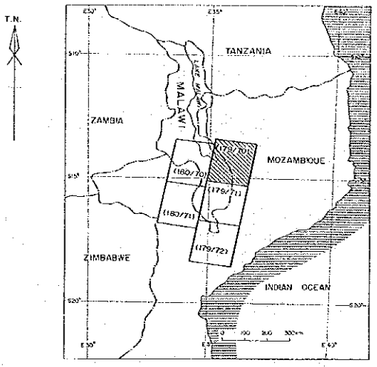
REPORT ON THE COOPERATIVE MINERAL EXPLORATION
IN THE CHILWA ALKALINE AREA, REPUBLIC OF MALAWI (PHASE I) MARCH '87

E 35°30'
E 36°00'
E 36°30'
S 14°00'
S 14°00'
E 35°00'
S 14°30'
S 15°00'
LAKE MALAWI
MOZAMBIQUE
MANGOCHI
LAKE MALOMBE
LAKE CIUTA
Chifoli
Kongwe

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

RESULT OF LANDSAT IMAGE PHOTOGEOLOGICAL INTERPRETATION (SHIRE VALLEY)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0 10 20km

Scale 1 : 250,000

E 35°30'
E 36°00'
E 36°30'
S 14°00'
S 14°30'

MOZAMBIQUE

MANGOCHI

LAKE MALOMBE

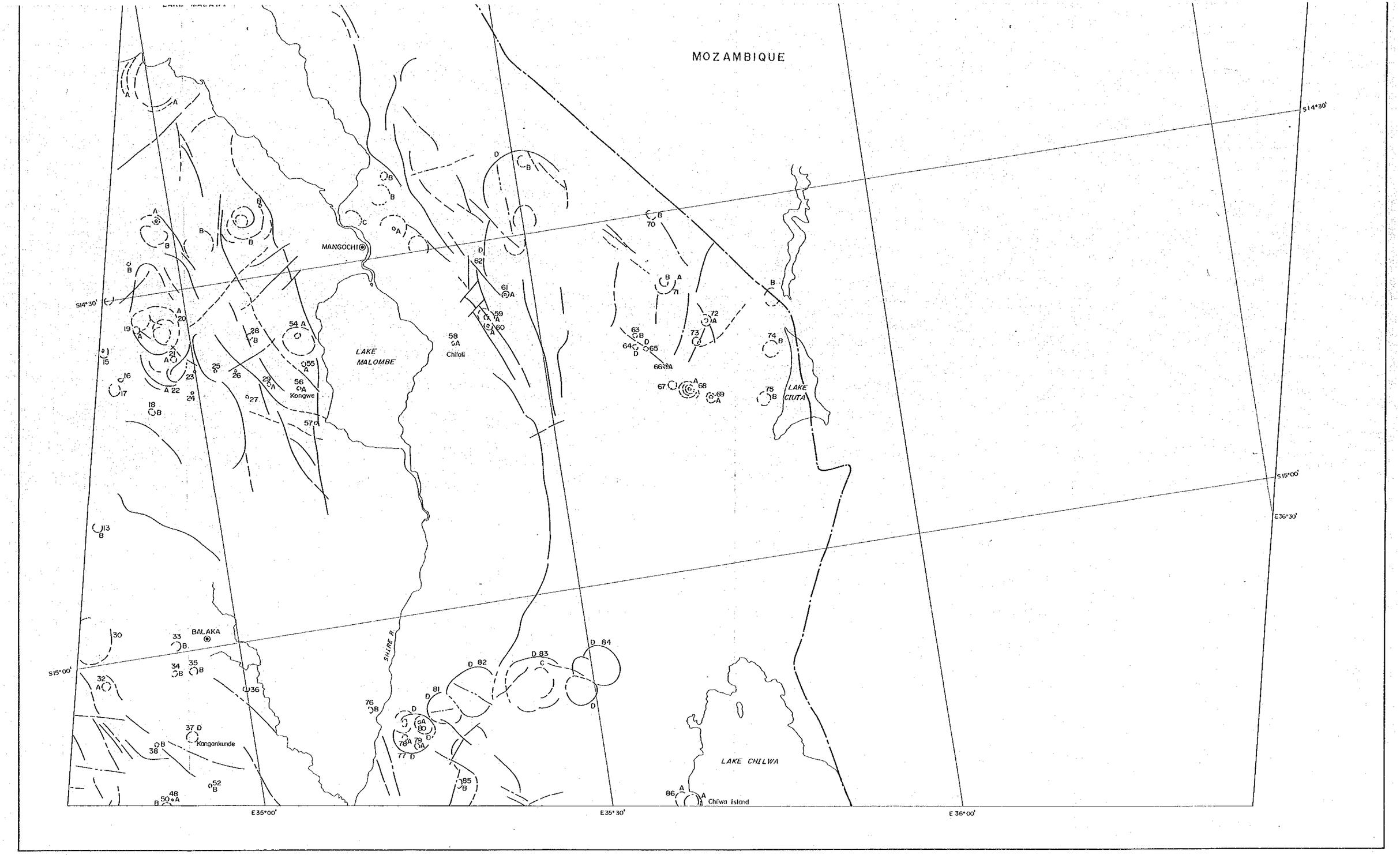
Chiloli

LAKE CIUTA

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure


MOZAMBIQUE
S14°30'
S15°00'
E35°00'
E35°30'
E36°00'
E36°30'
MANGOCHI
LAKE MALOMBE
Chiloli
Kongwe
LAKE CIUTA
BALAKA
SHIRE R.
Kangankunde
LAKE CHILWA
Chilwa Island

MOZAMBIQUE

S14°30'

S15°00'

E35°30'

E36°00'

E36°30'

LAKE MALOMBE

LAKE CHIUTA

LAKE CHILWA

SHIRE R.

Chiloli

Chilwa Island

LEGEND

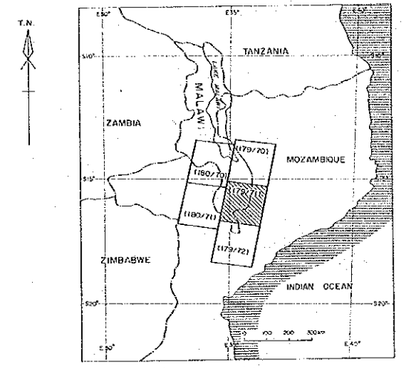
- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure

E35°00'
E35°30'
E 36°00'
S15°30'
S16°00'
E 34°30'
Kangankunde
Chilwa Island
LAKE CHILWA
ZOMBA
BLANTYRE
PHALOMBE
Nkalonje
Tundulu
Songwe
Nsmangale
SHIRE R.
MOZAMBIQUE

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

RESULT OF LANDSAT IMAGE PHOTOGEOLOGICAL INTERPRETATION
(BLANTYRE)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

FEBRUARY 1987

0 10 20km

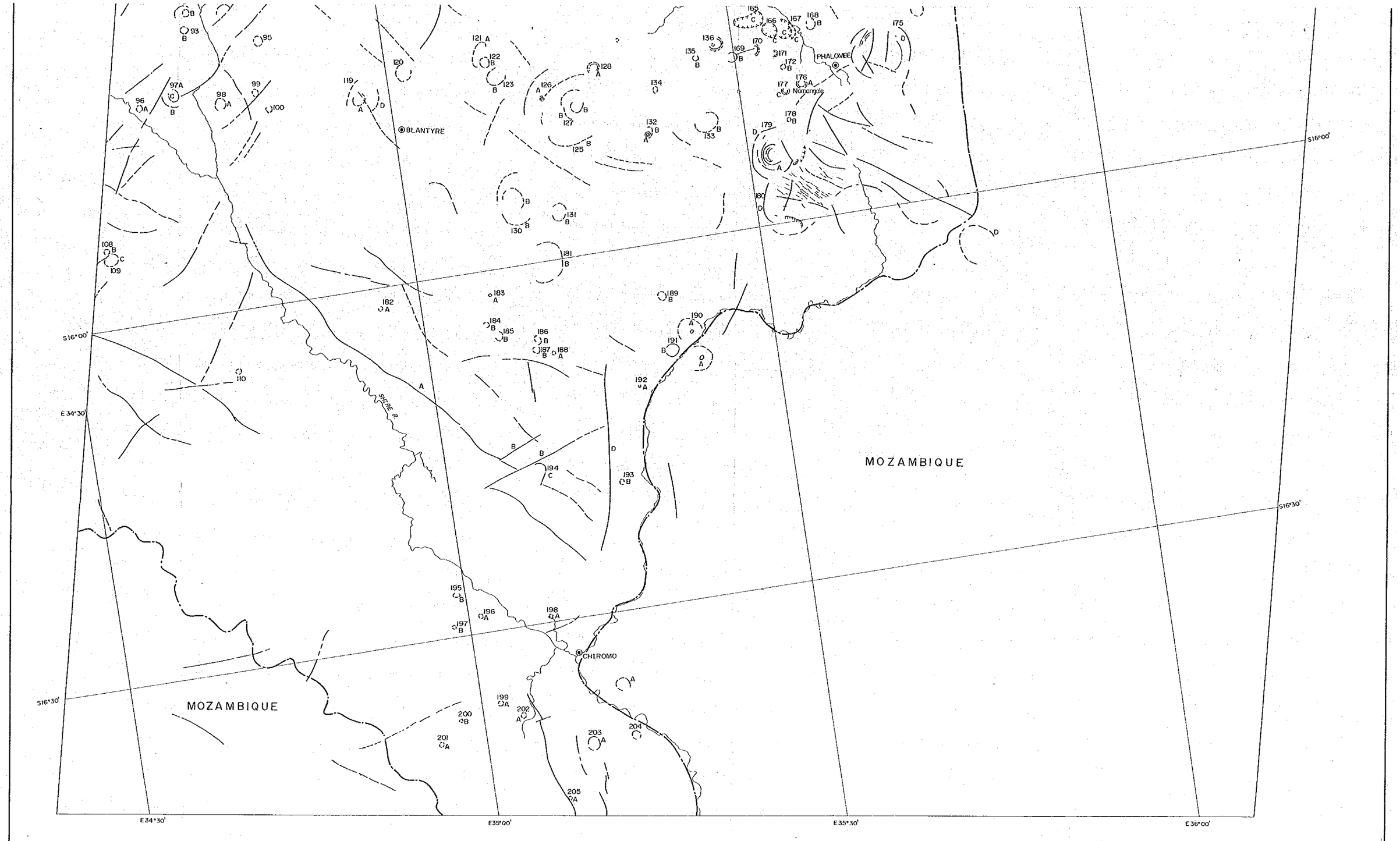
Scale 1 : 250,000

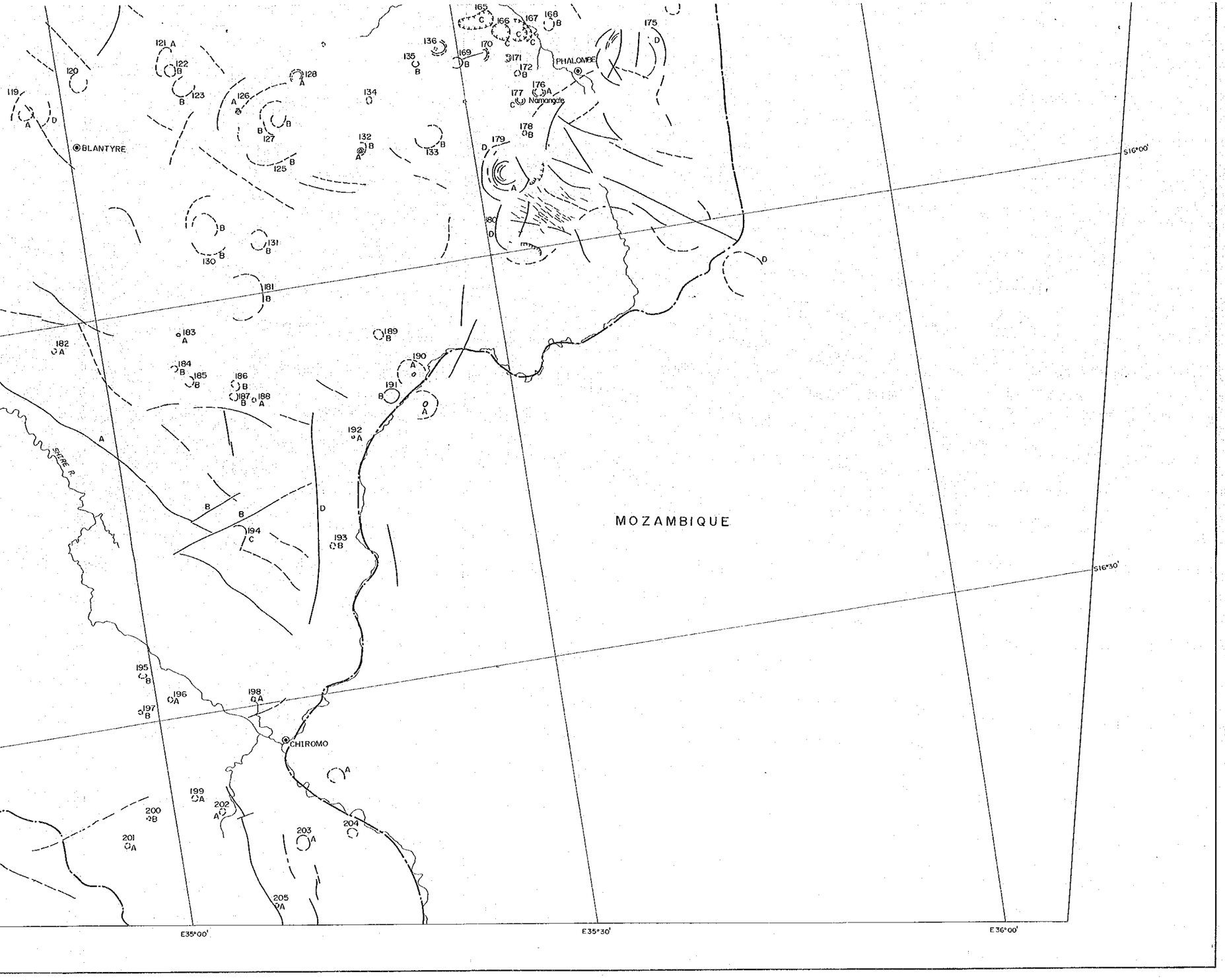
E35°30'
E36°00'
S15°30'
S16°00'
Chilwa Island
LAKE CHILWA
ZOMBA
BLANTYRE
Tundulu
Nkolonje
Songwe
PHALOMBE
Namangale
SHIRE R.
MOZAMBIQUE

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure


BLANTYRE
PHALOMBE
Namangale
CHIROMO
SHIRE R.
MOZAMBIQUE
MOZAMBIQUE
S16°00'
S16°30'
E 34°30'
E35°00'
E35°30'
E 36°00'



LEGEND

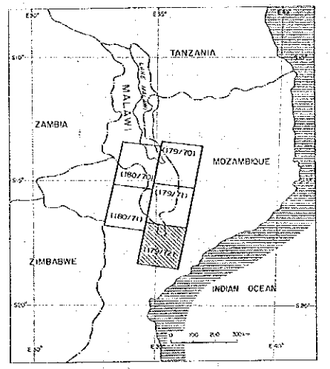
- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure


E34°30'
E35°00'
E35°30'
S16°30'
S17°00'
S17°30'
E34°00'
195
B
196
A
197
B
198
A
CHIROMO
199
A
200
B
201
A
202
A
203
A
204
205
A
206
A
B
D
C
MOZAMBIQUE
MOZAMBIQUE

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

RESULT OF LANDSAT IMAGE PHOTOGEOLOGICAL INTERPRETATION (BLANTYRE – 2)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

FEBRUARY 1987

0 10 20km

Scale 1 : 250,000

E35°00' E35°30' S16°30' S17°00' S17°30'

MOZAMBIQUE

MOZAMBIQUE

CHIROMO

195 196 197 198 199 200 201 202 203 204 205 206

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure

MOZAMBIQUE

206

S17°00'

S17°30'

E34°00'

S18°00'

E34°30'

E35°00'

E35°30'

MOZAMBIQUE

LEGEND

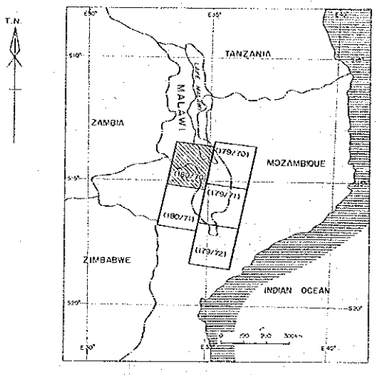
- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Sfructure
D : Cone Structure

E 34°00'
E 34°30'
E 35°00'
MOZAMBIQUE
LAKE MALAWI
S14°00'
LILONGWE
S14°00'
E33°30'
S14°30'
S14°30'

COOPERATIVE MINERAL EXPLORATION IN THE CHILWA ALKALINE AREA, REPUBLIC OF MALAWI (PHASE I)

RESULT OF LANDSAT IMAGE PHOTOGEOLOGICAL INTERPRETATION (MONKEY BAY)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0 10 20km

Scale 1 : 250,000

E 34°00'
E 34°30'
E 35°00'
S 14°00'
S 14°30'
MOZAMBIQUE
LAKE MALAWI

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure

S14°00'

E33°30'

S14°30'

S15°00'

E33°30'

E34°00'

E34°30'

MOZAMBIQUE

S14°30'

E35°00'

S15°00'

BALAKA

Kanganku nde

MOZAMBIQUE

S14°30'

S15°00'

E34°00'

E34°30'

E35°00'

BALAKA

Kangonkunde

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure


E 33°30'
E 34°00'
E 34°30'
S 15°30'
S 16°00'
E 33°00'
MOZAMBIQUE
SHIRE R.
Mlindi
MWANZA
38
39
52
48
49
50
51
53
40
41
42
43
44
45
46
47
87
88
89
90
91
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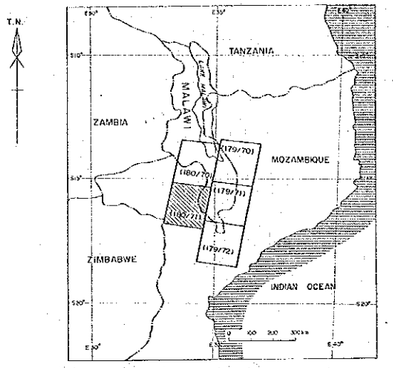
PL. I – 5

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

RESULT OF LANDSAT IMAGE PHOTOGEOLOGICAL INTERPRETATION
(ZOBUE)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0 10 20km
Scale 1 : 250,000

E 34°00'
E 34°30'
S 15°30'
S 16°00'
MOZAMBIQUE
Mlindi
MWANZA
SHIRE R.
SHIRE R.

