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COMMENTS TO DRAFT

RD-327 and GD-327

REVISION RECORD

Rev No	Para No	Description of Revision	Prepared By and Date	Verified By and Date	Approved By and Date
R00		Initial Issue	D.A. Snopek 18-Mar-10	n/a	P. Desiri 18-Mar-10

Comments to Draft RD-327

No.	Section	Comment
1	General	Suggest that ANSI/ANS-8 series of standards (or other international standards) be adopted by reference, with changes indicated if required, similar to US Nuclear Regulatory Commission Regulatory Document 3.71-2005 instead of reproducing large sections of these standards directly into the Regulatory Document (and Guidance Document). Dissociation of the text from referenced standards makes it difficult to identify potential differences between the Regulatory Document/Guidance Document and the standard thereby making best practice sharing and benchmarking with international users of the referenced standards difficult and essentially creating a Canada-only version of the international standard. This approach has the potential to result in divergence of the two systems over time, both with revision of the referenced standards and potential of independent revision of the RD/GD. This is especially so given that for much of the text adopted from international standards within the RD/GD it is not apparent from which international standards the text originates, or in fact if the text is original or adopted from standards.
2	2.1.1	The use of *shall* in reference to following *recommendations* is inconsistent.

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3	2.1.1, Document	Draft RD-327 is inconsistent with international standards and existing license conditions at it applies criticality safety to operations with natural uranium. International standards (IAEA, ANSI/ANS-8) apply criticality requirements to operations with *fissile materials*, excluding natural uranium.[1] *Fissile material* as defined in the Glossary of draft RD-327 is consistent with definitions applied internationally (IAEA, ANSI/ANS-8) whereby natural uranium is excluded. However, *fissionable material* as defined in the Glossary of draft RD-327 includes natural uranium. *Fissile material* is used interchangeably with *fissionable material* throughout the document but unlike ANSI/ANS-8 natural uranium is understood to be included within the scope of RD-327 based on 2.1.1.1(2) where it is exempted under certain conditions. Natural uranium is exempted from the scope of draft RD-327 under clause 2.1.1.1(2) only under very strict criteria that would not be met for already-licensed operations with natural uranium. Natural uranium is exempted under the conditions that; *"no other fissionable materials or advanced moderators (more effective than water) are allowed in the facility".* There are no licence conditions that require the exclusion of moderators more effective than water from natural uranium facilities.[2,3] This is in recognition that the necessary significant quantities of moderators more effective than water, such as large quantities of heavy water, would not reasonably be present within a fuel manufacturing or storage facility, or during transport. This

[1] Although the term *fissionable material* is used in various standards within the ANSI/ANS-8 series, the term is not defined and therefore it can be unclear whether it is intended to include or exclude natural uranium. However, there are clauses within the series that make clear natural uranium is excluded from the scope. The term *fissile material* is used interchangeable between standards within the series (i.e. *fissile material* is used in ANSI/ANS-8.7-1998, ANSI/ANS-8.19-2005, ANSI/ANS-8.22-1997, ANSI/ANS-8.23-2007, ANSI/ANS-8.24-2007) and is defined in ANSI/ANS-8.7-1998 to specifically exclude natural uranium. Further, the scope of many ANSI/ANS-8 series of standards qualify their scope to apply to operations involving *fissionable materials* in which inadvertent criticality can occur (i.e. ANSI/ANS-8.3-1997; R2003, ANSI/ANS-8.19-2005, ANSI/ANS-8.20-1991). Inadvertent criticality can not occur with natural uranium consistent with other international standards and the absence of license conditions applying criticality safety requirements to natural uranium operations in Canada. Therefore, although the term *fissionable material* is used in ANSI/ANS-8, it is clear that the scope of the series excludes operations with natural uranium consistent with IAEA and the term *fissile material* as defined in RD-327.

