SMEDG Presentation
Thursday, November 27, 2014

Exploration Mines and Money

Tony Hope
50 million tonnes ore treated at average grade of 5.9 g/t gold and 0.7% copper
c1888. Mount Morgan Gold Mine Queensland
The mine founded in 1882 was the largest gold mine in the southern hemisphere.
Some early Mount Morgan identities

Kelso King, G A Richard, Walter Hall, and R G Casey. c1909
Comparative rock samples from Mount Morgan and Rotorua, c late 1880’s

Bacon Ore
Mt. Morgan

Geyserite
Rotorua, N.Z.
Massive sulphide with quartz veining
Mount Morgan geological plan and section
Alex Taube 1990
William D’Arcy
father of oil in Persia (Iran).

May 26, 1908: Mideast Oil Discovered — There Will Be Blood
By Randy Alfred
Mount Morgan c 1904
No. 2 steam shovel on Grasstree level, 1906
Gold ingots-183 kg each worth AUD $9 million per ingot at 2012 prices.
Australasian Institute of Mining & Metallurgy (Inc.)

First Ordinary Meeting 1952, Mount Morgan

Photo taken at Swimming Baths, Mt. Morgan
Tuesday Morning, 28.8.1952.

Front Row—left to right—O. A. Wilson, Miss G. Meyers, R. R. Neal, Mrs R. R. Neal, W. J. Cuming, Mrs W. J. Cuming, N. S. Kirby, Mrs N. S. Kirby, J. J. Whitelaw, Mrs J. J. Whitelaw, Mrs J. W. Westaway, Mrs L. B. Haney, Mrs A. D. Mackay, Mrs C. Blyth, K. B. Gross, Mrs K. B. Gross, Mrs D. I. Izatt, Mrs G. Sheil, J. Krutschnitt, Mrs Krutschnitt, G. Sheil, Miss B. E. Jacka, G. B. O’Malley, I. W. Morley, Mrs S. S. Pullar, Mrs R. B. Lawrie, Mrs J. J. Topping, Mrs J. M. Horsburgh, Mrs B. W. Lennon, Mrs J. G. Hart, Mrs A. E. Dainton, A. A. McLeod, K. A. Rowell, L. E. Elvey, Mrs P. L. Adams, P. L. Adams.


1961 and 2008
Mount Morgan fireclay mine and dinosaur footprint

- The HM comprises ilmenite, leucoxene, rutile, zircon and monazite
c1935. Hauling black sand from beach by horse and dray at Yamba NSW

(By courtesy late W. H. Derrick)
Murphyores’ exploration sites
Eastern Queensland
ABOVE: Hand augering on Fraser Island main Beach. 1964.

RIGHT: Sludging Eurimbula south of Gladstone 1963
Fraser Island 1979. Rehabilitated part of mining area.
Murphy Star. Ex fishing boat used for prospecting.
Moreton Island. Wind blown sand dunes. 1963
1963. Middle island from Bustard Head (named by Captain Cook).

Field camp Moreton Island 1963
Middle Island near Gladstone
Moreton Island from the air. 2011
Ginkgo Heavy Mineral Mine
New South Wales 2005 to present

- 161 million tonnes at 2.68% HM
- The HM comprises 46% ilmenite, 8% leucoxene, 13% rutile and 10% zircon
Murray Basin from Landsat imagery showing strand lines tens of kilometres long, an ancient lake and location of Ginkgo deposit.
IMPERIAL MINING N.L. / PROBO MINING PTY LTD
MURRAY BASIN
HEAVY MINERAL TENEMENT LOCATIONS
SEPTEMBER 1999

LEGEND

- BONO JOINT VENTURE
  - Imperial Mining NL 50%
  - Probo Mining Pty Ltd 50%
- OURINA JOINT VENTURE
  - Imperial Mining NL 50%
  - Probo Mining Pty Ltd 50%
- MURRAY BASIN JOINT VENTURE
  - Bemax Resources NL 50%
    (Peregrine Mineral Sands NL)
  - Imperial Mining NL 25%
  - Probo Mining Pty Ltd 25%
- Illuka Resources
- Redfire Resources
- RZM
- Basin Minerals NL
- Heavy mineral prospects

Adelaide
GREAT AUSTRALIAN BITH
Victoria
Melbourne
Ginkgo heavy mineral mine in the Murray Basin, NSW. 2006
Geologist Ian Browne and visitors, 1998

Prof. Ian Plimer
Exploration field team 1999 outlining Ginkgo deposit.
HM panned from RC drill hole sample. L to R. Zircon, ilmenite/rutile, ancient beach sand.
Ginkgo test pit 2001
Spud dredge with cutter raised 2009
Ginkgo strandline from dredge pond 2008
Ginkgo mine manager and dredge operator
Ilmenite heap Gingko mine site

Leucoxene and secondary ilmenite

Ilmenite

Zircon and rutile
Road train used to transport HM from Ginkgo Mine to Broken Hill treatment plant.

