

Para	Comment
L52, L117, L828, L833, L834, L1733	The numerical values of the reference level for existing exposure situations are recommended per year, and this should be explicitly stated (e.g., L52, “1–20 mSv per year band” not “1–20 mSv band”).
L53, L118-119, L794-795, L829	“The tolerability of risk” appears several times in the draft, albeit with no discussion of the level of risk tolerable for emergency and existing exposure situations.
L96	Intention of “more good than harm for the environment” is unclear.
L114	“urgent” should be removed.
(10)	<p>“convenient” is not appropriate considering the translation. Use of different word or adding an explanation is preferable.</p> <p>Are the meanings of early, intermediate, long-term consistent with short-, medium-, long-term in Introduction (L153-154)? Use of different words for different concepts is proposed.</p>
Fig 2.1	A clear boundary between emergency response and recovery process contrasts with a fuzzy boundary between emergency exposure situations and existing exposure situations. This contradicts with definition stated in L234-235.
Section 2.2.1 onward	“severe tissue/organ damage” is used here instead of “deterministic health effects” or “tissue reactions”, although “deterministic effects” is used in other sections. For consistency, tissue reactions should be used for consistency throughout the draft and with previous ICRP publications (e.g., ICRP-118).
Table 2.1	<p>Given ICRP-118, “Increased risk of circulatory disease (decades later) 0.5 Gy to the whole body” should be “Increased risk of circulatory disease (>10 years) 0.5 Gy to the heart and brain”. Likewise, “Cataract induction (decades later) 0.5 Gy to the lens of the eye” should be “Cataract induction (>20 years) 0.5 Gy to the lens of the eye”</p> <p>Meaning of brackets should be consistent. Latency should be written in the other column.</p>

	“0.5 Gy to the whole body” should be “0.5 Gy to heart or brain” according to Pub 118.
(19) L312	<p>Target organ of radiation-induced circulatory disease is still controversial. In Pub 118, target organs are indicated as heart or brain, while Little 2012 considers the whole-body exposure.</p> <p>In addition to Little 2012, the following paper (second meta-analysis by Little) should be cited: Little MP. Radiation and circulatory disease. <i>Mutat Res.</i> 2016;770(Pt B):299-318.</p>
L313	Here “an approximate threshold” fits better than “a threshold”.
(29) L381	Brief explanation of ethical values with ICRP-138 cited will be helpful.
(36)	<p>The following paper should be cited on disorder.</p> <p>Tsubokura, M., Hara, K., Matsumura, T., Sugimoto, A., Nomura, S., Hinata, M., . . . Kami, M. (2014). The Immediate Physical and Mental Health Crisis in Residents Proximal to the Evacuation Zone After Japan's Nuclear Disaster: An Observational Pilot Study. <i>Disaster Medicine and Public Health Preparedness</i>, 8(1), 30-36. doi:10.1017/dmp.2014.5</p>
2.2.5, 2.2.6	Since the deep interaction of psychological consequences and changes in lifestyle is expected, combining these sections into one section is proposed.
(40) L458	“evacuation” may be more suitable than “accident”.
(46)	“disruption” should be changed to the other word since the effect on biodiversity is still unclear, especially in the long term.
(58) L620	“values that” may be “values, along with beneficence/non-maleficence, that”.
(65) L676	“greater than” should be “greater for some health effects than”.
(67) L697-698	Limitation of the inequity with the reference level sounds contradictory.
(77)	However, there may be situations where it is not possible to expect to keep all doses below or in the range of 100 mSv, such as in very severe accidents when high acute exposures can be received within minutes or hours, and when faced with taking actions under exceptional

