Prospecting History leading to the discovery of Botswana's diamond mines: from artefacts to Lesedi La Rona

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50 Years of Diamonds in Botswana 11th IKC 2017 Gaborone

18th September 2017

Three exploration/mining phases in Bechuanaland/Botswana

- **Pre-historic**
  - Artifacts factory sites: **Earliest ESA** (3.4 – 1.7Ma), **ESA** (1.7Ma – 280Ka), **MSA** (280Ka – 50Ka) and **LSA** (50 – 20Ka) stone age
  - Mining for minerals used as pigment for rock paintings, decorative purposes (c. 2,000 BP).
  - Iron (AD 800 – 1,000), Copper (AD 1,000 – 1,700), Gold (AD 1,200 +) mining.

- **Historic**
  - Gold found in 1866 (lower Tati River), this led to establishment of Francistown
  - 1887 – 1888: Prospecting for diamonds in Bangwaketsi Native Reserve (*Balkis Ltd*)
  - 1896 – 1898: Prospecting for diamonds in Ngamiland (*West Charterland Ltd*)
  - 1932 – 1938: Prospecting for diamonds in Bamangwato reserve (*Victoria Prospecting Co Ltd*)

- **Modern**
  - 1959 – 1960: Conso*lidated African Selection Trust* - CAST (Bamangwato Reserve).
  - 1955 – present: *Kimberlitic Searches/De Beers Botswana*
  - 1977 – 1982: *Falconbridge*
  - 1990s - *Tinto Botswana, TNK, Seltrust, Motapa, Ampal, Petra, Kalahari, Firestone, Lucara*, etc

A. Pre-historic mining (3.4 Ma – AD 1200 +)

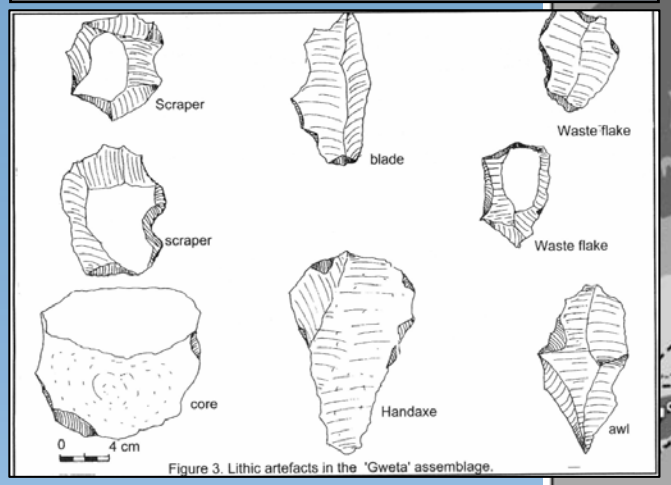
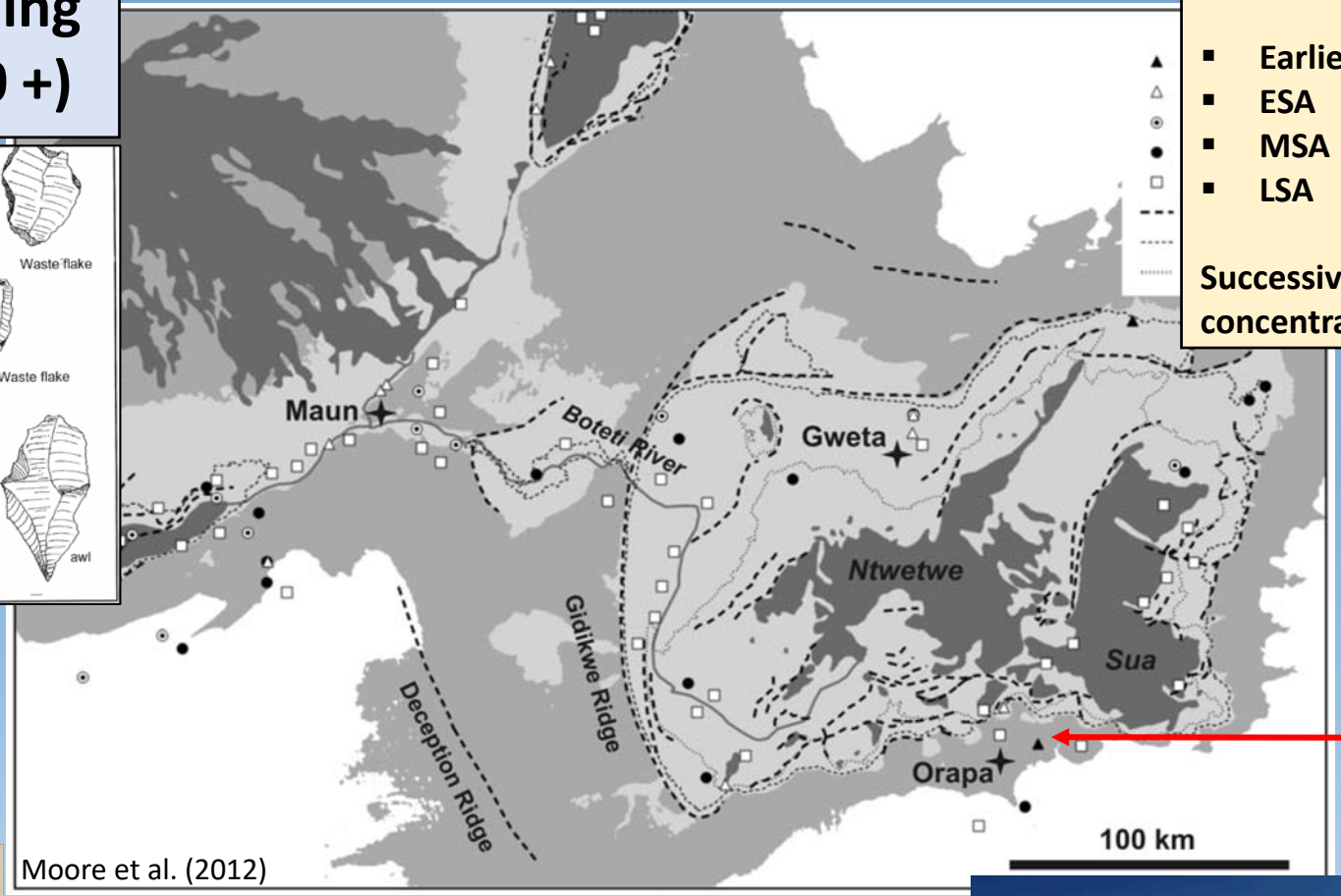


Figure 3. Lithic artefacts in the 'Gweta' assemblage.



Moore et al. (2012)

Archaeological sites around the Makgadikgadi Basin

- Earliest ESA (3.4 - 1.7 Ma) - 995 m
- ESA (1.7 - 0.3 Ma) - 945 m
- MSA (300 – 50 Ka) - below 945 m
- LSA (50 – 20 Ka) - < 920 m

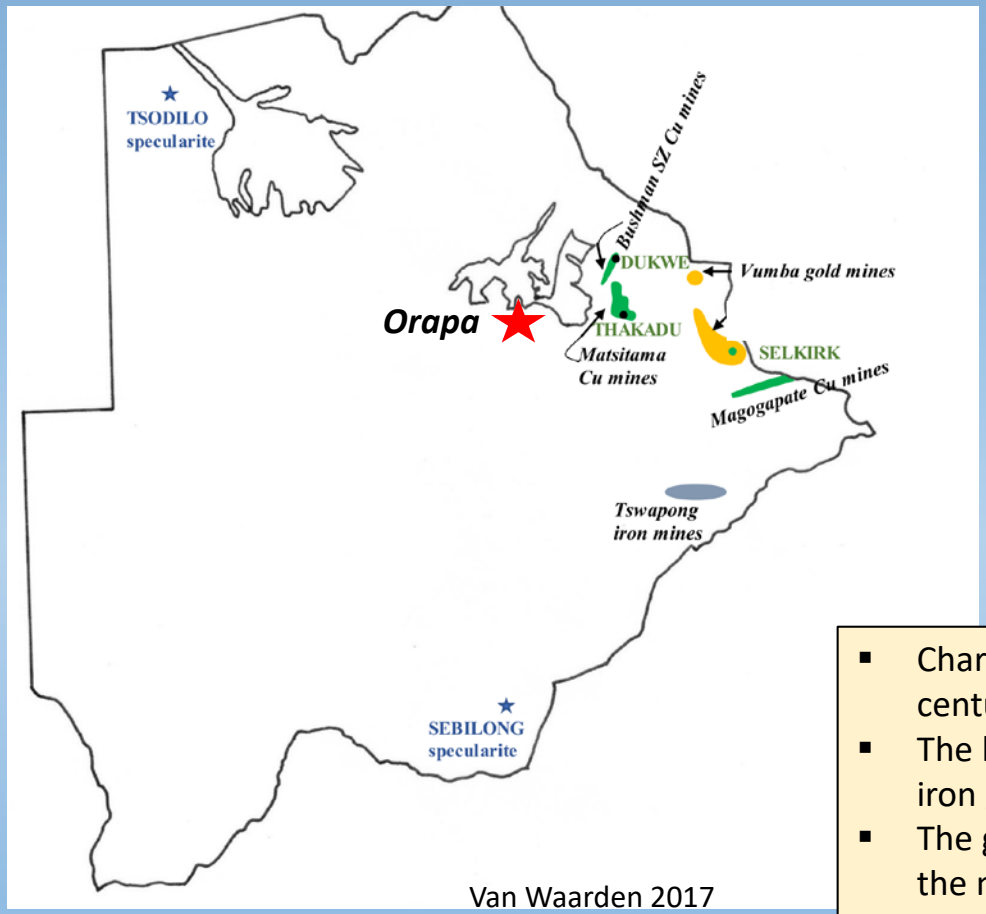
Successive older stone age artifacts are concentrated at progressive higher lake levels.

Earliest ESA (Oldowan) artifacts on BK09

Silcrete artifacts at the base of the Kalahari over BK9 (Walker 2011) and BK12 (Gibson, pers. comm. 2017)

Pre-historic mines in Botswana: AD 800 – 1,200

- Iron (AD 800 – 1,000)
- Copper (AD 1,000 – 1,700)
- Gold (AD 1,200 +)



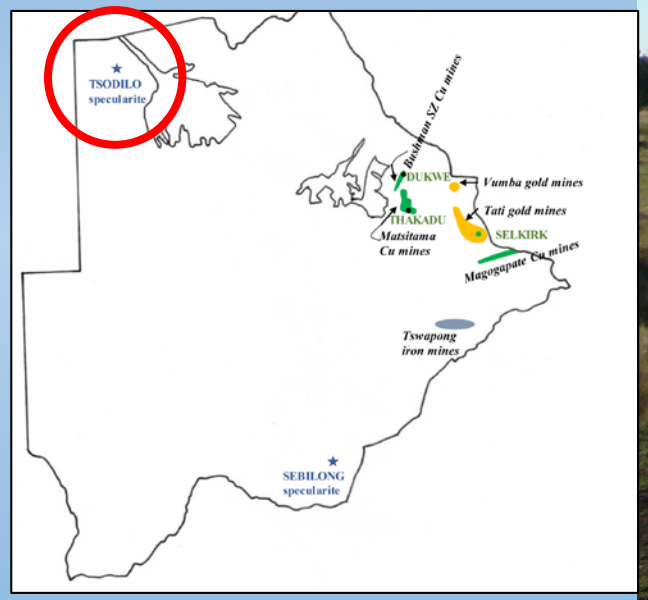
Van Waarden 2017

15m deep pre-historic stope

Pre-historic Dukwe Copper mines: Malokojwe

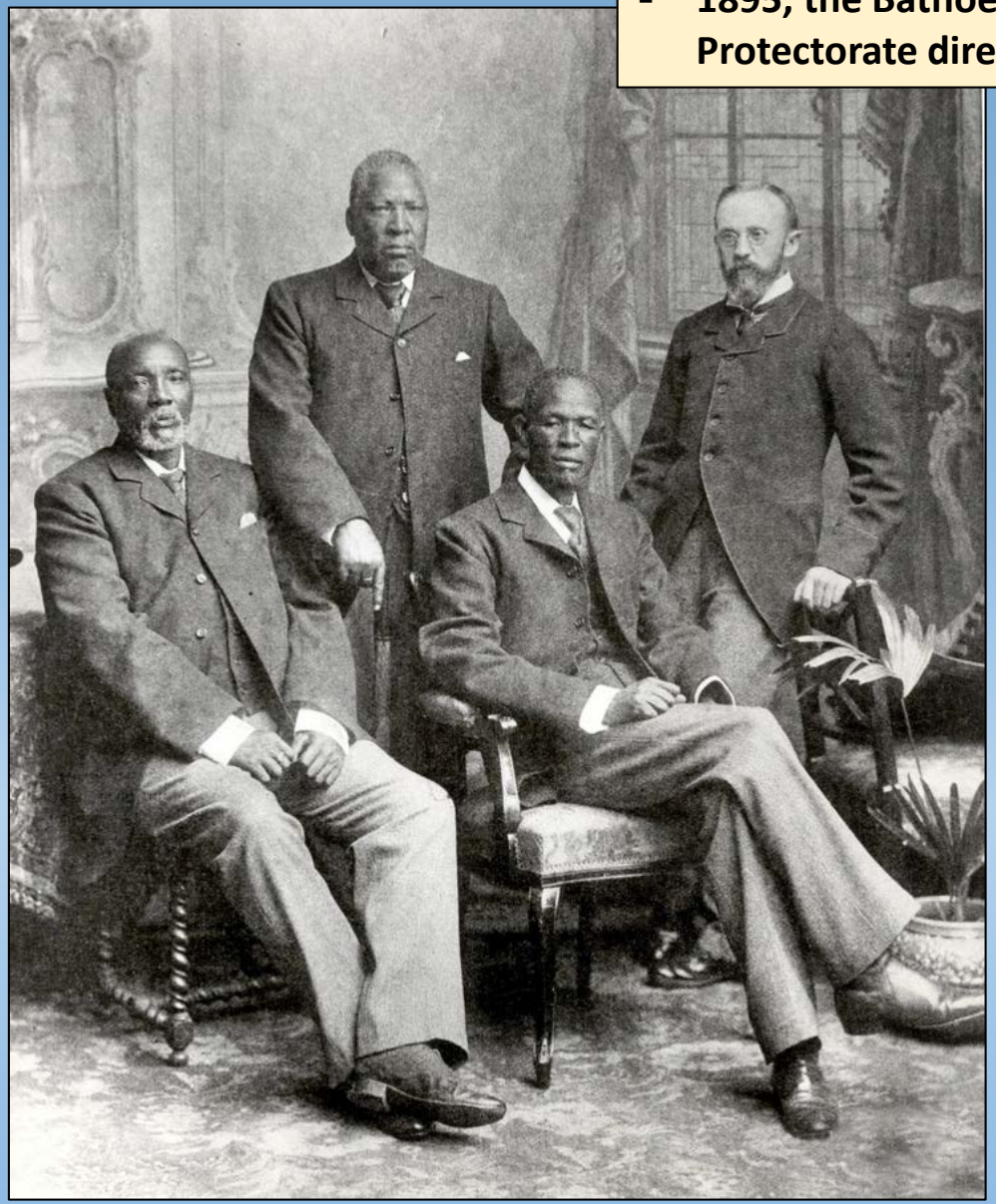
- Charcoal from fire-setting was collected for dating – 13th - 14th century.
- The blocky nature is where the rock had been removed by iron gad and hammerstones.
- The green copper oxide (mostly chrysocolla) left behind, as the miners only targeted malachite.

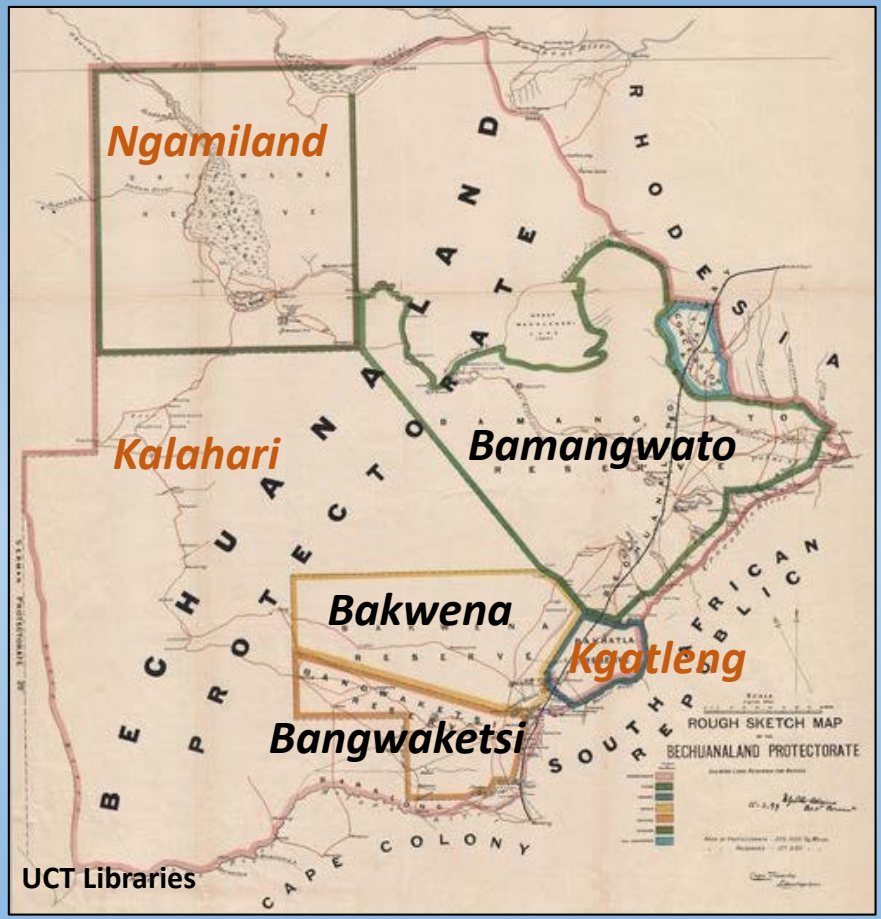
Prehistoric mining at Tsodilo Hills for specularite-hematite used for pigment

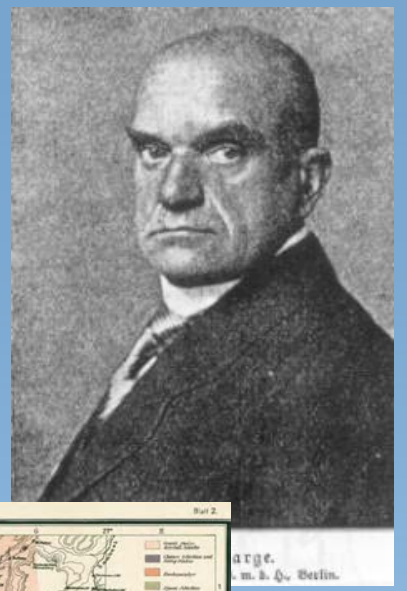


B. Historic mines (1860 – 1950)

- 1866 gold was discovered in the Tati area.
- 1885 southern Bechuanaland became a British Protectorate; in 1890 northern Bechuanaland (incl. Ngamiland, Chobe) was added.
- 1895, the Bathoen I, Sebele and Khama III went to England to plead for Bechuanaland to remain a Protectorate directly and not to be transferred to the *British South African Company* (Cecil Rhodes).



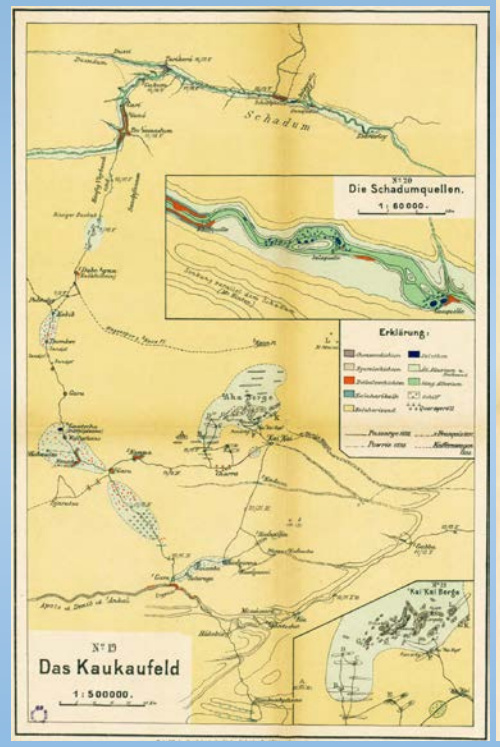


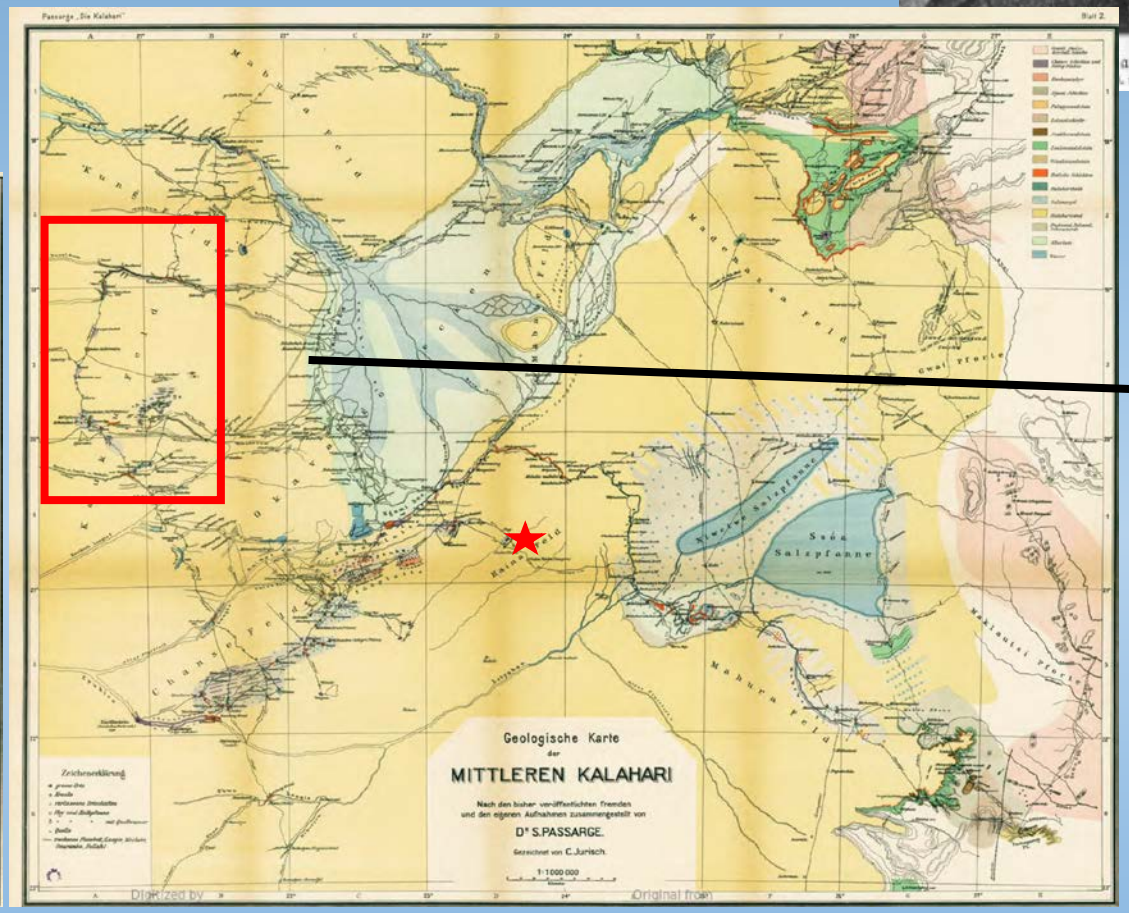


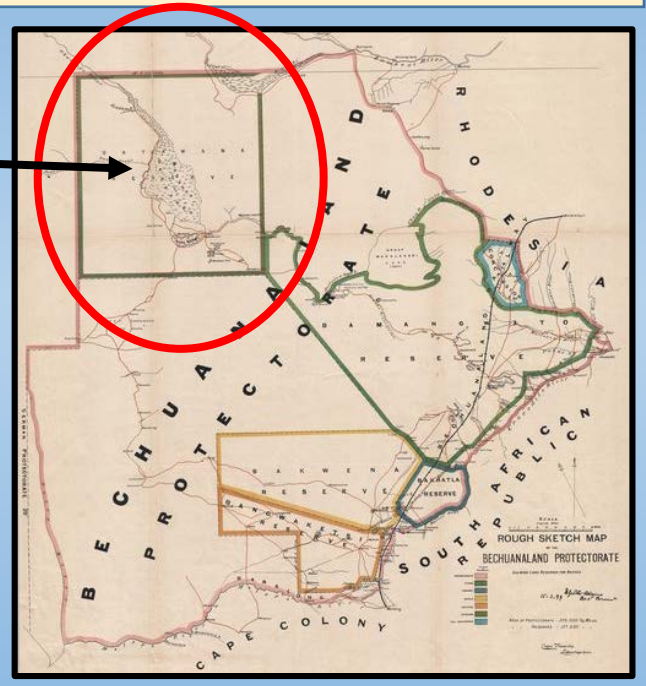
1896 – 1899

British West Charterland Ltd Expedition

- Led by Siegfried Passarge.
- To explore Ngamiland for gold and diamonds.
- From Palapye to Kwebe Hills – 3 months = 420 km.
- Several members perished mainly by malaria and lion.







