VAN DIEMAN MINES PTY LTD

SAPPHIRE AND ASSOCIATED GEMSTONES

VAN DIEMAN TIN PROJECT AREAS

NORTH EASTERN TASMANIA

PREPARED FOR:	Van Dieman Mines Pty Ltd
DATE PREPARED:	6th October 2003
PREPARED BY:	Niugini Resources Pty Limited P.O. Box 62, HAWKER, 2614 ACT Australia. Phone: +61 2 6254 8689 Fax: +61 2 6278 4672 Email: nkinnane@ozemail.com.au

EXECUTIVE SUMMARY

Sapphire has been recorded from a number of localities throughout Tasmania however it is only those locations in the north and north east that have sufficient size potential to become attractive for large scale mining exploitation. Sapphire was regularly reported as a component of the tin bearing alluvial gravels in the north east and was often recovered from tin shed concentrates at such operations as the Briseis, Pioneer, and Endurance Mines and from the Dorset dredging operations in the Ringarooma River.

Long regarded with little more than passing interest by tin miners sapphire has however become of interest to weekend fossickers and in recognition of that interest Mineral Resources Tasmania have set aside several small fossicking areas throughout the northeast.

In 1999, Mineral Holdings Australia (MHAPL) obtained tenure by way of a Special Exploration Licence (SEL) over a vast area of the north east corner of the State. Preliminary exploration indicated that sapphire was widespread throughout both the younger and older Tertiary alluvial deposits. That work was subsequently extended to specific tin resources, Monarch, Endurance, Pioneer, Great Northern Plain and Scotia. Test results indicated that sapphire as a resource base would not be of sufficient grade to “Stand Alone” in economic terms however when recovered along with tin, gold and tantalite it represented a very significant economic component of the recovered mineral train.

The source of the sapphire has now been determined and while much of the source volcanic material has been eroded the postulated location of the source rock has enabled specific areas to be targeted for further test work.

Most of the test work conducted by various parties overt the last two years has been oriented toward tin testing and thus the lighter sapphire component of the heavy mineral train is usually lost to tailings. Recent broad based testing indicates that the ore grade, tin bearing gravels, usually contain sapphire grades of 1 to 3 grams / metre. Of that material some 20% is of gem quality, that is, after cleaning and heat treatment it is suitable for facet cutting.

Recent studies of major tin deposits at Monarch, Pioneer, Endurance, Scotia and the Great Northern Plain indicate that all contain significant quantities of sapphire and that if recovered that sapphire component will greatly enhance the economic viability of those particular projects. A number of conclusions can be drawn as a result of those studies, specifically:

- Sapphire has a dominant blue hue and responds very well to conventional heat treatment;
- Size varies from 1 mm through to pieces of in excess of 25 mm;
- Sapphire is recovered from the basal sections of almost all Tertiary and Quaternary alluvial deposits in the north east;
- It is unlikely that any “Stand Alone” sapphire deposits will be located, however sapphire can be economically recovered along with the tin component of stanniferous deposits; and
- Parcels of cut sapphire have been well received by established sapphire marketing groups who compare quality and colour to the best small to medium size Sri Lankan material.

The following report details the geological and historical background to sapphire occurrence in north east Tasmania, reviews the various major tin / sapphire projects and other exploration targets and comments on sapphire quality and recovery and marketing.

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

LIST OF PLANS

LIST OF PHOTOGRAPHS

1.0 INTRODUCTION:

Sapphire occurrences are widespread throughout north east Tasmania. Until recent times these occurrences have held nothing more than academic interest however exploration results derived from work programs conducted since 1999 indicate that sapphire is in fact an important accessory component of the heavy mineral fraction of most Tertiary and Quaternary stanniferous alluvials.

Most reports indicate that the bulk of the Tasmanian sapphire is of green colouration, this has however not been the observation of the author nor is it reflected in recent bulk sampling programs. It now appears that a high proportion of the sapphire is of blue hues varying from milky pale blue, through grey – blue to the finest cornflower colouration. There is strong evidence to suggest that at least 20% of the sapphire fraction is of fine blue gem hues. In addition a large proportion of the sapphire exhibits milky to grey blue hues and is not unlike the much sought after Sri Lankan “Geuda” material that responds to heat treatment yielding fine blue stones.

To date sapphire discoveries have been associated with past and present alluvial tin mining operations and much of the gem currently recovered by fossickers is derived from areas comprising almost solely tin mine tailings or mining disturbed ground. While there is a general opinion that the bulk of the sapphire is all of small size ranges this does not now appear to be the case. There is ample evidence that larger stones are present. Historical records indicate stones as large as 900 carats have been recovered from the Weld River alluvials and the Company has inspected parcels of stones of gem quality from the priory area near St Helens containing stones of up to 25 mm in size and weighing as much as 95 carats.

It has proven difficult to determine what percentage sapphire comprises of the heavy mineral fraction. Many argue that it has little significance however it should be noted that most sapphire is being recovered from old worked tin ground or from ground that has been derived from tin workings and comprises both wash and overburden.

Exploration by MHAPL, although of a semi-quantitative and qualitative nature and aimed at determining the extent of sapphire mineralisation has established the significance of sapphire as a viable economic component of the stanniferous deposits. The most recent bulk sampling was aimed at determination of tin content and thus testing equipment was adjusted to the recovery of cassiterite, the difference in SG precludes the adequate recovery of both minerals in the one treatment process.

Recent studies of major tin deposits at Monarch, Pioneer, Endurance, Scotia and the Great Northern Plain indicate that all contain significant quantities of sapphire and that if recovered that sapphire component will greatly enhance the economic viability of those particular projects. A number of conclusions can be drawn as a result of those studies, specifically:

- Sapphire has a dominant blue hue and responds very well to limited heat treatment;
- Size varies from 1 mm through to pieces up to 25 mm in size;
- Sapphire is recovered from the basal sections of almost all Tertiary and Quaternary alluvial deposits in the north east;
- It is unlikely that any “Stand Alone” sapphire deposits will be located, however sapphire can be economically recovered along with the tin component of stanniferous deposits; and
- Parcels of cut sapphire have been well received by established sapphire marketing groups who compare quality and colour to the best small Sri Lankan material.

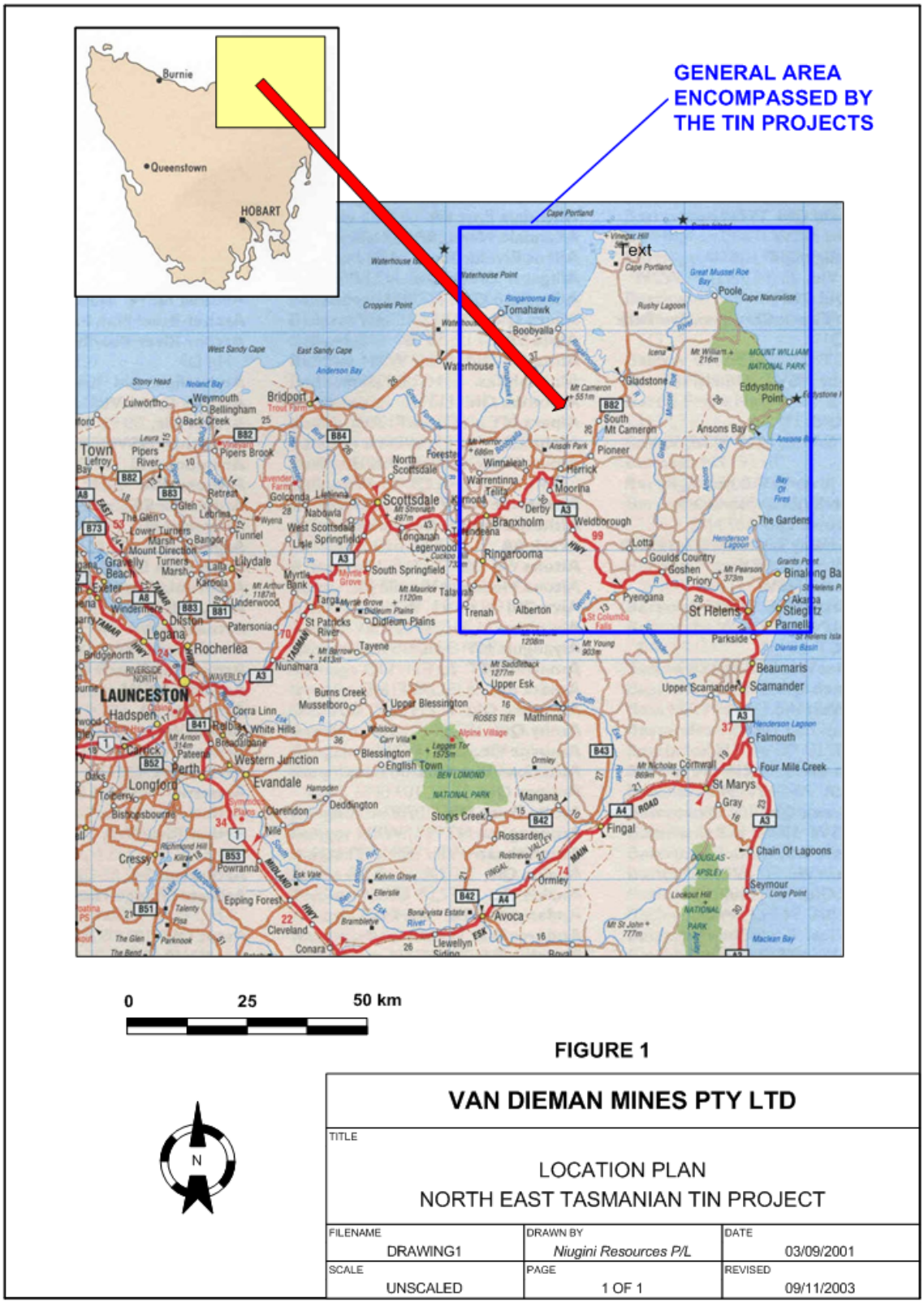


FIGURE 1 – LOCATION PLAN

2.0 LOCATION AND ACCESS:

The tenements comprising the tin project area encompass an area of approximately 1,211 square kilometres and are located in the north eastern corner of the Australian island State of Tasmania. See Figure 1. The area is centred approximately 80 kilometres north east of the northern coastal city of Launceston around the townships of Branxholm, Derby, Pioneer, Gladstone and St Helens.

Launceston provides major regional air access with regular daily flights from Melbourne on the Australian mainland. From Launceston a network of major bituminised roads provides access to the north east through Scottsdale to the Ringarooma River valley or via Bridport to the Great Northern Plains.

Locally access is generally excellent, well formed gravel roads and tracks service all of the major mining project areas and that access is rarely disrupted by bad weather and flooding.

3.0 CLIMATE AND TOPOGRAPHY:

Climate is typically 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 $0^{O}C$ to maximums in the 15 to $20^{O}C$ range, and in summer, November to February, from $15^{O}C$ up to $30^{O}C$. Average rainfall varies from 890 mm to 1,020 mm. Snowfalls are not unusual in the higher country such as the Blue Tier and further south around Mt Victoria.

Exploration can, as a rule, be conducted throughout the year although some wetter periods during the winter months may cause delays particularly where heavy machinery movement is involved. Mining activities are generally not disrupted and continue throughout the year. Ample groundwater exists in streams and old mine workings to sustain large scale mining.

The tin project area encompasses a wide topographic range. The dominant topographic features are the granite massifs of the Blue Tier, Scottsdale Batholith and Mt Cameron Massif and the elevated mountainous areas south of the Blue Tier. These areas vary in height from around 500 metres at Mt Cameron and the Blue Tier to over 1,200 metres at Mt Victoria. A broad coastal plain is located along the north and north east coast north of the Blue Tier. These coastal plains are dominated by a number of major drainage systems, the Great Forester, Tomahawk, Boobyalla, Ringarooma and Mussel Roe Rivers. To the south the George and South Esk Rivers drain the high country to the east coast.

4.0 TENURE:

Van Dieman has negotiated an option over a large tract of the north east that is currently encompassed by a series of mining tenements that have been aggregated over the past 20 years by MHAPL.

Detail of those tenements is provided as Table 1.

Of the thirteen tenements listed one has been taken out specifically for gem minerals; sapphire and zircon. The balance of twelve tenements, were taken up for metallic minerals, specifically tin, tantalite and gold. The tabulation includes several abbreviations, specifically those are:

S.E.L.	Special Exploration Licence
E.L.	Exploration Licence
E.L.A	Exploration Licence Application
R.L.	Retention Licence

Details of the various forms of tenure can be perused by the reader in the Mines Act, Tasmania.

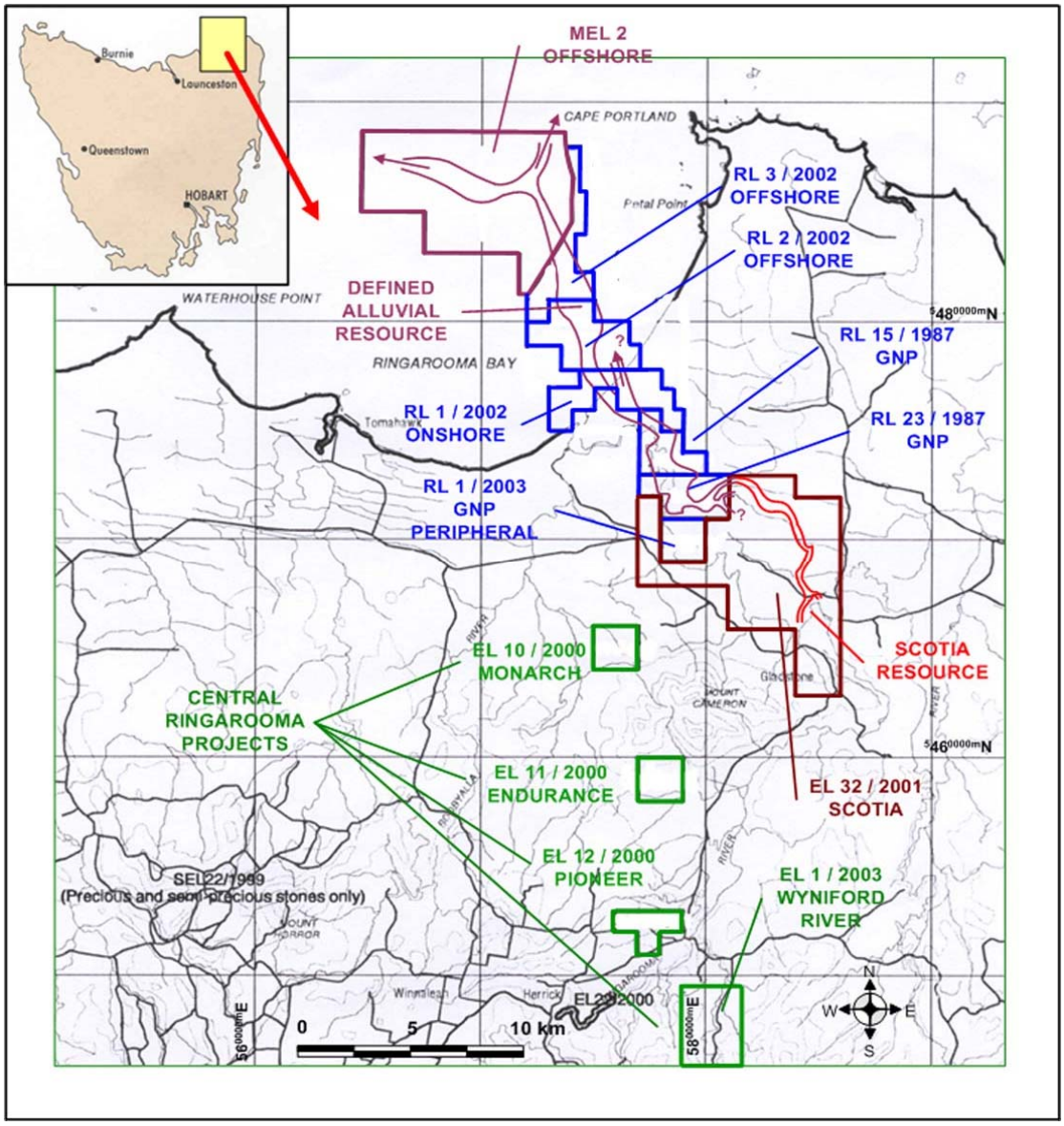


FIGURE 2 – TENURE LOCATION MAP

TABLE 1

TENEMENT SCHEDULE

RENTALS Aus $	TENEMENT AND PERIOD	LOCATION	COMMODITY	AREA Sq. Km	EXPENDITURE COMMITMENT TO 30 JUNE 04 Aus $
** TBA	MRL-1	Commonwealth Offshore – Ringarooma Bay / Bass Strait	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum	49	TBA
1,037	R.L 15 / 87 30/5/03 - 05	Fosters Marshes & GNP	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum	6	5,000
1,157	R.L 23 / 87	Fosters Marshes & GNP	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum	7	5,000
475	R.L 1 / 2003-11-06 To 30/5/05	Aberfoyle Hill – Ringarooma River Basin	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum & Bentonite	4	5,000
3,100	R.L 1 / 2002 To 20/06/05	Onshore GNP	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum & Bentonite	10	# 50,000 + One Drill Hole
3,288	R.L 2 / 2002 To 20/06/05	Boobyalla Beach & GNP	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum	10	# 50,000
3,100	R.L 3 / 2002 To 20/06/05	Ringarooma Bay & Offshore	Tin, Rutile, Zircon, Ilmenite, Gold, Sapphire, Gems, Sand, Tantalum	9	# 50,000
748	E.L 32 / 2001 To 12/04/05	Scotia & GNP	Tin, Rutile, Zircon, Ilmenite, Gold, Sand, Tantalum	42	21,000
147	E.L 10 / 2000 To 08/12/05	Monarch Flats – Ringarooma Valley	Tin, Rutile, Zircon, Ilmenite, Gold, Sand, Tantalum	4	5,000
147	E.L 11 / 2000 To 08/12/05	Endurance – Ringarooma Valley	Tin, Rutile, Zircon, Ilmenite, Gold, Sand, Tantalum	4	5,000
147	E.L 12 / 2000 To 08/12/05	Pioneer – Ringarooma Valley	Tin, Rutile, Zircon, Ilmenite, Gold, Sand, Tantalum	4	5,000

TABLE 1 (Continued)

TENEMENT SCHEDULE

RENTALS Aus $	TENEMENT AND PERIOD	LOCATION	COMMODITY	AREA Sq. Km	EXPENDITURE COMMITMENT TO 30 JUNE 04 Aus $
623	E.L. 1 / 2003 Application	Wyniford River	Tin, Rutile, Zircon, Ilmenite, Gold, Sand, Tantalum	17	5,000
3,996	S.E.L 22 / 99 08/07/05	GNP / Blue Tier	Sapphire, Gems	1,211	100,398
TOTAL **18,185**				**1,377**	**++ 201,398**

NOTES:

50,000 Combined expenditures for R.L. 1, 2 and 3 / 2002 has been set at $50,000.

** The Commonwealth is yet to advise rentals and expenditure for this tenement.

++ The total expenditure is provided as at 01/11/2003, these figures will reduce when current quarterly expenditures are updated.

RED The S.E.L encompasses all tenements and those that do not include sapphire and gems are thus covered under the terms of grant of this tenement. No portion of the S.E.L including areas within current E.L's can be applied for as a gem area by third parties.

5.0 HISTORICAL BACKGROUND:

Early tin miners of the late 1800's, first reported the presence of sapphire from many mining locations throughout the north east. None of those early reports were quantified and sapphire was treated as an oddity rather than a significant component of the alluvial deposits. The early 1900's saw the development of many larger tin mining operations, the Arba, Briseis and the deposits along the Lower Ringarooma River including Pioneer, Endurance and Scotia / Lochaber all helped add to a total tin production of in excess of 40,000 tonnes of concentrates. Sapphire was reported from all these areas but never received other than passing interest from miners and explorers.

Sapphire is a significant component of the tin shed tailings at the Pioneer, Endurance and Dorset Mines. Recent discussions with John Volker, ex manager of the dredge during the 1960's indicates that sapphire of fine blue colour and of some size was regularly recovered from the primary and secondary jig beds during clean-up. Various workers on the dredge scavenged this material. Volker has, remaining in his possession, a small parcel of fine blue sapphire in the +3 mm to +6 mm size range.

Similar stories are reported from mining activities at the Salter and Woods Mines on the Wyniford River, Gilbert Salter has a number of facetted +1 carat fine blue sapphires from that location in his possession. A visit to the current Summers operations on Dorset Flats north of Pioneer confirms that sapphire commonly reports to the top of both the primary and secondary jig beds and mention is made later in this report to the significance of that observation.

In all the exploration programs involving cassiterite bearing alluvials of the Great Northern Plains region, sapphire was never treated as a significant component of the heavy mineral fraction. During sampling by MHAPL effort was made to recover any gem reporting to both jig beds and into jig underflow concentrates. It should be noted that the recovery of cassiterite requires the jig beds to be "ragged" with steel shot and thus the circuit is not well suited to recovery of the lighter heavy mineral fraction, much if not most of the sapphire and zircon is lost to tailings.

Up to the present time most interest in sapphire has come from the casual fossicking community who regularly visit such locations as the Weld River and Moorina Fossicking Reserve, Main Creek and the Cascade River, Branxholm Creek and the Wyniford River. Historically there have been a number of significant stones recovered. A 264 carat stone was reported to have been recovered in the Weld River in the *Catalogue of Minerals of Tasmania, 1910* published as Geological Survey Record No. 9 of the Tasmanian Department of Mines. More recently, in 1933, a 900 carat stone was reported to have been discovered in old mining detritus at the Weld River.

A number of large gemmy stones were observed in the collection of Michael Lloyd of Priory near St Helens. This material was evidently obtained by his father or grandfather from alluvial tin mining operations in the Tertiary Leads of the St Helens district. This parcel does not appear to have been hand picked over and remains one of the few intact and representative parcels observed by the author.

It is likely that there are other locations in the north east that would yield fine gems, such locations being known only to the casual fossicking population who keep them a closely guarded secret. Recent finds of coarse-grained zircon, sapphire and spinel at Ruby Flat, Branxholm and at Main Creek illustrate how little is known about the extent of the sapphire occurrences within the tin project area. Recent exploration has confirmed that gem quality sapphire is a significant component of many of the tin bearing alluvial leads, and along with gold and tantalite comprises a significant economic component previously overlooked in most test programs.

6.0 GEOLOGY:

Three acid igneous intrusive massifs, the Eddystone, Blue Tier and Scottsdale Batholiths of Devonian to Carboniferous age that intrude the older Ordovician to Devonian Mathinna Bed sediments dominate the regional geological setting. The region was subjected to two periods of alkali volcanism during the Tertiary and with periods of rapid uplift followed by massive erosional events and periods of marine transgression created. This resulted in the development of extensive terrestrial and marine sedimentary sequences throughout the north east.

6.1 REGIONAL GEOLOGICAL SETTING:

The following text is intended to provide the reader with a broad general background to the regional setting within the tin project areas. Further more detailed descriptions can be obtained from the various publications of the Tasmanian Department of Infrastructure, Energy and Resources.

A PALAEOZOIC:

The Palaeozoic era was dominated by extensive acid intrusive activity and the remnants of three igneous bodies dominate the topography of the tin project area.

i ORDOVICIAN TO DEVONIAN:

- **Mathinna Beds:**

  Remnants of this unit are widespread throughout the north east; specifically the unit consists of a greywacke turbidite sequence consisting of interbedded sandstones, mudstones, shales and siltstones. Locally the unit has been subjected to psammitic contact metamorphism resulting in the production of spotted pelites, schists and some hornfelsic rocks.

