**VGB comments on**
**ICRP TG 93 draft report *Radiological Protection of People and the Environment in the Event of a Large Nuclear Accident***
**Update of ICRP Publications 109 and 111**

| COMMENTS BY REVIEWER | | | | RESOLUTION ICRP | | | |
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| Reviewer: | | | Page 1 of 12 | | | | |
| Country/Organization: VGB | | | Date: 14. October 2019 | | | | |
| Comment No. | Para/Line No. | Proposed new text | Reason | Accepted | Accepted, but modified as follows | Rejected | Reason for modification/rejection |
| 1 | General | Because radiation protection is only one aspect in such emergency situations, and as ICRP itself states, not always the most important one, it is inappropriate to compare this with any planned exposure situation. Therefor the ambition to achieve doses down to 1 mSv/a is a wrong objective.<br><br>To propose any number for doses to be achieved or present some sort of limit is also inadequate. In each emergency situation the circumstances are different and have to assessed individually and flexible.<br><br>When ICRP recommends several and rather low numbers for doses it will bring any decision maker into trouble when deviations from these numbers would be appropriate and adequately reflect the special circumstances.<br><br>For convenience of the TG93 we have used the commenting format of IAEA. This would lead to a better transparency in the process of considering the comments. | | | | | |
| 2 | Line 16 | In both exposure situations, these objectives are achieved using the fundamental principles of justification of decisions and optimisation of protection with reference levels, as appropriate. | Reference levels are not always a method of optimization. The experience with dose constraints in planned situations shows that they are not needed in most cases. | | | | |
| 3 | Line 39 | The principle of optimisation | See above | | | | |

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| | | of protection applied with reference levels, as appropriate, considering all impacts | | | | | |
| 4 | Line 44 | For protection of responders and the population during the emergency response, the reference level should ~~not generally exceed~~ be in the order of a few 100 mSv, while recognising that higher values, in the order of 1 Gy may be necessary to save lives and for the prevention of catastrophic conditions. | The restriction to 100 mSv is a wrong signal to the first responders. Fire-fighters risk there lifes when doing their job. It is not to understand that in the acute phase of a severe accident first responders should be treated differently from fire-fighters. There is no radiological concern to receive higher doses if compared with areas of high natural background. There are people in Ramsar which receive more than 100 mSv/a and do not show any health effects. | | | | |
| 5 | Line 50 | Individual and case specific Reference levels should be selected to support this progressive improvement, taking into account the progress already achieved. Levels should be in the order of ~~within or below~~ the Commission's recommended 1–20-mSv/year band taking into account the actual distribution of doses in the population and the tolerability of risk<br>for the long-lasting existing exposure situations, ~~and would not generally need to exceed 10 mSv per year.~~ | There is a need for flexibility. Emergency situations are different from planned exposures and the proposed band from 1-20 mSv/year has its origin in the radiation protection philosophy for planned exposures.<br><br>Recommending a goal of 10 mSv means to make the decision before consideration of the actual circumstances. | | | | |

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| 6 | Line 54 | The objective ~~of optimisation~~ of protection could be ~~is~~ a progressive reduction in exposure to levels on the order of 10 mSv per year depending on circumstances. | 1 mSv is definitely too low. There is no proven evidence of radiation effects below 100 mGy. Natural background is at least more than 2 mSv/a at most places in the world. 1 mSv/a is not optimization but minimisation and is not appropriate after emergency situations. | | | | |
| 7 | Line 93 | The principle of justification shall ensure ~~ensures~~ that decisions about the implementation of protective actions have a positive benefit in terms of exposure reduction, although this<br>may induce potentially significant societal, economic, and environmental disruptions.The overall result shall be ~~is~~ more good than harm for affected people and the environment. | A principle cannot ensure something. It is rather the objective that is meant here. | | | | |
| 8 | Line 97 | The principle of optimisation of protective actions applied with reference levels, as appropriate, aims to<br>maintain and reduce all exposures as low as reasonably achievable, taking into account economic, societal, and environmental factors | There is no need for reference levels in optimising protection. It may help in some cases, but it must not exclude solutions. | | | | |
| 9 | Line 107 | For protection of responders and the population during the emergency response, the reference level should ~~not generally exceed~~ be in the order of 1 Gy ~~100 mSv~~, | See comment above. 100 mSv will be a wrong signal to rescue workers and it might lead to difficulties to win volunteers. | | | | |

