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Quick Reference Guide: Element Measurement Matrix

 Element	XRF Use Case
Lithium (Li)	<ul style="list-style-type: none"> Map Li indicator elements: K, Rb, Cs, Mn, P, Ta, Nb, Sn Control impurities in beneficiation: Al, Fe, Si Screen residuals post-roasting & leaching QA for final Li product purity and specs
Rare Earths (REE)	<ul style="list-style-type: none"> Detect REEs & define ore zones during exploration Track REE distribution in tailings & concentrate streams Quantify REE oxides in process liquors Verify REE content & quality in final product output
Nickel (Ni)	<ul style="list-style-type: none"> Detect Ni, Co, Cu and other elements & define ore zones, halos Grade Ni in laterite (limonite/saprolite) & sulfide ores Track Ni, Co, Fe, Si, Al, Cr in feed, tails & Ni recovery Control impurities in Ni matte & final product quality
Cobalt (Co)	<ul style="list-style-type: none"> Quantify Co in laterite ores (limonite vs saprolite) & sulfide ores Assay Co grade in hydroxide, carbonate & leach residues Monitor Co in SX eluates, raffinate & process streams Certify battery-grade Co purity & trace impurities (Fe, Ni, Mn)
Copper (Cu)	<ul style="list-style-type: none"> Detect Cu & pathfinder elements (Mo, As, Zn, Pb) in exploration Track Cu, Fe, S & impurities (As, Sb, Bi, Pb, Zn) in flotation feed Monitor Cu & impurities in leach liquors and residues Assay matte or blister Cu for major and trace elements in QA/QC
Graphite (C)	<ul style="list-style-type: none"> Map gangue elements (Si, Al, Fe, S) in graphite exploration zones Monitor impurities in graphite conc. & estimate C via LOI proxies Track ash-forming elements in feed materials during processing QA graphite purity & trace elements in final product output

Tips and Pitfalls

!! XRF cannot directly detect lithium (Li) due to its low atomic number

✓ Use LIBS for direct Li analysis; handheld LIBS tools are available

✓ Choose fused beads for better accuracy; pressed pellets for speed

!! Always calibrate for matrix effects to avoid misleading results

✓ Use XRF and XRD together for optimal geometallurgical or process analysis.