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Goodz & Associates

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REPORT 3904

NORTH VALLEY ALLUVIAL TIN MINE WARATAH, TASMANIA

UPDATE ON EXPLORATION AND ASSESSMENT
TO MARCH, 1990

PREPARED FOR: Mr. Harry Floyd
C/- Campelane Nominees Pty. Ltd.
35 Beard Street
Eltham 3095
03 - 439-8667

M.D. Goodz M.Aus.I.M.M.
Consulting Geologist

• March 12th, 1990

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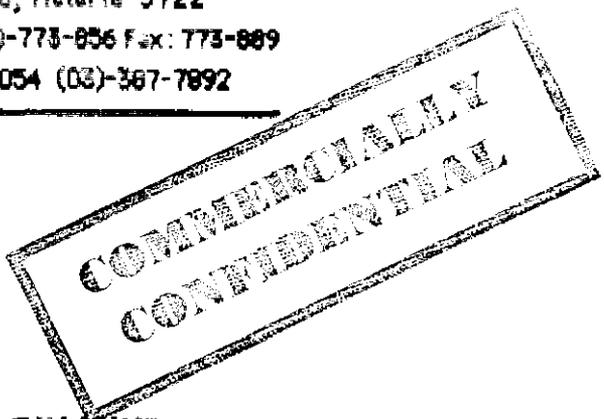
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AMG REFERENCE POINTS ADDED

M.D. GOODZ OF AUSTRALIA
Geological & Mining Consultants

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SUMMARY

This is a summary of activities since June 1988, under the direct management of Goodz & Associates. This report was prepared on the request of Campelane for the Tasmanian Department of Resources and Energy correspondence dated the 27th February, 1990.

RESOURCE

A resurvey of the Waratah Valley has suggested reserves and resources of:

- (1) Probable reserve of about 200,000 cubic metres at a test grade of 2.9kg 67% tin /m³ in the Ringarooma Mining tailings dump.
- (2) Measured and indicated resource of between 1.0-1.3 million tonnes of stockpiled oversize material estimated at 0.6-1.0kg Sn /m³.
- (3) Indicated resource of virgin wash of 0.3-0.5 million tonnes at test grades of 0.3 - 1.0 Kg Sn /m³.
- (4) A further inferred resource of 1.1 - 1.4 million tonnes of virgin alluvium immediately downstream and upstream of the current test area.

METALLURGY

Test studies have shown that the tin is contained within 3 hosts: ((a) free cassiterite (tin oxide), (b) cassiterite within Bischoff Granite boulders and (c) sulphide concentrates.

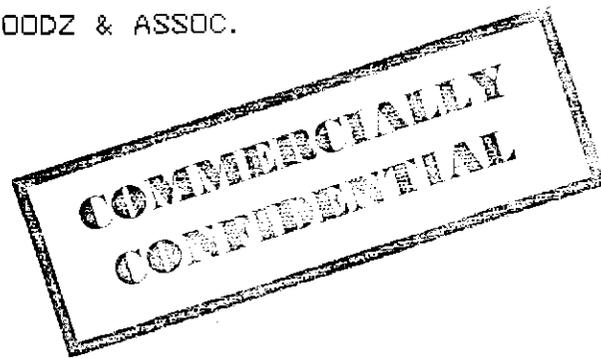
The free cassiterite averages 67% tin metal and comprises about 40% of the tin. Cassiterite within granite boulders (in oversize dumps) is up to 30% of the tin, while the tin contained in base metal sulphides also constitutes up to 30%. Cassiterite-bearing boulders were picked out of oversize dumps.

Tests showed that a rescreening and crushing of the -15cm fraction to 60 mesh yields grade and recovery increases of 5-10 times that previously obtained.

Tin and sulphide concentrates show sub-economic grades of base, precious and rare earth elements. Further study is required.

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TREATMENT

It has often been a problem of the North Valley operations to get better than 30% recovery. This can be achieved by:

- (1) Reconfiguring the existing plant.
- (2) Including 2 other regrind circuits.
- (3) Relocating some of the jigs and tables.
- (4) Establishing a sulphide concentrate circuit.