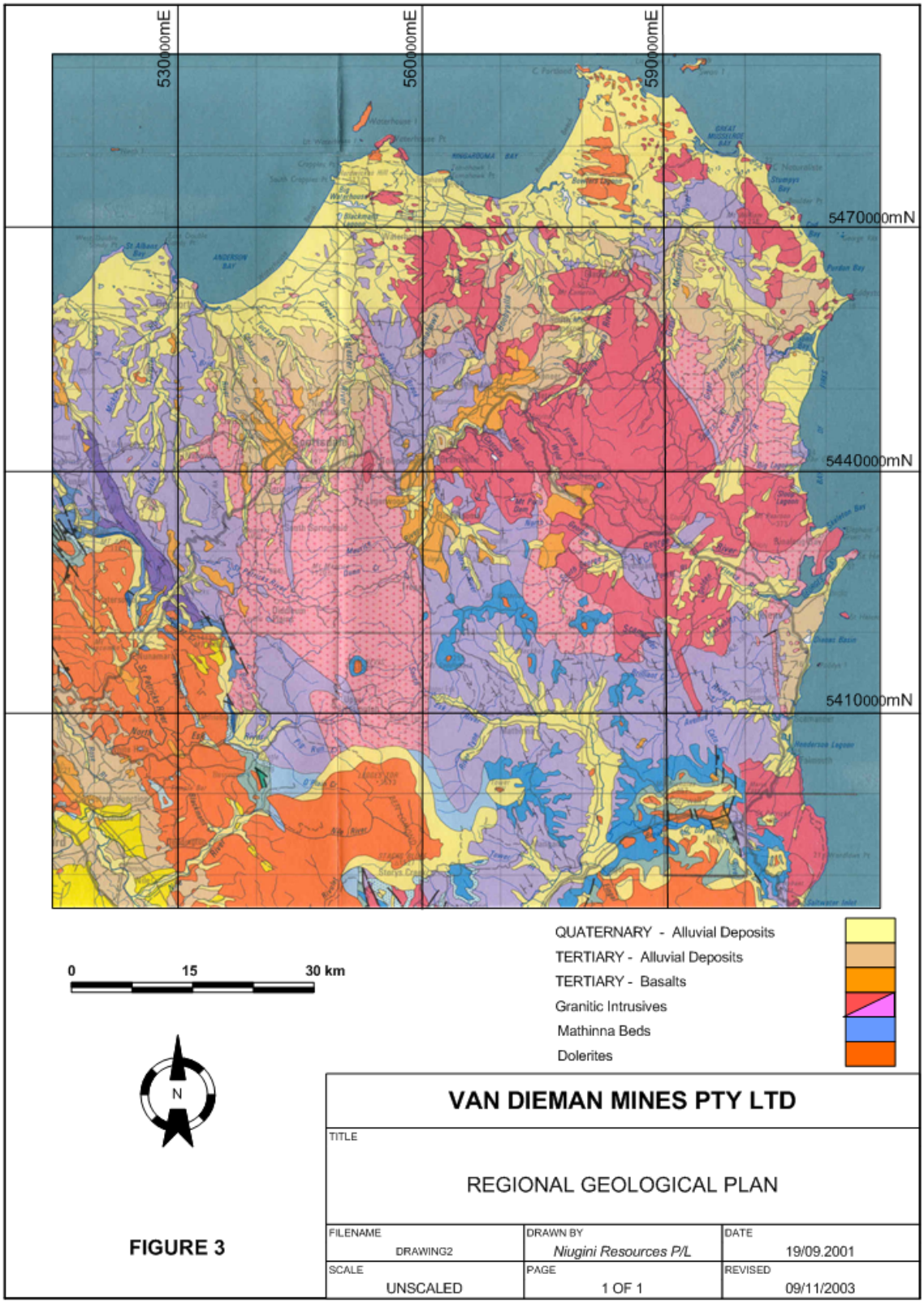


FIGURE 3 – REGIONAL GEOLOGICAL PLAN

At a number of locations the unit hosts quartz vein gold mineralization (Gladstone Township area) and in fact this style of mineralisation may be more widespread but masked by a thick cover of Tertiary sediments. Metamorphic quartz veined rocks have been recorded as "Basement" in drilling at Scotia and Lochaber leads north of Gladstone and gold locked on angular quartz recovered in those workings suggests that the buried basement is auriferous.

ii DEVONIAN TO CARBONIFEROUS:

Three major granitic intrusives dominate this geologic period, specifically:

❖ Scottsdale Batholith:

Is located in the west and south west of the tin project area where it consists of a series of fine to medium and rarely coarse-grained adamellites, granites and granodiorites. Some fine-grained intrusives have been recorded; aplites, micro-granites and fine-grained adamellites. Quartz and pegmatite veining is common at several locations and is usually associated with tin mineralization.

❖ Blue Tier Batholith:

This igneous unit has a similar petrology to the previously described unit. The rocks do however tend to be more porphyritic and predominantly fine to medium-grained although coarse-grained differentiates do occur.

This intrusive is the main mineralizer in the region and it is tin eroded and shed from this unit that is the source of the rich tin bearing alluvials. Primary tin mineralization is highly variable. Tin bearing quartz veins have been worked at a number of locations and where these occur with associated cassiterite disseminated within greisens major mine development has occurred, the Anchor Mine, Mt Michael Mine and the Fly By Night were all significant tin producers of this type.

❖ **Eddystone Batholith:**

This unit is far more variable in composition than the previous two although petrographic types are similar. Rocks vary from very fine to coarse-grained, porphyritic to equi-granular.

In addition to these three major igneous units the region hosts a large number of undifferentiated intrusive dykes including aplites, micro-granites, micro-adamellites, pegmatites and porphyries. Massive quartz veining is also common. These dykes and veins may be mineralized with cassiterite and rarely wolframite and molybdenite.

iii PERMIAN:

Undifferentiated Permian glacio-marine and marine sediments occur in the south of the tin project area. The Lower Permian units consist of a sequence of mudstones with minor pebble beds and basal tillites. The Upper Permian rocks comprise mudstones with minor siltstones, sandstones and conglomerate beds. The basal section of the Upper Permian contains glacio-marine and freshwater sequences.

B MESOZOIC:

Few outcrops of Mesozoic rocks occur within the project area, dolerites of Jurassic age being the most significant.

i TRIASSIC:

A small and insignificant outcrop of bedded quartz and felspathic sandstones and mudstones occurs on Cape Portland in the extreme north east of the area.

ii JURASSIC:

Intrusive doleritic rocks are widespread throughout the project area. In the Great Northern Plain north of the township of Gladstone they appear to form a north eastern bounding outcrop to a graben like depression that hosts a significant sequence of stanniferous Tertiary marine transgressive sediments. Doleritic dykes are common throughout the Blue Tier and the Scottsdale Batholith, intrusive into acid igneous rocks.

iii CRETACEOUS:

An unusual suite of appinitic and andesitic lavas and lamprophyre dykes occur in the cape Portland area. Unsubstantiated reports of diamonds having been recovered from some Tertiary sediments in the north east has, in the past, raised some interest in this suite.

C CAINOZOIC:

In terms of the economic geology of the study area Cainozoic units are the most significant. The Tertiary was dominated by two periods of alkali volcanism, uplift, prolonged erosion, substantial alluvial deposition and marine transgression. The latter events occurring during the Quaternary resulted in the deposition of extensive near-shore marine sediments and subsequently a series of Aeolian dune related deposits.

Tertiary volcanism controlled, to a large extent, the Cainozoic geomorphology of the region and the depositional controls and thus location of the thick tin bearing sequences.

i TERTIARY:

Tertiary units are most widespread in the north, north eastern and eastern sections of the tenements. A period of alkali volcanism was followed by widespread erosion and subsequent sedimentation that resulted in the development of thick, extensive alluvial sequences in the northern drainages of the Blue Tier Batholith. These alluvial deposits, most tin bearing, were subsequently covered by later or younger valley fill basaltic flows.

❖ Older Basaltic Flows:

Only a few remnants of this unit remain as isolated outcrops on the higher country along the edges of the Blue Tier, specifically around the upper reaches of the Weld River, at Grays Hill near Branxholm and at Mutual Hill near Derby. Prior to the Tertiary erosional events it is postulated that this unit was widespread across the Blue Tier region.

At the Weldborough Pass the unit consists of a basal agglomerate and tuff unit that is in turn overlain by a thick series of alkali basalt flows. The presence of pyroclastic units is considered to be indicative of the presence of a local vent.

The unit is considered to be the source of the sapphire and zircon gem material, the widespread occurrence of these gems is further indication of the original extent of the volcanic suite.

Experience in the Inverell region of New South Wales suggests that sapphire and zircon are normally concentrated in the first explosive units, the tuffs, agglomerates and volcanic breccias. While this has not been substantiated in the tin project area the presence of coarse grained zircon and sapphire in the upper Weld River, near Grays and Mutual Hills (possible vents) certainly points to a similar association.

❖ **Undifferentiated Alluvium:**

Uplift resulted in the deposition of a complex alluvial sediment sequence along the major northerly and to a lesser extent easterly drainage systems that developed during the Tertiary. These included the ancestral Ringarooma, Boobyalla, Musselroe and George River systems.

The sequences consist of a series of interbedded sands, sandy-clays, clayey-sands, gravels, cobble and boulder beds. The latter units are generally developed in the basal sections and are as a rule stanniferous. At several locations silicified horizons consisting of silcretes and greybilly appear to represent erosional breaks in what was a sustained period of sedimentation. Ferricrete and associated lateritic horizons have been located in areas adjacent to younger basaltic flows and in areas such as the Monarch Mine where there has been an increase in iron content probably related to a high pyrite content in the surrounding alluvial gravels.

Clasts within these units are highly variable and content is largely dependant on location of the horizon in relation to local basement geology. At locations such as Monarch and Endurance granitic material is dominant, in the Dorset Flats area two periods of sedimentation have been recognised, an older Mathinna Bed dominated sequence and a granite / quartz based sequence, both are stanniferous and both contain sapphire.

Sphericity is also variable. Well rounded clasts occur in areas furthest from the Blue Tier source while locally to basement source, rock clasts may be very angular.

Cassiterite, sapphire, gem zircon, gold and tantalite as the heavy mineral fraction within these sediments, are all widespread. Higher grades of these minerals are restricted, in the main, to the basal horizons although all are distributed in some proportion throughout the whole sequence. Recent studies at the Scotia and Lochaber leads indicate that within that stream system considerable and consistent basal enrichment has occurred. Grades in this deposit may well exceed initial indications.

❖ **Younger Basalt Lavas:**

The younger volcanic sequence consisting of olivine nephelinites, limburgites, hawaiites and basinites is widespread throughout the north central and north western section of the project area. The palaeo-Ringarooma and Boobyalla drainage systems appear to have been major channel-ways down which the very fluid younger volcanics flowed probably emanating from vents along the edge of the Blue Tier. This resulted in dramatic geomorphological changes, drainage capture and drainage movement that influences the local topographic setting right through the Tertiary and Quaternary.

These lavas are essentially olivine rich and apart from olivine and possibly minor zircon contributed little by way of sapphire to the drainage train.

ii QUATERNARY:

The Quaternary is represented by rocks of Pleistocene and Holocene age, specifically:

I. PLEISTOCENE:

❖ **Undifferentiated Marine Sediments:**

Marine transgression during the Quaternary resulted in the deposition of thick sequences of sands, clayey-sands, gravels and shelly horizons and the reworking of older near shore sediments. Such units are observed at the Monarch Mine, at the Aberfoyle Workings (Shelly Face) and McGregors Mine on the edge of the Great Northern Plain. Locally on the "Plain" the sediments consist of almost entirely of doleritic material derived from the north east shelf that bounds the marine embayment.

These sediments are in part stanniferous and cassiterite is reported from a number of "Deep Lead" type deposits around the fringe of the "Plains".

❖ **Older Aeolian Deposits:**

Late Pleistocene wind blown sands were deposited as dunes and sand sheets, the latter often being locally derived. These occur principally along the coastal fringes and in particular along the eastern lee shore of the main bays or in elongated dunes lying parallel to wind direction.

II. HOLOCENE:

❖ **Younger Aeolian Deposits:**

These deposits occur along the marine fringe with large sand dunes being developed along the eastern edge of Ringarooma bay. The unit consists of dune sands, beach sands and gravels with minor shelly horizons. Many dunes are stabilized however those in the vicinity of Bowlers Lagoon are active and strong south eastward dune advancement is indicated.

❖ **Recent Alluvial Deposits:**

Thick alluvial deposits have been developed as terraces and gravel bars along most of the major streams within the project area. These units consist of basal gravel, cobble and boulder beds, usually stanniferous, in turn overlain by thick sands, sandy clays and clays. In places these deposits are often mistaken for Tertiary Alluvials and in fact where both units occur together it often proves difficult to differentiate between them. Local coalified vegetation appears to indicate the presence of Tertiary sediments.

Locally swampy deposits; peats and clayey-peats have developed particularly in low lying, basinal topographic features. These are particularly prevalent around the fringes of the Great Northern Plain.

6.2 GEOLOGICAL AND GEOMORPHOLOGICAL HISTORY:

In the 1920's and 30's, Government Geologist, P.B. Nye made one of the few efforts to understand the geomorphological setting in the north east and how that setting controlled to location of the numerous stanniferous deposits in the region. Little further work of this nature was undertaken until that by Rattigan, 1958 and more particularly by Yim, 1991. In the latter study titled *"Tin Placer Genesis in Northeastern Tasmania"* Yim provided a detailed genetic history of alluvial development in the region.

Recent exploration has enabled that genetic interpretation to be extended and modified to explain the emplacement more specific of the numerous stanniferous deposits.

It is unfortunate that geomorphological processes during this period are not well researched as clearly they control the economic deposition of alluvial tin. One of the foremost geologists, P.B. Nye (1932) has much to offer in general background in the north east and many of his personal notes and letters (Archived MHAPL) and his published works provide an insight to the setting of the various deposits. The following text is intended to provide a broad, but by no means complete, background to the formation of the cassiterite bearing alluvial and estuarine deposits.

Traditionally the geological view of the alluvial tin deposits of the north east has been of a tin component being, in the main, derived from the tin bearing granites of the Blue Tier, Scottsdale and Mt Cameron Batholiths. Dramatic uplift, and a northwards shedding erosional profile, related to tropical or semi tropical environments during the Tertiary, resulted in rapid denudation of these areas and the formation of blanket and reworked tin bearing alluvials over a wide area of the north east.

The history of the region commenced in the Permo-Traissic with the unroofing, and commencement of erosion of the cassiterite bearing granitic rocks of the Blue Tier and Scottsdale Batholiths.

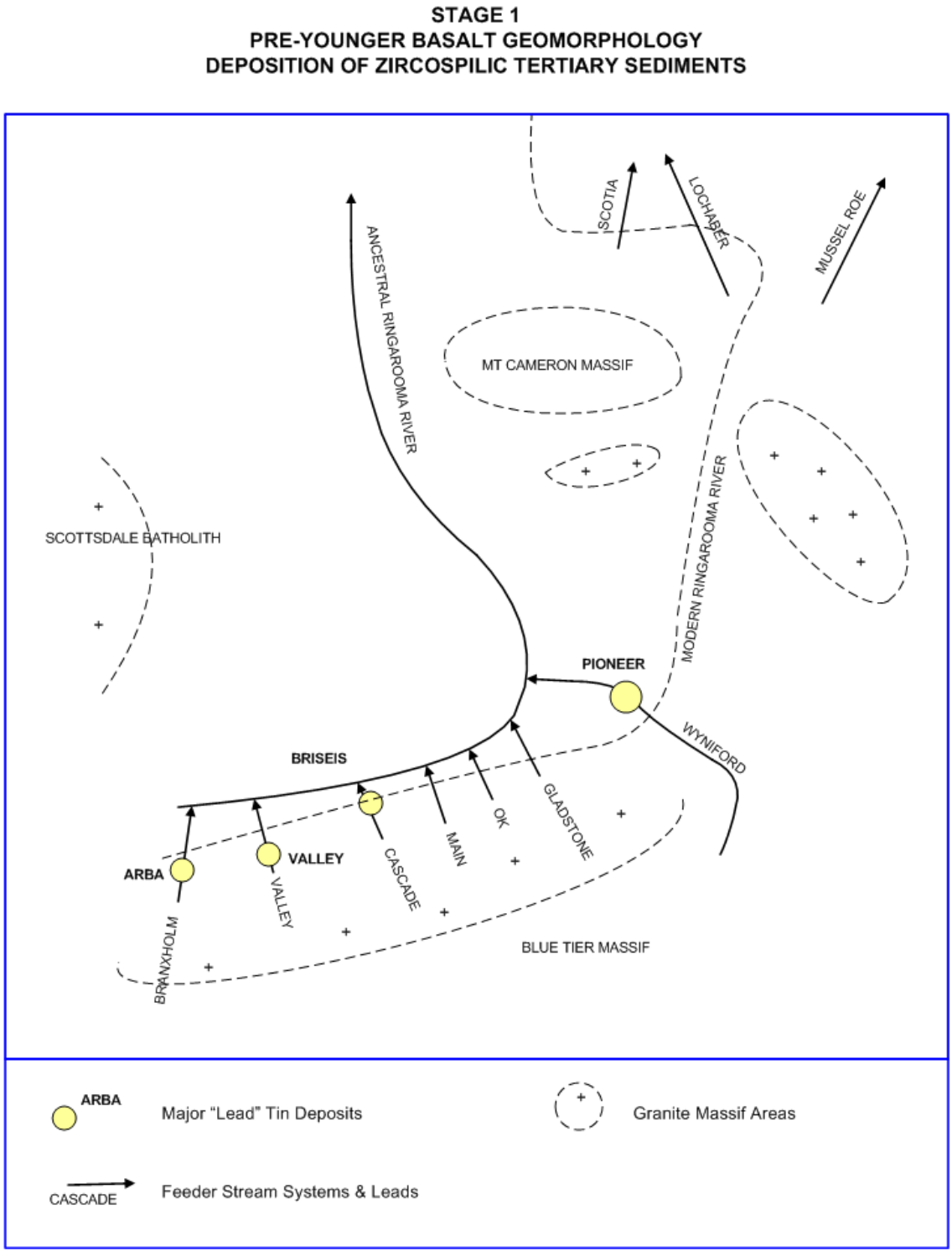


FIGURE 4 – GEOLOGICAL HISTORY - STAGE 1

The Late Jurassic saw a period of uplift accompanied by the intrusion of extensive dolerite sheets followed by widespread and intense erosion. Deep weathering during this period further assisted in liberation of heavy minerals from the granitic hosts.

The Middle Eocene period saw the commencement of volcanic activity along the Blue Tier with the extrusion over a wide area of the Older Basaltic flows. It is likely that these were emplaced along stream systems incised into the pre-Eocene granitic land surface.

Subsequent or contemporaneous uplift and a humid tropical climatic regimen resulted in rapid erosion of the basalts resulting in the introduction of a zircospilic suite of heavy minerals (sapphire and zircon) into the basal sediments of the deep lead deposits. Cassiterite rich pre-Eocene leads may still exist beneath the remnants of these flows.

Pre-Middle Eocene alluvial deposits were mixed and reworked with these younger, basalt derived sediments giving rise to extensive flood plain alluvial deposits 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 been the dominant erosional and alluvial depositional period.

The Middle Miocene saw a second period of basaltic volcanism with extensive lava flows down many of the larger valleys in the region. These caused the diversion of the generally north west flowing streams of the Blue Tier; Black Creek, Cascade River, Main Creek, Weld River and the Wyniford River and the capture of those streams by the Ringarooma River. The capture of those streams created a broad shallow lake in the Mount Cameron Basin (south of the present mountain, the Dorset Flats). The Endurance deposit is considered to represent the northern expression of the ancestral Ringarooma River where it became entrenched immediately adjacent to the Mt Cameron massif and represented the westerly shedding outlet for the “Dorset Lake”.

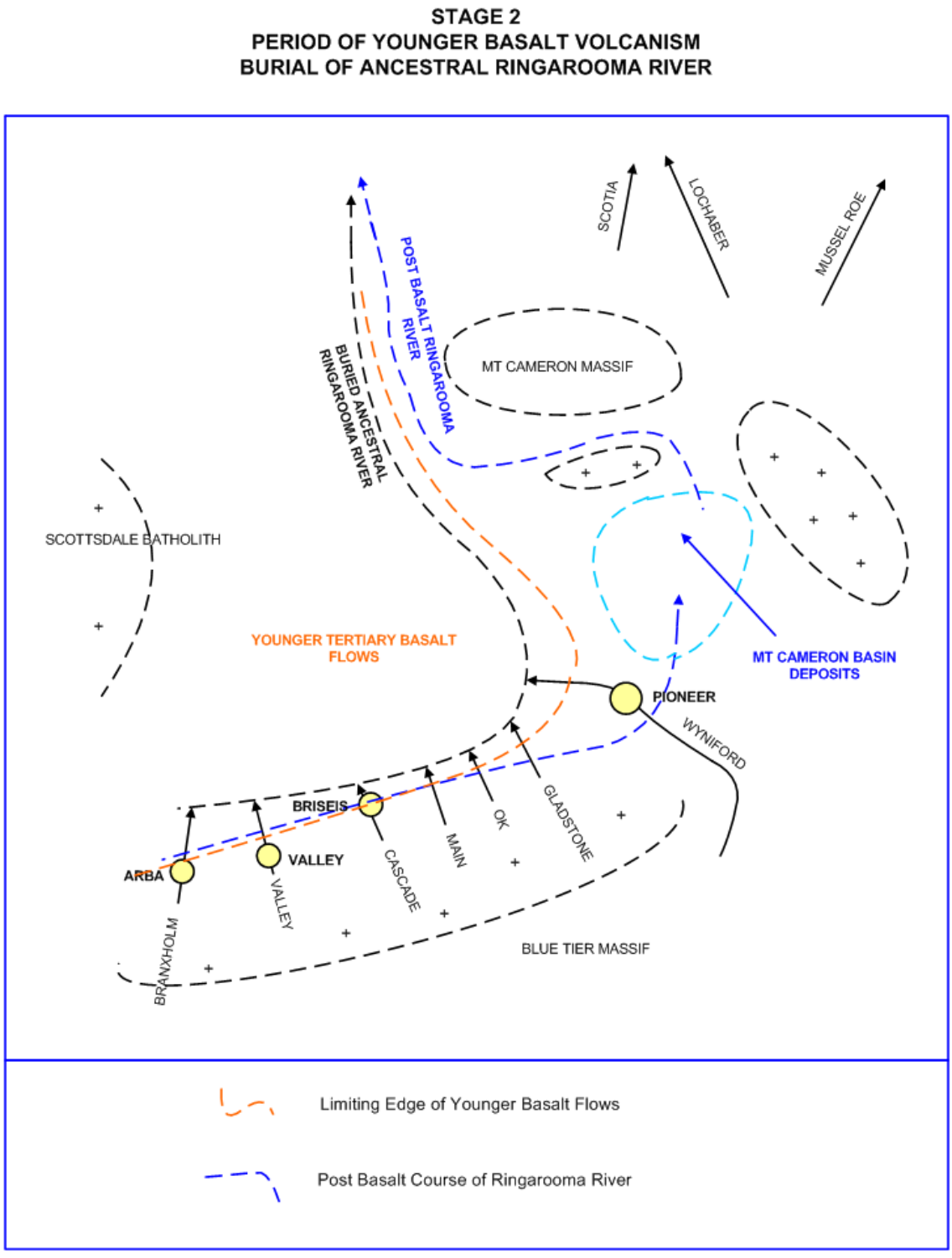


FIGURE 5 – GEOLOGICAL HISTORY – STAGE 2

Subsequently the lake and the Endurance stream system filled and the stream overflowed into the sea via Garfield Creek and the Musselroe River reversing the flow of the Ringarooma to the east.

During the post Oligocene a period of uplift and/or marine regression resulted in the lateritization and silicification of much of the land surface and probably saw the 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.

Nye, 1932 reports that estuarine sediments can be recognized throughout the Scotia Project area and while the author believes this may be the case in the northern end of the area, the Scoloch Lead, the southern section takes the form of a deeply incised active terrestrial stream system.

In the Great Northern Plain deposits north of Scotia, marine concentration possibly by wave action in shallow waters or by current movement during periods of heavy terrestrial flood outflow and complicated by stream influx into an active estuarine environment are almost certainly the major controls on tin deposition. 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. It is unclear if this period saw the river add greatly to the sediment pile in the marine embayment or if the embayment was even active during this time.

