Bruce Power Comments on RD-337 version 2, "Design of New Nuclear Power Plants"

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In response to Information Bulletin 12-32**,** *Invitation to comment on draft regulatory document RD-337 version 2, Design of New Nuclear Power Plants***,** dated July 26, 2012, attached please find Bruce Power's comments on the draft document.

If you have any questions or need further information regarding this submission, please contact Mr. Maury Burton, Department Manager, Regulatory Affairs, at 519-361-2673 extension 15291 or at maury.burton@brucepower.com

Sincerely;

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#	Section	Excerpt of Section	Industry Issue	Suggested Change
1	**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.
2	**2. Scope**	SSR 2/1, *Safety Requirements: Safety of Nuclear Power Plants: Design*	Editorial: The correct title of SSR2/1 is "Specific Safety Requirements: Safety of Nuclear Power Plants: Design"	Suggest title of the document be corrected to. "Specific Safety Requirements: Safety of Nuclear Power Plants: Design"
3	**3**	Bullet 5	The list of paragraphs 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 paragraphs 5(k), 6(j) and 6(k).	Suggest that final version 2 of RD-337 be reviewed against the Class I Nuclear Facilities Regulations for completeness.
4	**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."
5	**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	Suggest bullet 4 be changed to "4. Beyond design basis accidents, which include severe accident conditions" If the IAEA terminology is adopted,

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			"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. 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."	then it is suggested to change the text to: "4. design extension condition (DECs), which could include severe accident conditions."

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6	**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..	
7	**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)**". It is understood that ALARA must be included when developing the operator activities for performing surveillance, maintenance, testing and inspection of the plant.	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**"
8	**5**	"**4. a safety management program that recognizes the importance of a healthy safety culture**"	Editorial: Suggest substituting "strong safety culture" for "healthy safety culture, because the commonly used term in the nuclear industry is "strong safety culture". 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"

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9	**5.1**	"The applicant or licensee shall confirm that 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.	"The applicant **or licensee shall** confirm that the design authority has achieved the following objectives for the design"
10	**5.2**	"10. Physical protection systems are provided to address design basis threats."	Physical protection systems and cyber security programs are 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."
11	**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. 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	No change to the text.

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			(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."	
12	**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 is 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."
13	**5.7**	The design documentation shall include: 3. system SSC classifications	For clarity, suggest "SSC classifications" be expanded to "system, structure and component classifications".	Suggest changing the text to: "3. structure, system and component classifications".

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14	**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"
15	**6.1**	"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."	Achievement of defence in depth level one requires 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.	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."
16	**6.1.1**	"To the extent practicable, the design ~~therefore~~ **shall** prevent: 4. the possibility of harmful consequences of errors in operation and maintenance"	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.	Suggest changing the text to. "To the extent practicable, the design **shall** prevent: 4. the possibility of failure of engineered barriers from errors in operation and maintenance that could result in harmful consequences".
17	**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	Suggest changing the text to: "4. shielding against radiation for worker access"

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			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.	
18	**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 cooling, containment, emergency heat removal and power systems."
19	**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."
20	**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 portable equipment under systems important to safety in complementary design features for new nuclear power plants. Note, that portable equipment is	No change to the text.

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			not considered under systems important to safety for existing nuclear power plants. This additional clarification should be included in GD-337.	
21	**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 from adversely affecting the function or reliability of ~~an~~ SSCs of greater importance."
22	**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**	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 with the design basis and the complementary design features. According to requirement 14 in IAEA SSR-2/1 (which is indicated	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**

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		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."	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 (change in bold); and RD-337 ver 2 sect 7.4.2 shows external events can be classified as DBA or DEC (change in red). 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 is 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-	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 text 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."

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			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.	
23	**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:"
24	**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.	Use of Beyond Design Basis Accident is preferred because it is the commonly used term in the Canadian nuclear industry. 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". 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	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

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			definition for DECs does not consider DECs to be a subset of BDBAs. The following text for bullet 4 should be used to make it consistent with IAEA SSR 2/1: "**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."	could include severe accident conditions."
25	**7.3.3**	“Provision shall also be made to support timely detection of, and manual response to, conditions where prompt action is not necessary.”	Editorial: Replace "where" with "when".	Suggest changing text to: "Provision shall also be made to support timely detection of, and manual response to, conditions when prompt action is not necessary."

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26	**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"	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."
27	**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 accident"	The phrase 'involving severe accident' 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.	Suggest changing the text to: "the design shall provide biological shielding of appropriate composition and thickness in order to protect operational personnel during DECs"
28	**7.3.4**	Design Extension Conditions	Use of the term BDBAs is preferred.	Suggest changing text to: "Beyond Design Basis Accidents"

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29	**7.3.4.1**	"Early in the design process, the various potential barriers to core degradation **shall be** 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"	Suggest changing text to: "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**."
30	**7.3.4.1**	"Containment **shall** also **prevent** uncontrolled releases of radioactivity after this period."	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".
31	**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."
32	**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."

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33	**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."
34	**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 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: "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."

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35	**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."
36	**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	Suggest moving this text to GD-337, because it only contains clarification for the next paragraph and not requirements.	Move this text to GD-337.

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		or design deficiency."		
37	**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 shows "may" is used to express an option or permission while "can" is used to express possibility or capability. Using "may" in 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."
38	**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".
39	**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**.

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40	**7.8**	"Equipment and instrumentation credited to operate during DECs shall be demonstrated, with reasonable confidence, to be capable of performing 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."
41	**7.9.1**	"General ~~Consideration~~"	Editorial: add "Requirements" to section title	Suggest changing the Section title to: "General Requirements".
42	**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: rewording 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."
43	**7.12**	"**General provisions** "	Editorial: replace "provisions" with "requirements".	Suggest changing the text to: "General Requirements.

