

CONCEPT AND VALIDATION STUDIES OF THE REAL-TIME
REACTOR-ACCIDENT CONSEQUENCES ASSESSMENT MODEL "ECOSYS"

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ABSTRACT

The Chernobyl accident has demonstrated the urgent need for computer programs for real-time assessment of potential radiological consequences of major reactor accidents and for timely recommendations of useful and cost-efficient counter measures. During the past decade the dynamic radioecological program "ECOSYS" has been developed by us for nuclear accident consequence assessment with high resolution in space, time and exposure pathways. The Chernobyl reactor accident leading to relatively high contamination of Southern Germany provided excellent conditions for realistic validation studies of concept, sub-models and parameters of ECOSYS. To this purpose more than 7000 low level and in-situ gamma spectroscopy measurements were performed to study experimentally the behaviour of radionuclides in foodchains and in the urban environment and to compare the results to theoretical predictions of ECOSYS. The results show good agreement in the contamination levels of important food stuffs and in external exposure dose rates from a given surface contamination. Improvements were necessary in the assumptions regarding the food consumption habits which changed considerably - and in the functions describing the weathering off from urban and plant surfaces.

The results of this validation study and the concept of the improved computerized model, which has subsequently been converted into a real-time code, will be discussed in detail.