

High Throughput Argon-37 Field System

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PNNL is exploring the use of ^{37}Ar for detecting nuclear explosion, including for use in the International Monitoring System (IMS). A high throughput ^{37}Ar separation and measurement system was developed at Pacific Northwest National Laboratory (PNNL) to detect ^{37}Ar activity generated from an underground nuclear explosion. Argon-37 is an activation product generated when neutrons interact with calcium in the soil surrounding an underground nuclear explosion. As a noble gas, argon is unreactive and migrates through the earth and can be released into the atmosphere with the radionuclide fission gases that are also produced during a nuclear explosion. Detection of ^{37}Ar can be a confirmatory measurement for a nuclear test, and when combined with radionuclide isotopes from the same sample the confidence that a nuclear explosion occurred improves significantly. PNNL has performed a large number of soil gas and atmospheric background measurements to understand gas migration of naturally occurring Ar-37 in the soil and for experiments where ^{37}Ar and ^{127}Xe were injected into a nuclear test cavity. PNNL will present on the newly developed Argon-37 High Throughput system as well as discuss measurements made at locations throughout the northwest region of the United States.

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