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| | | while recognising that higher levels even without any restrictions may be necessary in exceptional circumstances to save lives and prevent further degradation of the facility leading to catastrophic conditions. The initial reference levels may be applicable for a short period, and should not generally exceed ~~1 year~~ many years. | 1 year is a completely arbitrary number and in no way reflect the individual circumstances. | | | | |
| 10 | Line 114 | For protection of responders after the urgent emergency response, the reference level should not exceed ~~20~~ 100 mSv per year. For people living in long-term contaminated areas<br>following the emergency response, the reference level should be selected ~~within or below above~~ in the order of the Commission's recommended band of 1–20/year mSv for existing exposure situations, taking into account the actual distribution of doses in the population and the tolerability of risk for the long-lasting existing exposure situations, ~~and there is generally no need for the reference level to exceed 10 mSv per year.~~ The objective ~~of optimisation~~ of protection is a progressive reduction in exposure to levels on the order of 10 mSv per year. | See also comments above. 20 mSv is the normal limit for planned exposures. Again, to propose this number is not taking the specific circumstances into account.<br><br>1 mSv/a as a long time goal means restricting a possible return of people and is unnecessary with respect to the existing natural background. | | | | |
| 11 | Line 303 | Acute organ doses up to approximately 100 mGy (0.1 Gy) pro- | This is an exaggeration. To have deterministic effects it | | | | |

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| | | duce no functional impairment of tissues. At higher doses, the risk of tissue reactions becomes ~~increasingly~~ more important and there is increased likelihood of ~~serious~~ adamage. As it is prudent to take uncertainties in the current estimates of thresholds for deterministic effects into account, the Commission considers that short-term or annual doses ~~rising towards~~ above some hundreds of~~100~~ mSv for whole-body exposure almost always justify the consideration of protective actions. | needs several Gy of exposure.<br><br>There will be no serious organ damage at even some Gy.<br><br>Regarding uncertainties it is not prudent to assume that there will be an effect, especially when the consequences for the people are extremely severe (e.g. evacuation). | | | | |
| 12 | Line 324 | There is reliable scientific evidence that whole-body exposures on the order of ≥100 mSv can increase the probability of cancer occurring in an exposed population. Below 100 mSv, ~~the evidence is less clear~~ there is no evidence . The Commission ~~prudently~~ precautionary assumes, for purposes of radiological protection, that even small doses might result in a slight increase in risk. | What the ICRP believes is prudent may be seen differently by people which suffer from such prudence. | | | | |
| 13 | Line 331 | Although heritable (genetic) effects have been seen in animals, there is no direct evidence that exposure of humans to radiation leads to excess heritable disease. | See above | | | | |

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| | | However, the Commission ~~prudently~~ precautionary continues to include the risk of heritable effects in its system of radiological protection. | | | | | |
| 14 | Line 349 | In its recommendations on protection of the environment under different exposure situations (ICRP, 2014), the Commission states that although environmental impacts may not be an immediate priority during the early phase of a nuclear accident, the environmental consequences of protective actions should be considered, with human protection being prior, when choosing options to protect humans in the intermediate and long-term phases. | The wellbeing of humans should have priority in planning of recovery measures. | | | | |
| 15 | Line 457 | This increase cannot be attributed to<br>the direct health effects of radiation, although it is a direct consequence of the non-nuclear and nuclear accident. | For clarification | | | | |
| 16 | Line 483 | For implementation of the optimisation principle, the Commission recommends using reference levels, as appropriate, to guide decision making concerning protective actions. | See comment above | | | | |
| 17 | Line 504 | However, the Commission recommends that appropriate measures should be taken to protect pets and livestock, and specific | Again, human protection and wellbeing has priority. It would be absurd to restrain from measures for the reason to pro- | | | | |

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| | | arrangements should , if possible and reasonable, be developed in the emergency preparedness planning process to preserve their welfare. Further, even where concerns about human exposure predominate, consideration should be given to the environmental consequences of the possible protective actions with human protection being prior. ~~This is particularly true regarding the choice of actions to decontaminate the environmental medium (e.g. soil), as this is likely to affect the organo-mineral fertility of the soil in the long term, and introduce disruption in biodiversity.~~ | tect the environment. | | | | |
| 18 | Line 512 | During the recovery process, as the radiological situation is better characterised, it may be possible to consider actions to protect species which are likely to be threatened by contamination in the long term. Special provisions may also be ~~necessary~~ considered to safeguard the quality of the environment impacted by the implementation of protective actions.– | This seems to be rather theoretical. The example of the forbidden zone around Chernobyl reveals that nature recovers very well, irrespective of the radiation level, when human activities are taken out. | | | | |
| 19 | Line 528 | Decisions should be based on a reasonably realistic ~~conservative~~ approach to consider the inevitable uncertainties concerning the situation on-site as well as off-site, and | To be conservative is not a goal, but being realistic. | | | | |

