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MT. BISCHOFF TIN PROSPECT
EXPLORATION LICENCE 13/79
TASMANIA

ANNUAL REPORT ON EXPLORATION
AND DEVELOPMENT ACTIVITIES
1984/85

OPEN FILE

June 1985

R02232CK1

INTRODUCTION

Exploration and development work performed on the Mt. Bischoff tin deposits during the period July 1984 to June 1985 has been heavily influenced by the continued imposition of production quotas by the International Tin Council. As a result, it is not possible to gain a Mine Dispatch Quota in Australia for mines which were not in production or under development in 1981.

The Mt. Bischoff property was nearing completion of the exploration and development feasibility study phase in 1981. However, capital expenditure on development had not begun despite the expenditure of over \$3 million on drilling and project study work.

Work programmes for 1984/85 reflected the desire to obtain development of the demonstrated reserves via continued work on development options and timing, associated with obtaining a market outlet via the lifting of quotas or, via the possibility of obtaining a mine dispatch quota through producers which were in operation during 1981.

Work conducted included:

1. Sulphide Flotation Testwork - performed on oxidised ore taken from Pig Flat.
2. Monitoring of Tin Market and Australian Quota situation.
3. Review of Development Options.

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1. Sulphide Flotation Testwork

Mine planning optimisation work performed during the previous year pointed to early production from the Pig Flat area. It was realised that ore in this area, and other near surface areas on the property, is oxidised to secondary pyrite and had not been adequately tested for sulphide removal in previous testwork.

Samples from Pig Flat were procured and tested in Kalgoorlie. Testwork results are contained in Appendix 1. These results indicate the following:

- . Oxidised surface ore will have high natural acidity.
- . Sulphides can be activated and removed with marginally less efficiency than for fresh DSL ore, ie 88% efficient (see Tests 1 & 2).
- . Tin loss to sulphide concentrate is slightly higher than for fresh DSL ore (see Tests 1 and 2).
- . Attempts to improve sulphur elimination resulted in excessive tin loss (see Tests 3 to 8).

2. Monitor of Tin Market and Australian Quota Situation

The market for tin metal was monitored throughout the year. A study on the market with most current data is included in Appendix 2. This study indicates that current ITC quota system is not being effective in significantly reducing visible tin stocks, due to expansion of production from non ITC countries and smuggling from ITC countries. It is concluded that quotas are not likely to be lifted before the end of the 6th International Tin Agreement in mid 1987.

As the Mt. Bischoff project was not operating or under development in 1981 it is not possible for it to be allocated a specific Mine Despatch Quota.

The mechanism for transfer of unused quotas within Australia has been under review by the Federal Department of Trade and the possibility of gaining access to a suitable quota was pursued during the year, including discussions with Aberfoyle Ltd. concerning the Cleveland quota. It has not been possible to come to any agreement at this stage.

3. Review of Development Options

Development options were reviewed during the year incorporating previous mine planning particularly with respect to use of the Cleveland plant and facilities.

Factors crucial to the project are the timing of development and the possibility of a significant drop in the price of tin if all quotas are lifted with the ending of the 6th ITC Agreement.

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MT. BISCHOFF JOINT VENTURE

EL 13/79

WARATAH, NW TASMANIA

Expenditure for period July 1984 to June 1985

Actual	July 1984 to April 1985	\$42,352
Forecast	May to June 1985	3,500

		\$45,852
		=====

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METALS EXPLORATION LIMITED
METALLURGICAL LABORATORY

Testwork on Oxidized Mt. Bischoff Ore

A laboratory investigation has shown that the separation of sulphides from the non-sulphide constituents of ore sampled from Pig Flat and Mt. Bischoff by flotation requires more effort than was found necessary with "fresh" drill core material. Even then, the same degree of sulphide/cassiterite separation has not been achieved in the tests carried out (8 in total). Generally, when sulphide recovery was high, the concentrate also contained a large proportion of tin, and where the tin loss into the concentrate was low, a considerable proportion of sulphides remained in the tailings.

For the testwork the received material was air-dried, stage-crushed to pass 3.3mm and ground to give a fineness of 80% passing 75 micron.

