



WALKABOUT RESOURCES PTY LTD

EL11/2005 SPECIMEN REEF

ANNUAL REPORT

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SPECIMEN REEF

IRON OXIDE-COPPER-GOLD-URANIUM PROJECT

EL11/2005, WESTERN TASMANIA

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Foreword

Gold was first discovered at Specimen Reef in 1882. A small underground mining operation was established, with the reef being accessed by adits on three levels. Copper also was observed in descriptions of the adit geology.

Following the discovery of gold and copper in 1882, there was no recorded sub-surface exploration in EL 11/2005 for the next one hundred years. A modest drill programme was conducted in and around the old working in 1982. One of these drill holes intersected high-grade gold over a narrow interval at a depth of about 140 meters. The drill log from this hole also described copper in the form of chalcopyrite.

Petrography conducted on a sample from the above interval in 1998 identified the uranium mineral brannerite in carbonate veins.

A study of the Savage River iron ore deposit and adjacent geology, by the Geological Survey of Tasmania concluded in 2007, states that “the mineralization, setting and alteration are highly indicative of iron oxide-copper-gold styles of mineralization.....”

Thus the information gained from sporadic and limited exploration over a time span of 125 years has now led Walkabout Resources to the recognition that the province has potential for the discovery of iron oxide-copper-gold/uranium deposits.

Gold, copper and uranium mineralization has been confirmed by drilling at Specimen Reef which is located in EL 11/2005. Though the exploration strategy will target IOCG/U style of mineralization within favourable host geology, this report will focus on the uranium potential of EL 11/2005 and the other tenements that form the project area.

Executive Summary

Walkabout Resources Limited commissioned this report on the uranium potential of EL11/2005 (Specimen Reef) in western Tasmania. Walkabout is the major partner in a 65:35 joint venture with the beneficial owner of the tenement, Red Rock Resources plc.

It is underlain by a fault-bounded belt of highly metamorphosed rocks which contain the Savage River iron mine. This belt is a major tectonic lineament cutting NE-SW across western Tasmania. The tenement abuts the northern boundary of the iron mine; it itself contains the old Specimen Reef gold mine, in which uranium, gold and copper mineralization was drilled.

These metal showings, namely the iron oxide, copper and gold, together with the tectonic setting, the Proterozoic age and the metamorphism of the host rocks strongly suggest the presence of an iron-oxide copper gold (IOCG) type deposition system. Such systems contain uranium deposits, the giant Olympic Dam, being the prime example. The possibility thus exists to discover a uranium deposit on EL11/2005.

Hitherto no one has examined this possibility. As such, it presents a unique opportunity for a junior company like Walkabout to conduct exploration for uranium on the Specimen Reef tenement and others that it has applied for in the metamorphic belt.

A M Surtees
November 2009

SPECIMEN REEF IRON OXIDE-COPPER-GOLD-URANIUM PROJECT EL11/2005, WESTERN TASMANIA

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ASSESSMENT OF THE URANIUM POTENTIAL OF EL11/2005, WESTERN TASMANIA

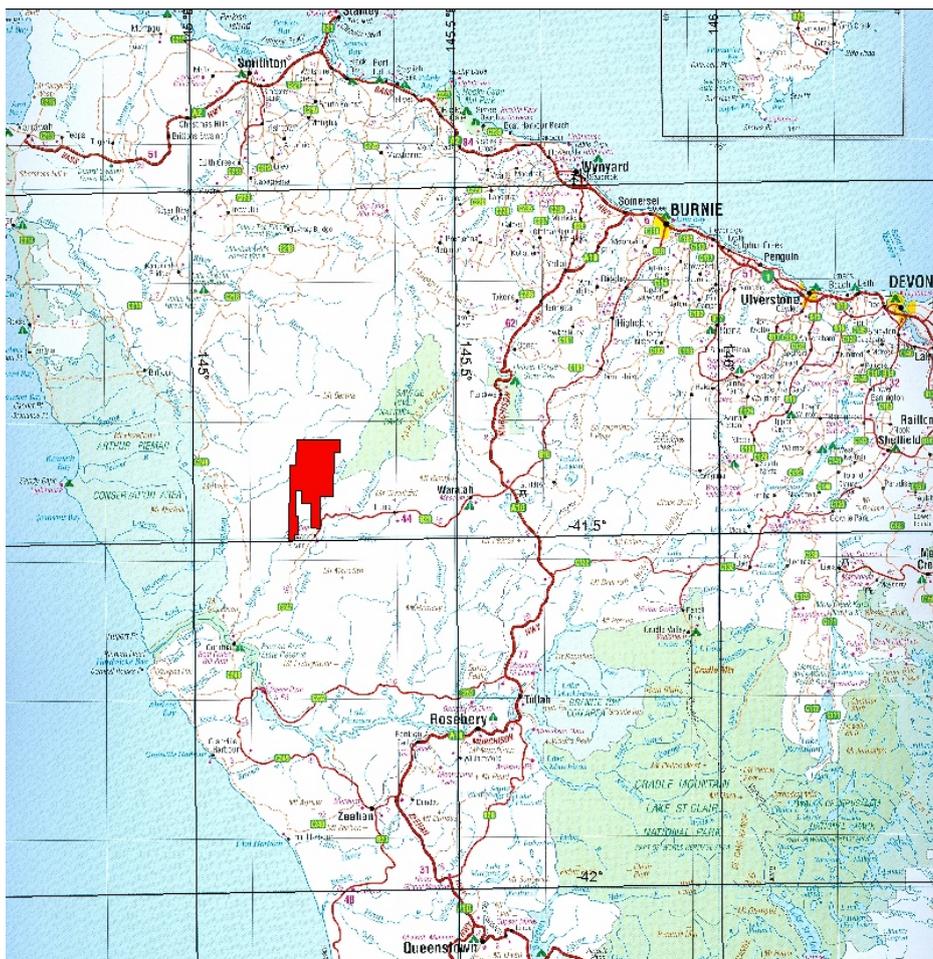
1. Introduction

This report for Walkabout Resources Limited (“walkabout”) investigates the uranium potential of the Exploration Licence (“EL”) number 11 of 2005, located in western Tasmania. Regency Resources Limited of Perth, Australia owns the EL. Walkabout is in joint venture with Red Rock (the beneficial owner) of EL 11/2005, whereby Walkabout may earn a 65% equity interest in the tenement.

The report discusses characteristics of the tenement’s geology, which is likened to those characteristics salient to the environment of a family of metal deposits known as the iron-oxide copper gold type. This forms the basis of Walkabout’s exploration philosophy. The historical work in the area, and the work program are discussed. The metallurgical extraction of uranium, particularly from the uranium minerals expected to be present on the tenement, is also mentioned.

2. Location

The Specimen Reef exploration Licence (EL11/2005) lies on the northern boundary of the Savage River iron mine. Within its boundaries is the Specimen Reef mine, a small underground working on 3 levels. Geologically the tenement overlies the Arthur Metamorphic Complex, a fault-bounded belt of altered late Proterozoic rocks cutting northeast-southwest across western of Tasmania. The main rock types are mafic schist and hornfels and also include mica schists, dolomites, albitites and skarns.



Map: Western Tasmania showing the Location of EL11/2005 (the red block).

3. Exploration Philosophy

The exploration philosophy of Walkabout Resources Limited is that there exists in the Specimen Reef tenement (and its surrounds) characteristics of age, tectonic setting, alteration and mineralogy that are in keeping with the environment of the family of metal deposits that have become broadly known as the Iron-Oxide Copper Gold ("IOCG") type. Included in the greater family group are the iron skarns, magnetite-apatite deposits ("Kiruna-type") and the Phalaborwa-type carbonatites. "The magnetite-apatite deposits ("Kiruna-type") and the IOCG deposits form end members of a continuum. In general the magnetite-apatite deposits form prior to the copper-bearing deposits in a particular district."¹

There has been no exploration for uranium in the tenement and its surrounds.