[2] FFOL-3621.2/2010 Nuclear Fuel Facility Operating Licence GE-Hitachi Nuclear Energy Canada Inc., Peterborough Facility

[3] FFOL-3622.0/2010 Nuclear Fuel Facility Operating Licence General Electric Canada Incorporated Toronto Facility

No.	Section	Comment
		clause effectively introduces criticality control (control of moderators) for natural uranium operations and is therefore inconsistent with existing license conditions[2,3] as well as international standards.[4, 5, 6, 7] It is therefore suggested that, consistent with international standards and existing licenses, natural uranium be excluded from the scope of RD-327, i.e. that; 1. exemption quantities (2.1.1.1) and small quantity of materials (2.1.1.2) be based on facility limits of *fissile material*, 2. 2.1.1.1 (2) and (3) referring to natural uranium be deleted, and; 3. *fissile material* replace *fissionable material* throughout the remainder of the document.
4	2.1.1	The term *facility* needs a definition. While the definition of *site* appears to allow multiple *facilities* on a *site*, recent licensing decisions make clear that small quantity of fissile material limits (2.1.1.2) are based on total inventory at the licensed facility.[2]
5	2.1.1.1, 2.1.1.2, 2.1.1.3	International standards apply requirements for criticality safety to *operations* with fissile material. While it is understood that limits for establishing applicability of RD-327 are facility limits, criticality requirements (and thus RD-327) should be applicable to *operations with fissile material* and not to *facilities*. Suggest replacing 2.1.1.1 (last sentence) with: "*Operations with fissile materials under this clause are exempt from the requirements and recommendations of this regulatory document*." Suggest replacing 2.1.1.2 (last sentence) with: "*This regulatory document is partially applicable, as further*

[4] ANSI/ANS-8.22-1997 Nuclear Criticality Safety Based on Limiting and Controlling Moderators
[5] IAEA NS-R-5 Safety of Nuclear Fuel Cycle Facilities - Safety Requirements, 2008
[6] IAEA DS317 "Safety of Uranium Fuel Fabrication Facilities", 2006
[7] IAEA TS-R-1 Regulations For The Safe Transport Of Radioactive Material, 2009

No.	Section	Comment
		specified in Subsection 2.1.1.4, to operations with fissile material under this clause." Suggest replacing 2.1.1.3 (second paragraph) with: "*This regulatory document is applicable to operations with fissile material under this clause*."
6	2.1.1.2(2)	Suggest replacing limits a, b, and c with similar limits stated in the form of 2.1.2.2 (b) given that; 1. the scope of application for the various references are fully explained in the references, 2. the option of using 80% of a critical mass is unnecessarily constrained by 2.1.1.2(2)c.
7	2.1.1.4(1)	It is unclear from this section what sections of RD-327 are excluded for the reduced scope program in addition to 2.1.2.2. Suggest listing the sections that are not applicable (see related comments below).
8	2.1.1.4(1)	In order to avoid the interpretation that this clause requires evaluation of normal and abnormal conditions similar to large quantity of fissile materials, suggest changing the last sentence in the clause to state: "*The program shall ensure that the credited conditions for Small Quantity of Fissile Material are maintained at all times*."
9	2.1.1.4(2)	Reference to RD-327 and separate "CNSC requirements". RD-327 should contain the complete set of CNSC requirements for criticality safety.
10	2.1.2.2(1) a i	The margin of subcriticality (MOS) is not calculated using formulas presented in the reference, the upper subcritical limit (USL) is calculated using formulas presented in the reference. Suggest replacing MOS with USL.
11	2.1.2.6	While criticality program activities should be to a QA program, they should be to the QA program in place for the facility, which may not necessarily be to N286, NQA-1, or equivalent.
12	2.1.2.9	The requirements under this section should not be applicable for small quantity of fissile materials under section 2.1.1.2.
13	2.1.3	The requirements under this section should be specified as not applicable (in section 2.1.1.4) for small quantity of fissile materials under section 2.1.1.2 unless reliance is placed on calculation methods in determining 80% of a critical mass.
14	3.0	The requirements under this section should be specified as not applicable (in section 2.1.1.4) for small quantity of fissile materials

