

**Brilliant Brumby Project:  
Northeast Queensland, Australia  
Competent Persons Report (CPR)**

**for:**

**Brumby Group Pty Ltd  
Southport, Queensland  
Australia**



by

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Houston, Texas and Seattle, Washington  
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## **Section 1.0 Executive Summary**

- The area in and around the Brilliant Brumby tenement has been explored for decades, but many sites within the tenement remain under investigated and untested. The general area has received only superficial investigation to date on the obvious fracture zones and associated geological structures.
- Previous exploration programs have not located significant deposits, but have pointed to new areas of focus for the current exploration program to pursue.
- I2M Associates, LLC (I2M) confirms that exploration on the subject tenement will benefit from the data produced over 30 years of exploration within and around the tenement and will assist the current exploration in designating priority areas that were not investigated previously. This will improve the likelihood of making new discoveries within the tenement.
- I2M supports the selection of the three priority areas proposed by Circle Resources to the Brumby Group for follow-up aggressive exploration on: 1) the Brilliant Brumby Trend, 2) the far northeast area of the tenement where the Lolworth Trend intersects the northeast fracture zone, and 3) the Early Bird area in the north-central area of the tenement as a blind prospect with geophysical support has potential for high-sulfide mineralization.
- I2M recommends two additional priority exploration areas as: 4) the main northeast fracture zone trending northeast through the tenement, and 5) the area of Tertiary cover near the southern boundary of the tenement, especially where the northeast fracture zone is covered by Tertiary sediments.
- I2M evaluated the deposits of surrounding mines and advanced exploration programs and has concluded that all such deposits may have an analogy near the surface or at depth within the subject tenement, with special emphasis on the Pajingo deposits south of Charters Towers that should be examined in detail for any relevant exploration methods that may be useful to the subject tenement.
- I2M agrees with Circle Resources that having an experienced consultant such as Terra Search, who has specific previous experience in and around the subject tenement, will benefit the current exploration program.
- I2M encourages the Brumby Group to aggressively fund the exploration on the subject EPM over a number of years on the basis that this tenement is a high-quality prospect.

## Section 2.0 Project Summary

The Brilliant Brumby tenement lies within the Pentland District where the early Paleozoic Igneous Belt is bounded by deep-seated faults to the north and south. The District is characterized by widespread shows of gold and to a lesser degree by base-metal mineralization. This suggests that the geological setting is generally favorable for significant mineralization to be present in the district. Major historical deposits are well known in the Charters Towers area located in vein systems having produced over 224 tonnes of gold and other metals in associated mineralized zones. The Brilliant Brumby project area of EPM 18419 is centered over a prospective portion of the Pentland District that includes several historic mines that have recovered precious metals (gold and silver) from shafts and adits, and advanced prospects that have received sporadic exploration over the past 25 years.

Major historical and exploration results to date are:

- The Brilliant Brumby Mine's total recorded production was 790 ozs (24.6 kg) from 950 tons of ore. Mineralization at the Brilliant Brumby Mine is hosted by quartz veining trending north-south, in contrast to the general NE-SW trend of major faults and lineaments.
- Reconnaissance and sampling around and to the south of the Brumby workings located more workings not marked on the geological sheets and apparently not under claim; also located was a mineralized quartz zone displaying similar characteristics to those at the Brumby Mine. Sample results from this zone (1-1.5 meter x 300 meters) were anomalous, ranging from 0.11 g/t to 4.96 g/t gold, and averaging 0.95 g/t gold.
- The Surprise Mine located near the northwestern boundary of the tenement is a prospect that appears not to have been worked for many years. The workings are of limited strike extent but alteration exists over a reasonable width, in the order of 50 meters. The alteration zone was found to carry 0.16 g/t gold, the quartz 1.07 g/t gold.

Based on the available historical reports, several key geological elements make the Pentland District especially prospective:

- The numerous shows of precious metal mineralization and surface geochemical anomalies.

- The presence of multiple high-level intrusives associated with known gold mineralization.
- North and northeast trending deep-seated fault structures with localized magnetic low intensity features adjacent to previous small-scale mining. These could be areas of alteration related to extension or structural intersections.
- The prospective Devonian Lolworth Granite which is the same age as the mineralized host at the Charters Towers Complex and Mundic Igneous Complex, and its volcanic equivalents.

### **Section 3.0 Introduction**

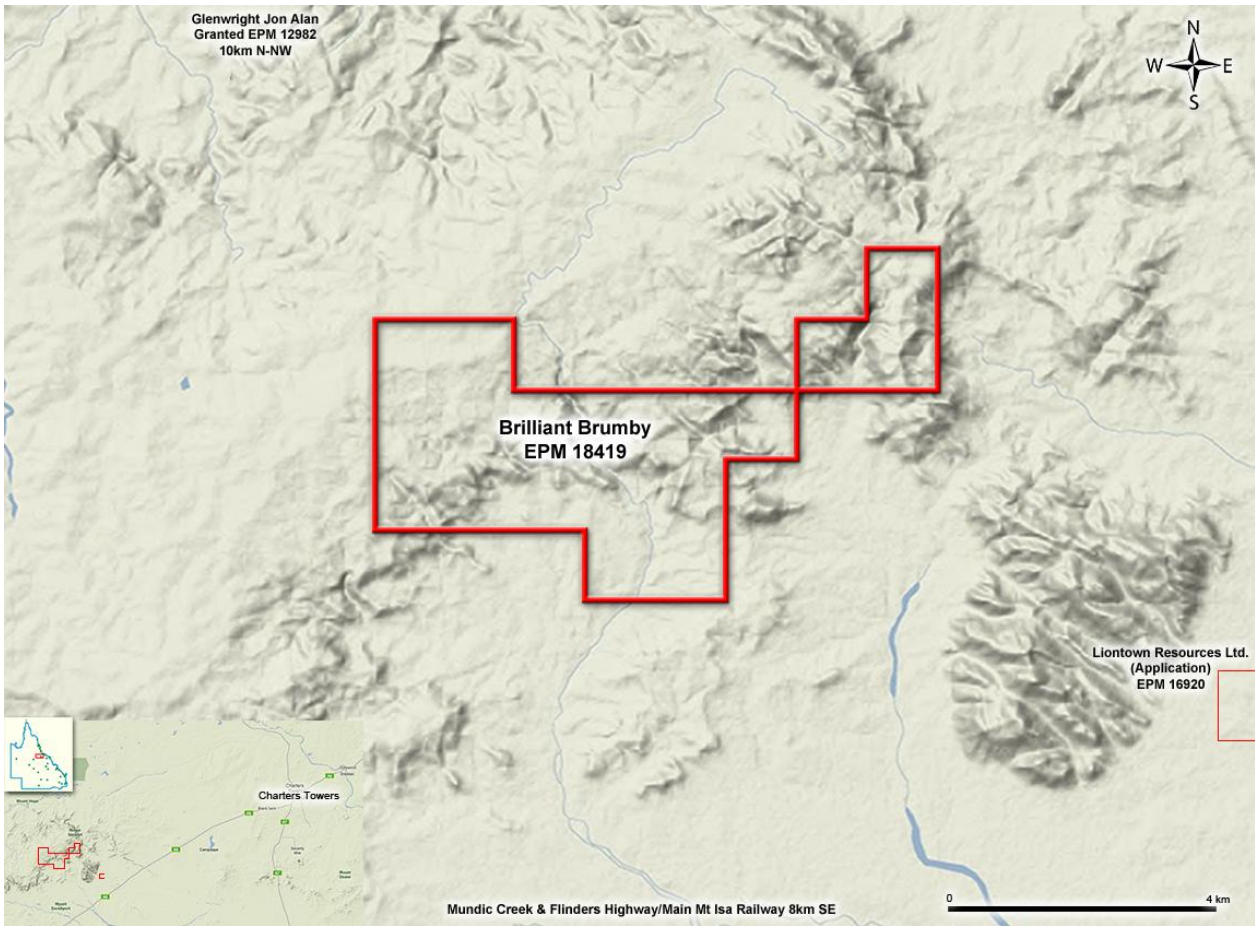
The Brumby Group engaged I2M Associates, LLC (I2M) on November 25, 2010 to provide an independent assessment and review of the current technical information and of the potential merit of future exploration and development plans for the Brilliant Brumby tenement located in Northeast Queensland, (see Figure 1). This report is to be used by the Brumby Group as part of a future listing on the London Stock Exchange's International Market (AIM).

#### **3.1 Location of Property**

EPM 18419 was named after the Brilliant Brumby Mine, which is located southwest of Mount Stewart and approximately five miles northwest of Mount Stewart Homestead. The center of the EPM is located about 27 km north of the Flinders Highway about 75 km southwest of Charters Towers and some 215 km southwest of Townsville, Queensland (see Figures 1 and 2B).

#### **3.2 Scope of Work**

This report has been prepared based on our review of the available internal documents from Circle Resources and the Brumby Group, and on information provided by their principal consultant, Terra Search Pty Ltd (Terra Search) located in Townsville, Queensland. Additional information has been obtained from various Queensland governmental agencies, from the available geoscience literature, and from the files of I2M Associates, LLC in Houston, Texas, and Seattle, Washington.



**Figure 1**  
**General Location of the Brilliant Brumby Tenement**

For this report, I2M personnel carried out the following tasks:

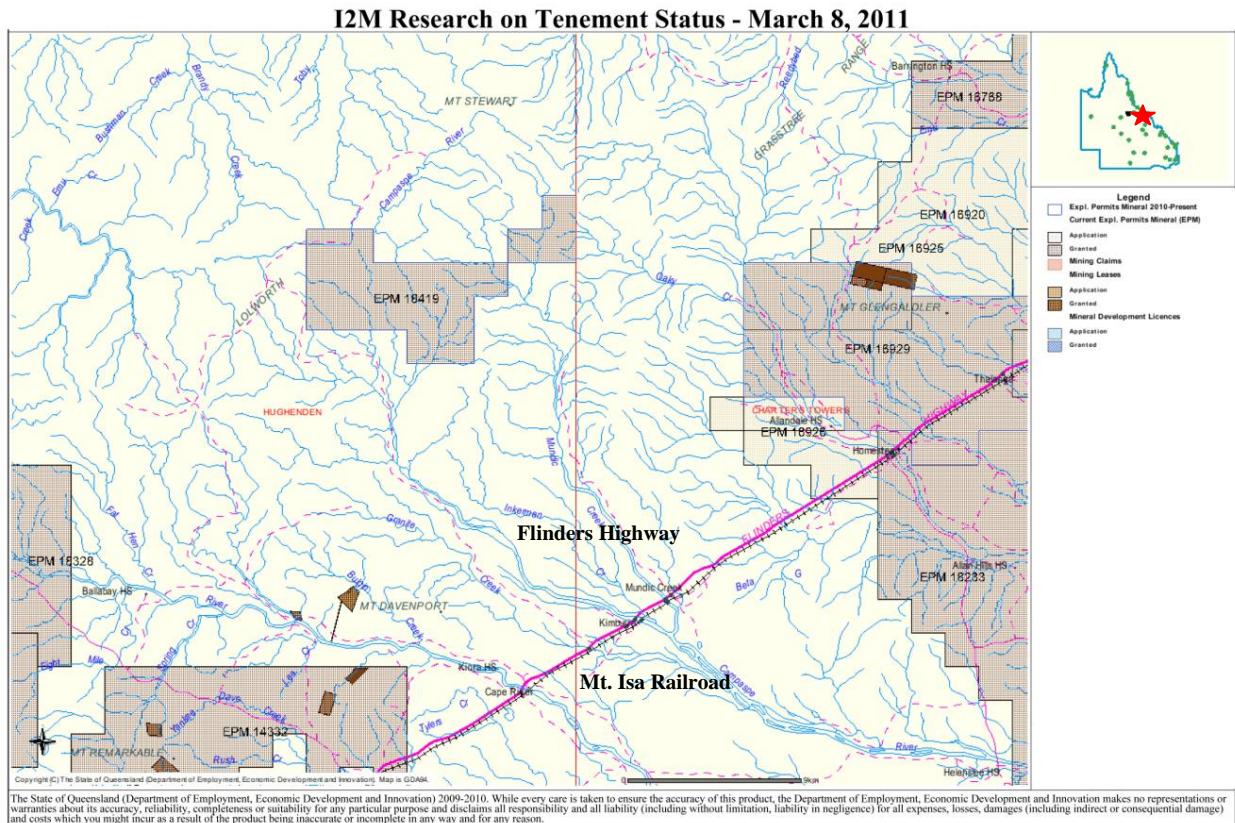
- Discussions on December 15, 2010 with senior personnel of the Queensland Department of Mines and Exploration (DME) in Brisbane, Queensland regarding Department activities in Northeast Queensland.
- Discussions with Queensland Environmental Protection Agency senior personnel Townsville, Queensland on December 16, 2010 regarding potential environmental issues should Brilliant Brumby be developed as a mining operation.
- Discussions with Terra Search Personnel, Townsville, Qld. on December 17, 2010 regarding their results to date, with special emphasis on their exploration plans.
- Site visit to the Brilliant Brumby tenement and environs southwest of Charters Towers, Qld. on December 18, 2010.



- Independent review of historical reports on previous exploration from the 1970s to date concerning the Brilliant Brumby EPM area and environs.
- Independent geological assessment of the reported mineralized zones in and around the EPM in context with other similar deposits nearby that have been studied by others in detail.
- Independent assessment of the basis for pursuing additional exploration at the Brilliant Brumby tenement.

### 3.3 Brilliant Brumby Tenement

The Brilliant Brumby tenement was filed in application in December, 2009 and was subsequently granted in May, 2010. The general location of the tenement (EPM 18419) is shown in Figure 2A.

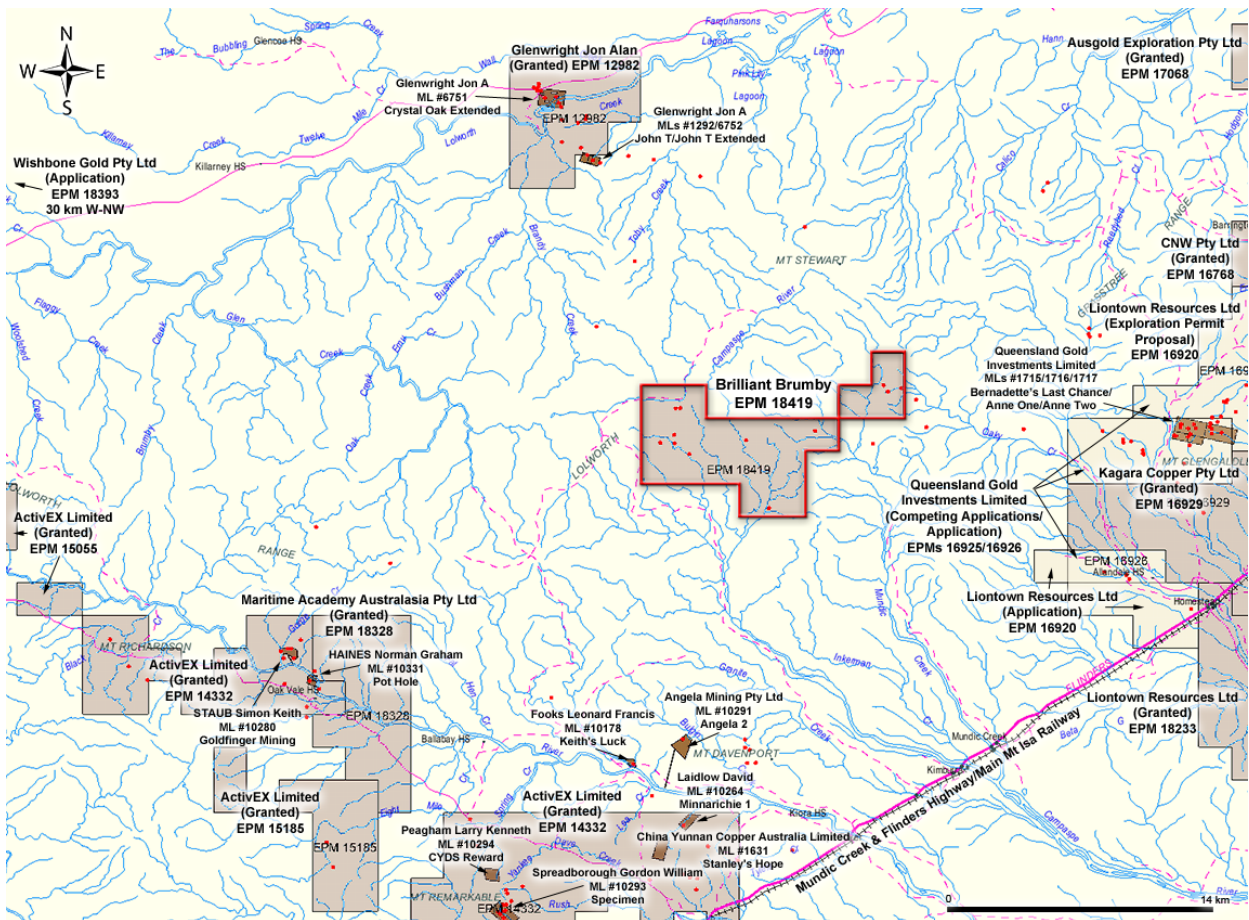


**Figure 2A - Brilliant Brumby & Surrounding Tenements**

Source: QDEX Tenement Database (As of March 8, 2011)

This shows the location of the tenement and the immediately surrounding tenements and mining leases (shown in dark patterns). The regulatory status of the tenements shown is either “granted” (medium-brown shade) or “application” status (shown in light-brown shade). There are no mining

leases currently located within the Brilliant Brumby tenement. Figure 2B presents the current tenement holders at a distance of more than 9 km from the center of the Brilliant Brumby tenement (aka the subject tenement or EPM). Additional information is provided on other companies with tenements either granted or in application stage surrounding the Brilliant Brumby tenement in Section 16.0 - Adjacent Properties (Tenements).



**Figure 2B – Expanded Detail of Surrounding Tenements**  
 Source: QDEX Tenement Database (As of March 26, 2011)

The above tenement boundaries were confirmed as of March 26, 2011 with the DME database (see citation and link: Section 22.0 - References). It should be noted that tenement boundaries plotted in all figures in this report are approximate only.

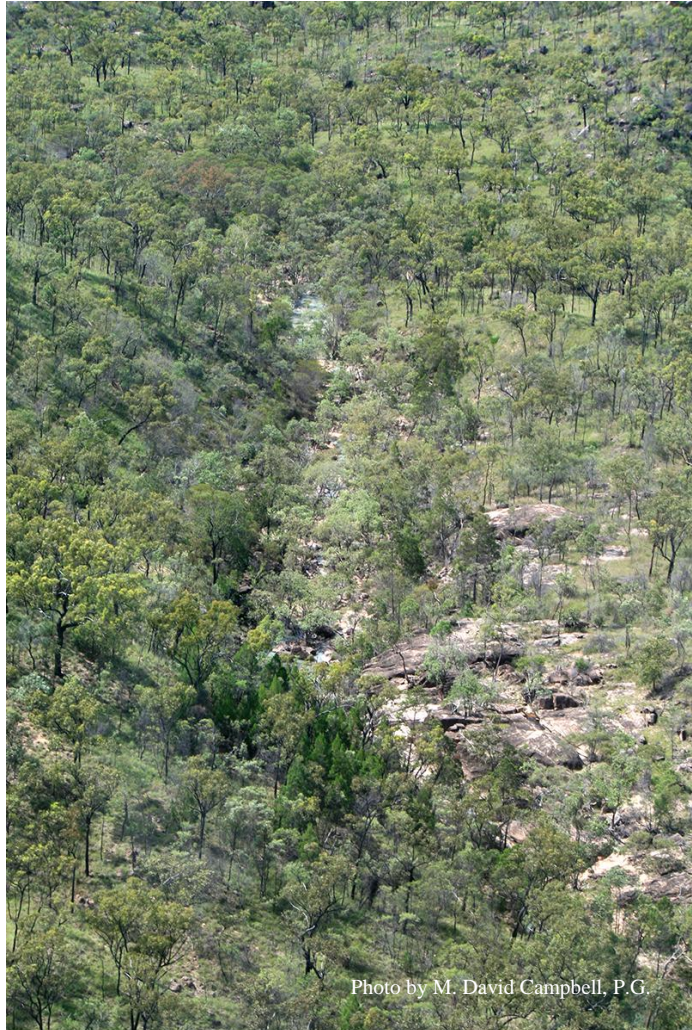
During December 18, 2010, I2M personnel, consisting of Michael D. Campbell, P.G., P.H., Thomas C. Sutton, Ph.D., P.G., and M. David Campbell, P.G., visited the subject tenement by helicopter and

on foot. I2M personnel also observed the Brilliant Brumby workings and the terrain in the area (see Figures 3 and 4).

### 3.4 Units

The Metric System is the primary system of measure and length used in this Report and is generally expressed in km (km), meters (m), and centimeters (cm); volume is expressed as cubic meters (m<sup>3</sup>); mass is expressed as metric tonnes (t); area as hectares (ha); laboratory analyses are reported as elements or are converted to oxide percents (in parts per million (ppm)). Grams per tonne (g/t) is an equivalent unit to ppm. One tonne is the equivalent of 2,204.6 lbs. A list of standard technical abbreviations are given in Appendix I.

Monetary units are treated as Australian Dollars. Mining and mineral acronyms in this report conform to mineral industry-accepted usage. The reader is directed to the glossary of commonly used terms:



[www.maden.hacettepe.edu.tr/dmmrt/index.html](http://www.maden.hacettepe.edu.tr/dmmrt/index.html).

**Figure 3 – Aerial View of the Brilliant Brumby Mine Area**

## Section 4.0 Reliance on Other Experts

The authors of this report have relied on the information made available from Circle Resources, Ltd., the Brumby Group, the technical literature and company reports made available online by personnel of the Geological Survey of Queensland, and from the I2M library. Queensland exploration reports were recovered using an Internet document-management system called QDEX

(Queensland Digital EXploration Reports system), which contains thousands of company reports, associated figures, tables, maps, and geophysical information from the 1960s to the present on mineral exploration and development projects in Queensland. The reports consulted have been cited in this report and are listed in Section 22.0 - References.



**Figure 4 – Site Visit Personnel at the Brilliant Brumby Mine Site**

The I2M personnel selected for this project also included Thomas C. Sutton, Ph.D., P.G., and M. David Campbell, P.G. Their resumes may be viewed in Section 25.0 - Appendix IV. During the week of December 12, 2010, I2M personnel met in Brisbane with Mr. David Mason, Executive Director, Geological Survey of Queensland, Department of Employment, Economic Development and Innovation; Mr. Terry Denaro, BSc (Hons) - Project Leader-Mineral Geoscience, Geological Survey of Queensland, Queensland Government Department of Mines and Energy; and with Mr. Ian Withnall, BSc (Hons), FGSAust - Geoscience Manager - Minerals, Geological Survey of Queensland, Queensland Mines and Energy, Department of Employment, Economic Development and Innovation, to discuss the geological information available in the area of the Brilliant Brumby tenement.

On December 16, I2M personnel met with Mr. Kevin Doyle, representative of Circle Resources, Ltd. in Townsville to discuss the status of the project, and with Ms. Tania Laurencont, Manager - Environment, Queensland Environmental Protection Agency and associated staff members to discuss environmental matters that may impact current and future exploration and mining operations on the Brilliant Brumby tenement.

During December 17, 2010, I2M personnel met with Simon Beams, Ph.D., Principal Geologist, and Mr. Tim Beams, B.Sc., Geophysicist, of Terra Search to discuss the status of the Brilliant Brumby project. On December 18, 2010, I2M personnel, in the company of Mr. Kevin Doyle, conducted a site visit of the Brilliant Brumby tenement by helicopter and on the ground, with special emphasis on their future exploration plans. The next day, I2M personnel visited James Cook University to consult the library for any geological reports focusing on the area of interest.

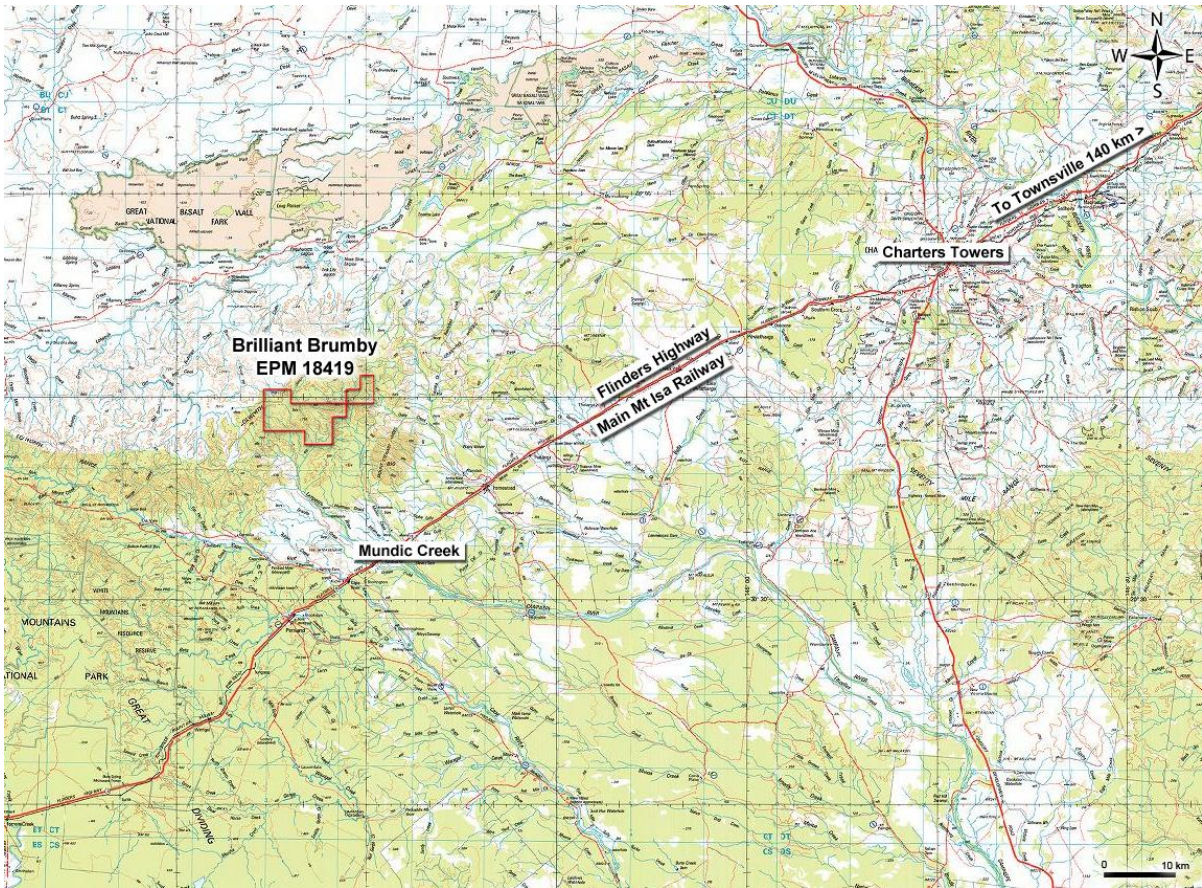
I2M personnel were also provided with copies of the technical reports and some of the associated literature on past exploration on the Brilliant Brumby tenement. Input was also subsequently received from the Brumby Group management regarding current land status (see Sections 5.2 and 5.3).

## **Section 5.0 Property Description and Location**

### **5.1 General Description**

The Lolworth Range is a major topographical feature rising more than 500 meters above the surrounding plains. The range has the form of a large plateau sloping down to the west. The edges of the plateau are being incised and form an extremely rugged landscape around a relatively low relief upper plain. The rugged topography in the Lolworth Range area is one of the main reasons the area has remained under-explored.

The EPM is located 27 km north of the township of Pentland on the Flinders Highway southwest of Charters Towers, in north Queensland. Access is by an unsealed track which leaves Flinders Highway at Mundic Creek and heads north along the Campaspe River for 27 miles. Access to the area by vehicle can be difficult due to the rugged terrain and thick scrub (see Figure 3). Location and access are shown in Figures 2B and 5. Station holders for Mt. Stewart Station and Allandale Station are listed just below Table 1.



**Figure 5 - Section of Topographic Sheet (100,000 sheet), showing the Brilliant Brumby Tenement and Infrastructure (roads, tracks, railroad, and creeks).**

## 5.2 Property Ownership and Financial Obligations

Brumby Group Pty Ltd, domiciled in Queensland, Australia, is a 100%-owned subsidiary of Brilliant Brumby Holdings Ltd. We understand that Circle Resources has conveyed the rights of the Brilliant Brumby EPM to the Brumby Group. The financial obligations of holding the Brilliant Brumby tenement include yearly rentals and a commitment to a minimum yearly expenditure for exploration in the area held. We have included our estimates of the likely rentals fees in Table 2. It is the responsibility of the EPM holder to check the current rental rate and to pay the rentals before the indicated due date. The anticipated increase in the annual rental rates through 2012 have been estimated at \$6.30 and are incorporated in Table 2. The EPM must be reduced in size by sub block periodically, as required by the Queensland Department of Mines and Environment (DME). At some point in the exploration program, assuming results are favorable, a Mineral Development

License (MDL) and lease will be required to permit a mining venture to proceed. The MDL is designed to allow time to conduct various permitting requirements, one of which will be the confirmation of a Native Title Agreement. Others include agreements on water-use rights, railway agreements (if possible), and others focusing on the construction of facilities or infrastructure, and with the holder of any overlapping MDL (see Section 5.4 - Permitting).

The Brilliant Brumby EPM currently holds 18 sub-blocks within the Lolworth (7957) 100,000 map sheet, described in Table 1. The sub-block assignments and general location are shown in Figure 6.

**Table 1**  
**Brilliant Brumby EPM Holdings**

Sheet Name	Sheet Reference	Block	Sub Block	Date Granted	Initial Holder
Clermont	SF55	162	z	May 10, 2010	Circle Resources, Pty Ltd.
Clermont	SF55	233	c,d,h,j,k,n,o,p	May 10, 2010	Circle Resources, Pty Ltd.
Clermont	SF55	234	d,e,f,g,h,l,m,q,r	May 10, 2010	Circle Resources, Pty Ltd.

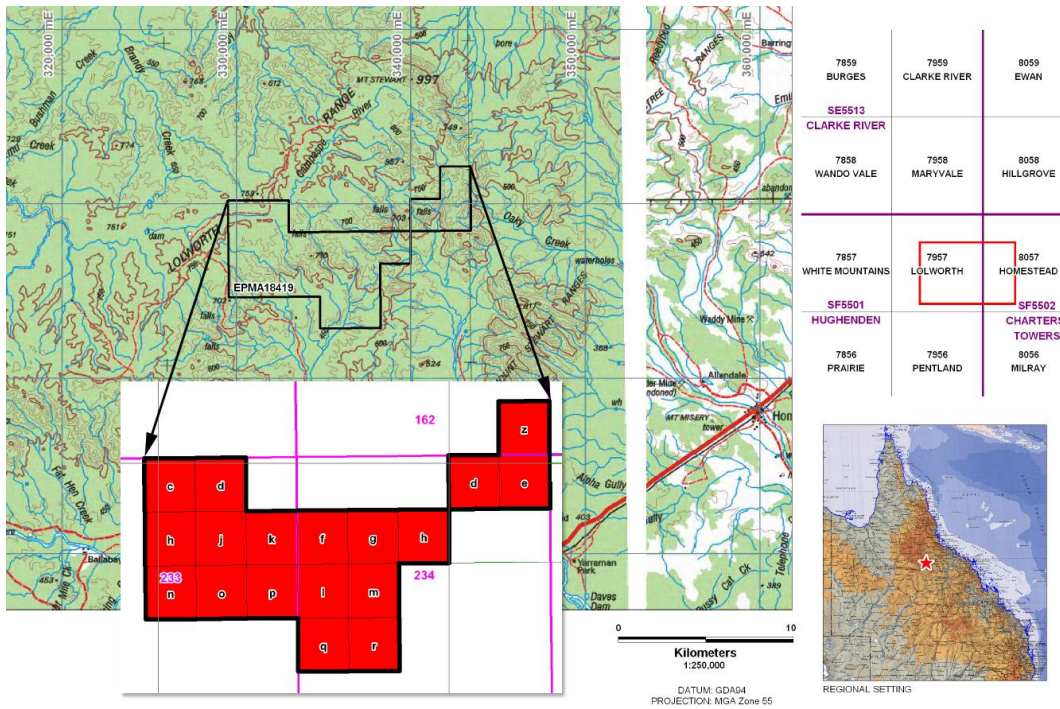
Station Holders were listed as:

<b>Mt. Stewart Station</b>	<b>Allandale Station</b>
Allan and Cheryl Lennox	Thomas and Kaye Griffiths
c/o Judy and Bevan Lennox	Allandale Station
Post Office	Homestead, Queensland 4816
Homestead, Queensland 4816	

In addition to the rental payments, there is a minimum annual expenditure (MAE) of \$1,000 per sub-block. An estimated MAE is required by the DME and is included in the EPM application by the applicant based on the anticipated scope of work (and cost estimate), the latter becoming the MAE if approved by the Queensland Government. The subject tenement application was approved in May, 2010 with a MAE of \$209,000 over a five-year program.

