



Report : file9-2011/ 2

**ANNUAL REPORT FOR THE PERIOD 13/08/2012**  
**TO 01/08/2013**

**MONARCH FLATS EXPLORATION LICENCE**

**EL 09/2011**

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**Keywords:** Stanniferous Depocentres, Pioneer, Scotia, Monarch , granite distribution, basement sources, field reconnaissance.

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## **1.INTRODUCTION**

**Exploration Rational** – see abstract

**Licence**

**Tenement Number EL09/2011**

**Beneficial Holder**

The Tenement was applied for by Tin Dragon Pty Ltd of 214 York Street, Subiaco ,WA 6008.

**Area**

The project area is currently a 103 sq. km Exploration Licence, EL 09 / 2011. Specifically:

**Date of Grant** 13 / 08 / 2011

Expenditure Commitment : First two years \$70,000.

Reporting Period is 13<sup>th</sup> August 2012 to 1<sup>st</sup> August 2013.

**Tenement Location**

The Pioneer (or **Monarch Flats** ) Project is located in north east Tasmania approximately 85 kilometers north east of the City of Launceston .The Pioneer project is located just west of the Pioneer to Gladstone Road. The other key prospect areas are distributed around the southern, northern and western flanks of the Mt. Cameron massif – part of a juxtaposed group of three Exploration Licences being explored by Tin Dragon Pty.Ltd (*figure below*).

Access to the perimeter of the project area is excellent. An all weather sealed road services the townships of Gladstone and Pioneer and a well formed gravel track provides heavy vehicle access from that public road to the project sites.

Land tenure is a mixture of government forest and low-conservation-value reserves, plus private freehold/leasehold land. In the tenements no parts of the known tin resources are barred to access.



## **2.REVIEW OF PREVIOUS WORK**

### **Prior to Current Tenement**

*See extensive reviews undertaken of the Pioneer, Monarch and Scotia areas attached.*

### **3.REGIONAL GEOLOGY AND MINERALISATION**

#### **HISTORY OF MINING IN THE TENEMENT AREA**

**2011-2012 Tin Dragon** has compiled the following production figures from within its tenements:

**PAST PRODUCTION - >23,000t cassiterite**, including these main deposits:

- **Pioneer - 10,814t**
- **Endurance- 6,240t**
- **Dorset Dredge - 2,714t**
- **Scotia - 1,270t**
- **Monarch-**

The estimated Total Resources in the Tin Dragon Tenements (all categories except Possible or Potential) **approximates 16,446 tonnes of cassiterite** concentrate-see *table below*.

<b>MAIN KNOWN PLACER RESOURCES HELD BY TIN DRAGON</b>					
<b>DEPOSIT</b>	<b>Volume bcm</b>	<b>Grade gm/cu. m</b>	<b>Tonnes Cassiterite</b>	<b>Strip Ratio</b>	<b>Category</b>
<b>Monarch</b>	1,861,100	346	643		Indicated
<b>Endurance</b>	3,820,000	959	3,707	4	Proven/Probable/Inferred
<b>Clarence</b>	2,052,000	290	587		
<b>Pioneer</b>	18,620,000	290.3	5,269	4.9	Measured/Inferred
<b>Scotia</b>	3,657,000	1,300	4,220	4.7	Probable
<b>Ringarooma Flats</b>	13,210,000	442	980		
<b>Musselroe Swamps-North</b>	3,711,500	146	487		
<b>Wyniford</b>	850,000	650	553		Indicated
<b>TOTAL</b>			<b>16,446</b>		

The deposits with the largest resource base are Pioneer, Scotia, and Endurance. At both Pioneer and Endurance the mining has been idle for the last 28yrs. The resources have remained intact for that time and refined utilizing the databases generated by the previous explorers and more recently by Van Diemen Mines in the period 2003 to 2008.

In the case of deposits Monarch, Endurance, Pioneer, Scotia, the potential for expansion of the resources is considered excellent and the tenement holder continues to research the extensive historical database for production centers , further potential, and for practical controls on the known tin areas .

In addition there is a practical synergy between the former three deposit areas and the un-exploited Clarence, Hasties, Eastern Leads and South Cameron prospect areas.

**TOTAL “ENDOWMENT”** – the combination of all known production plus proven and drill indicated resources (endowment) is >40,000t (Current, including only the known deposits)  
Examination of the architecture of deposit controls, basin geometry, and granite distribution clearly demonstrates, in the view of Tin Dragon, that the endowment polygons are confined (more or less) to the “day lighting” positions of the alluvial tin – with little apparent consistent effort to explore in areas of shallow overburden.

## **GEOLOGY**

The northern Gladstone areas, within EL 9/2011, are characterized by relatively poor outcrop and much of the basement rocks are covered with various types of unconsolidated sediments, most of which are tin bearing. Consequently prospectors and companies;

- have been able to exploit the subcropping alluvial deposits over a sustained period between 1880 to 1982, but
- have been unable to locate the source areas of primary tin deposits in the project area.

All known metallic resources in the Monarch Flats tenement are alluvial tin (with accessory gold, ilmenite, monazite, sapphires?).

The original sources of the cassiterite were the Devonian tin-bearing granites of the Blue Tier Batholith. Tin concentrates in quartz and greisen vein systems in the roof zone of the granites near the contact with overlying Silurian Mathinna Beds.

The relevant history of the region commenced in Permo-Triassic time (ca 250Ma) with the unroofing and erosion of the granitic rocks. In late Jurassic time (ca 150Ma) further uplift occurred with intrusion of extensive igneous dolerite sheets followed by a long period in the Late Cretaceous (ca 75Ma) of widespread and intense erosion. Deep weathering of the granites during this period resulted in liberation of large amounts of cassiterite from the granitic hosts and their deposition in alluvium of the streams draining the highlands.

During Middle Eocene time (ca 46Ma) volcanic activity commenced along the Blue Tier and into the Boobyalla area with the extrusion of the Older Basaltic lava flows. It is likely that these were emplaced along stream valleys incised into the pre-Eocene granitic land surface, and so buried the older alluvial cassiterite deposits.

From the Mid Eocene to Late Oligocene (ca 46 to 24Ma) uplift and a humid tropical climate resulted in rapid erosion of the basalts, and renewed liberation of cassiterite from granites and reworking and upgrading of the earlier pre Middle Eocene alluvial deposits. The Middle Miocene (ca 14Ma) saw a second period of basaltic volcanism with extensive lava flows down many of the larger valleys in the Derby area, causing diversion of the Ancestral Ringarooma River.

Post Middle Miocene to Recent alluvial deposits were then formed along the alluvial flats of the Ringarooma River and other rivers.

In the far north there were marine incursions which have reworked the earlier alluvials.

In summary there has been a complex history of placer formation which has allowed for unique opportunity for reworking and concentration of cassiterite.

Reconstructing the complex alluvial history of the area is important for generating new prospective areas. Tin Dragon is fortunate to be able to build upon the 140 years of mining and exploration experience and a vast database to assist in this process.

#### **4.EXPLORATION COMPLETED DURING CURRENT REPORTING PERIOD**

1. Recovery and formatting historical and GIS data.
2. Data compilation from MRT open files and other databases was continued.
3. Review of environmental, cultural, and heritage data pertaining to individual project areas at the St Helens History room and in the field. Field work included assessment of the terrain, degree of outcrop, search for basement related mineralisation, and the extent of private restrictions in major project areas within the Exploration Licence.
4. Seeking a senior Joint Venture Partner.

#### **Pioneer**

- Checking the nature of old alluvials- there are good exposures in the walls of the open pits, as per photos- one was sampled and panned down to obtain reference samples of heavy min suite including the cassiterite.
- The pebbles and cobbles associated with the local sediments are dominantly quartzitic/silicified Mathinna Beds- see photos- almost no granite- and no greisens were observed. The dominant quartz sand is probably derived from granite (and vein qtz)- the pebbles and cobbles of Mathinna Beds are all well rounded- how far have they travelled is unknown. Some perhaps were derived locally ( say within 3 km). But no known outcrop is recorded so perhaps the mineralised roof zone of a tin granite has been stripped away in the general area.
- Checking the extent of workings revealed a huge lake ( water filled-used for swimming and water skiing}
- Checking the nature of rehabilitation work completed revealed large sandy areas south of the main pit .These areas have been bulldozer tynd ( visible on Google ) and plants appear to be naturally regenerating

- In checking for evidence of bedrock exposures the area was found to be covered by a vast sand cover, some natural, some manmade- water cover in the large lake- consequently we have been unable to determine if there is a local mineralised basement
- In visiting the local township local expertise on mining history was found to be scant at best. Several knowledgeable Gladstone identities were not located during the reporting period.



## Monarch

- On checking the nature of old alluvials- pebbles and cobbles dominated by Mathinna Bed quartzite/silicified siltstones some with quartz veinlets- see photo -no micaceous greisens- most are well rounded suggesting transport

from a further distance that that available in the existing drainage system. Rare, somewhat angular, material was sighted and are from a local source.

- The extent of workings- see photo and Google earth-was examined.
- The nature of rehabilitation work was not obvious
- evidence of bedrock exposures is absent again sand cover seems extensive so search for bedrock mineralisation will not be easy.



MONARCH AREA SHOWING THE PREVIOUSLY MINED AREA AND BLAND PEBBLY CLAYSTONE PROFILE WITH LARGE SCALE X-BEDDING AT TOP.

## Scotia

- Field inspection has been required to;
- Put in context the published information on attempted mining by VDM.
- Check the nature of old alluvials- quartz sand silt and clay are dominant- pebbles and cobbles were volumetrically small and dominated by Mathinna Bed quartzite/silicified siltstones -no micaceous greisens were located. The trial pit area was overlain by a lateritic looking profile- similar to the yellow clay zone at the top of the Endurance deposit and being mined at South Cameron.
- the extent of workings was checked- see photos.
- A very good road in to site is well formed gravel.
- No obvious rehabilitation work present.
- In check for evidence of bedrock exposures- a number exist in current and historical workings-so mapping of area is recommended.
- A flat lying Mathinna bed contact with weathered granite (non greisenised) was cited.
- Quartz veins were found in Mathinna Beds-but no cassiterite observed. These may be the style of mineralisation from which the alluvial tin is derived.



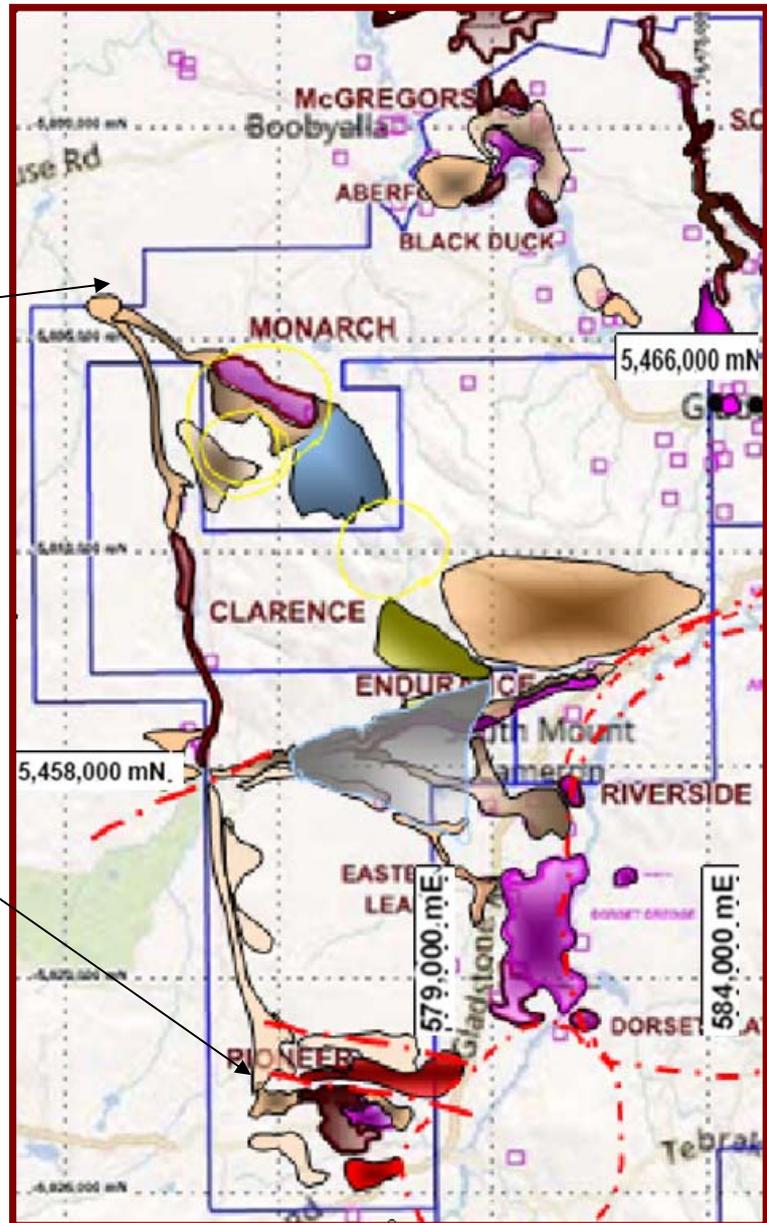
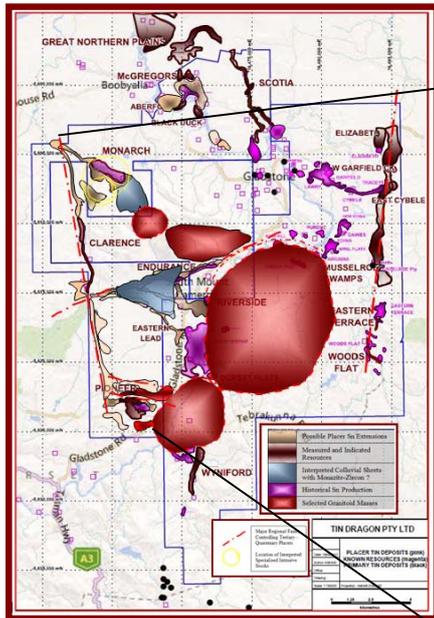
**CURRENT SCOTIA AREA OF LIMITED EXPLORATION MINING**

## **5.DISCUSSION OF RESULTS**

Results from observations and data compilation (*see figure below for reference to polygon designation*);

- At least 5 Tertiary paleochannel placer tin deposits- *purple on figure below*- (and 4-5 additional poorly explored paleochannels-*pale orange polygons* ) – most of which contain measured resources – are interpreted for the Monarch Flats Exploration Licence.

- A significant area of 3-4 very large (approx 8km long), multiply reworked, drainage channels –representing regional fault zones (Endurance , Clarence and Shallamar) – *red dashed lines below-and*
  - Onshore ,poorly explored alluvial fans/depocentres ( 20 to 50square km)
- all resources (*maroon colored polygons*) previously held and drilled by well known long life (30 to 90yr ) Public Corporations such as Pioneer Tin Mining Company, Endurance Tin Mining Company, Clifton Syndicate , never before held by one entity, and more recently;
  - Van Dieman Mines Pty Ltd. And Kangaroo Metals (casualties of the GFC).
- These resources are demonstrably prospective for many more alluvial resources and for basement tin/tungsten mineralization.
  - adjacent to sub members of the Blue Tier Batholith (notorious for governing a total regional endowment in excess of 100,000tonnes of cassiterite) –*red and yellow colored circular and curvilinear features and orange /green sub variants of Mt Cameron? – below and*
  - accessory monazite (Monarch, Endurance),and gold (Pioneer etc) may be important in the area but reports data to quantify this is sparse.–*pale blue areas* .



## **6.CONCLUSIONS**

### **Recommendations and Proposed Future Exploration**

A search for local identities who are familiar with the old tin operations will continue.

Detailed research and interpretation is ongoing for the Endurance Group ,Pioneer ,Football Oval, Scotia , Dorset West ,Pioneer North, Clarence, Clarence Extended, Monarch West Fan, Monarch NW.

Areas interpreted to possibly host shallow hardrock resources are to be further investigated.

## **7.ENVIRONMENT**

**Surface Disturbing Operations;** No surface disturbing operations conducted during the period. It is noted in the field that extensive areas of insitu and mining operation related sand and clay are distributed about the project areas.

## Surveys

Rehabilitation; Not Applicable during the reporting period

## **8.EXPENDITURE**

Expenditure on exploration for the period 13<sup>th</sup> August 2012 to 1st August 2013;

### **EXPENDITURE EL 9-2011**

	<b>Grant 13/8/2011</b>	<b>Expenditure Quarter</b>	
Yr			
2011	Q3/11	24,749	
	Q4/11	0	
Yr			
2012	Q1/12	7200	
	Q2/12	38100	
	Q3/12	0	
	Q4/12	0	
Yr			
2013	Q1/13	6254	76303
	Q2/13		
	Q3/13		
	Q4/13		

## **9.REFERENCES**

**Askins ,P.W (2006)**; Comprehensive Technical Study of Derby Deep Leads (unpublished).

**Askins ,P.W and Stewart, J.I ( 2004)** Technical Information Memorandum – Review of the Great Pyramid, Storeys Creek, Aberfoyle, and Anchor Tin Deposits (unpublished )- refer Minemakers Prospectus .

**Askins ,P.W and Stewart, J.I ( 2011)** Technical Review of TnT Project Package (unpublished ).

**Tin Dragon Pty Ltd ; April 2012** Information Memorandum (Askins and Stewart unpublished ).

**Stewart, J. I., 1980b** – “Report on the Drilling of the Valley Horizontal Sheeted Vein Systems, Silver Valley ,North Queensland”. Newmont Pty.Ltd. Unpublished Report.

**Stewart, J. I., 2009-2011** – “Report on of EL 11/2008 Mount Cameron Tin Project, Tasmania”. Unpublished Report.

### 13. PIONEER

#### Introduction

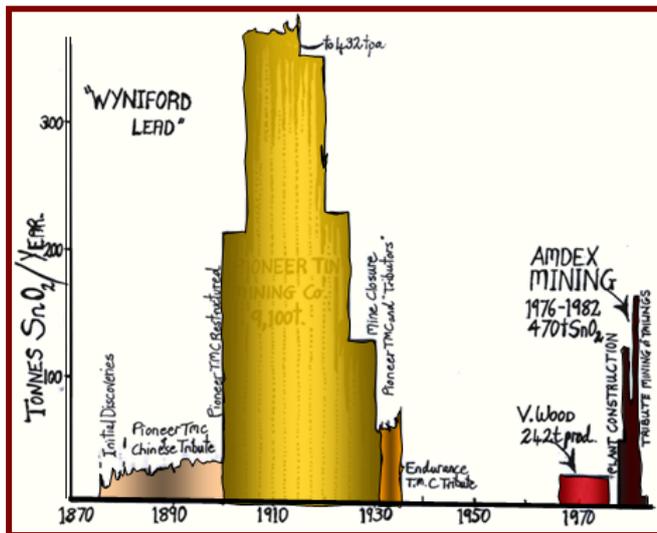
The Pioneer Project area is located in the south central section of the extensive Ringarooma River alluvial tinfield, a mineralised province that has historically produced in excess of 40,000 tonnes of tin.

The Pioneer alluvial deposits are considered to be the outfall of the Wyniford Lead into the ancestral Ringarooma River floodplain. Tin is predominantly derived from the Wyniford Lead - its sediment load from the mineralised Blue Tier Batholith. The known resource is contained within a deep basin that extends northwards from the current Ringarooma River and then swings westward around the northern edge of Pioneer Township.



