Introduction

The Crandon massive sulfide deposit in Forest County, Wisconsin, is by far the most poly metallic ore body discovered in Wisconsin. First discovered in 1976 by the Exxon Minerals Co., the company was eager to exploit the deposit which could yield over 25 million tonnes of Cu and Zn resources. After numerous years of exploration, the company filed a Notice of Intent to mine at the Crandon location in 1981. Despite numerous environmental and industrial regulation exemptions for mining companies by the state legislature, the Crandon mine project went on a hiatus due to low metal prices. This time period of inactivity at the Crandon site saw an increase of pro-conservatism in the public allowing the project to come under public scrutiny and controversy. Later attempts to mine the site coincided with new state and federal mining and environmental legislation that made permitting more difficult.

Crandon Stratigraphy and Lithology

The stratigraphy of the rocks containing the Crandon deposit were initially described by Exxon. More advanced geochemical methods are very destructive. In order to justify the preservation, the sample had to meet two criteria. 1) The sample had to be representative of the sample suites, the spatial distribution of the drill holes is uncovered, and serve as the foundation for the 3D model. 3D Modeling

Figure 7. Modern 3D Model Using Vulcan

This is the first known modern model of the deposit, which can be seen better on the laptop presentation. Through this model, new cross-sections, plan maps, and drill sections can be generated. Additionally, this model allows for the spatial context of the lithology and drill holes to be better constrained. This model provides the framework for future analysis and can easily be updated as new data is discovered and analyzed.

Digitization of Maps

Figure 6. Digitized plan geologic maps

The plots above represent the 230 level of the proposed Crandon mine. These plan maps, originally created by Exxon, provide a bird’s-eye view of the eastern and western parts of the deposit. In addition to lithostratigraphic changes, these detailed maps also include information on mineralization type, alteration assemblages, and volcanic facies. It also includes drill hole targets and proposed shafts. These targets were used in creating a digital drill holes database for the surviving partial core samples in the 3D modeling software. The geologic detail on these maps were generated by experts that had access to cores, geotechnical, and geochemical databases that have since been lost. Even the maps are partially illegible because of fading and the rendering these maps provide a critical framework for understanding the context of sample suites, the spatial distribution of the drill holes is uncovered, and serve as the foundation for the 3D model.

Geochemistry & pXRF Analyses

Figure 8. Preliminary trace element geochemistry via X-Ray Fluorescence (XRF).

A total of 107 samples from UMD were analyzed using handheld XRF device, while only 7 samples from the WIGS were analyzed in-house. This process is very controversial as current geochemistry methods are very destructive. In order to justify the preservation, the sample had to meet two criteria. 1) The sample had to be representative of the sample suites, the spatial distribution of the drill holes is uncovered, and serve as the foundation for the 3D model. 2) The sample had to be large enough to be able to preserve a piece for archiving. Figures A and B show felsic and mafic rocks which have an affinity for continental arcs. This is consistent with original research completed by Exxon. More advanced geochemical data and modern interpretation will improve our knowledge of the Crandon volcanic system and tectonic evolution of the Pembine-Wausau terrane.

Conclusions

This project has been extremely successful in obtaining and organizing original, scientific data pertaining to the Crandon deposit from Exxon and other sources. This past year has exceeded expectations for geospatial reconstruction of the deposit and conducting modern analyses of core samples. Most importantly, a 3D model of the deposit was created with a database that is capable of generating additional datasets and deposits. This is the first known modern model of the deposit, which can be seen better on the laptop presentation. Through this model, new cross-sections, plan maps, and drill sections can be generated. Additionally, this model allows for the spatial context of the lithology and drill holes to be better constrained. This model provides the framework for future analysis and can easily be updated as new data is discovered and analyzed.

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