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NORTH EAST TASMANIA

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PERIOD ENDING 8TH AUGUST 2005

VOLUME I

VAN DIEMAN MINES PTY LIMITED

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EXECUTIVE SUMMARY

During the year the company has continued to actively investigate various avenues for marketing of rough and finished sapphire and associated gemstones. Executives visited several major international gem shows including the AGTA (American Gem Traders Association) Show in Tucson Arizona and the JA (Jewelry Association) Show in New York. Contact was made with a broad spectrum of dealers, both wholesale and retail. A draft marketing and business plan has been completed based on the information gleaned from those visits.

In addition, the company acted as sponsor for a graduate honours student at the University of Tasmania. The student, Brendan McGee, has completed his thesis entitled "Characteristics and Origin of the Weldborough Sapphire, NE Tasmania". That document is appended as part of this report. Note should be taken however that the printed appendices provided appear as abridged versions (print format) of those provided in electronic format. McGee has reported several significant findings; he has accurately dated the sapphire by dating of zircon inclusions and has discovered interesting associations of the sapphire to basement source rocks.

The company has also completed investigation into the response of Tasmanian sapphire to a variety of heat treatments. This work conducted by Dr. John Emmett, Crystal Chemistry of Washington in the USA has resulted in some significant changes to what would have otherwise been second and third grade stone. Dr. Emmett has provided a detailed pictorial record of the changes with comment as appropriate; those works are also appended to this report. Further work is to be carried out by Crystal Chemistry in 2006.

Application has been made to allow the company to bulk sample at several locations within the SEL, specifically at the Weld River, Frome River, Main Creek and within EL 1/2003 at the Wyniford River. As soon as approvals are received track work and bulk sampling and stockpiling will commence

TABLE OF CONTENTS

	PAGE NUMBER
1.0 INTRODUCTION	1 - 3
2.0 MARKET REVIEW	3 - 6
3.0 McGEE HONOURS THESIS	7 - 11
3.1 AIMS OF THE THESIS	7
3.2 ABSTRACT	7 - 8
3.3 SIGNIFICANT RESULTS	8 - 11
4.0 THE CRYSTAL CHEMISTRY PROJECT	12 - 14
4.1 SAMPLE SUITE	12
4.2 TREATMENT TECHNIQUES	12 - 13
4.3 SUMMARY OF RESULTS	14
5.0 PROPOSED WORK PROGRAM 2005 - 2006	15 - 20
5.1 BULK SAMPLING PROGRAM	15 - 17
5.2 SAMPLE TREATMENT PROTOCOLS	18 - 19
5.3 GEOCHEMICAL TEST WORK	19
5.4 MARKETING	20
6.0 CONCLUSIONS	21
7.0 RECOMMENDATIONS	22
8.0 BIBLIOGRAPHY	23 - 24
9.0 APPENDICES	25
9.1 THESIS, BRENDAN McGEE (Volume II) INCLUDES TWO VOLUMES OF ABRIDGED APPENDICES	
9.2 PHOTOGRAPHS - CRYSTAL CHEMISTRY (Volume III)	

LIST OF PLANS

		PAGE NUMBER
FIGURE 1	GENERAL LOCATION PLAN	2
FIGURE 2	SAMPLE LOCATION PLAN, McGEE THESIS	9
FIGURE 3	BULK SAMPLE LOCATION SITES	16
FIGURE 4	FLWSHEET - PILOT TEST PLANT	17

1.0 INTRODUCTION

The controversy surrounding “Be” Diffusion of sapphire during the period 2002 to 2005 has made conventional marketing of rough and finished sapphire extremely difficult. The company has recognized that the subsequent pricing slumps will, if not rectified in relation to Tasmania stone, flow-on to effect the previously forecast profit expectations. The advent of “Free Trade” recognition by the gem and many other industries has in many respects provided Van Dieman with an ideal marketing strategy for Tasmanian stone. The idea of “Provenance Guarantees” and “Source Guarantees” of stone will, it is hoped, overcome many of the doubts as to authenticity of rough and finished product currently being voiced by both wholesalers and retailers.

The company has as a result of its activities has prepared a “Draft” business plan in relation to the marketing of rough and finished sapphire. The plan will be completed once rough stone flows on from the proposed bulk testing program.

The completion of the honours thesis by Brendan McGee while answering a number of questions as to source and age of the sapphire has raised other questions as to background geochemical composition, indicator inclusions and multiple sources for the sapphire. The Fe - V - Ga association is typical of many of the Pacific rim sapphires although in this instance the Fe values are very low, considerably lower for instance than sapphire from Inverell or Central Queensland. The Nb - Ta - Be association is seen by McGee to represent an association with a granite pegmatite or carbonatite melt, an association not as yet recognized from other Australian locations. Dating of zircon inclusions in sapphire of 47 ± 4 Ma is the same age as the Weldborough Basalt (46.8 ± 0.6 Ma) confirming that the basalts brought the sapphire to the surface. For full details of the thesis the reader is referred to Appendix 9.1.

Dr John Emmett of Crystal Chemistry was provided a sample of 33 sapphires from a variety of local sources within the Licence. He was not provided with any information as to exact location and his conclusions that we are dealing with very different material from 3 to 5 separate source rocks is significant. His work did indicate that in the majority of the stones there was a dramatic increase in transparency after heat treatment. The conclusion he draws is that these tests indicate that this type of material will have to be sorted into 3-5 lots before heat treatment and then each lot treated differently.

