

MEMORANDUM

TO: Andrew McIlwain

FROM: Rob McLean

SUBJECT: Mt Farrell Mine Options

Introduction

This memorandum discusses two options for mining at Mt Farrell. The first option, Mt Farrell Deeps, looks at a possible resource below the historic New North Mt Farrell workings. The second option, Mt Farrell Open Pit, looks at a near surface resource in the vicinity of the historic Farrell workings.

Historic Production

Historic production from the Farrell Mine area occurred from two mines the North Mt Farrell (NMF) and the New North Mt Farrell (NNMF). The North Mt Farrell operated from 1899 to 1939 and produced 432,000t at 11.4% Pb, 2% Zn and 370g/t Ag. The New North Mt Farrell operated between 1933 and 1973 and produced 299,000t at 14.9% Pb, 2% Zn and 506 g/t Ag. Other small mines on the field include the Mt Farrell, Mt Farrell South and North, and South and Central Mackintosh.

The lead-zinc-silver ore occurs in veins which trend north-south and are found within zones of structural disruption. The lodes vary in width from 0.2m to 9m averaging 1.6m.

The Farrell mines exploited 14 different lodes, some of which persist for hundreds of metres along strike and down dip. The others are branches from the main lodes or less persistent veins running parallel or sub-parallel to the main structures. Some ore occurs in narrow stringers adjacent to the lodes, which were usually not mined as they tended to be zinc rich and this interfered with lead recovery.

Geology – from report by Angela Lorrigan in August 1996

The Farrell Lodes occur within the Cambrian Mt read Volcanics in the Farrell Slates Formation. These rocks lie along the eastern side of the Henty Fault, a structure which dominates the Tullah area, separating a pile of felsic volcanic known as the Central Volcanic Sequence from the Farrell Slates. The structure dips steeply to the west, and the slates and volcanics adjacent to the fault have a strong cleavage which is predominantly parallel to the dip and strike of the fault. In the slates, bedding is at a very low angle (2-10 degrees) to cleavage.

The Lodes are found in zones of structural disruption, marked by kink folding adjacent to planar faults filled with graphitic pug and quartz-carbonate (predominantly siderite) veining. The ore is found within fault zones and in quartz-carbonate stringers next to them. From observations of the mineralisation in the core and old mine workings it appears that the kink folding post dates ore deposition.

Resources

In 1985, EZ reported a Measured Resource of 71,000t at 12.3% Pb, 4.8% Zn, 0.24% Cu and 378 g/t Ag at the NMF mine below 9 level at a depth of 250m below surface. This drilling was carried out from underground prior to the mine closing in 1973. Drill sample results from this resource are shown in Table 1. The average ore intersection was 1.4m. The deposit is open at depth and has not been drilled along strike at depth.

Collar Location	Drill Hole Number	Intersection					
		From (m)	To (m)	Pb%	Zn%	Ag g/t	True Thickness (m)
Surface	1 F (surface)	471.30	474.3	4.3	1.3	136	3.1
9L F/W Drive Nth	F 27	30.8	33.1	9.8	1.8	202	1.2
9L F/W Drive Nth	F 28	31.4	33.1	26.5	2.1	923	0.9
		34.5	35.7	22.7	6.1	629	0.5
9L F/W Drive Nth	F 29	30.0	30.6	12.4	2.0	446	0.3
9L 14N X/C East	F 30	35.8	36.3	1.4	4.2	60	0.3
9L 13N X/C West	F 38	63.1	65.4	16.2	5.7	426	1.7
		78.3	80.2	33.5	5.6	896	1.5
	F 53	66.7	67.1	1.9	0.42	115	0.3
	F 59	54.5	56.1	7.2	4.6	183	1.5
9L North Dr. Sth	F 39	51.8	54.3	1.9	2.4	74	2.4
		63.3	64.0	16.6	1.9	338	0.8
9L 6N Dr. South	F 40	Nil					
9L 6N Dr. North	F 41	Poor Recovery					
9L Centre H/W X/C	F 57	Nil					
9L " " "	F 58	38.1	41.8	5.6	4.4	150	3.4
9L South End	F 44	Nil					
9L South End	F 45	43.9	47.4	23.0	14.0	818	3.2
9L South End	F 46	44.5	45.4	3.1	1.75	79	0.8
9L South End	F 47	Nil					
9L South End	F 48	42.1	44.5	11.5	6.6	364	2.1
9L South End	F 49	28.0	28.7	59.4	2.0	2155	0.5
9L Sth End X/C W	F 50	76.4	77.7	10.5	5.7	226	1.4
9L Sth End X/C W	F 52	44.9	46.4	5.5	5.5	133	1.2
		50.3	51.2	2.1	20.0	76	0.8
9L Sth End X/C W	F 53	Nil					

Table 1 – Sample results from EZ drilling.

