IRSN Comments on Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident

21 October 2019

1 GENERAL COMMENTS

IRSN acknowledges the usefulness of the ICRP publication on radiological protection of people and the environment in the event of a large nuclear accident. This document provides clear recommendations and comprehensive guidance. It illustrates the complexity of managing the consequences of a large nuclear event and highlights the necessity to take into account many aspects going far beyond radiological aspects.

This publication appears to consider only accidents originating from the core of a nuclear power reactor whereas other type of nuclear installation such as reprocessing plants or spent fuel pools, may experience accident of magnitude as large as nuclear power reactors but with a different spectrum of radionuclides. Especially radioiodine is not always present in the release. Some assertions in the text may be put in perspective with regards to this consideration.

The introduction of the reference value of 10 mSv per year for a population living in long-term contaminated area is questionable, lowering the flexibility introduced with the 1-20 mSv per year band.

The difference introduced between on-site and off-site responder during the intermediate phase regarding reference levels is difficult to justify and may raise some legal issues.

2 MAIN POINTS

In the fourth paragraph the Commission's recommended band of 1 to 20 mSv is per year. The notion of a dose for a year should be added here and should be consistent throughout the document.

3 EXECUTIVE SUMMARY

§(b) The recommendation of the Commission to distinguish between the emergency response and the recovery process is perfectly understandable, stressing that issues to be solved are different during these two periods but what is the rationale behind making distinction between on-site and off-site in a radiation framework?

§(d) The statement is perfectly valid but gives the false impression that all nuclear accidents will result in the release of radioiodine.

§(i) The use of a reference level exceeding 100 mSv for exceptional circumstances could also be needed to deal with off-site facilities which can't be stopped easily, or which may need periodic attention.

§(m) The preparedness and planning are essential to ensure consistent protection actions but, even with limited knowledge on the developing situation during the emergency, there is a need to still assess the situation in order to ensure that the taken decisions in terms of protection are still justified and proportionate with regards to the actual and foreseen situation.

4 INTRODUCTION

§(9) Considering that this publication focuses only on the protection of the population facing a large nuclear accident (see §(6)) it is not correct to write that this publication supersedes previous publications of the IRCP. Especially publication 109 which addresses all situations.

5 GENERAL CONSIDERATIONS

§(10) A definition of “large accident” should be given. The use of the INES scale may clarify what type of large accident the Commission is considering in this document.

§(11) Does the period of time between the start of an accident and the release of radioactive material belongs to the early stage period?

§(14) If the terms “all areas” mean on-site and off-site, this should be stated.

§(22) The risk added to the existing risk of fatal cancer from a dose over 100 mSv is dependent of the age and gender. Therefore, it should be mentioned that the value proposed of 0.5% is a mean value or a table for different classes of age and gender should be added.

§(55) Including numerical radiological protection criterion is, of course, one mean contributing to the rehabilitation process but the way the sentence is written gives probably too much focus on this particular mean and should balance it with other means available.

§(67) The recommendation of the Commission about the use of residual dose to measure the effectiveness of protective actions which have been implemented needs to be clarified. It is very unlikely that, for the early phase, the residual dose the population as a whole or some individuals, may have received can be evaluated with sufficient accuracy to be able to be compared with a reference level.

§(78) The re-evaluation process of a reference level, described in §(76) as the situation evolves with time especially during the intermediate and long-term phase will be perfectly understood by the general public. The strategy which consist to quickly change the reference level during the early stage of the emergency from the partial classification of the developing accident is more questionable. Especially if, with time, there is a need to re-increase the reference level. Using the reference level of the scenario developed during preparedness exercises is not adequate. At the preparedness phase, such reference level could be defined more sustainably in hazard assessment studies, which are adapted for planning.

§(80) The recommendation to generally choose a reference below 10 mSv introduces a new band of reference level and confusion. For certain large accidents covered by this publication the selection of a reference below 10 mSv per year may be not adapted and not achievable. The strength of the recommendation issued in the IRCP publication 111 is to encourage authorities to take into account prevailing conditions and the timing of rehabilitation processes to take advantage and set reference levels to improve the living conditions progressively. The reference level of 10 mSv per year proposed could then easily be used by authorities discarding the regular process of re-assessment of the situation. Either the 1-20 mSv per year is judged too wide and should be replaced by a new band of 1-10 mSv per year or the recommendation should insist on the use of the lower part of the

band. The recommendation may also be to carefully choose the first reference level to be used in order to be able to regularly adapt it to improving conditions over time. The difference introduced by this recommendation compared by other international reference documents or regulatory documents may raise difficulties.