LEGEND

- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure

MOZAMBIQUE

S15°30'

E33°00'

S16°00'

S16°30'

E33°00'

E33°30'

E34°00'

E34°30'

SHIRE R.

96A

97A B

98 A

99 C

100

101 B

102

103 B B

104 C

105 B

106

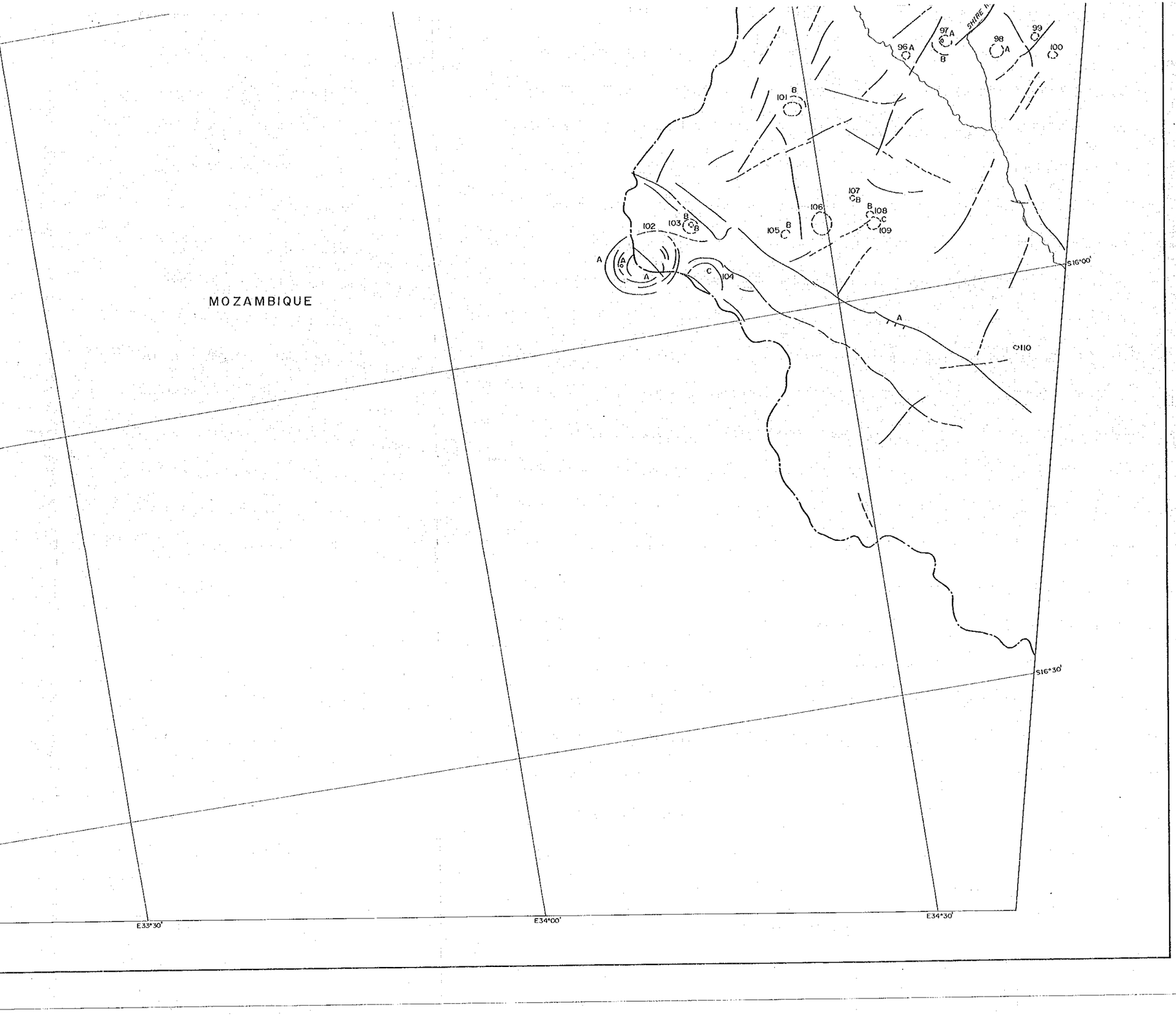
107 B

108 B C

109

110 A

A A A



LEGEND

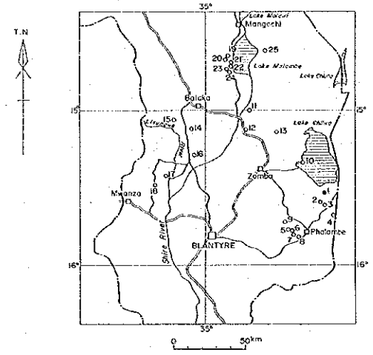
- Circular Structure (Clear)
- Circular Structure (Dim)
- Lineament (Clear)
- Lineament (Dim)
- Basin Structure
- International Boundary

A : Projected Ring Structure
B : Depressed Ring Structure
C : Basin Structure
D : Cone Structure

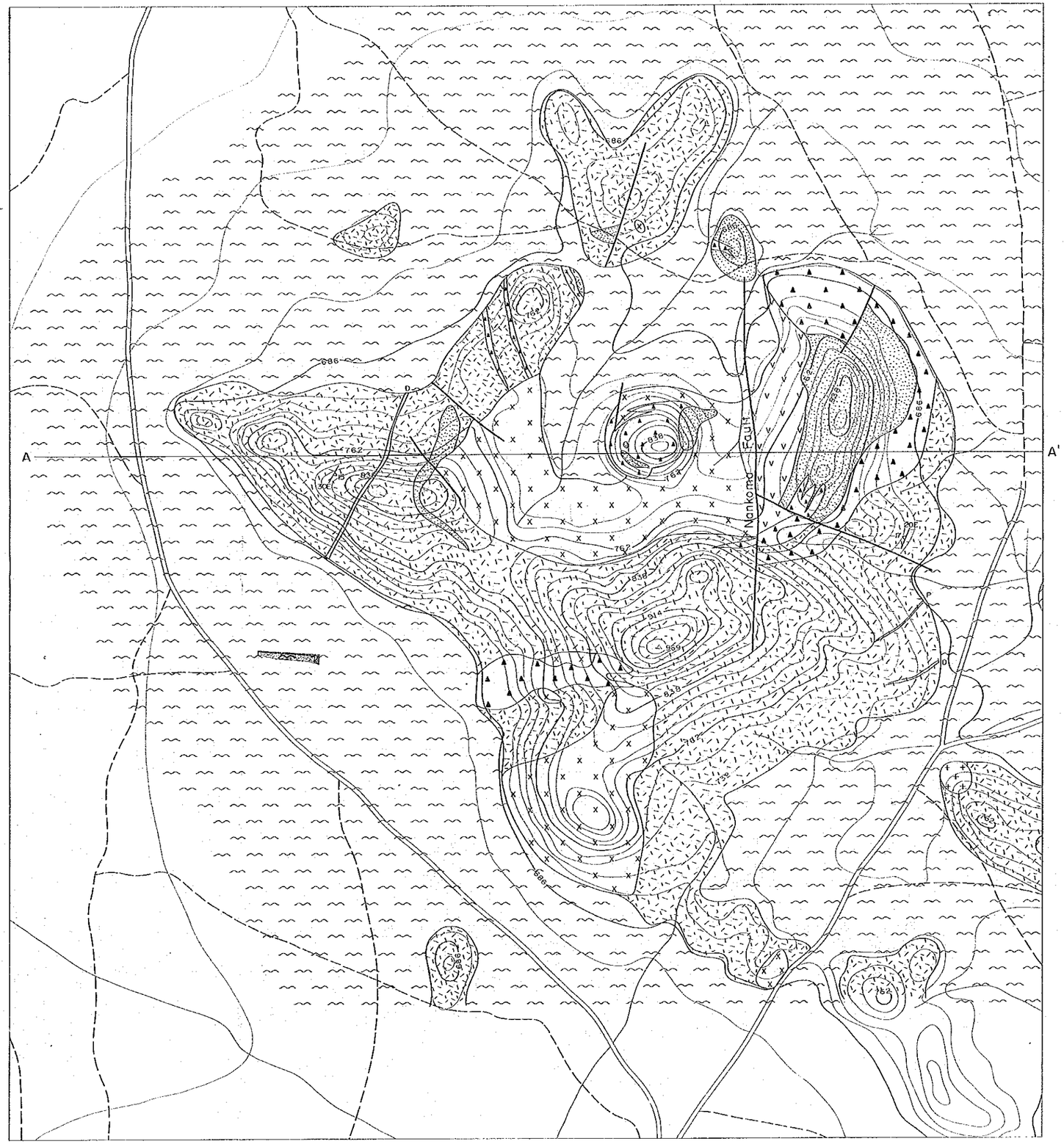
PL. 2-1

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Tundulu (I)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

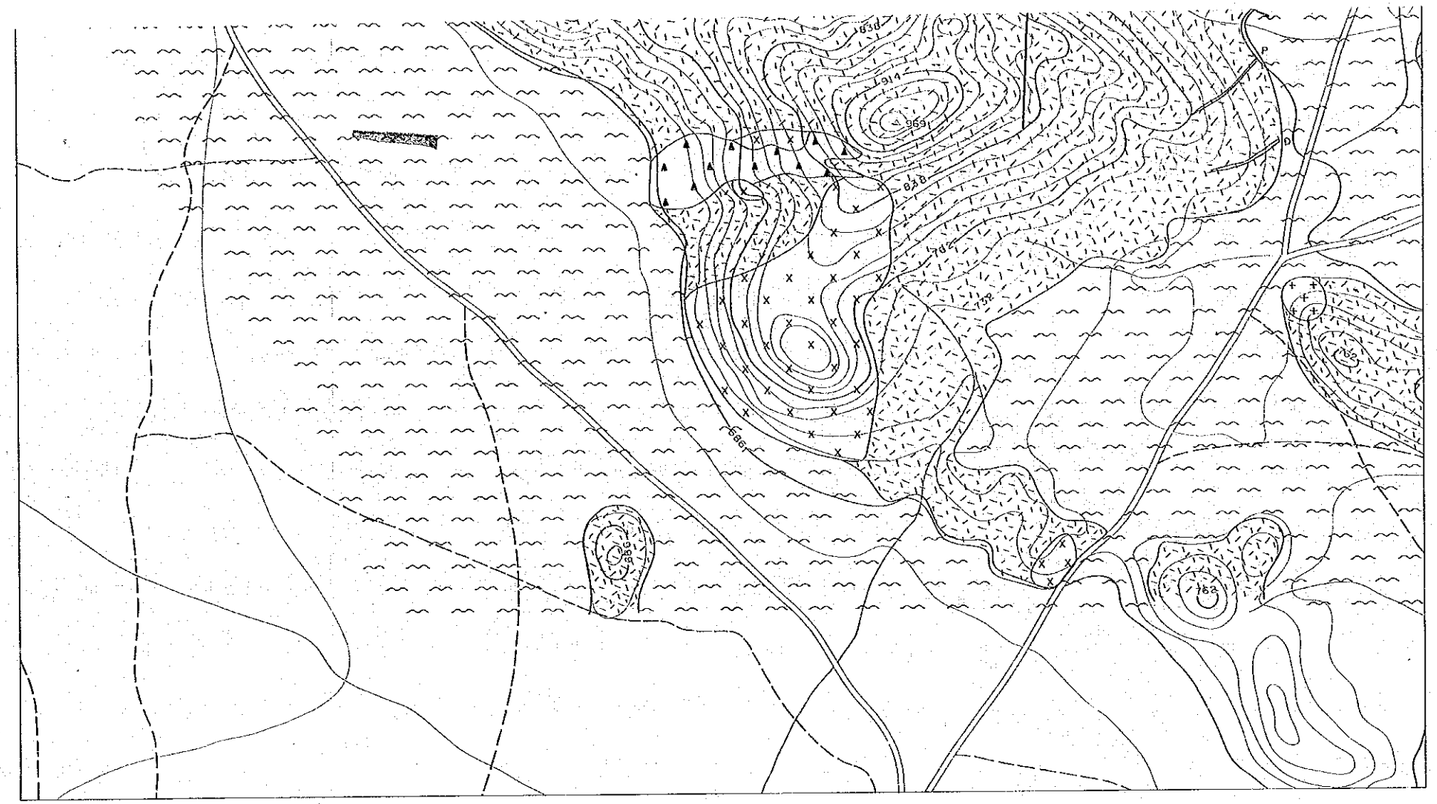


0m 500m 1,000m

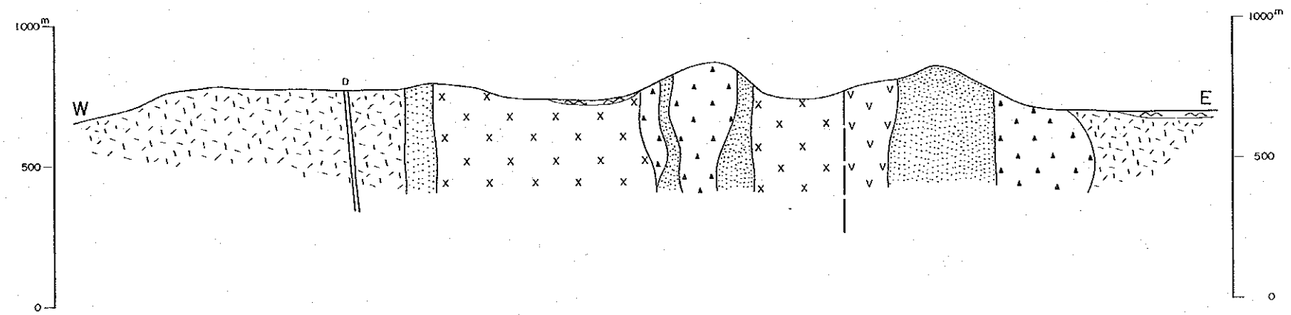
Scale 1 : 10,000

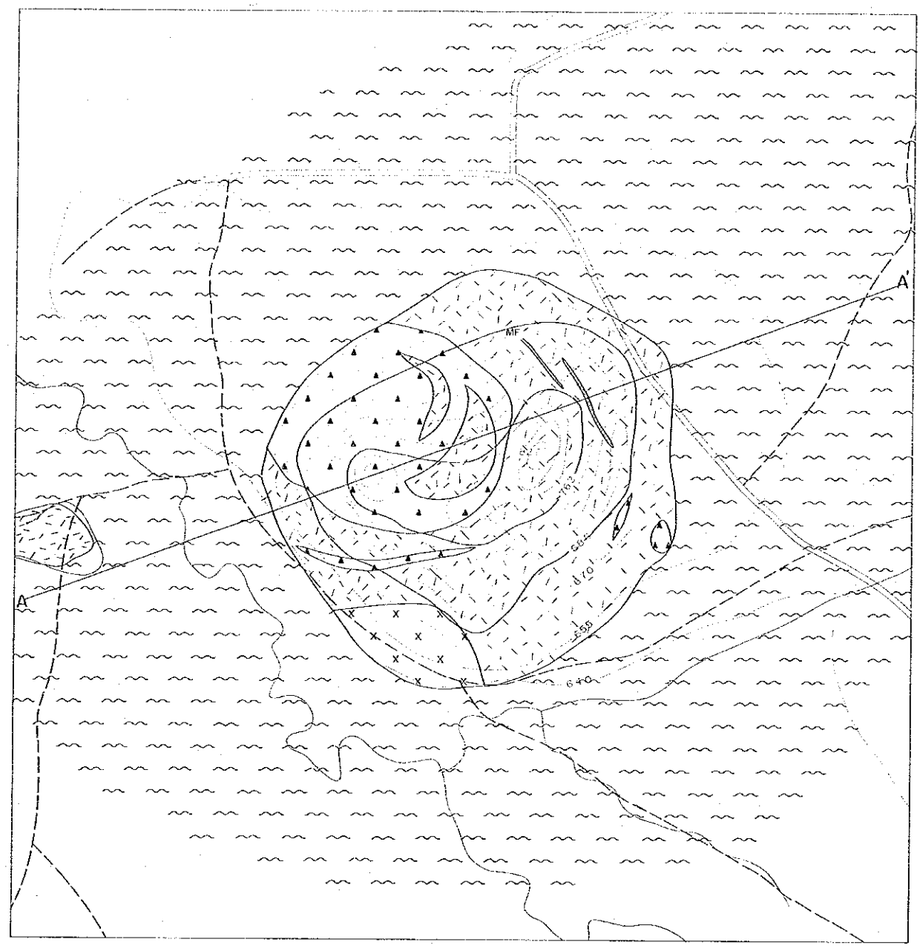
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Puloskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte
  P – Phonolite
  N – Nephelinite
  MF – Microfoyaite
  S – Sölvsbergite
  I – Ijolite
  D – Dolerite
  M – Monchiquite
  A – Aplite
- Fault
- 30° Dip of foliation of gneiss



