

MINERAL HOLDINGS AUSTRALIA PTY., LIMITED

TECHNICAL REPORT

SEL 22 / 1999

NORTH EAST TASMANIA

PREPARED BY:

Niugini Resources Pty., Limited

Neil R. Kinnane - Geologist

DATE PREPARED:

15th September 2002

TABLE OF CONTENTS

FILE DESIGNATOR	FILE
SEL2299_200209_01_report.pdf	TECHNICAL REPORT, SEL 22 / 1999
SEL2299_200209_02_map.pdf	FIGURE 1
SEL2299_200209_03_map.pdf	FIGURE 2

TABLE OF CONTENTS
FILE: SEL2299_200209_01_report.pdf

	PAGE NO
1.0 INTRODUCTION	1 - 2
2.0 LOCATION AND ACCESS	3
3.0 CLIMATE AND TOPOGRAPHY	4
4.0 TENURE	5
5.0 HISTORICAL BACKGROUND	6 - 7
6.0 GEM ASSESSMENT PROGRAM	8 - 23
6.1 ACQUISITION OF GEM PARCELS	8 - 9
6.2 DESCRIPTION OF GEM PARCELS	9 - 15
6.3 ASSESSMENT OF GEM PARCELS	16 - 23
7.0 RESULTS OF THE PROGRAM	24
8.0 CONCLUSIONS	25
9.0 RECOMMENDATIONS	26 - 27
10.0 APPENDICES	28 - 31
10.1 DESCRIPTION OF FACETTED GEM PARCEL	

LIST OF FIGURES

FILE: SEL2299_200209_02_map.pdf

FILE: SEL2299_200209_03_map.pdf

FIGURE 1 REGIONAL LOCATION PLAN

FIGURE 2 SAMPLE LOCATION PLAN

1.0 INTRODUCTION

Sapphire occurrences are known from a number of widespread locations throughout north east Tasmania. Until recent times these have held nothing more than passing interest however recent exploration by Mineral Holdings (MHAP/L) indicate that sapphire is in fact an important accessory mineral component in most if not all of the Tertiary and recent alluvial tin deposits.

Previous reports indicate that the bulk of the Tasmanian sapphire is of green colouration, results of recent work by MHAP/L indicate that this is not the case and that in fact the major part of the sapphire / corundum material is grey, grey – blue or vivid gem quality blue.

In mid 2001, MHAP/L, as a result of bulk testing around the fringes of the Great Northern Plain recognised the significance of the accessory sapphire component in the heavy mineral fraction of the alluvial deposits. In order to better understand the economic implications of these discoveries MHAP/L retained Coolamon Mining Pty., Ltd., a central Queensland sapphire mining and marketing group to advise on treatment, cutting and valuation of the Tasmanian blue sapphire.

The initial assessment by Coolamon indicated the necessity for MHAP/L to produce a 1 kg “Run of Mine” sapphire parcel that would allow % gem, colour and treatment characteristics to be determined. Based on preliminary estimates of grade of sapphire in the deposits, that is, between 0.5 and 2.5 grams per cubic metre the Coolamon recommendations would require MHAP/L to undertake a 500 to 1,000 cubic metre bulk-sampling program.

Given the time, economic and environmental constraints of such a large program it was decided to try to accumulate a parcel of stone, in part from production, and also by acquisition from amateur fossickers. Accordingly an advertisement was placed in local newspapers and small parcels of stone subsequently purchased.

Sufficient rough sapphire was acquired by MHAP/L to enable Coolamon to select a parcel for heat treatment and subsequent cutting. Results have been quite amazing. While most parcels contained up to 20% cutting blue much of the lower grade material responded very well to heat treatment and a fine light to cornflower blue cut gem product was obtained.

Work is continuing on gem assessment and MHAP/L is currently in the process of taking and treating further small bulk samples from sites at Priory and Main Creek.

