PERSONAL STORIES OF 65 GEOSCIENTISTS IN THEIR SEARCH FOR THE POT OF GOLD

AUSTRALIAN MINERAL DISCOVERERS

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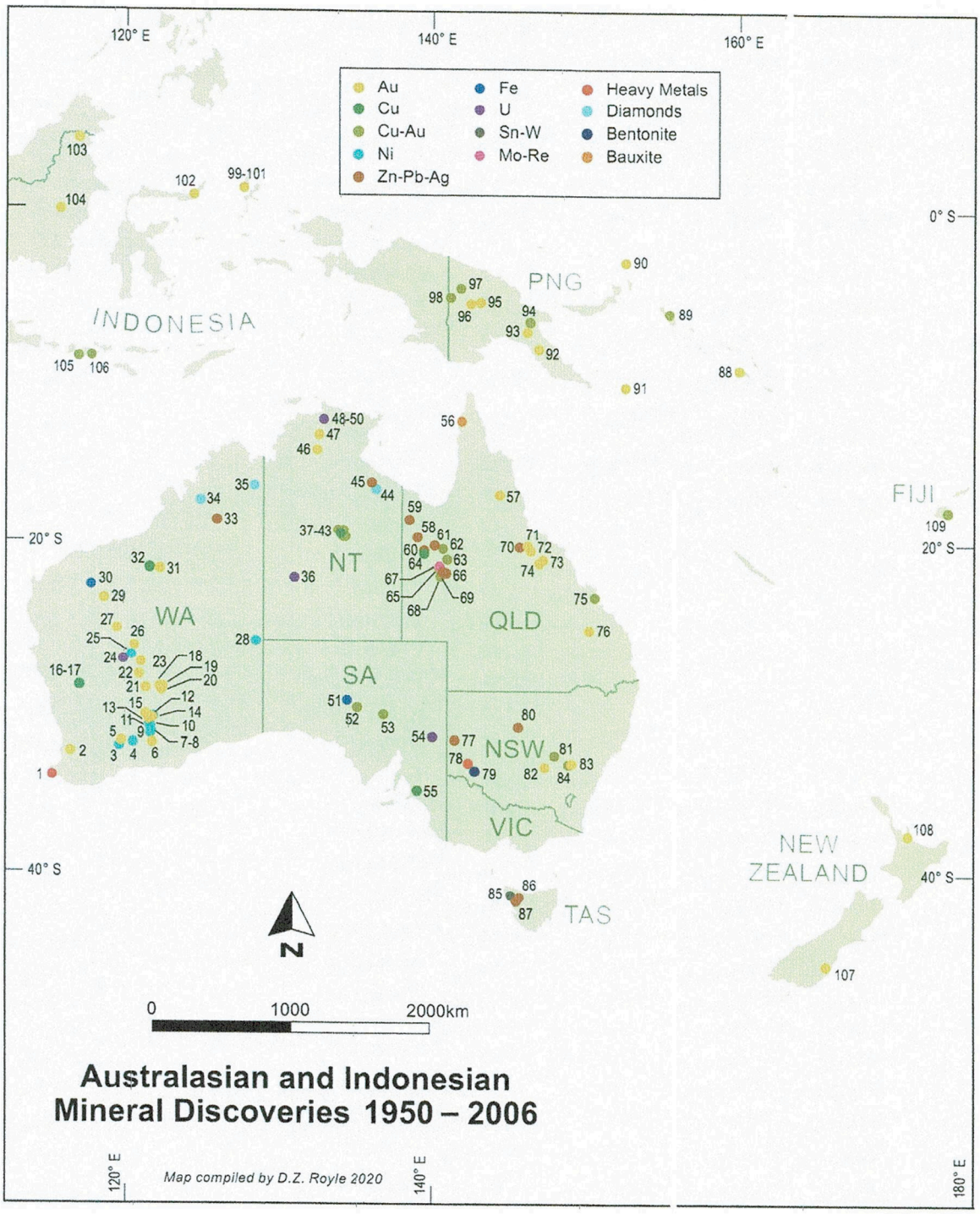
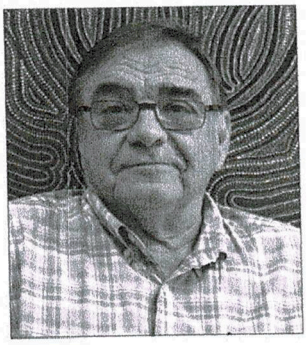

