The Yilgarn Craton contains several world-class, nickel-sulphide ore bodies. Komatiite-hosted massive nickel sulphide deposits are typically found at the basal contact of ultramafic bodies, which are thought to have formed during the eruption of long-lived komatiite flow fields, which flowed over an underlying, often felsic, substrate. The volcanic footwall successions of many commercially exploited nickel-sulphide deposits are often poorly understood. Consequently investigation, combining core logging, geochemical analysis and petrology, into the succession at Xstrata Nickel Australasia’s Cosmos mine, will enhance the understanding of komatiite-felsic interaction and Archean volcanism. Despite the region experiencing amphibolite metamorphism and several deformation events, primary textures within the footwall are well preserved, aiding protolith identification. The footwall to the Cosmos nickel sulphide deposits consists of a complex succession of both fragmental and coherent extrusive lithologies, ranging from andesites to rhyolites, plus later-formed felsic intrusions. The occurrence of thick sequences of amygdaloidal intermediate lavas intercalated with extensive sequences of dacite tuff, coupled with the absence of marine sediments or hydrovolcanic products, indicates that the succession was formed in a sub-aerial environment. The chemical composition of the footwall lithologies is dominated by a calc-alkaline signature, indicative of a volcanic arc setting. REE data shows that the compositional variability was not achieved via fractional crystallisation alone, and that crustal assimilation and/or different sources must be invoked to explain the observed andesite to rhyolite magma suite. Complex relationships between komatiite-hosted sulphide deposits and the underlying footwall, imply that the eruption of felsic, intermediate and komatiite magmas was near co-eval.