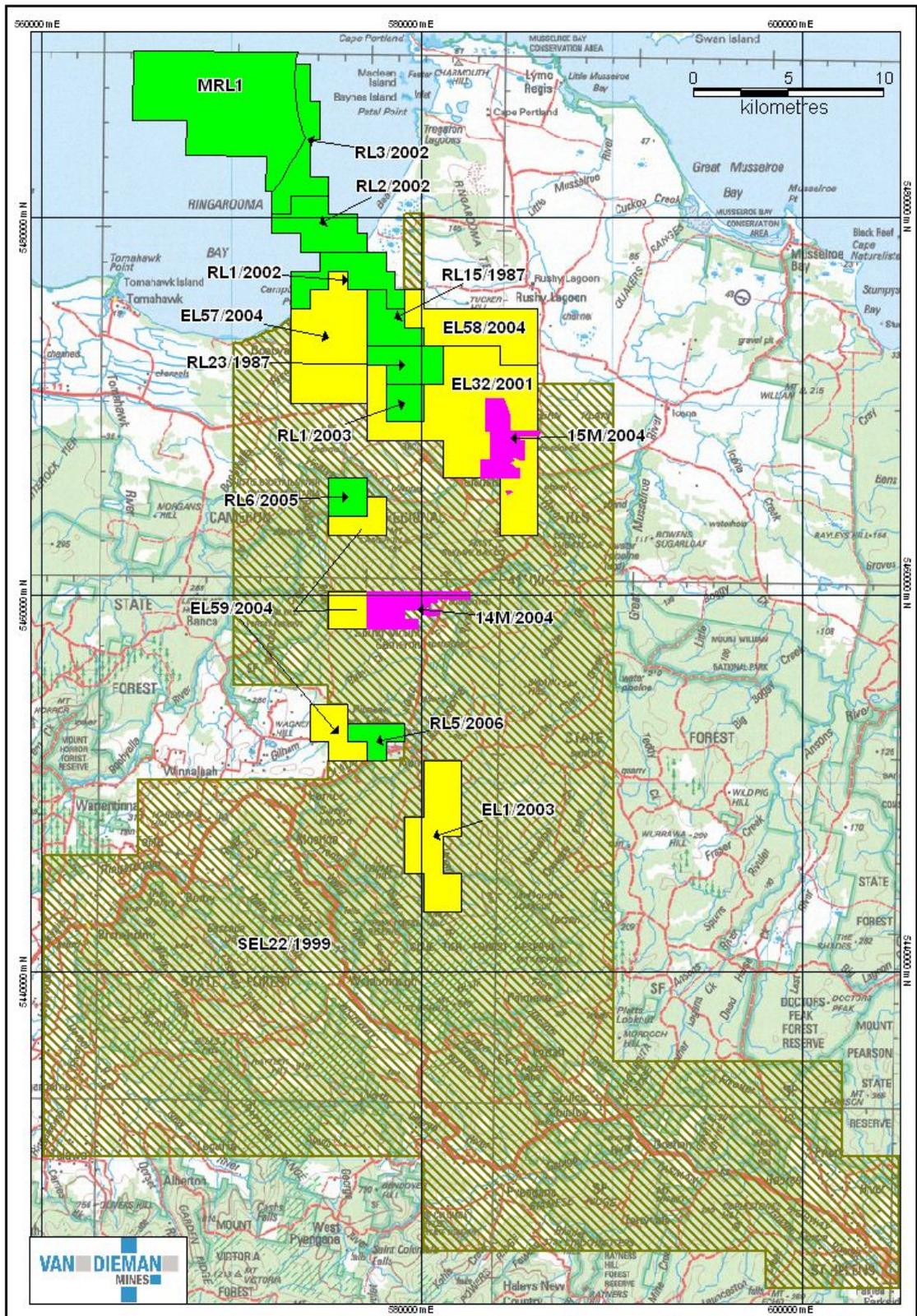


Figure 1 - Tenement Location Map - March, 2006

FIGURE 1 GENERAL LOCATION PLAN

The increase in transparency is significant as many stones exhibit moderate to major rutile silk inclusions that render them non-cuttable. This treatment removes the silk and generally lightens the stone to a very acceptable blue hue. It is also interesting to note that the very low Fe values in Tasmanian stone mean that few stones exhibit the “blue with a green cross table” as is seen elsewhere in Australia. This effectively means that with careful heat treatment, color of stones can be manipulated to a fairly standard blue with no green overtones.

Work programs proposed for the year 2006 include further heat treatment and chemical studies, bulk sampling and a review of the other gem components of the alluvial gravels, zircon, spinel and topaz.

2.0 MARKET REVIEW

Moves to regulate markets, particularly within the USA have increased during the year. The AGTA are now strictly enforcing the “Disclosure Rules” as they apply to any form of enhancement or treatment of gemstones. Dealers are now openly displaying notices such as:

“Natural Unheated”

“Heated”

“Diffused”

Further the advent of “Free Trade” goods is increasing in use, many of the larger gem houses now openly declare that their material is “Free Trade Sourced” and they support this with a clear statement as to provenance and treatments. This has resulted in there being little of the “Be” Diffused yellow sapphire in the market place, or openly in the market place and a shift upwards in prices across the range for blue sapphire.

Our observations at the major shows in 2005 indicate a dramatic shift in the popularity of a number of the colored stones. Table 1 indicates the popularity of the various colored gemstones as the “Top Ten Sellers”. Blue sapphire remains by far the most popular colored gemstone and now appears, as disclosure laws tighten, that it will remain in that position.

Emerald has slipped dramatically in popularity due to ongoing scandals and concerns regarding undisclosed fracture filling and oiling of stones. Similarly tanzanite, irregardless of a very active marketing plan by Tanzanite One and their creation of “Tanzanite Sight Parcels” has slipped in popularity. The gems observed vary dramatically in color and have become unpopular due to their low hardness and brittle nature.

During 2005 the fashion industry and its quirky nature has seen the pastel colored gemstones increase in popularity, Blue Topaz has surged to number 3, fancy sapphire, amethyst, peridot have moved upwards on the list and aquamarine, citrine and rhodolite garnet make an appearance in the top ten sellers.

Tasmanian blue sapphire because of its lighter almost Sri Lankan hue has been well received and we expect, as our product sample range increases, to find more doors opening for sale of both rough and finished product.