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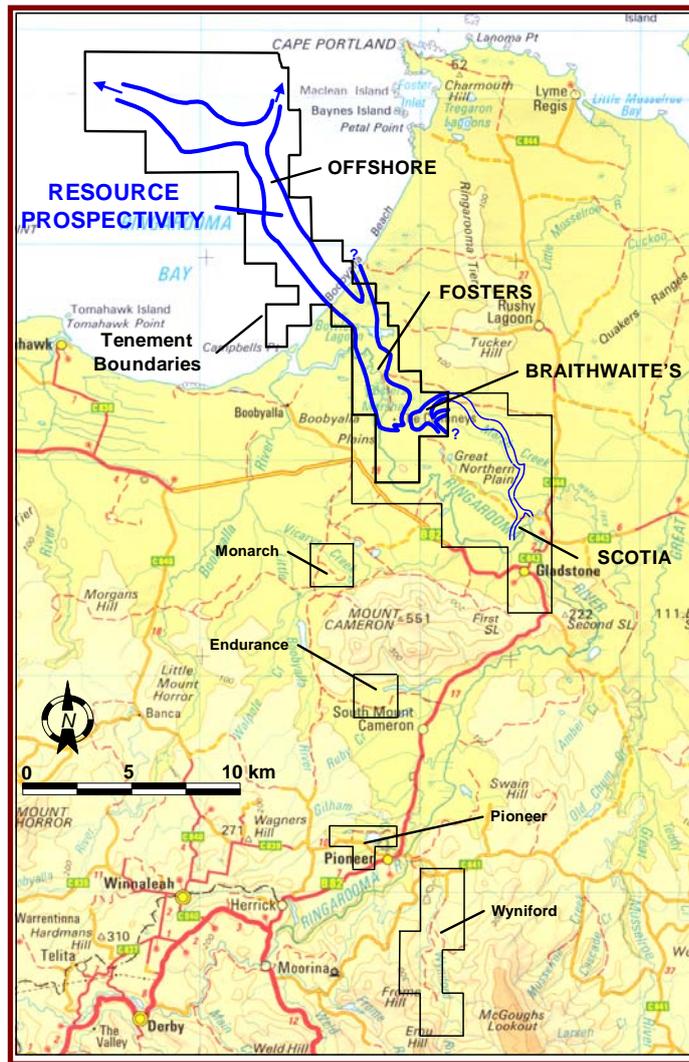
- Cassiterite is concentrated in a basal alluvial horizon resting immediately on granitic bedrock.
- The deposit consists of coarse, granite-derived sands with a high felspathic component, and erratically distributed gravel, pebble, cobble and boulder size horizons are derived from granite and metamorphic sources.



PERIOD	OPERATOR	VOLUME TREATED (m <sup>3</sup> )	STREAMED SnO <sub>2</sub> (Tonnes)
1877 – 1900	Pioneer Tin Co. & Tributors	-	500 estimated
1900 – 1931	Pioneer Tin Co.	10,915,000	9,360
1931 – 1933	Pioneer Tin Co. & Tributors	Residues	142 estimated
1933 – 1946	Tributor for Endurance Co.	Residues	100 estimated
1967 – 1976	Vern Woods	1,000,000	242
1976 - 1979	Kibuka Mines	750,000	470
<b>TOTAL</b>			<b>10,814</b>

#### Location

The project area is located in north-eastern Tasmania approximately 80 kilometres north-east of the northern City of Launceston - immediately north of the township of Pioneer on the northern bank of the Ringarooma River.



## Topography and Climate

- Topography is undulating.
  - the main resource occupies a broad basin like depression that runs northwards from the Ringarooma River and then turns westward around the northern edge of Pioneer Township.
  - Elevations are 100 metres above sea level (ASL).
- The drainage is dominantly eastward into the Ringarooma River
  - Old workings have disrupted stream flows, many of which occupy large old mining cuts.

Climate is temperate maritime with four seasons and moderate temperatures. Locally winter is the coldest and wettest period. Daily winter temperatures (June to October) range from below 0deg.C to maximums in the 15 to 20deg.C range and in summer (November to February) from 15deg.C up to 30deg.C. Average annual rainfall varies from 890to 1020mm.

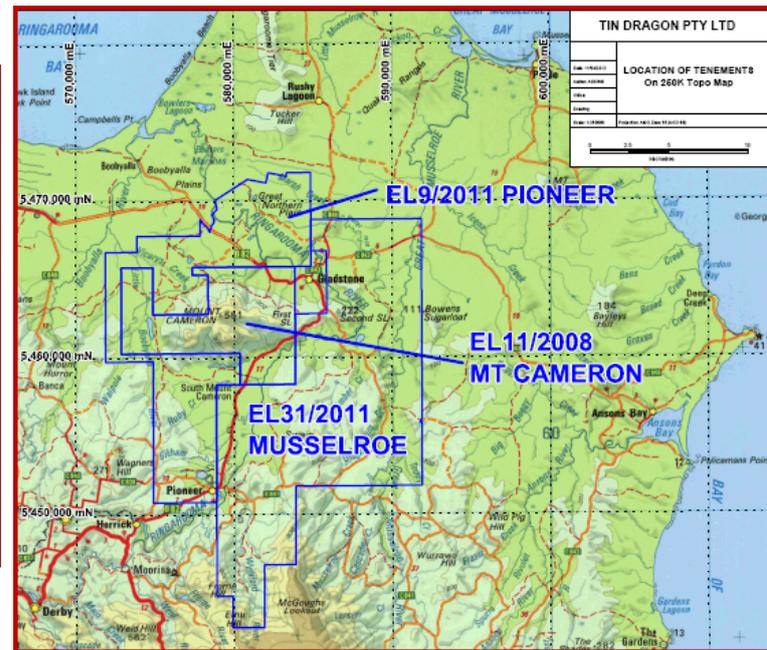
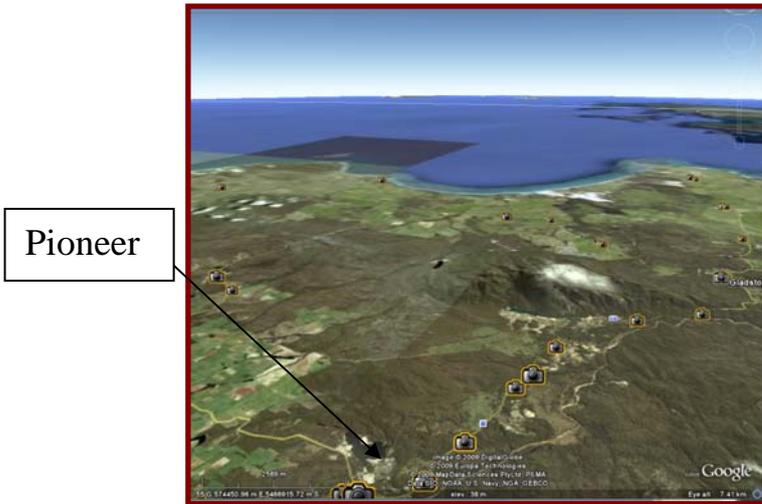
## Tenure

The Tenure comprises Exploration Licences:

- EL09/2011 of 103sq.km and 31/2011 of 190sq.km
- Termed Pioneer and Musselroe, respectively.
- The tenements co-join.

Tin Dragons' tenements capture;

- the previously exploited alluvial cassiterite deposits known as Pioneer
- the known and estimated potential resource areas within influence of the core alluvial deposits
- any possible bedrock –primary tin sources



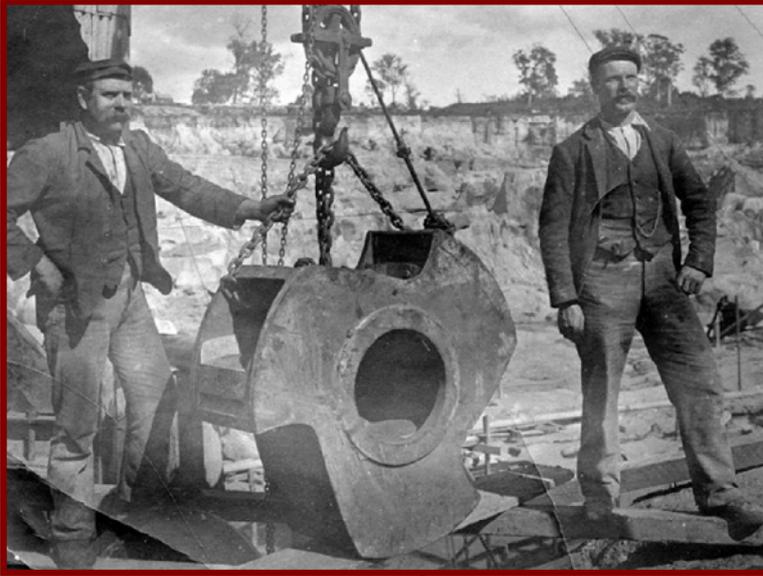
## Access

Access to the area is excellent.

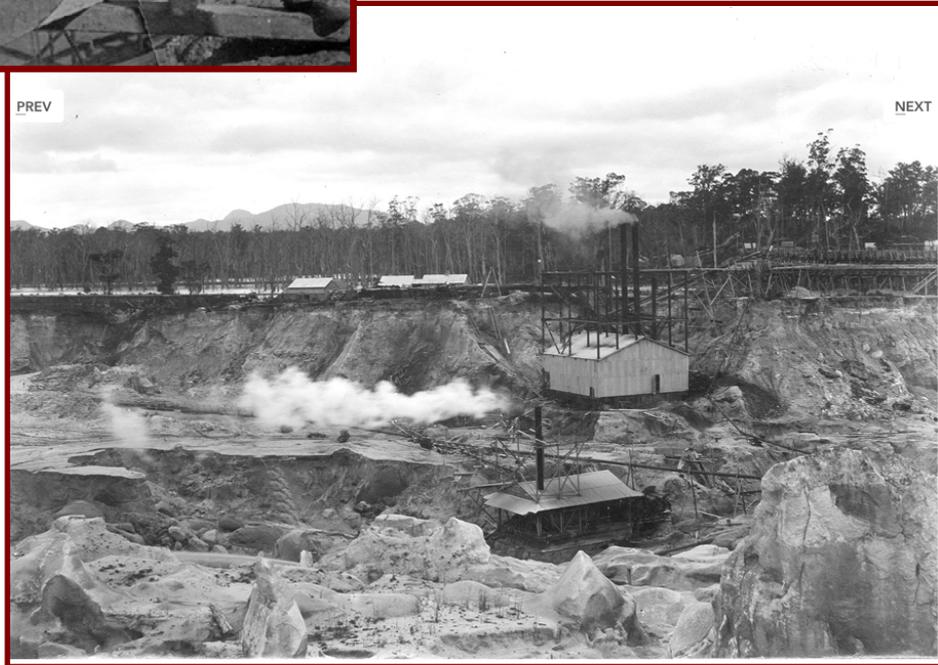
An all-weather, sealed road provides vehicular access from Launceston through Scottsdale, Branxholm and Derby. Vehicular access is also available by a northern link via the towns of Bridport and Tomahawk. Bulldozed and graded sandy gravel bush tracks provide access throughout the Project area.

Tin Dragons' granted Exploration Licences are of exploration or pre-development status and require to proceed through project management and development approval stages prior to the grant of mining development permits.

## History



**1877 William Bradshaw** discovered tin at the junction of Bradshaw's Creek and the Ringarooma River. The first deposits worked were the shallow alluvials resulting from the reworking of the Pioneer and Wyniford Deep Lead by the Ringarooma River. Operators worked the ground in a westerly direction—leading to the discovery of the rich "Pioneer Deep Lead".



**1882 -1929 The Pioneer Tin Mining Company (PTMC)** was formed.

Operations appear to have been unsuccessful and the area was let out on "Tribute" to Chinese miners and was then operated successfully until the 1890's. The Company was restructured in 1900 and hydraulic mining commenced the same year.



**1900** Steps were taken to reopen the mine with the construction of dams and water races, and drilling prior to restructuring the company. Mining recommenced in 1900 utilizing hydraulic monitors, the gravel being pumped to sluice boxes by steam driven pumps. Hydraulic elevators or conveyors were used to dispose of tailings.

**1909** the Company completed construction of a hydroelectric facility at the Frome Dam and the operation was converted from steam to electric power the same year. Operations continued successfully until the floods of **1929** when, despite every effort, the Ringarooma River flooded the mine workings (three consecutive days of rain exceeded the capacity of the pumps).

**1902-1929 9,093** tonnes of cassiterite produced from **14.221mill.cu.yds** for a **yield of 1.432lbs/cu.yd**. Grade cutoff for the operations was in the range 0.4-0.5lbs/cu.yd.

-Pioneer Tin Company commonly recovered 93% of their borehole tin values.

- **PTMC** had on issue only 38,756 shares at one pound. The 23 years of operation produced 495,961 pounds of dividends to shareholders.



#### **1930-1931**

Sluicing recommenced in 1930 but due to falling tin prices, and declining grades of cassiterite, ceased again by 1931. The workings were then let to local miners-“Tributors”.

**1933-mid 1940s** The mine was purchased by the **Endurance Tin Mining Company (ETMC)**, that group continuing operations until the mid 1940s. At that time most of the plant and equipment was moved for use at ETMC Mt. Cameron operations.

**1935 Austral Malay Tin Mining Company** drilled 18 scout holes ahead of the workings and records indicate that **at that time the resource ahead of the mine face was quoted as 7.6 million m<sup>3</sup> at a grade of 297 gm SnO<sub>2</sub> / m<sup>3</sup>**. Unofficial writings (hand written notes on 1935 plans) suggested 10.0mill cu.yds at 0.5lbs/cu.yd.

**1940s to mid 1960** No work appears to have been carried out.

**1960-1961 Storeys Creek Tin Mining Company** drilled a further 15 holes in the vicinity of the old Pioneer pit. Grades were lower than the 1935 work, but this has been suggested to be due to poor drilling and sampling procedures.

ETMC appear to have then relinquished their Pioneer tenement in favour of retaining the Frome Dam and water licences for their Mt. Cameron operations.

**Mid 1960s Utah Development Company** took up extensive Exploration Licence tenements in the area that partly covered the Pioneer resource.

**1967 Mr. Vern Woods** acquired the Pioneer Leases from Utah and commenced mining along the south eastern side of the old workings. Woods obtained his water supply from the Pioneer Race owned by ETMC.

-over the **10yrs** he produced 242 tonnes of cassiterite at an average mine **grade of 0.3kg/cu.m**

- removal of ore from the pit face was by high pressure water jet and pumping wet sediment up slope to a plant that screens gravel on concentrates heavies using primary and secondary jigs and spirals.

**1970 B.M.I** purchased the Endurance operations and in doing so restricted the supply of water available to Woods from the old Frome Dam race.

**1973-1976** Woods purchased Frome Dam, power station, and water from B.M.I and with larger volume of water was able to replace the sluice boxes with a modern jig plant and continued operations.



**1976-1979** Pioneer operations were purchased by **Triako/Kibuka Mines Pty.Ltd and Buka Consortium (Amdex managed).**

Kibuka optioned the properties and equipment from Mr. Woods for \$150,000 cash and five annual payments each of \$50,000 (total \$400,000).

- their work indicated that the lower tin grade area has a consistent thickness of 40-50ft over a large area with drilling indicating an average grade of 0.43-1.73 (1.01).

-in terms of a 330ftx 330ft drill grid a volume of 1.6335mill. cu.yds at 0.95lbs cu.yd, for 704tonnes of concentrate was calculated.

- in calculating the appropriate operation Kibuka used \$2.36/lb cassiterite price ,93% recovery, 2:1 strip ratio, cutoff grade 0.146lbs (to as low as 0.03 internally),cost of production per yd at 32cents,production rate 1.008mill.cu.yds/annum ore ( 2.016mill.cu.yds/annum waste), and an estimated CAPEX of \$408,000.

**Amdex Mining** on behalf of that consortium carried out extensive testing in a westerly direction from the old pit. As a result of their work Amdex Mining have quoted a resource base as follows:

**“..PROVEN RESERVE (200 gm SnO<sub>2</sub> / m<sup>3</sup> Cut-off)**

3,833,115 cubic metres at an average grade of 333.6 grams/cubic metre of 70% Sn concentrate  
(1,275 tonnes contained SnO<sub>2</sub>)

**PROVEN RESERVE (100 gm SnO<sub>2</sub> / m<sup>3</sup> Cut-off)**

5,448,353 cubic metres at an average grade of 279.6 grams/cubic metre of 70% Sn concentrate  
(1,523 tonnes contained SnO<sub>2</sub>)....”

Amdex Mining continued to mine westward following the deep lead and in addition conducted an extensive drilling programme in the area.

Operations ceased in late 1979 following the collapse of the world tin price and introduction by the Australian Government and the International Tin Council of production quotas.

**1977** (Piggott and Gibson-p32) estimated that the **retained tailings/dumps** from historical production could be inferred at **14mill.cu.yds grading 0.16-0.25 lbs/cu.yd**. They noted."Considerable potential for an additional 25mill cu.yds at 0.25lbs/cu.yd..."  
 ..Located ..."120ft deep profile....tin in lower 20-40ft with finer material in top 10-15ft"

**AMDEX MINING** intensively drilled utilizing conventional alluvial churn drill (with cable tool) and RC.

**- 10,278m were completed with 2,900 analyses.**

**1980** K.C.Morrison completed a sedimentological study of the Pioneer Deposit.

**1984 Australian Anglo American Limited/Triako and Buka. Amdex Mining Joint Venture (a four-way Joint Venture).**

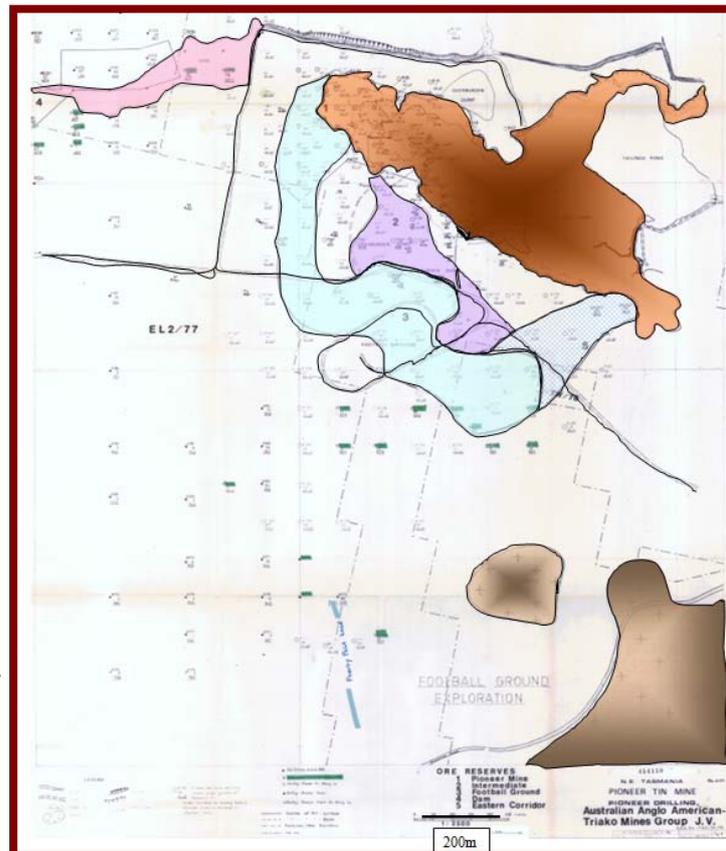
Work completed comprised;

- drilling near East Banca Flats
- review and drilling on Picketts Plain
- drilling part of the Poverty Point Lead "appreciable cassiterite and abundant ilmenite"
- review and drilling Dam Reserve (2holes) and Football Ground (9holes)-Pioneer Football Ground Deposit (pale blue ) probable reserve was increased from 6.432mill cu.m at 220g/cu.m to **7.127 mill.cu.m at 226g/cu.m (1,500tonnes concentrate)**

SE Football Ground Deposit to Woods Face/Pioneer. Low grade reserve **of 1.42mill.cu.m at 124gm/cu.m (158 tonnes concentrate)**

Anglo did not calculate ore boundaries up to the Woods Working face, did not recognize the Mineral Holdings "Eastern Zone" potential (possibly as it transgresses the Gilham Creek Deviation ), and did not incorporate the western extension.

- Little if any work undertaken in the Pioneer area between approximately 1984 and 2001.



**2002 Mineral Holdings Australia** acquired the Pioneer area.

They:

- aggregated the alluvial resources of the Middle and Lower Ringarooma basin into an "economic resource base".
- Acquisition of drill data enabled Mineral Holdings to reassess the resource status at Pioneer in light of modern mining and alluvial treatment techniques.
- undertook a program of pitting, bulk sampling and sample treatment at the Monarch Project. , reviewed the resource base at the Endurance Project, and collected several alluvial heavy mineral concentrates to determine if valuable accessory minerals also occurred in conjunction with the cassiterite.

- converted older data from imperial to metric, replotted cross-sections, and recalculated reserves.

TIN RELATED TESTING			
PERIOD	OPERATOR	NO. HOLES	TOTAL DEPTH metres
1900 - 1929	Pioneer Tin Mining	85	2,119.5 (Approx)
1935	Austral Malay	18	570.0 (Approx)
1960 - 1961	Storey's Creek Mining	15	455 (Approx)
1977 - 1984	Kibuka (Amdex)	238 115 define resource	10,275.8
<b>TOTAL</b>		<b>356</b>	<b>13,240.3</b>

**2004** Willsted (2004-VDM Prospectus) estimated an **expenditure of \$1.94million by Mineral Holdings**, for a total of 356 drillholes (13,420m), to achieve this work.

