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THE CODE ROM FOR ASSESSMENT OF RADIATION SITUATION ON A REGIONAL SCALE DURING ATMOSPHERE RADIOACTIVITY RELEASES

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A new approach for assessment of radiation situation outside industrial sites of objects at radiation risk has been being developed in the last few years. This approach is based on performing of multiple calculations using real time series of weather condition parameters. A standard conservative estimation assumes that the meteorological parameters are constant. This assumption increases the conservatism of estimates because in practice the weather conditions during a long-term release (BDBA) are changing.
According to the new approach a series of calculations with shifted dates of the release beginning are performed. Each calculation realizes real weather conditions taking into account their changeability. A realistic dose distribution is obtained on the base of statistical analyses of the results of all separate calculations.
An example of successful application of such approach is safety analyses of a new designed NPP in Lithuania (Visaginas) with regard to assessment of emergency radioactivity releases into the atmosphere.
The code ROM intended for realistic assessment of doses received by population outside the site of an object at radiation risk during incidents of arbitrary duration has been developed in the Nuclear Safety Institute of the Russian Academy of Sciences in frame of «BREAKTHROUGH» (or «PRORYV» project). This code is a next stage of the development of NOSTRADAMUS computer system, which is based on a Lagrangian model of atmosphere dispersion. Models for the estimation of deposition rates of aerosols formed by polonium and sodium burning products, that are specific for fast reactors, are developed and realized in the code. The models of atmosphere dispersion and of deposition rates of aerosols are validated against experimental data.
The code ROM utilizes time series of meteorological parameters measured at the WMO stations close to the object for a sufficiently long time period (at least, for a few years). In doing that, the code ROM employs an algorithm of reduction of overlapping parts of calculations, which has no analogues within the considered class of models. This algorithm allows significantly reduce the time of multiple calculations of long-term releases (by a few orders of magnitude) due to omitting the parts of calculations performed under the same weather conditions.
The code was applied for analysis of various hypothetical emergency scenarios typical for fast reactors. It was demonstrated that the algorithm of reduction of overlapping parts of calculations is efficient.

Country/Int. Organization

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