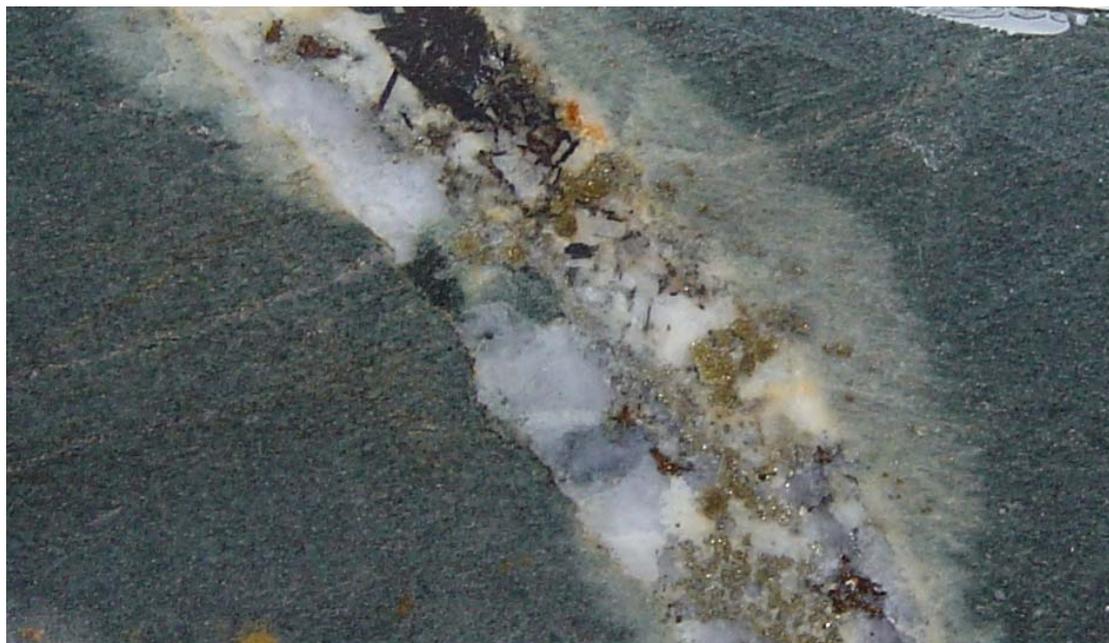
In the following discussion, this report will point out various aspects of the geology that suggest that the environment in and around the Specimen Reef Tenement, EL11/2005, is correct for the deposition of uranium, as well as magnetite, copper and gold, in the style of the IOCG deposition model.

¹ Hitzman (2)

For some years, the Savage River iron deposit has been discussed as being of the IOCG type. A recent paper from the Geological Survey of Tasmania² states this belief, although placing it towards the other, earlier, Kiruna-type end of the continuum, rather than at the Olympic Dam end in which uranium is more commonly one of the contained metals.

However, there is uranium deposited in the area. It occurs in the form of brannerite in one of the holes drilled around the Specimen Reef mine. Additionally core from 2 other holes showed twice to 3 times background counts per second with the scintillometer. Thus, uranium is believed to be present in the host rocks. This is significant “because the metal content in IOCGs is probably directly related to the bulk composition of the regional wall rocks.”³ Gold is present too, as is copper, and this is very much in keeping with IOCGs.

It is understood that the alteration that occurs with IOCGs is “largely replacive rather than obviously veinlet controlled.”⁴ Presumably, this extends to the deposition process. Indeed, magnetite replaces a mineral of bladed habit in quartz-carbonate-siderite–albite-chalcopyrite veins⁵ in the core examined by the author. See photo below.



Photograph of Core from DDH SC2 at 94.85 m. Dark mass at top of vein is magnetite replacing a mineral of bladed habit. Other minerals in the vein are: Albite: $\text{NaAlSi}_3\text{O}_8$, Chalcopyrite: CuFeS_2 , Dolomite: $\text{Ca}(\text{Mg},\text{Fe})(\text{CO}_3)_2$, Magnetite: Fe_3O_4 , Pyrite: FeS_2 , Quartz: SiO_2 , Siderite: FeCO_3 .⁶

² Botterill & Taheri

³ Hitzman (1)

⁴ Hitzman (1)

⁵ Bottrill

⁶ Bottrill

Thus the metallic minerals commonly associated with the Olympic Dam type of IOCG deposits, and the processes of mineral replacement, are seen and have been at work on this tenement.

The Arthur Metamorphic Complex, a highly metamorphosed fault bound belt, hosts the Savage River iron mine and underlies the Specimen Reef tenement. Alteration such as this is a characteristic of IOCGs.⁷

The majority of known deposits of this general type (and there are some 810 identified worldwide by the Geological Survey of Canada⁸), particularly the larger examples, are found within Early to mid-Proterozoic host rocks (1.1 to 1.8 Ga)⁹. The Arthur Metamorphic Complex (“AMC”) is seemingly a little younger, late Proterozoic in age, around 0.8 Ga and younger¹⁰ and thus does not conform to the norm. However, the age of IOCGs is diverse; “deposits of this family are found in post-Archaeon rocks from the Early Proterozoic to the Pliocene”¹¹ (2 Ma).

The vein in the photo of the core from DDH SC2 (above) can be seen to be crosscutting the schistosity formed during the development of the AMC. These veins are possibly of Devonian age.¹² It may be, therefore, that the mineralizing activity of the postulated IOCG system is of this post Proterozoic younger age.

The tectonic setting of IOCGs is in “areas that were cratonic or continental margin environments during the late Lower to Middle Proterozoic, and in many cases there is a definite spatial and temporal association with extensional tectonics. Most of the districts occur along major structural zones, and many of the deposits are elongated parallel to regional or local structural trends.”¹³ The AMC is a belt of rocks bounded by faults and cut into slivers by internal faults, constituting a major structural lineament.

The presence of a Permian to late Carboniferous aged mixed glaciomarine sediment (sandstone, mudstone, limestone etc.) block that is caught up within the AMC in the tenement suggests that extensional tectonics existed – albeit not apparently temporally related. However, tectonic lineaments such as the AMC are long lived, commonly reactivating over long periods of time.

All IOCG environments have significant igneous activity related to high heat flow.¹⁴ Expectedly this heat source would drive the deposition process. There are episodes of igneous activity in the Proterozoic in the environs of the tenement such as the emplacement of amphibolites of the AMC and tholeiitic dolerite dykes.

⁷ Hitzman, Oreskes and Einaudi

⁸ Corriveau

⁹ Hitzman, Oreskes and Einaudi

¹⁰ Bottrill & Taheri

¹¹ Hitzman (2)

¹² Bottrill

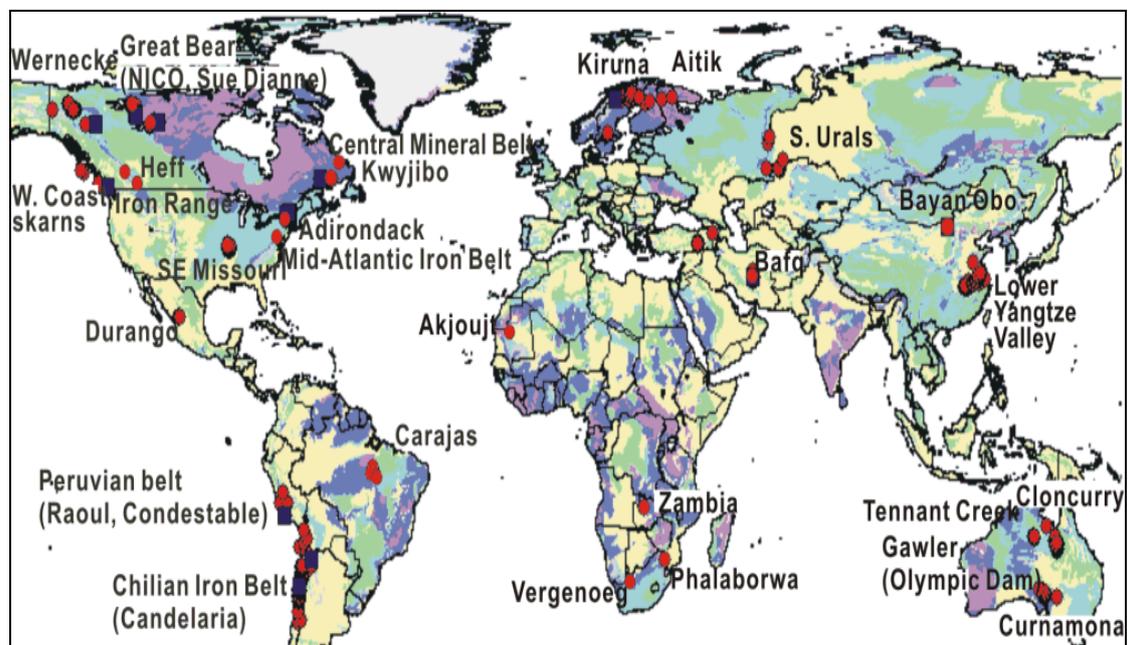
¹³ Hitzman, Oreskes and Einaudi

¹⁴ Hitzman (2)

These characteristics strongly suggest that an IOCG system has operated in the Specimen Reef tenement and that the possibility of a uranium deposit exists. The loci of uranium and other metal deposits is diverse. They do not occur necessarily within the iron ore deposit. The mineralizing system is large, spread along the AMC, and uranium concentration may occur at any place within it.

