Geoscience Australia undertook a marine reconnaissance survey in 2008-9 focussing on sedimentary basins and volcanic features northwest of Perth as far as the Wallaby Plateau. Samples collected included ten volcanic rocks from seamounts in the Wallaby Saddle and Houtman Canyon across a distance of approximately 400 km.

Three samples come from a seamount on the Wallaby Saddle. These include vesicular olivine basalts that contain gneissic quartzo-feldspathic xenoliths, and amygdaloidal lamprophyre. Three samples are from two recent cone-shaped mounds at the head of Houtman Canyon. Samples include relatively unaltered amygdaloidal porphyritic olivine basalt, altered basalt and basaltic hyaloclastite. Four samples are from the lower reaches of Houtman Canyon and are probably from lower in the stratigraphic sequence. They are amygdaloidal porphyritic olivine basalt.

Geochemical analysis was done a subset of samples from the three locations. Samples have low SiO$_2$ (37.11-42.36 wt %) and plot as basanite on a standard TAS plot. They have high MgO, CaO, and TiO$_2$, Nb, Zr, Ba, Cr, Ni and Sr. Rare earth element abundances for all cones are similar suggesting a common source. All have steep slopes on chondrite-normalised plots (La/Lu = 34.2-112.7), are highly LREE-enriched and relatively HREE-depleted suggesting a deep garnet-bearing source. All have a primitive mantle-normalised trace element pattern similar to basalts of hot spot-type settings. Despite their wide geographic separation, samples plot as a coherent chemical group.

This thermal pulse may have affected sedimentary petroleum maturation rates in the region, calling for a reassessment of the basinal tectono-thermal history.