Radiation monitoring systems as a tool for assessment of accidental releases at the Chernobyl and Fukushima NPPs

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The experience gained during mitigation of the consequences of the accidents at the Chernobyl and Fukushima NPPs has shown that what makes different the decision-making in case of nuclear accidents is that the greatest benefit from decision-making can be achieved in the early phase of an accident. Support to such process can be provided only by a real-time decision-making support system.

In case of a nuclear accident the analysis of the situation and decision-making is not feasible without an operational radiation monitoring system, international data exchange and automated data processing, and the use of computerized decision-making support systems.

With this in mind, in the framework of different international programs on the Chernobyl-related issues numerous projects were undertaken to study and develop a set of methods, algorithms and programs providing effective support to emergency response decision-making, starting from accident occurrence to decision-making regarding countermeasures to mitigate effects of radioactive contamination of the environment.

The presentation focuses results of the analysis of radiation monitoring data and, on this basis, refining or, for many short-lived radionuclides, reconstructing the source term, modeling dispersion of radioactivity in the environment and assessing its impacts. The obtained results allowed adding and refining the existing estimates and in some cases reconstructing doses for the public on the territories contaminated as a result of the Chernobyl accident.

The activities were implemented in two stages. In the first stage, several scenarios for dispersion of Chernobyl-related radioactivity were developed. For each scenario cesium-137 dispersion was estimated and these estimates were compared with measurement data. In the second stage, the scenario which showed the best agreement of calculations and measurements was used for modeling the dispersion of iodine-131and other short-lived radionuclides.

The described approach was used for assessing the consequences at the Fukushima NPP. These results are also provided in the presentation.

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