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The Evolution of the Hidden Order Phase in $URu_{2-x}Re_xSi_2$ under Pressure J.R. JEFFRIES, N.P. BUTCH, B.T. YUKICH, M.B. MAPLE, University of California, San Diego — The heavy fermion compound URu_2Si_2 exhibits three distinct ordered states as a function of temperature and pressure: "hidden order" (HO), in which the order parameter has yet to be identified; antiferromagnetism (AFM), which seemingly develops out of the HO state at $P \leq 15$ kbar; and superconductivity (SC), which exists at ambient pressure. While URu_2Si_2,the parent compound of the $URu_{2-x}Re_xSi_2$ system, has been the subject of much scrutiny in the past several years, the nature of the HO phase is still uncertain. The evolution of the ordered phases as a function of pressure in the $URu_{2-x}Re_xSi_2$ system could provide clues to or constraints on the elusive order parameter of this HO phase. To this end, oriented single crystal samples of $URu_{2-x}Re_xSi_2$ with small values of x have been synthesized and investigated under nearly hydrostatic pressure via electrical resistivity measurements. While the SC in $URu_{2-x}Re_xSi_2$ is rapidly suppressed with Re concentration, the HO phase persists up to $x \approx 0.1$. The pressure dependence of the HO phase in this concentration range will be discussed along with possible consequences to the ordered states. This research was sponsored by the U.S. DOE under Research Grant No. DE-FG02-04ER46105 and by the U.S. NNSA under the Stewardship Science Academic Alliances program through DOE Research Grant No. DE-FG52-03NA00068.

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