Intro, Mining & Reserves
Section of GECO Report

I

019684

GENERAL DESCRIPTION

History

1. The Vangorda Creek sulphide deposit was found in July, 1953 by a prospector, A. Kulan, of Whitehorse, Yukon Territory. E. U. Chisholm of Prospectors Airways Co. Ltd. examined the showing immediately after its discovery and optioned 48 claims around the showing. During the summer, a group of 238 contiguous claims was staked around the original 48 and work was begun in the vicinity of the showing.

2. Extensive work has since been done on the property as follows:

   a. Geochemical survey.

   b. Geophysical surveys including, gravity, magnetic, electrical and electromagnetic.

   c. Diamond drilling, which defined the sulphide body of interest.

3. In addition, a ten mile road was constructed from the Pelly River to the property; an airstrip was constructed at the river and camps were built.

Location and Access

4. Vangorda Creek is a tributary of the Pelly River and joins it about 36 miles downstream from the Canol Road crossing at Ross River Post.

The property straddles Vangorda Creek seven miles upstream from its confluence with the Pelly. It is located in the Whitehorse Mining Division of the Yukon Territory and is about 125 air miles Northeast of Whitehorse.

5. Access to the property may be gained from Whitehorse by float plane in the summer and ski plane in the winter by landing on a small lake on the south boundary of the claim group about 1-1/2 miles from the camp. Overland routes of some difficulty are also available. Proposed new road construction would make access easier.

6. No mines are in the area, and it is very sparsely populated. The nearest small settlement is at Ross River post some 35 miles from the property.

General Geology

7. Outcrop in the area of the deposit consists largely of metamorphosed sedimentary rocks which are now schists and gneisses carrying sericite, graphite, garnet, staurolite and other minerals indicative of intense metamorphism. These rocks have been intruded by granites and gabbros, none of which, however, are found in the vicinity of the sulphide deposit.

8. Regionally, the rocks strike to the northwest and dip about 25° to the southwest. There is some reason, however, for believing that the metasedimentary units form a gentle syncline and that the schistosity in the vicinity of the sulphide deposit is almost horizontal. As planar elements in the cores are reported almost normal to the core length,

and as Kerr Addison reports refer to the sulphide bodies as horizontal, they have been so considered in calculations embodied herein. However, in a few small pieces of core seen in the Toronto offices of Kerr Addison, the planar elements dip at about 30 degrees or as the regional geology.

II

MINING

The Orebody

1. The main ore zone has been delineated by diamond drilling along a length of 3,000 feet across a general width of 400 feet which bulges to more than 600 feet at the northwest end. The strike of the zone is northwest-southeast.

2. Diamond drill holes spaced at 200 feet centres form a grid pattern on the main zone. In the (1954) initial pattern, 78 holes were drilled vertically to an average depth of 350 feet. Eleven holes were drilled outside the pattern. A later drill program (1955) filled in spacing to 100 feet on alternate cross-sections every 400 feet along the strike length of the main zone with the objective of clarifying the continuity of ore lenses not apparent from drill holes spaced at 200 feet.

3. The main mineralized zone disclosed by drilling is a series of flat lying overlapping lenses of sulphide minerals made up mostly of pyrite with irregular concentrations of galena and sphalerite with some chalcopyrite. The overlying stratum is predominantly sericite schist and the underlying stratum graphite schist. The sulphides appear to be a high temperature replacement of a quartzitic horizon that formerly existed between the two. Remnants of this are present within the ore zone.

4. The main ore minerals are iron-rich sphalerite and galena with minor chalcopyrite. Other minerals are pyrite (very abundant),

arsenopyrite, magnetite, pyrrhotite, marcasite, and very small amounts of tennantite, covellite, and three undetermined minerals, two of which resemble polybasite and cobaltite.

5. Gangue minerals are quartz, actinolite, barite, witherite, celestite, with calcite and other carbonates. The ore is fine-grained, and grinding to minus 100 mesh size is necessary to achieve separation.

6. Lenses of sulphide minerals containing irregular streaks and patches of galena and sphalerite enrichment are best developed in the northwest end of the zone where lenses are thickest and deepest. The best continuous ore intersection is in hole number 10 which is 115 feet thick and bottoms at a depth of 338 feet. Progressing to the southeast mineralized lenses become thinner and lie closer to the surface. It is noticeable that the lead-zinc enrichment of the sulphide lenses forms a layer on the upper parts of the lenses.

Pit Design

7. All intersections of ore encountered in drilling could not be included within the limits of an economic open pit design. Many were too low grade, or too isolated and deep-seated to warrant consideration.

8. A preliminary trial pit design was based on the premise of mining the deepest and thickest lenses in the northwest portion of the ore zone which contain 64 per cent of the total ore. These lenses were shown in drill holes 10 and 33 to bottom at an elevation of 3,680 feet, about 370 feet below the general surface contour which would form the perimeter

of an open pit. The 3,680 feet elevation was used as the base for the pit, and benches designed upward at a slope of 57 degrees in a series of benches 33.3 feet deep. Rising from the lowest bench the higher benches were extended to include - lenses of ore considered to be within economic limits determined by ratios of waste to ore. The design resolved itself into a pit layout with benches elongating to the southeast to embrace the shallowest lying lenses.

9. A detailed explanation of the step-by-step design of the pit is given in Appendix A of this report along with seven plan illustrations showing surface contours, ledge contours, location of diamond drill holes collars and their nomeclature, three classifications of diamond drill holes, and a pit location sketch.

10. From the pit plans fourteen pit sections have been drawn which are illustrated in a book form in the Appendix to this Report. The cross sections show the pit, the surface contours, and the rock ledge. All relevant drill holes are shown with delineations of waste rock and sulphide ore lenses with their differentiations of ore grade material.