Walkabout has thus applied for other ground along the AMC to complement the Specimen Reef tenement.

Below is a map showing the distribution of IOCG deposits worldwide and a table of the resources of selected IOCG deposits.



World Map: Distribution of IOCG districts and important deposits worldwide (red dots).¹⁵

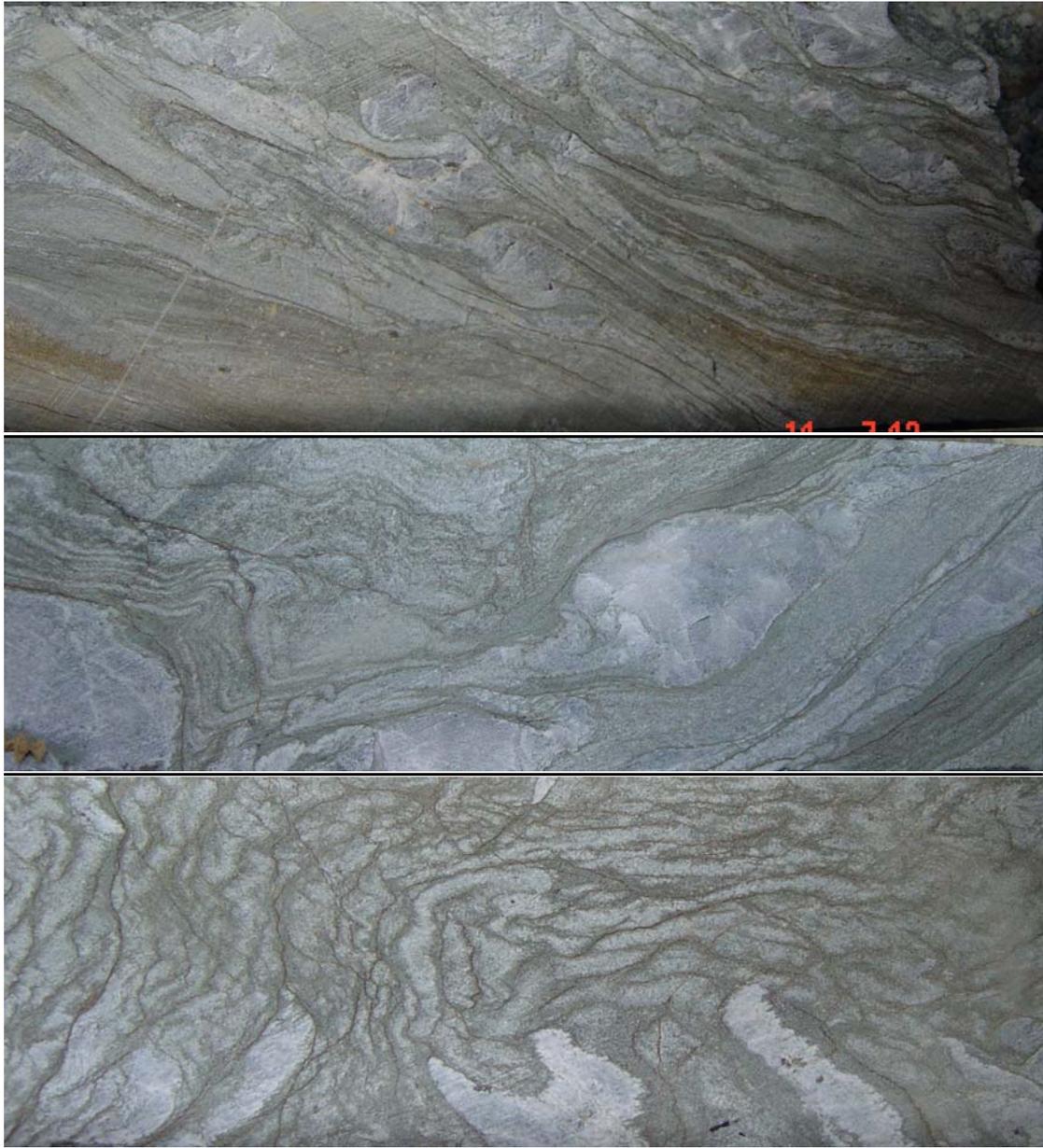
¹⁵ Corriveau

Deposit	Country	Resources ¹	Grade	Key references
Pea Ridge	US	120 Mt	57% Fe	Gandhi, 2003
Kiruna district	Sweden	3400 Mt	60% Fe (400 Mt produced)	Gandhi, 2003
NICO	Canada	42 Mt	0.5g/t Au, 0.1% Co, 0.12%Bi	Goad et al., 2000
Bayan Obo	China	1500 Mt	35% Fe	Smith and Chengyu, 2000
		48-100Mt	6% REE ₂ O ₃	
		1Mt	0.13% Nb	
Phalaborwa	South-Africa	850 Mt	0.5% Cu (+ Au, Ag, PGE, U, Zr, REE, Ni, Se, Te, Bi)	Leroy, 1992
Monakoff	Australia	1 Mt	1.5% Cu, 0.5g/t Au (Pb, Zn, U)	Williams and Skirrow, 2000
Eloise	Australia	3 Mt	5.5% Cu, 1.4g/t Au (+ Fe, Ni)	Williams and Skirrow, 2000
Starra	Australia	7.4 Mt	1.9% Cu, 3.8 g/tAu (ironstone)	Rotherham et al., 1998
Sue Diane	Canada	17 Mt	0.72% Cu, 2.7g/t Ag	Goad et al., 2000
Osborne	Australia	15.5 Mt	3.0% Cu, 1.05g/t Au (metamorphosed)	Gauthier et al., 2001
Ernest Henry	Australia	167 Mt	1.1% Cu, 0.5g/t Au	Williams and Skirrow, 2000
Igarapé Bahia	Brazil	170 Mt	1.5% Cu, 0.8g/t Au	Ronze et al., 2000
Sossego	Brazil	355 Mt	1.1% Cu, 0.28 g/t Au	Haynes, 2000
Aitik	Sweden	380 Mt ²	0.4% Cu, 0.2g/t Au, 4g/t Ag ²	Wanhainen et al., 2003
		226 Mt ³	0.37% Cu, 0.2g/t Au, 3g/t Ag ³	
		850 Mt		
Candelaria	Chile	470 Mt	0.95% Cu, 0.22g/t Au, 3.1g/t Ag	Marschik et al., 2000
Cristalino	Brazil	500 Mt	1% Cu, 0.30g/t Au	Tallarico et al., 2004
Manto Verde	Chile	600 Mt	0.5% Cu, 0.1g/t Ag	Sillitoe, 2003
Salobo	Brazil	789 Mt	0.96% Cu, 0.52 g/t Au	Souza and Vieira, 2000
Olympic Dam	Australia	3810 Mt	1.1% Cu, 0.4kg/t U ₃ O ₈ , 0.5 g/t Au	Western Mining Corp., 2004
		2000 Mt	0.24-0.45% La + Ce; 0.3285% REO	Orris and Grauch, 2002