TABLE 1
TOP TEN SELLING COLORED GEMSTONES IN THE USA

2001	2002	2003	2004	2005
Blue Sapphire	Blue Sapphire	Blue Sapphire	Blue Sapphire	Blue sapphire
Pearl	Ruby	Ruby	Fancy Sapphire	Ruby
Tanzanite	Emerald	Tanzanite	Ruby	Blue Topaz
Ruby	Tanzanite	Emerald	Tanzanite	Fancy Sapphire
Emerald	Amethyst	Amethyst	Emerald	Amethyst
Amethyst	Rhodolite Garnet	Blue Topaz	Pink Tourmaline	Peridot
Green Tourmaline	Pearl	Tsavorite Garnet	Amethyst	Tanzanite
Rhodolite Garnet	Opal	Aquamarine	Blue Topaz	Emerald
Fancy Sapphire & Pink	Peridot	Opal	Peridot	Aquamarine, Citrine & Opal (Tie)
Tourmaline (Tie)				
Blue Topaz	Blue Topaz	Green Tourmaline	Pearl	Rhodolite Garnet

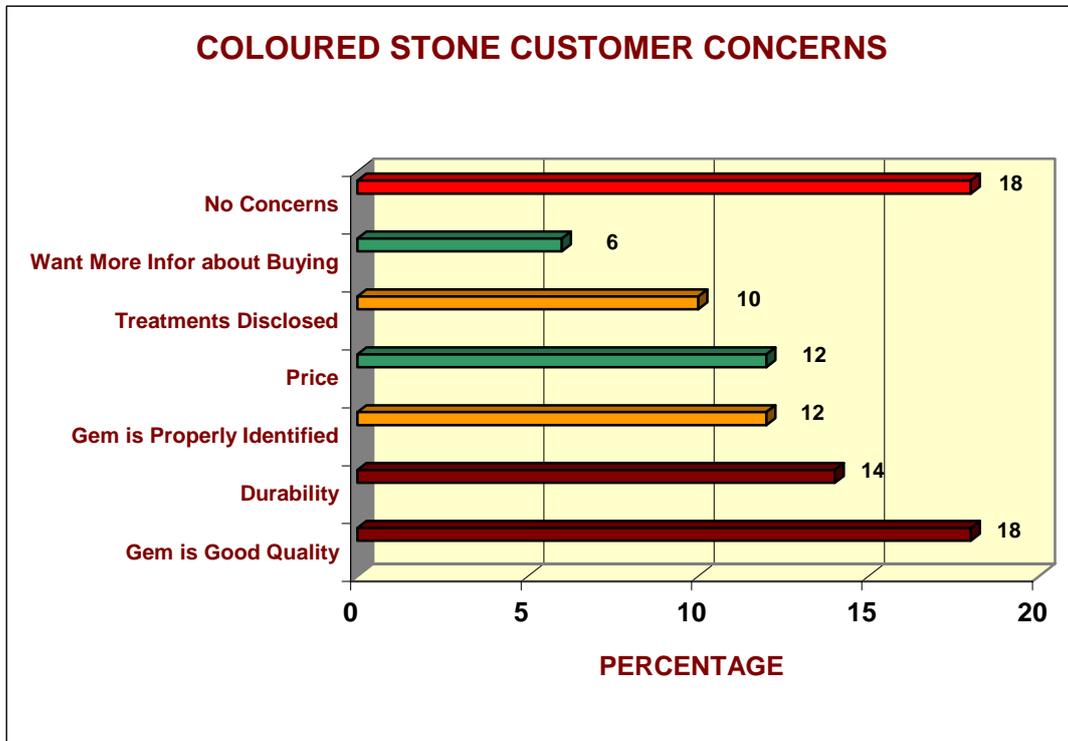
SOURCE: Colored Stone Magazine, January / February 2005 & 2006

Coloured Stone Magazine in their Jan / Feb 2006 issue published a survey of coloured stone customer concerns; this is repeated below in graphical form as Graph 1. In our graph the colors represent more broad groupings, thus treatments and identification represent 22% of the concerns, pricing and buying information 18%, durability and quality 32% and no concern 18%.

Our observations indicate that durability, quality, treatments and identification can be grouped as one at 54%. Up until the “Be”, fracture filling of ruby and emerald and oiling of emerald controversies this figure was running at around 35%.

In 2006 we expect to see the pastel colored stones increase in popularity and to see tanzanite slip further down the chart, emerald will probably remain static, blue topaz and fancy sapphire may displace ruby at number 2 and 3 while sapphire will cement its hold at the top of the list. In mid 2006, with a small inventory of rough from the bulk testing, we propose to present to the market at two major USA shows samples of rough and finished sapphire. It is also anticipated that the company will have a sample inventory of finished black spinel which it will offer as an alternative to black diamond in the mid to low end fashion jewelry.

GRAPH 1
CUSTOMER CONCERNS WHEN BUYING COLOURED STONE



3.0 McGEE HONOURS THESIS

During 2005 the company sponsored Brendan McGee, an Honours student at the University of Tasmania, School of Earth Science, CODES. Brendan's study was entitled "Characteristics and Origin of the Weldborough Sapphire, NE Tasmania".

3.1 AIMS OF THE THESIS

The first aim of this research thesis was to determine the macroscopic, microscopic and chemical characteristics of the Weldborough sapphires. Features such as the physical characteristics (i.e. colour and shape), mineral chemistry, oxygen isotope chemistry, the mineral/fluid inclusion types and geochronology of the sapphires were examined. These were to be used to contrast the sapphires with literature examples and evaluate modern sapphire genesis models.

The second aim of the thesis was to determine the type and location of the primary source of the Weldborough sapphires.

3.2 ABSTRACT

The "Abstract" to the McGee Thesis is repeated here however the reader is referred to the main thesis document so that this Abstract can be read in the correct context.