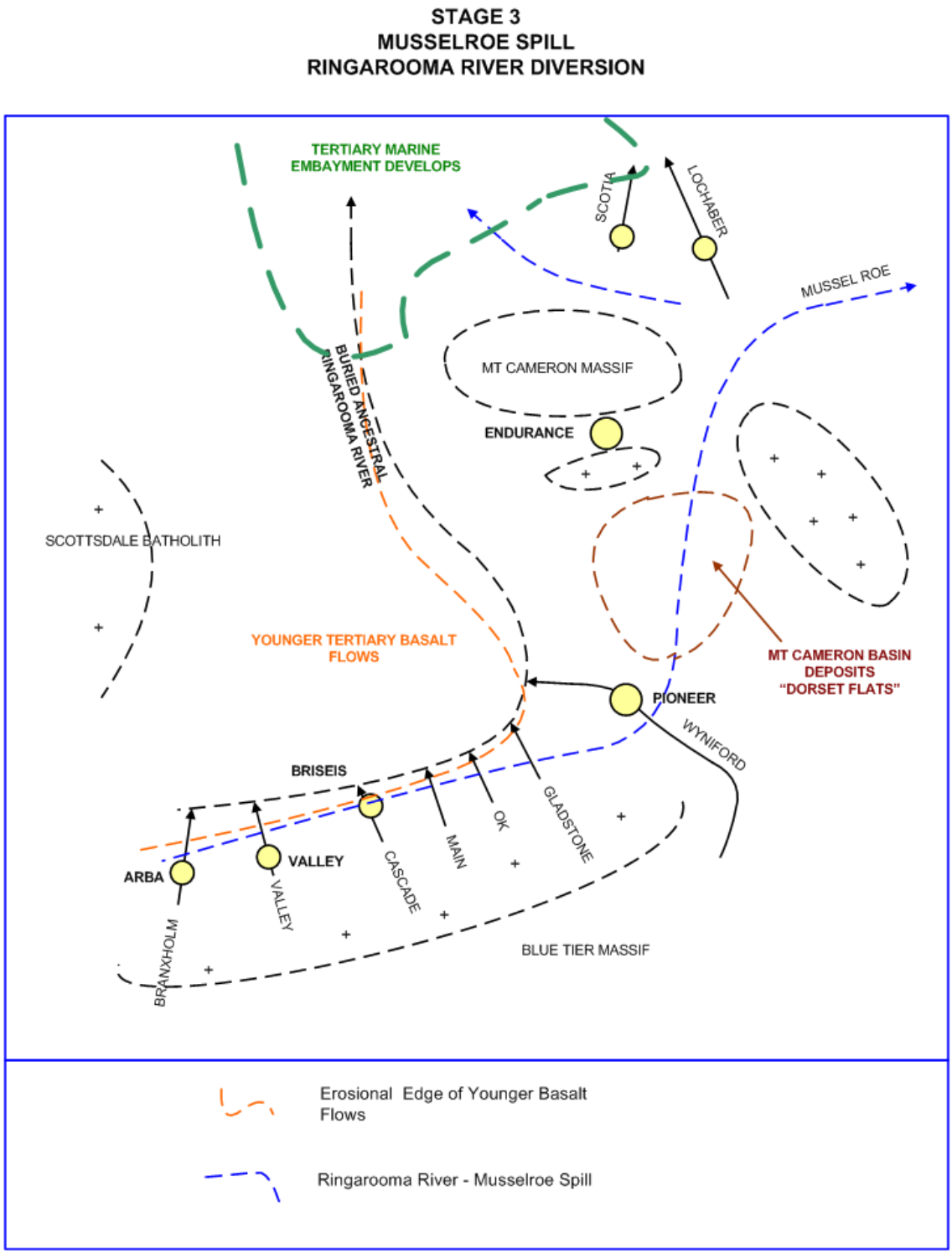


FIGURE 6 – GEOLOGICAL HISTORY – STAGE 3

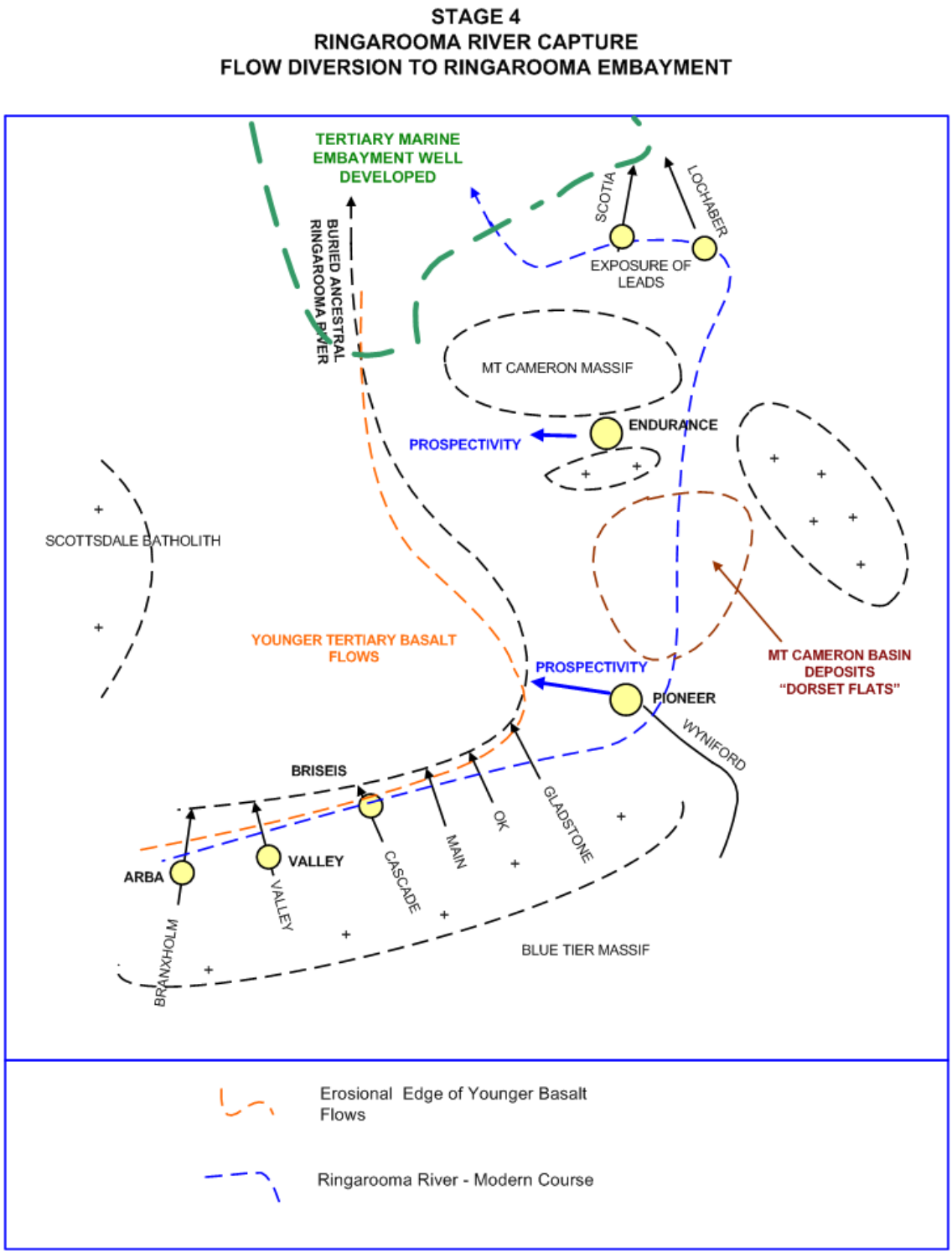


FIGURE 7 – GEOLOGICAL HISTORY – STAGE 4

The genetic history of alluvial deposition is still far from complete. Many deposits do not fit into this broad descriptive scenario and the history detailed above certainly does not apply to the southern watershed of the Blue Tier.

The southern watershed dominated by the George River appears to have an equally complex history. While the general history in terms of timing is similar, the southward shed during the Post Older basalt period saw more rapid and localized alluvial deposition. The basalt boulder beds at the base of Thureau's Lead near St Helens are almost certainly derived from the "Older" volcanic suite and it is only in this southern shed from the Blue Tier that deposition was rapid enough to preserve these boulders. Evidence for this rapid depositional environment is supported by the presence of larger cassiterite and sapphire grains, the latter often exhibiting distinct hexagonal remnant crystal shape.

6.3 MINERALOGY:

The following is provided as background information on the mineralogy of the heavy mineral suite contained within the Tertiary and Quaternary alluvial deposits of the tin project area. As a result of ongoing exploration sapphire is now treated as a major and important economic component of that suite. The mineral assemblage is described in order of abundance and / or importance, quantitative information is provided later in this report.

i CASSITERITE:

Cassiterite is widespread throughout the Tertiary and Quaternary alluvial profiles however as a rule the higher grade (economic) concentrations are restricted to the more coarse basal horizons.

The grain size, angularity and colouration are highly variable and dependent to a large extent on source rocks and proximity to source. Colour varies from black to grey, colourless, amber, yellow, brown and red. Angularity and grain size are totally dependent on proximity to source. In the Blue Tier area the cassiterite is predominantly coarse grained and usually angular to sub-rounded being locally derived from quartz, quartz pegmatite veins and greisen deposits. At Ruby Flat near Branxholm very coarse crystalline cassiterite was recovered during a recent site visit along with coarse angular zircon, sapphire and spinel. Exceptions do occur. At Dry Gut, Monarch and Taylors Workings, all deposits lying on the northern side of the Mt Cameron Massif and where fine grained tin is the norm, there are local concentrations of coarse angular cassiterite often occurring as particles locked on quartz. A very local source is indicated.

Grades within the alluvial deposits are highly variable and are again dependent on the proximity to source and the degree of maturity of the deposit. There must be a differentiation between economic and sub-economic grades and such differentiation is usually related to depth of the deposit, depth of barren overburden and mining methodology.

Grades vary from lows of 50 to 300 gm / m^3 in the upper more fine grained alluvials to high grades of up to 40 kg / m^3 in the basal zones of the Scotia Lead. In some deposits high grade basal enrichment appears random, in others such as Scotia, Lochaber and Briseis massive basal enrichment is the norm throughout the deposit. As a general rule the sands and clayey-sands that overly the pebble and cobble horizons contain little or no cassiterite.

Recent exploration work and data assessment studies have delineated significant economic tin bearing deep alluvial deposits. While these remain marginally economic at tin prices below US $5,000 per tonne the current increased prices and value of accessory mineral components have raised the viability to the positive side of economic.

ii SAPPHIRE (Corundum):

In the context of economics sapphire is by far the second most significant component of the heavy mineral fraction. The reason for such statement has to do not only with its widespread occurrence, but also to do with the excellent blue hues, pale to beautiful cornflower, exhibited by the gem fraction of the sapphire concentrate.

The sapphire observed in both Tertiary and Quaternary alluvials is considered to have been derived from the Older Tertiary Basalts and more specifically probably from the first explosive phases of that volcanic event, that is the tuffs, ash flows and agglomerates. While only remnants of this volcanic unit remain it is clear that it was extruded over a vast area of the elevated tablelands of the Blue Tier and possibly the Scottsdale Batholith.

It has been generally reported that Tasmanian sapphire is as a rule green in hue. It is the opinion of the author that this is certainly not the case, and that the bulk of the material is of blue hue, either milky pale blue through to dark fine clear blue of a cornflower shade. Much of the corundum also is of a bluish, grey blue to white colouration.

In all parcels inspected blue is the dominant color although some of the larger stones do exhibit a green cross table (This is a feature well recorded in other Australian sapphire deposits). The parcels inspected include corundum and about 20% gem quality sapphire, pale blue to dark cornflower, some green and rarely very fancy pink and yellow stones. The corundum is for the most part milky grey or blue grey in color. This observation may of course reflect a tendency of the fossickers (parcel owners) to retain and put aside the better blue or gemmy green stones however experience suggests that this is not the case.

In many of the parcels inspected there appears to be a small component of milky diesel like stone not unlike the Sri Lankan “Gueda” that heat treats to the finest blue. Cutting of several parcels suggest this is the case, many fine blue stones have resulted from heat treatment of this milky material.

Size and color of sapphires vary greatly throughout the area and clearly there were a number of source volcanic vents with slightly different elemental make up. For example Cascade River yields predominantly green stone, Main Creek not far away blue, the Wyniford River that sheds the Blue Tier a variety of colors including blue, fancy, yellow and rarely green.

Most material is of a small grain size, +2 mm to 5 mm and is well rounded indicating considerable and rapid transport. At other locations proximal to the source rocks sapphire retains its crystal shape, generally “dogs tooth” prisms. In the Weld River other crystal fragments indicate the original shape to be trigonal, some with etched prism faces, bipyramidal prisms and rhombohedral crystals. Large stones are not as uncommon as originally thought. Large “Dogs Teeth” crystals of fine blue color can be recovered from the St Helens alluvials, from Ruby Flay near Branxholm, from the Main Creek deposits and the Wyniford River alluvials. It should be noted that angular sapphire fragments may not be a result of attrition in the current stream system but may have been damaged during volcanism and in fact be of local derivation.

The sapphire bearing stanniferous deposits of the Weld River are probably the best known and exploited. It should be noted however that most of the sediment within that stream system is now nothing more than tin mining tailings, representative of both the stanniferous basal wash and the barren overburden that was hydrauliced away from the tin mines down the active stream system.

In the Weld and the adjoining Main Creek deposits the sapphire is predominantly blue with many fine “cornflower” colored stones being recovered. Size is highly variable from 1mm through to +7 mm fragments and very large 200 to 900 carat specimens have been recorded. In addition to blue stones these streams contain green, brown, black, red and rarely yellow gems, star sapphire is quite common particularly in Spinel and Black Creeks.

Recent reconnaissance at Ruby Flay near Branxholm has located an alluvial system containing coarse crystalline zircon, spinel, cassiterite and sapphire, clearly two distinctly different source rocks are indicated. The zircospilic suite is considered to be derived from the Older Basalts represented locally by the basalts of Grays Hill.

Sapphire recovered from the Wyniford River is usually of a fine blue color although fancy stones (pinks) and yellow stones are reported as being common. Sapphire from the Pioneer Mine (Sourced from the Wyniford Lead) is abundant in the older Tertiary stanniferous gravels but less common in the overlying Quaternary deposits. A parcel of stone recovered from the Pioneer Tin Shed yielded some excellent blue stones.

The Ringarooma River is also considered to be a significant sapphire source. Stones observed by the author vary from -1 mm to +10 mm in size, most are rounded a few angular. Hues are predominantly of fine blue but there is a larger green, parti-blue green, brown, black and star component. John Volker the ex manager of the Dorset Dredge has in his possession a small parcel of fine blue stones. This was obtained by him when the dredge was working the Dorset Flats between Pioneer and Gladstone. Volker advises that coarse and fine sapphire was regularly observed on the primary and secondary jig beds during clean-up.

He also makes the observation that heavy “ragging” of the jigs to enable high grade tin concentrate production would not have been conducive to the recovery of the much lighter sapphire and that much of the sapphire would have been washed from the bed into tailings. Abundant bright blue sapphire can be observed on the beds of the primary and secondary jigs at the current operation at Summers Mine (Dorset Flats).

Recent bulk testing of the stanniferous alluvials fringing the Great Northern Plain has recovered sapphire from on top of the jig beds and from jig underflow concentrates. Results indicate that 20% of this material is of light blue coloration and in the 1 mm to 7 mm size range. Results are considered qualitative only. Ragging of jig beds would indicate sapphire losses to tailings.

Sapphire is a common component of the tin leads of the St Helens region. A 169.9 gm parcel of stone in the possession of Michael Lloyd of Priory, near St Helens, is reported to have been derived by his father or grandfather from tin mining operations in the immediate vicinity of Priory, probably the Siam Mine. This parcel contains abundant gemmy blue stones varying in size from 2 mm to + 20 mm. The largest is a blue stone of 95.5 carats exhibiting strong growth zoning. Some of the larger stones exhibit crystal shapes indicating rapid deposition from a local source. A breakdown of the sizing of the parcel appears in Table 2.

Apart from test work by MHAPL and GTN resources, the latter group excavating eight poorly sited pits, there does not appear to have been any other attempts to quantify the sapphire content of the Tertiary and Quaternary alluvial profiles. The MHAPL work conducted at Monarch, Taylor’s, Aberfoyle and Great Northern Plains workings was primarily aimed at testing for cassiterite with sapphire, zircon, rutile, ilmenite and gold being recovered as accessory minerals. The GTN work while aimed at testing for sapphire was hindered by poor site location (a fault of the haste rather than the execution), two sites being in disturbed mined ground, two in extremely wet, bouldery ground and the balance in a previously unmapped high terrace that in part appears to have been deposited pre-sapphire.

TABLE 2

M.LLOYD COLLECTION – PRIORY AREA

ST HELENS DISTRICT, NORTH EAST TASMANIA

SIZE RANGE In mm	WEIGHT In Grams	FRACTION BY % OF WHOLE PARCEL
+20 mm	19.1	13.1%
+10 mm – 20 mm	3.3	1.9%
+6 mm – 10 mm	95.6	56.3%
+4 mm – 6 mm	38.3	22.5%
- 4 mm	13.7	8.1%
TOTALS	**169.9**	**100.0%**

iii ZIRCON:

Three types of zircon have been recognized in the alluvial deposits of the north east, specifically:

- Fine zircon grains, - 5 mm in size, commonly observed in the cassiterite concentrates at all mine location are considered to have been derived from the acid igneous intrusive rocks and to a lesser extent from both basaltic units. This material is now considered to be a significant accessory mineral and of significant economic importance.

- Two generations of coarse zircon have been observed at widespread locations in the north east. They are exclusively derived from the Tertiary basaltic units and probably the bulk is derived from the Older Basalts and associated pyroclastic rocks.

  The material varies in size from 1 mm to +10 mm. Color varies from pale almost colorless through light brown, champagne, brownish red to bright foxy red. A high proportion of the larger stone is gemmy and makes attractive facetted gems.

The larger size zircon is typically accompanied in the alluvial deposits by large pleonaste – hercynite spinel and sapphire and is considered proximal to source. Large stones often retaining crystal shape have been recovered from Ruby Flat, Branxholm where they appear to be shedding from the Older Basalt unit at Grays Hill. Similarly the upper Weld River, in particular the Spinel Creek tributary, Main and Black Creeks and the Cascade River all contain coarse angular and crystalline material of local derivation.

Further downstream in the Ringarooma River and Great Northern Plains, attrition has much reduced grain size and it is rare to see stones any larger than 2 mm. Until recently very little quantitative data in relation to zircon content of the alluvials was reported. In the 1960's Hellyer Mining conducted some zircon analysis of concentrates derived from drilling of the Great Northern Plain and in recent times bulk sampling by MHAPL reported zircon grades of between 1 to 50 gm / m^3. The nature of the treatment flowsheet used by MHAPL was not conducive to zircon recovery thus higher zircon contents would be expected if improved treatment circuitry was utilized.

iv RUTILE:

Rutile occurs in most of the alluvial deposits and reports to the cassiterite concentrates as fine reddish to black grains rarely more than 1 mm in size. The source of the rutile is considered to be the acid igneous rocks and to a lesser extent the Tertiary basalts and associated pyroclastics. Where the alluvials are exclusively derived from Mathinna Bed sediments rutile contents are very low.

Recent test work by MHAPL included analysis for TiO_2, however no effort was made to report these results as either ilmenite or rutile. Grades of TiO_2 were reported to lie between 4 and 140 gm / m^3. Test plant losses would indicate higher grades as being present.

v ILMENITE:

Ilmenite is by far the most abundant of the titanium bearing minerals occurring as fine steely grey black grains. Field observations indicate that ilmenite content far exceeds that of rutile. Much of the ilmenite is traditionally lost to tailings and no effort has ever been made to quantify content.

vi SPINEL:

Along with cassiterite, sapphire and zircon, spinel is one of the most abundant accessory heavy minerals. The bulk of the spinel is of the pleonaste – hercynite variety however there have been a number of reports of the presence of the green, gahnite species. The color is usually steely grey to black and sizes vary from small angular to rounded fragments to very large +25 mm crystal pieces. Localities such as Ruby Flat, Main Creek, Black Creek and the Upper Weld River that are proximal to the Older Basalt source rocks all contain very large and crystalline spinel.

Spinel is invariably accompanied by sapphire and zircon and thus is a valuable indicator as to the possible presence of sapphire in the alluvial profile.

vii GOLD:

Gold is a regular component of the heavy mineral suite. Traditionally gold has been recovered as a by-product of all the alluvial tin operations and the Dorset Dredge recovered sufficient gold from its operation to meet the annual cost of power supply. The ex manager, John Volker, reports that the gold grade averaged around 30 mg / m^3 and his comments appear to agree with the general reported recoveries from other operations. Gold was also recovered from the Monarch, Pioneer and Endurance Mines and grades of + 2 oz / y^3 were reported to have been recovered from the Lochaber lead north of Gladstone.

Concentrates obtained by MHAPL as part of its recent testing all contained fine gold and the deposits tested around the fringe of the Great Northern Plain all contain visible free gold.

Gold recovered by MHAPL from Taylors workings was angular and several pieces were locked on angular quartz. The gold retained by J. Volker and derived from the Dorset Flats area comprised rounded nuggety and shotty pieces of up to 5 mm in size, larger nuggets have been reported.

Few of the concentrates derived from drill holes were ever analysed for gold, Volker stated that Storeys Creek Tin who operated the dredge relied on an average historical grade of around 30 mg / m^3 rather than spending money on analysis of concentrates for Au. Grades reported in the resources section of this report err on the side of conservatism.

viii TANTALITE / COLUMBITE:

There is strong evidence now available to conclude that the heavy mineral fraction also contains one of the tantalite – columbite series minerals. All recent concentrates were analysed for Ta / Nb and all returned positive and some very high results. Ta / Nb values are reported from both the magnetic and non-magnetic fractions and are of sufficient significance to be counted as part of the economic mineral train. Tantalite content has been dealt with in more detail in reporting on the Great Northern Plain.

ix RARE EARTH OXIDES:

Tin shed tailings from Pioneer, Endurance and the Dorset Dredge are all observed to contain appreciable REO's, principally monazite – xenotime. These minerals report to the "Magnetics 2" fraction of the heavy mineral concentrate and comprise between 0.2 to 5% by weight of the concentrate.

x TOPAZ:

Gem quality topaz, some of considerable size and excellent blue colour is widespread throughout the project area. It is mentioned here out of interest only as its value as an accessory mineral is low, rather where it occurs in any quantity it causes extreme difficulty in clean-up of tin concentrates.

Size, angularity and quality are highly variable. Streams shedding from Mt Cameron (Endurance and Monarch Deposits) contain abundant fine to coarse, rounded to sub-rounded to crystalline fist size pieces of topaz and abundant fine topaz sand varying in colour from clear through to green and blue. The Wyniford River, Weld River, Main Creek, Black Creek, Ruby Flay and Cascade River all contain abundant topaz.

xi PERIDOT (Olivine):

Gemmy green olivine is abundant in the Younger Tertiary Basalts particularly in the vicinity of the Briseis Mine at Derby. Grains of bright apple green olivine have been reported from most of the alluvial deposits at Branxholm, Derby, Pioneer and minor amounts in the Weld River.

xii OTHER GEMS:

Other gem mineral reported to occur in the project area include the gem quartz species, gem quality chrysoberyl, garnet, beryl and tourmaline. Gem quartz, beryl and tourmaline are all probably derived from quartz and quartz – pegmatite veins and the chrysoberyl from the Older Tertiary basalts. The origin of the garnet is uncertain but it may be related to zones of contact metamorphism in the Mathinna Beds.

7.0 EXPLORATION:

While a vast amount of exploration has been undertaken in the region since the discovery of tin in the late 1800's the gem component is only rarely mentioned. It was not until 1999 that interest was shown in the possible contribution of gem quality sapphire to the economic value of the heavy mineral fraction of the alluvial deposits. Recent bulk sampling by MHAPL, albeit for cassiterite, and very limited exploration by GTN Resources has highlighted the significance of accessory minerals and in particular sapphire to the economics of the alluvial deposits in the project area.

7.1 MINERAL HOLDINGS EXPLORATION PROGRAMS:

In 1999 MHAPL was granted a Special Exploration Licence (SEL 22 / 1999) specifically for gemstones (sapphire and zircon). Field reconnaissance testing coupled with a comprehensive literature search and data assessment were undertaken and as a result it MHAPL concluded that sapphire as a recoverable member of the heavy mineral fraction was economically significant.

