

Method Development for X-Ray Diffraction Analysis of Thin Powder Deposit Samples of Simulated Radioactive Tank Waste

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Washington River Protection Solutions (WRPS) is the Department of Energy's Tank Operations Contractor responsible for managing Hanford's 56 million gallons of highly radioactive waste and preparing it for delivery to the Waste Treatment Plant. In the course of performing these work activities, solid waste materials are routinely characterized using polarized light microscopy, scanning electron microscopy, and X-ray diffraction (XRD). In the case of the XRD evaluation of crystalline phase content, traditional sample preparation methods (i.e., packed powder cavity) typically involve 100x or more the sample volume compared to the microscopy methods. One of the primary safety concerns associated with characterizing radioactive waste materials is reducing the dose received by individuals characterizing tank waste materials to As Low As Reasonably Achievable (ALARA) levels. Furthermore, conventional cavity packing methods frequently introduce crystallite orientation effects which can make accurate phase identification more challenging. This poster addresses the method development process used to reduce sample volume while also improving the randomness of the powder materials evaluated. Non-radioactive tank waste simulant materials were synthesized and evaluated using X-ray methods in conjunction with microscopy methods.