

Examining Spatial Distributions of Elemental Impurities in Uranium Certified Reference Material 124 (CRM 124) Using Micro-X-ray Fluorescence

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Certified Reference Materials (CRMs) are vital to nuclear material analysis and quantification. The spatial distributions of elemental impurities in uranium Certified Reference Material 124 (CRM 124) were examined using micro-X-ray fluorescence (MXRF). Per the certificate of analysis, the uranium CRM 124 Elemental Impurity Standard was milled and blended to ensure elemental homogeneity over a macro scale. However, when micro analytical methods such as MXRF and scanning electron microscopy are used, elemental heterogeneity could be present over the small specimen areas examined. Thus, MXRF was used to image elemental impurity spatial distributions in the 10's of square millimeter regions of CRM 124 examined. Elemental heterogeneity was observed in the calcium, chromium, copper, iron, nickel, titanium, tungsten, and zinc MXRF elemental images. To inspect areas of interest with greater spatial resolution than possible using the MXRF instrument camera, high resolution optical microscopy was used to study regions containing elemental inclusions located by MXRF.