

**AMDEX MINING LIMITED**

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TECHNICAL REPORT

ORE RESERVES OF ALLUVIAL TIN DEPOSITS
IN NORTH - EAST TASMANIA

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SUMMARY

Calculated reserves are based on drilling carried out by many Companies including Amdex.

Only percussion and Conrad drilling results have been used to calculate reserves as these are considered to be the most reliable. Auger results have not been taken into account.

Most of the information used for the calculation of grades was obtained from original log sheets. Grades were calculated by relating recovered volume and recovered cassiterite.

The history and reserves of each deposit are outlined in individual sections.

The drill indicated reserves of cassiterite are of the order of 6,000 tonnes - the breakdown of this figure is shown in Summary of Reserves (Table I).

TABLE I

SUMMARY OF RESERVES

AREA	RESERVE CLASS	CUT-OFF GRADE (g SnO ₂ /m ³)	VOLUME (m ³)	WT. AV. GRADE (g SnO ₂ /m ³)	CONTAINED SnO ₂ (tonnes)
Pioneer	Proven	200	3833115	333.6	1274
	Proven	100	5448353	279.6	1523
Endurance	Probable	200/100	5437385	307.5	1672
Monarch	Possible	200	1801968	353.0	636
		100	2437032	296.7	723
Scotia	Proven	?	7233221	178.4	1290
	Probable	?	4855598	73.4	355
Dorset	Possible	-	4587300	123	564
Chimneys	Possible	100	6160000	136	595

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INTRODUCTION

The object of this study is to assess the drill indicated reserves of alluvial tin deposits held by Amdex in North-East Tasmania. Three Exploration Licences 28/76, 2/77 and 6/78 (see Figure 1) cover the area surrounding the deposits.

The reserves of Pioneer, Endurance, Monarch and Dorset are held under Mining Leases. The Scotia area is covered by a Government reserve over which Kibuka holds a Special Exploration Permit. The Chimneys area is also covered by Government reserve; however, no mining tenements have been granted over this area to date.

The compilation has been made using data held at Amdex Mining office, South Mount Cameron, Tasmania.

DRILLING METHODS

Percussion Drilling

The most effective method of testing alluvial ground to any depth is the percussion drilling method. This method involves the ramming of steel casing, with an attached cutting shoe, into the ground. The material which is forced inside the casing is retrieved as a sample using a slush pump. The casing is driven a short distance ahead of the interval being sampled to prevent run-in. The sample interval currently used is 2 metres.

In the past the intervals used were normally 5 feet and in some cases varied so that a 1 cubic foot section of casing was sampled.

This method is painstakingly slow with penetration rates often less than 2 metres a day in coarse material towards the base of the alluvial section. Normally a 40 metre hole can be completed in 5 to 7 working days.

Variations in recovered volume are normally encountered - usually a volume less than the theoretical is recovered.

Samples from the percussion drilling are taken in increments through a 2 metre interval and transferred from the slush pump sampler to sample bins. The drums are transferred to the sample shed where volumes are measured and the material cradled and panned. The panned concentrate is then assayed.

Conrad Drilling Method

This method provides excellent results but is not frequently used as it has been found to be up to three times slower than the percussion drilling.

This method uses large 400 mm diameter casing which is rotated and screwed into the ground. The material inside is then retrieved and samples are treated by a mini-plant.

The recovered volumes are frequently equal to the theoretical volume and are many times larger than volumes obtained by percussion drilling. For these reasons the grades calculated from Conrad drilling are considered to be more representative than grades based on percussion drilling.

CALCULATIONS OF GRADE

The grade of alluvial tin is normally expressed as the weight of cassiterite contained in a set volume, that is lbs/yd³ or grams/m³. The whole of hole grades used in this assessment were obtained by the following formula:

$$\text{Grade (g/m}^3\text{)} = \frac{\text{Total grams SnO}_2 \text{ recovered}}{\text{Total recovered volume of hole from surface to basement}}$$

Each section of this formula requires further comment.

The mode of occurrence of cassiterite is such that it is generally contained in the wash immediately overlying the basement. During drilling and sampling tin from the basal wash is frequently carried into the barren basement granite. The tin recovered from basement samples is therefore added to the tin recovered from the alluvial section of the hole. Often these "basement tin" values contribute significantly to the overall grades of the hole.

The assays of panned concentrate from drill samples are expressed in percent Sn and the amount of cassiterite (SnO₂) is calculated using the following formula:

$$\text{g SnO}_2 = \frac{\text{Weight of pan concentrate (g)} \times \% \text{Sn}}{70\% \text{ SnO}_2}$$

Cassiterite is approximately 76.8% Sn metal by weight. However the concentrate is normally washed to about 70% Sn purity hence this value is used in the calculation.

The second factor in the grade formula relating to volume has been the subject of considerable debate.

Traditionally, the theoretical volume or theoretical volume adjusted to 80% (Radford Factor) has been used. The author cannot find any basis for using these adjusted volumes as the assumptions made when using them are not consistent. For example, when the recovered volume is less than the theoretical volume the Radford Factored volume is used. Where greater than the theoretical is recovered the Radford Factor of 80% is applied to the recovered volume to take into account the expansion of the unconsolidated gravel sample. The above shows inconsistent treatment of the samples of varying volumes.

By using the Radford Factored volume when the recovered volume is less than the theoretical, the assumption made is that 80% of the tin is recovered from the sample interval but not 80% of the wash. This implies that the slush pump selectively samples the tin. This is an extremely remote possibility considering the small percentage of tin generally contained within the samples. By way of contrast, when samples larger than the theoretical volume are recovered allowance is made for the recovery of a disproportionate amount of wash relative to tin.

The argument put forward by the author is that the relative percentages of wash and tin are the same for the recovered sample and for the undisturbed sample irrespective of the size of the sample recovered and that the inconsistent treatment of samples as described above undervalues grade for volumes less than theoretical and overvalues grade for volumes greater than theoretical.

The assessment of reserves in this report is based on recovered sample volumes and recovered tin.

Recovered volumes from drilling are usually significantly smaller than theoretical volumes. This has been attributed to non-recovery of boulders, which force material away from the casing, and loss of slimes, etc. In the majority of cases the alluvial profile does not contain abundant boulders and a comparison between boulder and non-boulder holes show no significant difference in recovered volumes. The author considers the variability to be mainly due to differences in the alluvial material being sampled.

It has always been difficult to account for the loss of slime. In undisturbed material clay fills the voids between the grains and in the recovered sample these voids are filled by water and slimes. Hence the measured volume of the recovered samples should be approximately equal to that of the undisturbed sample. The loss of slimes is further compensated for by the slight expansion of the material when it is unconsolidated.

RESERVE CALCULATIONS

Two basic geometric methods of calculations have been used in the evaluation of ore reserves - the influence area-depth method and the cross-section method.

Pioneer reserves have been calculated using the influence area-depth method and the reserves of Endurance and Monarch calculated using the cross-section method.

The reserves at Pioneer are geological reserves and not mining reserves as no provision has been made for batter. The pit slopes at Pioneer are near vertical, in any case, so no allowance for batter may be necessary.

The slope stability of the alluvial pile at Endurance is not known. To provide an indication of the influence of batter on the grade of this deposit both geological and probable mining reserves have to be calculated.

The Monarch reserves are located at shallow depths and the effect of batter on grade is minimal, therefore, only geological reserves have been calculated on this deposit.

Reserves for Scotia have not been re-calculated and those stated in this report were calculated by Gibson in 1976.

The reserves of Dorset have been derived by subtracting estimated production figures from the original reserves.

The reserves of The Chimneys area are quoted directly from Braithwaite, 1967.

CUT-OFF GRADES

The cut-off grades used in this assessment have been arbitrarily selected at 200 g SnO₂/m³ and 100 g SnO₂/m³.

The cut-off grade for Pioneer will be calculated when accurate figures for the meterage currently being mined per month become available.

CLASSIFICATION OF RESERVES

The system of classification of reserves adopted for use in this report is based on that set down by the Australasian Institute of Mining and Metallurgy in the Field Geologists Manual.

Proven Reserves are defined as reserves which have been calculated from results of a systematic drilling programme on a closely spaced grid (approximately 50 metres by 50 metres).

Probable Reserves are defined as reserves which have been indicated from the results of drilling where the line spacing is greater than 50 metres but less than 200 metres and the hole spacing along these lines 50 metres or less.

Possible Reserves are defined as reserves which are indicated from drilling on a more widely spaced grid than probable reserves.

