ABSTRACT. 2-dimensional geostatistical study of the Little Chief copper deposit of Whitehorse Copper Mines, Yukon, Canada, is a practical case study of a copper-magnetite skarn deposit. Kriging of thickness and assay data provided unbiased grade and tonnage estimates of stopes, pillars and sills that compare favourably with estimates by empirical methods. An attempted optimization study for stope-pillar locations in the low levels requires more information than was available to us. A drilling grid 100 x 100 feet will provide grade estimates within 10% (rel. std. dev.).

INTRODUCTION

Little Chief deposit is about 6 miles south of Whitehorse, Yukon near the Alaska highway (Kindle, 1964). The deposit is a copper-bearing, magnetite-rich skarn zone contained in a wedge of sedimentary rock, principally limestone and quartzite, surrounded on three sides by dioritic rocks of the Whitehorse batholith. Geometric form is that of a near vertical tabular sheet that extends about 700 feet horizontally and 1,000 feet vertically with an average thickness of about 60 feet and a northwesterly strike direction. Ore minerals are bornite and chalcopyrite in a magnetite-rich zone that also contains various calc-silicates, calcite and serpentine. Small but significant amounts of gold and silver are present. Valerite occurs sporadically in the upper part of the deposit.

The ore body has been defined by an irregular grid of horizontal drill holes each of which penetrates the ore zone (Fig. 1). For each drill hole our data base consisted of 2-dimensional coordinates, (in the plane of Fig. 1), thickness of the mineralized intersection and the average Cu grade (as %) over the preceding

Fig. 1. Location of drill holes on a vertical longitudinal section.

thickness. Several remarks are in order:

(1) The uneven sample density for the deposit means that estimation quality will differ considerably locally depending on available data.

(2) Definition of thickness is based on a cut-off grade of 1.4 Cu and corresponds to a geological limit of mineralized rock.

(3) Dip of the deposit has been assumed constant and equal to 70°.

(4) Density of ore is a regionalized variable that should be estimated for each ore panel. Unfortunately, insufficient values were available and a constant conversion factor of 10 cu. ft. of ore per ton has been used throughout, where tonnage estimates are quoted.

In this study our data base has restricted us to estimation of in situ resources and a 2-dimensional geostatistical approach to the problem. The purpose of the geostatistical investigation is