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44	**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."
45	**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."
46	**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 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.	Suggest changing the text to: "The design **shall** enable implementation of periodic inspection programs for structures important to safety, **in order** to verify that the as-constructed structures meet their functional and performance requirements."

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47	**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.	Delete from RD-337.
48	**8.1**	"All foreseeable reactor core configurations, for various appropriate operating schedules shall be considered in the design."	Need improved clarity.	Suggest changing the text to: "The design shall consider all foreseeable reactor core configurations for normal operation, AOOs and DBAs."
49	**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."
50	**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 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."

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51	**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."
52	**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."
53	**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 section 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".
54	**8.6.4**	"To the extent practicable, penetrations shall be designed to allow individual testing of each penetration."	"To the extent practicable, penetrations shall be designed to allow individual testing of each penetration." 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.".

#	Section	Excerpt of Section	Industry Issue	Suggested Change
55	**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."
56	**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. It is not necessary to require that any radioactivity leaked from the flow path be returned to the flow path.	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 capability for leakage of radioactivity."
57	**8.6.12**	"Following onset of core damage, the containment boundary shall be capable of contributing to the reduction of radioactivity	The second sentence is unnecessary; the first sentence lays out the containment requirement. Delete from RD-337 and move	Suggest deleting: ""This requirement applies to DECs with core damage""

#	Section	Excerpt of Section	Industry Issue	Suggested Change
		releases to allow sufficient time for the implementation of offsite emergency procedures. This requirement applies to DECs with core damage".	"This requirement applies to DECs with core damage" to GD-337, because it only provides clarification for the requirement.	
58	**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 low probability events	Suggest changing the text to: "4. minimize to the extent practical unfiltered and uncontrolled release from containment".
59	**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)."
60	**8.9.2**	"**This is accomplished by the use of an onsite or offsite portable or transportable power sources, or a combination of these.** "	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.**"

#	Section	Excerpt of Section	Industry Issue	Suggested Change
61	**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** 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"
62	**8.12**	Fuel handling and storage "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."	It should allow the designer/licensee 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."
63	**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.	Suggest changing the text to: "4. providing hydrogen mitigation in the spent fuel bay area, if required"

#	Section	Excerpt of Section	Industry Issue	Suggested Change
			Also, for consistency with standard terminology used in the Canadian nuclear industry, "spent fuel pool" should be "spent fuel bay".	
64	**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…."
65	**9.2**	"**8. demonstrate that the design 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 wording is sufficient to capture the issues related to sensitivity analyses and overall safety margins.	Suggest changing the text to: "8. Demonstrate that the design incorporates sufficient safety margins."
66	**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	Suggest changing the text to: "1. derive and confirm OLCs that are consistent with the design and safety requirements for the plant"

#	Section	Excerpt of Section	Industry Issue	Suggested Change
			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 the following rewording for consistency with RD-310: "1. derive and confirm OLCs that are consistent with the design and safety requirements for the plant"	
67	**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 limits and derived acceptance criteria. Derived acceptance criteria may not necessarily be design limits as they often provide additional allowance for safety margins. Suggest the following rewording for consistency with RD-310: "4. compare the result of the analysis with radiological dose limits and derived acceptance criteria"	Suggest changing the text to: "4. compare the result of the analysis with radiological dose limits and derived acceptance criteria"
68	**9.4**	"7. demonstrate that DECs can be prevented or mitigated by complementary design features and prescribed	RD-310 does not distinguish DECs amongst BDBAs with respect to deterministic analysis requirements.	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

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		operator actions"	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 Industry's attention as part of pending changes to RD-310. Industry needs clear understanding of what this new requirement implies for existing reactors in order to assess the feasibility and approach to compliance. what this new requirement implies for existing	implications on existing reactors and when it becomes part of RD-310 requirements.

#	Section	Excerpt of Section	Industry Issue	Suggested Change
			reactors in order to assess the feasibility and approach to compliance.	
69	**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.**"
70		General	Version 1 had a reference section. So does GD-337 version 2. Why not include them here as not everyone will refer to GD-337?	Suggest not removing the reference section.

#	Section	Excerpt of Section	Industry Issue	Suggested Change
71	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.		Suggest changing the text to the RD-310 wording: "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."
72	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. The proposed wording is sufficient to capture the issues related to sensitivity analyses and overall safety margins.	Delete from RD-337
73	Glossary	**"complementary design feature** **A design feature added to the design as a stand-alone structure, system or component (SSC) or**	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	No change to text.

#	Section	Excerpt of Section	Industry Issue	Suggested Change
		added capability to an existing SSC to cope with design extension conditions."	not considered under systems important to safety for existing nuclear power plants. This additional clarification should be included in GD-337.	
74	Glossary	**"management arrangements** The means by which an organization functions to achieve its objectives, including:"	Since "management system" has replaced :management arrangements" in RD-337 version 2, this definition is not needed.	Delete text.
75	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."
76	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**	The wording of **probabilistic safety assessment** is not identical to the wording in the glossary in S-294. There should only be one wording for these definitions.	"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

#	Section	Excerpt of Section	Industry Issue	Suggested Change
		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 radionuclides in the environment and evaluates the resulting effect on public health. "**		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. A PSA may also be referred to as a Probabilistic Risk Assessment (PRA).

#	Section	Excerpt of Section	Industry Issue	Suggested Change
77	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.**"
78		"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."

#	Section	Excerpt of Section	Industry Issue	Suggested Change
79		**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 (aka 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.**"