A-A' Section
(W-E)

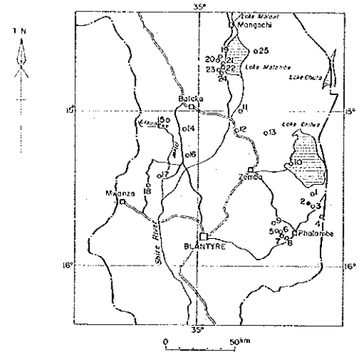




PL. 2 - 2

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Nkalonje (2)

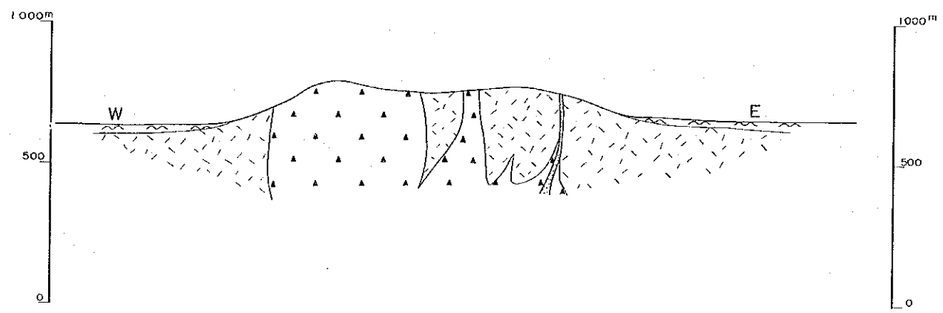


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

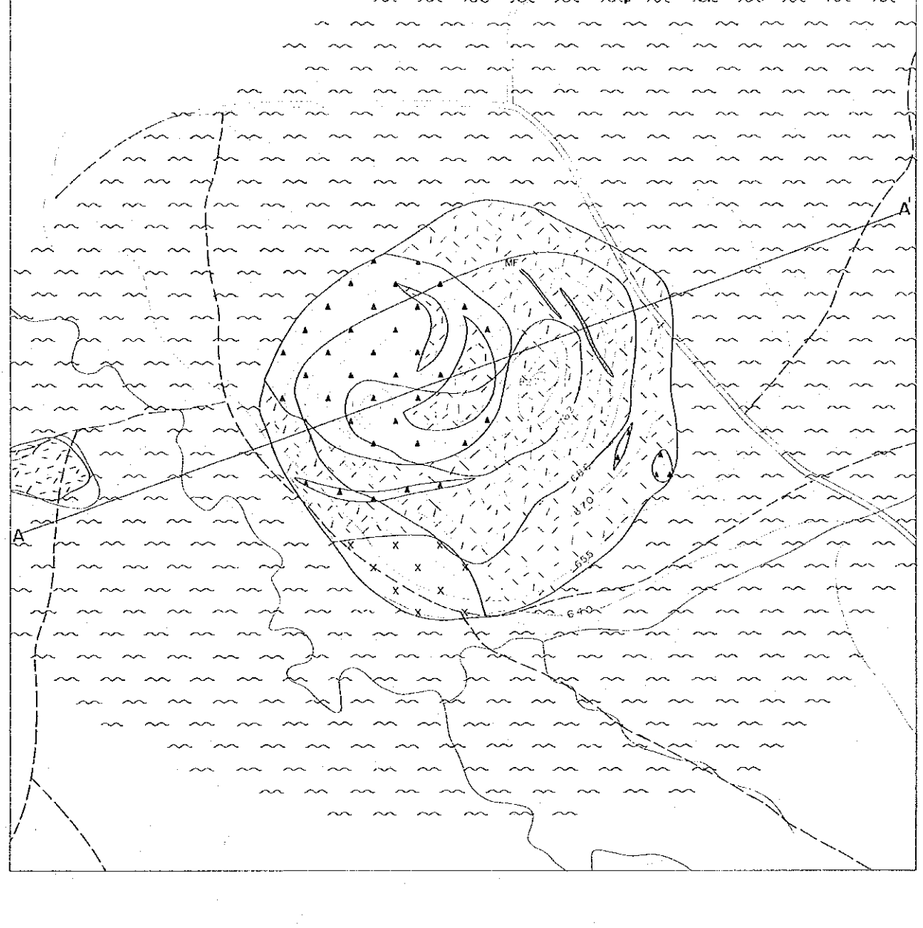
Scale 1 : 10,000

A-A' Section
(N70E)

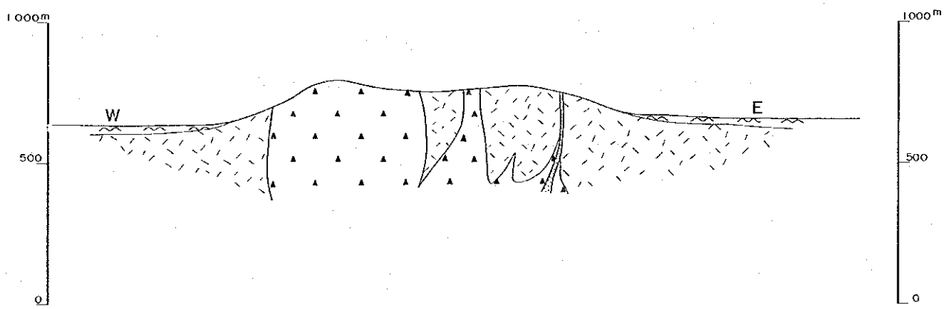


LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perihosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T - Trachyte
  P - Phonolite
  N - Nephelinite
  MF - Microfoyaite
  S - Sölvsbergite
  I - Ijolite
  D - Dolerite
  M - Monchiquite
  A - Aplite
- Fault

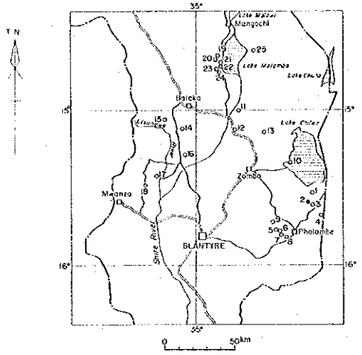


A—A' Section
(N70E)



IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Nkalonje (2)



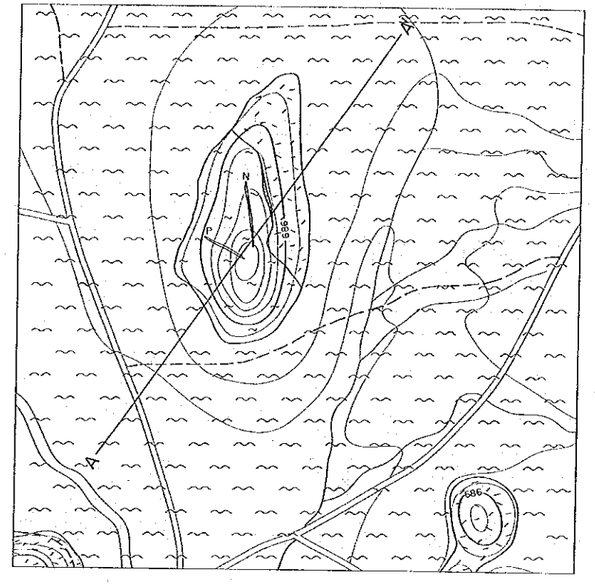
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

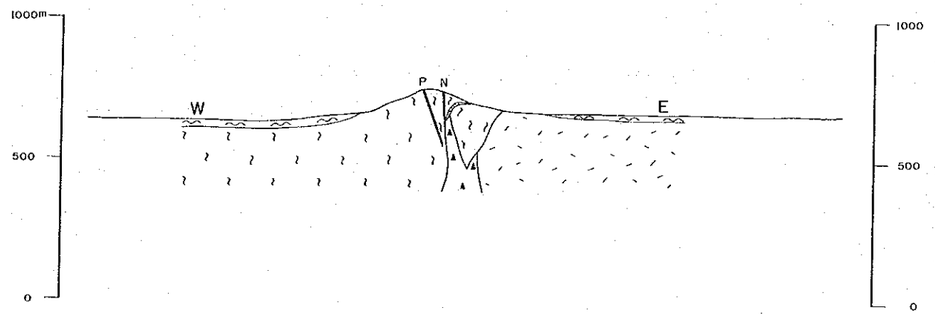
Scale 1 : 10,000

LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Puloskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T—Trachyte
  - P—Phonolite
  - N—Nephelinite
  - MF—Microfoyaite
  - S—Sölvsbergite
  - I—Ijolite
  - D—Dolerite
  - M—Monchiquite
  - A—Aplite
- Fault
- 50° Dip of foliation of gneiss



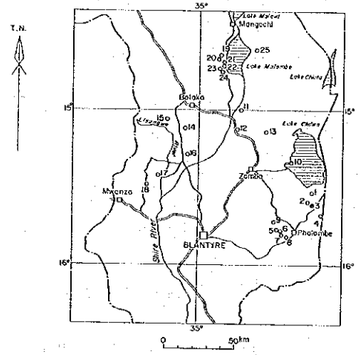
A-A' Section
(N35E)



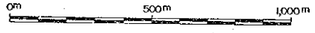
PL. 2-3

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Matoponi (3)



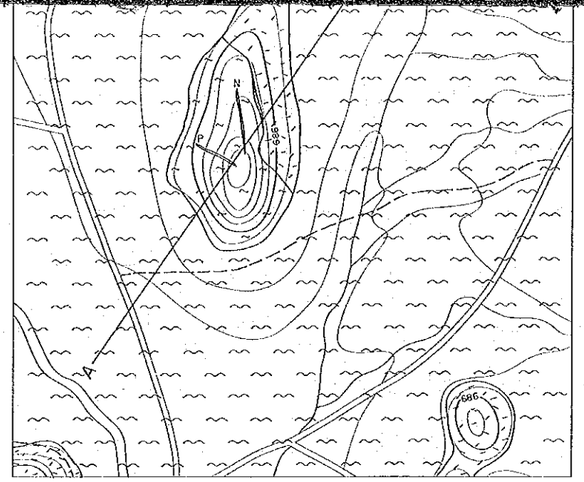
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



Scale 1 : 10,000

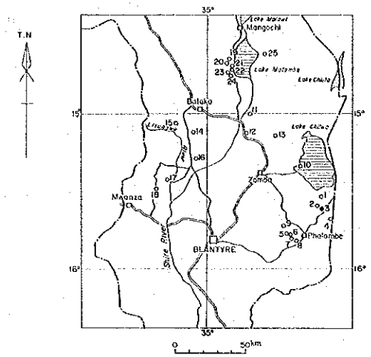
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T-Trachyte
  P-Phonolite
  N-Nephelinite
  MF-Microfoyaite
  S-Sölvsbergite
  I-Ijolite
  D-Dolerite
  M-Monchiquite
  A-Aplite



REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Matoponi (3)

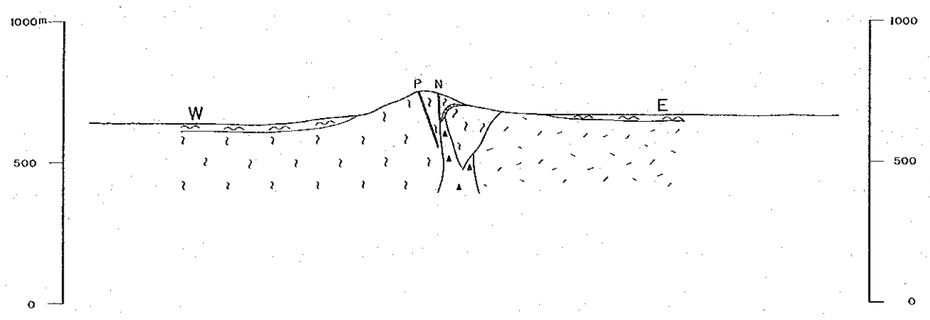


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

Scale 1 : 10,000

A-A' Section
(N35E)

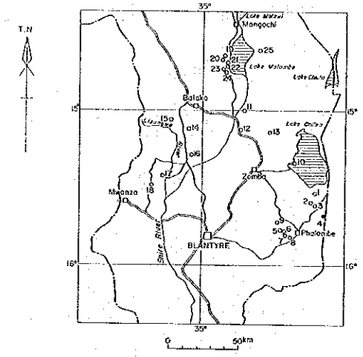


LEGEND

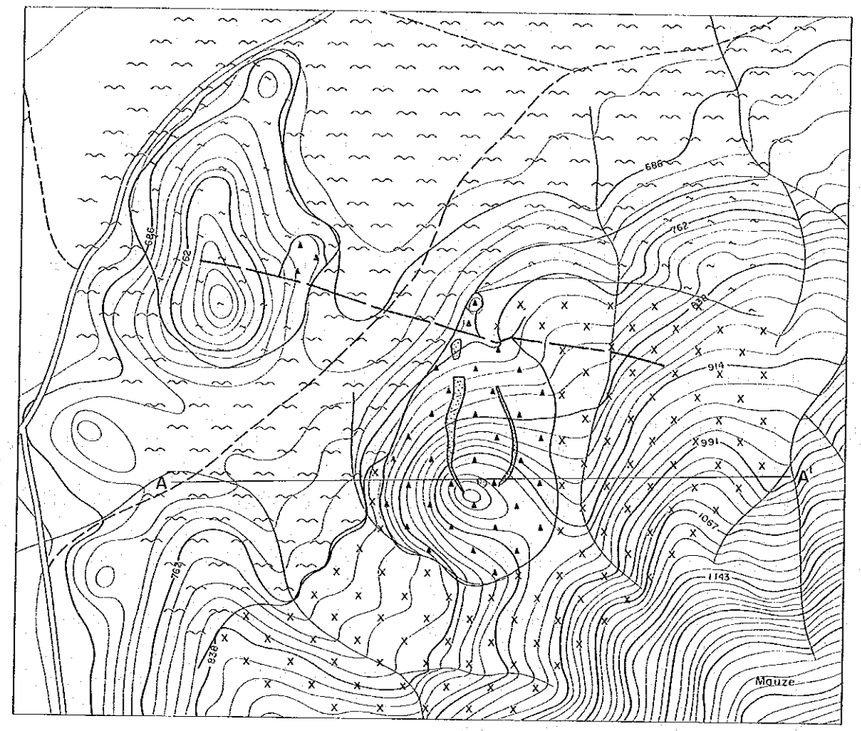
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Gronite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T-Trachyte, P-Phonolite, N-Nephelinite, MF-Microfoyaite, S-Sölvsbergite, I-Ijolite, D-Dolerite, M-Monchiquite, A-Aplite
- Fault
- Dip of foliation of gneiss (30°)

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Songwe (4)

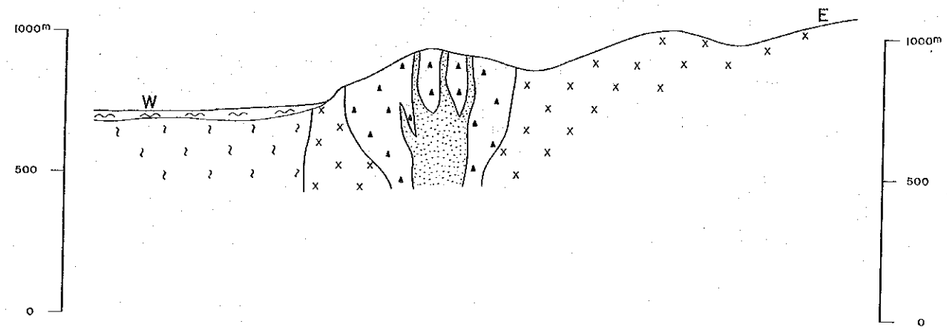


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



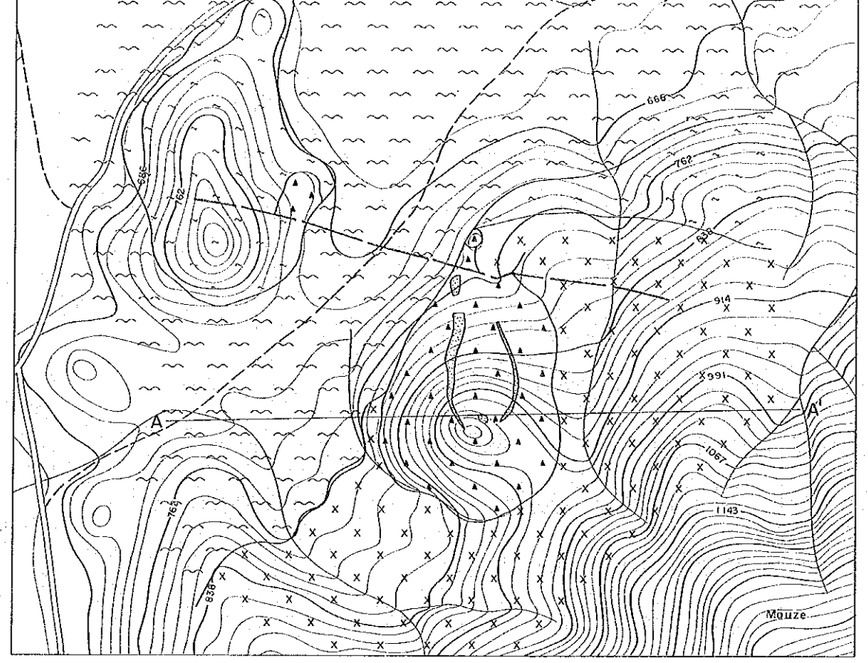
Scale 1 : 10,000

A-A' Section (W-E)