A RECONNAISSANCE HEAVY MINERAL SAMPLING:

As a result of their research MHAPL defined a number of conceptual alluvial sapphire targets. The company then commenced a regional reconnaissance heavy mineral sampling program specifically aimed at the location, identification and quantification of the sapphire component of the alluvial deposits.

Exploration entailed the collection and hand treatment of samples of alluvium; active stream gravels, tailings, tin shed tailings and un-worked ground. As a rule the sample sizes were restricted to between10 and 30 kg each. Samples were screened to +/- 5mm. The large size fraction was hand picked, then dished and the concentrate hand picked again. The small size fraction was dished to a heavy mineral concentrate, the concentrate dried, weighed and then hand picked. Sapphires recovered were weighed. The concentrate residues were then analysed for Sn% and Au ppm. Those results appear as Appendix 13.1 with sample locations being plotted on individual map sheets.

i Weld River and Tributaries:

A total of fourteen samples were collected from the Weld River and its major tributary, Spinel Creek. All samples returned significant cassiterite values, particularly those in Spinel Creek where most samples appear to represent worked alluvial tin mine tailings (both Sn bearing gravel and overburden). Sapphire grades varied from a low of 2.7 gm / m^3 to a high of 171.3 gm / m^3. It is difficult to determine how representative these results may be as they probably represent reworked tin mine tails rather than un-worked ground. Sample 63, taken near Moorina returned a grade of 12.2 gm / m^3 and was taken from un-worked ground, the sample also contained free gold.

Sapphire was generally of blue hues however there was a considerable quantity of black and brown star sapphire particularly from the Spinel Creek samples. Stones were all angular probably because the Weld River deposits are proximal to a series of remnant outcrops of Older Tertiary Basalt. Concentrates also contained abundant coarse zircon, magnetite, spinel and ilmenite.

PHOTO 1 – UPPER WELD RIVER VALLEY
SHOWING THE BROAD UNMINED ALLUVIA TERRACES

ii Branxholm Area:

Grouped into this area are some twenty samples taken from Ruby Flay, Branxholm, Main and Black Creek, the Cascade River and a number of old tin mine tailings areas. These samples, probably because they were spread into several different drainage systems exhibited more variation in tin and sapphire content, gold was reported from two locations. Significant sapphire results were obtained from Black and Main Creeks and the stone was of larger size that in the other locations and for the most part was of blue hue, minor brown and black star sapphire was also noted.

A significant parcel of predominantly green sapphire of 5 to 10 mm size is exhibited in the Derby Museum, this is reported to be from the Cascade River. It is likely however that the stone is from the Cascade Lead (the Briseis Mine) and was recovered from sluice boxes at that operation some time prior to 1929.

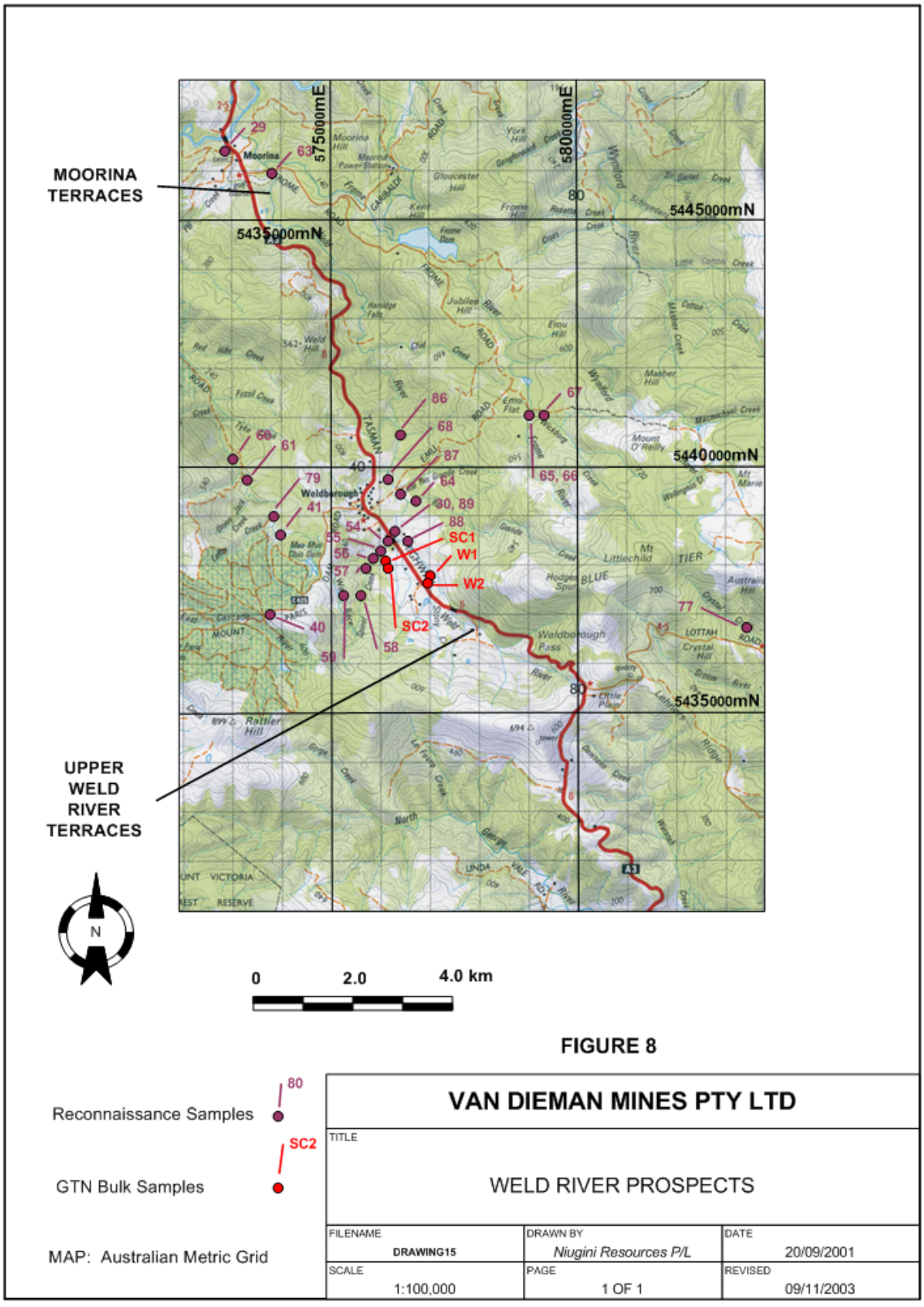


FIGURE 8 – WELD RIVER PROSPECTS

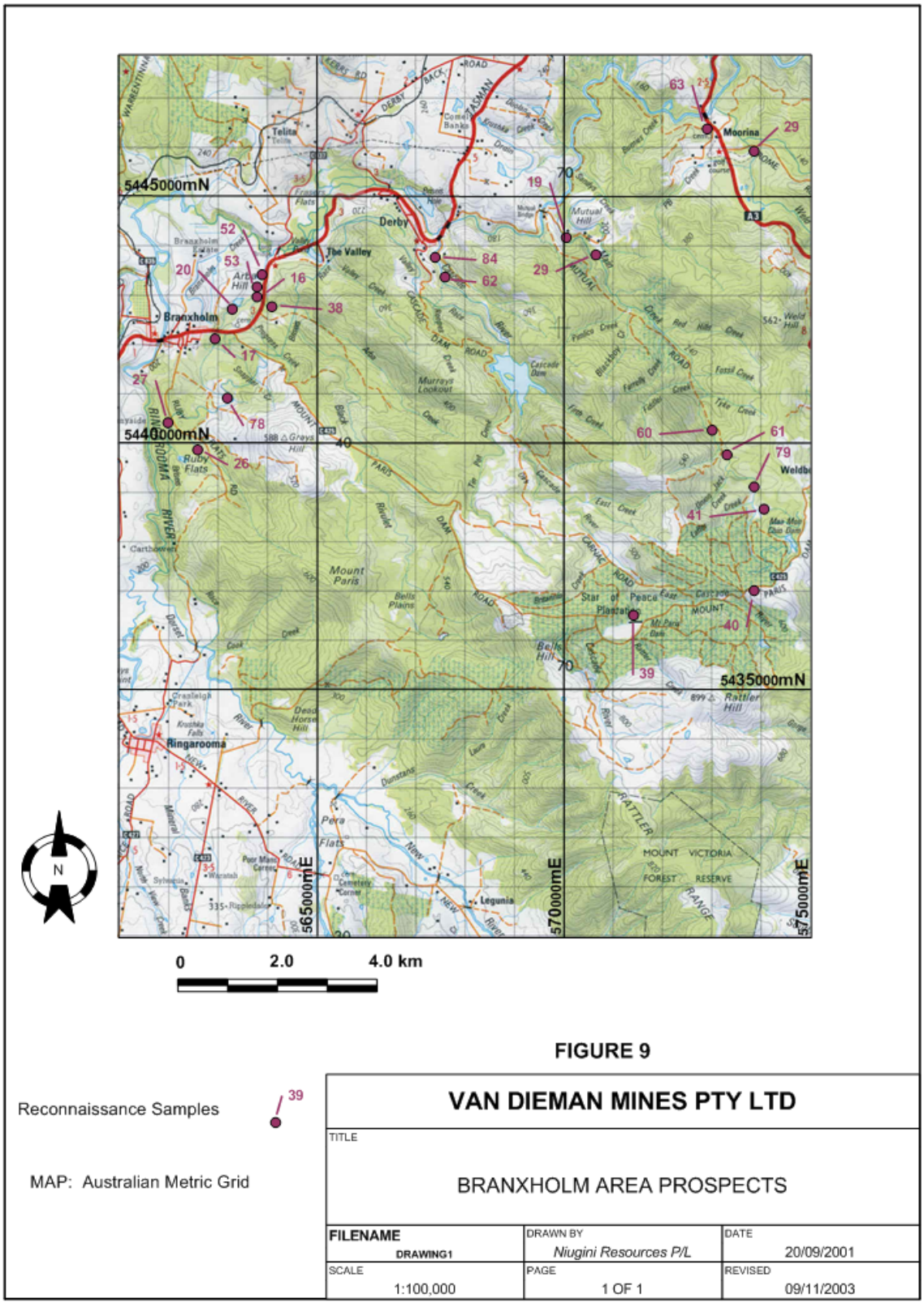


FIGURE 9 – BRANXHOLM PROSPECTS

iii Wyniford River:

Twelve samples were collected from this drainage system. Initial reconnaissance samples returned sapphire only from sites in the downstream section of the River close to its junction with the Ringarooma River. This was somewhat puzzling as historically the Wyniford had yielded large fine blue sapphire particularly in the area around Salter and Woods Mines. Recent re-sampling has in fact confirmed that sapphire of blue, yellow, green and parti–colour hues is a significant constituent of the tin bearing alluvials of the mid to upper reaches of the Wyniford system.

Samples taken from the western watershed, the Frome and Rio Grande Rivers, yielded poor results and while the initial thought was that the source basalts lay at the head of the Wyniford on the Blue Tier and not on the western fall careful re-sampling as was conducted at Wyniford may well establish the presence of sapphire in these stream as well.

iv Great Northern Plains:

Traditionally this is the area described as lying north and east of the Ringarooma River and north of Gladstone and encompasses extensive old workings along the northern bank of the Ringarooma River. Reconnaissance results were highly variable and reflect the overall lower heavy mineral contents of these distal alluvial deposits. There were however some significant sapphire grades returned from the Aberfoyle and Delta workings. The highest sapphire grade of 91.5 gm / m^3 reported from the Aberfoyle workings is significant in that it was obtained from a remnant of un-worked basal alluvium. Gold is a common component in all the basal gravels in this area, visible gold was observed in all samples from Taylors workings.

It is important to note that in the deposits that fringe to “Plains” the heavy mineral is patchy. These erratic grades may reflect sample site selection, that is only some sites are accessible and these are not always representative of the alluvial profile or, they may reflect local concentration effects around basement highs or through marine shoreline wave action or localised stream re-working.

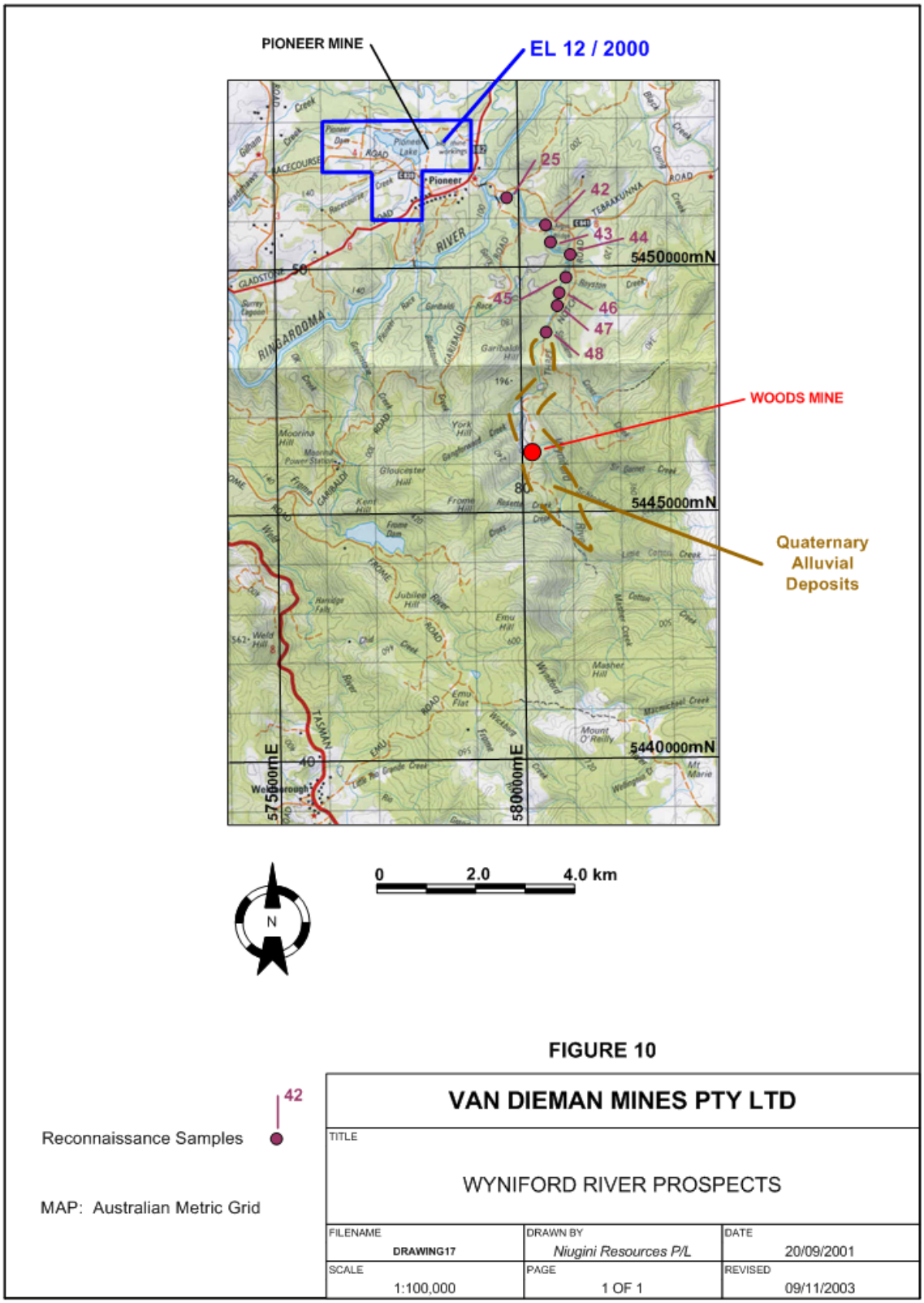


FIGURE 10

FIGURE 10 – WYNIFORD RIVER PROSPECTS

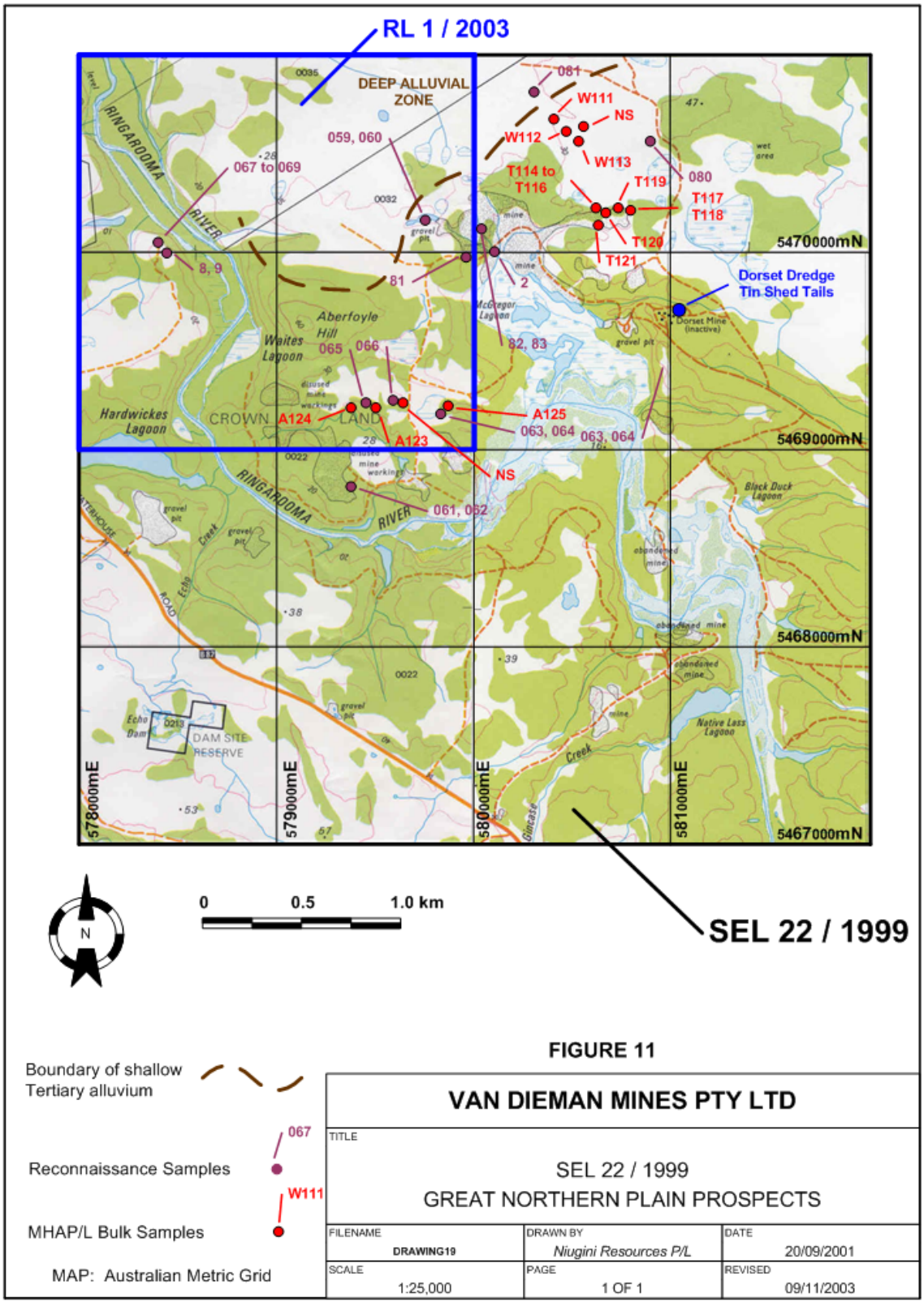


FIGURE 11

VAN DIEMAN MINES PTY LTD		
TITLE: SEL 22 / 1999 GREAT NORTHERN PLAIN PROSPECTS		
FILENAME: DRAWING19	DRAWN BY: Niugini Resources P/L	DATE: 20/09/2001
SCALE: 1:25,000	PAGE: 1 OF 1	REVISED: 09/11/2003

FIGURE 11 - GREAT NORTHERN PLAINS PROSPECTS

PHOTO 2 ABERFOYLE TESTING

PHOTO 3 - TAYLORS TESTING

v Mt Cameron Mines:

Reconnaissance involved the collection of samples from old workings and from stream systems proximal to the Mt Cameron Massif. Most of these workings are not considered to be representative of the general Tertiary and Quaternary alluvials as they derive much of their mineral load locally from the Mt Cameron granites. Minor sapphire was reported from the Monarch and at several other locations on the northern flank of the massif. This region is isolated from the direct shed from the Older Basalts and sapphire in this region is considered to be derived from re-working of the Tertiary alluvials.

Sapphire was recovered from old jig ragging at the Endurance Mine and from Endurance Mine tin shed tailings and thus sapphire is considered to be a significant component of the heavy mineral fraction at that Mine.

vi Dorset Flats Area:

This suite of samples encompasses Tertiary alluvial deposits and mine sites on both the east and west banks of the Ringarooma River. While tin results were high as was expected sapphire results were poor and are considered to be typical of sampling carried out in old tailings and mined areas.

At Summers Mine, the unmined wash returned values averaging 13.5 gm / m^3, a significant result when the same samples also yielded 1.83 kg / m^3 of cassiterite and 125 mg / m^3 of gold. Further the sapphire samples contained 32% of blue gem, 36% star and the balance brown sapphire and corundum. A recent dished sample from the wash face at the mine yielded two dark grey sapphire each of 0.4 carats in weight.

Abundant blue sapphire can be observed on top of the primary and secondary jig beds and in the tailings being discharged from the plant. The observed abundance of sapphire supports a primary grade of well in excess of 2 gm / m^3. Summers heavily rags his jigs, his final tin concentrates consistently averaging in excess of 76% Sn. Such practice is not conducive to sapphire recovery.

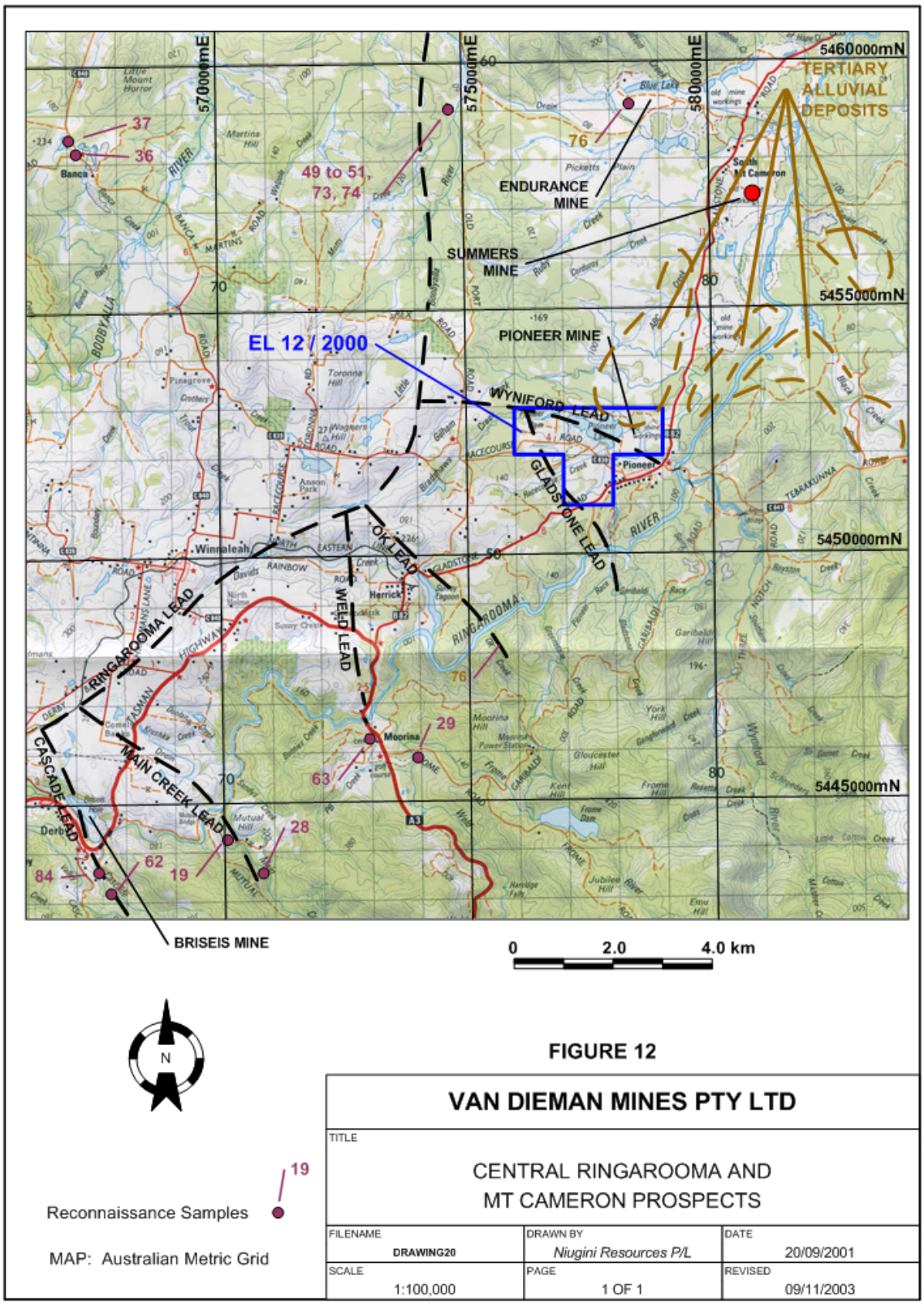


FIGURE 12 – CENTRAL RINGAROOMA AND MT CAMERON PROSPECTS

vii St Helens Area:

This area is on the southern drainage of the Blue Tier in the George River system. Extensive Tertiary alluvial deposits occur along the southern side of the George River and across the Tasman Highway to the south. Smaller deposits occur around Priory on the north bank of the river.

