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VANGORDA EVALUATION
CYPRUS ANVIL MINING CORPORATION

September 6, 1979

VANGORDA EVALUATION

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SUMMARY

VANGORDA EVALUATION REPORT

This report presents several analyses of the net present value of the Vangorda lead-zinc deposit, the dominant asset of Vangorda Mines Limited at the time the take-over bid was made to its shareholders. These analyses have been carried out with the aid of a data center programmed for Cyprus Anvil Mining Corporation's long-range forecasting and incorporates programs reflecting current tax and royalty legislation.

The reserve estimates for the Vangorda deposit were calculated by Prospector's Airways Limited, a subsidiary of Kerr Addison Mines Limited, based on diamond drilling carried out between 1954 and 1956. Total reserves were 9,400,000 short tons grading 3.16 percent lead, 4.96 percent zinc and 1.6 ounces per ton silver. Due to poor core recovery in some holes, the reliability of the assay data is uncertain. In 1964, General Engineering Company carried out a mining feasibility study on the western portion of the deposit, which contains the majority of reserves and somewhat higher than average grade. The undiluted mineable reserves considered by General Engineering totalled 5,640,000 tons grading 3.25 percent lead, 5.34 percent zinc, 1.77 ounces of silver per ton and 0.026 ounces of gold per ton.

The net present values of three basic cases, variable as to cost and/or metal price assumptions, are calculated assuming an open pit mine supplying 3,000 short tons per day mill feed to a concentrator operating 350 days per year for 5.9 years, which exhausts reserves considered by General Engineering in their 1964 study. It is assumed the development is a free standing project requiring its own concentrator and related ancillary facilities.

The analyses yield a net present value using a 14 percent discount rate applied to future net cash flows. This type of calculation is commonly used in the mining industry to judge the value of a mining project acquisition or development opportunity and properly forms the principal financial analytical basis for decision making. A 14 percent discount rate is judged to be low in these circumstances due to the preliminary nature of data, but is the basic minimum requirement used by Cyprus Anvil.

The nature of these analyses presumes that the shareholders of Vangorda Mines would be fully assessable in providing their share of development costs and that no debt financing would be involved. Any attempt to structure an economic model differently would be highly speculative with respect to minority shareholder dilution, extent of project borrowings, interest rates and premiums that would be appropriate, should controlling shareholders provide completion and deficiency guarantees in order to facilitate project borrowings.

In addition to the three basic cases, the impact of adding two years of reserve life to each case is presented because there is a fair possibility that a limited tonnage additional ore from the eastern portion of the Vangorda deposit could be mined at costs similar to those estimated for the main section of the deposit that was studied by General Engineering.

Technical assumptions, capital and operating costs, and transportation and marketing charges are estimated on the basis of consultants' reports and Cyprus Anvil's current experience and anticipated conditions. Smelter treatment terms are based on those currently applicable in Cyprus Anvil's contract with Toho Zinc of Japan, who are Cyprus Anvil's largest customer. These assumptions and estimates are outlined later in the report, along with metal price assumptions. The average prices forming the basis of payment for Cyprus Anvil have averaged over the past five years 1974 to 1978 inclusive: Lead - 24.9 U.S. cents per pound; Zinc - 33.7 U.S. cents per pound; and Silver - 4.66 U.S. dollars per ounce. All cost and price assumptions are in current (1979) dollars and cents. These analyses assume that inflation in costs with time will be offset by increased prices.

The cases studied are based on reasonably optimistic operating assumptions; however, confirmatory drilling, metallurgical testing and other engineering feasibility studies are required to advance the project to a final feasibility analysis. Provision for completion of this work is made in pre-production costs.

The following table summarizes the net present values of the three basic cases examined and the extension of each case by two additional years of reserves.

<u>Case</u>	<u>Net Present Value*</u> <u>(14% Discount Rate)</u>
Base Case	\$(34,796,000)
Base Case Extended	(29,185,000)
Current Evaluation	(14,260,000)
Current Evaluation Extended	(6,376,000)
Optimistic Evaluation	(809,000)
Optimistic Evaluation Extended	9,335,000

* Bracketed figures are negative.

It is clear from these analyses that, as a freestanding project, the Vangorda Deposit has a negative or nominal net present value. The only case examined that yielded a positive net present value was Optimistic Evaluation Extended, which uses extremely optimistic lead and zinc prices.