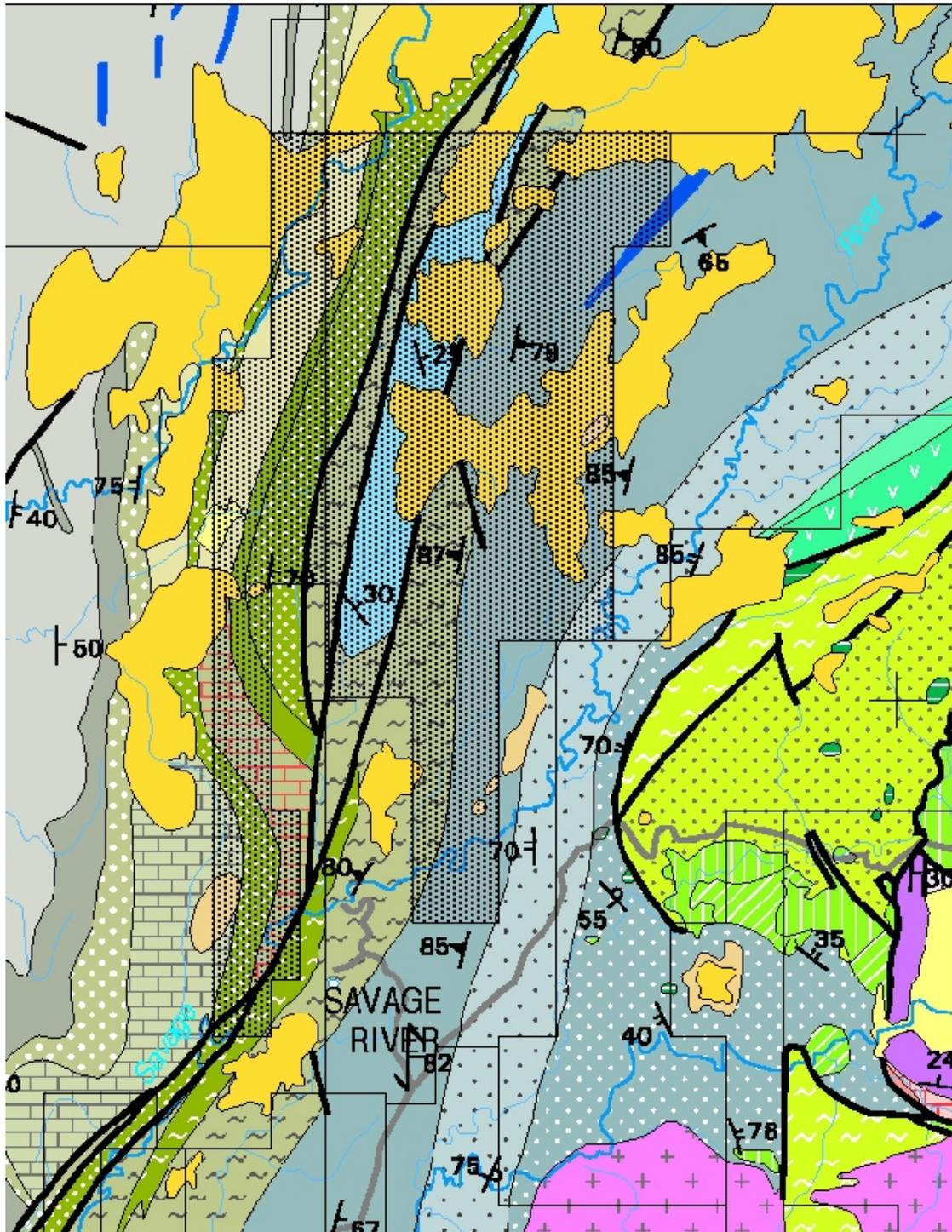
¹: calculated; ²: produced; ³: reserve.

Table: Resources of selected IOCG deposits.¹⁶

¹⁶ Corriveau



Photographs of core from DDH SC2 illustrating the highly metamorphosed, tectonised nature of the Arthur Metamorphic Complex rocks



Map: Geology of the area of EL11/2005. The tenement is stippled. The late Proterozoic Arthur Metamorphic Complex is that coloured khaki green and grey, prominently trending NE-SW. Later Proterozoic Tholeiitic dolerite dykes are dark blue. The early Carboniferous to late Devonian Meridith Granite is the magenta in the SE. The Permian to late Carboniferous fluvio-glacial mixed sediment block, possibly a graben, is light blue in the middle of the tenement. Tertiary flood basalts are the deep yellow covering patches.

4. Historical Activity on the Tenement

As mentioned above Specimen Reef occurs on EL11/2005. "In May of 1882, four gold prospectors, S. Hall, T. Jones, G. Johnson and T. Farrell, found rich gold in a creek west of the Savage River about 9 kilometres north of Long Plains. One tributary to this creek named Specimen Creek became famous for its coarse gold. It was in this creek that T. Greenway and G. Thunder found the first gold reef on the West Coast. The two men collected about 40 ounces of free gold from its outcrop. About 30 leases were pegged out in the vicinity, some with promising names like the Lucky Hit, the Second to None and the Goldfinger. The reef was named Specimen Reef. Some rich specimens from this reef were exhibited in Launceston in November 1882."¹⁷

The development of an underground mine on Specimen Reef followed. It was accessed by adits on 3 levels, as well as a number of winzes.

In 1982 Savage Resources Limited drilled 15 holes into the mine area. The holes are designated SPC1 to 15. Holes 7 to 11 are percussion holes: the others are diamond drill holes. The reef was intersected in SPC1 from 140.85m to 141.05m (downhole). The gold grade for this intersection is 910.0 g/t. A summary of the core log of this intersection is: "*Dolomite-calcite-haematite GOLD vein. True width 1.5 m. CVA 15°. ¹⁸ GOLD associated with haematite 140.88-140.91(m) and 140.93-140.97(m) remainder of vein is carbonates only. GOLD approx. 5% of gold bearing interval.*"¹⁹

In reviewing later drilling for this gold target (that is DDH SPC1) it is reported: "The gold in the IMI Savage Resources core is in a siderite+quartz veinlet and is intergrown with a non-magnetic black metallic mineral."²⁰

A recent trip to Tasmania (October 2009) failed to locate this core.

In 1996 the Corinna Joint venture between Goldstream Mining N.L. and Titan Resources N.L. commenced. The JV was based on EL26/95, which covered the Specimen Reef mine. Some stream sediment sampling was done and 2 holes were drilled to investigate the 910 g/t Au intersection in the 1982 hole SPC1. Intersections of 0.56 g/t Au x 2.0 m in DDH SP1 and 0.05 g/t Au x 1.0 m in DDH SP2 correspond to the position of the original 910 g/t Au intersection. The conclusion is that the new holes SP1 and SP2 did not intersect the plunge of the gold enriched shoot.

A report by the Centre of Excellence in Ore Deposits, University of Tasmania, commissioned by the Corinna Joint Venture²¹ in 1998 examined core from the 2 holes and a piece from the 910 g/t Au intersection drilled by Savage Resources Limited. In the latter carbonate veins containing the uranium mineral brannerite, and gold in the form of electrum, was identified. The electrum occurs in fractures in the brannerite and along the margins of it. The

¹⁷ Treasure Enterprises

¹⁸ Presumably CVA is "core vein angle"

¹⁹ Newnham

²⁰ Turner

²¹ Sharpe

brannerite occurs as large grains hosted by well formed, interlocking anhedral carbonate that is strongly fractured.²² See the Appendix for more details on the brannerite- electrum petrography.



Photograph: Black grains of brannerite with gold and other minerals.

Chemical formula: $(U,Ca,Ce)(Ti,Fe)_2O_6$ = a Uranous titanate

Location: Witwatersrand field, South Africa.

Scale: Picture size 4 mm.

Photo Copyright © [Thomas Witzke / Abraxas-Verlag](#)

It seems therefore that the haematite described in the core log for SPC1 and the black metallic mineral described in the later review was in fact brannerite.

There was no follow-up work done on this uranium discovery.

Regency Resources Ltd acquired the ground in 2006 under EL11/2005, of a different configuration to the original Corinna JV licence EL 26/95. Some sampling was done.