The highest sapphire grades were reported from several north bank tributaries just west of Priory. It is thought that this is the general area from which the Michael Lloyd collection was sourced, a fact supported by the coarse nature of the stone recovered.

An inspection of the general Priory area indicates that some recent (Quaternary) sapphire rich tin deposits appear to be developed as a result of erosion and re-working of the older elevated Tertiary alluvials that originally blanketed the area. Remnants of these older gravels can be seen at “Maddens Leap” on the west bank of the river and at Chapple’s and Reid’s properties between St Helens and Priory.

Mines Departmental drilling of Thureau’s Lead immediately adjacent to the Tasman Highway indicates a quite complex alluvial profile that appears to reflect rapid and high energy alluvial deposition. The sequence commences with a tin deficient and possible sapphire rich basal horizon of basalt boulder beds, probably the Older Basalts. The depositional cycle was completed with the deposition of tin bearing granitic derived sediments. There is evidence to suggest that many of the tin workings were completed on a false bottom of granite sand and granite derived clay and thus large sections of the tin / sapphire bearing sections of these Deep leads remains un-worked.

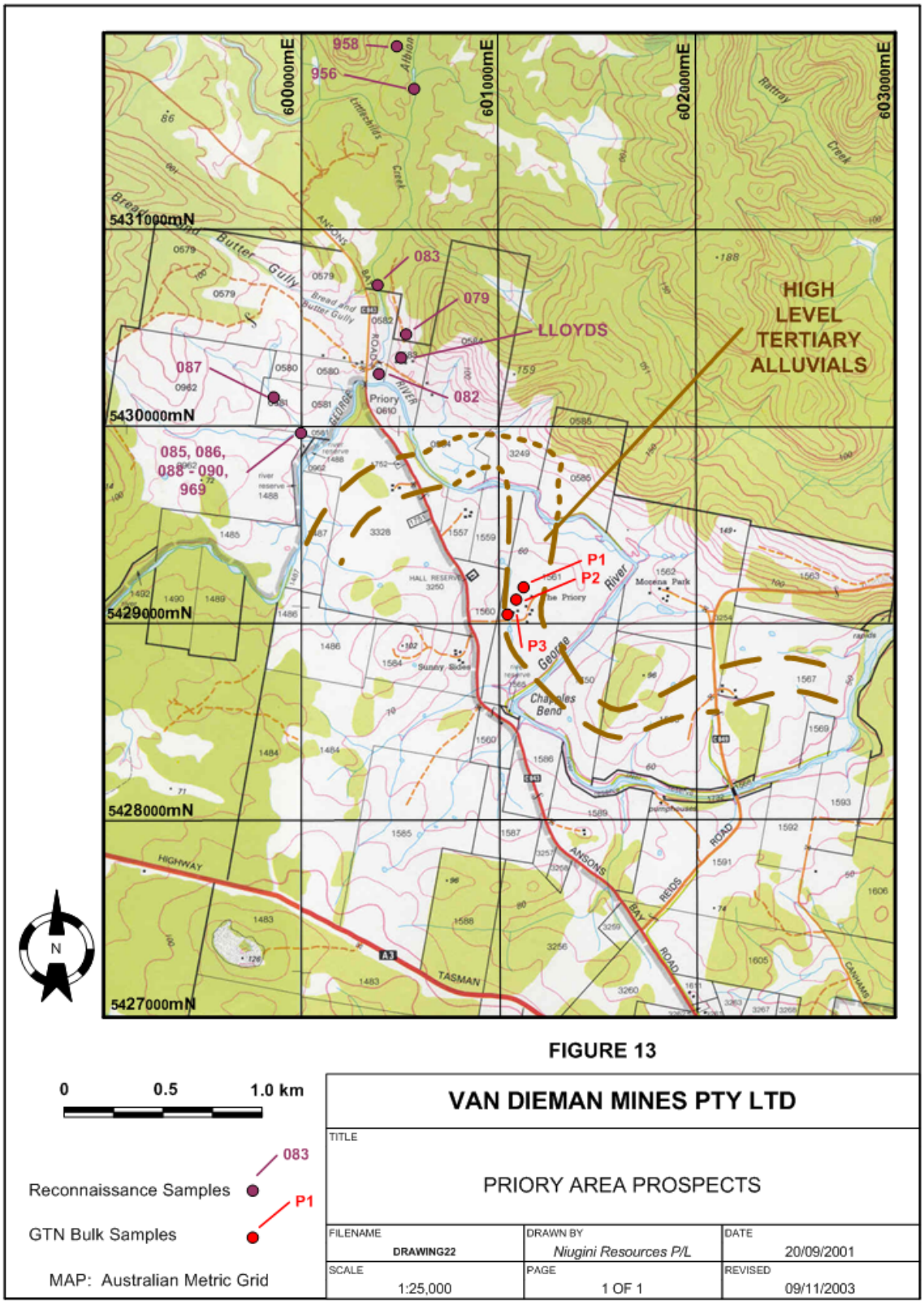


FIGURE 13

FIGURE 13 – ST HELENS PROSPECTS

viii Other Areas:

Sampling has been conducted in a number of other area within the tin project albeit on a much more limited coverage and at this time insufficient data are available on which to base conclusions as to possible sapphire content.

B PITTING AND BULK SAMPLING:

In mid 2001 MHAPL conducted pitting and bulk sampling at the Monarch Project (E.L 10 / 2000) on the north western flank of Mt Cameron and at three old mining faces on the edge of the Great Northern Plain, specifically at Aberfoyle, Taylors and Wanex. In addition GTN Resources also conducted pitting and sampling at Priory and in the Weld River. The MHAPL work was oriented toward tin analysis and the GTN work specifically for sapphire.

i Mineral Holdings Program:

MHAPL specifically targeted tin deposits at the Monarch Mine and along the southern fringe of the Great Northern Plain.

Pits were excavated, to bedrock where possible using a CAT 350 Excavator, the profile logged and a sample cut from the face in what was considered to be the heavy mineral rich basal horizon. Samples were loaded directly onto a truck and deposited to separate stockpiles. Volumes were cross checked between the actual bucket measurement and a direct measurement of the coned stockpile. In most cases a 0.006 m^3 check channel sample was hand cut from the face.

Each sample was processed through a small mobile alluvial treatment plant comprising feed bin, trommel, two-cell Dorr-Olivor type jig and sluice. See Figure 14 and Photo 4. Samples collected included:

- All of the material from the jig bed which was screened and sapphire hand picked; and

PHOTO 4 – TREATING BULK SAMPLES AT MONARCH

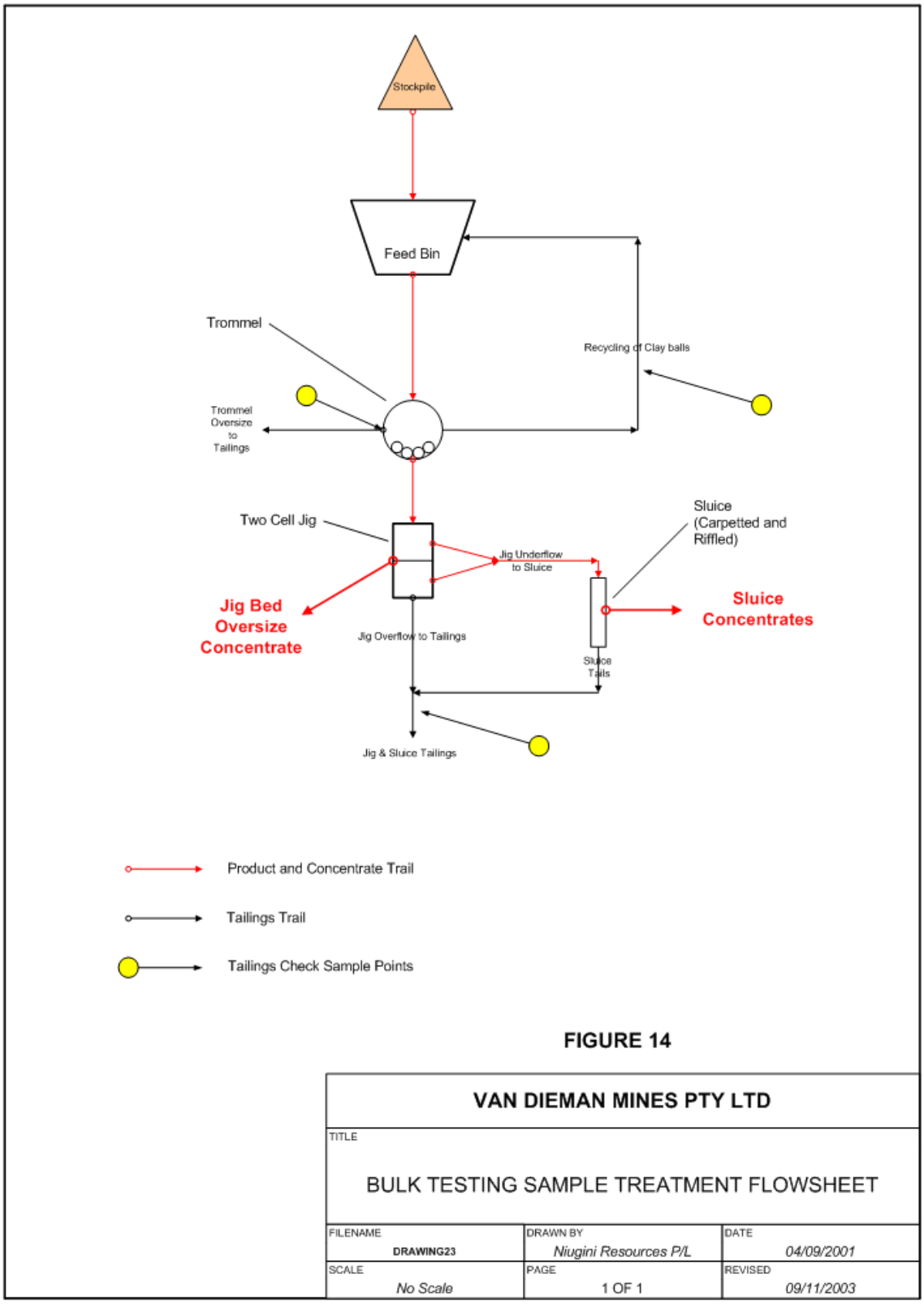


FIGURE 14 – BULK SAMPLE TREATMENT FLOWSHEET

- Jig underflow (sluice product) was collected and dished to a concentrate, sapphire was hand picked and the balance submitted for analysis. See Figure 15.

It should be noted that the jigs were ragged with steel shot and thus not well suited tom recovery of gem, zircon, rutile or ilmenite.

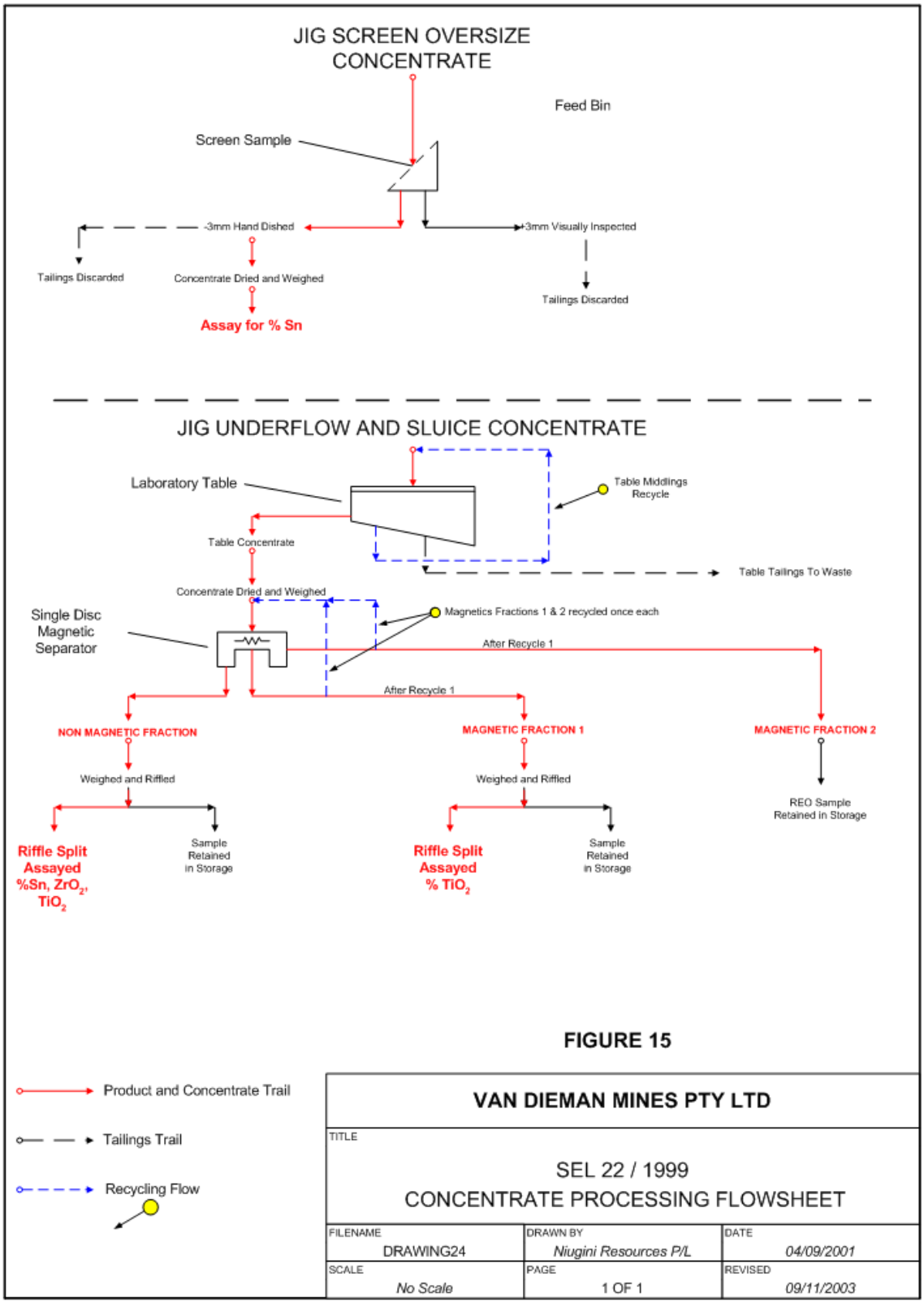


FIGURE 15

FIGURE 15 – SAMPLE TREATMENT FLOWSHEET

a. Monarch Project (E.L. 10 / 2000):

The pits were excavated in the "B" Lens section of the resource not far from previous reconnaissance sample locations. No sapphire was observed in either the jig bed or jig underflow concentrates and tin results were in line with those reported from previous drilling. Reports from individuals who worked at the mine during the 1970's were that sapphire was regularly observed on jig beds during clean-up, stones of +10 mm being collected. The consensus of opinion was that heavy ragging of the production jigs aimed at securing very high Sn values in the concentrate would have resulted in heavy sapphire loss to tails. This also applies to the MHAPL work.

b. Wanex Prospect (S.E.L 22 / 1999):

Four pits were excavated at this prospect in an area previously drill by Wanex. Sites were selected so as to coincide with old drill locations where high cassiterite grades had been reported. Several holes failed to reach basement (+7 metres) and in fact did not intersect the profile described in drilling. Thick zones of bouldery dolerite were intersected in three of the pit. Pit W113 intersected a sandy Tertiary alluvial horizon that yielded 24 sapphires, the largest a 7 mm fine blue stone. This result is significant in that the site is distal from source rocks.

c. Taylors Prospect (E.L 38 / 1997 now R.L 1 / 2003):

These old worked areas lie just west of the abandoned Dorset Dredge Tin Shed site at the edge of the Great Northern Plain. The workings expose up to 8 metres of Tertiary alluvium consisting of sands, gravely sands, sandy clays and a basal gravely granite based sand resting on weathered granite. There is some evidence to suggest at least part of the deposit has been reworked by marine wave action. Coalified wood and pyrite are common.

Without exception all samples yielded sapphire and while predominantly in the smaller size ranges most exhibited distinct blue coloration, one ruby was reported in sample T119.

Gold was commonly observed in dished check samples and 0.0065 gm of fine gold was recovered from sample T117. There is strong evidence to suggest that there is a proximal source for some of the cassiterite in this deposit. Alluvial clasts were sub-angular and coarse cassiterite locked on quartz and angular coarse cassiterite was recorded from some samples.

d. Aberfoyle Prospect (E.L 38 / 1997 now R.L 1 / 2003):

Four pits were excavated at Aberfoyle East Workings, three on the western side of the access track at the old "Shell Face", an area from which marine shell fossils have been recorded, the fourth sample from the western side of the track in an area of shallow basement. Only three of the pits were samples, all yielded cassiterite, sapphire, zircon, rutile and ilmenite, no gold was observed.

Pit ABE4, sample A125 yielded 4.9 grams of sapphire (3.3 gm / m3), predominantly blue in colour in 2 mm to 3 mm size ranges, sample A122 and 124 yielded sapphire in the 2 mm size ranges.

7.2 GTN EXPLORATION DATA:

In July 2001 GTN resources conducted a short pitting and sampling program in the St Helens and Weld River areas. The program was hindered by a limited budget and recent wet weather.

a. Priory Area (S.E.L 22 / 1999):

Initially GTN sited holes close to old worked areas on the western side of the George River. Access to these sites was subsequently denied and new locations were selected on the Chapple and Reid properties south of Priory. Wet ground conditions restricted access to those sites and a further set of sites were located on what was thought to be a residual remnant of Tertiary alluvium near the Chapple house.

The three pits were excavated at this location delineated a northward deepening sequence of reddish brown sandy clays grading downward into gravely and bouldery alluvials containing clasts of Mathinna Bed metasediments. Pit P3 encountered a surface sandy gravel horizon containing granite based clasts, visible black spinel, cassiterite and sapphire. Unfortunately the three samples were combined into one large sample for treatment, Sample P1, and while 0.12 grams of sapphire were recovered it was impossible to determine if that gem material was derived from the Mathinna or the granite based alluvium. The latter is thought to be the case.

It now appears likely that two pits were located in older gravels derived from an area that was originally devoid of sapphire bearing basalt. The younger (overlying) granite based alluvium was clearly derived from the Blue Tier region and sourced some of its material from the Older Basalts.

b. Weld River Area (S.E.L 22 / 1999):

Two pits were excavated in the west bank of the Weld River above the confluence of Spinel Creek. The first pit failed to reach basement, encountering extreme ground water inflow in bouldery ground just below topsoil. The second pit although wet, did reach basement, and what was considered to be a representative sample was collected.

The first pit did not yield any sapphire and only a little cassiterite, the second contained 0.51 grams of sapphire, gem zircon, spinel and cassiterite.

c. Spinel Creek Area (S.E.L 22 / 1999):

The pit sites selected were all in disturbed and worked ground and neither were considered to be representative of the Spinel Creek profile.

7.3 GEM ASSESSMENT PROGRAM:

In early 2002 MHAP/L began to actively seek parcels of sapphire in an effort to provide Coolamon Mining Pty Ltd, a Queensland sapphire miner and marketer, with feedstock for testing and assessment. A number of parcels were acquired, forwarded to Coolamon, sorted and some material dispatched for cutting. Results of this work appear in the following text.

The reasoning behind this plan was:

- Fossickers may have accumulated parcels of stone that could be purchased, such purchases would allow assessment of:
  - Range of colour specific to each area;
  - Size of stone specific to each area; and
  - New locations not delineated during exploration.
- Purchase of a quantity of stone would be a cheaper option than processing sufficient alluvium to produce a kilo or so of raw gem;
- Purchase of parcels would allow a valuation of:
  - % gem;
  - value of and amenability to heat treatment of Tasmanian stone; and
  - quality and value of finished gem.

A ACQUISITION OF PARCELS

The following parcels of sapphire and mixed sapphire and gem were acquired by MHAP/L, specifically:

(i) Weld River Parcel # 984.

Two separate collections of sapphire were obtained by MHAP/L by hand processing of active stream deposits in the Weld River above Moorina. The collections were weighed and combined into an 89.1 gram parcel.

(ii) Ron Lawry Parcel

Local St Helens prospector / miner, Ron Lawry, kindly provided MHAP/L with a parcel of 369.4 grams of sapphire and corundum from a collection of material aggregated by him over the past twenty or so years.

(iii) Dorset Dredge Tin Shed Tailings

During mid 2001 MHAP/L collected and treated a 1 m^3 sample of tailings from the old Dorset Dredge Tin Shed site on the Great Northern Plains. A total of 350.3 grams of sapphire in the 1 mm to 5 mm size range was recovered.

(iv) Purchased Parcels

As a result of advertisements placed in local newspapers MHAP/L acquired six parcels of sapphire from local fossickers. Specifically these were:

- Parcel 1 – 67 grams from the Weld River and Main Creek;
- Parcel 2 – 82 grams from Branxholm Creek;
- Parcel 3 – 112 grams from the Weld River;
- Parcel 4 – 200 grams from the Wyniford river;
- Parcel 5 – 40 grams from the Star of Peace area; and
- Parcel 6 – 815 grams from the Pioneer Tin Shed tailings.

(v) Facetted Gem Parcel

In addition to untreated rough sapphire MHAP/L also acquired a parcel of 57 facetted sapphires all with specific north east Tasmanian locations.

B DESCRIPTION OF GEM PARCELS

While reference is made throughout this report to “sapphire” it should be noted that the bulk of all parcels was in fact non-commercial corundum, actual gem quality contents very rarely exceeded 30% by volume.

(i) Weld River Parcel #984

Proved to be very spinel rich and a residue parcel of 8 kg of spinel, zircon, topaz and cassiterite was forwarded to Independent Diamond Laboratories in Perth to determine if any sapphire remained undetected in the residues.

The parcel consisted of typical Weld River corundum. Grey, bluish-grey, brown, black and milky corundum formed the bulk of the parcel with approximately 20% gemmy sapphire in blue, clear, green and pale yellow hues.

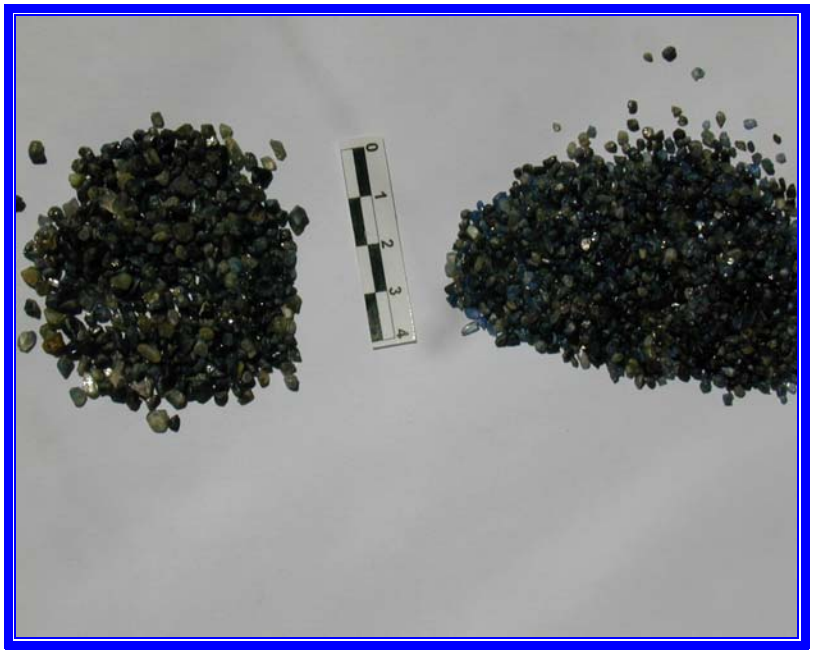
(ii) Ron Lawry Parcel

This parcel consisted primarily of grey, bluish and milky corundum. Ron advised that he had removed all of the best gem blue sapphire and larger stones thus the parcel could not be deemed “Run of Mine”.