Passarge and termites

Die Kalahari.

Versuch einer physisch-geographischen Darstellung der Sandfelder des südafrikanischen Beckens.

Von

Dr. Siegfried Passarge.
Privatdozent an der Königlichen Friedrich Wilhelms-Universität zu Berlin.

HERAUSGEGEBEN MIT UNTERSTÜTZUNG
DER KÖNIGLICH PREUSSISCHEN AKADEMIE DER WISSENSCHAFTEN.

Mit 8 Tafeln und 33 Abbildungen
nach Original-Photographien des Verfassers im Text, sowie 7 Abbildungen im Anhang
nebst einem Kartenband
enthaltend 11 Blätter physikalische und geologische Karten nach Originalaufnahmen der Expedition der Gesellschaft British West Charterland im Ngamiland und den bisher veröffentlichten Materialien, 9 Blätter mit geologischen Profilen und Kartenskizzen, sowie ein Blatt landschaftliche Panoramen.

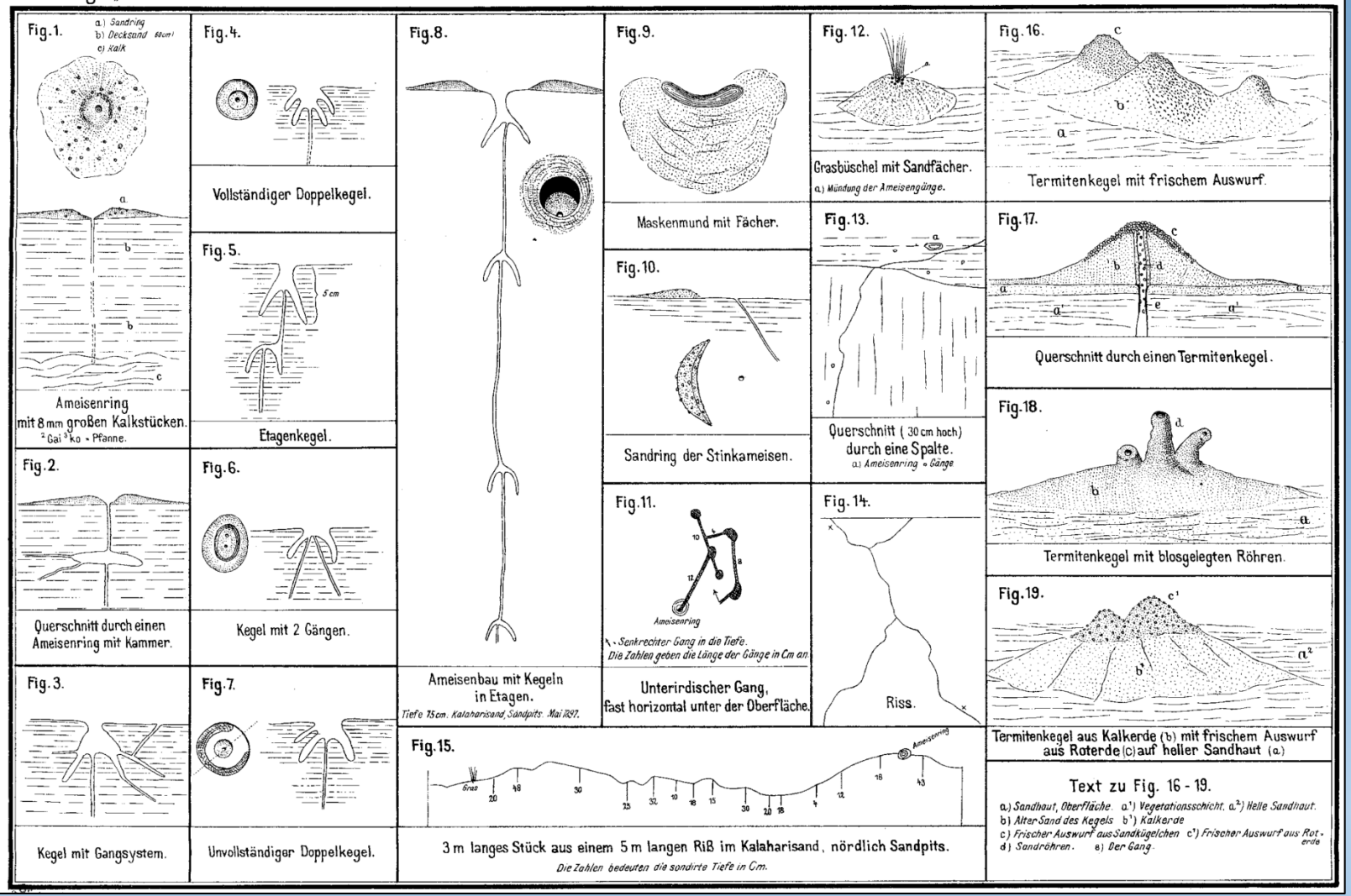
Textband.

Berlin 1904.
Dietrich Reimer (Ernst Vohsen).

Passarge „Die Kalahari"

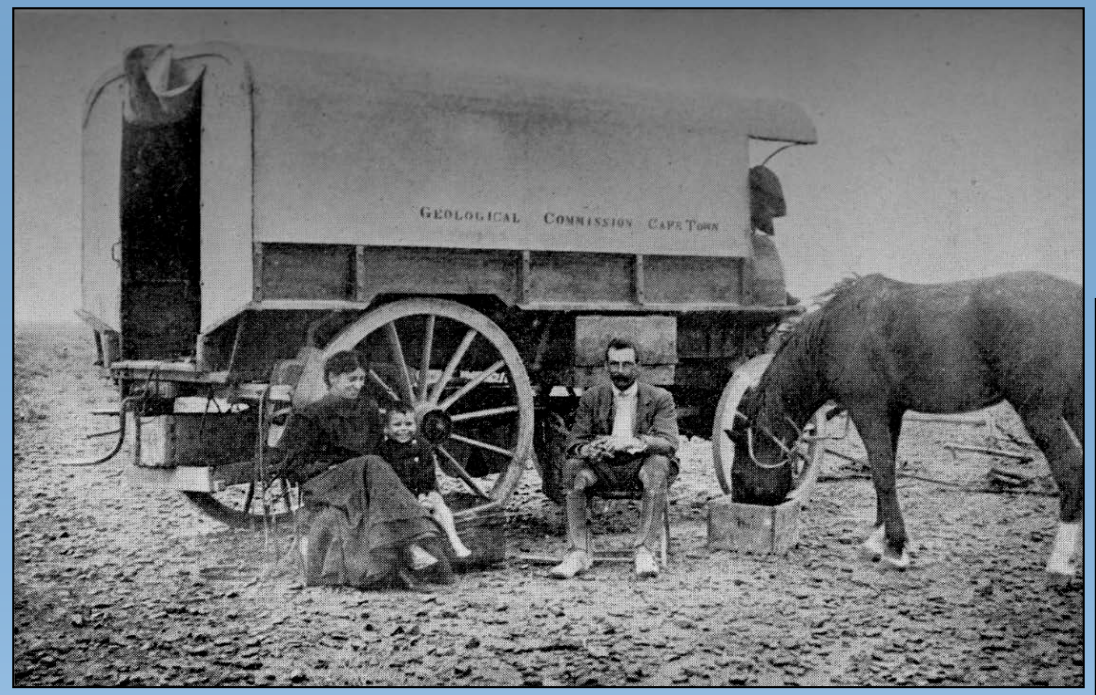
BAUE DER AMEISEN UND TERMITEN.

Blatt 19.

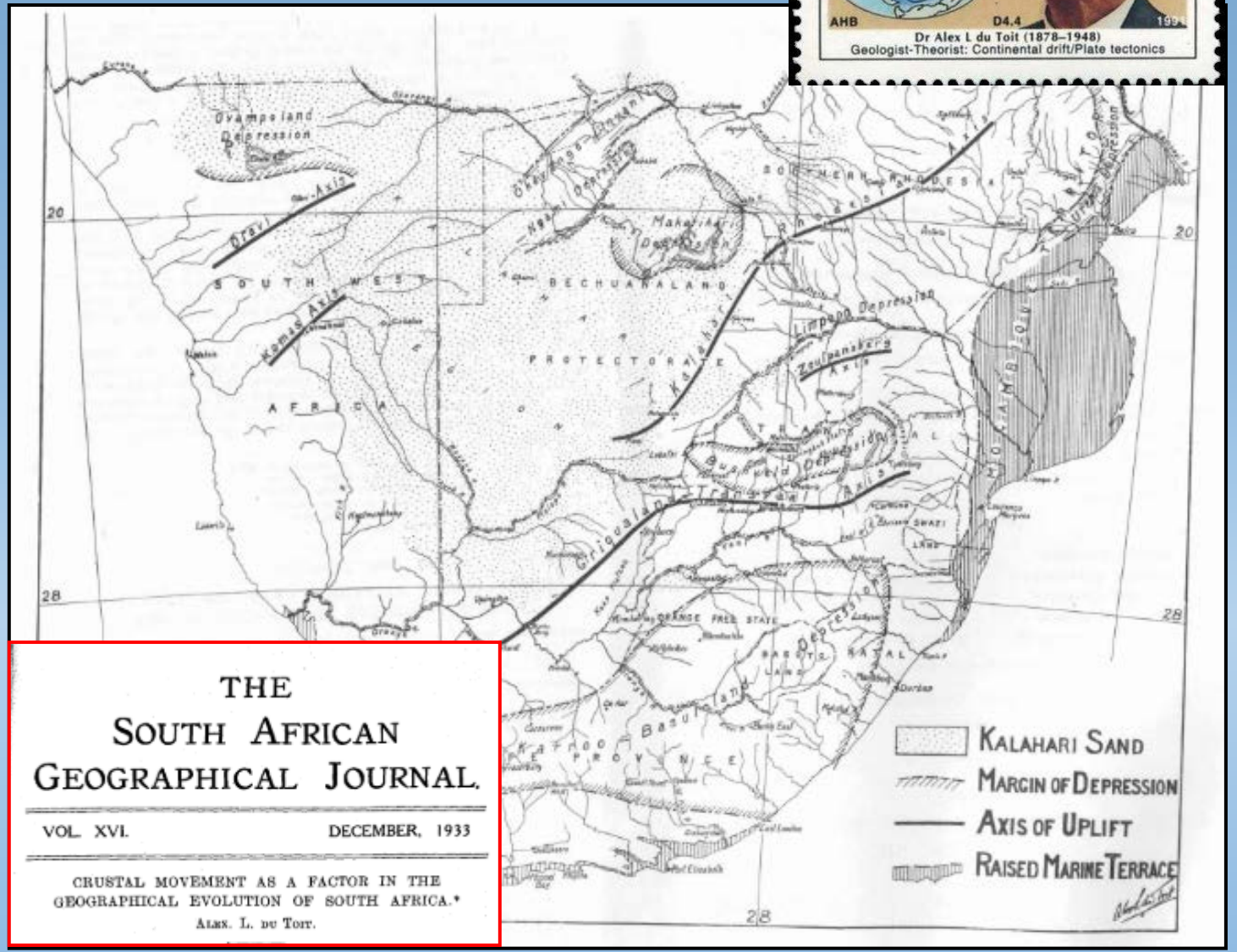


- **A medical doctor by training; ended up as Professor in *geography*.**
- **Was a naturalist with a great interest in *termites* for instance.**
- **Was *not permitted to report* on the results.**
- **But *no diamonds or gold* was found.**

The 1930s:
The influential person No. 1:
Alex L du Toit



- 1903 – 1920: Geological Commission, Cape Town
- 1920 – 1927: Union Irrigation Department as Hydrogeologist (spent 1925 in northern Botswana)
- 1927 – 1941: Chief Consulting Geologist to De Beers
  - Prospecting of parts of Botswana 1932 – 1938 (*Victory Prospecting Company Ltd*)
- 1947 External Examiner to G Lamont's PhD



THE
SOUTH AFRICAN
GEOGRAPHICAL JOURNAL.

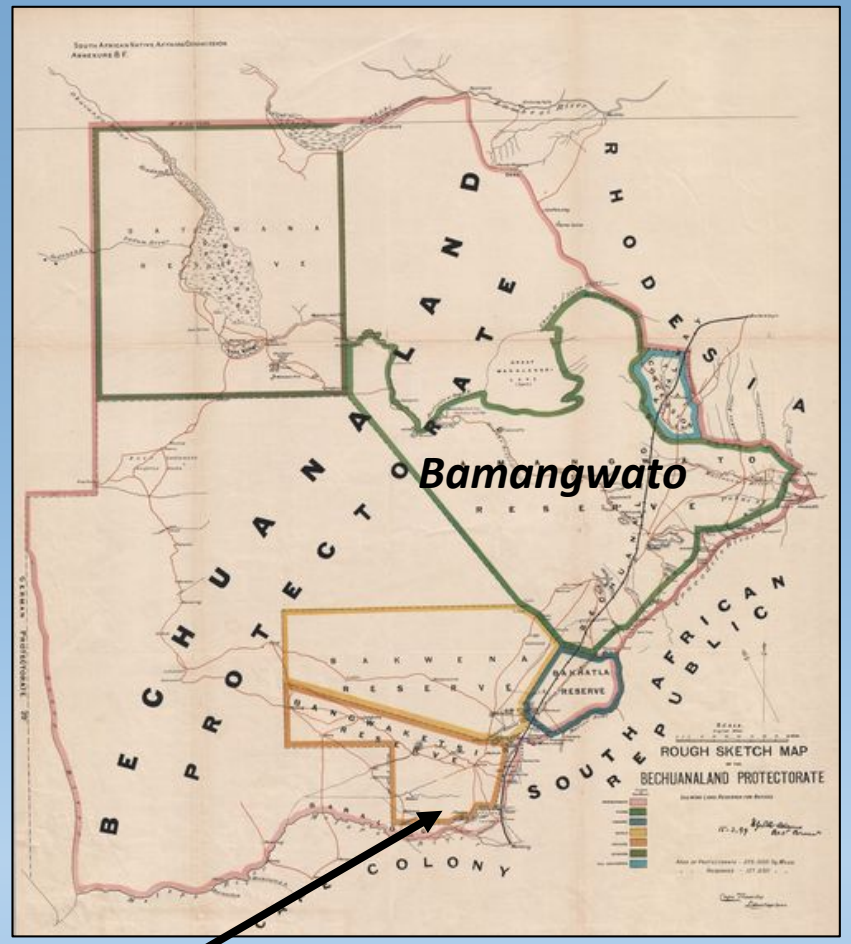
VOL. XVI. DECEMBER, 1933

CRUSTAL MOVEMENT AS A FACTOR IN THE GEOGRAPHICAL EVOLUTION OF SOUTH AFRICA.*

ALEX. L. DU TOIT.

- **1887: Khama III signed an agreement to prospect for *precious stones and minerals* over Bamangwato with Northern Gold Fields Exploration Syndicate.**
- **1893: British South African Company (BSAC - Cecil John Rhodes) took over the concession.**
- **1925 – 1932: After lengthy negotiations with Khama's successor, Tshekedi, this agreement was revised.**
- **1932 – 1934: Victoria Prospecting Company Ltd (AAC/De Beers).**
- **1934: BSAC (AAC) abandoned the concession. De Beers continued until 1938.**

Bamangwato Reserve: 1932 - 1938

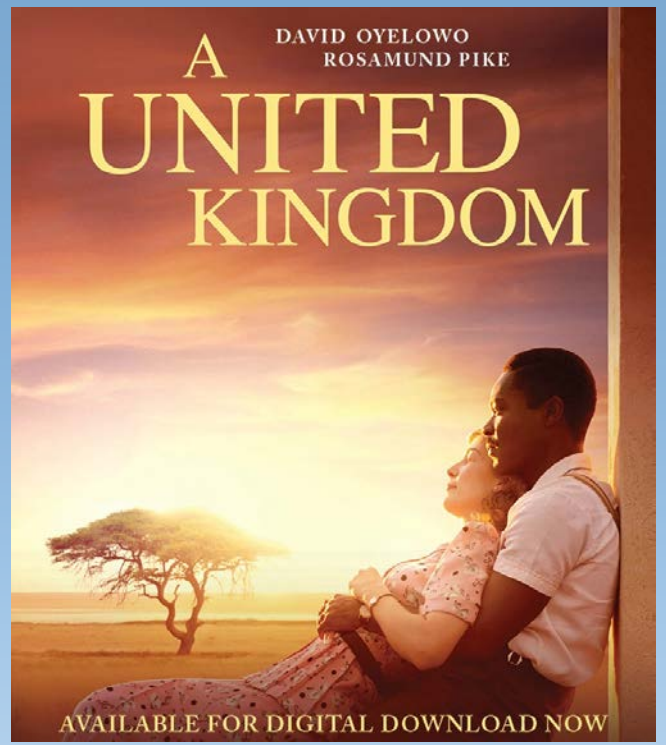


Memos by AL du Toit to AAC and De Beers between 1931 and 1939

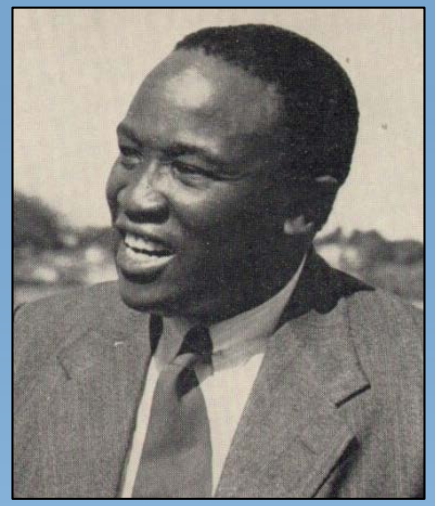
- Kimberlites are undoubtedly present in Bechuanaland and gravels from large river may prove diamondiferous (Aug 1931).
- Diamonds had reportedly been found in the Motloutse area while digging a water well in 1894 by BSAC engineer Bennett (1911).
- ***Victoria Prospecting Company Ltd*** started prospecting in 1932, reporting to Dr J Bancroft (AAC) with AL Du Toit as De Beers consultant. Gravels were located, no pipes.
- In 1934 De Beers sent a prospecting party to test certain gravels in the Bamangwato and Bakwene reserves.
- Bulk samples (200 loads) were among others taken some 10 miles upstream from Foley's Station but no diamonds nor kimberlitic minerals were found.
- In 1938 at Pitsani along the Ramatlhabama spruit the same prospecting party from Kimberley washed 1163 loads of the *'pebble beds'* and *recovered 4 minute diamonds.*

1938
First authenticated diamonds found in Botswana

C. Modern mining (1959 onwards)



- **1945: Seretse went to Oxford**
- **1948: married Ruth Williams**
- **1965: entered politics and formed the Bechuanaland Democratic Party**
- **1966: became Botswana's 1st president**



Tshekedi Khama (1905- 1959)

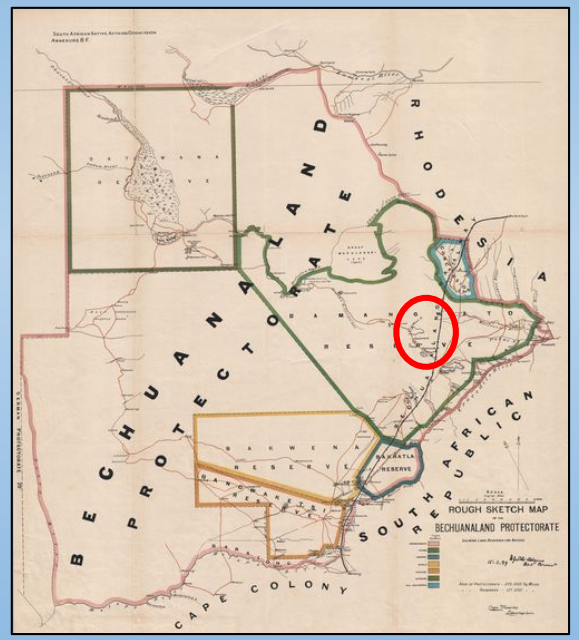
- In 1925, ***Tshekedi***, second son of Khama III, became Guardian to the Bamangwato tribe, because Khama's oldest son had also died. The son of Khama's oldest son, ***Seretse***, was then only 4 yrs old.
- Tshekedi had long resisted mining companies into Bamangwato.
- However, in **1959** he signed an agreement with Rhodesian Selection Trust to developed the Cu at Phikwe (BCL). It included access for **Consolidated African Selection Trust (CAST)** to sample the east and exposed part of Bamangwato