Re-assessment of the old data was undertaken by Niugini Mining Consultants They commented;- That the **area west of the Amdex resource, remains "open"**.

- That the Amdex resource utilized grades averaged from surface to base of lead (whole of hole). And

- by recalculating the resource to exclude the barren overburden, an increase in the overall quantity of contained tin concentrate can be achieved.

--The resource, at a cut-off of 200 g/m<sup>3</sup>, became 3,186,040 m<sup>3</sup> at a grade of **1,164.82g SnO<sub>2</sub> / m<sup>3</sup>**.

A **JORC compliant** resource in the Measured and Inferred Categories of 4,027 tonnes cassiterite at 0.872kg/m<sup>3</sup> with a strip ratio waste to ore of 4.9:1.

**2007 Van Dieman Mines.** Unpublished new JORC compliant Ore Reserve Statement of 4.62Mm<sup>3</sup> at 870g/m<sup>3</sup> for 4,019t cassiterite, by Kinnane consulting as Niugini Resources Pty Ltd.

A Goldfields G 33 percussion rig in the process of sampling alluvial ground ahead of the Pioneer Mine.



### **2011-2012 Tin Dragon Pty Ltd**

Various Technical records were recovered by Tin Dragon from the offices of the MRT-Hobart (Oct.2011).

Tin Dragon has consolidated the tin potential areas in the district into one corporate entity, and evaluated the extensive technical databases held by MRT (approximately 90 gigabytes in size).

## Resources

### Previous Exploration

- Early exploration drill results of Austral Malay and Storey's Creek available only on plan
- the more reliable drill records are from Amdex, Angloamerican and Mineral Holdings

### **Amdex Mining- 1980 - 1984**

Available are; detailed logs and various plans depicting drill hole and resource locations.

- The drilling pattern on 50m by 100m grid spacings. Reserves were classified as "Proven".
- Grades used in the Amdex calculation are based on "Recovered Volumes" and tin results shown on the logs are treated as "Recovered Grades".
- Amdex continued the practice of calculating grades "Top to Bottom" or "Whole of Hole" of the drill holes probably because current mining practice at the time was to treat the resource "Top to Bottom".

<b>Pioneer - Summary of Drilling – VDM 2007</b>				
<b>Company</b>	<b>Area</b>	<b>Year</b>	<b>Prefix</b>	<b>No. of holes (in database)</b>
Pioneer Tin Mining Company	Pioneer	1898-1928	P	240
Austral Malay	Pioneer	1935	A	18
Storeys Creek	Pioneer	1961	S	31
Amdex	Pioneer	1978	A	20
Amdex	Poverty Point	1979	AA	19
Amdex	Pioneer	1977-1980	K	118
Amdex	Pioneer Tailings	1980	PT	1
Amdex	Pioneer	1980	K	20
Amdex	North Pioneer	1980	AA	9
Amdex	Poverty Point	1980	AA	11
Amdex	Pioneer	1981	K	10
Anglo	Pioneer	1982	K	63
Anglo	Pioneer	1983	K	29
<b>Total :</b>				<b>589</b>

### **Amdex Resource**

- based on grades reported in holes drilled by Amdex Mining during the period 1980 to 1984.
- in order to conduct the evaluation the "whole of hole" grades were calculated using only the grades from the sampled section. Unsampled intervals were assigned theoretical volumes with a zero grade.
- Cut-off grades of 200 gm/m<sup>3</sup> and 100 gm/m<sup>3</sup> were used and only that section of the resource considered to be "Proven" was quoted. Amdex calculated reserve volumes using the "Influence Area – Depth" method.

CLASS	CUT-OFF GRADE (gm SnO <sub>2</sub> / m <sup>3</sup> )	VOLUME M <sup>3</sup>	WT. AV. GRADE (gm SnO <sub>2</sub> / m <sup>3</sup> )	CONTAINED SnO <sub>2</sub> Tonnes
Proven	200	3,833,115	333.6	1,275
Proven	100	5,448,353	279.6	1,523

Amdex did not include in their resource calculations areas to the south-east of the old workings, ie around the Football Ground and south of the Cyclone tails heap.

### Mineral Holdings Re-assessment Nuigini Mining Consultants (NMC):

Recalculated all drill hole data with the removal of overburden sections that, it is felt, will extend the resource boundaries into what now appears to be marginal ground;

- many of the early holes, particularly those in the central section of the resource (Holes K19 to K29) were not sampled in the central sections of the hole. In these cases Amdex calculate grade using "Theoretical Volume" and thus grade may be undervalued for those holes.

- early drilling terminated in high-grade wash and not basement. This may have resulted in the Amdex resource being undervalued.

**-work does not include the area to the east, that is, previously drilled by the Pioneer Mining Company, Austral Malay and Storeys Creek Tin.**

- no attempt was made to differentiate between "Proven, Probable and Possible Reserves" and "Resources"- given the unreliable nature of some of the previous reporting.

- only a "possible resource" is quoted - this can be upgraded to a "Proven Reserve" through the digitising of previous data onto a new map base, complete recalculation of all old logs and application of specific mining parameters.

Extended the resource to the west, south-west and south of the area presently drilled "The western extension between the old workings and the postulated location of the ancestral Ringarooma River. This area is considered to have the **potential to contain 3.5 million m<sup>3</sup> of tin bearing gravels at an average grade of 1,000g/m<sup>3</sup> or 3,500t of SnO<sub>2</sub> concentrate**".

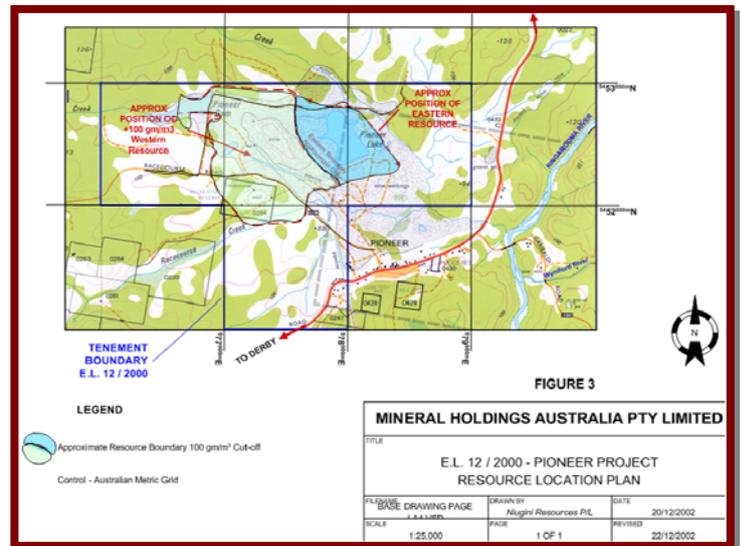
Recommended the definition by drilling the northern boundary of the resource;

Recommended locating the old drill data relating to the area east of the old Pioneer workings (Austral Malay, Pioneer Tin Mining Company and Storey's Creek Tin) where there appears to be a shallow higher grade resource present. Data currently indicated the area may contain shallow high-grade resources that would make an ideal preliminary mining target.

Recommended quantifying the content of accessory minerals present in the basal wash zone. These minerals include, rutile, zircon, ilmenite, gold, sapphire, the REO's monazite and xenotime and possibly a tantalite/columbite mineral..."Ample evidence exists to suggest that rutile, zircon and ilmenite occur in grades of 50 to 200 gm/m<sup>3</sup>, gold at 10 mgm/m<sup>3</sup>, REO's in the order of 100 to 200 gm/m<sup>3</sup> and Ta minerals in the order of 1 to 2 gm/m<sup>3</sup>. Sapphire has been observed in tin shed tailings and grades of 1 to 5 gm/m<sup>3</sup> of gem quality stone predicted."

Recommended further exploration including shallow seismic surveys, and

Drilling in areas to the west and south-west may also further expand the resource base.



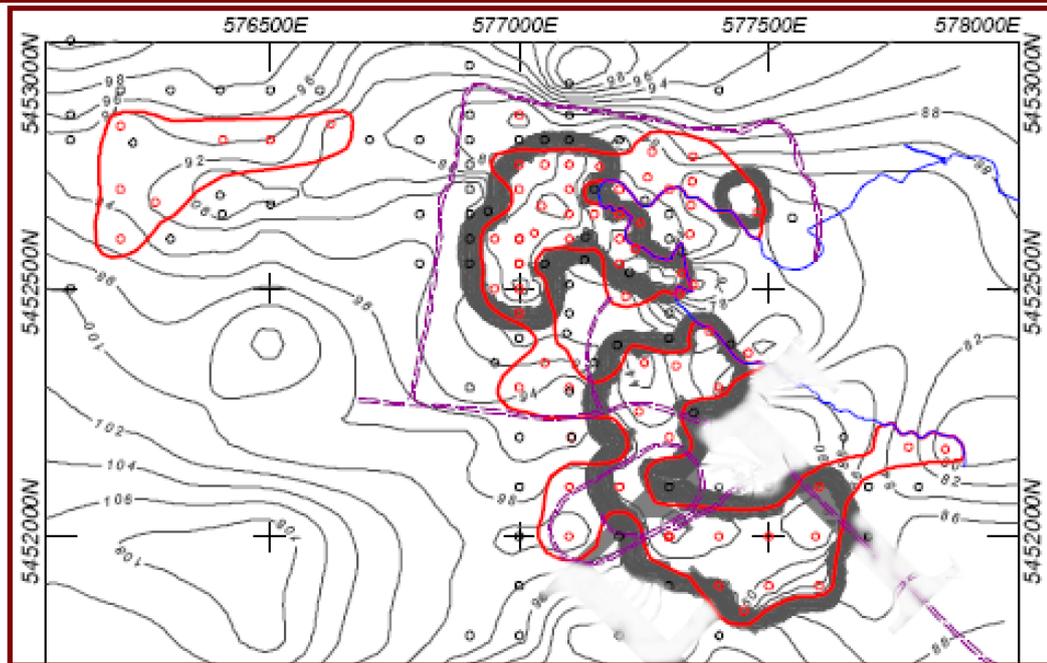


**PIONEER OPENCUT PROJECT - SUMMARY OF RESOURCES 1<sup>st</sup> Aug 2004 Competent Person Mr. Neil Kinnane**

Location	Measured		Indicated		Inferred
	Vol.- Mbcm	Grade - kg/bcm	Vol.- Mbcm	Grade - kg/bcm	
West			0.49	1.03	
East			2.58	0.95	Tonnes Conc.
<b>Total</b>			<b>3.07</b>	<b>0.96</b>	265

**PIONEER OPENCUT PROJECT - SUMMARY OF RESOURCES 13th Aug 2004 Competent Person Engineer Robert de Jongh**

Location	Proved		Probable		Contained Cassiterite	
	Vol.- Mbcm	Grade - kg/bcm	Vol.- Mbcm	Grade - kg/bcm	Waste/Ore Ratio	Tonnes Conc.
NW	nil	na	0.55	1.21		665
NE	nil	na	0.06	0.4		24
South	nil	na	0.92	1.19		1095
<b>Total</b>	<b>nil</b>	<b>na</b>	<b>1.53</b>	<b>1.17</b>	<b>5.82</b>	<b>1784</b>



**Resource Extension**

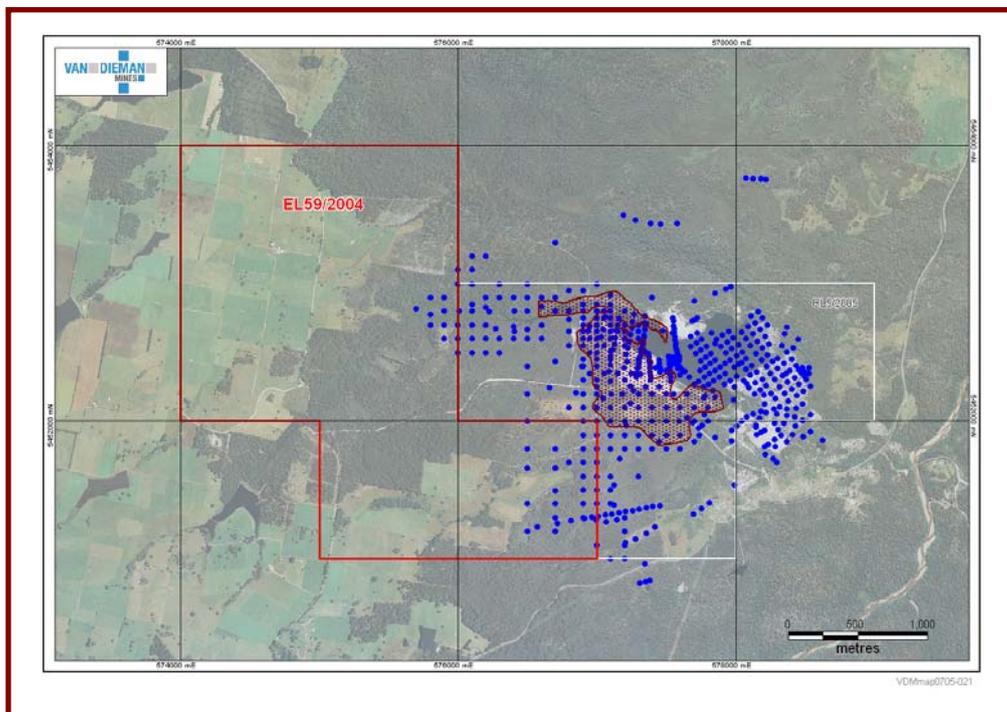
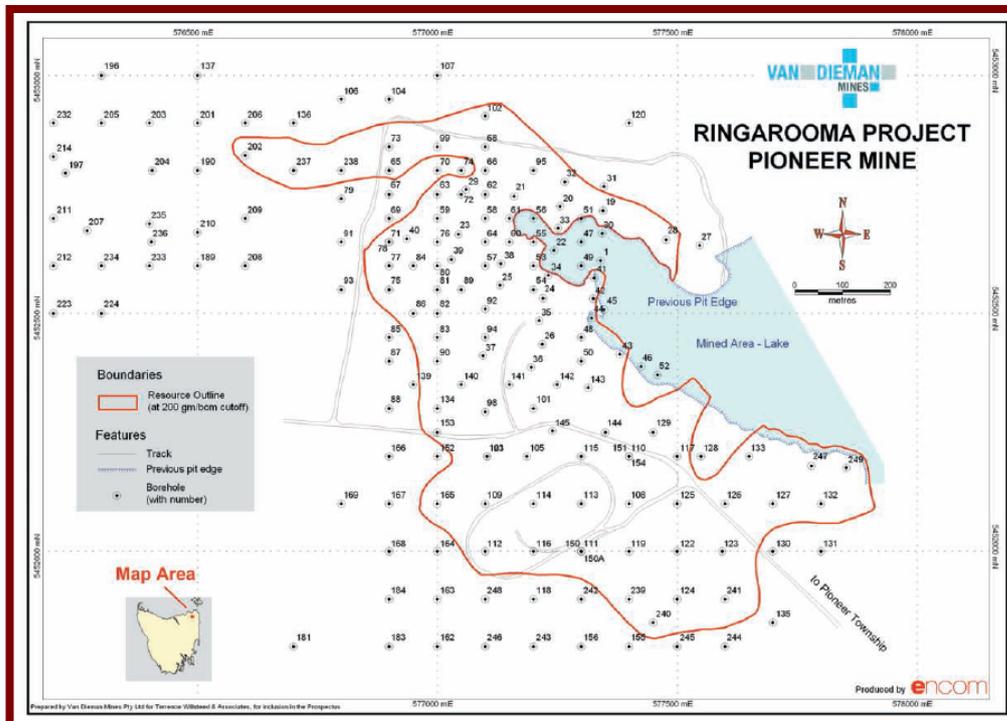
An assessment of previous data by VDM indicates possible extensions to the resource base by:

- Recalculation of all drill hole data with the removal of overburden sections that, it is felt, will extend the resource boundaries into what now appears to be marginal ground;
- Extension of the resource to the west, south-west and south of the area presently drilled;
- Define by drilling the northern boundary of the resource;
- Locate old drill data relating to the area east of the old Pioneer workings (Austral Malay, Pioneer Tin Mining Company and Storey's Creek Tin) where there appears to be a shallow higher grade resource present

These extensions are considered to have the prospectivity to contain 3.5Mm<sup>3</sup> at an average grade of 1,000 gm / m<sup>3</sup> of SnO<sub>2</sub> at 70% Sn or 3,500 tonnes of SnO<sub>2</sub>.

### 2004 Van Dieman Mines -PROSPECTUS

The VDM prospectus published new resources for Pioneer of;  
**4.62mill.cu.m at 0.872 kg/cu.m conc.(Measured) and 3.5mill.cu.m (Inferred) for a combined 4,027tonnes of cassiterite concentrate .**

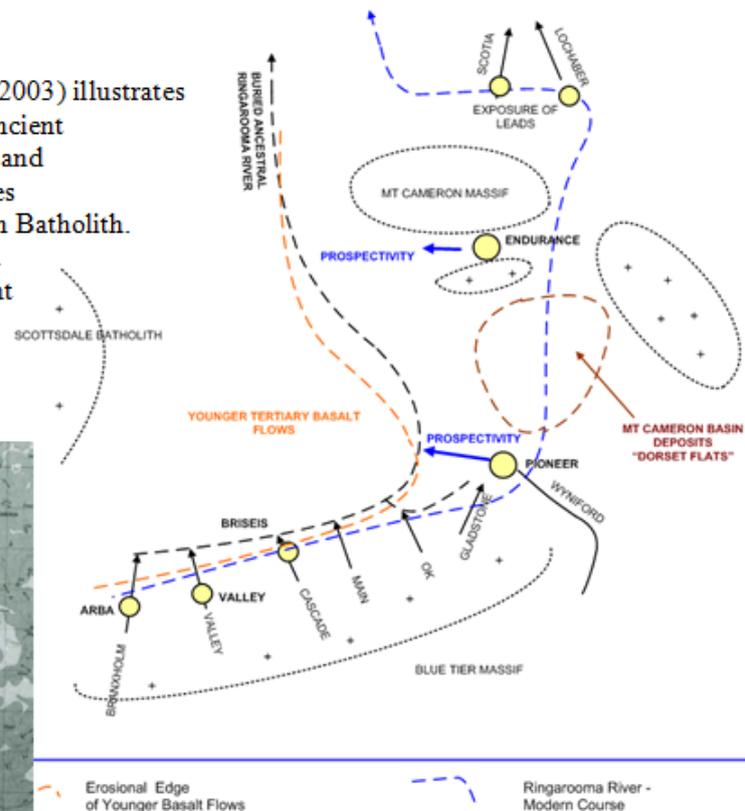
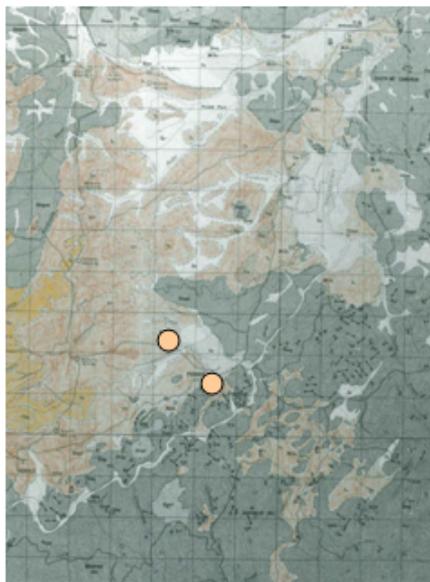


Year	Company	Inferred	Probable	Proven mill. cu.m	Cassit. grade	Contained Cassiterite Tonnes
1935	Austral Malay	10mill.possible?		7.6	297g	
1976	AMDEX		200g cutoff	3.8	333.6g	1,275
			100g cutoff	5.4	279.6g	1,523
1977	Piggott and Gibson			14.0	0.16-0.25lbs/yd	
1984	AMDEX/Anglo AmericanJV	Football Ground Deposit		7.127	226	1,500
		SE-Football Ground Deposit		1.42	124	158
2001	Mineral Holdings-Nuigini Mining Consultants	200g cutoff		3.2	1,164.82	
		Northern Fringe	Potential			
		Western Extension	3.5		1,000.00	3,500.00
		Eastern Area	unquantified			
	Mineral Holdings	200g cutoff		3.2		3,711
		100g cutoff		5.5		4,740
2004	Van Dieman Mines	Measured and Inferred-"JORC" Compliant			0.827kg	4,027
		Rutile ,Zircon ,Ilmenite			50-200g	
		Gold			10mg	
		REO			100-200g	
Aug-04	Van Dieman Mines	NW	0.55		1.21kg	
	Robert de Jongh-Competent Person	NE	0.06		0.4kg	
		South	0.92		1.19kg	1,784
	Dr Bryce L Wood -TWA-Indep. signoff					
Jan-07	Van Dieman Mines	JORC		4.6	870	4,019.40

It would appear that, in broad terms, **VDM** combined all the resource areas assessed by AMDEX and Mineral Holdings and discovered under joint venture by Angloamerican.  
- the eastern resource prospectivity area cited in NMC – Mineral Holdings assessment.  
The sampling and analytical methodology and resource estimation procedures were **independently checked by Dr Bryce L Wood for TWA.**

## Geological Setting

In the adjacent diagram Kinnane (2003) illustrates the interpreted flow path of the ancient Ringarooma River at Endurance and Pioneer along very major structures that dismembered the Mt Cameron Batholith. If the interpretation is correct then The potential for further significant tin deposits exists between and west of Pioneer and Endurance.



