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Parametric improvement for the ingestion dose module of the European ARGOS and RODOS decision support systems

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More than any other tools, the ARGOS and RODOS decision support systems constitute the prognostic ‘spine’ in European preparedness against accidents at nuclear installations. The systems deliver crucial information that can be used for justification and optimisation of countermeasure strategies during different time phases, thus assisting in effectively reducing the adverse health impacts through different pathways. The module for estimating ingestion dose is in both systems based on the ECOSYS model, which was developed in the 1980’s. It is however problematic that contrary to recommendations from its originators this model has undergone very few parametric changes by its many users since it was created, and default parameter values, which are generally used uncritically, do not make use of the huge amount of radioecological data that has been generated over the latest few decades. Prognoses made with the model ‘as is’ are therefore not founded on the best knowledge of today. On the basis of investigations made under an ongoing Nordic research activity (NKS-B-PardNor), new and improved parameterisation is suggested for parameters such as deposition velocities (originally specified in ECOSYS without considering aerosol characteristics), natural contaminant weathering rates from plants, and soil-to-plant transfer factors (in ECOSYS not related to soil characteristics), as well as leaching rates, fixation rates and desorption rates of soil contaminants. This presentation will in this context focus on the importance of improving deposition velocity and natural weathering rate estimates, thereby presenting results of the final step of the project that will be completed by the end of 2010. An other problem with the use of the ingestion dose modules in the two decision support systems is that, parameters are generally not ‘customised’ locally to reflect the specific conditions in the country or area for which the system is to be used. This means that parameters describing for instance dietary habits, import fractions of food items, animal feeding regimes, seasonal plant development and soil characteristics are not properly specified, and analyses made under the NKS-B-PardNor activity have demonstrated that this can lead to serious prognostic errors. Examples are given in this presentation for Nordic conditions.