	<p>circumstances in order to prevent further degradation of the facility leading to catastrophic conditions, or saving human lives (see Annexes A and B).</p> <p>Reference level of the occupational exposure for urgent rescue operations has been recommended to be below 1000 or 500 mSv in Publ. 103 and a guidance value of below 500 mSv has provided in IAEA GSR Part 3.</p> <p>At the end of Para. 77, following text should be added.</p> <p>In those particular situations, the reference level for emergency responders may be temporarily set in the range of 100 – 500 mSv.</p>
(79)	<p>In the 2007 Recommendations, existing exposure situation is not assigned for occupational exposure category, while exposures resulting from long-term recovery and remediation operations or from protracted employment in affected areas should be treated as part of planned occupational exposure, even though the source of radiation is ‘existing’. In Fukushima Daiichi NPP, while occupational radiation exposure is controlled as planned exposure situation with the dose limit of 100mSv/5y and 50mSv/y, this paragraph describes the “Commission recommends that the reference level for restricting the exposures of recovery responders should not exceed 20 mSv per year on-site and off-site.” Concrete guidance in such a case may be helpful for the practical radiation protection.</p>
(80) L835	<p>“may” be more suitable than “can”.</p>
(89)	<p>When providing the information in an emergency situation, care should be taken for deaf person and visually impaired person.</p>
(102)	<p>“Thyroid measurements can be made by trained and properly equipped personnel at evacuation centres and post-accident centres established for health surveillance.”</p> <p>Appropriate condition and equipment (shower, clean room, shielding, etc.) for thyroid dose measurement should be mentioned in the paragraph. It is expected that gymnasiums are unavailable because of the ventilation characteristics and increase of background count rate by the radioactive substance dispersion. It will be unrealistic to assume that many children and pregnant can move to the limited numbers of evacuation centres and post-accident centres established for health surveillance immediately.</p>
(102) L1058	<p>“exposure” may be something like “declaration of emergency”.</p>
(102) L1059	<p>“organ dose” may be “organ absorbed dose”.</p>

(118)	<p>The Commission recommends using a reference level ≤ 20 mSv per year to control individual exposures according to the circumstances.</p> <p>At the end of Para. 118, following text could be added.</p> <p>“In later phase of emergency exposure situation, the radiological conditions may be controlled using a reference level ≤ 20 mSv per year recommended for existing exposure situation. (See Fig.2.1.)”</p> <p>Footnote of Table 3.1</p> <p>“ † The Commission continues to recommend to take all practicable actions not to exceed exposure in the order of 1 Gy to avoid severe deterministic effects for responders involved in exceptional circumstances during the early phase of the emergency response (ICRP, 2012a).” should be described in the main text since it gives important philosophy regarding reference level for emergency responders.</p>
(120) L1266 L2248-2250	Suggest to remove “NCRP 2018”.
(155) L1534- 1535, L1576- 1578	the sentence is repeated so that the latter may be redundant.
(173)	<p>Considering the Fukushima NPP, recovery process includes removal the nuclear fuel debris, which may arise a difficult exposure circumstance. Removing the huge amount of debris at the severely damaged reactors is the challenging process and first experience for human, and this process could be the typical case which might cause the “unexpected situation”. Therefore, inserting the text of “removal of fuel debris after core meltdown and” in the first sentence will make the recommendation more practical</p> <p>“During the long-term phase on-site, the recovery process aims to dismantle the damaged installation, including removal of fuel debris after core meltdown and management of the corresponding waste.”</p> <p>To cope with the unexpected situation, however, current text of “During the long-term phase on-site, the recovery process aims to dismantle</p>

	<p>the damaged installation, including removal of fuel debris after core meltdown and management of the corresponding waste.” is insufficient. “challenge the reference level” is also unclear. The following text [inside brackets] is proposed for clarification and practical purpose.</p> <p>“The Commission recognizes that unexpected circumstances in the environment at the damaged facility may challenge [radiological protection measures to be normally applied in the existing exposure situation. Under a national law or the relevant national guidance, recovery responders would be protected satisfying such as an annual dose limitation determined by regulatory authority referring to the above reference level ≤ 20 mSv per year. For example, the dose limitation may sometimes be equal to the dose limit in the planned exposure situation, which is an effective dose of 20 mSv per year averaged over five consecutive years (100 mSv in 5 years) and of 50 mSv in any single year. For providing wider options preparing for the unexpected situation, the Commission also considers that regulatory authority can use more flexible restriction for individual dose, e.g. 20 mSv per year averaged over ten consecutive years (200 mSv in 10 years) maintaining with 50mSv in any single year, rather than the dose limit in the planned exposure situation.] In that case, great care is needed when preparing and conducting the work in order to keep exposures as low as reasonably achievable.”</p>
(175)	<p>"Commission recommends that the reference level should be within the 1-20-mSv per year band, and would not generally need to exceed 10 mSv."</p> <p>Evidence and warrant for “not generally need to exceed 10 mSv” should be indicated. Section (2.3.3) should be cited for this explanation.</p>
(178) L1759	<p>“reference value” may be “the numerical value of the reference level”.</p>
(187)	<p>“For the management of radioactive waste generated by decontamination actions, the Commission recommends that the relevant reference levels set for public or environmental exposure should be used as a criterion, considering exposures from radioactive waste as one of the sources of exposures. ”</p> <p>It should be clarified what “the relevant reference levels” implies. As stated in para. (76), it may be appropriate to re-evaluate the reference level when conditions evolve and the dose distribution changes, and the reference level may be lowered to accompany the improvement of the radiological situation. It is, therefore, not appropriate to use an a-priori fixed reference value. Publication 111 also states that National</p>

