Radionuclide signatures from complex releases of vented fission products Emily Gordon¹, Pranshu Adhikari¹, Justin Lowrey², Christine Johnson², James Ely², Derek Haas¹ ¹Walker Department of Mechanical Engineering, The University of Texas at Austin ²Pacific Northwest National Laboratory



Introduction

This project builds on previous work modeling the detection of noble gases at IMS stations, now incorporating a variable vent fraction for both prompt and delayed releases of fission products from a simulated underground nuclear explosion.

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Method

Two modeling tools, SCALE and HSYPLIT, were combined with a data processing tool to handle complex radioactive decay chains of fission products.

Results and Next Steps

Venting fractions can be combined with dilution factors from HYSPLIT and decay fractions from SCALE to produce hypothetical activity concentrations at IMS stations. The study will be expanded using supercomputing resources at UT.

SCALE Nuclide Inventory - Case 143 10¹⁶ xe135 xe133 xe131m xe135m 10¹⁴ xe133m cs135 Activity (Bq) ₀₁₀₁₀ 10⁸ 10⁶ 10⁴ 8 10 0 Time (days) NOAA HYSPLIT MODEL Concentration (/m3) averaged between 0 m and 1000 m ntegrated from 1500 06 Jan to 1800 06 Jan 20 (UTC) XEDL Release started at 0000 01 Jan 20 (UTC) >1.0E+14 /m3 >1.0E+12/m3 >1.0E+10 /m3 >1.0E+08/m3 >1.0E+06 /m3 Maximum: 3.6E+09 /m3 Minimum: 1.3E+01 /m3

GFSQ METEOROLOGICAL DATA