PIONEERHistory

Cassiterite was first discovered at Pioneer by William Bradshaw in 1877. The discovery was made near the junction of Bradshaw's Creek and the Ringarooma River. The cassiterite was probably found in recent alluvium which was derived from the reworking of the Pioneer deep lead by the Ringarooma River.

The Pioneer Tin Mining Company was formed in 1882 to work this shallow ground; however, these operations were not entirely successful. The workings were then let on tribute chiefly to the Chinese who carried out the operations successfully until the late 1890's. The working of the shallow ground in a westerly direction led to the discovery of the rich Pioneer deep lead. As this rich ground became exposed the Company took steps to equip and work the mine, construct dams, water races and test the property by drilling. The Company was restructured in 1900 to provide capital for this development.

Mining commenced in 1900 and was carried out by means of hydraulic monitors and the ground was pumped to sluice boxes by two large mounted steam-driven diesel pumps. The tails were discarded by hydraulic elevators or conveyors.

In 1909 the Pioneer Tin Mining Company completed installation of a hydroelectric scheme at the Frome Dam at a cost of \$77,600. During the same year the mining equipment was converted from steam to electricity.

Operations were carried out successfully until 1929 when the Ringarooma River swollen by three days continuous heavy rain rose to abnormal heights and backed up through the drainage races and poured over into the mine. The two electric gravel pumps worked continuously in the hope of holding the incoming water until the peak of the flood had passed but the bursting of the Cascade Dam caused a further rise in the River. By this time the power generation from the Frome Dam had ceased because a race from the Dam was destroyed by a landslip and the mine quickly filled with water.

Sluicing recommenced in June 1930, some twelve months after the flood, but declining grades and falling tin prices led to the cessation of sluicing operations in December 1931. The workings were then let on tribute to local operators.

In October 1933 the Endurance Tin Mining Company purchased the Tasmanian assets of the Pioneer Company for \$30,000. Local operators continued to produce tin on tribute until the mid-1940's. During this time most of the Pioneer plant and equipment was removed to the Endurance operations at South Mount Cameron.

In 1935 the Austral Malay Tin Mining Company, which was then assessing mines in the district, drilled 18 scout holes ahead of the old working face. No written report is available on the drilling but pencilled comments on a plan at the Tasmanian Mines Department suggests their assessment of the reserves was 7.6 million m³ of 297 g SnO₂/m³ (2,257 tonnes SnO₂). Austral Malay did not proceed with any follow-up work.

Further drilling was carried out in 1960-1961 by Storey's Creek Tin Mining Company who drilled a total of 15 holes in the vicinity of the old Pioneer pit. It appears that by this time Endurance Tin Mining Company had dropped the mining leases covering the Pioneer lead and retained the Frome Dam and water licences for the Endurance Mine. The Storey's Creek drilling showed lower grades than the 1935 drilling, however this may be attributed to poor drilling and sampling procedures.

In the mid-1960's Utah took up extensive exploration licences in the north-east to explore for tin. Part of these exploration licences covered the Pioneer lead.

In 1967 Mr. V. Wood acquired the Pioneer leases from Utah and commenced mining along the south-east side of the old workings. Initially Wood mined by hydraulic monitor and sluice box using water from the Pioneer race owned by Endurance.

In 1970 B.M.I. purchased the Endurance operations and restricted the amount of water released by the Frome Dam. This action severely curtailed Wood's mining operations at Pioneer. In 1973 Wood purchased the Frome Dam, power station and water races from B.M.I. for \$40,000. With larger volumes of water available, Wood replaced the sluice boxes with jigs.

Wood continued to mine until early 1976 when the Pioneer operations were purchased by Triako and Buka. Since that time Amdex has continued to mine in a westerly direction following the deep lead and has carried out an extensive drilling programme to prove the reserves ahead of the face. The estimated production from the Pioneer Lead is shown in Table 2.

TABLE 2

PRODUCTION FROM PIONEER LEAD

Period	Operator	Volume treated (m ³)	Streamed SnO ₂ (tonnes)
1877-1900	Pioneer Tin Co. & Tributors	-	500*
1900-1931	Pioneer Tin Co.	10,915,000	9360
1931-1933	Pioneer Tin Co. & Tributors	Residues	142*
1933-1946	Tributor for Endurance	Residues	100*
1967-1976	V. Wood	1,000,000	242
1976-1979	Kibuka Mines	750,000	210
TOTAL			<hr/> 10554

* estimated

Reserves

Evaluation of the reserves of Pioneer are based on percussion drilling carried out by Amdex since February 1976.

The influenced area-depth method has been used to assess the reserves. The drilling pattern on which the reserves are based is not regular because the grid orientation was changed part-way through the programme. The unequal areas of influence for the holes (see Plate I) which have resulted from this action are considered to have no significant effect on the quality of the reserves. Broadly speaking the drilling has been carried out on a 50 metre by 100 metre grid and as such the reserves are classified as proven reserves.

The grades used in this evaluation are based on recovered volumes and recovered tin shown on original log sheets. Prior to this assessment grades were calculated using Radford Factored volumes.

In some of the early holes (K 19 to K 29) the central section of the holes was not sampled. In these cases, where the recovered volumes are not recorded, theoretical volume has been used. This has probably resulted in several holes being undervalued mainly because the theoretical volume is rarely recovered.

Many of the holes, (K 19 to K 55) contain high tin concentration in basement samples and are considered not to have penetrated the basement to sufficient depth. This has probably caused undervaluing of the grades of some holes.

The reserves tabulated below lie to the west of the present mining face and represent the western extension of the deep lead mined by the Pioneer Tin Mining Company. Details of the reserve calculations are contained in Appendix I.

Class	Cut-Off Grade (g SnO ₂ /m ³)	Volume (m ³)	Wt. Av. Grade (g SnO ₂ /m ³)	Contained SnO ₂ (tonnes)
Proven	200	3833115	333.6	1275
Proven	100	5448353	279.6	1523

Drilling is currently being conducted on a 100 metre square grid to the south of the Pioneer Mine. Sufficient drilling has not been completed to establish trends or close off the area. Reserves for this area are not included in the reserves given above and represent possible additional reserves to those already delineated.

ENDURANCEHistory

Tin was discovered in the Endurance district in 1875. Shallow deposits associated with small streams which drain Mount Cameron and are perched above the buried Endurance deep lead were the first to be worked. The Clifton Tin Mining Company and the Endurance Tin Mining Syndicate were the major producers. The Clifton Company worked an area along Clifton Creek which was reputed to have averaged 2000 to 3000 g/m³. The Endurance Syndicate worked the shallow ground to the north-east of the Clifton Company workings.

The Endurance Tin Mining Company was formed in 1922, and took over the assets of the Syndicate of the same name. By this time the Clifton Company appears to have worked out its ground and the Endurance Company probably acquired the Clifton Company's leases.

The initial plant consisted of hydraulic monitors and steam-driven gravel and water pumps. The lack of adequate water supply resulted in the utilisation of return water schemes with steam-driven water pumps. This equipment worked ground to a maximum depth of 10 metres. At this depth a perched lead averaged approximately 7000 g/m³.

The growing scarcity of firewood within a reasonable distance of the working face and the return water scheme made costs high. In 1928 the steam plant was supplemented by a diesel plant but both closed down shortly afterwards when tin prices declined. For the next

few years the only mining operations on the leases were by parties of tributors.

In the early 1930's the Endurance Company restructured its share capital and acquired for \$30,000 the Tasmanian assets of the Pioneer Tin Mining Company including the hydroelectric power station at the Frome Dam. This enabled the Endurance Mine to be electrified.

Mr. Cecil G. Ryan, former manager of Pioneer was appointed General Manager in January 1934 and he laid out the scheme for the working of the deep lead as well as the remnants of the shallow terraces. The essentials of the scheme were:

1. Installation of a pumping plant on the Ringarooma River to pump water for sluicing;
2. Utilisation of a 254 mm gravel pump to work the shallow ground;
3. Installation on the pontoon formerly carrying the steam plant of larger gravel pumps to work the deep ground;
4. Provision of a tail race to the Ringarooma River to dispose of tails from the upper end of the deep lead where an adequate area did not exist.

The pumping plant was commissioned in February 1935, and sluicing of shallow ground was commenced. However, success was not immediate as it was found that the boring which had been carried out some years before was unreliable. It was found necessary to carry out a completely new boring programme and to reselect payable areas.