A bond is also required to be paid to the Australian EPA of \$2,500 per EPM for a five-year period. At the end of 5 years, the bond is refundable if all required restoration activities (if any) have been carried out. The actual expenditures may exceed the above estimates if so deemed by the EPM holder. Total holding cost as minimum or MAE for 5-years for the subject tenement is:

Rentals:	\$13,000	\$13,000
MAE:	66,000	209,000
Bonds:	<u>12,500</u>	<u>12,500</u>
<b>Minimum:</b>	<b>\$91,500</b>	<b>MAE: \$234,500</b>



**Figure 6 – General Location and Sub-Block Assignment in the Brilliant Brumby EPM.**

**Table 2  
Rentals for Brilliant Brumby EPM Sub-Blocks Held**

Year of Project	Cost per Sub-Block	Number of Sub-Blocks	Total Cost(AUS\$)
Year 2011	\$143.50*	18 (5,400 ha)	\$2,583.00
Year 2012	149.80**	17 (5,100 ha)	2,546.60
Year 2013	149.80**	16 (5,100 ha)	2,396.80
Year 2014	149.80**	15 (5,100 ha)	<u>2,247.00</u>
Total:			\$9,773.40

\* Based on Tenure Rental Current Yearly Rates – 2011 for EPMs at \$143.50 per sub-block (~300 ha)

\*\* Based on 2011 Rate Sheet

\*\*\* Anticipated increase of \$6.30 per year through 2012.

## 5.3 Production Royalties and Agreements Concerning Land Access

### 5.3.1 Royalty

The *Mineral Resources Act 1989* (Qld) (Act), the holder of a prospecting permit must pay, in respect of all minerals mined or purported to be mined, a royalty to the



Minister. The royalty rate for each mineral is provided for in Schedule 4 to the *Mineral Resources Regulation 2003* (Qld). The royalty rate is calculated as follows:

- (a) if the average price for each tonne of ore is more than \$100 - the rate is worked out using the following formula, rounded down to 2 decimal places:

$$R = 1.25\% + ((A-100)/A \times 1.25\%)$$

Where:

*R* is the rate.

*A* is the average price for each tonne of ore.

*Note:* The royalty payable for ore under paragraph (b) is worked out by applying the royalty rate as a percentage of the value of the ore sold, disposed of or used in the return period.

There are no other current royalties in affect involving future production from the Brilliant Brumby EPM. This is not to imply that additional royalties may not be offered by Brilliant Brumby and/or accepted by a third-party at some time in the future.

### **5.3.2 Agreements Concerning Land Access**

#### Land Access Code

We understand that the Queensland Parliament has recently introduced a new Land Access Code that will form part of the conditions of all tenements issued under the Act. The Code updates the existing notice of entry (NOE) and compensation provisions contained under the Act and aims to ensure consistency in the definitions of “compensatable effects” for which tenement holders must compensate landowners. A breach of the Code may result in pecuniary penalty, and can also potentially lead to forfeiture of a tenement.

#### Access / NOE provisions under the Code

Proposed activities, for which access to the land is required, are categorized as either a ‘preliminary activity’ or an ‘advanced activity.’ A ‘preliminary activity’ is an authorized activity “that will have no impact, or only a minor impact, on the business

or land use activities of any owner or occupier of the land on which the activity is to be carried out”. Some examples are provided below:

- walking the area;
- driving along an existing road or track;
- taking soil or water samples;
- drilling without constructing earthworks;
- geophysical surveying without site preparation; and
- aerial, electrical or environmental surveying.

Activities on land that is less than 100 ha or that is used for intensive farming or broad-acre agriculture, an activity that is carried out within 600 meters of a school or an occupied residence, or that affects the lawful carrying out of an organic or bio-organic farming system, is considered a preliminary activity. All other activities are considered to be ‘advanced activities’.

NOE requirements under the Code provide that a tenement holder can enter the land in accordance with an existing agreement, such as the subject Compensation Agreement. However, for advanced activities, broad overview compensation must be determined first, and once that has occurred, an NOE may be given. If an agreement can’t be reached, a negotiation notice must be given to the land owner to commence negotiating the entry of the tenement holder on the land.

An agreement remains to be worked out with the Homestead owners with land holding within the Brilliant Brumby EPM (see Table 1 for list of Homestead owners).

### **5.3.3 Native Title**

There are no known native title claims within the area of current interest.

#### **5.4 Permitting**

At present, there are no known active Mining Development Licenses (MDL) currently held within the subject EPM (see Section 3.3 - Brilliant Brumby Tenement). A permit is required to drill test wells; coring and logging are considered part of the drilling program. Drilling of the test holes also require a Class 3 driller with all the appropriate certificates for permission to drill in the Brilliant Brumby area. Other permitting requirements include yearly reports on the exploration program to the Queensland Department of Natural Resources and Water (DNRW).

In the event that a ground-water supply is desired at some time during the project, management will be required to communicate with the staff at the DNRW and the Department of Infrastructure and Planning (DIP) offices in Brisbane and Townsville to evaluate the current conditions and availability of ground-water resources for use in any operations on the Brilliant Brumby EPM. A bore census may be required to assess ground-water usage in the area, followed by a title search of the nearby bores. These activities would identify the nearby bores in the area so that selected landowners could be contacted, if need be, and negotiations initiated concerning the possible transfer of the ground-water license for use in any Brumby Group operations. Management may elect to drill a new bore to secure an independent water supply, if permitted by the regulatory agencies. These activities would be considered sometime in the future should the Brumby Group management contemplate mining operations.

#### **5.5 Environmental Issues**

The Brilliant Brumby EPM is not currently subject to any known environmental study. All work carried out by the Brumby Group will be in accordance with the Code of Practice, as outlined in the Department's "Schedule of General Exclusions and Conditions for Exploration Permits". The Brumby Group management anticipates that the proposed exploration methods will have minimal impact on the environment. Initial traversing will be done on foot and light four-wheel-drive vehicles, and where possible vehicles will keep to existing tracks. In areas of no tracks, vehicle traversing will be designed to cause minimal soil erosion or damage to existing vegetation. Any earth works necessary for drilling programs will be rehabilitated at completion of the program, if required. A truck-mounted drilling rig will be the only significant large item of equipment that will

be used on site. Minor site preparation will be required to maintain personnel safety. All drill sites will require rehabilitation, including:

- all top soil will be preserved,
- all drill holes, including open hole RAB, will be capped at ground level,
- drill sumps, where used will be backfilled, and
- if a drill site is to impact a water course, the drill hole will be redesigned to avoid disturbance.

We understand that the Thalanga Copper Mines, located approximately 37 km southeast from the subject EPM have a number of rehabilitation environmental experts on their staff. Brumby Group and Circle Resources management have arranged that should the need arise, they would call on them to assist with any operations on the subject EPM. There are also other environmental consultants that could be called upon, if required.

## **Section 6.0 Accessibility, Climate, Local Resources, and Physiography**

The Brilliant Brumby tenement is located in an area of monsoonal climate and heavy rainfall during the wet season on soils desiccated during the warm dry months and not only produces severe gully and sheet erosion, but also results in significant ground-water recharge with excess discharging as surface run off via streams and rivers. Much of the information provided in Section 6.0 is based on information provided by the Australian Government (see Section 22.0 - References cited under Australian Government).

### **6.1 Accessibility**

Ground access to the tenement is by an unsealed track which leaves Flinders Highway at Mundic Creek and heads north to Mt. Stewart Homestead. Access to the area by vehicle is often difficult due to the rugged terrain and high waist-high scrub. Helicopter access is difficult in places as a result of the hilly terrain and thick canopy of scrub and the thick timber in the plateau region. Because of the limited access, historical sampling density has been less than ideal, and is the primary cause for leaving many areas unsampled.

## 6.2 Topography, Elevation, and Vegetation

The topography and associated elevation in the general area of the subject tenement is illustrated in Figure 7, along with the boundaries of the subject tenement. The vegetation in the area of interest is mainly eastern eucalypt woodlands to open-forests with rangelands (or savannas) to the south at lower elevations that was originally occupied by brigalow (*Acacia harpophylla*) or grasslands of eastern grasses (*Dichanthium* and *Bothriochloa spp.*). The rangelands occur as eucalypt woodland, often in a mosaic pattern.

The Brilliant Brumby EPM is part of the Brigalow Belt North bioregion and contains headwaters of the Campaspe River, Mundic Creek, and Oaky Creek in the Lolworth Range at elevations between 500-800 meters above sea level with a subhumid to semiarid climate. The vegetation of the Brigalow Belt North bioregion consists of woodlands of ironbarks (*Eucalyptus melanophloia*, *Eucalyptus crebra*), poplar box (*Eucalyptus populnea*) and Brown’s box (*Eucalyptus brownii*) with forests of brigalow (*Acacia harpophylla*), blackwood (*Acacia argyrodendron*) and gidgee (*Acacia cambagei*).

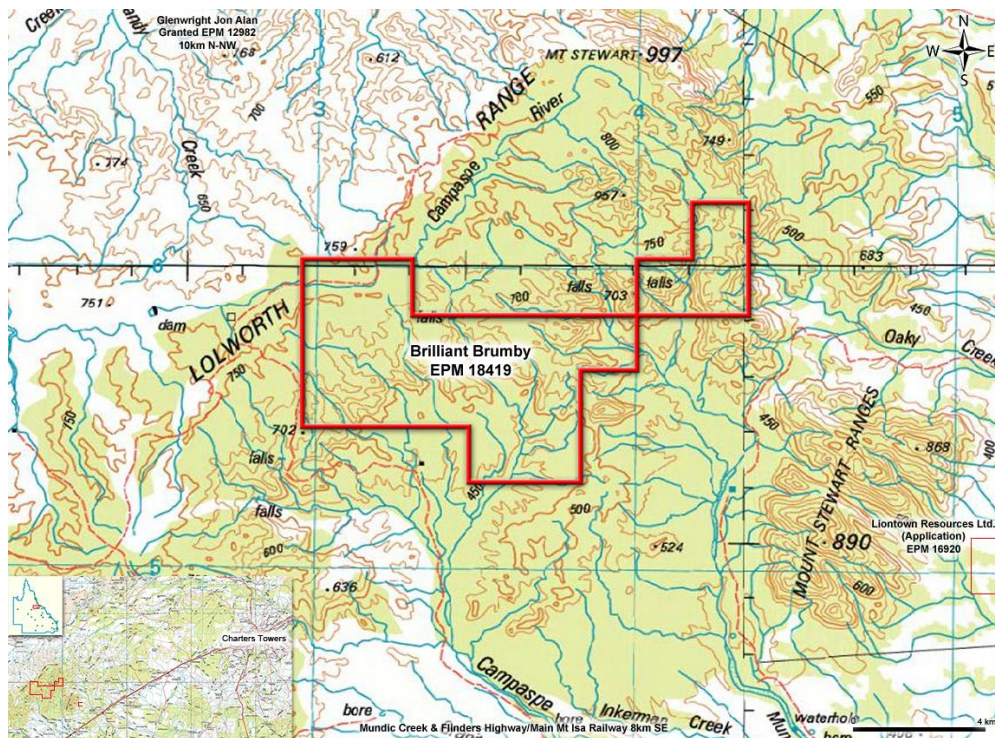


Figure 7 - Topography and Elevation in the Brilliant Brumby EPM and Environs

The rangelands tend to form linear hills, small mesas, breakaways and undulating to hilly country in the north in the subject area. The central areas are characterized by rugged to undulating hills, plains and plateaus. The southern areas are dominated by the lowlands with low ridges.

The alluvial plains south of the Brilliant Brumby EPM support woodlands of poplar box, gidgee or coolibah (*Eucalyptus coolabah*) with forest areas of Dawson gum-brigalow (*Eucalyptus cambageana-Acacia harpophylla*). Along the water courses, such as the Campaspe River and Mundic Creek to the south, are tall woodlands to open-forests of red gum (*Eucalyptus camaldulensis* and *E. tereticornis*) and coolibah. During years of wet periods, with a lack of burning, an undergrowth of various acacias and eucalypts form thickets on the higher ground making field work difficult. On lower, flatter ground, thick bunches of spear grass and spinifex can grow to waist height, while in and bordering gullies and dry creeks great masses of cypress pine reach 2 to 3 m in height.

There are 78 rare, 53 vulnerable and 13 endangered plant species within this bioregion. Mammal species in this bioregion are generally adapted to the eucalypt woodlands and open forests. Approximately 43 mammal species have been recorded with ten species of macropods, including the bridled nailtailed wallaby (*Onychogalea fraenata*), brushtailed rock-wallaby (*Petrogale penicillata*), wallaroo (*Macropus robustus*), eastern gray kangaroo (*Macropus giganteus*) and the black-striped wallaby (*Macropus dorsalis*). Parrots and rosellas have been reported as have dingos and herds of wild pigs. Snakes are common along creek banks.

There are 4 presumed extinct, 10 endangered, 30 vulnerable and 35 rare animal species within the bioregion. The extinct animals include the western quoll (*Dasyuria geoffroii geoffroii*), white-footed rabbit-rat (*Conilurus albipes*), downs hopping-mouse (*Notomys mordax*) and the paradise parrot (*Psephotus pulcherrimus*).

### **6.3 Local Resources**

Ground-water resources are available from water bores (windmills and tanks (ponds)) in higher elevations in areas where fractures and joints are prevalent and from the Tertiary sands in the lowland areas. In areas where granite and other igneous and metamorphic rocks are present in the

subsurface, ground-water supplies would be available, especially near dry creeks where major fractures or joints often occur. Lower meadows surrounded by hills consisting of igneous and metamorphic rocks serve as collection areas for shallow ground water. The depth to the water table in such areas will need to be monitored because the volume of ground water available within the fracture systems may not be large, although sufficient supplies can be available under certain circumstances, see Larsson, I., M. D. Campbell, *et al.*, (1984). Surface water was noted in numerous creeks leading to the Campaspe River south of the subject tenement. Typically, these creeks are dry and only run during and after rainfall. Only a few kangaroos were observed during the I2M Associates' site visit the week of December 12, 2010.

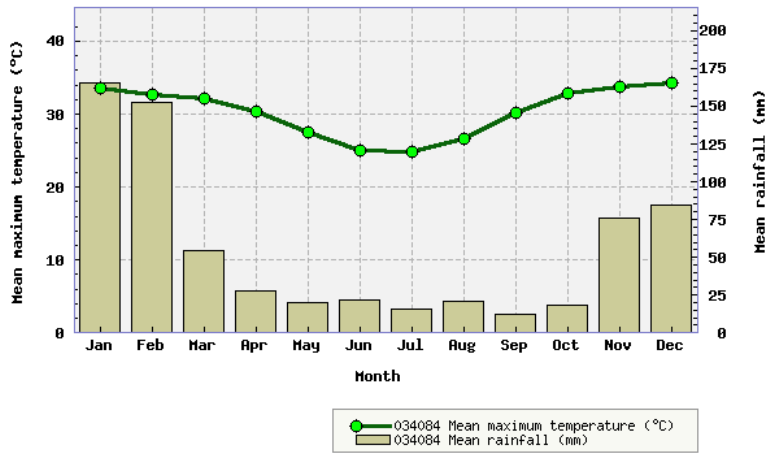
The nearest railway is the main Mt Isa Railway located parallel to Flinders Highway, approximately 27 km to the southeast of the EPM (see Figure 5).

#### **6.4 Climate and Seasonal Operations**

The general area experiences a semi-arid climate with dry winters. Extensive precipitation can occur in association with the passage of tropical cyclones emanating out of the Coral Sea across the coast and inland. The annual average rainfall ranges from 125 mm to 170 mm, except during drought periods that may last five years or more. Drought conditions occur more frequently inland than near the coast. Temperatures in the Charters Towers area range from 25°C in the summer to 35°C in winter (see Figure 8). Extremes are not uncommon and can reach 1°C in the winter to 42°C in the summer.

During the summer, field conditions related to industrial development are not usually conducive to optimal production. However, the prevailing weather factors could be favorable for year-round operations if certain safety precautions were taken during the rainy season and high temperatures and humidity during the summer. During the dry season of moderate temperature, low rainfall, and low humidity, the area offers near optimal conditions for exploration and potential mining operations. The prevailing weather factors, based on many years of accumulated weather data collected in Charters Towers are illustrated in Figures 8, 9 and 10.

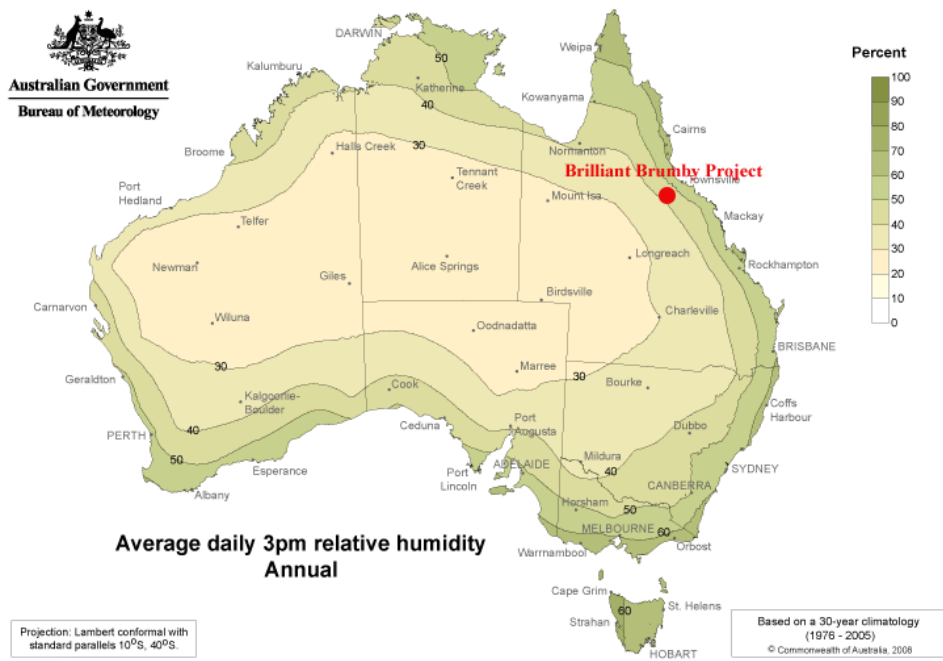
Location: 034084 CHARTERS TOWERS AIRPORT




**Australian Government**  
 Bureau of Meteorology

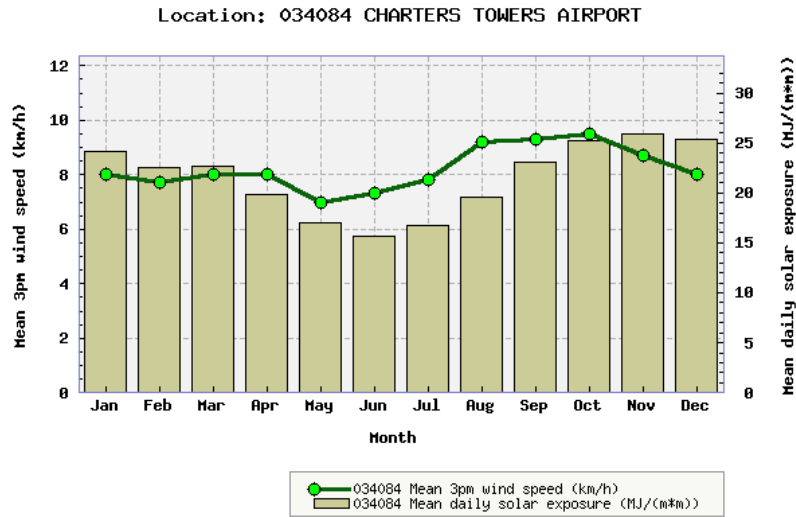
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**Figure 8 - Mean Maximum Monthly Temperatures and Rainfall**



**Figure 9 - Average Daily Relative Humidity (@ 3:00 PM)**





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**Figure 10 - Mean Monthly Wind Speed (@ 3:00 PM) and Mean Daily Solar Exposure**

## 6.5 Available Infrastructure

As discussed in Sections 6.1 - Accessibility to Properties and 6.3 - Local Resources, supporting infrastructure is available in Charters Towers some 75 km to the northeast via the Flinders Highway, which is located approximately 27 km southeast of the EPM. The Main Mt Isa Railway parallels Flinders Highway heading northeast to Townsville which is approximately 140 km from Charters Towers (see Figure 5).

## Section 7.0 History

### 7.1 Previous Exploration Results

The Brilliant Brumby Mine, the namesake for the EPM, was discovered and worked from 1936 to 1941, and sporadically thereafter in 1947 and 1961. In the western area of the tenement, the discovery of the Brilliant Brumby mineralization and Mine prompted a minor gold rush in the area, which led to the discovery of the Surprise and Sunrise discoveries to the north along the same structure and in nearby areas.

Total recorded gold production from the mine during 1937 to 1961 was 790 ozs (24.6 kg) from 950 tons of ore. The gold grade was rather high, and using a gold price of \$1,000 per ounce, the tons produced in those days would produce \$830 per ton mined in present terms. Table 3 is a summary of the production records filed with the Queensland Government and an estimate of current value per ton mined. Production data and other historical information regarding production are available in Purcell (1988, Appendix 1).

**Table 3**  
**Brilliant Brumby Mine Production Record**  
 (After Purcell, 1988)

Year	Months Reported	Ore Produced (Tons)	Gold Produced (Fine Ozs)	Average (Ozs/Ton Produced)	Revenue/Ton (\$1,000/oz Basis)
1937	7	412	269	0.65	\$650
1938	3	256	180	0.70	700
1939	3	198	216	1.09	1,090
1940	3	95	80	0.84	840
1941	1	27	26	0.96	960
1947	1	41	17	0.41	410
1961	1	<u>21</u>	<u>4</u>	<u>0.19</u>	<u>190</u>
<b>Total:</b>		950 tons	790 ozs	0.83 oz/ton	\$830

The Surprise Mine is also located near the western boundary of the EPM some distance to the north of the Brilliant Brumby workings along the same structure. It was held earlier under a mining lease by Mr. Lionel Powell. The prospect has not been worked for many years. The mine buildings are derelict and the deposit seems not to have been worked since 1981, although an exploration grid and bulldozer trenches appear to be more recent. The workings are of limited strike extent but alteration exists over a significant width of about 50 meters. Reports indicate that the alteration zone was found to carry 0.16 g/t gold, the quartz 1.07 g/t gold. The Surprise prospect has been sparsely explored and certainly not on any systematic basis before 1990. The Lolworth Diggings just northwest of the Brilliant Brumby EPM were sampled over the years and reports suggest that mineralization was probably controlled by emplacement of the intrusion at the intercept of northwest and northeast trending structures delineated by dike swarms (Purcell, 1988). The anomalous drainage in the northeast of the subject tenement, consistent with the reported workings associated with the Lolworth Diggings trend to the northwest, is therefore an area requiring follow-up in future exploration on the EPM (see Section 10.1 - Type of Mineralization).

The central part of the EPM was held under Mining Lease 10188 (Rob Kidd), but it is assumed to be abandoned since there is no indication of the lease in the tenement maps of Figure 2A and 2B.

The Early Bird Mine area consisted of a series of subsurface workings on a quartz vein up to 0.5 m in width. Joint surfaces are typically covered with a distinctive waxy green coating, thought to be a chlorite-sericite  $\pm$  propylitic alteration. This alteration is of limited extent. Visual examination of the workings suggests that only the quartz vein contained gold, this being confirmed by historical assay results in the general vicinity (0.01 g/t gold from the altered granite; 0.34 g/t gold from quartz).

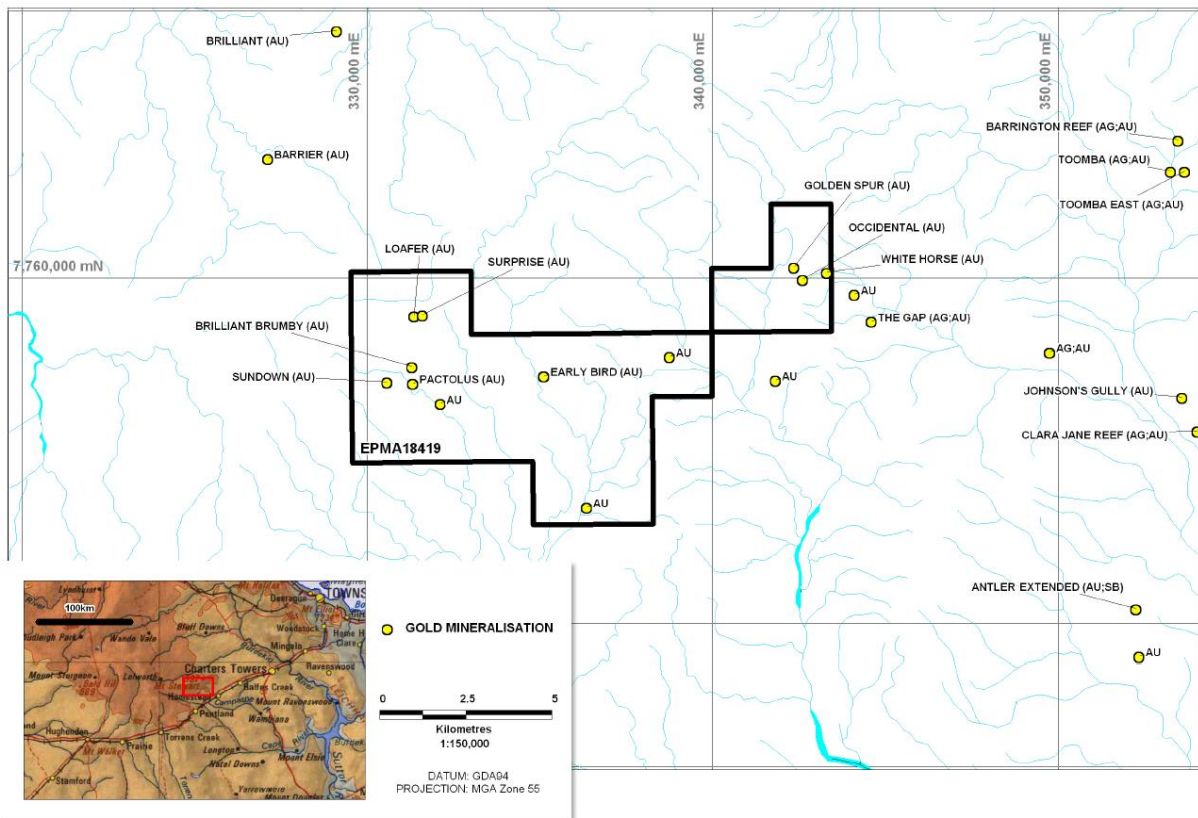
During 1996 and 1997, field work by Acapulco Mining, Amad, NL, and by Boss Resources, Ltd. were conducted to test the potential of the area. It was considered by the above companies that the felsic intrusive of the Mundic Igneous Complex, located in the east of the EPM, may have mineralized the surrounding Lolworth granites along the contacts or permeable fracture zones. In addition, mesothermal vein targets in the granite were sought. Exploration consisted of traversing the creeks sampling float and outcrop under difficult field conditions. A total of 62 rock chip samples were collected and assayed for gold, copper, lead, and zinc. In addition, the margins of the Mundic Creek Igneous Complex were traversed in a search for evidence of copper mineralization including leached cappings, biotite or orthoclase alteration, and similar indications of mineralization.

In the eastern region of the EPM, the Lolworth Granite appears to contain the potential for mesothermal vein occurrences of the type found at 'The Gap' prospect near the eastern boundary (see Figure 11). In particular, sampling from the western fork of Mundic Creek has shown anomalous gold values and was not followed up with detailed sampling (Levart, 2006). Based on the reports reviewed, particular interest should be paid to areas marginal to the Mundic complex because existing mineralization may well have been re-mobilized to higher grades along these trends (Garrard, 1996; DME, 1998).

Of particular note is that The Gap prospect was indentified in 1988 by Terra Search, the principal consultants to Circle Resources and the Brumby Group, who were conducting exploration on behalf of Australian Overseas Mining (see Anon, 1988; and Anon, 2001). The highest gold values obtained from rock-chip sampling indicated 49 g/t and 145 g/t. Limited drilling in selected areas was not encouraging (Dudgen and Beams, 1989). Other exploration companies have been active in

the general area over the years and we have selected a few of the more significant highlights in Section 7.2 below.

The area has the benefit of an unusually comprehensive geological coverage provided by the Queensland DEM as the result of a long history of gold and other mineral occurrences and associated study (Garrad, 1996 and 1998).



**Figure 11 – Historical Prospects (Circle Resources, 2009)**

## 7.2 Review of Historical Company Exploration Reports

We have reviewed a number of the company reports that focused on areas in and around the Brilliant Brumby EPM over the past decades (see Table 4), and have summarized some of the more significant results as revealed in the historical reports filed with the Queensland Government, as follows:

### **Northern Mining Corporation**

In 1971, Northern Mining Corporation carried out a geological reconnaissance in the general area and field personnel described a ‘felsitic granite’ rather than a microgranite. This granite showed no evidence of containing sulfides or of being hydrothermally altered. However, Northern Mining concluded that the Lolworth mining field was examined with the conclusion that additional mineralization may still exist in the area, but surface manifestations of alteration were not noted during their field surveys (Mills and Pike, 1971).

### **Freeport of Australia**

In 1983, Freeport of Australia Inc. sampled the area and the highest gold result from rock-chip sampling was obtained from a pyritic white quartz vein, outcropping in sericitic pink granite. The results indicated that gold mineralization is present in selected zones (Stockley, 1983).

### **Elliot Exploration**

In 1988, Elliott Exploration Co. Pty. Ltd. undertook a series of literature searches, produced a review of previous work, and recommended a work program. Metana Minerals personnel joined the program in a possible joint venture. Work included helicopter-borne rock-chip and stream-sediment sampling and subsequent ground follow up of anomalous results. Field work was directed towards sampling of major streams flowing from the north and west of the subject tenement; and streams flowing southwest from Mt. Stewart within the outcrop area of the Mundic Igneous Complex. A rock-chip sampling survey taken in conjunction with a stream-sediment survey targeted several dike/vein structures interpreted from air photos, and such lithologies and structures that seemed to be prospective from ground traverses (Purcell, 1988).

The Brilliant Brumby Mine was also inspected and sampled. A total of 33 rock-chip samples and 32 stream sediment samples were taken initially, followed by a further 58 rock-chip samples and 9 stream- sediment samples in the follow-up. The sources of anomalous results appeared to be confined to narrow quartz veins of restricted strike length (0.10 m x 10 m).

Sampling around and to the south of the Brumby workings located more workings not marked on the geological sheets and not under claim; also located was a quartz reef displaying similar

characteristics to those at the Brumby workings. Samples from this quartz vein (1-1.5 meters x 300 meters) were anomalous, ranging from 0.11 g/t to 4.96 g/t gold, and averaging 0.95 g/t gold.

**Table 4**  
**Company Reports: Pre-2007 Exploration Activities**

<b>EPM / ATP</b>	<b>Holder</b>	<b>Report Date</b>	<b>Company Report</b>
880/9980M	Levart /Northern Mining	1971	CR 3726
3558	Freeport (Australia)	1983	CR 12536
3615	Amad, N.L.	1984	CR 13228
“	“	“	CR 13493
“	“	“	CR 14460
“	“	“	CR 15474
“	“	“	CR 3615
3611	Portman Mining Ltd	1984	CR 13897
3615	Amad, N.L.	1985	CR 14460
“	“	“	CR 15473
“	“	“	CR 15474
4352	Penarroya Ltd.	1987	CR 16311
5015	Australian Overseas Mining	1988	CR 17977
4680	Kennecott (Australia)	1987	CR 17010
4669	Elliott Exploration	1988	CR 18243
5112	Australian Overseas Mining	1988	CR 18334
“	“	“	CR 19697
“	“	1989	CR 20522
5015	“	1989	CR 20429
“	“	“	CR 19424
5913	Australian Overseas Mining	1990	CR 21586
“	“	“	CR 21586
5747	American Boulder	1990	CR 21247
9509	Newcrest Mining	1994	CR 25663
9637	MPI	1994	CR 26160
10501	Acapulco Mining	1996	CR 27606
11116	“	“	CR 29157
“	“	“	CR 29569
“	“	1997	CR 30816
“	“	“	CR 30933
“	“	“	CR 43163
10625	Amad, N.L.	“	CR 28744
10625	“	“	CR 29374
10625	“	1998	CR 30787
10859-877	Boss Resources, N.L.	1998	CR31386
11487	Mt. Stewart Gold Ltd.	2005	CR 39761
“	“	2006	CR 44582

11536	Mt. Stewart Gold Ltd.	2001	CR 33164
11985	“	2001	CR 33049
12900	China Yunnan Copper (Aus)	2006	CR 44595
11487-12900-01	“	2007	CR 50570-51145
12124	Newcrest Mining Ltd.	2007	CR 45757
14591	“	“	CR 45757
14594-97	“	“	CR 45757
11487-12900-01	China Yunnan Copper (Aus)	2008	CR 54139
18419	Circle Resources/Brumby Group	2009	
12900	China Yunnan Copper (Aus)	2010	CR 64563

Eleven (11) anomalous zones were identified from the stream-sediment survey represented by 21 samples. Only one of these anomalous samples was downstream from the known mine workings, and a broader anomalous zone was indicated to the west of those workings. Unmarked and apparently unclaimed mine workings also occur in this area, as does a quartz reef similar to that at the Brilliant Brumby Mine.