"Alluvium and colluvium in the Weldborough area, NE Tasmania, yield sapphire, zircon and spinel, corroded by magma and abraded by alluvial transport. Drainage patterns and inferred palaeodrainage indicate the Weldborough basalts are the primary source. The Weldborough intraplate alkali basalts are fine-grained, olivine- and/or clinopyroxene-phyric with varying content of mantle and crustal xenoliths and xenocrysts. Despite extensive study, no sapphire or zircon megacrysts are found in the basalt or related clastic rocks. The Weldborough sapphires are blue (80%), yellow and green (20%) with rare pink sapphires. They contain olivine, feldspar, spinel, zircon, molybdenite and Nb-Ta-rich phases as mineral inclusions. The composition of zircon inclusions indicates the parental melt was highly evolved. Secondary olivine mineral inclusions are present. Primary fluid inclusions indicate a minimum trapping pressure of 4.5 kbar at 1000 to 1200°C. LA-ICPMS analysis indicates the sapphires have iron (2590 ppm), titanium (383 ppm), gallium (258 ppm) and tantalum (186 ppm) as the most abundant trace elements.

Niobium, beryllium, magnesium, vanadium, chromium and tin are low level trace elements in the Weldborough sapphires. Beryllium, titanium, niobium and tantalum are enriched in the cores of the sapphires. Two element associations were recognised in the sapphires: an Fe-V-Ga association and an Nb-Ta-Be association. The Nb-Ta-Be association is typical of input by an incompatible-element rich melt such as a granite pegmatite or a carbonatite. The sapphires have O-isotope values of + 4.4 ‰ to + 6.3 ‰, indicating they are in O-isotope equilibrium with rocks of mantle O-isotopic compositions and little or no crustal interaction is inferred in the source. The zircon inclusions in the sapphires have a U-Pb age of 47 ± 4 Ma which is identical to the age of the Weldborough basalts (46.8 ± 0.6 Ma). The zircon inclusions have been reset during entrainment in basaltic magma. The Weldborough sapphires were entrained and brought to the surface by the Weldborough basalts 47 million years ago. The Weldborough basalts are the source of sapphire, spinel and zircon found in the Ringarooma, George and possibly the Boobyalla River catchments. The broad range of trace element and inclusion data reported here support an origin for the sapphire in shallow parts of the underlying mantle”.

The location of the samples used in the McGee thesis study are depicted on Figure 2.

3.3 SIGNIFICANT RESULTS

It has long been considered that the basalt from Ringarooma, the Weldborough area (includes the Mt Littlechild, Tower Hill, Forest Lodge and outlier basalts), Greys Hill and Mutual Hill are all possible sources of corundum. McGee through his work concludes that:

“The only suitable target for a primary corundum deposit is one (or more) of the alkalic basalt fields that occur in NE Tasmania. This suitability is based on distribution, drainage and literature examples. By reviewing the paleodrainage of the area it is apparent that the basalts and associated basaltic deposits of the Weldborough area the likely primary source for the Weldborough sapphire”.

Further McGee states that his mapping of the basalt outcrop at Weldborough supports previous findings that Mt. Littlechild, Tower Hill and Forest Lodge are small basaltic shield volcanoes.