By 1937 the production of tin from tributors on the old Pioneer leases and from terrace ground near South Mount Cameron allowed profitable operations while a major plant for operations at the eastern end of the Endurance lead was purchased, established and put into operation.

In the first full year, 1938, a total of 150.9 tonnes of high grade concentrate were won. The meterage handled at South Mount Cameron was 284,400. Cost per metre³ was 7.44 cents and the recovery 528 g SnO₂/m³. Profit for the year was \$19,608 equal to just over 6 cents per m³.

In 1939 with the settling down of operations at Endurance 277,500 m³ produced 142 tonnes of concentrate equal to 475 g SnO₂/m³. During this period costs were lowered to 5.5 cents/m³ and the profit for the year totalled \$23,600. Ore reserves at this time were estimated at just over 3.8 million m³ carrying 1,400 tonnes of concentrate equal to 310 g/m³.

In 1940 the Endurance lead and surrounding areas produced 130.8 tonnes from 359,000 m³ equal to 364 g SnO₂/m³ at a cost of 6 cents/metre.

In 1945 all the payable shallow ground at the eastern end of the leases had been exhausted. Deep ground reserves in the Endurance area totalled 2.68 million m³. In that year preparations were in hand to move the barge west to the centre section of the Endurance because values were more definite in this section.

In 1947 sluicing was confined to the Endurance deep lead except for

18 tonnes recovered from shallow ground. Total production for the year was 134 tonnes equal to $338 \text{ g SnO}_2/\text{m}^3$.

In 1950 sluicing was still progressing to the west. The year's work produced 108.4 tonnes equal to $333 \text{ g SnO}_2/\text{m}^3$. Costs were rising and were 19.6 cents/ m^3 for 325,000 m^3 .

In 1954 profitability with recovered values of $285 \text{ g SnO}_2/\text{m}^3$ was being questioned and the return to the eastern part of the centre section was being forecast. In that year 26,700 m^3 were sluiced at a cost of 32.7 cents/ m^3 .

Thus in the years 1946 to 1959 the so-called centre section of the Endurance produced around 1,220 tonnes of concentrate from 3.82 million m^3 equal to $319 \text{ g SnO}_2/\text{m}^3$. The lead averaged approximately 100 metres in width. The principle operating difficulties were concerned with stacking of the tailings and from time to time pyrite associated with tin-bearing wash. Despite the rise in costs per m^3 from 11.7 cents/ m^3 in 1947 to 27.4 cents/ m^3 in 1952-1953, profits were reasonable because of high tin prices during the Korean War. Profit for the year 1952 was \$50,000 from 245,000 m^3 carrying 75.7 tonnes of tin concentrate.

In 1960 the decision was made to continue sluicing east from the Blue Lake. In the next six years, due to the narrowing of the lead which was hard against the flanks of Mount Cameron and the heavy boulders present on the bottom within the lead, the average annual production

was just over 70 tonnes per annum, from steady meterages of 306,000 per annum. The average recovered grade was $237 \text{ g SnO}_2/\text{m}^3$.

From 1966 to 1968 only 75 tonnes of concentrate were produced. However the average grade mined was approximately $237 \text{ g SnO}_2/\text{m}^3$ or the average for the years 1960-1966.

In 1968 sluicing operations on the eastern end of the Endurance ceased and an attempt was made later in that year to commence operations on western Endurance.

Prior to mid-1969 control of Endurance flowed from the Murray-Murray-Maguire group to and from groupings which made up the Attunga Mining Syndicate in New South Wales and finally to interests associated with Mr. Walter Shapwloff.

The Murray brothers period of control started on July 31st, 1968 when the Melbourne brokers Leonard G. May and Son made a first come first served bid for the shares of the Endurance Tin Mining Company. Through the raid and through an off-market deal with a single large shareholder the Murray brothers acquired a joint holding of 80,021 shares giving them control of the Company and by mid-August, seats on the Board.

Soon after the joint holding was registered, the Board split the Company's shares from 50 cents to 25 cents and made 3 for 1 par share issue.

About this time the Endurance Tin Mining Company purchased the mining leases at Monarch for \$55,000 from Vernon Wood who was subsequently appointed Development Manager for Endurance. Shortly after this, the name was changed from Endurance Tin Mining Company to the Endurance Mining Corporation N.L. By December of 1968 development work was in progress on the Monarch and the western Endurance Mines.

During the Murray group's period the capital was lifted from 189,425 shares to 5.7 million shares. The Murray group disposed of some of their large shareholding to Mainline Enterprises who subsequently obtained Board representation.

Early in 1969 the Murray group negotiated for Endurance an option agreement over the Attunga Scheelite prospect near Tamworth involving an issue of 100,000 pre-bonus shares to shareholders in Attunga, making Attunga Mining a wholly owned subsidiary. The 900,000 shares issued made the former Attunga shareholders very significant holders in Endurance. Their influence increased as the Murray-Murray-Maguire-Mainline interest reduced its holdings and it became important when the two groups clashed in June over the use of consultants Hall Relph and Associates. The control of Endurance Mining Corporation had thus moved to the former Attunga shareholders.

Early in 1970 Endurance planned to float the tin mining operation in Tasmania as a new company. This was abandoned and the operations were sold to B.M.I. for approximately \$220,000.

B.M.I. discontinued the mining operations at the western Endurance in favour of mining the shallow terrace ground further to the east and commenced an extensive evaluation of the western end of the Endurance deep lead.

In April 1978 Triako and Buka acquired the B.M.I. leases and continued mining and exploration in the area. Amdex is currently operating four shallow terrace mining operations in the South Mount Cameron area.

Reserves

The grades used in the evaluation of Endurance reserves are based on holes drilled by the Mines Department (1958, 1968-1969), Endurance Tin Mining Company (1943) and B.M.I. (1971-1972).

The holes were drilled at 15 metre intervals along lines which varied from 259 metres to 48 metres apart (see Plate II). The average line spacing is approximately 150 metres. This line spacing is too wide to allow classification of reserves as proven hence the reserves are classified as probable.

The reserves of Endurance are divided into two sections by a post-depositional fault which has a relative vertical displacement of 14 metres and relative horizontal displacement of 135 metres.

The majority of the holes drilled at Endurance did not sample the drift overlying the basal tin-bearing wash. East of the fault only two holes

(P 119 and P 184) sampled the top 18.3 metres. The average grade for these holes from 0 to 18.3 metres was $37.4 \text{ g SnO}_2/\text{m}^3$. West of the fault only one hole (P 133) sampled from 0 to 30.5 m. This interval averaged 48.3 g/m^3 .

Without the detailed information on the upper section of the holes it is difficult to calculate the whole of hole grades. For the purpose of this evaluation the whole of hole grades were calculated using only that section which was sampled, i.e., the section below 18.3 metres east of the fault and the section below 30.5 metres west of the fault. The unsampled intervals were assigned theoretical volumes with zero grade. This has resulted in the undervaluing of nearly all of the whole of hole grades. However this has been compensated to some extent in the final reserves by attributing the average grade to the top 18.3 metres of holes P 119 and P 184 over the reserve area east of the fault and the grade of the top 30.5 metres of the hole P 133 over the reserve area west of the fault.

The cut-off grade boundaries of 200 grams and 100 grams are almost coincident hence only one reserve figure is given. A more detailed definition of these boundaries will be possible after further drilling.

The reserves tabulated overleaf were calculated using the cross-section method. In the majority of cases these grades were calculated using recovered tin and recovered volume shown on original log sheets. For some of the early Endurance holes the original log sheets could not be located and the grades used were those shown in the weekly reports. Details of the reserve calculations are given in Appendix II.

GEOLOGICAL RESERVES

Area	Class	Cut-Off Grade (g SnO ₂ /m ³)	Volume (m ³)	Wt. Av. Grade (g SnO ₂ /m ³)	Contained SnO ₂ (tonnes)
East of Fault Top 18.3 m	Probable	200/100	3265710	237.6	776
				37.4	81
West of Fault	Probable	200/100	2171675	343.5	746
				48.3	69
TOTAL			5437385	307.5	1672

The slope stability of the alluvial pile at Endurance is not known, however if it is similar to that at Pioneer then the mineable reserves would be approximately equal to the geological reserves. In order to demonstrate the effect of a batter on the geological reserves probable mineable reserves have been calculated using a batter angle of 60°.