A large area in the southeast corner of the area now included in the EPM is broadly anomalous, hosting four first-order rock-chip geochemical anomalies (>0.9 ppb gold <4 ppb) and three second-order anomalies (>4 ppb gold). Two further isolated anomalies are located in the northeast sector of the EPM, and one on the southern boundary. All of these anomalies warranted follow-up and detailed investigation, but received none.

Elliott Mining recommended areas less than 2 km<sup>2</sup> should be followed up by ridge and spur rock-chip sampling (with soil sampling where outcrop is absent) at 100 m spacing together with 1:5000 geological mapping. Areas greater than 2 km<sup>2</sup> were to be sub-sampled by bulk cyanide and pan concentrate at a density of 3 or more per square kilometer, depending on the drainage pattern (Purcell, 1987). The tenement was subsequently dropped.

### **Newcrest Mining**

In 1993, Newcrest Mining acquired holdings in the area on the basis of reports of a polymictic breccia pipe north of the tenement; reports of stream-sediment anomalies and the proximity to a subvolcanic complex. The company carried out reconnaissance 1:25,000 scale mapping and follow up <10# stream- sediment sampling of the anomalous areas. A total of 73 stream-sediment samples

and 7 rock-chip samples were collected. Approximately 30 km<sup>2</sup> were mapped. Two anomalous areas were identified: 1) “Anomaly One” (see Figure 17) and 2) Brilliant Brumby. Gold sampling results were anomalous with results up to 210 ppb gold but this sample was explained by a special winnowing process operating within a clay-poor granitic sediment. The source for the first cycle gold dispersion is most likely the small quartz veins occurring in altered shear zones within the granite. No significant area of broad alteration, brecciation or stockwork development was encountered (according to Wright, 1994).

### **Acapulco Mining, N.L.**

In 1995, Acapulco conducted a preliminary literature search to identify areas of interest and evaluate the effectiveness of past exploration methods. Field work consisted of traversing previously defined anomalous drainages, and the collection of rock-chip samples.

#### *Anomaly One Area*

A traverse to examine the southern part of Newcrest’s “Anomaly 1” examined numerous outcrops of silicified and moderately recrystallized metasediments intruded by adamellite, leucogranites and pegmatites, and heavily faulted contacts. The metasediments appeared to be derived from black cherts and greywackes indicating a eugeosynclinal depositional environment.

Parts of the drainage in the area are occupied by extensive water-polished granite surfaces with relict fragments and xenoliths of metasediment, with some areas showing extensive brecciation. Prominent small cliff-forming plateaus of Campaspe Beds were also noted. These sediments consist of a coarse, granite sand with occasional rounded quartz pebbles and cobbles. They are strongly weathered and kaolinized with a hard limonite-stained cap which forms a floor to some creeks. No evidence was found of the andesite or rhyolite dikes previously mapped by Newcrest in the area traversed, although some of the chert beds had a fine isoclinally folded banding (probably bedding), which could have caused their misidentification as an acid volcanic, while recrystallized greywacke could be mistaken for an intermediate volcanic dike (Anon, 1996a, b, c, and d).

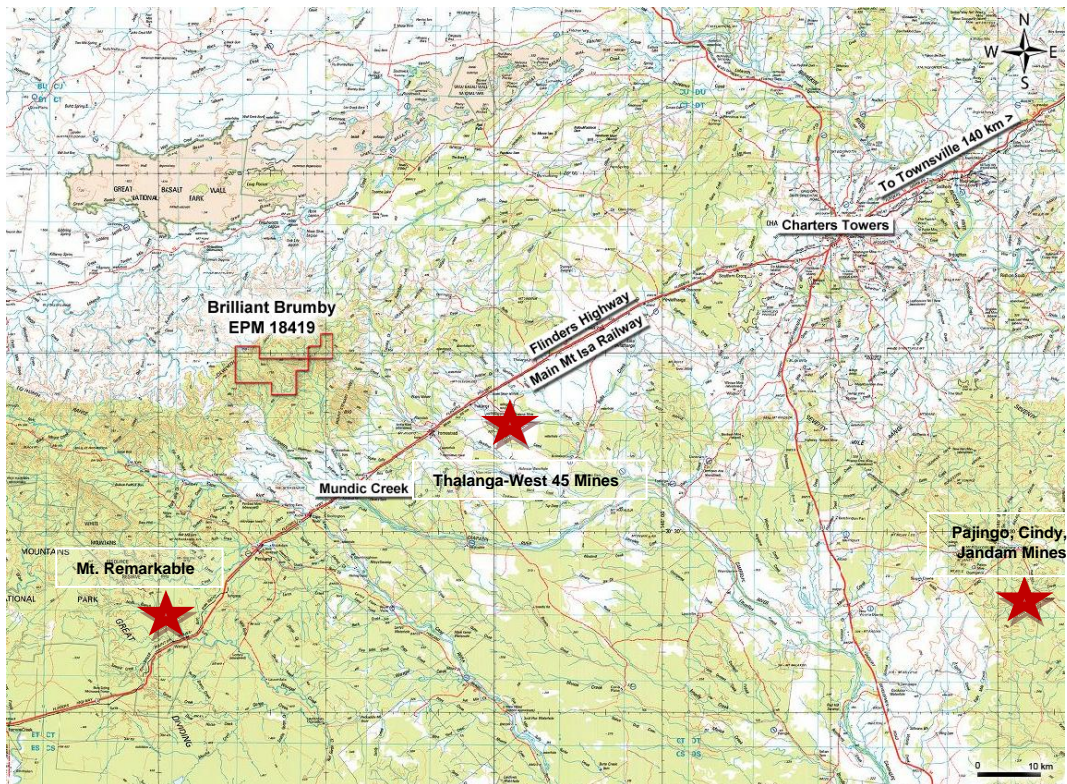


### 7.3 Review of Current Nearby Exploration Reports

Historical company activities in the area are useful in determining what exploration methods and techniques have been applied and their results over the past decades. Appendix II contains a summary of the exploration methods employed before 1990. It is also instructive to know the type and characterization of mineralization of the current exploration/mining operations present in the general area surrounding the Brilliant Brumby EPM in order to assess the viability of the exploration program being considered by the Brumby Group. A few of the current operations in the general area around the subject EPM have been reviewed (see Figure 12 for the principal sites reviewed).

#### Mount Remarkable Area

At Mt. Remarkable, located about 20 km to the southwest of the subject EPM, shallow drilling by previous exploration encountered gold-copper-molybdenum mineralization of a porphyry style. Work by ActivEX identified an anomaly via Induced Polarization in proximity to the previously identified mineralization, but at a deeper level. The closest drilling to the anomaly has intersected 47 meters of 0.92 ppm gold to a depth of 306 meters.



**Figure 12 – Topographic Sheet (100,000) Showing nearby Exploration and Development**

The target anomaly for drilling is 800 meters long and 200 meters wide and reportedly increases in tenor at depth. The identified IP anomalies surround a magnetic intrusive diorite (porphyry) which has low-grade gold associated with it. The IP anomalies targeted by the two drill holes are structurally controlled and occur over at least 800 meters of strike length.

At the Norwood site, gold ore occurred near the surface. Shallow drilling by previous explorers looking for oxide gold, intersected scattered gold mineralization with better intersections of 18 meters of 0.98 g/t gold and 8 meters of 2.28 g/t gold.

### **Thalanga-West 45 Mines Area**

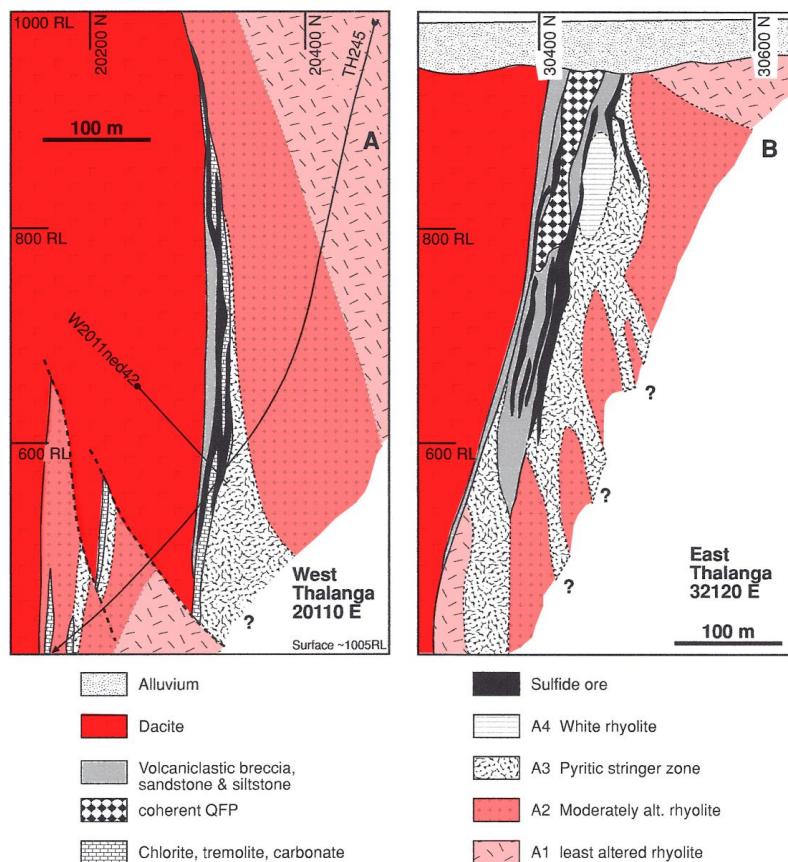
The Thalanga massive sulfide deposit is located in the Cambro-Ordovician Mount Windsor Volcanics some 40 km to the southeast of the subject tenement (see Figure 12). Thalanga is located at the foot of the eastern end of the Thalanga Range. The range is a low, northwest-trending ridge of the Mount Windsor Formation volcanics surrounded by semi-consolidated Tertiary alluvial sediments known as the Campaspe Beds, which cover the uneven basement surface to a depth of up to 100 m. Surface exposure in the vicinity of the deposit is poor, and most of the geologic interpretation is based on observations from drilling and mine development. The conductive nature of the Campaspe Beds has been an impediment to the application of electrical geophysical exploration techniques in the area (Paulick, *et al.*, 2001).

Of interest to the subject EPM are the number of dikes of coarse quartz-feldspar porphyry (locally termed the quartz-eye unit that have intruded the Thalanga mine area as well as the eastern areas of the subject EPM. The general consensus is that the porphyry was extruded directly on the sea floor, capping parts of the massive sulfide of the Thalanga deposit. Quench fragmentation around the edge of the extruded porphyry built up an apron of quartz crystal-rich volcanoclastic materials, particularly around East Thalanga. The Thalanga hydrothermal system remained active after the emplacement of the quartz porphyry, resulting in the deposition of sulfides in the clastic facies of the quartz porphyry. In places, this material reaches ore grade (Herrmann and Hill, 2001).

Drilling activities in the Thalanga area, as in the early days of exploration in the Charters Towers area (Kreuzer, 2005), were conducted on a blind basis, that is, there were no surface indications of

mineralization in the area drilled. In the former, a good geological basis was helpful in drilling along mineralized trends (see Figure 13). This figure illustrates two important features. The first is that drilling for a blind target (targets without local surface indications) can have favorable results, as in Figure 13A. The second feature is that mineralization can go unrecognized for years because it is covered by younger sediments, as in Figure 13B below.

The West 45 mineralization, located a few km to the northwest near the Flinders Highway, is hosted within clastic facies of the quartz-feldspar porphyry (locally called quartz-eye) situated near the top of the Mount Windsor Formation. There are three sub-vertical strata-bound semi-massive sulfide lenses that lie 5 to 25 meters beneath the dacite-quartz eye contact. Maximum thickness and grade within the sulfide lenses occur at their intersection with footwall pyritic stringer zones.



**Figure 13 A and B – Typical Mineralization at the Thalanga Mines Area**  
(from Paulick, et al., 2001)

The footwall feeder zone, which forms an envelope of strong sericite-pyrite alteration trending northeast and dipping steeply to the north, cuts across both the Mount Windsor Formation rhyolites

and the quartz-eye volcanoclastics. Within this envelope, subeconomic base-metal sulfide and pyrite veins dipping steeply northwest and southeast form a series of discontinuous shoots.

Strata-bound massive to semi-massive sulfide mineralization occurs throughout the quartz-eye unit, consisting of three textural and mineralogical types:

1. Sphalerite-galena dominant lenses with subordinate chalcopyrite, pyrite, and barite, which are typically poorly banded, coarse grained, and recrystallized, lensoidal with anastomosing and gradational contacts.
2. Pyrite lenses with minor chalcopyrite and subordinate barite and base metals, which are commonly finely banded or massive and granular. They are situated at the base of the quartz-eye unit toward the strike extremities of the base-metal sulfide lenses.
3. Semi-massive anastomosing stringer zones of pyrite-sphalerite-galena-chalcopyrite in varying proportions, which are frequently adjacent to the more massive sulfide lenses or within the feeder zones.

Previous research (Duhig, *et al.*, 1992) revealed that some of the stratiform quartz-hematite lenses (jaspers) are lateral to the Thalanga massive sulfide mineralization and displayed enriched light rare earth element (LREE) patterns and positive europium anomalies (Graf, 1977; Miller, *et al.*, 2001). These patterns were interpreted as diagnostic of chemical exhalite deposits formed from hydrothermal vent fluids that precipitated at or near the sea floor. The jasper chemistry is revealing which of the underlying hydrothermal systems were sufficiently hot and acidic to drive feldspar-destructive hydrothermal reactions and hopefully also mobilize base metals. Barium values alone were useful indicators of the relative position along the temperature gradient of the massive sulfide mineralization.

The Thalanga deposit is a volcanic-hosted polymetallic massive sulfide deposit. Outcropping gossans (usually dark brown or orange soils containing oxidized iron minerals) in the central part of the deposit led to its discovery in 1975. Nearby deposits were essentially blind targets, many were discovered by serendipity. Production commenced in May 1989 with open-pit mining of oxidized supergene ore from the Central ore body, to a depth of 70 m below surface, and progressed in February 1991 to underground production of primary sulfide ore via two declines accessing the West and East Thalanga ore bodies.

The total resource at Thalanga was 5.75 million tons (Mt) at average grades of 1.8 percent copper, 2.5 percent lead, 8.2 percent zinc, 69 g/t silver, and 0.5 g/t gold. To 1993, production totaled 202,000 tonnes of zinc, 45,000 tonnes of lead, and 90,000 tonnes of copper with significant credits of silver and gold.

### **The Jajingo-Cindy-Jandam Area**

Deposits of particular relevance to future exploration on the subject EPM is the Pajingo epithermal gold deposits located some 53 km southeast of Charters Towers. Discovered in 1983 by Duval Mining (then Battle Mountain Gold) in previously unexplored areas over a 15-year period, these mid-Carboniferous epithermal quartz vein deposits are hosted by intermediate (late Devonian to Carboniferous) high-level intrusives, lava, and other volcanoclastic rocks. The original deposit was developed by open-pit and underground mining and produced 366,500 ozs gold and 1,022,601 ozs silver.

In 1991, not far from the Pajingo deposit, the Cindy vein was found by drilling beneath 5 to 15 meters of Tertiary sediments. This deposit produced 46,468 ozs gold and 25,066 ozs silver. Other veins were also discovered along strike. For example, reports on the Jandam deposit indicated in a mineral inventory (resources, reserves, plus mined) as of mid-June, 2001 of 6.6 million tons @ 13.5 g/t gold, 14 g/t silver, for a gold inventory of 2.9 million ozs of gold (see Parks and Robertson, 2003). That amounts to \$2.9 billion at a gold price of \$1,000/oz.

## **Section 8.0 Geology**

### **8.1 Regional Geology**

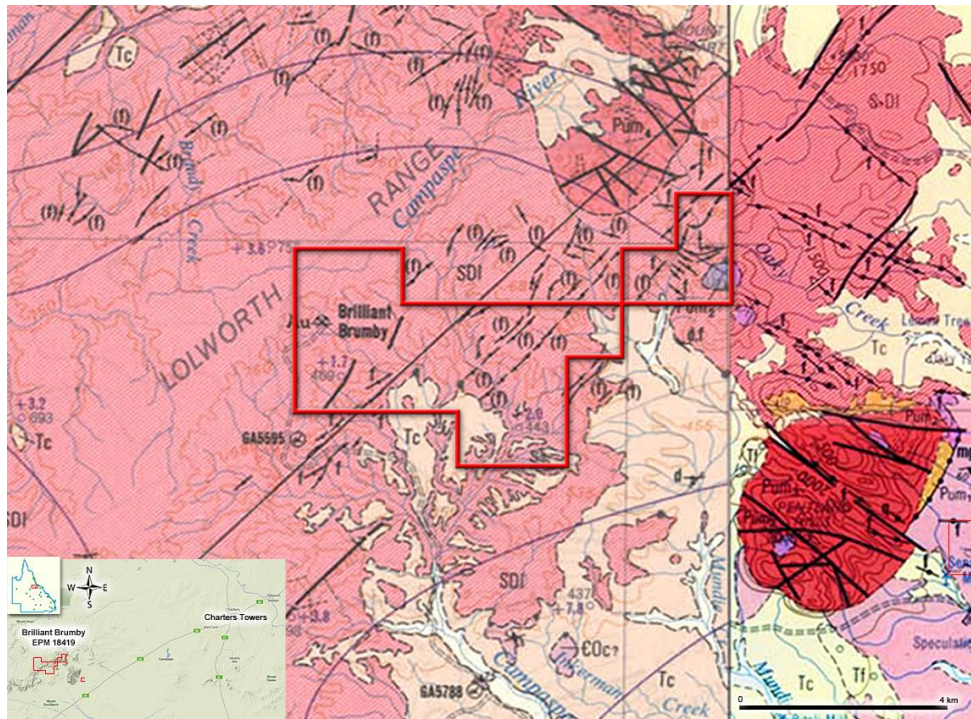
The majority of the Brilliant Brumby tenement is underlain by granitoids of the Lolworth Igneous Complex (see Figure 14A and B). This is regarded as a post-orogenic batholith. It consists mainly of massive biotite adamellite and granodiorite, but a zone of banded pegmatitic and aplitic garnet-muscovite granite and adamellite occurs on the eastern margin. Dikes of garnetiferous muscovite pegmatite, granite and aplite are abundant within the complex. The age of the complex has been radiometrically dated as ranging from Upper Silurian to Lower Devonian (Vine and Paine, 1974).

To the east of the EPM, the Mundic Igneous Complex intrudes the Lolworth Complex. This complex is a group of subvolcanic stocks, bosses, dikes and minor volcanics. The main body is a microgranite epizonal stock that forms Mt. Stewart, while a small micro-adamellite intrusive occurs on the eastern boundary of the complex, which likely is the source of gold and minor base metal mineralization at Mt. Stewart and Lolworth Diggings to the north and northwest of the subject EPM (Ward, *et al.*, 1998).

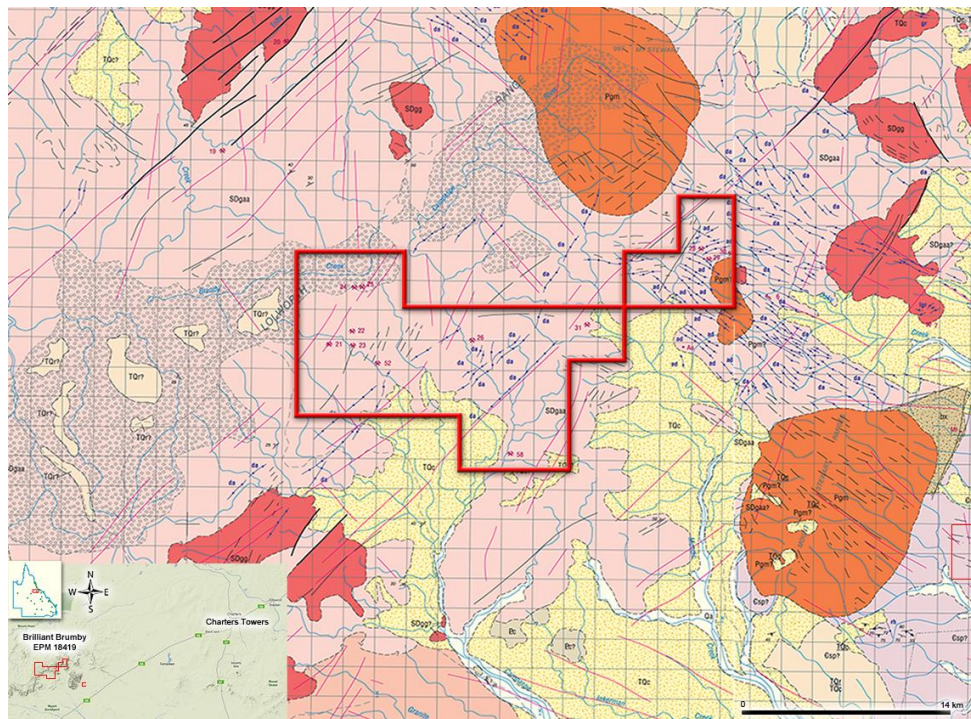
Both the Lolworth and Mundic Igneous Complexes are overlain by the Tertiary (Pliocene) Campaspe Beds, the same beds that occur in the Thalanga area to the southeast. This unit consists of clayey and gritty sandstone, conglomerate and siltstone. The presence of fossil alluvial gold near the base of the Campaspe Beds in the Cape River area suggest that these outcrops should be regarded as a prospective target for gold exploration. A single outcrop Quaternary alluvium of sand, silt, gravel and clay reportedly occurs in the valley of Mundic Creek, which are likely the product of eroding Campaspe Beds.

Price (2010) concludes that the Mundic Complex, both intrusives and volcanics, are of considerable importance in the exploration of the area. After decades of surface sampling and some drilling by numerous companies, the areas surrounding the subject EPM have not made any significant discoveries. However, the area within the subject area has experienced far less sampling (both geochemical soil and geophysical surveys). The intrusives in the eastern area of the subject EPM were accompanied by widespread swarms of northwest trending dikes ranging in composition from dolerite and microdiorite to rhyolite (see Figure 14A). Similar dikes are also common in the Lolworth gold workings located to the northwest of the subject EPM and were apparently emplaced after the auriferous breccia pipes in that area.

The geological legend for the area is presented in Appendix III. Northeast trending faults and fracture systems in the region were periodically active up to the Permian when dikes contemporaneous with the Mundic Complex intruded them. The dikes are numerous within two major northeast corridors, some of which are associated with older gold workings.



**Figure 14A**  
**Geological Mapping of the 1960s**  
(Vine, 1974)



**Figure 14B**  
**Geological Mapping of the 1990s**  
(see Hutton, *et al.*, 1998)

Figures 14A and 14B illustrate many of the northeast dikes (but do not show many northwest trends). The trends that have been evaluated over the past 30 years also included the northwest trends, but only to a limited extent.

## **8.2 Local Geology**

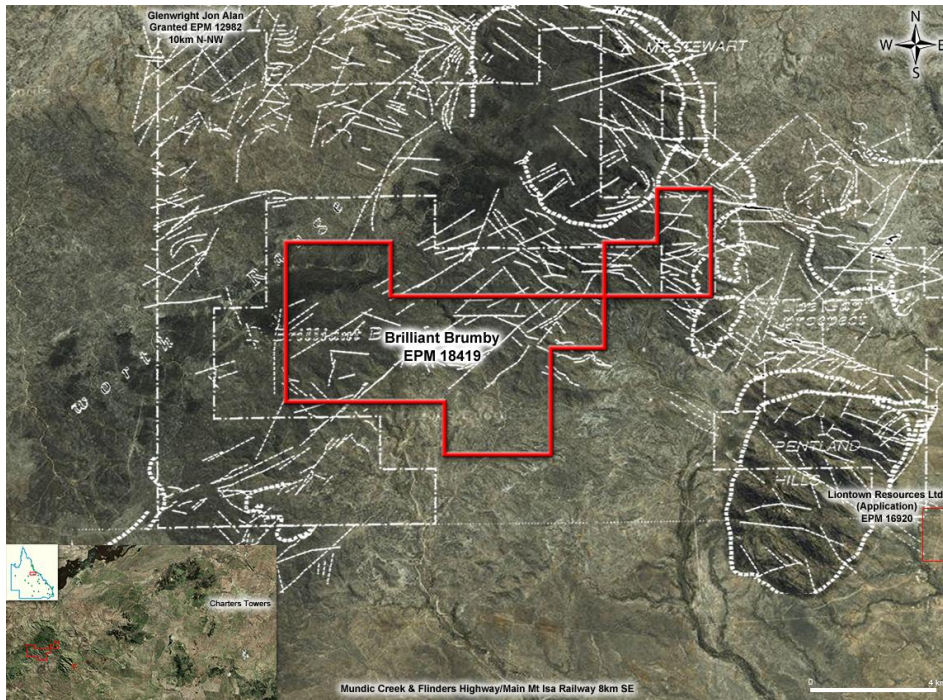
Waxy chlorite-sericite alteration on joint surfaces with possible weak propylitic alteration similar to that at the Brilliant Brumby has been observed in some of the creeks traversed, which suggests that such alteration may be more widespread than previously considered. The quartz vein mapped by Newcrest as the source of “the anomaly” was a quartz vein of pegmatitic origin returning 0.07 g/t gold. Another anomalous drainage (with earlier samples containing 14.5 ppb gold) was traversed without confirming earlier results (max 0.02 g/t gold).

The intrusives in the central to eastern section of the tenement are considered to derive from melted sediments rather than a deep magma, and appear to represent a number of phases. Faulting, jointing, and emplacement of pegmatites post-date the intrusive activity. Acapulco Mining personnel concluded that the mineralization in the tenement may be related to the pegmatite intrusions (Anon, 1996). A comprehensive lineament map was prepared and the northeast fractures are clearly evident (see Figure 15 - this figure shows the current EPM overlying earlier EPMs).

Figure 15 also illustrates the structures and linear features along the northeast Trend and some of the areas where high-grade samples were reported, although the general consensus was that the deposits were small but offered reasonable gold and silver content. The subject EPM’s northeast sub blocks were selected because of the favorable sampling in nearby areas and because the area has not been explored in any detail to date.

Another more detailed lineament (photo geology) map was prepared by Purcell (1986, Figure 3). These maps show the northwest trend. The map also shows the subtle off-shot or splinter faults that often make for favorable site of mineralization. For example, the Brilliant Brumby mine workings are located along one the splinter faults emanating out of the main northeast trending fault zone.





**Figure 15**  
**Lineament Map within and around Brilliant Brumby EPM**  
 (after Gannan, 1990)

Based on a review of many of the earlier reports by companies working in the area, many of side-shoots have not been examined or sampled in any detail. These photogeologic maps updated with the new satellite photography will likely improve lineament/fault mapping for making advanced field maps for the approaching exploration on the Brilliant Brumby tenement.

## Section 9.0    Deposit Types

Mineralization at the Brilliant Brumby Mine is typically hosted by quartz veining trending north-south, in contrast to the general NE-SW trend of major faults and lineaments. Exploration has focused on north-south trending features located in anomalous catchment areas for a number of years, without a significant discovery to date. This may be a result of the complexity of the local geology and lack of sophisticated geophysical tools. For example, although mineralization is associated with a north-west trending *en echelon* vein system, it has developed in an overall-trending north-south fracture zone, which may be related to off-shoot faults of the northeast and/or northwest trending faults in the area.

Mt. Stewart Gold personnel reported that mineralization has a main quartz vein trending 350 degrees (Anon, 2001). This vein is near vertical with several smaller parallel veins with a maximum thickness of approximately one meter, and an average thickness of about 30 centimeters. The outcrop has been traced for 300 meters and the surface has been worked for over 200 meters. The main workings are about 120 meters long and up to 24 meters deep at the northern end. Gold was produced from several small shafts and a few pits.

In places, the producing veins consist of white quartz or in the matrix of fault breccias. The veins are often laminated and preserved vugs that are lined with euhedral quartz crystals. Galena and pyrite crystals also line the cavities or may appear to be disseminated in the quartz. Alteration is indicated by green sericite alteration immediately adjacent to the veins.

Australian Overseas Mining personnel indicated that areas of potential leads to bedrock mineralization south and east of the Brilliant Brumby Mine workings seem to follow drainage where anomalous sampling, i.e., up to 3.2 ppb gold was reported from historical creek traverses and associated sampling. The samples also consisted of rock-chips. This encouraged a systematic follow-up sampling across outcrop as well as soil sample traverses and mapping. The Brandy Creek workings to the northwest also require systematic mapping and sampling that should include soil auger traverses because of a lack outcrop in the areas. These reports suggest that the likely economic potential lies in shear-hosted gold-bearing quartz veins within a number of the old drainage anomalies. Many of these leads remain untested to date (Anon, 1988a and b).

The presence of gold-shedding Campaspe beds along the southern boundary of the EPM on slopes and ridges makes exploration difficult but perhaps rewarding, especially, for example, in the area where an anomaly of 1.91 ppb for a rock-chip sample was reported from historical records. There is a likely veneer of Tertiary sediments that may host gold in the basal unit of the Campaspe beds and in the subsurface below in quartz dikes below the Tertiary cover (Dow, 2007).

## **Section 10.0 Mineralization**

Based on our review of the historical activities and on the more recent exploration programs conducted during the 2000s, the most significant, known mineralized trend with records of gold production within the subject tenement is related to simple epithermal quartz veins in the Brilliant

Brumby Trend (see Figure 16) but there are other types of mineralization that may also be present on the subject EPM.

### 10.1 Type of Mineralization

Based on our review of the information, two principal types of mineralization are prospective on the subject EPM for producing significant mineralization in the area by either epithermal and/or intrusion-related styles of mineralization. Figure 16 captures the variations to these models of mineralization. Much of the previous exploration in the Pentland District has been focused primarily on quartz veins to the east and south including the Klaster and Parties, Antler, Antler Extended and the Mt. Remarkable prospects located more than 20 km to the south and southwest of the Brilliant Brumby EPM (see Figure 11 for general locations).

These are typically erratically developed quartz reefs in fissures, particularly in granitoid hosts, or lenticular anastomosing quartz bodies in faults or shear zones. More closely related to the subject EPM, earlier work has indentified the principal trends within the subject EPM, i.e., Lolworth Trend and the Brilliant Brumby-Surprise Trend.

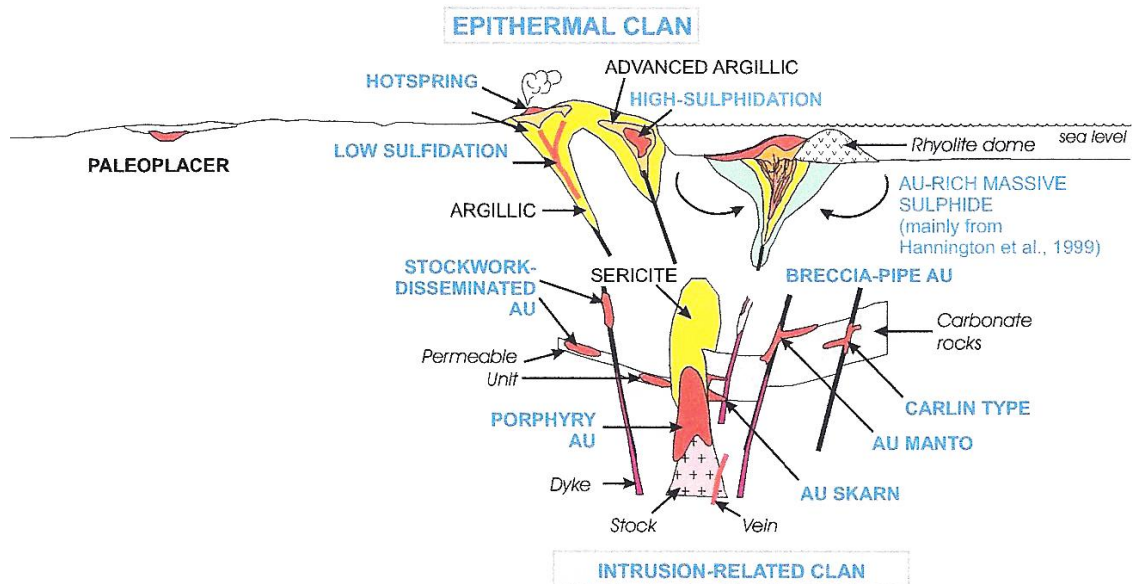
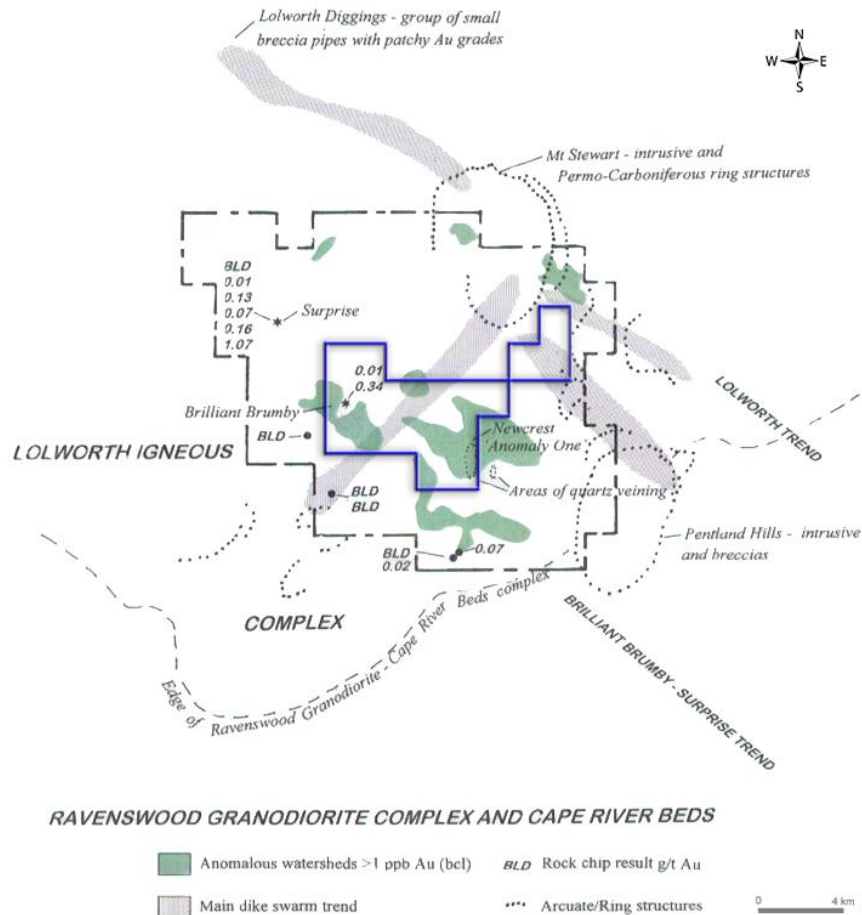


Figure 16 – Epithermal and Intrusion-Related Mineralization (Robert, et al., 2007)

These are likely based on faulting trends (to the northwest). The associated northeast trend is apparent on satellite photos and has been explored much less than areas associated with the northwest trend (see Figure 17).