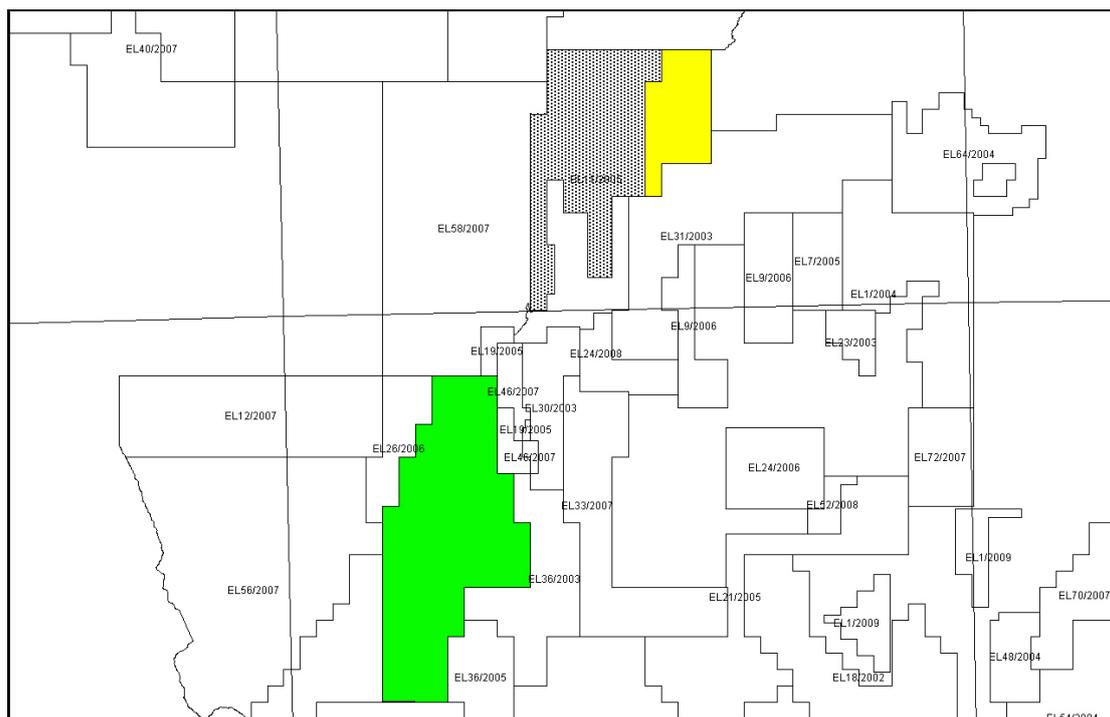
There has been no work done in EL11/2005, or to my knowledge in the surrounding area, for uranium.

²² Sharpe

5. Work Program

Walkabout's work program (laid out in bullet format below) is generalized; details will change as the program progresses.

- Walkabout has made applications for available ground underlain by the AMC rocks. The map below shows the ground applied for. The work program for these areas will follow much the same pattern as that bulleted below.
- The area of the Specimen Reef mine, where uranium, gold and copper are known to exist, will be examined and tested. An orientation survey to establish geochemical sampling parameters will be carried out here
- Establish a GPS controlled grid of spacing probably at 400 X 100 m. The lines (spaced at 400 m) will be orientated across the main trend of the AMC, that is, approximately NW-SE
- Soil sampling at 100 m intervals along the lines. Samples will be assayed for uranium, gold, copper and iron.
- A gravity survey along the lines.
- Any indications of metal or gravity build-up will occasion a secondary program of in-fill sampling.
- If ground conditions permit, we will trench (costean) the anomalous areas.
- Drilling, probably diamond drilling will follow.
- Thereafter, resource development will commence.



Map showing tenement applications (“ELA”) (green and yellow). EL11/2005 is the stippled area.

6. Metallurgical Extraction of Uranium from Brannerite

Indications are that brannerite is probably the mineral that will occur in any uranium deposit found in the tenement. It is refractory and thus the extraction of its uranium is relatively difficult.

“For ores like brannerite alkaline-carbonate leaching is normally employed. Alkaline carbonate leaching has the decided advantage of being very selective for uranium, so unwanted nuclides and other potential product-impurity elements are not appreciably solubilized.”

This process was used at Beaverlodge, at the Homestake mill in Grants, New Mexico, at the Cotter Corporation mill at Canon City, Colorado, and at Cogema's Lodeve mill in France. None of these alkaline-carbonate mills is now in operation, but a pressure alkaline leach continues to be operated by the Romanian National Company for Uranium at Feldioara Brasov.²³

About half the uranium ore at Olympic Dam is in the form of refractory brannerite. In 2001, the recovery was about 71% but modern methods have now brought that to about 97%.²⁴

In conclusion: processing of brannerite ores, is more difficult than other uranium ore ores but modern processes have made it readily achievable.

²³ Edwards & Oliver

²⁴ Mining Technology.com

7. Conclusions

The geological indications are that an IOCG system has deposited magnetite (being mined at Savage River) as well as copper, gold and uranium at Specimen Reef. No previous investigation was made of this geological concept. As such, Walkabout is in a unique position to investigate the occurrence of uranium (and gold and copper) in EL11/2005 and its other ELA's in the area.

A M Surtees
November 2009

Disclaimer and Competency Statement

Albert Murray Surtees prepared this report, under contract to Walkabout Resources Limited, for payment. The information provided came from reports on Open File at the Mineral Resources of Tasmania, from geological papers, from work by a commissioned expert, from examination of core drilled at Specimen Reef, from discussion with people knowledgeable about the work done at Specimen Reef and from my own geological expertise. The Bibliography provides a list of relevant literature.

Albert Murray Surtees has sufficient experience in the matters discussed in this report to qualify as a Competent Person as defined in the 1999 Edition of the "Australasian Code for Reporting of Mineral Resources and Ore Reserves".

Every reasonable care was taken to ensure that the facts are accurate and that opinions expressed are based on those facts. It must be realised, however, that opinions and conclusions drawn from them may change as more data (technical or non-technical) become available in time.

No parts of this report should be used for any purpose, other than in Walkabout's use as an Information Memorandum, without the written permission of Albert Murray Surtees.

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APPENDIX

Plate 6: Petrography of a piece of Core from the Savage Resources Limited Drilling at Specimen Reef

Extracted from Robina Shape's Report (CODES SRC, University of Tasmania), commissioned by the Goldstream Mining NL – Titan Resources NL Joint Venture, entitled "Petrographic Examination of the Alteration and Vein Assemblages, Arthur Mobile Belt, Western Tasmania", in Turner N.J., Annual Report to 6/3/99, EL 26/95, Western Tasmania, MRT Report # 99-4288, Appendix 6.

The petrographic descriptions hereunder refer plate 6, overleaf.

195073

Plate 6

(a) A buff coloured, foliated wall rock (schist) with pervasive white mica alteration. An electrum-carbonate-brannerite vein cuts the wall rock. Sample is from SP1 at 160 metres.

(b) Photomicrograph of the wall rock in (a) in plane polarised light. The wall rock is intensely white mica altered and hosts a closely spaced, intense cleavage. The cross cutting carbonate vein consists of interlocking well-formed anhedral carbonate grains.

