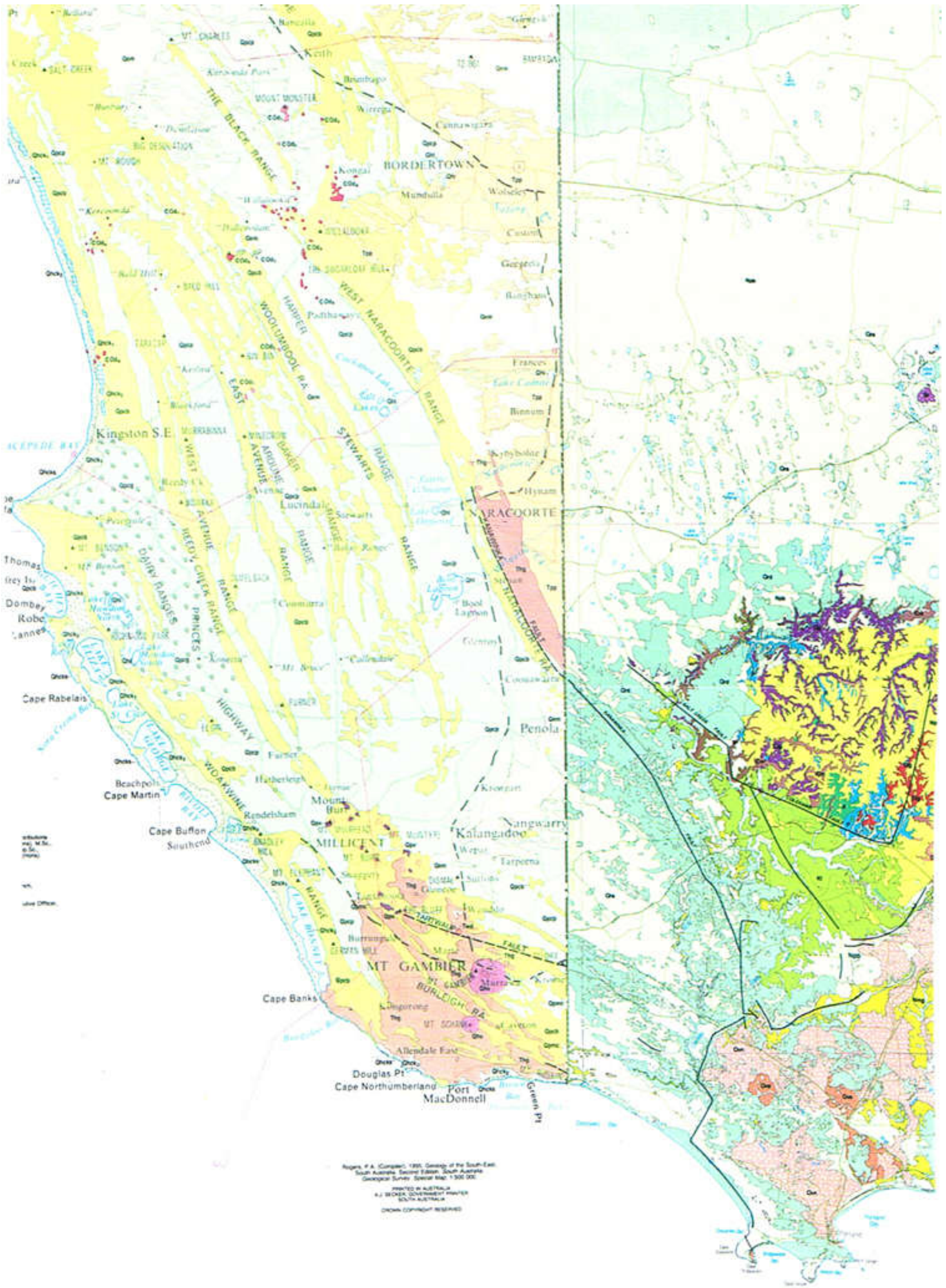

Rogers, P.A. (Compiler), 1995. Geology of the South-East, South Australia. Second Edition. South Australia Geological Survey. Special Map. 1:500 000.

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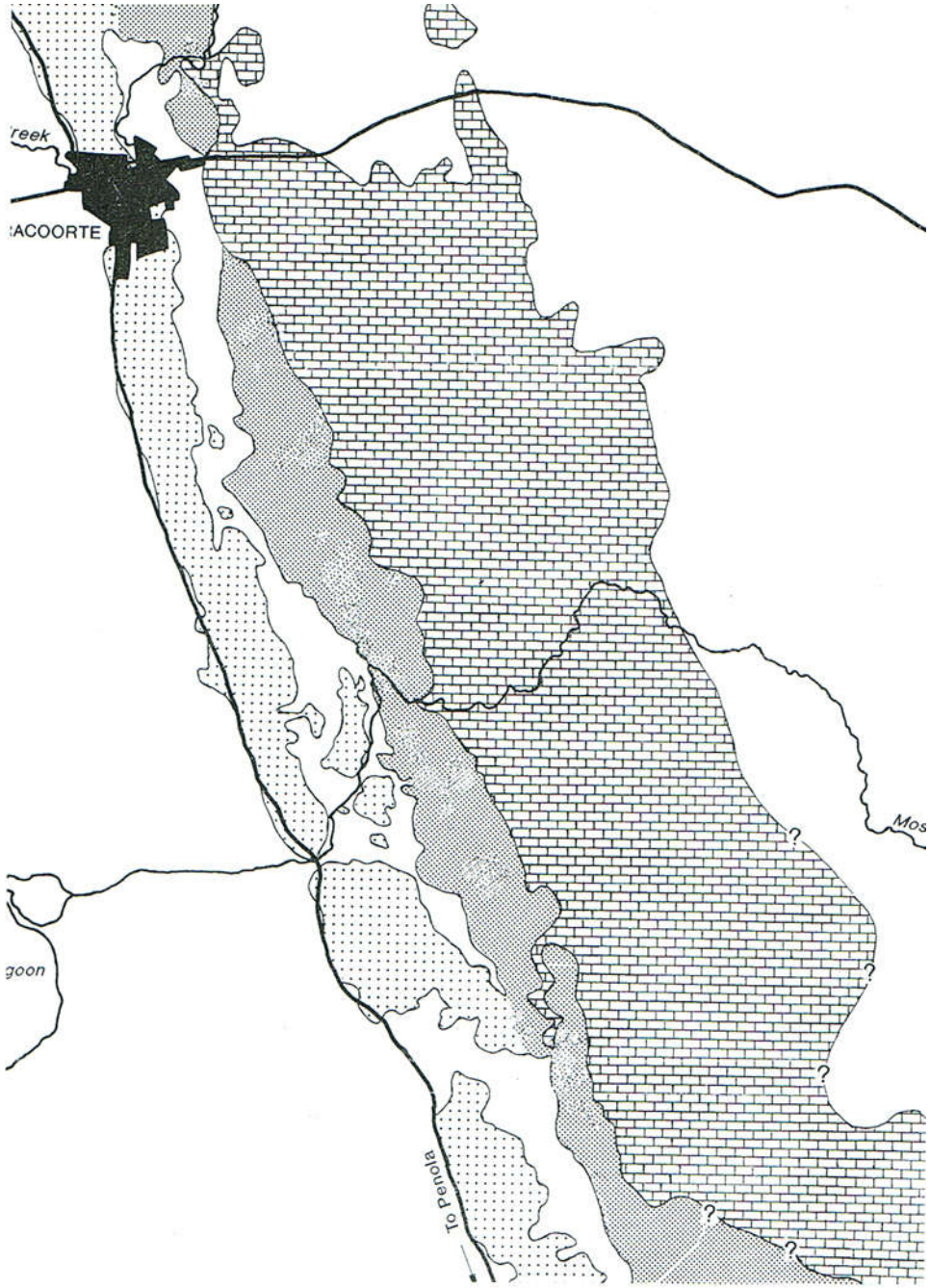
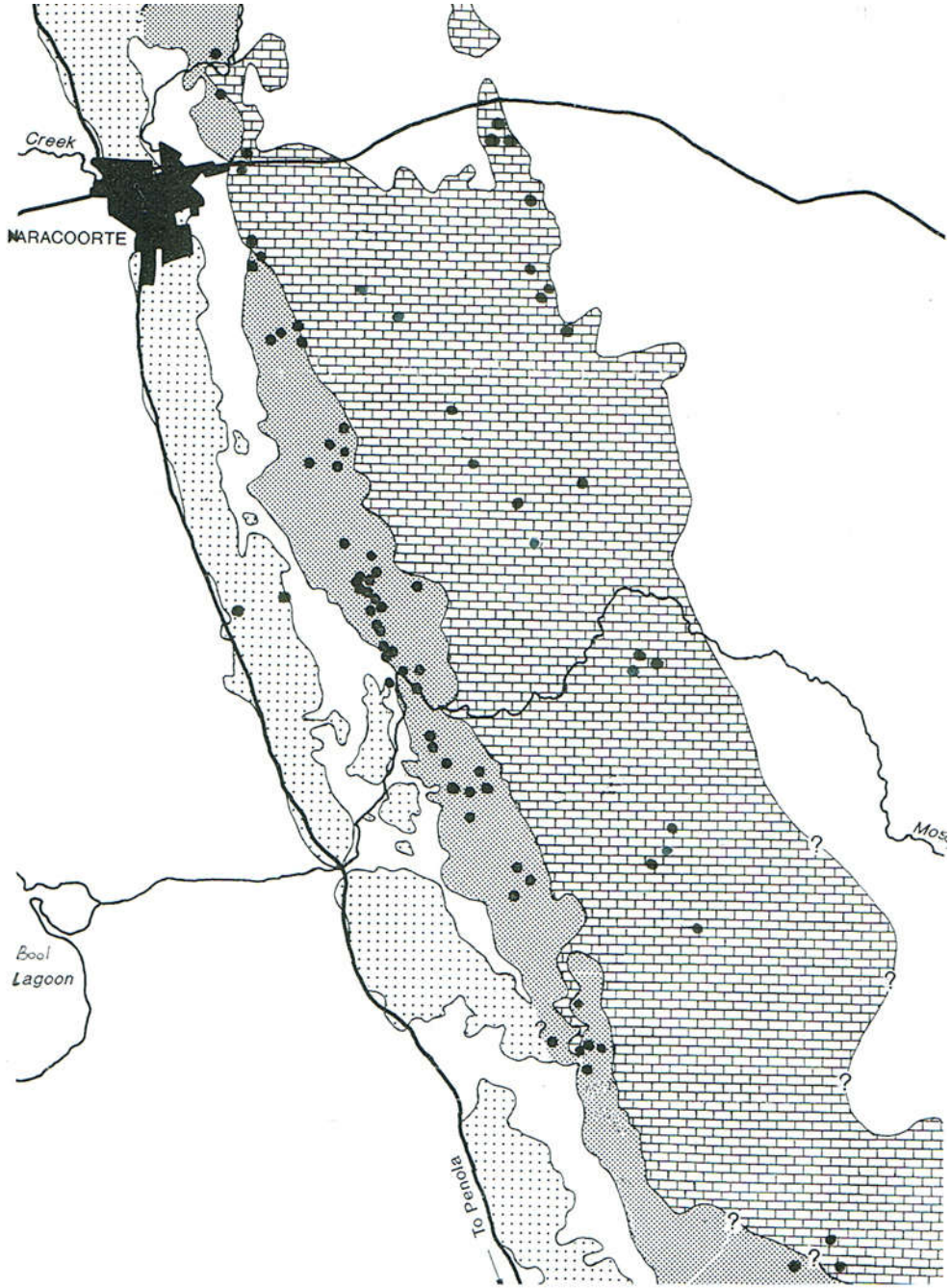
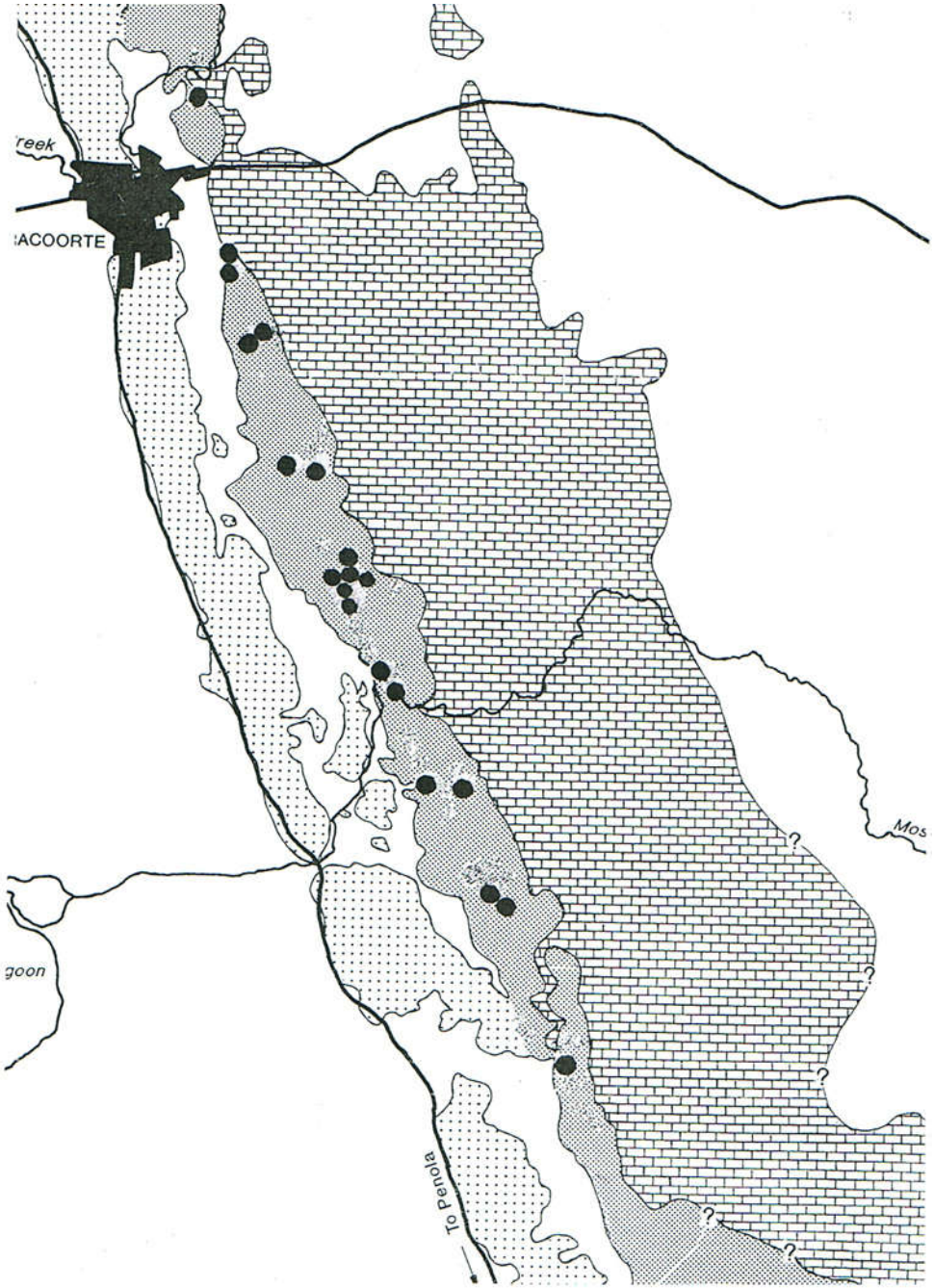
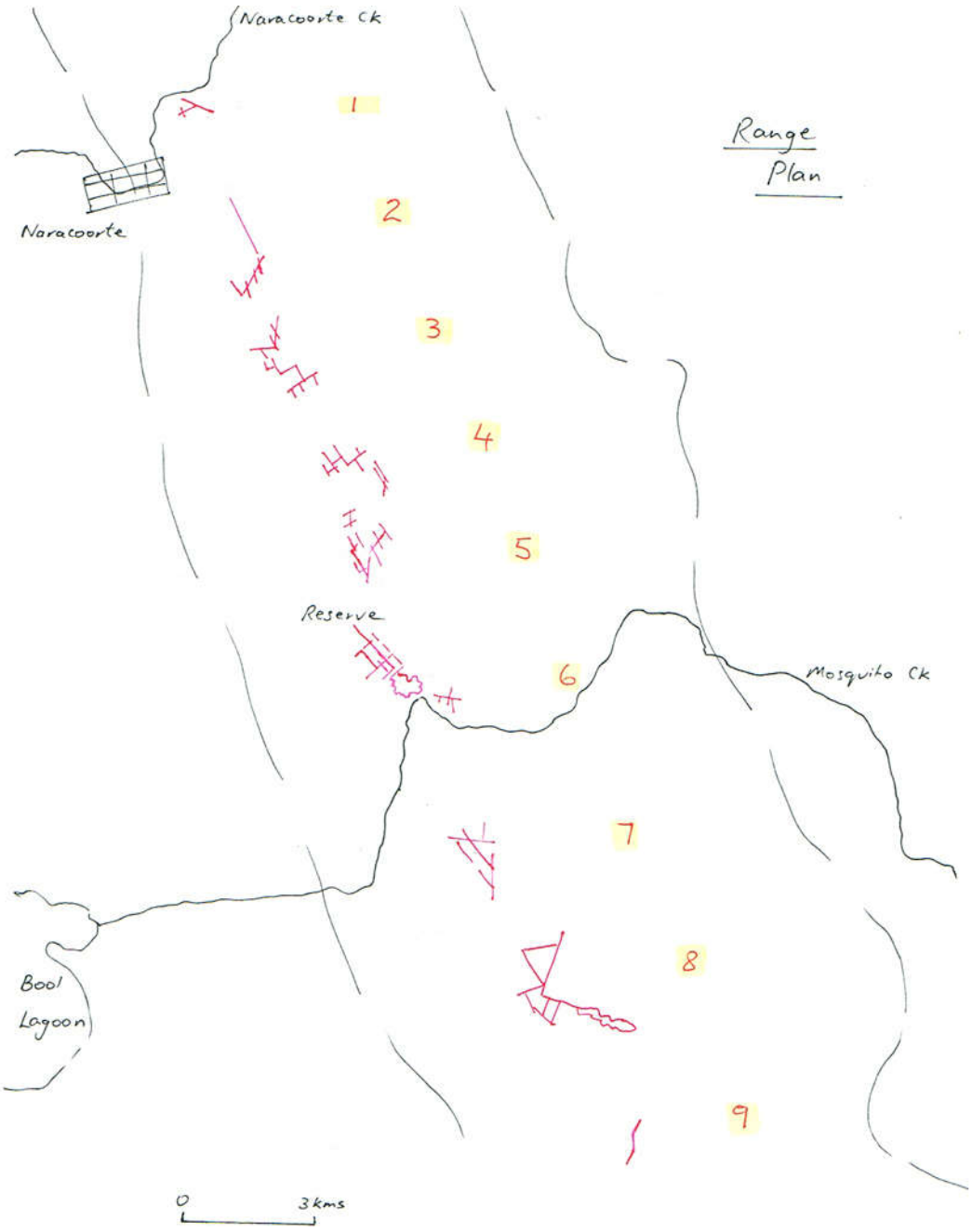
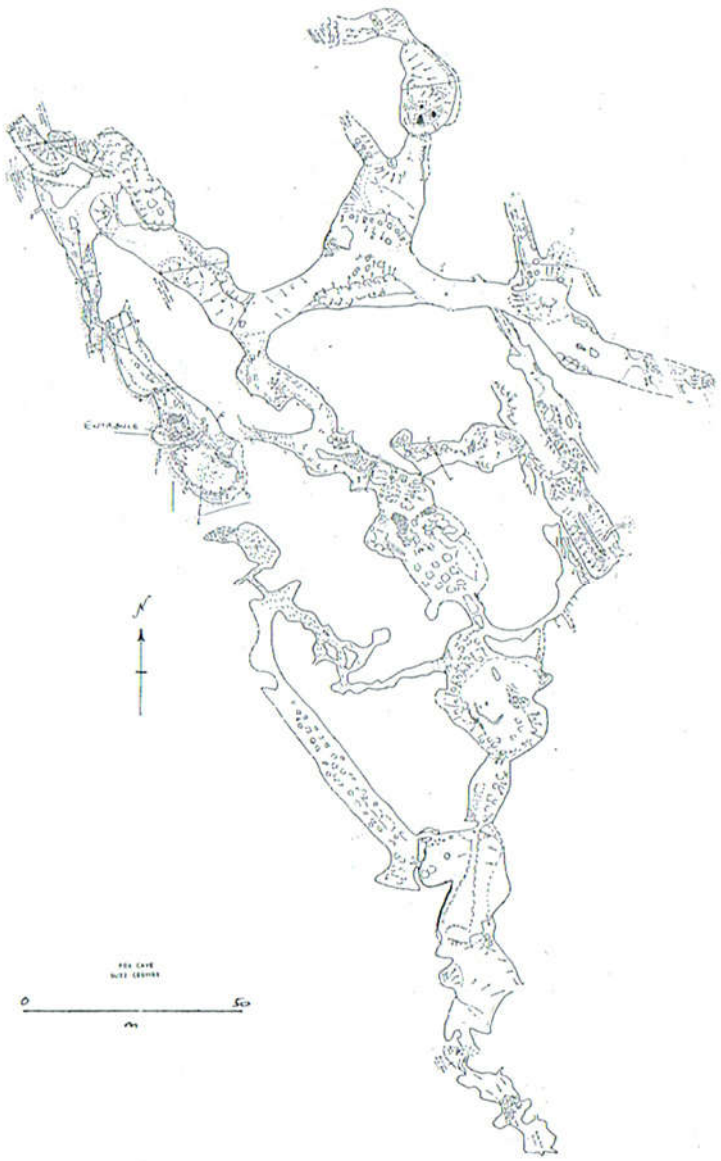
SOUTH AUSTRALIA