POSSIBLE MINING RESERVES

Area	Cut-Off Grade (g SnO ₂ /m ³)	Volume (m ³)	Wt. Av. Grade (g SnO ₂ /m ³)	Contained SnO ₂ (tonnes)
East of Fault	200/100	3701700	236.1	838
West of Fault	200/100	3073699	279.3	858
TOTAL		6775399	250.4	1692

Several fill-in lines will be necessary to upgrade the reserves from possible to proven prior to the commencement of any mining activity. This will allow the zone of tin-bearing wash and variation of grade to be assessed in greater detail.

The reserves outlined in this assessment are limited only by the extent of percussion drilling. Additional drilling to the west would almost certainly increase the current reserves.

MONARCH

History

The first discovery of tin in this area is not known but it was probably in the late 1800's. The early plans show working by the Chinese.

The only recorded early production from the area is 71.5 tonnes from 1928 to 1936 although many other operations have probably been carried out since the beginning of the century.

In the early 1960's Mr. V. Wood and Company took out Special Prospecting Licence No. 399 over the Monarch area.

B.H.P. took an option over the area in 1964 but abandoned it in the next year after carrying out geological and geophysical surveys and a drilling programme. The Monarch reserves estimated by B.H.P. were 2.29 million m³ containing 450 tonnes of SnO₂ with an average grade of 200 g SnO₂/m³.

Later in 1965 a similar option was taken up by Austminex Pty. Ltd. but after a short drilling programme it too was abandoned.

In March 1966 Kathleen Investments (Aust.) Limited signed an option

agreement with Mr. Wood which was a free option for one year, twelve months extension for \$2,000 and a purchase price of \$40,000. In the autumn of 1966 the Company carried out a short testing programme by backhoe and in early summer of the same year a limited programme on the Bonser Creek area. Kathleen Investments did not proceed after the expiry of the first option period.

The Endurance Tin Mining Company purchased the Monarch area from Wood in September 1968 for \$55,000. At this time Wood was appointed as Production Manager of Endurance. By December of the same year work had commenced on a dam to supply water to the mine. Mining had commenced at the Monarch prior to the purchase of the Endurance Mining Corporation's holdings by B.M.I. in early 1970.

The equipment used by Endurance to mine Monarch consisted of hydraulic monitors, gravel pumps and sluice boxes. B.M.I. continued mining operations in a similar manner but replaced the Endurance sluice boxes with jigs. Later on, mining was carried out with a scrape dozer and finally by dragline.

As mining progressed, B.M.I. carried out an extensive auger drilling programme. The results of this programme were used to guide the mining operations. The use of this data for mining control has most certainly resulted in payable ground being missed. Hence the section of the lead mined by B.M.I. has good potential for additional reserves. B.M.I. ceased operations at Monarch in 1973 and concentrated mainly on shallow terrace ground in the Endurance area.

Reserves

The grades used in the calculation of the Monarch reserves are based on drilling carried out by B.H.P. in 1965 (see Plate III). B.H.P. used a 400 mm diameter Conrad drill hired from Dorset Dredge Company. Holes were drilled at 80.5 metre intervals along lines 322 metres apart. The wide hole and line spacings will only permit classification of these reserves as possible reserves. The grades used in this evaluation are based on recovered volume and recovered tin.

The results of fill-in auger lines drilled by B.M.I. were not used as they showed poor correlation with B.H.P. results and more particularly because of the inability of open-flight augers to sample below the water table.

Some of the reserves outlined by B.H.P. were mined by Endurance Tin Mining Company and B.M.I. Complete mining figures for this period are not available however estimates of tonnage and grades mined have been made from drilling information, aerial photography and maps. It is estimated that 862,713 m³ containing 355 tonnes of SnO₂ and averaging 411 g/m³ have been mined. The reserves stated below assume total recovery of tin from the mined section. Details of reserve calculation are contained in Appendix III.

Area	Class	Cut-Off Grade (g SnO ₂ /m ³)	Volume (m ³)	Wt. Av. Grade (g SnO ₂ /m ³)	Contained SnO ₂ (tonne)
Area A	Possible	200	594048	375.5	223
" B	"	200	773742	322.2	249
" E	"	200	233289	259.9	61
TOTAL	"	100	1601079	332.9	533
Area A	Possible	100	988047	273.3	270
" B	"	100	838248	310.2	260
" E	"	100	347341	227.7	79
" D	"		217737	134.4	29
TOTAL	"	100	2391373	296.7	638

SCOTIA LEADHistory

Scotia was one of the earliest deposits found, the Scotia Tin Mining Company being formed in 1881. Little information is available in connection with the early workings.

In 1891 the Scotia Company and T.W. Brown were working six faces on what is now the southern end of the old workings. These workings were 3 to 5 metres deep and the slate bottom was generally flat with a gentle slope to the north-west. These workings were apparently payable but later production decreased.

In 1901 deeper ground was found in the northern part of the workings and under the management of Mr. Galloway, Scotia became a leading producer. The deposit eventually assumed a form of a deep lead with a narrow gutter towards the base. Acting mining continued until 1905 but the production dwindled in 1906 and 1907 and 1908 when it eventually stopped.

The northern part of the workings was apparently on the Scotia Lead while the southern part was largely on lead deposits resorted and redistributed by the Ringarooma River when it eroded its present course across the Scotia Lead.

Production from the mine is not known with any certainty. The Scotia Company is reputed to have produced 500 tonnes and J. Galloway 500 tonnes. No records of the workings of the Scotia Company are available but from 1901 (when the deeper ground was discovered) until 1908 records

show a production of 188.4 tonnes, the greatest yield being 95.5 tonnes in 1904.

Sometime after the cessation of operations at Scotia C.G. Ryan, Manager of Pioneer Tin Mining Company, bored three east-west lines of holes ahead of the face, there being 12 holes each in lines 1 and 2 and 4 holes in line 3 - a total of 28 holes.

In 1917 Mr. H. Roach put down thirteen holes as part of a government drilling programme. This drilling programme proved that the gutter continued in a northerly direction.

During the years 1935 to 1944 an extensive drilling programme was carried out by the Department of Mines using two power boring plants. Eight hundred and fifty-five (855) holes were drilled to an average depth of 27.7 metres totalling 23,827 metres. About 1938 the area was declared a Special Reserve exempt from mining.

The tin is confined to narrow gutters ranging in width from 30 to 80 metres, the richer concentrations are contained in basal beds from 0.3 to 10 metres in thickness overlying slate and sandstone bedrocks. Only a small proportion of the tin occurs in the upper 15 to 25 metres of the deposit.

The basal beds consist of gravels and coarse grits while the material extending to the surface is largely composed of silicious sand and

grits intermixed with lesser quantities of clay. The average depth of the sediments along the gutters is 33 metres and with the exception of a thin cemented zone occurring near the surface in a few places the deposit as a whole is unconsolidated.

Over the total area tested, a length of 6.5 kilometres of lead was indicated. Six blocks were delineated using 185 closely spaced holes. These blocks covering portions of the narrow gutters have an aggregate length of 2.2 kilometres. The Mines Department reserves of these blocks total 3.35 million m^3 averaging 288 g SnO_2/m^3 . These calculations made no allowance for batter.

In 1958 Rio Tinto Exploration Australia carried out drilling on the Scotia Lead Reserve but did not proceed any further with the area.

In 1965 the Government cancelled the Scotia Reserve and granted Storeys Creek Tin Mining Company Special Prospecting Licence No. 8 to give them secure tenure to the ground. Storeys Creek carried out drilling to check the results of Government bores. In particular the programme was aimed at checking the results of selected blocks (Blocks 3, 4, 5 and 6). In general the values were lower than the Government bores however the relative distribution of values was similar. The narrow nature of the gutter and the variability of the grade within it is a possible explanation of the above results. This is discussed in detail in Gibson, 1976.

In 1966 J.K. Couper of Storeys Creek reassessed the reserves of the six blocks defined by detailed drilling carried out by the Mines Department.

Couper's reserves were 8.26 million m³ with an overall grade of 177 g SnO₂/m³ containing 1,463 tonnes and an average overburden to ore ratio of 5.9:1. The batter angle Couper used was 60°.

Storeys Creek's activities were aimed at providing additional reserves for the Dorset Dredge. No information is available to indicate whether this goal was ever achieved however financial problems and management changes in the late sixties probably negated an effective conclusion to the study.

Shortly after B.M.I. purchased the Endurance leases in 1970, they acquired exploration rights over the Scotia Reserve.

During the period from 1970 to 1973, B.M.I.'s exploration of Scotia was carried out in two stages.

