



Comments Register

Document Title: ICRP's draft of "Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident"

Thank you very much for the opportunity to comment on ICRP's draft of "Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident". We welcome the good progress that has been made over the last year and with the comments SRP provided through European Presidents as part of IRPA. There are a number of further detailed comments that we would like to see addressed as set out below. These comments have also identified some aspects of potential inconsistencies with other ICRP documentation and principles.

Section / Para	Comment
General	Overall the document is a good summary of the main issues and principles. As per several of the comments below there is concern that it focuses too much on the assumption that the emergency involves an operational nuclear reactor and some referral to the potential for a much wider range of emergencies should be made. Whilst it provides a summary of the main issues/principles There is some surprise that it does not go into more depth in certain areas. In particular the health and societal impacts of evacuation and the difficulties surrounding evacuation of those in need of constant care. This was a significant learning area from Fukushima that needs in depth analysis and discussion.
General	<p>It would be helpful if there is consistent use of 'justification of decisions' and 'optimisation of protection'.</p> <p>There are instances where justification is applied to other parts of the process e.g. line 205/206 would be better as "justification of decisions on protective actions" rather than "justification of protective actions". Similarly should line 558 be 'optimisation of the overall protection strategy' not 'justification of the overall protection strategy'. Also, should line 572 be 'Optimisation then applies to ...' rather than 'Justification then applies to ...</p>
Executive summary	<p>Lines 82-85...</p> <p><i>(d) A large release of radioiodine in the case of a nuclear accident can result in high thyroid exposures due to inhalation or ingestion. Specific efforts should be made to avoid, or at least reduce, intakes of radioiodine, and radioiodine levels in the thyroid should be monitored, particularly in children and pregnant women.</i></p> <p>Two points here. First there should be recognition that nuclear accidents can occur at facilities other than operational NPPs. This is also the case in line 199. Second the use of stable iodine is not to avoid intake, it's to reduce the uptake into the thyroid as a result of intake. Sheltering may be of little benefit from the vapour iodine hazard and evacuation is not a specific effort so I'm concluding that this is referring to stable iodine.</p>



Section / Para	Comment
Section 2.1	<p>Section 2.1 takes a simplistic view of the onsite timeline</p> <ul style="list-style-type: none">a (lines 240-245) There is an implicit assumption in the definition of ‘Early phase’ that the release phase is short. In practice (and in severe accident analysis), there are accident scenarios where releases occur over a long period, or in several short bursts over a long period. While it is difficult to put a time duration of releases, it should be possible to define (at least in principle) a duration on the ‘Early phase’ in terms of implementing the prompt protective actions. Recognising this might introduce a further ‘Waiting/Gain control’ phase before entering the ‘Intermediate phase’ as currently defined.b (lines 251-258 and 1185-1187) There may be a significant delay between ‘source secure’ and ‘commencement of work to dismantle’ in the on-site arena (e.g. commercial decisions, clean-up vs decommissioning strategy, planning & safety case development, etc etc), whereas the transition between off site ‘Intermediate phase’ and ‘Long-term phase’ is likely to be more straightforward in the off site arena (also impacts on lines 903-904).
Section 2.2	<p>While stressing that radiological protection principles cannot be addressed in isolation (i.e. must consider counter arguments to ‘achieve balance’ on the optimisation of protection), gives no discussion on how this balance may be achieved – leaving us with a one-sided weighted set of balance scales! Section 2.2 as a whole could be improved (language, context and length). Section 2.2.3 particularly contains a lot of repetition of later sections and could be summarised here (with cross-reference). Section 2.3.1 - Lines 568-570 are important and should be give more significance e.g. in main introductory paragraphs. Note - consistent use of Reference Level (rather than reference level or reference value uncapitalized or even just level) would help the reader.</p> <p>There are also some significant editorial issues with this section, e.g.</p> <ul style="list-style-type: none">a. Introduction (lines 271 to 287) are rather undisciplined and repeat text from other areas – and use some highly emotive language which is not suitable for this technical section.b. Line 293 should clarify that deterministic effects are attributable to ‘high dose/high dose rate radiation exposure’.c. Line 297 is referring to a lower level cut-off for deterministic health effects at 1%ile of the distribution function (for each health effect), this could be more clearly described.d. Line 336 & 803 – quantify (w.r.t. INES scale) what is meant by ‘very severe release’.e. Line 356-360 remove emotive language. It also refers to ‘unprecedented complex situation’ but we have 2 precedentsf. Line 513 applies only to wild/native species rather than farmed or domestic species?g. Line 530 ‘... and bearing in mind the likely beneficial and negative consequences of both implementation versus non-implementation’.h. Lines 640-647 could be clearer in terms of steps of applying optimisation principle.i. Line 799 doses of this order would need to be delivered almost instantaneously to cause any measurable physiological effect.j. Lines 873-875 – environmental reference values should be DCRLs, ‘radiological consequences’ should be ‘positive and negative impacts’
Section 2.2.1.1, para 17	<p>(17) <i>Severe tissue/organ damage is directly attributable to radiation exposure, irreversible 293 in nature, and severely impairs the quality of life of exposed individuals.</i></p> <p>We would suggest that it <i>may</i> severely impair quality of life but it’s not an absolute.</p>