The following reagents were tested:

Activator : Copper sulphate
Frother : MIBC, TEB, Teric 401
Depressant : GUARTEC
Collector : Sodium Ethyl Xanthate, Potassium Amyl Xanthate,
Aero Promoter 412, Aero Promoter 3501

Due to the advanced stage of oxidation, the pulp pH of the ground ore was very low (less than 2), and the pulp was heavily loaded with soluble metal ions. Consequently, in the first test, at natural pH, flotation was very sluggish. A large quantity of collector (S.E.X.) was necessary, and even after 1 hour flotation there still appeared to be a lot of sulphide in the pulp (confirmed by assay: approx. 12% of total S).

It was impossible to maintain a suitable froth with MIBC, especially after the initial heavy flotation stage. Likewise, Teric 401 had very little effect, but the third frother tried, TEB, gave good froth conditions. TEB was used in all subsequent tests.

In the second test the Cyanamid Collector Aeropromoter 3501 was substituted for S.E.X. Flotation response appeared to be better than with S.E.X., and with half the addition rate and half the flotation time the final results were very similar to those in the first test.

In tests 3 and 4 the pulp was stirred for 10 minutes after grinding and arbitrarily deslimed by settling and decantation in

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in a glass cyclinder. The decanted slime fraction was assayed separately, the settled solids filtered and washed three times and then repulped for flotation. Cyanamid Aeropromoter 412, used in test 3, appeared to have a very low degree of selectivity, with only 70% of total S, but 33% of Sn reporting in the concentrate.

The use of P.A.X., in test 4 achieved the same level of sulphide recovery as in tests 1 and 3, but far more Sn reported in the concentrate.

Details and results of all tests are shown on the enclosed test sheets.

The possibility of lowering the xanthate consumption by raising the pulp pH with soda-ash was considered, but not further investigated, when a preliminary test showed that it would be necessary to add soda-ash at the rate of 48 Kg/tonne to raise the pH to 8.5.

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DETAILED EXPLANATION LTD - LABORATORY FLOTATION TEST SHEET

ONE SAMPLE MT. BISCHOFF OXIDIZED ORE

DATE 30-7-54

LAB: MRCI

FLOTATION						Reagent Addition (GRAMS PER TONNE)					REMARKS	
TIME	% Solids	MINS	ADDITION POINT	pH	Water ml	CaSO ₄	SEX	Quartz	MIBC	T.E.B.		
GRINDING	60	3 1/4	Ball mill			200						Grind ~ 50% 200#
Conditioning	30	3	2 1/2 Cells	1.9	1500		200					
Reagent 1	18	30	"	2	1000		500*	400				* XANTHATE ADDED IN STAGES AS REQUIRED.
Conditioning 2		5	"				200					
Reagent 2		25	"	2			300*					MIBC PRODUCED A VERY BRITTLE, UNSTABLE FROTH, WHICH COLLAPSED COMPLETELY WITH EACH XANTHATE ADDITION. VERY LARGE QUANTITIES OF MIBC WERE REQUIRED TO MAINTAIN FROTH. CHANGING TO T.E.B. FROTH TOWARD THE END OF TEST GAVE VISIBLY IMPROVED FROTH CONDITIONS.
						200	1500	400	LOTS			

TIME	ASSAYS				ANALYSIS DISTRIBUTION						
	% Cu	% Sn	% Mg	% S	Sn	Cu	S	Sn	% Distribution Mg	S	
COARSE FROTH	42.77	0.14	0.00	42.2	17.2	17.11	1434.82	6.57	11.04	88.22	
FINE FROTH	57.27	2.55	2.40	4.38	145.94	137.35	244.24	93.43	35.96	11.78	
Calc. Head	100.00	1.53	1.43	19.34	163.16	154.94	2679.77	100.00	100.00	100.00	
Ass. Head		1.35	1.29	21.4							
Solvent	WEIGHT LOSS = 7%										
TOTAL SOLIDS	RECOVERED										
100% OF TOTAL WEIGHT											

MINERAL EXPLORATION LTD - LABORATORY FLOTATION TEST SHEET

MBC 3

ORE SAMPLE Mt. Rose

DATE 1.8.54

FLOTATION						Reagent Addition (grams per tonne)					Remarks	
Time	% Solids	MINS	ADDITION	pH	D. SOL	CaSO ₄	A.P. 412	TEB	FLUOR			
Conditioning	60	3/4	None									
Leaching		10	None	1.9								
Desliming			Spencer									
Conditioning	~ 30	5	3/4 Cell	4.2	1500	200	250					
Conditioning	~ 18	8	"		1000		100					
Conditioning		2	"		"		100					
Conditioning (1st)		15	"	4.3	"		150					
						200	600					

* THIS REAGENT WAS SUPPLIED AS AN ALLEGED SOLUTION OF UNKNOWN STRENGTH. ADDITION RATE IS BASED ON THIS SOLUTION NOT ON DRY SOLIDS BASIS.