The regional geological history is summarised as follows:

- Permo -Triassic with the unroofing and erosion of the cassiterite bearing, Blue Tier Batholith.

- The Late Jurassic - uplift, intrusion of extensive dolerite sheets (eg 5km sw of Pioneer), and widespread erosion/deep weathering. This also liberated heavy minerals from the granites.

- The Middle Eocene - volcanic activity along the Blue Tier and extrusion of the Older Basaltic flows- these were also emplaced along stream systems incised into the pre-Eocene granitic land surface.

The dominant erosional and alluvial depositional period:

- uplift and a humid tropical climatic regimen, rapid erosion of basalts ,and introduction of a zircospilic suite of heavy minerals into the basal sediments of the deep lead deposits.

- Pre-Middle Eocene- alluvial deposits were mixed and reworked. Extensive flood plain alluvial deposits formed across the northern plains and southwards towards the present site of St Helens. No source vents for these rocks have as yet been located. The Mid Eocene to Late Oligocene appears to have

- Post Oligocene - uplift and/or marine regression , lateritization and silicification of the land surface and commencement of the deep incision of some streams into the Tertiary conglomeratic land surface (Scotia and Lochaber Leads). Subsequent rises in sea level saw the development of broad marine embayments at Boobyalla and in the lower Ringarooma River area and the development of cassiterite bearing blanket type deposits derived from proximal cassiterite bearing alluvial deposits, from some proximal cassiterite bearing hard-rock deposits and from larger streams such as the Scotia Lead.

Locally around this marine embayment marine processes appear to have resulted in the development of some cassiterite bearing strand line deposits.

The capture of the tributary of the Musselroe River in this Post Oligocene period saw the development of the modern Ringarooma River and the reworking of many of the alluvial cassiterite bearing deposits proximal to the stream.

#### THE RINGAROOMA DEPOSITS - PIONEER

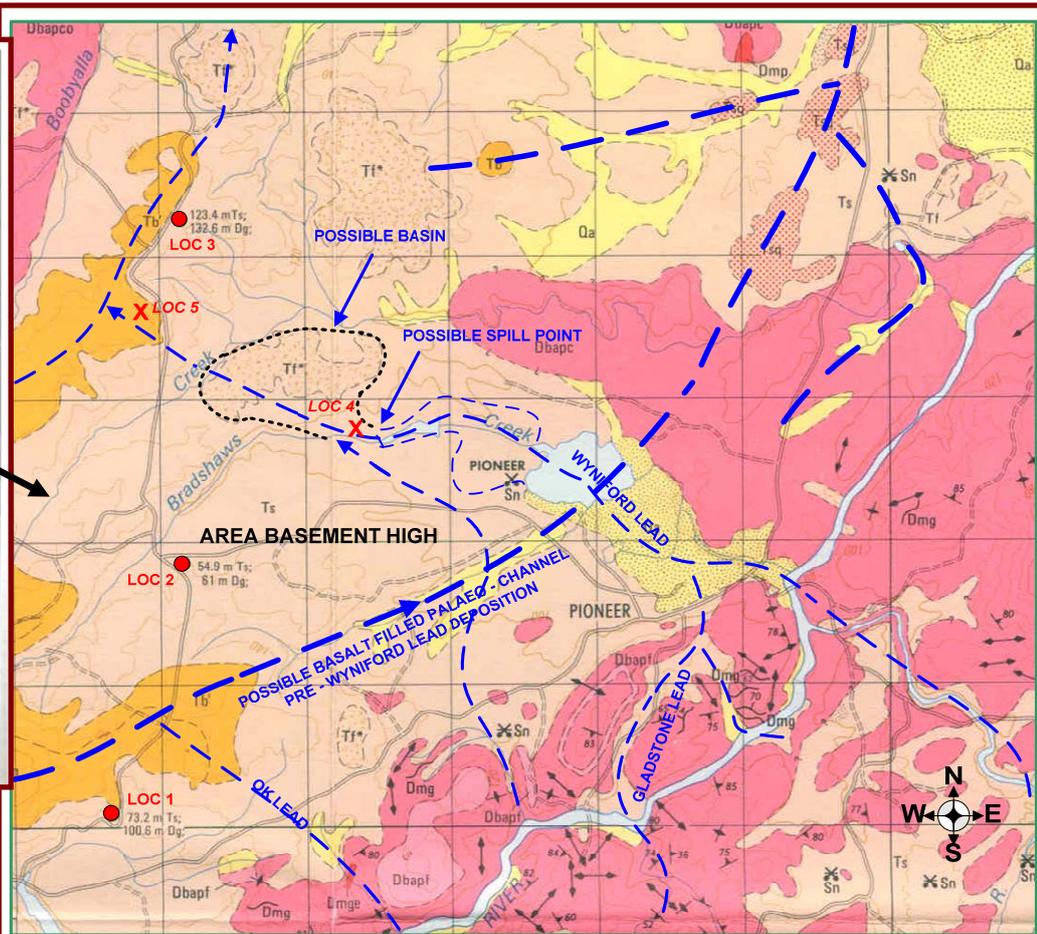
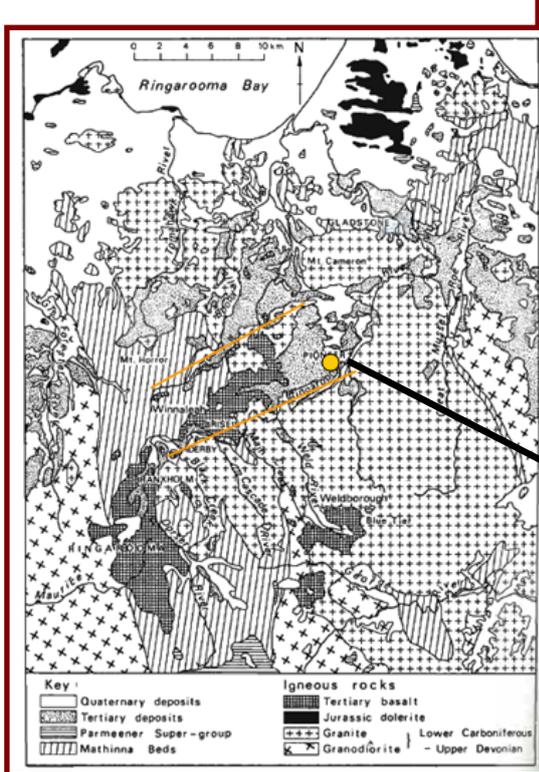
- the Ringarooma River ran eastwards and then northwards through the area occupied by the present Boobyalla River. The river was fed by a number of major tributaries, the Branxholm / Black Creek, Valley Creek, Cascade River, Main Creek, Weld River, OK Creek, Gladstone Creek and the Wyniford River.

-During this period the tin bearing Blue Tier massif (hornblende granodiorite-adamellite, biotite granite/adamellite, and musc-bi granite) formed a major elevated mountainous area south of the Ringarooma River basin. Streams draining this massif were probably deeply dissected and high energy systems that contributed a major heavy mineral rich sediment load into the basin.

-Sharp changes in gradient at the junction of these systems with the basin, resulted in a reduction in stream energy, and thus assisted the development of deeply entrenched, major tin bearing alluvial deposits. Basement topographic levels along the ancestral channel would seem to indicate that these basinal deposits were probably elevated above the levels of the main river channel.

Filling of these basins resulted in spilling of tin rich sediments further north to the main channel of the Ringarooma River.

About 16 Ma the Ringarooma River valley was partly flooded by the Younger Basaltic flows. These flows pushed the river to the south against the granite massif and in places, below Derby, the river was forced to incise its course into granitic basement rocks. In turn this isolated the paleo-Ringarooma River and its tin bearing basinal deposits under thick basaltic flows.



Taken From Mineral Resources Tasmania  
Geological Atlas 1:50,000 Series

- Palaeo-Channel "Lead"
- Resource Boundary
- LOC 2 ● Water Bore Location with Depth
- LOC 5 X Text Location

## GEOLOGICAL PLAN PIONEER PROJECT

The Pioneer deposit was first located near the junction of Bradshaw's Creek and the Ringarooma River.

The tin bearing deposits are considered to be of Tertiary age (VDM 2004-2007);

They are probably Post Middle Eocene being pre-Younger Basalt.

-The original Pioneer discovery made where the modern Ringarooma River cut the older Tertiary Wyniford Lead. From that point the Pioneer deposit trends north and then north-west toward the buried paleo-channel of the Ringarooma River, Loc 5. The junction of these two systems is postulated to lie approximately 3 to 3.5km north west of the Pioneer workings (above diagram).

## MINE GEOLOGY - PIONEER (Morrison 1980)

Located at the eastern margin of a Tertiary sedimentary basin.

### Exposed stratigraphy;

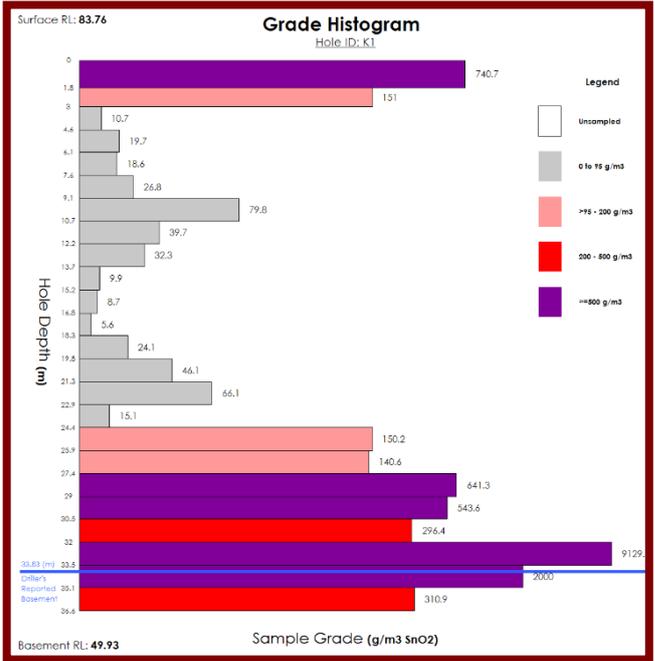
- Finning upward trend.
- Mine sequence to granite basement is approx.40m thick
- Late Oligocene-E Miocene pollens and regional relativity.
- Channel trends NW in downslope direction.
- longitudinal, transverse bar and side channel facies sediment
- sedimentology predicts that tributary channels should be present upstream and incised into the granite east of the Pioneer Mine
- high grade tin is restricted to this channel
- tin grade historically decreased with sequence thickening to the west.
- 1906-grades averaged 0.97kg/cu.m.
- 1912-1922 average grade was 0.73kg/cu.m
- possible abrupt channel termination downstream; questionable as the coarse basal gravels persist.

**Upper (overburden) sequence:** 30-40m thick, of trough x-bedded sands and large bodies of kaolinic clay. Modification up to 2-5m thick (extensive horizontal beds of black silt, laminated, small trough x-beds of sand) and upward to present soil position.

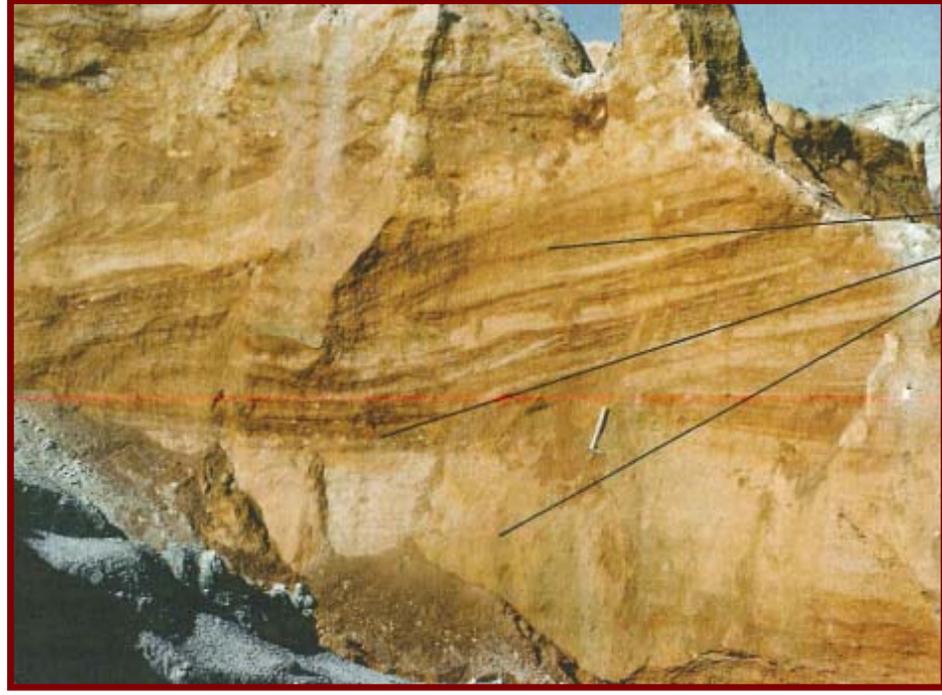
- thin lag layers may contain ilmenite plus/minus cassiterite-monzazite



Drill records also suggest quantities of cassiterite in the Upper Stratigraphy (e.g. below);



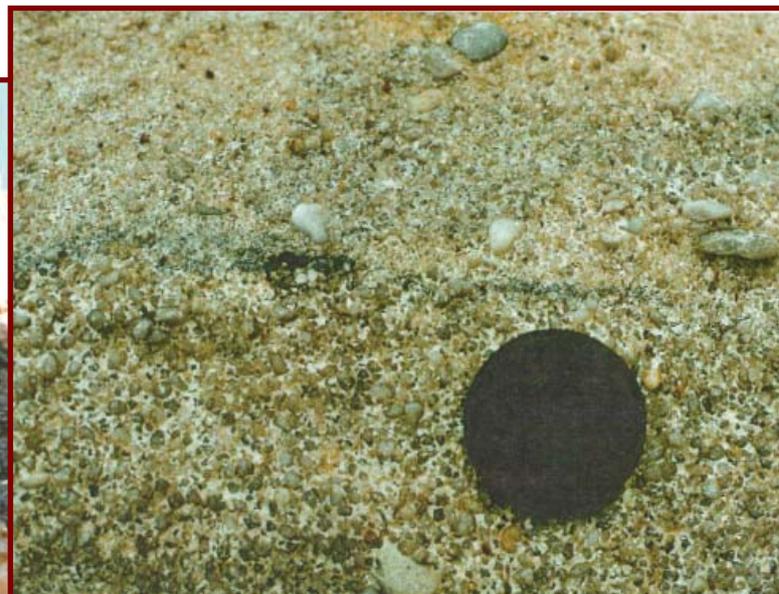
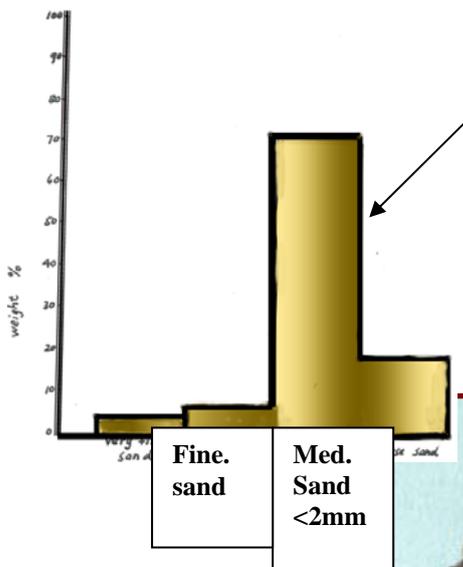
**Contact between Upper and Lower Mine Sequence (a thin pebble lag)**

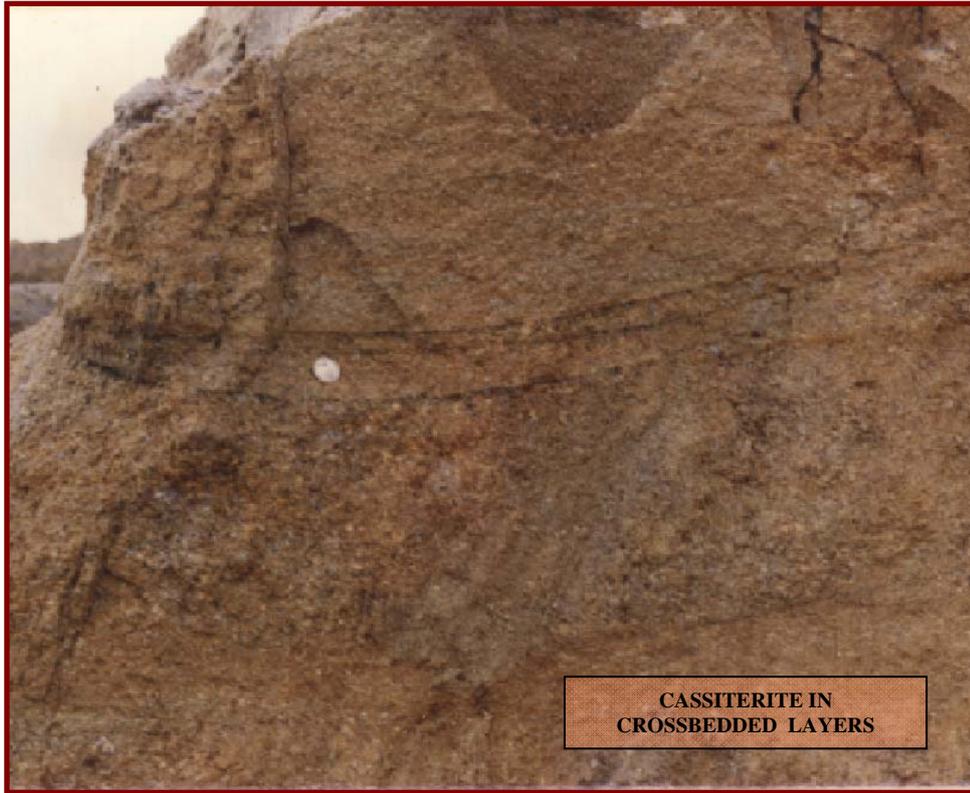


**A lower (cassiterite bearing) sequence.** 6m thick, stratified gravels, tabular x-bedded sand/gravel, trough x-bedded sand, and lenticular bodies of peat/clay (leaves and pollen, pyrite-marcasite nodules)

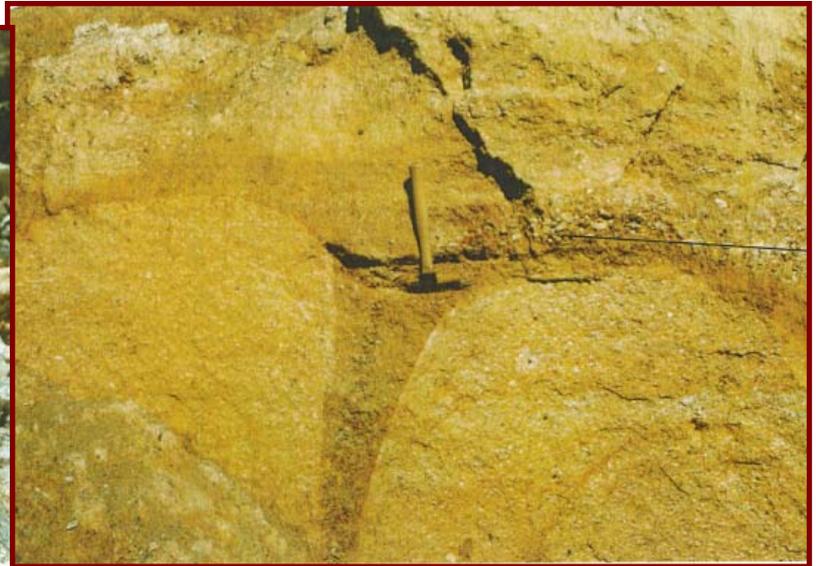
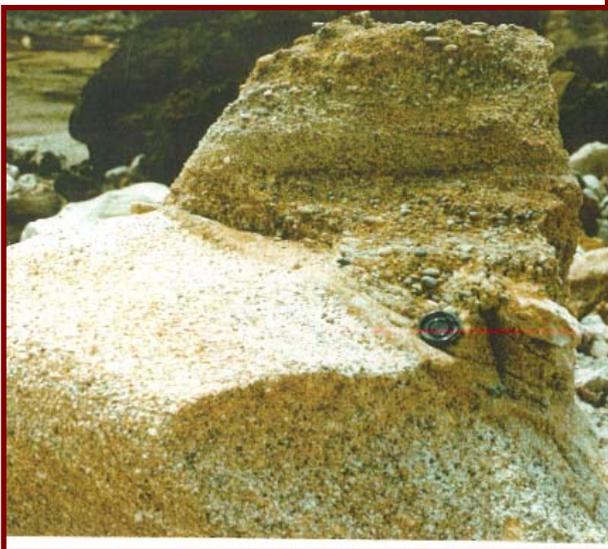


- "proximal braided stream sediment" origin
- some clastics coarsening upwards.
- 8 sedimentary facies recognised
- heavy minerals (**59%** 0.15-0.25mm redbrown/black/red/yellow/clear **cassiterite**, 28%ilmenite, 6.5%monazite, 3.4%zircon, 1.6%topaz, 0.2%spinel, rutile, tourmaline, concentrated in longitudinal bar, transverse bar and channel facies.
- higher grade Sn with gravels and pebbly sediments
- approximately 70% of medium grained sand size-130 to +60mesh.
- some composite grains (1.3% of cassiterite) of cassiterite/quartz and ilmenite/quartz
- mostly deposited during initial stages of waning flow-after flooding.
- basal gravels may contain silicified Permian bryozoans.