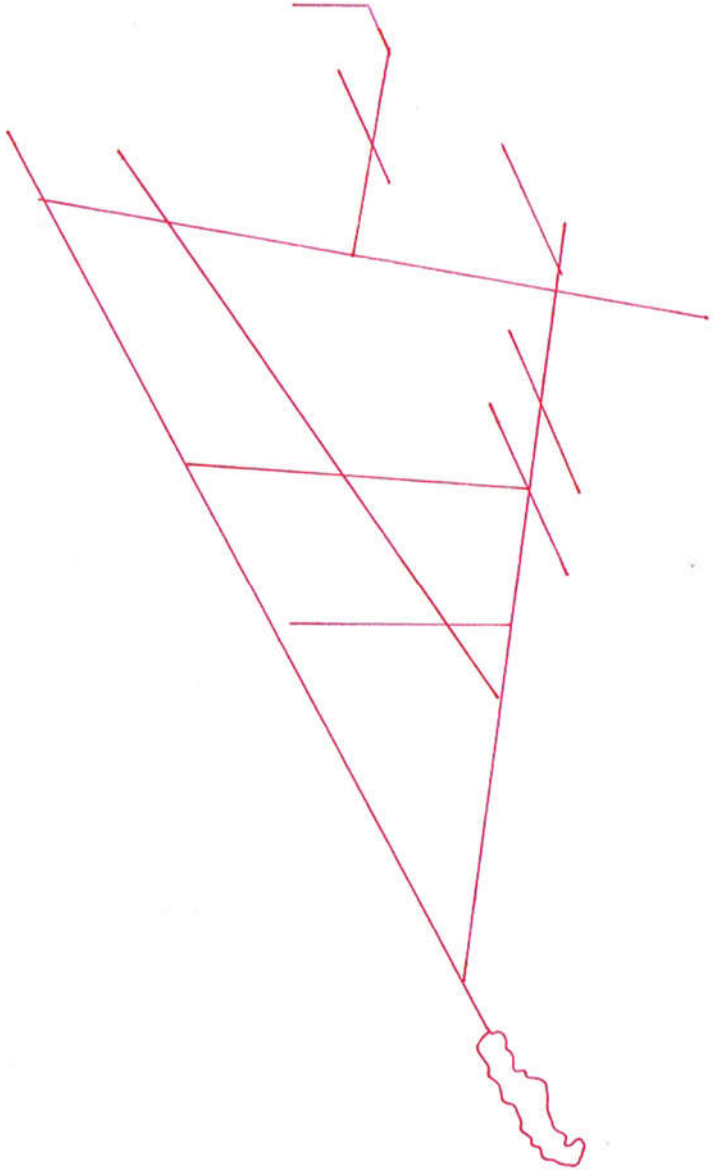

reek
ACOORTE
goon
Mos
?
?
?
?
?
To Penola

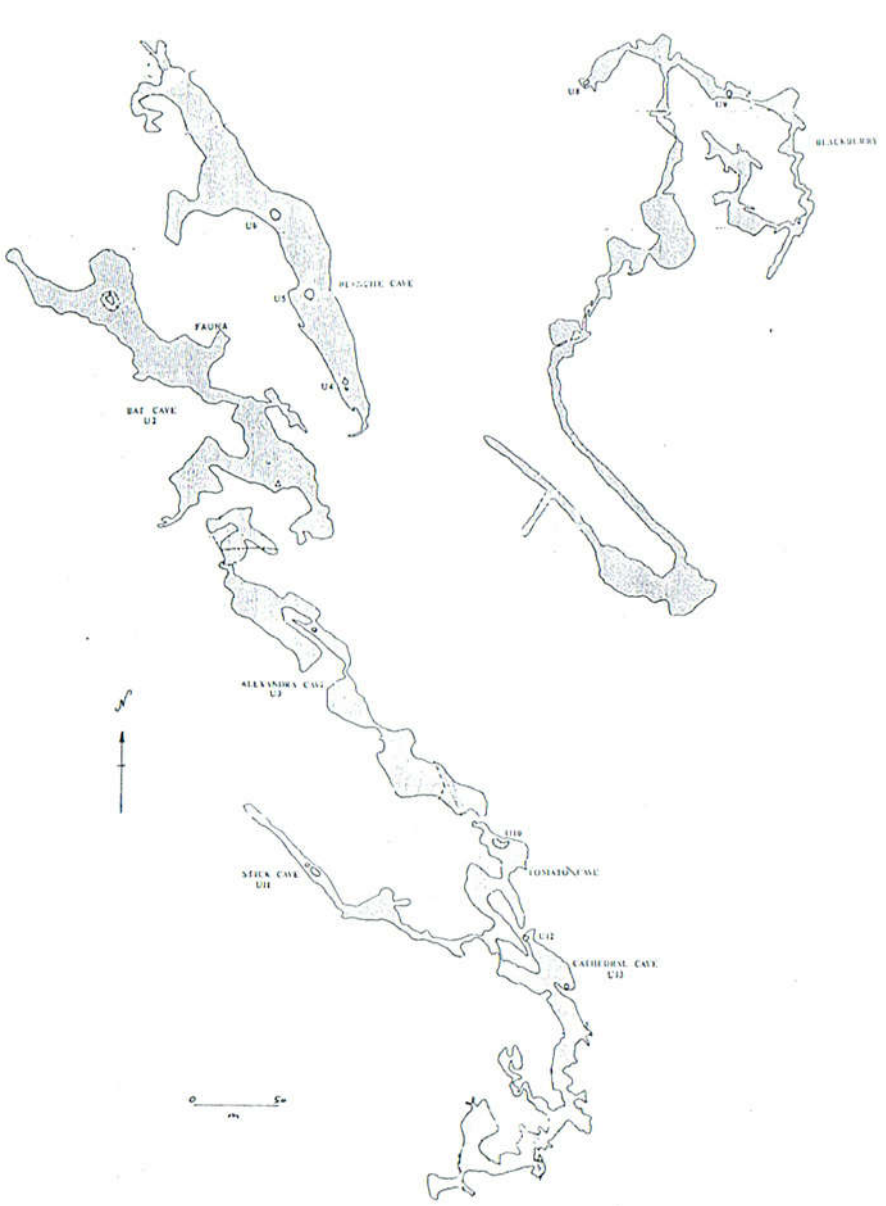

Creek
NARACOORTE
Bool
Lagoon
To Penola
?
?
?
?
?

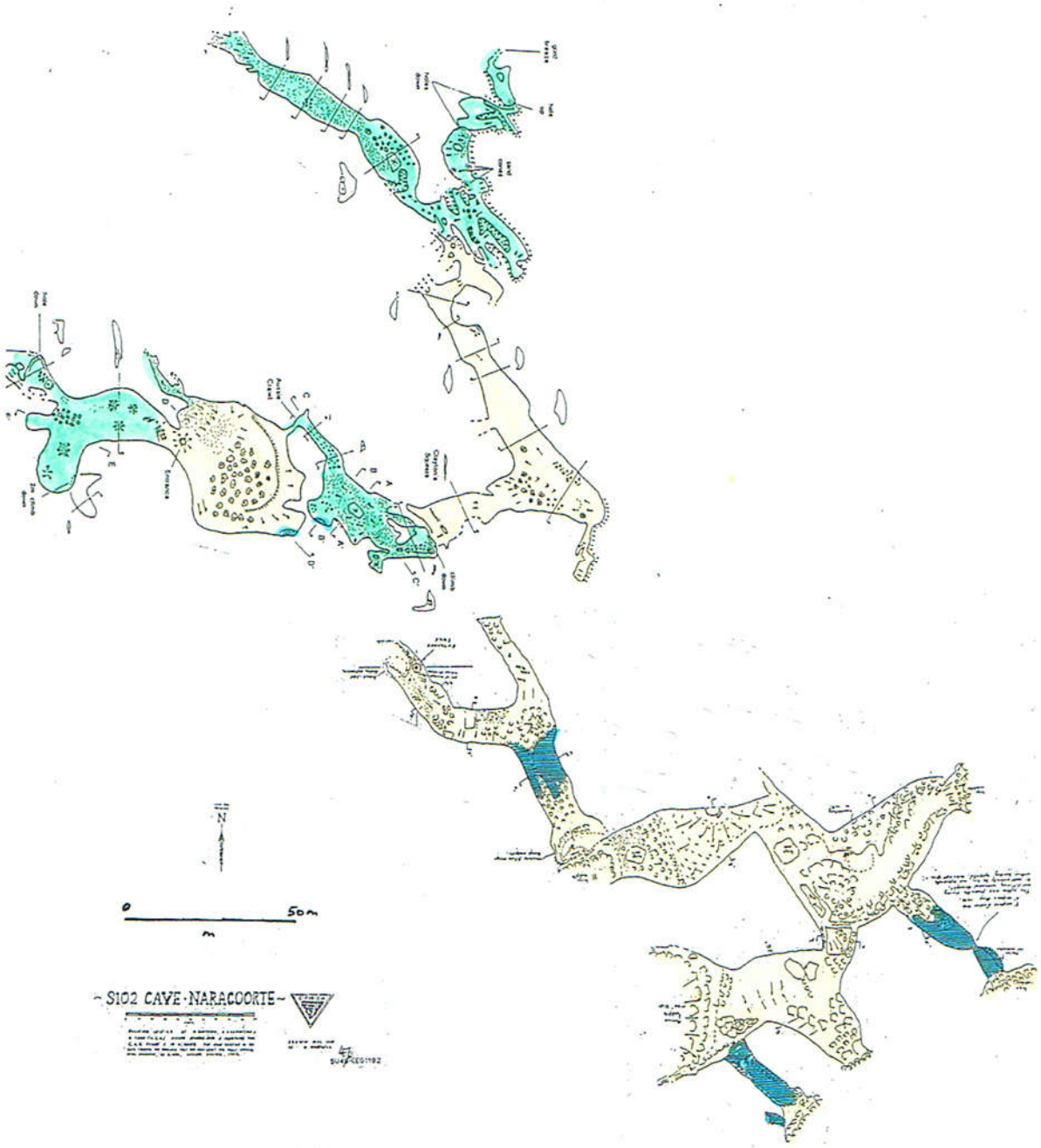

reek
ACOORTE
Mos
goon
To Penola
?
?
?
?
?

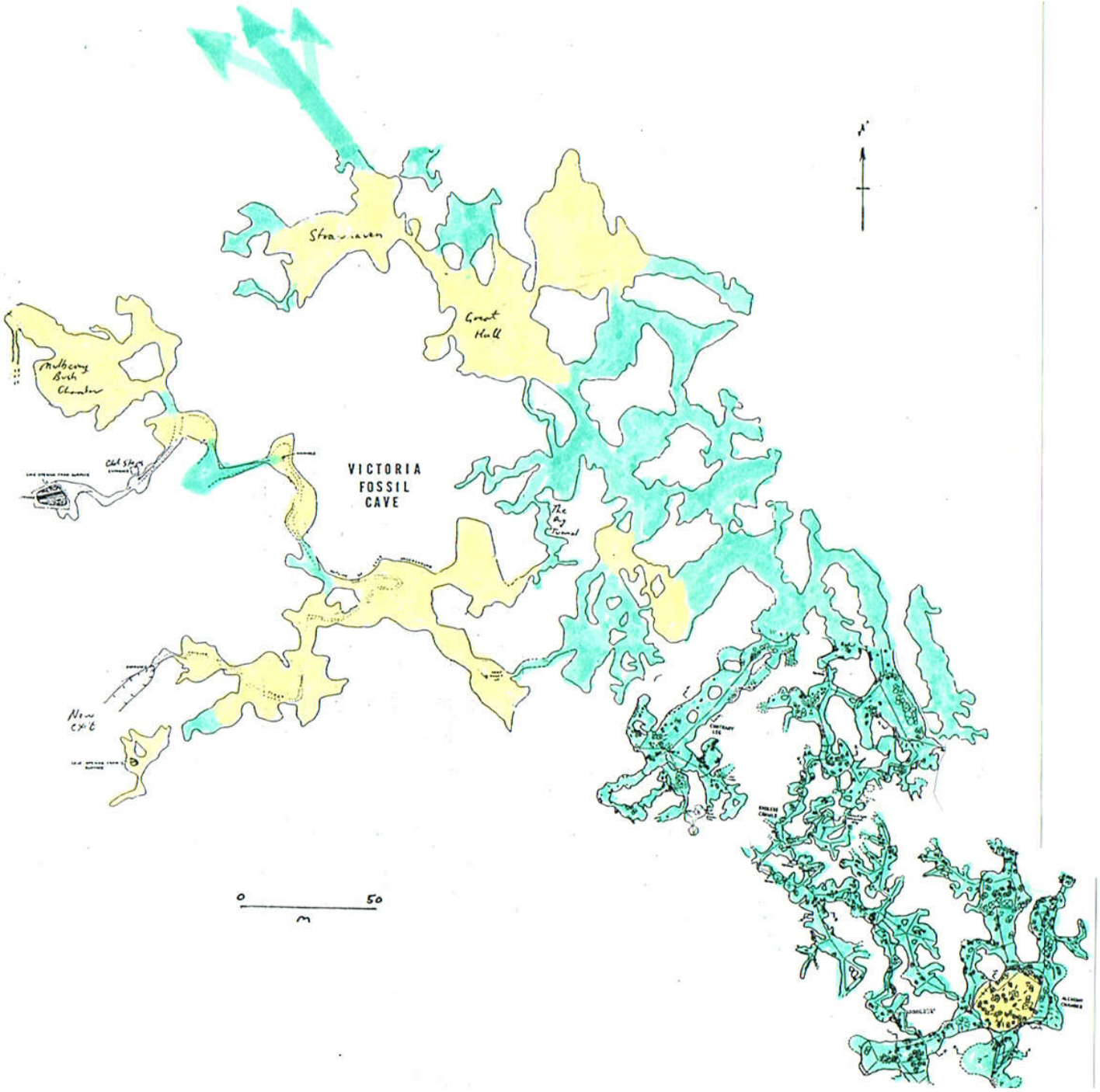

Naracoorte Ck
Naracoorte
Range Plan
1
2
3
4
5
Reserve
6
Mosquito Ck
7
8
Bool Lagoon
9
0
3kms

