operation, in AOOs and in DBAs, and maintaining the reactor subcritical by an adequate margin and with high reliability, for even the most reactive conditions of the core." However, I do not understand the requirement below very well. I was expecting the DRAFT GD-337 to explain this. "At least one means of shutdown shall be independently capable of quickly rendering the nuclear reactor subcritical from normal operation, in AOOs and DBAs, by an adequate margin, on the assumption of a single failure. For this means of shutdown, a transient recriticality may be permitted in exceptional circumstances if the specified fuel and component limits are not exceeded." Since it is assumed that one means of shutdown could fail unsafely, why is the other means of shutdown not required to have the same performance capabilities as required for means of shutdown that failed? 2. I understood from the meaning of AOOs, that they are to be managed by the reactor control system, not by the safety systems (the means of shutdown). And I understood that if the reactor control system is incapable of		2) No change. To demonstrate level 2 defence in depth, control systems must be capable of mitigating a “wide

#	Organization	Section	Comment	Suggested Change	CNSC Response
			controlling an AOO then the event is not an AOO but really a design basis accident (DBA). So, the reactor trips should be for DBAs (and DECs), not for AOOs and DBAs. However, RD-337 states in Section 8.4.1 that reactor trips are to be initiated for AOOs and DBAs. GD-337 does not clarify the confusion created by requiring the safety system to trip for AOOs (in addition to DBAs). Please clarify in GD-337 or revise RD-337 to remove AOOs from the role of safety systems.		range of AOOs". The requirement for level 2 defence in depth is to ensure that demands on safety systems will be infrequent. In addition to this, to demonstrate level 3 defence in depth, safety systems must be capable of mitigating all AOOs and DBAs without assistance from control systems. Further guidance is provided in GD-310.
150.	OPG	8.4	As stated in RD-337 version 2, "redundancy shall be provided in the fast acting means of shutdown unless the safety analysis demonstrates that, for any AOO or DBA coincident with failure of a single fast acting means of shutdown, the acceptance criteria can be met." It is interpreted from this discussion that both of the two independent means of shutdown do not necessarily have to be "fast acting" (only one needs to be). It is proposed to add a statement in the present guidance document to explicitly clarify this point.	Change text as follows: "Redundancy shall be provided in the fast acting means of shutdown unless the safety analysis demonstrates that, for any AOO or DBA coincident with failure of a single fast acting means of shutdown, the acceptance criteria can be met. **In which case, only one fast acting means of shutdown would be required.**"	Agreed. Text revised as suggested.
151.	OPG	8.4.2	"The reliability evaluation should be such that the reliability of the shutdown function is such that the cumulative frequency of failure to shutdown on demand can be shown to be less than 10^{-5} failures per demand, and the	Please clarify.	Text revised for clarity as follows: "The reliability of the shutdown function should be such that the cumulative frequency of failure

#	Organization	Section	Comment	Suggested Change	CNSC Response
			contribution of all sequences involving failure to shutdown to the large release frequency of the safety goals can be shown to be less than 10^{-7}/yr." Regarding the reliability of the shutdown function, the basis for the guidance to show 10^{-5} or less failures per demand and 10^{-7}/yr or less contribution to the LRF safety goal are not clear.		to shutdown on demand is less than 10^{-5} failures per demand, and the contribution of all sequences involving failure to shutdown to the large release frequency of the safety goals is less than 10^{-7}/yr". The reliability numbers consider the likelihood of the initiating event and that the two shutdown means may not be completely independent.
152.	George Vayssier	8.6.2	1. Sec. 8.6.2 (containment strength). There should be a clear recommendation that the containment under DEC-loads will remain intact during a pre-specified time (e.g. 24 hours - USNRC approach) and thereafter still provide an effective barrier against the escape of fission products into the environment. Note: there is not a corresponding clear requirement on the containment in RD-337 either. Although this document does not comment RD-337, such a requirement should be placed on new reactor designs. 2. The requirement that the containment function under a severe accident must provide sufficient time to implement emergency measures (RD-337, sec. 8.6.12) is far too weak! The prevention of core-concrete interaction is only covered by a recommendation ('should'), not by a requirement. RD-337 is not the place for		1. No change. The requirements in section 8.6.12 state that: "Following onset of core damage, the containment boundary shall be capable of contributing to the reduction of radioactivity releases to allow sufficient time for the implementation of offsite emergency procedures". The guidance in section 8.6.12 provides additional direction, including the 24 hour target: "The containment leakage rate in DECs should not exceed the design leakage rate for a sufficient period to allow for the implementation of offsite emergency measures. This period should be demonstrated, with reasonable confidence, to be at least 24 hours".