Measurement of Pit Material Volumes

11. The areas of each category of material in the pit, overburden, waste rock, total sulphides, ore differentiations and the volumes are recorded on each cross-section of the pit. A summary is given in Table One.

Table One

Pit Quantities and Distribution

Overburden	=	4,100,000 cu. yds.	- 38.0%
Waste Rock	=	2,670,000 cu. yds.	- 25.3%
Massive Sulphides	=	3,830,000 cu. yds.	- 36.1%
Total		10,600,000 cu. yds.	- 100.0%

Massive sulphide are divided into barren sulphides and ore grade sulphides.

Barren or low grade sulphides	=	1,780,000 cu. yds.	- 46.5%
Ore grade sulphides	=	2,050,000 cu. yds.	- 53.5%
Total sulphides	=	3,830,000 cu. yds.	- 100.0%

Ore Reserves

12. Cut-off grade for ore was taken at 4 per cent combined lead and zinc metals. Specific gravity was taken at 3.6 for calculation of ore tonnage. This was given as an average specific gravity by Noranda Mines laboratory. (it is to be noted that Prospectors Airways used a specific gravity of 4.0 in earlier calculations, and that two core samples of typical looking ore measured recently at the University of Toronto showed specific gravities of 4.28 and 4.42 respectively).

13. Areas of ore on each cross-section were checked by planimeter measurements and by calculations of drill hole intersections extended half way to the adjoining drill holes or to the sides of the pit. Volumes

were calculated by extending areas of each section half way to the next section with the end sections, 2 and 14, being extended half way to the pit limits taken to be 50 feet. Dilution of ore was arbitrarily taken to be 10 per cent waste rock at nil grade.

14. Table Two

Summary of Ore Reserve Calculations

		Calculated	Diluted 10%
Tonnage (short tons)		5,640,000	6,200,000
Grade:			
Lead %	=	3.256	2.963
Zinc %	=	5.344	4.863
Copper %	=	0.277	0.252
Silver, ozs.	=	1.773	1.613
Gold, ozs.	=	0.026	0.024

The tonnage given above corresponds to the tonnage figures recorded on the cross-section diagrams.

Pit Refinement

15. As has been stated, the ultimate pit design used in this study is subject to adjustment in final detail. Some waste sulphides on lower benches may be eliminated and the pit shrunk somewhat as a result. Similarly some upper benches may be extended at the southeast end to mine the sulphide lens indicated in diamond drill hole No. 81. Adjustments, however, will not appreciably affect the basic pit design or the

volumes and calculations of costs as set out. For this reason a refinement of pit design has not been considered necessary for the purposes of this preliminary cost study.

Mining Method

16. The pit design is a layout for a standard open-cut benching operation using shovels for loading and trucks for haulage of overburden, waste and ore. Details of equipment to be used will depend on the scale of operations. Benches are designed for a depth of 33.3 feet with rock slopes of 3 to 1 plus a horizontal berm of 25-35 feet at each bench elevation. The finished pit will have a bottom floor at 370 feet below the elevation of 4,050 feet on the road entering the pit. Ramp grade is 8.5 per cent and completed length 4,800 feet. Width of ramp is 55 feet tapering up 40 feet at the pit bottom.

17. Waste material of sericite or graphite schist will be easily distinguishable visually from the sulphide ore and may be broken and loaded separately for haulage to spoil. Sulphides, however, have an assay cut-off which will require a system of grade control guided by drill hole or bench sampling.

Mining Costs

18. The level of operations is taken as 3,000 tons of ore per day or 1,050,000 tons per year.

19. Preliminary cost figures have been developed by taking average costs for stripping and mining of similar type operations in Canada and applying an increment of 14 per cent to take care of added costs likely to be experienced in the remote location of the project, and a further increment of 6 per cent for contingencies. Costs include all operating expenses properly distributable to the mine, but do not include head office, taxes, or capital write-offs.

20. Basic Costs per Cubic Yard:

For	Overburden	Rock and Sulphides including Ore
Any pit in a not too remote location	$ 0.42	$ 1.29
Vangorda location add + 14%	0.06	0.18
Possible minimum cost	0.48	1.47
Contingency + 6%	0.03	0.09
Estimate Used	$ 0.51	$ 1.56

21. Total Cost for Pit

	Cu. Yds.	Cost per Cu. Yd.	
Overburden	4,100,000 @	$ 0.51 =	$2,091,000
Waste Rock	2,670,000 @	1.56 =	4,165,000
Sulphides	3,830,000 @	1.56 =	5,975,000
Total	10,600,000		$12,231,000

Cost per ton of ore (6,200,000 tons) =$ 1.97

The estimate for volume of waste rock is subject to some adjustment in further detailed planning for production. The pit may be shrunk somewhat and adjusted to a degree to eliminate waste rock and stripping. It seems possible that a minimum cost of about $1.75 per ton of ore may be attainable.

Total Pit Vol = 10,600,000
overburden = 4,100,000
waste rock = 2,670,000
sulphides (not all ore) = 3,830,000

GECO SUMMARIZED

Their Section #	Our Section #	Short tons ore.	depth of pit feet (convert and subtract 89.6m to get current elevation datum)
1	2W	—	4050
2	0E	380,000	3830
3	2E	1,290,000	3700
4	4E	1,550,000	3690
5	6E	880,000	3730
6	8E	676,000	3800
7	10E	260,000	3870
8	12E	175 000	3900
9	14E	230,000	3920
10	16E	146,000	3940
11	18E	175 000	3970
12	20E	202 000	3970
13	22E	175 000	4000
14	24E	45000	4000
		6,190,000	

SG = 3.6 for ore