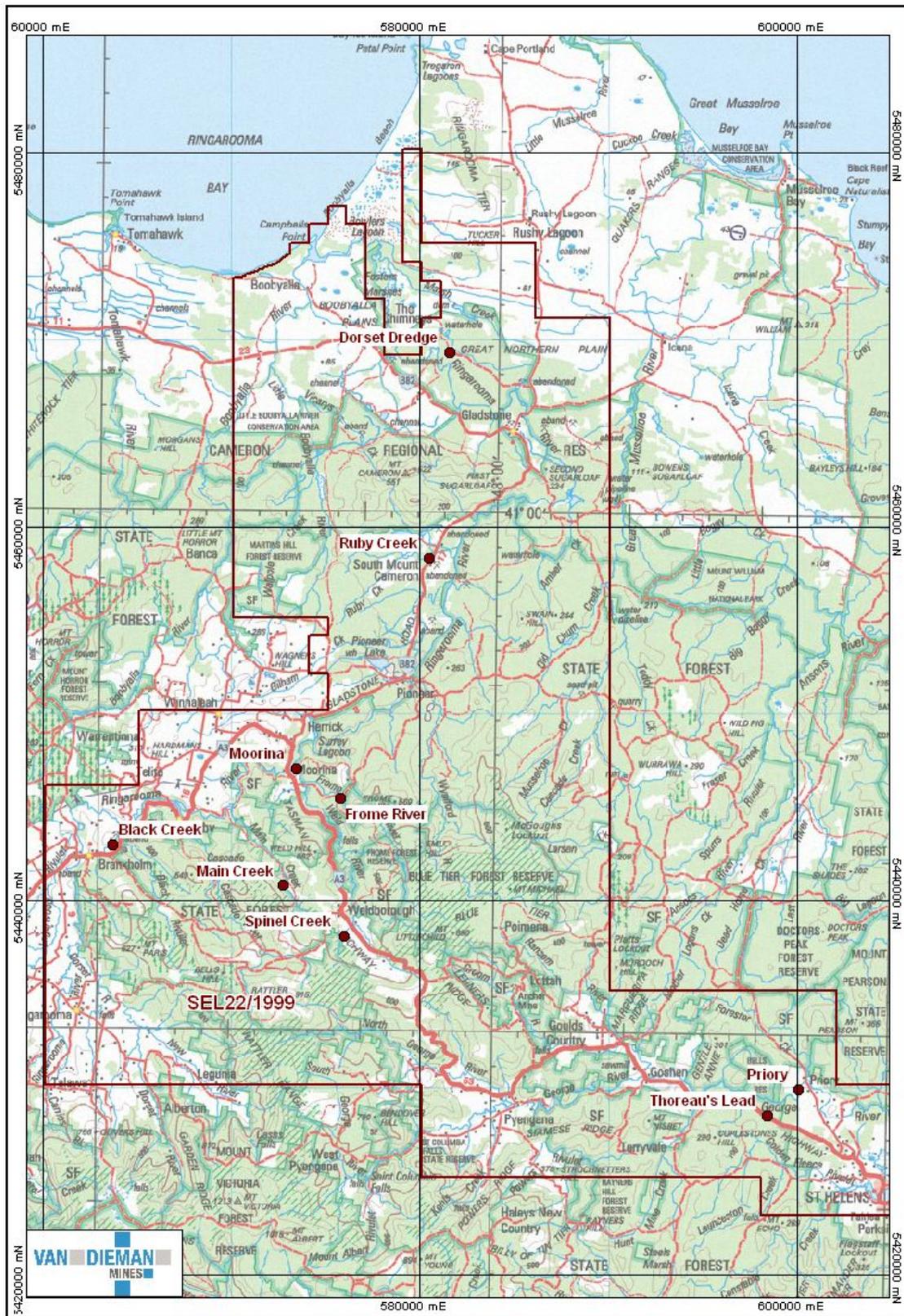


Figure 2 - Sample Location Map - McGee Thesis

FIGURE 2

SAMPLE LOCATION PLAN, MCGEE THESIS

In his geochemical and inclusion studies McGee makes some significant observations. Studies of zircon as inclusions in corundum places the range of age of the zircon between 41 ± 5 and 47 ± 4 Ma giving the zircons a mean age (weighted by data-point errors only) of 45 ± 4 Ma (95% confidence level). Studies of detrital zircons indicate three sources of varying age, specifically:

- 46.7 ± 0.4 Ma (Tertiary)
- 192 ± 3 , 210 ± 4 and 242 ± 1 Ma (Triassic to Early Jurassic)
- 385 ± 5 and 391 ± 3 Ma (Early Devonian).

Given that the Weldborough basalts have K-Ar cooling ages of 46.8 ± 0.6 Ma. And that no other lithologies have similar ages in the area McGee concludes that ***“This is strong evidence to suggest that the Weldborough sapphires were transported to surface by the Weldborough basalts around 47 million years ago”.***

McGee reports that the Weldborough sapphires contain inclusions of olivine, feldspar, molybdenite, spinel, zircon and Nb-Ta rich phases. Feldspar inclusions comprise anorthite and oligoclase. The zircon inclusions have high hafnium (1.8 wt% HfO₂), and uranium (1.3 wt% UO₂), and moderate thorium (0.99 wt% ThO₂). Nb-Ta-rich phases are suspected to be pyrochlore and/or columbite. Molybdenite is unique to the Weldborough sapphire. Olivine is present as a secondary inclusion.

Further he states that the Weldborough sapphires are characterised (Average Values) by iron (2590 ppm), titanium (383 ppm), gallium (258 ppm) and tantalum (186 ppm) as trace elements. Niobium, beryllium, magnesium, vanadium, chromium and tin are minor components of all Weldborough sapphires. Barium, zinc, copper and nickel are only present as constituents of inclusions. The Be content is considered problematic as inclusions of beryl were reported. The company is now conducting check analyses of both the McGee samples and selected samples derived from company bulk testing. This work will continue as new supplies of sapphire are derived from bulk sampling.

McGee believes that the Nb - Ta - Be association indicates that Nb and Ta in elemental and mineral inclusion form can be explained by the input of a granite/syenite pegmatite. This agrees well with the Nb-Ta-Be element association, trace element discrimination diagrams and sapphire color. This would imply that the sapphire was at some stage in close association with a pegmatite or carbonatite source such as the underlying Blue Tier batholith granitic bodies.

The data contained in the thesis is very detailed and comprehensive and should be read in the correct context, the reader is referred to that thesis for further more detailed analyses and conclusions.

4.0 THE CRYSTAL CHEMISTRY PROJECT

In mid 2005 a sample of some 33 sapphires was obtained from a local prospector Louis Wood, these stones were sent to Dr. J. Emmett who operates a corundum testing and heat treatment facility at Brush Prairie near Vancouver, Washington, USA.

4.1 SAMPLE SUITE

Samples were derived from the following locations:

Main Creek;
Frome River;
Weldborough; and
Moorina.

The dogs tooth crystals were derived from the headwaters of the Frome River and are indicative of a very local source, two distinct types of sapphire were derived from that location. The orange tinted material was derived from a tributary of Main Creek. Weldborough and Moorina samples were silky blue.

4.2 TREATMENT TECHNIQUES

The “raw” stones were Acid cleaned and sorted of the rough to eliminate all non-corundum minerals. The sorting is combination of all or some of the following processes; in part a visual sort, a fluorescence sort and a density separation by immersion in methylene iodide. The corundum is then sorted into visually similar groups. A group might be fully opaque and thus have no gem value or silky and require treatment. Some groups will have to be processed through different furnace process because they are chemically different.

The stones were then photographed on the surface of a light box (primarily transmitted light). In order to standardize lighting the first frame of each roll of film used is a photograph of a neutral density filter, in this case a grey square. Using this method enabled Emmett to color correct the film and match colors roll to roll. Matching was done by:

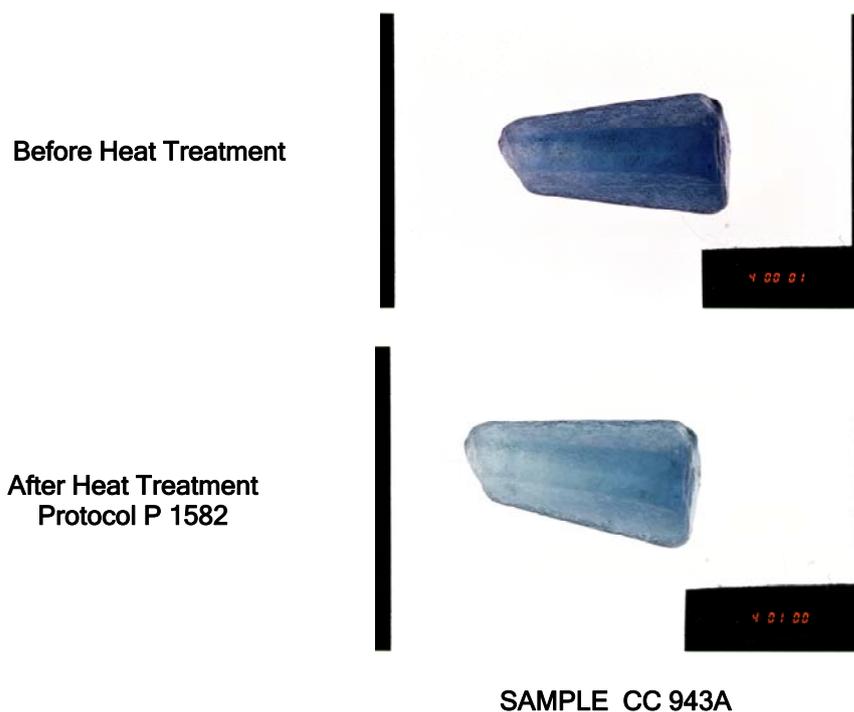
- Scanning the developed film with a Nikon scanner;
- Matching grey squares using Adobe Photoshop software using color space Adobe 1998;
- Convert image files to ICC color space of a Fuji 370 Frontier printmaker; and
- Print images.