### 10.2 Trends

The areas associated with the Lolworth Trend has been intensively explored on the surface but only superficially drilled to any depth. Historical records on the Charters Towers area indicate that few surface indications were present and that significant mineralization was found by accident via drilling (Scott and van Eck, 2003; Morrison and Beams, 1995). The subject EPM has many more geological leads than Charter Towers in the early days, and the leads illustrated in Figure 17 and in the geochemical and geophysical data available in the historical reports contribute to the value of the subject tenement.



**Figure 17**  
**Trends within Brilliant Brumby EPM**  
 (after Bubendorfer, 1997)

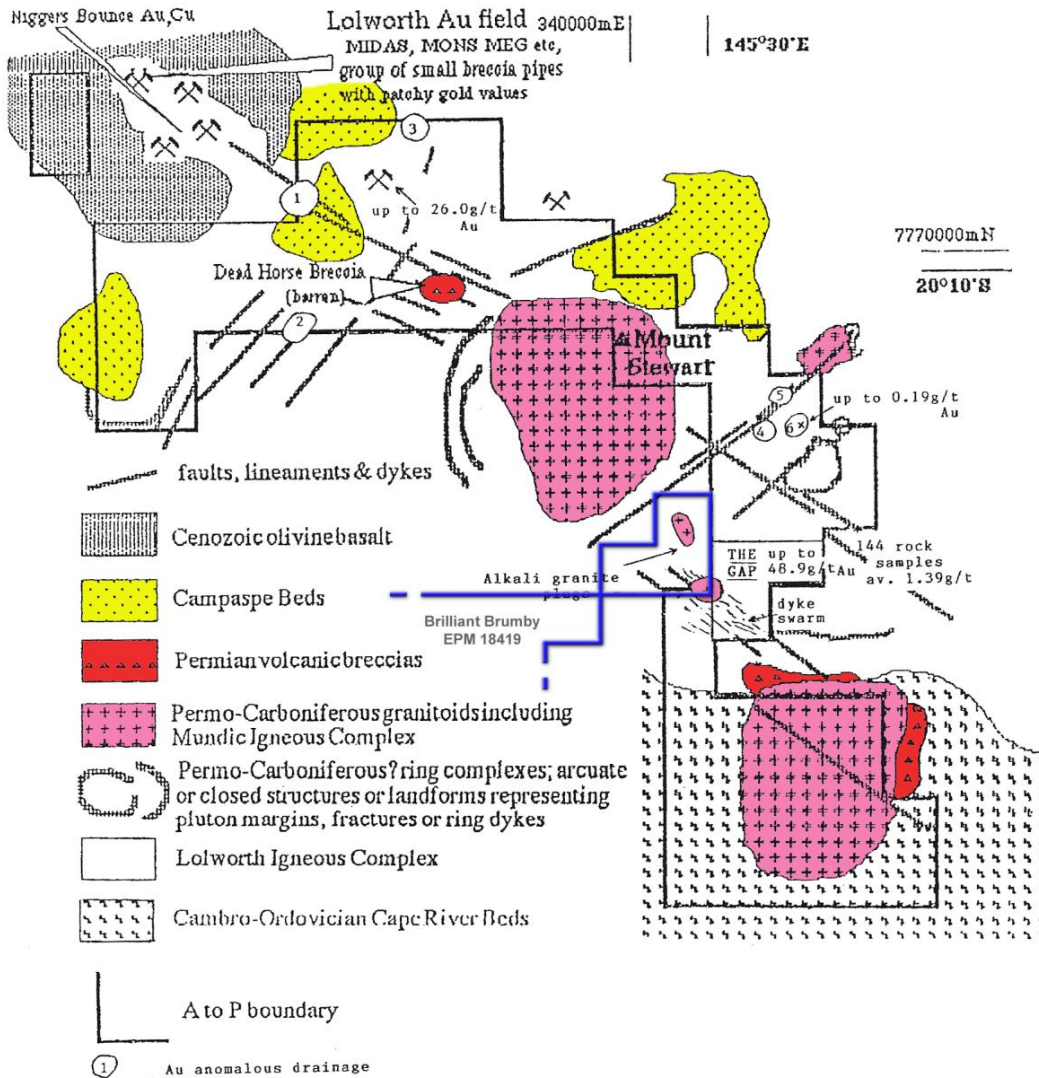
The Pajingo epithermal gold mineralization model may be an analogy to apply to the subject EPM. Late-stage quartz vein development from the interior of an intrusive body appears to be present at the Brilliant Brumby mine area as in the Pajingo area.

Along the Lolworth Trend (Figure 18), quartz in various zones of mineralization is massive and consists of tightly interlocked euhedra; it is sheared, brecciated, cut by veinlets, and infilled with a further generation of vug-forming quartz in ore shoots. Mineralization is typically restricted to the cross-cutting generations of quartz and is rarely in the primary quartz or the wall rock.

Typically, a simple pyrite-base-metal-sulfide assemblage constitutes up to 20% of the zone, and gold occurs as free grains adjacent to the sulfides, particularly galena. Silver is generally only in gold grains with moderate fineness (approx. 770), leaving 33% of silver and other metals in the free gold particles. As in the Thalanga deposit, these targets may not be obvious on the surface and subtle alteration may be easy to overlook in the field.

Alteration is a narrow zone up to two to three times the width of the vein or lode. Further from the vein, dark green carbonate often gives way to pink carbonate, then weak propylitic alteration. No distinct vertical zoning of alteration has been reported in the area to date, even in veins exposed in underground workings. However, individual ore shoots may be surrounded by zoned alteration that has not yet been identified in the field.

The distinctive features of the mineralization are the proximity and timing relationships of the mineralization in general; but a lack in detail from a specific example of the mineralization and magmatic fluid path has made previous discovery rates unusually low. If the fluid was of magmatic origin, then it must have originated at deep crustal levels and not within the exposed intrusive bodies.



**Figure 18**  
**Trends within Brilliant Brumby EPM Northeast Sections**  
 (Dudgen and Beams, 1989)

Another style of potential mineralization is precious-metal breccia pipe mineralization related to late-stage intrusion of Permian porphyritic granites. The margins of the late-stage Mundic Igneous complex have been considered as a favorable exploration target for many years but no discoveries has been made to date. More subtle occurrences have become potential targets.

## **Section 11.0 Exploration**

### **11.1 Previous Surveys and Investigations**

Geophysical methods have played a significant role to date in the evaluation of prospects throughout Australia and the world: aeromagnetics and radiometrics have also been utilized for drilling target selection, and good quality aeromagnetics is available through the Aerodata multiclient survey. IP and other electrical geophysical methods have not been utilized at Pentland to any great extent, in contrast to their extensive use at Pajingo where resistivity and IP has tracked siliceous zones under Tertiary cover. Previous exploration for porphyry copper in the 1970s utilized IP at Mt Wyatt with some success. The abundant outcrop in the subject EPM suggests that geological mapping can also be effective in delineating favorable geological and structural features.

Circle Resources (and the Brumby Group) are the beneficial owners of the past 30 years of exploration results and expertise carried out in the region, including the Brilliant Brumby EPM, and has access to the complete open-file exploration database. Terra Search also has access to numerous additional technical reports and data as well as the exploration expertise and support built up over twenty years exploring within North Queensland and more specifically in the Pentland District. We have reviewed many of these reports during the course of our evaluation to assess the relative value of the Brilliant Brumby EPM with respect to its potential for major discoveries within the tenement (see the citations to the various reports in Section 22.0 - References).

### **11.2 Current Concepts**

After reviewing the technical literature and company reports relating to the type of potential mineralization in and around the subject EPM, it is clear that previous exploration in the western sections of the subject EPM have been based on simple quartz vein emplacement of gold with minimal other metals, while the exploration in the eastern area has been focused on other types of mineralization. To assess the potential of the subject EPM and the concepts of exploration that may need to be considered in any ensuing exploration on the subject EPM, we have reviewed the technical literature on the various types of gold mineralization that might be expected in the immediate and surrounding areas.

During the past decade, there has been renewed emphasis on the diversity in deposit types within provinces containing orogenic gold deposits (e.g., Robert, *et al.*, 1997 and 2007), with emphasis on intrusion-related gold deposits. Sillitoe (1991) grouped these deposits into five distinct classes:

- Class 1:** Stockworks and disseminated ores in porphyritic and nonporphyritic intrusions;  
(e.g., representative deposits: Lepanto, OK Tedi, Boddington in the former and the Zortman-Landusky, Salave, Gilt Edge, Kori Kollo deposits as representatives of the latter type of intrusion);
- Class 2:** Skarns and replacement ores;  
(e.g., Fortitude, McCoy, Nickel Plate, Red Dome in skarn deposits and Barney's Canyon, Ketza River, Yanicocha deposits in carbonate rocks in replacement ores);
- Class 3:** Stockworks, disseminated ores, and replacement bodies in country rocks to intrusions (e.g., Porgera, Murunggold, Mount Morgan, Quesnel River deposits);
- Class 4:** Breccia pipes in country rocks (e.g., Montana Tunnels-Golden Sunlight, Kidston, and Chadbourne deposits); and
- Class 5:** Mesothermal and low-sulfide, epithermal veins in intrusions and country rocks (e.g., Charters Towers, Jiaodong Peninsula, Majara deposits).

The classes obviously reflect many different types of gold deposits that indicate a relatively local zonation within and surrounding a contributing pluton. With some exceptions (e.g., Charters Towers being one exception), there is little debate that most of these gold deposits are genetically associated with a well-defined igneous body and are, therefore, properly classified as intrusion-related deposits (Sillitoe and Thompson, 1998).

However, Class 5 of intrusion-related gold vein deposits may have many characteristics identical to orogenic gold deposits. Of the five geochemical associations that they identify within this class of vein-type deposits, only the deposits with the gold-tellurium-lead-zinc-copper (e.g., Charters Towers) and gold-arsenic-bismuth-antimony associations have features resembling, and can be confused with orogenic gold deposits, which if used as an exploration guide can result in wasted



exploration funds over the life of the project. The Kidston deposit located to the northwest of the EPM should be reviewed as a potential guide in the exploration of the far eastern sub blocks of the EPM.

*Distinction from orogenic gold deposits*

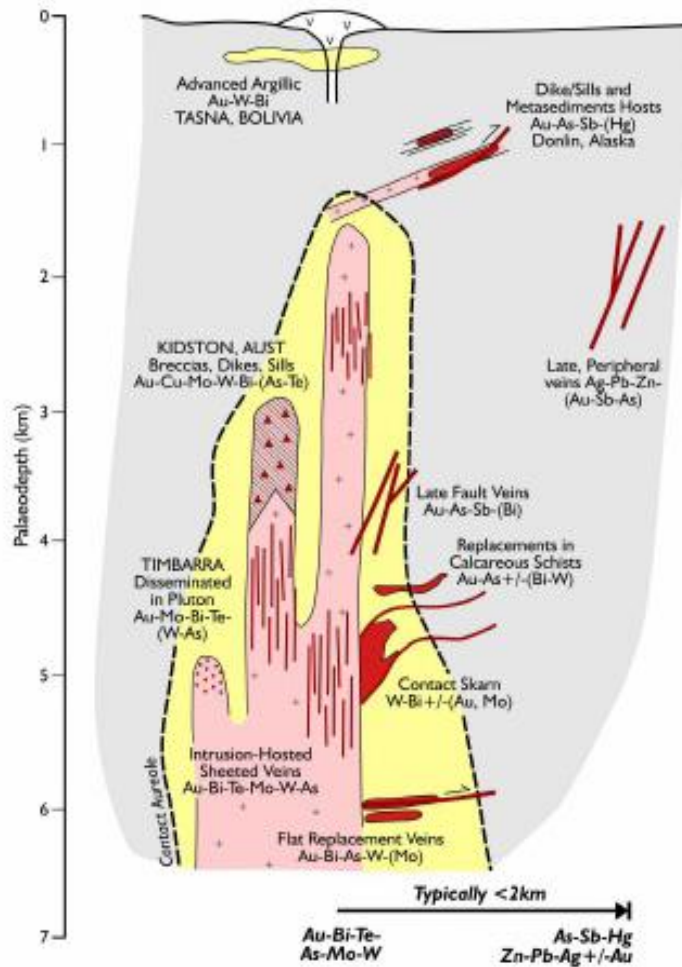
In perhaps the clearest refinement of their defining characteristics, Lang *et al.* (2000), utilizing the studies of Sillitoe (1991), and others, have summarized the major characteristics of intrusion-related gold deposits, illustrated in Figure 16 and in Figure 19.

Intrusion-related gold mineralization has the following characteristics:

- 1) Metaluminous, subalkalic intrusions of intermediate to felsic composition, that spans the boundary between ilmenite and magnetite series;
- 2) CO<sub>2</sub>-bearing hydrothermal fluids;
- 3) A metal assemblage that variably includes gold with anomalous bismuth, tungsten, arsenic, molybdenum, tellurium, and/or antimony, and typically has noneconomic base-metal concentrations;
- 4) Comparatively restricted zones of hydrothermal alteration within granitoids;
- 5) A continental tectonic setting well inboard of inferred or recognized convergent plate boundaries; and
- 6) A location in magmatic provinces best or formerly known for tungsten and/or tin deposits.

The deposits of the Pine Creek, Tanami, and Telfer Districts of the Northern Territory are not actually hosted in the associated granitoids but in the associated country rock. In addition, the Charters Towers goldfield northeast some 70 km from the subject EPM has been described as both an epithermal to shallow magmatic-hydrothermal deposit and as being of orogenic origin, but the latter was excluded on the basis of the higher salinity and relatively higher pressures and greater depths (relative to epithermal deposits) inferred from ore-stage fluid inclusions (Goldfarb *et al.*, 2005; and Kreuzer, 2005).

### Reduced Intrusion - Related Clan



**Figure 19 – Modeling of Intrusion-Related Mineralization**  
(Robert, *et al.*, 2007)

Pajingo epithermal gold deposits consisting of late-stage quartz vein development from the interior of an intrusive body appear to represent similar geological conditions at the Brilliant Brumby mine area (Parks and Robertson, 2003).

## Section 12.0 Drilling Activities

The exploration program at the Brilliant Brumby EPM is still at a relatively early stage. No drilling has been conducted on the EPM to date by the current EPM holder.

### **Section 13.0 Sampling Method and Approach**

The exploration program at the Brilliant Brumby EPM is still at a relatively early stage. No sampling has been conducted on the EPM to date by the current EPM holder. Analyses and other data produced from earlier exploration programs or mining should be considered as of historical interest only. Mining production records from the Brilliant Brumby mines are likely to be accurate and reliable only to a limited extent since there is no current way to confirm such reporting on the methods of sample preparation employed at the time, or on the quality of the laboratory or methods employed to determine gold content, or on the security and veracity of the sampling results reported in the historical records.

### **Section 14.0 Sample Preparation, Analyses, and Security**

As indicated in Section 13.0 above, the exploration program at the Brilliant Brumby EPM is still at a relatively early stage. No sampling or drilling has been conducted on the EPM to date by the current EPM holder. Analyses and other data produced from earlier programs or mining should be considered as of historical interest only. Mining production records from the Brilliant Brumby mines are likely to be accurate and reliable only to a limited extent since there is no current way to confirm such reporting on the methods of sample preparation employed at the time, or on the quality of the laboratory or methods employed to determine gold content, or on the security and veracity of the sampling results reported in the historical records.

### **Section 15.0 Sample Data Verification**

As indicated in Section 14.0 above, the exploration program at the Brilliant Brumby EPM is still at a relatively early stage. No sampling or drilling has been conducted on the EPM to date by the EPM holder. Analyses and other data produced from earlier programs or mining should be considered as of historical interest only. Mining production records from the Brilliant Brumby mines are likely to be accurate and reliable only to a limited extent since there is no current way to confirm such reporting.

## Section 16.0 Adjacent Properties (Tenements)

No tenements (EPMs) are currently listed within 9 km of the Brilliant Brumby EPM. The closest EPMs located 9 km and beyond are:

**Table 5**  
**Current Tenements in the General Area of Brilliant Brumby EPM**  
(See Figures 2A and 2B for Locations)

<b>EPM#</b>	<b>Holder</b>	<b>Distance from EPM</b>	<b>Status</b>
12982	Glenwright Jon Alan	12 km N-NW	Granted
17068	Ausgold Exploration Pty Ltd.	23 km NE	Granted
16768	CNW Pty Ltd.	18.5 km E-NE	Granted
16920	Liontown Resources Limited.	10 km E	Application
16929	Kagara Copper Pty Ltd.	9 km E	Granted
16926	Queensland Gold Investments Limited	9 km E	Application
14332	ActivEX Limited	16.5 km S	Granted
18328	Maritime Academy Australasia Pty Ltd.	14.5 km SW	Granted
15055	ActivEX Limited	30 km W-SW	Granted
18393	Wishbone Gold Pty Ltd.	63 km W-NW	Application

## Section 17.0 Mineral Processing and Metallurgical Testing

No metallurgical testing has been conducted on the Brilliant Brumby EPM because exploration is still at a relatively early stage.

## Section 18.0 Mineral Resource and Mineral Reserve Estimates

The exploration program at the Brilliant Brumby EPM is still at a relatively early stage. No mineral resource and mineral reserve estimates have been prepared to date.

## Section 19.0 Other Relevant Data and Information

There is no other relevant data or information that the authors are aware of that should be included in this report. I2M has endeavored to locate and review all relevant and appropriate documents as listed in Section 22 - References that would provide information on the relative quality of the subject tenement, but we do not assert that we have considered all such information that may be in

existence. Therefore, we reserve the right to revise or alter our opinions should new information become available that would materially impact our views on the subject EPM.

## **Section 20.0 Interpretations and Conclusions**

After reviewing the above company activities and associates reports, we have concluded that only superficial studies have been conducted in the general area of current interest over the past decades. In the past, if obvious outcrops did not show significant alteration and associated favorable sampling results, the tenements were relinquished. No systematic local mapping and little drilling have been conducted that would support the development of various models.

With the addition of advanced ground magnetics surveying and associated data modeling, coupled with sophisticated software used by Terra Search, exploration of a higher level and sophistication than previous efforts can lead to more effective targeting of sites for drilling and for working out the geological relationships of the mineralization, if encountered. This will improve the chance of discovering a significant ore body. Based on the available reports and associated information, we have concluded that the Brilliant Brumby EPM is a high-quality exploration target meriting serious attention by the Brumby Group in their exploration program. Over the last decade, commodity prices have driven exploration more than ever before. With the current gold price well over \$1,000 per ounce, well-funded exploration incorporating new geological and geophysical methods and systems have become available to companies now to drive exploration in more aggressive programs over a number of years.

Past exploration did not permit detailed assessment and, in many cases, only superficial assessments could be made with the limited funding available since the 1960s and before. Now that most shallow deposits exhibiting gossanous manifestations at the surface have been found, the deeper, albeit blind deposits with no indications at the surface have become legitimate exploration targets. With improved commodity prices bringing better funding to exploration programs, this allows numerous opportunities to evaluate mineral properties and greater detail and thereby increase the likelihood of discovering new deposits that have been overlooked.

The Brilliant Brumby EPM is one example where, based on our review of the information available, we have concluded that previous exploration programs have not covered the property in sufficient detail to determine its potential, leaving a number of exploration leads for the Brumby Group to pursue. The following are the principal exploration leads we have selected from our evaluation:

### **20.1 The Brilliant Brumby Trend**

This target area encompasses the inactive gold workings at Brilliant Brumby as well as the Loafer, Pactolus and Sundown occurrences close to a major NE trending deep-seated fault structure. These occurrences and their extensions may indicate the existence of a large-scale mineralized system.

### **20.2 Early Bird Area**

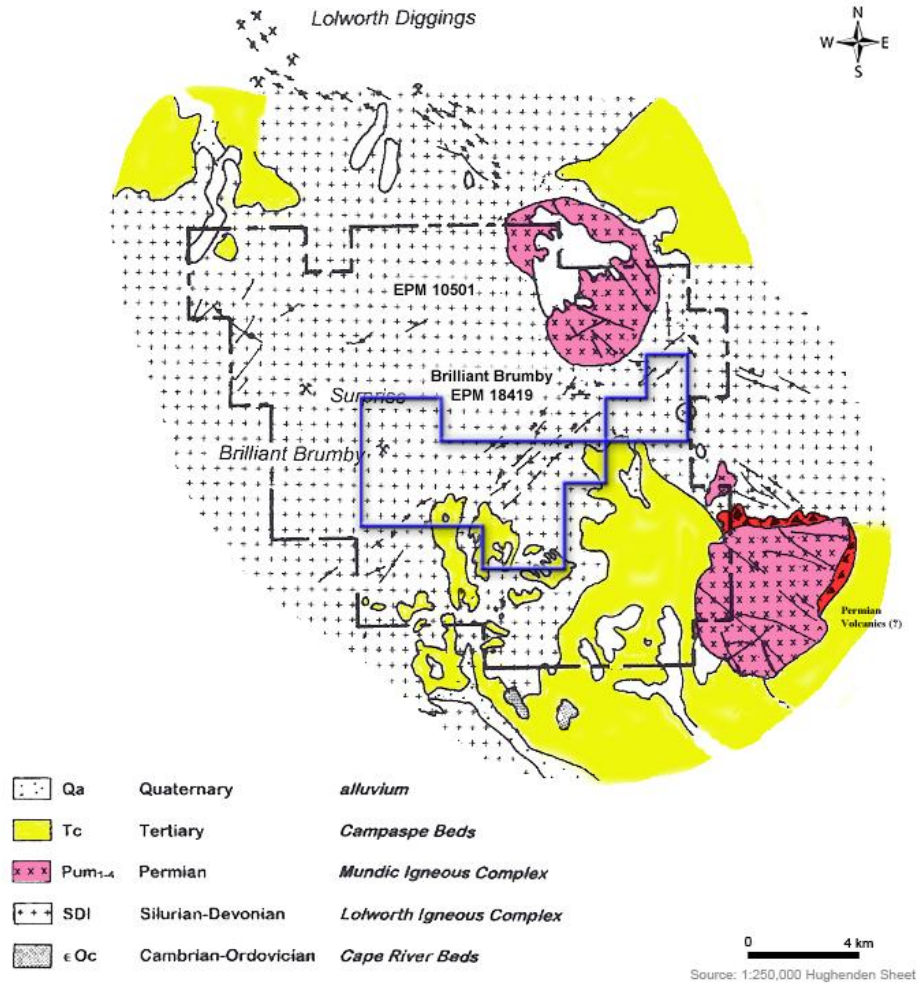
This area exhibits a large magnetic low adjacent to a regional NNE trending, deep-seated fault zone, which may indicate an area of alteration within the granite. Gold occurrences have been reported in this area. There are also a series of northeast-trending dikes which may be a locus for gold mineralization.

### **20.3 Golden Spur**

This target area is a cluster of previous artisanal gold workings, including Occidental and Golden Spur (see Figure 11) at the margin of a magnetic high related to the intrusion of the Permian Mundic Igneous Complex. There are numerous mapped NW-SE and E-W faulted trends which indicate the structural complexity of the area but they are also potential conduits for gold and base-metal mineralization. Figure 20 illustrates the main northeast fracture zone. This figure is based on reports by an earlier tenement holder (i.e., Acapulco Mining), and shows the major fault-zone trending northeast. This zone extends into the far north-east sub blocks where the Lolworth Trend intersects the northeast fracture zone. Such intersections typically create permeability that allows for hydrothermal systems to have developed along with gold and massive sulfide mineralization.

Of interest to the current exploration, there are at least five high-quality target areas within the EPM:

- 1) The so-called Brilliant Brumby Trend (Figure 17) at depth along the north and northwest fracture system linking the Brilliant Brumby and Sunrise and Surprise Mines,



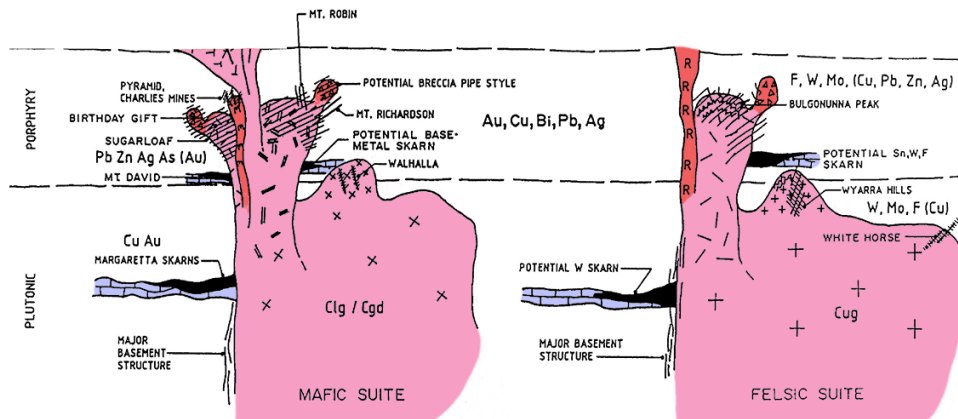
**Figure 20**  
**Principal Fault Map within and around the Brilliant Brumby EPM**  
 (after Anon, 1996)

- 2) The areas along and within the prominent northeast-trending fault zone (Figure 20),
- 3) The areas below the Tertiary sediments within the main fault zone trending northeast near the central southern boundary of the EPM,
- 4) The areas in the far northeast where two main fault zones intersect, i.e., the Lolworth Trend and the Northeast Trend (shown in Figure 15, 17, and 18), suggesting that most of the sub blocks in that area would be potential targets of quality, and
- 5) The area of the Early Bird mine workings in the north-central part of the EPM and the reported geophysical anomalies and favorable conditions in surrounding areas.

## Section 21.0 Recommendations

### 21.1 Exploration Strategy

The Pentland District, and particularly the Brilliant Brumby EPM, is highly prospective and warrants further exploration for vein-style and porphyry-related breccia-hosted deposits (see Figure 21). This is based on the view that: 1) earlier exploration has resulted in determining where not to explore for economically significant ore deposits, which serves to increase the likelihood of discovering economic mineralized zones during the current exploration program, and 2) exploration employing recently developed tools and methods has only begun in the priority areas of the subject EPM.



**Figure 21 - Primary Models of Mineralization for the Brilliant Brumby EPM**

The general exploration strategy that should be applied is to use all available data and information from the historical record in the formation of the exploration plans. Areas within the EPM should be assigned priorities and then systematically pursued while appropriately documenting the resulting data and information for possible use in nearby areas.

We recommend that surface geochemical surveys be limited to particular types of targets, and that aerial geophysics and ground geophysics should be applied over priority areas of the EPM. Airborne Electromagnetic (EM) surveys, such as AeroTEM III, GEOTEM III or VTEM, and ground EM surveys, including Lamontagne's UTEM and Crone's Pulse EM surveys should be applied in the search for moderately to strongly conductive assemblages of massive sulfides (as in the Early Bird priority area). The depth penetration of these surveys varies between 200 and 400



meters, depending on the size and concentration of the sulfides within the targeted body of mineralization. Induced Polarization (IP) surveys are used to target the disseminated sulfide halos that have been documented around most footwall-, contact-, and faulted offset-style deposits. Depending on the configuration, standard IP surveys can offer reliable and high-resolution depth penetration up to 100 to 150 meters.

Reverse circulation and diamond drilling of appropriate targets should then be followed up by borehole geophysics (either downhole EM or IP) to further target either mineralized intersections or near-hole geophysical anomalies. This makes full use of drilling beyond obtaining core samples. Investigating the Brilliant Brumby Trend may require a few drill sites along this trend to test for possible blind targets.

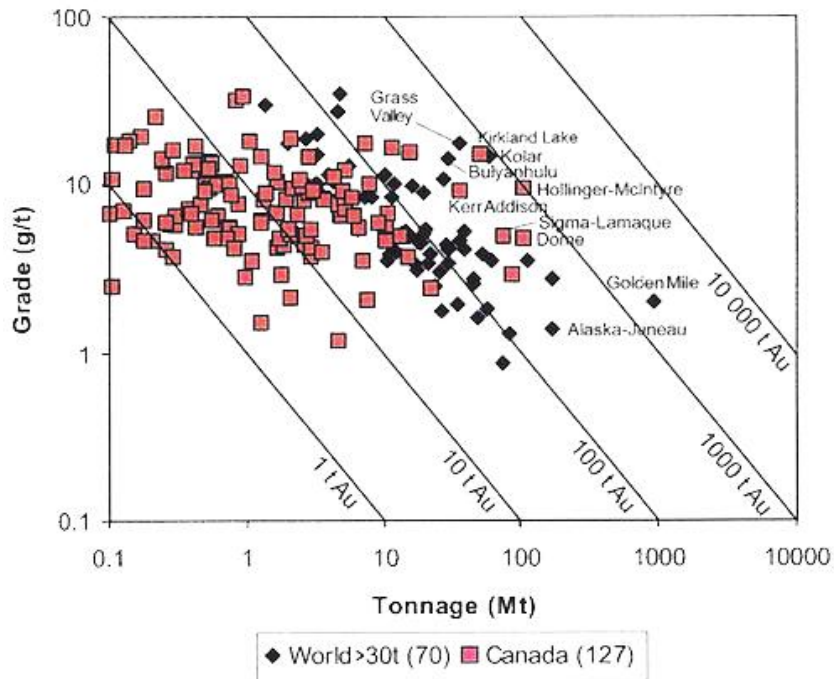
Subsequent to mapping activities that would involve detailed ground reconnaissance in designated priority areas, and after some stripping away of shallow cover, altered zones should be investigated geologically in detail with the aid of a hand-held magnetometer and the new XRF detectors, such as the Gems System GSM-19 Overhauser Magnetometer with internal GPS. The unit is sensitive to  $0.022 \text{ nT}/\sqrt{\text{Hz}}$ , which would allow some depth perception of magnetically mineralized zones. The new hand-held XRF units should be used by qualified geological professionals during field reconnaissance, which would increase the effectiveness of deploying such equipment.

Previous discoveries have been made by the successful application of exploration techniques such as geological reconnaissance and mapping surface geochemistry surveys, and in applying a range of appropriately selected geophysical tools, followed with bedrock drilling (RC and coring) to test priority targets. Although the subject EPM has been explored over the past decades by a number of exploration companies, in applying appropriate funding to incorporate recent advances in geophysics, especially in airborne and ground-magnetics systems, complemented by TM imagery and extensive geochemical datasets, as well as applying the new and revised models of mineralization, the Brilliant Brumby EPM remains as a high-quality prospect. Using the 30-year exploration history of activities by exploration companies available to Circle Resources and the Brumby Group, this information will drive fast-track exploration in the priority areas that include previously mined areas and other under-explored areas by previous companies.

Also, the local exploration expertise and previous history working on these areas by the Circle Resources-Brumby Group principal consultant, Terra Search, provides the Group with a competitive advantage in exploration within the Pentland District. Terra Search, a fully independent, privately-owned mineral exploration services company, has operated throughout Australia since May 1987. Terra Search personnel operate out of offices in Townsville with a field depot in Charters Towers, which is within a 3-hour drive to the subject EPM. Terra Search has the equipment and demonstrated technical expertise to manage the exploration program. Field crews are experienced in working in the more remote areas of northern Queensland. Since Charters Towers is a hub for exploration in the general area, commonly needed equipment, supplies, and emergency assistance is less than 100 km from the subject EPM, mostly by way of the paved Flinders Highway. Smaller communities offering basic needs are located along the highway as well. Other needs are generally met in Townsville located further northeast along the Flinders Highway at a distance of less than 200 km connected by the Flinders Highway.