	<p>authorities may take into account the prevailing circumstances and also take advantage of the timing of the overall rehabilitation programme to adopt intermediate reference levels to improve the situation progressively. The following revised text is proposed:</p> <p>“For the management of radioactive waste generated by decontamination actions, intermediate reference levels set for public or environmental exposure can be adopted considering exposures from radioactive waste as one of the sources of exposures. Once a reference level is set, it should be used as a criterion. The reference level may be lowered to accompany the progress in the improvement of the radiological situation.”</p> <p>Also, a stepwise approach to setting a radiological protection criterion for waste management suggested in the following scientific paper may be added as an example of selecting relevant reference levels.</p> <p>Sugiyama, D., Kimura, H., Tachikawa, H. et al., 2018. Integrating radiation protection criteria for radioactive waste management into remediation procedures in existing exposure situations after a nuclear accident. J. Radiol. Prot., 38, 456-462.</p>
(188)	<p>" The Commission recommends performing surveillance of decontamination waste storage and disposal sites for as long as necessary."</p> <p>The Commission should be addressed how can the “necessary” be identified.</p>
(200-203)	<p>Although it is clear that Para (199) explains about the first category (or component as shown in (198)), it is difficult to understand whether Paras (200-203) explain about second and/or third category. If Para (203) is for the third category, it should be mentioned that the comprehensive system is necessary that can separately estimate the health risk due to radiation exposure and other factors, such as evacuation, isolation and lifestyle in a design of an epidemiological study.</p>
(204-206)	<p>In the co-expertise process, while the “experts” were often the “researcher (professor) on radiation” after the Fukushima accident, it was recognized that the necessity of specialist who can support the communication between researcher and public. Role and preparation of the “experts” should be mentioned in these paras.</p>
(219)	<p>Meaning of “internationally” is unclear.</p>
(223) L2097	<p>“and may last” be more suitable than “and last”.</p> <p>“for several decades” may be depend on the situation.</p>

(A12) L2455	“whole body equivalent dose” may be “effective dose” (or “dose equivalent”).
(A13)	“However, the 350-mSv limit was rejected by the state officials due to pressure from the public and mass media.” What was the final decision regarding lifetime dose? Was it just refused or selected smaller limit?
(A21) L2541, L2543, L2545	“mR” may also be described in the currently used unit.
(A42) L2770- 2781	Relevance to “participation of stakeholders” is unclear.
L2449, L2675, L2916, L2988, L3119	It will be useful here or around to provide brief narratives of timelines for each phase listed in Tables A.2 and B.1.
Fig B.3	Detail explanation of the figure should be added in the caption.
(B19, B20, B27, B43)	Appropriate references should be cited.
L3329	“deterministic effects” should be replaced with “tissue reactions (also termed “deterministic effects”)”.
L3421	“Self-help protection” may be replaced with “Self-help protective action”.

Editorial comments

L30: “by” not “ny”.

L111, L798: “which” in place of “and”.

L169: Remove “respectively”.

L434: “Suzuki” not “Sususki”.

L596: “graded”

Fig 2.2 Allow line is non-vertical.

L794: Remove “considerations on”.

L1487, L1584, L1599, L1603, L2365, L2472, L2478, L3121: “radiological” instead of “radiation”.

L1792: Remove “the production of”.

L1876: “food distribution” may be “food distributors”.

L2095: “heritable” instead of “hereditary”.

L2904: “boiling water reactors” not “boiling reactors”.

L3042: “radioiodine” instead of “iodine”.

L3163, L3168: “regulation” not “regulatory”.

L3385-3388: Remove glossary for radiation detriment that does not appear in the draft.