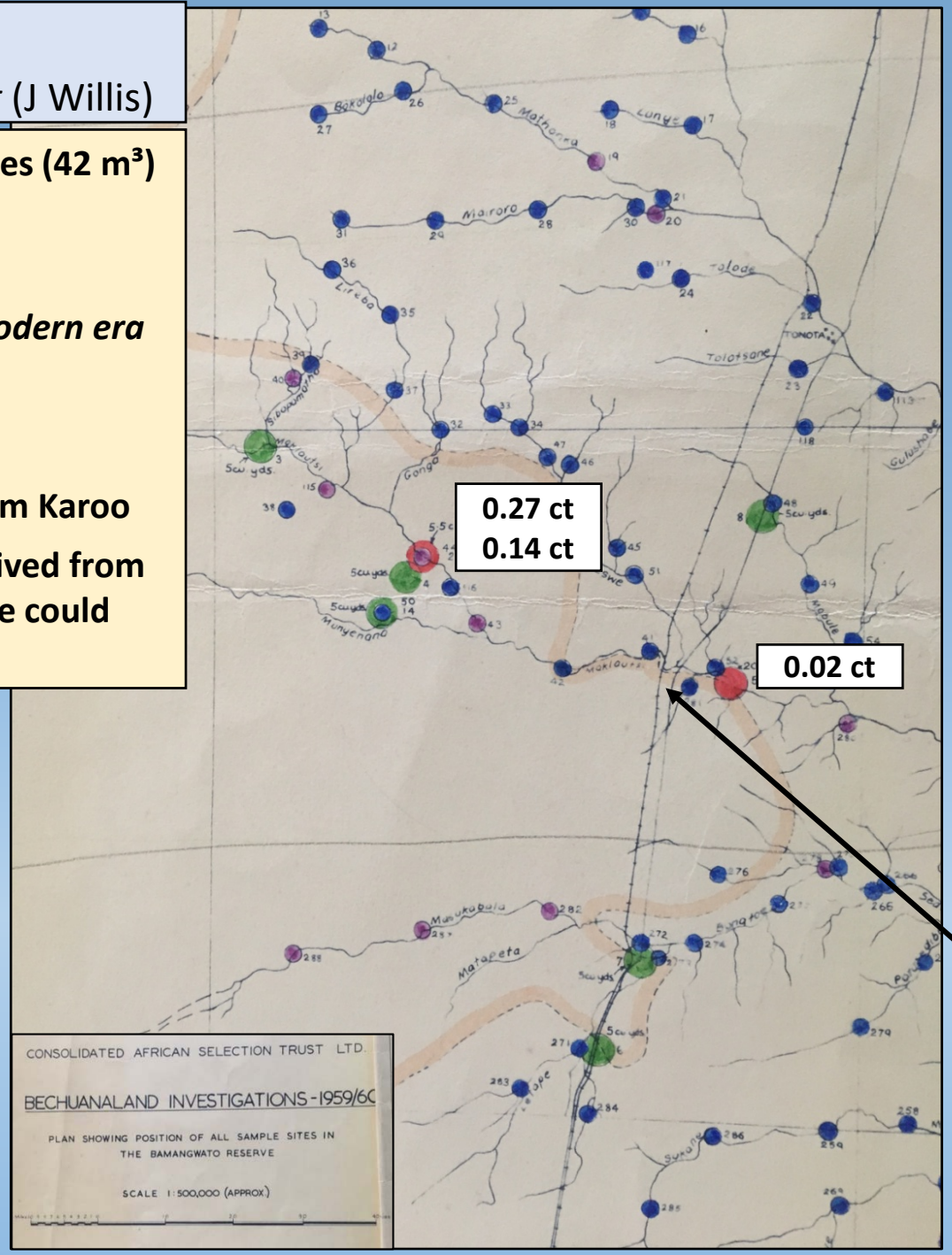
Company	Founder	Date	Comment
Selection Trust Ltd	Alfred Beatty	1913	Oppenheimer (De Beers) had invested in CAST from the 1920s.
Consolidated African Selection Trust Pty Ltd		1924	Founded in Ghana in 1920s. Found diamonds in SL in 1930.
Rhodesian Selection Trust		1928	Formed in northern Rhodesia (Zambia) to mine copper.
Sierra Leone Selection Trust		1934	Agreement between SL and CAST

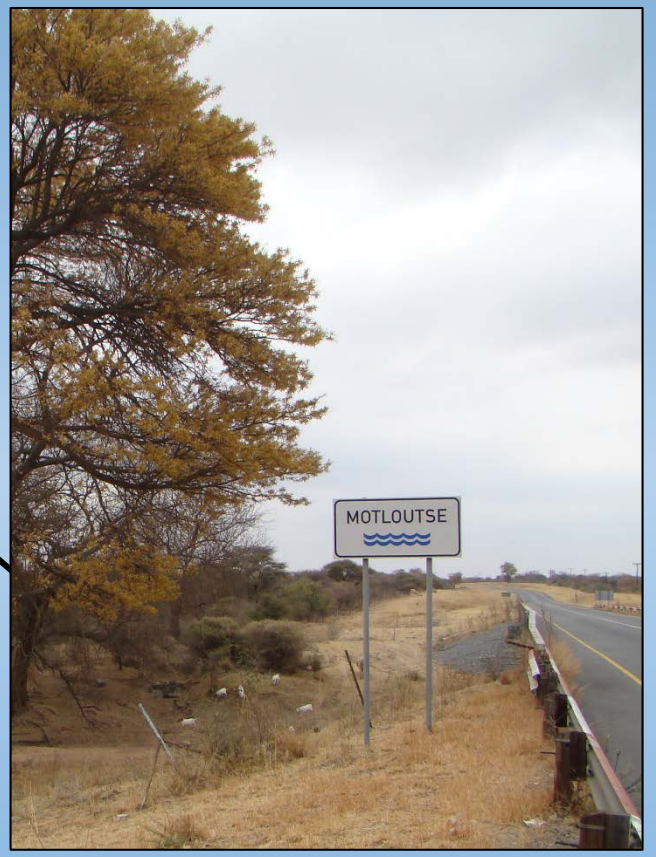
1960

Consolidated African Selection Trust (J Willis)

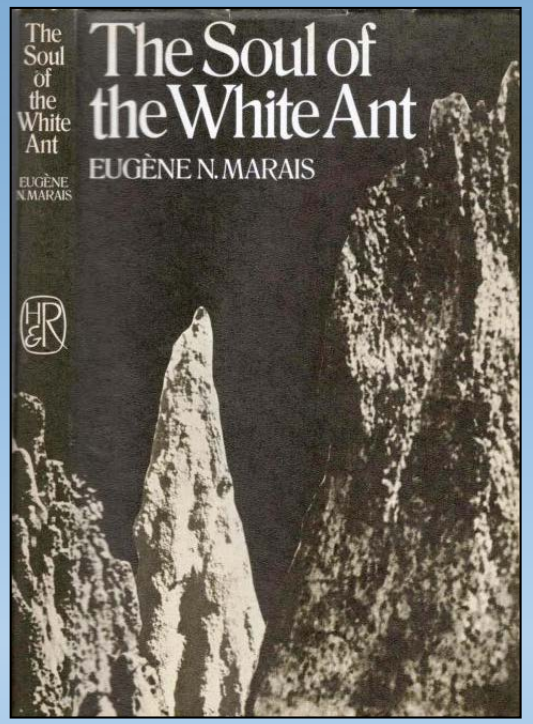
- **Stream (60 L) and bulk alluvial samples (42 m³) of – 4 +1.5 mm**
- **Covered 111,000 km²**
- **Found 3 diamonds: *the first in the modern era***
- **No other kimberlitic minerals**
- **Conclusions:**
  - **Diamonds probably derived from Karoo**
  - **Diamonds could have been derived from the west, but due to cover these could not be detected**



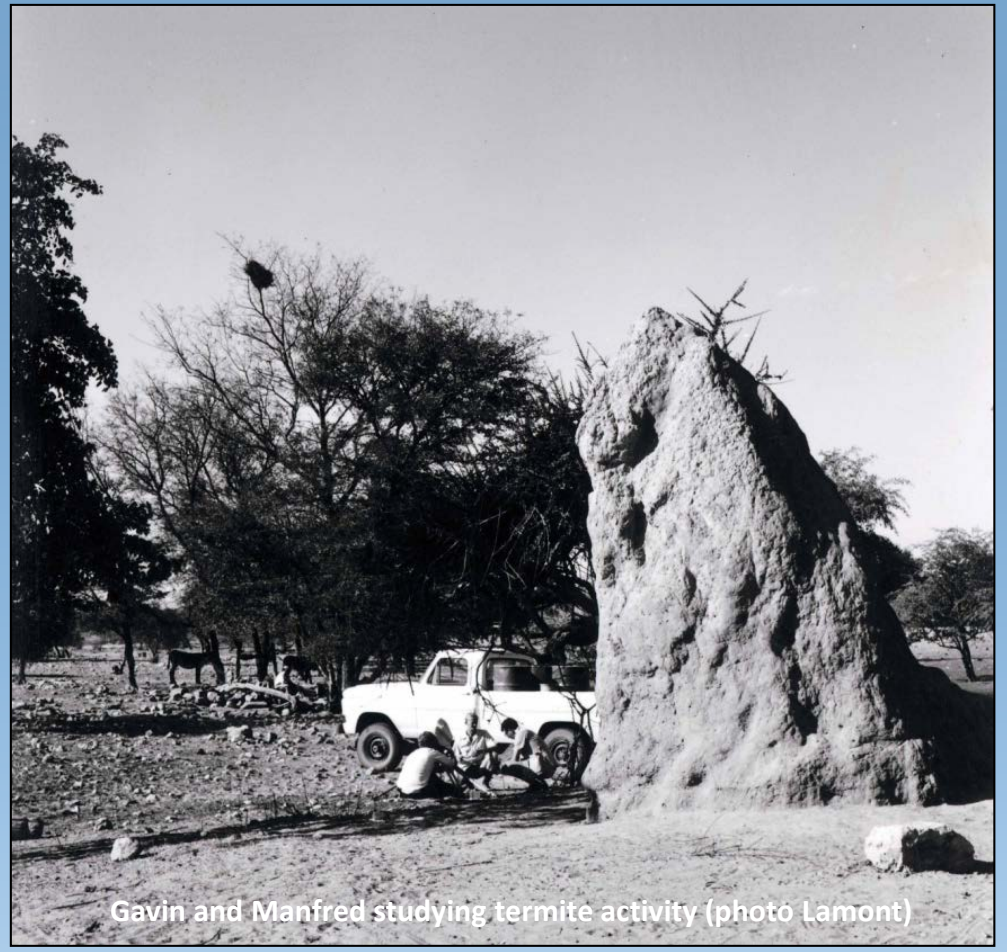




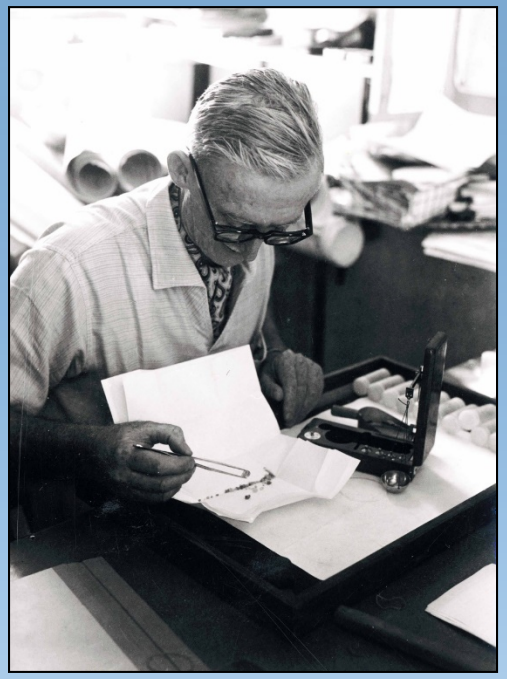
The 1960s:
The influential person No.2:
Gavin Lamont



1925 Afrikaans
1937 English

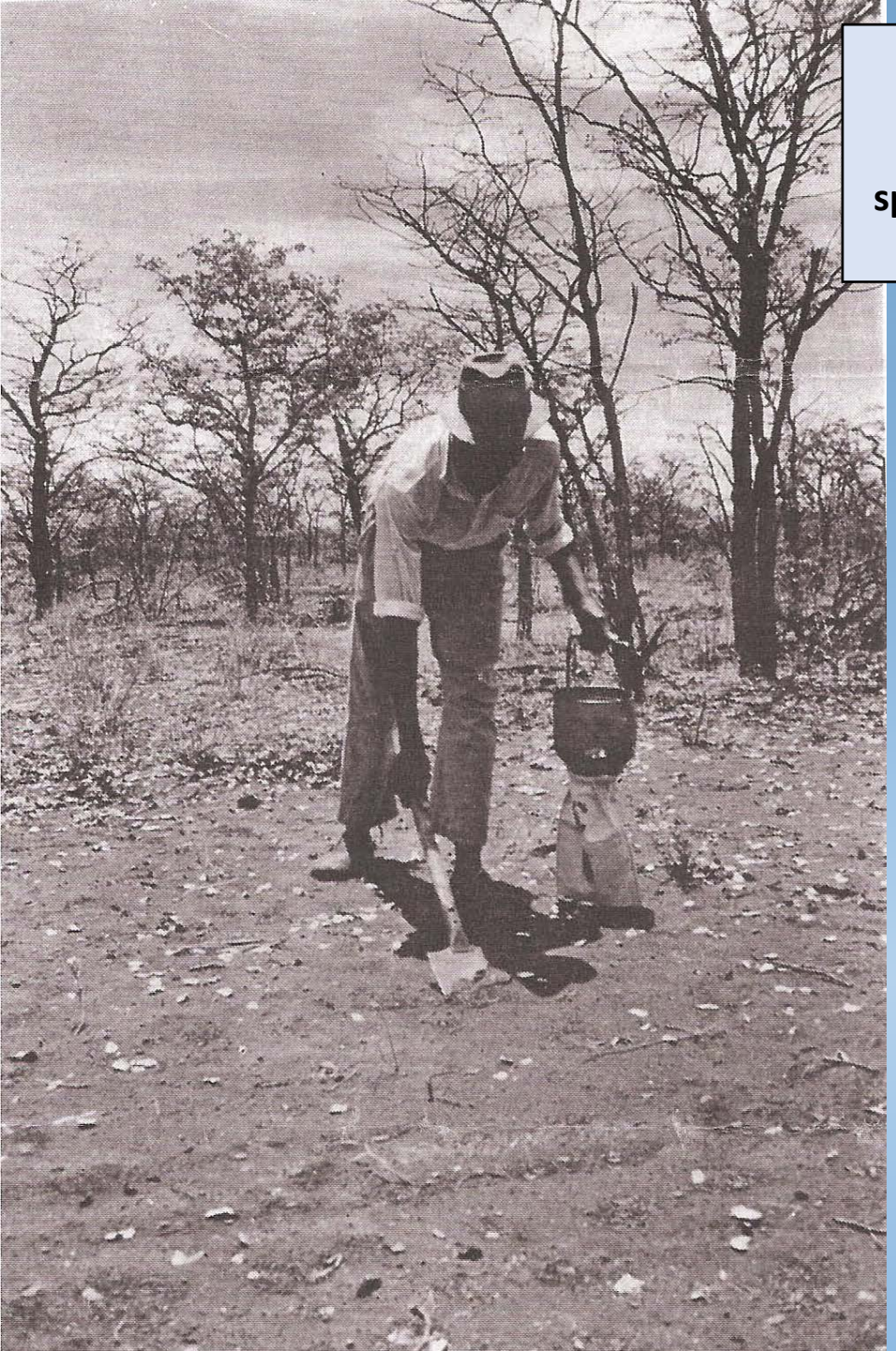


Gavin and Manfred studying termite activity (photo Lamont)



Having read Eugene Marais' 'the soul of the white ant '(1925), I suggest that bioturbation by termites over hunderds of thousands years has brought to the surface from kimberlites pipes the garnets and ilmenites that we have been able to use successfully in our soil-sampling procedures (Lamont 2002).

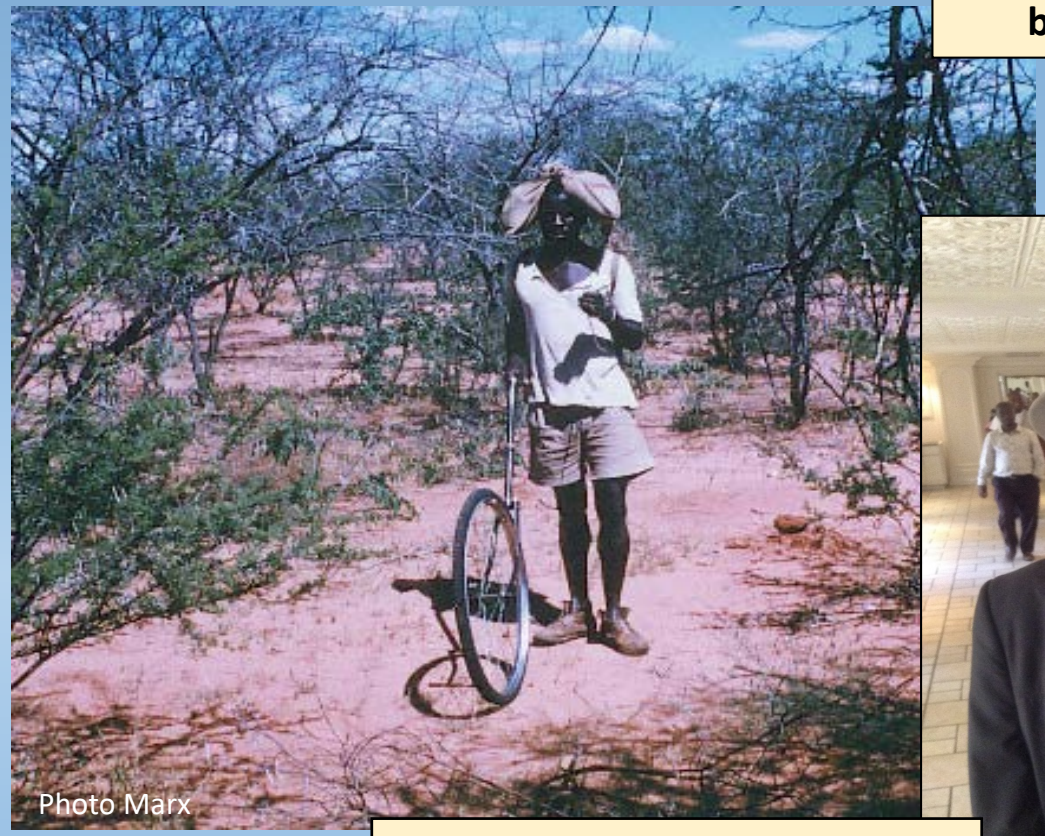
- **1947: PhD at UCT. External examiner Dr AL du Toit**
- **1948: Geological Survey of Southern Rhodesia**
- **1949: Geological Survey of Bechuanaland Protectorate**
- **1955: AAC/De Beers in Botswana (Kimberlitic Searches Ltd)**



Early 1960s

Lamont's scoop (every 12 to 15 paces) and soil splitter method that, as Manfred Marx would say 'this helped us to win the west'

A cyclometer on a bicycle wheel was used to measure distance – developed in Northern Rhodesia by 'Joe' Bancroft in 1926.



Bicycle wheelman – Eleven Malema Early1970s and 7th Nov 2014

The 1960s

Lamont's (De Beers) Sampling machines

3x Base lines

10' of longitude ±10 miles

TN

5 miles

Traverse lines

1 mile

- Each sampler carries a soil splitter
- Scoop every 12 to 15 paces
- At 0.2 mile the wheel pusher blows his police whistle: 2 bags are ½full: one full bag (8 – 9 lbs) every 0,2 mile along two parallel lines (300 yrd apart)
- Every 1.2 mile = 6 samples - taken back by the 1st porter. At 2.4 mile the next porter takes 6 bags to the vehicle.
- The vehicle is driven to the next rendeview point
- These 2 porters walk to meet the team as they 'home in' on the referee whistle blown at regular interval.

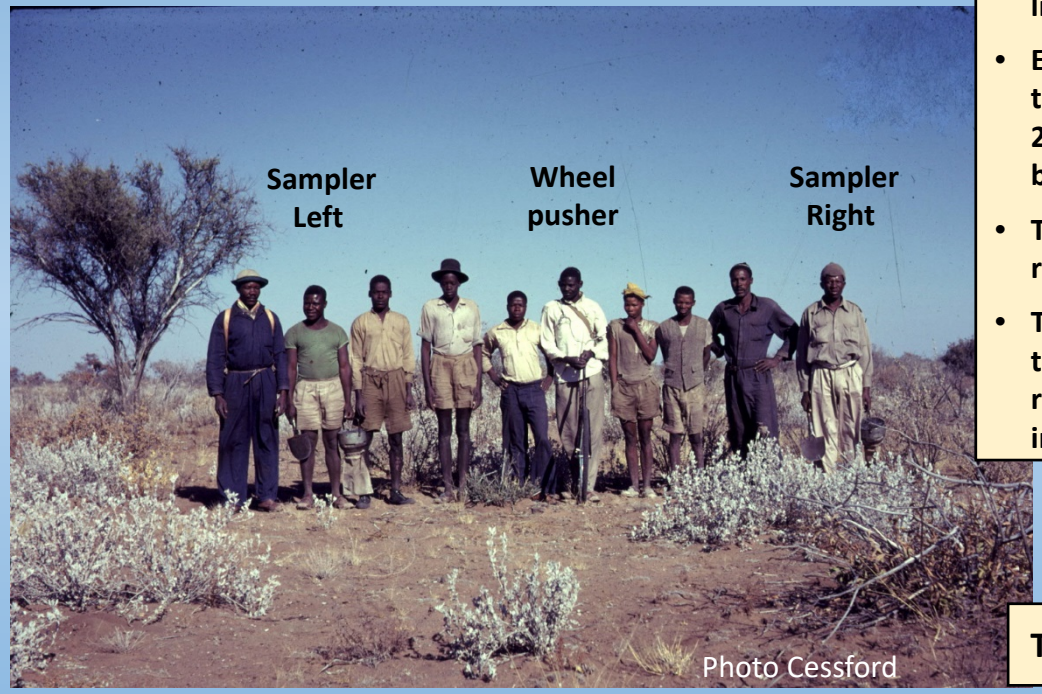
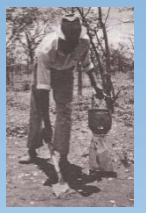


Photo Cessford

Typical sampling team

Sampling team




300 yards

Team leader | Wheel-pusher | 2x samplers | 9x porters

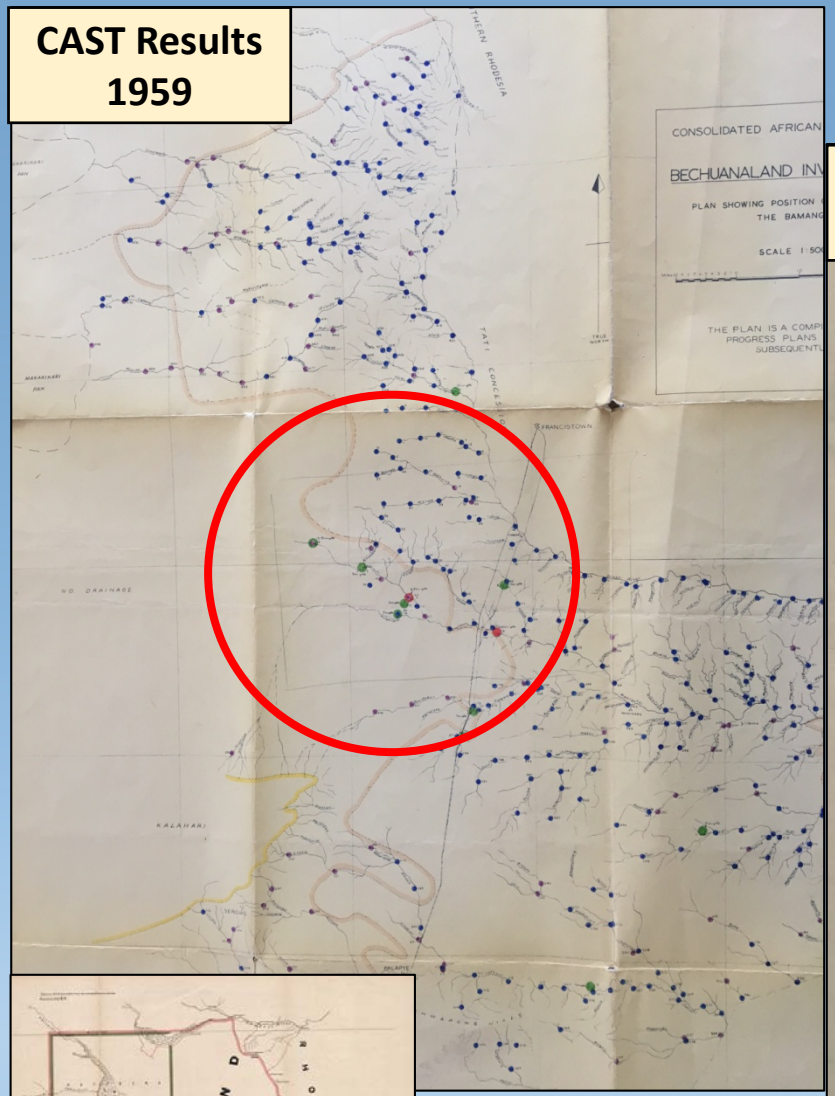

Photo Marx

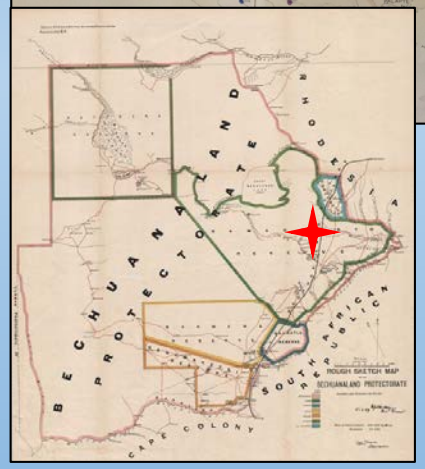
1960

Lamont changed the De Beers concentrating method from gold panning to hand gravitation