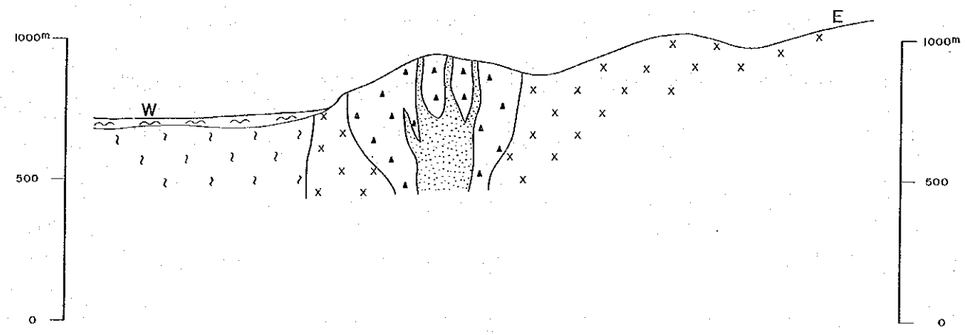


LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Puloskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T-Trachyte, P-Phonolite, N-Nephelinite, MF-Microfoyaite, S-Sölvsbergite, I-Ijolite, D-Dolerite, M-Monchiquite, A-Aplite
- Fault

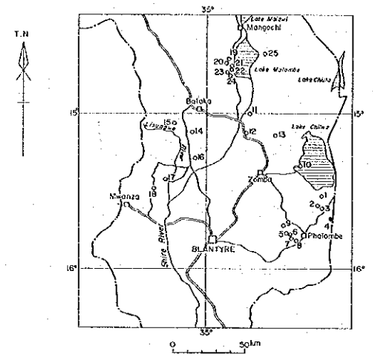


A-A' Section
(W-E)



IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Songwe (4)



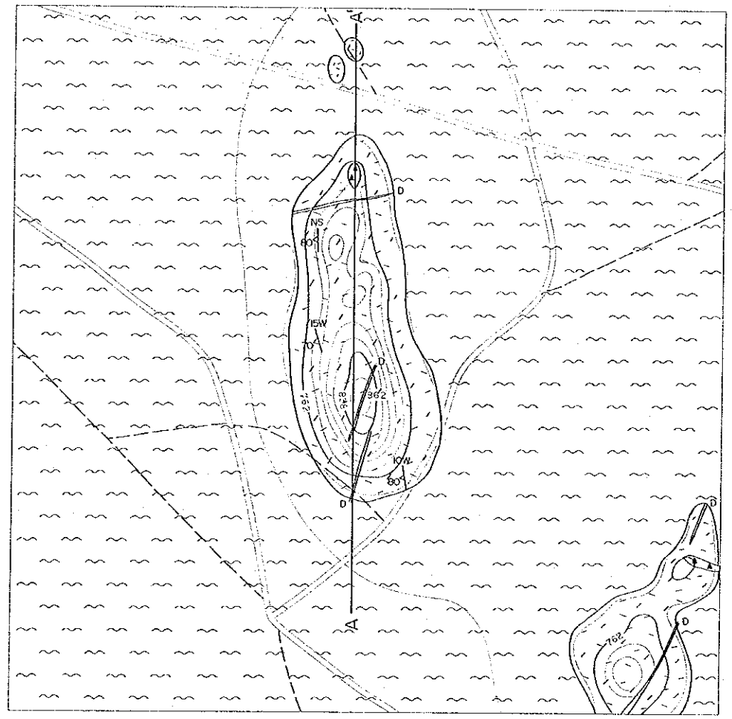
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

Scale 1 : 10,000

LEGEND

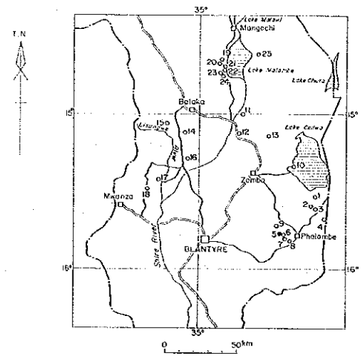
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T - Trachyte
  - P - Phonolite
  - N - Nephelinite
  - MF - Microfoyaite
  - S - Sölvsbergite
  - I - Ijolite
  - D - Dolerite
  - M - Monchiquite
  - A - Aplite
- Fault
- 20° Dip of foliation of gneiss



PL. 2 - 5

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Mikomwa (5)

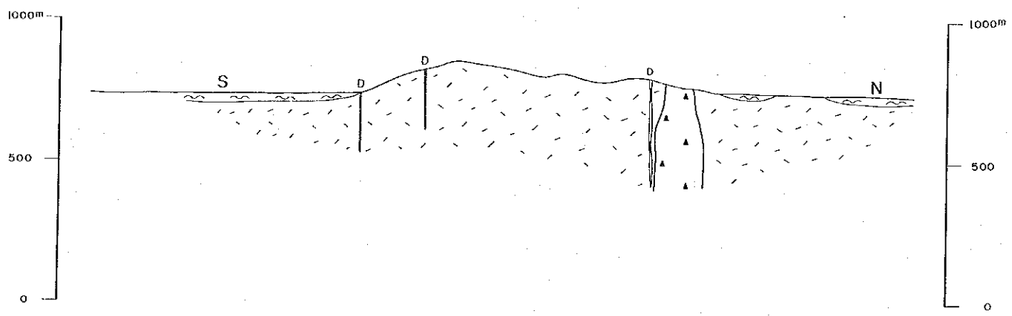


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

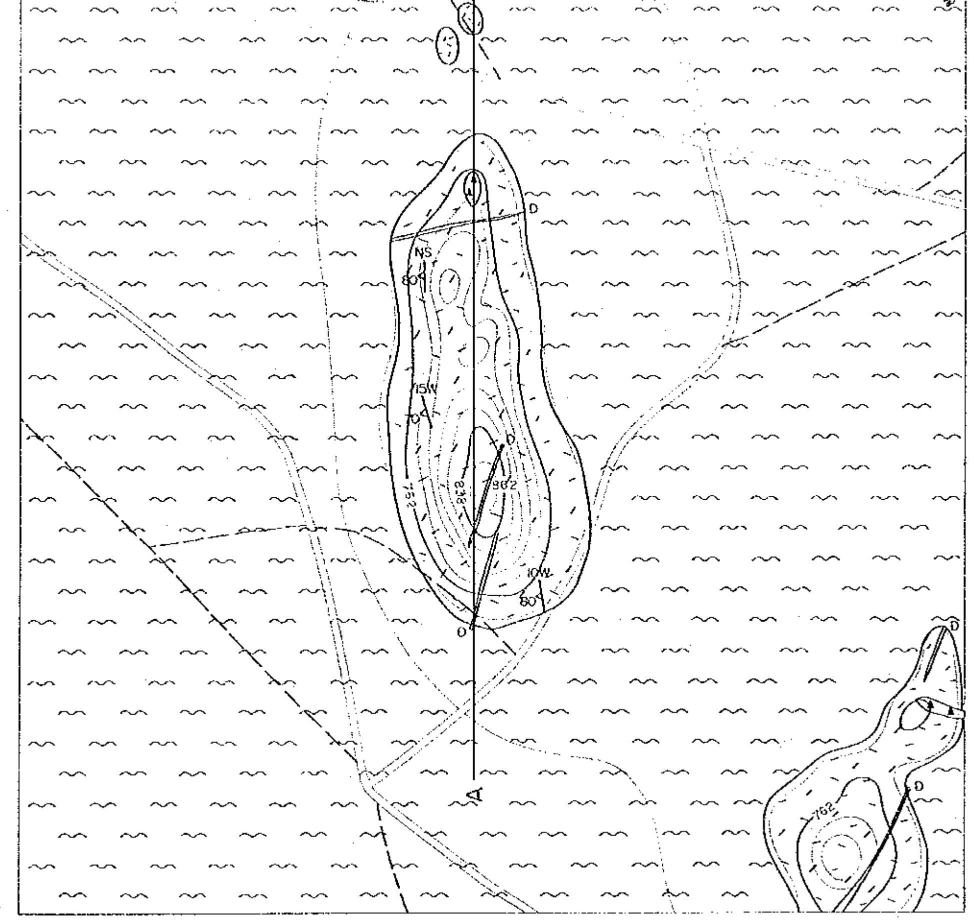
Scale 1 : 10,000

A-A' Section
(S - N)



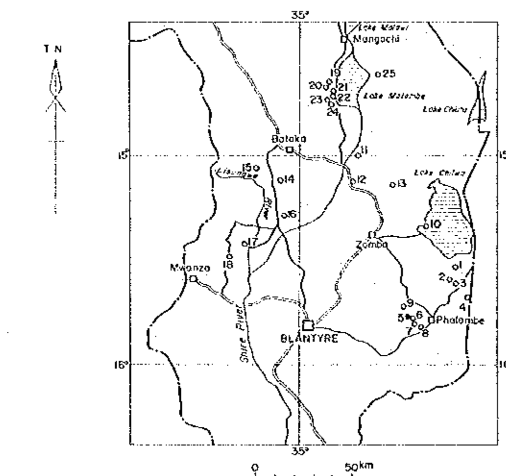
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenilized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T - Trachyte
  P - Phonolite
  N - Nephelinite
  MF - Microfoyaite
  S - Sölvsbergite
  I - Tjolite
  D - Dolerite



COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Mikomwa (5)

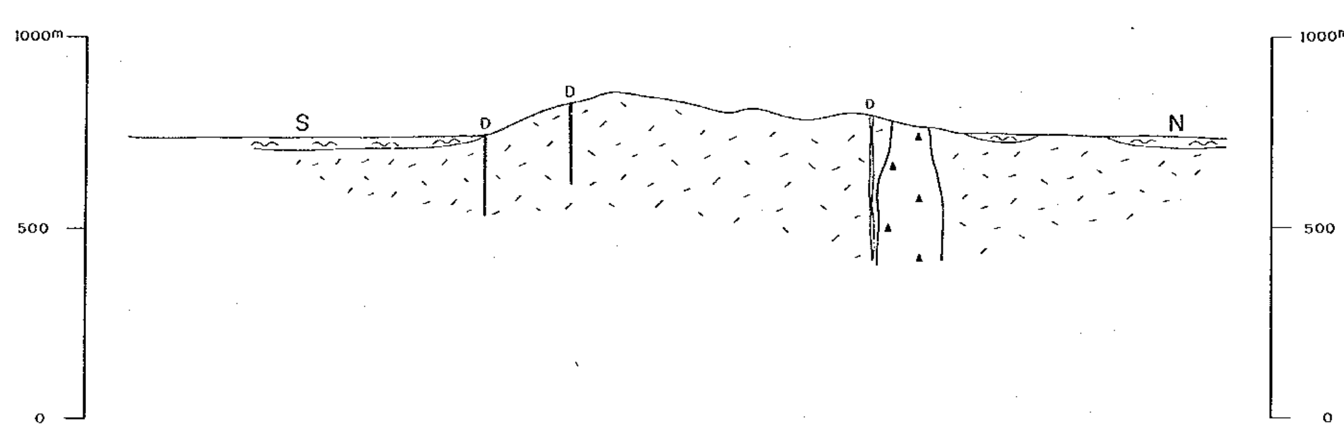


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

Scale 1 : 10,000

A-A' Section
(S - N)

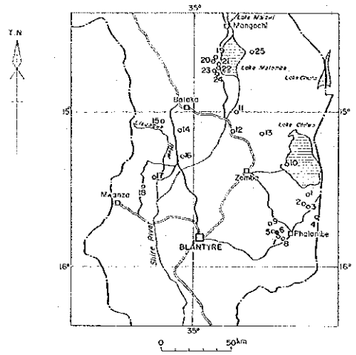


LEGEND

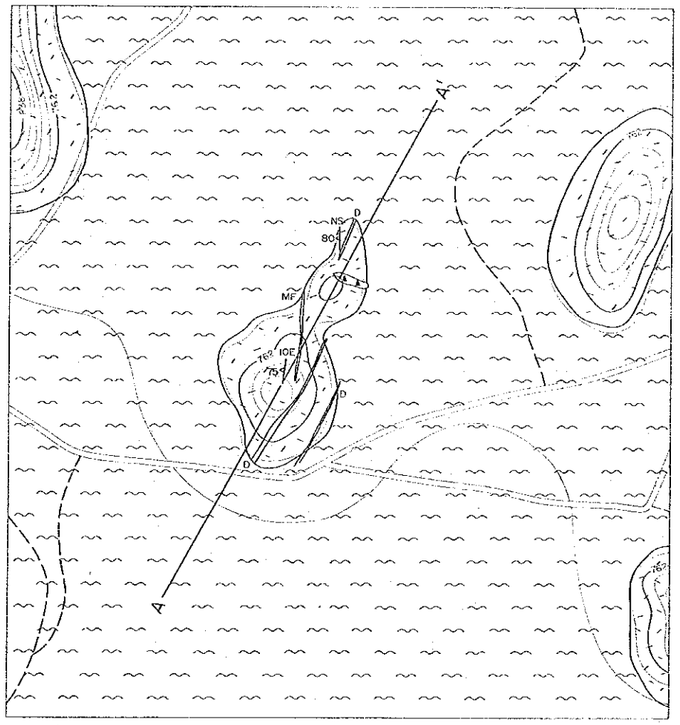
Drift
Sideritic carbonatite
Ankeritic sövite
Sövite
Carbonate-Silicate rock
Feldspathic breccia, agglomerate
Phonolitic breccia
Fenitized gneiss
Trachyte
Phonolite
Nephelinite
Syenite (Pulaskite)
Nepheline syenite (Foyaite)
Hornblende biotite-gneiss
Granulite and gneissose granite
Dolomitic marble
Dolerite
Granite
Perthosite
Biotite-metapyroxenite, metagabbro & biotitite
Meta conglomerate
Green pyroxene skarn
Dykes and plugs
T - Trachyte
P - Phonolite
N - Nephelinite
MF - Microfoyaite
S - Sölvsbergite
I - Ijolite
D - Dolerite
M - Monchiquite
A - Aplite
Fault
Dip of foliation of gneiss

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Chipalanje (6)



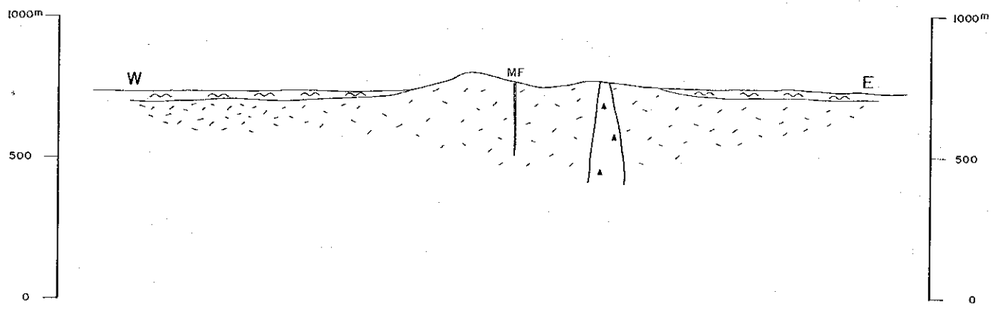
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



0m 500m 1,000m

Scale 1 : 10,000

A-A' Section
(N30E)