In 1996, Pasmaenco Exploration carried out an exploration program to investigate the potential for an open cut resource. Eleven short diamond holes were drilled in the vicinity of the two Farrell mines, targeting shallow extensions of the known orebodies. Sampling of mine dumps and geological mapping was also undertaken. The conclusions of this work were:

- Identified continuations of the Farrell lodes close to the surface and the potential for a resource of approximately 100,000t at 6.3% Pb, 1.6% Zn and 201 g/t Ag.

- The orebodies are narrow veins that have limited tonnage potential.
- Potential for additional lodes to be found to the east of the known orebodies
- There is a considerable volume of mineralised dump material in the Farrell area.

In July 2005, Saracen Metals reported an estimated Mineral Resource of 180,000t at 11.0% Pb, 4.0% Zn, 0.2% Cu and 342 g/t Ag, for the area below 9 level (shown in red on Figure 1). The Mineral Resource was reported as follows.

Measured Resources: 51,000t at 11.9% Pb, 4.2% Zn, 0.2% Cu and 358 g/t Ag

Indicated Resources: 22,000t at 11.7% Pb, 4.1% Zn, 0.2% Cu and 351 g/t Ag

Inferred Resources: 107,000t at 10.7% Pb, 3.7% Zn, 0.2% Cu and 314 g/t Ag

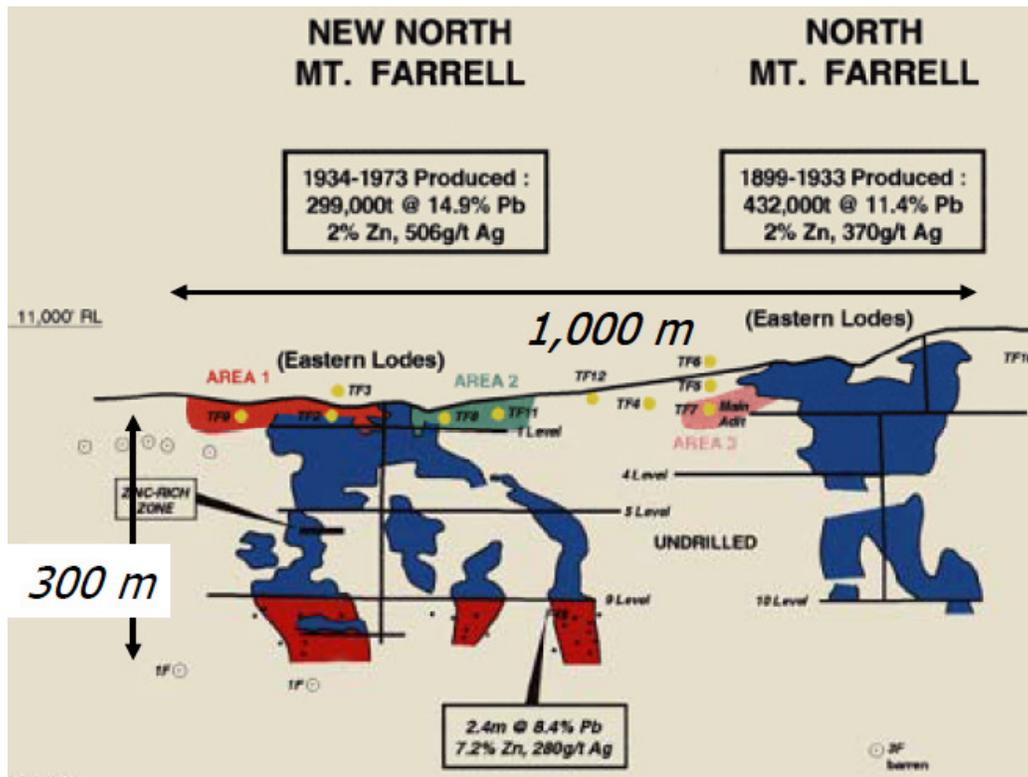


Figure 1 – Farrell Mine Long Projection

In late 2005 early 2006 Saracen drilled a total of 8 holes (2450m of diamond core) to test the area around and below the earlier resource area. No further resource update was made as a result of this drilling and the intercept grades reported were much lower than what had been reported previously.

