

Lessons Learnt from Clean-up of Urban Area after Chernobyl Accident

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Abstract

The accident at Chernobyl NPP showed that huge territories including densely populated areas can be exposed to contamination as a result of unforeseen circumstances. The Chernobyl accident forced reconsidering of many regulations in the field of population protection and was a powerful incentive to development of many applied sciences. In 1992-1996, an international team of scientists carried out investigations on ECP-4 project "Strategies of Decontamination". Including of an independent sub-project "Urban environment and countermeasures" into the project of French-German initiative on Chernobyl "Radioecology" was the extension of work on study of urban environment contamination.

The aim of the projects were to synthesize the large body of experimental data received during elimination of the consequences of the Chernobyl accident and in the course of special studies carried out in former USSR and later in Ukraine, Belarus and Russia, and prediction on this basis of radionuclide behavior in the urban environment. In 2003 the EMRAS (Environmental Modelling for Radiation Safety) project was organized by the International Atomic Energy Agency (IAEA). The Urban Remediation Working Group of the EMRAS has focused on the assessment of the effectiveness of countermeasures employed in urban settings after releases of radioactivity.

This review considers results of principally Ukrainian, Russian, and Belarusian researchers who worked on these projects. Over the 20-year period a number of publications have reviewed the effectiveness of countermeasures, particularly those used after the Chernobyl accident. The general principles of radiological protection are based on radiation doses, intervention levels and effective countermeasures. Decontamination of densely built-up cities constructed of various building materials with total surface area significantly exceeding the administrative city area is an extremely difficult task. In the Late-Phase Response, "classical" radiological principles and criteria need detailed clarification. The specific aspect of this phase is the problem of social protection and social rehabilitation.

The rehabilitation of the contaminated territories has been considered as a combination of measures directed at improvement of environmental conditions and the quality of life. While planning decontamination for the long term, it is important to take into account the contribution of external dose to the total (external and internal) dose. The materialization of the social aspect is a very important characteristic of this phase.

Unfortunately, in spite of all the efforts, the negative consequences of the accident have not been completely overcome. Nevertheless, the data array that has been accumulated since the accident allows unbiased assessment of not only the errors but also the achievements of the stupendous work on minimization of the consequences of the accident and drawing conclusions important for the future.

KEYWORDS: Chernobyl accident; contamination; clean-up; late-phase response.