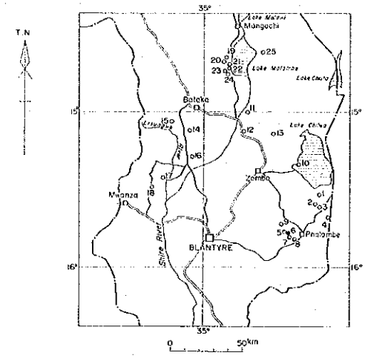


LEGEND

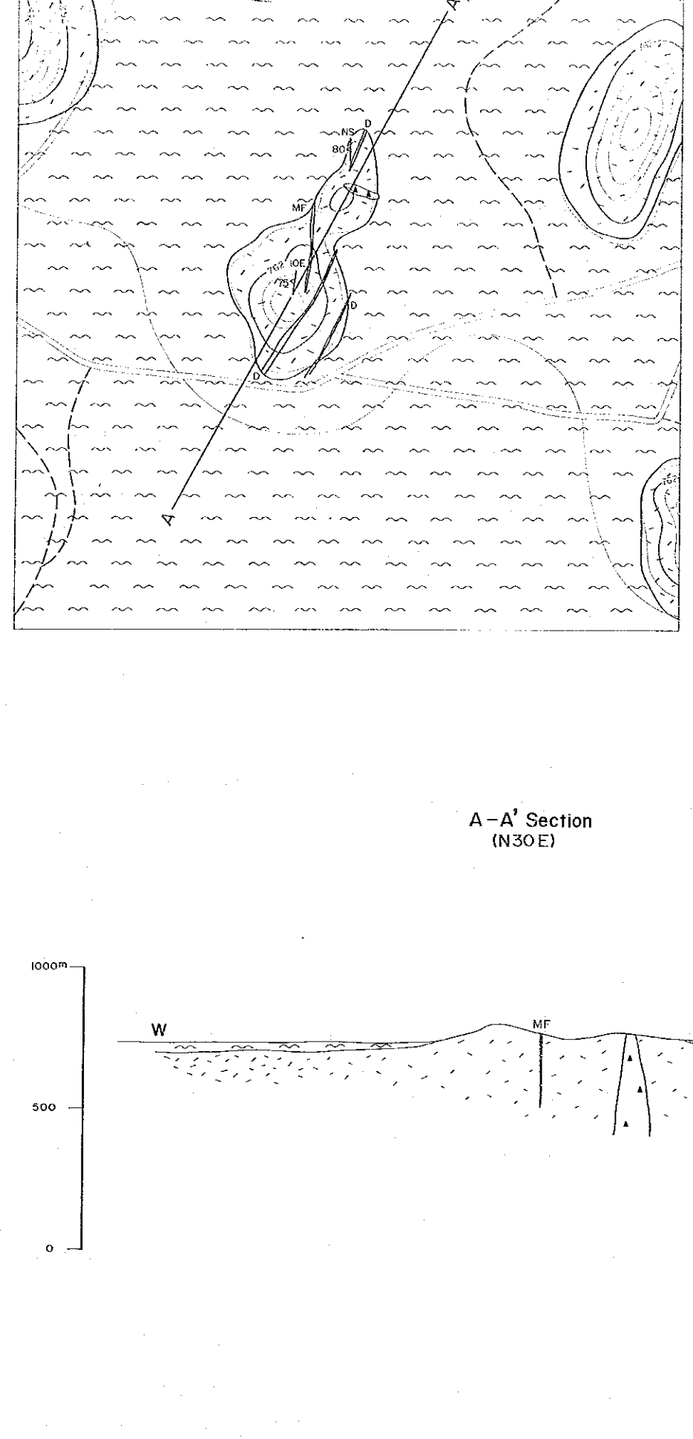
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T-Trachyte, P-Phonolite, N-Nephelinite, MF-Microfoyaite, S-Sölvsbergite, I-Ijolite

THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Chipalanje (6)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



A-A' Section
(N30E)

0m 500m 1,000m

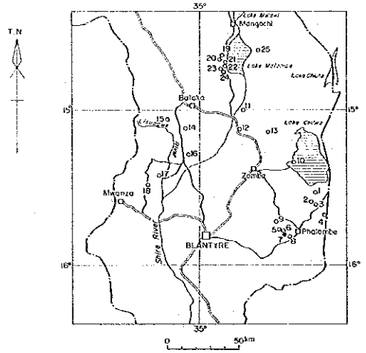
Scale 1 : 10,000

LEGEND

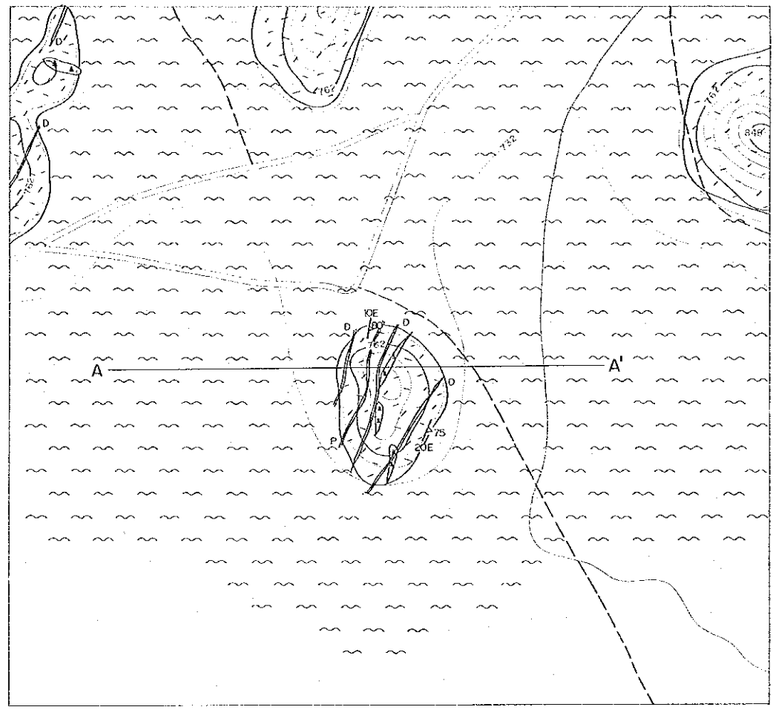
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T – Trachyte
  - P – Phonolite
  - N – Nephelinite
  - MF – Microfoyaite
  - S – Sölvsbergite
  - I – Ijolite
  - D – Dolerite
  - M – Monchiquite
  - A – Aplite
- Fault
- 50° Dip of foliation of gneiss

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Salambidwa (7)



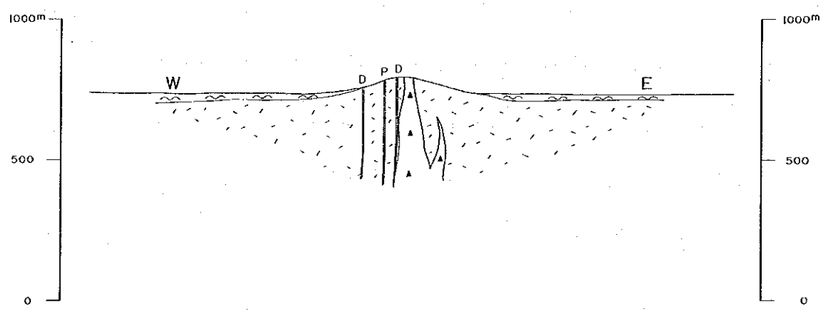
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



0m 500m 1,000m

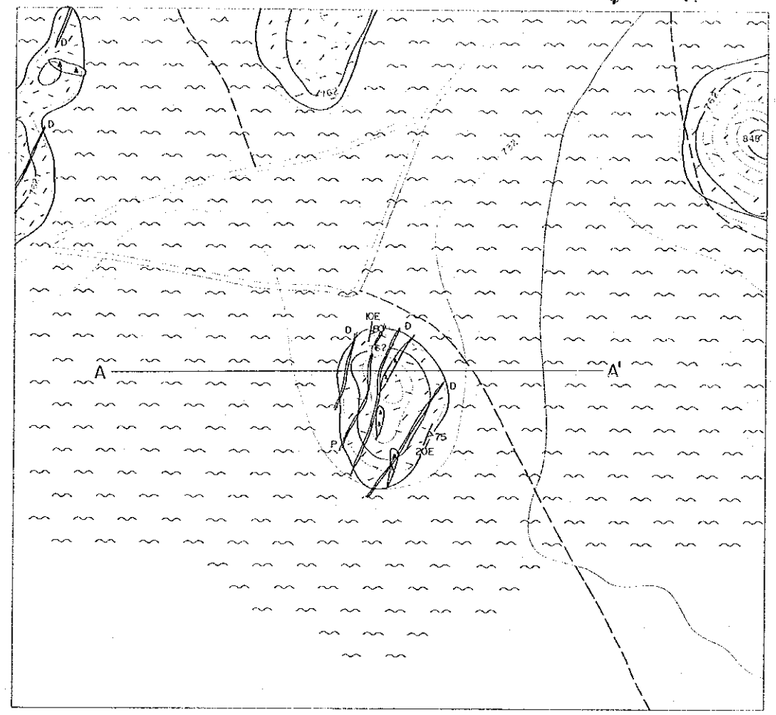
Scale 1 : 10,000

A-A' Section
(W-E)



LEGEND

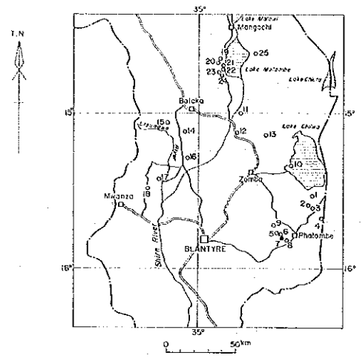
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Puloskite)
- Nepheline syenite (Foyoite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte
  P – Phonolite
  N – Nephelinite
  MF – Microfoyaite
  S – Sölvsbergite
  I – Ijolite
  D – Dolerite



PL. 2-7

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Salambidwa (7)

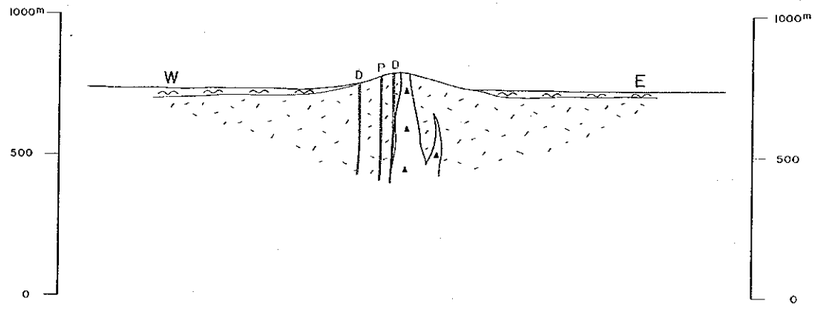


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

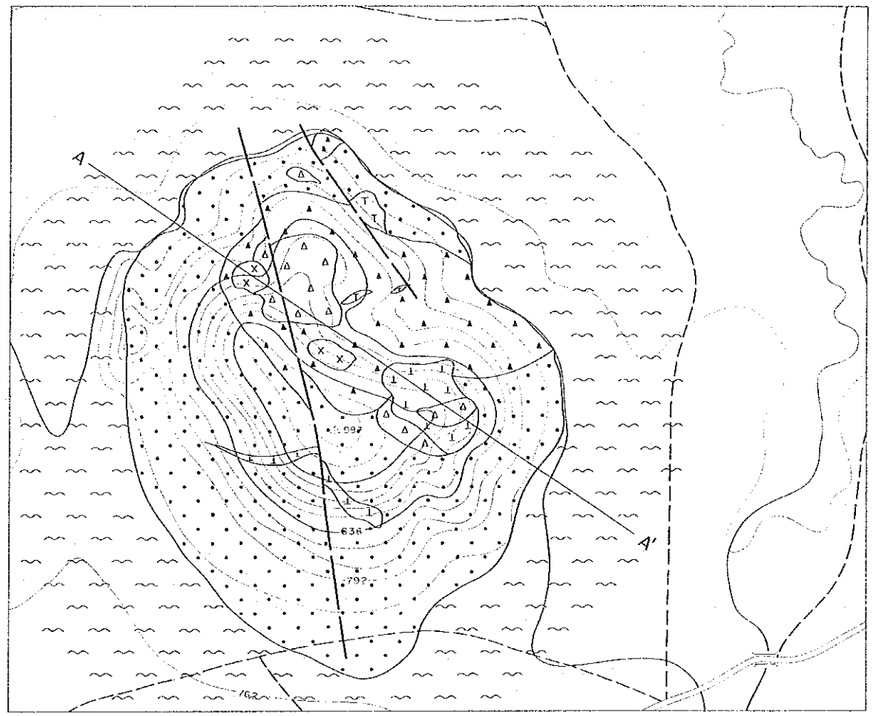
Scale 1 : 10,000

A-A' Section
(W-E)



LEGEND

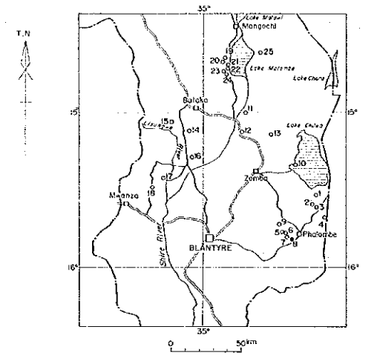
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T-Trachyte
  - P-Phonolite
  - N-Nephelinite
  - MF-Microfoyaite
  - S-Sölvsbergite
  - I-Ijolite
  - D-Dolerite
  - M-Monchiquite
  - A-Aplite
- Fault
- 50° Dip of foliation of gneiss



PL. 2 - 8

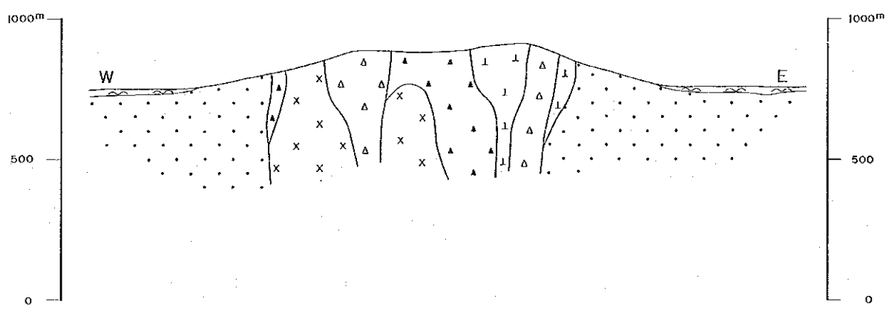
COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Namangale (8)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

A - A' Section
(N55W)



0m 500m 1,000m

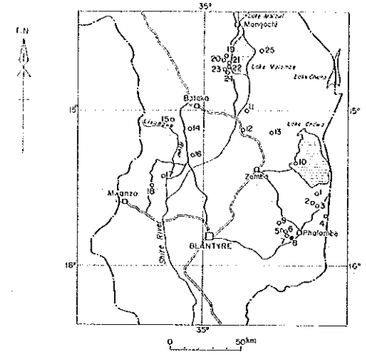
Scale 1 : 10,000

LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T - Trachyte
  - P - Phonolite
  - N - Nephelinite
  - MF - Microfoyaite
  - S - Sölvsbergite
  - I - Ijolite
  - D - Dolerite
  - M - Monchiquite
  - A - Aplite
- Fault

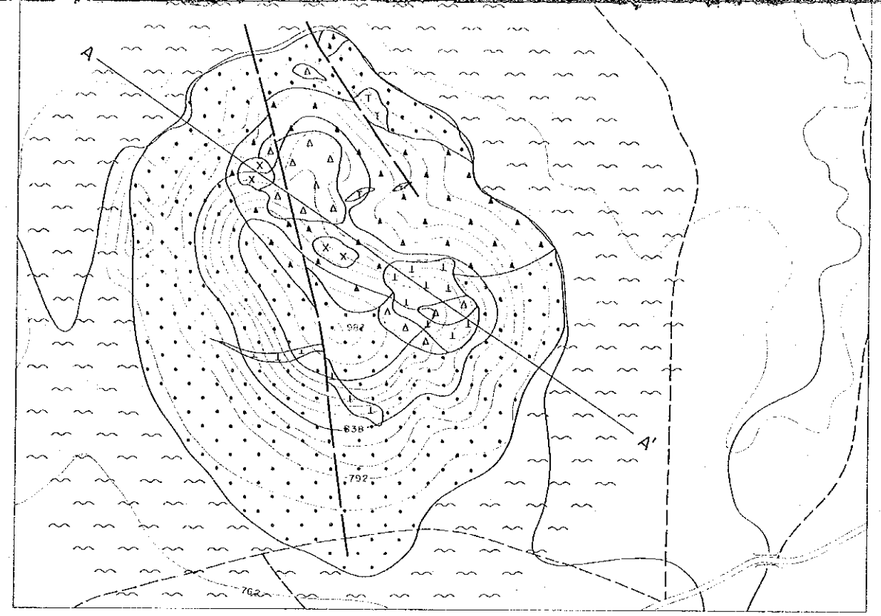
REPUBLIC OF MALAWI
(PHASE 1)

GEOLOGICAL MAP AND PROFILE OF THE Namangale (8)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

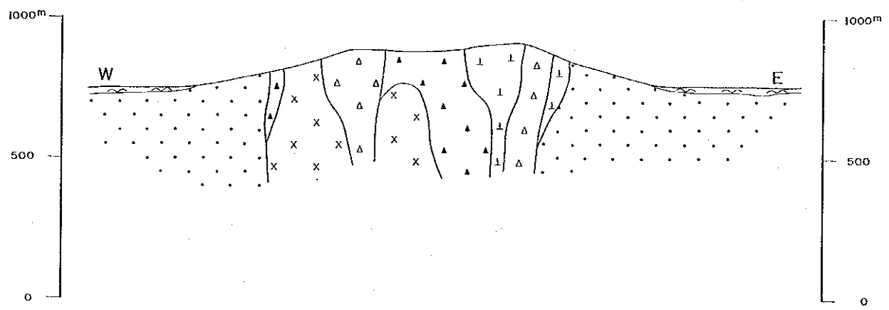
FEBRUARY 1987



0m 500m 1,000m

Scale 1 : 10,000

A-A' Section
(N55W)