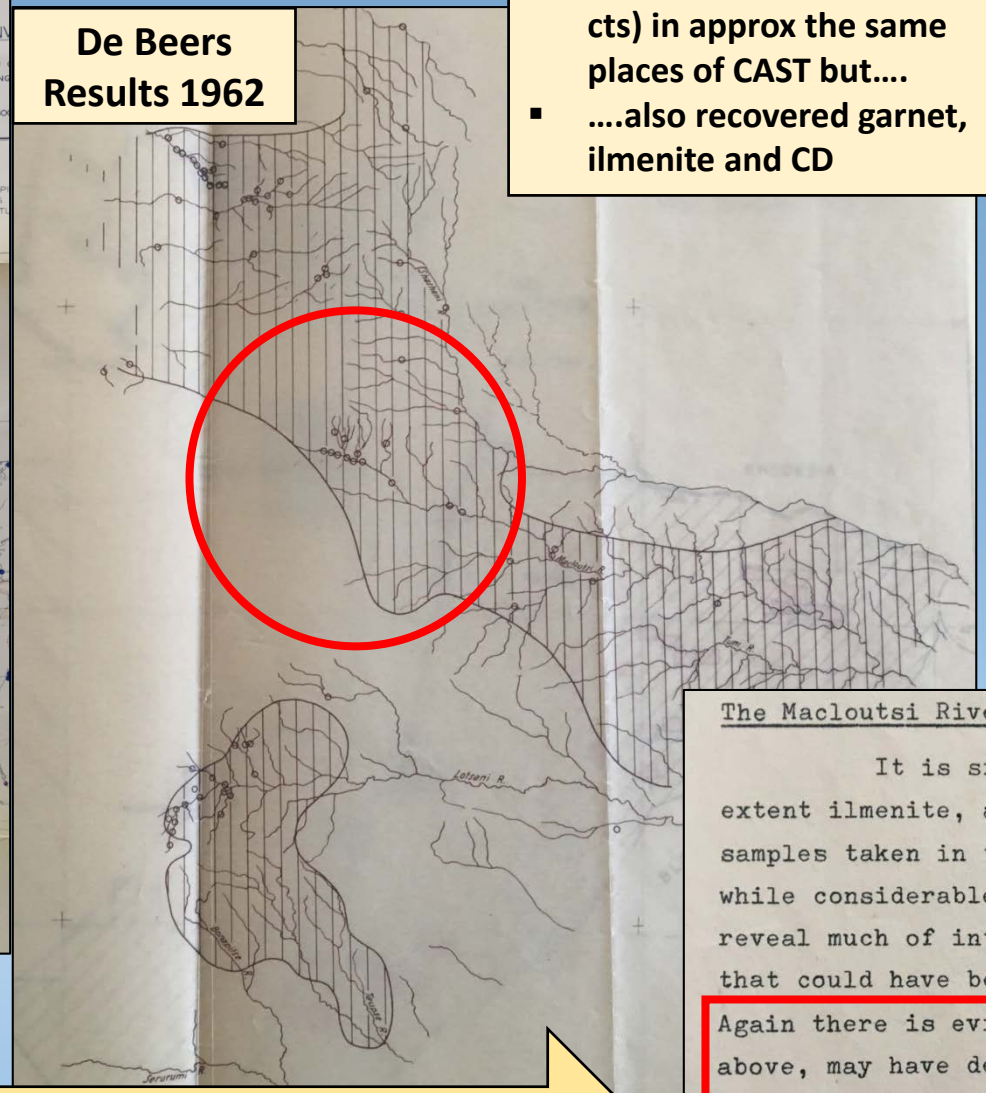

Photo Liddle

CAST Results 1959





De Beers Results 1962



- **2 diamonds (0.50 and 2.40 cts) in approx the same places of CAST but….**
- **….also recovered garnet, ilmenite and CD**

1962

De Beers repeats CAST's results

In 1964 Lamont already advised AAC/DB about the upwarp

Renewal report for Bamangwato Crown Grant No. 42 (1961 -1966) (G Lamont, 1967)

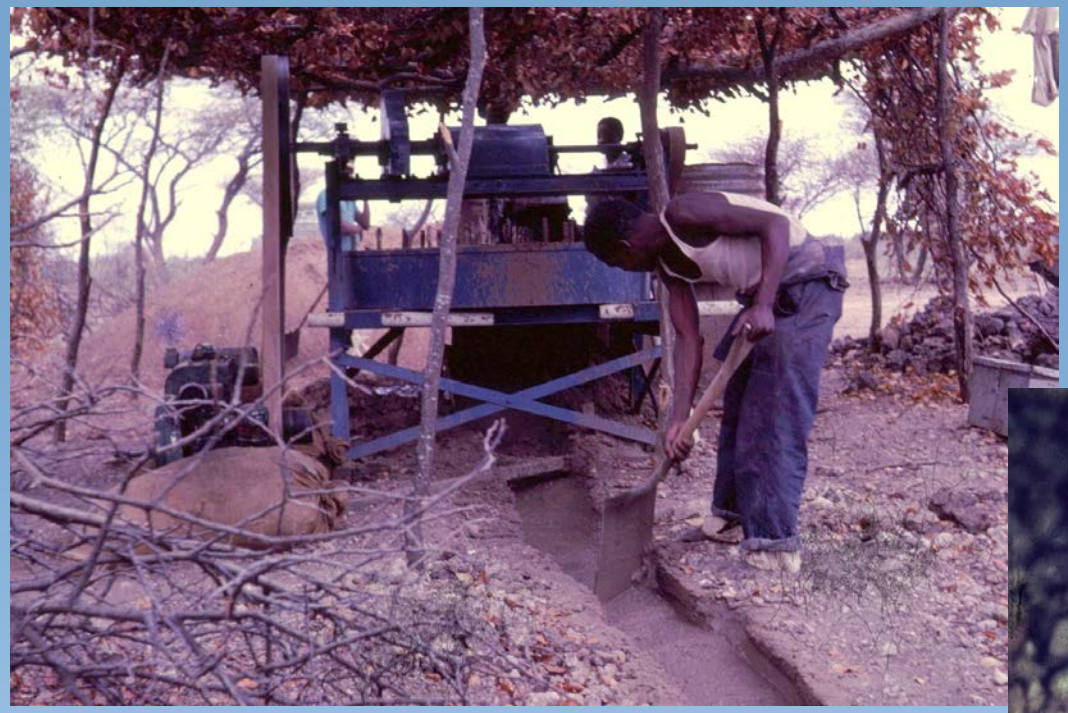
The Macloutsi River

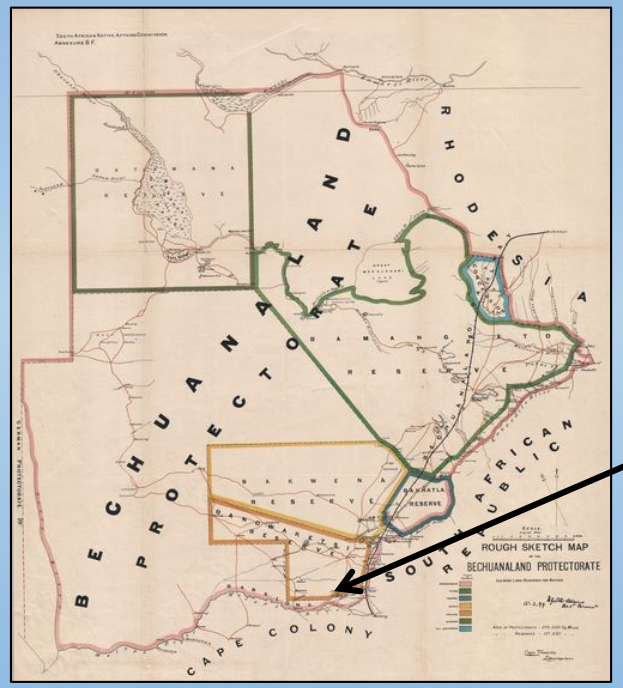
It is significant that pyrope garnet, and to a lesser extent ilmenite, are present in the majority of the drainage samples taken in the upper reaches of the Macloutsi River, while considerable sampling of the soils in the area did not reveal much of interest, apart from small grains of garnet that could have been transported by wind from some other area.

Again there is evidence that the crustal warping mentioned above, may have decapitated the ancient Macloutsi drainage system and that the diamonds found in its present-day gravels could have been derived from sources to the west that were tapped by the old headwaters. The recent finds of kimberlite indicator minerals in the Letlakane area are thus significant.

1962

Sampling higher level terraces along the Molopo River



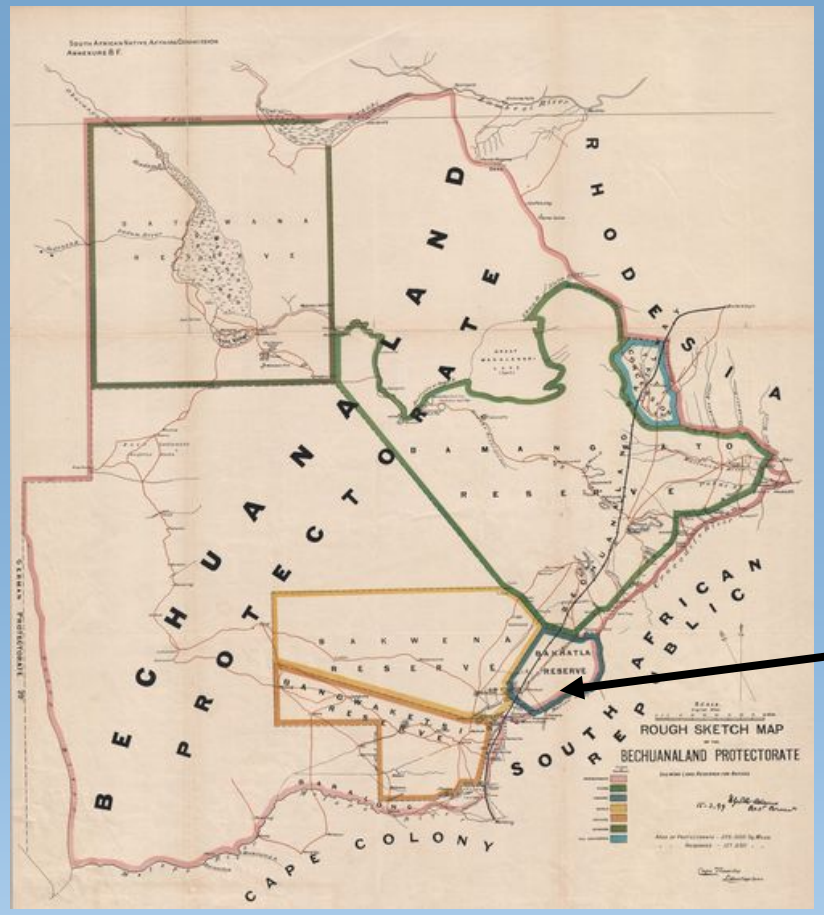


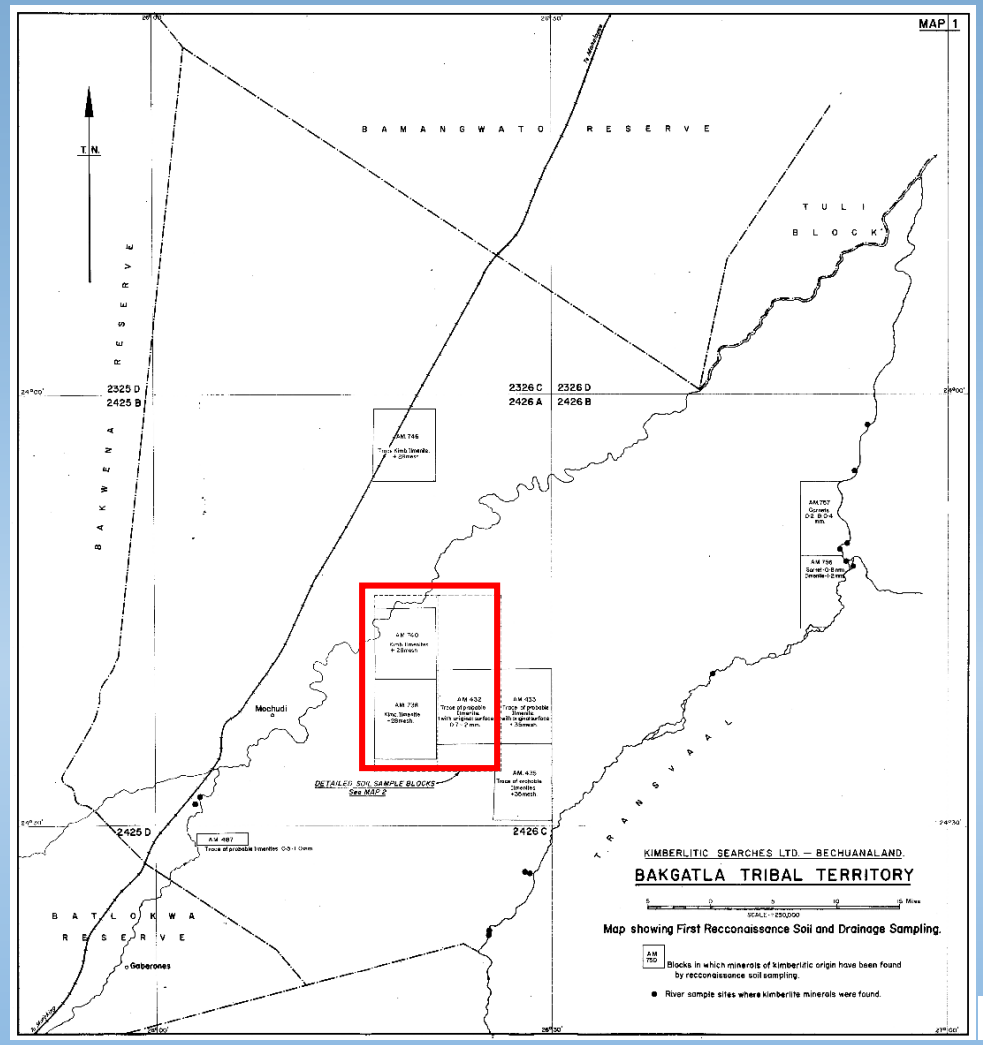
- Sampling gravels and drainages on major drainages using 6-foot rotary pans.
- At Phitsane in early 1962 De Beers found the first diamond in the modern prospecting era – 0.31 ct (Lamont 1980).

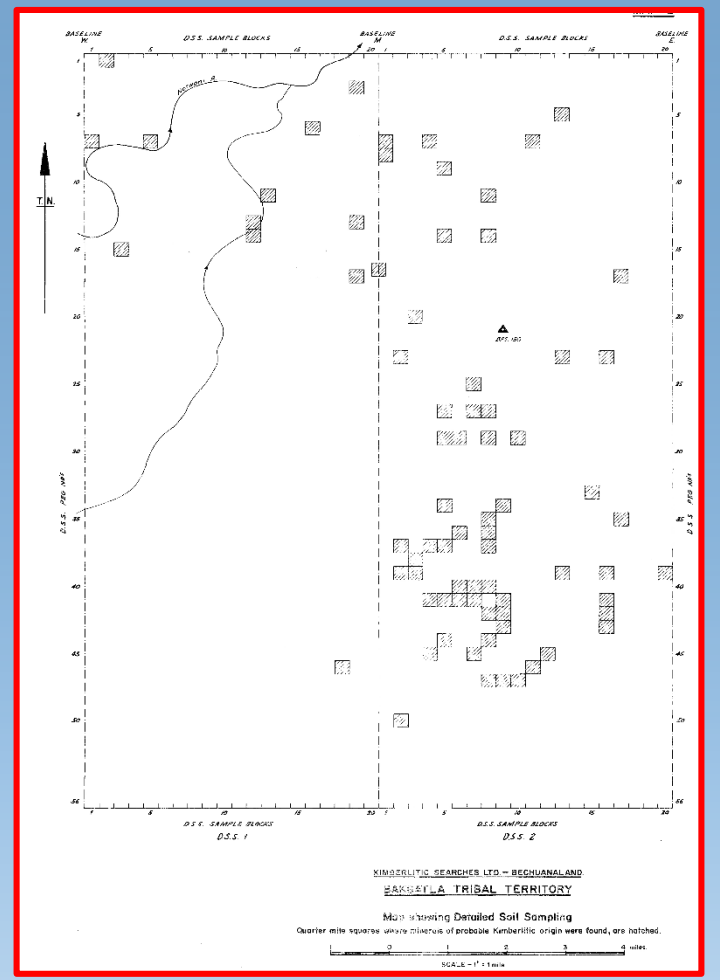
Photos Tony Cessford

March 1966

- De Beers discovered first (para-) kimberlites K1 and K2 near Mochudi
- By soil sampling - ilmenites
- Dismissed by EMW Skinner as lamprophyres







Maps supplied by AAC/DB

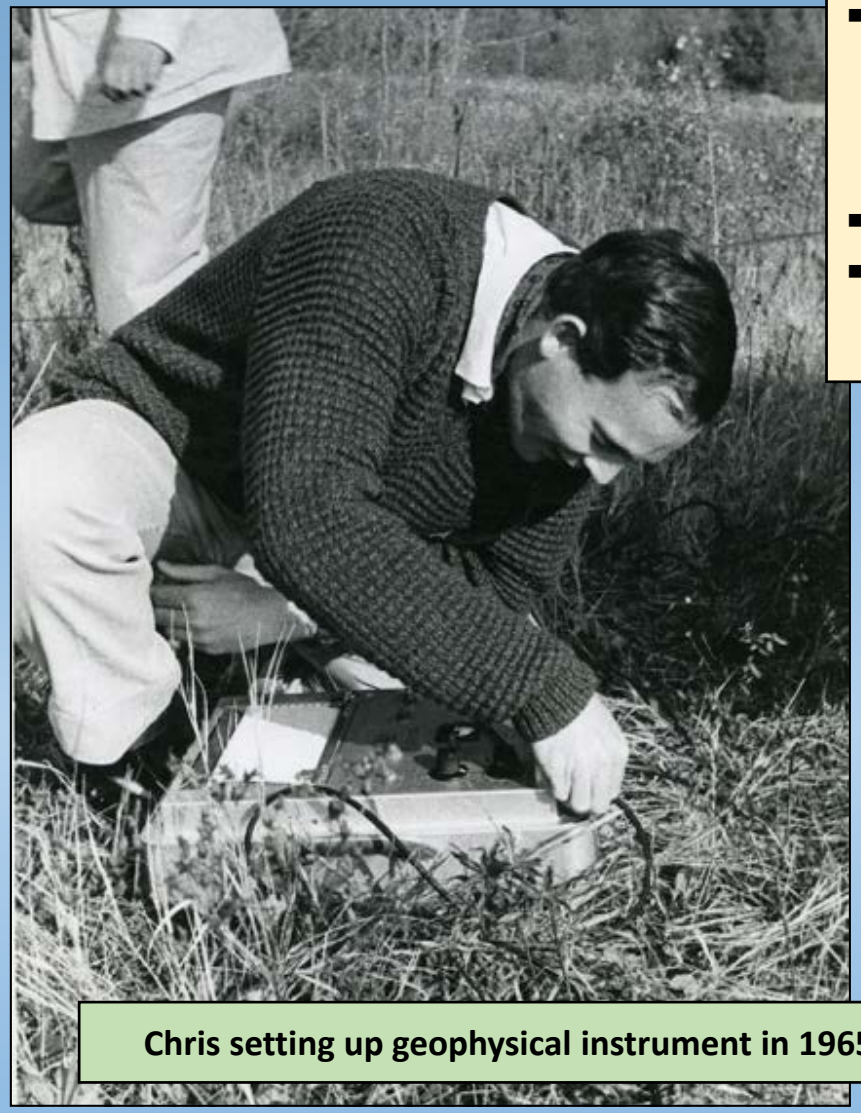
The 1970s:
The influential person No.3:
Chris Jennings

❑ **1957 – 1970**

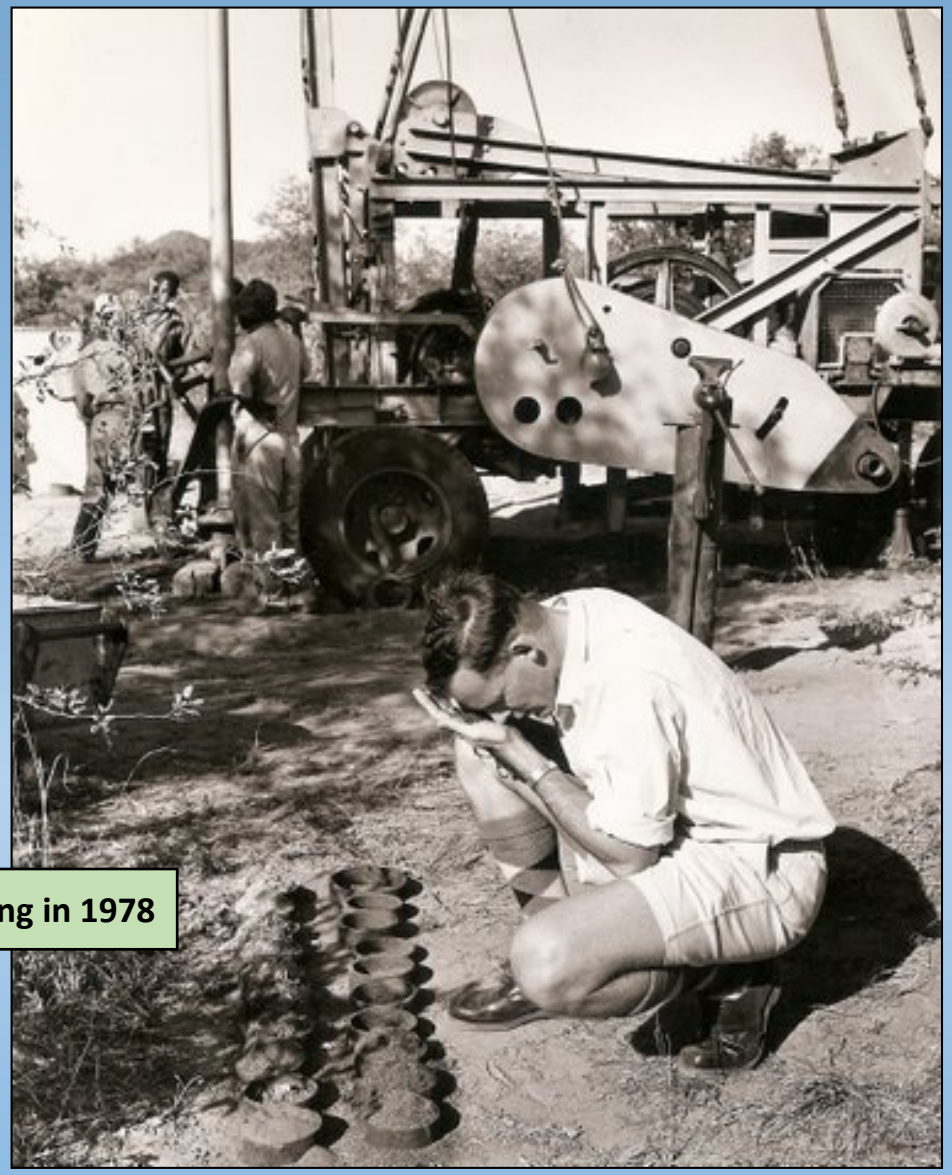
- Botswana Geological Survey, 2 yrs after Gavin Lamont
- Mainly in ground water – extensive use of geophysics
- Obtained PhD: 'The hydrogeology of Botswana' in 1974

❑ **1971 – 1981**

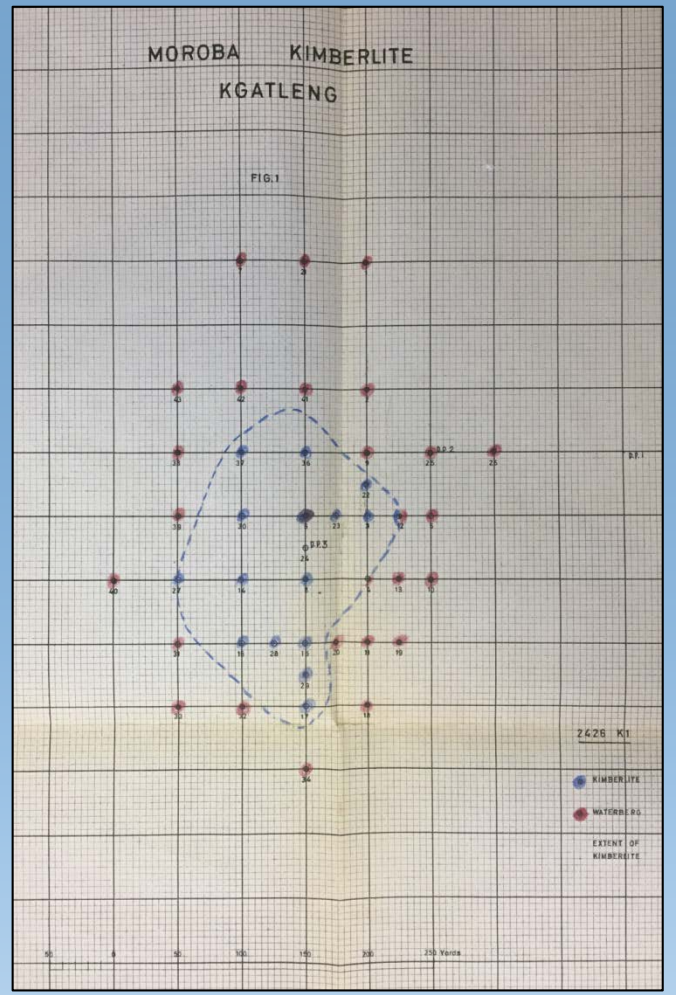
- Joined Falconbridge
- In **1975** Proposed to Falconbridge to explore for diamonds.