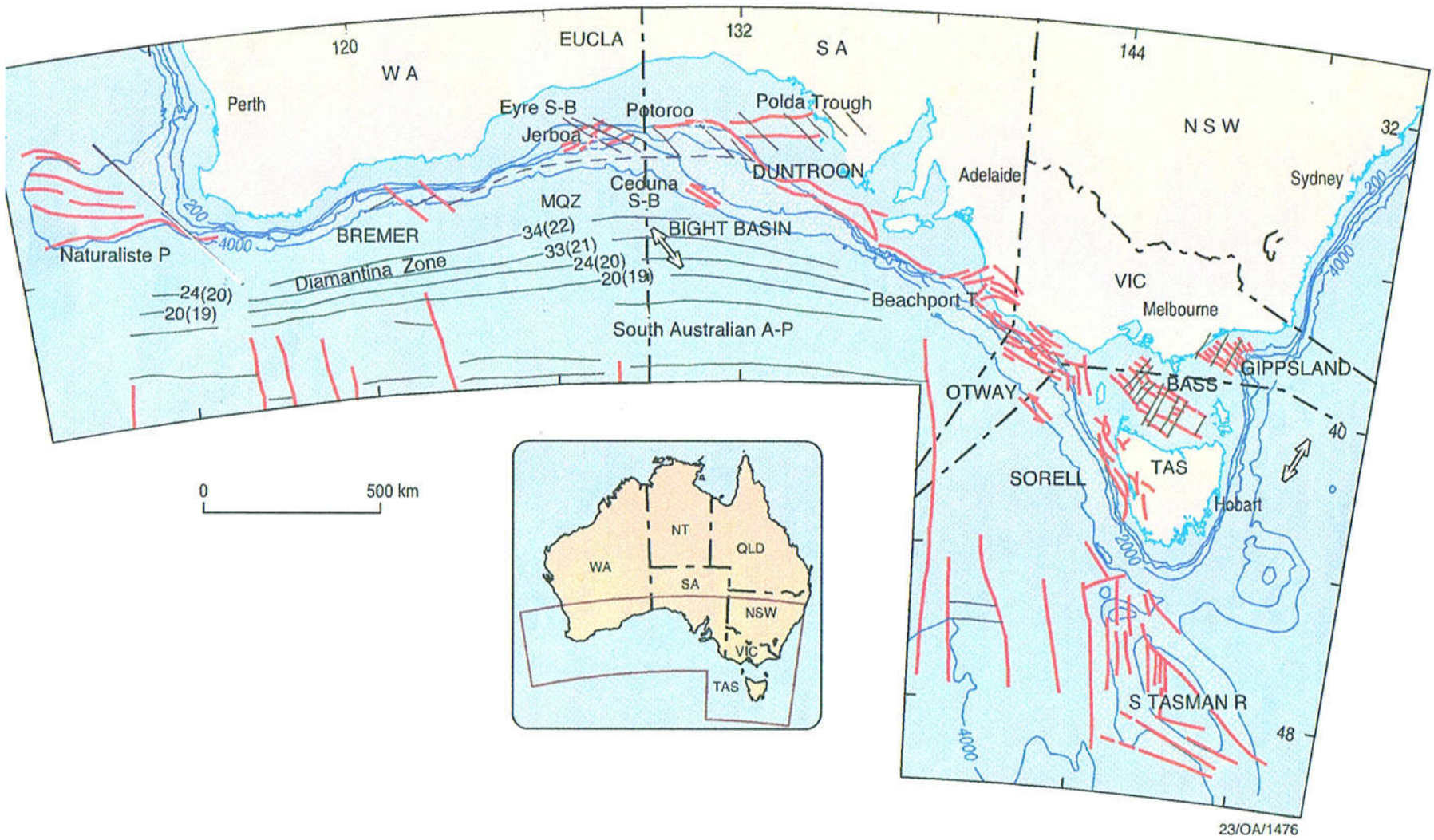

0
50
m



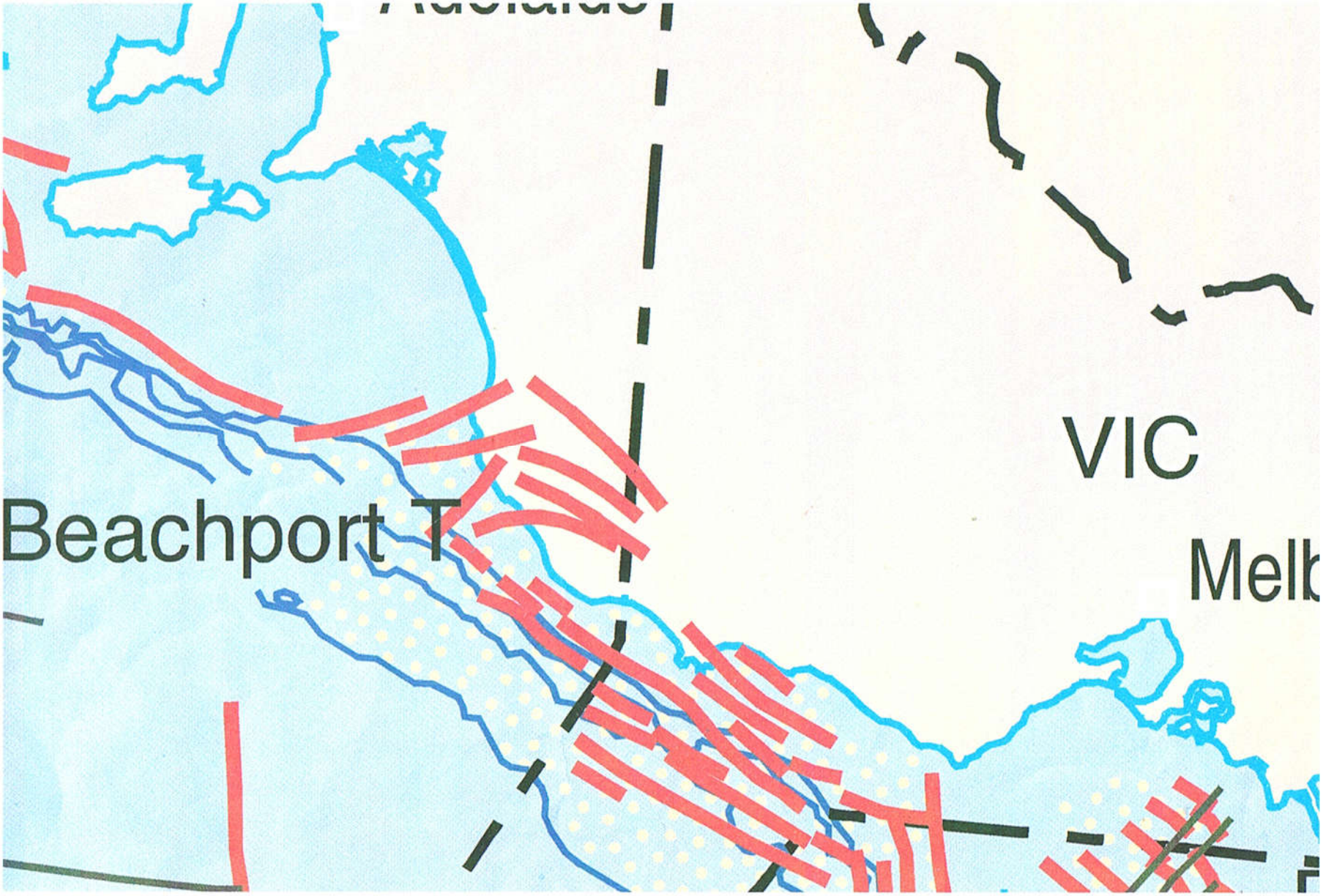

U6
U5
FAUNA
U4
BAT CAVE
U3
U9
U8
U10
U11
U12
U13

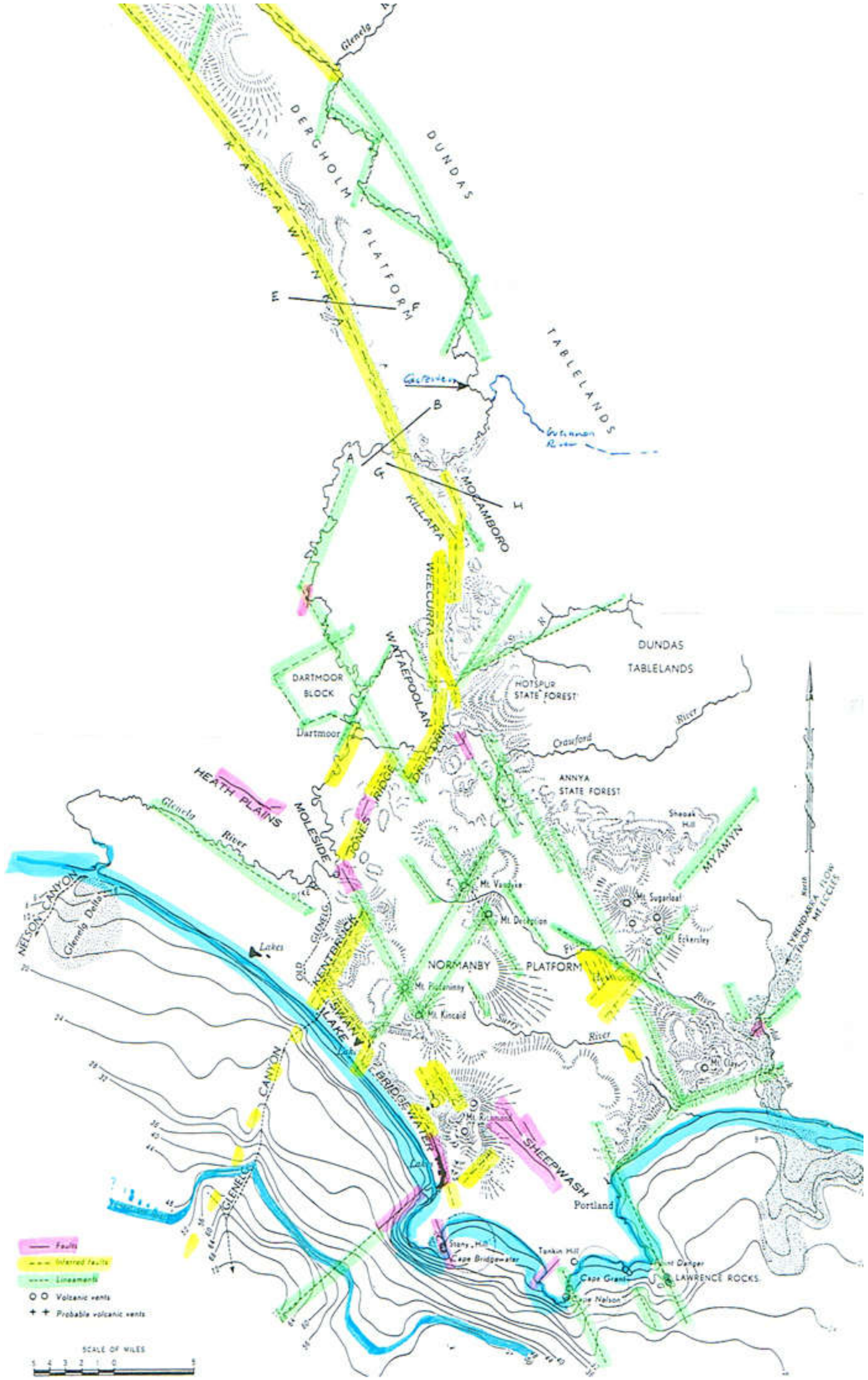

N
0
50m
m
~ S102 CAVE · NARACOORTE ~


Great Hall
VICTORIA
FOSSIL
CAVE
0
50
m

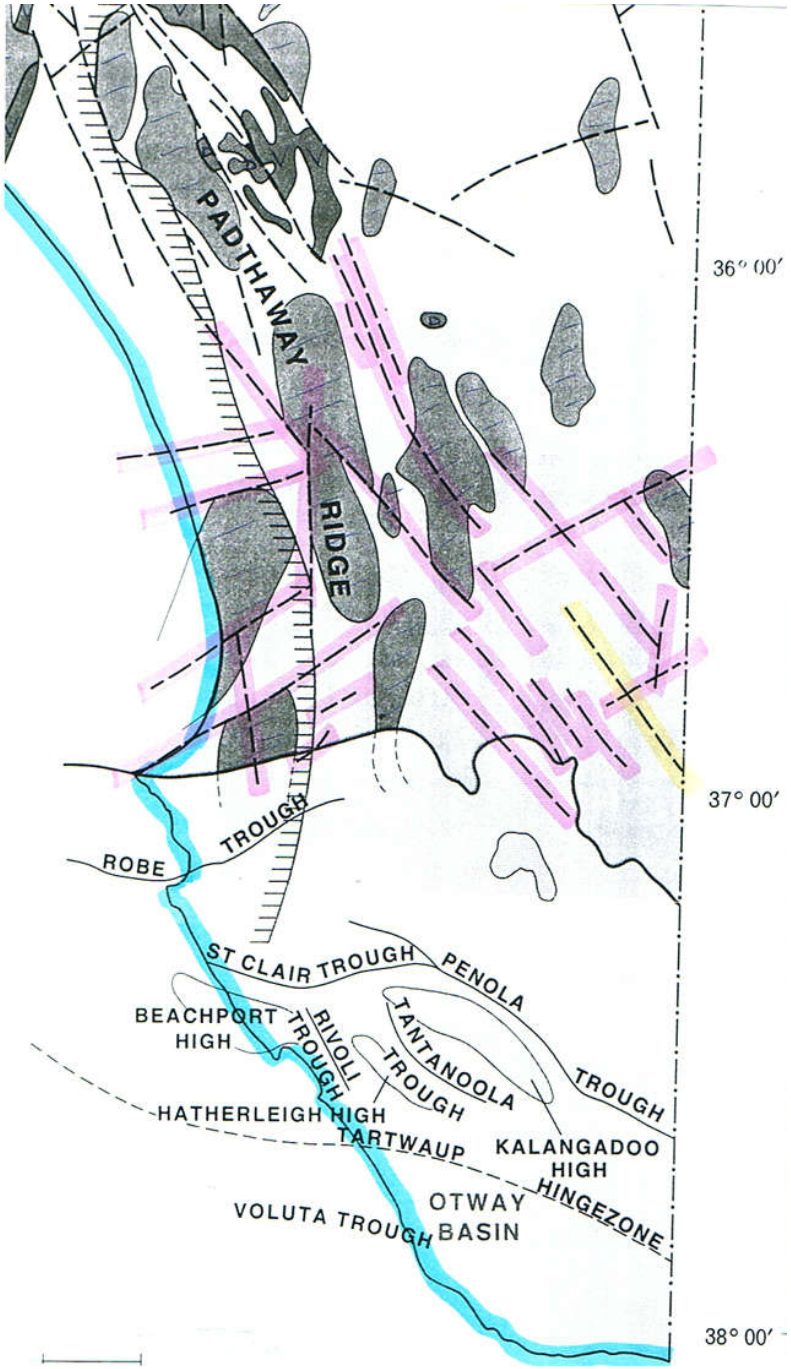


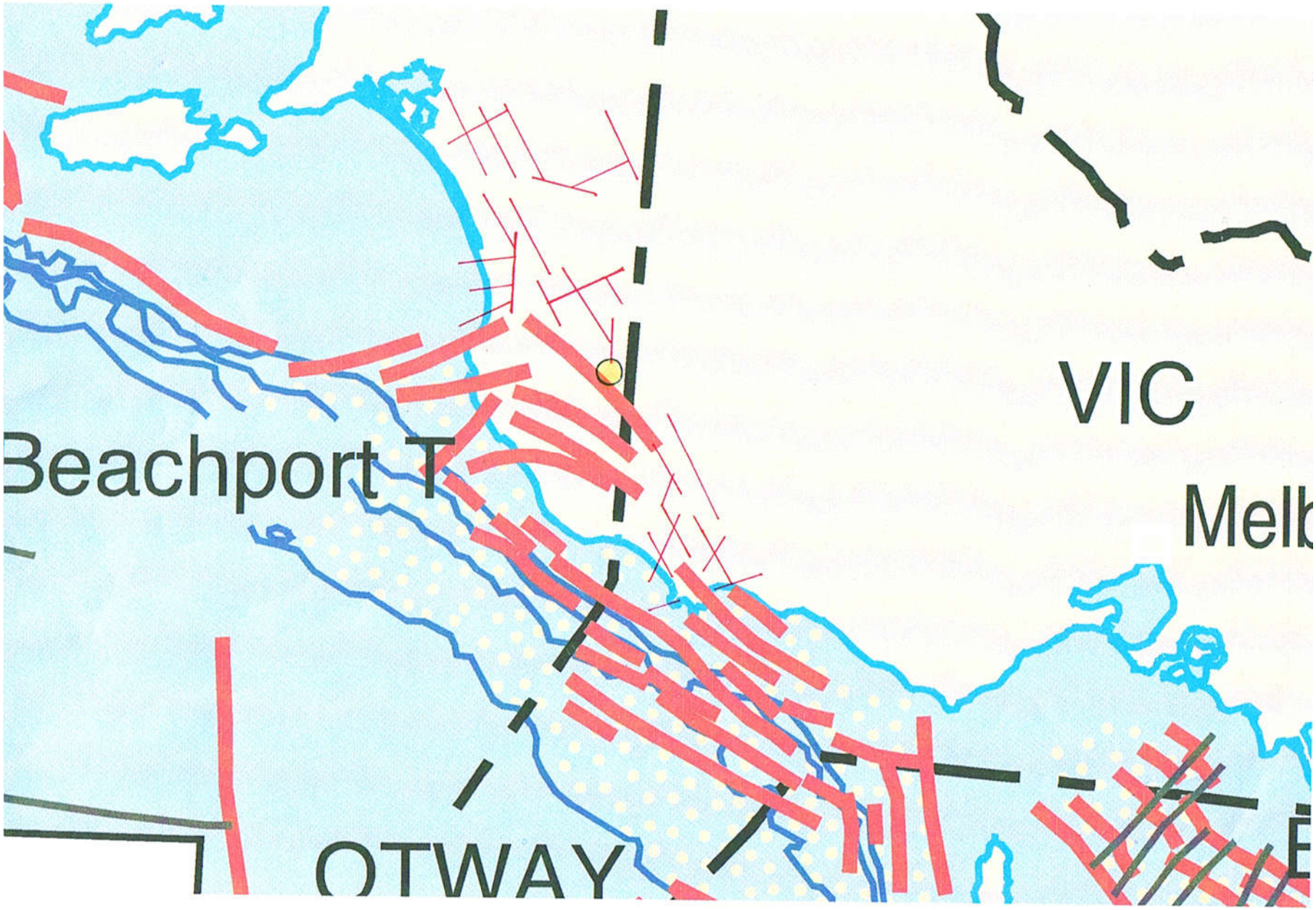
gure 4. The Southern Rift System (SRS) of Stagg et al. (1990) and Willcox (1990). Sea-floor spreading anomalies shown by anomaly number (bracketed er Weissel & Hayes 1972; unbracketed after Cande & Mutter 1982). Arrows show postulated sense of lithospheric extension. Note use of transfer faults to nafer rifting along strike