120° E
140° E
160° E
Au
Cu
Cu-Au
Ni
Zn-Pb-Ag
Fe
U
Sn-W
Mo-Re
Heavy Metals
Diamonds
Bentonite
Bauxite
INDONESIA
PNG
FIJI
NEW ZEALAND
WA
NT
SA
QLD
NSW
VIC
TAS
0° S
20° S
40° S
N
0
1000
2000km
Australasian and Indonesian Mineral Discoveries 1950 – 2006
Map compiled by D.Z. Royle 2020
120° E
140° E
180° E

Australasian and Indonesian Mineral Discoveries — 1950–2006

Number	Deposit	Commodity
1	Beenup	Heavy minerals
2	Jarrah (Boddington)	Au
3	Forrestania	Ni
4	Maggie Hays	Ni
5	Bounty	Au
6	Norsman	Au
7	Redross	Ni
8	Mariners	Ni
9	Widgie 3	Ni
10	Kambalda	Ni
11	Carnilya	Ni
12	New Celebration	Au
13	Kalgoorlie	Au
14	Cawse	Ni
15	Paddington	Au
16	Scuddles	Zn-Cu
17	Golden Grove	Cu-Zn-Au
18	Granny Smith	Au
19	Wallaby	Au
20	Sunrise Dam	Au
21	Sons of Gwalia	Au
22	Thunderbox	Au
23	Bronzewing	Au
24	Yeelirrie	U
25	Honeymoon Well	Ni
26	Jundee	Au
27	Plutonic	Au
28	Nebo Babel	Ni
29	Mt Olympus	Au
30	Mt Tom Price	Fe
31	Telfer	Au
32	Nifty	Cu
33	Cadjebut	Zn-Pb
34	Ellendale	Diamonds
35	Argyle	Diamonds
36	Bigrlyi	U
37	Argo	Au-Bi
38	Geko	Cu
39	Juno	Au-Ag-Cu-Bi
40	Orlando	Au-Cu
41	Peko No.2	Au-Cu
42	Warrego	Au-Cu-Bi
43	Ivanhoe	Cu-Au
44	Merlin	Diamonds
45	HYC McArthur River	Zn-Pb-Ag
46	Maud Creek	Au
47	Coronation Hill	Au-Pd
48	Ranger 1	U
49	Ranger 68	U
50	Jabiluka 2	U
51	Hawks Nest	Fe
52	Prominent Hill	Cu-Au
53	Olympic Dam	Cu-U-Au-Ag
54	Honeymoon	U
55	Kanmantoo	Cu
56	Weipa	Al
57	Red Dome	Au
58	Century	Zn-Pb-Ag
59	Lady Loretta	Zn-Pb-Ag
60	Hilton	Zn-Pb-Ag
61	Dugald River	Zn-Pb-Ag
62	Ernest Henry	Cu-Au
63	Eloise	Cu-Au-Ag
64	Mt Isa (Enterprise)	Cu
65	Selwyn	Cu-Au
66	Pegmont	Zn-Pb-Ag
67	Merlin (Mt Dore)	Mo-Re
68	Osborne	Cu-Au
69	Cannington	Pb-Zn-Ag
70	Thalanga	Zn-Cu-Pb-Ag
71	Mount Leyshon	Au
72	Pajingo	Au
73	Wirralie	Au
74	Yandan	Au
75	Mt Chalmers West	Cu-Au
76	Cracow	Au
77	Broken Hill	Pb-Zn-Ag
78	Ginkgo	Heavy minerals
79	Arumpo	Bentonite
80	Elura	Zn-Pb-Ag
81	North Parkes	Cu-Au
82	Cowal	Au
83	McPhillamys	Au
84	Cadia (Ridgeway)	Au-Cu
85	Cleveland	Sn-W-Cu
86	Hellyer	Zn-Pb-Cu-Ag-Au
87	Rosebery	Zn-Pb-Cu-Ag-Au
88	Gold Ridge	Au
89	Panguna	Cu-Au
90	Lihir	Au
91	Misima	Au
92	Tolukuma	Au-Ag
93	Hidden Valley	Au
94	Wafi-Golpu	Cu-Au
95	Porgera - Zone 7	Au
96	Mount Kare	Au
97	Freida River	Cu-Au
98	Ok Tedi	Cu-Au
99	Gosowong	Au-Ag
100	Toguraci	Au-Ag
101	Kencana	Au-Ag
102	Mesel	Au
103	Seruyung	Au
104	Kelian	Au
105	Batu Hijau	Cu-Au
106	Elang	Cu-Au
107	Macraes	Au
108	Waihi (Favona)	Au-Ag
109	Namosi	Cu-Au

Ed considers that success for future gold discoveries in Australia will be greatly improved by a strong understanding of the regolith, deep understanding of geology, and bold, and where appropriate, early intense drilling strategies and adequate capital.