The first stage involved a series of four test lines drilled across known tin-bearing channels within zones of intense Mines Department drilling. The aim of this programme was to check the accuracy of the Mines Department drilling. The B.M.I. results showed the Mines Department drilling to be reliable and able to be used for reserve calculations. The second stage of the programme involved auger drilling on widely spaced lines to provide basement information in areas where the Scotia channel was poorly defined. The drilling delineated a narrow channel over 9,000 metres in length but did not provide grade information.

B.M.I.'s assessment of the reserves for five blocks totalled 19 million m³. The calculation of contained cassiterite was not attempted. The batter angle used was 30°.

In 1976 Amdex acquired the exploration rights to Scotia Reserve area when B.M.I. failed to renew their Licence.

Gibson in 1976 re-evaluated the reserves for Amdex using the Mines Department data. The reserves are detailed below.

Amdex has subsequently carried out limited check drilling of holes drilled by the Mines Department and has arrived at the same conclusion as previous workers, i.e. the Mines Department drilling is reliable and able to be used in assessment of reserves.

Reserves

All the ore reserve calculations carried out to date by Tasmanian Mines Department, Storey's Creek Tin Mining Company, B.M.I. and Amdex are based entirely on the drilling carried out by the Mines Department in 1935 to 1944.

All previous workers indicate that original drilling records for the Mines Department work are non-existent therefore the author has made no attempt to re-assess the reserves.

The reserves tabulated below were calculated for Amdex by Gibson in 1976.

Class	Volume m ³	Wt. Av. Grade (g SnO ₂ /m ³)	Contained (tonnes)	Ore to Over- Burden Ratio
Proven	7233221	178.4	129	1: 6.35
Probable	4855598	73.3	356	1:12.42
TOTAL	12088819	136.2	1647	1: 7.98

Details of the assumptions made and criteria used for these calculations can be obtained from Gibson's report. It is important to point out that the reserve figures shown represent only the basal wash. No reserves of contained tin have been calculated for the overburden.

It is essential to know the quantity of tin contained in the overburden as this material has to be removed prior to the mining of the basal wash and it could significantly affect the economics of any operation.

DORSETHistory

In the early 1900's attempts were made by several companies to recover tin by dredging from alluvial flats of the Ringarooma River. These dredges were steam-driven and used sluice boxes to recover tin and gold.

The earliest recorded dredging operations commenced in August 1905 near Gladstone using a bucket dredge, and were carried out by the Gladstone Tin Development Company. The Annual Report of the Secretary of Mines, 1905, reports that the Company had many commissioning problems but had overcome these by the beginning of 1906.

No information is available on the production and life of this operation.

In the Dorset Flats area approximately 3.5 kilometres north of Pioneer, two dredges operated in the early 1900's. These were the Ringarooma Bucket Dredging Company and the Dorset Bucket Dredging Company.

The Ringarooma dredge commenced operations in 1907 and produced the following amounts of tin and gold:

Year	Material Treated (m ³)	Tin (tonnes)	Gold (g)
1907	186,000 (160 g/m ³)	29.5	-
1908	-	54.1	2796
1909	-	32.4	3717

The Dorset Bucket Dredging Company was formed in March 1906 and at first instigated a boring campaign. Forty-seven bores were drilled on three lines, the bores being approximately 15 metres apart. The average depth of the ground was 4.8 metres and the average grade was 706 g/m³. Values ranged up to 2.8 kg/m³.

A further thirty-three bores were put down towards the high ground to the west. The average depth was 5.8 metres and the average cassiterite content was 356 g/m³. Of these eight bores contained no tin.

As the bores gave satisfactory results, dredging was commenced. Besides tin, gold was also indicated. The following production was recorded:

Year	Material Treated (m ³)	Tin (tonnes)	Gold (g)
1907	179,000 (237 g/m ³)	42	1493
1908	-	67	1834
1909	-	32	3471
1910	-	18	617

In 1910 a new company, the South Mount Cameron Tin Dredging Company was formed from the Dorset Bucket Dredging Company and the plant was altered and repaired. The Company however had very disappointing results. In 1911, according to the Annual Report of the Secretary of Mines, 4.93 tonnes of SnO₂ and 303 grams of gold were obtained. In 1912, the Company evidently ceased operations however 2.75 tonnes of tin and 46.6 grams of gold were won in the first quarter of that year.

Little interest was shown in the flats associated with the Ringarooma River until 1935 when Austral Malay Tin Limited drilled Dorset Flats. Sixty-three 100 mm diameter hand bores were put down. These holes were drilled at 120 metre intervals along lines 240 metres apart running across the valley. Austral Malay appears to have abandoned the area after completion of this work.

During the Second World War when tin was in short supply because of the occupation of the major tin-producing nations in South-East Asia by the Japanese, the Minerals Production Committee of the Department of Supply and Shipping carried out a survey of Australia's tin resources. Dorset Flats was amongst the tin occurrences examined. This area offered the possibility of rapid proving and of being a producer with minimum manpower if equipped with a bucket dredge.

The area had been previously bored and average tin value was low, even in comparison with the large low grade dredging areas in Malaysia. Nevertheless the urgency of the time, the high tin price and factors favouring equipment were considered collectively to warrant exploitation of the property.

In 1942 the Mineral Production Committee drilled a further seventy-three holes along lines midway between the Austral Malay drill lines. The results of the two sets of bores closely agreed and from them an area of 9.7 ha was selected having an average depth of 8.8 metres and comprising approximately 8.6 million m^3 with an average grade of 196 g SnO_2/m^3 . The boring also indicated the ground contained a little gold but in such small quantities that it could not be estimated. Tin and gold values were

restricted to the wash, the overlying alluvials being barren.

In 1943-1944 the Commonwealth Government obtained a gold dredge from Redbank in Victoria and dismantled, redesigned and re-erected it on the Dorset Flats. Operations commenced in October 1944. Mining of Dorset Flats was completed by July 1959. The area yielded just over 2000 tonnes of tin concentrate assaying 75% Sn and 171 kg of gold for a total throughput of 19 million m^3 or $105 \text{ g SnO}_2/m^3$.

The Dredge was then transferred to the Dorset Extended Flats approximately 1.6 kilometres downstream from the Dorset Flats. The transfer was accomplished by sluicing a 550 metre long channel through a ridge, locking the dredge up 10 metres above the flat level to the channel entrance, towing the dredge through the channel and dredging from the channel exit to the Extended Flats - a distance of 700 metres and a fall of 12 metres.

Productive operations on Dorset Extended commenced in August 1959 and were completed in May 1963. Dorset Extended Flats yielded approximately 432 tonnes of tin concentrate assaying 75% Sn and 43.5 kg of gold for a total throughput of 3.98 million m^3 or $100 \text{ g SnO}_2/m^3$.

In June 1960 Storeys Creek Tin Mining Company purchased the Dorset Dredge and associated works from the Commonwealth Government.

After the completion of Dorset Extended the dredge was dismantled and re-erected 22 kilometres downstream at the New Dorset area where operations commenced in April 1964.

Operations ceased in March 1971. Reserves of the New Dorset area were estimated at 12.6 million m³ averaging 124 g SnO₂/m³ over an area of 97 ha. Details of these reserves are tabulated below:

Location	Area ha	Volume (m ³)	Grade (g SnO ₂ /m ³)
Aberfoyle	13.4	1,529,000	147
McGregor	50.4	6,880,000	127
Black Duck 1	22.1	3,058,000	95
Black Duck 2	11.6	1,146,000	148
Total	97.5	12,613,000	124

The reserves were estimated to provide a working life of approximately twelve years. Production from the New Dorset was 762 tonnes of tin concentrate assaying 75% Sn and 24.8 kg of gold.

Early in 1977 Amdex purchased the Dorset Dredge and mining leases from Aberfoyle for \$40,000.

Reserves

The remaining reserve at New Dorset is approximately 4.5 million m³, averaging 124 g SnO₂/m³ equivalent to about five years life for the Dorset Dredge. This reserve estimate will be revised when a detailed study of the area previously dredged has been completed.

THE CHIMNEYS AREA - GREAT NORTHERN PLAINHistory

A possible dredging area has been outlined by the Mines Department (Braithwaite, 1967) on the Great Northern Plain north-east of Gladstone.

This area is covered by Special Reserve 32/70, 16 kilometres square in area and is exempt from mining. Amdex does not currently hold this area. Steps should be taken immediately to secure it.

Reserves

Percussion drilling was carried out by the Mines Department on a 152 metre by 183 metre grid. The reserves based on this work are classified as possible only. The grades used by Braithwaite to calculate reserves shown below are based on the theoretical pipe volume. We know from previous experience that theoretical volumes are rarely obtained and that recovered volumes are generally less than the theoretical. For this reason the author considers Braithwaite's reserves are conservative.