RON LAWRY SAPPHIRE PARCEL (Part Only)

(iii) Dorset Dredge Tin Shed Tailings

No sapphire larger than 5 mm was expected to be recovered from the tailings sample. The parcel prior to sorting consisted of sapphire, abundant black pleonaste spinel, zircon, topaz, quartz and fine cassiterite. Blue was the dominant hue of the sapphire and a much larger proportion than expected proved to be gem quality.



DORSET DREDGE TIN SHED SAPPHIRE PARCEL (Part)

(iv) Purchased Parcels

- Parcel 1: A 67 gram parcel of mixed sapphire and corundum from which eight gem quality stones had been removed prior to purchase. As depicted in the photograph the parcel contained abundant milky, bluish-grey and grey corundum, some gemmy blue, clear and greenish sapphire and a number of very dark sapphires exhibiting some asterism.

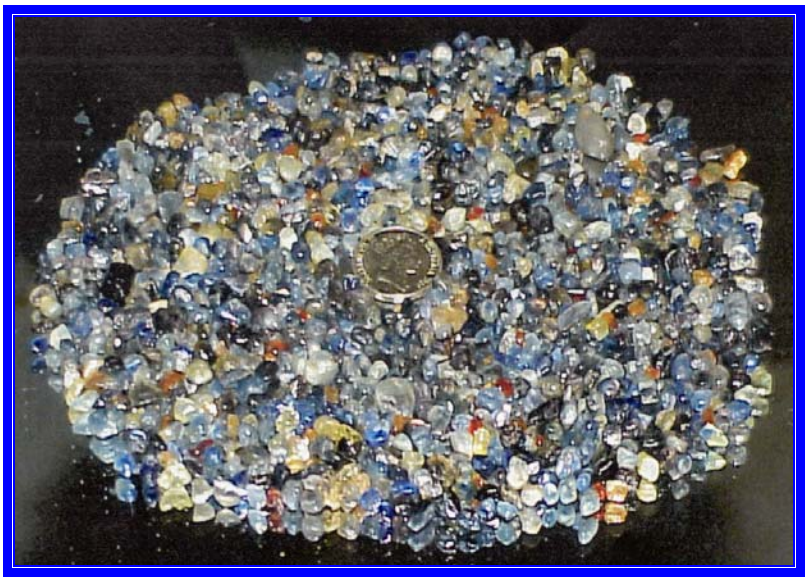
PARCEL 1 - WELD RIVER / MAIN CREEK (67 Grams)

- Parcel 2: An 82 gram parcel of quite coarse sapphire and corundum derived from Branxholm Creek near Ruby Flats. The parcel contained some unusually coloured milky stones although as the photo shows bluish hues predominate.

  Some of the dieselly stones are reminiscent of Sri Lankan “Gueda” sapphire that after heat treatment changes to brilliant blue stones. While the seller stated no stone had been removed the absence of very gemmy material was quite noticeable and the absence of this material was commented on by Coolamon.

PARCEL 2 - BRANXHOLM CREEK (82 Grams)

- Parcel 3: A 112 gram parcel of mixed gem from the Weld River near Moorina and consisting of multi-hued sapphire / corundum, reddish zircon, abundant topaz, minor quartz, minor black pleonaste spinel. The seller advised he had withheld 14 stones from the parcel, these were subsequently inspected and acquired by MHAP/L, all were excellent gemmy blue sapphire.



PARCEL 3 - WELD RIVER SAPPHIRE (112 Grams)

- Parcel 4: From 3 to 4 metre deep Recent alluvials in the Wyniford River in the vicinity of the Woods Alluvial Tine Mining operation. The 200 gram parcel consisted of mixed gem, sapphire / corundum, zircon, topaz, quartz, cassiterite and spinel.

An 80 gram fraction of topaz, zircon and quartz was handpicked from this parcel prior to shipment to Coolamon. Much of the sapphire was milky although blue and bluish-grey, none appeared suitable for cutting.

PARCEL 4 - WYNIFORD RIVER (200 Grams)

- Parcel 5: A small parcel of 40 grams sourced from small creeks in the vicinity of the Star of Peace tin workings. Principally low grade sapphire and corundum, three pieces of reasonable bluish sapphire were too fractured to be cut.

Some of the larger dark brown and black corundum pieces exhibited weak asterism.

PARCEL 5 – STAR OF PEACE (40 Grams)

- Parcel 6: A large parcel of 815 grams of sapphire recovered during the re-treatment of cassiterite rich tailings at the Pioneer Tin Shed. The parcel contained about 20% gem quality sapphire principally fine blue with a small proportion of fancy sapphire; green, yellow and clear.

  It was noted that this material represented only the fine sapphire / corundum fraction being the jig underflow and secondary jig underflow products sourced during the AMDEX operations in the mid 1970's. The seller advised that this parcel represented only a small fraction of the sapphire present in the tailings and was material easily hand picked from the tin concentrates to improve cassiterite concentrate grades.

PARCEL 6 - PIONEER TIN SHED TAILINGS (815 Grams)

(v) Facetted Gem Parcel

The parcel comprising blue, yellow, parti and fancy stones was purchased from Peter Curwen of Rosevale near Launceston, a Gemmologist who has for many years traded in specialty Tasmanian gem material.

None of this material has been enhanced (Heat Treated) and the source location for each stone has been provided to MHAP/L.

C ASSESSMENT OF GEM PARCELS

Where available, detailed size analyses of each parcel have been presented along with comments on quality, amenability to heat treatment and results of cutting as provided by Coolamon Mining.

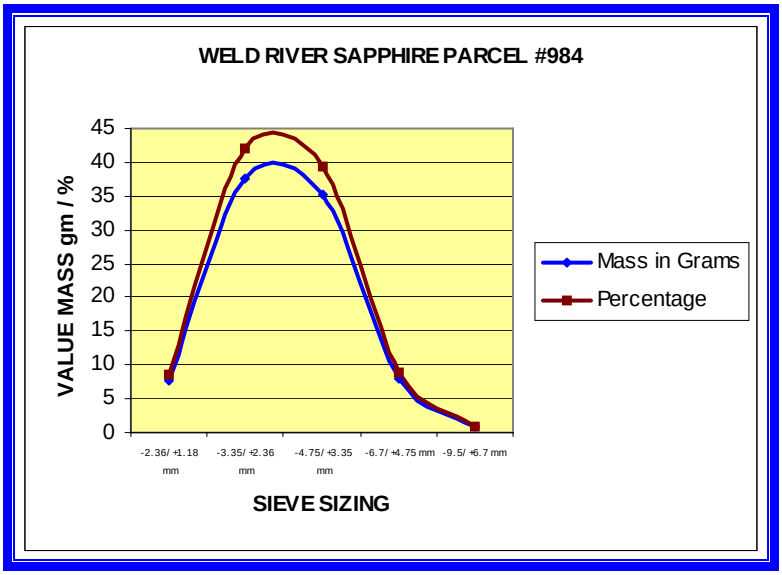
(i) Weld River Parcel #984

The two parcels collected by Lawry and Tuma were weighed separately and then combined, the parcel then screened at TEMCO in Launceston. It is difficult to assess if this can be considered as "Run of Mine" since it was recovered from recent active stream gravels in areas known to be regularly disturbed by casual fossickers.

TABLE 3

WELD RIVER PARCEL #984 - SIZE ANALYSIS

SCREEN SIZE	MASS gm	PERCENTAGE	CUMULATIVE %	COMMENT
-9.5 mm +6.7 mm	0.8	0.9	0.9	1 Sapphire Only
-6.7 mm +4.75 mm	7.9	8.9	9.8	
-4.75 mm +3.35 mm	35.2	39.5	49.3	
-3.35 mm +2.36 mm	37.5	42.1	91.4	
-2.36 mm 1.18 mm+	7.7	8.6	100.0	
TOTALS	**89.1**	**100.0**		



The interesting feature exhibited by these results is that the largest part of the parcel lies in the mid range of sizing, +2.36 mm to +4.75 mm, this was not anticipated as historically the area is reported to produce only small stone. The lack of large size fractions may reflect recovery from disturbed ground.

This material was forwarded to Coolamon who conducted the following procedures.

- The parcel was acid washed (HF for 2 hours) to remove iron staining;
- All non-sapphire was sorted from the parcel and the parcel of sapphire / corundum sorted into gem and non-gem.

As this was the first parcel viewed by Coolamon only two stones out of the gem fraction were cut, these are now in the possession of N. Thomas, MHAP/L.

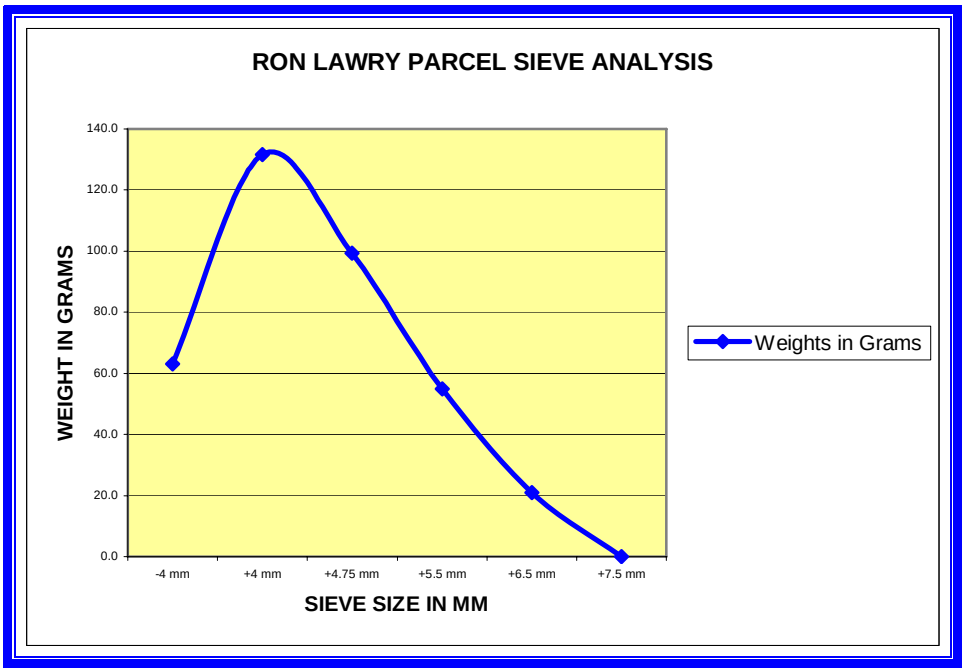
(ii) Ron Lawry Parcel

The parcel was first acid washed (HF for 2 hours) and the small amount of non –sapphire removed by hand sorting. The sample was screened prior to sorting into gem and non-gem components.

TABLE 4
RON LAWRY PARCEL – SIZE ANALYSIS

SIEVE SIZE	WEIGHT	% BY WEIGHT
+7.5 mm	0	0
+6.5 mm	20.9	5
+5.5 mm	55.0	15
+4.75 mm	99.3	27
+4.0 mm	131.7	36
-4.0 mm	63.0	17
TOTAL	**369.9**	**100**

After screening the sample was hand sorted into the various gem components, the comments of Coolamon Mining are repeated in the following text. Screening indicates a strong bias to the smaller fractions a feature considered to be caused by removal of the better and larger gem material by Lawry.



❖ Gem Component:

The better grade material was split into four fractions, specifically:

a 16.4 grams of gem quality blue was sent for heat treatment and cutting;

b 6.2 grams of 'fancy' and 'pale' coloured gem was also sent for heat treatment and cutting;

c The balance of 51.8 grams of lower quality gem blue, mostly opaque material, was split into two parcels:

26.0 grams of that material was sent for heat treatment and the balance of 25.8 grams retained as a control sample.

❖ Corundum Component

This was split into three fractions, specifically

a 25.0 grams was sent for heat treatment to determine if any low quality corundum could be improved.

b 25.0 grams of the same material was kept as a control sample.

c The balance of the parcel, 245 grams was returned to MHAP/L.

The gem quality parcels sent for heat treatment responded very well. Much of the rutile related silk was redistributed and quality, clarity and colour were all greatly enhanced.

RON LAWRY PARCEL FACETTED GEM COMPONENT

Top Left – Fancy Colours

Top Right and Bottom Row - Gem Blue

The 25 gram corundum sample also exhibited marked improvement in colour however clarity was only marginally improved and none of the parcel could be upgraded from non-gem corundum to gem sapphire.

RON LAWRY PARCEL – CORUNDUM FRACTION

Left – Heat Treated

Right – Not Heat Treated

(iii) Dorset Dredge Tin Shed Tailings

This material was not considered representative of “Run of Mine” and apart from acid washing to determine gem component the parcel was not sized or treated. Acid washing improved clarity through the removal of iron staining and did indicate a 20 to 30% blue gem component.

(iv) Purchased Parcels.

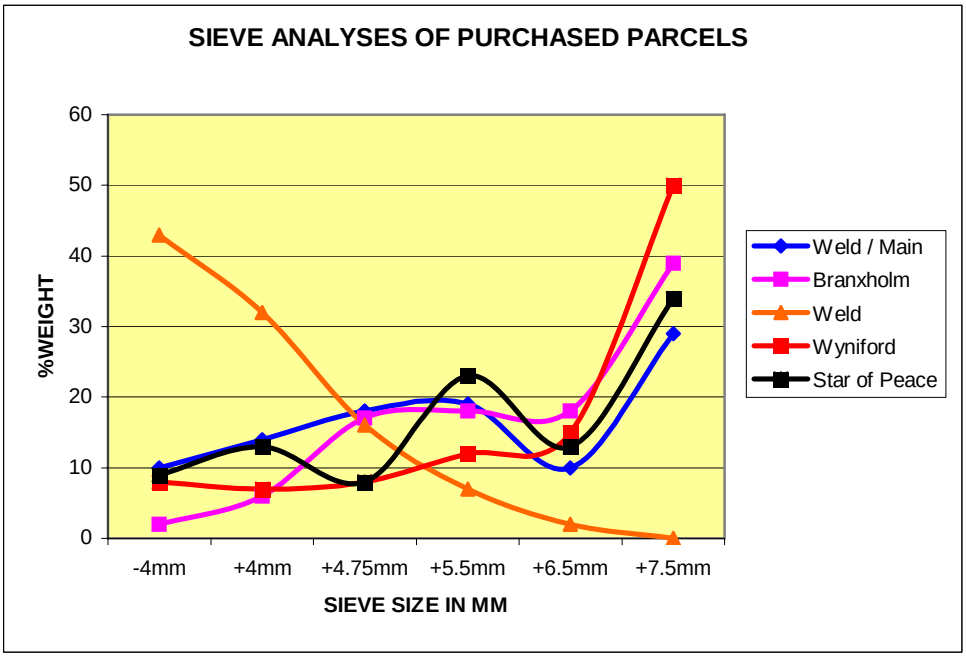
Each individual parcel, except for the Pioneer Parcel, was acid washed, dried and all non-sapphire material hand sorted. The remaining sapphire / component was sieved and then picked for gem component. The Pioneer Parcel was acid washed but because it did not represent “Run of Mine” material no screen analysis was undertaken.

TABLE 5

SIEVE ANALYSES OF PURCHASED PARCELS 1 TO 5

As % Weight Retained

PARCEL	+7.5 mm	+6.5 mm	+5.5 mm	+4.75 mm	+4.0 mm	-4.0 mm
Weld River/Main Creek	29	10	19	18	14	10
Branxholm Creek	39	18	18	17	6	2
Weld River	0	2	7	16	32	43
Wyniford River	50	15	12	8	7	8
Star of Peace	34	13	23	8	13	9

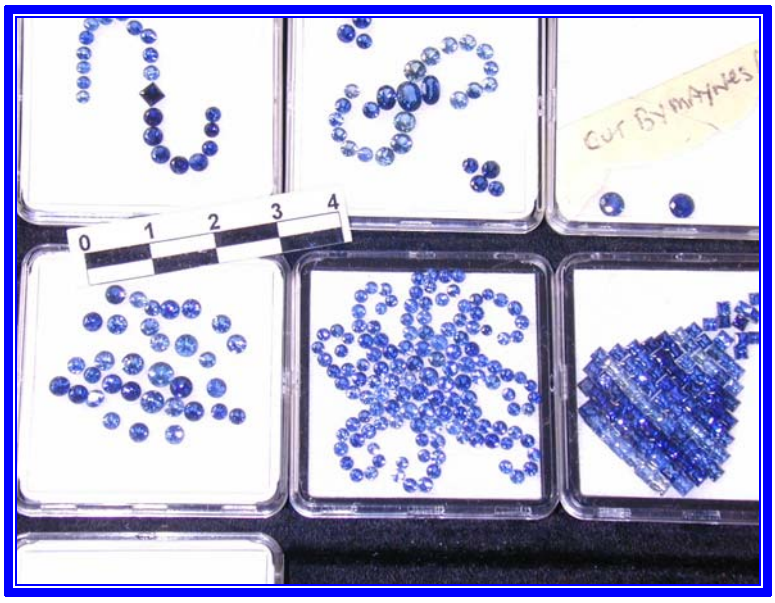


These graphed results should be compared to the Weld Parcel #984 and the Lawry Parcel. Two completely different profiles can be observed, the former two parcels have size distribution profiles that exhibit a major small size component reflecting continual handpicking of the better and larger gems. Weld Parcel in this batch reflects a similar finer size range. The other parcels even though they appear to have had some material removed appear to best reflect the size distribution that would be expected in “Run of Mine”.

In relation to the six purchased parcels Coolamon report as follows:

- Weld River / Main Creek Parcel – 17 pieces selected totaling 7 carats, not sent for cutting.
- Branxholm Creek Parcel – 1 piece appeared to have been tumbled, it was a complex grey/mauve/white colour, this was placed in the "fancy" cutting parcel.
- Weld River Parcel – 77 pieces were selected totaling 35 carats, all sent for cutting.
- Wyniford River – No cutters selected.
- Star of Peace Parcel – 3 pieces of blue sapphire selected but considered too low grade to be cut.
- Pioneer Parcel – this was s significant contributor to the cutting parcel. 1,200 pieces of gem blue were selected totaling 385 carats and a further 50 pieces of "fancy" colour totaling 23 carats selected for cutting.

All material selected for cutting was heat-treated prior to cutting to improve quality and color. Results were outstanding and the resultant gems although small exhibit excellent bright blue coloration and a marked consistency of color saturation.



PURCHASED PARCEL CUT PRODUCT
(Bottom Left Boxes)

(v) Facetted Gem Parcel

None of that sapphire has been treated in any way and was used as a quality comparison to the heat-treated material from the Purchased Parcels.

7.4 EXPLORATION TARGETS:

In defining potential exploration targets those data generated to date including historical and anecdotal information have been taken into account. Selection criteria include:

- Access - the area should be reasonably easy to explore, access preparation minimal and depth to basement within reach of dry mining machinery. Topography, vegetation cover, ground conditions and other related matters should all be favourable;
- Volume - the area should have the potential to yield sufficient volume to support a viable mining operation for at least 5 years;
- Gem Content - test work to date indicates that most of the ore grade cassiterite bearing alluvials contain sapphire at grades of around 2 gm / m^3 of which 20% is gem quality. Deposits with recognised basal cassiterite enrichment must be considered priority targets given that all indications reflect a close relationship between cassiterite and sapphire content;
- Logistics - the area must be logistically attractive, that is no major infrastructure works are require prior to mining; and
- Accessory Minerals - it is doubtful that a "Stand Alone" sapphire deposit will be located thus the value of accessory minerals such as gold, cassiterite and tantalite should be such as to assist reaching economic viability.

It is fortunate that the project area contains a number of major tin based resources that have, as a result of ongoing work, been established to also contain sapphire. Alluvial deposits proximal to the source of the sapphire are as a rule of low volume and are not considered principal targets. The larger deposits such as Pioneer, Endurance and Scotia while not as close to source have been proven to contain adequate sapphire grades, fine coloured and good size stone and thus when sapphire is considered along with cassiterite, tantalite and gold contents many of these deposits can be shown to be well above economic break even.

Specifically exploration has delineated the following exploration targets:

i Weld River Deposits:

While much of the Weld River below Spinel Creek has been mined for cassiterite two areas of some significance remain.

The area immediately upstream of the Moorina Fossicking Reserve and below the Weld Gorge contains a large area of worked, partly worked and un-worked ground containing substantial cassiterite grades and excellent sized and coloured sapphire. Above Spinel Creek none of the major Weld River terraces have been explored or mined. All have an Older Basalt provenance and must be considered highly prospective as a sapphire target. Larger stones would be expected in this region.

ii Branxholm Area:

Excellent sapphire has been recovered from Ruby Flat, Branxholm, main and Black Creek, all was of blue colouration and reasonable sizing. Large volume targets do not appear to be present as all streams are deeply incised and narrow.

The only target of any significance appears to be located in the headwaters of Main Creek where alluvium has developed in a broad basin proximal to Older Basaltic source rocks.

iii Wyniford River Area:

This is a highly prospective area. Previous pitting has defined a substantial tin resource and recent exploration indicates that the cassiterite bearing basal bouldery gravels also contain substantial gem quality sapphire in the larger size ranges. Headwater sections of this stream are proximal to Older Basalt source rocks.

iv Mt Cameron Deposits:

Two significant alluvial deposits occur on the flanks of Mt Cameron. Both contain quantified cassiterite resources and exploration indicates they also contain gem quality sapphire at economic grades. Resource reports on each of these deposits have been prepared and are subject of other reporting to Van Dieman. Both resources are open in areal extent.

v Central Ringarooma Project Areas:

Some of the most prospective exploration and mining areas occur within this region. Sapphire has been recorded from all deposits and work on a parcel from the Pioneer Mine indicates that it is gemmy and suitable for processing.

- Briseis Lead Extension:

The Briseis Lead at Derby was never completely exploited as it extends northwards below a thick veneer of Younger Tertiary Basalt. Sapphire is reported to be a major component of the heavies fraction. The extensions of this lead particularly in the area downstream of Pioneer offer excellent large volume targets.

- Pioneer Mine:

This deposit was last worked in the 1970's. The area is well drilled and a substantial resource open in areal extent has been delineated. Sapphire is reported to be a major component of the heavies fraction.

- Dorset Flats:

This was the site of the original Dorset Dredge workings, some ground remains untested west of the road and large volumes of cassiterite and sapphire bearing alluvium occur to the east of the Ringarooma River at Chung Creek.

vi Scotia Resource:

This major tin bearing resource is located between the Ringarooma River and the Great Northern Plain. The deposit is noted for its consistent basal enrichment and is expected to yield sapphire grades well in excess of the 2 gm / m^3 quoted in the resource statement.

vii Great Northern Plains Region:

Three cassiterite / sapphire bearing deposits are recognised, specifically:

- ❖ Onshore Large Volume – Low Grade Deposits:

These deposits are now encompassed by a series of Retention Licences that cover substantial cassiterite based terrestrial and marine sediments. Recent test work has established the presence of sapphire in the deposits peripheral to the major resource area and sapphire is postulated to be a significant component of that larger resource.

- ❖ Offshore Palaeo-Lead Deposits:

These deposits believed to contain some 200 million m^3 of cassiterite bearing alluvium are encompassed by Retention and Commonwealth Licences. While fine grained sapphire has been reported it is uncertain if economic size stone occurs in this resource.

