July 19, 2019

VIA EMAIL

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Dear Mr. Torrie:

Cameco Corporation's Comments on draft REGDOC-2.7.2, *Volume I-Dosimetry: Ascertaining Occupational Dose*

Cameco Corporation (Cameco) has reviewed and prepared the following comments on the draft REGDOC-2.7.2, *Volume I-Dosimetry: Ascertaining Occupational Dose* (the REGDOC) for the Canadian Nuclear Safety Commission (CNSC).

In general, Cameco sees the REGDOC as part of two negative trends in REGDOC drafting. The first is that REGDOCs are increasingly adding requirements to legislated requirements when REGDOCs should be used to provide guidance on how licensees may meet the legislated requirements. This two-tier regulatory scheme creates uncertainty and inconsistency with respect to compliance expectations and enforcement without the necessary checks and balances. Further, REGDOCs blur the line between guidance and requirements, such that it is unclear whether an enforceable requirement is identified as a "must" only and does not include a closely associated "should" or "may". Compliance is best achieved when licensees and CNSC inspectors have a common understanding of what is a requirement and what is an option and REGDOC would be improved by removing examples and guidance that may suggest confuse the two while focusing on guidance.

The following are specific comments for the applicable REGDOC section number provided in bold above:

Radon Progeny and Effective Dose Calculations

The REGDOC does not include methods for calculating how radon progeny is included in the effective dose calculation. This is fundamental to the determination of whether dose limits are met and is a major concern for uranium mines and mills. The Regulatory Impact Analysis Statement (RIAS) for the proposed *Regulations Amending Certain Regulations Under the Nuclear Safety and Control Act (Radiation Protection)* published in the *Canada Gazette*, Part 1

on June 15, 2019 states that the methods for calculating doses in section 13 of the *Radiation Protection Regulations* (RPR) are better placed in regulatory guidance. Cameco strongly disagrees and the combined effect of the proposed changes to the RPR and the failure to include these methods in the REGDOC would orphan the effective dose calculation for radon progeny without any regulatory certainty that the status quo will continue. This would also eliminate the transparent process for changing the calculation method that now exists in the RPR.

Cameco believes that the appropriate instrument for regulating effective dose calculations is in the RPR because any change to the dose conversion factor from exposure (working level month) to dose (mSv) should be subject to the procedural rigor provided by the regulatory amendment process and is not available for REGDOC revisions. In any event, Cameco also recommends that the methodology in the RPR should be retained.

Determining Dosimetry Service Requirements (2.4)

The technology used to measure a source of radiation does not affect the magnitude of that source; it is the magnitude of the component of each source that should be used to determine if a licensed dosimetry service (LDS) is required and not the technology used to measure the source. This section links the technology used to measure a source with its magnitude through a LDS requirement, which implies that the magnitude of exposure is also linked. This requirement could force licensees and vendors to abandon technologies where not all components have a LDS.

The sentence "[i]n cases where a dosimetry device measures more than one source…these should be treated as a single component for the purposes of determining dosimetry requirements" incorrectly links controls and technology and should be deleted.

In addition, there is no credit given for the widespread use of LDS for gamma. That component typically has a licensed dosimetry service. Therefore, in our view, it is the remaining components that should be assessed to determine if additional requirements are necessary for those components.

Neutron Dosimetry (5.6)

The first sentence of the third paragraph describes placing a survey meter at the location on a person where radiation readings are highest. This would significantly overestimate the dose to workers who are rarely in the maximum dose rate. As a general point, not specific to neutron dosimetry, dose measurements should be accurate and not overly conservative if the intent is dosimetry. In this case, the reference to locating the meter where readings are highest should be removed.

Individual Monitoring (9.1)

The recommendation on page 27 that reads "[u]rine bioassay programs designed for the purpose of dosimetry should be designed…to collect and analyze samples collected over a period of 24 consecutive hours" should be removed. This would impose unnecessary administration and operational burdens for routine sampling when more sensitive methods permit analysis of smaller volumes and/or when correction to Reference Person models for screening or urine volumes corrections are available when appropriate or required.

Appendix B, section B.1:

These sections do not include respiratory protection as a factor in the potential intake fraction equivalent to the reciprocal of the respirator's protection factor. This should be included in a note.

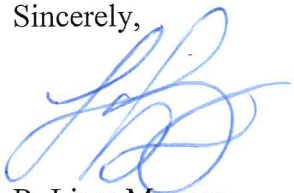
The following are recommended editorial or clarifications:

- **1.3**, third bullet: This bullet should be revised to read "…record the magnitude of exposure to radon progeny, where applicable" to clarify that radon progeny dosimetry applies to exposures from a CNSC-licensed activity only such as exposures at uranium mining and milling facilities and to be consistent with draft REGDOC-2.7.1, *Radiation Protection*.
- **2.4**, second paragraph: In multiple radiation source situations, the use of technically justified surrogates should be included as an option to ascertain dose for a component.
- **6.2** and **7**: REGDOCs should not suggest that licensees should implement a new ICRP value or guidance without a transition period after an ICRP publication is released because it is impractical. It may take years before software required for implementation is available and, in all cases, it takes time and resources for licensees to revise programs and procedures. Cameco is concerned that this failure to incorporate transition periods into guidance could occur for a requirement in future REGDOCs and we recommend that transitions always be acknowledged and contemplated in REGDOCs.
- **6.3.3**, last sentence: This should be revised to read "…radiation safety officer or equivalent radiation authority should be consulted…"
- **7**, the second last paragraph: To be consistent with ICRP 103 and 130, the breathing rate of 1.2 m^3 should be replaced with 1.1 m^3.
- **9.1**: The bullets should be aligned to represent equal and independent importance. The last three bullets are independent normalization factors and the third bullet is not dependent on the third bullet.
- **9.1.1**, second last sentence in paragraph before Table 6: 1 mSv should read 1 mSv/year.
- **9.2**:
    - Third paragraph: There is a poor correlation between personal air sampler (PAS) and static air sampler (SAS) and a poor correlation between SAS and bioassay. The text states that SAS results should be used with caution, but the caution is then extended to PAS without a connection being drawn.
    - Sixth paragraph: Specific documents should be referenced for calibration methods.
    - Seventh paragraph: This should be clarified by revising the paragraph to read "The licensee should demonstrate that the air sampled is representative of breathing zone air when the personal air samplers are not worn within 30 cm of the worker's head and one or more of the following conditions exists: (i) the worker's dose will be ascertained on the basis of air monitoring, and/or (ii) annual exposures are likely to exceed 100 DAC-hours (or the annual CED resulting for inhaled radionuclides is likely to exceed 1 mSv)."

- **11**, last paragraph, page 42: It is unclear why there is a recommendation to vary f_r and s_s values and not the value of s_r when varying other parameters and factors first, such as intake time and pathway, may be more appropriate to address a rejected fit. Cameco recommends that additional references and rationale are provided for this recommendation or simply state this is one possible option deal with a rejected fit.
- **14**: fourth numbered paragraph, page 46: As drafted, this step for monitoring a contaminated wound may not be useful for all radionuclides and it should be revised to read "equivalent dose to skin at the wound site should be determined using data from steps 2 and 3."
- Table 11: units are missing.

If you have any questions with respect to the above, then please contact John Takala at 306-956-6486 or john_takala@cameco.com.

Sincerely,



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c: UMMD - Regulatory Records, C. Purvis
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