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Magnetic properties of single crystal $Pr_5Ni_2Si_3$ R.W. MCCALLUM[1,2], Y. JANSSEN[1], K.W. DENNIS[1], P.C. CANFIELD[1,3], Ames Laboratory[1], Matrials Science and Engineering[2], Dept. of Physics and Astronomy[3], Iowa State University — $Pr_5Ni_2Si_3$ is the n = 3 member of the series, $R_{(n+2)(n+1)}Ni_{\ n(n-1)+2}Si_{n(n+1)}$, which consists of three compounds with n = 2, 3 and 4. These phases exhibit similar hexagonal crystal structures and as a result, their physical properties are expected to vary systematically. $Pr_5Ni_2Si_3$ orders with a net moment along the c-axis at $\sim$50 K. A sharp λ anomaly in the specific heat is observed at the ordering temperature, and a shoulder is observed at lower temperatures. The saturated moment parallel to c (M||c) at 5 K is 2 μ_B/Pr compared to the full Pr moment of 3.2 μ_B. At 5 K M$\perp$c/ M||c = 0.05 at 1T, and undergoes a broad step to M$\perp$c/ M||c =0.5 between 2.5 and 3.5 T. As T is increased the step becomes less pronounced and shifts to lower fields. These results are tentatively attributed to two almost degenerate magnetic states, one ferro or ferrimagnetic and the other conical. Ames Laboratory is operated for the US Department of Energy by Iowa State University under contract number W-7405-ENG-82.

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