Newly constructed treatment plant at Broken Hill, 2006.
Panguna Copper–Gold mine Bougainville Papua New Guinea. 1972 to 1989

- Produced 3.1 million tonnes copper, 10 million ounces gold and over 25 million ounces silver.

- Original reserves in 1968 were 230 Mt at 0.63% copper and 0.98 g/t gold.
Author’s drainage sediment field gear. 1963
Consolidated Zinc exploration field team 1961 and 1962
Bougainville and Mt Bagana
Geologist Phil Macnamara
Top. Ken Phillips and Rex Brooks providing rations and pay to locals. 1964.

Surveyor Fred Pratt on helipad. 1965.
Flooding at Bougainville site. c1970
Aerial view of developing open pit. c1972.
Open pit 1986
Bougainville field assistants Stuart Golu and Augustine Gomona. c 1967
Above. Breccia pipe

Bougainville. Stream geochemistry. Copper values.
Ok Tedi Copper–Gold mine
Papua New Guinea
1982 to present

- By end 2007 the mine had produced 3.6 million tonnes copper and 10.5 million ounces gold.

- Mineable reserves in May 1988 were 355 Mt at 0.67% copper and 0.61 g/t gold. In addition to leached cap ore of 2.7 Mt at 2.08 g/t gold.
Ok Tedi-copper/gold
Old camp 1968. Shower and “self flushing” toilet!
Ok Tedi discovery day 13th July 1968. Doug Fishburn examining sulphides in stream. Photo by Chris Larkin.
Ok Tedi co-discoverer John Felderhoff 1968. Photo by Chris Larkin.
Mount Fubilan. C 1972 (photo by Russ Lord)

Diamond drill rig. 1969
Ok Tedi geological plan and section, 2008. (Smith and Shephard)
Tabubil plateau 1971 and 2004
Ok Gilor in flood beside old camp, 1968
Contact between endoskarn and mineralised quartz porphyry.
High grade copper zone, c 1977.
Gold medallion struck from the first gold pour at Ok Tedi, 1984.
Lihir Gold mine
Papua New Guinea 1982 to present

• 60 million ounces gold.

• 1991. Sulphide resource 421 MT at 2.77g/t gold and oxide resource 4.3 MT at 2.55 g/t gold
Louise Harbour
before and during mining

c 1987
c 2009
First campsite on Lihir 1983
Aerial view of base camp, c1987
Kennecott Geologist Gavin Thomas panning gold at Lihir for Sir Julius Chan (PNG Prime Minister) and family. 1983
Discovery outcrop Lihir

L-R: Gavin Newman, Russell Madigan, Peter McNab, Ken Rehder. Kainantu, c1980s
Geothermal slimline drill hole (750.3 m), 1985.

Beginning of discharge
Geologist Sandy Moyle at hot spring used by locals for cooking c1984
One of many active geothermal sites, Kapit 1986
A typical family prior to mining on Lihir, 1986
Kennecott President – Frank Joklik, 1988

Graeme Minifie, c1985

Greg Corbett, Mike Turbott & Rod Davies, c1986
Track mounted reverse circulation air core drill, c1987

Atop a drilling rig, c1985
Aerial view of Lienetz and Minifie Pits, 2007

Londolovit town site, 2007
Local village (Putput), processing plant and mine, 2007

Lihir plant site

Lihir processing plant, 2007
Operating in area of geothermal activity, Lihir
Damage caused by the geothermal outburst of 30 April 2006
Geothermal outburst
Pit sections and gold grades, c2008
Anhydrite crystals

Cackle and fluidised breccia

? Tree clast in breccia

Diorite with pyrite selvages and potassic alteration
Drill hole L188, 129-134.5m showing intense potassic alteration, crackle breccia and quartz-filled structures associated with high gold grades, 1989
Lihir project reunion in Sydney, December 2010
Working on Lihir geology. PhD students at CODES, University of Tasmania, 2009.