Unusual Magnetic Response of an S = 1 Antiferromagnetic Linear-Chain Material.\textsuperscript{1} J.S. XIA, M.W. MEISEL, Dept. of Physics and NHMFL, Univ. of Florida, A. OZAROWSKI, NHMFL, Florida State Univ., P.M. SPURGEON, A.G. GRAHAM, J.L. MANSON, Dept. of Chem. and Biochem., Eastern Washington Univ. — An S = 1 antiferromagnetic polymeric chain, [Ni(HF\textsubscript{2})(3-Clpy\textsubscript{4})\textsubscript{4}]BF\textsubscript{4} (py = pyridine), has been identified to have nearest-neighbor antiferromagnetic interaction $J/k_B = 4.86$ K and single-ion anisotropy $D/k_B = 4.3$ K, while avoiding long-range order down to 25 mK.\textsuperscript{2} With $D/J = 0.88$, this system is close to the $D/J \approx 1$ gapless quantum critical point between the topologically distinct Haldane and Large-$D$ phases. The magnetization was studied over a range of temperatures, 50 mK $\leq T \leq 1$ K, and magnetic fields, $B \leq 10$ T. The results allow an upper bound of the critical field, $B_c$, which closes the Haldane gap, to be estimated. Specifically, $B_c \leq (35 \pm 10)$ mT, which is close to the predicted 46 mT,\textsuperscript{3} when using the reported\textsuperscript{2} values of $J$, $D$, and $g$. In low fields, the magnetic signal increases with decreasing $T$ for 400 mK $< T < 800$ mK but is independent of $T$ for 50 mK $\leq T \leq 400$ mK. This observation is consistent with a significant increase in the specific heat arising from the accumulation of entropy in the vicinity of the quantum critical point.

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