### Granite Basement



**Note:** the high grade cassiterite (black bands) between weathered granite tors and in gravels above the unconformity (left).

The gravel source, heavy mineral sands, light mineral sands, clay, and fossils in the tin-bearing sequence are likely derived from contact and regional metamorphic rocks, clastic sediments, "granite", and greisen from east of Pioneer (possibly Anchor styled greisen)?



### **Additional Minerals**

**Gold (VDM 2007)** ...”is reported as a regular component of the tin concentrates and old records seem to indicate that the  $\text{SnO}_2$ : Au ratio is in the order of 600 to 650:1. Sapphire and corundum were regularly observed and abundant 2 to 3 mm sapphire was a problem component of the tin concentrates. Old records indicate that alluvial related to the Wyniford River section of the lead contained abundant gemmy sapphire, sizes varied from 2 mm to 10 mm, fine blue and yellow stones were recovered. The abundance of these accessory minerals varies dependant on the position in the deposits in relation to both gradient and source. That is the sediment related to the **Wyniford Lead** report a higher sapphire component while the Ringarooma River sediments report less sapphire and higher gold.”

**Monazite** AMDEX (Morrison 1981) initiated a survey of monazite presence in the tin bearing alluvials. Dumps containing monazite were found at **Pioneer, Dorset Dredge**, Endurance, and Sth. Cameron. At Pioneer it accounted for 6% of the heavies’ fraction in basal wash. They also recognized the potential for sedimentary roll front analogue uranium deposits in the area- the pyrite –marcasite zones adjacent to lignites and granite contacts- In particular the use of Thorium to detect richer areas. Uranium has not been found in any of the deposits.

### **Clay**

Given that there are a number of discrete clay horizons in the Pioneer Resource area and old workings, and if a new mine operation was to include selective mining of the clayey horizons between tin bearing layers, it would prudent to test the different clay zones for;

- Material more suitable for paper coating

- Alunitic varieties? etc

### **Nature of the tin bearing horizons**

J. Newton-Smith of Aust AngloAmerican (1981) in Joint Venture with AMDEX contended that alluvial cassiterite in the Boobyalla Depocentre was of 3 types depending upon the sedimentological disposition;

- Type 1 Occurs in deeply buried alluvials (stratified gravels, trough and planar x-bedded sands and peat). The cassiterite is black and brown and associated with abundant ilmenite and monazite.

- Type 2 Tributaries and gutters to deep leads. Cassiterite is black and occurring in poorly sorted boulder rich sediments-without associated accessory heavy minerals. e.g. Clifton is buried by <20m of overburden is in the upper fan fluvial facies and cassiterite more proximal to its source?

- **Type 3** cassiterite is in shallow, surficial deposits (generally upward fining sequences of pebbles-sand-clay). it is red, yellow and black with accessory spinel (hercynite) and gold e.g. Pioneer and Riverside.

## Potential

The main potential remaining at Pioneer is both the

- extensions of the known endowment and
- new Pioneer styled "gutters";

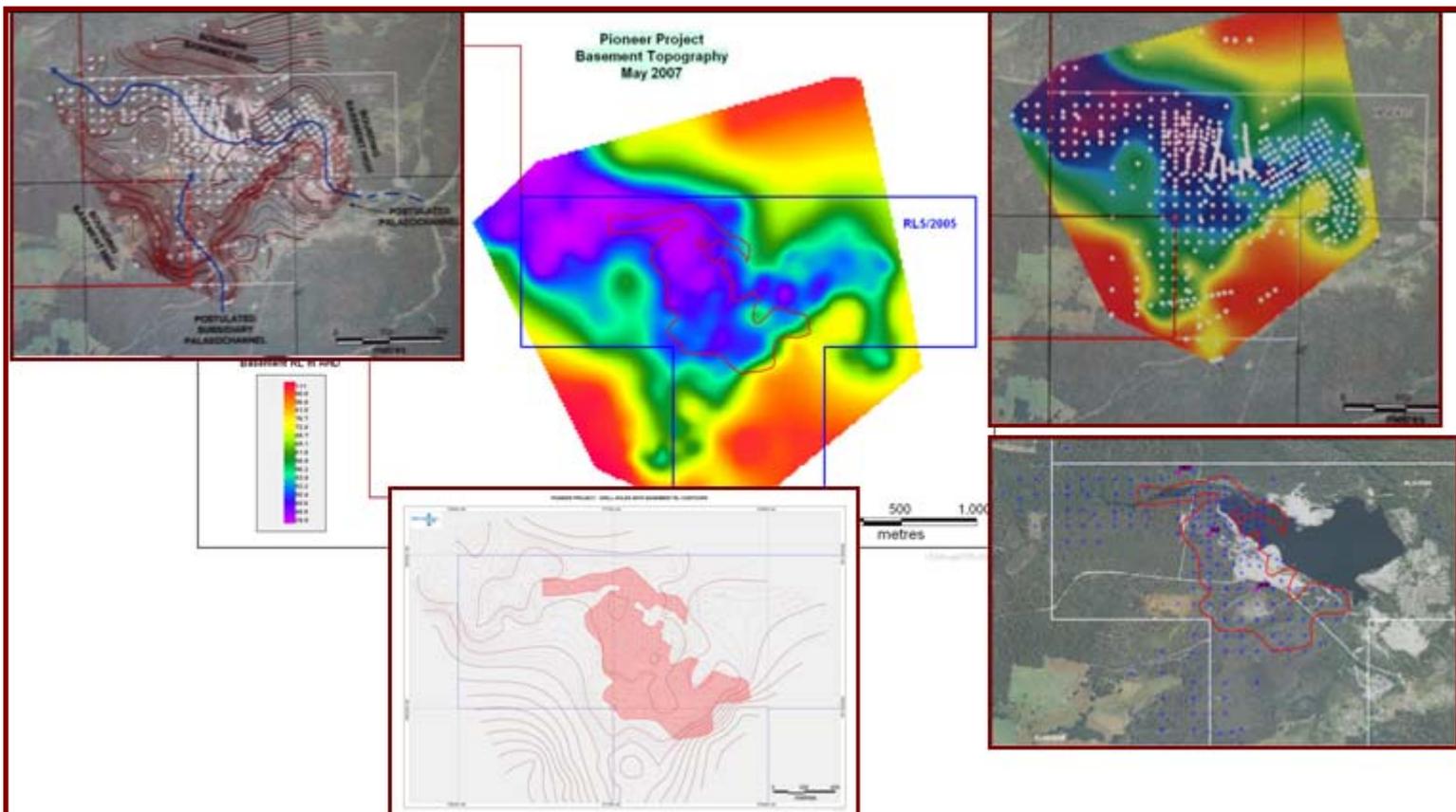
At Pioneer endowment corresponds with the deeper portions of the Bradshaw Lead (blue-purple on diagram below).

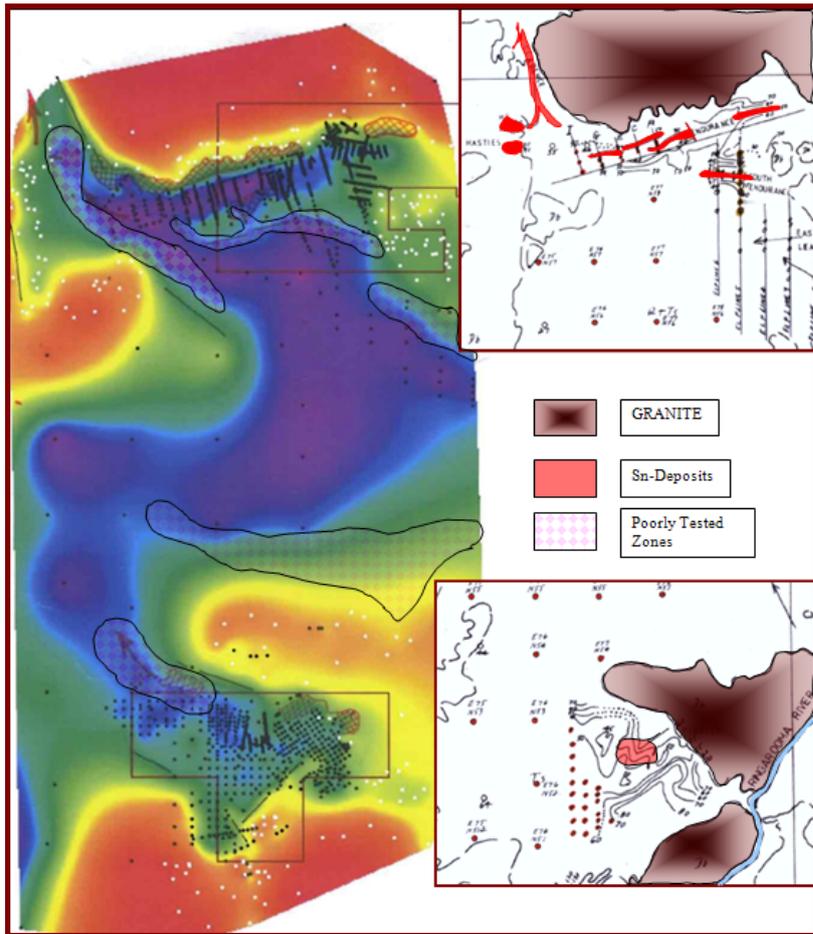
The western extension, as indicated by the VDM resource work, is clearly open to the west or over 750 metres. At the project scale there is indicated to be a potential for 4,000 to 10,000 tonnes of cassiterite as the paleo channel has an identical geometry to the main mine area.

- further west again this drainage either swings to the sw or nnw, spilling into the larger depocentre heading northward.

Basement isopachs illustrate that the eastern and northern fringes of the Pioneer deposit or its drainage is controlled by strong WNW and NE trending granite contacts.

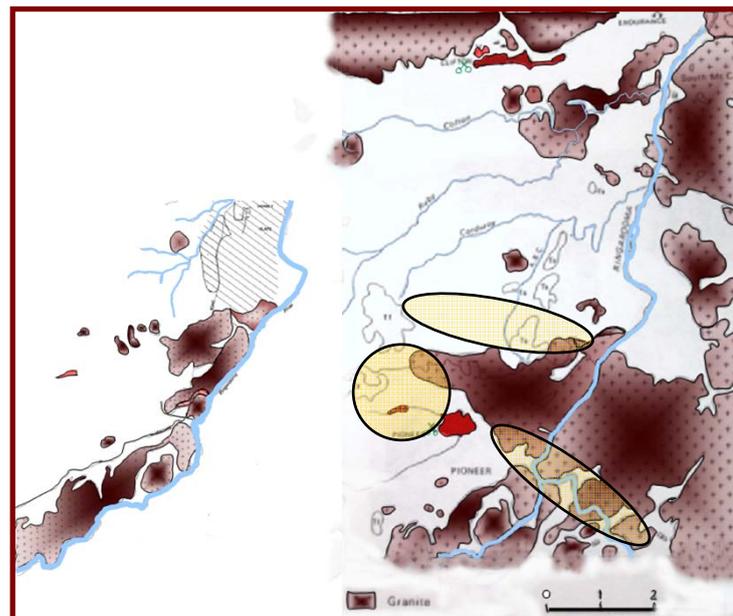
- potential for incremental tonnages exists in the Bradshaw drainage from the mine and eastward





Amdex mapping (*below*) of exposed granite trending to the NNE, this trajectory also cut by the Ringarooma River. Again (*below right*) Yim (1990) simplified the granite subcrop areas.

Empirically correlating the influence of the granite margins with granite depth under Tertiary and Quaternary cover (isopachs of Angloamerican and VDM) the paleo drainage containing the tin endowment is clearly related to major faulting of the granite, the granite boundaries, and thus the sedimentary channels incised into and fans distributed around basement.



Historical and modern placer exploitation at Pioneer clearly relates to the areas where cassiterite 'daylighted' amongst the subcropping granite and at the confluence of the ancient Ringarooma and other drainages. By practical necessity mining commenced and progressed in the areas of very shallow tin placer.

The work of Anglo, Amdex and Mineral Holdings shows good potential W, Sth and East of Pioneer – however, exploitation has not progressed either side of the 20yr gaps in activity at Pioneer.

### Proposed Exploration

- Drilling of 10 holes to confirm the resources east of Pioneer.
- review of drilling to the south where the depocentre of Pioneer prevails
- seismic profiling and systematic drilling in the 800m extension to the west, and
- 6-8 seismic lines and follow-up drilling on a major target of over 3000m length off the northern face of the Pioneer granite. This may be a Pioneer look-a-like position?

Prefeasibility studies at modern tin prices with account of the accessory minerals as they relate to multiple stanniferous layers and bulk mining versus selective removal of wash and clay should be done together with resource evaluation of other deposits in the tenements.

Incorporation of the resources at

**Environmental**

There are no environmental studies known to Tin Dragon.

## 14. MONARCH

The Monarch alluvial cassiterite deposit area is owned 100% by Tin Dragon Pty Ltd. It occupies a relatively flat basin-like depression immediately adjacent to the NW slopes of Mt Cameron at elevations of around 50m ASL.

Tenure comprises Exploration Licences:  
EL09/2011 of 103km<sup>2</sup> and EL11/2008 of 50km<sup>2</sup>.

### Brief History

**1800s** Tin was discovered at the Monarch site in the 1800s and was initially worked by Chinese prospectors. Production records are incomplete.

**1922 to 1936 The Monarch Tin Mining Company** worked the area;

- historical production up to and including the period was approximately 71.5 tonnes of concentrate.
- 1930s drilling.

**1963 V.Woods** undertook mining and drilling.

BHP Joint Venture with Woods. Drilling completed:

- 322m spaced lines at 80.5m hole spacing.
- outlined a resource of **2,909,300 cu yd at 5.8oz Sn conc. per cu. yd** (for **470.1t** concentrate). Five resource blocks or three NW-trending mineralized zones (coinciding with the current drainages)- W.S.Chesnut 1965.
- The tin wash layers are between 15 and 20ft thick.

### **1965 Austminex Pty Ltd**

**1966 Kathleen Investments** conducted limited testing on Bonser Creek.

Consultant Hughes (1967) considered that the BHP resources estimate was too conservative.

- 50 backhoe pit tests

**1968 The Endurance Tin Mining Co** purchased the property, and produced **355t** of cassiterite.

**1970 to 1973 Blue Metal Industries (BMI)** took over the area .They undertook mining and extensive auger drilling until mine closure in 1973.

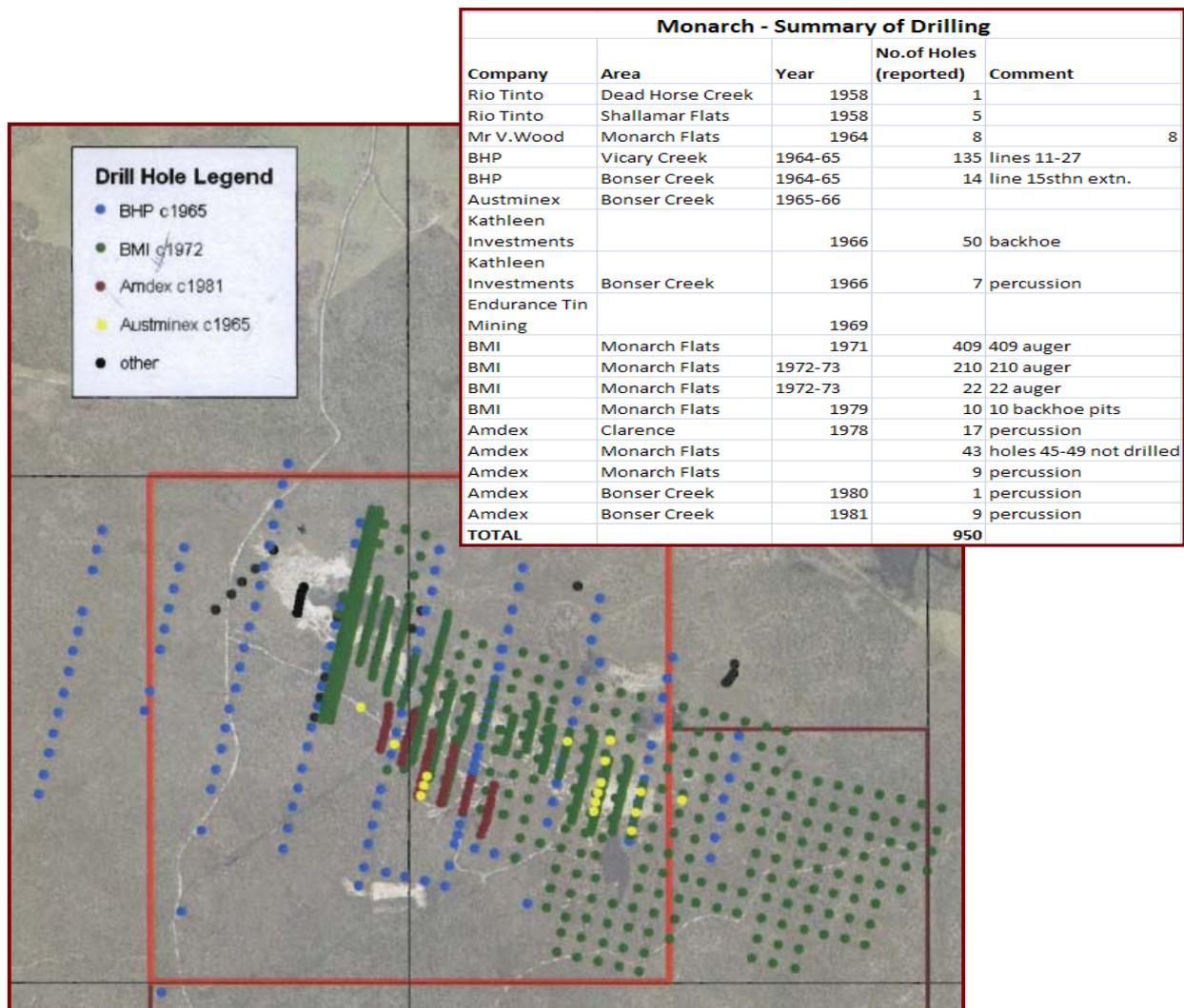
- BMI produced 52tonnes of tin concentrate between 1970-1972.
- Infill auger holes were on 80m x 80m spacing.
- At the time that area was concealed by a large BMI waste dump and treatment plant.

**1974** Geologist Thomas reported difficulty reconciling the old cross-sections with plan records and consequently calculated a smaller tonnage of 1,400,000 cu yds with a grade of 5.6oz/cu.yd.

-“Recovered mining grades tended to be higher than those indicated by drilling”.