The price of \$1.50 per share or \$3,033,000 negotiated between Cyprus Anvil and Kerr Addison is a result of Vangorda Mines, with the Vangorda deposit as its principal asset, being combined with other mineral properties in the Anvil District, principally the property containing the Grum Deposit. This group of properties and property interests provides Cyprus Anvil with an opportunity to examine, explore, evaluate and develop, where warranted, lead-zinc deposits in a sequence yet to be determined, but to optimize economic factors and best utilize its existing concentrating and ancillary facilities. Existing reserves in the Anvil Mine are sufficient for eight or nine years at current milling rates. Only imprudent or speculative technical assumptions, operating cost estimates and metal price projections, or the opportunity to ultimately sell or re-deal to Cyprus Anvil, would motivate a third party to buy Vangorda for more than a nominal price.

REGD/mp

R. E. Gordon Davis

FINANCIAL
EVALUATION

FINANCIAL EVALUATION

Individual Assumptions Common to All Cases

The Vangorda ore body is to be placed into production as a freestanding project separate from other operations in the Anvil district.

A mill would be built near the existing ore body as well as which, mine equipment, tailing water storage facilities and housing would be required to tie in with existing infrastructure in the area.

Mill throughput would be at the rate of 1,050,000 short tons per year. Reserves, feed grade and overburden parameters are as outlined in the study prepared by General Engineering Company in June 1964, extracts of which are attached as Exhibit One.

Metallurgical performance is similar to the expected results for the Grum ore as predicted in December 1977 by the Noranda milling committee using results of testing by Lakefield Research. As a result it is anticipated concentrate would contain higher levels of mercury, silver and gold than Anvil ore. These results show higher zinc concentrate grades and recovery than CAMC is currently achieving. Specific key assumptions:

Metal Recovery:

Lead 80%
Zinc 84%

Concentrate Grades and Annual Tonnage:

Lead - D.M.T. 36,418
Lead 62%
Silver 28.0 oz./DMT
Gold 0.15 oz./DMT

Zinc - D.M.T. 69,484
Zinc 56%

*Recovery =
% of available metal
recovered from ground
or to general purposes
Concentrate grade
= % mineral in
concentrate ??*

???

It is assumed sales contracts could be arranged at similar terms to current CAMC contracts with Toho Zinc, the largest customer for CAMC selective lead concentrate and selective zinc concentrate. Due to the possibility of high mercury in concentrates this may be optimistic.

Kilborn Engineering have estimated it would be necessary to have 175 employees working. To provide this coverage CAMC experience indicates it would require roughly 200 employees on the company payroll.

Housing for 200 employees could be provided at the Faro townsite at an average unit cost of \$42,500 (25 houses at \$100,000 and 175 single units for \$6 million). This is based on 1979 estimates for CAMC construction of single family units and escalation to 1979 of CAMC historical costs to build the single persons' quarters at Faro.

Capital costs of construction would be as outlined in the Kilborn Engineering estimates, attached as Exhibit Two.

Individual Assumptions Common to All Cases (Continued)

Transportation ex mine site would be handled by White Pass and Yukon Route on a contract basis for the inland freight and by company-arranged ocean transportation on a spot basis.

It is assumed residual asset values when the ore body is mined out are zero.

Development, drilling and feasibility studies could cost \$1 million and these could be completed in the first year of a three-year construction period.

Power for this project would have to come from an on-site generating plant. Cost and operating cost estimates have been provided by Kilborn Engineering.

Operating Assumptions

Base Case

This is an evaluation of the ore body using estimates CAMC would have made during October 1978 immediately prior to negotiations with Kerr Addison, and reflect cost expectations for 1979 based on Anvil experience or outside information where it is felt to be more appropriate. Most of these estimates were used in evaluating the Grum deposit at that time.

Current Evaluation

This reflects Anvil experience and the best information available during the last three months.

Details of operating cost estimates:

Mining: \$1.80 per cu. yd. of material to be moved. This is an estimate prepared by Kilborn and would appear to be optimistic. CAMC costs for the much larger equipment used in its 10,000 ton per day operation are approximately \$1.75 per cu. yd. moved.

Milling costs of \$5.98/D.S.T. are based on CAMC experience with adjustments for additional grinding which likely will be necessary for this type of ore which is finer grained than Anvil Mine ore.

Electrical - As well as the operating costs for power as estimated by Kilborn, \$250,000 has been provided for on-site electrical labour and supplies. This is roughly one-quarter of current CAMC experience, reflecting optimism relating to smaller pit equipment.