## **21.2 Development Strategy**

The target of the exploration is to identify and develop gold and base-metal deposits of sufficient size and ore grade to be of economic interest to the Brumby Group. The typical gold deposits in Canada and elsewhere in the world have been classified by tonnage and gold grade in Figure 22. Although most gold deposits developed by the major gold companies begin at 10 million tonnes, smaller deposits should also be considered for development by the Brumby Group. As indicated at the Pajingo epithermal gold deposits, once the geological key to a gold deposit has been revealed, this often results in additional mineralized zones that can add to the overall tonnage and gold produced. Based on our experience in exploration and the development of gold prospects, we encourage the Brumby Group to provide the funds to drill all priority areas identified within the Brilliant Brumby tenement.



**Figure 22 - Tonnage versus Grade Relationship of Canadian and World Gold Deposits (Combined Production and Reserves).** ( Dubé and Gosselin, 2007)

We have prepared an estimated budget for the first two years of the exploration program on the subject EPM (see Figure 6). This budget is more aggressive than the annual expenditures proposed by Circle Resources in the EPM application documents on the basis that two field teams and other functions can be performing concurrent field tasks on separate priority areas within the subject tenement. This would allow exploration to move along at a greater pace than with only one field team. Coordination of results will become an important data-keeping function of technical management personnel.

Access roads will likely need to be constructed in unexplored areas; field camps will need to be stocked with supplies and water at strategic points in the various priority areas, not only to provide support to the field crews, but also to provide the appropriate support for any emergencies that may occur in the field. Handheld-radio units, GPS and locator beacons should be standard equipment for the field crews.

**Table 6**

**Estimated 2-Year Program Costs: Brilliant Brumby EPM Exploration**

<b>Task Category</b>	<b>Year 1</b>	<b>Year 2</b>
Geological Reconnaissance and Mapping	\$25,000.	\$75,000.
Geophysics (Air & Ground Magnetics & IP)	35,000.	40,000.
Preliminary Drilling Planning	15,000.	20,000.
Geological Supervision & Yearly Report	25,000.	45,000.
Drilling & Field Supplies	15,000.	65,000.
Laboratory & Assays	15,000.	45,000.
Backhoe & Bulldozer & Roadwork	<u>35,000.</u>	<u>10,000.</u>
SubTotal:	\$165,000.	\$300,000.
Contingency @ 10%	<u>16,500.</u>	<u>30,000.</u>
<b>Total:</b>	<b>\$181,500.</b>	<b>\$330,000.</b>

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and Photo Geology (Lineaments Map) Figure 3:  
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## Section 23.0 Certificates of Competent Persons

**Michael D. Campbell, P.G., P.H.**  
**Vice President and Chief Geologist/Hydrogeologist**  
**I2M Associates, LLC**

I, Michael D. Campbell, do hereby certify that:

1. I am Vice President and Chief Geologist/Hydrogeologist in the firm of I2M Associates, LLC, based in Seattle, Washington and residing at 1810 Elmen Street, Houston, Texas 77019.
2. I graduated with a Bachelor of Arts in Geology in 1966 from The Ohio State University in Columbus, Ohio, and with a Master of Arts in Geology from Rice University in Houston, Texas in 1976 and have practiced my profession continuously since 1966.
3. I have worked as a geologist and hydrogeologist for my full working career. After graduation, I worked for Continental Oil Company (Australia), Sydney, N.S.W., as Staff Geologist/Hydrogeologist, Minerals and Mining Division (from 1966 to 1969). I was responsible for conducting, coordinating, and implementing prospect evaluations, mapping and sampling programs, well-site operations, and ground-water supply investigations in various parts of Australia, Micronesia (Caroline Islands) and the South Pacific (Coral Sea) for exploration on: phosphate (NW Queensland, west of Mt. Isa, and Northern Territory, phosphate discovery was made in Alroy Station area), potash (Carnarvon Basin), sulfur, coal, base metals, and uranium. Joint-venture programs with Japanese and Korean companies required extensive travel between Australia and Japan and Southeast Asia. I also investigated uranium prospects on the Nullibar Plains of South Australia. I was granted Resident Status in Australia from 1966 to 1969 to work on phosphate and other minerals in Queensland, the Northern Territory and on potash in Western Australia and elsewhere in South East Asia.

After completing the assignment, I was transferred back to the U.S. to work on Conoco's uranium projects in the western U.S. In 1970, I joined Teton Exploration, Div. of United Nuclear Corporation in Casper, Wyoming and served as District Geologist for uranium exploration. From 1972 to the present, I have worked for various engineering and environmental companies involved in natural resource development and mining and on managing and executing environmental projects for industry. In the early 1980s, I served as a senior consultant to an international venture to explore for, acquire, and development gold and silver properties in the U.S. One such property was permitted and placed into production. An especially high-quality gold dore' was produced over a three-year period.

4. I am a licensed Professional Geologist in: Texas, Washington (and as a Professional Hydrogeologist), Alaska, Mississippi, and Wyoming, and I hold national certifications

by the American Institute of Professional Geologists and American Institute of Hydrology. I am a member of the Society of Mining Engineers of AIME (1975-Present), a senior member of the Society of Economic Geologists, a founding member of the Energy Minerals Division (EMD) of American Association of Petroleum Geologists (AAPG) - currently serving as Chair of the EMD Uranium (Nuclear Minerals) Committee since 2004, and was elected EMD President (Term: 2010-2011). I have been active in numerous other professional associations and societies, as time permitted, such as the National Ground Water Association (AGWSE), and other professional societies. I have produced numerous presentations and publications and was elected a Fellow in the Geological Society of America (see Resume for additional details, Section 26.0 – Appendix III CVs of Authors).

5. I have read the definition of “Competent Person” as defined in the AIM Rules for Companies Guidance Notes for Mining, Oil & Gas Companies, and I certify that by reason of my education, affiliation with a number of relevant professional organizations, and by my past relevant work experience in Australia and elsewhere, I fulfil the requirements to be a “Competent Person” under the AIM Rules for Companies.

Furthermore, the information in this report that relates to exploration results is based on information compiled by myself and others. I am a member in standing of the Society of Mining & Exploration (SME) of AIME, a Certified Professional Geologist of the American Institute of Professional Geologists (AIPG), a senior member of the Society of Economic Geologists a Licensed Professional Geologist in the U.S. States of Texas, Washington, Alaska, Wyoming, and Mississippi, and a Fellow of the Geological Society of America (GSA). I am a full-time employee of I2M Associates, LLC, based in Seattle and Houston.

I have sufficient experience relevant to the styles of mineralization and types of deposit under consideration and the activities which I have undertaken to qualify as a Competent Person as defined by the Australasian Code for Reporting Exploration Results, Mineral Resources and Ore Reserves. I fully consent to the inclusion of my name in this report and to the issuance of this report in the form and context in which it appears.

Also, I have read the definition of “qualified person” as defined in NI 43-101, and I certify that by reason of my education, affiliation with a range of professional organizations (Foreign associations in Appendix A of NI 43-101), and past relevant work experience, I fulfill the requirements to be a “qualified person” for the purposes of NI 43-101. I have read the Instrument (NI 43-101) and Form 43-101 and this technical report has been prepared in essential compliance with this Instrument and Form 22-2.

As of the date of this certificate, to the best of my knowledge, information and understanding, this technical report contains all the scientific and technical information that is required to be disclosed to make the technical report not misleading.

6. I made a personal inspection of the Brilliant Brumby Project in Queensland during the week of December 12, 2010 in the company of I2M's Senior Geologists: Tom Sutton, Ph.D., P.G., and M. David Campbell, P.G.
7. I have not had any prior involvement with the Brilliant Brumby Pty Ltd. or Brilliant Brumby Holdings Limited, the company involved in this project. Therefore, I am independent of Brilliant Brumby Holdings Limited and any and all of its predecessors.
8. As of the date of this certificate, to the best of my knowledge, information and understanding, this CPR contains all the scientific and technical information that is required to be disclosed to make this document not misleading.
9. I consent to the filing of this CPR with any stock exchange and other regulatory authorities and any publication by them for regulatory purposes, including electronic publication in the public company files or on their websites accessible by the public of this CPR.

**Mr. Jeffrey D. King, P.G.**  
**President and Senior Project Manager**  
**I2M Associates, LLC**

I, Jeffrey D. King, do hereby certify that:

1. I am President and Senior Program Manager in the firm of I2M Associates, LLC, based in Seattle, Washington, and residing at 8424 E. Meadow Lake Drive, Seattle (Snohomish), WA 98290.
2. I graduated with a Bachelor of Arts in Geology in 1979 from Western Washington University in Bellingham, Washington and have practiced my profession continuously from that time (approximately 30 years).
3. I have worked as a geologist and/or project/operations manager for my full working career. In 1979, I joined Bethlehem Copper (later Cominco) of Vancouver, Canada as a Staff Geologist. I was responsible for conducting, and implementing prospect evaluations, mapping and sampling programs, and well-site operations in the North Cascades of Washington State and central/eastern Nevada. In 1980, I joined the consulting firm of Watts, Griffis and McQuat of Toronto (WGM), Canada as a Senior Exploration Geologist where I was responsible for field operations for WGM's national exploration program searching for rare-earth and other minerals. Also during that time I aided WGM's senior staff on large-scale property evaluations for multiple large clients. In 1982, I was engaged by MolyCorp to work on their regional exploration program for rare-earth minerals and in 1983 I was engaged by Campbell, Foss and Buchanan, Inc. to conduct gold exploration and mine development as well as gold-placer evaluations in the lower states and in Alaska. In 1984, I joined an international venture as Mine Manager at a gold/silver mine in east/central Nevada. In 1986, I was promoted to Vice President of Operations. Since 1988, I have been affiliated with M. D. Campbell and Associates, L.P. as a Senior Program Manager. In early 2010, I formed I2M Associates, and currently serve as President and Senior Program Manager. I have completed numerous mine evaluation and environmental projects over more than 25 years.
4. I am a licensed Professional Geologist in Washington State (see Resume for additional details, Section 26.0 – Appendix III CVs of Authors).
5. I have read the definition of “Competent Person” as defined in the AIM Rules for Companies Guidance Notes for Mining, Oil & Gas Companies, and I certify that by reason of my education, affiliation with a number of relevant professional organizations, and by my past relevant work experience in Australia and elsewhere, I fulfil the requirements to be a “Competent Person” under the AIM Rules for Companies.
6. I am involved in the preparation and review of the contents and coverage of this CPR and hence serving as co-author of this CPR.
7. I have not had any prior involvement with the Brilliant Brumby Pty Ltd or Brilliant

Brumby Holdings Limited, the company involved in this project. Therefore, I am independent of Brilliant Brumby Holdings Limited and any and all of its predecessors.

8. As of the date of this certificate, to the best of my knowledge, information and understanding, this CPR contains all the scientific and technical information that is required to be disclosed to make this CPR not misleading.
9. I consent to the filing of this CPR with any stock exchange and other regulatory authorities and any publication by them for regulatory purposes, including electronic publication in the public company files or on their websites accessible by the public of the technical report.

Signed in Houston, Texas this 31st day of March, 2011. We reserve the right to revise this CPR in the future as new information becomes available or as we deem appropriate.

Sincerely,

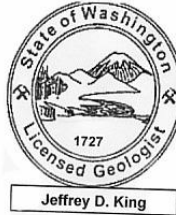
**I2M Associates, LLC**



Michael D. Campbell, P.G., P.H.  
Vice President & Chief Geologist

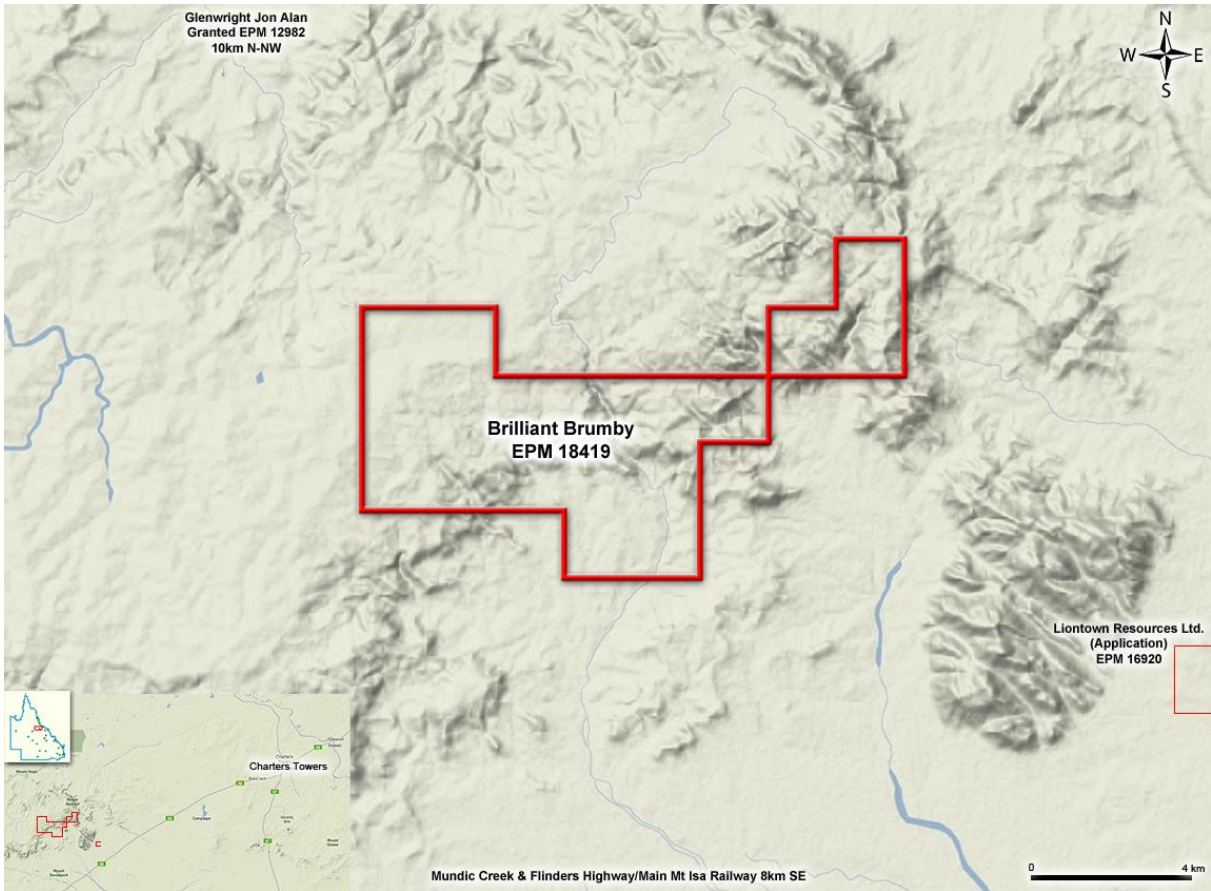


Jeffrey D. King, P.G.  
President and Senior Program



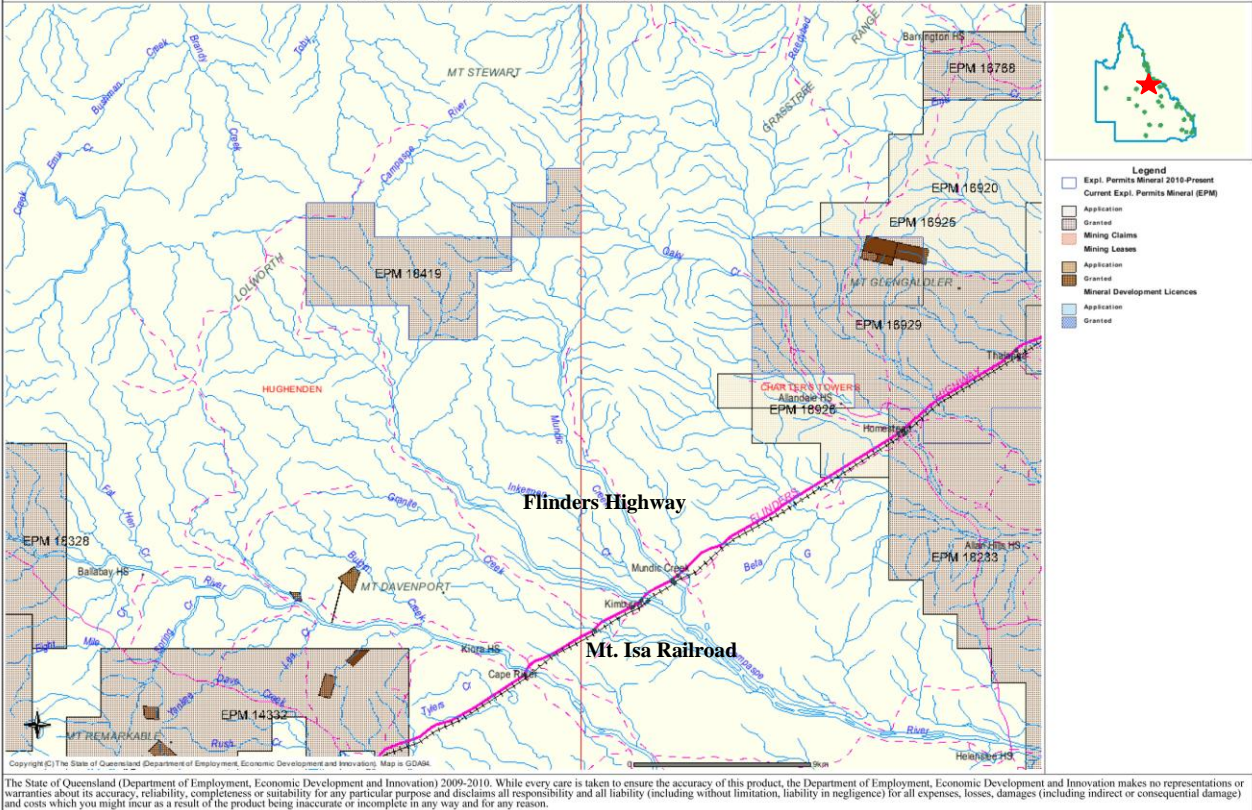


## Section 24.0 Illustrations (Expanded Views)

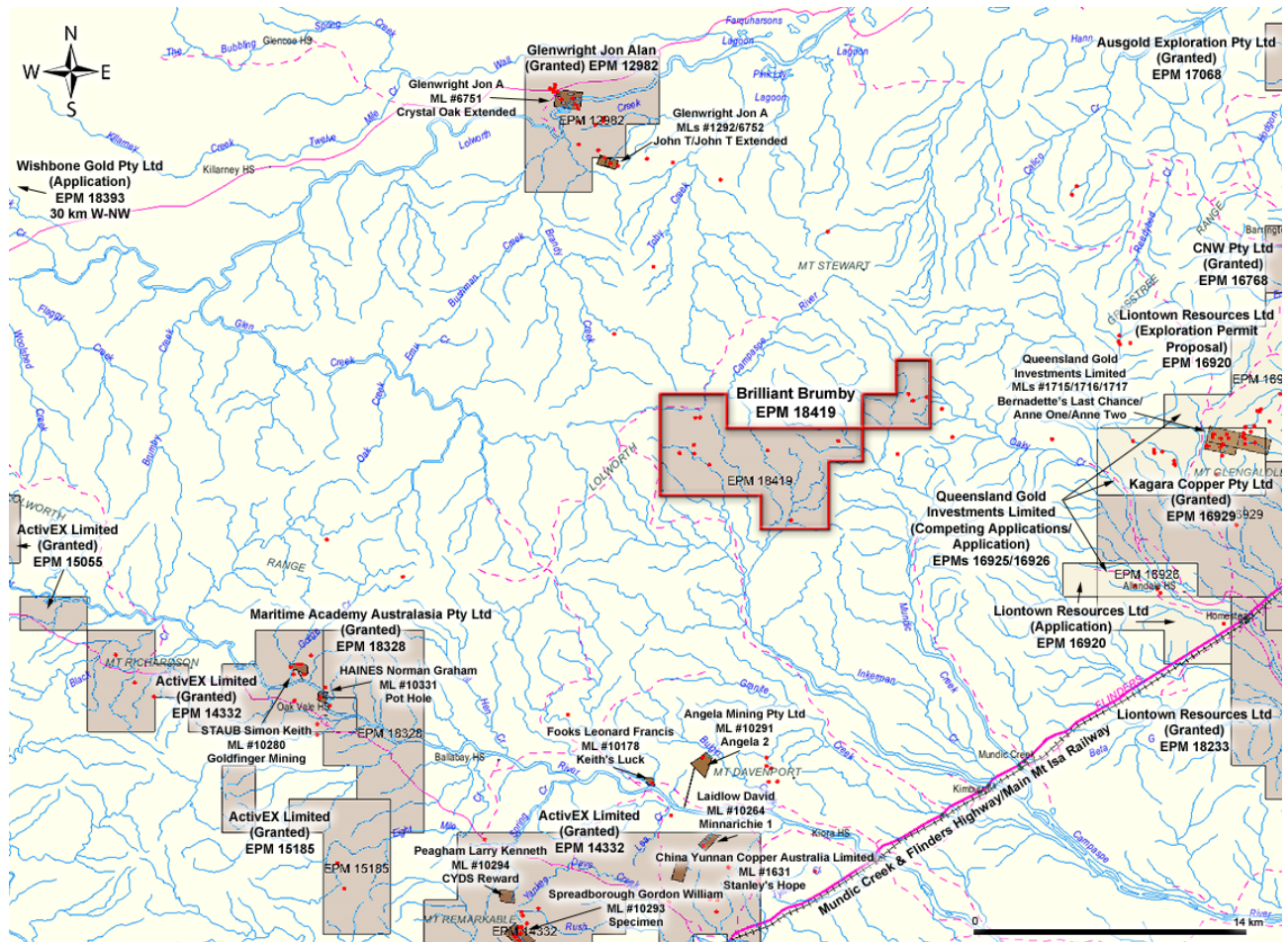


**Figure 1**  
**General Location of the Brilliant Brumby Tenement**

**I2M Research on Tenement Status - March 8, 2011**



**Figure 2A - Brilliant Brumby & Surrounding Tenements**  
 Source: QDEX Tenement Database (As of March 8, 2011)



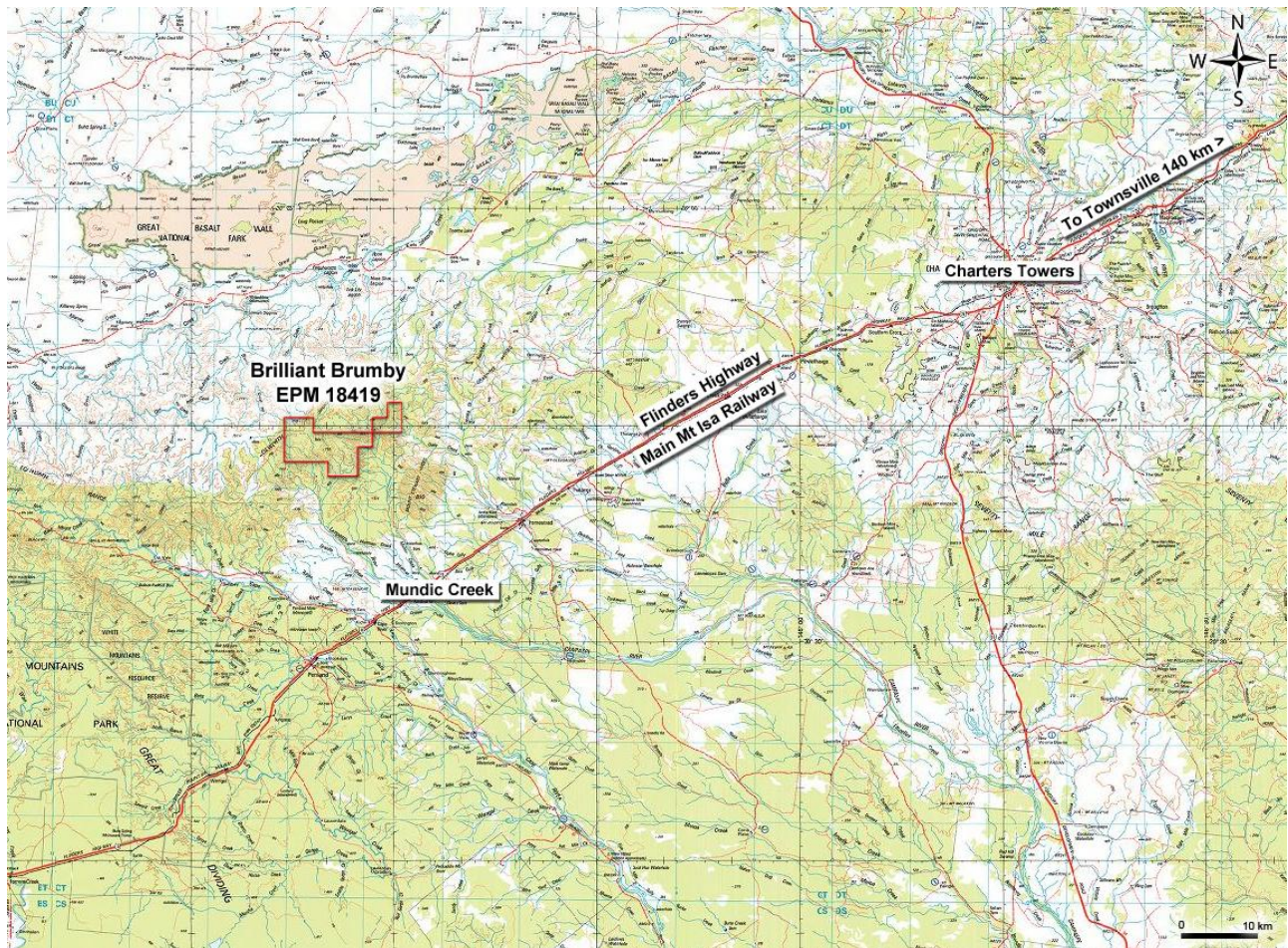
**Figure 2B – Expanded Detail of Surrounding Tenements**  
 Source: QDEX Tenement Database (As of March 26, 2011)



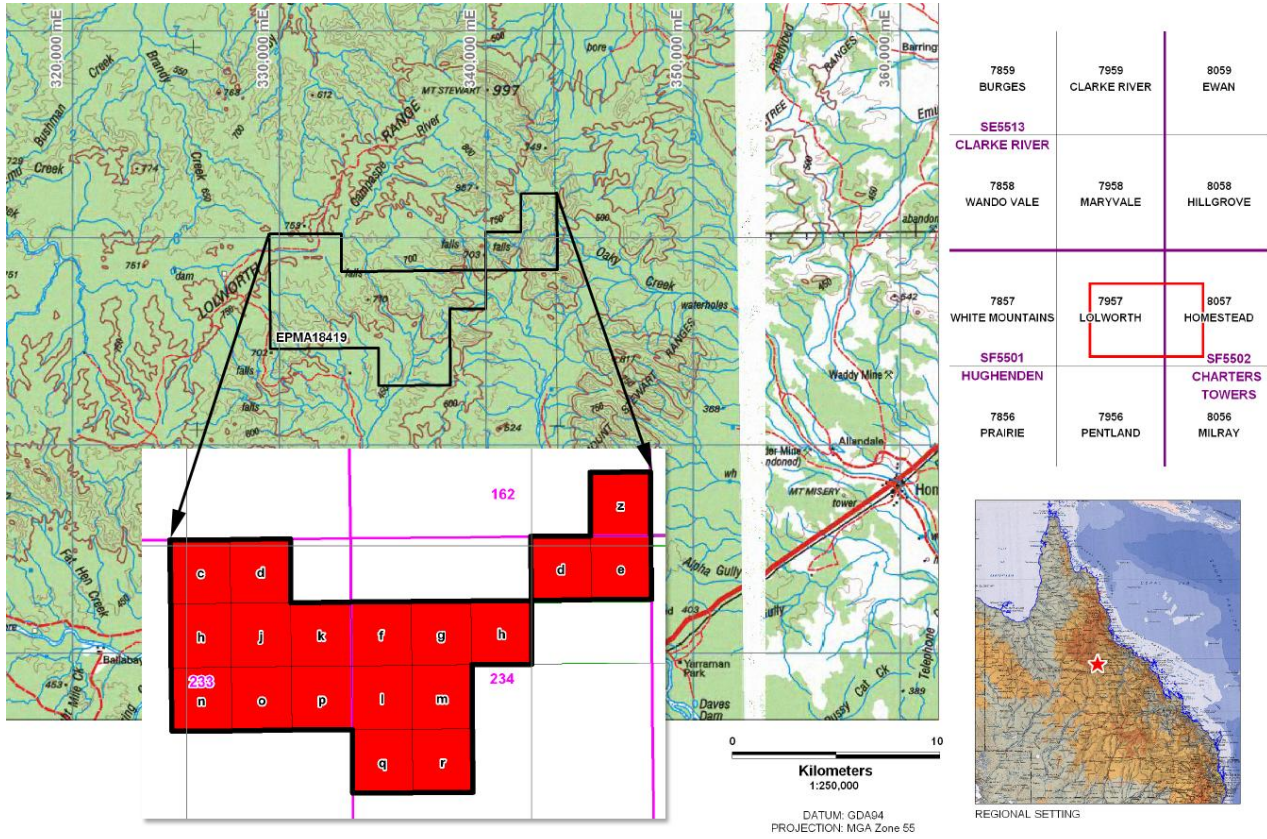
**Figure 3 – Aerial View of the Brilliant Brumby Mine Area**



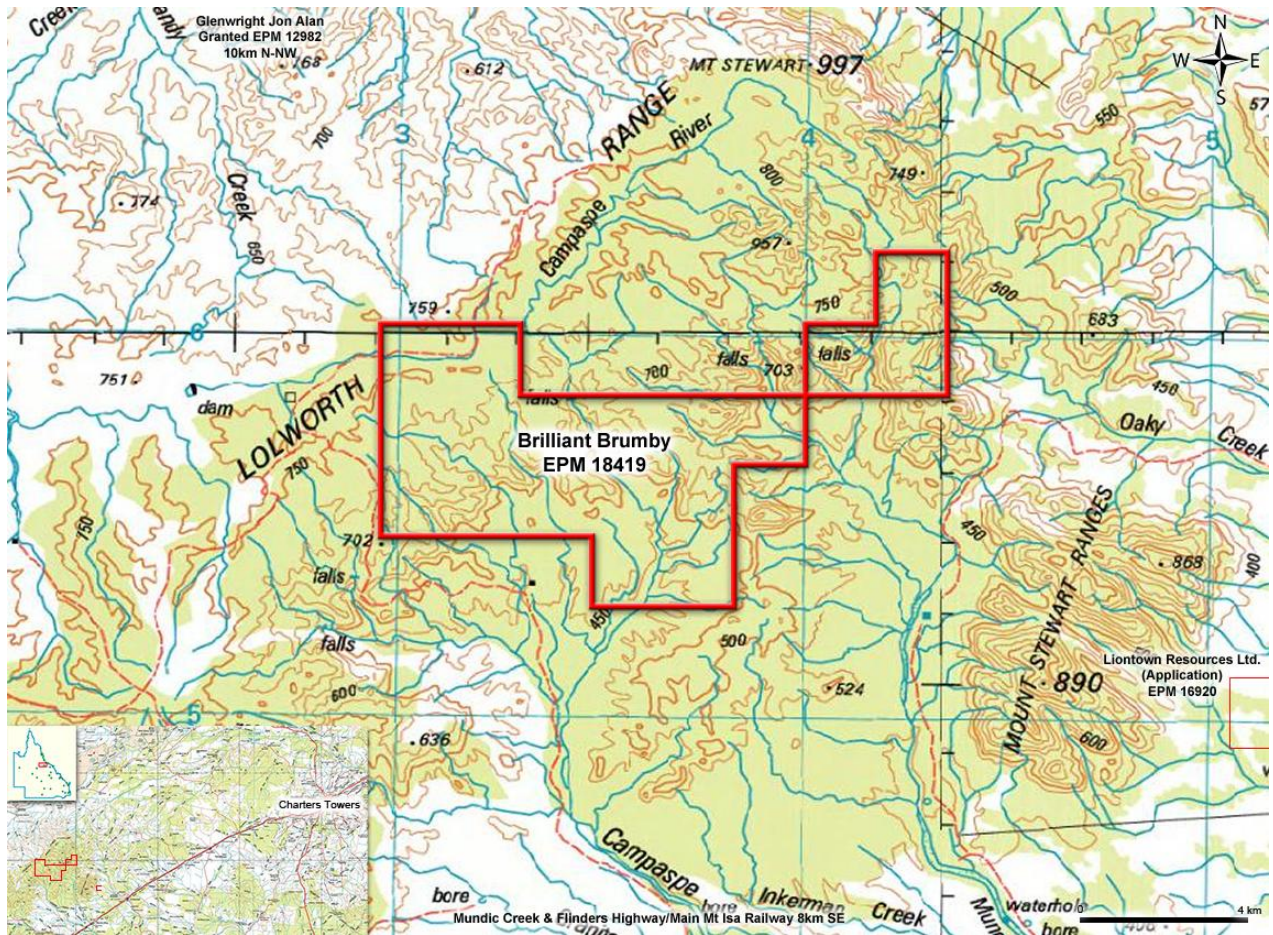
**Figure 4 – Site Visit Personnel at the Brilliant Brumby Mine Site**



**Figure 5 - Section of Topographic Sheet (100,000 sheet), showing the Brilliant Brumby Tenement and Infrastructure (roads, tracks, railroad, and creeks).**