#	Organization	Section	Comment	Suggested Change	CNSC Response
			recommendations, it should define the requirements. Hence, measures to prevent core-concrete interaction are not required! As such, RD-337 lags behind modern developments (EPR, AP1000, AES2006, ESBWR, etc.)		2. Additional guidance added into section 8.6.12. Note that regarding prevention of core-concrete interaction, the following requirements in section 8.6.12 achieve this: "The design authority shall demonstrate that complementary design features have been incorporated that will: 1. prevent a containment melt-through or failure due to the thermal impact of the core debris 2. facilitate cooling of the core debris 3. minimize generation of non-condensable gases and radioactive products 4. preclude unfiltered and uncontrolled release from containment".
153.	Candu Energy	8.6.12	Discussion of the term "**Design Extension Conditions**" throughout this section. Use of the term BDBAs is preferred.	Suggest revising the text to discuss BDBAs rather than DECs.	No change. The term DEC was introduced to provide a clear distinction between those BDBAs that are considered in the design and those that are not. This document places physical design requirements for a subset of BDBAs. This subset is DECs. Furthermore, the term has been adopted by IAEA in SSR-2/1 and the change in terminology maintains the alignment with IAEA standards.

#	Organization	Section	Comment	Suggested Change	CNSC Response
					The definition of DECs has been changed to more closely match SSR-2/1. However, CNSC has not adopted all the clauses related to DECs from SSR-2/1 since they are not internally consistent. See for example, paragraph 5.31 which refers to “DECs that have been practically eliminated”. This should read “plant states that have been practically eliminated” to be consistent with the rest of the document. Also, the SSR-2/1 glossary claims that DECs supersedes BDBA, implying they are totally equivalent. However, BDBAs is the unbounded set of events less frequent than DBAs and therefore includes events of vanishingly small frequency, i.e. events that are “practically eliminated.” CNSC does not believe it is possible or necessary to make design provision against events that are practically eliminated. Furthermore CNSC does not believe that SSR-2/1 intended this meaning.
154.	Candu Energy	8.6.12	“Containment leakage rate in DECs does not exceed the design leakage rate for sufficient period to allow for the implementation of offsite emergency measures.”	Suggest revising the text as follows: “Containment leakage rate in DECs **with core damage** does not exceed the design leakage rate for sufficient period to allow for the implementation of offsite emergency measures.”	Agreed. Text changed as follows: “The containment leakage rate in DECs with core damage should not exceed the design leakage rate for a sufficient period to

#	Organization	Section	Comment	Suggested Change	CNSC Response
			It should be clarified that this requirement only applies to DECs with core damage.		allow for the implementation of offsite emergency measures”.
155.	George Vayssier	8.6.12	Sec. 8.6.12 (DECs). Filters should also be protected against hydrogen combustion, notably where the filter condenses the steam and, hence, makes vented gases combustible.		No change. Section 8.6.12 para. 3 reads as follows: “Containment venting design should take into account such factors as: • **ignition of flammable gases** • impact on filters by containment environmental conditions, such as radioactive materials, high temperature and high humidity”
156.	George Vayssier	8.8	Sec. 8.8 (emergency heat removal). One of the paramount characteristics of defence against severe accidents is the EHRS function also during severe accidents. This is neither required in RD-337, nor recommended in GD-337, and, as such, does not comply with IAEA regulations and underrates present modern designs (as in sec. 8.6.2).		No change. The requirements in section 8.8 includes: “There shall be reasonable confidence that the EHRS will function during DECs”.
157.	Bruce Power	8.9.1	“station blackout” It is suggested that some additional clarification is needed for the definition of station blackout. To achieve greater clarity, the complete loss of ac power from offsite and onsite main generator, standby and emergency power sources needs to be defined as: - the loss of supply of AC power to essential and non-essential switchgear buses in a nuclear power		No change. The definition of station blackout should remain as is. IAEA uses similar definition of SBO. The “essential and non-essential” terminology is not typically used in Canada to describe switchgear bus function. Concurrent DBA and concurrent single failure do not need to be