Class	Area (ha)	Volume m ³	Grade (g SnO ₂ /m ³)	Contained SnO ₂ (tonnes)
Possible	45	6160000	136	595

These reserves will be re-calculated using recovered volumes when the original drill hole information has been received from the Mines Department.

T.I. Neale

Kibuka Mines Pty. Limited
24th March 1980

APPENDIX I

Pioneer Ore Reserve Calculation

PIONEER ORE RESERVE BLOCKS

029049

100 g/m³ cut-off grade

Hole No.	Volume m ³	Grade g/m ³	Kg SnO ₂
86	105000	191.7	20129
84	113750	203.7	23171
83	202000	142.2	28724
82	170625	306.1	52228
81	167625	497.0	83310
80	91000	254.3	23141
76	117925	475.0	56014
59	217000	278.4	60413
63	155625	137.2	21352
89	148500	46.0	6831
39	100800	147.8	14898
23	109750	391.9	43011
72	97500	379.3	36982
57	119130	317.2	37788
64	107325	338.1	36287
58	157500	948.7	149420
62	113400	633.6	71850
66	138375	139.8	19345
25	130613	129.0	16849
38	103000	38.2	3935
60	92000	230.0	21160
61	93000	80.8	7514
21	199500	188.7	37646
54	130597	206.4	26955
53	90750	1219.4	110661
55	79640	367.0	29228
56	93750	180.4	16913
95	138170	101.3	13997
24	112395	89.3	10037
34	119100	384.3	45770
22	109440	557.4	61002
33	76745	132.7	10184
20	111834	162.1	18128
32	125510	176.1	22102
44	111300	152.1	16929
49	88373	79.0	6981
47	75900	103.3	7840
51	93870	235.2	22078
43	140280	286.7	40218
45	72600	181.3	13162
42	66616	910.9	60681
41	85952	99.5	8552
1	77503	466.6	36163
30	121888	274.1	33410
19	114547	165.7	18980
31	160650	132.8	21334
TOTAL	5448353		1523303

5.45 million m³ averaging 280 g/m³ containing 1523 tonnes SnO₂

200 g/m³ cut-off grade

Hole No.	Volume m ³	Grade g/m ³	Kg SnO ₂
84	113750	203.7	23171
81	170625	306.1	52228
80	91000	497.0	83310
76	117925	254.3	23141
59	217000	475.0	56014
39	100800	278.4	60413
23	109750	147.8	14898
72	97500	391.9	43011
57	119130	379.3	36982
64	107325	317.2	37788
58	157500	338.1	36287
62	113400	948.7	149420
38	103000	633.6	71850
60	92000	38.2	3935
61	93000	230.0	21160
54	130597	80.8	7514
53	90750	206.4	26955
55	79640	1219.4	110661
56	93750	367.0	29228
34	119100	180.4	16913
22	109440	384.3	45770
33	76745	557.4	61002
20	111834	132.7	10184
49	88373	162.1	18128
47	75900	79.0	6981
51	93875	103.8	7840
43	140280	235.2	22078
45	72600	286.7	40218
42	66616	181.3	13162
41	85952	910.9	60681
1	77503	99.5	8552
30	121888	466.6	36162
19	114547	274.1	33410
24	112395	165.7	18980
		89.3	10037
TOTAL	3833115		1274894

3.83 million m³ averaging 333 g/m³ containing 1275 tonnes SnO₂

029051

SUMMARY OF ENDURANCE

	WIDTH (m)	INFLUENCE LENGTH (m)	AVERAGE DEPTH (m)	VOLUME (m ³)	AVERAGE GRADE (g/m ³)	CONTAINED SnO ₂ (kg)	REMARKS
EAST OF FAULT							
Section 1	182.9	160.0	26.6	778422	237.8	185109	
" 2	167.7	228.7	26.7	1024025	290.1	297111	
" 3 and 3A	213.4	152.4	27.0	878098	232.1	203807	
" 4	106.7	91.5	30.2	294844	82.8	24413	
" 5	100.6	48.8	34.0	166916	241.1	40243	
" 6	106.7	36.6	31.6	123405	204.9	25286	
				3265710	237.6	775969	
Top 18.3 m (60')				(2172516)	(37.4)	(81252)	
TOTAL				3265710	262.5	857221	
WEST OF FAULT							
Section 7	120.7	105.2	45.6	579012	514.6	297960	
" 8	97.6	152.4	44.2	657441	333.7	219388	
" 9	67.1	147.9	47.4	470402	286.3	134676	
" 10	61.0	152.4	50.0	464820	202.1	93940	
				2171675	343.5	745964	
Top 30.5 (100')				(1427167)	(48.3)	(68932)	
TOTAL				2171675	375.2	814896	
<u>TOTAL</u> (EAST & WEST)				5437385	307.5	1672117	

APPENDIX II

Endurance Ore Reserve Calculation

ENDURANCE - SECTION 1

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 116	24.6	95.1	B.M.I. Percussion
P 152	26.5	170.9	" "
P 117	25.9	217.8	" "
P 153	25.9	481.2	" "
P 118	25.9	559.7	" "
P 154	25.9	215.3	" "
P 119	27.4	427.8	" "
P 155	25.9	160.0	" "
P 120	27.4	88.1	" "
P 156	25.9	57.6	" "
P 121	27.4	208.4	" "
P 157	26.2	34.9	" "
P 122	29.0	234.6	" "
P 158	22.5	11.4	" "
P 141	23.2	8.0	" "
P 219			" "
P 220			" "

ENDURANCE - SECTION 2

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 137	22.9	137.4	
P 136	24.4	1.5	
P 169	24.4	73.7	
P 110	27.4	53.3	
P 170	24.4	13.3	
P 111	27.4	243.7	
P 171	26.7	350.6	
P 112	25.9	108.5	
P 172	25.9	1065.2	
P 113	27.4	716.9	
P 173	27.4	37.8	
P 114	26.8	48.0	
P 174	27.4	114.5	
P 115	25.6	228.8	
P 175	25.9	58.0	
P 140	27.1	230.9	
P 221	24.1	13.2	
P 222			

029055

ENDURANCE - SECTION 3

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 177	27.4	75.5	
P 178	25.7	489.7	
P 179	26.2	82.6	
P 180	29.0	876.8	
P 181	28.4	102.2	
P 182	28.4	32.2	
P 183	26.1	26.0	
P 142	27.1	49.8	
P 184	27.4	176.3	
P 143	27.1	107.3	
P 186	28.5	157.1	
P 144	27.7	85.8	
P 187	27.7	265.2	
P 188	26.2	127.0	
P 189	25.9	135.6	

029056

ENDURANCE - SECTION 3A

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
R 14	16.8	-	
R 13	24.1	49.9	
R 12	25.0	196.2	
R 11	26.5	337.0	
R 10	26.5	1025.4	
R 9	26.2	305.1	
R 8	26.1	405.2	
R 7	26.5	67.2	
R 6	26.5	167.7	
R 5	27.1	192.5	
R 4	27.7	28.6	
R 3	28.0	55.0	
R 2	27.7	361.3	
R 1	28.2	105.5	
R 15	27.1	52.6	
R 16	25.9	-	
R 17	26.2	-	
R 18	26.2	141.4	
R 19	23.5	-	

029057

ENDURANCE - SECTION 4

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 229	26.8	18.3	
P 217	28.1	22.6	
P 228	28.7	13.2	
P 218	29.6	11.2	
P 227	29.6	13.7	
P 101	30.5	50.9	
P 226	30.5	399.0	
P 102	29.9	18.6	
P 225	29.6	16.5	
P 103	30.5	54.7	
P 224	30.0	36.8	
P 104	31.7	24.3	
P 223	29.6	26.5	
P 105	31.1	1.5	
P 190	29.0	29.6	
P 106	32.3	181.9	
P 191	32.0	45.3	
P 107	32.0	240.4	
P 139	29.0	10.7	

029058

ENDURANCE - SECTION 5

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 138	27.4	≈ 4	
E 11	29.0	-	
4	29.9	-	
3	31.4	-	
2	30.5	-	
1	31.4	-	
11	35.1	562.3	
12	33.5	89.4	
13	33.5	198.7	
14	36.6	317.8	
15	33.5	41.1	
16	33.5	81.9	
17	30.5	18.1	
18	29.0	6.3	
19	21.3	-	