Environmental - These costs have been projected at a minimum of \$100,000 per annum.

It is assumed coal could be acquired from CAMC for 25% over CAMC costs and still be cheaper than oil-fired furnaces.

- * These assumptions would result in an average production cost of \$11.⁹⁵~~91~~ per DST of mill feed.
- * Transportation to tidewater - White Pass and Yukon Route, which currently provide these services for CAMC on a contract basis, has requested that the current contract be reopened due to its financial difficulties. It is expected the costs to move the Vangorda concentrate would be at least \$36.70 per short wet ton.
- * Skagway Terminal costs: Approximately \$4.97 per DMT of product. These costs have been included at CAMC current costs plus 20% to cover possible contract revisions and minimum charges acceptable to CAMC. This terminal is operated by White Pass for CAMC on a cost plus basis.
- * General Administration: \$3.29/DST milled. These costs have been included at 30% of CAMC costs. This is an arbitrary estimate and would seem extremely optimistic but is based on the ratio of milling capacity.

Optimistic Evaluation

Same cost bases for Current Evaluation with metal prices increased.

Metal Prices

Metal prices and exchange assumptions are probably the most difficult to determine for any analysis of this type. Three basic price assumptions have been used as shown below, all of which are in relation to 1979 costs.

Base Case: These price levels were used by CAMC in the Anvil District acquisition and were made during September-October 1978.

Current Evaluation: These prices reflect what may well be used by non-ferrous companies evaluating ore bodies at the current time and would probably be used by CAMC.

Optimistic Evaluation: These prices reflect what is considered extremely optimistic for the lead-zinc mining industry.

<u>PRICES & EXCHANGE</u>	<u>BASE CASE</u>	<u>CURRENT EVALUATION</u>	<u>OPTIMISTIC EVALUATION</u>
Lead US ¢/lb.	32.00	40.00	45.00
Zinc US ¢/lb.	40.00	45.00	50.00
Silver US \$/oz.	6.00	8.00	9.00
Gold US \$/oz.	175.00	250.00	300.00
Exchange Cdn \$ to US \$1.00	1.0525	1.111	1.111

THB/jh

T. H. Biggs

KILBORN

Kilborn Engineering (B.C.) Ltd. / 1193 W. Pender, Vancouver, Canada V6E 2R1. Telex: 04-507734, Tel: (604) 669-8811

CONFIDENTIAL

July 4, 1979

Cyprus Anvil Mining Corporation
#330 - 355 Burrard Street
Vancouver, B. C.
V6C 2G8

Attention: Mr. J. F. Oik
Senior Vice President

Dear Sirs:

As requested by Mr. L. P. Taggart, we have prepared a factored capital cost estimate for a 3,000 tpd operation based upon open pit mining of the Vangorda deposit. The capital cost is estimated by adapting figures from studies of similar northern operations available in-house.

Included on the following pages are:

- (a) Estimated Capital Cost, 3,000 tpd Operation
- (b) Estimated Mining cost/ton Mill Feed
- (c) Estimated Electrical cost/ton Treated
- (d) Preliminary List Mine Equipment Requirements
- (e) Total Personnel Requirements

Mill and Service operating costs are not included.

We trust these figures meet your immediate needs.

Yours very truly,

KILBORN ENGINEERING (B.C.) LTD.



J. B. Mitchell, P. Eng.
Senior Vice President
Western Operations
Kilborn Engineering Ltd.

JBM:jmi

Attachments

cc: Mr. L. P. Taggart - with attachments

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(a) ESTIMATED CAPITAL COST, 3,000 tpd, 1,050,000 tpy

Thousands Dollars Canadian

Site Preparation	410
Galleries	450
Transfer House	170
Crusher Station	2,200
Concentrator Building	10,080
Equipment	5,600
Pipe and Instruments	1,800
Tailings	4,800
Water & Supply	1,300
Fuel Supply	130
Powerhouse	7,000
Site Electrics	4,700
Yards & Services	680
Service Complex	3,900
Office & Laboratory	960
Surface Mobile	420
Explosive	50
Construction Camp	1,500
Mining - Production Equipment	5,600
Service Equipment	900
	<hr/>
	52,650
Construction Indirects	15,000
Contingency	10,000
Engineering, Procurement and Construction Supervision	7,000
	<hr/>
TOTAL	\$84,650

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(b) Estimated Mining Cost based on a waste/ore stripping ratio of 3:1 is \$2.74 per ton of mill feed.