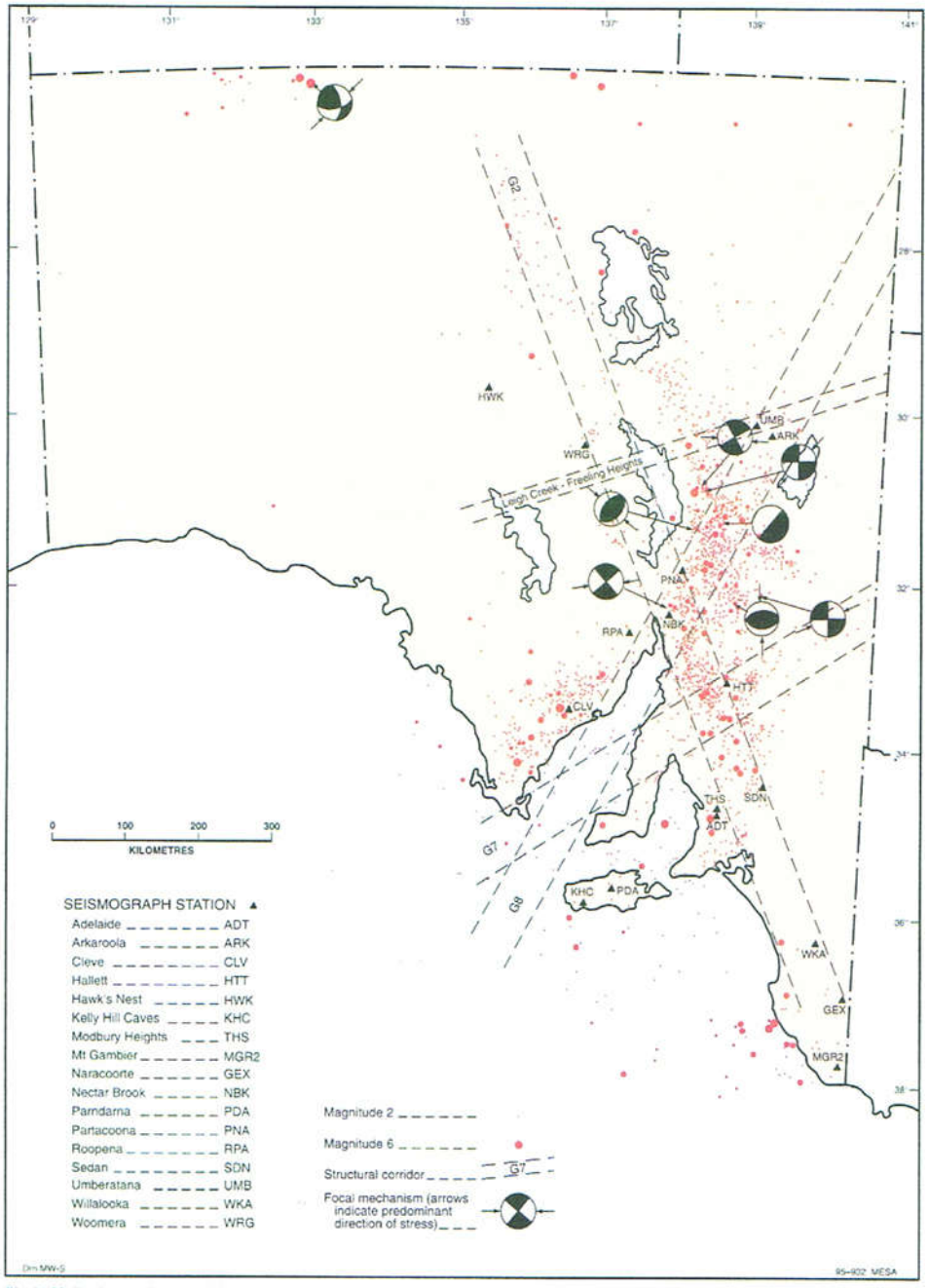

VIC
Beachport T
Melb

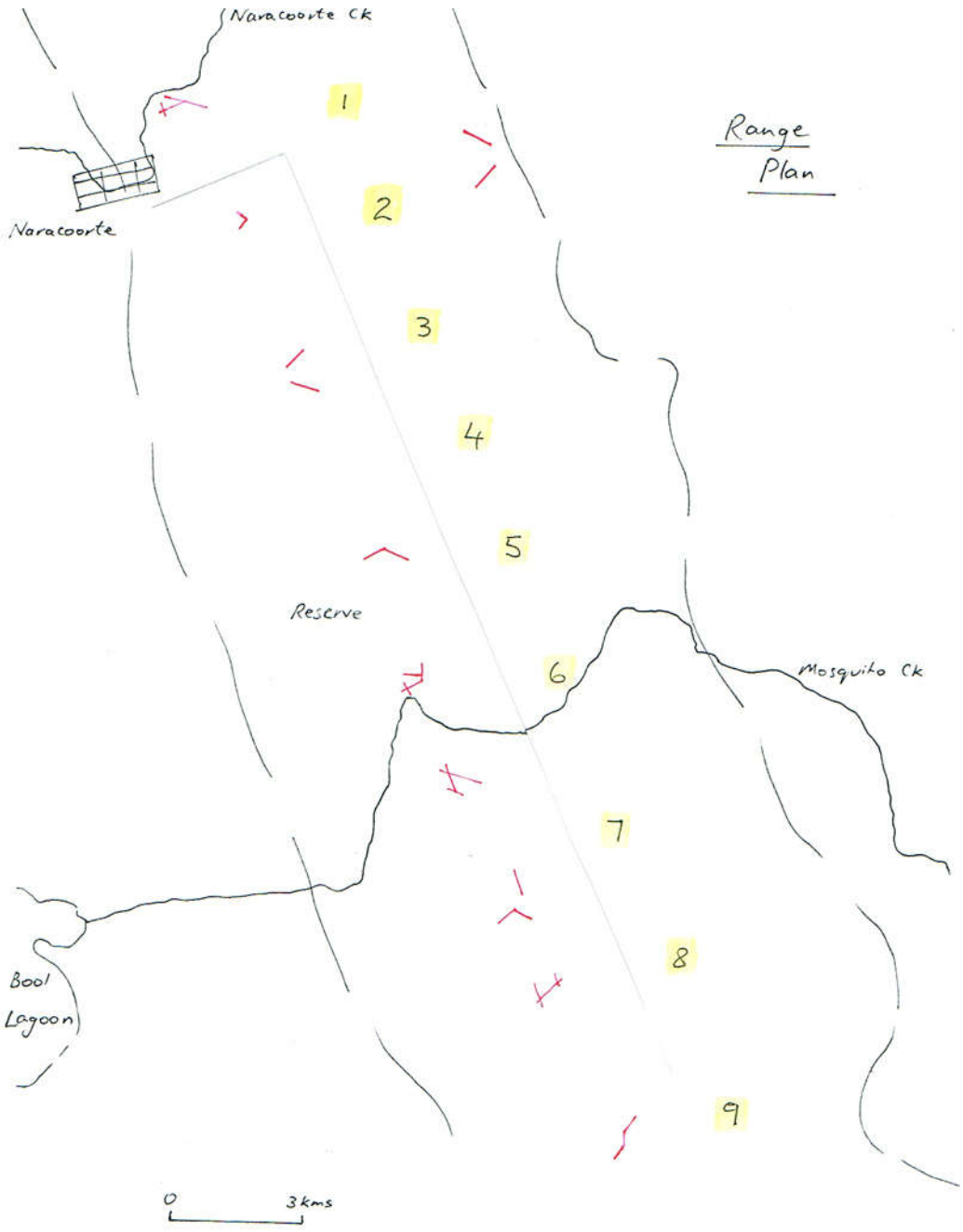


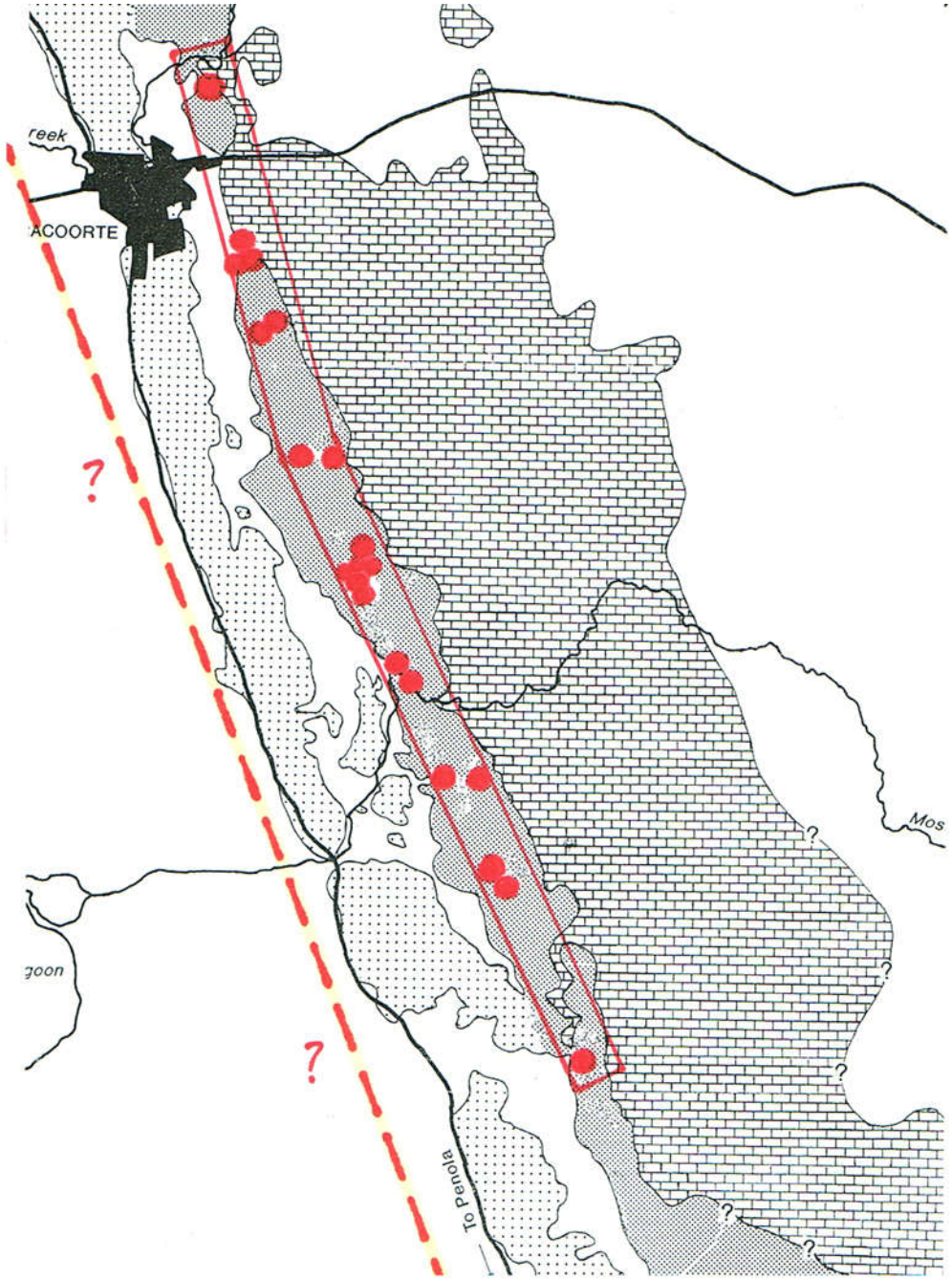
KANAWINKA
DERGHOLM PLATFORM
DUNDAS TABLELANDS
Glenelg
E
F
A
B
G
H
MOCAMBORO
KILLARA
WEECURRA
WATAEPOOLAN
DRIK DRIK
DARTMOOR BLOCK
Dartmoor
DUNDAS TABLELANDS
HOTSPUR STATE FOREST
Crawford
River
ANNYA STATE FOREST
HEATH PLAINS
MOLESIDE
TONES RIDGE
Glenelg
River
NELSON CANYON
Mt. Vandyke
Mt. Deception
Mt. Sugarloaf
Eckersley
MYAMYN
NORMANBY PLATFORM
Mt. Picaninny
Mt. Kincaid
KENTBRUCK
SWAN LAKE
Lakes
BRIDGEWATER
Mt. Richmond
SHEEPWASH
Portland
Mt. Clay
River
Stony Hill
Cape Bridgewater
Tarkin Hill
Cape Grant
Cape Nelson
Point Danger
LAWRENCE ROCKS
Faults
Inferred faults
Lineaments
Volcanic vents
Probable volcanic vents
SCALE OF MILES


PADTHAWAY RIDGE
36° 00′
37° 00′
38° 00′
ROBE TROUGH
ST CLAIR TROUGH
PENOLA TROUGH
BEACHPORT HIGH
RIVOLI TROUGH
TANTANOOLA TROUGH
HATHERLEIGH HIGH
TARTWAUP HINGEZONE
KALANGADOO HIGH
OTWAY BASIN
VOLUTA TROUGH


VIC
Beachport T
OTWAY


129°
131°
133°
135°
137°
139°
141°
26°
30°
32°
34°
36°
38°
G2
HWK
WRG
UMB
ARK
Leigh Creek - Freeling Heights
PNA
NBK
RPA
HTT
CLV
THS
SDN
ADT
G7
G8
KHC
PDA
WKA
GEX
MGR2
0
100
200
300
KILOMETRES
SEISMOGRAPH STATION ▲
Adelaide ADT
Arkaroola ARK
Cleve CLV
Hallett HTT
Hawk's Nest HWK
Kelly Hill Caves KHC
Modbury Heights THS
Mt Gambier MGR2
Naracoorte GEX
Nectar Brook NBK
Parndana PDA
Partacoona PNA
Roopena RPA
Sedan SDN
Umberatana UMB
Willalooka WKA
Woomera WRG
Magnitude 2
Magnitude 6
Structural corridor G7
Focal mechanism (arrows indicate predominant direction of stress)
Dm MW-S
95-802 MESA


Naracoorte Ck
Naracoorte
Range
Plan
1
2
3
4
5
Reserve
6
Mosquito Ck
7
8
Bool
Lagoon
9
0
3kms