#	Organization	Section	Comment	Suggested Change	CNSC Response
			plant, - the unavailability of standby and emergency power sources that automatically start up and connect in response to the loss of offsite power and a turbine trip, - excluding a concurrent single failure, and - excluding a concurrent design basis accident. Furthermore, it is suggested that the definition of station blackout should exclude assumptions of failure to standby AC power sources that are dedicated to powering SSCs that are complementary design features, provided the applicable requirements are met.		explicitly excluded in this section. RD-310 requires consideration of event combinations. Since station blackout is very low frequency, concurrent DBA and concurrent single failure will almost certainly be excluded by event classification. The definition of station blackout already excludes failure of alternate AC power.
158.	Candu Energy	8.9.1	"Station blackout" "A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power." It is suggested that some additional clarification is needed to accompany the definition of station blackout. To achieve greater clarity, the complete loss of AC power from offsite and onsite main generator, standby and emergency power sources needs to be defined as:	Suggest revising the text to provide additional clarification.	No change. The definition of station blackout should remain as is. IAEA uses similar definition of SBO. The "essential and non-essential" terminology is not typically used in Canada to describe switchgear bus function. Concurrent DBA and concurrent single failure do not need to be explicitly excluded in this section. RD-310 requires consideration of event combinations. Since station blackout is very low frequency, concurrent DBA and concurrent single failure will almost

#	Organization	Section	Comment	Suggested Change	CNSC Response
			- the loss of supply of AC power to essential and non-essential switchgear buses in a nuclear power plant, - the unavailability of standby and emergency power sources that automatically start up and connect in response to the loss of offsite power and a turbine trip, - excluding a concurrent single failure, and - excluding a concurrent design basis accident. Furthermore, it is suggested that the definition of station blackout should exclude assumptions of failure to standby AC power sources that are dedicated to powering SSCs that are complementary design features, provided the applicable requirements are met.		certainly be excluded by event classification. The definition of station blackout already excludes failure of alternate AC power.
159.	George Vayssier	8.9.1	Sec. 8.9.1 (Batteries). No time is specified batteries should provide power during an SBO. A load shedding program - to decouple non-essential loads - should be made available.		No change. The requirements in section 8.9.1, state that “the standby and emergency power systems shall have sufficient capacity and reliability, for a specified mission time specified mission time”. Furthermore, Section 7.10 requires that safety support systems, including electrical systems, be capable of supporting continuity of the fundamental safety functions for at least 8 hours without the need to connect temporary onsite

#	Organization	Section	Comment	Suggested Change	CNSC Response
					service. As long as the 8 hour requirement is met, design and operational choices such as load shedding programs need not be highlighted.
160.	George Vayssier	8.9.2	Sec. 8.9.2 (Alternate AC). In some countries, NPPs have special connections to neighbouring plants to strengthen their AC. Possibly difficult for very large countries like Canada.		No change. Refer to section 8.9.2 for additional details related to Alternate AC power. Refer to section 7.6.5 for more information on sharing.
161.	George Vayssier	8.10.1	Sec. 8.10.1 (control room). The habitability of the control room should be specified for a minimum duration, also during DECs, e.g. 72 hours. Also the habitability of the SCR and ESC should be considered for a minimum duration.		Additional guidance is added as follows: “Habitability assessment should be conducted for all control facilities. The minimum duration of habitability should be sufficient to fulfill the required safety functions in each facility”. Add the following into additional information and references: NEI 99-03, “Control Room Habitability Assessment Guidance”