- Zn grades ranged from 0.5% to 6.2%,
- Pb grades ranged from 1.1% to 2.1%
- Ag grades ranged from 1 g/t to 48 g/t

Key points reported were:

- Mineralisation is not limited to the shales and slates of the Farrell Group Sediments. Mineralisation also extends into what has been described as the Mackintosh Tuff. This tuffaceous schist has not previously been recognised as containing ore bearing material in the environs of the NMF. Structures observed in core suggests that it is likely to be a manifestation

- of a continuous geologic event that the path of mineralisation crosses, rather than a wedge or unconformity of the overlying volcanic sequence.
- Zinc and copper mineralisation appears to predominate over lead and silver at depth. This is most evident in the deeper holes drilled on the southern edge of the NNMF area but is less obvious in the northern deep holes.
 - The footwall of the ore lode in the most southern block, appears to be truncated by a substantial fault with associated fault breccia and clay pug. The geologic setting of this ore shoot (which returned the highest grade intersection of the drill programme) and its position (between the NNMF and the NMF) presents opportunities for discovering larger shoots and continuations of existing shoots in untested ground to the south.
 - The ore lodes appear to be manifest in a predictable, repeatable pattern along strike and down dip. Discrete markers; Interbed Zone; Major Fault (referred to as the Henty Fault by previous explorers, but not confirmed in the results of the Saracen drilling program); first appearance of cream-coloured carbonate veining; and the main lode zones can be used to predict the relative positions of intercepts of mineralisation of both sphalerite and galena.

Dewatering

The historic workings are currently full of water and would require dewatering prior to mine development occurring. From what I understand there is water flowing from the shaft or adits into the nearby creek which runs into Lake Rosebery. Coffey Geosciences were commissioned, by Saracen, to make an initial assessment of the mine water quality and discuss options for disposal into Lake Rosebery. The report suggested a possible option was to pump the water into the deeper part of the lake (30 to 50m below surface). Further characterisation of the toxicity associated with the shaft water is required. One method is toxicological testing using a NATA registered laboratory. This type of testing uses living organisms to assess the potential effect of discharging contaminated water and provides a better indication of likely impact than chemical analyses alone.

Mt Farrell Deeps Mine Design

The reported resource is 250m to 350m below surface and directly below the existing NNMF mine workings. The existing main shaft is approximately 200m deep with an internal shaft extending below this point to a depth of 265m.

The existing NNMF mine shaft is approximately 1.3m x 3.3m and is considered too small to be used as a primary access for a modern trackless mine and as such a decline is required from surface. The existing shaft can be used to provide ventilation and as an emergency egress.

The surface site is located on the side of Mt Farrell and it is assumed that the decline portal will commence from within a cutting excavated into the side of the mountain. The site is estimated to be approximately 25 hectares in area to allow for mine offices, ablutions, workshop and waste rock storage.

The decline will be mined to a similar dimension as the Henty decline (5m x 5m) so as to allow use of 35 tonne trucks or similar. It is assumed that a contractor will be employed to carry out all mining activities.

Raiseboring of an exhaust ventilation shaft will be required. This shaft will be constructed in 2 stages in line with decline development. Due to the small size of the mine a 3.1m diameter shaft has been assumed.

The NNMF main shaft will be fitted out with a ladderway to provide emergency egress and fresh air.

The mining method is assumed to be bench stoping using waste rock as backfill similar to the method currently used at Henty.

Ore will be trucked to a surface ROM pad then transported to Rosebery via road trucks for processing.

The Rosebery operation is currently producing around 700 to 800ktpa, which is below the production rate of around 900ktpa which was in place back in the late 1990's. Therefore it would appear that the Rosebery concentrator has between 100kt and 200kt of spare capacity. As such a production rate of around 150ktpa from the Farrell operation would help fill this spare capacity.

