Volcanic Reconstruction of the Powderhouse Dacite in the Paleoproterozoic VMS Hosting Chisel Sequence, Snow Lake, Manitoba

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The Chisel sequence is a 3-5 km thick succession of voluminous felsic volcaniclastic rocks that hosts six known volcanogenic massive sulfide (VMS) deposits in the 1.89-1.88 Ga Snow Lake arc assemblage. The VMS deposits occur at the boundary between the upper and lower Chisel sequences. The Powderhouse dacite is the uppermost unit of the lower Chisel sequence and constitutes the stratigraphic footwall to the Chisel, Chisel North, Lost, Ghost, and Lalor VMS deposits. The Powderhouse dacite is laterally discontinuous and is localized to the extent of the overlying VMS deposits. The stratigraphy and structure of the Powderhouse has been established through detailed surficial mapping (1:25 to 1:1000), core logging, lithogeochemistry, and petrographic analyses. The most distinctive lithofacies is a massive, feldspar crystal-phyric felsic tuff containing 5-10 % lithic dacitic clasts and 10-20 % tectonically flattened dark lapilli, interpreted to be juvenile vitric clasts. The juvenile lapilli, voluminous clastic material, and massive to poorly graded bedforms suggests that the Powderhouse was emplaced subaqueously as a mass flow. Subsidence occurred during the emplacement of the Powderhouse dacite as indicate by abrupt truncation (restriction) of facies and localized heterolithic breccia beds intercalated with these massive tuffs. The uppermost lithofacies of Powderhouse dacite is a unit that consists of well stratified, heterolithic, block-rich breccia intercalated with beds of fine tuff or siliceous finely laminated tuffs without breccia. The stratified sub-unit represents a hiatus in voluminous massive flow deposition that is contemporaneous with the emplacement of rhyolite domes and formation of the VMS deposits. The Powderhouse dacite is interpreted to be a product of voluminous pyroclastic eruptions, which along with concomitant subsidence, preceded the formation of VMS deposits.