Using this technique the relative colors are very precise and the smallest color changes observed in the images are real.

Each group was then processed separately in a furnace. The furnace process might be a single furnace run, or as many as three sequential runs each with a different process. Following each procedure the stones were again photographed and each frame color adjusted as above. Some stones were then selected for further treatment, in this case color lightening or darkening and again re-photographed. The processes used by Emmett are proprietary however the coding used generally represents the process, for example:

- P1582 is a high temperature process in an oxidizing atmosphere;
- P976 is a high temperature process in a mildly reducing atmosphere; and
- P2524 is a very high temperature heat treatment process in a strongly oxidizing atmosphere.

The photos are presented here as 'jpg' files, each folder represents the full suite of photos for one stone.



Thus in Folder CC 943A-1; photo 4 00 01 represents the untreated stone and photo 4 01 00 represents the stone after heat treatment in a high temperature oxidizing atmosphere. The full suite of photos appear as Appendix 9.2.

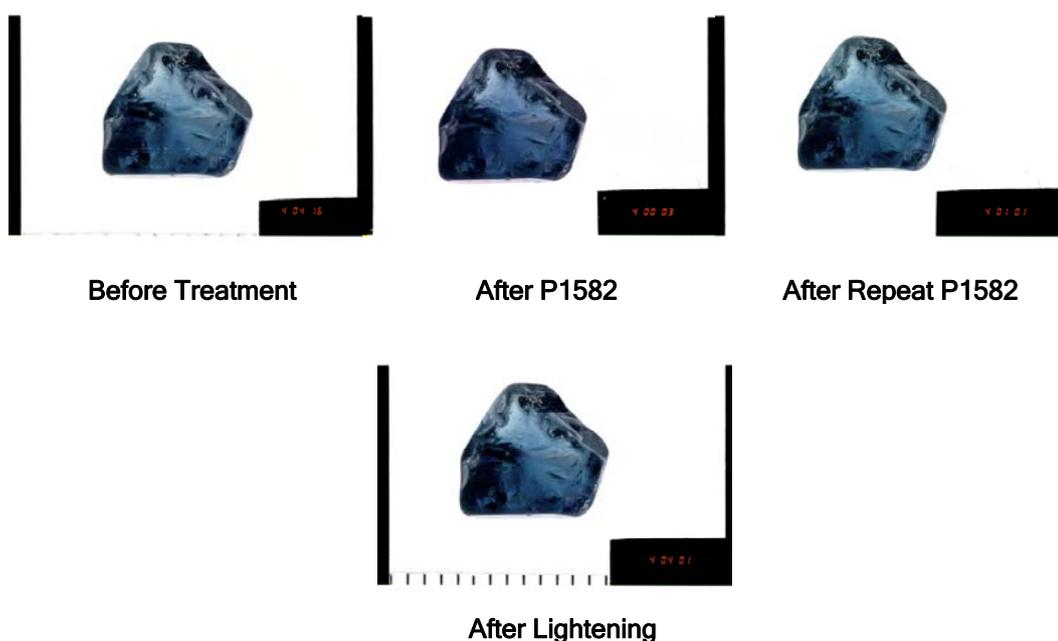
4.3 SUMMARY OF RESULTS

The treatments applied by Emmett resulted in a dramatic increase in transparency for all stones. This is basically the removal of the silky effect imparted onto the stone by the presence of rutile needles in the crystal. The transparency is difficult to see from the photographs as the surfaces of the stones are rough thus masking their internal clarity.

The low Fe levels have enabled the color or hues to be manipulated by further heat treatment and the absence of a green cross-table in all stones has eliminated the green cast or peacock blue color so commonly observed in treated stone from elsewhere in Australia.

The observation that the stones are from chemically different sources is also significant particularly as Emmett was not aware that the sources were different before he started treatment. It appears that different sections of the older basalt flows and associated pyroclastic rocks imparted subtly different compositions to the contained sapphire.

The ability to manipulate color by conventional heat treatment without any requirement to diffuse the stones with "Third Party" elements is very important. This is feature is depicted in the following photos.



This will enable the company to give any rough requiring treatment (that is improve transparency or remove color graduation through the stone) an initial heat treatment, cut the stones and then adjust the color of any batch to a more consistent blue at a specific hue or shade.