#	Organization	Section	Comment	Suggested Change	CNSC Response
162.	OPG	8.10.4	As stated in RD-337 version 2, "if operator action is required for actuation of any safety system or safety support system equipment following indication of the necessity for operator action inside the control rooms, there is at least 30 minutes available before the operator action is required". OPG has made a comment on the referenced section of RD-337. The basis and justification for changing from an Industry standard of 30 minutes for operator action outside of the control needs to be provided. This change does not appear to be consistent with IAEA guidance.	Please ensure consistency with the updated RD-337.	Additional guidance provided for clarity. The corresponding requirements remain unchanged. IAEA SSR 2/1 5.2 provides high-level requirements such that a sufficiently long time be available between detection and action times although it does not specify the values. UK, France and WENRA all ask for 30 min as a minimum period. Section 8.10.4 (the same section) allows for alternative times stating "Alternative action times may be used if justified…"
163.	OPG	9.4	It is proposed to include the supplementary guide to CSA N286.7.	Reference: Guideline for the application of N286.7-99, Quality assurance of analytical, scientific, and design computer programs for nuclear power plants (November 2009).	Agreed. CSA N286.7.1-09 added to additional information.

#	Organization	Section	Comment	Suggested Change	CNSC Response
164.	Candu Energy	10.1	"The design should incorporate the "best available technology and techniques economically achievable" (BATEA) principle for aspects of the design related to environmental protection." The introduction of the term "best available technology and techniques economically achievable" goes beyond the current Canadian environmental protection regulations. This is introducing new requirements that may not be consistent with the current Canadian Environmental Protection Act.	Suggest deleting this statement.	No change. The term BATEA is in alignment with the principles of pollution prevention and continuous improvement for sustainable development which is consistent with the principles of the Canadian Environmental Protection Act (CEPA). The term BATEA does not introduce new requirements that are inconsistent with CEPA. Furthermore, licensees have Environmental Protection Policies to uphold and abide by the principles of pollution prevention and continuous improvement. Some of these principles are outlined in the CNSC documents in the additional information list for 10.1: P-223 (*Protection of the Environment*), S-296 (*Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills*) and G-296 (*Developing Environmental Protection Policies, Programs and Procedures at Class I Nuclear Facilities and Uranium Mines and Mills).*

#	Organization	Section	Comment	Suggested Change	CNSC Response
165.	Candu Energy	10.2	“The design authority should demonstrate adherence to the principles of optimization and pollution prevention, through the demonstration of the application of ALARA and BATEA principles.” The introduction of the term "best available technology and techniques economically achievable" goes beyond the current Canadian environmental protection regulations. This is introducing new requirements that may not be consistent with the current Canadian Environmental Protection Act.	Suggest revising as follows: “The design authority should demonstrate adherence to the principles of optimization and pollution prevention, through the demonstration of the application of ALARA principles.”	No change. See comment #164.

#	Organization	Section	Comment	Suggested Change	CNSC Response
166.	OPG	Glossary	For clarity and completeness, include a definition for the phrase "alternate AC power", which appears in the definition of "station blackout". Definition should be consistent with G-306 revision.	Add definition as follows: “Alternate AC Power - An alternating current power sources that is available to, and located at (or nearby) a reactor facility, and is characterized by the following: 1. Is connected to but not normally connected to the offsite or onsite standby and emergency AC power system, 2. Has minimum potential for common mode failure with offsite power to the onsite standby and emergency AC power sources, 3. Is available in a timely manner after the onset of station blackout, and 4. Has sufficient capacity and reliability for operation all the systems required for coping with station blackout, and for the duration of the required to bring and maintain the plant in a safe shutdown state.”	The definition no longer appears in the glossary, as it is provided in section 8.9.2 of merged document. The definition is also aligned with the revised G-306.

