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Measurements of Argon-39 in Shallow Surface Soil

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It has previously been reported at Science and Technology conferences that PNNL has measured Argon-39 at historic underground nuclear explosion (UNE) sites at the Nevada Nuclear Security Site in gas samples from shallow (few meters or less) subsurface soil. Considerable Argon-39 was observed at UNE sites sampled. Thus, the detection of Argon-39 in such samples at strengths sufficiently above background can help identify possible UNEs, though Argon-39's long half-life precludes constraining when the UNE occurred. While a published Argon-39 background value for atmospheric air exists (16.6 mBq/m3 whole-air equivalent), there were no published Argon-39 background values for shallow subsurface air samples. We report on such measurements at a number of locations across the western United States of America, in an attempt to characterize the range of backgrounds that might exist. The measured concentrations varied from the published atmospheric concentration to about 3.5 times that. The measurements, analysis, locations and results will be described and compared with measurements taken at UNE locations.

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Promotional text

Argon-39 is a long-lived signature of UNEs that can be detected for decades afterwards in shallow subsurface air samples. We compare this signature with background measurements.

Oral preference format

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