All of the above would address the problem of recovering coarse tin (in boulders) and sulphide tin (as well as base and precious metals).

LOCATION AND ACCESS:

The North Valley leases are located 4km north-westerly from Waratah, and lie along the valley of the Waratah River abutting the northern base of Mt. Bischoff. A wide gravel road leads around the western flank of Mt. Bischoff and falls 300 metres in elevation over 3km, and is negotiable by heavy vehicles. A private powerline links the property to the State grid and a telecom line is connected. Structures include the main plant, mill and refining building, 2 accommodation buildings, a machinery workshop, assorted sheds, offices, crib and ablution blocks.

TENEMENT HOLDINGS

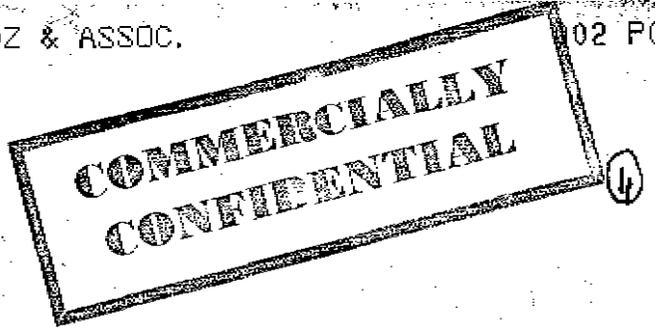
- | | | |
|----|---------------------------|---|
| 1. | Consolidated Lease 19M/72 | - 263 acres - principal lease |
| 2. | ML 4W/71 - 80 acres | - adjoins 19m/72 on west and includes dam site |
| 3. | 3W/72 - 8 acres | - power easement |
| 4. | 4W/72 - | - access road |
| 5. | 1W/73 - 100 acres | - Magnet Dam water right |
| 6. | 1W/72 | - Falls Creek water right
(flows from Magnet Dam to Waratah River) |

OTHERS:

The leases are surrounded in part by Exploration Licences 13/79 - Metal Exploration Ltd., EL 5/63 - Comstaff Pty. Ltd. and new Exploration Licences (ETA 53) awarded to Placer Pacific and Billiton Australia.

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GEOLOGY AND MINERALISATION:

The principal lease (19M/72) covers some 3.2 kilometres of the Waratah River Valley upstream from its junction with the Arthur River. Alluvial flats up to 200 metres across and to thicknesses up to 16 metres have been worked down to the Precambrian bedrock which consists of shales, quartzites and slates. The alluvials in the unworked lower 700 metres are shallower, being 4 - 6 metres thick. The modern river is entrenched into the alluvials, and has been substantially diverted from its original course by mine operators. The Waratah River upstream from the lease is confined to a narrow gorge with only limited development of alluvial deposits.

The tin-bearing deposits in the valley consist of both talus on the mountain slopes, and waterworn boulder/cobble/gravel deposits. Accumulations of tailings from the Mt. Bischoff plant occur in the southern section. The detrital tin is derived from the erosion of the various ores on adjacent to Mt. Bischoff: - fissure lodes, mineralised quartz porphyry, and massive pyrrhotitic ores. The principal contribution to the North Valley alluvials is the lodes and quartz porphyries on the northern flank of the mountain.

The alluvial deposits consist of up to 80 per cent boulders and cobbles of plus 6cm. The free cassiterite recovered from mining is mostly in coarse nugget form (pea size and greater). Values are concentrated at the bottom of the alluvials.

