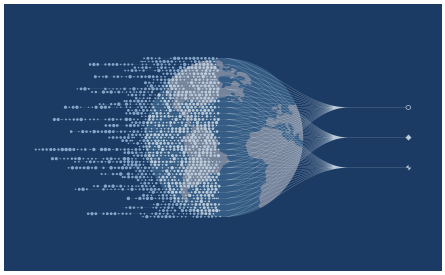

ID: **P2.3-222** Type: **E-poster**

# gas transport analysis from a recent chemical explosion at the US Nevada National Security Site

Detection of radioactive gas from potential underground nuclear explosions can provide irrefutable evidence of nuclear testing. To better understand gas transport from underground explosions toward the surface, scientists in the Low Yield Nuclear Monitoring Program have implemented an experimental program involving tracer gases and high explosives by-product gases released from underground chemical explosions at the Nevada National Security Site, USA. In this presentation we report gas transport simulation results from the first experiment, Physics Experiment 1-A (PE1-A). We begin with a summary of permeability measurements related to gas migration at scales ranging from the core scale (cm) to the cavity scale (10s of meters). Permeability estimates then are used to simulate pressure propagation from the blast and subsequent gas migration. Results show that cavity scale permeability estimates lead to pressure migration that matches measured data at gas sampling locations surrounding the blast cavity. Gas migration results are partially explained by variations in solubility, porosity, and saturation. However, ongoing analysis is attempting to better understand variations in transport to gas sampling locations in layered the volcanic tuff.
We identify methods and technologies that would improve nuclear-test-ban monitoring and on-site inspections. We connect, inspire and integrate diverse communities involved in nuclear-test-ban monitoring.

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**Session Classification:** P2.3 Atmospheric and Subsurface Radionuclide Background and Dispersion

**Track Classification:** Theme 2. Monitoring events and Nuclear Test Sites: T2.3 Atmospheric and Subsurface Radionuclide Background and Dispersion