- ❖ Plains Marginal Deposits – Mid-Grade:

These deposits occur in the area between the Ringarooma River and the Great Northern Plains. Most of the targets have been worked in part but substantial volumes of cassiterite / sapphire bearing alluvium remains. Recent work established sapphire in the 2mm to 7 mm size range with 20% being of good blue colour. Many of the areas were not worked to basement thus the full depth and areal extent remains to be tested.

Targets include the Delta, Aberfoyle, McGregors, Taylors, Wanex and Canary Mines areas.

viii St Helens Deposits:

Two target types occur in the St Helens area, specifically:

- Older High-Level Tertiary Alluvial Deposits:

These include the famous Thureau's Lead, the Royal Ruby and Siam Mines. Departmental drilling indicates a very thick alluvial sequence, in places over 30 metres. Drilling also indicates that the basal horizons contain basalt boulder based sediments, and if, as has been assumed, these are Older Basalts then these areas could contain substantial sapphire reserves. The full extent of these deposits is yet to be defined, the discovery of older gravels at Chapple's and Reid's farms near Priory indicate the deposits to be more widespread and genetically complex than previously thought.

- Quaternary and Recent Gravel Deposits:

These deposits are as a rule derived by erosion and re-working of the older perched deposits. Many are proximal to remnant areas of Older basalt and the large terraces situated along the George River ay Pyengana offer excellent targets.

8.0 RESOURCES:

This report is not intended to provide detailed descriptions of the resource base of the tin project however the quantified resource where known are summarised as follows and sapphire grades highlighted in bold, specifically:

8.1 MONARCH PROJECT:

Proven Ore Reserve – A, B & E Lens

(At 200 gm / BCM grade cut-off)

556,751 bank cubic metres (BCM) at an average grade of
1.220 kg/BCM of 70% Sn concentrate
(679 tonnes of 70% Sn concentrate)

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
19 grams / BCM of Zircon as ZrO_2.
48 grams / BCM of Rutile and Ilmenite as TiO_2

Probable Ore Reserve – D Lens

(At 100 gm / BCM grade cut-off)

59,100 bank cubic metres (BCM) at an average grade of
139 grams / BCM of 70% Sn concentrate
(8.2 tonnes of 70% Sn concentrate)

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
19 grams/BCM of Zircon as ZrO_2.
48 grams / BCM of Rutile and Ilmenite as TiO_2

8.2 SCOTIA PROJECT:

Probable Ore Reserve –

(100 gm / BCM cut-off)

5,334,338 BCM containing an average grade of
1,300.00 gm / BCM of SnO_2 at 70% Sn
(6,948 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
250 grams / BCM of Zircon and Rutile
0.015 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 3.0 : 1

Inferred Mineral Resource –

(100 gm / BCM cut-off)

5,336,750 BCM containing an average grade of
1,300.00 gm / BCM of SnO_2 at 70% Sn
(6,938 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
250 grams / BCM of Zircon and Rutile
0.015 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 3.0 : 1

Recent data to hand has quoted gold grades in the Lochaber Lead of 2 oz / y^3 thus estimated grades given above may be conservative.

8.3 ENDURANCE PROJECT:

Proven Ore Reserve –

(100 gm / BCM cut-off)

1,637,395 BCM containing an average grade of
983.72 gm / BCM of SnO_2 at 70% Sn
(1,611 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
200 grams / BCM of Zircon and Rutile
0.020 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 4.6 : 1

Indicated Mineral Resource –

(100 gm / BCM cut-off)

2,342,134 BCM containing an average grade of
978.72gm / BCM of SnO_2 at 70% Sn
(2,343 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
200 grams / BCM of Zircon and Rutile
0.020 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 3.6 : 1

8.4 PIONEER PROJECT:

Proven Ore Reserve –

(200 gm / BCM cut-off)

3,186,040 BCM containing an average grade of
1,164.82 gm / BCM of SnO_2 at 70% Sn
(3,711 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
200 gm / BCM of Zircon and Rutile
0.020 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 6.2 : 1

Inferred Mineral Resource –

(200 gm / BCM cut-off)

3,500,000 BCM containing an average grade of
1,000.00 gm / BCM of SnO_2 at 70% Sn
(3,500 tonnes of SnO_2 concentrate).

and an estimated
2.0 gm / BCM sapphire (20% gem quality)
200 gm / BCM of Zircon and Rutile
0.020 gm / BCM of Gold
1.50 gm / BCM of Tantalite

Stripping ratio of Overburden to Ore is quoted at 4.3 : 1

Previous sapphire assessment works indicate grades average in excess of 2.0 gm / BCM.

8.5 GREAT NORTHERN PLAINS PROJECT:

Probable Ore Reserve –

(100 gm / BCM grade cut-off)

41.8 million BCM at an average grade of

199.1 gm / BCM of 70% SnO_2 concentrate.

(8,322 tonnes of 70% SnO2 Concentrate)

and an estimated

100 gm / BCM of Zircon as ZrO_2

100 gm / BCM of Rutile as TiO_2

100 gm / BCM of Ilmenite as TiO_2

0.010 gm / BCM of Gold

1.2 gm / BCM of Tantalite

1.0 gm / BCM of Sapphire (20% gem quality)

Resource open in area and depth

8.6 WYNIFORD RIVER PROJECT:

Indicated Mineral Resource –

(No defined grade cut-off)

0.40 million BCM at an average grade of

2,000.00 gm / BCM of 70% SnO_2 concentrate.

(800 tonnes of 70% SnO2 Concentrate)

and an estimated

+3.0 g/BCM of Sapphire (30% gem quality)

300 gm / BCM of Zircon and Rutile

0.025 gm / BCM of Gold

2.0 gm / BCM of Tantalite

9.0 EXPLORATION PROGRAM:

It is difficult to prioritise exploration targets from the detail given previously in the text. Many of the tin projects have well developed drilled resources and little if any of the ore zones are exposed in surface outcrop. Exceptions to this are the Great Northern Plains and Scotia Projects where old working faces, albeit now covered by erosional detritus, are readily accessible.

The MHAPL work has reasonably defined the extent of sapphire occurrence and now exploration should be oriented to recognition of alluvial deposits within the zones defined that contain sufficient resource potential to warrant bulk testing.

Further, the MHAPL work has identified several areas within the testing procedures where major bottlenecks have delayed implementation of the works and receipt of results.

i PROGRAMS:

The understanding of the Tertiary and Quaternary alluvial systems should continue to be defined specifically with reference to sedimentation controls, location of deposits in relation to known and as yet undiscovered source rocks and the distribution of sapphire in the profile in relation to cassiterite and other heavies.

The creation of a more detailed information database is now required. All data should be accumulated to one “Gem” file and a map base created onto which data can be spatially located.

Further bulk testing work is imperative if the full value of sapphire to the various alluvial projects is to be achieved. Target sites should include:

- Scotia / Lochaber, old worked faces;
- Doones Workings, old worked faces;
- Great Northern Plains peripheral workings, old worked faces, (Taylors, McGregors, Aberfoyle, Delta and other of the smaller workings where gravels are exposed;

- ❖ Wyniford River and tributaries;
- ❖ Weld River (Upper and Moorina sections); and
- ❖ St Helens areas.

The programs should involve provision of adequate access for excavator and truck, excavation of at least 2 to 5 cubic metre samples at selected representative locations, processing of samples with the test plant set for sapphire (NOT TIN).

ii EXPLORATION PRACTICES:

a. Bulk Sampling:

Most of the areas set out above are easily accessible with minor roadwork and road clean-up. The CAT 320 excavator used in previous programs achieved digging depths of 8 metres and while larger machines will increase, fractionally, that depth they are less easily transported over the narrow road network.

The problem with large machines is that they are not overly sensitive when trying to sample to very precise depths and selected horizons particularly in wet holes. The alternative is to drill holes, this is slow and very costly by comparison and does not provide sufficient sample to overcome the nugget effect sometimes seen in sapphire test work.

Bulk sampling should be supported by the collection of smaller hand cut channel samples, where ground conditions are sufficiently safe enough to allow samplers to enter trenches.

The use of the small MHAPL test plant will enable larger samples to be processed however at the present time it must be fed by hand. The addition of a small feed bin and water nozzle, the bin large enough to be fed by a “Bobcat” type loader, will speed up sample processing and thus reduce costs.

b. **Sample Processing and Analysis:**

In past programs this area of the test work has been a major bottleneck as it requires drying of samples and subsequent hand picking of sapphire. The presence of massive amounts of heavy black spinel makes sapphire recognition difficult. While it is imperative that the samples be thoroughly tested for minerals other than sapphire the fact that the other heavies invariable report to jig underflow makes analysis relatively simple.

The proposed procedure would be:

- Collection and screening of jig bed product to +/- 2 mm, the wet screened product hand sorted and sapphire picked;
- Any heavy minerals other than sapphire be retained;
- Jig Underflow hand dished to a heavy mineral concentrate, that concentrate dried and weighed;
- Underflow concentrate magnetically separated into three fractions, Non-magnetics, Magnetics 1 and Magnetics 2.
- The Non-magnetic fraction hand picked for sapphire and all other fractions analysed for Sn, Zr, Ti, Ta, Nb and Au.

All results should be presented in tabulated form and sapphires classified by colour and quality.

10.0 CONCLUSIONS:

As a result of work to date it is concluded that:

(i) The sapphire component of both the Tertiary and Quaternary cassiterite bearing alluvials of the north east Tasmanian region is of more than a curiosity and recovery of sapphire in all size ranges has significant economic implications.

(ii) Sapphire recovered to date is amenable to heat-treatment and the resulting gem exhibits excellent clarity, brilliance and colour saturation and is of a fine cornflower blue. Other coloured gems; green, yellow, parti-blue, parti-green and fancy pink also occur.

(iii) Some of the milky blue and blue-grey corundum, non-gem material, also responds to heat –treatment and may be a significant addition to gem parcels as lower grade facetable material.

(iv) Ruby is a rare component and at this time appears to be restricted to the upper Weld River region.

(v) Most of the parcels were observed to contain accessory gem minerals, zircon, topaz and a variety of quartz gems. These were in many instances, of gem quality, and could also prove to be of some economic significance.

(vi) Bulk test work has established that the major tin resources delineated to date contain sapphire at grades of between 1 and +3 gm / BCM dependant on their position in relation to sapphire source rocks.

(vii) Of the sapphire detailed in (vi) some 20 % is considered to be of suitable grade to be cut to gems, exceptions do occur, the Wyniford stone parcels generally contains 30% gem material.

(viii) Current market prices of around US $10.00 per gram for gem quality rough blue place the in-situ value of the sapphire component of these deposits at between US $2.00 and + US $6.00 per BCM.

11.0 RECOMMENDATIONS

The exploration conducted to date has met with reasonable success but certainly suffered in that a representative "Run of Mine" sample was not obtained. In order to remedy this situation it is recommended that:

(i) A number of bulk sample sites be selected, these sites should be located so as to allow sampling of virgin alluvial gravels and those gravels should contain better than 500 gm/m^3 of cassiterite;

(ii) Selected sample sites should be capable of providing 2 to 10 m^3 samples for treatment;

(iii) The current MHAPL test plant be modified by the addition of a feed bin and water nozzle;

(iv) Samples should be treated through a small-scale conventional sapphire recovery plant comprising screen and primary and secondary jigs. The plant should be sufficiently adaptable to allow for the recovery of all other heavy minerals and in particular cassiterite, gold, tantalite, zircon, ilmenite and rutile. The gem minerals zircon, topaz, spinel and quartz can be recovered from screen oversize of from on top of jig beds.

Where high spinel contents are anticipated the plant should be sufficiently adaptable to allow regular robbing of jig bed product, jigs should not be ragged;

(v) Gem concentrates should be processed in the following manner:

- Acid washed in HF, rinsed and dried;
- Total sample weight recorded;
- The parcel sized into –4 mm, +4 mm, +4.75 mm, +5.5 mm, +6.5 mm and +7.5 mm;

- The parcel sorted into various gem fractions, “Fine Blue”, “Blue Seconds”, “Fancy” and “Blue Corundum”;
- All non sapphire / corundum gem and other heavies removed by hand sorting;
- The two fractions gem and non-gem weighed, both fractions heat treated as required;
- Gem quality stone cut and valued; and
- Results tabulated and reported as gm / m^3 of gem and an equivalent monetary value / m^3 quoted.

(v) All current data be accumulated into an electronic database and transferred to customised map sheets.

(vi) Further parcels of gem rough be acquired where possible and treated in a similar nature tho those already processed by Coolamon.

12.0 BIBLIOGRAPHY:

1. BLAKE, F. 1955
Boring on the Scotia – Lochaber Tin leads, great Northern Plain, Gladstone District.
Unpublished Report, UR1955_061_66

2. AMDEX MINING, 1981
   a. Percussion Drill Hole Logs, “SRC” Series, AP 1/80
   b. Percussion Drill Hole Logs, “AS” Series, AP 1/80

3. GIBSON, C.R. 1976
Report on the Assessment of Geology and Reserves of the Scotia Deep Lead.
Company Report, Mineral Resources Tasmania Open File, 76_1188

4. HENDERSON, Q.J.
   a. 1936
Boring at Gladstone
Unpublished Report, Mineral Resources Tasmania, UR1936_005_8

   b. 1937
Table of Tin Values, Near Scotia lead, Gladstone
Unpublished Report, Mineral Resources Tasmania, UR1937_125_133

5. LEAMAN, D.E. 1971
Summary of Geophysical Work, Gladstone Area
Technical Report, Mineral Resources Tasmania, TR20_62_76

6. MINERAL RESOURCES TASMANIA
   a. Boring on Mallinson’s Section No 7298.
   b. Drilling Records, Volume 1
   c. Drilling Records, Volume 2
   d. Drilling Records, Volume 3
   e. Drilling Records, Volume 4
   f. List of Drill Holes, Great Northern Plains and Environs.
   g. Drill Logs, “D”, “E”, and “F” Series

7. NEALE, T.I. 1980
Ore reserves of Alluvial Tin Deposits In North - East Tasmania
Amdex Mining Limited, Open File Report, Mineral Resources Tasmania

8. NYE, P.B.
a. 1925
The Sub-Basaltic Tin Deposits of the Ringarooma Valley
Geological Survey Bulletin No. 35, Tasmania, Department of Mines
b. 1932
Report on the Proposed Restoration of Syphon at Site of Old No 6 Syphon, Mt Cameron Water Race.
Unpublished Report, Mineral Resources Tasmania, UR1932A_17_44

9. RATTIGAN, J.W.
a. 1958
Report on Alluvial Boring, Ringarooma District, N.E. Tasmania, May – September, 1958, S.P.L 323.
R.T.A.E. Open File Report, Mineral Resources Tasmania.

b. 1958
Report on Bedrock Studies in Relation to Tin Prospects of the Tertiary Basins of S.P.L 323, Ringarooma District, N.E. Tasmania. 1958.
R.T.A.E. Open File Report, Mineral Resources Tasmania.

10 SCOTT, J.B.
a. 1926
Mt Cameron Water Race
Unpublished Report, Mineral Resources Tasmania, UR1926_108_117

b. 1926
Scotia Mine, North Mt Cameron
Unpublished Report, Mineral Resources Tasmania, UR1926_096_98

11 SECRETARY FOR MINES, 1981
Report on the General Geological Structure and Tin Bearing Gravels of the Gladstone District
Parliamentary Papers, Mineral Resources Tasmania, OS_86

12 STANDARD, Dr. J.C.
a. 1971
Geological Evaluation of the Scotia Tin lead, N.E. Tasmania
B.M.I. Mining Pty Ltd, Open File Report, Mineral Resources Tasmania, 71_0783

b. 1973
Results of Drilling Programme on the Scotia Tin Lead to July, 1973
B.M.I. Mining Pty Ltd, Open File Report, Mineral Resources Tasmania, 76_0884

13 YIM, W.W.S. 1991
Tin Placer Genesis in Northeastern Tasmania
In M.A.J. Williams, P. Deckker & A.P. Kershaw eds
The Cainozoic in Australia: A Re-Appraisal of the Evidence.
Special Publication No. 18, Geological Society of Australia Incorporated

13.0 APPENDICES:

13.5 MHAPL RECONNAISSANCE SAMPLE RESULTS

RECONNAISSANCE HEAVY MINERAL SAMPLING

PROJECT: Weld River **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

SAMPLE NO	SAMPLE SITE	CASSITERITE			SAPPHIRE			GOLD	
		% Sn	70% SnO_2 grams	70% SnO_2 kg/LCM	Number	Mass grams	Grade g/LCM	gm	g/LCM
	Weld River								
29	Weld River at Moorina	0.95	13512.8	20.27	7	0.3713	48.0		
63	Moorina Wash	0.15	2133.6	3.20	7	0.1588	12.15	#	
68	Weld River, Weldborough	0.06	899.0	1.35	22	0.5008	31.5		
86	1.5 k below Weldborough	0.11	1564.6	2.35	4	0.1581	13.8		
87	Below Spinel Creek	0.03	471.4	0.71	9	0.5461	35.4		
88	Above Spinel Creek	0.03	399.0	0.60	3	0.1611	10.5		
	Spinel Creek								
30	Spinel Creek	0.20	2840.0	4.26	39	1.5368	134.6		
54	Spinel Creek	0.20	2840.0	4.26	19	0.4225	41.1		
55	Spinel Creek	0.10	1397.3	2.10	20	0.6829	66.2		
56	Spinel Creek	0.05	768.2	1.15	72	2.0872	171.3		
57	Spinel Creek	0.09	1280.8	1.92	45	1.3539	99.9		
58	Spinel Creek	0.03	367.8	0.55	2	0.0266	2.7		
59	Western Tributary	0.19	2698.0	4.05	29	0.5524	43.1		
89	Just above Weld River	0.11	1562	2.34	38	1.2053	109.8		

PROJECT: Branxholm Area **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

16	Black Creek	3.2	45440.0	68.16	12	0.3920	250.5	#	
17	Branxholm Creek	1.01	14342.0	21.51					
19	Main Creek	0.07	952.8	1.43	1	0.0120	1.8	#	
20	Arba Mine Tailings	0.02	244.2	0.37	1	0.0094	1.5		
26	Ruby Flat Mine Tailings	0.02	302.5	0.45					
27	Pearce Creek	0.30	4260.0	6.39					
28	Main Creek at Derby	0.03	413.2	0.62	9	0.1537	14.7		
38	Black Creek at Highway	0.13	1846.0	2.77					
39	Cascade River below Mt Paris	0.00	35.5	0.05	1	0.0127	1.1		
40	Minnie Jessup Creek	0.01	107.9	0.16					
41	Main Creek - top end	0.01	207.3	0.31	1	0.032	3.5		
52	Black Creek	0.16	2272.0	3.41	8	0.2904	31.5		
53	Black Creek	0.19	2698.0	4.05	9	0.2576	18.9		
60	Main Creek	0.17	2414.0	3.62	35	1.4152	107.0		
61	Main Creek	0.33	4686.0	7.03	14	0.675	62.0		
62	Cascade River	0.09	1343.3	2.01	13	0.2261	20.4		
78	Creek to Grays Hill	0.05	758.3	1.14					
79	Main Creek Headwaters	0.84	11928	17.892	10	0.2969	29.3		
84	Old Cascade River at Derby				1	0.0065	0.75		

RECONNAISSANCE HEAVY MINERAL SAMPLING

PROJECT: Wyniford River **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

SAMPLE NO	SAMPLE SITE	CASSITERITE			SAPPHIRE			GOLD	
		% Sn	70% SnO_2 grams	70% SnO_2 kg/LCM	Number	Mass grams	Grade g/LCM	gm	g/LCM
	Wyniford River								
25	Wyniford River	0.11	1562.0	2.34	4	0.0953	15.8		
42	Wyniford River	0.11	1562.0	2.34	33	0.8024	75.6	#	
43	Wyniford River	0.06	852.0	1.28	9	0.1322	11		
44	Wyniford River	0.22	3124.0	4.69	22	0.2837	24.2		
45	Wyniford River	0.01	140.6	0.21					
46	Wyniford River	0.07	994.0	1.49	1	0.0334	2.6		
47	Wyniford River	0.002	28.4	0.04					
48	Wyniford River	0.03	413.2	0.62					
64	Rio Grande Creek	0.01	139.2	0.21					
65	Frome River	0.06	822.2	1.23					
66	Old Workings at Frome River	0.11	1562.0	2.34					
67	Wickborg Creek	0.02	342.2	0.51					

PROJECT: Great Northern Plain **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

	Great Northern Plain								
1	Canary Mine	0.12	1704.0	2.56				#	
2	McGregor Mine Tailings	0.02	222.9	0.33	2	0.0119	0.8	#	
8	Delta Mine Tailings	0.02	265.5	0.40	5	0.0507	4.8		
9	Delta Mine Feed	0.04	516.9	0.78					
10	Dugard Mine Tailings	0.05	660.3	0.99					
12	Dry Gut Mine Feed	0.05	701.5	1.05	1	0.0108	2.0		
81	Creek past McGregors Mine	0.10	1393.02	2.09	3	0.0254	3.5		
82	McGregors Wash	0.0057	80.9	0.12					
83	McGregors Wash	0.01	78.1	0.12				#	
630059	McGregors Wash	0.00	2.8	0.00					
630060	McGregors Wash	0.01	96.6	0.14					
630061	Aberfoyle Central	0.10	1420.0	2.13	97	1.0638	91.5	#	
630062	Aberfoyle Central	0.0074	105.08	0.16					
630063	Aberfoyle East	0.014	198.8	0.30					
630064	Aberfoyle East	0.0115	163.3	0.245	4	0.0577	4.95		0.015
630065	Aberfoyle Central	0.0078	110.76	0.17	1	0.0106	1.35		
630066	Aberfoyle Central	0.0005	7.1	0.01				#	
630067	Dry Gut								
630068	Dry Gut	0.0239	339.38	0.51					
630069	Dry Gut								
630070	Delta Workings	0.0166	235.72	0.35					0.03
630071	Delta Workings	0.0571	810.82	1.22	5	0.0453	7.35		0.15
630072	Delta Workings	0.0013	18.46	0.03					
630080	Wanex								
630081	Wanex	0.0007	9.94	0.01				#	

RECONNAISSANCE HEAVY MINERAL SAMPLING

PROJECT: Mt Cameron Area **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

SAMPLE NO	SAMPLE SITE	CASSITERITE			SAPPHIRE			GOLD	
		% Sn	70% SnO_2 grams	70% SnO_2 kg/LCM	Number	Mass grams	Grade g/LCM	gm	g/LCM
	Mt Cameron Mines								
3	Fly by Night Creek	0.0175	248.5	0.37				#	
4	Mt Cameron Creek	0.75	10650.0	15.98					
5	Galloways Creek	0.05	745.5	1.12	2	0.0268	8.6	#	
21	Monarch Mine Tailings North	0.01	100.8	0.15	1	0.0027	0.3		
22	Monarch Mine Tailings South	0.02	285.4	0.43	2	0.0209	2.7		
32	Ruby Creek, South Mt Cameron	0.19	2698.0	4.05	13	0.0998			
33	Cambells Creek	0.14	1988	2.98					
34	Ah Kaws Creek	0.28	3976.0	5.96					
49	Gressons Wash	0.08	1167.2	1.75				#	
50	Gressons Mine Tails Top	0.01	193.1	0.29					
51	Gressons Mine Tails Bottom	0.12	1704.0	2.56					
72	Ah Kaws Creek	0.00	35.5	0.05					
73	Gresson Mine Tailings	0.06	789.5	1.18					
74	Motts Creek	0.00	27.0	0.04					
75	Sapphire Creek	0.30	4260.0	6.39					
76	Endurance Mine Jig Ragging	1.24	17608.0	26.41	3	0.0536	4.2		

PROJECT: East of Gladstone **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

	Gladstone East Area								
6	Star Hill Mine Tailings	1.33	18886.0	28.33				#	
7	Hardens Ravine Tributary	0.27	3834.0	5.75					
13	Amber Creek	0.05	664.6	1.00					
14	Amber Hill Mine Tailings	0.04	516.9	0.78				#	
15	Star Creek	0.86	12212.0	18.32	1	0.0148	2.1		
18	Hardens Ravine								
23	Amber Hill Mine Tailings	0.00	4.3	0.01					
24	Amber Hill Workings Tailings	0.0303	430.26	0.65				#	
35	Summers Mine Jig Tails	1.77	25134.0	37.70	326	6.7383	597		
71	Amber Creek above bridge	0.02	251.3	0.38					
630076	Summers Mine Water Pump Site	0.01	211.6	0.32			3.5		0.09
630077	Summers Mine below Cleaner Jig	0.02	265.5	0.40			0.8		0.03
630078A	Summers Mine Current face	0.08	1161.56	1.74			8.6		0.04
630078B	Summers Mine Current Face	0.17	2414.0	3.62			24.7		0.33
630078C	Summers Mine Current Face	0.007	92.3	0.14			7.1		0.01