029059

ENDURANCE - SECTION 6

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
P 207	32.0	67.7	
P 192	32.0	45.3	
P 193	32.0	82.0	
P 194	31.4	775.9	
P 195	31.4	194.6	
P 196	31.4	109.5	
P 197	31.7	35.2	
P 198	32.0	78.8	
P 199	32.0	98.6	
P 200	31.4	148.1	
P 201			

029060

ENDURANCE - SECTION 7

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
108	36.0	-	
107	36.6	194.5	
106	45.7	263.5	
105	46.3	735.4	
104	48.8	571.2	
103	48.8	907.1	
102	47.3	325.6*	
101	39.6	31.9	
109	41.5	~ 9.6	
135	34.1	~ 119.0	
134	31.7	~ 45.6	

* Samples taken by geologist prior to washing

029061

ENDURANCE - SECTIONS 8, 9 AND 10

HOLE NUMBER	DEPTH TO BASEMENT (m)	AVERAGE GRADE (g/m ³)	REMARKS
<u>Section 8</u> P 124 P 123	36.6 51.8	202.9 426.1	
<u>Section 9</u> 20 W 5 W 4 W 6 W 3 W 133 W 2 W 132 W 131 W 1 W	40.9 48.2 51.5 49.1	711.9 129.8 196.5 179.7	
<u>Section 10</u> 25 W 125 W 126 W 127 W 128 W 129 W 130 W	46.3 53.7	141.0 254.7	

APPENDIX III

Monarch Ore Reserve Calculation

MONARCH ORE RESERVE BLOCKS

Hole No.	Depth to Basement	Grade g/m ³	Area m ²	Volume m ³	SnO ₂ Kg
<u>Line 27</u>					
F27 8G	8.1	15.2			
F27 12G	7.9	13.7			
G27	9.0	259.9	25921	233289	60632
G27 4H	4.4	161.7	"	114052	18442
G27 8H	2.0	50.1			
G27 12H	0.3	-			
H27	0.3	-			
<u>Line 25</u>					
E25 12F	7.0	17.4			
F25	5.9	8.9			
F25 4G	3.8	195.0			
F25 8G	4.4	49.7			
F25 12G	6.4	7.0			
G25	6.6	13.7			
G25 4H	7.8	5.2			
G25 8H	11.7	85.3			
G25 12H	11.9	74.5			
H25	10.8	123.8	25921	279947	34657
T1 PE5	5.8	30.8			
<u>Line 23</u>					
23 E 4F	2.7	16.7			
23 E 8F	4.3	13.7			
23 E12F	3.7	23.4			
F23 E 2	5.2	14.1			
23 F 4G	4.3	60.8			
23 F 8G	5.5	17.1			
23 F12G	4.1	19.7			
G23	5.5	252.1	25921	142566	35941
23 G 4H	5.9	43.0	"	152934	6576
23 G 8H	8.4	196.5	"	217736	42785
23 G12H	5.5	27.1	"	142566	3864
H23	4.6	33.4	"	119237	3983
J23	1.1	121.3	"	28513	3459

MONARCH ORE RESERVE BLOCKS

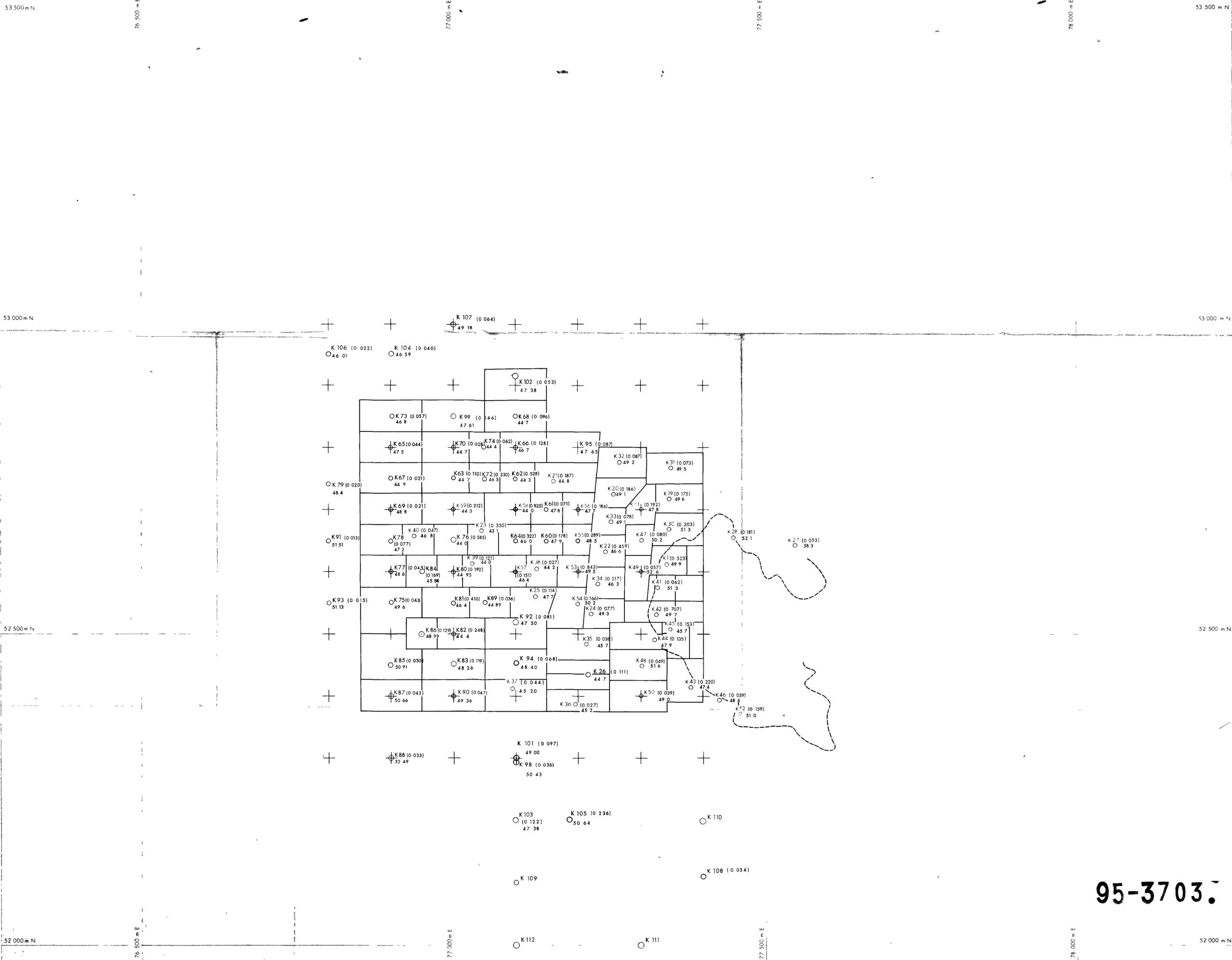
Hole No.	Depth to Basement	Grade g/m ³	Area m ²	Volume m ³	SnO ₂ Kg
<u>Line 21</u>					
E 21	2.4	3.3			
21 E 4F	3.2	17.4			
21 E 8F	3.0	13.3			
21 E12F	2.9	14.5			
F 21	0.6	24.1			
21 F 4G	4.9	29.3			
21 F 6G	5.5	31.9			
21 F 8G	4.9	36.3			
21 F10G	4.1	93.4			
21 F12G	7.2	1287.4	25921	186631	240269
21 F14G	6.6	697.1	"	171079	119259
G 21	4.6	264.4	"	119237	31526
21 G 4H	2.7	-			
21 G 6H	4.1	11.1			
21 G 8H	3.7	391.6	25921	95908	37558
21 G10H	2.3	14.5	"	59618	864
21 G12H	4.9	643.3	"	127013	81707
21 G14H	4.6	722.7	"	119237	86173
H 21	4.9	169.5	"	127013	21529
21 H 2J	3.4	26.7			
21 H 4J	3.7	68.6			
21 H 6J	3.7	49.7			
21 H 8J	2.3	-			
21 H12J	0.9	-			
J 21	0.3	-			
21.5 H 8J	0.3	-			
<u>Line 19</u>					
E 19	3.7	10.4			
19 E 4F	3.7	72.3			
19 E 8F	0.6	17.8			
19 E12F	3.0	135.7		77763	10552
F 19	5.8	18.9			
19 F 4G	4.6	81.2			
19 F 8G	5.9	160.9	25921	152934	24607
19 F12G	4.3	14.5			
G 19	2.9	23.4			
19 G 4H	4.5	238.8	25921	116645	27855
19 G 8H	5.5	207.3	"	142566	29554
19 G12H	2.4	4.1			
H 19	1.2	0.4			
19 H 4J	3.3	4.8			
19 H 8J	8.2	26.3			
19 H12J	2.6	10.8			
J 19	5.5	3.3			
19 J 4K	1.5	0.7			
J 19.5	0.3	0.4			
J 20	1.2	1.1			
J 20.5	0.6	-			