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| | | bearing their potential negative consequences in mind. | | | | | |
| 20 | Line 691 | A few individuals (particularly responders) may receive high exposures that could induce severe radiation health effects if protective actions are not implemented promptly or adequately. The Commission ~~therefore pays particular attention to equity in the distribution of exposure within the groups of affected people, and~~ recommends that, in the event of an accident, ~~optimisation of~~ protection should be implemented with the aim of reducing the exposure of the most exposed individuals ~~as a priority~~. | Within the recommended dose restrictions there will be no difference in the health consequences for people. The objective to restrict high individual doses is needles.<br><br>In Chernobyl the death victims received doses that were far away from those recommended.<br><br>In Fukushima doses to workers remained below 250 mSv for a shorter period. There will be no severe health consequences at this level. | | | | |
| 21 | Line 696 | For the implementation of optimisation during an emergency response and recovery process, the Commission recommends using reference levels, as appropriate, to guide actions to reduce individual exposures ~~and limit inequities~~. | See above | | | | |
| 22 | Line 704 | As the best protective option is always specific to the exposure situation, it is not relevant to determine, a priori, a target dose level ~~below which the optimisation process should stop~~ (ICRP, 2007, Para. 218). | There is obviously a level of dose when it is inappropriate to reduce doses further. It makes no sense to reduce doses less than some percent of natural background. For workers it makes no sense to reduce their doses at levels below the limit for the public. | | | | |

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| | | | We rewrote therefor the sentence and gave it a new meaning. | | | | |
| 23 | Line 717 | The implementation of targeted protective actions will progressively contribute to reducing ~~the highest~~ exposures, as well as the average exposure of the population. In the longer term, experience has demonstrated that, in areas where people are allowed to live, it is generally possible to reduce the exposure of most people to levels comparable with those in non-affected areas (see Annexes A and B). However the places where people were allowed to live have been chosen on the basis of rather arbitrary criteria ( e.g. 30 km radius) and without participating the people affected. | This is a rather theoretical approach as the decisions about evacuation will be taken at times when the circumstances are not very well known. | | | | |
| 24 | Line 759 | The objective is to ensure ~~that when implementing protective actions, the range between the highest and lowest individual exposures is reduced, and~~ all exposures are kept as low as reasonably achievable below the reference levels, or at least remain in the order of these levels. | To add the demand for evenly distributed doses is unnecessary and makes the situation even more complicated. | | | | |
| 25 | Line 790 | Fig. 2.3. Use of a reference level and evolution of the distribution of individual exposures with time as a result of implementing the op- | Graph is unrealistic. It should be a function like 1/x. Function does not start with X=Y=0 | | | | |

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| | | timisation process. | | | | | |
| 26 | Line 796 | For the optimisation of protective actions during the emergency response, the Commission recommends that the reference level for restricting exposures of the affected population and the emergency responders should generally not exceed ~~100~~ some hundreds of mSv. This may be applied for a short period, and should not generally exceed ~~1~~ several years ~~year~~. This is because, at doses of the order of a few hundreds of mSv, there ~~is~~ may be an increased likelihood of deterministic effects and a more significant risk of cancer (ICPR, 2007, Para. 236). | See above | | | | |
| 27 | Line 861 | For protection of the environment in ~~emergency and~~ existing exposure situations, the Commission recommends the use of Derived Consideration Reference Levels (DCRL) to prevent or reduce the frequency of deleterious effects on fauna and flora in affected areas. | There is neither the time nor the possibility to protect the environment on the basis of the DCRL-concept during an emergency. | | | | |
| 28 | Line 1074 | 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 significantly exposed (> 100 mSv see also (119)) but not showing any symptoms. | Only for significant exposures one can detect something by medical monitoring. The SUV in Switzerland has terminated medical examinations for occupationally exposed people because the never found any effect. | | | | |

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| 29 | Line 1207 | As in the early phase, the Commission recommends the use of reference levels as appropriate, adapted to the situation, up to several hundreds ~~100~~ mSv per year, and does not consider that the application of dose limits is appropriate. | See above | | | | |
| 30 | Line 1240 | Early phase<br><br>≤100 mSv*<br><br>Exceptional circumstances†<br>In the order of 1 Gy | See above | | | | |
| 31 | Line 1361 | Personal decontamination is the complete or partial removal of radioactive material from a person by a deliberate physical, chemical, or biological process. In many cases this could be achieved by washing and/or changing clothes. | For clarification | | | | |
| 32 | Line 1426 | All of the relevant stakeholders need to be informed and ~~involved in setting~~ the radiological criteria must be explained: authorities, farmers' unions, food industry, retailers, non-governmental consumer groups, and representatives of the general population (Kai, 2015). In-depth debate at national level is needed to maintain a degree of solidarity in the country. | Stakeholders need to be informed but they are not the decision makers. | | | | |
| 33 | Line 1705 | For the management of recovery | For a rapid progress it would | | | | |

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| | | responders on-site, the Commission recommends setting a reference level in the order of ≤20 mSv per year, and applying the requisites for occupational exposure, as relevant. | be better to have more flexibility. | | | | |
| 34 | Line 1728 | When protective actions are implemented in a restricted area where exposures may be higher (not open to the public), it is recommended to treat the exposures using a reference level in the order of ≤20 mSv per year. | See above | | | | |
| 35 | Line 1826 | Relevant stakeholders should be informed ~~involved~~ in detail about ~~as much as possible in~~ decisions related to the management of decontamination waste (particularly storage locations) and selection of the associated protective actions (particularly surveillance of sites, as well as potential re-use and recycling). | See above | | | | |
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