ASSESSMENT OF GAUSSIAN AND LAGRANGIAN DISPERSION MODELS IN JRODOS FOR DIFFERENT TERRAINS AND SOURCE TERMS

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Since the Chernobyl accident in 1986, radiation dispersion modeling has become a critical element of Emergency Preparedness and Response in safety assessments for new nuclear installations. Simulating the release of radionuclides from nuclear sites, their dispersion in the atmosphere and subsequent deposition in the environment is essential for determining expected doses, intervention activities and informing Emergency Planning Zones. Depending on the purpose, most decision support tools employ different dispersion models- more detailed models for planning and faster running models for on-line response support. The objective of this study is to compare the performance of Gaussian and Lagrangian dispersion models within the JRodos software. In order to evaluate the performance of those models at different (mountainous vs flat) terrain conditions, emission point at Muehlberg nuclear plant site was selected. Its close proximity to the Alpine mountain range as well as flatter regions provides an opportunity to model the dispersion over different terrain based on wind direction. Another objective is to compare the performance of those models at different distance ranges. For this purpose, we are modeling the dispersion of two source terms. A smaller one is based on the Tennessee Valley Authority's (TVA) source term used in Clinch River Nuclear site evaluation. Larger one is based on the Finnish Radiation and Nuclear Safety Authority's large accident source term for Olkiluoto 1&2 reactors. As a parameter of interest in the analysis, the effective dose criterion of 10 mSv in 48 hours to a general member of the public without implementing protective measures is applied and the distances at which this threshold is reached is analyzed. Based on the resulting observations, the study presents the importance and guidelines on the selection of dispersion models in different use cases.

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