(c) Estimated Total Electrical Cost is 6.12¢/kwh based on a self generated power with a diesel fuel cost of \$1.00 per gallon; or \$2.70 per ton of mill feed. Power cost includes fuel, maintenance.

(d) Preliminary List - Mine Equipment Requirements

Mine Operating Equipment

Electric - Hydraulic 10 cu yd shovel	1
Electric Rotary 9" Drill	1
Crawler mounted 4" Drill	1
Portable Compressor 750 cfm	1
Tank mounted 2½" Drill with Compressor	1
Front end Load 10 cu yd	1
Rear dump 85 ton Haulage Trucks	5
Rack type Tractor, 300 hp with Ripper	2
Utility Boom (An/Fo) Loader	1
Outdoor portable Switchgear, 5 Kv, 100 mva	2
High Voltage Connector	12
Training Cable	7,500 ft

Mine Services Equipment

Wheel Dozer, 310 hp	1
Front end Loader, 4 cu yd	1
Grader, 14 ft Blade	1
5 Ton Rear Dump Truck and Mounted Hiab 3 ton Crane	1
Pickup Trucks	3
Fuel Truck	1
Lube Truck	1
Water Truck	1
Submersible Pumps	2
Pipeline, steel, 6" dia	1,000 ft
Survey Equipment	-
Radio Equipment	-
Miscellaneous Tools & Equipment	-

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(e) Total Personnel Requirements

Mine	
Staff	11
Operators	59
Maintenance	17
Administration & Surface	42
Mill & Laboratory	44
	—
TOTAL	173

Table OnePit Quantities and Distribution

Overburden	=	4,100,000 cu. yds.	-	38.0%
Waste Rock	=	2,670,000 cu. yds.	-	25.3%
Massive Sulphides	=	<u>3,830,000</u> cu. yds.	-	<u>36.1%</u>
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	=	<u>2,050,000</u> cu. yds.	-	<u>53.5%</u>
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

CANC-4.15
3.9-2m2

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 TwoSummary of Ore Reserve Calculations

	<u>Calculated</u>	<u>Diluted 10%</u>
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.

SALES AND CONVERSION SUMMARY

	1982	1983	1984	1985	1986	1987
CONCENTRATE SOLD(000 DMT)						
1. LEAD SELECT	34.418	36.418	36.418	36.418	36.418	34.950
2. ZINC SELECT	66.484	69.484	69.484	69.484	69.484	65.867
PAYABLE METAL						
3. LEAD (000 LBS) - SELECT	44692	47289	47289	47289	47289	45383
4. ZINC (000 LBS) - SELECT	69768	72916	72916	72916	72916	69120
5. SILVER(000 OZS)- SELECT	916	969	969	969	969	930
6. GOLD (000 OZS) - SELECT	5	5	5	5	5	5
SALES (US\$000)						
7. LEAD - SELECT	14301	15133	15133	15133	15133	14523
8. ZINC - SELECT	27907	29166	29166	29166	29166	27648
9. SILVER - SELECT	5493	5812	5812	5812	5812	5578
10. GOLD - SELECT	874	925	925	925	925	888
11. GRAND TOTAL	48576	51036	51036	51036	51036	48636
=====						
CONVERSION COSTS (US\$000)						
TREATMENT CHARGES						
12. LEAD SELECT	5042	5335	5335	5335	5335	5120
13. ZINC SELECT	11362	11875	11875	11875	11875	11520
14. TOTAL	16405	17210	17210	17210	17210	16641
OCEAN FREIGHT						
15. BASE COSTS	1604	1684	1684	1684	1684	1603
16. INSURANCE	0	0	0	0	0	0
17. TOTAL	1604	1684	1684	1684	1684	1603
OTHER						
18. CONVERSION COSTS(\$000/YR)	50	50	50	50	50	50
19. SUPERINTENDENT	61	64	64	64	64	60
20. TOTAL	111	114	114	114	114	110

21. TOTAL CONVERSION COSTS	18119	19008	19008	19008	19008	18354
22. NET REVENUE (\$000US)	30456	32028	32028	32028	32028	30282
23. EXCHANGE (\$C/\$US)	1.053	1.053	1.053	1.053	1.053	1.053
24. NET REVENUE (\$000CAN)	32055	33710	33710	33710	33710	31872