2.0 LOCATION AND ACCESS

The tenement, SEL 22 / 1999 encompasses an area of approximately 3,856 sq. km. of the north eastern most corner of Tasmania. See Figures 1 and 2. The tenement is centred approximately 80 km's north east of the City of Launceston around the towns of Derby and Branxholm. Launceston provides major regional air access to the north east. An excellent network of roads, bot sealed and gravel criss-cross the tenement and provide vehicular access to all but the most rugged mountainous areas.

Access to the more remote and rugged mountainous areas can be disrupted by bad weather, heavy rain and even snow may cause vehicular access problems durin winter and early spring months.

3.0 CLIMATE AND TOPOGRAPHY

The climate throughout the region 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°C to maximums in the 15 to 20°C range and in summer (November to February) from 15°C to 30°C. Average annual rainfall varies from 890 mm to 1,020 mm. Snowfalls are not unusual in the higher country along the Blue Tier and further south at Mt Victoria.

Exploration can, as a rule, be conducted year round although some periods of heavy rain in winter and early spring may cause delays in use of heavy machinery. Ample groundwater exists in streams and in old mining cuts to support alluvial treatment facilities.

The project area encompasses a wide topographic range. The dominant topographic features are the granitic massifs of the Blue Tier, Mt Cameron and mountainous areas south around Mt Victoria. These areas range in height from 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 plains are dominated by a number of major north trending drainage systems, the Great Forester, Tomahawk, Boobyalla, Ringarooma and Musselroe Rivers. To the south of the Blue Tier the George and South Esk Rivers drain to the east coast.

4.0 TENURE

The project area is encompassed within SEL 22 / 1999, a total area of 3,865 sq. km. See Figure 2.

Specifically tenure is:

Tenement Number	22 / 1999
Area	3,856 sq. km.
Location	North East Tasmania
Date of Grant	06 / 09 / 2000
Date of Expiry	08 / 09 / 2005
Beneficial Holder	Mineral Holdings Australia Pty., Limited 10 th Floor, 100 Collins Street, Melbourne 3000, Victoria.
Contact	Mr. Neil Thomas. Managing Director.
Contact Point	Phone: +61 3 9654 7999 Fax: +61 3 9650 3855 Email: tominex@iprimus.com.au

5.0 HISTORICAL BACKGROUND

Early tin miners of the late 1800's first reported the presence of sapphire from many mining locations throughout the northeast. None of these 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 alluvial tin mining operations, the Arba, Briseis and the numerous deposits along the lower Ringarooma River all helped to add to a total tin production of in excess of 40,000 tonnes. Sapphire was reported from all these areas but never received other than passing interest from miners and explorers.

Sapphire is a significant and very visible component of the tin shed tailings at Pioneer, Endurance and the two Dorset Dredge operations. Recent discussions with John Volker, manager of the Dorset Dredge in the 1960's indicates that sapphire of fine blue colour and of some size was regularly scavenged from the primary and secondary jig beds during production clean-outs. Volker has in his possession a small parcel of fine blue sapphire in the 3 mm to 6 mm size range recovered from the dredge operation.

Similar stories are reported from mining activities at the Salter and Woods operations in the Wyniford River, Gilbert Salter of Herrick has a number of + 1 carat fine blue cut sapphires recovered from his tin mining operations. A recent visit to Summer's Mine at the Dorset Flats between Pioneer and Gladstone confirms that sapphire commonly reports to the top of the primary and secondary jig beds.

Sapphire recovered from recent test work was derived from both jig beds and jig underflow sluice products and while quantities were small they proved significant in terms of values per cubic metre. It should be noted however that "Ragging" of jig beds with steel punchings to aid in cassiterite recovery has the effect of causing much sapphire to be discharged to tailings.

Most interest in sapphire from north east locations comes from casual fossickers who regularly conduct hand-mining activities in such locations at the Weld River at the Moorina Fossicking Reserve, Main Creek, Cascade River, Branxholm Creek and in old tin mine tailings deposits. Historically there have been a number of large stones recovered. A 264 carat sapphire / corundum was reported in the catalogue of *Minerals Of Tasmania* published as Geological Survey Record No. 9 of Mineral Resources Tasmania as being recovered from the Weld River. More recently, in 1993, a 900 carat stone was reported to have been discovered in old mining detritus near Weldborough again in the Weld River alluvial system.