reek
ACOORTE
?
?
goon
To Penola
Mos

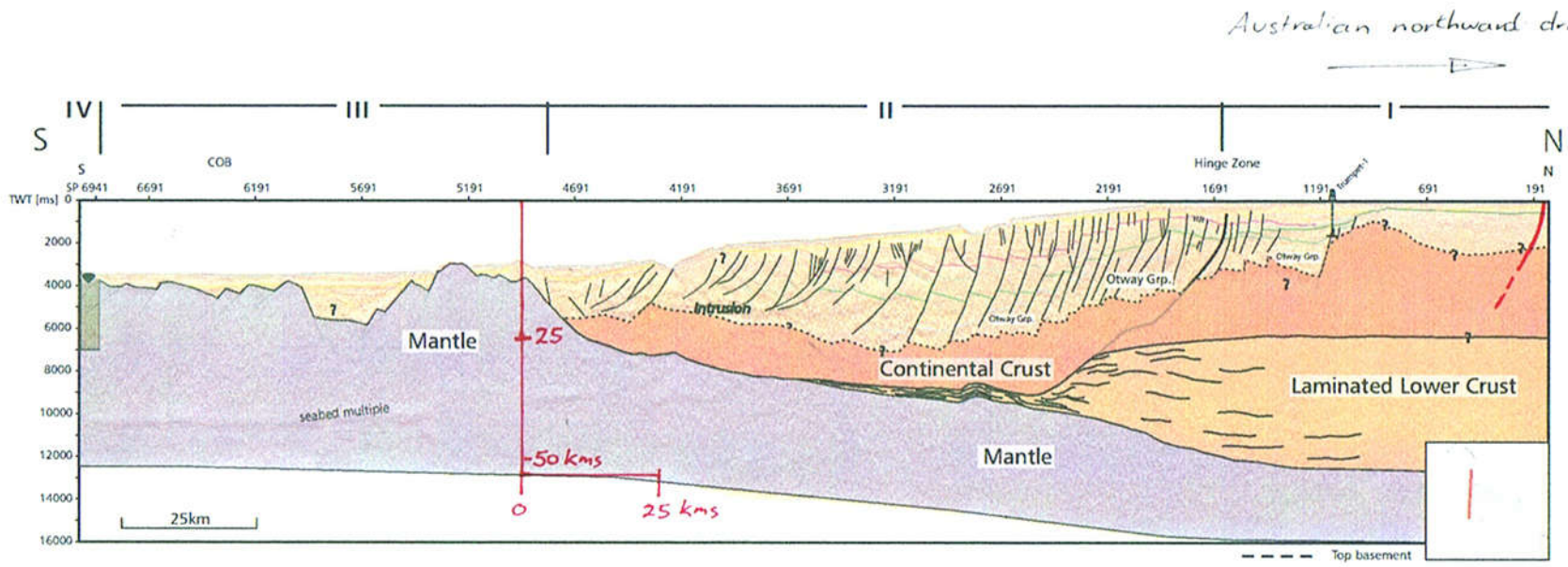
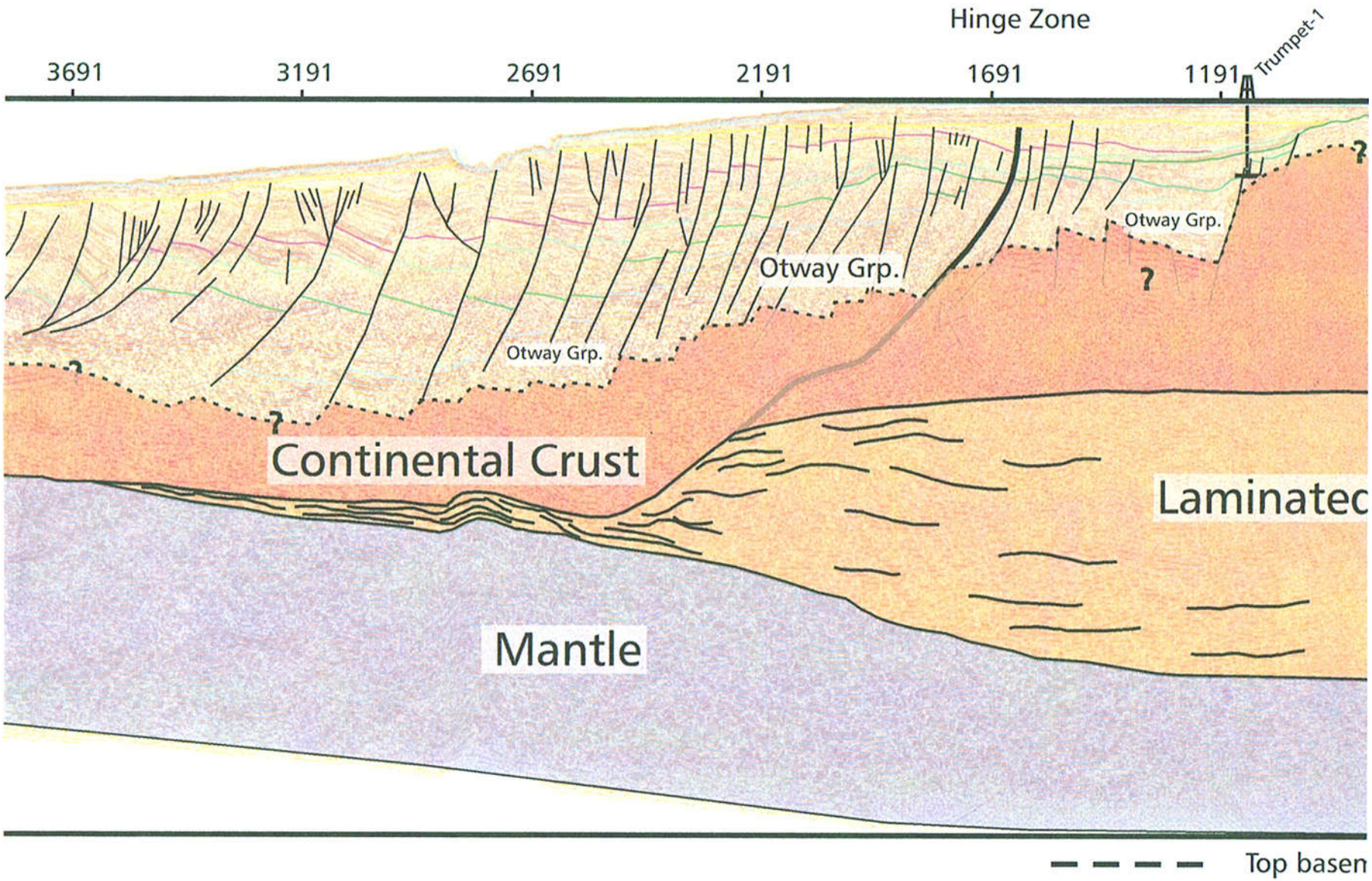
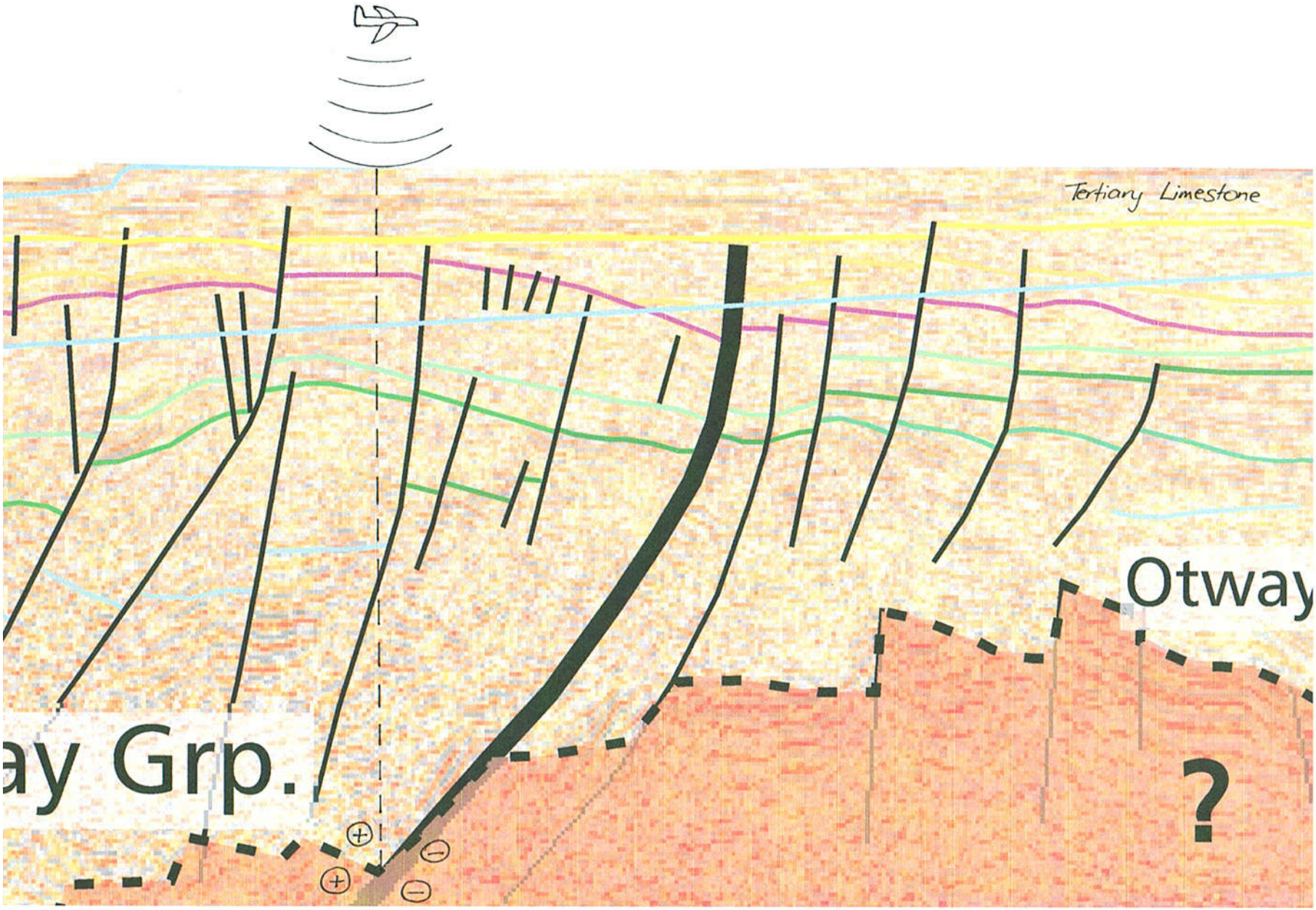
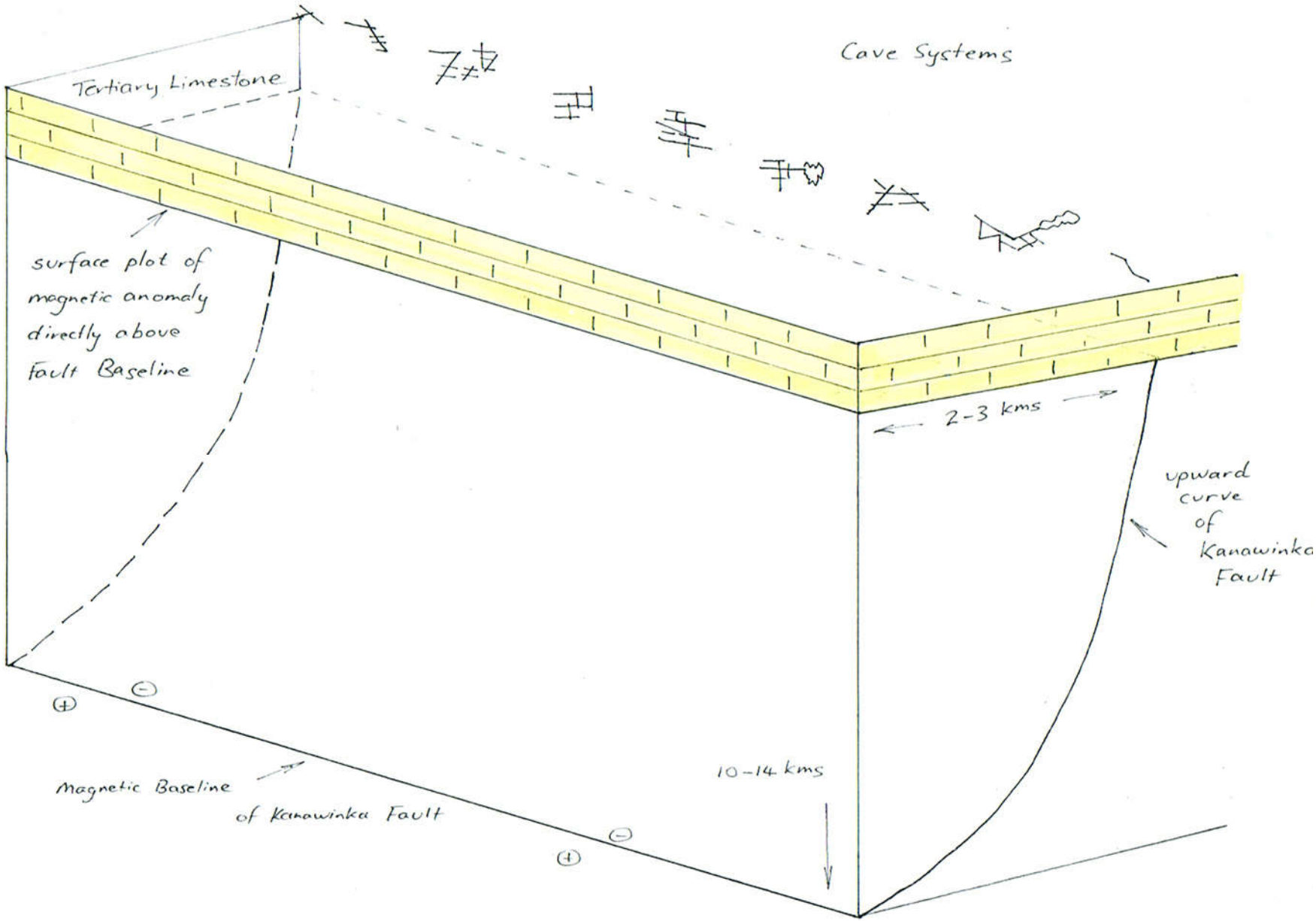


Figure 3 Structural zones I, II, III and IV of the Otway Continental Margin illustrated along seismic-line GA137-09 and GA137-03. The top basement reflector is poorly defined, in particular in structural zone II. The lamination of the lower continental crust has been highlighted. The seismic image of both lines has been flattened to half the water layer TWT as a first approximation to depth conversion – removing the water layer effect. Vertical exaggeration approximately 2x.


Hinge Zone
3691
3191
2691
2191
1691
1191
Trumpet-1
Otway Grp.
Otway Grp.
Otway Grp.
Continental Crust
Laminatec
Mantle
Top basen


Tertiary Limestone
Otway
ay Grp.
?

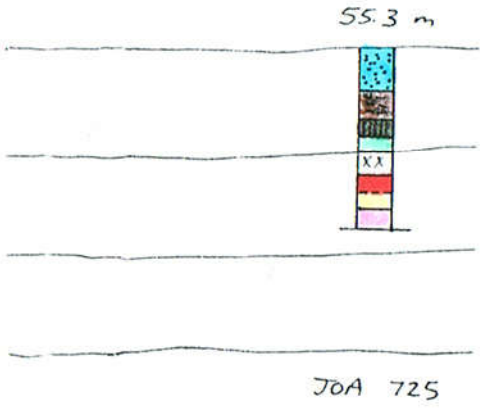

Tertiary Limestone
Cave Systems
surface plot of magnetic anomaly directly above Fault Baseline
2-3 kms
upward curve of Kanawinka Fault
⊕
⊖
Magnetic Baseline of Kanawinka Fault
10-14 kms
⊖
⊕

What happens under the Cave Zone?

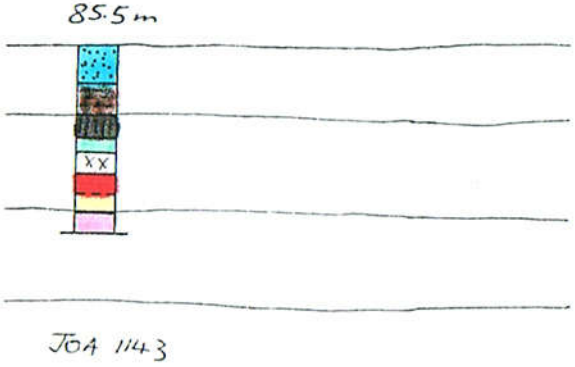
West

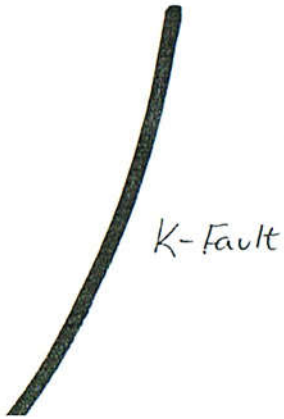
East

Cave
Zone



?

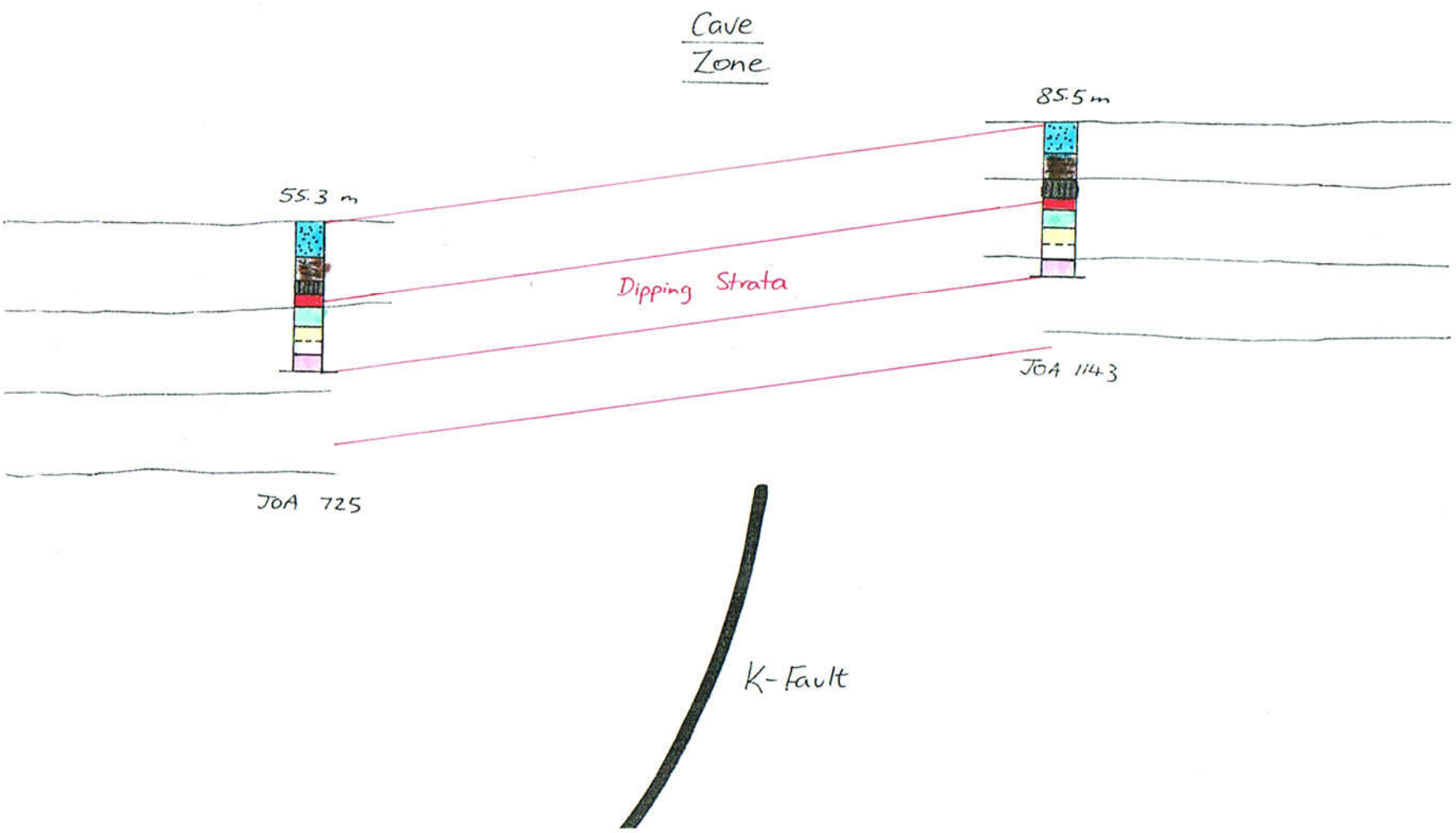




What happens under the Cave Zone?

