Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Scaling behavior near the itinerant ferromagnetic quantum critical point (FQCP) of $NiCoCr_x$ for 0.8 <x <0.95 BRIAN SALES, KE JIN, HONGBIN BEI, JOHN NICHOLS, MATTHEW CHISHOLM, ANDREW MAY, MICHAEL MCGUIRE, Oak Ridge National Laboratory — Low temperature magnetization, resistivity and heat capacity data are reported for the concentrated solid solution $NiCoCr_x$ as a function of temperature and magnetic field. In the quantum critical region the low field (0.001-0.01 T) magnetic susceptibility, Chi, diverges as $\approx T^{-1/2}$ and the magnetization data exhibits T/B scaling from 0.001 <B <2 Tesla for T <30 K. At the lowest temperatures the ratio of Chi/C_p diverges consistent with the expectations of a FQCP. At higher magnetic fields, B >2 Tesla, the crossover temperature from the QC to Fermi liquid regime is no longer linear in B, and is better described by $B^{0.75}$. This scaling behavior is particularly accurate in describing the normalized magnetoresistance data [Rho(B,T)-Rho(0,T)]/T, which is equivalent to the ratio of relaxation rates associated with magnetic field and temperature $\approx Tau_T/Tau_B$. The location of the QCP is sensitive to the composition x and the strain generated during synthesis. These medium-entropy alloys are interesting model systems to explore the role of chemical disorder at FQCP. Research supported by the DOE Office of Science, Materials Science and Engineering Division, and the Energy Dissipation to Defect Evolution EFRC.

Brian Sales
Oak Ridge National Laboratory

Date submitted: 04 Nov 2016 Electronic form version 1.4