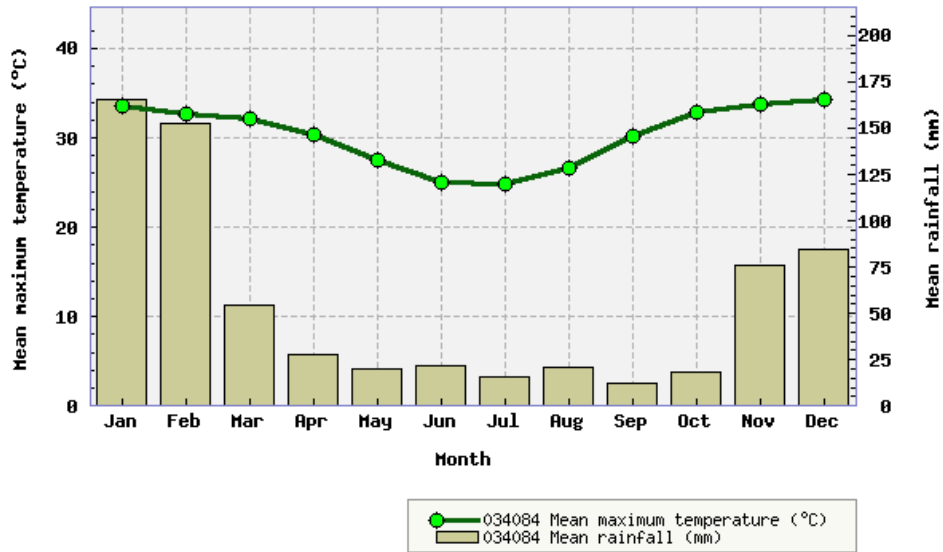
**Figure 6 – General Location and Sub-Block Assignment in Brilliant Brumby EPM.**



**Figure 7 - Topography and Elevation in the Brilliant Brumby EPM**



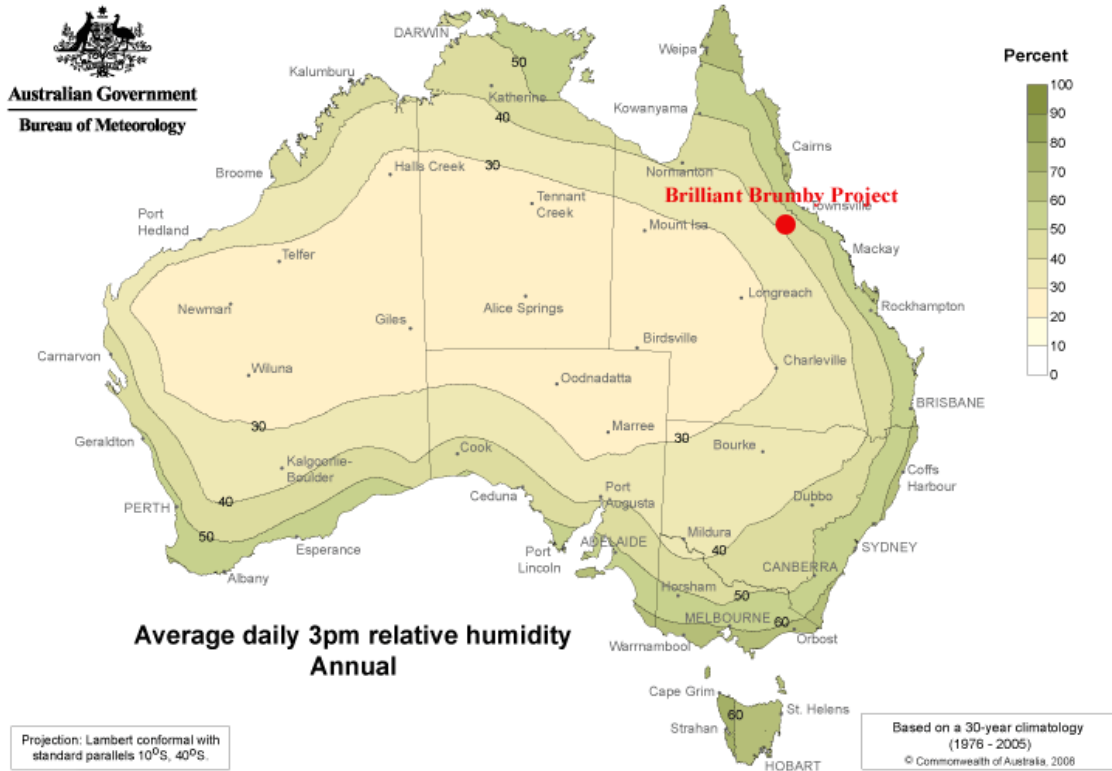
Location: 034084 CHARTERS TOWERS AIRPORT



Australian Government  
Bureau of Meteorology

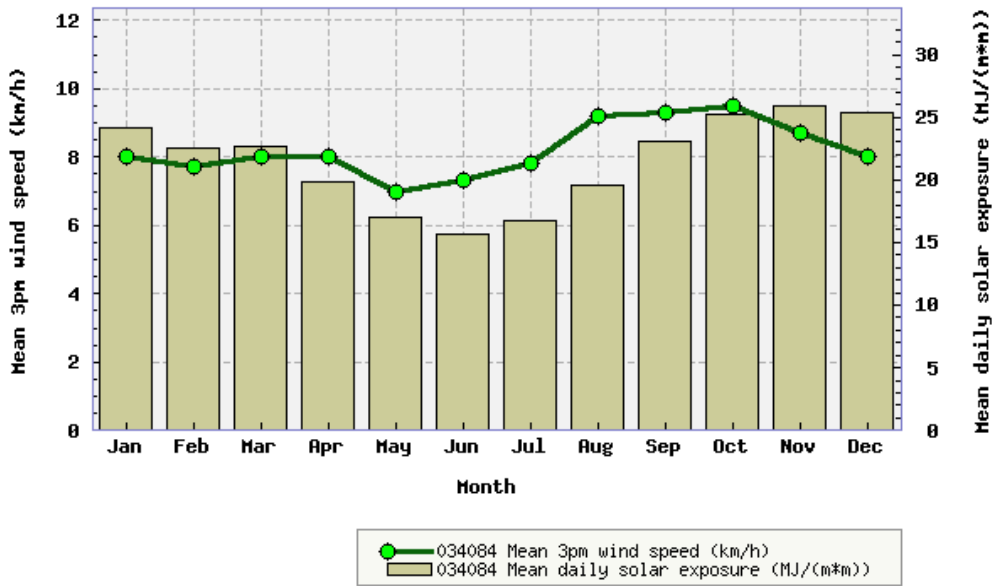
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**Figure 8 - Mean Maximum Monthly Temperatures and Rainfall**



**Figure 9 - Average Daily Relative Humidity (@ 3:00 PM)**

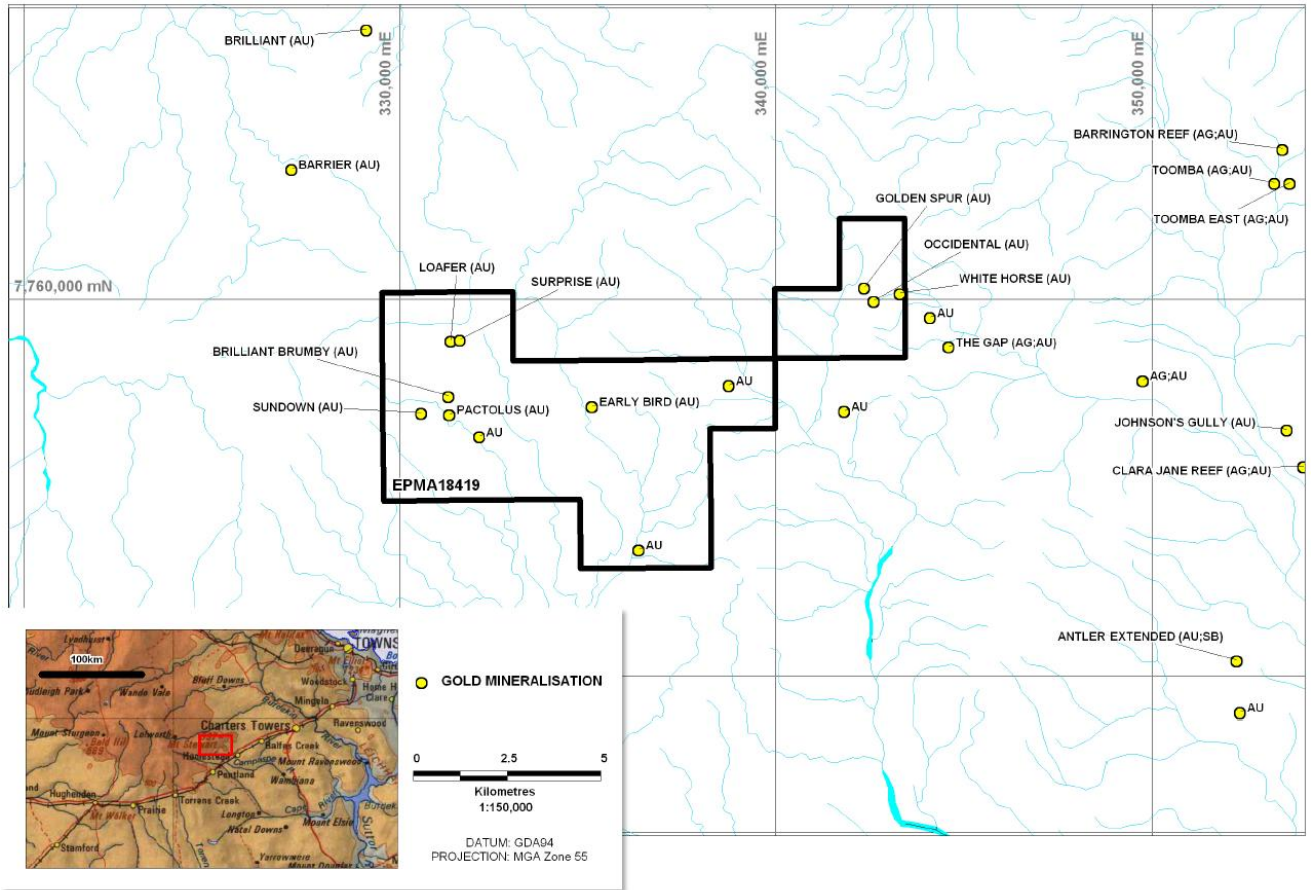
Location: 034084 CHARTERS TOWERS AIRPORT



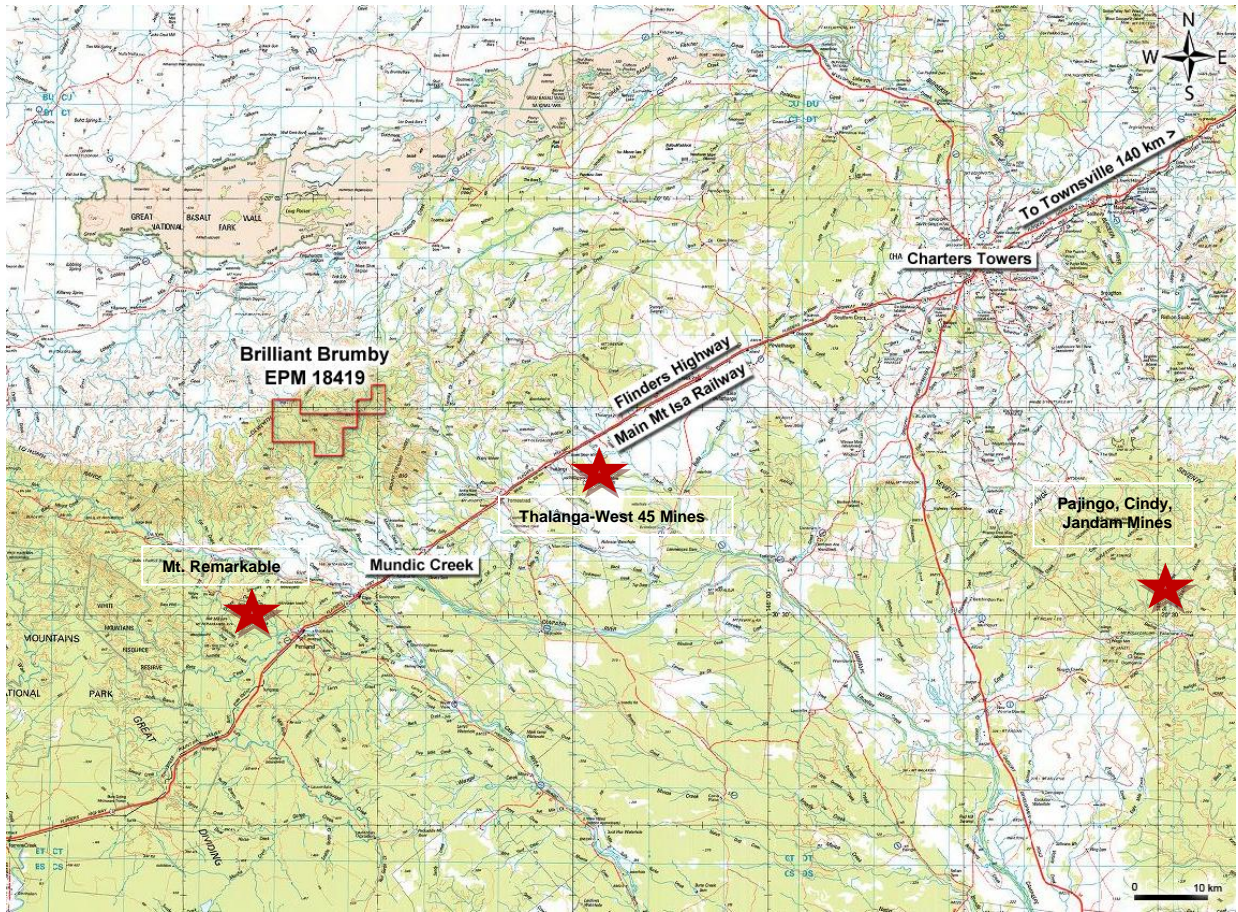
Australian Government  
Bureau of Meteorology

Created on Tue 22 Mar 2011 15:00 PM EST

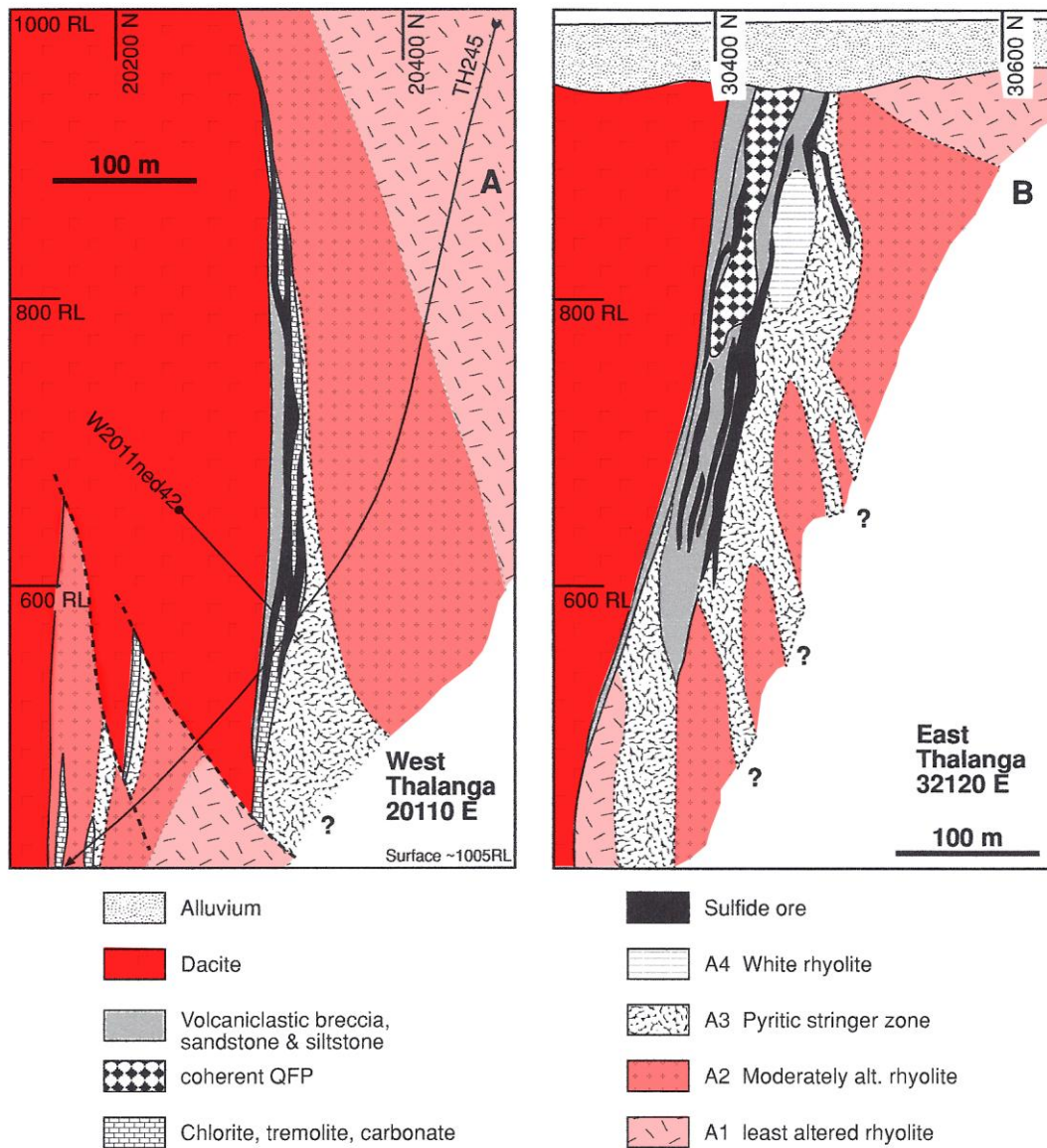
**Figure 10 - Mean Monthly Wind Speed (@ 3:00 PM) and Mean Daily Solar Exposure**



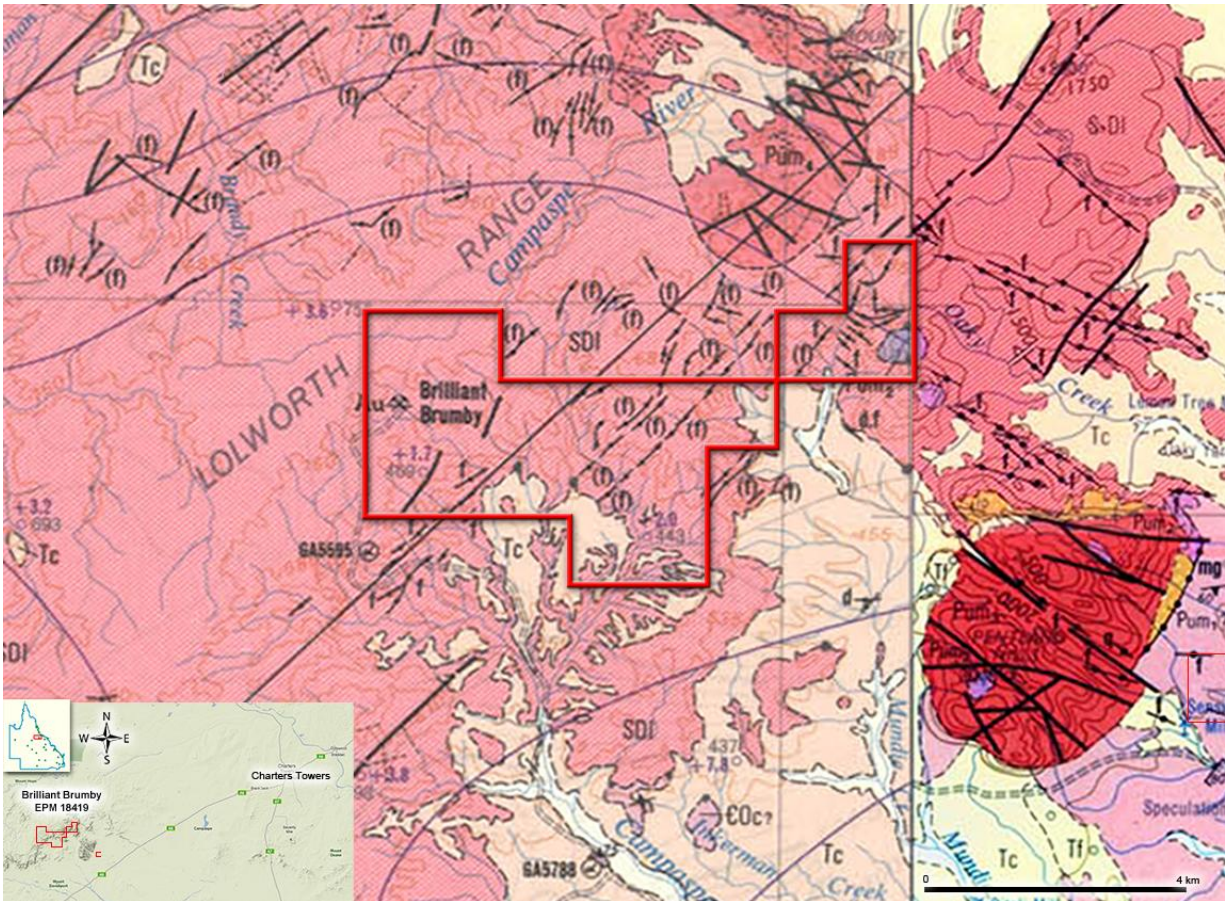
**Figure 11 – Historical Prospects (Circle Resources, 2009)**



**Figure 12 – Topographic Sheet (100,000) Showing nearby Exploration and Development**



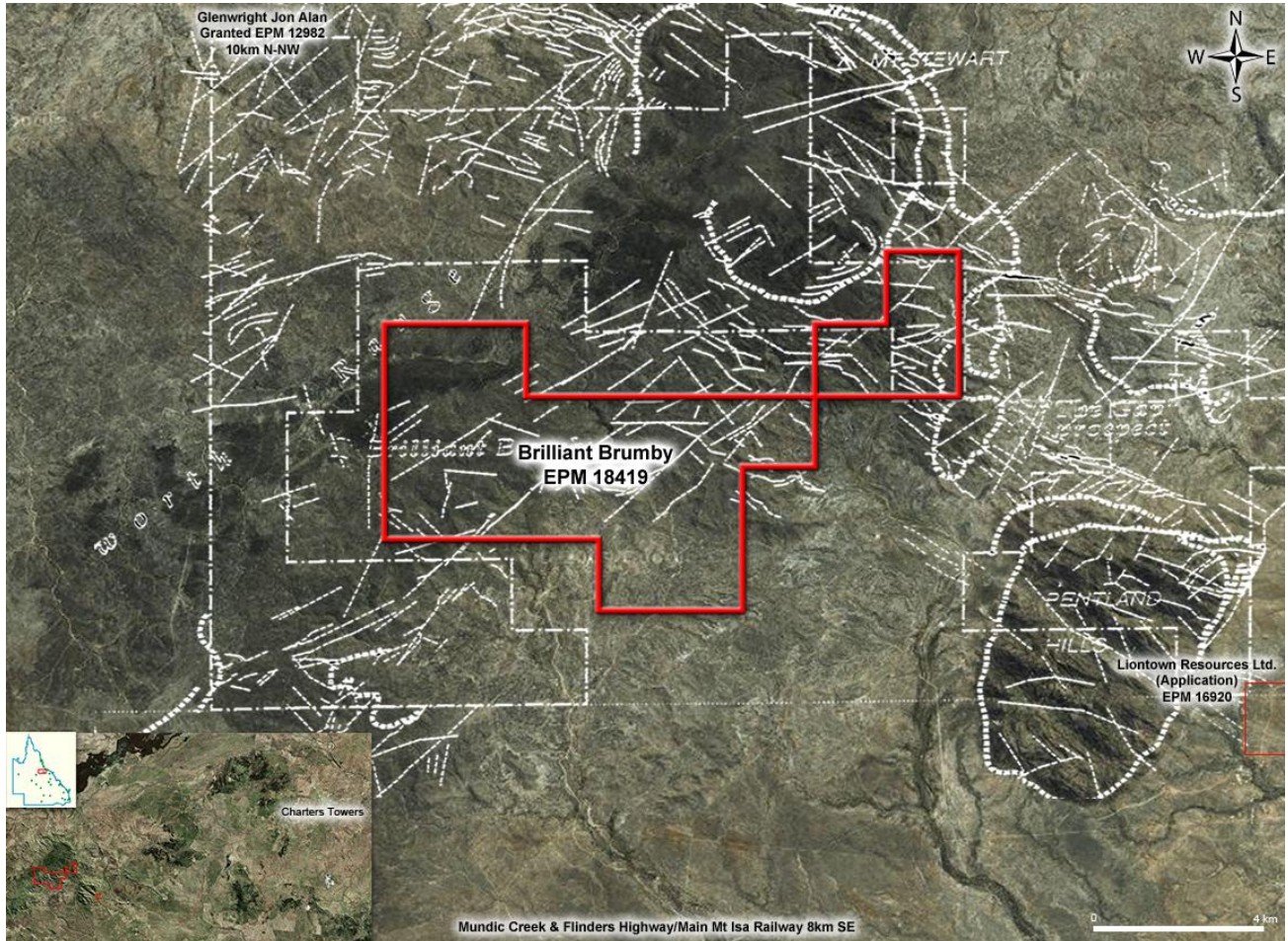
**Figure 13 – Typical Mineralization at the Thalanga Mines Area**  
(from Paulick, *et al.*, 2001)



**Figure 14A**  
**Geological Mapping of the 1960s (Vine, 1974)**







**Figure 15**  
**Lineament Map within and around Brilliant Brumby EPM**  
(after Gannan, 1990)

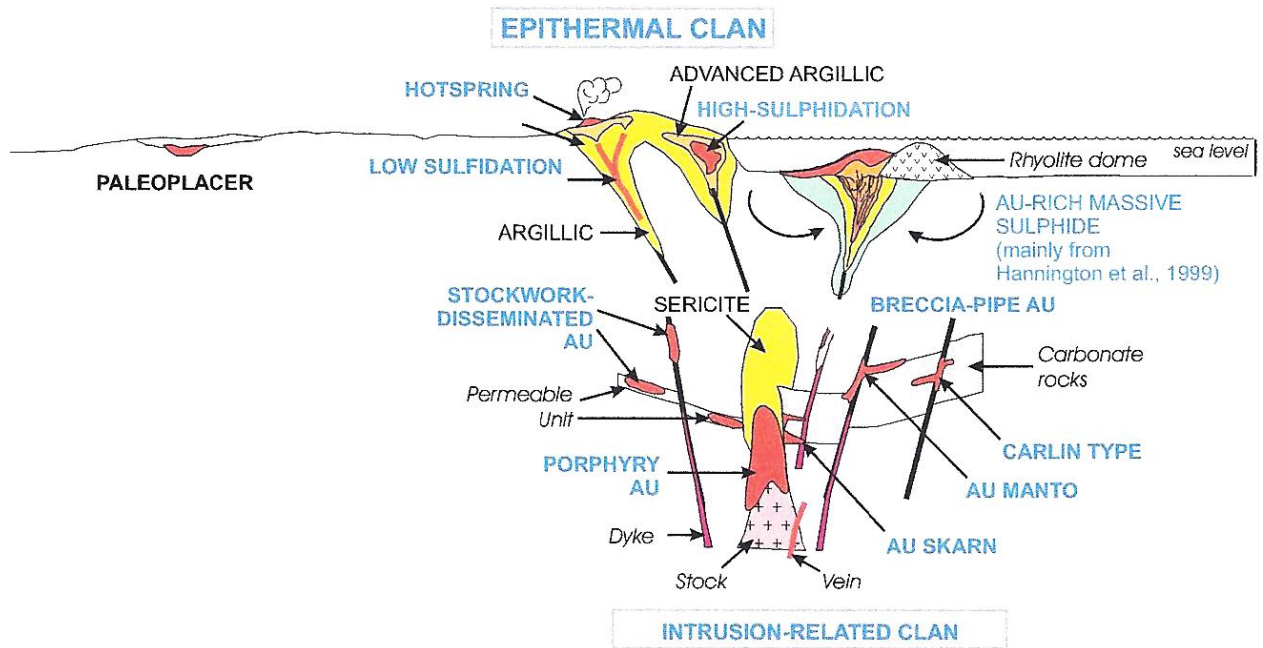
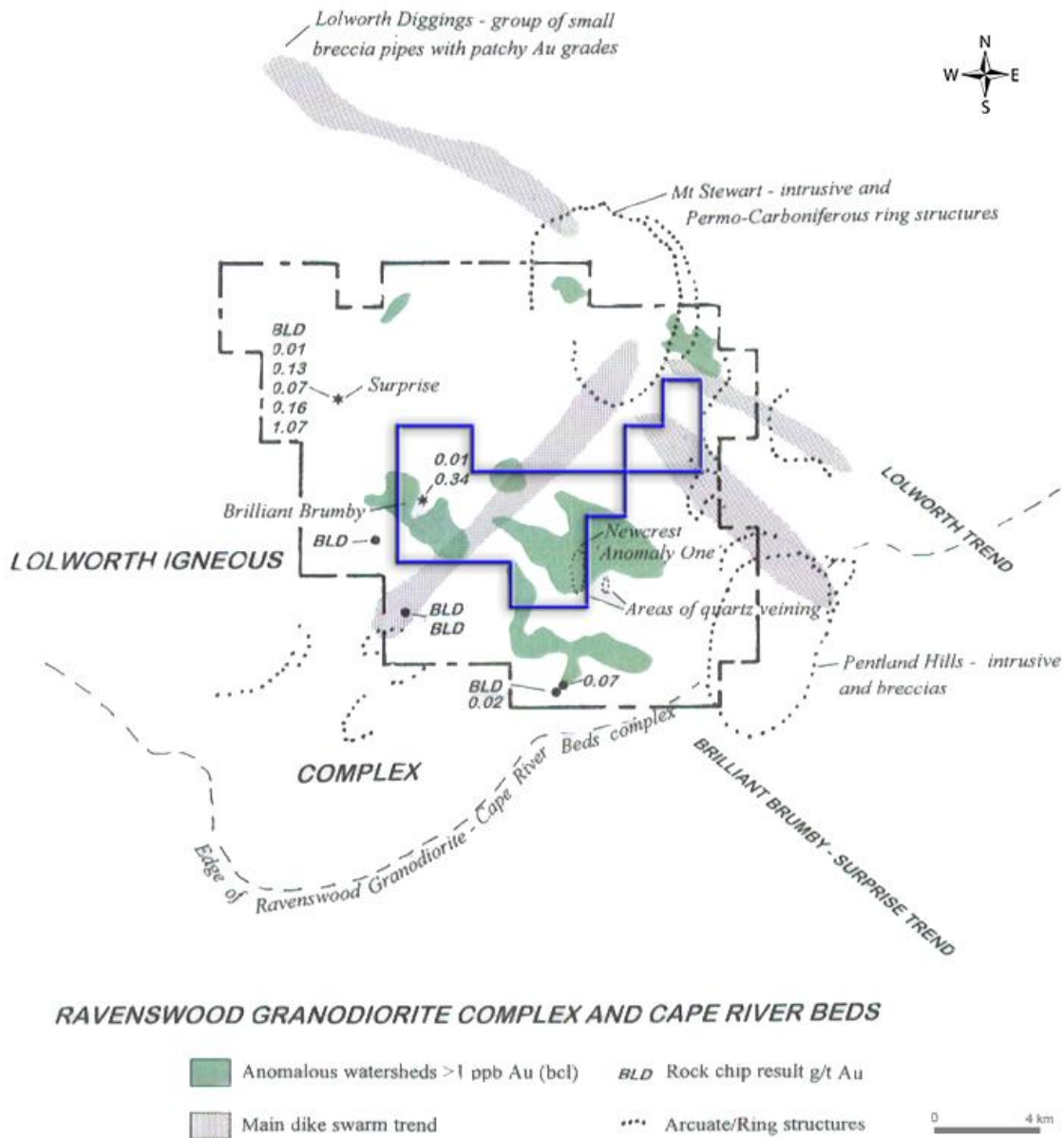
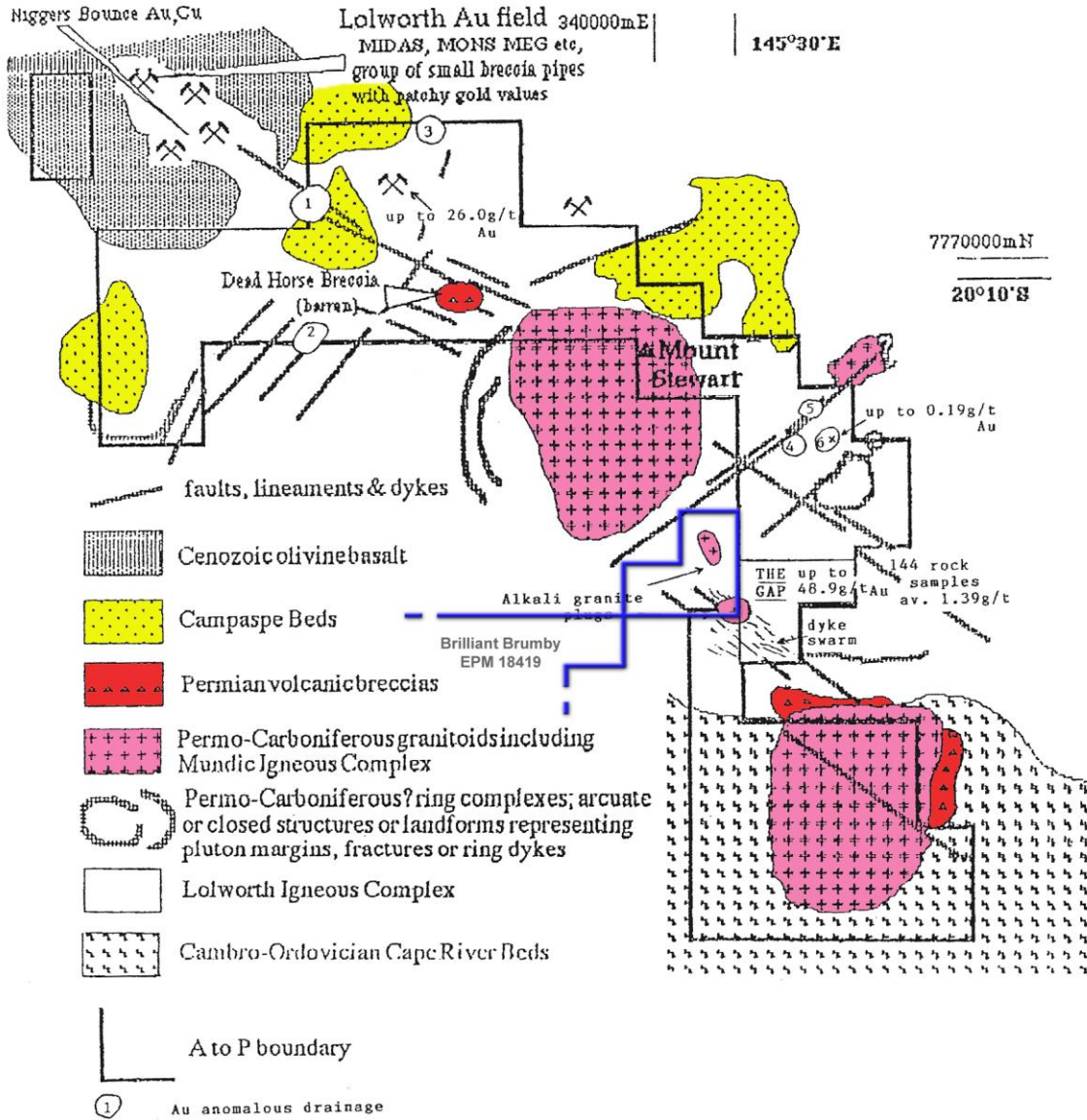