Geoff Eupene, 1946–



Geoff Eupene ('Yups') was born and raised in Wondai, in the South Burnett District of Queensland. At an early age, he surprised inquirers by 'knowing' that he would be a geologist when he grew up. His parents hailed from Kilkivan, a village with historical gold and mercury mines, on the edge of the Gympie goldfield. They visited the area frequently, and Geoff soon developed a fascination with his Uncle Frank, a prospector. Geoff had access to Uncle Frank's mineral collection and technical library and was soon given his first book on minerals.

Geoff's secondary schooling was completed at boarding school at De La Salle, Scarborough, followed by entry to the University of Queensland in 1964, where he completed his BSc in 1967 with a double major in geology, mineralogy and chemistry. Geoff had been introduced to the Planet Group when it was exploring around Kilkivan and engaged his Uncle Frank as their local manager. Planet agreed to fund his 1968 Honours year.

Geoff's thesis topic was on the Bundarra Granodiorite that intrudes the Bowen Basin not far from Nebo. The arrangement with Planet was that while doing his fieldwork for his thesis, he would supervise a magnetometer survey to target drill holes which he would also supervise. Mastering this left him impatient to get out and find orebodies. One eastern Australian assignment involved sampling and mapping the rehabilitated Long Tunnel gold mine outside Kilkivan, on which his grandfather, Bernard Eupene, had worked in 1893.

In early 1969, Geoff was sent to Planet's Kimberley holdings in Western Australia, exploring for a variety of commodities, of which uranium was near the top of the list. Joe Fisher, a Planet consultant who had spent many years finding, developing and mining the uranium deposits of the South Alligator Valley in the Northern Territory, taught Geoff how to use a scintillometer. During 1969, Geoff had married, and by the end of the year, needed a more stable workplace.

Geoff applied to Geopeko Ltd for a mine geologist position at Mount Morgan; instead he was offered a post east of Darwin. He later realised that the key to this appointment was his season's experience looking for uranium. Geopeko had discovered the Ranger 1 uranium deposits in October 1969, on behalf of the Gondwana Joint Venture (50% Peko-Wallsend Ltd and 50% Electrolytic Zinc Co Ltd). While this joint venture was set up to explore for base-metal deposits such as the Woodcutters zinc project near Rum Jungle, its major success was a world-class uranium deposit.

In 1970, 24 year old Geoff was involved with preparing the prospect for drilling. Over the next four years, he supervised the drill-out of the Ranger 1 No. 1 orebody, plus broad delineation of the Ranger 1 No. 3 orebody, along with exploration of the other seven anomalies in the Ranger 1 group. Once drilling started, Geoff's job was to piece together the geology and mineralisation of the largest accumulation of high-grade uranium known at the time. This was the way to kick off a career in the minerals industry!

Geoff's understanding of the Ranger geology was aided by a field trip around the Rum Jungle district with Clive Prichard, the Darwin manager for the Bureau of Mineral Resources. At Ranger, even though the mineralisation came right to surface, a heavy

blanket of laterite destroyed all primary rock features for the top 15 m. The initial Ranger 1 drilling comprised 18 percussion holes in the early dry season, mid-1970. This was followed by a successful in-fill diamond drilling program encountering and solving numerous technical issues in this weathered terrain.

By late 1972, federal resources minister Doug Anthony told Peko and EZ directors that the production lease would be granted after the December 1972 election. History records a Labor electoral victory, and the lease was not granted until 1980. Half of the asset had been appropriated by the Labor government, and it cost Peko and EZ, the original owners of the Ranger Project, A$120 million to buy back full ownership. In 1980, ownership was passed to the new ASX-listed entity, Energy Resources of Australia Ltd (ERA).

Between 1972 and listing of ERA, there was intense political and media interest in the project, with its setting in what became Kakadu National Park. Geoff participated in many site visits by federal cabinets and relevant parliamentary committees of the Whitlam and Fraser governments. He appeared before two royal commissions, and several parliamentary enquiries. It taught Geoff clearly that it is not only a brilliant technical achievement that makes a successful resource project, but a spectrum of non-technical issues must be resolved before successful development of an orebody.

In July 1973, Geoff was sent to Leeds University, England, to attend a geostatistics course to evaluate new resource estimation techniques for use at Ranger. However, neither the mining engineers nor Geoff believed that the existing implementations of this new technology could incorporate the precision of the geological model developed, and Geoff's hand-drawn 7 m bench plans were used for mine planning. The reserve estimates for Ranger 1 No. 1 as used in the ERA Prospectus very closely matched recovered total tonnes and grade over 22 years of production. By 1974, all was in place technically to get Ranger under way, pending approvals.