A number of large and gemmy sapphires have been observed by the author in the collection of Michael Lloyd of Priory near St Helens. This material was apparently derived from old tin workings in Tertiary and Recent alluvials in the Priory area. Recent acquisitions of sapphire rich gem parcels by MHAP/L indicate that gem quality blue sapphire in a range of sizes can be recovered from most streams shedding from the Blue Tier region or nearby areas that were originally capped by older Tertiary basaltic rocks.

6.0 GEM ASSESSMENT PROGRAM

In early 2002 MHAP/L began to actively seek parcels of sapphire in an effort to provide Coolamon 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.

6.1 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 m³ 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 Branhholm 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.

6.2 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

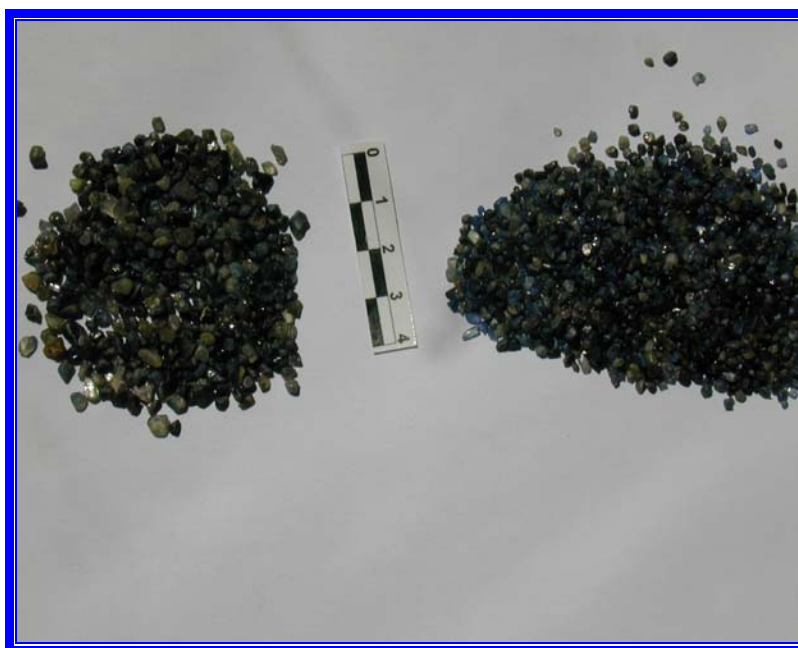
This parcel consisted primarily of grey, bluish and milky corundum. Ron advised that he had removed all of the best gem blue sapphire and larger stones thus the parcel could not be deemed “Run of Mine”.



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 DRREDGE 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 Branhholm 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

Specific details of the facetted sapphire material appear as Appendix 10.1. 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 speciality 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.

6.3 ASSESSMENT OF GEM PARCELS

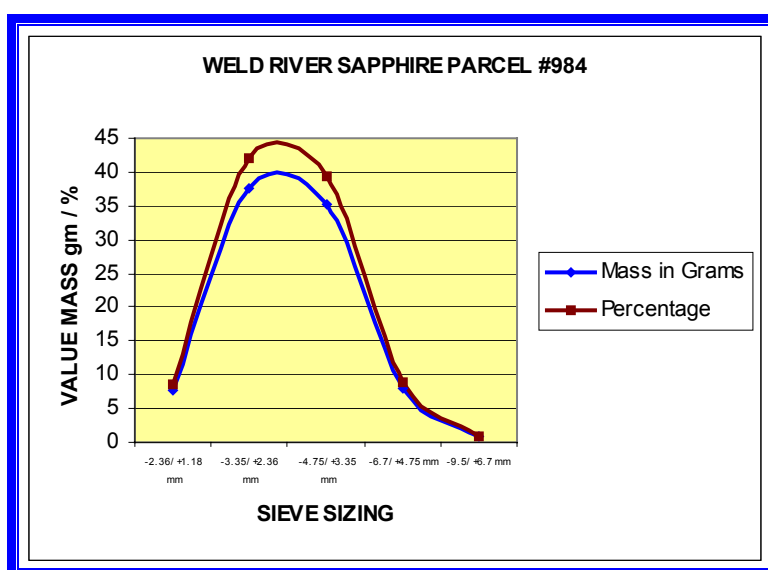
Where available detailed size analyses of each parcel have been presented along with comments on quality, amenability to heat treatment and results of cutting as provided by Coolamon Mining.

