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Effects of Rhenium doping on the high magnetic field versus temperature phase diagram of URu_2Si_2 SONIA FRANCOUAL, NEIL HARRISON, MARCELLO JAIME, CHUCK MIELKE, ALEX LACERDA, FREDERIK FABRIS, National High magnetic Field Laboratory, Los Alamos National Laboratory, NICHOLAS BUTCH, BRIAN MAPLE, University of California, San Diego — Rhenium doping of URu_2Si_2 yields a heavy fermion compound $U(Ru_{1-x}Re_x)_2Si_2$ in which the Hidden Order ($T_N = 17$ K) is suppressed at x = 0.05 and ferromagnetism and non Fermi liquid behavior coexist below 10 K from x = 0.15. In the present study, low temperature and high magnetic field resistivity and magnetization measurements are carried out in $U(Ru_{1-x}Re_x)_2Si_2$ single-crystal samples up to x = 0.15 in order to investigate the effects of rhenium doping on the robustness of the multiple ordered phases previously identified in URu_2Si_2 around the putative quantum critical point (QCP) at 37 ± 1 T and the properties of the underlying metamagnetic Fermi liquid as the ferromagnetic region is approached. It is shown that the dilute substitution of Re in place of Ru in URu_2Si_2 yields a complete suppression of the ordering at the QCP at x = 0.04 and postpones to higher field the metamagnetic transition in agreement with an increased hybridization of the f electrons with the conduction electrons.

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