

002654

To

D. Marr

Date

September 16, 1977

From

J. C. Devitt

Subject 1978 PLAN ORE RESERVES

As requested, the following is a brief list of differences between scheduled ore projected in the September, 1976 forecast and the new September, 1977 forecast for the year 1978.

Grades in the new model, especially lead grade, have dropped significantly from that projected previously. The reasons are:

(1) Shift in the Ore Sources:

Attributing factors to different ore sources in the new as opposed to the old can be explained by several factors:

- a) The difference between scheduled start-up in 1976 and actual start-up. The plan at that time was to restart October 1st. Actual start-up results in a shift forward of the entire schedule of 62 days.
- b) Actual plan mill throughput was 10,000 TPD. This has not been achieved. Actually, the average from December 2, 1976 to September 1, 1977 averages only 8831 TPD. This pushes the schedule forward by an additional 32 days.

(2) Additional Ore Encountered in Upper Phase IV Benches:

On the 3830 bench, plan tonnage in the ore model was 469,000 tons. Actual tonnage encountered in this bench was 667,000 tons. This accounts for a further shift forward of approximately 20 days.

(3) New Ore Reserve Model:

Methodology in determining new ore reserves has changed in an attempt to come up with a more realistic model. Block sizes have been decreased to 50 x 50 x 20 feet. Grades are calculated for each block on the basis that a block value is influenced by diamond drill values lying in a surrounding elliptical area on the same bench level. This generally 'smooths' grades between diamond drill holes, unlike the previous model where actual diamond drill values were assigned to large blocks. In addition, the diamond drill assays that are given to the 20 foot intervals, and used in the new model, are somewhat differently arrived at than those previously worked out as the assay value for a block. The old model only incorporated combined values of 5% and above in its working, whilst the new model includes all grades averaged over the 20

effect of internal dilution
4% - 5% on 78 plan.
4.5% | 4.0%

foot interval, thereby giving a more realistic account regarding internal dilution. We know historically that on ore-pyrite contacts we encounter inevitable dilution in the ore grades from what has been planned. This is now allowed for in the new model, whereas it was not in the old. Also 1975 and 1976 diamond drilling was incorporated in the new model.

- (4) In the old model, 4-5% material was roughly estimated from E. N. Pennebaker's sections and was only a rough approximation. The new model includes all 4-5% material as determined accurately from ore blocks.
- (5) -A tabulation of ore sources between the two schedules is as follows:-

1978 ORE COMPARISONS

SEPTEMBER 1976 SCHEDULE (1975 MODEL)

<u>Bench</u>	<u>Phase</u>	<u>Tonnage</u>	<u>% Pb</u>	<u>% Zn</u>
3670	IV	377,783 ₁	4.2	5.8
3670	IV	33,500 ₁	1.9	2.6
3750	V	441,517	3.2	5.8
3710	V	1,278,304 →	4.0	6.3
3670	V	1,463,457	4.5	6.4
3630	V	55,439	3.6	6.1
	Total	3,650,000	4.1	5.9 ²

SEPTEMBER 1977 SCHEDULE (1977 MODEL)

3750 ³	IV	527,000	2.8	5.7
3710	IV	987,000	2.9	5.2
3870	V	94,000	3.2	5.4
3830	V	129,000	4.2	6.0
3790	V	296,000	2.3	4.4
3750	V	537,000	3.4	6.0
3710	V	1,060,000	3.4	5.9
	Total	3,630,000 ⁴	3.1	5.6

- 1) Low grade material included on this bench only
- 2) Zinc grade reduced by 0.2%
- 3) 40 foot benches calculated from 20 foot benches
- 4) 7 days reduced milling in February, 1978

Revised '78
157
155,000
291 - 1000 / 287
/60
89

As can be seen, the considerable shift forward of the entire schedule resulted in a deletion of higher grade material on 3670. This provides a much more suitable mining plan and better, wider working benches. However, 3670 material dropped from the new model could be re-inserted in the plan with a tightening up of phase configurations and a concentration on the lower benches. However, even by doing this, the schedule shift could not allow all previous 3670 ore to be mined in 1978. A quantitative estimate of production lost due to mining by splitting phases is impossible to predict. The splitting of Phase V to get to the 3670 would certainly lead to many operational inefficiencies. However, the Phase IV 3670 material could be developed and included with no particular problems.