ANALYSIS	ASSAYS				% DISTRIBUTION					
	% wt	% S _u	% MgO	% S	S _u	Quartz MgO	S	S _u	MgO	S
Re. CONCENTR.	47.51	1.20	0.55	21.11	25.37	24.65	11.07	32.61	16.43	21.12
Re. TAILINGS	45.71	2.15	2.33	1.00	93.97	105.11	11.11	55.53	70.07	2.25
SLIME	10.65	1.40	2.01	55.0	14.11	20.26	53.20	2.56	13.50	27.63
CHC. HEAD	100.00	1.63	1.40	15.7	164.87	150.62	28.06	100.00	100.00	100.00
AN. HEAD		1.35	1.29	2.00						

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NEUBERG REFINEMENT LTD - LABORATORY FLOTATION TEST SHEET

LABORATORY: MR (4)

ORE SAMPLE: MT. RISCHOFF Oxidized ore

DATE: 3 SEP 68

FLOTATION						Reagent Addition (grams per tonne)					Remarks
TIME	% SPENT	MIN	ADJUSTING PRINT	pH	SPENT	CuSO ₄	P.A.X.	T.E.B			
STARTING	00	3/4	BEAKER								
LEACHING			BEAKER	1.0							
PREPARING											
CONDENSING	30	5	2 1/2 Ltr	4.4	1500	260	260	200 mg/ml			
FLUTATION	18	14	"	↓	1500		100				
CONDENSING		1	"	↓	"		100				
FLUTATION		15	"	5.4	"		50				
						260	450				

TIME	ASSAYS				% DISTRIBUTION					
	% Cu	% Sn	% MgO	% S	% Sn	Counts MgO	% S	% Sn	% MgO	% S
Re. Condensate	42.57	0.69	0.49	43.7	29.37	26.86	1800.31	18.29	15.42	55.80
Re. Flotation	47.07	2.50	2.05	0.59	117.73	96.53	27.75	73.34	71.36	1.33
Slime	16.34	1.30	1.73	20.0	13.44	17.89	206.80	8.37	13.22	9.87
Waste Water	100.00	1.50	1.26	20.0	160.54	135.25	2074.89	100.00	100.00	100.00
Loss (Total)		1.35	1.29	21.4						

BEAUMONT EXPLORATION LTD - LABORATORY FLOTATION TEST SHEET

PROJECT: MBC 5

ORE SAMPLE: MT. BISHOP OFF EX-101200 ore

DATE: 6.8.84

FLOTATION						Reagent Addition (grams per tonne)					Remarks
Time	% Solids	mins	Amount added	pH	Reagent	CuSO ₄	PAX	TEB	Flux		
Conditioning	60	3/4	60 ml H ₂ O								
Filter & wash			400 ml H ₂ O	1.9							
Conditioning	30	5	200 ml H ₂ O	4.3	1500	200	200	as			
Re. Flotation	18	30	"		1000		300*	10,000			
											* stage-added during rougher period
						200	500				

Description	ASSAYS					% DISTRIBUTION					
	% Cu	% S	% MgO	% SiO ₂	% Fe	Si	units HgC	S	S ₂	% dist MgC	S
Re. concentrate	47.31	0.63	6.58	43.4		20.01	27.44	20.57-25	17.55	15.88	43.87
Re. tails + 35% " " - 35% " " - 35%	26.67	2.15	2.12	1.95	2.66	37.34	56.54	52.01	33.75	35.91	2.35
" " - 35%	22.15	3.50	2.24	3.10		77.65	49.62	68.67	45.63	34.14	3.14
" " - 35%	3.87	1.35	3.63	3.45		5.32	11.73	13.35	3.07	8.07	0.61
Calc. head	100.00	1.58	1.75	20.4		169.90	145.33	2187.25	100.00	145.33	100.00
Ass. head		1.35	1.29	21.4							

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DETAILS FLOTATION TEST - LABORATORY FLOTATION TEST SHEET

M806

ORE SAMPLE MT. BISCHOFF OXIDIZED ORE

DATE 14-8-54

FLOTATION						Reagent Addition (grams per tonne)					Remarks
Process	% Solids	MINS	ADDITION POINT	pH	Rotor RPM	Cu ₂ SO ₄	PuX	Querc	TEB		
GRINDING	60	3 1/4	20 Mill VACUUM FILTER	1.4							
FILTER & WASH											
CONDITIONING	30	5	26.2 COL	3.8	1500	200	200				
Re. FLOTATION	18	30	"	3.9	1600		400	100	as required		
						200	600	100			

