Concentrations of Pb, Zn, and Ag Associated with Native Copper Deposition, Keweenaw Peninsula, Upper Michigan

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**GEOLOGIC SETTING**

The Keweenawan Peninsula is home to the world's largest native copper deposits. These deposits are found within the volcanic rocks of the Keweenawan Supergroup. The volcanic rocks are typically composed of basaltic andesite, andesite, and dacite. The deposits are associated with the Keweenawan Basalt, which is overlain by the Marquette Supergroup. The Marquette Supergroup consists of sedimentary and volcanic rocks that were deposited during the Paleoproterozoic era.

**Native Copper Mineralization**

Native copper mineralization is associated with the Keweenawan Basalt, the Marquette Supergroup, and the Lake Superior Fold Belt. Native copper mineralization occurs in two distinct stages: the first stage is associated with the Keweenawan Basalt and the second stage is associated with the Marquette Supergroup. The second stage mineralization is further divided into three categories: oxide, chalcocite, and native copper.

**Oxide Copper**

Oxide copper is associated with the Keweenawan Basalt and is found in the interflow conglomerates and the brecciated/amygdaloidal flow tops. The oxide copper is typically associated with Pb, Zn, and Ag mineralization. The oxide copper is also associated with the Lake Superior Fold Belt and is found in the interflow conglomerates and the brecciated/amygdaloidal flow tops.

**Chalcocite Copper**

Chalcocite copper is associated with the Marquette Supergroup and is found in the Nonesuch Shale and the Freda Sandstone. The chalcocite copper is typically associated with Pb, Zn, and Ag mineralization. The chalcocite copper is also associated with the Lake Superior Fold Belt and is found in the interflow conglomerates and the brecciated/amygdaloidal flow tops.

**Native Copper**

Native copper is associated with the Marquette Supergroup and is found in the Nonesuch Shale and the Freda Sandstone. The native copper is typically associated with Pb, Zn, and Ag mineralization. The native copper is also associated with the Lake Superior Fold Belt and is found in the interflow conglomerates and the brecciated/amygdaloidal flow tops.

**Native Copper Deposits**

Native copper deposits are found in the Keweenawan Peninsula and are associated with the Marquette Supergroup. These deposits are associated with the second stage mineralization and are found in the Nonesuch Shale and the Freda Sandstone. The native copper deposits are associated with Pb, Zn, and Ag mineralization.

**Exploration and Mining**

Native copper deposits are explored and mined for their valuable metals, including copper, lead, and zinc. The mining of native copper deposits is a complex process that involves the use of advanced technology and techniques. The mining process includes the extraction of the native copper from the rock, the separation of the copper from other minerals, and the refinement of the copper to produce high-purity metal.

**Future Research**

Future research on native copper deposits in the Keweenawan Peninsula will continue to focus on understanding the geological setting of these deposits and the processes that led to their formation. This research will help to improve our understanding of the geology of the region and the potential for similar deposits in other areas. Additionally, research on the economic and environmental implications of mining native copper deposits will continue to be important for the future development of this valuable resource.

**Acknowledgments**

The authors would like to acknowledge the support of the National Science Foundation and the United States Geological Survey for funding this research. The contributions of the many researchers who have worked on this project are gratefully acknowledged. Finally, the authors would like to thank the Keweenawan Peninsula Mining Association for their continued support and encouragement.

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