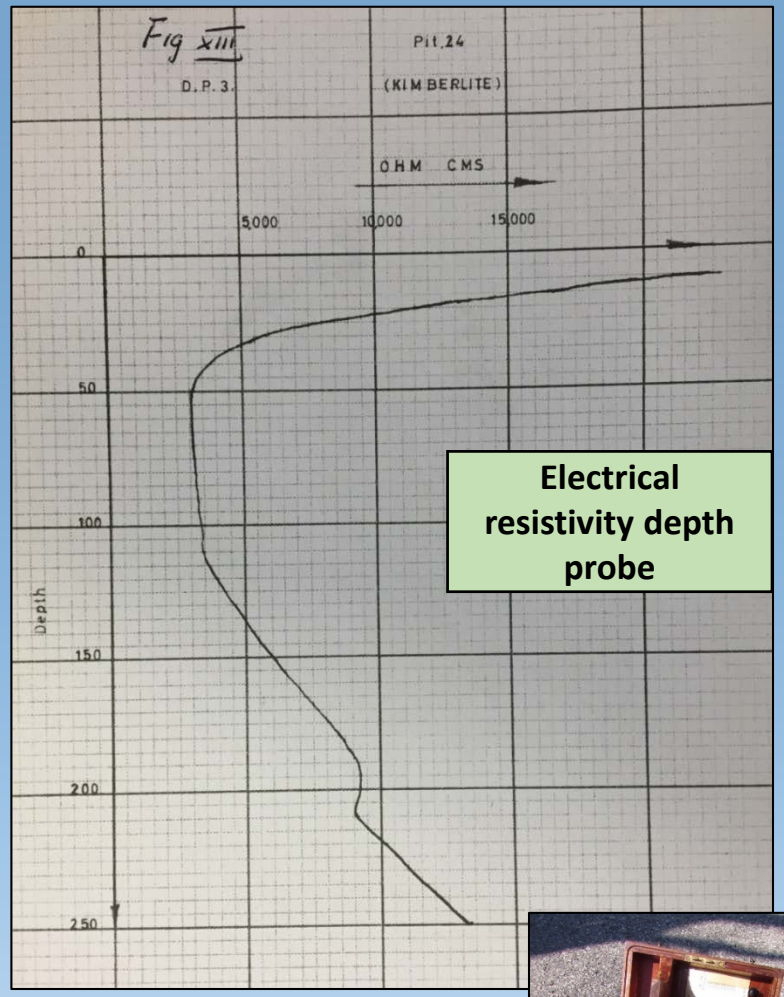


Chris setting up geophysical instrument in 1965



Inspecting drill samples at Tsabong in 1978





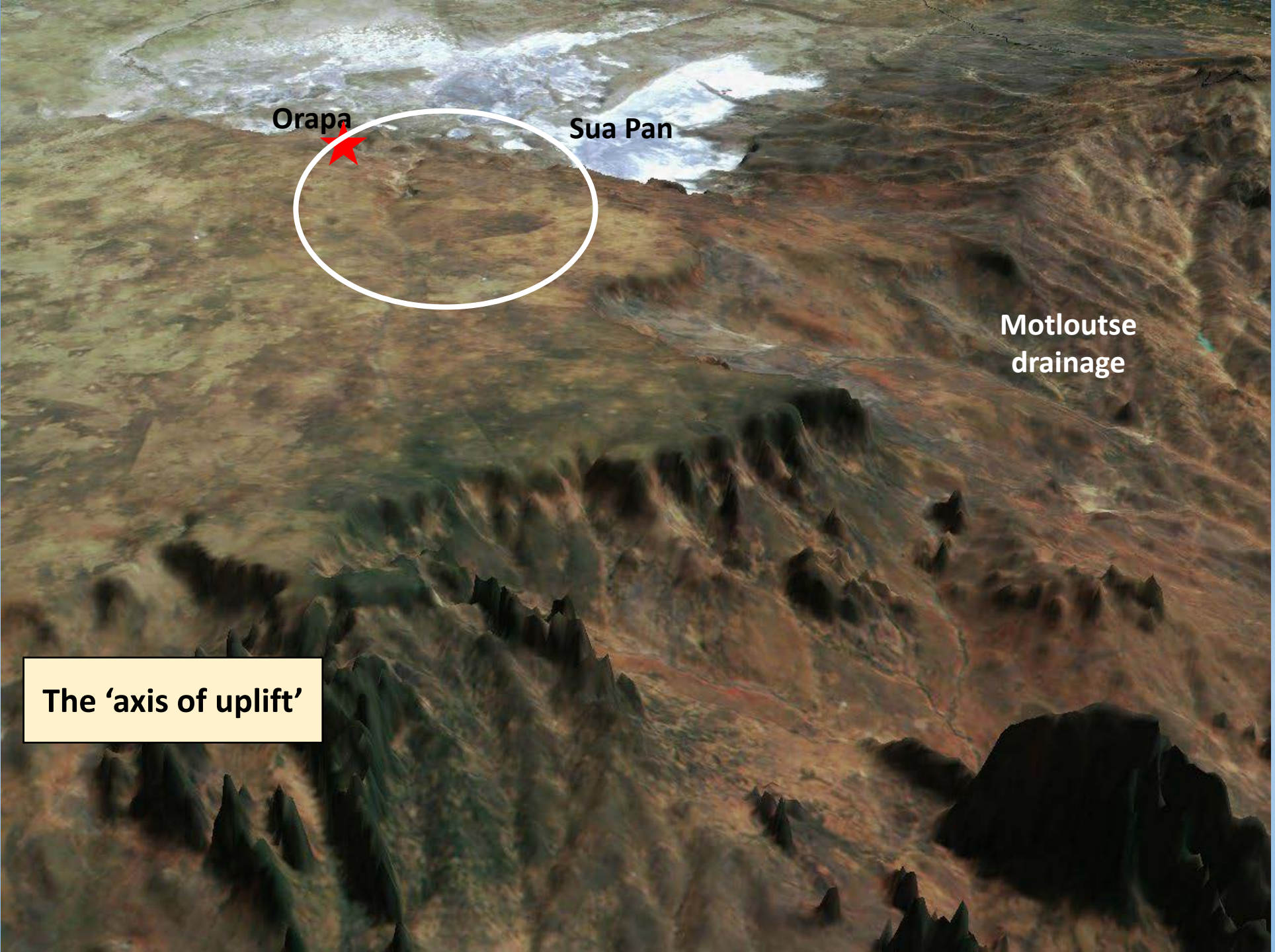
Electrical resistivity depth probe

Conclusion by Jennings (1966) after the Mochudi work:

1. **Magnetics will work.**
2. **Gravity was not tested (no instrument) but would also be useful**
3. **EM and IP difficult to interpret the results**
4. **Seismic not practical and need technical expert to interpret.**

May 1966

- **Jennings** was asked by Lamont in May **1966** to experiment with geophysics (magnetics) over the Mochudi bodies.
- Then in **1968** Jennings was asked again by Lamont to so some magnetic lines over **AK01** using a *Hilger and Watts* magnetometer.



July 1966

- Gibson and Lamont went out on a *crude road soil-sampling* program south of the Makgadikgadi pans.
- They collected 17 bulk scoop samples on sheets 2125 A and B in 5 days covering approx. 6,000 km².
- 12 of their 17 scoop samples were positive with ilmenite and garnet.

30 Sept 1966

Botswana independence

1967

Mineral rights in Territories Bill

Agreement between Tribal Chiefs and Government to surrender all mineral rights of tribal lands to nation

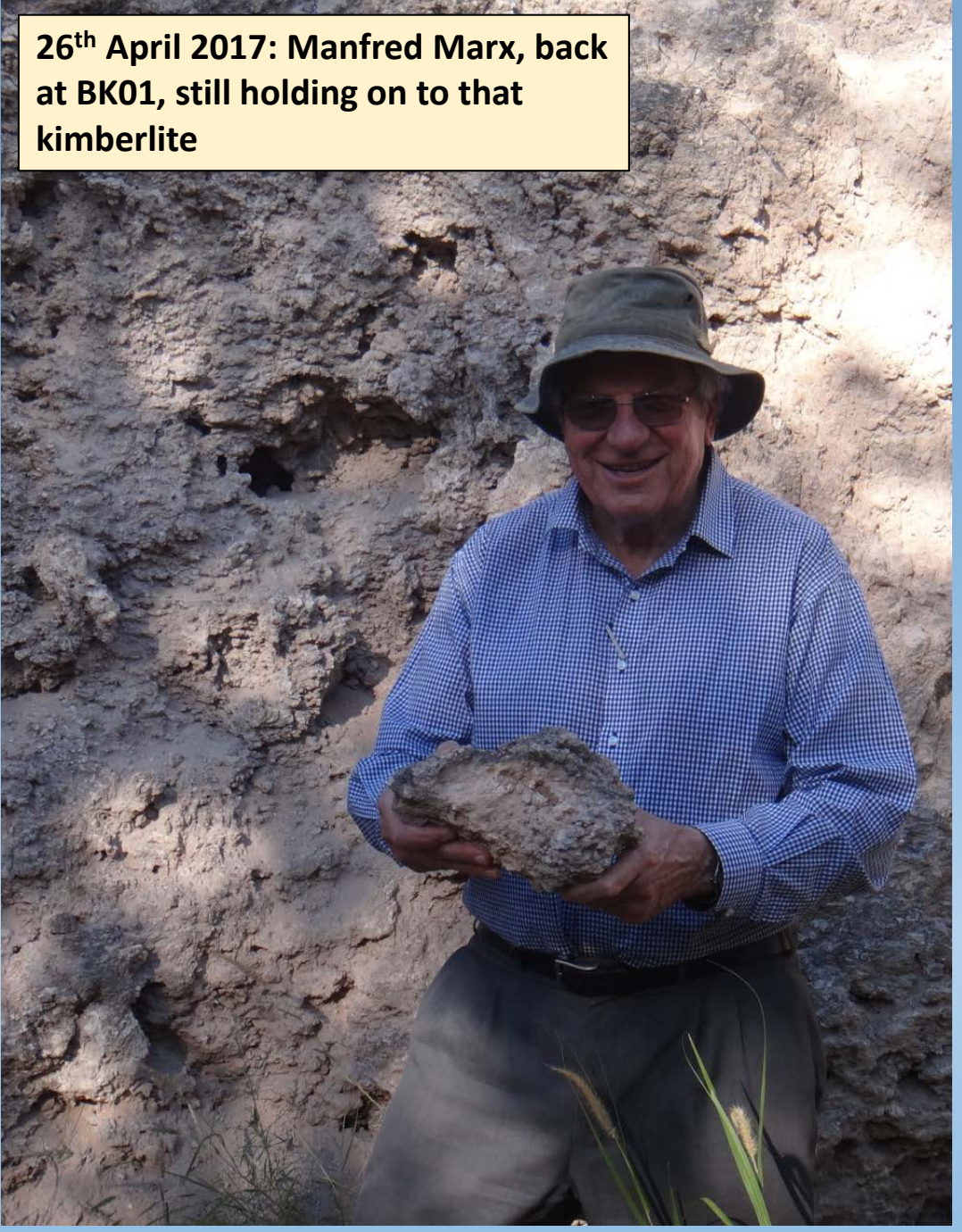
Our picture taken after signing of the agreement, shows: L-R front row: Regent Kelemogile Mokgosi Chief Neale Sechele, Mr. Masire, Chief Linchwe. Back row: Minister of Commerce Industry and Wate Affairs, Mr. Haskins; Messrs. O. Porogwe, A. Matsietsa (Bamalete); S. Matlhabaphiri, N.B. Kgosie-ntsho (Bakwena); B. Pilane, C. Ratsheko (Bakgatla) and the Minister of Local Government Mr. Kgabo

Seretse Khama:

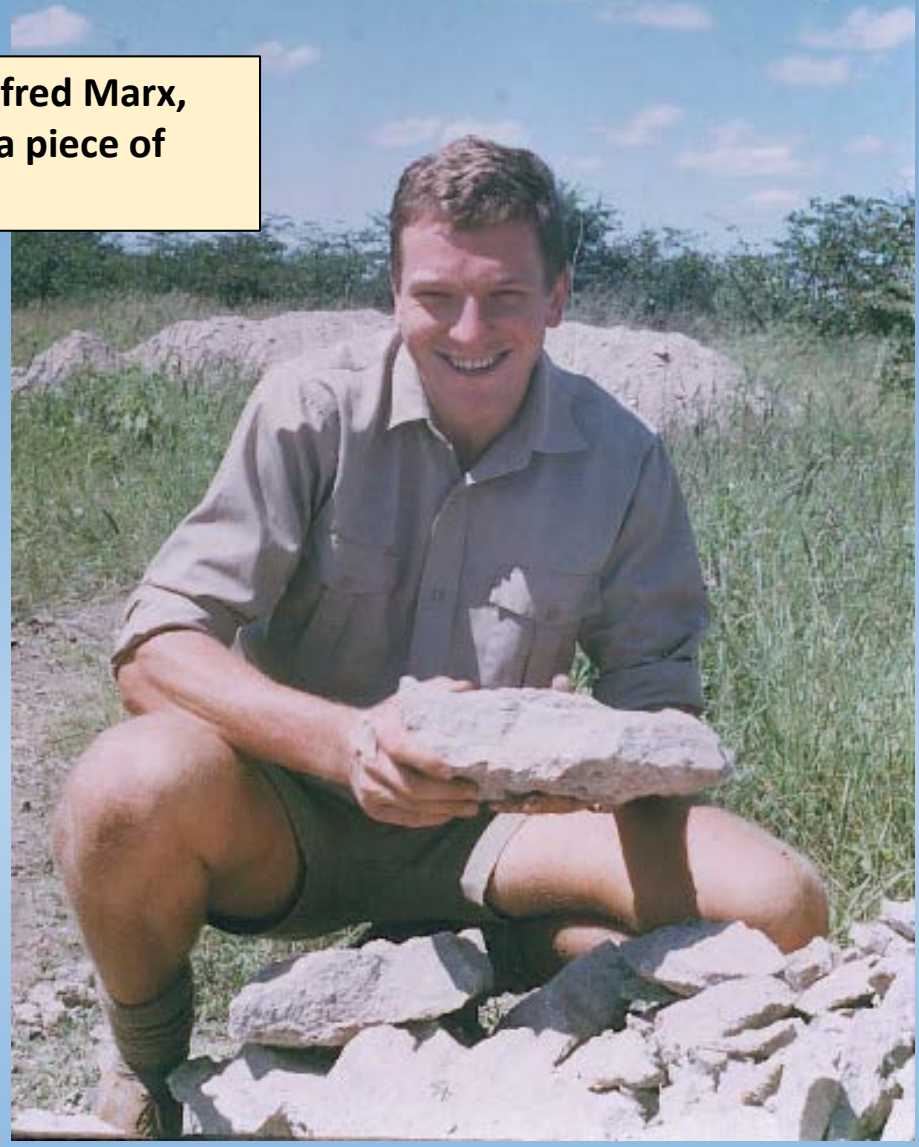
'let us share any wealth we find underground with the whole nation; irrespective of where it is found'.

March 1967
Discovery BK01 near Orapa: Botswana's 1st kimberlite

26th April 2017: Manfred Marx, back at BK01, still holding on to that kimberlite



1st March 1967: Manfred Marx, the discoverer, with a piece of BK01 kimberlite



This was followed in the same year by:

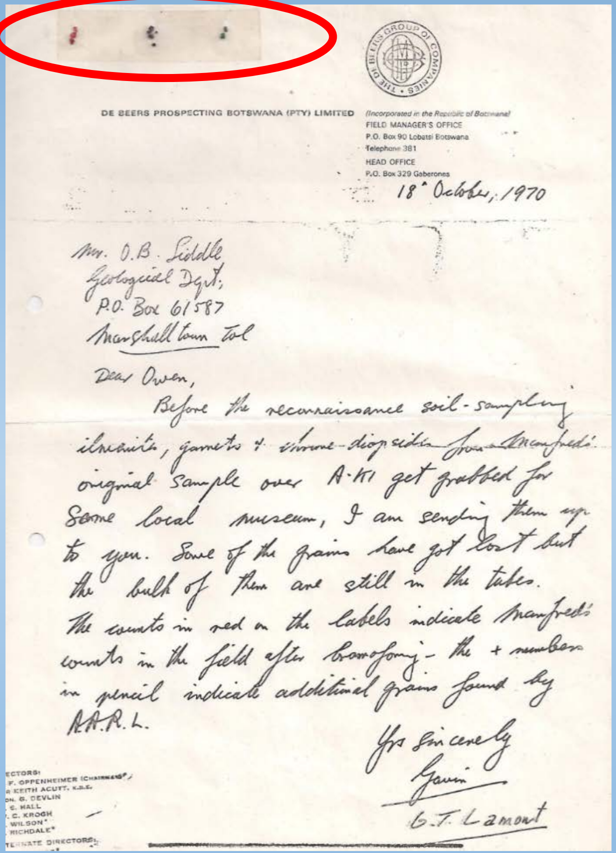
- BK02 – 17th March
- AK01 – 25th April

21st April 1967

First positive sample over AK01

The mineral count of the concentrate was:

- +3000 picro-ilmenites
- +1000 pyrope-garnets
- 50 chrome-diopsides



DE BEERS PROSPECTING BOTSWANA (PTY) LIMITED

(Incorporated in the Republic of Botswana)
FIELD MANAGER'S OFFICE
P.O. Box 90 Lobatsi Botswana
Telephone 381
HEAD OFFICE
P.O. Box 329 Gaberones

18th October, 1970

Mr. O.B. Liddle
Geological Dept,
P.O. Box 61587
Marshalltown Tvl

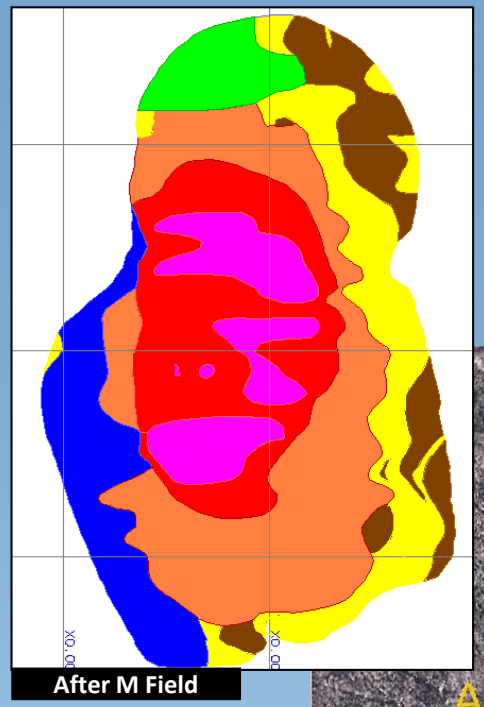
Dear Owen,

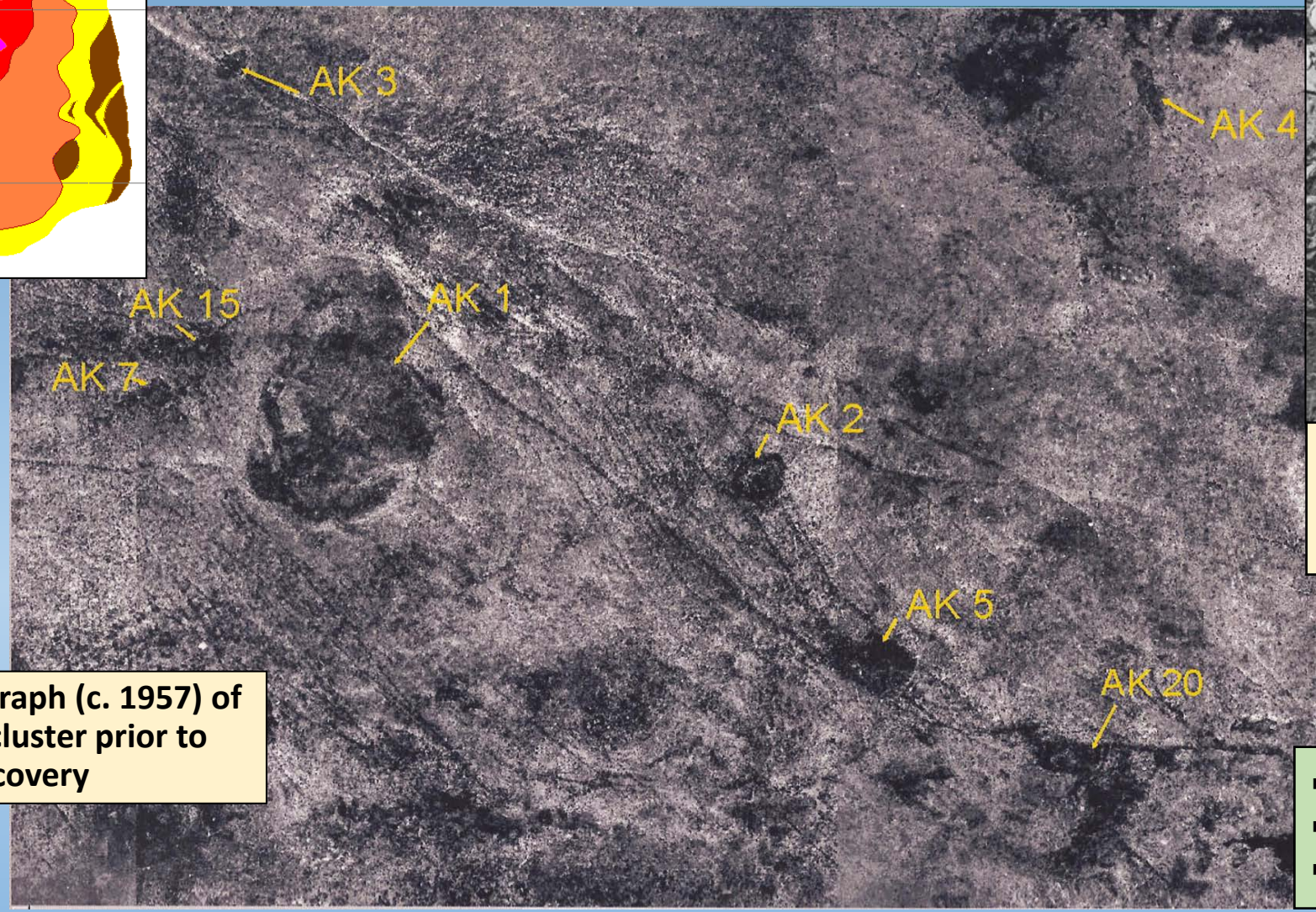
Before the reconnaissance soil-sampling ilmenites, garnets + chrome-diopsides from Manfred's original sample over A.K1 get grabbed for some local museum, I am sending them up to you. Some of the grains have got lost but the bulk of them are still in the tubes. The counts in red on the labels indicate Manfred's counts in the field after bromoforming – the + numbers in pencil indicate additional grains found by A.A.R.L.