ANALYSIS	ASSAYS					% DISTRIBUTION					
	% wt	% Sn	% MgO	% S	% Sn	Sn	units MgO	S	Sn	% DISTRI ^{ns} MgO	S
Re. CONCENTRATE	46.93	0.90	0.58	42.6		42.24	27.22	1999.22	22.69	17.64	97.60
Re TAILS +35µ	26.57	2.15	2.36	0.40	} 2.71	57.13	62.71	10.63	30.70	40.64	0.52
" -35µ	20.60	3.80	2.26	0.72		76.00	45.20	14.40	40.84	29.29	0.70
" SLIME	6.50	1.65	2.45	3.71		10.73	19.18	24.12	5.77	12.43	1.18
OPCL. HEAD	100.00	1.86	1.54	20.5		186.10	154.31	2048.37	186.00	100.00	100.00
ASP. HEAD		1.35	1.29	21.4							

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BEAUBI MINERALS LTD - LABORATORY FLOTATION TEST SHEET

ORE SAMPLE MT. BISCHOFF OXIDIZED

DATE 29.8.84

LAB NO: MBO 8

FLOTATION						Reagent Addition (grams per tonne)					Remarks
	% Solids	MINS	ADDN. Pblnt	pH	ROTOR R.P.M.	CaSO ₄	A.P. 3501 (CYAN.)	QUARTZ	TEB FATHOR	S.E.X.	
GRINDING	60	3 1/4	ROB MILL	1.6							
FILTER + WASH			VAC. FILT.								
CONDITIONING	30	5	2% CaCl ₂	4.5	1500	200	250				
RO. FLOTATION	18	30	"	4.6	1000		100	2.50		200	
						200	350	250		200	

	ASSAYS					% DISTRIBUTION					
	% wt	% Sn	% MnO	% S	% Sn	Sn	MnO	S	Sn	MnO	S
	RO. CONCENTRATE	49.04	0.82	0.63	42.0		40.21	30.90	2059.68	23.79	21.46
RO. TAILS + 3% SLIME	26.46	2.20	2.21	1.50	2.53	58.21	58.48	31.69	34.44	40.60	1.85
" " - 3% SLIME	20.21	3.25	2.05	1.55		65.68	41.43	31.33	38.85	28.77	1.46
" " SLIME	4.29	1.15	3.08	3.00		4.93	13.21	12.87	2.92	9.17	0.60
CHLC. HEAD	100.00	1.57	1.34	19.9		169.03	144.02	2143.57	100.00	100.00	100.00
KG. HEAD		1.35	1.29	21.4							

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Appendix 2TIN MARKET AND QUOTAS
1984/85Summary

Export controls under the Sixth International Tin Agreement have been applied since April 1982, and are expected to continue to be applied until at least June 1987.

The effectiveness of the ITC export controls in reducing the supply of tin is being reduced by three factors -

- . Increasing production by countries which are not producer members of the Sixth ITA. In 1984, such countries produced almost 45% of western world tin.
- . Smuggling of tin from producer member countries, mostly through Singapore.
- . Disposals from the USA's General Services Administration stockpile.

It is expected that tin prices will remain at present levels (M\$29.15/kg) during the next two years. However, a collapse in prices is a real possibility after the Sixth ITA expires in June 1987.

Consumption

Western world tin consumption reached 165,000 tonnes in 1984, a slight increase on the 1983 figure of 161,000 tonnes. Current ITC estimates for 1985 consumption rates are only marginally above the 1984 level, and no dramatic increase in western world tin consumption is expected during this decade.

The demand for tin in tinsplate seems to have peaked, because of substitution of other packaging materials and processes for tinsplate, and because the amount of tin used per square metre of tinsplate has declined.

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Solder has overtaken tinfoil in some countries as the largest end use for tin, and consumption of tin in this end use sector is expected to grow. The other markets for tin (chemicals, alloys etc.) are also expected to grow and these markets will be vital if there is to be a significant growth in tin consumption.

It is possible, however, that the market for tinfoil could be revitalised by a decline in the real price of tin (which is likely if the buffer stock support price is held steady over the next few years).