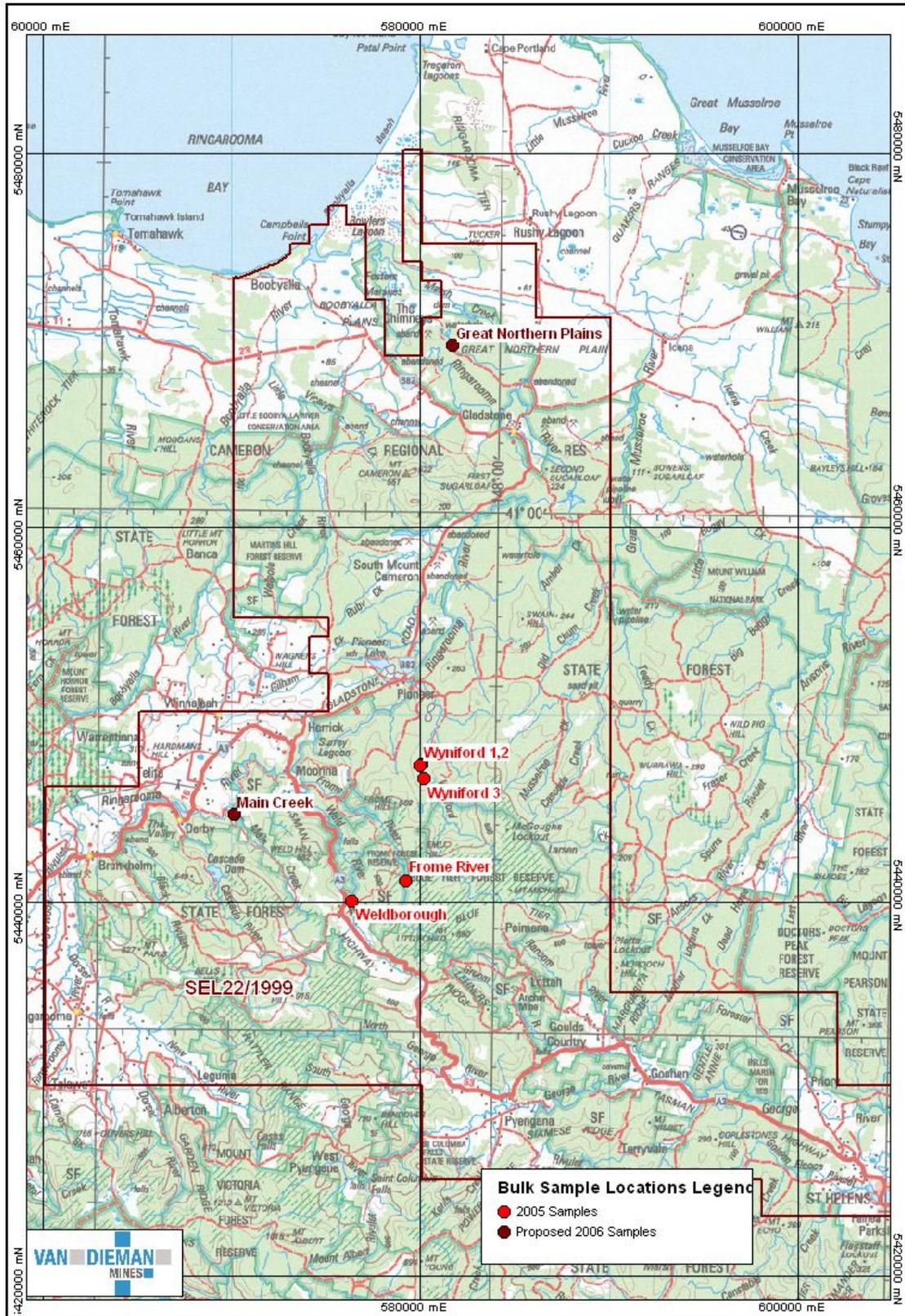


Figure 3 - Bulk Sample Location Map

FIGURE 3

BULK SAMPLE LOCATION SITES

The company has completed alterations to bring the plant into line with AS Electrical and Safety Standards and has altered the flowsheet circuit to improve recovery. Figure 4 depicts the new flowsheet.

