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Transport from an Underground Source in Fractured Rock with Application to the OSI and IMS Regimes: A French-US Collaborative Study

The CEA Roselend Underground Laboratory near Mont Blanc is a well instrumented facility for evaluating the transport of gases from depth across a highly fractured regime to the surface. At its deepest, the laboratory is 55 m beneath the surface and contains a sealed cavity for gas release experiments. The laboratory allows field scale studies of some aspects of the effect of transport on the noble gas source term of an underground nuclear explosion. A collaboration between the CEA and LLNL is exploring the dependence of gas releases driven both by cavity pressure and barometric fluctuations and preliminary modeling using the LLNL NUFT transport program has been performed as part of an experiment design effort. Experiments at the well characterized site will also allow computer simulations to be used in a predictive mode regarding the transport of tracer gases and their detectability. Future work involves deployment of the LLNL Subsurface Gas Smart Sampler (SGSS) to evaluate the temporal correlation between measurement of naturally produced radon and inert tracer gases released from the pressurized chamber in the facility. This study will support the development of improved sampling methods for capturing noble gases during a CTBT on-site inspection.

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