Figure 16 – Epithermal and Intrusion-Related Mineralization (Robert, et al., 2007)

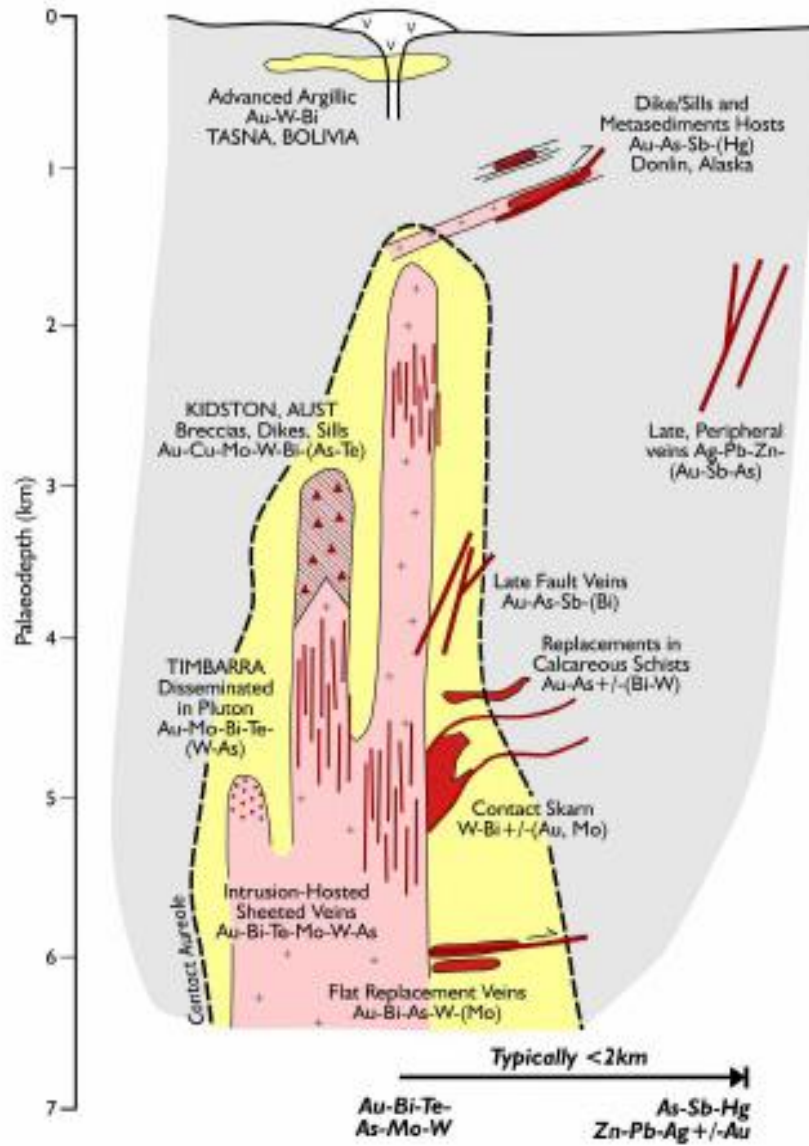


**Figure 17**  
**Trends within Brilliant Brumby EPM**  
 (after Bubendorfer, 1997)

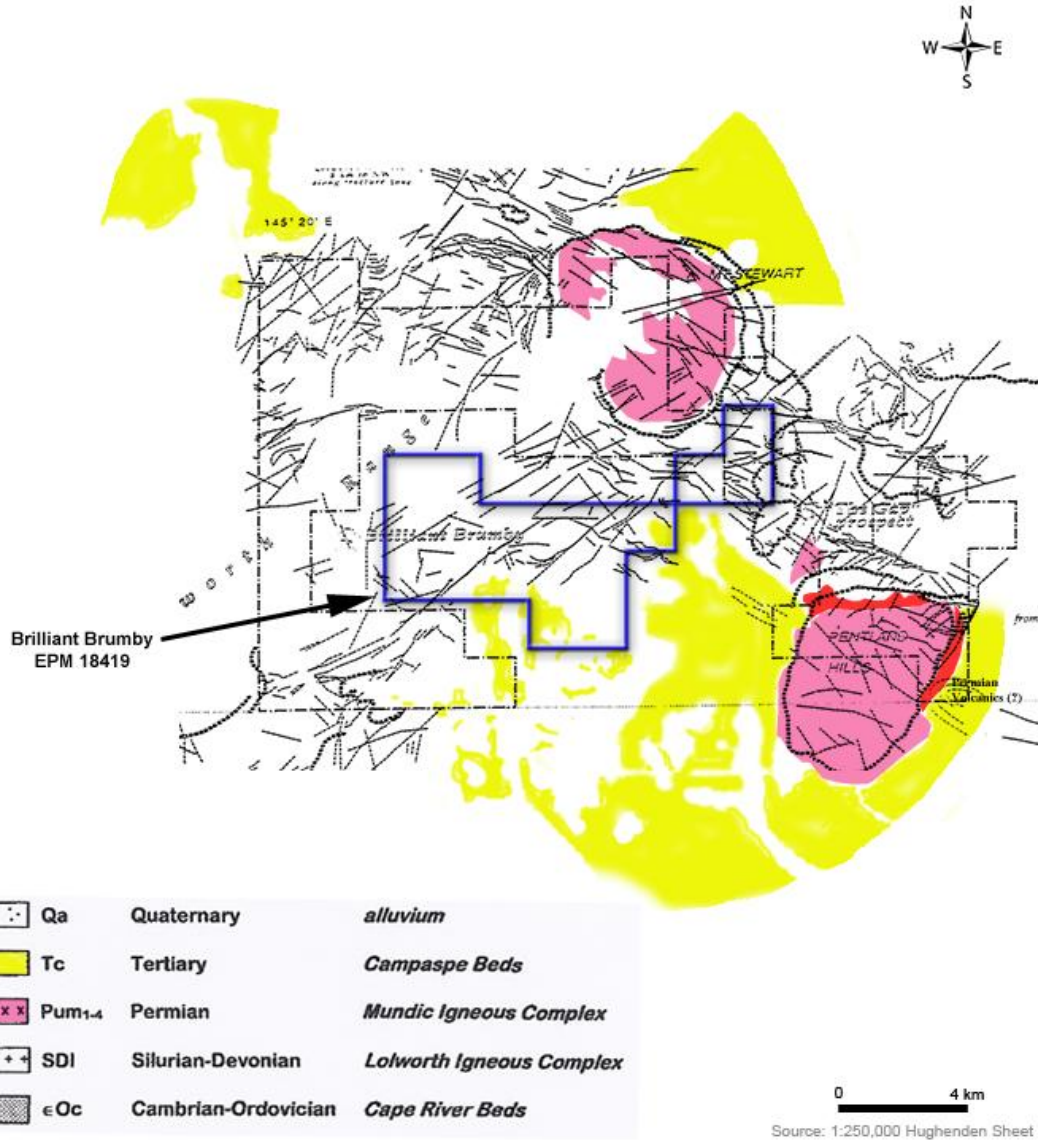


**Figure 18**  
**Trends within Brilliant Brumby EPM Northeast Sections**  
 (Dudgen and Beams, 1989)

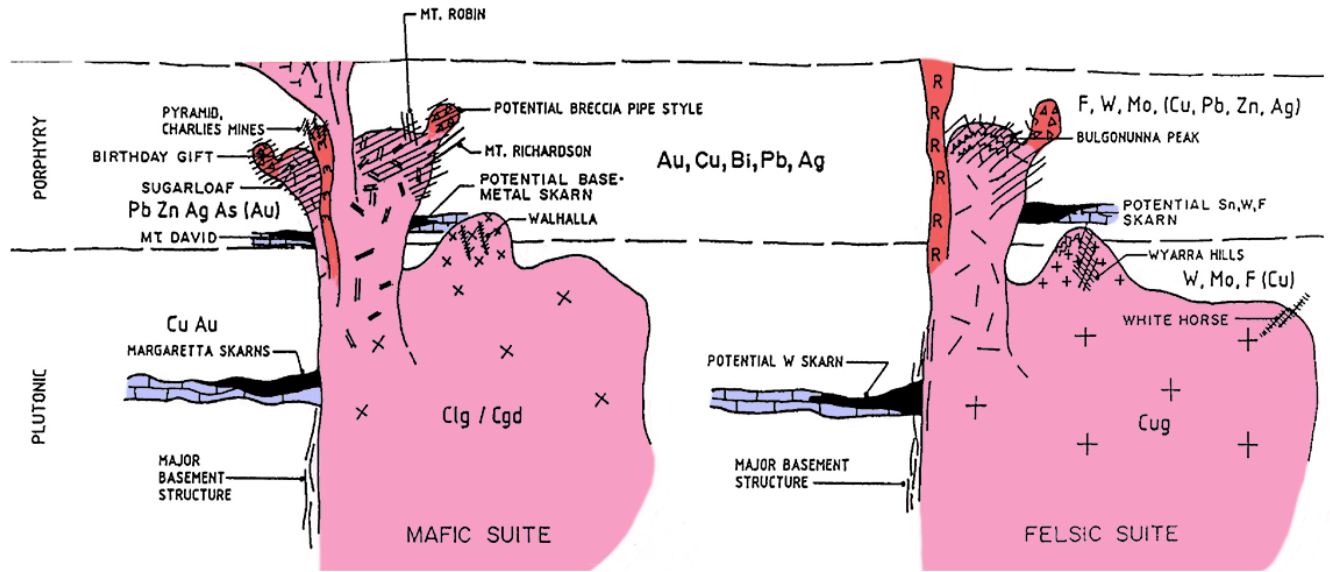
### Reduced Intrusion - Related Clan



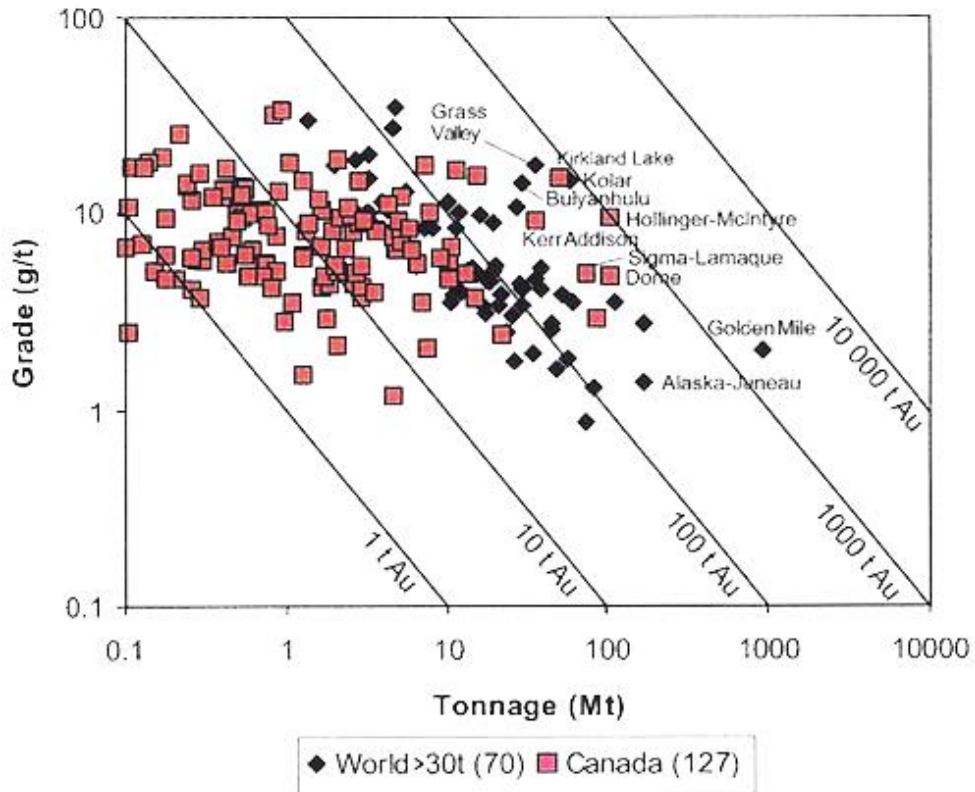
**Figure 19 – Modeling of Intrusion-Related Mineralization**  
 (Robert, *et al.*, 2007)



**Figure 20**  
**Principal Fault Map within and around the Brilliant Brumby EPM**  
 (after Anon, 1996)



**Figure 21 - Primary Models of Mineralization for the Brilliant Brumby EPM**



**Figure 22 - Tonnage versus Grade Relationship of Canadian and World Gold Deposits (Combined Production and Reserves).** ( Dubé and Gosselin, 2007)



**Section 25.0 Appendices**

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<b>Michael D. Campbell, P.G., P.H. ....</b>	<b>104</b>
<b>Jeffrey D. King, P.G. ....</b>	<b>132</b>

**B. Contributing Personnel**

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<http://i2massociates.com/content/m-david-campbell-pg-curriculum-vitae>

## **Appendix I – List of Standard Technical Abbreviations**

Above mean sea level .....	amsl
Ampere .....	A
Annum (year) .....	a
Billion years ago .....	Ga
Centimeter .....	cm
Cubic centimeter .....	cm <sup>3</sup>
Cubic feet per second .....	ft <sup>3</sup> /s or cfs
Cubic foot .....	ft <sup>3</sup>
Cubic meter .....	m <sup>3</sup>
Day .....	d
Days per week .....	d/wk
Degree .....	°
Degrees Celsius .....	°C
Dry metric ton .....	dmt
Foot .....	ft
Gallons per minute (US).....	gpm
Gram .....	g
Grams per liter .....	g/L
Grams per tonne .....	g/t
Greater than .....	>
Hectare (10,000 m <sup>2</sup> ) .....	ha
Horsepower .....	hp
Hour .....	h ( <i>not</i> hr)
Hours per day .....	h/d
Hours per week .....	h/wk
Hours per year .....	h/a
Kilo (thousand) .....	k
Kilogram .....	kg
Kilograms per cubic meter .....	kg/m <sup>3</sup>
Kilograms per hour .....	kg/h
Kilograms per square meter .....	kg/m <sup>2</sup>
Kilojoule .....	kJ
Kilometer .....	km
Kilometres per hour .....	km/h
Kilonewton .....	kN
Kilopascal .....	kPa
Kilovolt .....	kV
Kilovolt-ampere .....	kVA
Kilovolts .....	kV
Kilowatt .....	kW
Kilowatt hour.....	kWh
Kilowatt hours per tonne (metric ton) .....	kWh/t
Kilowatt hours per year .....	kWh/a
Less than .....	<
Liter .....	L
Liters per minute .....	L/m

Megabytes per second .....	Mb/s
Megapascal .....	MPa
Megavolt-ampere .....	MVA
Megawatt .....	MW
Meter .....	m
Meters above sea level .....	masl
Meters per minute .....	m/min
Meters per second .....	m/s
Micrometer (micron) .....	µm
Milliamperes .....	mA
Milligram .....	mg
Milligrams per litre .....	mg/L
Milliliter .....	mL
Millimeter .....	mm
Million .....	M
Million tonnes .....	Mt
Minute (plane angle) .....	'
Minute (time).....	min
Month .....	mo
Ounce .....	oz
Parts per billion .....	ppb
Parts per million .....	ppm
Percent .....	%
Percent moisture (relative humidity) .....	% RH
Phase (electrical) .....	Ph
Pound(s) .....	lb
Second (plane angle) .....	"
Second (time) .....	s
Specific gravity .....	SG
Square centimeter .....	cm <sup>2</sup>
Square foot .....	ft <sup>2</sup>
Square kilometer .....	km <sup>2</sup>
Square meter .....	m <sup>2</sup>
Thousand tonnes .....	kt
Tonne (1,000 kg) .....	t
Tonnes per day .....	t/d
Tonnes per hour .....	t/h
Tonnes per year .....	t/a
Volt .....	V
Week .....	wk
Wet metric ton .....	wmt



## **Appendix II – Historical EPM Exploration Methods (Pre-1990s)**

Table 2: Summary of mineral exploration under Exploration Permit, Authority to Prospect and Mining Lease Tenure

Title (AP for Min. & EPMA unless stated)	Company	Date Granted	Exploration Target	Mine(s)/ Prospect(s)	Exploration Techniques							Company Report No. (CR)
					Geology	Geophysics	Geochem.	No. of Samples	Develop. & DRIL/No.	Research & Assess.		
670	Nickel Mines Ltd	1/10/69	Cu, Pb, Zn, Ag	The Antler	C		d	0			4185	
815	Combined Mining & Exploration N.L./ Horizon Explorations Ltd	20/6/70	Cu, Pb, Zn				d	5			3557	
1016/1017/1074	Jododex Australia Pty Ltd	13/4/72	Cu, Pb, Zn		A		d	5			4500	
1018	International Nickel Australia Ltd	27/4/72	Cu, Pb, Zn	Mundic Creek, Calf Creek, Sensible Creek	A, B, C	N	b	2			4432	
1090	Easo Exploration & Production Australia Inc.	9/8/72	Cu, Pb, Zn	Waddy's Hill		G, M	c	2	F		4724	
1402	Easo Exploration & Production Australia Inc.	9/8/72	Cu, Pb, Zn		A		b	1			5601, 6680, 6318, 6681, 6944	
1544	Lo Nickel Australia Pty Ltd/ Penaroya (Australia) Pty Ltd	5/8/75	Cu, Pb, Zn	Thalanga, Waddy's Hill, Gyddie Hill, New Homestead Diggings, Crooked Creek, North Link, North Range, Thalanga East, Thumberg No. 1, 2, 3, 4	A, B, E, F	L, I, J, N, K, M, R	b	4	b4		5731, 5974, 6174, 6341, 7095, 6777	
1590	Penaroya (Australia) Pty Ltd		Cu, Pb, Zn	Gyddie Hill	A	L, N		2			6776, 7094	
2014	Penaroya (Australia) Pty Ltd	18/9/78	Cu, Pb, Zn	Thalanga East, Thalanga, Gyddie Hill	A, B	N, K	d	5	b/31		7050, 7643, 7644, 7781, 10074,	

Title (A/P for Min. & EPM unless stated)	Company	Date Granted	Exploration Target	Mine(s)/ Prospect(s)	Exploration Techniques							Company Report No. (CIR)
					Geology	Geophys.	Geochem.	No. of Samples	Develop. & drill./No.	Research & assess.		
2075	Easo Exploration & Production Australia Inc.	15/2/79	Cu, Pb, Zn			I, J						7728, 8734, 9455, 11446, 12318
2197	Penarroya (Australia) Pty Ltd	20/9/79	Cu, Pb, Zn									7862
2492/2493	Australian Anglo American Securities Pty Ltd	1/7/80	Placer Au		A, C		a b T	0 1 1	f			9245, 10090, 10939
2571	Easo Exploration & Production Australia Inc.	9/9/80	Cu, Pb, Zn									8837, 11459
2807	Metals Exploration Ltd	19/12/80	Au, Cu, Pb, Zn	Big Hill, UB-1, UB-1 South	A, B, F	I, J, N	a b d	2 4 2	j/3 j/2			9323, 10933, 10934, 11966
3221	Penarroya (Australia) Pty Ltd	26/2/82			A, C		d	0				13236
3282	EMS Associates/ Freeport of Australia Inc.	2/4/82	Au	The Flat, Chinese Diggins, Puddler Creek, Four Mile, Barrington Lode	C		d a T	4 3	j/559	O		11951, 13310
3450	Metals Exploration Ltd	19/12/80	Au, Cu, Pb, Zn	Big Hill, UB-1, UB-1 South						k	13	13134, 13664
3510	The Broken Hill Proprietary Co. Ltd	3/6/83	Au, Cu, Pb, Zn		E		a c	5		i	7	12966
3615	Arnold N.L./Aztec Exploration Limited	17/11/83	Au	The Antler, Antler Extended	B		b d o	0 4 5	E/10 U/26			13228, 13495, 14460, 15473, 15474
3699	CR.A Exploration Pty Limited	3/3/84	Cu, Pb, Zn	Century Area		L, J, K, N			V/17			13995, 14528
3798	Panconthental Mining Limited	16/8/84	Cu, Pb, Zn	Diago Gully, Gydele Hill					K/68			21615, 23326, 19482
3817	CR.A Exploration Pty Limited	21/8/84	Cu, Pb, Zn	Altan Hills	A		b d	1				14583, 15133
3909	M. Curtain & D. Fisher	5/12/84	Placer Au	Chinese Diggins, Puddler Creek, Barrington Reef	A, B		T	1				15416
4115	Battle Mountain (Australia) Inc.	14/10/85	Au		A, E	L, J, N	b	1				16505, 16506, 17358

Line (or lot) for Min. & EPM unless stated	Company	Date Granted	Target	Prospect(s)	Geophysical Requirements							Company Report No. (CR)
					Geology	Geophys.	Geochem.	No. of Samples	Develop. & drill/No.	Research & assess.		
4202	Western Mining Corporation Limited	5/2/86	Au	Big Hill, UB-1	A, B	L, J, M	b c d	5 5 5	k/6 j/4	q	16249, 16256, 16547, 16873, 18186, 18285, 18841, 21915	
4352	Penarroya (Australia) Pty Ltd	14/8/86	Au		A		b d	1 5			16311	
4404	Freeport of Australia Minerals Limited	9/9/86	Au, Cu, Pb, Zn	Nine Mile Creek, Telephone Gully, Sensible Creek	A, B		a b c d	3 3 4 3	g/4	q	17260, 17470, 17535	
4764	D. Wilson & E. & M. Sorham	21/5/87	Au	Toomba Mine, Don Start, Barrington, Poly Cow	A, B		b d	1 4			18173, 18934	
4819	Comatus Pty Ltd	20/7/87	Au	Johnson's Hill Reef, Johnson's Gully, Clara Jane Reef	C		b c	4 2			18497, 18837, 19826, 20058, 20817, 22417	
4912	Pan Australian Mining Ltd	7/9/87	Au, Cu, Pb, Zn		A, E		b d	3 4			19537, 19799, 20719	
4915	Pan Australian Mining Ltd	7/8/87	Au, Cu, Pb, Zn		A, E		b c d d	2 4 4 4			18214, 19540, 19818, 20705	
5015	Australian Overseas Mining Limited	26/10/87	Au		A		b d	1 2		3A, P	19424, 20429	
5025	Dainippon Resources N.L.	31/1/87	Au	Area 1 (Clansar Reef), Area 2, Area 3	A	L, J	b d	1 3			18215, 19734, 20510, 21293	
5068	Pan Australian Mining Ltd	18/11/87	Au, Cu, Pb, Zn		C, E		d	2			18119, 20168, 20465	
5112	Australian Overseas Mining Limited	5/1/88	Au	The Gap	A, B		b c d	4 2 0	v/10		18334, 19697, 20522	
5156	Heard Resources Limited	7/7/88	Au		C						18560	
5272	Pan Australian Mining Ltd	3/3/88	Au				b d	1 3			19440, 20282	
5322	Caribou Gold N.L.	5/4/88	Au	Grassie, Lady Barrington	B, C		b d	0 0			19140	

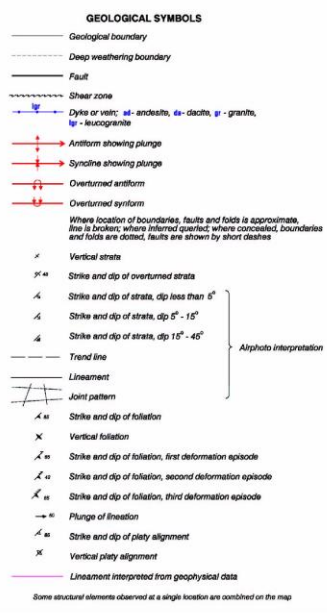


Title (AP for Mtn. & EPM unless stated)	Company	Date Granted	Exploration Target	Mine(s)/Prospect(s)	Exploration Techniques				Company Report No. (CR)	
					Geology <sup>a</sup>	Geophys. <sup>b</sup>	Geochem. <sup>c</sup>	No. of Samples		Develop. & Drill/No.
5419	Mount Burgess Gold Mining Co. N.L.	10/6/88	Au		A		a	0		20277
5736	Metana Minerals N.L.	10/2/89	Cu, Pb, Zn			I, J	b	3		21878
5747	American Boulder N.L.	10/2/89	Au				c	4		21247
5898	Pan Australian Mining Ltd	26/5/89	Au, Cu, Pb, Zn	Lone Hand Extended, Brumbly, Inpat The Gap	C, E	E, I, J, N	b, c, d	4, 4, 1	k/5	23164, 23751
5913	Australian Overseas Mining Limited	8/6/89	Au		A, B		b, c	4, 2	v/10	21586
7415/7507	ACM Gold Ltd	29/5/90 24/7/90	Au, Cu, Pb, Zn				b, d	1, 5		23274
7091	Conatus Pty Ltd	19/4/90	Au		C		b, d	4, 1		22930
7623	CRA Exploration Pty Limited	14/1/91	Au, Cu, Pb, Zn		C, D	N	d	1		24136
7743/8050	CRA Exploration Pty Limited	16/1/91 5/6/91	Au, Cu, Pb, Zn	Allandale, The Antler, Antler Extended	B, D	M, N, S	b, c	4, 5	k/10	23839

KEY TO ABBREVIATIONS

<b>GEOLOGY</b>	<b>GEOPHYSICS</b>	<b>GEOCHEMISTRY</b>	<b>DEVELOPMENTS &amp; DRILLING</b>	<b>RESEARCH &amp; ASSESSMENT</b>
A geological mapping (regional)	G EM (Aerial Surveys)	T (Sampling Types)	f cost/recovery/pit/ing	n environmental studies
B geological mapping (detailed)	H gravity	U core	g underground (shale/solids)	o feasibility studies
C geological reconnaissance	I magnetic	V cuttings	h diamond core/drilling	p geostatistics
D borehole	J radioactivity	W geochemical	i percussion drilling	q literature reviews
E photogeology	K (Ground Surveys)	X gas	j rotary drilling	r metallurgical studies
F photogeology/minerogeology	L ESR/FSK	Y grab/dump	k reverse circulation drilling	s mine design
	M gravity	Z water	l auger drilling	t mineral processing
	N TF & EP	a pan concentrates	m bucket drilling	u ore reserves/resources
	O magnet	b rock chip		v hydrogeological studies
	P radioactivity	c soil		
	Q resistivity	d stream sediment		
	R seismic	e chemical assay results		
	S dome/hic logging			

## **Appendix III – Legend of Geologic Units Occurring in the Subject Area**





**Appendix IV - Curriculum Vitae for:**

**Michael D. Campbell, P.G., P.H.**

**and**

**Jeffrey D. King, P.G.**

## Curriculum Vitae

**Michael D. Campbell, P.G., P.H.,**  
Vice President and Chief Geologist/Hydrogeologist  
**I2M Associates, LLC**  
<http://www.I2MAssociates.com>

Online: Summary & CV ([Here](#))

**PRINCIPAL MINING CONSULTANT**  
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## Education

1976, M.A., in Geology, Rice University under an *Eleanor and Mills Bennett Fellowship in Hydrology* for Research and Seminars in Hydrogeology and Associated Disciplines. 31 Graduate Hours Toward Ph.D., Houston, TX, Thesis: *Paleoenvironmental and Diagenetic Implications of Selected Siderite Zones and Associated Sediments in the Upper Atoka Formation, Arkoma Basin, Oklahoma-Arkansas*, 124 p. (Continuing Research)

1966, B.A., in Geology, The Ohio State University with Courses and Research in Hydrology, Hydrogeology and Associated Environmental Programs. German Secondary Field of Specialty, Columbus, OH. Began college in 1960 in southern California (at San Bernardino Valley College), taking undergraduate courses including: geology, chemistry, engineering drawing, etc. Transferred to OSU in 1962.

## Professional Memberships / Affiliations

Association of Ground Water Scientists and Engineers (AGWSE)  
American Association of Petroleum Geologists  
(Div. of Environmental Geosciences & Energy Minerals - Founding Member, 1977)  
American Society of Testing Materials (ASTM)  
Society of Economic Geologists (SEG)  
Society of Mining, Metallurgy, and Exploration (AIME)  
Geological Society of America (GSA-Fellow)  
Association of Geoscientists for International Development (AGID)  
Houston Geological Society (HGS)

Association of Environmental & Engineering Geologists (AEEG)  
International Association Hydrogeologists (AIH)  
American Institute of Professional Geologists (AIPG)  
International Society of Environmental Forensics (ISEF)  
Texas Association Professional Geoscientists (TAPG)

### **Professional Certification / Registration**

Professional Geologist (AIPG-#3330)  
Professional Hydrogeologist (AIH-#480) (Recertification-2004)  
Professional Geologist (Wyoming-#546)  
Professional Geologist (Mississippi-#347)  
Professional Hydrogeologist (Washington-#866)  
Professional Geologist (Washington-#866)  
Professional Geoscientist (Texas-#53)  
Professional Geologist (Alaska-#606)

### **Professional Honors, Awards and Committees**

Who's Who in the Southwest (First Listed: 18th Edition - 1982, etc.)  
Who's Who in America (First Listed: 49th Edition - 1995, through 58th Edition for 2004)  
Who's Who in Technology (1982, etc.) Listing: (CV)  
American Men & Women of Science Listing (here) (1st Listed: 14th Ed. -1979, etc.)  
Men of Achievement (International) (First Listed: 10th Edition - 1984)  
American Institute of Professional Geologists (1975, etc.)  
American Institute of Hydrology (1984, etc.)  
Ohioana Book Award in Science (1975): by Author, (see online CV); by County (CV)  
Citation by Law Engineering as Corporate Hydrogeologist (1990)  
Citation by Class of the Institute of Environmental Technology (1992 & 1994)  
Public Service Award - Outstanding Contributions, Texas Section, AIPG (1998)  
Chairman, Environmental & Mining Sessions, AIPG Annual Mtg, Houston, Tx, Oct., 1997  
Chairman, Internet Committee, Texas Section, AIPG (1998-Present)  
Chairman, Internet Resources Committee, Texas Section, AEG (2003-Present)  
Shlemon Mentor Hall of Fame in Applied Geoscience, GSA Mtg., Texas A&M U., March 16, 2004. Poster at GSA Mtg., Denver  
Fellow, Geological Society of America, April, 2004 (Press Release on Induction, see online CV)  
Distinguished Alumni Hall of Fame  
Mann Mentor in Hydrogeology, GSA South-Central Section Mtg., Trinity U., April 1, 2005  
Chairman, Uranium Committee, EMD-AAPG (2004-Present) - Public Web Page (see CV).  
President (2010-2011), EMD-AAPG - Public Web Page (see CV).

## **Continuing Professional Education / Training**

Mr. Campbell has attended, presented papers, or served as session chairman in the following technical conferences. He has also maintained the appropriate certifications in health and safety training.