(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 1
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.

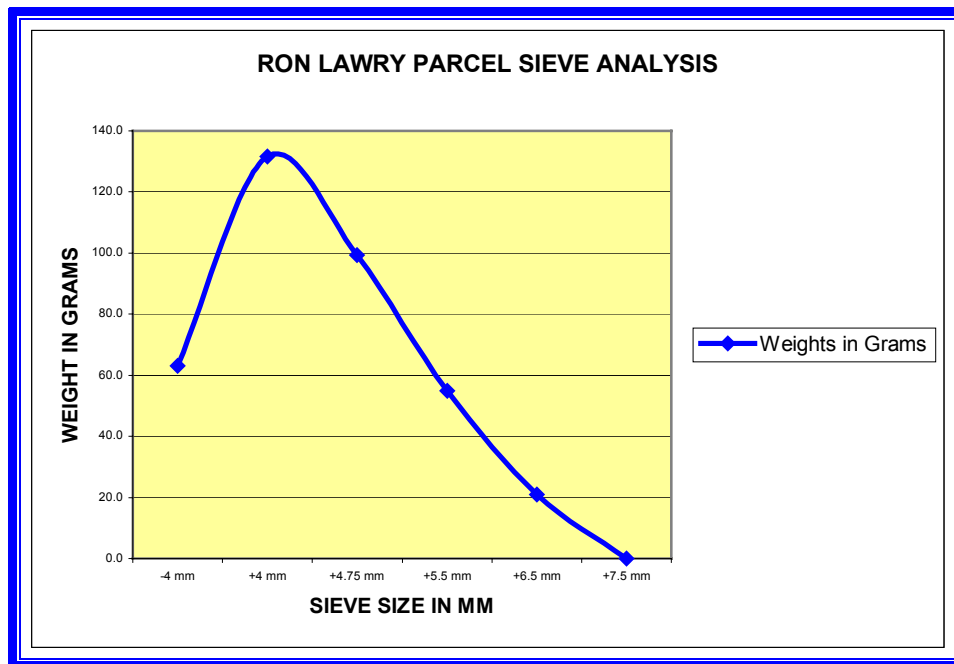
(ii) Ron Lawry Parcel

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 2
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.