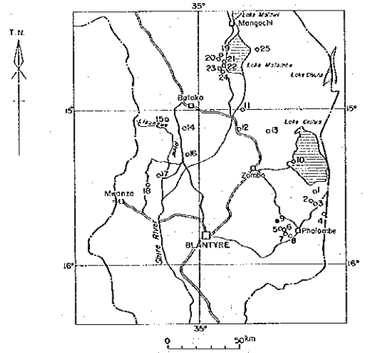


LEGEND

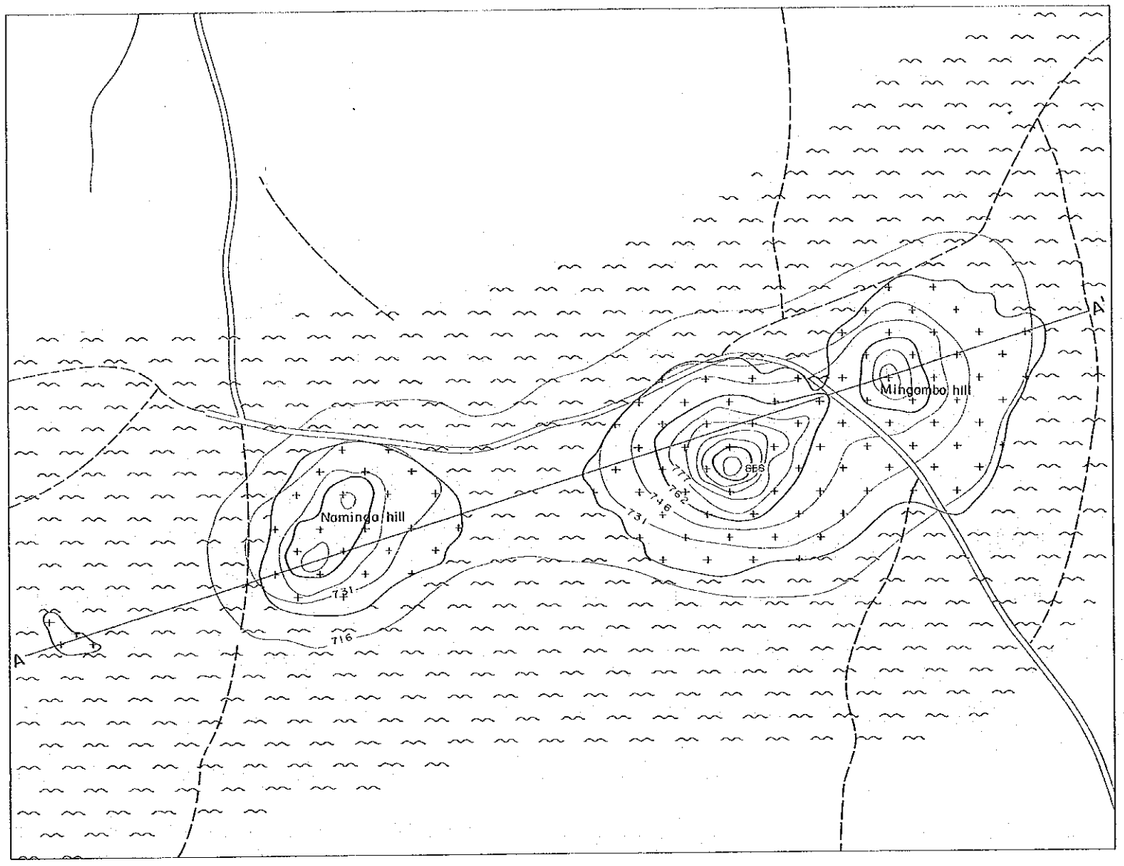
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T-Trachyte, P-Phonolite, N-Nephelinite, MF-Microfoyaite, S-Sölvsbergite, I-Ijolite, D-Dolerite, M-Monchiquite, A-Aplite
- Fault
- 50° Dip of foliation of gneiss

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Naminga (9)



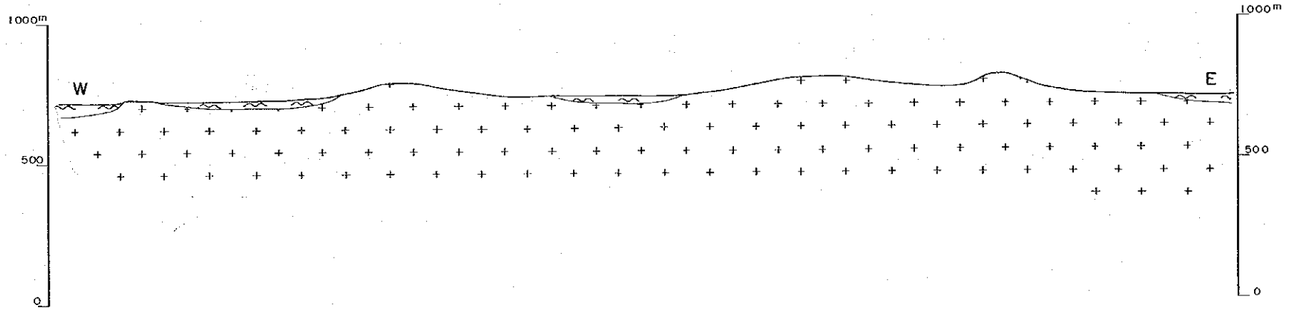
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



0m 500m 1,000m

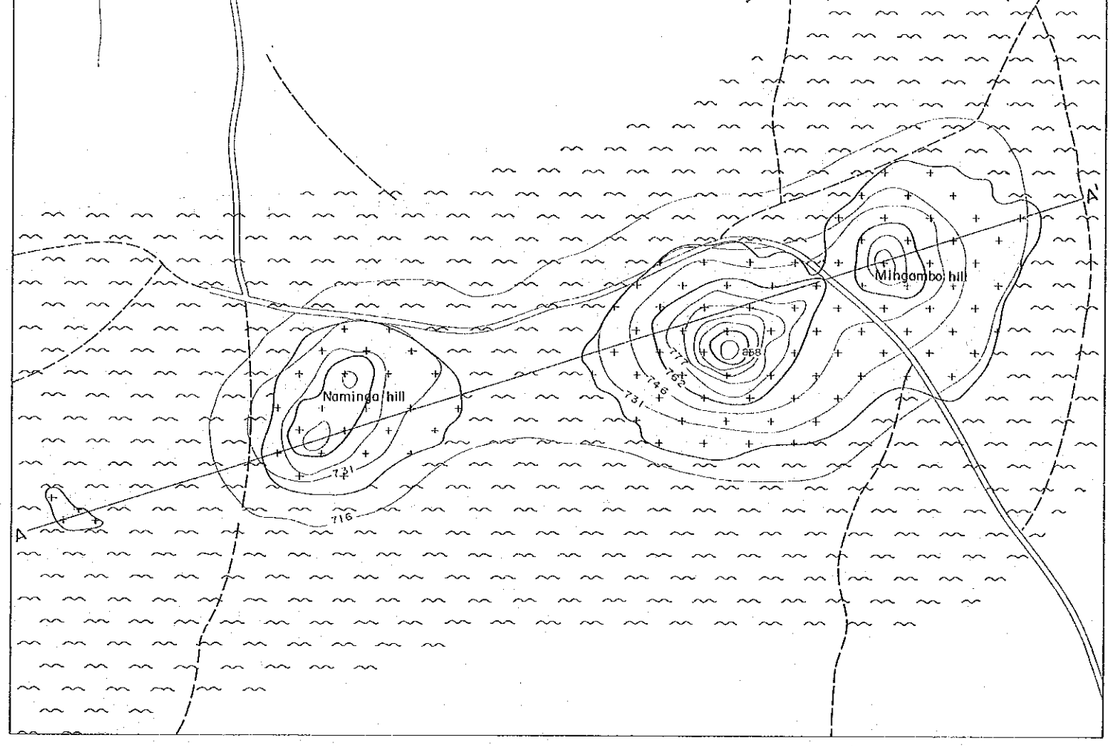
Scale 1 : 10,000

A - A' Section
(N73° E)



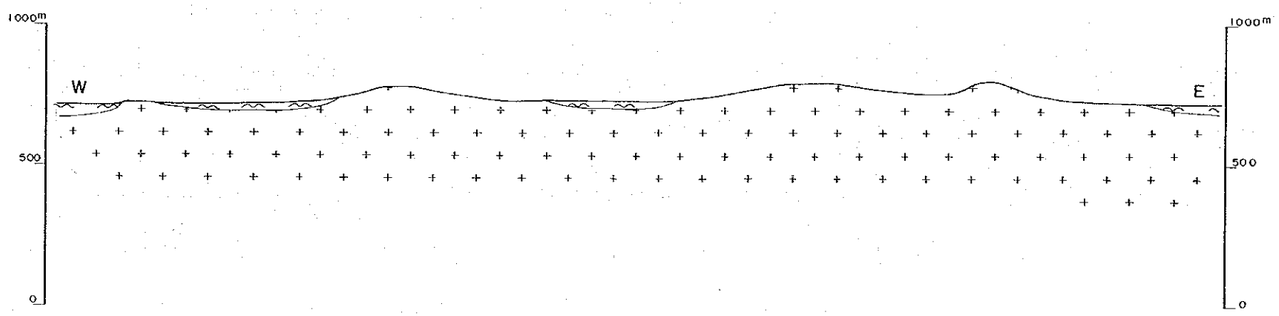
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biolite-metapyroxenite, metagabbro & biotilite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T - Trachyte
  - P - Phonolite
  - N - Nephelinite
  - MF - Microfoyaite
  - S - Sölvsbergite
  - I - Ijolite
  - D - Dolerite
  - M - Monchiquite
  - A - Aplite
- Fault
- Dip of foliation of gneiss



A – A' Section

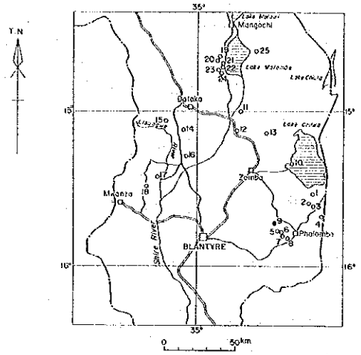
(N73° E)



REPUBLIC OF MALAWI

(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Naminga (9)



JAPAN INTERNATIONAL COOPERATION AGENCY

METAL MINING AGENCY OF JAPAN

FEBRUARY 1987

0m 500m 1,000m

Scale 1 : 10,000

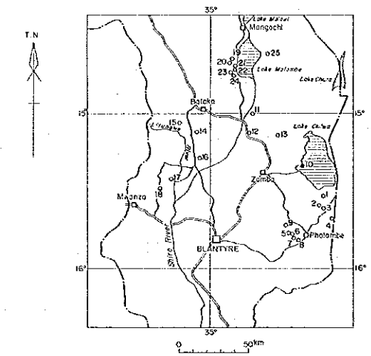
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate–Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite–gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite–metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T – Trachyte
  - P – Phonolite
  - N – Nephelinite
  - MF – Microfoyaite
  - S – Sölvsbergite
  - I – Ijolite
  - D – Dolerite
  - M – Monchiquite
  - A – Aplite
- Fault
- 50° Dip of foliation of gneiss

PL. 2 - 10

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

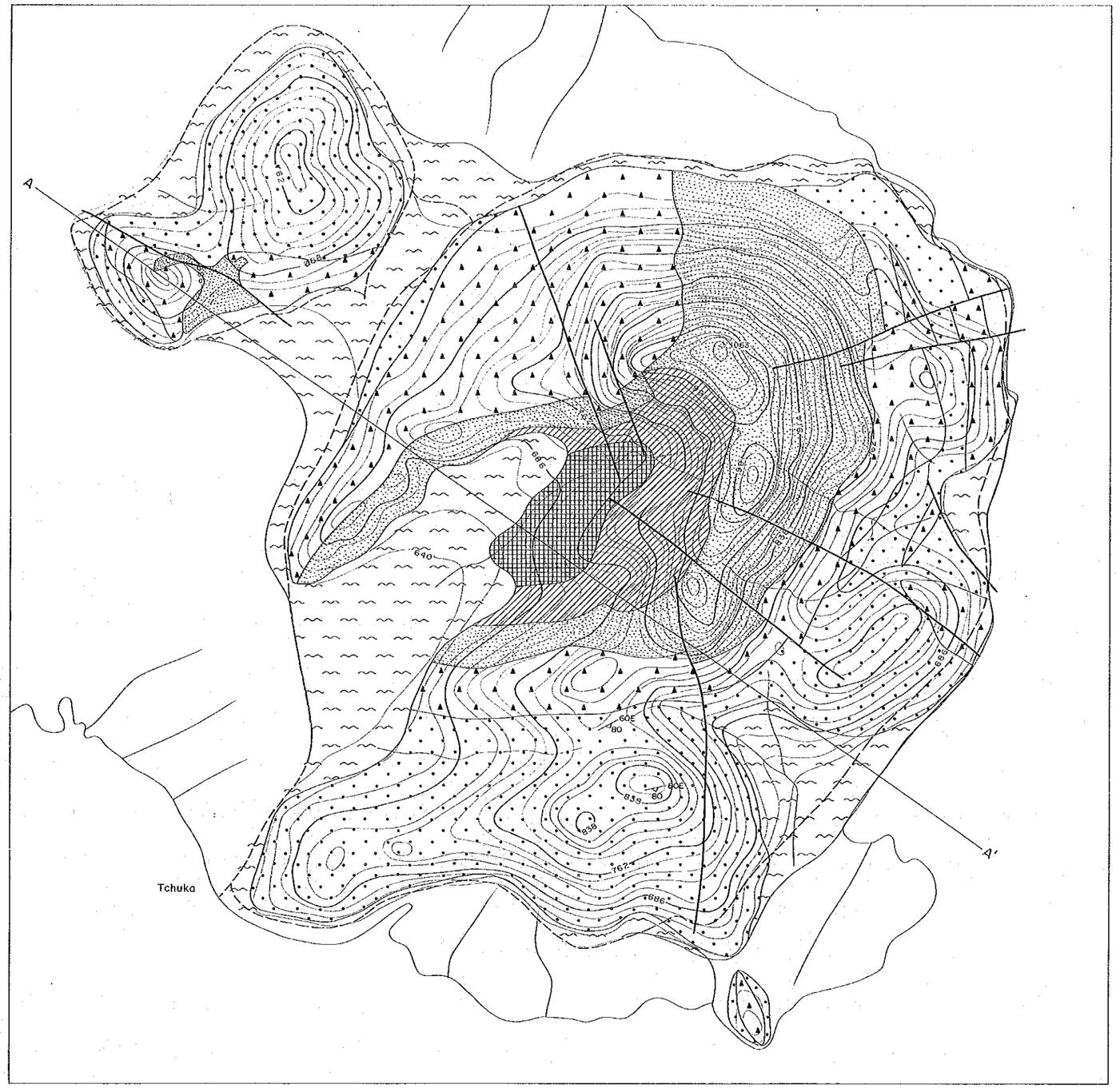
GEOLOGICAL MAP AND PROFILE OF THE Chilwa Island (10)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1000m

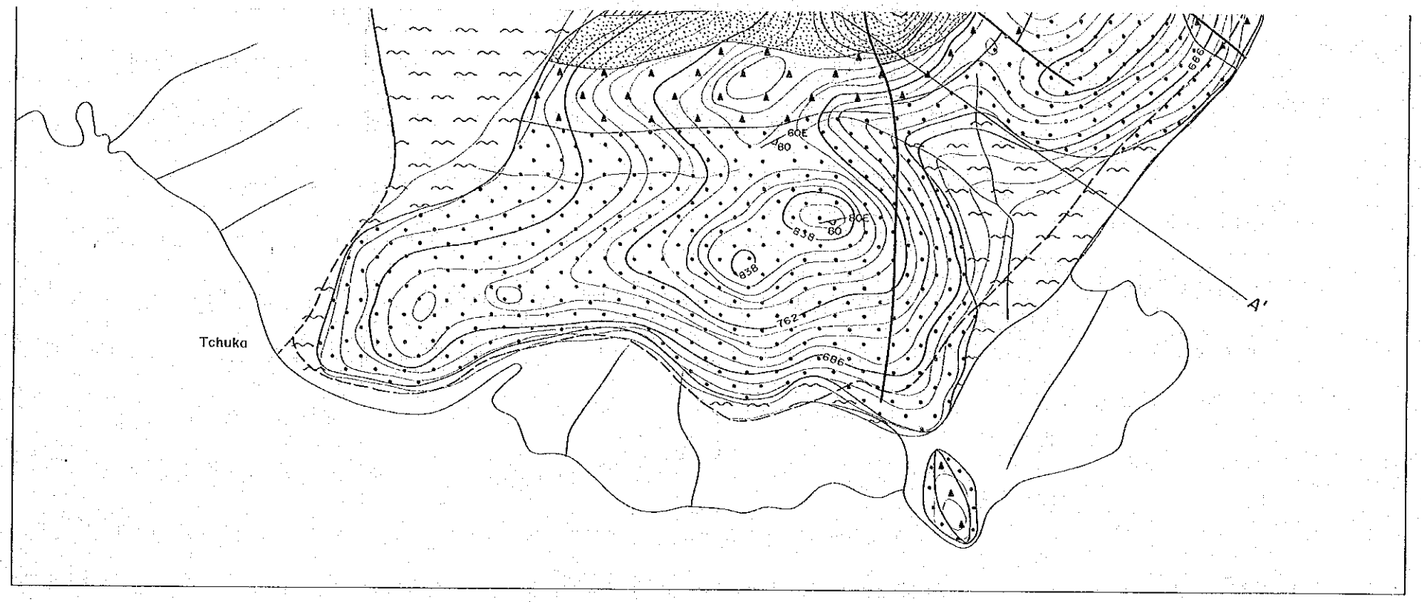
Scale 1 : 10,000



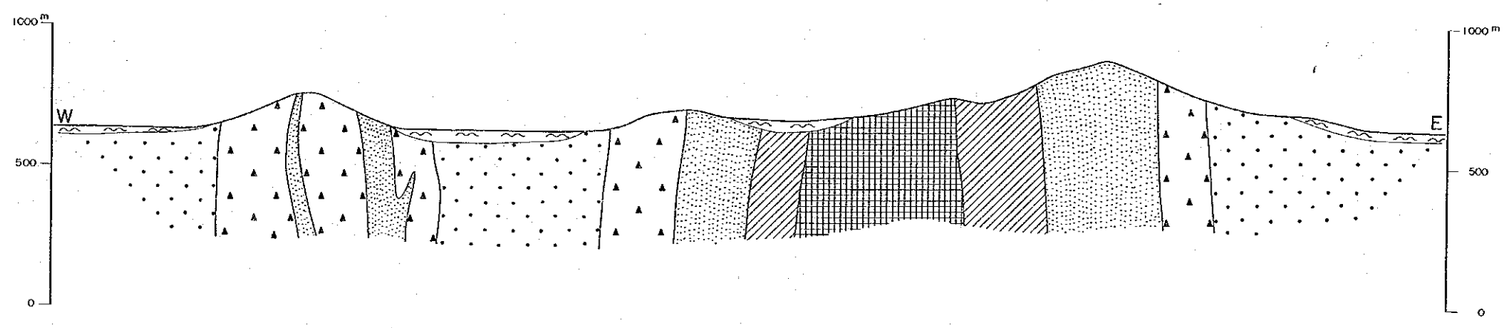
A - A' Section
(N55W)

LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T - Trachyte
  P - Phonolite
  N - Nephelinite
  MF - Microfoyaite
  S - Sölvsbergite
  I - Ijolite
  D - Dolerite
  M - Monchiquite
  A - Aplite
- Fault
- 60° Dip of foliation of gneiss



A–A' Section
(N55W)



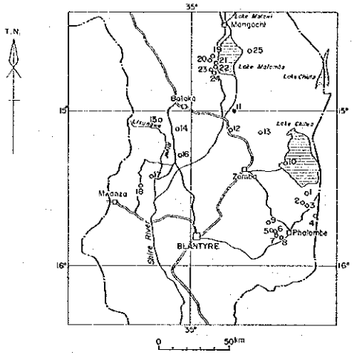
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate–Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite–gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite–metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte; P – Phonolite; N – Nephelinite; MF – Microfoyaite; S – Sölvsbergite; I – Ijolite; D – Dolerite; M – Monchiquite; A – Aplite
- Fault
- 50° Dip of foliation of gneiss

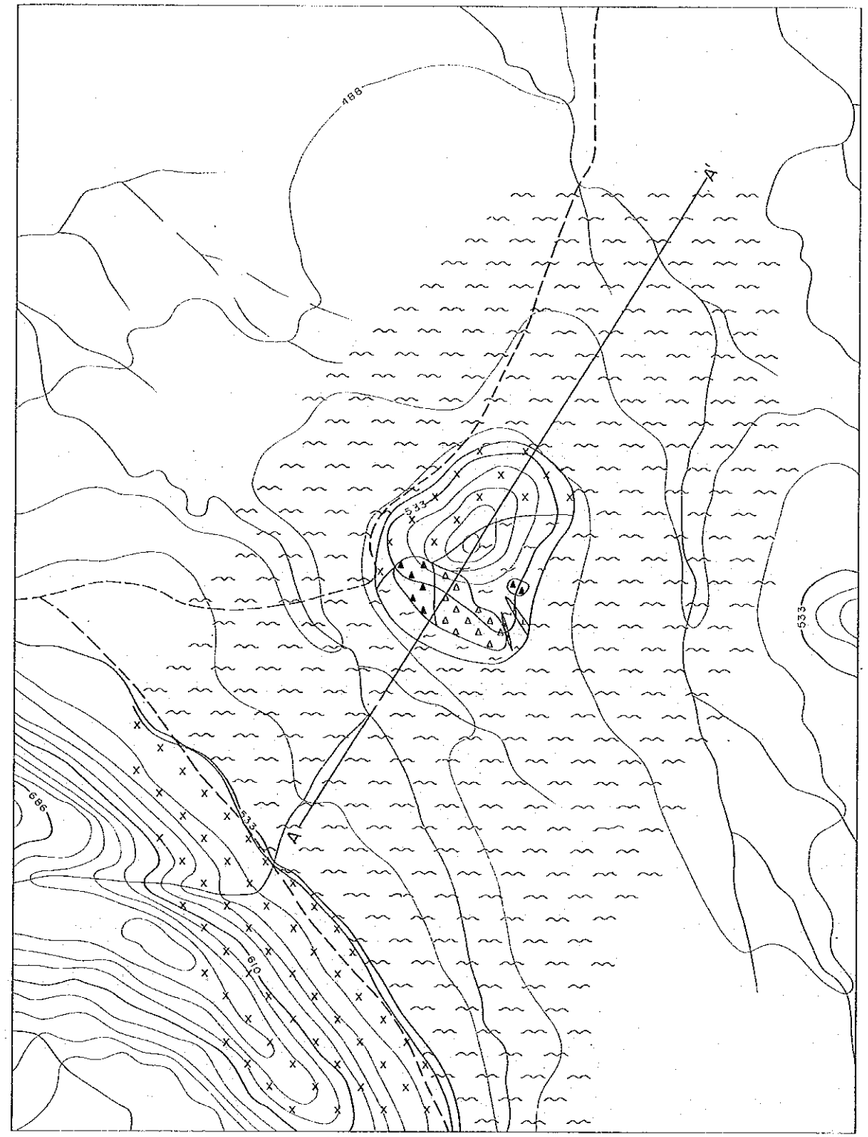
PL. 2-11

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Kadongosi (II)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



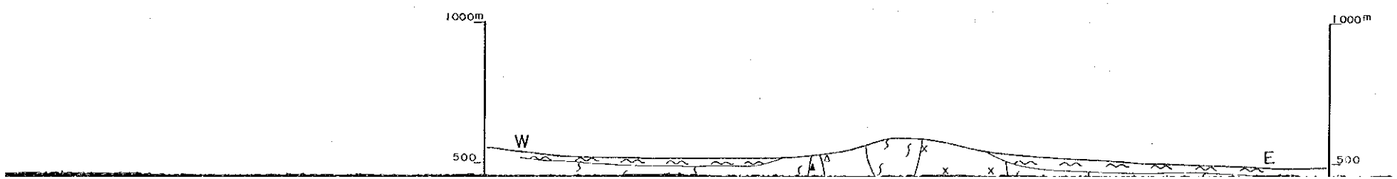
0m 500m 1,000m

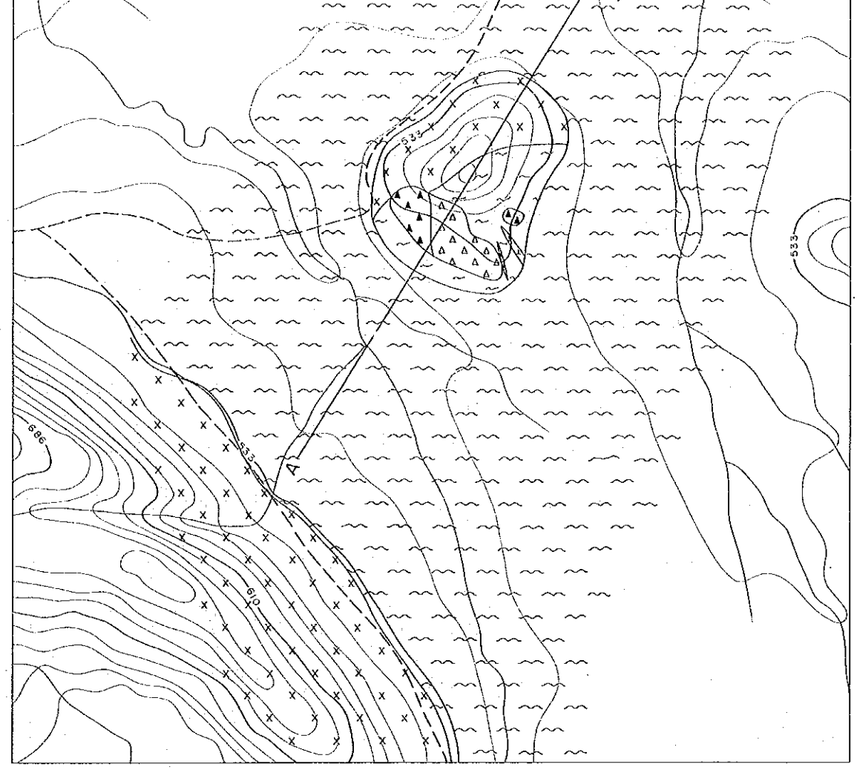
Scale 1 : 10,000

LEGEND

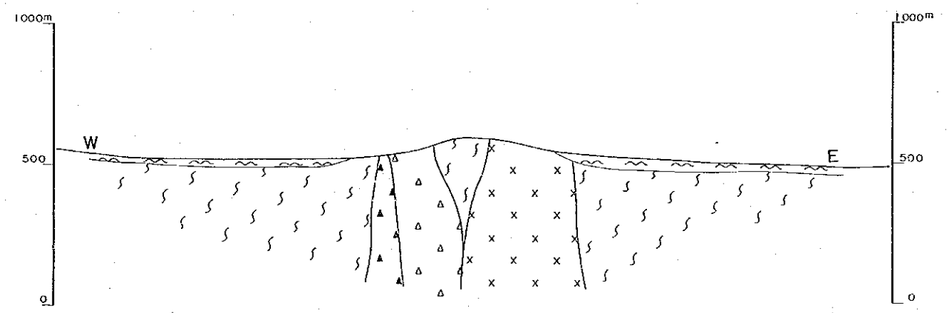
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite- metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T - Trachyte
  - P - Phonolite
  - N - Nephelinite
  - MF - Microfoyaite
  - S - Sölvsbergite
  - I - Ijolite
  - D - Dolerite
  - M - Monchiquite
  - A - Aplite
- Fault
- Dip of foliation of gneiss

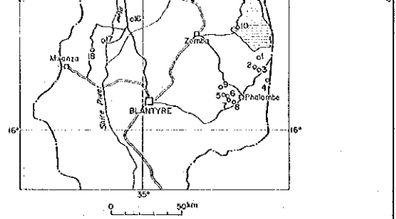
A-A' Section
(N30E)





A-A' Section
(N30E)





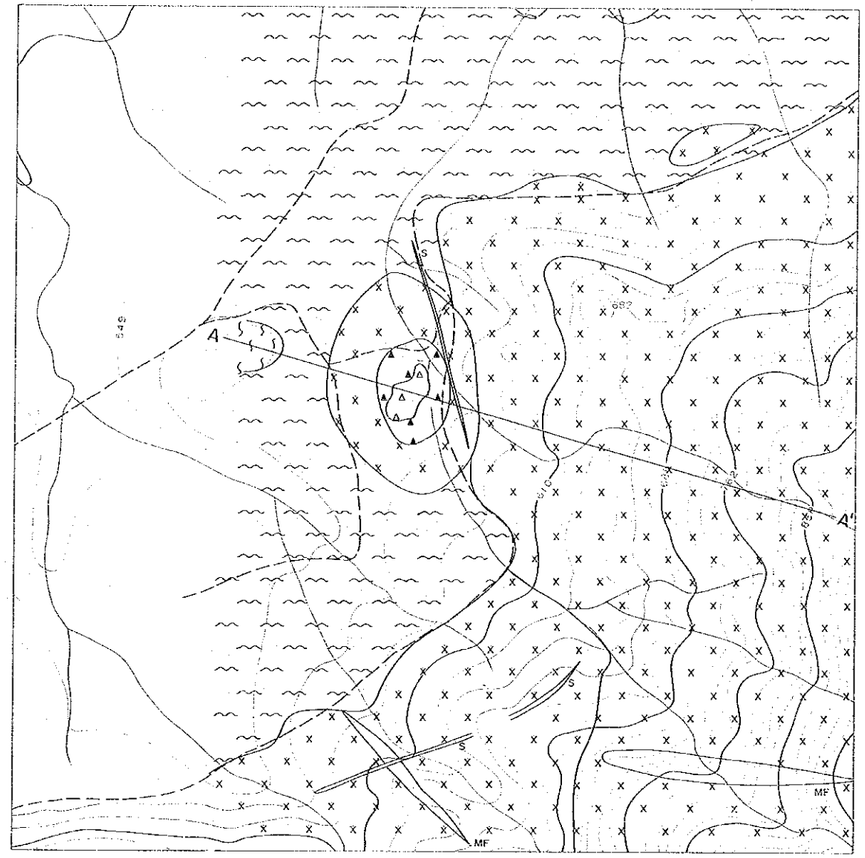
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

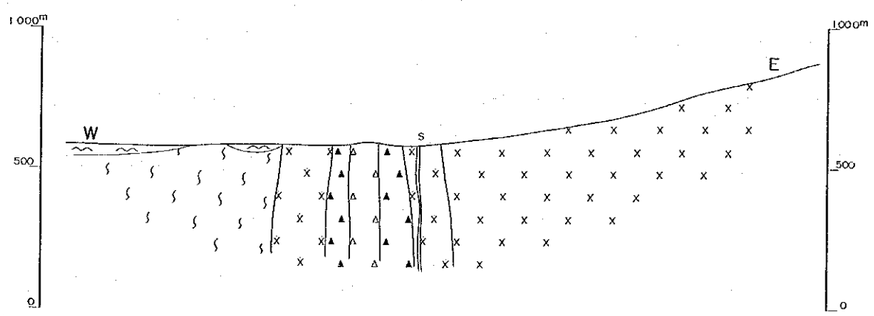
Scale 1 : 10,000

LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte
  P – Phonolite
  N – Nephelinite
  MF – Microfoyaite
  S – Sölvsbergite
  I – Ijolite
  D – Dolerite
  M – Monchiquite
  A – Aplite
- Fault
- 50° Dip of foliation of gneiss



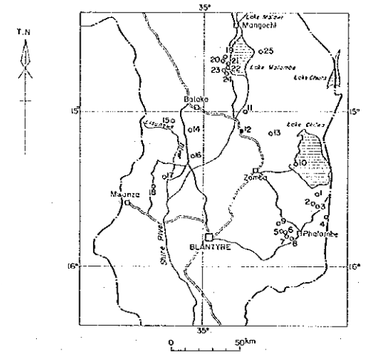
A – A' Section
(N70W)



PL. 2-12

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Mongolwe (12)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

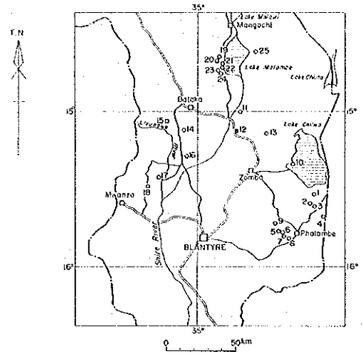
Scale 1 : 10,000

LEGEND

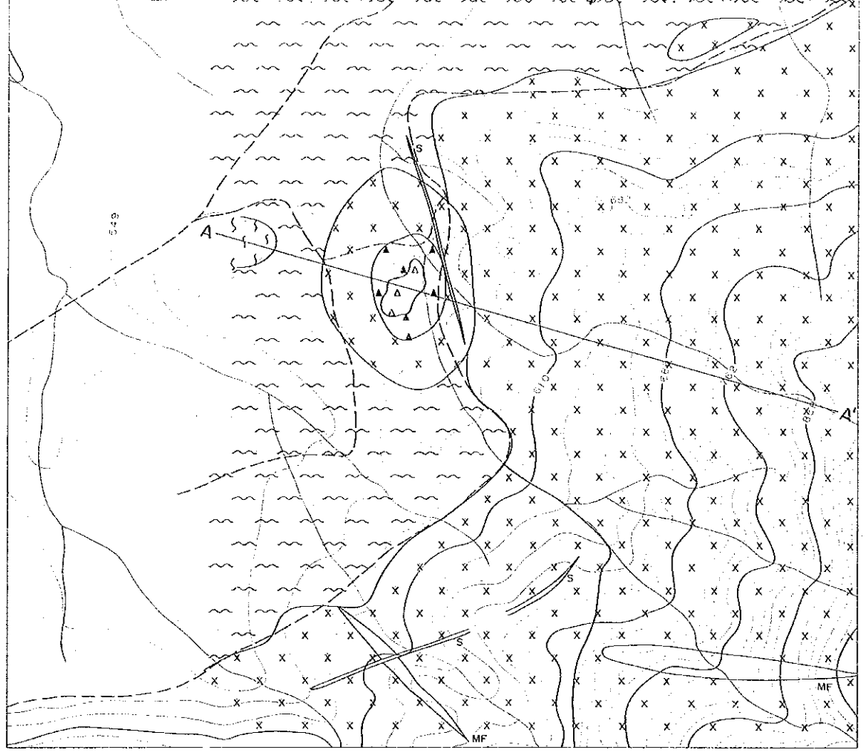
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate–Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite–gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite–metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T – Trachyte
  - P – Phonolite
  - N – Nephelinite
  - MF – Microfoyaite
  - S – Sölvsbergite
  - I – Ijolite
  - D – Dolerite
  - M – Monchiquite
  - A – Aplite
- Fault
- Dip of foliation of gneiss

REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Mongolwe (12)