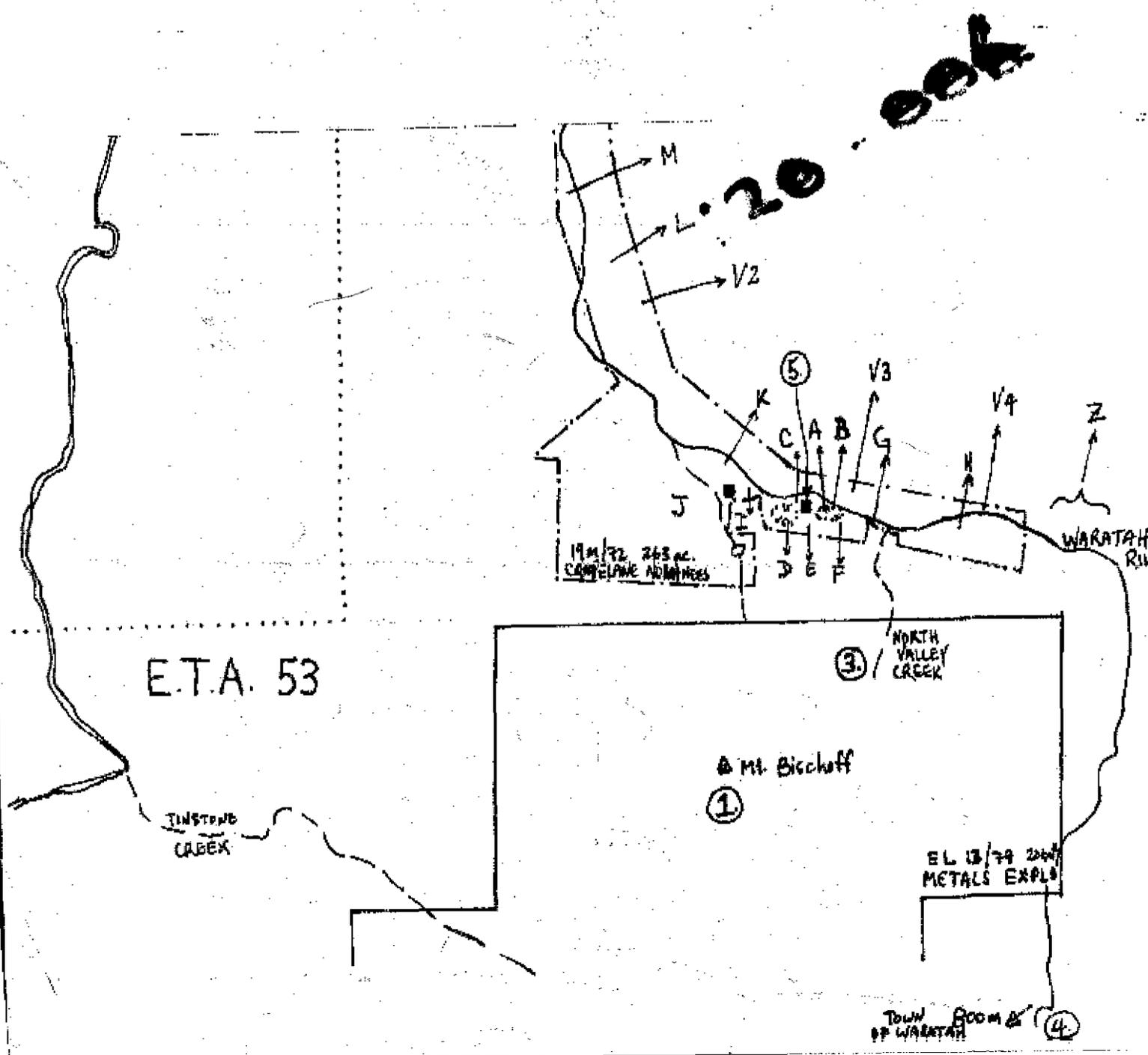
A substantial quantity (several million tonnes) of tailings was produced by the Mt. Bischoff hardrock mining operations and discharged directly into the river. As mineral dressing recoveries were often only 30 - 50%, a large resource from the tailings exists within the various river channels (diversions) from the last century.

MINING AND EXPLORATION HISTORY:

The Waratah River Valley has been worked intermittently throughout the history of the Mt. Bischoff area.

Talus deposits were worked to a large extent in the early days. Mill tailings in the upper reaches of the River were worked by tributors and contributed substantially to total output of Mt. Bischoff. Small remnants of tailings in the vicinity of the old mine at Waratah are still being worked.