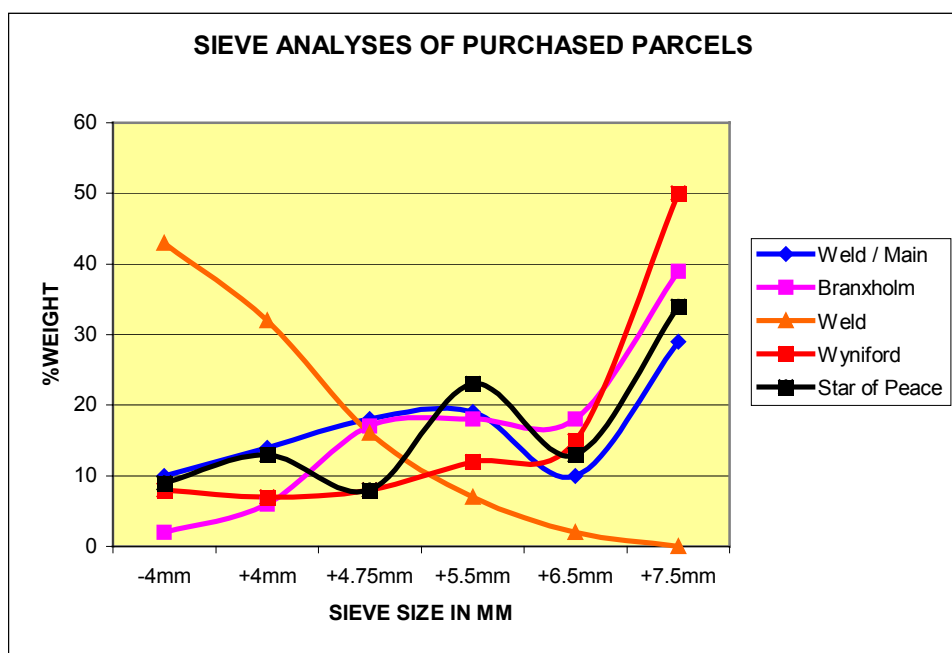
(iv) Purchased Parcels.

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 3
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

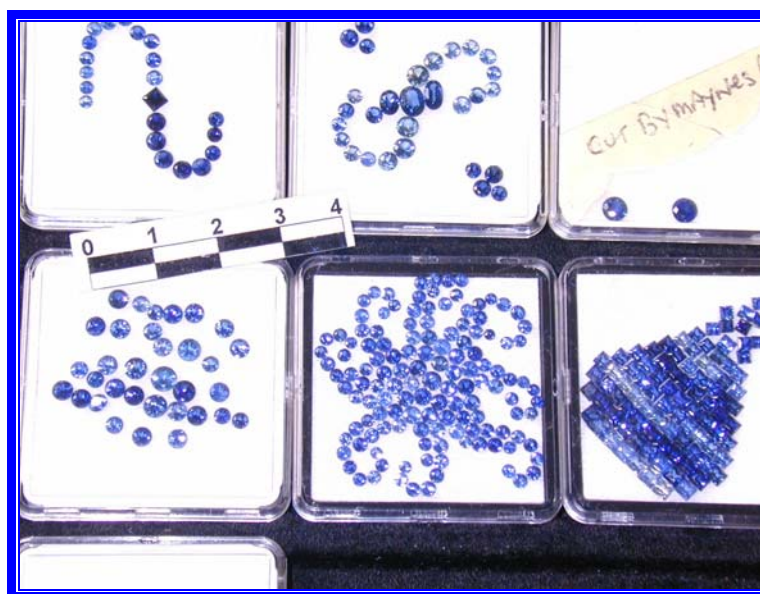


These graphed results should be compared to the Weld Parcel #984 and the Lawry Parcel. Two completely different profiles can be observed, the former two parcels have size distribution profiles that exhibit a major small size component reflecting continual handpicking of the better and larger gems. Weld 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 totalling 7 carats, not sent for cutting.
- ❖ Branhholm 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 totalling 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 a significant contributor to the cutting parcel. 1,200 pieces of gem blue were selected totalling 385 carats and a further 50 pieces of “fancy” colour totalling 23 carats selected for cutting.

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



PURCHASED PARCEL CUT PRODUCT
(Bottom Left Boxes)

(v) Facetted Gem Parcel

The list of north east Tasmanian cut sapphire appears as Appendix 10.1 to this report. 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.

7.0 RESULTS OF THE PROGRAM

While no sapphire parcel representative of “Run of Mine” was obtained either by hand mining or acquisition at least some of the Purchased parcels were sufficiently representative to enable some assessment of the gem quality of the sapphire to be made.

It is significant that blue is the dominant hue, even in the non-gem corundum fraction. Unlike other Australian locations where blue sapphire typically has a green colour on the cross table (green on blue), the Tasmanian stone rarely exhibited this feature and during this exercise was for the most part was “blue on blue”.