Yrs sincerely
Gavin
G.T. Lamont

25th April 1967

Discovery of AK01


After M Field



Aerial photograph (c. 1957) of the Orapa cluster prior to discovery

Gavin with his senior team: Jim Gibson (left) and Manfred Marx (right) at the discovery pit on AK01

- AK01 found in 1967
- Mine commissioned in 1971
- Produced some 343 mcts

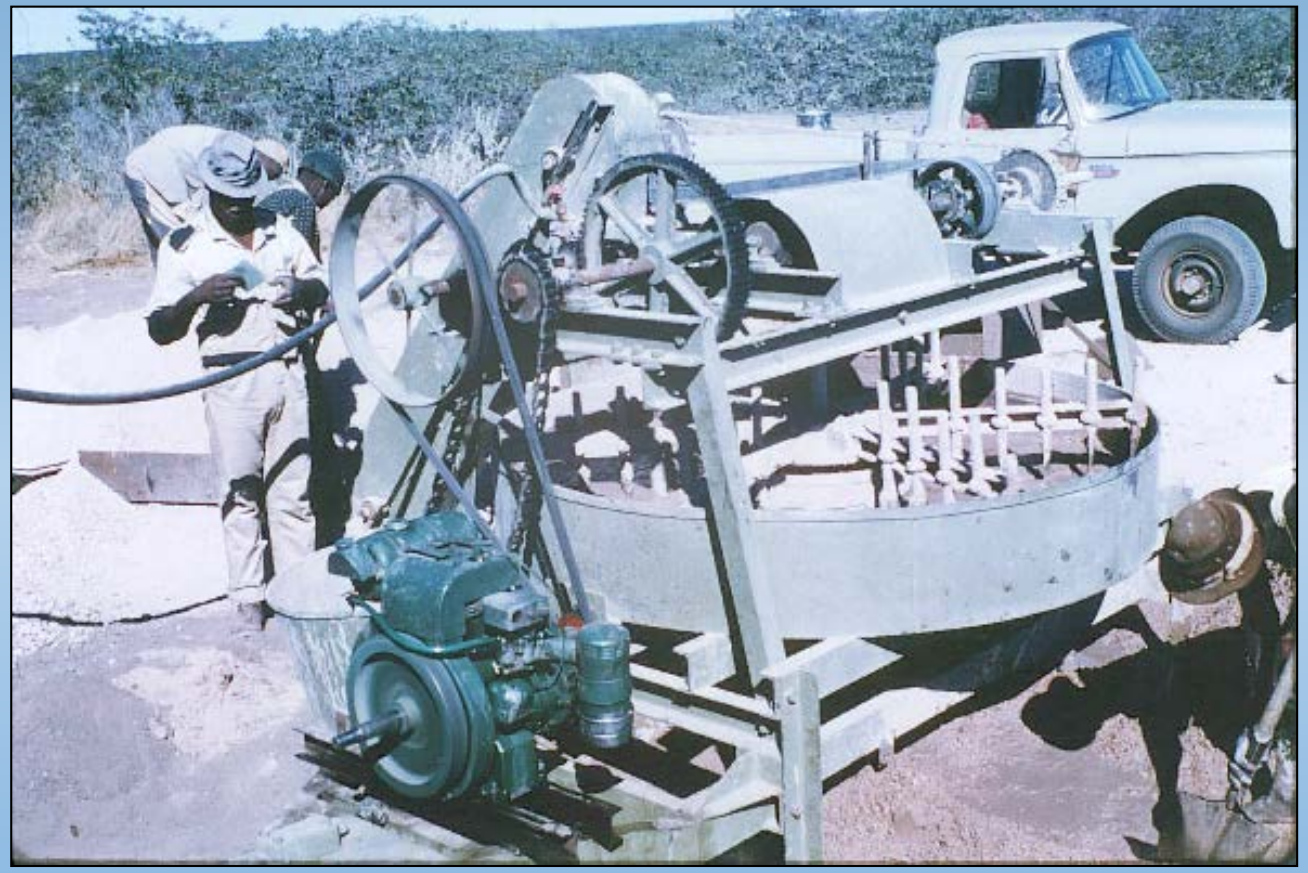
1967: Initial 9ft x 9 ft 20ft deep pits

Aug-Sept 1967

First evaluation BK01 and AK01

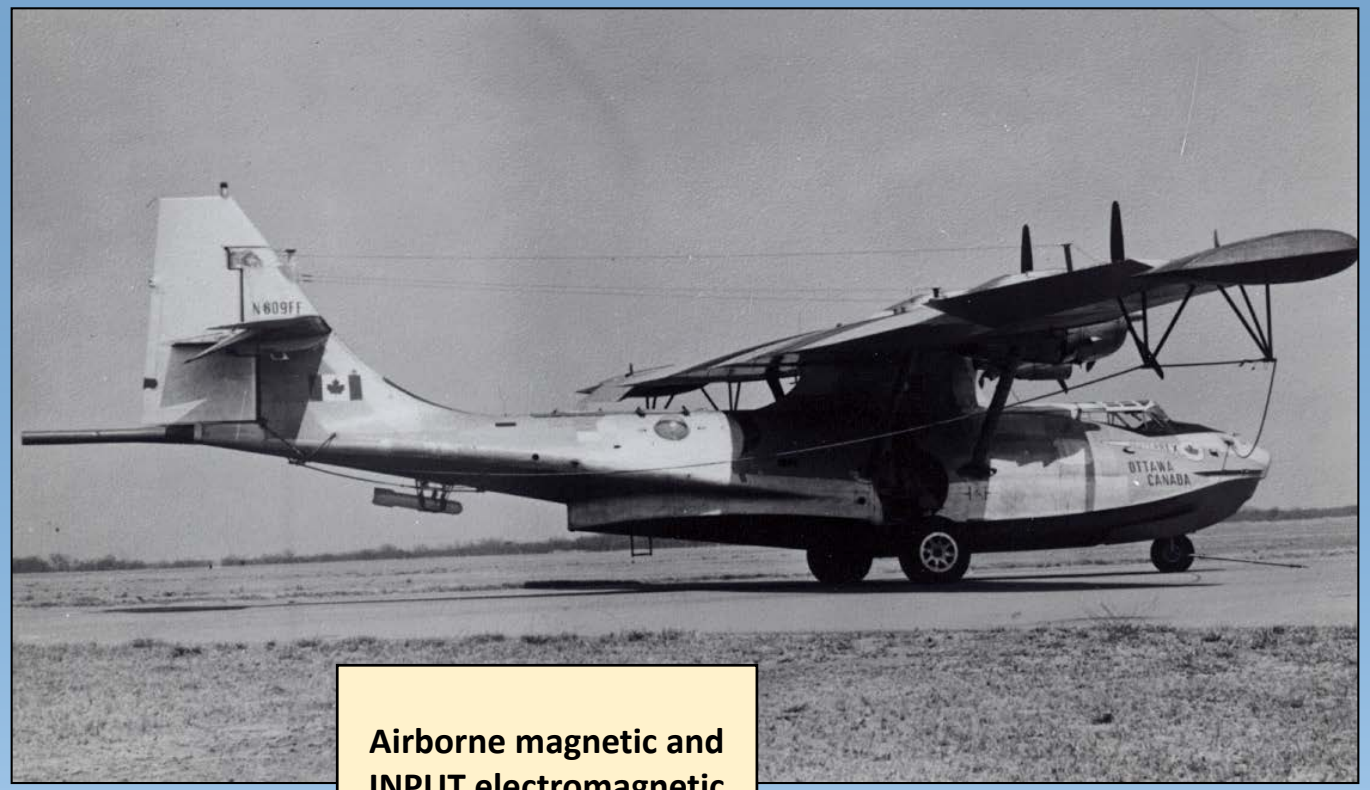
- The 6-foot rotary pan brought from Kimberley (Eben Venter and Spud Murphy) set up at BK01.
- First BK01 diamonds – Thursday 1st June.
- The first AK01 diamonds – Friday 23rd June.

The first 8 diamonds recovered from AK01



1968: 120ft deep evaluation pit samples to DMS plant

1968
1st Airborne geophysical survey over the Orapa field

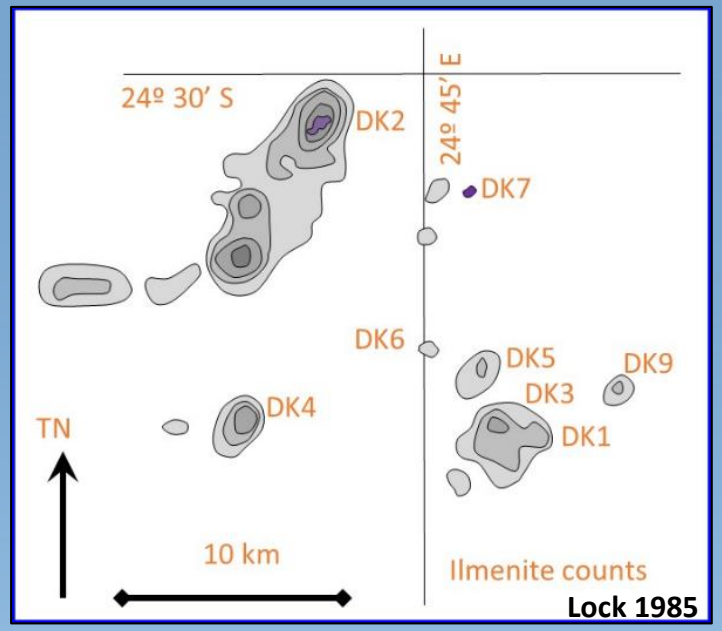


Airborne magnetic and INPUT electromagnetic system on Catalina.

The 1st ever airborne geophysical survey for kimberlites.

1969 – 1971
Sampling around Jwaneng

1962 Gibson sampled either side of the Lobatse – Ghanzi road and passed 20 km south of Jwaneng but no KIM positive samples.



Lock 1985

- 1969 Reconnaissance sampling produced first ilmenites.
- 1970 Detailed soil sampling yielded five positive areas over Jwaneng.
- 1971 Detailed grid loaming over 4 mineral anomalies:
  - Malan 1 (DK1)
  - Malan 2 (DK3)
  - Lynn's Luck (DK4)
  - Whateley's Wish (DK2)
- 1971 March: Drilling of DK1 and DK2, with Vole drill, failed to intersect kimberlite.

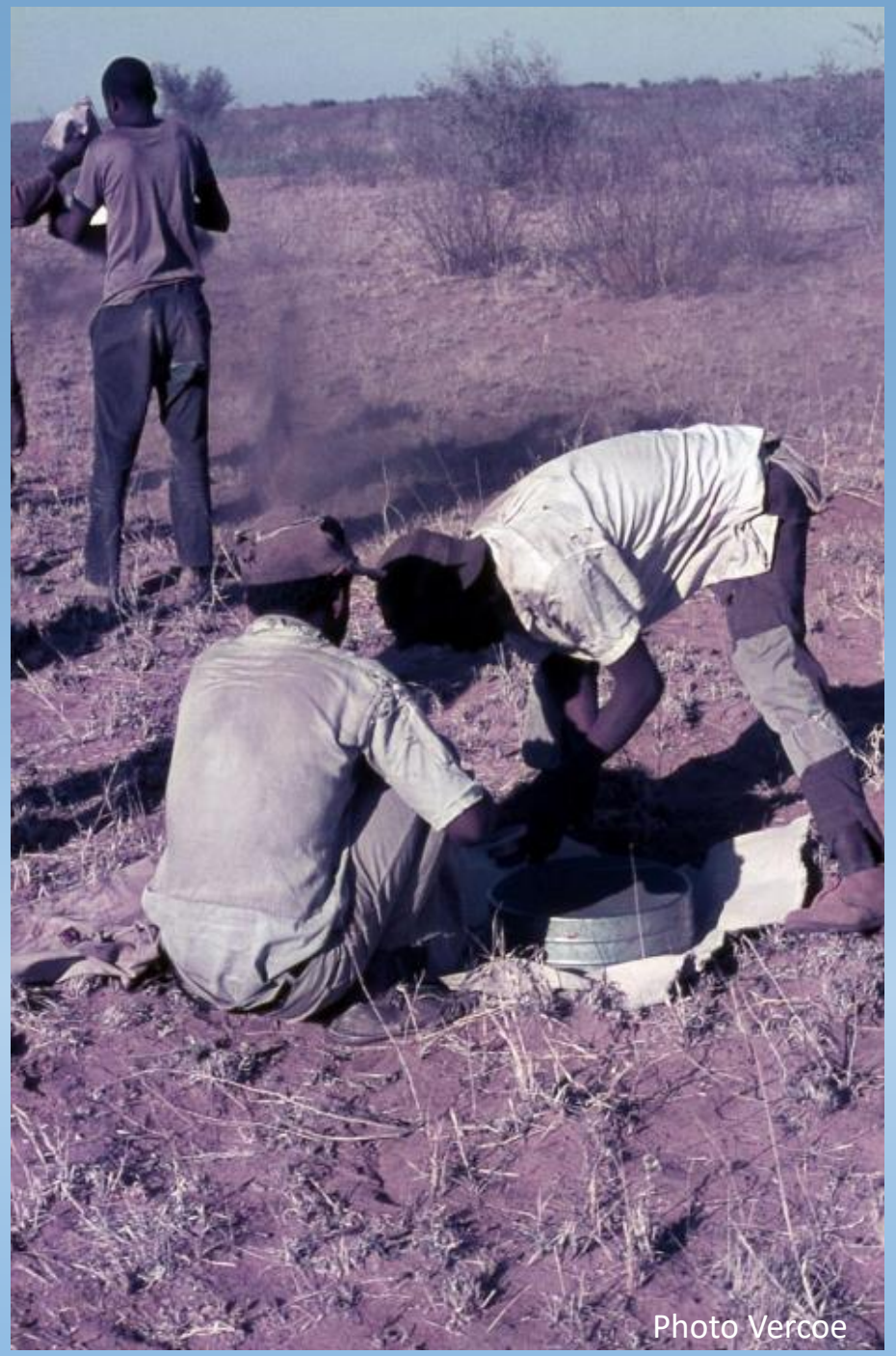
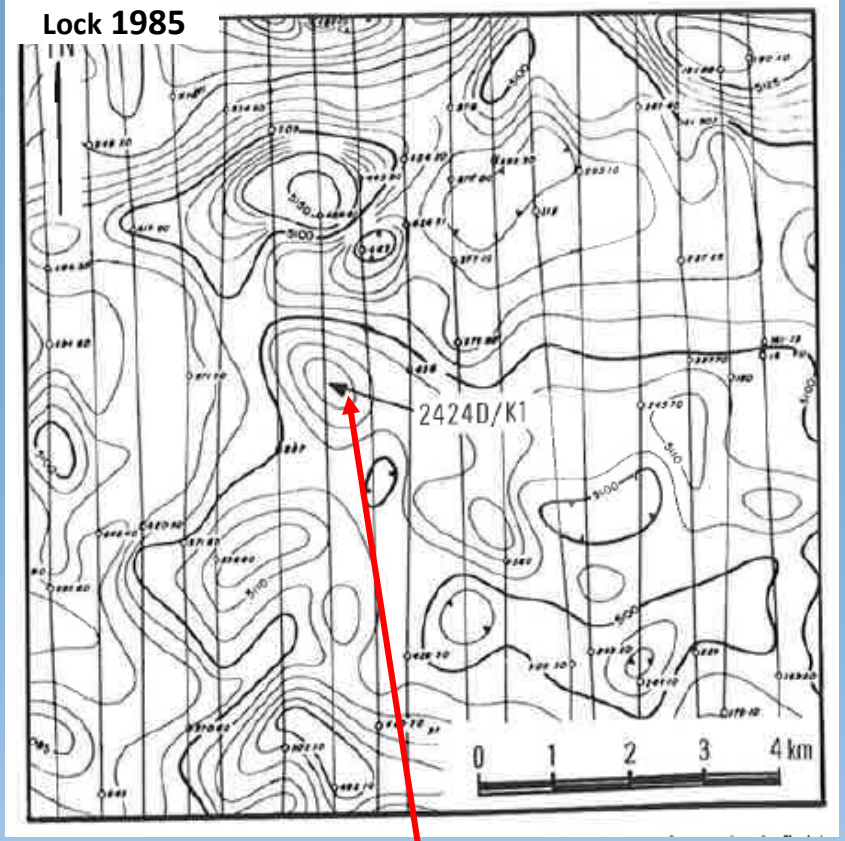
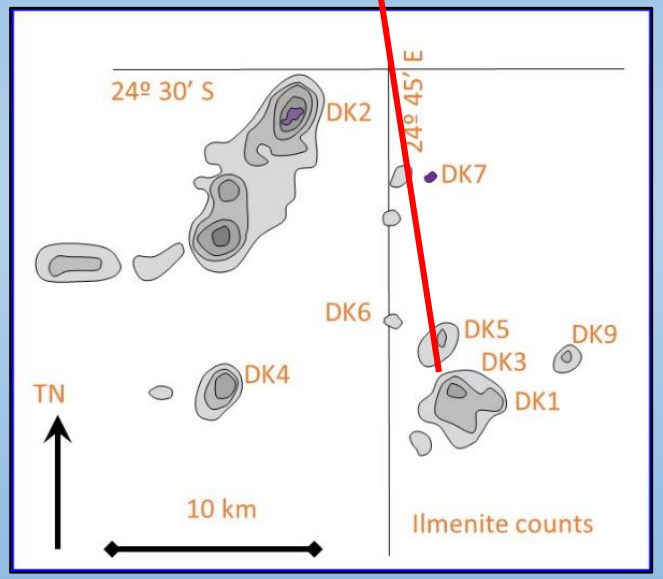


Photo Vercoe





Stuart Vercoe (left), the discoverer and senior geologist, assisted by Norman Lock

Tractor mounted Vole Drill on Malan1 (DK1)

March 1972

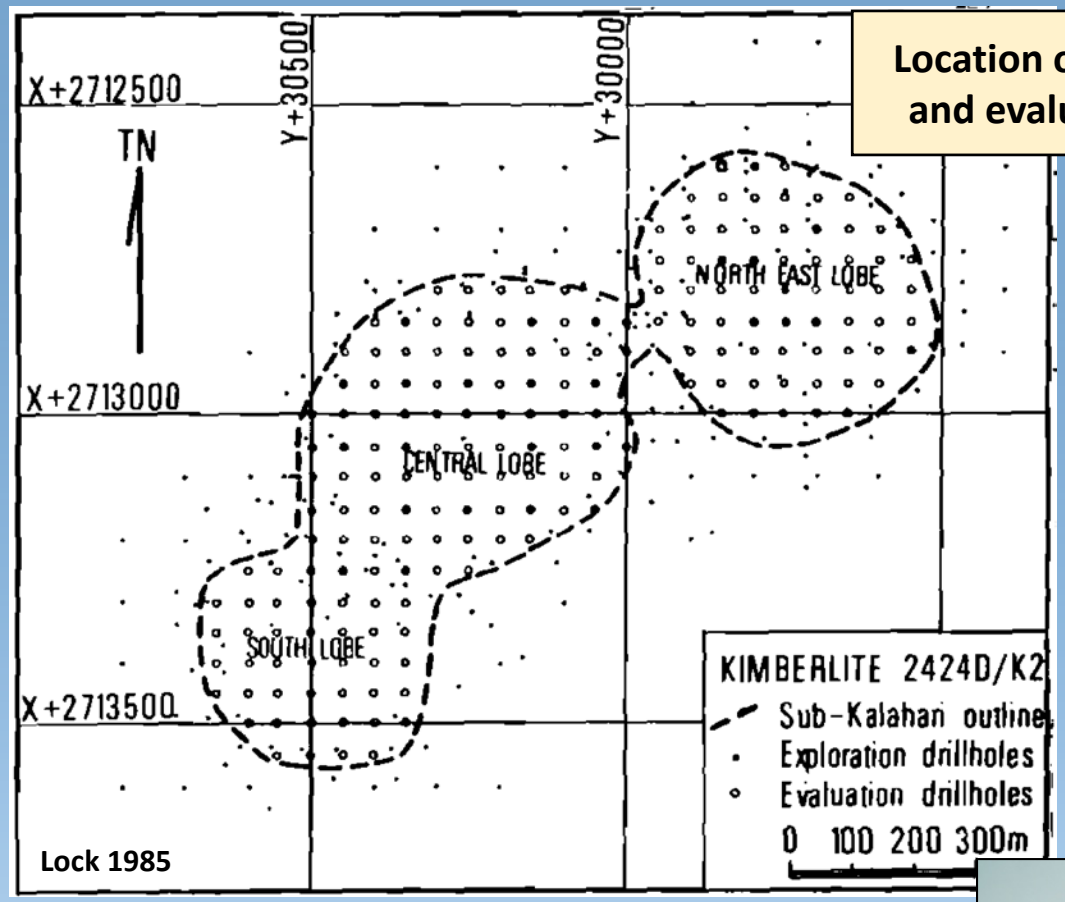
Discovery of Jwaneng

- Malan1 (DK1) the First Jwaneng Kimberlite to be drilled (March)
- Whateley's Wish (DK2) was re-drilled in December and two holes to 46 m and 56 m by the Vole drill (absolute maximum) intersected kimberlite
- Lynn's Luck (DK4) was drilling in Q3 1973
- DK6 in Q3 1975
- DK7 in Q3 1976
- DK9 September 1978
- By mid-1979 (10 years after the first positive soil samples) eleven kimberlites had been found in Jwaneng

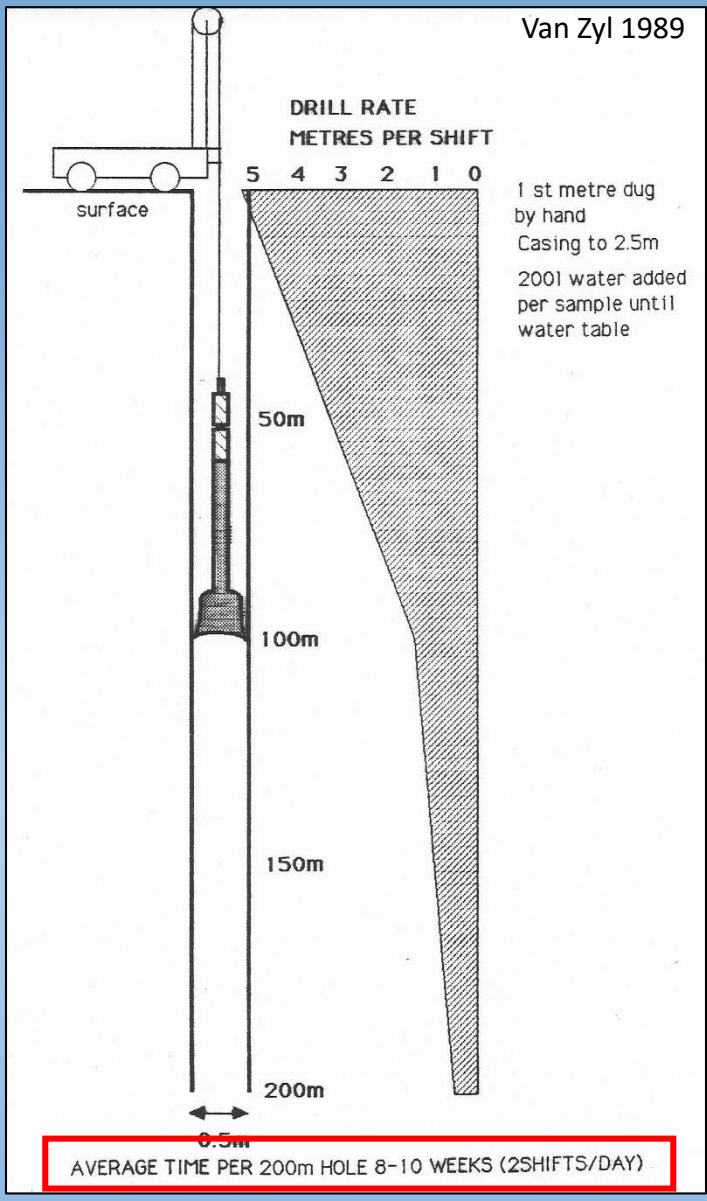
Early 1970s

Jwaneng evaluation

Jwaneng into production in 1982



Location of the exploration and evaluation drill holes



- Jwaneng 1st to use LDD (500mm) - Cable Tool
- It was fine to produce the 1st 8,000 cts – but slow and ……diamond breakage 26%.
- Later replaced by Rotary Percussion Drill (RPD) holes – cluster of 4 of 250 mm. Diamond breakage 8%.