SALES AND CONVERSION SUMMARY

	1982	1983	1984	1985	1986	1987
CONCENTRATE SOLD(000 DMT)						
1. LEAD SELECT	34.418	36.418	36.418	36.418	36.418	34.950
2. ZINC SELECT	66.484	69.484	69.484	69.484	69.484	65.867
PAYABLE METAL						
3. LEAD (000 LBS) - SELECT	44692	47289	47289	47289	47289	45383
4. ZINC (000 LBS) - SELECT	69768	72916	72916	72916	72916	69120
5. SILVER(000 OZS)- SELECT	916	969	969	969	969	930
6. GOLD (000 OZS) - SELECT	5	5	5	5	5	5
SALES (US\$000)						
7. LEAD - SELECT	17877	18916	18916	18916	18916	18153
8. ZINC - SELECT	31395	32812	32812	32812	32812	31104
9. SILVER - SELECT	7324	7750	7750	7750	7750	7437
10. GOLD - SELECT	1249	1321	1321	1321	1321	1268
11. GRAND TOTAL	57845	60799	60799	60799	60799	57963
CONVERSION COSTS (US\$000)						
TREATMENT CHARGES						
12. LEAD SELECT	5507	5827	5827	5827	5827	5592
13. ZINC SELECT	12243	12796	12796	12796	12796	12393
14. TOTAL	17750	18623	18623	18623	18623	17985
OCEAN FREIGHT						
15. BASE COSTS	2139	2245	2245	2245	2245	2137
16. INSURANCE	0	0	0	0	0	0
17. TOTAL	2139	2245	2245	2245	2245	2137
OTHER						
18. CONVERSION COSTS(\$000/YR)	50	50	50	50	50	50
19. SUPERINTENDENT	61	64	64	64	64	60
20. TOTAL	111	114	114	114	114	110
21. TOTAL CONVERSION COSTS	20000	20981	20981	20981	20981	20233
22. NET REVENUE (\$000US)	37845	39818	39818	39818	39818	37730
23. EXCHANGE (\$C/\$US)	1.111	1.111	1.111	1.111	1.111	1.111
24. NET REVENUE (\$000CAN)	42050	44241	44241	44241	44241	41922

SALES AND CONVERSION SUMMARY

	1982	1983	1984	1985	1986	1987
CONCENTRATE SOLD (000 DMT)						
1. LEAD SELECT	34.418	36.418	36.418	36.418	36.418	34.950
2. ZINC SELECT	66.484	69.484	69.484	69.484	69.484	65.867
REFINABLE METAL						
3. LEAD (000 LBS) - SELECT	44692	47289	47289	47289	47289	45383
4. ZINC (000 LBS) - SELECT	69768	72916	72916	72916	72916	69120
5. SILVER (000 OZS) - SELECT	916	969	969	969	969	930
6. GOLD (000 OZS) - SELECT	5	5	5	5	5	5
SALES (US\$000)						
7. LEAD - SELECT	20111	21280	21280	21280	21280	20422
8. ZINC - SELECT	34884	36458	36458	36458	36458	34560
9. SILVER - SELECT	8240	8718	8718	8718	8718	8367
10. GOLD - SELECT	1498	1586	1586	1586	1586	1522
11. GRAND TOTAL	64733	68042	68042	68042	68042	64871
CONVERSION COSTS (US\$000)						
TREATMENT CHARGES						
2. LEAD SELECT	5765	6100	6100	6100	6100	5854
3. ZINC SELECT	13124	13716	13716	13716	13716	13266
4. TOTAL	18889	19816	19816	19816	19816	19120
SEAV FREIGHT						
5. BASE COSTS	2139	2245	2245	2245	2245	2137
6. INSURANCE	0	0	0	0	0	0
7. TOTAL	2139	2245	2245	2245	2245	2137
OTHER						
8. CONVERSION COSTS (\$000/YR)	50	50	50	50	50	50
9. SUPERINTENDENT	61	64	64	64	64	60
10. TOTAL	111	114	114	114	114	110
11. TOTAL CONVERSION COSTS	21139	22175	22175	22175	22175	21368
12. NET REVENUE (\$000US)	43595	45867	45867	45867	45867	43503
13. EXCHANGE (\$C/\$US)	1.111	1.111	1.111	1.111	1.111	1.111
14. NET REVENUE (\$000CAN)	48438	50963	50963	50963	50963	48337