West

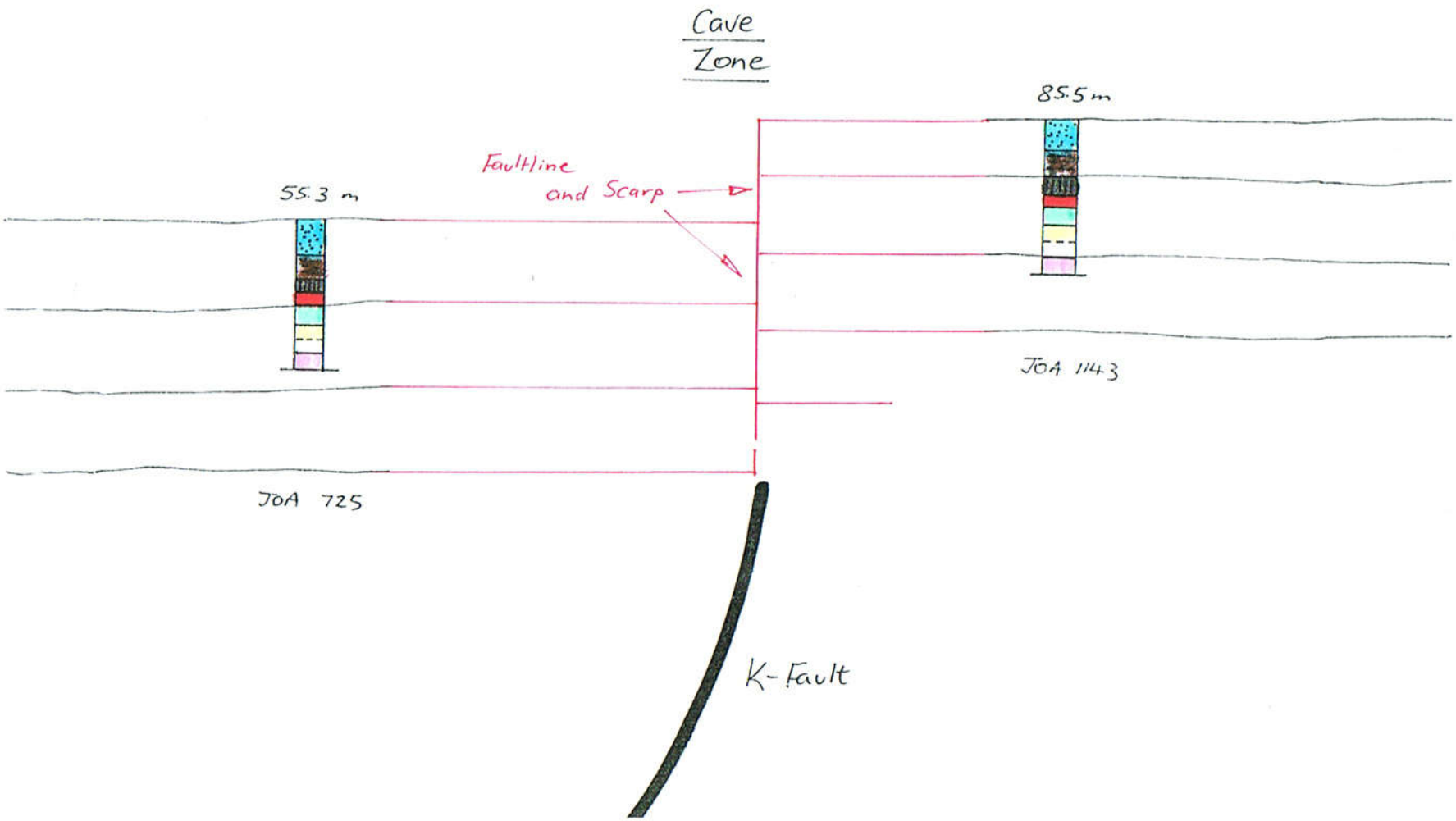
East



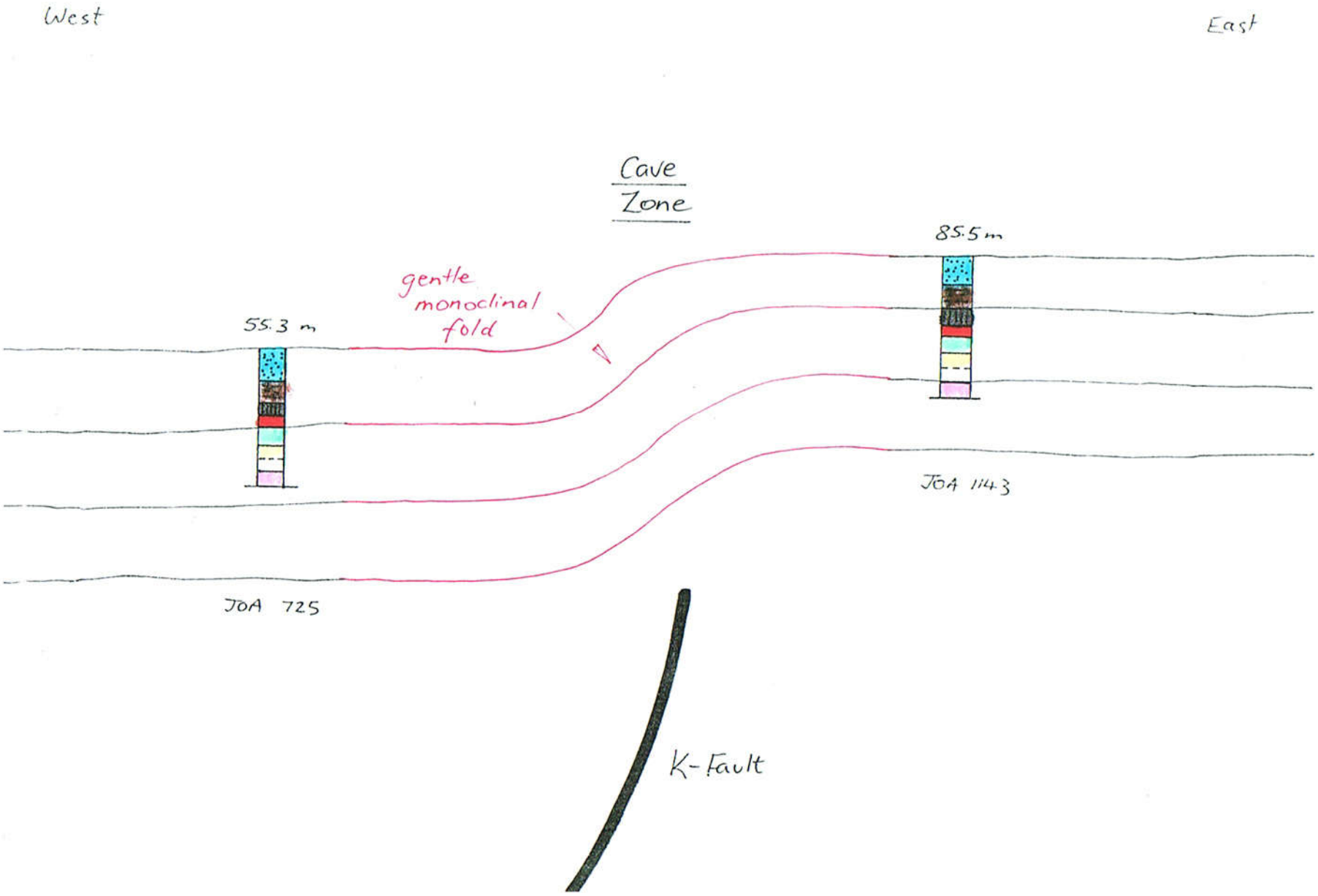
What happens under the Cave Zone?

West

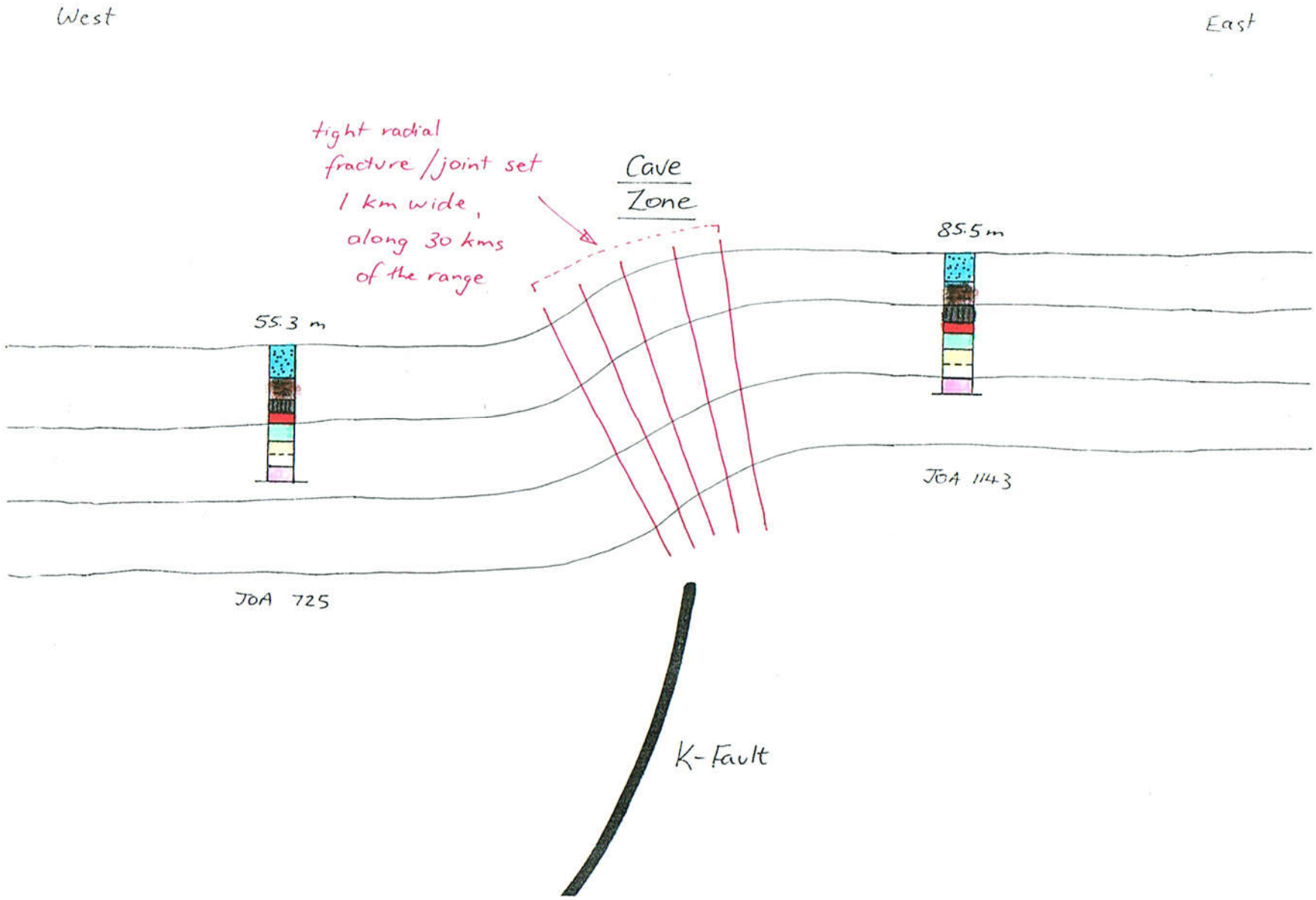
East

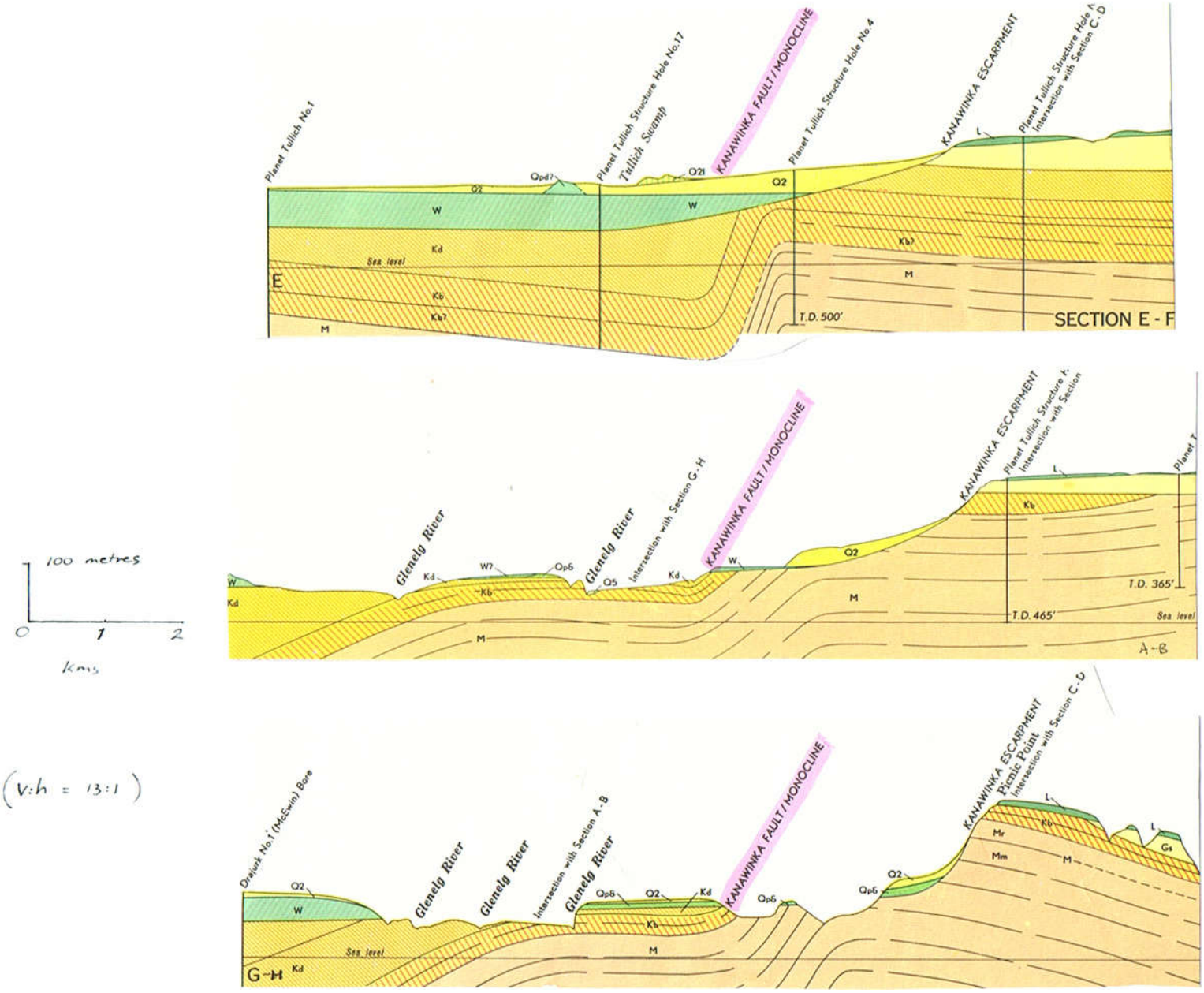


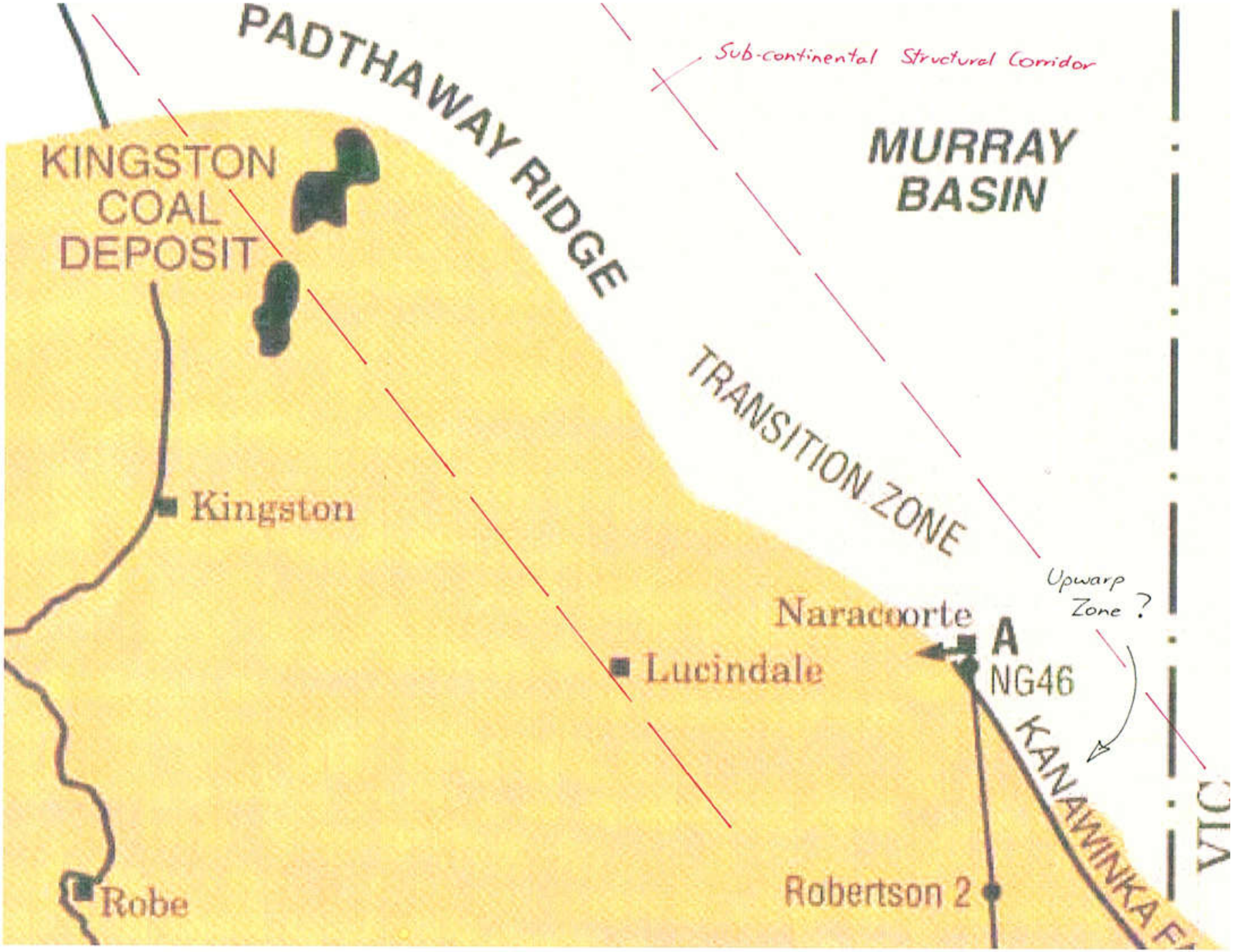
What happens under the Cave Zone?