**1977 to 1980 Amdex Mining Ltd** drilled 44 reverse circulation holes (100m spaced lines and 25m hole spacing) and 9 cable tool holes and also completed further ore reserve definition.

- They outlined Possible Resources of 1,800,968m<sup>3</sup> grading 353g/m<sup>3</sup> OR **2,437,032m<sup>3</sup> at 296.7g/m<sup>3</sup>** for 636 and **723t**, respectively, of 70% tin concentrate.



**1980-2000** no significant work undertaken.

-AMDEX (1981) recalculated the possibility of 3Mm<sup>3</sup> grading 250g/m<sup>3</sup> cassiterite in a series of channels and fan deltas, complicated by marine incursion in the west.

**2000 Mineral Holdings** explored the area.

-Consultants Nuigini Resources undertook ore reserve calculations as well as 10 trial pits in the SW resource area (B-lens).

- A+B+E lenses contained 556,751 BCM grading 1.22kg tin conc. per BCM (for **687t cassiterite conc.**) as well as 19gm/BCM ZrO<sub>2</sub> and 48gm/BCM of rutile -illmenite.

- Indicated resources at D-lens were calculated as 59,100 BCM at 139g/BCM.

- their work confirmed the tenor and general outline of BHPs work.

**2001 Nuigini Resources Pty Ltd** (Kinnane, 2001) also reported:

- Reasonable quantities of zircon, rutile, illmenite and monazite.

- That the resources were open to the south and east



- That the cassiterite appeared to be derived locally from the Mt Cameron Granite- although the cassiterite was generally less than 1mm diameter .In the eastern resources the cassiterite is coarser with common composite grains locked with quartz.
- It was recommended that an application for an extension licence be lodged

**2003 McPherson Duncan Associates** calculated that the resources were worth A\$3,500,000 based upon a prevailing tin price of A\$7,465.

**2003-2008 Van Diemen Mines** held the property with work limited to data entry to electronic format

and resource calculations. A JORC compliant resource calculated by Kinnane in 2007 from consultant company Niugini Resources Pty Ltd.

**2008 Askins and Stewart** secured the surrounding area and undertook data compilation and remote sensing studies as part of the overall Mt Cameron Exploration Licence.

**2009-2010 Van Diemen Mines forfeited their tenure.**

**2011 Tin Dragon Pty Ltd** applied for and was granted an Exploration Licence over the Monarch deposit bringing together all the know resources, their extensions and other potential targets.

### Mineral Resources

The Kinnane 2007 **JORC compliant Measured Resource is 1,802,000m<sup>3</sup> @ 353g/m<sup>3</sup> for 636t cassiterite.** Previous resource estimates are:

LISTING OF RESOURCES-RESERVES - MONARCH									
Year	Company	Cut-off	Area	Resource mill.cu.m	Indicated mill.cu.m	Possible mill.cu.m	Cassit. grade	Contained Cassiterite Tonnes	Production
	Historical								71.5 HIST.
1963-1966	BHP		full length drillholes	2,909,300			5.8oz	470	
1967	BMI-Thomas			1,400,000			5.6	267	355t ETMC 52t BMI
1980	AMDEX-Neale	200gms				1,802,000	353gms	636	
		100gms	"reserves only limited by extent of drilling"			2437000.0	296.7gms	723	
2000	Mineral Holdings-Niugini Mining Consultants		A+B+E lenses		556,751		1,220gm	679	
			D-lense		59,100		139gm		
								723	478.5
<b>TOTAL ENDOWMENT</b>								<b>1,202</b>	

## Geological Setting

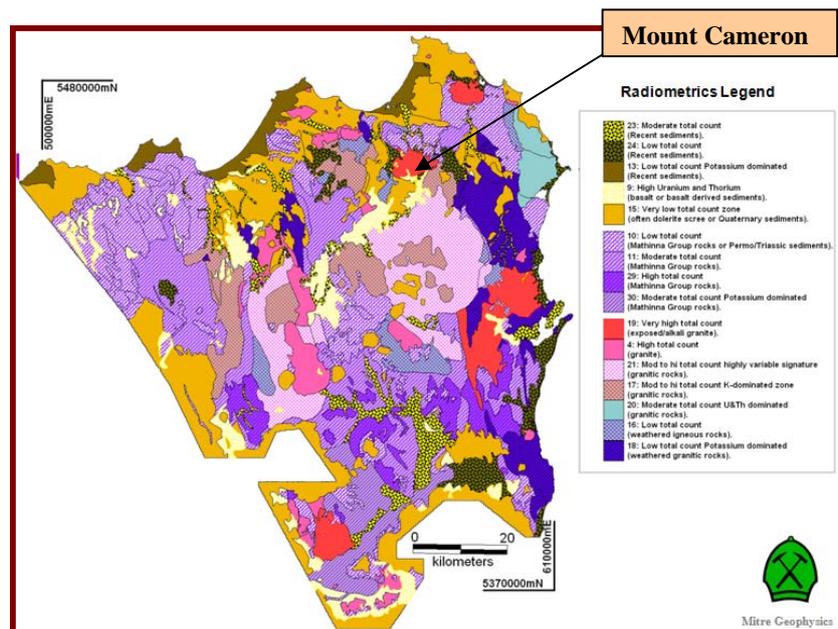
Basement dominated by granite and metasediments. Cassiterite bearing placers developed on the older units are of Tertiary age.

Devonian-Carboniferous Intrusives:

- acid igneous rocks; coarse grained inequigranular to porphyritic, coarse grained biotite and biotite/muscovite granites and adamellites.

-The two mica granites are generally topaz bearing and the biotite is often altered. Cassiterite has been detected occasionally.

-Mt Cameron is one of the two most radiometric and more "alkalic" granite plutons in the Blue Tier Batholith (see below).



Mathinna Beds

-Metasediments of Ordovician to Devonian age are located to the north and east of the Monarch area. Locally they exhibit contact metamorphic effects and include psammites, spotted pelitic rocks and schists.

Straddling the eastern margin of the Monarch area the sediments exhibit the effects of contact hornfelsing. If so this would be a prospective location for primary tin, tungsten bearing vein arrays. The East Monarch sediment – granite contact has not been explored and is partly soil covered.

Tertiary Alluvials

- alluvials both Tertiary and Quaternary in age.
- an isolated drainage off the northern face of Mt Cameron.

**Local Geology**

- preserved position the Monarch tin system is characterised by at least 4 NW trending, subparallel, stanniferous drainage corridors or streams in a 2,000m x 2,000m block.
- the Vicarys Creek, Shallamar Creek and Little Boobyalla Rivers are the central drainage in the Shallamar or Monarch Flats

The sedimentary sequence hosting the Monarch Alluvial tin deposits is highly variable, ranging from shallow "lag" type deposits along the slopes of Mt Cameron to thick marine reworked sediments along Vicary Creek in the west towards the Boobyalla River.

In the SW area (B-Block) overburden (mineralised and unmineralised) comprises:

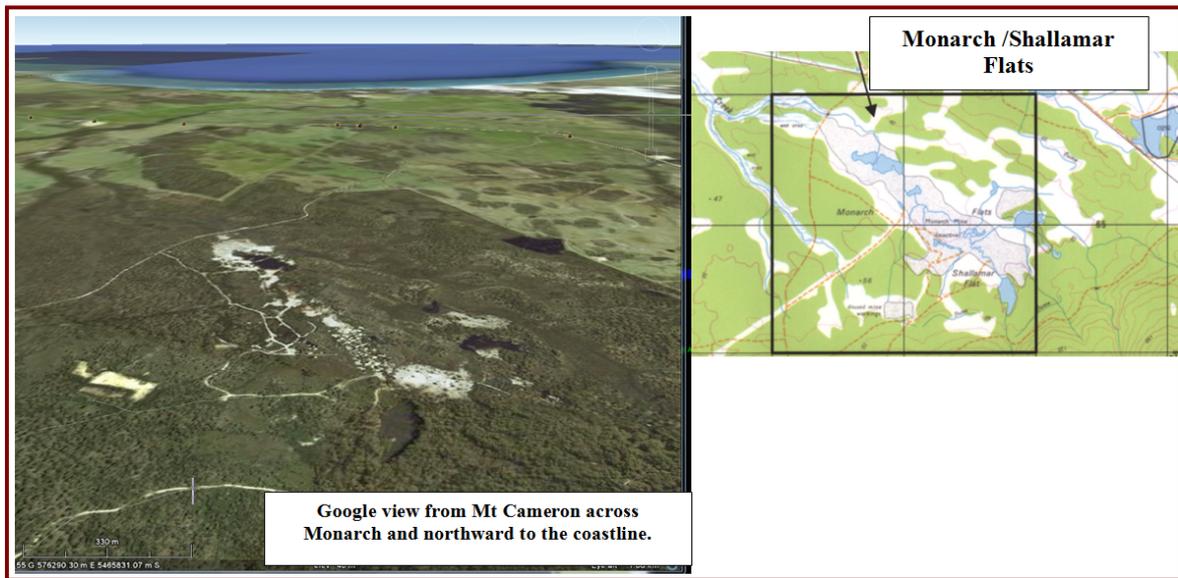
- 0 to 0.5m of black sandy and humic topsoil. Includes gravels and quartz grits
  - o Discontinuous layers of fine sands
- 1.0 to 4.7m of yellowish to brown clayey sands and sandy clays with minor heavy minerals. Increasingly mottled with depth.
- 0.5 to 1.5m of reddish brown cobbly and bouldery sands, some ferruginous hardpan layers, and important heavy minerals. In general this zone is referred to free running sands (sandy-gravelly, occasionally bouldery wash) and stanniferous wash passing downward to decomposed granite.
- Mottled grey gritty clay with silt and sometimes gravel and/or grey clay-sandstone wash and rarer mature quartz wash or birds-eye wash?
- Soft white decomposed granite.

The cassiterite bearing deposits occur as both stream alluvials developed along and parallel to the modern drainage system and deep marine reworked ground (with lens like cassiterite bearing bodies that may represent marine strand lines).

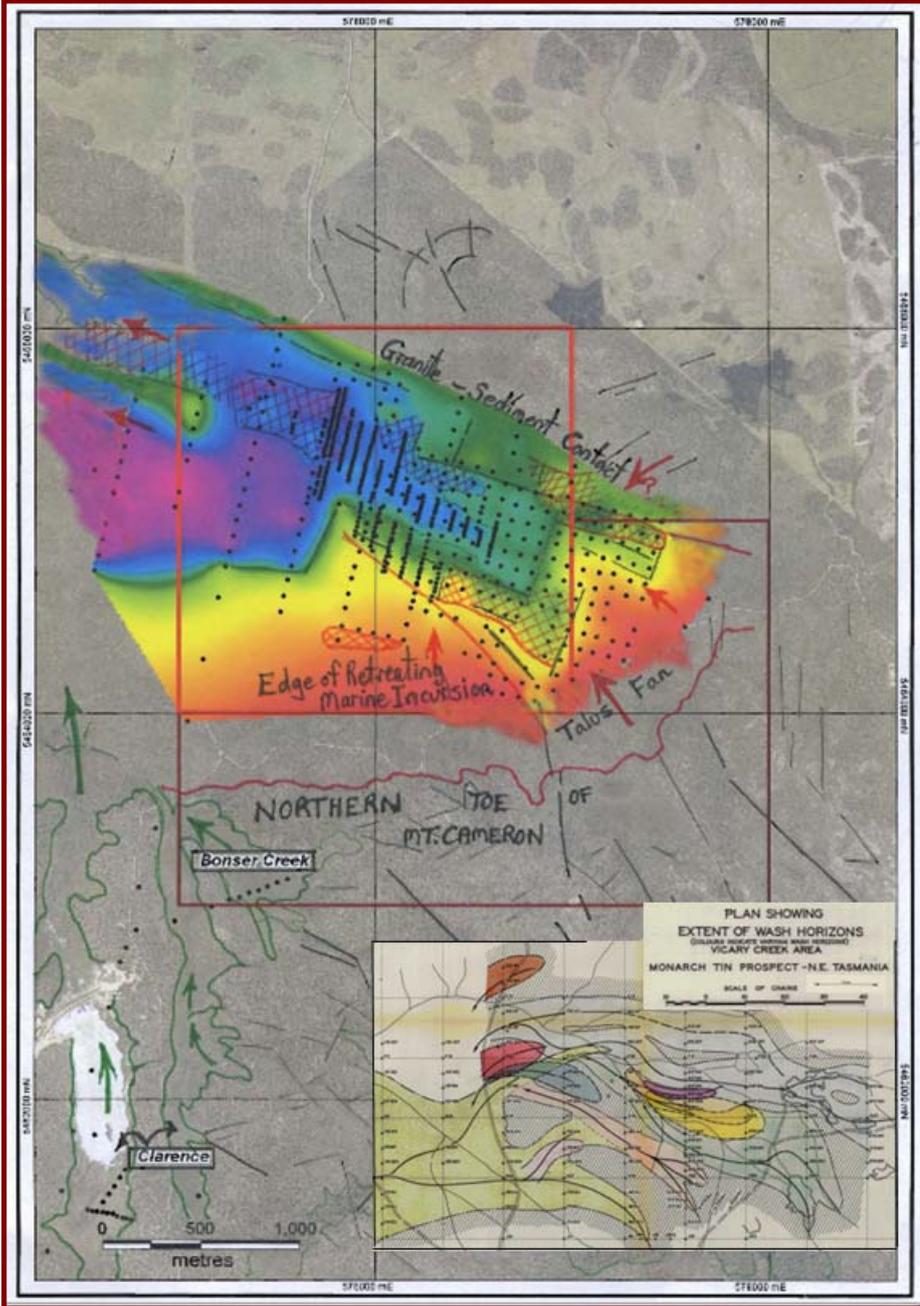
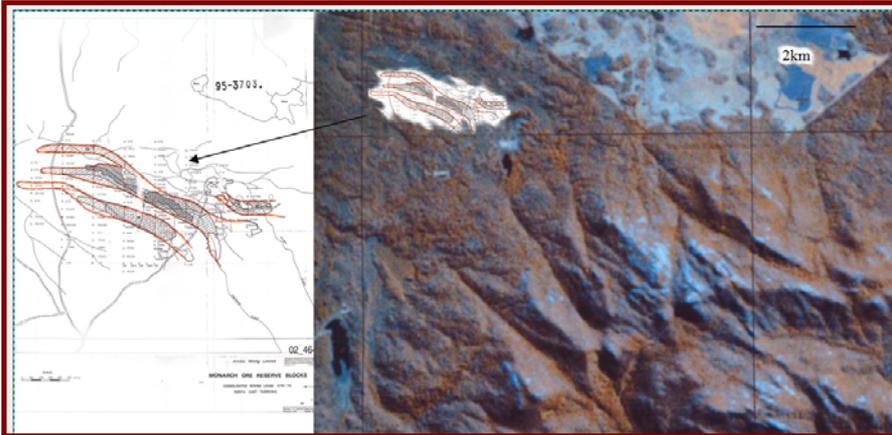
In the SW-ore blocks there is evidence of a remnant marine incursion with the presence of shells and pyritic cement.

Cassiterite grain size is generally less than 1.0mm. However coarser grains and composite grains locked with quartz are found in the eastern resource area.

In the SW resource area the cassiterite is associated with free running sandy to gravelly (occasionally bouldery) wash.

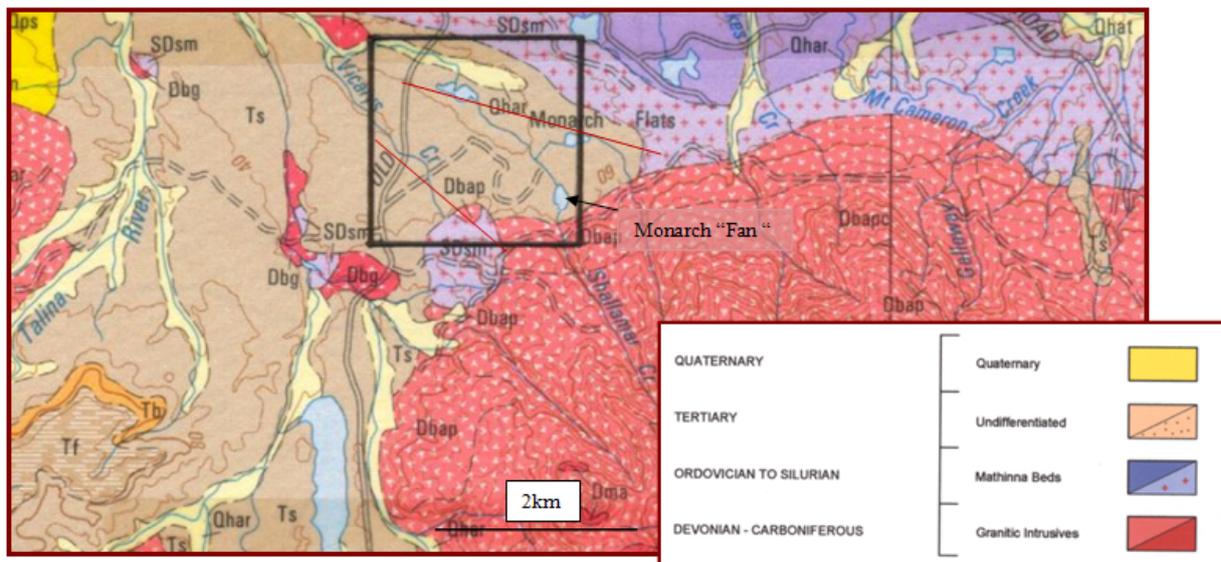


The alluvial tin deposits mimic the trend of the current creek systems (resource blocks A to E by AMDEX-inset) and in part the trend of large brittle fault arrays that pass through the Mt Cameron massif. The contoured “wash” zones (coloured inset below right), overlapping lower grade tin bearing material, and alluvium isopachs (image below showing drilling depth to basement, and near mine potential ) suggests deposition of gravels, reworking of older cover, and slumping being parallel to the range-front (toe of Mt Cameron).



The Monarch “alluvials” are underlain by weathered granite basement (Devonian-Carboniferous) against a NW trending contact with Ordovician-Silurian Sediments (Mathinna Beds).

The geological contact is regional in nature (5km in length) and appears to be intruded by a dyke of “granitoid” .The array of Ordovician- Silurian? sediments, a swarm of E-W jointing to the east and a 1km diameter circular feature suggest the possibility of primary tin located at the head of the alluvial/reworked colluvial Monarch Fan.



## Potential

Based upon the reconstruction of catchment size, source –trap relationships and recycling potential of the alluvial systems in the region.

**1.a** The endowment of the entire Monarch fan with ore blocks A to E and intervening material- **600 to 1500t** cassiterite potential.

**b.** The multiple layers of tin bearing wash, bulk treatment of the wash zones .

**c.** The extension of Blocks A,B and E to the south and SE up against the granite contact- **incremental tonnages** and/or gradation into semi colluvial and elluvial zones.

**d.** The extension of the tin wash to the west –following the e-w trending exhumed range front - this could yield an additional **1000 to 2000t** of cassiterite potential. Mineralisation occurs under the old treatment plant site, 400m west of the Zone B.

**e.** the **extension** of the primary tin drainage to the NW for **2,800meters** along the prominent sediment –granite contact. By analogy with other structure controlled stanniferous drainages (eg.Endurance) the channel or gutter narrows toward the confluence with Little Boobyalla River. Here there is a realistic potential of **3,000t** of cassiterite.

**2.a** The potential for blind, analogue Monarch alluvial-fan systems 2km to the west (Monarch West fan). Perhaps **1000t of potential** cassiterite.