Attached are tabulations of ore tons and grade by benches and phases as derived by the 1976 model and 1977 models for comparison.



J. C. Devitt
Chief Mining Engineer

JCD/mm

Attach.

ZONES 1 & 3 Sept. '76 ESTIMATE (000'S TONS)

	IV 2/6/21	V	VI	VII	VIII	IX	X	XI	XII	XIII												
3110		44	6.8/7.5									44	6.8/7.5									
3870	184	2.5/5.5	137	2.9/5.4					10	4.1/6.3		331	2.7/5.5									
3930	469	2.4/5.0	116	3.6/5.8					73	2.9/5.5		658	2.7/5.2									
3790	707	3.0/5.4	164	3.2/5.3					257	3.9/6.9	5	1.6/3.5	1133	3.2/5.7								
3750	611	3.3/5.3	441	3.2/5.8					143	3.0/4.7	146	3.0/5.2	1341	3.2/5.4								
3710	668	2.4/5.1	1,278	4.0/6.3	160	3.8/6.0			210	2.4/4.7	435	2.0/3.9	2751	3.2/5.5								
3670	483	3.9/5.5	1,463	4.5/6.4	477	4.4/6.1	42	4.2/5.3														
3630		1,187	3.2/6.1	559	4.1/5.9	512	2.3/4.1	101	2.1/3.6	8	3.8/6.5											
3570					650	3.2/5.6	292	3.1/5.3	179	1.9/2.4			210	3.0/6.2	88	2.9/5.9	1419	3.0/5.2				
3550						655	3.1/6.0	655	2.7/5.6	52	3.0/4.4		443	2.7/3.4	270	2.5/5.0	2075	2.8/5.1				
3510						457	4.5/7.0	1,229	3.8/6.4	129	2.6/3.6	1343	2.3/4.6	817	2.4/4.1	629	2.2/4.1	4604	2.9/5.1			
3470								768	3.6/4.8	1,500	3.3/4.5	532	3.1/4.6	534	3.5/5.2	1,134	2.7/4.8	4468	3.2/4.7			
3430								538	2.7/4.2	1,436	3.0/4.2	1,054	3.5/5.1	867	2.8/4.1	1,343	3.1/5.2	5238	3.1/4.6			
3390									861	2.7/4.3	630	2.8/4.9	452	2.4/4.9	464	2.0/4.6	2407	2.5/4.6				
3350																		490	2.2/4.4	490	2.2/4.4	
	3122	2.9/5.3	4,830	3.8/6.2	1,196	4.2/6.0	1,204	2.9/5.0	1,505	3.5/6.0	3,377	3.3/5.3	3,978	3.0/4.3	3,559	2.9/4.8	4,552	2.7/4.6	5,220	2.5/4.7	32,513	3.1/5.1

ZONES 1 & 3

SEPT '77 ESTIMATE

(000 TONS.)