In September 1974, Geoff was transferred to Darwin to supervise exploration out of Darwin for 'anything but uranium'. Cyclone Tracy on Christmas Eve 1974 disrupted activity for several months, but base metal and gold exploration was ramped up at Woodcutters and elsewhere in the Pine Creek Orogen. In 1976, uranium and base metal exploration was resumed in the Ranger region, resulting in discovery of the Ranger 68 uranium deposit, a blind uranium accumulation beneath the swamps of the Magela Creek wetlands, now in the middle of Kakadu National Park. In 1978, Geoff was invited to deliver a paper on NT-style unconformity-related uranium deposits at the quadrennial IAGOD conference in Snowbird, Utah. This enabled him to visit many North American mines, including the other major unconformity-related uranium province in the Athabasca Basin of Saskatchewan.

In 1980, with the listing of ERA about to occur, and after 10 years with Geopeko, Geoff decided to go freelance. In August 1980, he established Eupene Exploration Enterprises Pty Ltd (EEE), where his ongoing harmonious relationship with ERA management has lasted 40 years. He started doing mostly uranium work, but this was mainly of an advisory nature; the real demand was for the provision of services to the burgeoning gold sector.

Expecting to be having a very quiet Top End wet season in 1980–1981, Geoff decided to purchase a computer, and teach himself to use it. This was interrupted by Joe Fisher who, in his mid-sixties, had discovered what became the Goodall gold project, an outcropping but unnoticed gold stockwork on Ringwood Station, 30 km east of Adelaide River. Geoff was asked by Joe to help advance it for his clients, WR Grace & Co.

With the emergence of other gold work, EEE expanded and eventually became a large Darwin-based exploration contractor in the 1980s and 1990s, employing up to 13 geologists and additional support staff. EEE was heavily involved in the development of several advanced gold mine projects in the Pine Creek Orogen (including Goodall, Quigleys, Rustler's Roost, and Spring Hill). Through a relationship with a syndicate of the major shareholders of what eventually became Henry Walker Eltin Group Ltd (Australia's

largest mining contractors for some time), EEE helped to develop the Mount Bonnie gold-silver deposit, and then a string of others, including Golden Dyke, to feed the Pine Creek mill. In 1985, the syndicate acquired the 300 acres of granted Mining Lease over the original Tanami gold mine. This led to the opening on 17 October 1987 of the Tanami Mill, which was to have been the centrepiece of a $21 million float, to be launched two days later. Sadly, 19 October 1987 became known as the stock market's 'Black Monday'. The float never happened, and the project and the title portfolio were sold. Despite later ownership changes, the Tanami mill ran for approximately 16 years, with additional later campaigns, and is still on care and maintenance and likely to see other 'lives' in this gold-rich district. The positive role played by the Central Land Council (CLC) and the Warlpiri People in this development should be recorded.

In 1983 Peter Nicholson joined EEE as a partner, and eventually managed operations from Darwin. In the early 1990s, these became particularly focused on servicing the newly developed, expanding Woodcutters base-metal mine. With a change of ownership, the new owners wanted EEE to stay on, and made an offer for a partial takeover of EEE, including Peter Nicholson's interest. This worked well until it in turn was taken over around 1986 by a consortium comprising the Normandy Poseidon Group, Lachlan Resources NL and Nicron Resources Ltd.

In the later 1980s, Geoff was asked to assist companies with opportunities in Asia, particularly Indonesia. This, and other work on offer in ASEAN countries led to a decision to establish an office in Jakarta in 1990. Indonesia and South East Asia generally became an important source of consulting and contracting work, mainly for gold, but also for base metals and nickel. From early 1995, Geoff took on an almost full-time role managing a large gold exploration program based at Bau in Sarawak. This was a mostly enjoyable experience, but after 18 months of occasional frustration, in mid-1996, he returned to Jakarta, which was booming as a result of the Bre-X Busang 'boom' in East Kalimantan. While it is now known as a preposterous swindle, it saw hundreds of millions of dollars of risk capital poured into Indonesian grassroots exploration, and Geoff's group was one beneficiary of these ill-fated exuberances. This era ended in 1998 with the downfall of President Suharto and the highly disruptive aftermath of the 1997–1998 Asian financial crisis.

Geoff's group downsized and retained enough work to survive in Indonesia, but with the terrorist attacks in New York on 11 September 2001, and the anticipated increase in disorder, along with the poor outlook for foreign investment in mining in Indonesia, he relocated back to Darwin.

