

Draft Report for Consultation: Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident

Comments from Health Canada – Radiation Protection Bureau, September 2019

#	Section	Text	Comment
1.	General Comment		Reference levels are fundamental to the radiation protection in this document. To make sure that they are consistently used/applied, it would be helpful to provide a set of criteria and methodology for setting them, or at least some examples of how they are determined for some select scenarios.
2.	General Comment		With the possible exception of the 10 mSv/a suggested reference level, this draft represents a significant improvement over the previous version with respect to consistently recommending an all-hazards approach to assessing and managing risks.
3.	General Comment		As a new reference level is introduced in this document, namely the 10 mSv, a justification and background for this should be provided.
4.	General Comment		The document highlights the important, but as of yet unquantified, psychosocial and economic impacts on the affected population, but these have not been included in the derivation of the reference levels. The lessons learned from Fukushima regarding the significant psychosocial impacts suggest that the reference levels themselves need to be justified to assess whether the tenet of doing more harm than good is respected for those reference levels.
5.	General Comment	<p>Examples:</p> <p>Para 111: For responders not identified in advance and who have not been trained, the Commission recommends that they should receive information on the tasks to be undertaken and the risks incurred ... (1161-1163)</p> <p>Para 157: Advising people who have been evacuated or temporarily relocated that they are allowed to return home requires an assessment of their future exposures and the associated risks. (1557 – 1559)</p>	Several paragraphs (e.g., 157, line 1565, and others) recommend that members of the public and responders who are not familiar with radiation should be provided with information on exposures and risks in order to support personal decision-making. While it is likely beyond the scope of this document, a collective effort should be made to develop materials that can effectively communicate risk from exposures in the order of 10s of millisieverts or less. This would complement the co-expertise process and RP culture described in 4.3.2.1 and 4.3.2.2 and help bridge the gap between the onset of the

			emergency and the later phases where co-expertise can be implemented.
6.	<p>Main Points, pp. 4, bullet 4</p> <p>Executive Summary, pp. 6, item (j), line 120</p> <p>2.3.3 Optimisation and the use of the reference levels, pp. 24, para (80), lines 832 - 841</p>	<p>Levels should be within or below the Commission's recommended 1 – 20 mSv band taking into account the actual distribution of doses in the population and the tolerability of risk for the long-lasting existing exposure situations, and would not generally need to exceed 10 mSv per year.</p> <p>..the Commission recommended the selection of the reference level in the lower portion of the 1 – 20 mSv band. The current recommendation that the reference level would not generally need to exceed 10 mSv, clarifies this position...The Commission considers that annual exposures of the order of 10 mSv during the first years of the recovery process, added to the exposure received during the emergency response, could lead to total exposures greater than 100 mSv in a relatively short period of time for some affected people. Therefore, it is not recommended to select reference levels beyond 10 mSv per year when it is estimated that such exposures could continue for several years, which may be the case once the recovery phase starts.</p>	<p>The necessity to introduce another level/limit into the system of radiological protection is questionable. If the ICRP has judged that a reference level in the range of 1 – 20 mSv is acceptable for existing exposure situations, it is not necessary to introduce an expectation that doses will not exceed 10 mSv. If the ICRP now judges that doses above 10 mSv in the long-term phase represent a health risk (as appears to be the case based on the text on pp. 24), then the band of reference levels should be updated to be 1 – 10 mSv. In either case, the objective is clearly stated to reduce doses progressively towards 1 mSv, so the use of the 10 mSv appears to be redundant. Worse, it may cause mistrust among the public if a reference level above 10 mSv is chosen early in the long-term phase, may put undue pressure on decision makers and/or may cause actions to be implemented that are not justified to immediately obtain this new expectation.</p> <p>In addition, the following paragraph [para (81)] states the following: If radiological protection is implemented appropriately, past experience has shown that, after a few years, the combined effect of radioactive decay and protective actions will result in doses below 1 mSv per year or in the order of this level...Only a small fraction of the population is likely to receive higher exposures (of the order of a few mSv per year). Again, it is not clear why the ICRP has judged the introduction of 10 mSv as a new level/limit as necessary.</p> <p>Furthermore, the first footnote under Table 6.1 states that "The current recommendation recognises that the most appropriate reference level may be lower than the corresponding band under some circumstances." This begs the question: under what circumstances would a reference level of 20 mSv/a be acceptable?</p>
7.	<p>Executive Summary, pp. 6, item (h), line 106</p>	<p>The term 'responder' is appropriate for all of these categories.</p>	<p>Section 3.3 Protection of emergency responders includes the following text (line 1085 – 1086):</p> <p>The Commission considers that the term 'emergency responder' is appropriate to refer to all of these individuals.</p>

