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## Stability of Working Reference Standards for Hybrid K-Edge Densitometer Quality Assurance

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The relatively short working life of aqueous solution standards of actinides for the calibration and quality control of Hybrid K-Edge Densitometer (HKED) measurements necessitates the development of a stable matrix material less susceptible to degradation. Degradation in the form of evaporation, radiolysis, settling, sloshing, and sediment formation can all reduce the reliability and working life of an aqueous standard. These factors make aqueous solutions inadequate for long-term quality assurance measurements designed to detect weak or subtle trends in system performance. Epoxy, studied here, is an alternative matrix material that may be less vulnerable to degradation. An additional benefit of epoxy is that standards can easily be characterized as sealed sources which allows for simplified administrative controls during shipping and storage. The stability of working reference standards consisting of U<sub>3</sub>O<sub>8</sub> in an epoxy matrix for use in the HKED has been tracked for over 3 years through repeated X-Ray Fluorescence (XRF) and K-Edge (KED) measurements. A set of 6 epoxy standards ranging in concentration from 1 g/L to 76 g/L uranium were determined to be stable, within the expected accuracy of the system, over the period of analysis. During this time, no effort was made to enhance the stability of the epoxy standards; the radial measurement position was not controlled and in the middle of the analysis period the HKED system and standards were shipped from the vendor's factory to the customer. Epoxy standards afford numerous benefits over those created from aqueous solutions and should be considered when developing HKED standards for quality assurance measurements. The stability of the epoxy allows the development of working standards of a stability and robustness sufficient for use in a proposed international round-robin exercise based on the exchange of such standards.

### Country or International Organization

United States of America

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