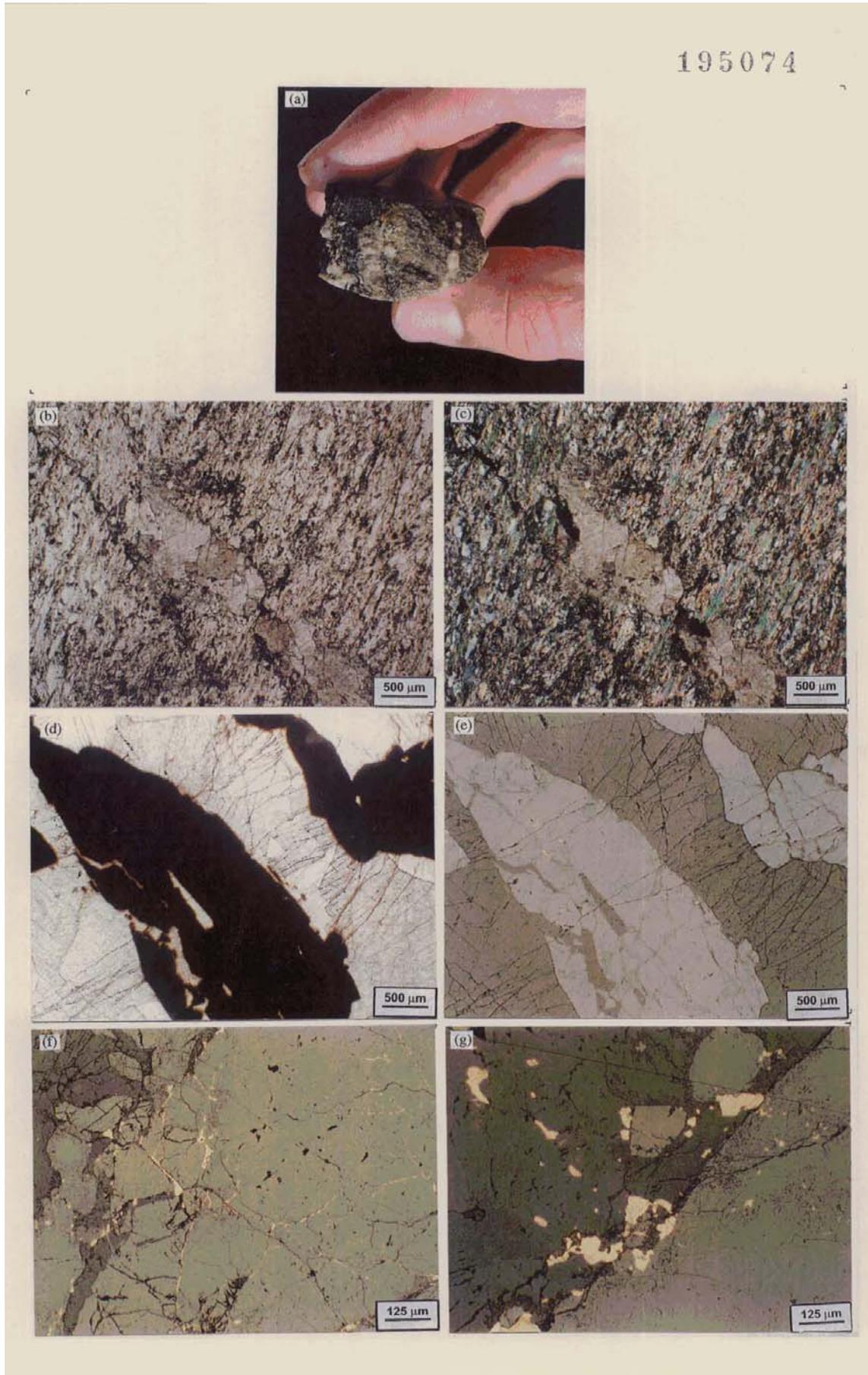
(c) as for (b) under crossed polarised light

(d) Photomicrograph of (a) under plane polarised light. The mineral brannerite is opaque and forms large grains that are fractured. Brannerite is hosted by interlocking well-formed, anhedral carbonate that is strongly fractured.

(e) as for (d) under reflected light. Electrum occurs within the brannerite grains within fractures.

(f) Photomicrograph of (a) showing the distribution of electrum within brannerite. Electrum predominantly occurs as irregular shaped grains within fractures of brannerite.

(g) Photomicrograph of (a). Electrum is generally concentrated at the margins of brannerite, where it forms large grains. Smaller rounded electrum grains are disseminated within brannerite close to its grain margin or as disseminations within carbonate or along carbonate grain boundaries.



GLOSSARY

The bulk of the descriptions herein are taken from the "Glossary of Geology" by Bates and Jackson, 2nd Edition, 1980. Other descriptions are attributed to source.

adit: a horizontal entrance or passage in a mine. (The Concise Oxford Dictionary, 9th Edition)

albite (al'-bite): (a) A colourless or milky-white triclinic mineral of the feldspar group: $\text{NaAlSi}_3\text{O}_8$. It is a variety of plagioclase with composition ranging from $\text{Ab}_{100}\text{An}_0$ to $\text{Ab}_{90}\text{An}_{10}$; it is also an alkali feldspar, representing the triclinic modification of sodium feldspar. Albite occurs in all groups of rocks, forming a common constituent of granite and of various acid-to-intermediate igneous rocks; it is widely distributed in low-temperature metamorphic rocks (greenschist facies), and is regularly deposited from hydrothermal solutions in cavities and veins. Albite crystals frequently exhibit polysynthetic twinning, predominantly after the albite twin law. Cf: analbite. Syn: sodium feldspar; sodalite; white feldspar; white schorl. (b) The pure sodium-feldspar end member in the plagioclase series.

albitite (al'-bi-tite): A porphyritic igneous rock, defined by Turner in 1896, containing phenocrysts of albite in a groundmass chiefly consisting of albite. Muscovite, garnet, apatite, quartz, and opaque oxides are common accessory minerals. Syn: albitophyre; albite porphyrite.

alteration (al-ter-a'-tion): Any change in the mineralogic composition of a rock brought about by physical or chemical means, esp. by the action of hydrothermal solutions; also, a secondary, i.e. supergene, change in a rock or mineral. Alteration is sometimes considered as a phase of metamorphism, but is usually distinguished from it because of being milder and more localized than metamorphism is generally thought to be. (b) Changes in the chemical or mineralogical composition of a rock produced by weathering.

altered rock

anhedral (an-he'-dral): (a) Said of a mineral crystal that has failed to develop its own rational faces or that has a rounded or indeterminate form produced by the crowding of adjacent mineral grains during crystallization or recrystallization. (b) Said of a detrital grain that shows no crystal outline. (c) Said of the shape of such a crystal. The term was originally used in reference to igneous-rock components by Cross et al. (1906, p. 698) in preference to the synonymous terms xenomorphic and allotriomorphic (as these were originally defined). Cf: subhedral; euhedral.

anomaly (a-nom'-a-ly): A departure from the expected or normal. (b) The difference between an observed value and the corresponding computed value. (c) A geological feature, esp. in the subsurface, distinguished by geological, geophysical, or geochemical means, which is different from the general surroundings and is often of potential economic value; e.g. a magnetic anomaly. Thus: anomalous

apatite (ap'-a-tite): (a) A group of variously colored hexagonal minerals consisting of calcium phosphate together with fluorine, chlorine, hydroxyl, or carbonate in varying amounts and having the general formula: $\text{Ca}_5(\text{PO}_4, \text{CO}_3)_3(\text{F}, \text{OH}, \text{Cl})$. Also, any mineral of the apatite group, such as fluorapatite, chlorapatite, hydroxylapatite, carbonate-apatite, and francolite; when not specified, the term usually refers to fluorapatite. The apatite minerals occur as accessory minerals in almost all igneous rocks, in metamorphic rocks, and in veins and other ore deposits; and most commonly as fine-grained and often impure masses as the chief constituent of phosphate rock and of most or all bones and teeth. Syn: calcium phosphate. (b) A group of hexagonal minerals having the general formula: $\text{A}_5(\text{RO}_4)_3(\text{F}, \text{OH}, \text{Cl})$, where A = Ca, Sr, or Pb, and R = P, As, V, or less commonly Si. Examples include svabite, hedyphane, mimetite, pyromorphite, and vanadinite. Symbol: Ap.

Archean (Ar-che'-an): Said of the rocks of the Archeozoic. Also spelt Archaean.

Archeozoic (Ar'-che-o-zo'-ic): The earlier part of Precambrian time, corresponding to Archean rocks. Cf: Proterozoic. Also spelled: Archaeozoic.

bladed (blad'-ed): Said of a mineral in the form of aggregates of flattened blades or elongate crystals.

brannerite (bran'-ner-ite): A mineral: $(\text{U}, \text{Ca}, \text{Ce})(\text{Ti}, \text{Fe})_2\text{O}_6$.

carbonatite (car-bon'-a-tite): A carbonate rock of apparent magmatic origin, generally associated with kimberlites and alkalic rocks. The origin of carbonatites is controversial; they have been variously explained as derived from magmatic melt, solid flow, hydrothermal solution, and gaseous transfer. A carbonatite may be calcitic (sövite) or dolomitic (rauhaugite). See: Heinrich, 1966; Tuttle & Gittins, 1966.

chalcopyrite (chal-co-py'-rite): A bright brass-yellow tetragonal mineral: CuFeS_2 . It is generally found massive and constitutes the most important ore of copper. Syn: copper pyrites; yellow copper ore; yellow pyrites; fool's gold.

contact (geological): the surface between two different rock types

country rock (coun'-try): The rock enclosing or traversed by a mineral deposit. Originally a miner's term, it is somewhat less specific than host rock. (b) The rock intruded by and surrounding an igneous intrusion.
flow: a body of extrusive rock that has flowed from a volcanic vent

craton: a major structural unit of the earth's crust, consisting of a large stable mass of rock, generally igneous and/or metamorphic, sometimes with a thin veneer of sediment.