It is also significant that the Tasmanian stone reacts to heat-treatment far better than does other Australian sapphire which, while clarity is improved, there is rarely any dramatic improvement in colour. In all the material that was treated from these parcels and subsequently cut all exhibited dramatic improvement. In all instances improvement was achieved in clarity and colour was not only improved to classic cornflower shades but colour was more consistent across the range of stones. This has important implications in the economics of sapphire production and subsequent use of stones in the gem trade.

The failure of the program to locate any amount of larger sized sapphire, that is 10 mm material, is considered to reflect the removal of larger and better sapphire prior to sale to MHAP/L. Dorset and Pioneer samples were both taken from sized tin shed tailings and thus stones over 5 mm would be rare if non-existent.

The non-treated cut parcel while of outstanding quality did not have the clarity or brilliance of the treated material. It should be noted however that both treated and un-treated sapphire have their own place in the market and many buyers prefer un-treated material. Coolamon and the Thais cutters believe the material produced to date to be of exceedingly high quality and because of the clarity, brilliance and consistency of colour has the potential to fill a niche marketing the manufacturing jewellery industry.

8.0 CONCLUSIONS

As a result of this purchasing and cutting program MHAP/L conclude that:

- (i) The sapphire component of both the Tertiary and Recent 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.
- (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) Most parcels contain, fancy, parti and clear sapphire that produces attractive cut gems. 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) If a representative parcel, “Run of Mine” is to be obtained MHAP/L will have to look at producing a bulk sample from high-grade cassiterite bearing gravels. There appears to be a direct relationship between high cassiterite and high sapphire grades in most of the north east tin deposits. Ongoing exploratory work should define such targets and suitable plant obtained to enable 200 to 1,000 metre alluvial samples to be excavated and processed.

9.0 RECOMMENDATIONS

The program conducted during the year met with reasonable success but certainly suffered in that a representative “Run of Mine” sample was not obtained. In order to remedy this situation and to allow MHAP/L to obtain such sample 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/m³ of cassiterite.
- (ii) Selected sample sites should be capable of providing 200 to 1,000 m³ samples for treatment.
- (iii) 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 or 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.

- (iv) Gem concentrates should be processed in the following manner:
 - ❖ Acid washed in HF, rinsed and dried;
 - ❖ Total sample weight recorded;
 - ❖ All non sapphire / corundum gem and other heavies removed by hand sorting;
 - ❖ 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”.
- ❖ The untreated parcels valued;
- ❖ All gem parcels heat treated, revalued and then cut;
- ❖ Cut parcels valued and values related back to a gem component value / m³.

10.0 APPENDICES

10.1 DESCRIPTION OF FACETTED GEM PARCEL

NO	LOCATION	COLOUR	WEIGHT carats	SIZE mm	SHAPE	COMMENT
1	Ringarooma R Derby to Gladstone Including side creeks	D.Blue	0.40	5 x 4	Oval	Typical dark colour form
2	"	M-D Blue	0.41	5.3 x 3.5	Oval	"
3	"	Yellow	0.62	5.1 x 3.7	Round	Shallow Cut, Unusually pale and included
4	"	D. Blue	0.49	5	Round	Shows asterism
5	"	M-D Blue	0.23	3.8	Round	Typical
6	"	M Blue - Yellow	0.34	3.5 x 3.5	Square	Slightly milky
7	"	Blue-Yellow Parti	0.31	4.9 x 3.5	Oval	Pronounced colour banding
8	"	Fine Blue – yellow Parti	0.45	5.7 x 4.2	Oval	Even colour spread water clear
9	"	"	0.33	4.8 x 3.7	Oval	Defined colours
10	"	M-D Blue	1.04	6.6 x 4.6	Pear / Cab	Clean but ill defined colour
11	Cascade River Derby	Yellow	0.56	4.7	Round	Pale yellow included stone
12	"	M-D Blue	0.24	4.5 x 3.1	Oval	Rich even colour
13	"	M-D Blue	0.23	4.5 x 3.2	Oval	Rich even colour
14	"	Blue – yellow Parti	0.39	5.1 x 3.5	Oval	Typical colour spread
15	"	Blue- yellow Parti	0.37	4.3	Round	Fine water clear with pronounced colour banding
16	Wyniford River	Blue – Yellow Parti	0.38	3.3	Round	High percentage parti
17	"	Blue – Yellow Parti	0.40	4.5 x 3.9	Oval	Fine water clear locally stones up to 4.5 ct
18	"	Blue – Yellow Parti	0.34	4.5 x 3.9	Oval	Rich yellow base colour
19	"	D Blue	0.36	4.2	Round	Typical for area
20	"	Blue Yellow Parti	0.23	3.5	Round	Even colour spread some green

