Defining Volcanic Stratigraphy and Syn-volcanic Intrusions at the Lynne Zn-Pb-Cu Deposit, Wisconsin, USA

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The Lynne Zn-Pb-Cu deposit was discovered in 1990 by Noranda Exploration and is one of many volcanogenic massive sulfide (VMS) deposits located in northern Wisconsin within the Paleoproterozoic Penokean volcanic belt. The environment for VMS deposition has previously been interpreted as continental back-arc volcanism due to the accretion of the Pembine-Wausau Terrane onto the Archean Superior Craton during the Penokean Orogeny (1.8-1.9 Ga). However, the deposit-scale geodynamic setting and its influence on the metallogeny of VMS deposits are poorly constrained. This project constrains the volcanic and tectonic setting at the Lynne Zn-Pb-Cu deposit in Oneida County, Wisconsin, and contributes to our understanding of the variations of VMS-forming environments within the Penokean volcanic belt. Samples of least-altered volcanic and intrusive rocks from the deposit were obtained from drill core and were prepared for geochemical and petrographic analyses. The volcanic units at the Lynne deposit were previously divided by their stratigraphic position relative to the ore horizon into upper and lower rhyolite/dacite units. Major and trace element geochemistry and petrographic observations from these volcanic units reveal no petrochemical difference between the upper and lower strata, indicating that VMS formation is not associated with transitioning geodynamic settings. Intersecting the Lynne deposit are fine grain felsic dikes and a coarse grain granodiorite pluton at the stratigraphic footwall of the deposit. These intrusive rocks at the Lynne deposit are geochemically indistinguishable from the volcanic host rocks which suggests they are a part of the same magmatic system. Additionally, the geochemical similarities to the felsic volcanic rocks and lack of contact metamorphic aureole suggest the granodiorite is the syn-volcanic intrusion that may have helped drive hydrothermal circulation prior to its final emplacement.