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The North Valley alluvials redescrbed in detail by Reid (1925) who reviewed earlier exploration and current (1925) testing. At that time most of the production in the North Valley was from the accumulated tailings of the early sluicing operations of the Mt. Bischoff Company. Estimating talus and alluvial deposits was around 1,500,000 cubic metres in depths up to 16 metres with grades in the order of 4 kg/cu.m. (free tin) dropping rapidly to around 0.9 kg/cu.m. in the last 700 metres above the junction with the Arthur River. The Mt. Bischoff Company and others worked a section of perhaps one kilometre downstream from the current plant site. Little information is available on this mining operation.

In the late 1960's a sluicing operation was carried on by Machen in the area southeast of the plant site. Recorded production 1969-71 was 32.7 tonnes of concentrate from an unknown volume. In 1971 Ringarooma Mining produced 3.8 tonnes from a sampling plant treating bulk samples from 7.6m x 1.5m diameter shafts. Between 1972 and 1975 Ringarooma Mining produced 793 tonnes of concentrates from 391,000 cubic metres of essentially virgin river alluvials in the section from the plant area to Webster's Gully. The average recovered grade being 2.0 kg/cu.m. Mining was carried out initially using a dragline feeding a semi-mobile grizzly/screening plant to produce a -38mm feed which was pumped to the treatment plant. The method was finally changed to full excavation using a hydraulic backhoe - loading Euclid dump trucks, then carted to a fixed grizzly at the plant site. Primary jig circuits provided for recovery +19mm nuggets while -19mm material was treated in the main plant. A tabling section was installed later to treat the fine products, recovery being complicated by the presence of a high proportion of sulphides.

In 1975/76 testing of bulk samples excavated by drag-line (from trenches across the valley) up to 1 kilometre downstream from the plant revealed grades in the essentially worked out ground of around 0.6 kg/cu.m. (Sourey 1980).

Total production in the last year of operations (1976) was 110 tonnes of concentrates from 180,682 cubic metres or 0.61 kg./cu.m.

TOTAL RINGAROOMA MINING PRODUCTION

903.28 tonnes of tin concentrates from 571,908 cu.m (avg. concentrate grade approx. 60% Sn) equivalent to 1.58 kg./cu.m.

In 1977 Northern Development took over and production through April 1978 (under G. Fisher) was approximately 19 tonnes of concentrates from an unknown quantity of Ringarooma's tailings. Fisher estimated a recovered grade of 0.6 kg./cu.m. (55% Sn).

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The current owners produced only 3.5 tonnes of concentrates from May 1978 until late 1979. 1.3 tonnes of this was recovered from a patch of virgin alluvials in the northern part of the lease. By the writer's estimates - approximately 1600 cubic metres of alluvial was mined giving an average of 0.8 kg/cu.m. of 60% Sn concentrates.

In 1978 a testing programme was undertaken by B.R.G.M. for Serem (Australia) Pty. Ltd. The results of this work were seen in the report by Ayling (1978). The testing was in two parts: (1) bulk sample pits in the virgin alluvials at the north end of the lease; (2) bulk samples from back-hoe pits in the Ringarooma Mining tailings dump.

In the results, B.R.G.M. estimate that the virgin alluvial consists of approximately 200,000 cubic metres at a grade of 0.18kg/cu.m. free cassiterite**; and the tailings dump contains approximately 180,000 cubic metres with negligible free cassiterite but an overall grade of 2.9 kg./cu.m. The virgin alluvial was also upgraded by crushing to give grades of up to 6kg./cu.m.**

** Fisher (1978) states that the recovery from 80 cubic metres of bulk samples was 50kg. of concentrates (55% Sn) for an average of .63 kg./cu.m.

** Note that crushing to 60 mesh and then recovering both tin and sulphide concentrates, increases the grade and recovery by factors of 5 to 10 times that previously recorded.

RESOURCE DISCUSSION AND CONCLUSION

During the site inspection, the dimensions of the 3 tailings dams and oversize stockpiles were documented. The complete river valley was inspected and average dimensions of possible resources were recorded. Depths were taken from river cuttings and pits, and where there was insufficient access an upstream and downstream, depths of 4 - 6m, respectively, were used. It was suggested that downstream towards the Arthur River it would be likely to encounter depths of 10+m. This would increase the resource by 50% but requires confirmation by auger holes.

The attached plan shows 18 areas (A-Z) of possible tin-rich gravels. The areas have been grouped into 6 resources.

