

Internal dose and risk assessment from European Spallation Source releases

Emergency preparedness and response arrangements are essential for ensuring safety of on-site workers and members of the public from the accidental release of radionuclides. Accidental releases from the European Spallation Source (ESS) will include a different set of radionuclides than accidental releases from a nuclear power plant, and therefore the potential internal contamination assessments of on-site workers and members of the public need to be developed and adapted to relevant ESS-specific conditions. Previous research has identified that radionuclides released at various accident scenarios will include alpha, beta and gamma emitting long-lived (e.g. Hf-172, Gd-148) and more short-lived radionuclides (e.g. W-187, I-125). Important dosimetric impact in various accident scenarios will be attributed to e.g. Gd-148 (pure alpha emitter, half-life of 76.4 years), and W-187, Hf-172, Ta-182 and I-125 (gamma emitters, with half lives of 23.7 hours, 1.87 years, 114.4 days, and 59.49 days, respectively). Following a few days after an accidental release, the main part of the effective dose will result from inhalation, cloud passage and ground deposition. In the long-term period, ingestion of contaminated foodstuffs may also contribute to the effective dose. Therefore, internal contamination of on-site workers and members of the public will be assessed considering inhalation and ingestion routes. The PhD project, financed by Swedish Radiation Safety Authority (SSM), will investigate which radiometric measurements need to be conducted to predict, monitor and follow-up the internal doses and will conduct a feasibility study of different methods for internal dose assessment. The results of the project will contribute to establishing effective protective measures and monitoring programs in order to ensure the safety of the on-site workers and members of the public. The project will focus especially on the releases predicted in connection with worst-case accident scenarios. The presented work will outline important previous findings and give an overview of the planned work to be done in this area.

Authors: Ms RAMLJAK, Belikse (Lund University, Department of Physics, Division of Nuclear Physics); Dr RÄÄF, Christopher (Lund University, Department of Translational Medicine, Medical Radiation Physics (Malmö)); Dr ERIKSSON STENSTRÖM, Kristina (Lund University, Department of Physics, Division of Nuclear Physics)

Presenter: Ms RAMLJAK, Belikse (Lund University, Department of Physics, Division of Nuclear Physics)

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