

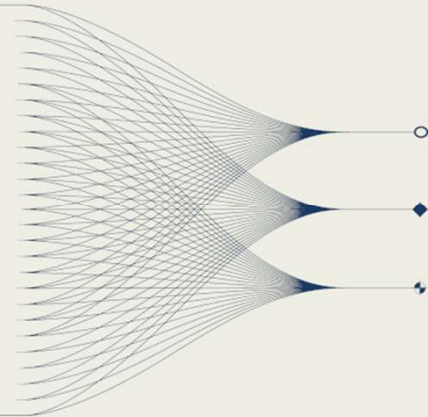
The BUE24 Radionuclides Scenario and Updates Needed Before IFE

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INTRODUCTION AND MAIN RESULTS

The Build-Up Exercise 2024 in Hungary was the first large-scale OSI exercise to involve a working tunnel complex, opening up new possibilities for the Scenario Task Force designing the exercise scenario. However, during the exercise the RN Scenario Control Team needed to make quick adjustments when their process of radioxenon injections into analysis equipment encountered problems. Details of the scenario are shared and also adjustments that are planned for the Scenario Control Team radioxenon injection process at the upcoming Integrated Field Exercise.



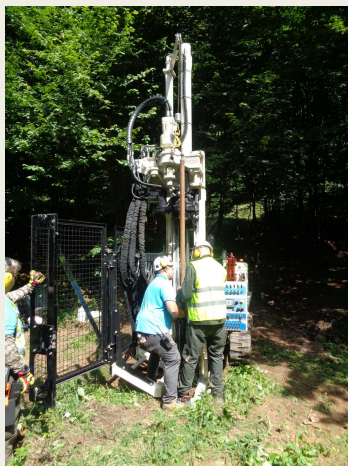
BUE24 RN Scenario

Build-Up Exercise 2024 took place in the vicinity of Gyöngyös, Hungary June 16 – July 5, 2024. The BUE site included a working tunnel complex, a first for a large-scale OSI exercise, which the Scenario Task Force (STF) utilized in designing the scenario.

The BUE24 scenario was that the ISP had conducted an underground nuclear explosion in the tunnel complex and that weak RN observables would be available for the IT to detect:

- 1) I-131 transported by water to the main tunnel entrance
- 2) Xe-133 and smaller amounts of Xe-131m transported to the surface for collection in air samples from the shallow subsurface near SGZ and a ventilation tunnel adit in the vicinity

Both of these observables were facilitated by the Scenario Control Team (SCT) QR coding samples in the field to identify for possible injection of sources in the BoO lab at the time of measurement by the SCT. In the case of the radioxenons, the actual isotopes were used.



The IT prepares for subsurface air sampling (left). The IT shows the SAUNA FIELD system to visitors (below). Note the sample bottles in the lower right of the container.



A Problem for the BUE24 RN Control Team

The BUE24 SCT planned to do radioxenon (RXe) injections the same way that had been done successfully at IFE14. At IFE14, the SCT would place a long trumpet-shaped tube containing appropriate amounts of RXe in the injection line between the samples and the analysis system. However, between IFE14 and BUE24, the CTBTO acquired a dedicated SAUNA FIELD system. Trials with the new system before BUE24 revealed that injects done the old way were not being detected. (The SCT theorizes that the early part of the sample was not being processed.) At BUE24, the SCT instead relied on injecting RXe directly into the SAUNA FIELD system's detector, though the trumpet was still used in front of the IT.

In addition, the SAUNA FIELD system allows queuing and presetting start times for up to six samples, meaning the SCT could need to do injects in the middle of the night. At BUE24, the SCT had to ask the IT to queue their samples in a particular order so as to avoid that.

How Radioxenon Injects will take place at IFE

FOI has designed, tested, and provided several copies of a new version of the “trumpet” that is compatible with OSI field equipment.

This trumpet will be inserted before the compressor in the field when samples are collected into SCUBA tanks, rather than immediately before the sample is input into the SAUNA FIELD system at the BoO.

The SCT member accompanying a field mission collecting shallow subsurface air samples will also bring a syringe and QR-coded bottles and inject the appropriate gas (RXe or “blank” air) into the trumpet septum (shown between the two dark green valves in the picture) during the sample collection.



The new “trumpet” for IFE



The new trumpet will go between the sample bag on the right and the compressor/SCUBA tanks on the left