Production Capacity

The six producer member countries of the 6th ITA had export quotas for 88,000 tonnes in 1984. Current capacity of these countries would be at least 110,000 tpa (1981 production of these countries was around 145,000 tonnes). When increases in production capacity in Brazil, UK, Canada and other countries are added to Bolivian production, the structural over supply position is apparent.

Supply

Western world tin supply comes from current production, GSA sales, Chinese sales, and ITC buffer stock sales.

Current production will climb gradually from the 167,000 level of 1984 as output from non producer members rises, while GSA sales should remain fairly steady, as should Chinese sales - both seem to have stabilised at around 3,000 tpa.

Supply of tin from the Buffer stock (at over 60,000 tonnes) will occur if the market moves into deficit.

The most puzzling feature of the tin market in 1984 was that (despite a significant statistical deficit from reported production) visible stocks did not decline and are still around 70,000 mt (equivalent to about five months western world consumption). Hence the analysis of supply and demand contains gross errors. The world tin industry is summarised on Table 3.5.

Quite large reductions in the number of mines producing tin are now occurring in Malaysia and Thailand. The off-shore dredging industry in Southern Thailand (Phuket) has shrunk dramatically, and 3 dredges, 14 open cuts, and 77 gravel pump operations closed in Malaysia in 1984. While it is premature to say that this production has been permanently lost from the industry, it is an encouraging step.

Demand Forecast

Demand for tin consists of western world consumption, and sales to Eastern Europe.

Consumption is expected to grow only slowly, and Eastern European imports are forecast to remain at around 17,000 tpa. Total demand is therefore expected to increase slowly from 182,000 tonnes in 1984. Again, these figures may be appreciably in error because the stock position does not agree with the statistical supply deficit.

Price

The real price of tin, expressed in the currencies of major consuming countries, is expected to fall. This will be deliberately engineered by the Buffer Stock Manager to assist tin consumption to grow. The Buffer Stock Manager has recently demonstrated his ability and willingness to allow the Kuala Lumpur Tin Market price to go below the previously sacrosanct floor price of M\$29.15 per kg.

Australian Quotas

The level of quota applied by the ITC for Australia remains unchanged at 2125 tonnes tin metal per quarter or slightly over 60% of 1981 production levels. In view of the continuing surplus of tin stocks it is not expected that the quotas will be relaxed before the end of the 6th ITC Agreement in June 1987.

The two major quota holders in Australia continue to hold high tonnages of tin in concentrate stocks and it is not expected that a shortfall of available tin to meet Australia's quota will occur before the end of the 6th ICT Agreement in June 1987.

Under the mechanism for allocation of quotas within Australia, as controlled by the Federal Department of Trade, shortfall of tin despatches from the mines of 1981 producers (or operations under construction during 1981) reverts to the pool for redistribution to other 1981 producers. As the Mt. Bischoff property was not under construction in 1981 it is not eligible for a specific quota allocation.

TABLE 3.5
 WORLD TIN - SUPPLY AND DEMAND
 (THOUSANDS OF METRIC TONNES OF TIN)

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
<u>SUPPLY</u>										
Malaysia	64	63	59	63	63	61	60	52	41	
Bolivia	32	30	34	31	28	27	30	27	34	
Thailand	16	20	24	30	34	34	31	26	20	
Indonesia	25	23	26	27	29	33	35	34	27	
Australia	9	10	11	12	13	12	13	13	10	
Nigeria	5	4	3	3	3	3	2	2	1	
Zaire	5	4	4	3	3	3	2	2	2	
Others	25	25	28	28	27	28	32	34	35	
<hr/>										
<u>Total World Prod.</u>	181	179	189	197	200	201	205	190	172	167 (Est)
GSA Sales	1	4	3	-	-	-	5	4	3	3
Chinese Sales	15	7	2	3	3	4	5	4	2	3
ITC Sales	-20	19	1	-	-	-	-1	-52	-1	10
<hr/>										
<u>TOTAL AVAILABLE TIN SUPPLY</u>	177	209	195	200	203	205	214	147	176	183
<hr/>										
<u>DEMAND</u>										
Tin consumption	174	194	185	185	186	174	163	157	161	165
USSR Imports	10	11	12	16	16	17	19	16	16	17
<hr/>										
<u>TOTAL DEMAND</u>	184	205	197	201	202	191	182	173	177	182
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<u>Apparent Deficit in Demand</u>	-7	4	-2	-1	1	14	32	-26	-1	-1
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Source: Tin International Statistical Supplement, Jan. 1985 & Tin International, September 1984