A few years later, a resurgence in interest in the nuclear power industry resulted in Geoff putting together Crossland Uranium Mines Ltd (CUX), which listed on the ASX in April 2007 with Geoff as CEO. This was based primarily on Northern Territory uranium projects. Funding came from a mixture of the ASX IPO and a joint venture with a Canadian company, Pancontinental Uranium Corporation, run by old friends from Jabiluka in the 1970s. Subsequently the name was changed to Crossland Strategic Metals Ltd, after the realisation in 2010 that the Central Australian holdings had a potentially important rare earth elements (REE) project at Charley Creek, 120 km west-northwest of Alice Springs. The 2013 stock market downturn led to a restructure, and Geoff retired from the board in 2017.

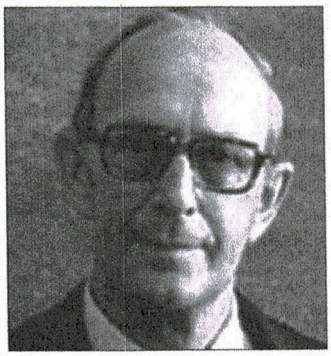
Geoff has retained his interest in gold projects in Indonesia. He was for a time lead independent director of SGX (Singapore) listing, Wilton Resources Corporation Ltd, with a gold project in West Java that he first worked on in 1993. The role and its responsibilities were challenges that drew on much of what he learned as a mineral explorer. He still has an interest in and manages a private company with old friends with projects which include a gold-silver project in Sumatra, and a large area of exploration licences in the Tanami Desert.

There remain many mine discovery opportunities around the world, but Geoff worries whether society will continue to recognise the

necessity to civilisation of mineral resource exploration and development.

Geoff has been able to share his successes with a variety of people, both technically and personally. As with many geologists where work has necessitated absences, Geoff understands that some of them may have hoped for more of his time and attention than they felt were given to them, and to those that feel that way, he apologises. The long hunt that is mineral exploration continues for Geoff.

Henry James Evans, OBE, 1912–1990



Henry James (Harry) Evans was born on 7 November 1912 in Greymouth, New Zealand, third of six children of New Zealand-born parents Henry David Evans, carpenter, and his wife Eva Lillian, née Lawn. When Harry was a boy, his father drowned while attempting to rescue people from a rip off the west coast. His mother subsequently married James William Patterson, who encouraged Harry's interest in ore deposit geology by taking him to prospect for gold in the Reefton district.

Harry attended the Waitahu and Reefton District High Schools, and at 16 began work at the nearby Alexander gold mine. After severely damaging his left arm in a shotgun accident, he went back to school, obtained the New Zealand Public Service entrance certificate, and gained employment as an assistant assayer at the Reefton School of Mines. His duties included assaying ore samples for gold and standing in for lecturers who were temporarily absent. He completed his qualifications as an assayer about 1934.

In 1936 Harry Evans took employment with the Geological Survey Branch, Department of Scientific and Industrial Research, mainly exploring for gold in South Westland. After working evaluating gold dredging areas on the west coast and later for a tin mining company, he joined New Zealand Petroleum as senior geologist in 1938 and spent six years with them before spending most of 1945 assessing the resources of the Greymouth Coal Basin with the New Zealand Geological Survey. During this period, he married Helen McLean Watson on 27 March 1937 at Knox Presbyterian Church, Reefton.

In 1946 Harry moved to Melbourne to work for Zinc Corporation Ltd, under Sir Maurice Mawby, then director of exploration and research. Seconded to the Frome-Broken Hill Company Pty Ltd oil exploration consortium, he travelled widely in Queensland and the Northern Territory looking for oil, gas and for uranium at Rum Jungle. In 1949–1950 he was sent to Britain to investigate potash deposits in Yorkshire.

He joined the Australasian Institute of Mining and Metallurgy as an associate member in 1953 and was also a member of the Geological Society of Australia.

In 1955, Harry Evans was asked to lead a group of American oil explorers to Cape York Peninsula. Sir Maurice Mawby suggested he should also search other minerals such as phosphate or bauxite. Prospects for oil seemed poor, but Evans collected some samples of the reddish-brown pebbles on his way to the Weipa Mission Station, suspecting they might contain bauxite. While at Weipa he could see the red cliffs at Hey Point across the Emberly River but had no boat to reach them. The samples he had collected proved to be bauxite, creating great interest. Evans returned to Weipa in October 1955, with a dinghy and outboard motor, and set off on a dangerous reconnaissance mission. He examined 84 km of the coastline to the south of Weipa, noting the huge extent of the bauxite deposits. Evans was unaware at the time that the striking red