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AREA CLASS	MATERIAL	DIMENSIONS	CUBIC METRES	TOTAL
A	Probable Tailings	125x40x15m	75,000	
B	" "	300x50x 5m	75,000	
C	" "	200x50x 4m	40,000	190,000m ³
D	Measured Oversize	65x90x10 m	58,500	
E	" "	300x25x 8m	60,000	
F	" "	250x50x15m	187,500	306,000
G	Indicated "	100x20x10m	20,000	
H	Inferred "	400x75x 6m	180,000	
I	Indicated Oversize	800x100x4m	320,000	
J	Inferred O/S & virgin	100x100x 5m	50,000	
K	Indicated Oversize	250x100x6m	150,000	
L	" Roadfill	1200x8x5m	48,000	
M	Inferred O/S & Tails Ponds	800x50x5m	240,000	1,008,000
V1	Indicated Virgin	800x120x 6m	576,000	
V2	" "	1400x50x 6m	420,000	
V3	" "	400x25x 6m	60,000	
V4	Inferred "	400x10x5m	20,000	1,076,000
Z	Inferred O/S & Virgin	1600x50x 4m		320,000

- ① Mt. Bischoff Open Cut Mine
- ② Arthur River.
- ③ North Valley Mine Face
- ④ Waratah - Town
- ⑤ Treatment Plant.

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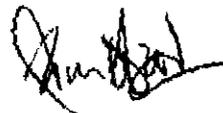
- (1) Probable Ore - Tailings - Preliminary surveying and testing outlined $190,000\text{m}^3$ with a test grade of 2.9Kg of 67% Sn/ m^3 . This would yield about 385 tonnes of tin and at \$11,000 tonne, it would have a gross value of \$4.2 million.
- (2) Measured Resources - Oversize stockpiles in excess of $300,000\text{m}^3$ at an untested grade.
- (3) Indicated and Inferred Resources - Oversize with depth unconstrained has in excess of 1 million cubic metres.
- (4) Indicated Resources - Virgin Gravels of northern end of Waratah River to the Arthur River and the eastern banks of the Waratah - in excess of 1.1 million cubic metres for a minimum total depth of only 6m.
- (5) Inferred Resources - The Headwaters of the Waratah River (not inspected). This area is outside the lease but within the water right. It was estimated from contour plans to be in excess of $300,000\text{m}^3$.
- (6) Unknown Resources - More than 5 million tonnes (8 million m^3) of tailings was produced by Mt. Bischoff and deposited freely into the Waratah River. This material lay within the river channels.

These resource calculations are preliminary and based on dimensions and test grades supplied by the Company Directors and historical reports.

From this information it appears that there is an established reserve with a gross value of \$4,200,000 within the accessible tailings, and a further minimum 2,700,000 cubic metres of material to be tested. With the plant and infrastructure in place and the reserves stockpiled within 50m of the plant, commencement of operations is pending:

- (1) plant reconfiguration, and
- (2) increased tin prices.

Future success of the operations would require the milling of ore to -60 mesh and the combined recovery of both tin and sulphide concentrates.



M.D. Goodz M.Aus.I.M.M.
• March 12th, 1990

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EXPLORATION AND VALUATION COSTS

Accounts of Goodz and Associates (and their subcontractors) for Campelane Nominees Pty. Ltd. projects at North Valley, Waratah, Tasmania.

Tenement Reports	2,100.00
Exploration Programme	2,925.00
Site Inspections & Reports	3,575.00
Subcontractors	2,025.00
Vehicular Hire and Costs	2,200.00
Metallurgical Testing	466.35
Photographic Costs	120.85
Accommodation and Meals	579.28
Reports, Maps, Printing & P/copies	149.15
Telephone	451.20
Postage and Faxes	122.50

TOTAL \$14,714.33

I, Morrie D. Goodz of P.O. Box 658, Mansfield 3722 do hereby attest for the above costs covered by Goodz & Associates on behalf of Campelane Nominees Pty. Ltd. for their tenements at Waratah, Tasmania up to the period ending March 12th, 1990.



M.D. Goodz
March 12th, 1990