#	Organization	Section	Comment	Suggested Change	CNSC Response
167.	Bruce Power	Glossary	"proven design" Add definition of "proven design from RD-337 version 2.	Suggest changing the text to: "proven design" A design of a component(s) can be proven either by showing compliance with accepted engineering standards, or by a history of experience, or by test, or some combination of these. New component(s) are "proven" by performing a number of acceptance and demonstration tests that show the component(s) meets pre-defined criteria."	Agreed. Text revised as suggested.
168.	Bruce Power	Glossary	"anticipated operational occurrence" An operational process deviating from normal operation, which is expected to occur at least once during the operating lifetime of a facility, but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety or lead to accident conditions. The definition of anticipated operational occurrences is not identical to the definition provided in the glossary in RD-310. The definition should be consistent in both documents.	Suggest revising the definition in this document to be consistent with that provided in RD-310: "An operational process deviating from normal operation that is expected to occur once or several times during the operating lifetime of the NPP but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety nor lead to accident conditions."	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
169.	Bruce Power	Glossary	"cliff-edge effect" A large increase in the severity of consequences caused by a small change of conditions. Note: cliff-edges can be caused by changes in the characteristics of the environment, the event or changes in the plant response." The term "cliff edge effects" should not be used. The impact of this proposed wording requires further evaluation, particularly in light of the work and projects in progress to meet RD-310 requirements.	Suggest that this term be deleted from GD-337 pending further evaluation.	The term "cliff-edge effect" is no longer used in the document.
170.	Bruce Power	Glossary	"complementary design feature" A design feature added to the design as a stand-alone structure, system or component (SSC) or added capability to an existing SSC to cope with design extension conditions." For new nuclear power plants, more clarification is required with respect to whether portable equipment should be listed under systems important to safety as complementary design features for new nuclear power plants. For existing nuclear power plants it is noted that portable equipment is not considered to be systems important to safety. This additional clarification should be included in GD-337.	No change to text.	Comment noted. CNSC recognizes the importance of providing clear requirements and guidance relating to temporary equipment. Further guidance has been added to section 7.3.4.
171.	Bruce Power	Glossary	"mission time" The duration of time within which a	Suggest changing the text to: "mission time	No change. The definition is general and could be applied to safety or non-safety related

