National Centre for Nuclear Security and Non-Proliferation

CASE STUDY: NUCLEAR SECURITY/EMERGENCY PREPAREDNESS

Development of Radiological and Chemotoxic Consequence Modelling Software with RiskAware

Traditionally, nuclear safety cases have focused predominately on the radiological hazards associated with a site; and where required assessments of specific chemical hazards are undertaken when the facilities in question contained significant quantities of certain hazardous and/or toxic chemicals.

Co-generation

The need to respond to climate change leads to renewed interest in the potential for new nuclear energy and deployment as co-generation sites (i.e. where the heat energy from the reactor is used for multiple purposes such as electricity, district heating, process heat and hydrogen/chemical production). As the likelihood of co-generation looks to become a reality there is a need to consider radiological and chemical hazards in a harmonised manner to allow an adequate safety demonstration to be made.

Expanding capability

During 2022 and 2023, the NNL Safety and Engineering Assessment (SEA) team has been working alongside RiskAware, a company specialising in real time incident modelling software. This work has expanded the capability of their existing Urban Dispersion Modelling (UDM) software, which previously only modelled chemical releases. It now also integrates a new radiological dispersion modelling capability.

This software will provide unique capabilities in modelling radiological and chemical releases, and interactions between co-located facilities. This will increase the accuracy of assessments, remove unnecessary pessimisms and enhance stakeholder confidence.

Initial studies have demonstrated excellent alignment between the UDM software and existing modelling techniques such as ASTRA and National Radiation Protection Board (NRPB) R91. A

paper summarising the work undertaken co-authored by NNL and RiskAware has also been submitted for publication during this period.

Next steps

The intent is to continue this program of collaboration in 2023/2024 to develop the software to a commercial state and to engage with industry and relevant regulators to gain acceptance of the tool for use in multiple areas including safety assessment, security assessment and incident planning.

This is an opportunity to work alongside a knowledgeable Small/Medium Enterprise organisation to develop a modern marketable programme which can be used throughout the nuclear industry and wider applications including emergency planning/response and security assessments.

More Information

Link to published paper: https://www.yumpu.com/de/embed/view/QrE0f6iT3vdtFc98