Mt Farrell Deeps Financial Evaluation

In order to assess the viability of a mining operation at Mt Farrell Deeps I have estimated a capital cost then looked at what mining reserve is required to deliver a 15% return on the capital investment. To allow for the varying capital cost that is likely to come from varying the reserve I have assumed a reserve of 2000t per vertical metre could be achieved at Farrell. Therefore adding an additional 200,000 tonnes will require an additional 100 vertical metres of decline, vent shafts and other capital development.

I have assumed a resource to reserve conversion rate of 60% and assumed that the resource grade would be diluted by 20%. Using the resource grade reported by Saracen and diluting it by 20% results in a reserve grade of 8.8% Pb, 3.2% Zn and 274 g/t Ag.

I have assumed Rosebery concentrator recoveries of 72% for Pb and Ag and 85% for Zn. I have assumed a Zn concentrate grade of 50% Zn and a Pb concentrate grade of 63% Pb and 1958 g/t Ag (assumes all Ag goes to the Pb conc).

Smelter revenue was estimated using treatment charges I found on a Nyrstar document from 2009 and typical payable metal percentages sourced from the AUSIMM Cost Estimation Handbook, 1993.

The Pb and Zn price used was \$1850 per tonne and the Ag price used was \$28.50 per ounce (rounded LME spot prices 5 June 2012). A US\$/A\$ exchange rate of 1.0 was assumed.

Capital costs were estimated using data from a recent feasibility study and assumed a contractor will carry out all mining activities.

Operating costs used were estimated based on adjustments to current Henty costs and first principles estimates.

Mining and geology	\$110/t
Transport	\$10/t
Processing	\$40/t (Bass Metals – for Que River to Rosebery)
Administration	<u>\$10/t</u>
Total	<u>\$170/t</u>

Rail and freight charges were estimated using data from a recent feasibility study. I have assumed that these costs are not included in the \$40/t processing charge.

Rail to Burnie	\$20/t concentrate
Handling and storage	\$15/t concentrate
Port charges	\$1/t concentrate
Ocean Freight	<u>\$35/t concentrate</u>
Total	<u>\$71/t concentrate</u>

I have assumed a state royalty of 4% of net sales revenue.

In order to achieve a return on capital of 15% would require a resource of 1.65Mt which converts to a reserve of 1.0Mt. This would generate a profit of about \$11M and require a capital investment in the order of \$75M for a mine that would eventually extend to a depth of over 750 metres below surface.

Given the production history of the Farrell mines and the local geology it would seem unlikely that a resource in the order of 1.6Mt could ever be achieved.

A more realistic scenario is likely to be a reserve of about 400kt extending say 200m below the old workings to a depth of about 650 metres, requiring a capital investment of about \$50M. This results in a loss of over \$14M or a return of minus 30%.

As such the development of a Mt Farrell Deeps project is unlikely to be viable.

Mt Farrell Open Pit Mine Design

Work carried out by Pasmenco Exploration in 1996 indicated that there was potential for a near surface resource in the order of 100,000t at 6.3% Pb, 1.6% Zn and 201 g/t Ag.

Mining of this ore would be by small open pits similar to those mined recently at Que River by Bass Metals with a production rate of about 50ktpa achieved. The ore would be trucked to Rosebery for processing.

Mt Farrell Open Pit Financial Evaluation

I have assumed a reserve of 150,000 tonnes at 5.7% Pb, 1.4% Zn and 181 g/t Ag.

Processing performance, smelter returns and metal prices were the same as those used for Mt Farrell Deeps.

Capital costs were estimated to be about \$2M.

Operating costs were estimated based on data reported by Bass Metals.

Mining and transport	\$85/tonne
Processing	<u>\$40/tonne</u>
Total	<u>\$125/tonne</u>

Rail and freight charges and royalties were the same as those used for Mt Farrell Deeps.

Using these assumptions results in a profit of \$4M from the capital investment of \$2M. Development of a small open pit project has the potential to generate a small positive cashflow

Conclusion

Development of a Mt Farrell Deeps project is unlikely to be viable.

Development of a Mt Farrell Open Pit project has the potential to generate a small positive cashflow.