**b.** the northern extension of the Clarence Deep Lead - 2 to 4km. **1000 to 3000t potential**.

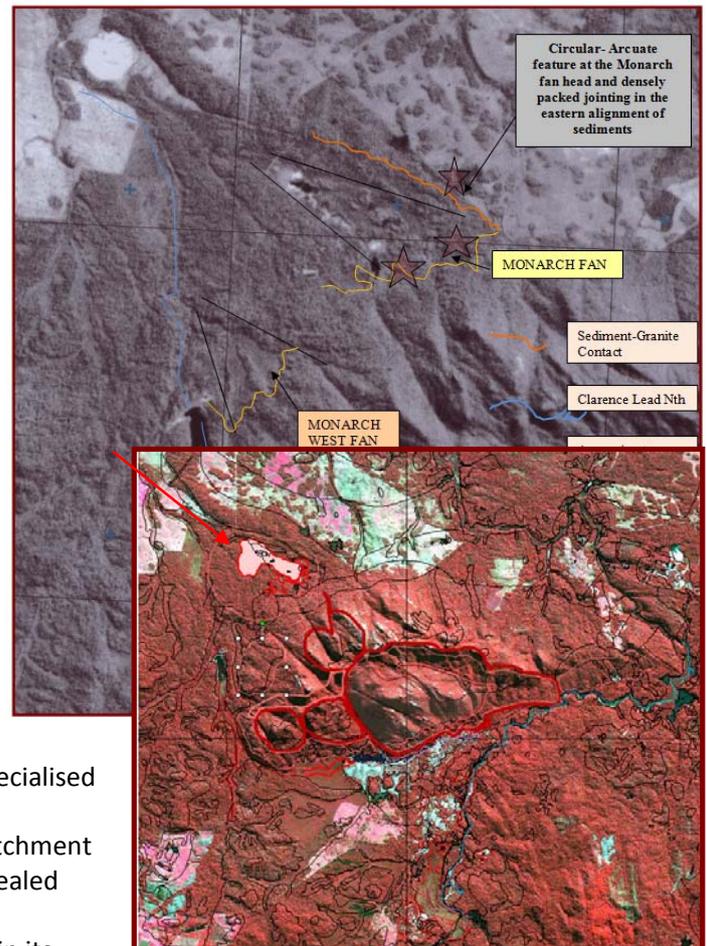
**c.** the confluence of the Clarence Deep Lead and Monarch West Fan. Potential target of **2000 to 3000t of cassiterite**. Surficial cover of as little as 5meters conceals important cassiterite deposits in the region.

### 3. The potential for primary cassiterite mineralisation

**A** at or near the granite-sediment contact (sheeted fracture swarms in granite or hornfelsed sediments), "contact greisens", Cinovec styled greisens, Anchor styled greisens.

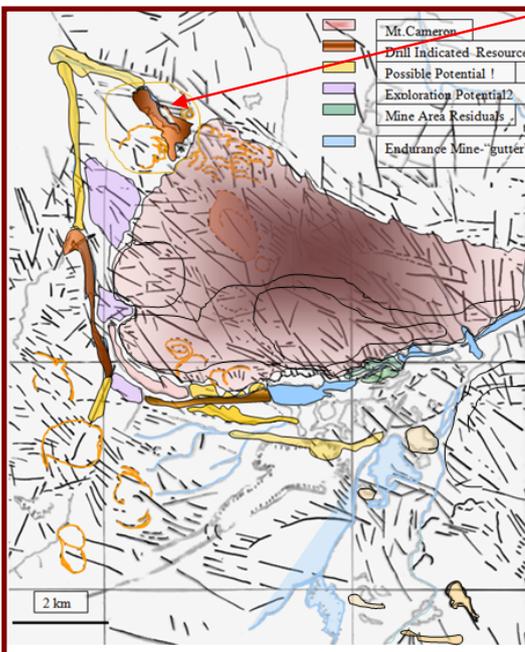
**B** Geologically the "wash" zones are located in NW pointing wedge between sediments and granite. Giving a fan shape. AMDEX, BMI and VDM referred to ore block E which fans outward in the eastern contact area. They regarded the mineralisation to be open to the ENE. This wedge position appears to have funnelled the alluvial wash into the Monarch system, from a primary tin source and/or an effective depocentre.

This wedge on is a 1km diameter circular feature intersected by an array of joint swarms from the east (see below).



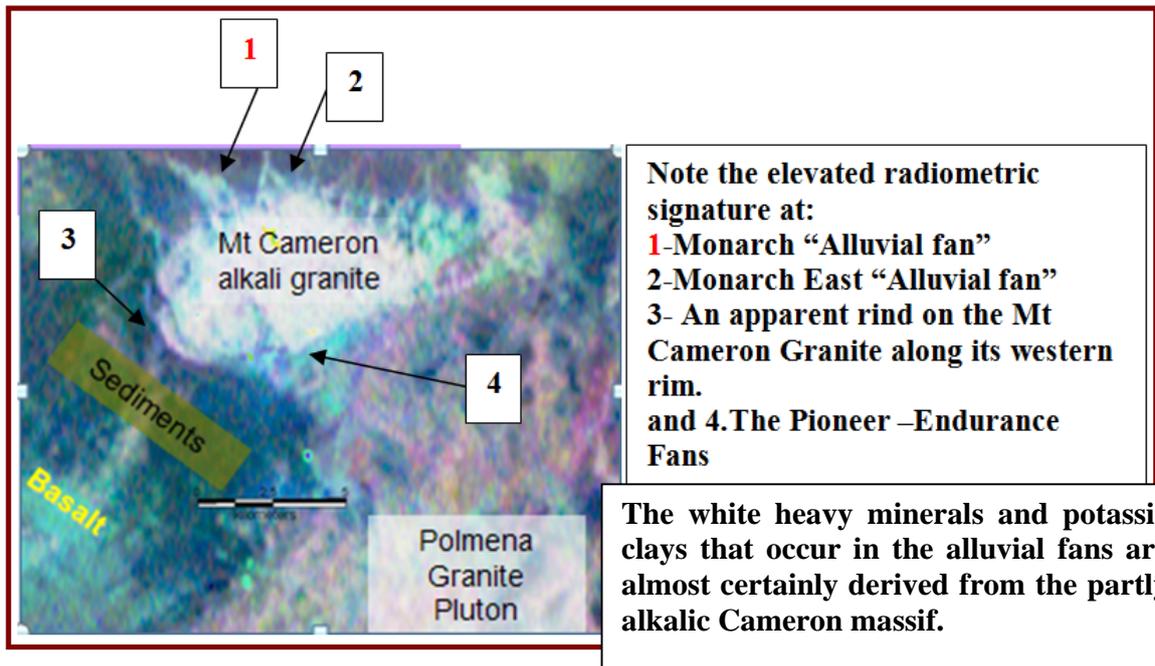
### 4. The Regional Potential of Monarch

The Monarch corridor is interpreted to comprise a string of arcuate features reminiscent of specialised intrusive stocks. - the Monarch catchment and shallow concealed bedrock could be significant target in its own right.



### 5. Potential for Monazite-Zircon Heavy Minerals

MRT geophysics, 2008, shows a significant radiometric anomaly on the Monarch Fan of the anomalous Mt Cameron massif. An as yet unquantified quantity of monazite does occur in the Monarch alluvials. Testing of mine waste and tailings and future drilling is highly recommended.



## 11. SCOTIA DEPOSIT

In comparison to the other major deep leads in the region (Arba, Briseis, Pioneer and Endurance), Scotia-Lochaber has the advantage of the lowest overburden: wash stripping ratio and the least previous mining.

### Summary History

- **1881** Tin discovered in the shallow deposits exposed by the modern Ringarooma River.
- **1881-1935** The deposit worked by the Scotia Tin Mining Company and a number of private individuals, production exposed the deeper and more rich ground of the “Main Lead”
- **1935-1944** The area extensively drilled by the Department of Mines and then in 1938 declared exempt from mining.
- **1955** The Department carried out a project assessment and arrive at a “Resource by Block”.
- **1958-1970** Various exploration groups conduct check drilling and confirm accuracy of the Departmental work.  
In 1965 the Government cancels the “Special Reserve” status and frees the area for exploration.
- **1970-1976** BMI Mining acquires the property and conducts check drilling.
- **1976-1984** Amdex acquires area and conducts check drilling and a new resource assessment. A dramatic decline in tin prices in late 1979 and early 1980 and impost of tin production quotas introduced by the Australian Government in 1982 as part of their obligation to the 6th International Tin Agreement cause Amdex to relinquish title.
- **2001-2003** Mineral Holdings Australia Pty Limited (MHAPL) acquires title by way of EL32/2001 and commenced regional test work for tin and sapphire.
- **2003-2004** Van Dieman Mines (VDM) acquires an option to purchase the project from MHAPL and re-calculates reserves and undertakes “feasibility” studies.
- **2004** VDM listed on London's AIM in Nov 2004 having raised £3.32M.
- **2004-2007** Compile and digitise early data, recalculate resources estimates
- **2006-2007** Preparation of DMEMP
- **2007** Approval given for mining. Mine development works commenced in September 2007, commissioning was originally scheduled for February 2008 with full production slated for March 2008.
- **2008** First VDM drill program.
- **2007-2009** Construct mining plant, and modifications to plant. Pre-strip planned initial mine area. Financial difficulties.
- **2009-2010** Reassessment of project by Gladstone Tin. Bulk sampling of Scotia wash and of perched alluvials.

### Geology [Morrison 10\_6109]

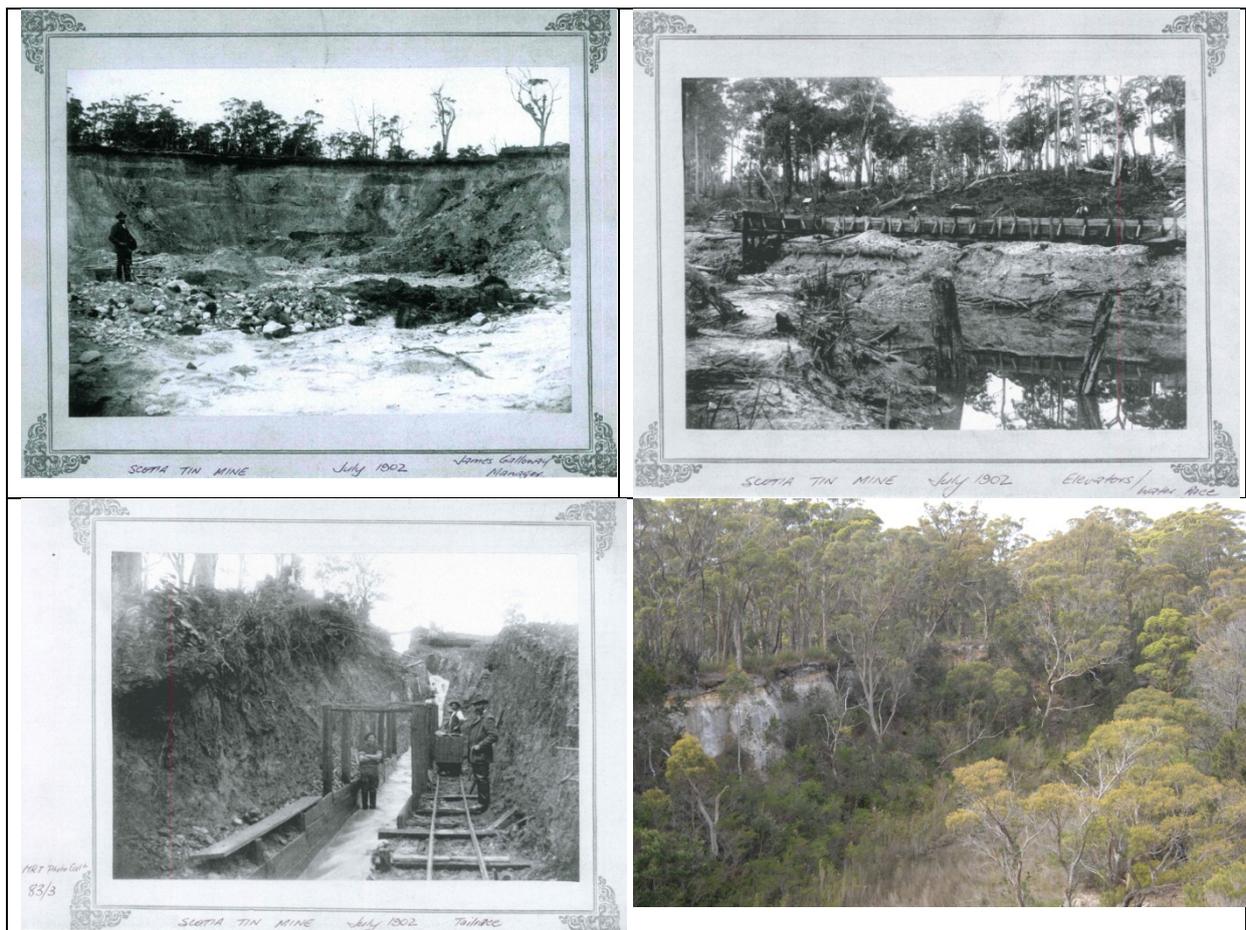
The Scotia Project alluvial tin deposit is contained in buried Tertiary sediments deposited in sinuous channels incised into sandstone-slate basement rocks of the Silurian-Devonian Mathinna Supergroup. These paleochannel-deposit sediments, including cassiterite and accessory heavy minerals, were eroded from Devonian granites and Silurian Mathinna Group metasediments. Most of the tin mineralisation is concentrated in basal gravel-rich sediments (wash) which is 1-10m thick and constitute the potential ore body. They are buried beneath an overburden sequence of sands and clay lenses, including minor lignite, up to 30m thick and carrying low grades of diffusely distributed fine grained tin, which will almost always be sub economic to mine. The land surface overlying the deposit is a flat coastal plain adjacent to the Ringarooma River. Plant fossils from the Lochaber lead indicate a Middle-Late Eocene age for the deposit

Minor exposures of the basal mineralised gravels exist in abandoned workings at the southern end of the Scotia and Lochaber leads but the geometry of the unmined lead system is defined entirely by exploration drilling. The lead system has been traced for about 7km total length (Scotia and Lochaber combined) and is open to the north but sparse drilling results over the northern 2km suggest a serious decline in grade (AMC, 2008), so it can be assumed that the Scotia resource base is restricted to the 5km of lead within the former VDM Mining Lease 15M/2004 (see Figure).

### Previous Production

Scotia was one of the earliest tin deposits found in N.E. Tasmania. The Scotia Tin Mining Company (STMC) was formed in 1881 and first worked shallow ground at the southern end of the deposit over a period of about 10 years. In 1901 Mr James Galloway found deeper ground to the north, which eventually was found to be part of a deep lead. Active mining continued until 1905, and there was dwindling production until 1908. Early production figures are not known with any certainty, however it is reputed that the STMC produced 500t and Galloway another 500t including a peak return of 95.5 tonnes in 1904.

The Lochaber deposit was first worked by the Imperial Tin Mining Company (ITMC) in the early 1880s. Production is reported as continuous until 1925, with figures ranging from 2-4 tonnes per week in 1885 to 0.5t per month in 1901.



### Drilling

The earliest exploration drilling was conducted by the Tasmanian Mines Department in 1902. Since that time over 1300 drill holes (+32,000m!) have been bored by various companies using a variety of techniques from traditional Banka type drilling to modern percussion and auger drilling in an effort

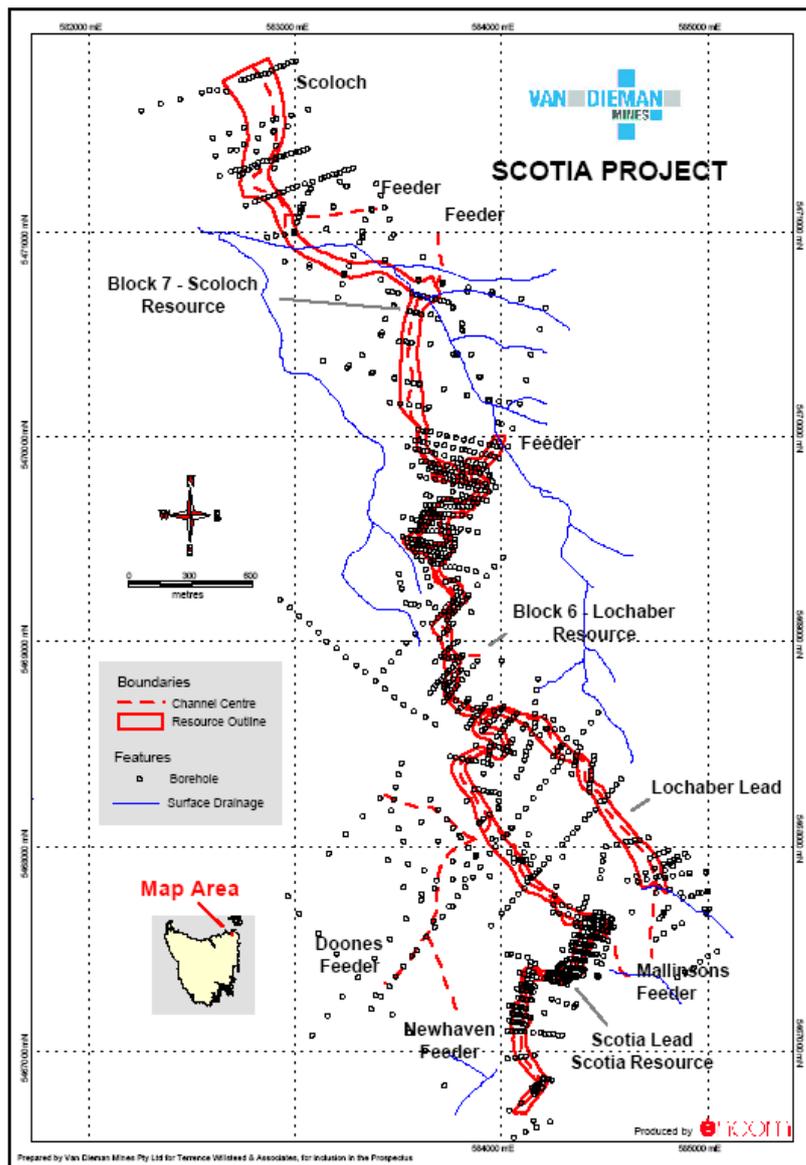
to define the extent and grade of the resource. Records searched from the Mineral Resources Tasmania library indicate a total of 1389 drill holes since 1902, including the 2008 VDM drilling.

<b>Drilled By</b>	<b>Locality</b>	<b>Date</b>	<b>No Holes</b>
Tas. Mines Department	Griffin bores	1902	32
Tas. Mines Department	Roach bores (West Scotia)	1914	24
Tas. Mines Department	Roach bores (Mallinsons)	1916	5
Pioneer Tin Mining Co.	Ryan bores (South Scotia)	1916	29
Tas. Mines Department	Roach bores (South Scotia)	1917	13
Tas. Mines Department	Groves bores (Scoloch)	c1917	39
Tas. Mines Department	Main boring campaign	1935-1937	104
Tas. Mines Department	Main boring campaign	1937-1944	751
Rio Tinto	Stinking Creek (scout)	1958	3
Rio Tinto	Scotia South (check)	1958	9
Storeys Creek Tin Mining Co.	Regional (check)	1964-1965	19
Utah Development	Scout boring	1965-1966	45
Tas. Mines Department	"LINE 14" (Scoloch)	1967	10
Tas. Mines Department	Lochaber	1971	16
BMI Mining	Scoloch	1971-1974	20
BMI Mining	Regional	1970-1974	158
BMI Mining	Scoloch	1970-1974	25
Amdex Mining	Regional	1978-1980	18
Amdex Mining	Lochaber	1980	28
Amdex Mining	Lochaber	1980	13
Anglo Australia	Scoloch	1981	7
Anglo Australia	Scoloch	1983	4
Van Dieman Mines	Scotia Lead south	2008	36
<b>TOTAL</b>			<b>1389</b>

### 2008 Drilling Program

In late 2008, 36 vertical holes for 684m, were drilled along 5 E-W fences across the southern 350m of the Scotia lead. This produced the only modern high quality grade data which can be validated to normal industry standards for the entire Scotia Project resource. It therefore provided a vital opportunity to validate earlier drilling and help produce data to enable new resource calculations to be made of the entire lead. It only covered 7% of the Scotia total lead length at a cost of approximately \$150,000. The consultant geologist believed that it may not be necessary to do any more exploration drilling. With over 1300 drill holes on the project area, albeit many apparently with poorly documented results, there is real potential to use these 2008 program results to calibrate against old logs and sections.

VDM made a press release on 26 Feb 09 [10\_6105] stating that correlation between the new assay results and the historic data remains strong, particularly in the higher grade sections. Unfortunately, however, elevated tin grades found in the overburden in the bulk sampling area (see below) were not replicated in the drill holes further to the north along the paleochannel, and the analyses from the 300m section immediately ahead of the bulk sampling area were also disappointing. This section of the paleochannel had very little historic drilling. The northernmost line of holes drilled by the Company was along the southernmost line of historic (Tasmanian Mines Department) drilling on one of the higher-grade sections of the Scotia lead, and the grades correlate very closely, giving confidence in the robustness of this high-grade section. Analysis of the full suite of drill data led to a recommendation to the board from management and the Company's consultants that the low-grade section should be 'leap-frogged' to access the higher grade section further north.



## Resource Calculations

The Scotia deposit has been subject to several resource calculations.

Most of the estimates are based within the 7km channel in the Scotia Project area.

Most estimates show a bottom wash grade averaging around  $1300\text{g/m}^3 \text{SnO}_2$ .