6 EMERGENCY RESPONSE

§(101) During the early phase the triage of the affected population is needed but, as the text is stating there is not only people who need care and people who require health surveillance. There may be also part of the affected population which may have not been exposed at all and for which the triage measurement shows nothing to worry about. Those people should then be informed that the measurement clears them and that the health surveillance may happen or not. The term “require” for the health surveillance seems too strong.

§(102) The considerations in this paragraph apply only for certain type of releases containing radioiodine. For other type of accident on other type of nuclear installations than nuclear power plant the presence of radioiodine is not certain, then the consideration may not apply.

§(104) As said in the document, transparency about knowledge, data and decision is a must but due to its judgmental nature concerning measurement on affected population, specific care should be taken in order not to stigmatize a specific group of people.

§(105) The paragraph needs some clarifications. A time reference would be useful to understand when these medical monitoring actions would be recommended to occur. The text is considering people who developed clinical conditions during the emergency, does it concern deceases only due to radiation exposure (i.e. deterministic effects). If so, the document should specify which long-term complications are foreseen. The text seems to address only long-term follow-up of the affected population, but for people developing clinical conditions, medical monitoring programs will start shortly after the end of the emergency. This point should be clarified. For the second category of people not showing any symptoms, the Commission seems to recommend the use of epidemiological follow-up which is not in accordance with the recent publication of IARC on the “thyroid health monitoring after nuclear accidents”.

§(106) The statement in which the Commission recommends, in order to organize the emergency response, to distinguish between on-site and off-site shall be explain in more details. Usually on-site there is specific plan to deal with the situation and there is also a plan for off-site response. Those two plans have interactions and interfaces but from a radioprotection perspective there is no obvious reason to organize it differently.

§(108) The benefits in term of avoidance for off-site of exposure can’t be the only factor which justify the exposure of emergency responders on site.

§(109) The use of reference levels to manage the exposure of emergency responders on-site allows to plan in term of overall capability, resource or needed time to achieved prescribed actions. The reference level of 100 mSv given in this paragraph refers to an effective dose. The Commission should consider issuing reference values for organs doses in this regard. For example, the exposure optimization and the response planning may benefit in having a reference level in term of dose to the thyroid in the case of a large accident on a nuclear power plant with the release of radioiodine. Some other reference levels such as dose to the skin or to extremities could also be provided.

§(110) Considering the diversity of situations which may occur on-site and the unpredictability of some key factors such as the meteorology, the assertion that off-site responders will be likely less exposed than on-site responder may be questioned.

§(126) The process of returning to evacuated areas covered in this paragraph is a process which, likely, will happen during the intermediate phase or the long-term phase. This paragraph should be put in the section on protective actions for the intermediate phase.

§(127) The shutting off of ventilation system is also a mean to reduce exposure of people inside a shelter.

§(130) Considering the diversity of accidents at a nuclear installation which may release amongst other things radioiodine, the necessity to use protective measures such as sheltering or evacuation may not be optimized. Whereas the ingestion of stable iodine will, in these circumstances limit the overall exposure of the public. Recommending complementing the stable iodine ingestion by sheltering or evacuation is then questionable. For example, a quick and short in time release containing radioiodine may trigger the justification to ingest stable iodine even sometime after the release (the efficiency of the ingestion is proven) but not any other protective action due to the fact that the release has ended. No references are provided about the possibility to take another compound of stable iodine, especially facing a long-lasting release without the ability to evacuate the area.

§(132) The paragraph gives the false impression that in performing a personal decontamination an individual may have removed all of its contamination. No matter how effective the decontamination process could be, there will still be the internal contamination which may need to be address by other means. The use of “removal of radioactive material from the skin” could address this ambiguity. The statement about the unlikeliness of having to decontaminate people outside the area in which evacuation has been advised is questionable. The decontamination process can also be seen as an optimization to lower the radiological impact on the affected population which could be recommended in areas where protective actions would have been taken during the emergency or not. Considering the diversity of situations which may arise as a large release accident, this statement needs to be adjusted.

7 RECOVERY PROCESS

§(189) The ecological risk assessment is missing in the list of objectives of the purpose of implementing a monitoring system in the recovery process.