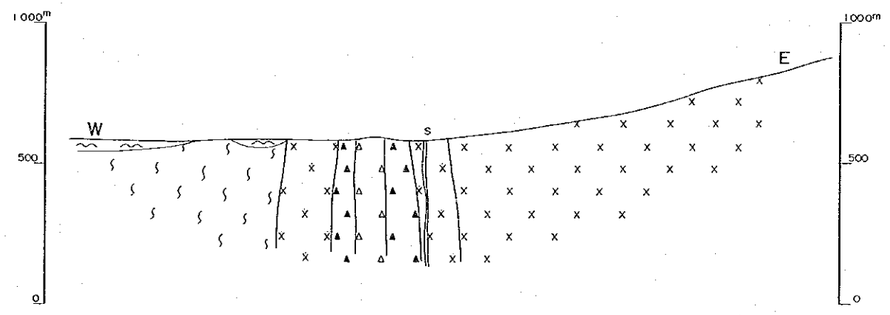
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



0m 500m 1,000m

Scale 1 : 10,000

A - A'Section
(N70W)

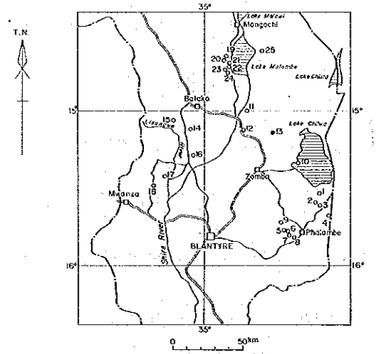


LEGEND

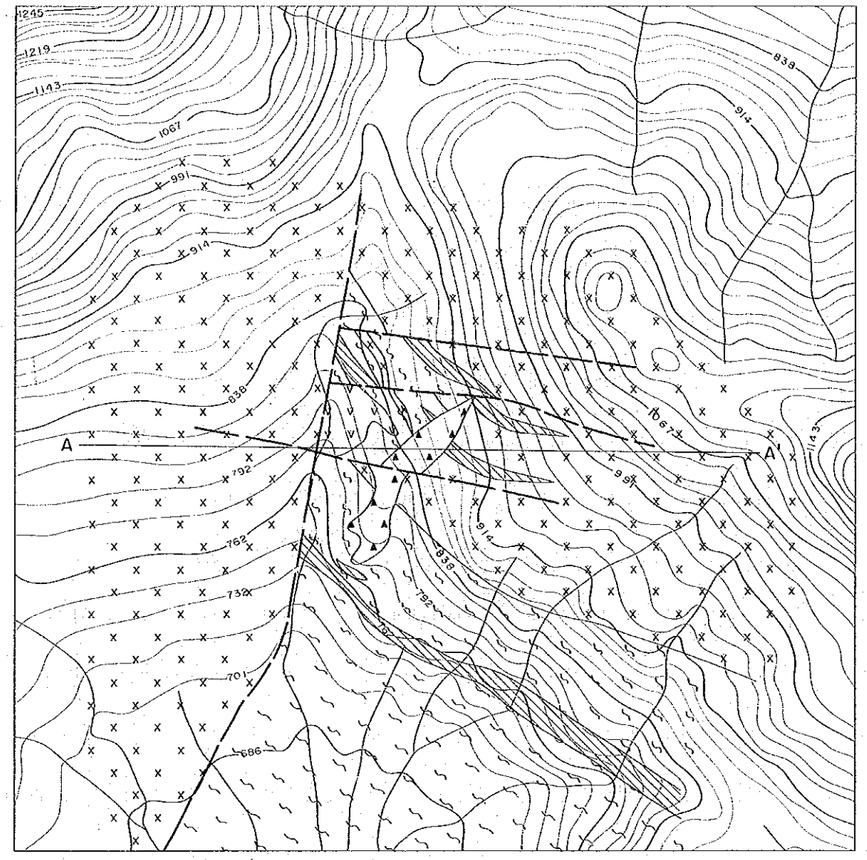
- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte
  P – Phonolite
  N – Nephelinite
  MF – Microfoyaite
  S – Sölvsbergite
  I – Ijolite
  D – Dolerite
  M – Monchiquite
  A – Aplite
- Fault
- 50° Dip of foliation of gneiss

COOPERATIVE MINERAL EXPLORATION
IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Chikala (13)



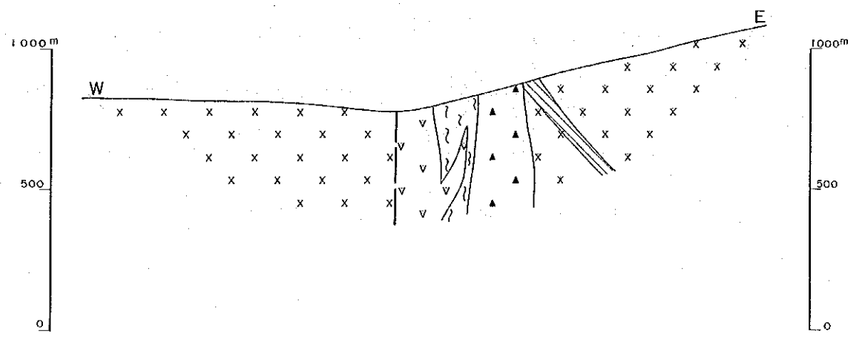
JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



0m 500m 1,000m

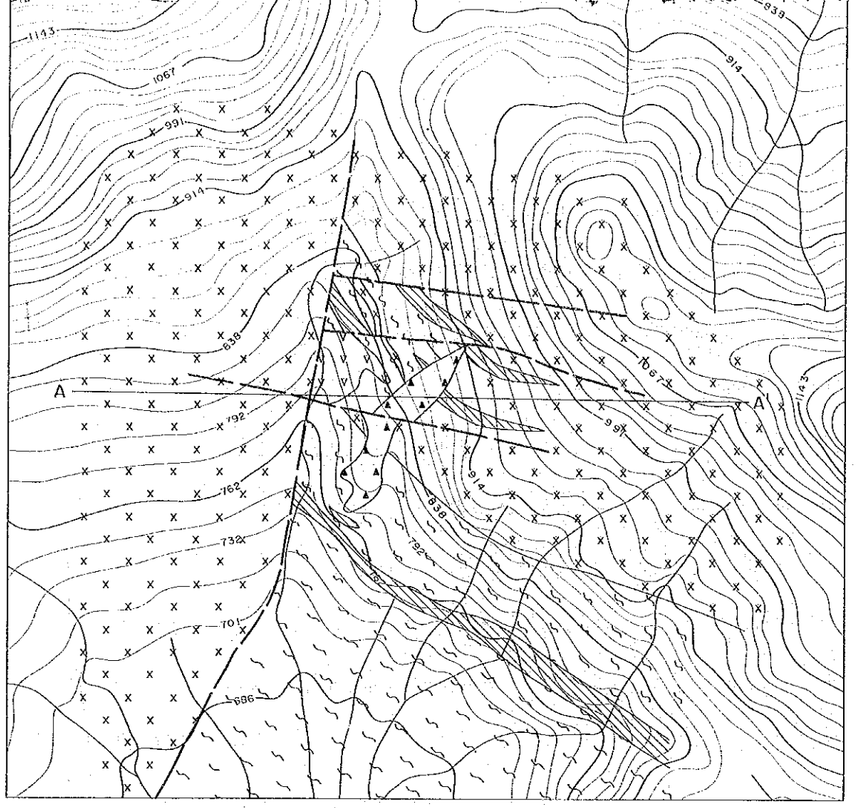
Scale 1 : 10,000

A-A' Section
(W-E)



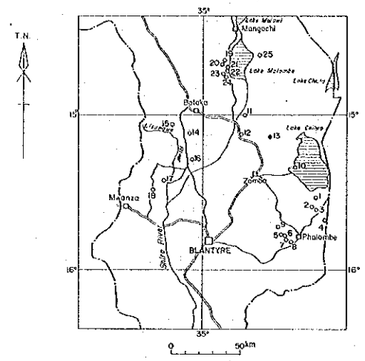
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate-Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyoite)
- Hornblende biotite-gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite-metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs
  - T - Trachyte
  - P - Phonolite
  - N - Nephelinite
  - MF - Microfoyoite
  - S - Sölvsbergite
  - I - Ijolite
  - D - Dolerite



IN
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE I)

GEOLOGICAL MAP AND PROFILE OF THE Chikala (13)

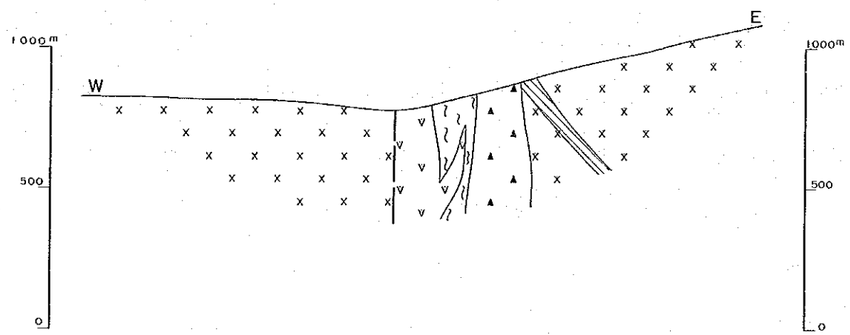


JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987

0m 500m 1,000m

Scale 1 : 10,000

A – A' Section
(W – E)



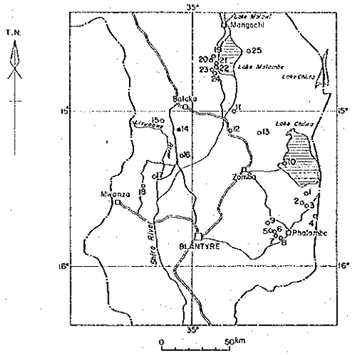
LEGEND

- Drift
- Sideritic carbonatite
- Ankeritic sövite
- Sövite
- Carbonate–Silicate rock
- Feldspathic breccia, agglomerate
- Phonolitic breccia
- Fenitized gneiss
- Trachyte
- Phonolite
- Nephelinite
- Syenite (Pulaskite)
- Nepheline syenite (Foyaite)
- Hornblende biotite–gneiss
- Granulite and gneissose granite
- Dolomitic marble
- Dolerite
- Granite
- Perthosite
- Biotite–metapyroxenite, metagabbro & biotitite
- Meta conglomerate
- Green pyroxene skarn
- Dykes and plugs T – Trachyte
  P – Phonolite
  N – Nephelinite
  MF – Microfoyaite
  S – Sölvsbergite
  I – Ijolite
  D – Dolerite
  M – Monchiquite
  A – Aplite
- Fault
- 50° Dip of foliation of gneiss

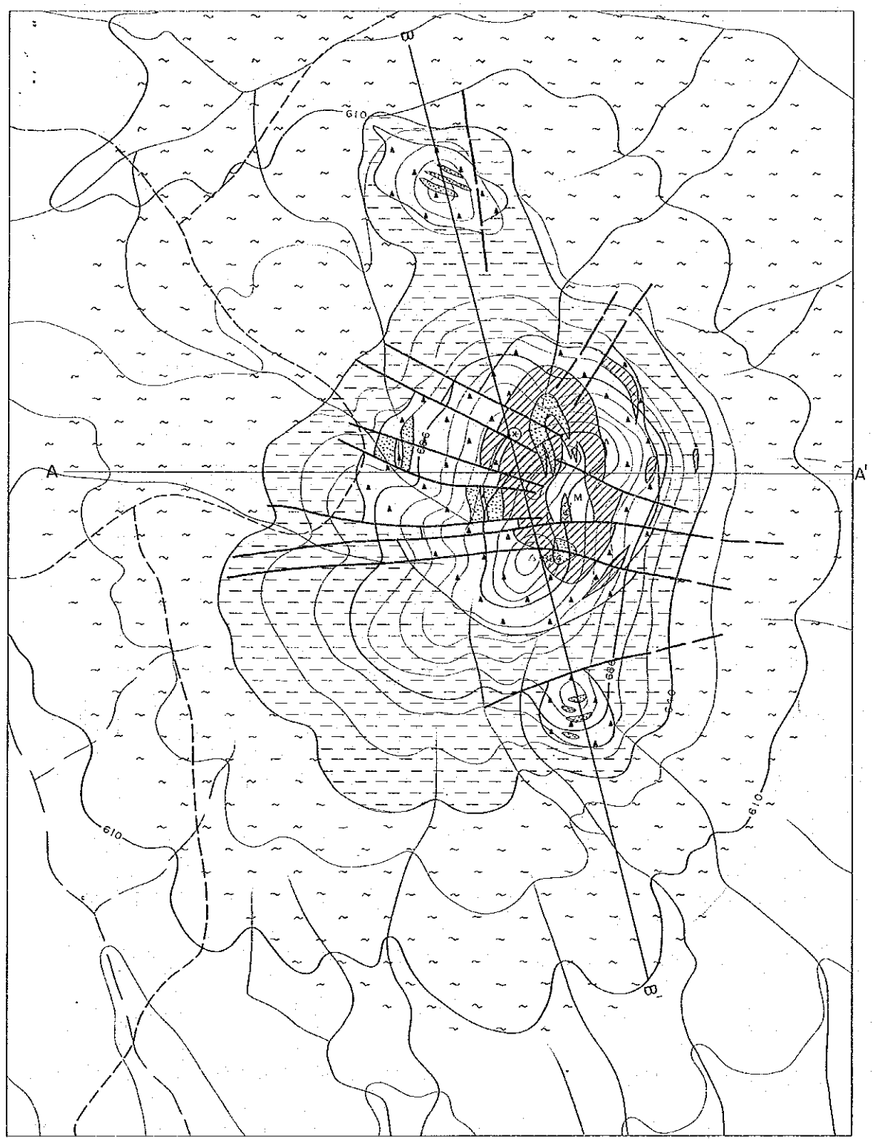
PL. 2-14

COOPERATIVE MINERAL EXPLORATION
IN :
THE CHILWA ALKALINE AREA,
REPUBLIC OF MALAWI
(PHASE 1)

GEOLOGICAL MAP AND PROFILE OF THE Kangankunde (14)



JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN
FEBRUARY 1987



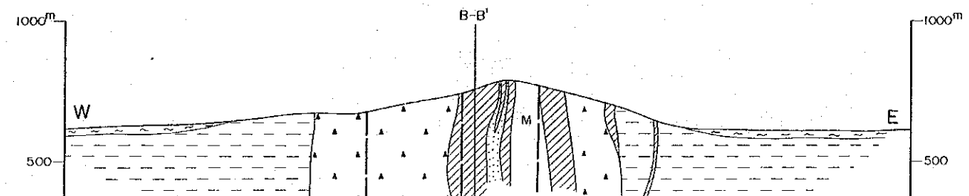
0m 500m 1,000m

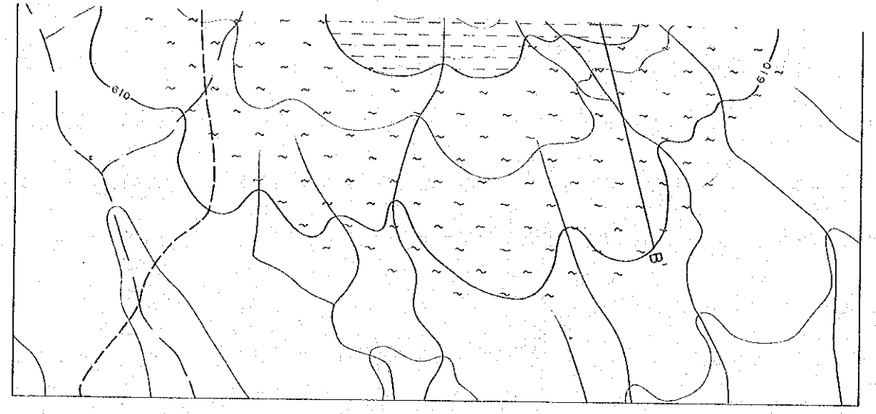
Scale 1 : 10,000

LEGEND

- Drift
- Dykes: S – sölvsbergite A – alnöite
- Drusy quartz-rock
- M — Manganiferous carbonatite
- Carbonatite
- Carbonatized feldspathic rock
- Feldspathic breccia, carbonatite-agglom
- Apatite-beforsite
- Feldspathized fenite
- Fault
- 80 — Dip of flow-structure
- 1/25 — Dip of gneiss

A–A' Section (W–E)

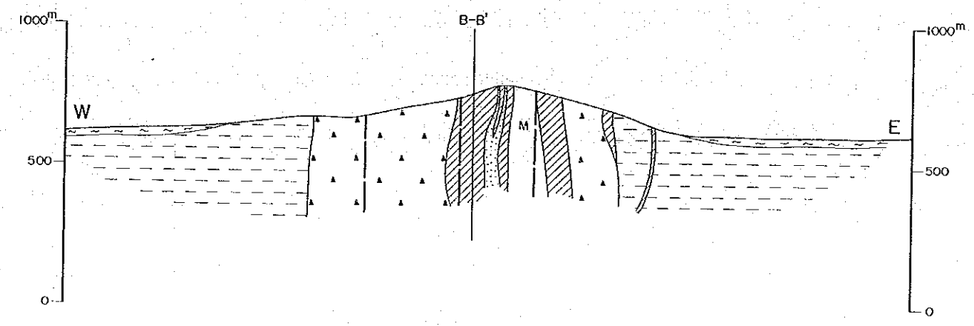




LEGEND

- Drift
- Dykes : S – sölvsbergite A – alnöite
- Drusy quartz-rock
- M — Manganiferous carbonatite
- Carbonatite
- Carbonatized feldspathic rock
- Feldspathic breccia, carbonatite-agglom
- Apatite-beforsite
- Feldspathized fenite
- Fault
- 80 — Dip of flow-structure
- 25 — Dip of gneiss

A–A' Section
(W – E)



B–B' Section
(N15W)