APPLICATION OF ICRP RECOMMENDATIONS IN EMERGENCY EXPOSURE SITUATIONS- REFERENCE LEVELS

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The report ICRP-103 which was published in 2007 re-states the application of justification and optimization principles of radiation protection to emergency exposure situations. It has been recommended that the level of protection should be the best under the prevailing circumstances, maximizing the margin of benefit over harm, application of optimization procedures, restrictions on the overall doses and risks received by individuals as a result of the emergency.

The reference levels are the level of dose or risk, above which it is generally judged to be inappropriate to plan to allow exposures to occur. The system of radiological protection applies to all exposures to ionising radiation from any source, regardless of its size and origin. However, the ICRP recommendations can apply in their entirety only to situations in which either the source of exposure or the pathways leading to the doses received by individuals can be controlled by some reasonable means. The types of exposure situations are planned, emergency and existing situations. Emergency exposure situations, which are unexpected situations such as those that may occur during the operation of a planned situation, or from a malicious act, requiring urgent attention. Emergency exposure situations include consideration of emergency preparedness and emergency response. Emergency preparedness should include planning for the implementation of optimised protection strategies which have the purpose of reducing exposures (which causes dose to individuals), should the emergency occur, to below the selected value of the reference level. During emergency response, the reference level would act as a benchmark for evaluating the effectiveness of protective actions and as one input into the need for establishing further actions.

The internationally accepted response criteria are included in our national legislation to reflect national perspective and the response goals may be given as follows; to regain control of the situation; to prevent or mitigate consequences at the scene, to prevent the occurrence of deterministic health effects in workers and the public, to render first aid and manage the treatment of radiation injuries, to prevent, to the extent practicable, the occurrence of stochastic health effects in the population, to prevent, to the extent practicable, the occurrence of adverse non-radiological effects on individuals and among the population, to protect, to the extent practicable, the environment and property and to prepare, to the extent practicable, for the resumption of normal social and economic activity. The Commission recommends that every practicable effort should

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be made to avoid the occurrence of severe deterministic injuries in the event of an emergency, and that planning to protect against the occurrence of severe deterministic injury should take priority over that to protect against stochastic risks. Doses for comparison with thresholds for severe deterministic injury should be calculated as the RBE-weighted absorbed dose to tissue or organ ($AD_T$). In order to calculate doses for the purposes of protection against stochastic effects the equivalent dose, $HT$, and the effective dose, $E$, are used. In general, where effective doses less than 100 mSv are calculated, it will be sufficient to optimise the planned protection strategy using this dosimetric quantity. For planning purposes, the dosimetric quantities that should to be used are projected dose, residual dose and averted dose. In the context of developing response plans for emergency exposure situations, the Commission recommends the use of reference levels in the process of optimization. In emergency exposure situations, for the highest planned residual doses the reference levels should be in the range of 20 -100 mSv band.

In this study, the ICRP recommendations for emergency planning and response will be introduced in details; possible effects in the adoption to national legislation will also be discussed.