#	Organization	Section	Comment	Suggested Change	CNSC Response
			system or component is required to operate or be available to operate and fulfill its function following an event. Editorial: For clarity, suggest adding "safety" before "function" and allowing for multiple safety functions.	The duration of time within which a system or component is required to operate or be available to operate and fulfill its **safety** function**(s)** following an event."	SSCs. For a safety related SSC, it is implicit that the mission time refers to the SSC's safety function.
172.	Bruce Power	Glossary	"probabilistic safety assessment" A comprehensive and integrated assessment of the safety of the nuclear power plant. The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the nuclear power plant, as follows: 1. a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel failures 2. a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment a Level 3 PSA starts from the Level 2 results and analyses the distribution of radionuclides in the environment and evaluates the resulting effect on public health." The definition of probabilistic safety assessment is not identical to that	Suggest replacing the definition in RD-337 version 2 with the definition provided in S-294: "probabilistic safety assessment For a NPP or a fission nuclear reactor, a comprehensive and integrated assessment of the safety of the plant or reactor. The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the plant or reactor, as follows: 1. a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel failures 2. a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment 3. a Level 3 PSA starts from the Level 2 results and analyses the distribution of radionuclides in the environment and evaluates the resulting effect on public health.	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			provided in the glossary in S-294. Consistency is required.	A PSA may also be referred to as a Probabilistic Risk Assessment (PRA).”	
173.	Bruce Power	Glossary	“severe accident” Accident conditions more severe than a design basis accident and involving significant core degradation” As written, the definition of severe accident does not encompass beyond design basis accidents involving the spent fuel bay where significant fuel degradation would be a postulated scenario. Suggest replacing “significant core degradation” with “significant fuel degradation” to encompass BDBAs for the spent fuel bay. This change would not have an impact on the intent of the definition of severe accident when applied to the reactor core. A change to the definition is also needed to make it consistent with Section 7.3.4.1, “Severe accidents represent accident conditions that involve significant fuel degradation, either in-core or in-fuel storage.”	Suggest changing the text to: “Accident conditions more severe than a design basis accident and involving significant **fuel** degradation.”	Text revised as follows: “Accidents more severe than a design basis accident and involving severe fuel degradation in the reactor core or spent fuel pool”.
174.	Bruce Power	Glossary	“shutdown state” A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems could be blocked and support systems may remain in abnormal configurations. Replace “actuation of safety systems could be blocked” to “actuation of	Suggest changing the text to: “shutdown state A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems **may** be blocked and support systems may remain in abnormal configurations.”	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
			safety systems **may** be blocked". This suggestion is to make the definition consistent with the use of "may" and "can" from the preface. Any blocking of safety system actuation is only permissible within the limits of the regulatory requirements.		
175.	Bruce Power	Glossary	"station blackout" A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power. Suggest identifying this is also "extended loss of AC power event" – consistent with use of term in industry.	Suggest changing the text to: "station blackout (also known as extended loss of AC power event) A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power."	Agreed. Text revised as suggested. Additional note added to definition as follows: "Note: station blackout is also known as an extended loss of AC power event".
176.	Bruce Power	Glossary	"ultimate heat sink" A medium to which the residual heat can always be transferred and is normally an inexhaustible natural body of water or the atmosphere." Suggest using the IAEA definition, rather than paraphrasing the IAEA definition.	Suggest changing the text to: "ultimate heat sink A medium into which the transferred *residual heat* can always be accepted, even if all other means of removing the heat have been lost or are insufficient. This medium is normally a body of water or the atmosphere."	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
177.	Candu Energy	Glossary	Add definition of “proven design” from draft RD-337 version 2.	Suggest adding the following term to the glossary: “proven design” A design of a component(s) can be proven either by showing compliance with accepted engineering standards, or by a history of experience, or by test, or some combination of these. New component(s) are “proven” by performing a number of acceptance and demonstration tests that show the component(s) meets pre-defined criteria.”	Agreed. Text revised as suggested.
178.	Candu Energy	Glossary	“anticipated operational occurrence” An operational process deviating from normal operation, which is expected to occur at least once during the operating lifetime of a facility, but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety or lead to accident conditions.” The definition of anticipated operational occurrences is not identical to that provided in the glossary in RD-310. Consistency is required.	Suggest revising the definition in this document to be consistent with that provided in RD-310: “anticipated operational occurrence” An operational process deviating from normal operation that is expected to occur once or several times during the operating lifetime of the NPP but which, in view of the appropriate design provisions, does not cause any significant damage to items important to safety nor lead to accident conditions.”	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
179.	Candu Energy	Glossary	"cliff-edge effect" A large increase in the severity of consequences caused by a small change of conditions. Note: cliff-edges can be caused by changes in the characteristics of the environment, the event or changes in the plant response." The impact of this proposed wording requires further evaluation, particularly in light of the work and projects in progress to meet RD-310 requirements. Therefore the term "cliff edge effects" should not be used.	It is suggested that this term be deleted from GD-337 pending further evaluation.	The definition of "cliff edge effect" is no longer used in the document.
180.	Candu Energy	Glossary	"complementary design feature" A design feature added to the design as a stand-alone structure, system or component (SSC) or added capability to an existing SSC to cope with design extension conditions." Draft RD-337 version 2 states that complementary design features are included in the list of systems important to safety. Portable equipment – such as emergency mitigating equipment, and pumps should not necessarily constitute systems important to safety. More clarification is required on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is not considered under systems important to safety for existing nuclear power plants.	Suggest providing clarification on positioning portable equipment under systems important to safety in complementary design features for new nuclear power plants.	Text in section 7.3.4 revised as follows: "The portable equipment credited for DECs are considered part of complementary design features. Therefore, they belong to SSCs important to safety. Portable equipment should be classified based on its safety importance. There may be different options available to fulfill the fundamental safety functions during DECs. However, when called upon the portable onsite or offsite equipment credited is expected to be effective with reasonable confidence. Portable onsite or offsite equipment is expected to support Severe Accident Management Guidelines".

#	Organization	Section	Comment	Suggested Change	CNSC Response
181.	Candu Energy	Glossary	"mission time" The duration of time within which a system or component is required to operate or be available to operate and fulfill its function following an event." Editorial: For clarity, suggest adding "safety" before "function" and allowing for multiple safety functions.	Suggest revising the text as follows: "mission time" The duration of time within which a system or component is required to operate or be available to operate and fulfill its **safety** function**(s)** following an event."	No change. The definition is general and could be applied to safety or non-safety related SSCs. For a safety related SSC, it is implicit that the mission time refers to the SSC's safety function.