No.	Section	Comment
		under section 2.1.1.2.
15	3.1.1	The remainder of the section following the first paragraph is unnecessary as more specific requirements, consistent with ANSI/ANS-8.3-1997; R2003, follow in section 3.1.2.1.
16	11.0	Section title refers to *light water reactor fuel*.
17	11.0	Suggest removing second sentence of second paragraph as the need for a criticality safety evaluation is dependent on small quantity fissile material or large quantity of fissile material operation which is invoked as necessary by reference to section 2 in preceding sentence.
18	12.5	The requirements under this section should be specified as not applicable (in section 2.1.1.4) for small quantity of fissile materials under section 2.1.1.2.
19	12.6	The last paragraph of this section should be specified as not applicable (in section 2.1.1.4) for small quantity of fissile materials under section 2.1.1.2.
20	12.7	The requirements under this section should be specified as not applicable (in section 2.1.1.4) for small quantity of fissile materials under section 2.1.1.2.
21	6.0, 11.0, 13.0, 15.0, 16.0	These sections generally do not introduce any new requirements.

Comments to Draft GD-327

No.	Section	Comment
G1	General	Same comments as RD-327.
G2	2.3.1, Document	2.3.1 indicates there are *requirements* described in this Guidance Document. All requirements should be described in the Regulatory Document. Additional requirements to those in RD-327 are indicated throughout GD-327 by the use of the word *shall* - i.e. in section 2.3.3.2.3.
G3	2.3.3.2.2	Inconsistent use of *should* and *shall* to describe the same item.
G4	2.3.1, 2.3.2	Sections are repetitive with the RD without adding new information. Suggest information in the RD not be repeated in the GD.
G5	3.2, 3.3.1, 3.3.2	All three sections discuss scope of applicability of the section with progressively increasing level of detail. Suggest only section 3.3.2, consistent with ANSI/ANS-8.3-1997 (R2003) be included.
G6	16.4	Suggest replacing *bounding accident* with the term *representative nuclear criticality accident* which is defined in the Glossary.
G7	Appendix A	Appendix A is referenced from section 2.3.2.2 that specifies: "*... the entire process will be subcritical under both normal and*

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		credible abnormal conditions (events or event sequences) that have a frequency of occurrence equal to or greater than 10^{-6} per year [5,6] (hereinafter "credible abnormal conditions")." However, paragraph 2 of Appendix A places additional *requirements* on individual engineered controls: *"The engineered nuclear criticality safety controls **shall** be designed to withstand the effects of extreme loading and environmental conditions ... arising from (the listed initiating conditions)."* (emphasis added) Failure of controls, including engineered controls, is assessed as part of the demonstration that the process be subcritical under normal and credible abnormal conditions (2.3.2.2). Given that 2.3.2.2 is satisfied, it should be irrelevant whether individual controls satisfy the additional requirement of Appendix A (second paragraph).
G8	Appendix B.3	Appendix B is based on ANSI/ANS-8.1-1998, however, Appendix B has replaced the term *allowable subcritical limit* with *allowable margin of subcriticality* in defining the term k_a (and the title of the section). *Allowable (or upper) subcritical limit* is used internationally for this purpose. Suggest using *allowable* or *upper subcritical limit* to describe k_a and for the section title for consistency and to avoid confusion with Δk_m defined internationally, and in GD-327, as the margin of subcriticality (or administrative margin of subcriticality). See definitions in ANSI/ANS-8.24-2007.
G9	Appendix B.4	The division of Δk_p into Δk_{p1} and Δk_{p2} is not consistent with ANSI/ANS-8.1-1998 and ANSI/ANS-8.24-2007, i.e., $$\Delta k_p^2 = \Delta k_{p1}^2 + \Delta k_{p2}^2$$