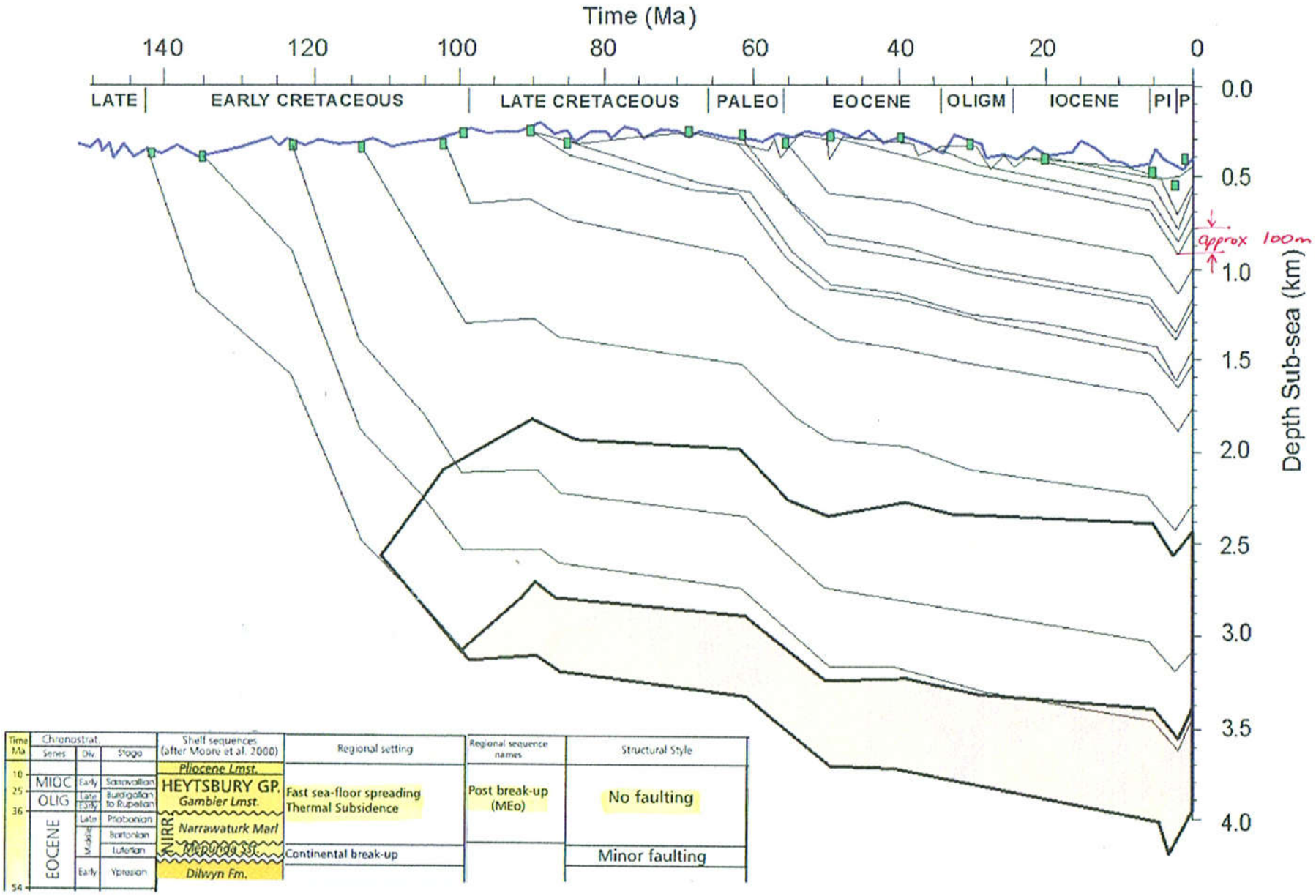
What happens under the Cave Zone?



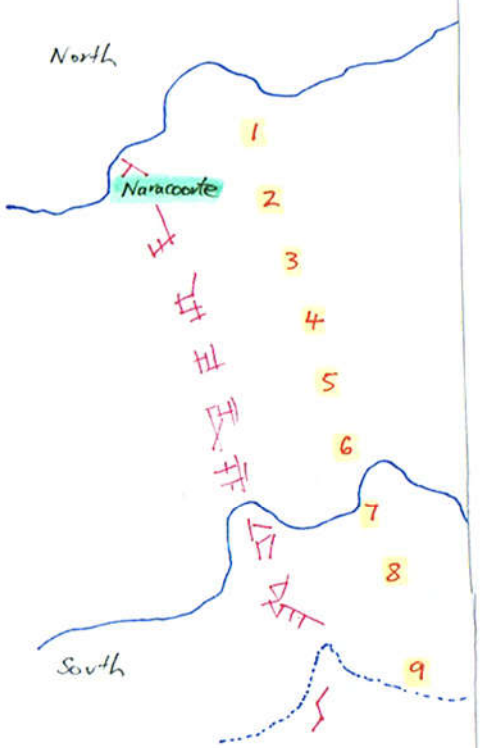

Planet Tullich No.1
Planet Tullich Structure Hole No.17
Tullich Swamp
KANAWINKA FAULT / MONOCLINE
Planet Tullich Structure Hole No.4
KANAWINKA ESCARPMENT
Planet Tullich Structure Hole No.5
Intersection with Section C - D
Qpd?
Q2
Q2i
W
Kd
Sea level
E
Kb
Kb?
M
T.D. 500'
SECTION E - F
Glenelg River
Intersection with Section G - H
W?
Qp6
Q5
T.D. 365'
T.D. 465'
Sea level
A - B
100 metres
0
1
2
kms
(V:h = 13:1)
Orajuuk No.1 (McEwin) Bore
Intersection with Section A - B
Picnic Point
Intersection with Section C - D
Mr
Mm
Ks
G - H


PADTHAWAY RIDGE
Sub-continental Structural Corridor
MURRAY BASIN
KINGSTON COAL DEPOSIT
TRANSITION ZONE
Kingston
Upwarp Zone ?
Naracoorte
A
NG46
Lucindale
KANAWINKA F
Robe
Robertson 2

Geohistory

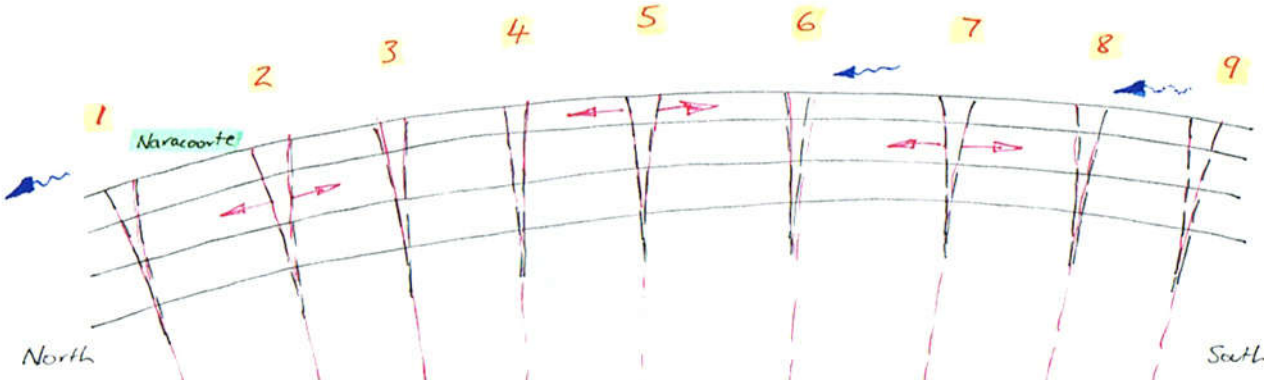

Time (Ma)
140
120
100
80
60
40
20
0
LATE
EARLY CRETACEOUS
LATE CRETACEOUS
PALEO
EOCENE
OLIGM
IOCENE
PI
P
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Depth Sub-sea (km)
approx 100m
Time Ma
Chronostrat.
Series
Div.
Stage
Shelf sequences (after Moore et al. 2000)
Regional setting
Regional sequence names
Structural Style
10
25
36
54
MIOC
OLIG
EOCENE
Early
Late
Late Early
Late
Middle
Early
Saharvallian
Burdigalian to Rupelian
Priabonian
Bartonian
Lutetian
Ypresian
Pliocene Lmst.
HEYTSBURY GP.
Gambier Lmst.
NIRR
Narrawaturk Marl
Dilwyn Fm.
Fast sea-floor spreading
Thermal Subsidence
Continental break-up
Post break-up (MEo)
No faulting
Minor faulting

We have —



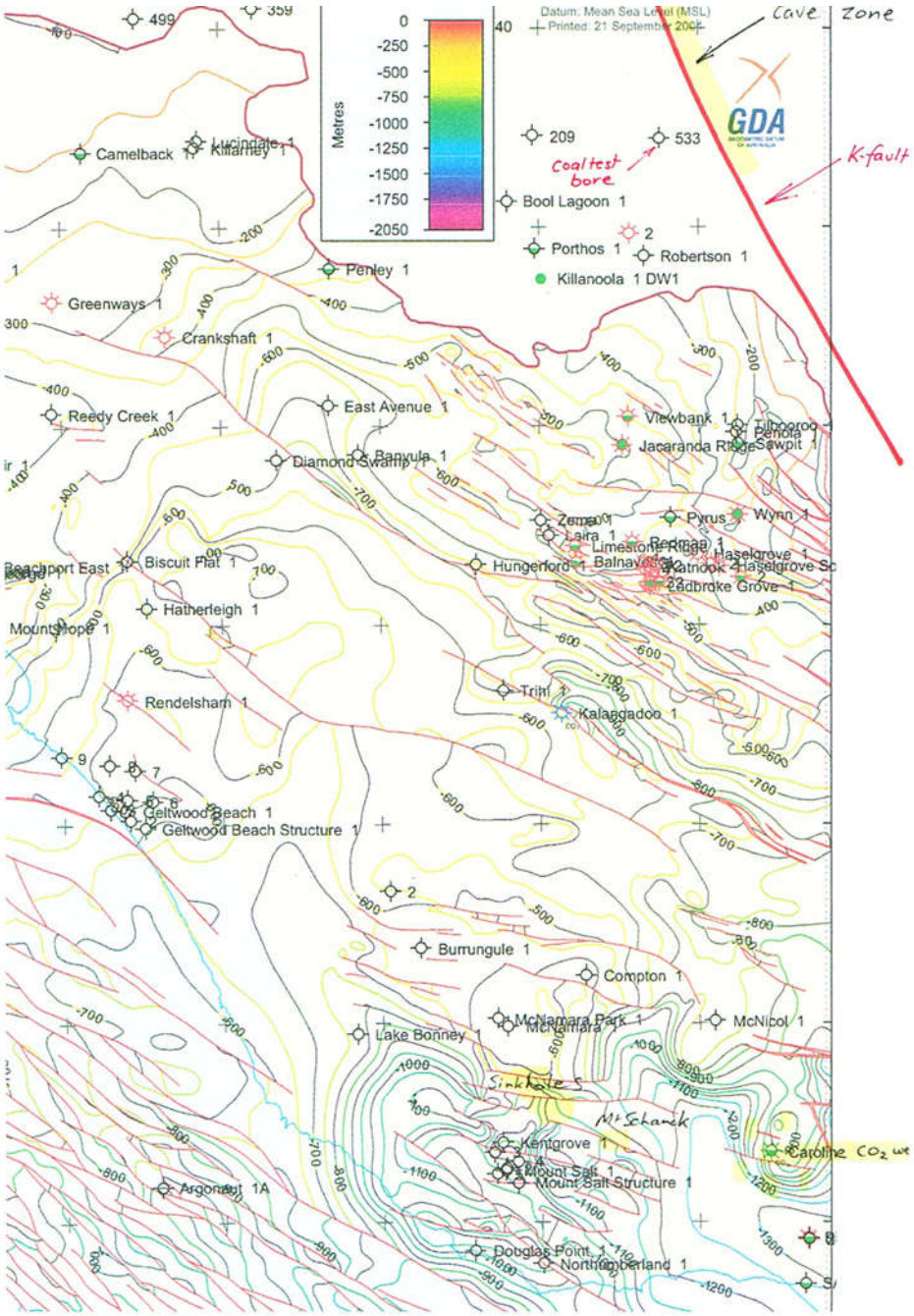
- caves with regional joint patterns
- caves occurring in clusters
- a gentle monocline, not a fracture scarp
- creeks being diverted

which can be explained by —



- a gentle local upwarp over 30 kilometres
- cross joints opened up on regular 3km spacing
- minimal lateral shearing of the K-fault itself
- northward deflection of creeks (same event?)

Padthaway Ridge movement or recent vulcanism


Datum: Mean Sea Level (MSL)
Printed: 21 September 2007
Metres
0
-250
-500
-750
-1000
-1250
-1500
-1750
-2050
Cave Zone
K-fault
GDA
Coal test bore
Sinkhole
Mt Schank
Caroline CO2 we
499
359
Camelback 1
Lucindale 1
Killarney 1
209
533
Bool Lagoon 1
Porthos 1
2
Robertson 1
Killanoola 1 DW1
Penley 1
Greenways 1
Crankshaft 1
East Avenue 1
Reedy Creek 1
Diamond Swamp 1
Banyula 1
Viewbank 1
Jacaranda Ridge
Sawpit 1
Zema 1
Laira 1
Pyrus 1
Wynn 1
Redmaa 1
Limestone Ridge
Haselgrove 1
Balnaves 1
Katnook 2
Haselgrove Sc
Hungerford 1
Redbrooke Grove 1
Beachport East 1
Biscuit Flat 1
Hatherleigh 1
Mount Hope 1
Rendelsham 1
Trihi 1
Kalangadoo 1
Geltwood Beach 1
Geltwood Beach Structure 1
Burrungule 1
Compton 1
McNamara Park 1
McNamara 1
McNicol 1
Lake Bonney 1
Kentgrove 1
Mount Salt 1
Mount Salt Structure 1
Argonaut 1A
Douglas Point 1
Northumberland 1

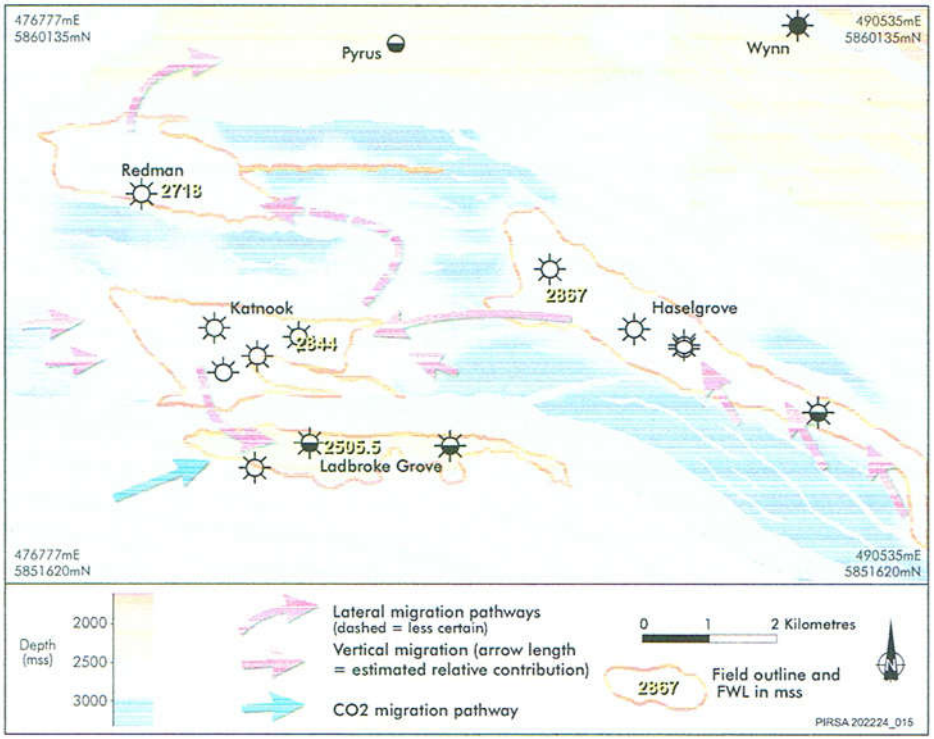


Figure 14. Top Pretty Hill Sandstone depth map over the Katnook Graben, showing possible lateral migration pathways between fields.

