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## Parametric safety study of a comprehensive model of deep geological repository in the Czech Republic

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For the safety assessment of the deep geological repository it is necessary to define scenarios of possible repositories development in order to evaluate all possible variants of its development. The present work is devoted to influence of the scenarios defined by the model geometry and model parameters on the development of the main safety indicator, which embedded in the Czech legislation. The main safety indicator is the optimization level. The influence of a hydraulic and migration parameter set, based on repositories barrier and surrounding geological environment parameters, the influence of the fuel cycle end, the influence of geosphere and the biosphere model geometry on the effective dose rate were studied in this particular case.

The results showed that the new obtained data for near and far field interactions had a significant effect only for  $^{79}\text{Se}$ . This radionuclide in terms of long-term safety seems to be one of the most important. The chemical properties of selenium, especially the solubility and distribution coefficient in granitic environment can be very significant for the overall impact of a deep geological repository on the environment (see presentation K. Videnská et al., 2014, this conference).

Results for closed cycle with the reprocessed MOx fuel and other wastes arising from reprocessing UOx spent fuel show almost an order of magnitude higher effective dose rate than for the open cycle with spent fuel UOx only. This is caused by the radionuclides released from the cement matrix of intermediate-level waste. Spent fuel MOx itself has lower effective dose rate than UOx one.

The biosphere model "FARM", which was previously used in the safety analyses under Czech Republic environmental conditions has been supplemented and extended to cover biotopes of current Czech Republic. New calculations show that the fish ingestion can significantly affect the effective dose rate of  $^{129}\text{I}$ ; it furthermore confirmed the importance of  $^{79}\text{Se}$  and showed the necessity to include the dust re-suspension in the intake of vegetables.

The results of sensitivity analyzes based on reason of a model deeper understanding and the determination of significance of individual model components and the importance of model parameters show a significant effect of groundwater flow rate and the geosphere total dilution on the effective dose rate maximum. With regards to factors such as the flow time through the geosphere, it doesn't show to influence the maximum of effective dose rate directly, but it show the effect on its time course.

The research leading to these results has received from Ministry of Trade and Industry (MPO TIP FR-TI1/362).

### References:

Videnská K., Gondolli J., Havlová V. (2014): Retention of selenium species on crystalline rock: The effect of redox conditions and mineralogical composition of crystalline rock. Presentation on Radchem conference, 2014.

**Primary author:** Dr TRPKOŠOVÁ, Dagmar (UJV Řež, a. s.)

**Co-author:** Dr LANDA, Jiří (UJV Řež, a. s.)

**Presenter:** Dr TRPKOŠOVÁ, Dagmar (UJV Řež, a. s.)

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