			Consistent terminology/language should be used.
8.	Executive summary, pp. 6, item (j), line 114	For protective of responders after the urgent emergency response...	'responders' should be 'emergency responders' and 'urgent emergency response' should be 'early phase' consistent with ICRP terminology described in Section 2.1 Timeline for managing a nuclear accident and 3.3 Protection of emergency responders.
9.	2.1 Timeline for managing a nuclear accident, pp. 10, para. (11), line 240	The early stage...	The early phase...
10.	2.3 Principles for protection of people and the environment, pp. 15 - 25	Whole section	There are several pages describing the principles of justification and optimisation, but what is still missing is a clear description of the methods that can be employed by decision makers to ensure that their decisions are justified and optimised. What are the steps necessary in the processes of justification and optimisation? (We note that Figure 2.2 is a very good start) What considerations are necessary in each step? Who needs to be consulted and when? Being more specific in how to apply these principles would ensure a more consistent approach by all authorities.
11.	Section 3.2.2.2, para 102	Thyroid dose monitoring in the early phase is important for children and pregnant women. Environmental monitoring cannot provide an accurate estimate of individual thyroid exposures. Therefore, a specific effort should be made to monitor radioiodine content of the thyroid rapidly in children (up to approximately 15 years old at time of exposure) and pregnant women in order to get realistic estimates of thyroid doses. Thyroid measurements can be made by trained and properly equipped personnel at evacuation centres and post-accident centres established for health surveillance.	This text (and point (d) in the Executive Summary) assumes that protective actions to prevent exposure to radioiodine were unsuccessful. The circumstances under which thyroid monitoring is important should be stated more explicitly.
12.	Section 3.2.2.2, paras 103 and 105	(103) During the intermediate phase, a whole-body counter can be used to provide measurements of contamination inhaled or ingested by affected people on-site and off-site. <i>This allows the assessment of internal</i>	When paras 103 and 105 are read together, they appear to recommend that individual monitoring should be used a) for medical reasons, when it is suspected that people have been exposed (105);

		<p><i>exposure, which can help to identify pathways</i>, mainly foodstuffs, deserving particular attention. Measurements of internal contamination in children, including babies, <i>provide useful information to mothers for understanding their child's situation, and options for adjusting their diet</i> (Hayano, 2014). Over time, important pathways of exposure can change, and this needs to be considered when prioritising people for whole- body counter measurements.</p> <p>(105) Medical monitoring programmes that are focused on people affected by a radiation emergency should consider two target groups: people who developed clinical conditions during the emergency; and people known to have been exposed but not showing any symptoms. Follow-up in the first group is aimed at diagnosis and treatment of long-term complications. Conversely, the main purpose of epidemiological follow-up in the second group is the detection of adverse effects or diseases that are potentially related to radiation exposure (e.g. cancer).</p>	<p>and b) to use them as human detectors (103). The text in italics could be interpreted as disrespectful; suggest rephrasing.</p>
13.	Section 3.2.2.2, para 104	<p>(104) Measurement data should be collected centrally and made available as soon as possible to all relevant organisations in charge of management of the emergency response in order to assist them in making protective decisions. For the sake of accountability and transparency, the Commission recommends that this information should also be made available to members of the public, accompanied by clear explanations.</p>	<p>This paragraph does not distinguish between environmental measurement data and results of individual monitoring. Text should acknowledge the need to handle personal information with respect, while still making important information available (e.g. as summary statistics).</p>
14.	Sections: 3.2.2 3.3.3 3.3.4	<p>In the intermediate phase, detailed environmental monitoring is essential for understanding the radiological situation of widespread contaminated areas, and for terminating the urgent protective actions implemented during the early phase (1027-1029)</p>	<p>These sections seem to contradict each other vis-à-vis the definitions of the early and intermediate phase. If detailed environmental monitoring is required for terminating urgent protective actions, it has to be done during the early phase, if the intermediate phase starts with the lifting of those protective actions. But the text says that the detailed monitoring happens during the intermediate phase.</p>