## **Career Summary**

Mr. Campbell is well-known nationally and internationally for his work as a technical leader, program manager, consultant and lecturer in hydrogeology, mining, and associated environmental and geotechnical fields. He has gained a wide range of interdisciplinary experience in business and technical management in the environmental (regulatory, geological and hydrogeological), mining, and financial fields spanning more than 40 years. For a summary of ELA projects, see I2M CV. For a historical summary of selected client projects, see I2M CV.

Mr. Campbell has published widely, most notably: *Water Well Technology* (McGraw-Hill) and *Rural Water Systems Planning and Engineering Guide* (Commission on Rural Water). In the mid to late 1970's, he served on the Editorial Board of the journal: *Ground Water* for eight years and served as cofounder and first Director of Research of the NWWA Research Facility at Rice University. In the late 1970's, he also produced *Geology [and Environmental Considerations] of Alternate Energy Resources* (Houston Geological Society) and many other publications and consulting reports over the years on a variety of applied hydrogeologic, geologic, and injection well and hazardous waste subjects. He maintains an extensive library of more than 300,000 citations on environmental and mining topics covering the U.S. and overseas.

Mr. Campbell interrupted his graduate studies after the master's degree (Ph.D. work at Rice University in 1976) to join a major engineering and environmental consulting company as Director, Alternate Energy, Mining and Environmental Programs. During this period, he also served as an invited technical expert and lecturer for UNESCO-sponsored water-supply projects conducted in many parts of the Earth. Mr. Campbell provided management consulting for a mining project (with revenues/expenses of more than \$8 million/year) and as a principal consultant for exploration, mining, processing/refining and environmental activities. Over the past 15 years, Mr. Campbell has provided senior technical guidance, review, training, litigation support and consultation on numerous hydrogeological, water supply, and hazardous waste projects involved in both RCRA and CERCLA programs for major law firms and consulting engineering and environmental companies as well as industry.

## **Chronological Professional Experience**

**2010-Present I2M Associates, LLC**, Vice President and Chief Geologist/Hydrogeologist, based in Houston, Texas. For additional details, see: <http://associates.com/content/michael-d-campbell-pg-ph-curriculum-vitae>.

Mr. Campbell, in cooperation with a number of senior Associates, is employed by a new company in Texas to expand the scale of a number of projects in the U.S. and overseas. With offices in the Seattle, Washington and elsewhere in the U.S., the I2MA team is providing consulting services in uranium, gold and silver, base metals, and other mineral and energy commodities, such as geothermal energy, combined with the associated environmental projects located in the U.S. and overseas.

**1993-2010 M. D. Campbell and Associates, L.P.**, Senior Consulting Geologist/Hydrogeologist and Principal-in-Charge, Houston, Texas.

Mr. Campbell and a support staff served industry by providing technical consulting on RCRA, CERCLA and related waste management involving a range of contaminants such as BTEX, solvents, brine, etc., risk assessment projects, and water-supply projects in Texas, the US and overseas. Mr. Campbell provided project/document review, and technical and QA/QC training for industry, consulting companies and law firms for RCRA, Superfund, and mining-related projects. He designs, lectures, and produces formal technical short courses and semester-long courses on environmental science, engineering and technology, and has served on the Editorial Board of the *Journal of Applied Ground-Water Protection*, sponsored by the Ground-Water Protection Council, and served as Special Editor for the journal: *Ground Water*. Mr. Campbell also served on the Editorial Board of the *International Journal of Environmental Forensics*, for the term 2000 to 2003.

During the summer of 1992, Mr. Campbell developed, managed and served as Principal Instructor for a 220-Hr Evening Semester Course: *Introduction to Environmental Technology*, held on the campus of North Harris Community College for the purpose of cross-training petroleum geologists, engineers, chemists, and others as a prelude to entering or advancing in the environmental field. Mr. Campbell lectured on RCRA and CERCLA and on hydrogeology and project management, and selected and managed all guest lecturers from industry, government and local universities. The course was later hosted by the Houston Engineering and Scientific Society (HESS) and recently by



The Institute of Environmental Technology. Almost 400 men and women have graduated from the program to date.

He served as: Principal and Chief Geologist of M. D. Campbell and Associates, L.P., Principal Hydrogeologist of Environmental Litigation Associates, and Principal Instructor for the Institute of Environmental Technology, all located in Houston, Texas.

**1991-1993 DuPont Environmental Remediation Services**, Houston, Texas - Regional Technical Manager and Chief Hydrogeologist. The firm is a wholly-owned subsidiary of E. I. DuPont de Nemours. Mr. Campbell managed the activities of the Technical Group covering DuPont plants and other plants over a seven-state area. He managed five operating departments: Geology, Environmental Specialties, Deepwell (Injection Wells), Conceptual Engineering, and Engineering /Construction, involving approximately 60 technical personnel. He provided technical and administrative leadership, staff recruitment, training, quality control/assurance, risk assessment on various DuPont projects and represented DuPont on technical committees in Superfund projects in the US.

**1991 ENSR Consulting and Engineering**, Houston, Texas - Regional Director of Geosciences and Chief Hydrogeologist. The firm is a leading environmental services firm specializing in RCRA and CERCLA projects for industry. Mr. Campbell provided senior technical review, managerial direction, guidance, and leadership to the hydrogeologic and geologic staff throughout the company's 22 offices in the US. He also provided and managed regular technical training sessions and performed quality control, assurance functions and litigation support for hydrogeologic projects (i.e., RCRA, CERCLA: Superfund and UST, and landfill investigations). He also initiated, guided and supported marketing efforts in environmental projects.

**1988-1990 Law Engineering, Inc.**, Houston, Texas - Senior Hydrogeologist and Corporate Hydrogeological Consultant. Firm is a large employee-owned geotechnical and environmental engineering company founded in the early 1940's. Mr. Campbell provided senior technical direction, guidance, leadership and motivation to the hydrogeologic staff for the company's 52 offices in the US and overseas on hazardous waste projects including UST, landfill, water supply, dewatering, and RCRA (Part B Permits) and CERCLA (Property Environmental Assessments: Stage I and II projects, and Superfund investigations and representations), including litigation support and expert witness testimony. He was responsible for initiating, guiding and supporting marketing efforts in environmental and relevant geotechnical projects.

Mr. Campbell also provided training sessions and managed technology development programs via in-house research groups throughout the company. He served on Senior Review Boards and performed annual quality control audits for the company. Mr. Campbell was cited by Law Engineering's corporate management as the Corporate Consultant in Hydrogeology (Chief Hydrogeologist) for his outstanding contributions to the company (1990).

**1983-1988      Campbell, Foss & Buchanan, Inc.**, Houston, Texas - President and Senior Partner. Firm engaged in domestic and international environmental and natural resource management projects involving geological, hydrogeological and engineering programs: environmental investigations and characterizations (Part B Permitting, and Property Transfer Assessments), mine dewatering, project management (RCRA Investigations), natural resource assessment, reserve analysis and acquisitions for industry, mining (Alaska and Utah), financial, and banking communities. Precious metal discovery credited in Nevada. Provided consulting services on an \$8-million/year precious metal mining and cyanide heap-leaching project from discovery through development operations and environmental liaison with state and federal regulatory agencies. As part of these services, Mr. Campbell provided guidance and consultation in the daily review and monitoring of the financial and operational activities of the 50-person mining company. In addition, he also served numerous other companies and consulting groups in senior review functions on hazardous waste and RCRA refinery and plant investigations during the period.

**1976-1983      Keplinger and Associates, Inc.**, Houston, Texas - Director, Alternate Energy, Minerals and Environmental Division. Formed group and defined marketing objectives in 1976. Responsible for and managed all non-oil & gas projects: alternate energy (coal/lignite, geothermal energy, uranium), minerals (precious and base metals and industrial commodities-phosphate, potash, sand & gravel, and related environmental projects involving property transfer assessments (Pre-CERCLA activities) for joint-venture negotiations, corporate mergers, and buyouts, financial and litigation preparations, hazardous waste investigations (RCRA Part A and Part B Permitting), geotechnical projects (dewatering), and water resource investigations. He also served on the expert's committee of the United Nations' ground water exploration and development program from 1978 to 1983. Mr. Campbell managed a staff of seven geologists, engineers and specialty consultants. He also presented seminars on a range of subjects involving environmental, hydrogeological, and water-supply issues.

**1971-1976      NWWA Research Facility**, Columbus, Ohio and Houston, Texas - Director of Research. Co-founded in 1971 and served as first Director of Research. Mr. Campbell conceived,

formulated, supervised and conducted investigations on: water well technology, ground-water contamination and investigation practices and procedures, well construction standards, injection well systems' operation & maintenance, rural water systems' planning and engineering. Mr. Campbell was responsible for the early research programs funded by the U.S. Office of Water Resources Research (here), and in the development of EPA's early protocol development and characterization of ground-water contamination and remediation practices (Early RCRA and CERCLA).

The NWWA Research Facility and the staff of six were moved to Rice University, Department of Geology and Geophysics, in 1973 and continued through 1976. He also was an invited lecturer for graduate-level seminar courses on hydrogeology and economic geology for two years. Conducted graduate research on paleo-environmental and diagenetic processes under fluvial-deltaic conditions. This project is continuing as new information becomes available. For an interim report on the research, see I2M CV.

**1969-1971 Teton Exploration, Div., United Nuclear Corporation**, Casper, Wyoming - District Geologist/ Hydrogeologist, Eastern US and Canada, Mr. Campbell was responsible for mineral prospect generation (with emphasis on uranium and other strata-bound mineralization) and for field reconnaissance, mapping, sampling, drilling site operations, recommendations for land acquisition and project budgeting and execution. He also conducted research on the hydrochemistry of the Morton Ranch uranium geochemical cell and nature of mine dewatering and water-supply development in and around the deposit, including the nature of abandoned drill holes plugged with bentonite muds. He advanced the development of hydrochemistry and geochemistry as an aid to frontier uranium exploration and for developing models of mineralization in frontier exploration areas.

**1966-1969 Continental Oil Company (Australia)**, Sydney, Australia - Staff Geologist/ Hydrogeologist, Minerals and Mining Division. Mr. Campbell was responsible for conducting, coordinating, and implementing prospect evaluations, mapping and sampling programs, well-site operations, and ground-water supply programs in various parts of Australia, Micronesia (Caroline Islands) and the South Pacific (Coral Sea) for: phosphate, potash, sulfur, coal, base metals, and uranium. Phosphate discovery credited. Also investigated a new uranium district on the Nullibar Plains of South Australia (see publications list). Joint-venture programs with Japanese and Korean companies required extensive travel between Australia and Japan and Southeast Asia.

## **Fields of Activities, Major Reports, Publications and Presentations:**

1. **Mineral Exploration and Development Projects**
2. **Hydrogeological and Environmental Projects**
3. **Geothermal Exploration and Development Projects**
4. **Coal / Lignite Exploration and Development Projects**
5. **International Projects**
6. **Miscellaneous Projects**

## **Management of Mineral Exploration Programs**

During the mid-to-late 1960's, Mr. Campbell worked for a major American oil and minerals company (Conoco) in Australia and Southeast Asia, successfully conducting/managing field exploration programs, drilling operations, and water-supply investigations for development projects involving industrial and energy minerals, and precious and base metals (discovery credited). In the early 1970's, after returning to the U.S., he served three years as Regional Geologist with a major uranium exploration and mining company in Wyoming (United Nuclear). While there, he conducted research on hydrochemistry associated with roll-front uranium occurrences and successfully applied the results to the company's field program nationwide.

Mr. Campbell subsequently conducted various exploration programs as a consultant in the U.S. for companies such as Texas Eastern Nuclear, General Crude Oil Company and others during the mid-1970's on targets ranging from uranium, rare earth minerals, sulfur, and industrial minerals to base metals and precious metals.

In 1983, Mr. Campbell and two associates formed a consulting firm and conducted many domestic and international geologic, mining, economic, and hydrogeologic investigations including mineral property valuations and exploration programs (discovery credited), mine operational and financial management projects, mineral reserve analyses, preliminary feasibility studies, environmental investigations of various types, and other geotechnical investigations.

## **Applicable Minerals Publications / Major Reports / Presentations**

Campbell, M. D. and H. M. Wise, 2010, "Uranium Recovery Realities in the U.S. - A Review," Invited Presentation for the Dinner Meeting of the Houston Geological Society's Engineering and Environmental Group, May 18, Houston, Texas, 51 p. ([Click here](#))

Campbell, M. D., J. D. King, H. M. Wise, R. I. Rackley, and B. Handley, 2009 "The Nature and Extent of Uranium Reserves and Resources and Their Environmental Development in the U.S. and

Overseas," AAPG – Energy Minerals Division 2008 Report, revised for publishing in AIPG's *The Professional Geologist*, Vol. 46, No. 5, September/October, pp. 42-51 - Peer Reviewed. ([Click here](#))

Campbell, M. D. and J. D. King, 2009, "AusPotash Corporation Project: Adavale Basin, Queensland, Australia, NI 43-101 Report, by M. D. Campbell and Associates, L.P., Houston and Seattle, July 8, 113 p. ([Click here](#)).

Campbell, M. D., J. D. King, H.M. Wise, B. Handley, and M. David Campbell, 2009, "The Role of Nuclear Power in Space Exploration and the Associated Environmental Safeguards: An Overview," Report of the Uranium Committee, Energy Minerals Division to the Astrogeology Committee of AAPG. Presented at the Conference of the AAPG-Energy Minerals Division and Astrogeology Committee Sessions, June 8-10, held in Denver, CO. - Peer Reviewed. ([Click here](#)).

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Campbell, M. D., 2009, "Uranium," in *Unconventional Energy Resources and Geospatial Information: 2008 Review by the Energy Minerals Division, American Assoc. Petroleum Geologists*, of the *Journal of Natural Resources Research*, Vol. 18., No. 1, January. - Peer Reviewed. (Uranium section in [Paper](#)).

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Campbell, M. D., 2007, "Pressure on the Electrical Grid and 3rd Quarter, 2006 Uranium Concentrate Production", in *Unconventional Energy Resources and Geospatial Information: 2006 Review by the American Assoc. Petroleum Geologists, Energy Minerals Division, Natural Resources Research*, Vol. 16., No. 3, September.

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Investment Forum, Session 1, Presented by Colorado Oil & Gas Association, August 1-3, Denver, Colorado, 44 p.

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Campbell, M. D., 2004, Professional Memorial: Ted H. Foss, Ph.D., P.G., Geological Society of America Memorials, Vol. 33, April, pp. 17-22.

Campbell, M. D., 2004, Preliminary Examination of Mineralogical Samples from Rwanda, April 24, 32 p. (Confidential Client from Rwanda).

Campbell, M. D. and K. H. Forster, 1996, Hydrogeology and Mining, a Study Guide for Workshop presented at The National Mining Conference, Knoxville, Tennessee, May 11, 137p.

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Campbell, M. D. and K. H. Forster, 1995, Basic Mining Hydrogeology, a study guide for a mini-course presented at the National Symposium on Mining, Hydrology, Sedimentology and Reclamation, Springfield, Ill., December 7-11, 96p.

Forster, K. H. and M. D. Campbell, 1994, "Hydrogeologic Investigations for Designing a Dewatering and Depressurizing System in a Gulf Coast Lignite Mine," Kentucky Coal Mining Symposium, Bowling Green, 10p.

Campbell, M. D. and S. R. Dinkowitz, 1987, "Preliminary Conclusions on the Geology, Mineralogy and Structural Controls of Mineralization at the Lookout Mt. and Hamburg Mines," A Field Trip Lecture at the Norse Windfall Mines, Inc., Eureka, April 11, 1987, *Post-Meeting Field Trip, The Symposium on Bulk Minable Precious Metal Deposits of the Western United States*, Sponsor Geological Society of Nevada, 35 p.

Campbell, M. D. and T. H. Foss, 1987, "The Re-Discovery of Precious Metals in the Eureka Mining District, Nevada," *Proc. The Symposium on Bulk Minable Precious Metal Deposits of the Western United States*, April 6-8, 1987, Geological Society of Nevada, 15p.

Campbell, M. D., T. H. Foss and K. J. Buchanan, 1986, "Report of Investigations on the Preliminary Feasibility of Development of the Eureka Precious Metals Project, Nevada," a Campbell, Foss & Buchanan, Inc. Consulting Report (private distribution), 123 p.

Campbell, M. D., and T. H., 1984, "Report of Investigations on the Geology, Geochemistry and Geophysics of the Eureka Precious Metal Properties, Nevada," a Campbell, Foss and Buchanan Consulting Report (private distribution), approx. 300 p., August.

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Campbell, M. D., and L. Clark, 1981, "Preliminary Economic Analysis of the Mining Restrictions and Land Takes from the Hartman Farm by the City of Columbus, Ohio, Division of Water," for the BancOhio National Bank, Trustee for the Hartman Trust, by Keplinger and Associates, Inc., Houston, May 15, 15 p.

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Campbell, M. D., and D. J. Lynch, 1980, "Preliminary Mining Engineering Evaluation and Economic Analysis of the Sand and Gravel Resources on Selected Properties Near Columbus, Ohio," for the BancOhio National Bank, Trustee for the Hartman Trust, a Keplinger Consulting Report, January 1, 85 p.

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Campbell, M. D., 1970, "Preliminary Recommendation Report on the Uranium and Other Mineral Potential of Pennsylvania," Pa. Report No. 2, Stage II Evaluation, United Nuclear Corporation, 80 p., 19 figs, 3 plates, 2 tabs., 37 refs. (unpubl.).

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Campbell, M. D., 1969, "Analysis of Transportation, Water Resources, Multiple Product Recovery and Mining in Australia," Interim Phosphate Report No. 2, Australian Phosphate Project," Continental Oil Company of Australia, Mineral Exploration Division, 25 p., 15 figs., (unpubl.)

Pendry, G., (with technical support provided by Campbell, M. D.), 1969, "Report of Potash Potential, Carnarvon Basin, Western Australia," Continental Oil Company of Australia, Minerals Exploration Division, Sydney, 15 p., 6 figs., 3 tabs. (unpubl.)

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Campbell, M. D., 1968, "Discovery of New Phosphate Deposits: Interim Phosphate Report No. 1: Northern Territory, Australia," Continental Oil Company of Australia, Minerals Exploration Division, 22 p., 3 tabs., 3 plates (unpubl.).

### **Mine Management**

During the mid-1980's, Mr. Campbell provided technical, operational, financial and environmental management consulting for a heap-leach precious metal mine in Nevada. He served as part of a three-man matrix consulting management team that provided management consulting for operations and management of a multiple mine-central mill project with 35 employees and for the prime mining, crushing, hauling and agglomerating contractor with more than 30 employees.

Mr. Campbell's activities included:

- 1) management consulting for the start-up mine operations,
- 2) consulting on operational financial and accounting (\$8 million cash flow/year),
- 3) consulting on company operating and hazardous material safety and bullion security policy development via personnel manual,
- 4) joint-venture representation with major mining companies,
- 5) development of economic modeling programs for detailed financial analyses of month-to-month economic conditions,
- 6) day-to-day monitoring of operational processes and hydrochemical data,
- 7) consulting on exploration programs and of land-acquisition projects,
- 8) conducted analyses of unsaturated flow in the heap-leach operations, and monitored solution chemistry, and
- 9) initiated ground-water monitoring programs and provided guidance in negotiations with BLM and EPA.

### **Applicable Mine Management Publications / Major Reports**

Campbell, M. D. and J. D. King, 1988, Norse Windfall Mines, Inc. Personnel and Corporate Policy Manual, August, Eureka, Nevada, 30p.

Campbell, M. D., T. H. Foss and K. J. Buchanan, 1986, "Report of Investigations on the Preliminary Feasibility of Development of the Eureka Precious Metals Project, Nevada," a Campbell, Foss & Buchanan, Inc. Consulting Report (private distribution), 123p. (See Summary Report).

## **International Projects**

Mr. Campbell spent his early professional years on projects in Australia, South East Asia and Micronesia, making trips to Japan, Hong Kong and Singapore as joint-venture project negotiation needs required. He has returned on occasions to present invited hydrogeological and water supply papers. Mr. Campbell has initiated or been associated with projects on mineral exploration, mining, and water supply and hydrogeological topics in the following countries: Australia, Canada, Chile, France, Honduras, Jordan, Italy (Sardinia), Liberia, Mexico, Niger, Sri Lanka, Sweden, South Africa, Sudan, and Tanzania.

## **Applicable International Publications / Major Reports**

Campbell, M. D., and M. David Campbell, 2004, "Crisis Management: Ground-Water Supplies in the 21st Century," in *EnviroTechnology (Chinese)*, Vol. 1, Summer, pp 78-81.

Swartz, T. E., K. Montesoglu, M. D. Campbell, and O. Akkol, 1991, "Turkey: Ground-Water Issues in a Country with a Developing Economy" in *Proc. Fifth National Outdoor Action Conference on Aquifer Restoration, Ground Water Monitoring, and Geophysical Methods, AGWSE Conference*, May 13-16, 1991, Las Vegas, Nevada, pp 165-174.

Larsson, I., M. D. Campbell, et al., 1984, *Ground Water in Hard Rocks (Igneous and Metamorphic Rocks)*, United Nations (UNESCO) and the Swedish International Development Authority (SIDA), 450 p.

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Campbell, M. D., 1979, "Practical Geological Guides for Drilling and Test Pumping in Igneous and Metamorphic Rocks," in *Proc. Inter-Regional Seminar on Ground Water in Hard Rocks, Coimbatore, India*, November 22-December 20, 1979, UNESCO/SIDA/CGWB/TNGOLD, 24 p.

Campbell, M. D., 1979, "Preliminary Evaluation of Selected Oil Shale Resources in Jordan," a Keplinger Consulting Report for the World Bank, 10 p., November.

Campbell, M. D., et al., 1979, *A Review of the United Nations Ground-Water Exploration and Development Programme in Developing Countries, 1962-1977*, United Nations, Natural Resources, Water Series No. 7, ST/ESA/90, New York, 84 p.

Campbell, M. D., 1977, "Water Well Technology for Ground-Water Development and Production in Igneous and Metamorphic Rocks," *Proc. United Nations International Seminar on Ground Water in Hard Rocks, Stockholm-Sardinia*, September 22-October 7, 61 p.

Campbell, M. D., 1976, "Mineral Exploration and Development Program in the Republic of Niger, Africa," a Keplinger Consulting Report (private distribution) 22 p., November.

Campbell, M. D., 1969, "An Evaluation for Uranium of the Pidinga Lakes Area, South Australia," Consulting Report of Minoil, 65 p., 8 refs. (unpubl.)

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Campbell, M. D., 1969, "Analysis of Transportation, Water Resources, Multiple Product Recovery and Mining in Australia," Interim Phosphate Report No. 2, Australian Phosphate Project, Continental Oil Company of Australia, Mineral Exploration Division, 25 p., 15 figs. (unpubl.)

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### **Other Subsurface Investigations**

Mr. Campbell also has conducted a number of other scientific, geologic, hydrogeologic and geotechnical investigations involving: growth-fault investigations, remote subsurface data

acquisition technology development, technology transfer, human toxicology, moon-earth-meteorite potassium-uranium systematics, paleoenvironmental and diagenetic processes in the subsurface, injection well design and operation, oil shale, sand and gravel-reserve assessment and preliminary development feasibility, geologic assessment of cavern integrity and injection operations at Strategic Petroleum Reserve Sites in Texas, and subsurface structural traps for oil and gas. Mr. Campbell has a strong interest in the industrialization of space for the purpose of development off-world natural resources:

### Significant Uranium and Other Discoveries on the Moon May Indicate New Space Race is

#### Afoot (PDF)

Campbell, M. D. and W. A. Ambrose, 2010  
Press Release (with Details) April 16

### Role of Nuclear Power in Space Exploration (3.85 Mb PDF)

Contributions from the EMD Uranium (Nuclear Minerals) Committee  
Michael D. Campbell, P.G., P.H., (Chair) Houston;  
Jeffery D. King, P.G. (Associate) Seattle;  
Henry M. Wise, P.G. (Member)  
Houston; Bruce N. Handley, P.G. (Member) Houston; M. David Campbell, P.G. (Associate)  
Houston

### Developing Industrial Minerals, Nuclear Minerals and Commodities of Interest via Off-World Exploration and Mining

Campbell, M. D., B. Handley, H. M. Wise, J. D. King, and M. David Campbell, 2009. Paper/Poster at the Conference of the American Association of Petroleum Geologist (AAPG), Energy Minerals Division Sessions, June 9, Denver, CO., 27 p.

## **Hydrogeological / Environmental Investigations**

In the early 1960's, Mr. Campbell was selected as Undergraduate Research Assistant in the Department of Geology, The Ohio State University and subsequently worked on one of the first long-term, systematic ground-water contamination investigations involving oil-field pollution by open brine disposal pits in Ohio and on early modeling of the associated ground-water flow behavior under Dr. Wayne A. Pettyjohn and others.

In 1966, Mr. Campbell joined Continental Oil Company (CONOCO), Minerals & Mining Group in Sydney, Australia working on mineral exploration, mining and associated ground-water supply projects. He served as an Invited Visiting Lecturer, University of Queensland (now James Cook University), lecturing on the principles of hydrogeology. After returning to the U.S., in the early 1970's, Mr. Campbell organized the National Water Well Association's Research Facility becoming its first Director of Research in Ohio and then at Rice University, Houston. Over the period of 1971 to 1976, Mr. Campbell provided technical seminars on hydrogeology for numerous universities and for the US E.P.A. He also served as Technical Consultant to the *Water Well Journal* and as Abstract

Editor for the journal: *Ground Water*. During the period, Mr. Campbell managed numerous Association and EPA projects and programs dealing with hydrogeology and shallow drilling, shallow well design, construction, operation and maintenance, injection well, technical education and industrial contamination assessment, providing the early guidance to EPA personnel on ground-water sampling, monitoring well construction protocols and hazardous-waste spill response strategy for subsequent RCRA and CERCLA activities. He also consulted for a number of companies to evaluate gold, silver, and uranium prospects.

In 1975, he received The Ohioana Book Award in Science for the text: *Water Well Technology* (McGraw-Hill). Mr. Campbell was appointed as United Nations Technical Expert to review overseas ground-water programs for the period: 1976 to 1981. While at Rice University, he also conducted graduate fellowship research on a variety of subjects and taught courses in hydrogeology and economic geology. Mr. Campbell and his team provided substantial input for the EPA-sponsored *National Ground Water Information Center Data Base* presently operated by the NWWA. He served as an Editor or as a member of the Editorial Board of the journal: *Ground Water* from 1964 to 1978. During the period, he conducted numerous consulting geotechnical investigations and served as an invited technical expert and lecturer for the United Nations and UNESCO sponsored projects on world-wide ground-water exploration and development in igneous and metamorphic rocks in: Sweden, Italy (Sardinia), India, and Tanzania. Among the hydrogeological consulting projects conducted during the early 1980's, Mr. Campbell completed a series of investigations for a major geotechnical consulting firm on gasoline leaks in and around service stations in Texas.

With Campbell, Foss and Buchanan, Inc. (CF&B), he initiated an evaluation of vadose flow of cyanide solutions of a heap-leach precious metals mining project (see abstract). A long-term monitoring program was established for evaluating flow and hydrochemical behavior, and for providing data for optimizing process control, and for regulatory monitoring purposes. C,F&B conducted numerous projects in the U.S. and overseas. During the period, Mr. Campbell provided senior technical review and consultation for hydrogeological and hazardous waste projects associated with lignite mining (mine dewatering) and chemical plants performed by other geotechnical consulting groups in the south-central and northern United States.

While with Law Engineering, Inc., he was promoted to the company's highest technical position in the discipline as Corporate Hydrogeological Consultant (aka Chief Hydrogeologist), the first such designation in the company's 42-year history. He provided direction and technical support to Law

Engineering's 52 offices through the U.S. and overseas. Mr. Campbell served in a similar capacity with ENSR Consulting and Engineering, and in industry, with DuPont Environmental. After leaving Dupont, he spent 17 years as a consultant providing consultation on mineral prospect evaluations, waste management, characterization, remediation, water supply projects, technical training, litigation support and expert witness testimony on hydrogeology, the National Contingency Plan, and related subjects (see Mr. Campbell's litigation summary). In early 2010, he joined I2M Associates, LLC, based in Seattle, with an office in Houston.

**Hydrogeological / Environmental Publications**  
**Major Reports, Publications and Presentations**  
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## **Management of Geothermal Exploration and Development Projects**

In 1976, Mr. Campbell conducted extensive investigations on the potential geothermal value of selected properties in Dixie Valley, Nevada for a series of clients. Based on the available geological, geophysical, and hydrogeological data, Mr. Campbell recommended further investigations and a preliminary drilling and hot-spring sampling program. Results indicated favorable conditions existed in the subsurface complex of Basin-and-Range geologic structures. Additional federal lands were acquired by the client in Dixie Valley and other geothermal companies became interested in the area. Deep exploratory drilling began and significant discoveries of high temperature, liquid-dominated geothermal energy reservoirs were identified. Economic analyses were conducted on behalf of the client to establish land values for possible buyout or merger with other geothermal companies. The client subsequently sold its interests. Dixie Valley geothermally generated power plants went on stream in 1987 and is producing electricity for the Nevada-California power grid on a regular basis.

Mr. Campbell conducted a series of additional geologic, hydrogeologic and economic investigations for a number of geothermal companies in the western US. He continues to monitor industry activities.

### **Applicable Geothermal Publications / Major Reports**

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### **Management of Coal / Lignite Exploration and Development Projects**

In the mid-1970's, Mr. Campbell initiated and managed the lignite exploration activities for General Crude Oil Company (Div. International Paper, Inc.) in Arkansas, Texas, Mississippi and Alabama. Subsequent consulting assignments on coal and lignite in the 1970's and 1980's involved: exploration programs, preliminary mining feasibility studies, detailed reserve analyses, property evaluations, and mining operations assessment and evaluation.

### **Applicable Coal-Lignite Publications / Major Reports**

Campbell, M. D., 1983, "Preliminary Evaluation of Coal Reserves, Cambria County, Pennsylvania," a Campbell, Foss and Buchanan Consulting Report (private distribution), 10 p., December.

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### **Publications / Papers in Preparation**

Campbell, M. D. (In Preparation), *Nuclear Energy and the Environment*, for the American Geological Institute Natural Resource Series, ~70 p.

Campbell, M. D., *et al.*, (In Press), *The Role of Nuclear Power in Space Exploration and the Associated Environmental Issues: An Overview*, a report of the Uranium Committee of AAPG's Energy Minerals Division, to be released late-2011.

Campbell, M. D. and M. David Campbell, (In Preparation), *Growth Faulting in the Houston, Texas Area: Origins and Characteristics, Regional and Local Relationships, Associated Geologic Hazards, Economic Impact and Methods of Investigation*, (see online I2M CV).

Campbell, M. D., Alexander, T. A., and M. David Campbell, (In Preparation), *Siderite Occurrences in the Atoka Formation, Oklahoma and Arkansas, and their Hydrochemical, Diagenetic and Paleomagnetic Implications*, Geological Society Section Mtg, Oklahoma State University, Stillwater, March 5-6 (Abstract), preparing for subsequent publication in *Geology* or other journal. (See Interim Report, (see online I2M CV).



## **Curriculum Vitae**

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### **Education**

1979, B.A. in Geology, Western Washington University, WA

### **Summary of Experience**

Mr. King has over 25 years of technical and managerial experience in the natural resource field. Mr. King has extensive experience in developing successful regulatory- and landowner-negotiation and public-relations programs, has conducted or directly managed all aspects of site permitting, and has been involved in the financial and technical evaluation of mining properties for a major mining company and other projects. He has also founded, developed and operated two successful companies. He is licensed as a Professional Geologist in the State of Washington (#1727).

### **Mining Experience**

Mr. King developed mining process expertise in the late 1970's and early 1980's. During this time he worked for Companies such as Bethlehem Copper, Union Oil (MolyCorp) and the mining consulting firms for Watts, Griffis and McOuat and Campbell, Foss and Buchanan, Inc. including gold mining and gold placer evaluation in the lower states and in Alaska. In 1984, Mr. King was named mine manager of a gold and silver mine in Nevada. He served in that capacity until 1986 when he was named Vice President of Operations.

Selected technical presentations on uranium by Mr. King are cited below:

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## **Environmental Experience**

Between 1990 and 1998 Mr. King worked for the DuPont Company directing environmental projects in Washington, Oregon, Alaska and British Columbia, Canada. In 1998, Mr. King formed Pacific Environmental and Redevelopment Corporation to focus on large-scale projects involving the redevelopment of formerly contaminated properties. In completing these projects, Mr. King has developed or managed a team of resources and associates with experience ranging from environmental sciences to master-planned community and golf-course construction.

One such environmental project managed by Mr. King involved the environmental clean-up of an industrial site south of Tacoma, Washington. Once the contaminants were removed, Mr. King oversaw the construction of a golf course followed by the construction of quality homes. The golf course was completed in 2006 and has just won the "Top Ten New Courses in the World" Award for 2007, given by *Travel and Leisure Golf Magazine* (See Announcement (CV)).

In late 1990, he served with M. D. Campbell and Associates, L.P. as a Senior Program Manager. In 2010, he formed I2M Associates, LLC and presently serves in a management role for the company as President and Senior Project Manager, and in a variety of other management functions, including corporate oversight, project management and assessment, property evaluations, and field investigations of mining and large environmental projects.

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