#	Organization	Section	Comment	Suggested Change	CNSC Response
182.	Candu Energy	Glossary	"probabilistic safety assessment" A comprehensive and integrated assessment of the safety of the nuclear power plant. The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the nuclear power plant, as follows: 3. a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel failures 4. a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment a Level 3 PSA starts from the Level 2 results and analyses the distribution of radionuclides in the environment and evaluates the resulting effect on public health." The definition of probabilistic safety assessment is not identical to that provided in the glossary in S-294. Consistency is required.	Suggest revising the definition in this document to be consistent with that provided in S-294: "probabilistic safety assessment For a NPP or a fission nuclear reactor, a comprehensive and integrated assessment of the safety of the plant or reactor. The safety assessment considers the probability, progression and consequences of equipment failures or transient conditions to derive numerical estimates that provide a consistent measure of the safety of the plant or reactor, as follows: 4. a Level 1 PSA identifies and quantifies the sequences of events that may lead to the loss of core structural integrity and massive fuel failures 5. a Level 2 PSA starts from the Level 1 results and analyses the containment behaviour, evaluates the radionuclides released from the failed fuel and quantifies the releases to the environment 6. a Level 3 PSA starts from the Level 2 results and analyses the distribution of radionuclides in the environment and evaluates the resulting effect on public health."	Agreed. Text revised as suggested.

#	Organization	Section	Comment	Suggested Change	CNSC Response
183.	Candu Energy	Glossary	“severe accident” Accident conditions more severe than a design basis accident and involving significant core degradation. As written, the definition of severe accident does not encompass beyond design basis accidents involving the spent fuel bay where significant fuel degradation would be a postulated scenario. Suggest replacing “significant core degradation” with “significant fuel degradation” to encompass BDBAs for the spent fuel bay. This change would not have an impact on the intent of the definition of severe accident when applied to the reactor core. A change to the definition is also needed to make it consistent with Section 7.3.4.1, “Severe accidents represent accident conditions that involve significant fuel degradation, either in-core or in-fuel storage.”	Suggest revising the text as follows: “severe accident Accident conditions more severe than a design basis accident and involving significant **fuel** degradation.”	Text revised as follows: “Accidents more severe than a design basis accident and involving severe fuel degradation in the reactor core or spent fuel pool”.

#	Organization	Section	Comment	Suggested Change	CNSC Response
184.	Candu Energy	Glossary	"shutdown state A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems could be blocked and support systems may remain in abnormal configurations." Replace "actuation of safety systems could be blocked" to "actuation of safety systems **may** be blocked". This suggestion is to make the definition consistent with the use of "may" and "can" from the preface. Any blocking of safety system actuation is only permissible within the limits of the regulatory requirements.	Suggest revising the text as follows: "shutdown state A state characterized by subcriticality of the reactor. At shutdown, automatic actuation of safety systems **may** be blocked and support systems may remain in abnormal configurations."	Agreed. Text revised as suggested.
185.	Candu Energy	Glossary	"station blackout A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power." Suggest identifying this is also "extended loss of AC power event" – consistent with use of term in industry.	Suggest revising the text as follows: "station blackout (also known as extended loss of AC power event) A complete loss of alternating current (AC) power from offsite and onsite main generator, standby and emergency power sources. Note that it does not include failure of uninterruptible AC power supplies (UPS) and DC power supplies. It also does not include failure of alternate AC power."	Agreed. Text revises as suggested with added note as follows: "Note: station blackout is also known as an extended loss of AC power event".

#	Organization	Section	Comment	Suggested Change	CNSC Response
186.	Candu Energy	Glossary	“ultimate heat sink A medium to which the residual heat can always be transferred and is normally an inexhaustible natural body of water or the atmosphere.” Suggest using the IAEA definition, rather than paraphrasing the IAEA definition.	Suggest revising the text as follows: “ultimate heat sink A medium into which the transferred residual heat can always be accepted, even if all other means of removing the heat have been lost or are insufficient. This medium is normally a body of water or the atmosphere.”	Agreed. Text revised as suggested.