DDH: abbreviation for diamond drill hole

diamond drilling: A variety of rotary drilling in which diamond bits are used as the rock-cutting tool. It is a common method of prospecting for mineral deposits, esp. in development work where core samples are desired.

dolerite (dol'-er-ite): In the U.S., a syn. of diabase. (b) In British usage, the preferred term for what is called diabase in the U.S. Etymol: Greek doleros "deceitful", in reference to the fine-grained character of the rock which makes it difficult to identify megascopically. Cf: diorite; traprock.

dyke [intrus rocks]: A tabular igneous intrusion that cuts across the bedding or foliation of the country rock. Also spelled: dike. Cf: sill [intrus rocks]; sheet [intrus rocks].

electrum (e-lec'-trum): A naturally occurring, deep-yellow to pale-yellow alloy of gold with silver; argentiferous gold, containing more than 20% silver. Also spelled: elektrum.

exploration licence: a licence issued by a Territorial or State Government to an entity to explore for minerals. Abbreviation is EL

fault [struc geol]: A fracture or a zone of fractures along which there has been displacement of the sides relative to one another parallel to the fracture. Obsolete syn: paraclase.

Ga: billion years

GIS: geographic information system

GPS: global positioning system

g/t: grams per tonne = 1 part per million (ppm)

geological time scale

EON	ERA	PERIOD	MILLIONS OF YEARS AGO
Phanerozoic	Cenozoic	Quaternary	1.6
		Tertiary	66
	Mesozoic	Cretaceous	138
		Jurassic	205
		Triassic	240
		Permian	290
		Pennsylvanian	330
	Paleozoic	Mississippian	360
		Devonian	410
		Silurian	435
		Ordovician	500
		Cambrian	570
	Proterozoic	Late Proterozoic Middle Proterozoic Early Proterozoic	
Archean	Late Archean Middle Archean Early Archean		3800?
Pre-Archean			

Downloaded from USGS website: <http://pubs.usgs.gov/gip/fossils/numeric.html>

grade [ore dep]: The relative quantity or the percentage of ore-mineral content in an orebody. Syn: tenor.

gridding: the placement of marker or survey pegs in a regular square or rectangular pattern over the surface of a mineral prospect. The grid, so formed, controls the position of the exploration observations (sampling, mapping, drilling, etc) made over the prospect.

hectare: 10, 000 square metre

km²: square kilometre = 1,000,000 square metres

haematite, hematite (hem'-a-tite): A common iron mineral α -Fe₂O₃. It is dimorphous with maghemite. Hematite occurs in splendent, metallic-looking, steel-gray or iron-black rhombohedral crystals, in reniform masses or fibrous aggregates, or in deep-red or red-brown earthy forms: it has a distinctive cherry-red to reddish-brown streak and a characteristic brick-red colour when powdered. It is found in igneous, sedimentary, and metamorphic rocks, both as a primary constituent and as an alteration product. Hematite is the principal ore of iron. Symbol: Hm. See also: specularite. Also spelled: haematite. Syn: red hematite; red iron ore; red ochre; rhombohedral iron ore; oligist iron; bloodstone.

host rock: A body of rock serving as a host for other rocks or for mineral deposits; e.g. a pluton containing xenoliths, or any rock in which ore deposits occur. It is a somewhat more specific term than country rock.

host: A rock or mineral that is older than rocks or minerals introduced into it or formed within or adjacent to it, such as a host rock, or a large crystal with inclusions of smaller crystals of a different mineral species; a palasome. Ant: guest.

intergrowth (in'-ter-growth): The state of interlocking of grains of two different minerals as a result of their simultaneous crystallization. Cf: graphic intergrowth.

joint venture: as used in this report it is a partnership between 2 or more parties (generally companies) set up to prospect (or mine) a mineral tenement. In Australia, generally one of the parties owns the tenement and the other(s) earn equity in the tenement ("farm-in") by expending funds in exploration.

lithology: a term pertaining to the general characteristics of rocks. It generally relates to descriptions based on hand specimens and outcrops rather than microscopic or chemical features.

m: metre. 1 metre is equal to 3.28084 feet Imperial

Ma: Millions of years before the present.

mafic (maf'-ic): Said of an igneous rock composed chiefly of one or more ferromagnesian, dark-coloured minerals in its mode; also, said of those minerals. The term was proposed by Cross, et al. (1902, p. 561) to replace the term femag, which they did not consider to be euphonious. Etymol: a mnemonic term derived from magnesium + ferric + ic. It is the complement of felsic. Cf: femic; salic; basic. Partial syn: ferromagnesian.

magnetite (mag'-net-ite): (a) A black, isometric, strongly magnetic, opaque mineral of the spinel group: (Fe, Mg)Fe₂O₄. It often contains variable amounts of titanium oxide, and it constitutes an important ore of iron. Magnetite commonly occurs in octahedrons and also granular or massive; it is a very common and widely distributed accessory mineral in rocks of all kinds (in orebodies as a magmatic segregation, in lenses enclosed in schists and gneisses, in igneous rocks as a primary mineral or as an alteration product, in placer deposits, and as a heavy mineral in sands). Syn: magnetic iron ore; octahedral iron ore. (b) A name applied to a series of isomorphous minerals in the spinel group, consisting of magnetite, magnesioferrite, franklinite, jacobsite, trevorite, and maghemite. Symbol: Mt.

metamorphic complex: The metamorphic rocks constituting a whole group closely related on a regional and/or stratigraphic basis, e.g. the Dalradian metamorphic complex of Scotland. Syn: metamorphic assemblage.

metamorphism: the process by which changes are brought about in the earth's crust by the agencies of heat, pressure and chemically active fluids.

metasediment: metamorphosed sedimentary rock.

mine gate costs: the costs incurred to bring the material mined to the surface – literally to a position outside of the mine gate.

Mining Lease (ML): standard mineral tenement in the Northern Territory, for all minerals. Provides the tenement holder the right to mine for any mineral (iron normally excepted). Granted for a maximum of 25 years - renewable.

Mt: million tonnes

Pliocene (Pli'-o-cene): An epoch of the Tertiary period, after the Miocene and before the Pleistocene; also, the corresponding worldwide series of rocks. It is considered to be a period when the Tertiary is designated as an era.

pluton (plu'-ton): An igneous intrusion. (b) A body of rock formed by metasomatic replacement.-The term originally signified only deep-seated or plutonic bodies of granitoid texture. See also: plutonism.

Plutonic

ppm: parts per million (equivalent to 1 gram per metric tonne).

pre-strip: the removal of unmineralised overburden, generally soil, at the start of the process of mining an open pit.

