

VMS Ore Lens Imaging and 3D Finite Difference Modeling Using Vertical Seismic Profiles from Flin Flon, MB

D.M. Melanson¹, D.J. White², C. Samson¹, G. Bellefleur², E. Schetselaar²

¹Department of Earth Sciences, Carleton University, Ottawa, ON, Canada; ²Natural Resources Canada, Ottawa, ON, Canada

Abstract

One of the main drivers of recent geophysical research in mineral exploration is to explore and define targets at greater depths. Seismic methods, including Vertical Seismic Profiling (VSP), currently provide the most powerful potential means to do so. In October 2006, three-component VSP data using dynamite and vibroseis sources were acquired from three deviated wells in the Flin Flon mining camp as part of a larger 3D seismic survey. These VSP data potentially contain a reflection signature of the 85.5 Mt Flin Flon-Callinan-777 VMS ore system. From the many drill records, surficial maps and seismic data, a 3D voxel model of the local geology and known ore lenses has been built, which can be used in 3D finite difference-modeled simulations of the VSP surveys. The number of geological units partitioning the 3D voxel model is increased incrementally to study the effects on seismic response of massive sulfide ore and major rock units. The simulations are jointly visualized with the VSP data to aid interpretation.