To satisfy increasing domestic fertilizer demand, development of low-grade, finely liberated, phosphate deposits within South America has increased. In response to this demand, and decreasing phosphate prices, efforts are being made to maximize global phosphate recovery and grade within existing and prospective phosphate flotation circuits. Such improvements are beneficial to all phosphate operations, but are most advantageous when treating a lower grade ore where processing costs are highest, operating margins are lowest, and a near zero-waste approach is necessary. Specifically, column flotation technology has proven to greatly increase phosphate flotation selectivity and recovery during treatment of fine, minus 212-micron, and ultra-fine, minus 53-micron, igneous phosphate ores from Aguia Resources’ Três Estradas project. Using column flotation, a deep froth is maintained and washed by means of a counter-current flow of clean wash water to minimize entrainment of gangue (i.e. calcite, silica, mica, etc.). Additionally, cavitation tube spargers are utilized to produce a fine bubble dispersion to maximize total available bubble surface area and improve fine phosphate particle recovery. In reverse flotation applications, where fine calcite or silica are rendered hydrophobic, such features also improve gangue rejection and phosphate recovery. This paper details the improved flotation response of both fresh carbonatite and saprolite of carbonatite phosphate ores from the Três Estradas deposit using CavTube column flotation.