Section / Para	Comment
Section 2.3.2, para 68	<p>(68) <i>Once the emergency response is over and the radiological situation has been characterised</i></p> <p>We suggest that this should be ‘...sufficiently characterised...’ as it may never be possible to fully characterise the radiological situation.</p>
Section 3.1, para 87	<p>(87) <i>Urgent protective actions taken before any significant release will avoid the occurrence of direct serious injuries</i></p> <p>Suggest that <i>radiological</i> is added here as it is not possible to categorically state that direct serious injuries from any other cause will not occur.</p>
Section 3.1	<p>It should be clarified (lines 908-909) which short term protective actions can influence only deterministic effects (mainly sheltering), both deterministic and stochastic effects (mainly evacuation) and which are almost exclusively to reduce likelihood of stochastic effects (thyroid blocking, food and water interventions). Similarly lines 914-916 is a sweeping generalisation that is questionable.</p>
Section 3.2.1	<p>This section contains some generalised statements about severe accidents that are questionable. Again what is meant by large nuclear accident? e.g. lines 962-964, modern PSA demonstrates that most likely scenarios have an intact containment where initial exposures would be relatively low and containment threats (leading to potential for large releases) happen later. Early containment failure/bypass is not generally considered likely. e.g. lines 964-965 assume high levels of fresh dairy consumption.</p>
Section 3.2.1 para 92	<p>(92) <i>In the case of an accidental atmospheric release, it is likely that initial exposures will be at a relatively high level due to the inhalation of short-lived radioactive products present in the plume.</i></p> <p>This is making the presumption that all nuclear emergencies only occur at operational nuclear reactors. This line is followed by several others talking about radio-iodine and caesium.</p>
Section 3.2.2	<p>This section contains some questionable statements e.g. line 1159 – surely this depends on the accident scenario and the onsite vs off site actions? e.g. onsite responders may be performing remotely controlled actions ...</p>
Section 3.2.2.1	<p>(100) <i>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.</i></p> <p>Whist true for sheltering and evacuation (if considering the return of people to the affected area) but not necessarily the case for stable iodine where the need for a second dose may lead to a decision to evacuate thus terminating the need for the protective action.</p>
Section 3.4	<p>Some clarifications could be added e.g.</p> <ol style="list-style-type: none">line 1317 – here talking about high short term exposures,line 1321 – serious health effects – are these deterministic health effects?