		<p>...the intermediate phase of the emergency response starts when the source is declared stabilised by the authorities (1183-1184).</p> <p>...the intermediate phase starts when the urgent protective actions for protection of the population are lifted (1215-1216).</p>	
15.	Section 3.3.4, para 118	Their dose should be assessed, and the information should be communicated to interested responders, and kept, as far as possible, on an individual basis. (1228-1229)	<p>“Interested responders” is not correct. Suggest re-wording: “Their dose should be assessed and communicated to the affected individuals if they are interested. As far as possible, doses should be kept on an individual basis.”</p>
16.	Sections: 3.4.1.1 3.5.1	<p>...monitoring should be performed promptly wherever sheltering is in place in order to locate and evacuate people from areas of high risk (1324-1325).</p> <p>....If the radioactive releases from the damaged facility last for several days, the confinement of people inside buildings becomes untenable to maintain, and authorities have to organise evacuation of the people concerned. (1527-1529).</p> <p>... monitoring information is required to determine whether exposures from external irradiation of inhalation of resuspended material from ground deposits are likely to be of radiological concern once sheltering is lifted. (1539-1541).</p>	<p>More information regarding the role of the field monitoring teams during the early phase would help clarify the definitions of the two phases. While most of the monitoring would be done during the intermediate phase, these sections suggest that detailed monitoring could also be required during the early phase and therefore the role of monitoring field teams should be emphasised in both phases</p>
17.	Paragraph 502-511	... protection of non-human species may not be an immediate priority...	<p>One can disagree with this statement. The paragraph should add that bad management of the livestock in addition to the nuclear emergency can generate other crisis that will make the situation worse (i.e. massive carcass disposal, infectious disease transmission, water contamination, protection of the environment and wild life, etc.).</p>
18.	Section 3.3.4	Lines 1216-1218 the intermediate phase ...finishes when the exposure situation for the population and affected	<p>Decontamination of buildings and environment should occur after the completion of this assessment that indicates the termination of</p>

		<p>areas is sufficiently well characterised to allow the authorities to decide the future of affected areas</p> <p>Lines 1220-1221...decontamination of buildings and the environment...</p>	<p>the intermediate phase and therefore decontamination activities are not mainly performed during the intermediate phase.</p>
19.		<p>Paragraphs 113 and 118</p>	<p>Para 113 has a reference level of ≤ 100 mSv during the early phase and Para 118 has a reference level of ≤ 20 mSv per year (or even lower) during the intermediate phase. Does this mean that someone who would have received more than 20 mSv during the early phase would be excluded in continuing to respond during the intermediate phase? If not, transition from the early phase to the intermediate phase for emergency responders who would receive a dose during the early phase needs to be articulated.</p>
20.		<p>Line 262, Figure 2.1: Timeline of a large nuclear accident.</p>	<p>The diagram does not align the transition from an emergency to an existing exposure situation with the line that separates the Emergency response to the Recovery process. The transition of the exposure situations and the emergency phases should align.</p>
21.		<p>Line 271, section 2.2 Consequences of a large nuclear accident:</p>	<p>Recommend replacing the word “dimensions” with “aspects”.</p>
22.		<p>Line 303 Section 2.2.1.1</p>	<p>Paragraph suggests no functional impairment of tissues from doses up to 100 mGy. This does not align with the Table 2.1 that shows the lowest threshold for selected tissue/organs of 0.5 Gy.</p>
23.		<p>Line 787 Figure 2.3</p>	<p>The figure does not align with the reference level recommendation from the main points in lines 48-53 of “1-20 mSvand would generally not need to exceed 10 mSv”.</p>
24.	<p>Section 3.4.2.2, para 141, and Section 4.1, para 169(141)</p>	<p>In the intermediate phase, the radiological quality of foodstuffs can be improved by many protective actions that aim to reduce the transfer of radionuclides in the food chain from farm to fork (Nisbet et al., 2015). These actions include, for example, removal of topsoil, ploughing and chemical treatment of soils, provision of clean feed or feed additives to livestock, and industrial-scale food processing to remove contamination. The actions selected will depend on the physical and chemical properties of the radionuclides released, season of the</p>	<p>Recognition of indigenous populations leading traditional lifestyles (including traditional food) is mentioned in some parts of the document, but it is noticeably absent from these two paragraphs. This should be corrected.</p>

		<p>year, and the types of land use affected (Bogdevitch, 2012). (1447-1453)</p> <p>And (169) For the sake of controlling exposure in long-term contaminated areas, different exposed groups of populations may need to be considered. Generally, the typical population groups are:</p> <ul style="list-style-type: none"> - the rural population – farmers or families with small holdings who reside and work in affected areas, and are assumed to derive some of their food from locally grown products; and - the urban population – people who inhabit houses constructed in a built-up area, and who generally derive the majority of their food outside the affected area. 	
25.	Section 4.2, para 175	The Commission considers that the exposure of these residents should be considered as public exposure, and should be managed using the same requisites as for the general population. (1721-1723)	Sentence should be amended: "... using the same requisites as for the general population <i>in the affected area.</i> "