	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII												
3910	27/57	49	55/74								49	5.5/7.4										
3870		163	31/53						59	3.3/4.0	222	3.1/4.9										
3830	132	27/57	129	42/60					74	2.4/4.8	335	3.2/5.6										
3740	905	23/47	296	23/44					160	3.0/6.2	1,362	2.4/4.8										
	617	28/61	537	34/60					310	2.6/4.0	13	2.8/5.0	1,476	3.1/5.6								
3710	987	29/52	1,215	3.3/5.7	123	32/52	144	27/43			140	2.2/4.6	264	2.2/4.0	2,873	3.0/5.2						
3670	893	3.3/5.1	1,393	3.7/6.2	516	4.3/6.1	173	2.0/4.1			121	1.8/3.4	6	2.2/3.6	3,091	3.5/5.6						
3630		1,310	2.9/5.9	603	3.5/5.1	225	2.4/3.5	106	1.6/3.2	34	1.3/3.2			491	2.3/5.1	2,769	2.8/5.2					
3590			637	2.6/4.4	232	2.7/5.2	196	1.6/4.1	74	1.7/3.6	47	2.0/2.6	6	2.9/5.2	582	2.4/5.0	71	2.9/6.3	1,845	2.4/4.7		
3550				11.5	5.1/8.0	22.5	2.2/4.1	171	2.5/4.2	566	3.3/4.4	268	3.3/5.2	688	3.0/4.1	277	2.2/3.9	2,310	3.0/4.5			
3510						213	3.4/5.3	425	4.6/5.7	1,115	3.1/4.3	544	2.6/3.8	1,028	2.6/4.3	174	3.2/5.0	4,229	3.1/4.6			
3470						618	3.8/5.3	806	4.2/5.1	962	3.1/4.4	835	3.5/4.2	1,283	2.5/4.5	155	2.8/5.3	4,658	3.3/4.7			
3430								719	3.5/5.2	1,454	3.1/4.3	675	3.1/4.2	794	2.9/4.9	797	2.8/4.3	4,439	3.0/4.5			
3390									609	2.4/4.3				979	2.4/4.0	591	2.8/4.4	2,179	2.5/4.3			
3350																	877	2.3/4.1	877	2.3/4.1		
	3533	2.8/5.2	5,082	3.3/5.8	1,879	3.4/5.2	889	2.8/4.8	2,087	3.1/4.9	2,227	3.7/5.1	4,752	3.0/4.3	2,330	3.1/4.2	6,710	2.6/4.5	3,224	2.6/4.3	32,715	3.0/4.8

To

J. C. Devitt

Date

August 17, 1977

From

J. W. Mustard

Subject ORE AVAILABILITY ON 3830 BENCH, PHASE IV

A comparison of tonnage predicted against tonnage mined was done for the 3830 bench (40' cut), Phase IV.

As a further comparison, the 1977 tonnage and grade model was also used to predict tonnages and grades.

<u>Model</u>	<u>Blasthole Assays</u>	<u>1977</u>	<u>1975</u>
Estimated Tons	667,000	585,000	469,000
Estimated Pb %	2.4	2.2	2.4
Estimated Zn %	4.5	4.2	5.0

Difference

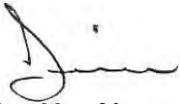
Tons	-82,000	-198,000
Pb %	-0.2	-
Zn %	-0.3	+0.5

Variance

Tons	-12%	-30%
Pb %	-8%	-
Zn %	-7%	+11%

There was a 30% gain in ore as predicted from the 1975 tonnage and grade model, and a 12% gain compared to the 1977 tonnage and grade model.

The "gain" in ore should only be restricted to the 3830 bench, i.e. not projected down to lower benches. Near external contacts, it is also possible to realize a loss in ore predicted, thus nulifying a gain.



J. W. Mustard
Mine Geologist

JWM/mm

Cyprus Anvil Mining Corporation

Interoffice Correspondence

C - D M

To
J. C. Devitt

Date
July 20, 1977

From
J. W. Mustard

Subject PROGRESS REPORT OF THE TONNAGE AND GRADE ESTIMATES, FARO DEPOSITS, ZONE 1 AND 3

In 1977 a complete revision of the tonnage and grade model for the Faro Deposits, Zone 1 and 3, is being undertaken.

A new interpretive model was drawn and new bench plans are being constructed. This major update incorporates the results of the 1975 and 1976 development drilling (36 holes).

Summary:

- 1) All assayed intersections were used to calculate grades; there was no discrete cutoff in sections, as in previous models.
- 2) Tonnages and grades are calculated on 20' benches.
- 3) Ore blocks contain a maximum of 6481.5 tons (3.5 SDT/BCY).

