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Current Research on Containment Technologies for Verification Activities: Advanced Tools for Maintaining Continuity of Knowledge

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The U.S. National Nuclear Security Administration (NNSA) Office of Nonproliferation and Verification Research and Development currently funds research on advanced containment technologies to support Continuity of Knowledge (CoK) objectives for verification regimes. One effort in this area is the Advanced Tools for Maintaining Continuity of Knowledge (ATCK) project. Recognizing that CoK assurances must withstand potential threats from sophisticated adversaries, and that containment options must therefore keep pace with technology advances, the NNSA research and development on advanced containment tools is an important investment. The two ATCK efforts underway at present address the technical containment requirements for securing access points (loop seals) and protecting defined volumes.

Multiple U.S. national laboratories are supporting this project: Sandia National Laboratories (SNL), Savannah River National Laboratory (SRNL), and Oak Ridge National Laboratory (ORNL). SNL and SRNL are developing the "Ceramic Seal," an active loop seal that integrates multiple advanced security capabilities and improved efficiency housed within a small-volume ceramic body. The development includes an associated handheld reader and interface software. Currently at the prototype stage, the Ceramic Seal will undergo a series of tests to determine operational readiness. It will be field tested in a representative verification trial in 2016. ORNL is developing the Whole Volume Containment Seal (WCS), a flexible conductive fabric capable of enclosing various sizes and shapes of monitored items. The WCS includes a distributed impedance measurement system for imaging the fabric surface area and passive tamper-indicating features such as permanent-staining conductive ink. With the expected technology advances from the Ceramic Seal and WCS, the ATCK project takes significant steps in advancing containment technologies to help maintain CoK for various verification regimes, including international nuclear safeguards.

Country or International Organization

United States of America

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