MONARCH ORE RESERVE BLOCKS

029065

Hole No.	Depth to Basement	Grade g/m ³	Area m ²	Volume m ³	SnO ₂ Kg
<u>Line 17</u>					
E 17	0.8	-			
17 E 4F	2.7	123.1		69987	8615
17 E 8F					
18 E12F					
F 17	8.2	226.2	25921	212552	48079
17 F 4G	4.4	108.6	"	114052	12386
17 F 8G	6.1	50.1			
17 F12G	20.7	7.8			
G 17	9.1 (20.4)	308.1 (134.4)	"	235881	72675
17 G 4H	3.0 (20.4)	206.5 (53.8)	"	77763	16058
17 G 8H	30.5	14.5			
17 G12H	23.2	4.8			
H 17	22.2	2.2			
17 H 4J	16.9	2.2			
17 H 8J	2.0	-			
17 H12J	3.5	3.8			
J 17	2.6	-			
<u>Line 15</u>					
15 D 8E	3.7	6.7			
15 D12E	1.5	17.1			
E 15	0.8	5.6			
15 E 4F	2.7	144.2	25921	69987	10092
15 E 8F	4.4	10.8			
15 E12F	2.7	-			
F 15	3.9	282.5	25921	101092	28558
15 F 4G	14.3	15.6			
15 F 8G	23.9	60.8			
15 F12G	24.4	13.3			
G 15	23.9	21.1			
15 G 4H	22.0	33.0			
15 G 8H	23.2	43.8			
15 G12H	22.0	8.5			
H 15	20.6	4.8			
15 H 4J	23.8	5.6			
15 H 8J	6.7	7.4			
J 15	7.9	1.9			
K 15	2.5	10.0			
L 15	1.7	0.7			

Hole No.	Depth to Basement	Grade g/m ³	Area m ²	Volume m ³	SnO ₂ Kg
<u>Line 13</u>					
13 E12F	3.4	11.9			
F 13	1.5	28.9			
13 F 4G	2.9	17.4			
13 F 8G	4.3	10.0			
13 F12G	12.5	2.6			
G 13	26.5	4.8			
13 G 8H	30.2	14.8			
13 G12H	23.5	7.8			
<u>Line 11</u>					
11 E12F	4.1	18.5			
F 11	1.8	1.9			
11 F 4G	0.9	-			
11 F12G	20.4	3.7			
G 11	25.0	11.1			
11 G 4H	24.7	3.3			
11 G 8H	29.7	2.2			
11 G12H	39.6	4.1			
H 11	40.5	6.7			
11 H 4J	36.3	14.5			
11 H 8J	34.1	8.2			
11 H12J	30.5	5.6			
J 11	12.2	5.9			



95-3703

029067

AMDEX MINING LIMITED
PIONEER TIN MINE

Pioneer Ore Reserve Blocks

Prepared by G J WALKEM & CO
surveyors & planners
hollyman house brisbane street
launceston 003 312428

K19 (0 175) Ribuka Percussion drill hole
overall grade $g/m^3 SnO_2$ (70% Sn) Rec Vol Method
46.4 Basement R L

> 400	} $g SnO_2 / m^3$
200 - 399	
100 - 199	
50 - 99	
< 50	

----- Approximate Pit Outline (Nov '79)

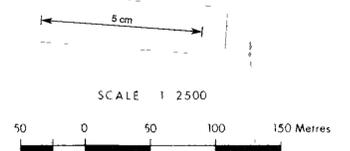
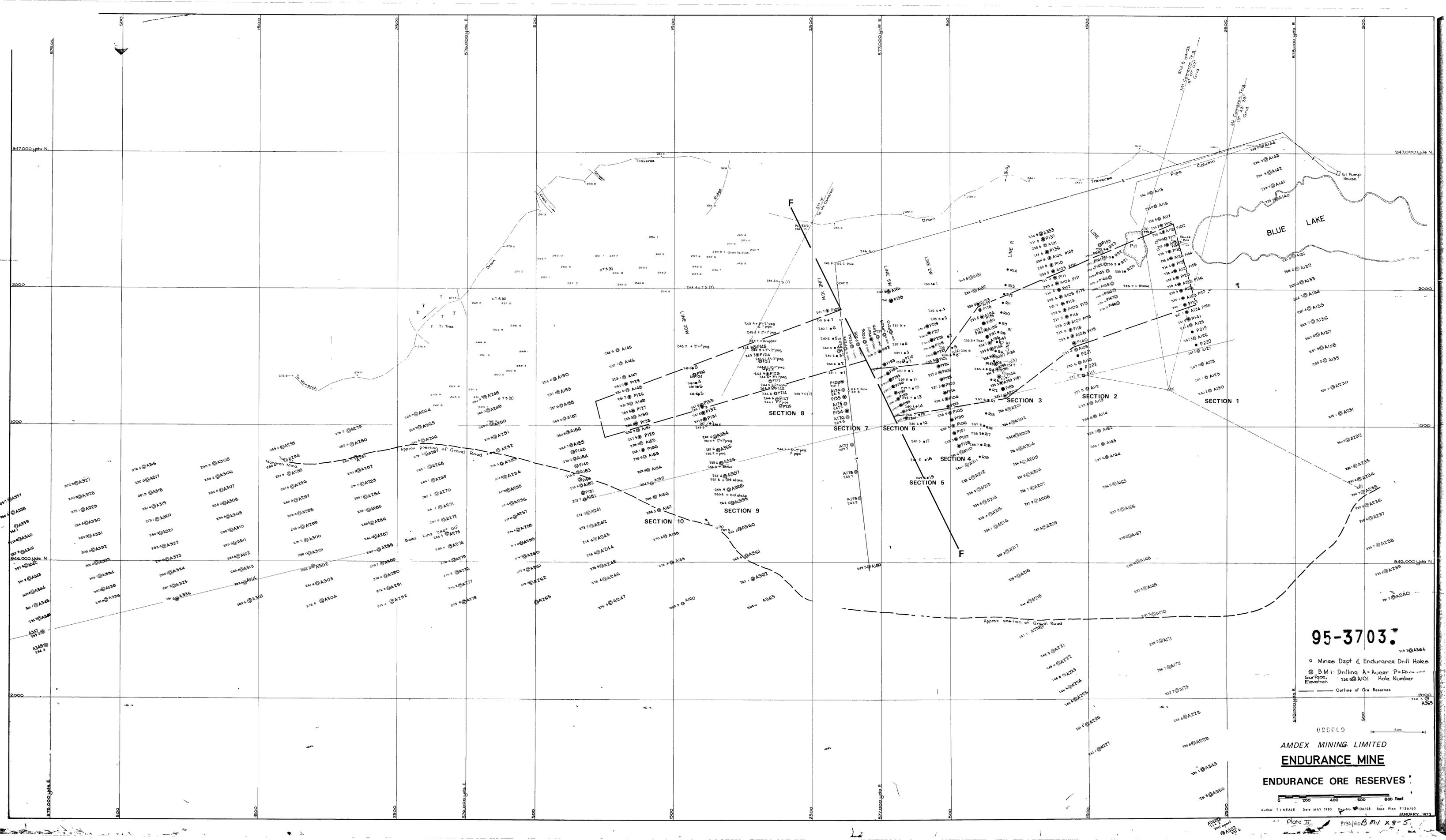


Plate I

Author: T NEALE	Date: January 1980
Drafting: B G	Dwg No: P136/65
Base Plan P136/33	



95-3703.

o Mines Dept. & Endurance Drill Holes
 o B.M. Drilling A-Auger P-Drill
 Surface Elevation 236 @ A101 Hole Number

— Outline of Ore Reserves

AMDX MINING LIMITED
ENDURANCE MINE
 ENDURANCE ORE RESERVES

0 200 400 600 800 Feet
 Author: T. NEALE Date: MAY 1980 Dep. No. 130/88 Base Plan P130/80
 JANUARY 1973

Plate II
 P130/60 B.M. X 8-5