1976

Gold, Base Metals and Diamonds in Botswana

by JW Baldock, JV Hepworth and BS Marengwa

(All Botswana Geological Survey)

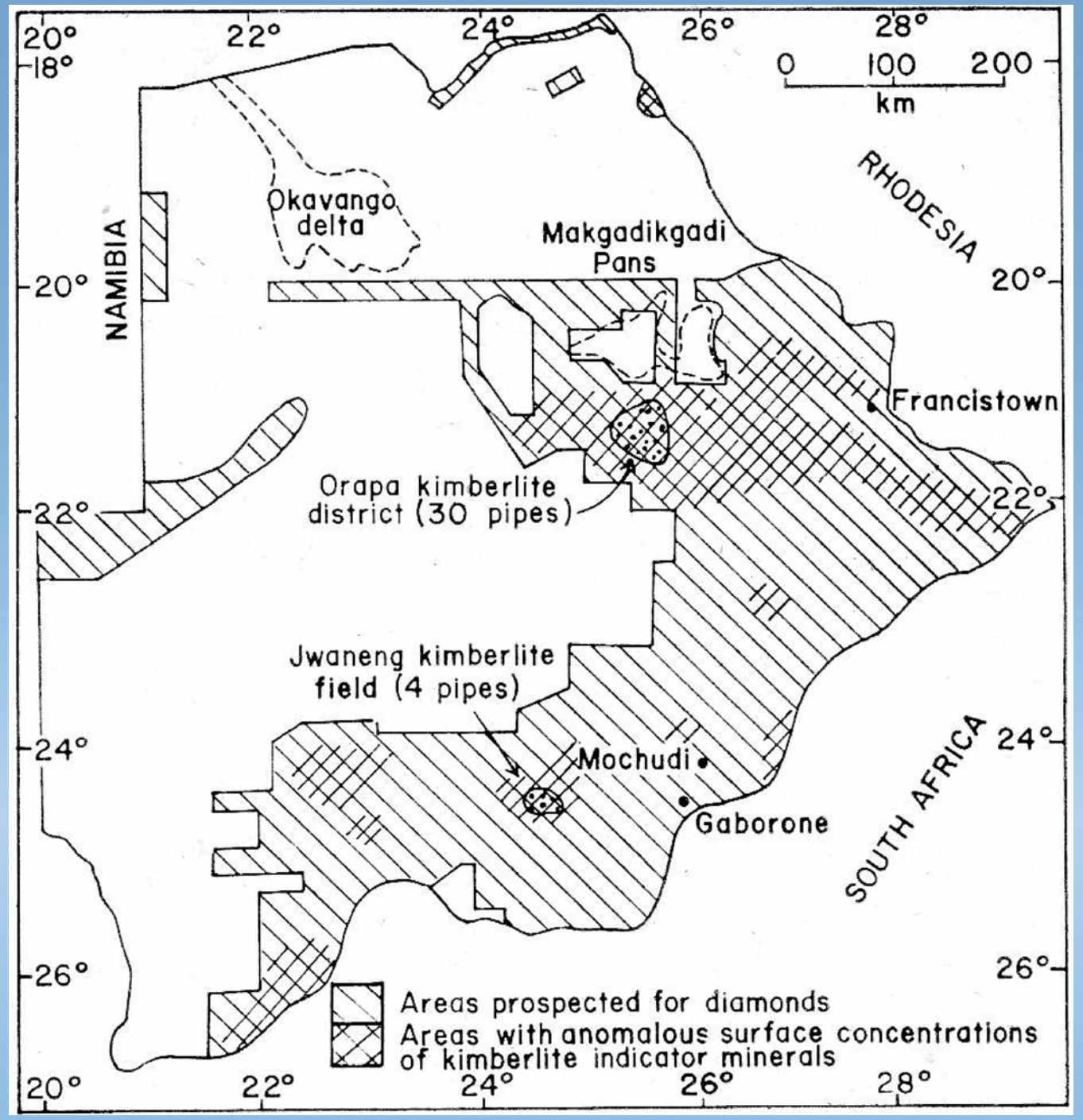
Economic Geology, vol 71, 139 - 156.

On the diamond side the paper highlighted:

- **The two economic diamond occurrences.**
- **Areas covered by soil sampling (all by De Beers) and areas with the presence of indicator minerals from these soil sampling programs.**

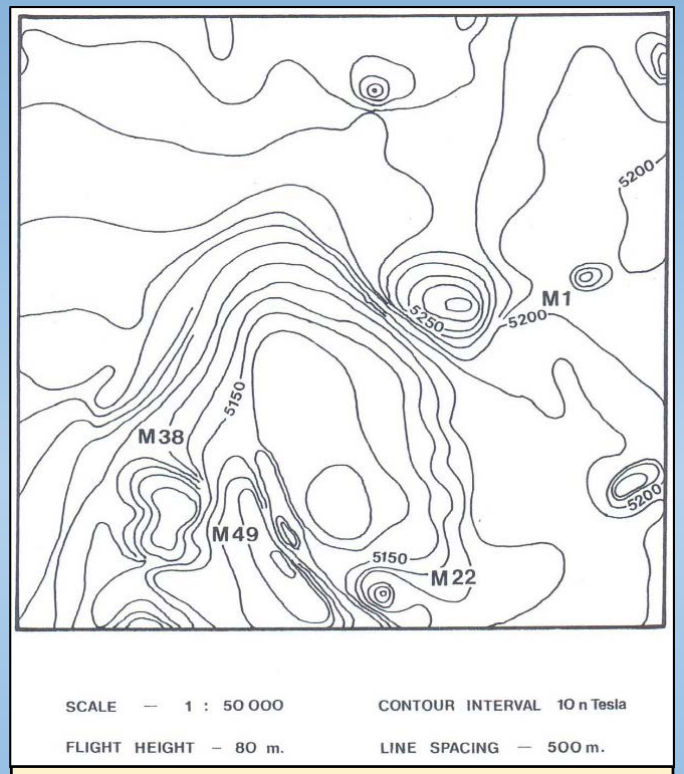
De Beers had already identified the following:

- **1970 – Highly positive samples from the Kang area**
- **1972 – Positive samples in the Tswabong area**

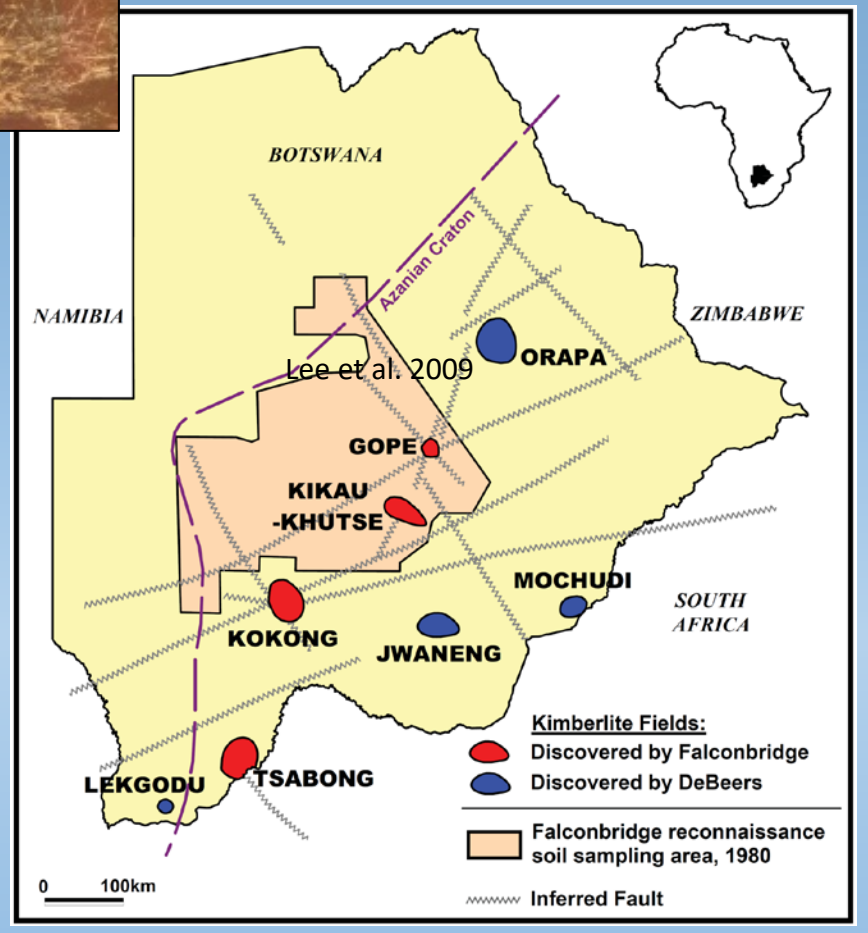


1977

Falconbridge made use of airborne geophysics and helicopter supported soil sampling



AM signature of M1 (Tshabong)



- **1977**
  Falconbridge flew an airborne magnetic survey over the Kokong and Tshabong.
- **1978 discovery of:**
  - **Kokong kimberlites (KN70 with a reputed grade of 10 cpht)**
  - **M1 in Tshabong (Jumper drilling).**
- **Between 1978 and 1982 Falconbridge discovered 62 kimberlites**

1978

The Falconbridge team in Tsabong

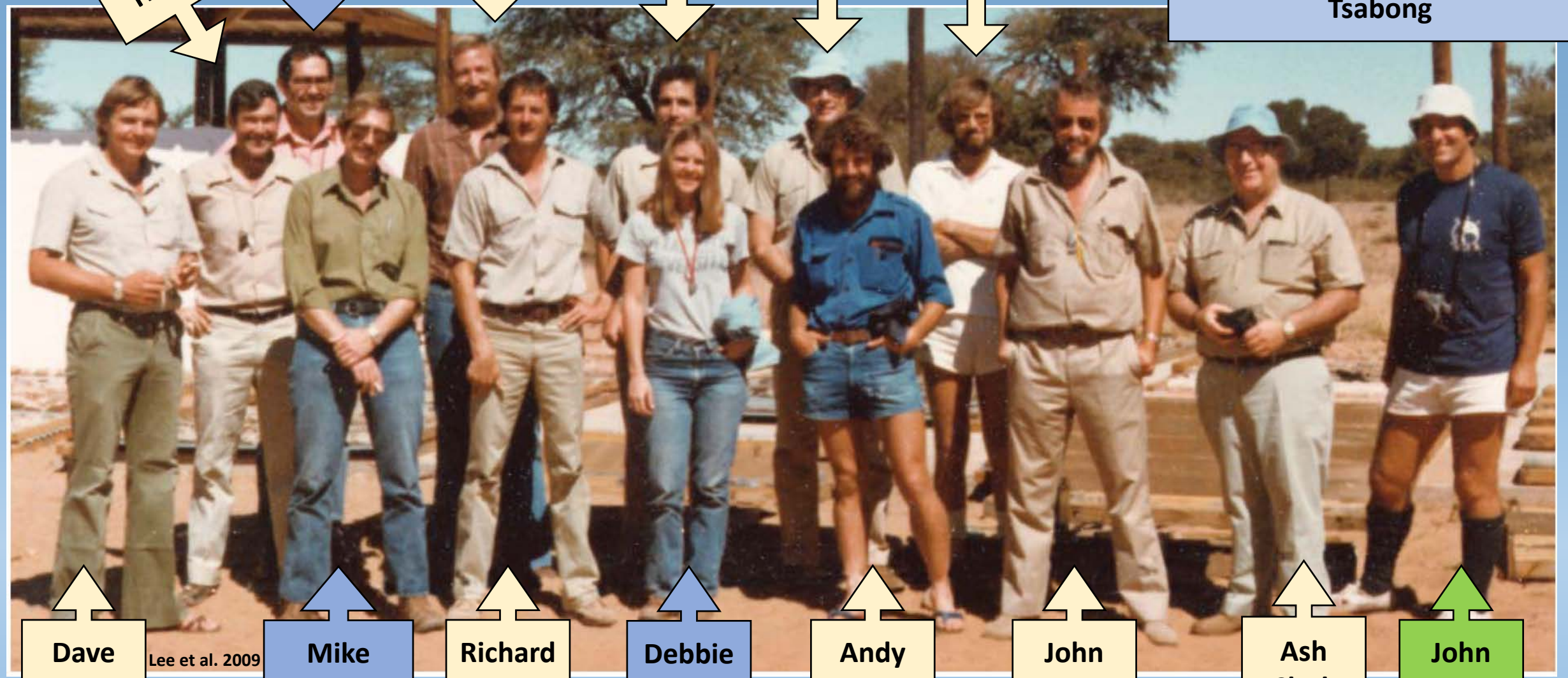


Photo Lee

1980

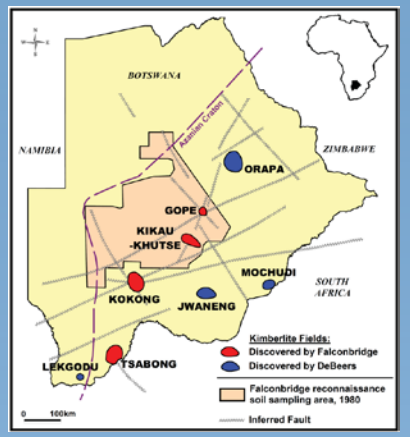
Falconbridge used helicopter supported sampling program in the CKGR and found Gope 25 (Ghaghoo)

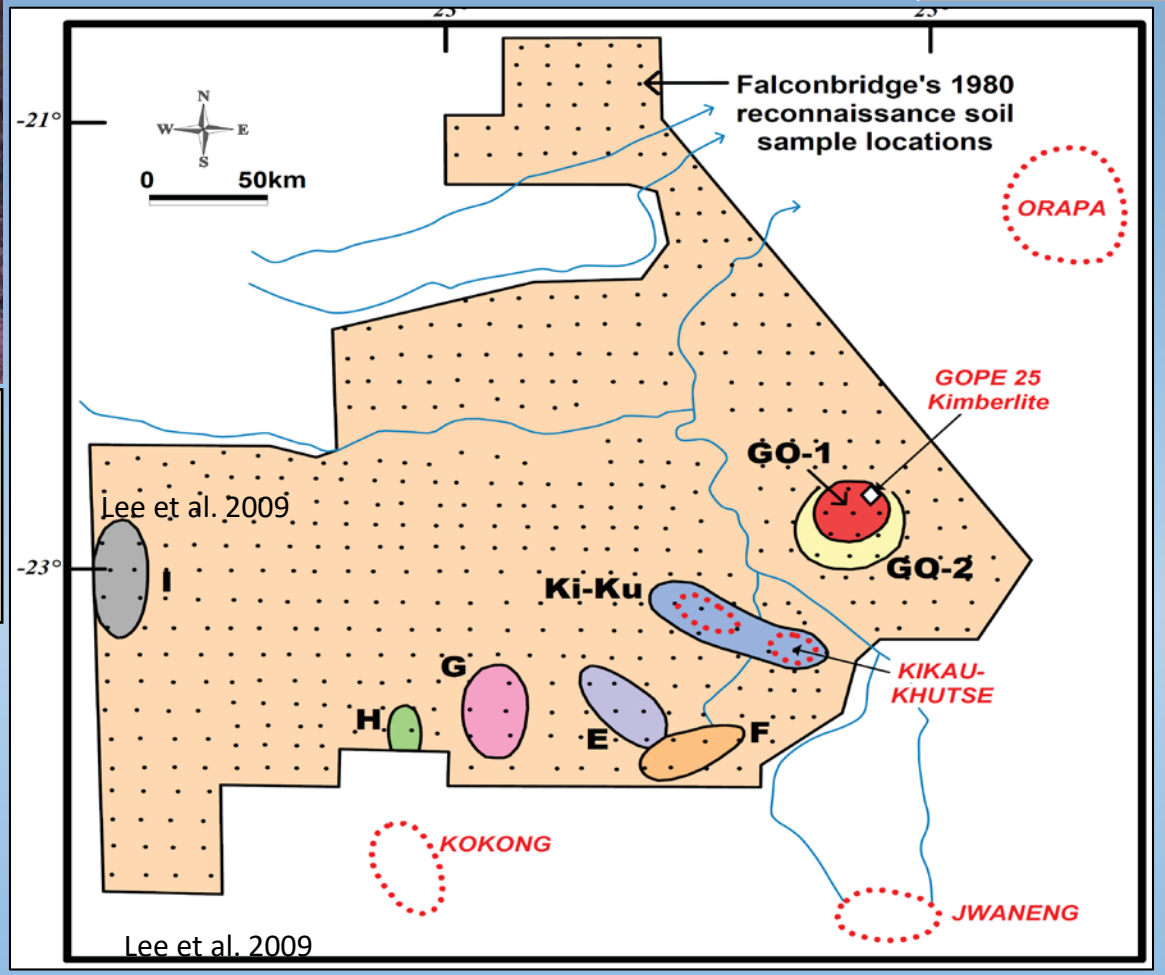
Photo Moore

- They covered 78 500 km²
- Some 470 samples, on a 13 x 13 km grid (1SS/165km²)
- 20 kg unscreened: Screened in the camp at 0.42 and 0.25 mm
- Gope anomaly expressed on only 4 ilmenites (1C & 3F)

1981

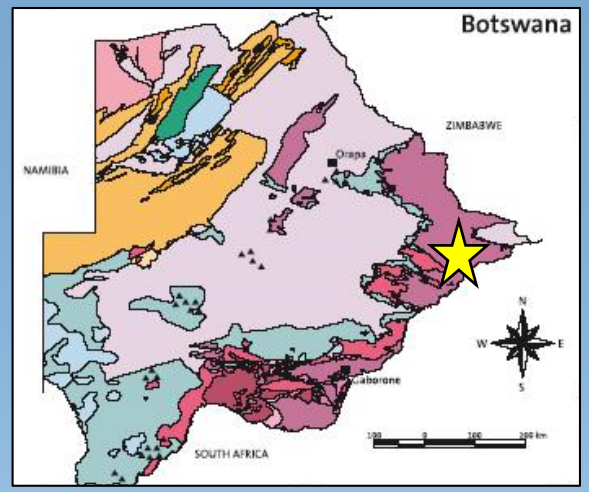
- Discovery of Gope
- 80 m of Kalahari cover
- Using Rotary Reverse Circulation drilling technique from Canada