RECONNAISSANCE HEAVY MINERAL SAMPLING

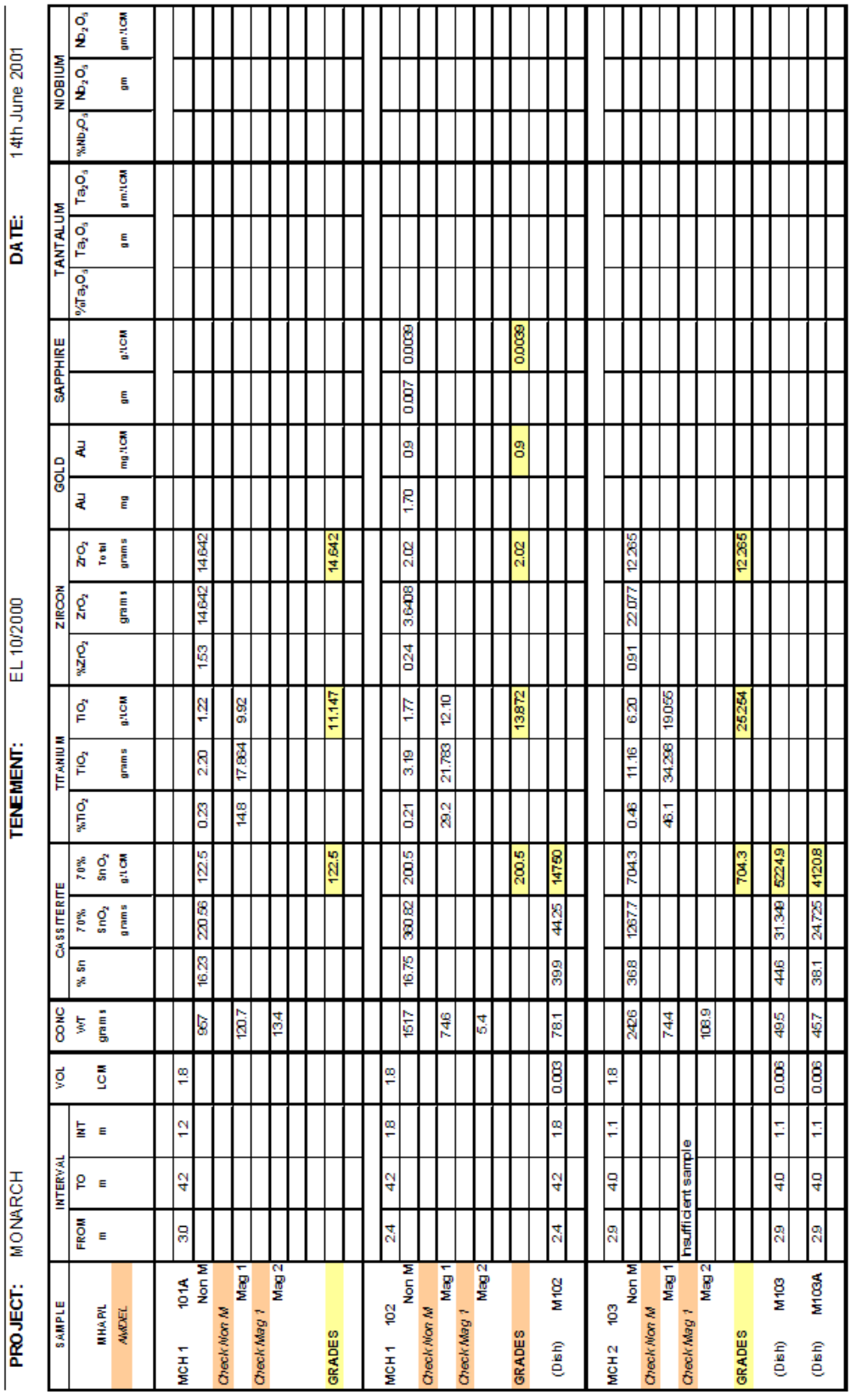
PROJECT: Other Locations **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

SAMPLE NO	SAMPLE SITE	CASSITERITE			SAPPHIRE			GOLD	
		% Sn	70% SnO_2 grams	70% SnO_2 kg/LCM	Number	Mass grams	Grade g/LCM	gm	g/LCM
36	Banca Creek	0.32	4544.0	6.82					
37	Banca Mine Tailings	0.19	2698.0	4.05					
80	Musselroe River	0.01	147.7	0.22					
85	Musselroe River below Vern Woods	0.14	1988.0	2.98	1	0.0977	15.5		

PROJECT: St Helens Area **TENEMENT:** SEL 22 / 1999 **DATE:** 16/09/2001

	George River								
29	7 km from St Helens	0.14	1991.4	2.99					
69	North George River	0.0008	11.4	0.02					
70	South George River	0.0004	5.7	0.01					
77	Crystal Creek	0.05	652.9	0.98					
	Priory Area								
630082	George River	0.02	215.8	0.32					
600083	Littlechilds Creek	0.06	839.2	1.26			7.4		
630085	Un-named Creek	0.04	614.9	0.92			594.0		
630086	Un-Named Creek	0.04	497.0	0.75			432.0		
630087	East Branch Un-named Creek	0.07	1002.5	1.50			307.5		
630088	West Branch Un-named Creek	0.10	1420.0	2.13			208.5		
630089	East Bank of Un-named Creek	0.0039	55.4	0.08			411.0		
630090	Bank Between Un-named Creek	0.0011	15.62	0.02			264		
132956	Albion Creek Tributary	0.0013	18.46	0.03					
132957	Albion Creek	0.0037	52.5	0.08					
132958	Albion Creek Tailings	0.0558	792.4	1.19					
132959	Forester Creek	0	0.0	0.00					
132960	Forester Creek Tailings	0.0015	21.3	0.03					
132961	George River Tailings	0.0219	311.0	0.47			27		
132969	West Branch	0.0086	122.1	0.18			31.5		

13.6 MONARCH BULK SAMPLE RESULTS:



PROJECT: MONARCH TENEMENT: EL 10/2000 DATE: 14th June 2001

SAMPLE		INTERVAL			VOL	CONC	CASSITERITE			TITANIUM			ZIRCON		GOLD		SAPPHIRE		TANTALUM			NIOBIUM		
MHA P/L		FROM m	TO m	INT m	LCM	WT grams	% Sn	70% SnO_2 grams	70% SnO_2 g/t CM	%TiO_2	TiO_2 grams	TiO_2 g/t CM	%ZrO_2	ZrO_2 grams	ZrO_2 Total grams	Au mg	Au mg/t CM	gm	g/t CM	%Ta_2O_5	Ta_2O_5 gm	Ta_2O_5 gm/t CM	%Nb_2O_5	Nb_2O_5 gm	Nb_2O_5 gm/t CM
MODEL																									
MCH 1	101A	3.0	4.2	1.2	1.8																				
	Non M					957	16.23	220.66	122.5	0.23	2.20	1.22	1.53	14.642	14.642										
Check Non M																									
	Mag 1					120.7				14.8	17.864	9.92													
Check Mag 1																									
	Mag 2					13.4																			
GRADES								122.5				11.147			14.642										
MCH 1	102	2.4	4.2	1.8	1.8																				
	Non M					1517	16.75	300.82	200.5	0.21	3.19	1.77	0.24	3.6408	2.02	1.70	0.9	0.007	0.0039						
Check Non M																									
	Mag 1					7.46				29.2	21.783	12.10													
Check Mag 1																									
	Mag 2					5.4																			
GRADES									200.5			13.872			2.02		0.9		0.0039						
(Dish)	M102	2.4	4.2	1.8	0.003	78.1	3.99	44.25	14760																
MCH 2	103	2.9	4.0	1.1	1.8																				
	Non M					2426	3.68	1267.7	704.3	0.46	11.16	6.20	0.91	22.077	12.265										
Check Non M																									
	Mag 1					7.44				48.1	34.268	19.055													
Check Mag 1		Insufficient sample																							
	Mag 2					108.9																			
GRADES									704.3			25.254			12.265										
(Dish)	M103	2.9	4.0	1.1	0.006	495	4.46	31.349	6224.9																
(Dish)	M103A	2.9	4.0	1.1	0.006	457	3.81	24.725	4120.8																

PROJECT: MONARCH **TENEMENT:** EL 10/2000 **DATE:** 14th June 2001

SAMPLE	INTERVAL			VOL	CONC	CASSITERITE			TITANIUM			ZIRCON			GOLD		SAPPHIRE		TANTALUM			NIOBIUM		
MHAPYL / AMCEL	FROM m	TO m	INT m	LCM	WT grams	% Sn	70% SnO_2 grams	70% SnO_2 g/LCM	%TiO_2	TiO_2 grams	TiO_2 g/LCM	%ZrO_2	ZrO_2 grams	ZrO_2 Total grams	Au mg	Au mg/LCM	gm	g/LCM	%Ta_2O_5	Ta_2O_5 gm	Ta_2O_5 gm/LCM	%Nb_2O_5	Nb_2O_5 gm	Nb_2O_5 gm/LCM
MCH 3 NS																								
MCH 4 104	2.8	3.3	0.5	1.5																				
Non M					3376	2.21	105.95	70.6	0.08	2.70	1.80	0.06	2.03	1.35	1.70	1.1								
Check Non M																								
Mag 1					17.9				20.2	3.62	2.41													
Check Mag 1																								
Mag 2					3.1																			
GRADES								70.6			4.21			1.35		1.1								
(Dish) M104	2.8	3.3	0.5	0.006	19.9	17.6	4.97	828.9																
MCH 5 105	4.0	5.0	1.0	1.8																				
Non M					6390	28.0	2540.7	1411.5	0.69	44.09	24.50	1.36	86.904	48.28	3	1.7								
Check Non M																								
Mag 1					288.1				40.9	117.83	161.92													
Check Mag 1						*6.26*	*25.653*	*14.252*	*5.00*			*0.11*	*0.3036*	*0.17*					*NA*			*0.0801*	*0.23*	*0.13*
Mag 2					113.2																			
GRADES								1425.7			186.42			48.449		1.7								0.13
(Dish) M105	4.0	5.0	1.0	0.006	105	46.1	68.735	11456																
MCH 6 106	4.7	5.2	0.5	1.8																				
Non M					9100	1.57	202.88	112.7	0.32	29.12	16.18	1.08	98.28	54.6										
Check Non M																								
Mag 1					561.5				39.7	222.92	123.8													
Check Mag 1																								
Mag 2					87.1																			
GRADES								112.7			140.02			54.6										

PROJECT: MONARCH **TENEMENT:** EL 10/2000 **DATE:** 14th June 2001

SAMPLE	INTERVAL			VOL	CONC	CASSITERITE			TITANIUM			ZIRCON			GOLD		SAPPHIRE		TANTALUM			NIOBIUM		
MHAPL *AMDEL*	FROM m	TO m	INT m	LCM	WT grams	%Sn	70% SnO_2 grams	70% SnO_2 g/LCM	%TiO_2	TiO_2 grams	TiO_2 g/LCM	%ZrO_2	ZrO_2 grams	ZrO_2 Total grams	Au mg	Au mg/LCM	gm	g/LCM	%Ta_2O_5	Ta_2O_5 gm	Ta_2O_5 gm/LCM	%Nb_2O_5	Nb_2O_5 gm	Nb_2O_5 gm/LCM
MCH6 107	5.2	5.7	0.5	1.8																				
Non M					8200	6.35	739.39	410.8	0.20	16.4	9.1111	0.57	46.74	25.967	1.7	0.9	0.006	0.0033						
Check Non M																								
Mag 1					417.1				29.9	124.71	69.285													
Check Mag 1																								
Mag 2					73.2																			
GRADES								410.8			78.396			25.967		0.9		0.0033						
(Dish) M107	5.2	5.7	0.5	0.006	12.9	3.5	0.6411	106.9																
MCH7 NS																								
MCH8 108	4.6	5.1	0.5	1.8																				
Non M					2662	7.55	285.39	158.55	0.39	10.382	5.77	1.03	27.419	15.233										
Check Non M																								
Mag 1					77.6				30.9	23.978	13.321													
Check Mag 1						*0.44*	*0.49*	*0.27*	*6.7*			*0.20*	*0.16*	*0.09*					*0.0476*	*0.037*	*0.0205*	*0.143*	*0.11*	*0.06*
Mag 2					8.9																			
GRADES								158.82			19.09			15.32							0.0205			0.06
(Dish) M108	4.6	5.1	0.5	0.006	32.9	17.3	8.0822	1347																

PROJECT: MONARCH **TENEMENT:** EL 10/2000 **DATE:** 14th June 2001

SAMPLE	INTERVAL			VOL	CONC	CASSITERITE			TITANIUM			ZIRCON			GOLD		SAPPHIRE		TANTALUM			NIOBIUM		
MHA P/L AMDEL	FROM m	TO m	INT m	LCM	WT grams	%Sn	70% SnO_2 grams	70% SnO_2 g/LCM	%TiO_2	TiO_2 grams	TiO_2 g/LCM	%ZrO_2	ZrO_2 grams	ZrO_2 Total grams	Au mg	Au mg/LCM	gm	g/LCM	%Ta_2O_5	Ta_2O_5 gm	Ta_2O_5 gm/LCM	%Nb_2O_5	Nb_2O_5 gm	Nb_2O_5 gm/LCM
MCH9 109	4.0	5.0	1.0	1.8																				
Non M					4106	6.5	378.98	210.5	0.30	12.318	6.84	0.48	19.709	10.949	1.7	0.94								
Check Non M																								
Mag 1					202.1				34.5	69.725	38.736													
Check Mag 1						*0.16*	*0.3234*	*0.1796*	*8.34*			*0.10*	*0.20*	*0.11*					*0.0574*	*0.116*	*0.0644*	*0.1574*	*0.3181*	*0.1767*
Mag 2					57.6																			
GRADES								210.7			45.58			11.063		0.94					0.06			0.18
(Dish) M109	4.0	5.0	1.0	0.006	22.5	16.9	5.3996	899.9																
MCH10 110	3.5	4.0	0.5	1.8																				
Non M					2686	13.3	507.28	281.8	0.30	8.06	4.48	0.82	22.025	12.236			0.008	0.0044						
Check Non M																								
Mag 1					187.4				41.4	77.584	43.10													
Check Mag 1						*0.46*	*1.2262*	*0.68*	*10.01*			*0.18*	*0.33*	*0.18*					*0.0305*	*0.0572*	*0.0318*	*0.1574*	*0.295*	*0.1639*
Mag 2					94.5																			
GRADES								282.5			47.58			12.419				0.0044			0.0318			0.1639
(Dish) M110	3.5	5.0	0.4	0.006	32.4	26.3	12.1	2016.7																

13.3 GREAT NORTHERN PLAINS SAMPLE RESULTS:

PROJECT: SEL 22 / 1999 **TENEMENT:** GREAT NORTHERN PLAIN PROSPECTS **DATE:** 31ST July 2001

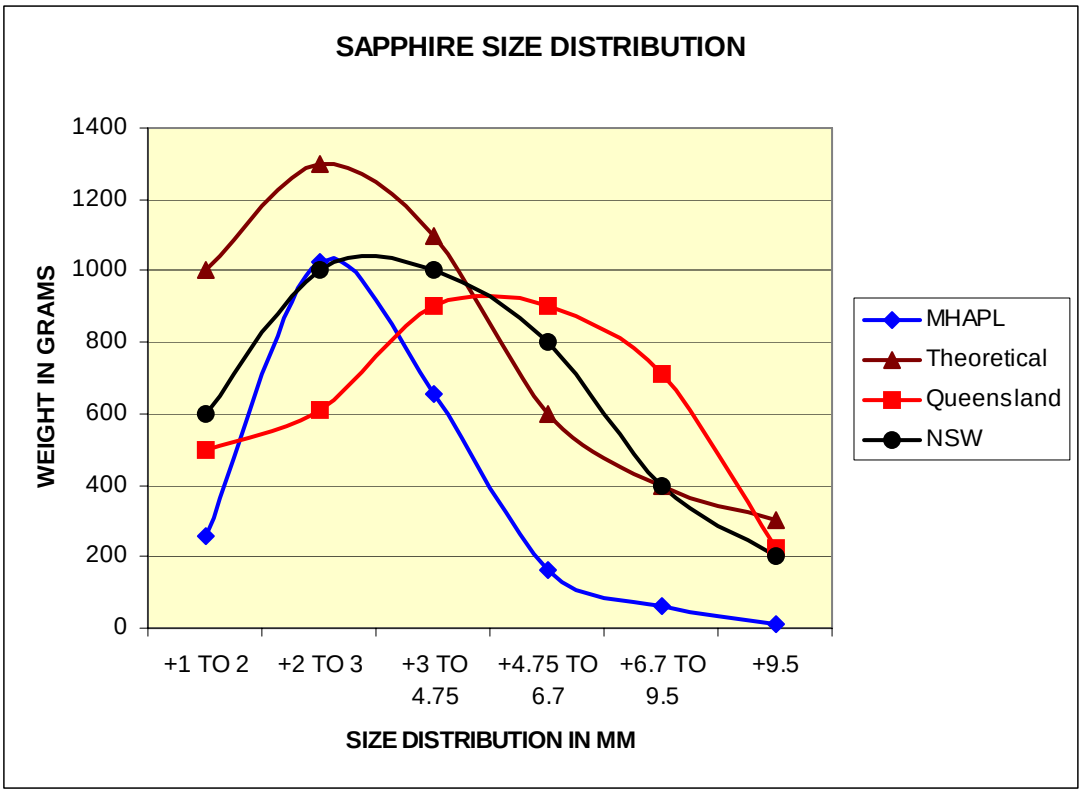
C	Clear	DB	Dark Blue	G	Grey	O	Other		
VLB	Very Light Blue	BK	Black	DG	Dark Grey	ST	Star		
LB	Light Blue	BR	Brown	GR	Green				
B	Blue	LG	Light Grey	R	Red				

SAMPLE NUMBER	INTERSECTION			VOL	WEIGHT OF GEMS							TOTAL WEIGHT	GEM, GRADE	COLOUR OF GEMS %OF WEIGHT													
	FROM	TO	INT	LCM	2 mm	3 mm	4 mm	5 mm	6 mm	7 mm	TOTAL COUNT	grams	gm/LCM	C	VLB	LB	B	DB	BK	BR	LG	G	DG	GR	R	O	ST
A122	2.8	4.0	1.2	1.8								0.24	**0.13**	8.33	12.50	45.84					12.50	20.83					
A124	2.3	4.0	1.7	1.8								0.19	**0.11**	31.58	10.5	15.79	5.24		5.26		15.80	15.80					
A125	0.0	2.6	2.6	1.5								4.96	**3.28**	9.6	17.10	14.90	7.20	5.00	8.20		20.30	14.50	1.60				1.60
T114	4.9	5.9	1.0	0.8								0.37	**0.46**	13.51	13.51	13.51		18.93	16.22			24.32					
T115	7.0	7.8	0.8	1.1								0.34	**0.31**	5.88	20.60	14.71		11.76	11.76			26.47					8.82
T116	1.0	3.5	2.5	1.1								0.12	**0.11**	16.67		16.67	33.33				25.00	8.33					
T117	6.4	8.4	2.0	0.9								0.09	**0.10**	33.34		22.22	22.22					22.22					
T118	3.0	4.0	1.0	0.9								0.15	**0.167**	13.33	13.33	26.67			6.68		13.33	13.33					13.33
T119	2.2	3.2	1.0	0.7								0.23	**0.35**				13.04				39.14	17.39			13.04		17.39
T120	0.0	1.5	1.5	0.9								0.25	**0.29**														
T121	7.0	8.7	1.7	1.1								0.11	**0.10**	36.36	45.46		9.09	9.09									
W111	4.0	5.4	1.4	1.8								0.02	**0.01**														
W113	3.0	4.3	1.3	1.9								0.76	**0.40**	22.37	18.42	5.26	34.21	1.32	5.26			3.95					9.21

13.4 GEM PARCEL ANALYSES POST-SEPTEMBER 2001

All parcels of sapphire recovered by MHAP/L or observed in the collections of local miners and prospectors appear to contain between 20 to 30% blue gem material. Large stones, that is stones that will not pass a 6mm screen, were rarely observed although historically such stones were regularly reported to have been recovered during alluvial tin sluice box and jig plant clean-up. Such stones can be observed in the collection of the Derby Museum, and in the possession of Michael Lloyd (Priory), Gilbert Salter (Herrick) and John Volker (Scottsdale).

The absence of such stones in most parcels can be explained by their removal by the owners as specimens or for cutting. While this does in part explain the lack of larger stone it was not seen by MHAP/L as the complete answer. In order to determine if a larger fraction should and in fact does exist, a series of sizing curves were constructed using data derived from various sources including MHAP/L test records, from local collections and from information provided to MHAP/L by GTN Limited



The graph indicates that the parcels of stone recovered by MHAP/L (Blue line) while corresponding closely to sizing of parcels from New South Wales and Queensland in the smaller size fractions does not contain similar proportions of larger stone. A theoretical curve was then constructed (Brown line) using historical data and observed size range measurements taken from private collections.

It is significant that when the larger stones observed in those collections are added to the curve the plot more closely corresponds to the plots for the sapphire parcels from the other two states. This conclusion was subsequently supported when MHAP/L was provided access to five large gem quality stones (total weight 7.4 grams) reported to have been derived from the Brisies Lead at Derby. These larger stones confirmed the presence of much larger size material throughout the region and supported the conclusions that large stones are generally not observed in parcels because:

- They have been preferentially removed for cutting or into collections; and
- Most weekend prospectors are only able to excavate surface horizons and not the basal layers, it is these basal layers in which the larger size sapphire would be expected to occur.

In addition to the sizing analysis, MHAP/L arranged to have some small parcels of very poor quality blue sapphire / corundum heat-treated. This was conducted in Rubyvale, Queensland by an Australian gem cutter. Details of the treatments are:

- Sample A3 - A 19.9 gram parcel of +4.75 mm sapphire and corundum from the Weld River. Four poor quality pieces were selected and heat-treated. All four responded very well and to illustrate how well the material treated one piece was cut into a 0.86 carat light blue stone.
- Sample 3 - A 76.9 gram parcel of mixed sizes from 2mm to 9mm from the Weld River. Thirteen stones weighing 12.3 carats in total were heat treated with excellent results, all changing to light and cornflower blue hues.
- Sample 8 - A 35.1 gram parcel of 2mm sapphire from the Weld River near Moorina. Fifty percent of the parcel was heat treated with excellent results and fine blue hues obtained.
-
-

- Sample 9 - A 143.1 gram parcel of 2mm sapphire recovered from the tin shed tailings heaps at the old Dorset Tin Shed at the Great Northern Plains site. A small sample was washed in hydrofluoric acid for about four hours.
- The treated material cleaned up considerably and clarity was improved. Heat-treating would result in further enhancement.

Heat treatment proved highly successful. While most untreated parcels contain between 20 and 30% blue gem, heating appears to improve these figure to between 30 and 40% blue gem.

In economic terms this result is most significant. MHAP/L have been advised that the quality of blue observed in the parcels would be expected to return a sale value of around $15.00 per gram. The following tabulation indicates the economics of these results.

PROPORTION BLUE GEM	GEM CONTENT AT 1GM/M^3 GRADE	VALUE / M3 AT $15.00/GRAM SALE	GEM CONTENT AT 2GM/M^3 GRADE	VALUE / M3 AT $15.00/GRAM SALE
20%	0.2	$3.00	0.4	$6.00
30%	0.3	**$4.50**	0.6	**$9.00**
40%	0.4	$6.00	0.8	$12.00

Further work is underway to confirm and firmly establish these preliminary results. A parcel of 374 grams of various sizes of sapphire from the Main Creek alluvial system has been forwarded to Queensland for sizing and heat treatment. Results are not expected until May 2002.