

Challenges of Applying XRF Spectrometry to Gold Refining Operations

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The Royal Canadian Mint (RCM) operates a gold refinery to support its gold and silver investment products. X-ray Fluorescence (XRF) Spectrometry has been very useful in the analysis of incoming rough (impure) gold for refining. The non-destructive analysis and relatively fast analysis times are distinct advantages of XRF. The two biggest challenges in using XRF have been sampling and developing in-house reference materials for calibration. Two applications will be discussed: determination of deleterious elements (As, Cd, Hg, Pb, Se, & Te) within rough gold (drill sampling) by Energy Dispersive XRF and the determination of gold and silver in rough gold after melting and sampling by Wavelength Dispersive XRF. An overview of the gold refining process at RCM will be presented. The presentation will focus on the development of the XRF methods and the manufacture and analyses of in house reference materials.