NO	LOCATION	COLOUR	WEIGHT carats	SIZE mm	SHAPE	COMMENT
21	Main Creek	Yellow	0.46	4.8 x 3.8	Oval	Included Stone
22	"	Pale Yellow	0.34	4.2 x 3.3	Oval	Internal feathering unusual for the area
23	"	Blue Yellow Parti	0.10	3.7 x 2.3	Tear	Nil
24	"	Blue Yellow Parti	0.37	5.0 x 3.4	Tear / Cab	Pronounced banding
25	"	Mid Dark Blue	1.03	6.2 x 5.2	Oval / Cab	Badly included
26	Black Creek North of Mt Paris Dam	Mid Dark Blue	0.41	4.7 x 3.8	Oval	Even colour spread
27	"	Dark Blue	0.50	4.8	Round	Slightly Uneven Colour
28	"	Yellow Green Parti	0.31	4.0	Round	Good Colour spread
29	"	Blue Yellow Parti	0.24	4.1 x 3.7	Tear	Very rich colour
30	"	Blue Yellow Parti	0.31	4.2 x 3.5	Oval	Clean colour combo
31	Sandy's Creek	Yellow Green Parti	0.91	6.6 x 4.9	Oval	Good colour
32	"	Blue Yellow Parti	0.20	3.7	Trilliant	Fine Clear Water Blue
33	"	Blue Green Parti	0.78	3.2	Round Pair	As Above
34	"	Green Yellow Parti	0.42	6.8 x 4.0	Tear / Cab	Fine colour
35	Branxholm Creek north of Ruby Flats	Dark Blue	0.17	3.8 x 3.0	Oval / Cab	Colour varies from this location
36	"	Dark Blue	0.31	3.0	Round	As Above
37	"	Deep yellow	0.49	5.4 x 4.0	Oval	Rare from this location
38	"	Yellow Green Parti	0.62	6.3 x 4.2	Oval	Rare from this location
39	Garabaldi	Mid Blue Yellow Parti	0.15	3.3 x 2.3	Emerald	Good colour and clarity
40	"	Mid Dark Blue	0.26	3.0	Round	Common Colour
41	"	Green	1.09	6.3 x 5.2	Oval	Some inclusions would cab better

NO	LOCATION	COLOUR	WEIGHT carats	SIZE mm	SHAPE	COMMENT
42	Garabaldi	Blue yellow Parti	0.47	4.7 x 3.2	Tear / Pair	Good colour combo
43	Greenstone Creek	Blue Yellow Parti	0.47	4.9 x 4.0	Oval	Common from this location
44	"	Rich yellow	0.30	4.4 x 3.4	Oval	Rare from this location
45	Weld, Child & Frome Rivers	Mid Blue Yellow parti	0.29	2.8	Round cab Pair	Common from this location
46	"	Green Blue	0.80	8.1 x 3.7	Marquise / Cab	Common
47	"	Dark Blue	2.12	7.0 x 5.0	Tear / Cab	Rich even colour
48	"	Green yellow	0.55	4.7 x 4.1	Oval	Large stones in this colour
49	"	Mid Blue	0.38	5.5 x 3.8	Oval	Rarer colour but can be up to 12 cts
50	"	Blue Yellow Parti	0.19	3.7 x 2.8	Oval	Fine colour combo