Estimation Method:

The estimation method has been completely revised from previous models. The dip projection method has not been used to assign grades to ore blocks.

The actual 20 ft. weighted assay is used for each hole. An elliptical method of smoothing between drill holes has been used to assign grades to individual ore blocks. This method uses the "closest hole criteria" within the ellipse and thus avoids overweighting of abnormally high or low values. Each hole within the ellipse is used to calculate a grade.

As with previous models, grades are biased in a northwest direction to coincide with a mineralogical zoning within the deposit.

Comparison of the 3910 Bench:

A comparison of the 3910 bench with the 1977 and 1975 tonnage and grade estimates indicates that the 1977 model is more accurate.

CYPRUS ANVIL

Tonnages and grades were compared using the 3910 and 3930 benches of the 1977 tonnage and grade model and a weighted average obtained for both benches.


<u>Model</u>	<u>1977</u>	<u>1975</u>	<u>Blasthole Assays</u>
Estimated Tons	3,433,000	3,233,000	3,789,000
Estimated Pb %	4.1	4.6	4.2
Estimated Zn %	6.3	7.0	5.9
<u>Variance</u>			
Tons	-9%	-15%	
Pb	-2%	-10%	
Zn	+7%	+19%	

There is an improvement of 6% in predicted tons, 8% in lead and 12% zinc, for an overall improvement of 9% over the 1975 model.

Reliability of Data:

As in previous models, there has been an overestimation of available Zn metal tons and the underestimation of available Pb metal tons.

Possible errors in the original assays appears to be the major cause of Pb and Zn deviations at this time. A program of systematically reassaying selected drill holes is in progress to overcome this problem.


J. W. Mustard
Mine Geologist

JWM/mm

To: C. Devitt

Date: August 18, 1977

From: J. W. Mustard

Subject: PROGRESS REPORT OF THE TONNAGE AND GRADE ESTIMATES, FARO DEPOSITS ZONE 1 AND 3; COMPARISON OF THE 3750 BENCH

A comparison of the 3750 bench (40' bench) with the 1977 and 1975 tonnage and grade estimates indicates that the 1977 model is more reliable.

Tonnages and grades were compared using the 3750 and 3770 benches of the 1977 tonnage and grade model and a weighted average obtained for both benches.

<u>Model</u>	<u>Blasthole Assays</u>	<u>1977</u>	<u>1975</u>
Estimated Tons	1,819,000	1,723,000	1,566,000
Estimated Pb %	3.8	3.8	4.1
Estimated Zn %	5.7	5.0	6.2
<u>Difference</u>			
Tons		-96,000	-253,000
Pb %		-	0.3
Zn %		-0.7	+0.5
<u>Variance</u>			
Tons		-5%	-14%
Pb %		-	+9%
Zn %		-13%	+9%

There is an overall improvement of 4% in the 1977 tonnage and grade model as compared to the 1975 tonnage and grade model.

No estimate of reliability of data is presented since this comparison is for only that portion of the 3750 bench which has been mined.



J. W. Mustard
Mine Geologist

JWM/mm

000⁵ tons Sept 1977 5yr. Plan.

	<u>Zone 1+3</u>	<u>% Pb</u>	<u>% Zn</u>	<u>Zone 2</u>	<u>% Pb</u>	<u>% Zn</u>	<u>Oxide</u>	<u>% Pb</u>	<u>% Zn</u>	<u>Total</u>
1979	3,322	3.6	5.8	328	3.4	5.3	-			3,650 3.5/5.6
1980	760	3.2	6.0	2,900	3.4	5.0	-			3,660 3.3/5.2
1981	2,534	2.8	4.9	-	-	-	1,116	2.9	4.8	3,650 2.8/4.9
1982	3,021	3.5	5.1				629	2.9	4.8	3,650 3.4/5.0