

## **Ultra-sensitive measurements of large-volume radioxenon samples using an ultra-low-background proportional counter**

The PTS and the international community have expressed interest in the ability to obtain xenon samples using the output of industrial oxygen plants, which could be three orders of magnitude or more larger than xenon samples currently collected by International Monitoring System (IMS) stations. Precise characterization of regional backgrounds is a motivation for very large volume samples and the enhanced sensitivity they could provide. Such samples would be too large for measurement in the existing detection systems and, as such, a new optimized method for analysis needs to be investigated. For many years the Pacific Northwest National Laboratory (PNNL) has been developing ultra-low-background internal-source gas proportional counters (ULBPCs) for use in a variety of applications; these ULBPCs function as beta spectrometers and have the capacity to analyze significantly larger gas samples than the traditional detectors used in the IMS and the potential to offer significantly improved sensitivity. PNNL has investigated the use of ULBPCs for measuring large-volume radioxenon samples to assess optimal performance parameters (e.g. operating pressure, count gas blend, etc.), sensitivity levels, and ability to discriminate multiple radioxenon isotopes. Results from these investigations will be presented.

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**Track Classification:** Theme 3. Verification Technologies and Technique Application