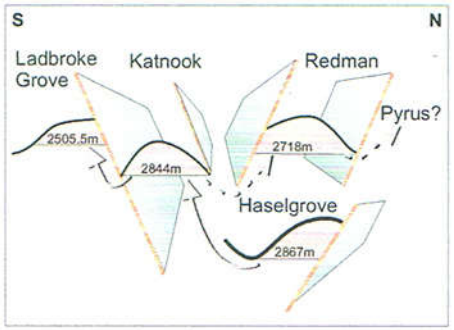


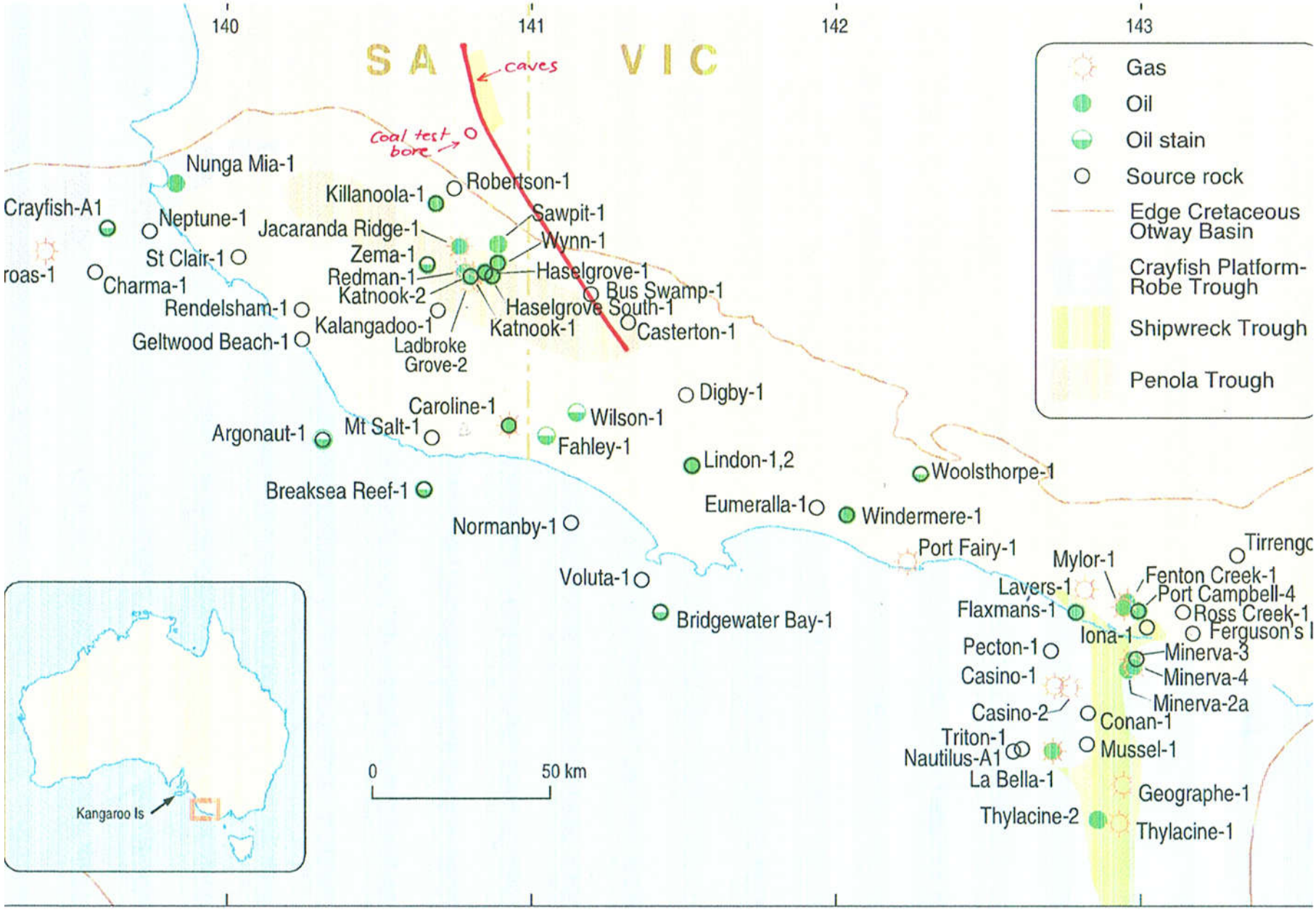
Figure 15. Psuedo-3D schematic diagram of the Katnook Graben, showing possible lateral migration pathways between fields at the top of the Pretty Hill Sandstone.

It is interesting to note that recent exploration on the Port Campbell area has reduced the risk of encountering CO_2, since a correlation between its occurrence and the intersection of basement related faults was found (B. Goldstein, PIRSA, pers. comm. 2003). Intersections of faults are known to be the location of dilation zones (Gartrell & Lisk in press) which may have allowed mantle derived CO_2 to migrate upwards. To the SW of the Ladbroke Grove field a circular feature has been identified in the 3D variance cube, which may represent a Miocene volcanic centre. The root of this is possibly the source of the CO_2 in the Ladbroke Grove Field.

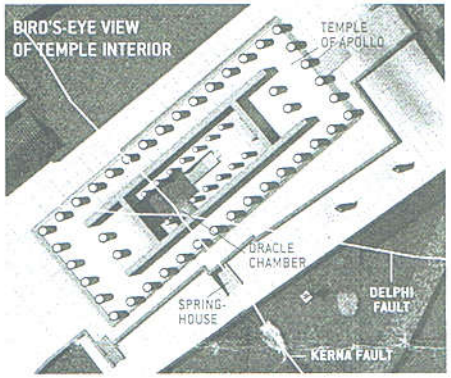
From their analysis of the unusual condensate associated with the Caroline gas accumulation, McKirdy & Chivas (1992) concluded that supercritical CO_2 might also play an important role in stripping free hydrocarbons from dispersed terrestrial organic matter. In doing so it may help enhance the oil expulsion efficiency of otherwise poor quality source rocks.

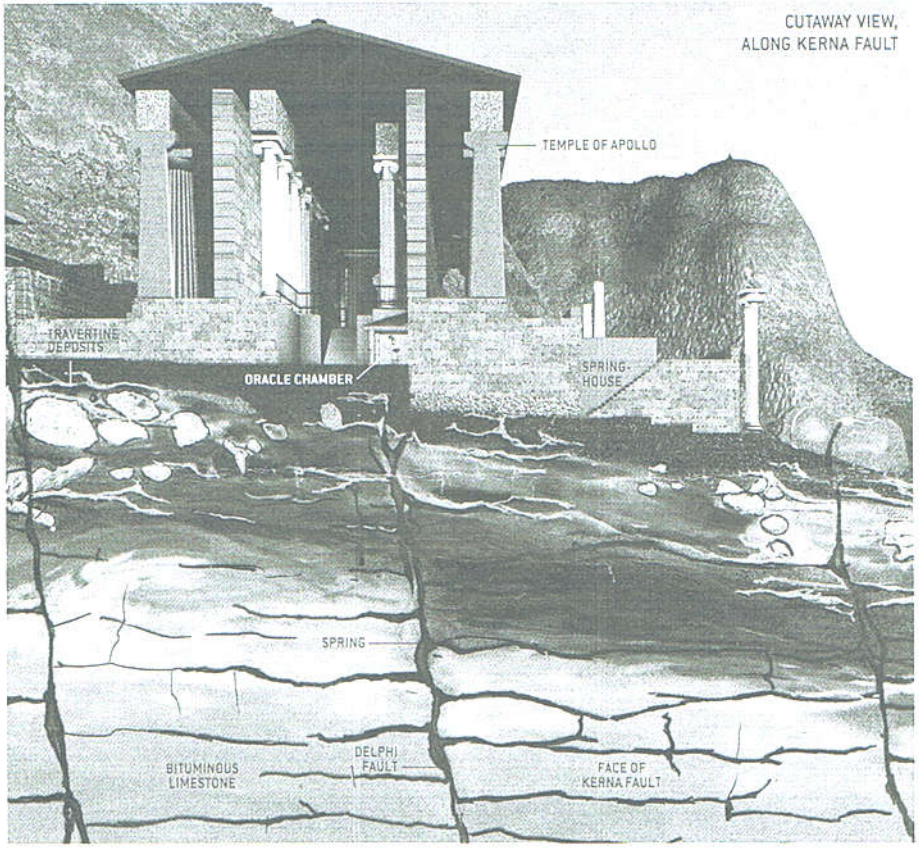
Evidence for palaeo-columns

In situ gas columns are primarily evident from RFT/MDT and DST data. Gas is not detectable from conventional wireline logs. Palaeo-columns in Crayfish group reservoirs have been interpreted to exist, with varying degrees of confidence, using a variety of



ure 1. Location map of the Otway Basin showing the wells from which oils, oil stains, natural gases and potential source rocks were sampled.





DAVID HEATH, NINA FINKEL [map]

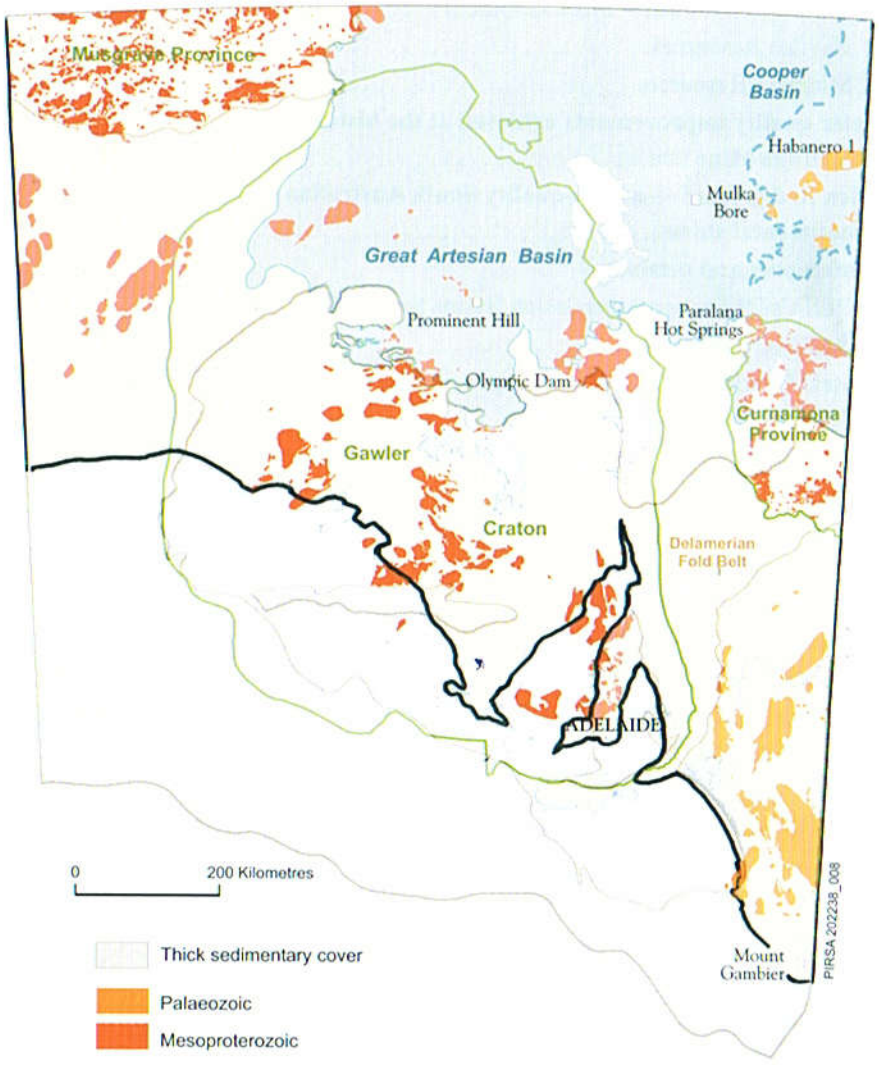
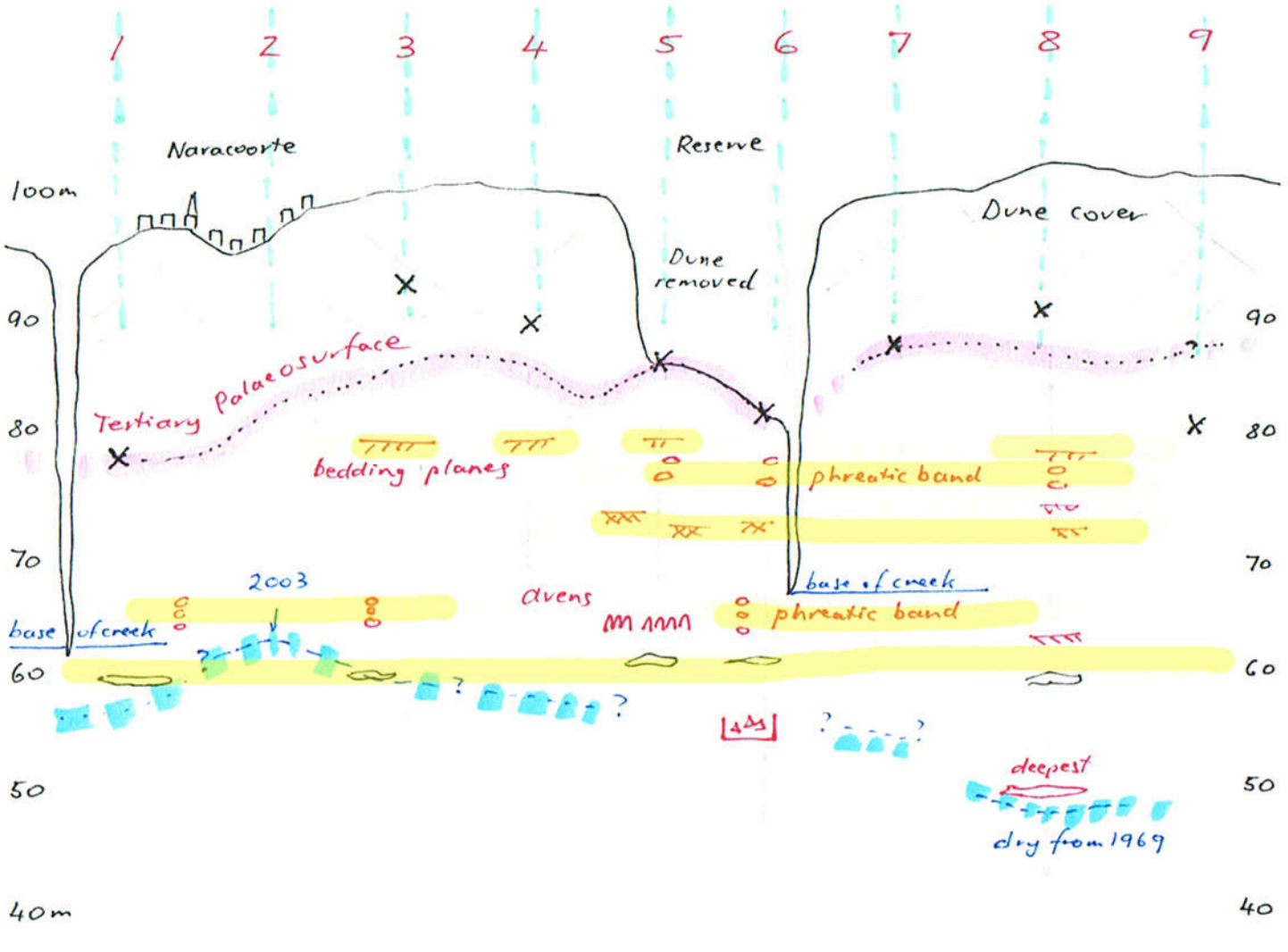
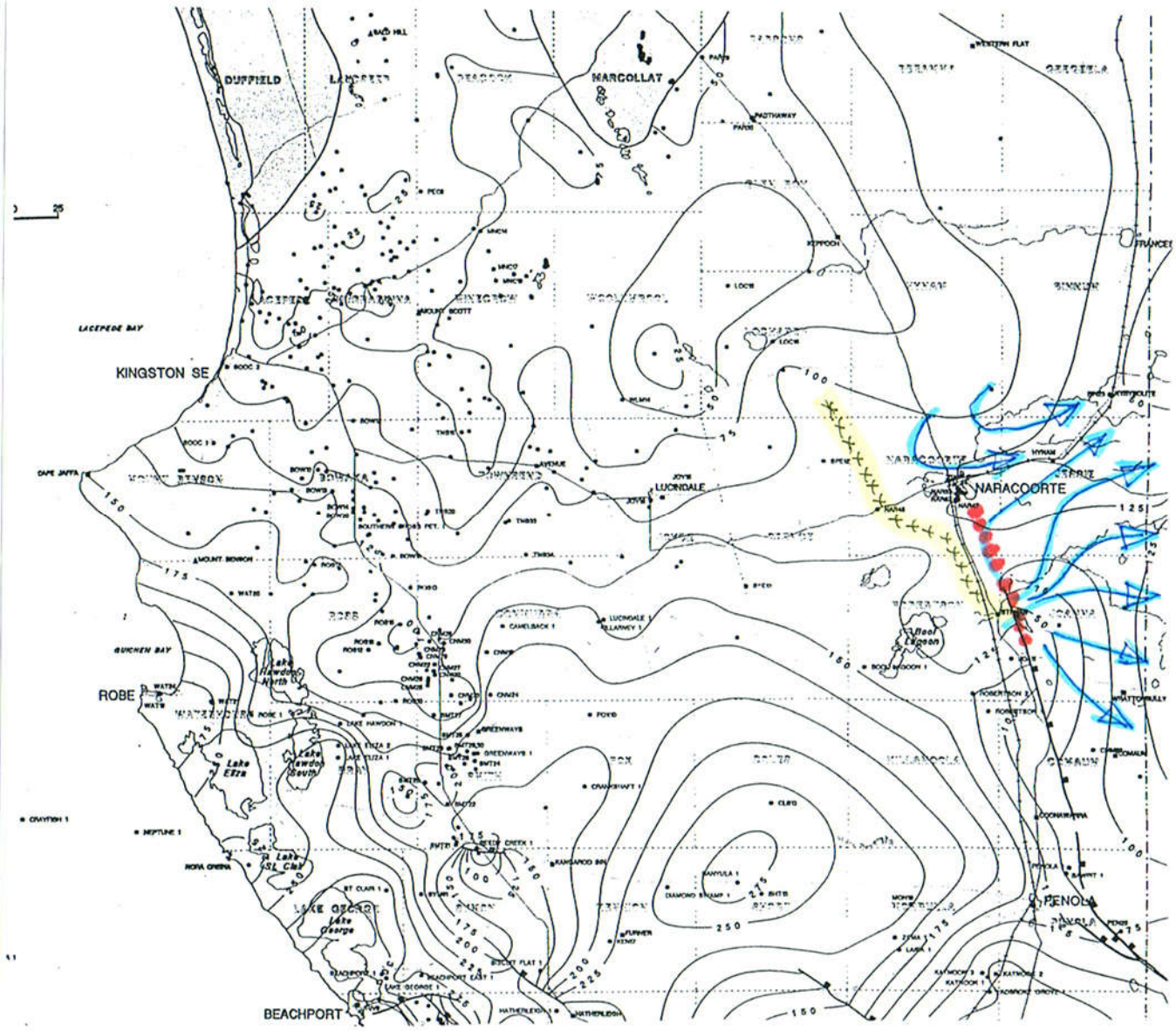


Fig. 1 Distribution of potential high heat flow rocks in South Australia.


1
2
3
4
5
6
7
8
9
Naracoorte
Reserve
100m
90
80
70
60
50
40m
Dune removed
Dune cover
Tertiary Palaeosurface
bedding planes
phreatic band
2003
dvens
base of creek
base of creek
phreatic band
deepest
dry from 1969


DUFFIELD
MARGOLLAT
KINGSTON SE
LUCINDALE
NARACOORTE
ROBE
BEACHPORT
PENOLA
Lake Hawdon North
Lake Hawdon South
Lake Eliza
Lake George
Blue Lagoon
LACEPEDE BAY
GUICHEN BAY
CAPE JAFFA
MOUNT BENSON
25
50
75
100
125
150
175
200
225
250