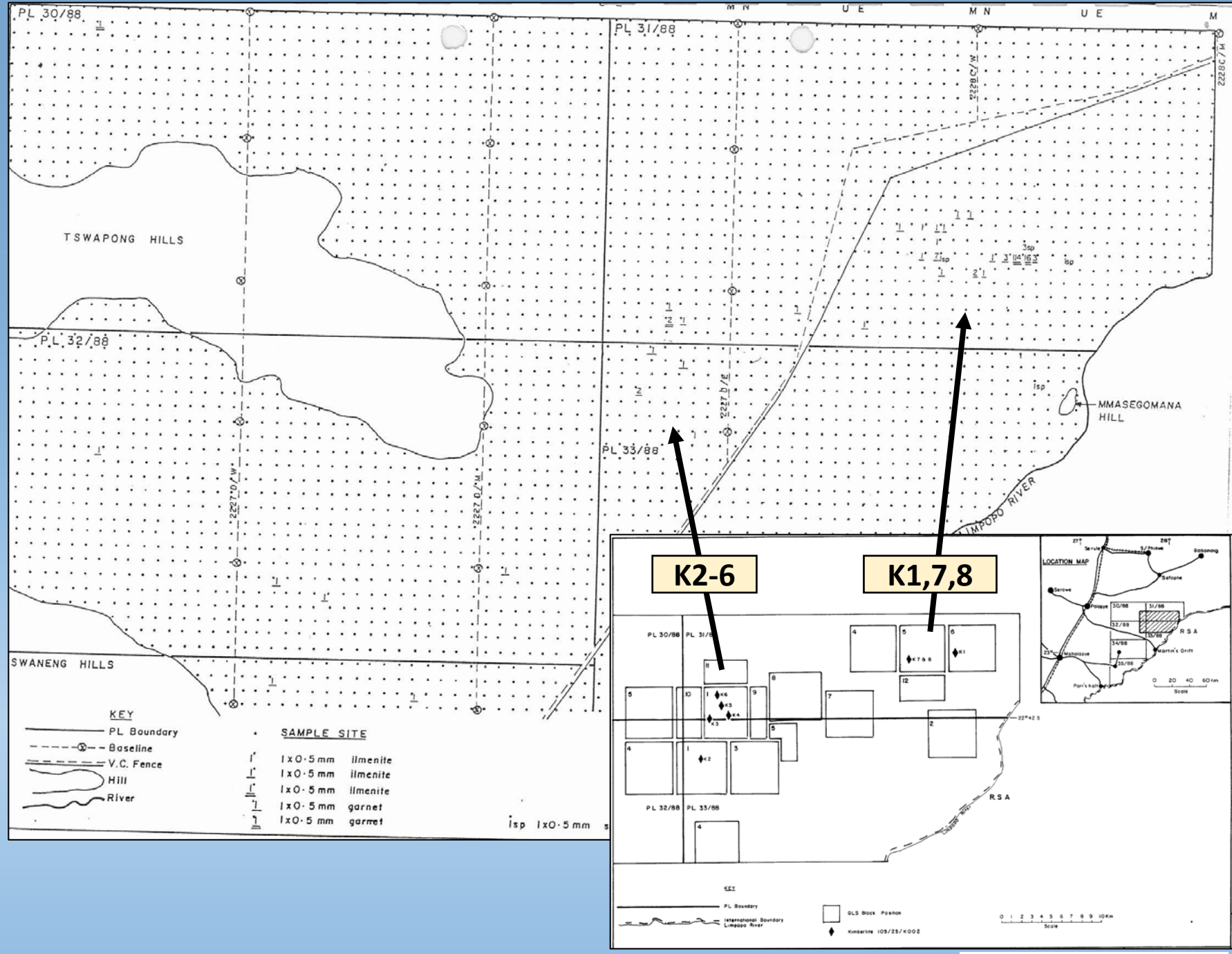


1991

Discovery of Lerala (Martin's Drift) kimberlites



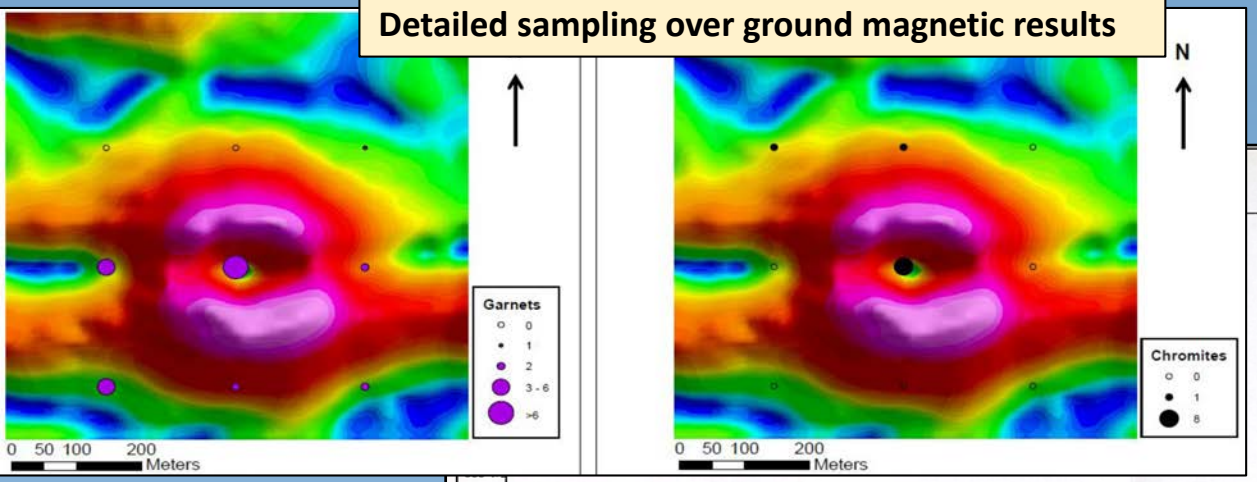
- Two Kim groups: K2-6 & K1,7,8
  - K2-6 – Garnet dominated
  - K1,7,8 – Contain some ilmenite
- Thin residual soil
- Reconnaissance sampling
  - Equivalent to 1 km²
  - Very restricted Kim anomalies
    - K2-6 Garnet only (some spinel)
    - K1,7,8 Ilmenite and Garnet



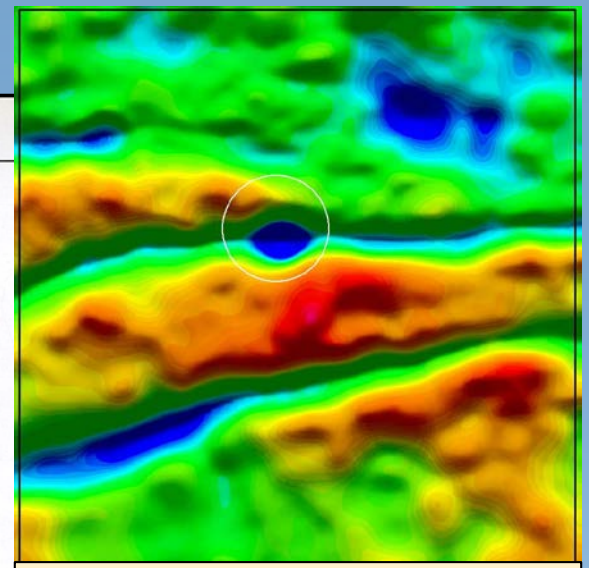
Maps supplied by AAC/DB

2007 Discovery KX36

Detailed sampling over ground magnetic results

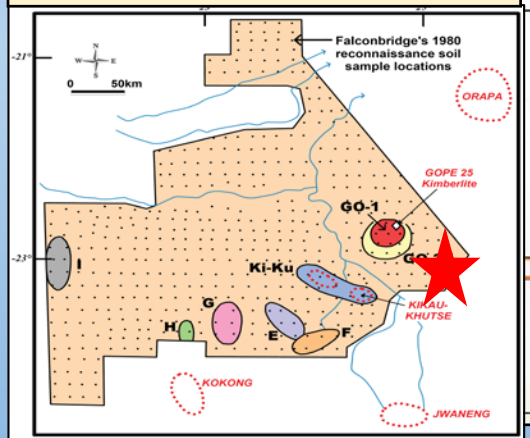


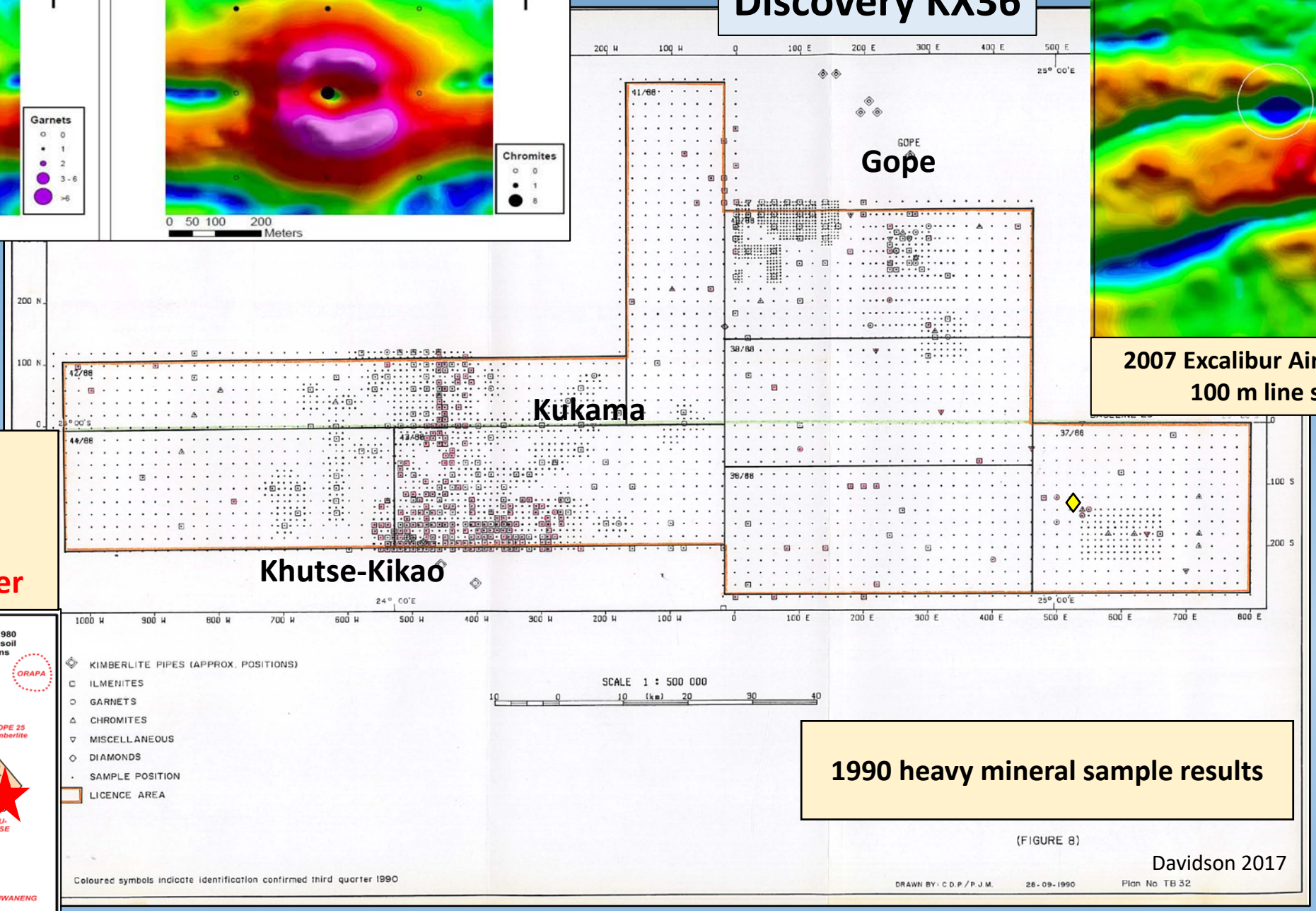
Rogers et al. 2013



2007 Excalibur Airborne Mag – 100 m line spacing

Fact sheet:
5 ha
30-40 cpht
78 m of Kalahari cover



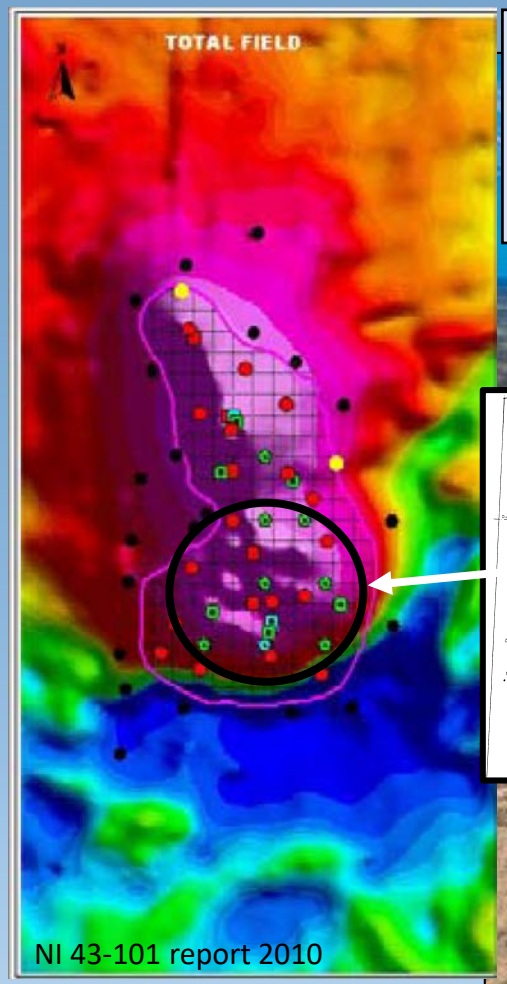


1990 heavy mineral sample results

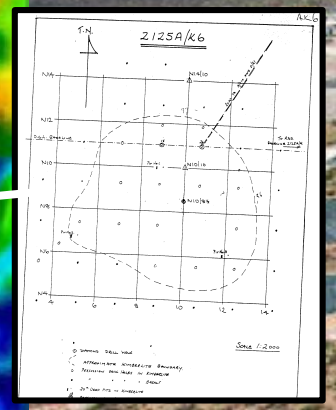
Davidson 2017

2000s

Reassessment of known kimberlites such as AK06



NI 43-101 report 2010



Discovered in 1969	Size	Estimated grade
Initial assessment early 1970s	3.3 ha	3.5 cpht
Revisited in 2003	9.5 ha	25 cpht (based on 97t)

Other kimberlites include: AK08, AK 09, AK11, BK2, BK5, BK11, BK16

342 ct

2012 onwards

Metallurgical developments of Karowe Mine

Mined since late 2012
Approaching 2 mcts
3242 stones > 10.8 ct
145 diamonds > US$1m
51 diamonds between 100 – 199 ct
17 diamonds between 200 – 299 ct
5 diamonds > 300 ct


9.46 ct

Fact sheet:
10.4 ha
27 cpht
80 m of Kalahari cover

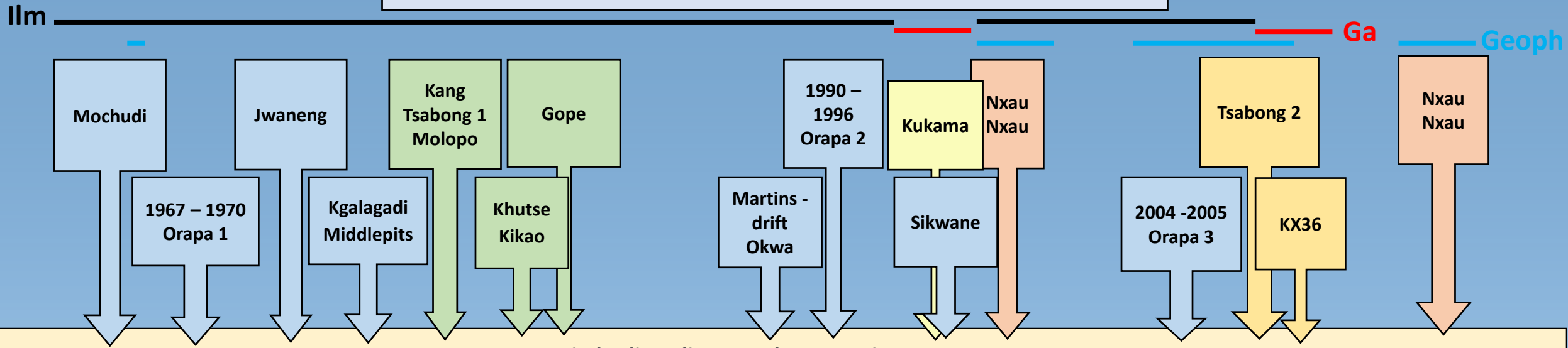
2014

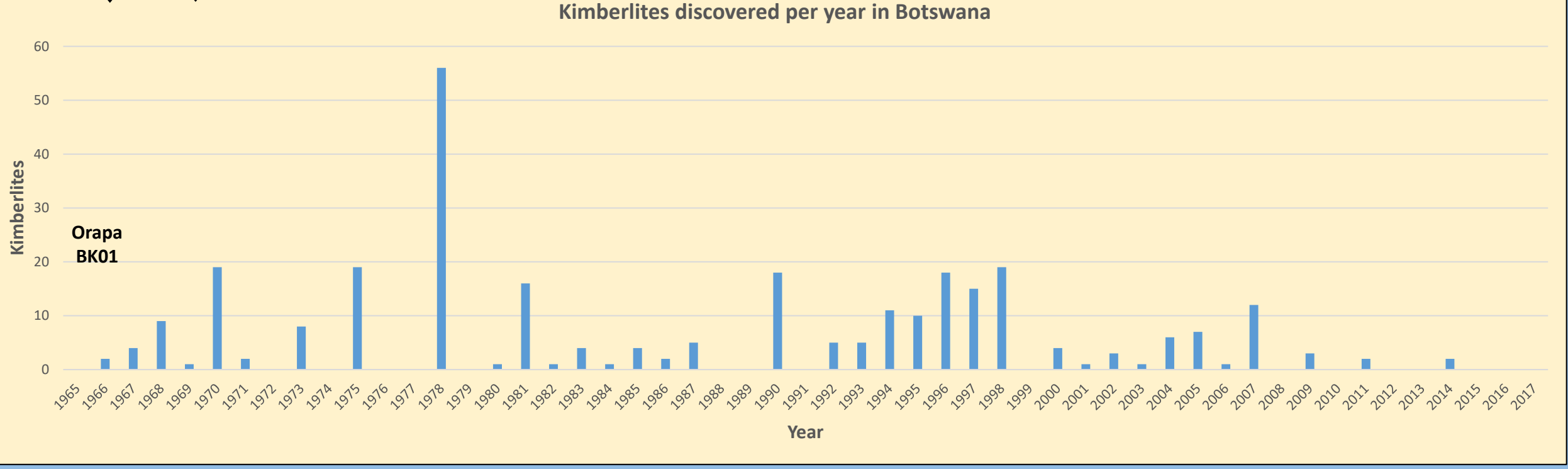
Opening of Ghaghoo mine

Brief history

1981 Discovered by Falconbridge as Gope25
2007 Acquired by GEM Diamonds Ltd
2014 Official opening as 1st underground mine in Botswana
2017 Put on Care & Maintenance

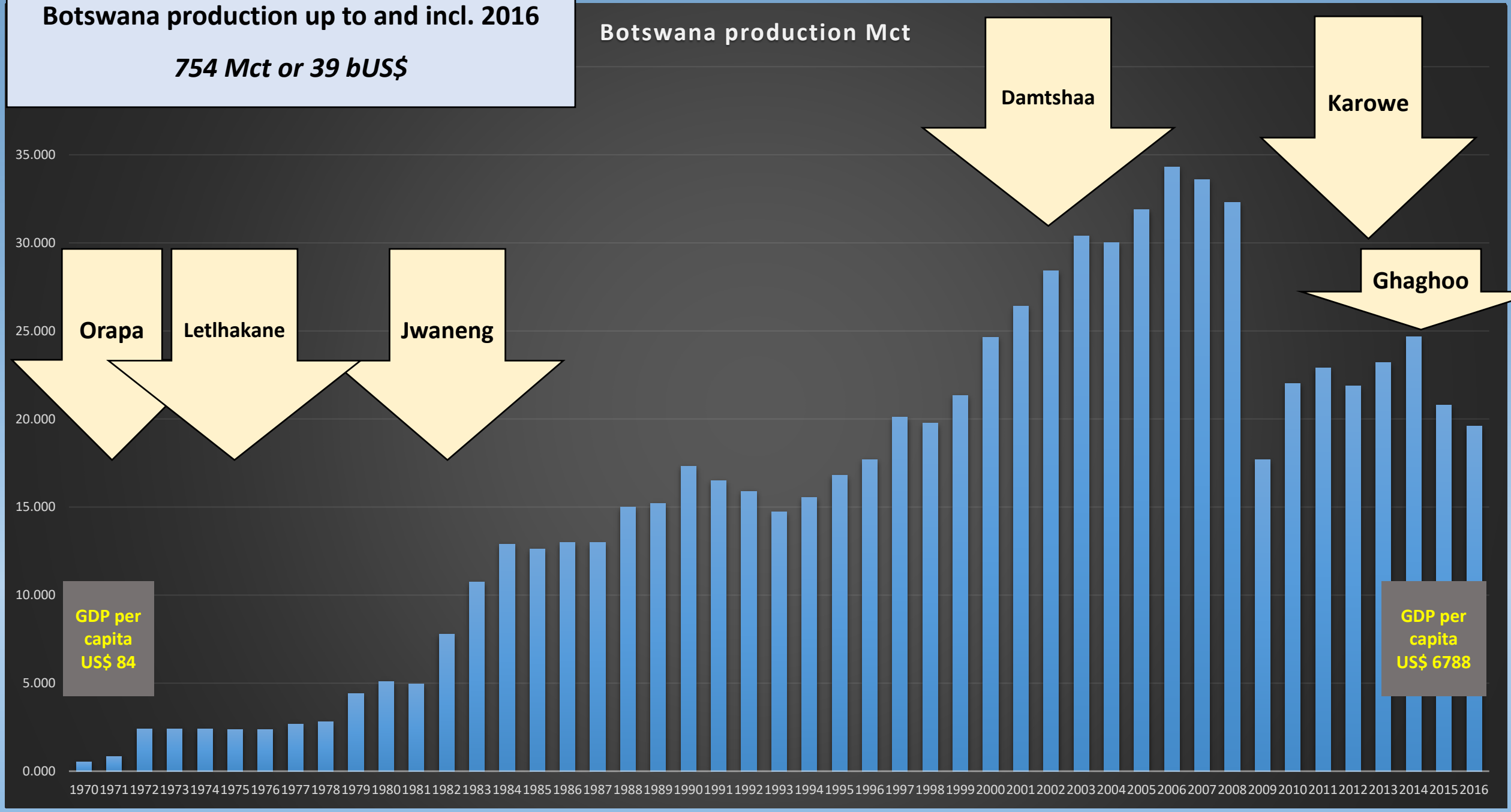
Discovery of Botswana kimberlites per year





Botswana production up to and incl. 2016

754 Mct or 39 bUS$

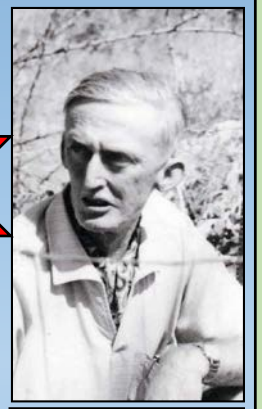


Prospecting History leading to the discovery of Botswana's diamond mines: from artefacts to Lesedi La Rona

A summary of some of the historical facts relating to this talk:

- **1896: Diamond exploration started**
- **1938: 1st diamond found**
- **1966: 1st Kimberlite-like intrusion found**
- **1967: 1st Kimberlite found (BK01)**
- **1967: 1st Economic kimberlite pipe (AK01) found**
- **1968: 1st Airborne Geophysical Survey flown**
- **1969: AK06; DK01 (Leth.); BK12, BK15 (Dam.) found**
- **1971: DK02 (Leth.); BK09 (Dam.); BK11 discovered**
- **1972: Jwaneng discovered (1982)**
- **1981: Gope 25 (Ghaghoo) found**
- **1991: Lerala kimberlites discovered**
- **2002: Damtshaa opened (2015)**
- **2007: KX36 drilled**
- **2010: Trial mining BK11 (2012)**
- **2012: Karowe opened**
- **2014: Ghaghoo opened (2017)**

Link 1



Link 2

The people largely responsible of where we are today in Botswana are people with vision and innovative thinking:

- **Alex du Toit** - his insight of the geomorphology of Botswana and his believe that diamonds would be present there based on the geology.
- **Gavin Lamont** – his innovative sampling and sample treatment methods, and following up on Du Toit's ideas.
- **Chris Jennings** – his innovative way of covering large areas fast by airborne geophysics and helicopter sampling; and introducing vastly improved drilling methods.

NB: Alex and Gavin had known each other, and Gavin and Chris had shared experiences, each of them building on each others knowledge base.

So where from here?

1. Sampling

Use finer grain-sizes to locate Group 2 and Ilmenite-poor Group 1 kimberlites.

2. Geophysics

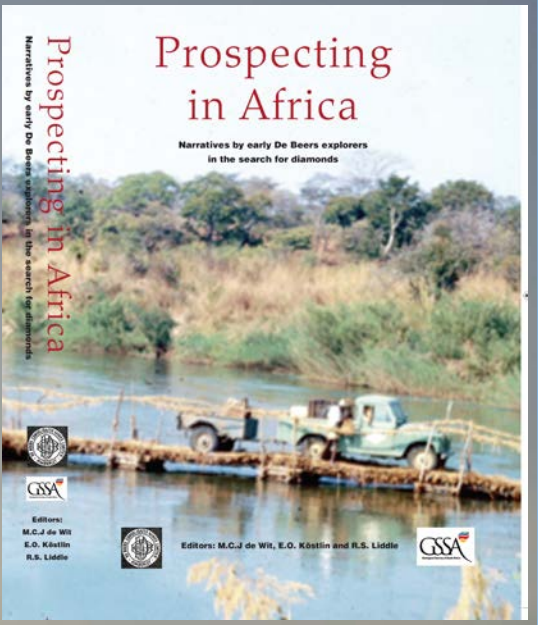
Integrated datasets
Airborne gravity/EM/QUID

3. Drilling

Capacity to drill at lower cost; sample Kalahari-bedrock interface

But above all:

- ***Innovative thinking***
- ***Trying new things like the three gentlemen did before us***



Ke a leboga