Section / Para	Comment
	<ul style="list-style-type: none"> c. line 1322 thyroid-blocking will not prevent deterministic health effects, d. line 1323 – specify long time as >1 or 2 days, e. line 1325 - evacuation from areas of high dose rate, f. line 1367 – surely if there was reason to believe an individual (or small group of individuals) was highly contaminated there would be some effort to segregate from a large group of lesser contaminated individuals (or at least contain them), g. line 1474 – surely optimisation is applied for all protective actions not just decontamination? (also applies to line 1868 of 4.3.1.3)
Section 3.4.1.2, page 36, line 1314	The paragraph talks about the passage of a plume above people’s homes but it could also be workplaces or other places they are visiting at the time when they would equally need to shelter, not only residents in the area. For clarity that it applies to everyone within a particular geographic area it would be helpful to expand the description beyond “people’s homes”.
Section 3.4.1.2, page 36, line 1320	Again this paragraph talks about the sheltering of residents but it would be anyone in the affected area whether they were residents, workers or visitors. For clarity that it applies to everyone within a particular geographic area it would be helpful to expand the description beyond “residents”.
Section 3.4.1.2, page 36, line 1322	This paragraph says that “sheltering is easy to implement” which it may be, but the challenge will be communicating the message to everyone within the sheltering area especially if are not local, outdoors or in transit at the time. It may also be that people do not have access to adequate shelter, e.g. if they are camping/caravanning in the area, involved in outdoor pursuits or in transit, they may not have adequate protected places to shelter in. For clarity it may help to include the need to consider “a mechanism for communicating with those who need to shelter is essential” similar to what is included in line 1535 for the lifting of sheltering advice. It would also be helpful to include a requirement to consider what advice should be given to those who do not have a suitable place to shelter that will provide adequate protection.
Section 3.5.2, lines 1574 -1585	Is this repetition? Also, in line 1546 what is meant by unacceptable or inadequately defined risks? The sentence could be truncated.
Section 4.1 lines 1675-1676	Rather than those few individuals, it might be useful to consider something like 95th %ile in line with general ICRP recommendations on representative persons for evaluating non-homogenous group doses.
Section 4.3.2	For clarification it should be stated that this applies only to off site response. The onsite response is within the purview of the licensee mainly.
Section 4.3.2.2.	Would this be better as ‘Emergence of a radiological protection culture among local communities’?
Section 4.4, line 2026	Should be large nuclear accident not radiation accident
Section 5	Header should be Emergency response and recovery process preparedness. Both section 5 and 6 would benefit from some editorial review to tighten up language.
Section A3.5.1	What is meant by re-evacuation? (Return from evacuation?) It may be helpful to describe the various protective actions as separate entries in Glossary (SHELTERING, THYROID BLOCKING, EVACUATION, FOOD RESTRICTIONS etc).
Glossary	<p>A “large nuclear accident” should be explicitly defined in the Glossary in terms of the INES scale (IAEA 2013).</p> <p>The definition of a large nuclear accident does not appear in the glossary and the text does not explicitly align with an INES level which constitutes the lower threshold for a large nuclear accident. Lines 198-200 attempt to align with the INES scale but it is not</p>



Section / Para	Comment
	<p>clear if the intention is to align with INES 5 or INES 6. It would be useful if this read-across is explicitly stated. Note lines 145 and 2088 refer to a major nuclear accident, which would imply INES Level 7. Should INES Level 4 also be included in this definition?</p>
Glossary	<p>Glossary entries for 'principle of justification' and 'principle of optimisation' should fully reflect the text in ICRP 103 para 203.</p> <p>The entry for 'principle of justification' is slightly amended from para 203 of ICRP 103 and does not include the important aspect of 'should achieve sufficient individual or societal benefit to offset the <u>detriment it causes</u>' but uses a more vague and slightly misleading statement of 'should achieve sufficient individual or societal benefit to offset any harm, including radiation detriment to humans and the environment'. Similarly, the entry for 'principle of optimisation' does not include the important statement that 'the level of protection should be the best under the prevailing circumstances, maximising the margin of benefit over harm' whilst restricting doses to specific individuals to avoid severely inequitable outcomes.</p> <p><i>Two principles are source-related and apply in all exposure situations</i></p> <ul style="list-style-type: none">• The principle of justification: Any decision that alters the radiation exposure situation should do more good than harm. <p>This means that, by introducing a new radiation source, by reducing existing exposure, or by reducing the risk of potential exposure, one should achieve sufficient individual or societal benefit to offset the detriment it causes.</p> <ul style="list-style-type: none">• The principle of optimisation of protection: the likelihood of incurring exposures, the number of people exposed, and the magnitude of their individual doses should all be kept as low as reasonably achievable, taking into account economic and societal factors. <p>This means that the level of protection should be the best under the prevailing circumstances, maximising the margin of benefit over harm. In order to avoid severely inequitable outcomes of this optimisation procedure, there should be restrictions on the doses or risks to individuals from a particular source (dose or risk constraints and reference levels).</p>