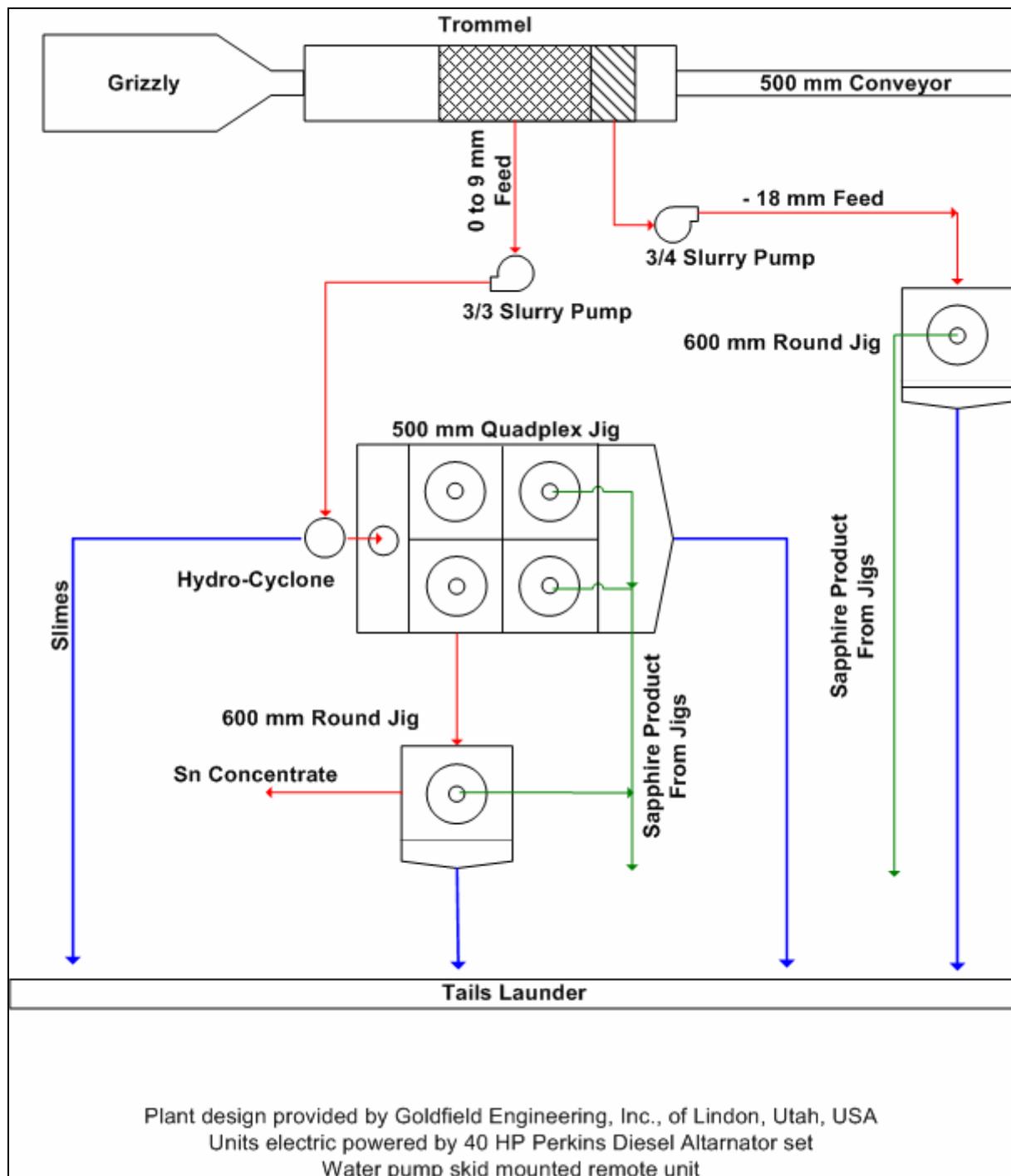


FIGURE 4 - MODIFIED PILOT PLANT FLOWSHEET

5.2 SAMPLE TREATMENT PROTOCOLS

The following procedure details the handling of samples from the treatment plant through to the final production of finished gem material. It is proposed during 2006 to extend sampling to three other gem materials; spinel, zircon and topaz. In summary each sample will be treated in the following fashion:

- **Bulk Sample:** Excavated using a 20 tonne tracked excavator, measurement of volume taken from both physical measurement of the hole (bank cubic metres) and by counting of excavator buckets (loose cubic metres). Each sample stockpiled individually;
- **Processing:** Sample volume fed to plant measured by counting loader buckets and reported as loose cubic metres;
- **Plant Products:** At the end of each day the product from top of the primary jig screen will be extracted and pumped to a holding bin, the product from the top of the second jig screen will be treated in a similar fashion. Any concentrate obtained from the underflow of the second jig (predominantly tin) will be retained;
- **Jig Products:** Will be magnetically separated to remove jig ragging (steel punchings). Heavy mineral residues containing a bulky spinel fraction, zircon, sapphire and topaz will be bagged for shipment to the USA for further treatment;
- **USA Protocols:** Residues will be passed through a Plietz Jig to concentrate gem materials, the concentrate will be screened and each fraction hand inspected with sapphire, spinel and other gem removed to separate concentrates:

Sapphire - will be sorted into gem (for immediate cutting) and treating materials (passed to Crystal Chemistry for heat treatment). Once heat treatment has been conducted all the stone will be proceed to cutting, once cut the stone will be assessed and re-heated as and if necessary. Final finished product will be graded, valued and certified (provenanced);

Spinel - all black spinel above 3 mm will be proceed to cutting, once complete it will be graded, valued and certified;

Topaz - will be collected and assessed, material deemed suitable for cutting will be sent to a "linear accelerator" for treatment (blue coloration) and cut on return;

Zircon - while it is unlikely any large zircon (suitable for cutting) will occur in the concentrates zircon will be collected and passed for assessment.

It should be noted that the secondary gem minerals as out in the above protocols are not considered of primary interest rather as they will be present in the gem concentrates it seems prudent for the company to determine if they have any additional value and are worth collecting and processing. Sapphire remains the principal gem material sought.

5.3 GEOCHEMICAL TEST WORK

In light of the chemical results obtained by Brendan McGee the company has decided to continue and extend his studies. The samples tested by him have been forwarded to Crystal Chemistry who will undertake the following work:

- re-fabricate the McGee samples with strict cross contamination and cleaning protocols, and then choose
- additional samples from the individual creeks from which McGee chose his samples and in addition, will include samples from the company's proposed bulk testing, and then
- submit them to Steve Novak at Evans East for SIMS analysis.

Novak and Crystal Chemistry have element-in-sapphire standards made by ion implantation for most of the relevant elements including beryllium. Using this procedure it is thus possible to establish absolute trace element concentrations for this material not just relative concentrations.

It is proposed to test three points on each sample to ensure absolute reliability.

5.4 MARKETING

The marketing and business plan is currently in draft format and requires more information about Tasmanian sapphire and its value prior to completion of the plan. It is envisaged that this information should be available mid 2006.

By mid 2006 the company should have a sufficient suite of sapphire to enable active marketing of both rough and finished product to be undertaken. It is proposed that the company, through several USA associates, exhibit examples of the finished and rough material at the AGTA Las Vegas Show and the later JA Show in New York.

6.0 CONCLUSIONS

Exploration, research and market studies during the year have greatly added to the company's knowledge base in relation to Tasmanian sapphire, specifically it can be concluded that:

- Market studies indicate that blue sapphire retains its popularity and is set to continue to do so for the foreseeable future;
- The ability of the company to guarantee provenance of the sapphire will be an important aspect of a successful marketing operation for both rough and finished product.
- The sapphire in north east Tasmania was carried to the surface by the Weldborough basalts about 47 Ma;
- At some point the sapphire was in contact with or had some input from an incompatible-element rich melt such as a granite pegmatite or a carbonatite;
- There is evidence to suggest that while the sapphire is genetically related to the basalts there appear to have been a number of varying sources within the basalts, that is, sapphire derived from petrologically different lava types; and
- While many stones require no treatment other than cutting a proportion that exhibit uneven coloration and silky inclusions can be successfully heat treated to improve transparency, color saturation and even out color variations.

7.0 RECOMMENDATIONS

Based on work conducted during the year ending 8th August 2005 it is recommended that:

- The bulk sampling program be commenced as soon as approvals are in place and as weather permits with all gem product being passed on to Crystal Chemistry for assessment, heat treatment, cutting and valuation;
- Chemical testing of the McGee samples and a suite of new samples be immediately undertaken as set out in the preceding text;
- New applications made for additional test sites.

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9.0 APPENDICES

9.1 THESIS, BRENDAN McGEE

SEE VOLUME II

Appendices in two bound volumes.

Note these are abridged versions of the McGee

Appendices reformatted to enable printing.

Full copies appear in the electronic files

9.2 PHOTOGRAPHS - CRYSTAL CHEMISTRY

SEE VOLUME III