Proterozoic (Prot'-er-o-zo'-ic): (a) The more recent of two great divisions of the Precambrian. Cf: Archeozoic. Syn: Algonkian; Agnotozoic. (b) The entire Precambrian.

pyrite (py'-rite): A common, pale-bronze or brass-yellow, isometric mineral: FeS₂. It is dimorphous with marcasite, and often contains small amounts of other metals. Pyrite has a brilliant metallic luster and an absence of cleavage, and has been mistaken for gold (which is softer and heavier). It commonly crystallizes in cubes (whose faces are usually striated), octahedrons, or pyritohedrons, and it also occurs in shapeless grains and masses. Pyrite is the most widespread and abundant of the sulphide minerals and occurs in all kinds of rocks, such as in nodules in sedimentary rocks and coal seams or as a common vein material associated with many different minerals. Pyrite is an important ore of sulfur, less so of iron, and is burned in making sulfur dioxide and sulfuric acid; it is sometimes mined for the associated gold and copper. Cf: pyrites. Syn: iron pyrites; fool's gold; mundic; common pyrites.

pyrites (py-ri'-tes): (a) Any of various metallic-looking sulphides of which pyrite ('iron pyrites') is the commonest. The term is used with a qualifying term that indicates the component metal; e.g. "copper pyrites" (chalcopyrite), "tin pyrites" (stannite), "white iron pyrites" (marcasite), "arsenical pyrites" (arsenopyrite), "cobalt pyrites" (linnaeite), and "nickel pyrites" (millerite). When used popularly and without qualification, the term usually signifies pyrite. (b) An obsolete term for a stone that may be used for striking fire.

recovery [mining]: In mining, the percentage of valuable constituent derived from an ore, or of coal from a coal seam; a measure of mining or extraction efficiency.

reef: a gold bearing quartz vein

refractory (re-frac'-to-ry): (a) Said of an ore from which it is difficult or expensive to recover its valuable constituents. (b) Exceptionally resistant to heat.

replacement [meta] (re-place'-ment): Change in composition of a mineral or mineral aggregate, presumably accomplished by diffusion of new material in and old material out without breakdown of the solid state.

resource: in this report is used in reference to the iron ore mineralization observed in outcrop, open pits, drillholes etc. It does not refer to Indicated or Measured Resource as defined in the JORC Code, unless specifically designated as such

reverse circulation (RC) drilling: a percussion type of drilling powered by compressed air which brings the rock chips broken by the bit to surface in the inside of the drill rod. This cuts down on contamination by rock broken from the sidewall of the hole by the returning sample. rock chip sample

scintillation [radioactivity]: A small flash of light produced by an ionizing agent (such as radioactive particles) in a phosphor or scintillator.

scintillation counter: An instrument that measures ionizing radiation by counting individual scintillations of a substance. It consists of a phosphor and a photomultiplier tube that registers the phosphor's flashes. It may be smaller and more efficient than a Geiger-Müller counter. It is used in spectrometry as well as prospecting. Syn: scintillometer.

scintillation spectrometer: An instrument for measuring a mass or energy spectrum, therein similar to a gamma-ray spectrometer, and determining its frequency distribution by the use of a scintillation counter.

scintillator (scin'-til-la'-tor): Any transparent material (crystalline, liquid, or organic) that emits small flashes of light when bombarded by an ionizing agent such as radioactive particles.

scintillometer (scin-til-lom'-e-ter): scintillation counter

schist: A strongly foliated crystalline rock, formed by dynamic metamorphism, that can be readily split into thin flakes or slabs due to the well developed parallelism of more than 50% of the minerals present, particularly those of lamellar or elongate prismatic habit, e.g. mica and hornblende. The mineral composition is not an essential factor in its definition unless specifically included in the rock name, e.g. quartz-muscovite schist. Varieties may also be

based on general composition, e.g. calc-silicate schist, amphibole schist; or on texture, e.g. spotted schist.

sediment (sed-i-ment): (a) Solid fragmental material that originates from weathering of rocks and is transported or deposited by air, water, or ice, or that accumulates by other natural agents, such as chemical precipitation from solution or secretion by organisms, and that forms in layers on the Earth's surface at ordinary temperatures in a loose, unconsolidated form; e.g. sand, gravel, silt, mud, till, loess, alluvium. (b) Strictly, solid material that has settled down from a state of suspension in a liquid. In the singular, the term is usually applied to material held in suspension in water or recently deposited from suspension. In the plural, the term is applied to all kinds of deposits, and refers to essentially unconsolidated materials. Cf: deposit.

sedimentary (sed-i-men'-ta-ry): adj. (a) Pertaining to or containing sediment; e.g. a "sedimentary deposit" or a "sedimentary complex". (b) Formed by the deposition of sediment (e.g. a "sedimentary clay"), or pertaining to the process of sedimentation (e.g. "sedimentary volcanism"). n. A sedimentary rock or deposit.

shale: A fine-grained detrital sedimentary rock, formed by the consolidation (esp. by compression) of clay, silt, or mud. It is characterized by finely laminated structure, which imparts a fissility approximately parallel to the bedding, along which the rock breaks readily into thin layers and that is commonly most conspicuous on weathered surfaces, and by an appreciable content of clay minerals and detrital quartz; a thinly laminated or fissile claystone, siltstone, or mudstone. It normally contains at least 50% silt, with 35% "clay or fine mica fraction" and 15% chemical or authigenic materials (Krynine, 1948, p.154-155). Shale is generally soft but sufficiently indurated so that it will not fall apart on wetting; it is less firm than argillite and slate, commonly has a splintery fracture and a smooth feel, and is easily scratched. Its color may be red, brown, black, or gray. A review of the origin and use of the term "shale" is given by Tourtelot (1960), who notes that it originally meant a "laminated clayey rock" but historically has also been applied to the "general class of fine-grained rocks", and who states that the general trend prior to 1850 in the U.S. "seems to have been to use 'shale' for almost any clayey rock of Paleozoic age; afterwards the term came to be applied to many clayey rocks of all ages" (p.341). Etymol: Teutonic, probably Old English scealu, "shell, husk", akin to German Schale, "shell". **shear zone:** a generally linear zone of stress along which deformation has occurred by translation of one part of a rock body relative to another part

shear zone: a generally linear zone of stress along which deformation has occurred by translation of one part of a rock body relative to another part

siderite [mineral]: (a) A rhombohedral mineral of the calcite group: FeCO_3 . It is isomorphous with magnesite and rhodochrosite, and commonly contains magnesium and manganese. Siderite is usually yellow-brown, brown-red, or brown-black, but is sometimes white or gray; it is often found in impure form in beds and nodules (of clay ironstone) in clays and shales, and as a directly precipitated deposit partly altered into iron oxides. Siderite is a valuable ore of iron. Syn: chalybite; spathic iron; sparry iron; rhombohedral iron ore; iron spar; siderose; white iron ore. (b) An obsolete syn. of sapphire quartz. (c) An obsolete term formerly applied to various minerals, such as hornblende, pharmacosiderite, and lazulite.

skarn: As used by Fennoscandian geologists, an old Swedish mining term for silicate gangue (amphibole, pyroxene, garnet, etc.) of certain iron-ore and sulphide deposits of Archean age, particularly those that have replaced limestone and dolomite. Its meaning has been generally expanded to include lime-bearing silicates, of any geologic age, derived from nearly pure limestone and dolomite with the introduction of large amounts of Si, Al, Fe and Mg (Holmes, 1920, p.211). In American usage the term is more or less synonymous with tactite. Cf: endoskarn; exoskarn.

solubilize: make soluble or more soluble. Also spelled *solubilise*

tectonic (tec-ton'-ic): Said of or pertaining to the forces involved in, or the resulting structures or features of, tectonics. Syn: geotectonic.

tenement, mining tenement: a registered mineral or mining property, either an and exploration, prospecting or mining licensed area.

tholeiite (tho'-lei-ite): A silica-oversaturated (quartz-normative) basalt, characterized by the presence of low-calcium pyroxenes (orthopyroxene and/or pigeonite) in addition to clinopyroxene and calcic plagioclase. Olivine may be present in the mode, but neither olivine nor nepheline appear in the norm. The term, first used in 1840 by Steinger, was derived from Tholey, Saarland, Germany, and was applied to a sill of altered andesite. The term was

given its present meaning by Kennedy in 1933. Chayes (1966) reviewed the history of the term and recommended its replacement by subalkaline basalt. Cf: basalt. Syn: tholeiitic basalt; subalkaline basalt.

tonne: a metric tonne equal to 1000 kilograms

unconformity (angular): the lower, older series of beds dip at a different angle to the upper, younger series.

volcaniclastic (vol'-ca-ni-clas'-tic): Pertaining to a clastic rock containing volcanic material in whatever proportion, and without regard to its origin or environment.

volcanics (vol-can'-ics): Those igneous rocks that have reached or nearly reached the Earth's surface before solidifying. The common use of the term for volcanic rocks should be avoided (USGS, 1958, p.86).

volcano-sedimentary rocks: rocks of sedimentary and volcanic origin.

workings: mine workings; any excavation created to recover mineral or metal.