The table following summarizes all resources. All estimates of sapphire content by VDM are left off because they have no validity, see below.

VDM prepared the latest suite of estimates. Kinnane produced several and these were published in the VDM prospectus, and the DVDM website, and finally as an unpublished JORC compliant report in 2007, of which Tin Dragon has a copy.

With changes at board level it became apparent that the resource estimates and proposed mining methods for the deposit were possibly inappropriate, so in 2008 McIntyre prepared a brief resource estimate as an unpublished note, ( Tin Dragon has a copy), which substantially downgraded Kinnane's estimates. This latest estimate was produced before the 2008 drilling program results were available and before the bulk sampling exercises, see below. No other estimates were subsequently done by VDM or Gladstone Tin before liquidation.

A comprehensive study would be required to determine which, if either, of the latest VDM estimates is valid. Tin Dragon has not done this.

**TABLE RESOURCE ESTIMATES FOR SCOTIA DEPOSIT**

Company	Author	Year	Reference	Volume m <sup>3</sup>	Av wash grade gSnO <sub>2</sub> /m <sup>3</sup>	Contained SnO <sub>2</sub> tonnes	Ore : Overburden ratio	Class / reliability	Comment
Mines Dept		c1945	76-1118		n/a	952	whole of profile		6 blocks; less Lochaber
Storeys Creek	J. K. Couper	1966	76-1118	1,201,680	1216	1,439	5.87		6 blocks; less Lochaber
BMI	J. Standard	1971	71-0783	1,107,400	n/a	n/a	whole of profile		6 blocks; less Lochaber
Amdex	C. Gibson	1976	76-1188	1,346,459	1222	1,620	7.98	Measured / possible	6 blocks; less Lochaber
Amdex		1980	80-1497			1,645	7.98	Proven / Probable	6 blocks; less Lochaber
Niugini Resources	Anon, ?Kinnane	2003	04_4989	22,311,000	309	6,916	whole of profile	Measured + Indicated	includes Lochaber
AMDAD	R. de Jongh	2004	11_6316	3,550,000	340	1,195	whole of profile	Probable	11 mining blocks; see figure in draft report
Mincom	T. McManus	2006	unpubl VDM consultant	1,220,930	1552	1,895	8.00		
Niugini Resources	N. Kinnane	2007	VDM Prospectus	5,320,000	1300	6,916	4.70	Proven / Probable	quoted on VDM website; in 2004 Prospectus; 2007 report is JORC compliant
Van Dieman Mines	G. McIntyre	2008	unpubl VDM file note	3,657,000	1300	4,220			area *av interval*av grade

## Development Proposals

In preparation for mining and to gain Government approvals for mining, VDM its consultants prepared a substantial document and data for public comment in October 2006, the DEVELOPMENT PROPOSAL AND ENVIRONMENTAL MANAGEMENT PLAN (DPEMP). Tin Dragon has all these files in its database. Information included is:

Scotia Mine DPEMP including Scotia Mine DPEMP Appendices A to J – prepared for Van Dieman Mines Pty Ltd by SEMF, October 2006.

Supplement to the DPEMP– prepared for Van Dieman Mines Pty Ltd by SEMF, February 2007.

Section Heading	Brief Description of the Information Provided
Executive Summary	A brief description of the function of the DPEMP as it applies to the proposed development.
1.0 Introduction	A summary of the proposed development and associated information provided in the DPEMP in support of the Development Application, and environmental and planning approvals.
2.0 Development Proposal	Description of the development proposal.
3.0 Alternatives	The assessment of alternative locations for the major components of the mine including the tailings dam, overburden disposal and processing plant site.
4.0 Planning Context	Description of the land use and tenure, planning scheme controls, the planning policy framework and relevant legislation, regulations, codes and policies.
5.0 Environmental Management Plan	Description of the existing environment, with identification of significant features, performance requirements, and potential impacts, which may necessitate the implementation of management measures to minimised potential impacts of the development.
6.0 Decommissioning and Rehabilitation	Description of previous mine rehabilitation operations, a conceptual decommissioning and rehabilitation plan, principles, and procedures, and post decommissioning assessment and monitoring recommendations.
7.0 Monitoring, Reporting, and Review	A summary of the monitoring, reporting, and reviews to be undertaken to ensure the effective implementation of environmental management measures.
8.0 Social and Economic Environment	A description of the existing social and economic environment is provided, along with the possible impacts of the development.
9.0 Conclusions and Commitments	A summary of the report findings for the prevention of pollution and protection of the environment, and a summary of the environmental commitments provided through the environmental management plan section of the DPEMP as an easy reference.

Appendix A - DTAE Guidelines.pdf

Appendix B - Information Bulletin 1.pdf

Appendix C - Preliminary Geotechnical Report.pdf

Appendix D - Water Balance Calculations.pdf

Appendix E - Scotia Water Quality Summary.pdf

Appendix F Part 1 - Flora and Fauna - Welling 2006c.pdf

Appendix F Part 2 - Flora and Fauna - Welling 2006b.pdf

Appendix F Part 3 - Flora and Fauna - Welling 2006a.pdf

Appendix F Part 4 - Flora and Fauna - Welling 2005.pdf

Appendix G - Aboriginal Heritage Report.pdf

Appendix H - European Heritage Report.pdf

Appendix I - Greenhouse Gas Emission Calculations.pdf

Appendix J - Traffic Impact Assessment.pdf

By way of 'ENVIRONMENTAL ASSESSMENT REPORT, Scotia Mine, Report and Recommendations of Environment Division, Department of Tourism, Arts and the Environment, April 2007' environmental conditions for mining were set out. It was concluded that the project was capable of being managed in an environmentally acceptable manner such that it was unlikely that the government objectives would be compromised, provided that the recommendations made in that report were satisfactorily implemented, including the commitments made by VDM in the DPEMP and Supplement to the DPEMP.

### **Bulk Sampling of Scotia Resource ("Trial Mining")**

In 2009 Gladstone Tin [10\_6107] carried out a program of bulk sampling and gravity plant processing at the southern end of the Scotia pit centred at approximately GDA 94 584,205E/5,466,955N, the aim being to get a representative sample of basal gravel wash from the deposit. This had not been previously done by VDM(!). The centre of the test pit was about 30m SW of the southernmost east-west fence of 2008 VDM drill holes and the extracted wash is from the western side of the deposit. Because of the bottom of the wash was below the water table, with high water flows, a full profile was not able to be sampled, so that a 4m depth was sampled and the lower 4m, which could be expected to carry the best grades, was unsampled.

A sub sample of approximately 100t of wash was processed through a portable jig plant, retreated across a Wilfley shaking table, then a final tin concentrate stage was completed at the Burnie Research Laboratory.

A final product of encouraging relatively clean heavy mineral concentrate dominated by reddish brown cassiterite assaying approximately 67% Sn was obtained. Only 0.7% of the recovered product is <75 microns and 8.4% is >300 microns. On a cumulative frequency curve 100% of the final concentrate product is within the 50-400 micron size range. Other heavy minerals recovered were monazite and fine grained zircon.

The recovered grade was  $1\text{kg}/\text{m}^3$ . Given that only upper half of the basal wash layer could be sampled, it is reasonable to consider this as a conservative estimate of the actual in-ground grade. This can be compared to the nearby drill grades for the entire wash interval of 119 to  $3829\text{g}/\text{m}^3$ .

It was not stated that gold or sapphire were present or absent; one can assume that they were absent.

Variable amounts of authigenic pyrite are preserved in the humic wash and the pyrite behaves as a heavy mineral during processing and can be a contaminant species to the concentrate. The extent of this problem was unclear because the concentration of pyrite varied substantially and the pyrite is metastable – ie it breaks down when dry and exposed to air. It is clear however that this pyrite would be a possible cause of acid drainage in a mining situation and would need careful environmental management.

A clear lesson from the sampling process was that the mining method proposed by VDM, via excavator and truck mining of the wash, would not have been viable, and the prior mine plans were incorrectly formulated.



Overburden removal

Wet pit at wash level

### Sampling Perched Alluvials

In 2010 Gladstone Tin [10\_6108] carried out sampling of remnant perched alluvial gravels at four sampling locations in and near the historical Scotia workings and processed in a portable jig plant. 17kg of rough table concentrate combined from the four sample sites, representing approximately 200t (100bcm) of gravel, with a head grade of 49% Sn, was sent to Burnie. The recovered grade was 120g 70% Sn concentrate per bcm. The heavy mineral suite comprised multi coloured cassiterite (locally called ruby tin), abundant coarse black spinel and finer ilmenite, minor but consistent gold and occasional topaz, sapphire and zircon stones up to approximately 1mm in size. Although very small, several of the gemstones appeared to be of good clarity and colour under the hand lens.

### Sapphires and Gold

There has been much heraldry by VDM of the sapphire and gold content of the Scotia resource. The fact is that no significant sapphires and no gold are known in the main resource; the only recorded sapphire is fine grained sapphire and gold from the surface alluvium, which is presumably Quaternary river terrace material, and not Eocene paleochannel alluvium.

Although the Scotia lead sediments and heavy minerals are predominantly granite-derived, Scotia differs from the other deep leads in the district in that it sits on a sandstone-slate basement (Mathinna Supergroup). The others all have granite basement. Quartz veins in the sandstone-slate unit are the source of all known gold mineralisation in NE Tasmania and small reefs were historically mined around Gladstone, so conceptually there is a possibility that minor gold has been eroded from the basement rocks at Scotia and incorporated into the basal wash. However the bulk sampling of this wash in 2009 failed (apparently) to recover gold. Perhaps the sampled area was not representative of the entire system.

### Mining and Treatment Problems

Plans for the mining of Scotia were undertaken by VDM without an industry-standard feasibility study, which could have anticipated and avoided the problems encountered. There were no checks on the resources and reserves with confirmatory modern drilling. There was no economic analysis of mining options. The treatment plant was acquired without sufficient knowledge of the nature of the mineralisation. It was designed for dry ore, yet it was logical that the pay wash would actually be below the water table. A belief that sapphires would be a significant component of the ore led to a

design of the plant biased towards recovery of sapphire. Plant and equipment like excavators and trucks were purchased/leased assuming dry mining.

Upon liquidation all plant equipment and the office/ shed facility were sold, so Tin Dragon holds none of those earlier assets.

### **Prospectivity for alluvial tin**

There are large areas, as shown on the figure, where tributary “feeder” channels flowing into the main channels are postulated to occur. Almost invariably drill data is lacking in those areas.

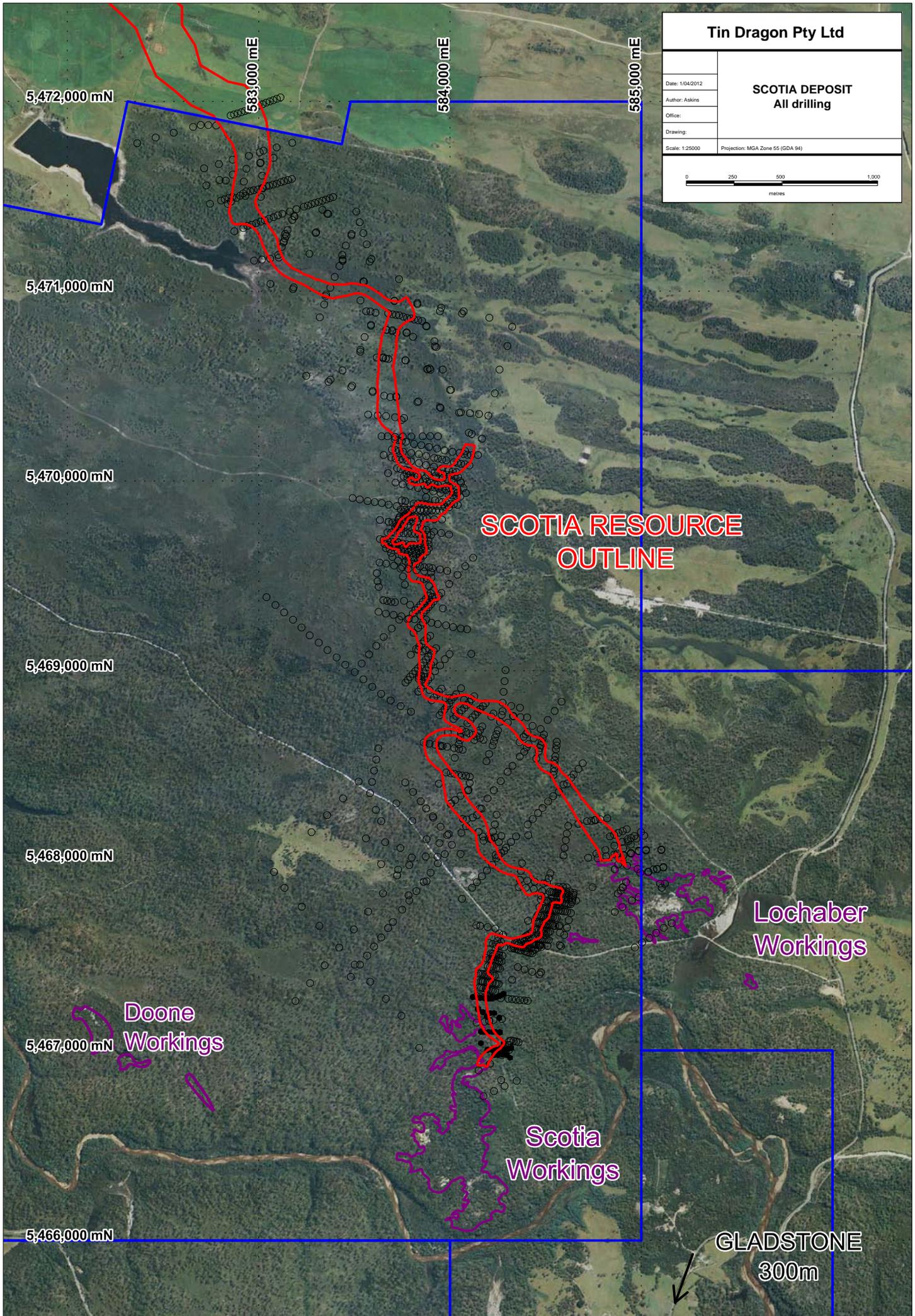
Doone. These workings are located well west of the Scotia Lead but previous departmental drilling around 1902 has established that the Doone Lead trends eastward, [VDM, 07\_5455]. A number of shallow workings occur on the edge of the lead. Grades in the drilling were not encouraging but a long potential lead system between here and Scotia remains unexplored.

Shaft Area. There are a dozen or so circa 1900 shafts lying west of the middle section of the Scotia Lead; they appear to have been sunk into tin bearing alluvials. Little or no drilling has been done in this area and there may be a further tributary lead developed in shallow ground in this section.

### **Prospectivity for Primary Deposits**

No exploration of the Mathinna beds which make up the basement to the Scotia deposit is recorded. Basement is reported as irregular and varies from hard indurated sandstones to quartz veined slates and soft slates. Large boulders and angular quartz blocks are common in the sections nearest to the old Scotia and Lochaber workings. It is not stated in old records whether these quartz occurrences carry cassiterite.

There is a distinct possibility that the sources of cassiterite at Scotia are close by and currently concealed; it has always been assumed that the source is from granites to the south towards Mt Cameron and from eroded mineralised parts of the Mt Cameron granite itself, with little supporting evidence. There are good chances that mining of Scotia will expose mineralised quartz vein stockworks or sheeted veins hosted in slate/sandstone, and these may constitute open pittable resources.

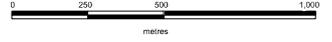


Tin Dragon Pty Ltd

Date: 1/04/2012  
Author: Askins  
Office:  
Drawing:

SCOTIA DEPOSIT  
All drilling

Scale: 1:25000 Projection: MGA Zone 55 (GDA 94)



5,472,000 mN

583,000 mE

584,000 mE

585,000 mE

5,471,000 mN

5,470,000 mN

5,469,000 mN

5,468,000 mN

5,467,000 mN

5,466,000 mN

SCOTIA RESOURCE  
OUTLINE

Doone  
Workings

Lochaber  
Workings

Scotia  
Workings

GLADSTONE  
300m

West

East

584 200mE

584 300mE

50mRL

25m RL

B

B1

### SECTION 5 487 006N

584 200mE

584 300mE

50mRL

25m RL

A

A1

### SECTION 5 486 978N

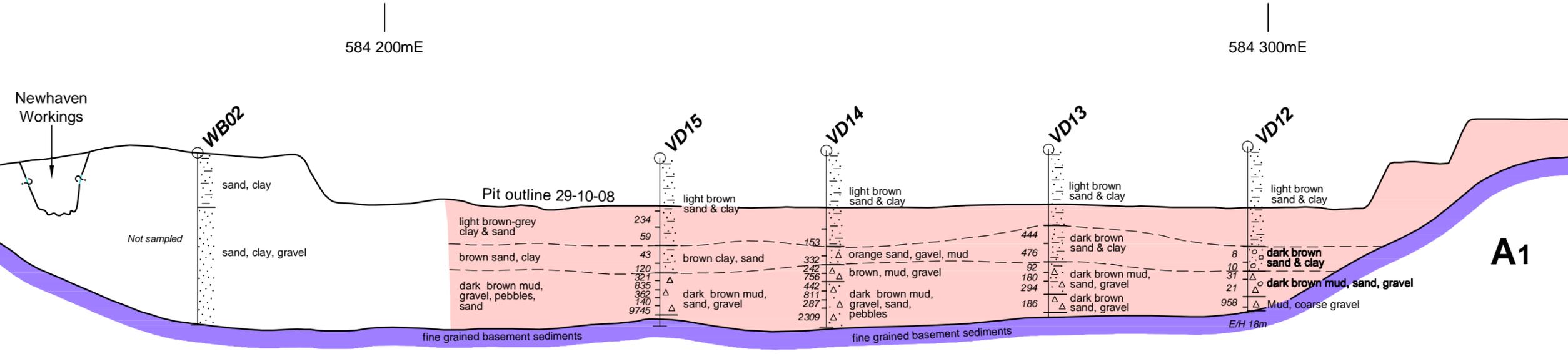
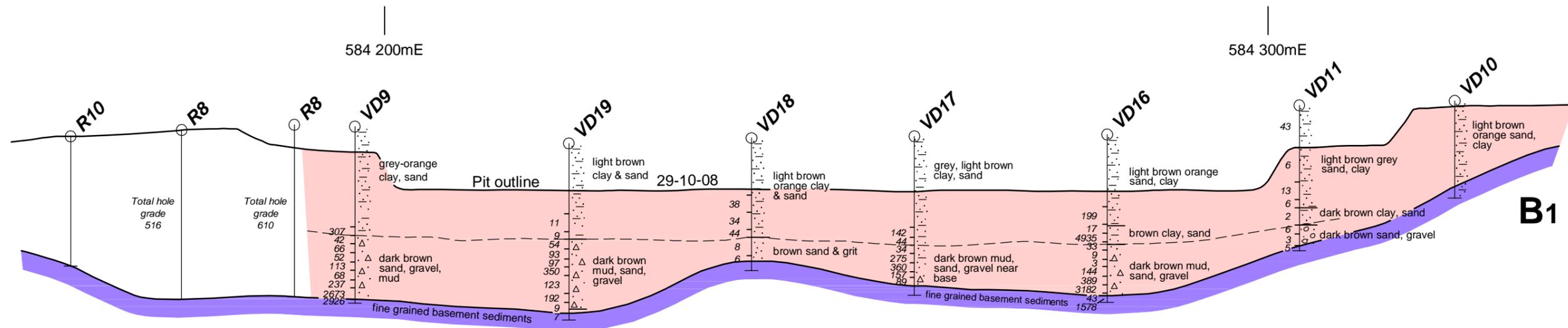
Newnham Exploration and Mining Services

VAN DIEMAN MINES  
ML 15M/2004 - SCOTIA

## SCOTIA MINE DRILLING PROFILES

Compiled: Lindsay Newnham	Drawn: Gillian Bennett	Date: 06/11/08	Datum: AMG 66 Zone 55
Scale: 1:500	0 10 20 m		Figure No: ...

Grades shown are  
gms SnO<sub>2</sub>/cubic metre





• VD28  
• VD29  
• VD30  
• VD31  
• VD32  
• VD33  
• VD34  
• VD35

584400 mE

5467200 mN

**Bottom of Main Channel**

**Proposed Pit Outline**

**THIS AREA BEING DEVELOPED FOR INITIAL MINING**

5467000 mN

A A1

**KEY**

- VD9
- Van Dieman drill hole August 2008
- Previous drilling

0 50m



584200 mE

# SCOTIA MINE PLAN

