Rept.Bk.No.69/125
G.S. No. 4380

# DEPARTMENT OF MINES
# SOUTH AUSTRALIA

GEOLOGICAL SURVEY

EXPLORATION SERVICES DIVISION

MINERAL EXPLORATION OF DIAPIRS

IN THE ADELAIDE GEOSYNCLINE

THIRD REPORT - WINDOWARTA DIAPIR

by

N. LANGSFORD
GEOLOGIST
GEOCHEMICAL EXPLORATION SECTION

DM.197/68

1st December, 1969

DEPARTMENT OF MINES
SOUTH AUSTRALIA

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# MINERAL EXPLORATION OF DIAPIRS IN THE ADELAIDE GEOSYNCLINE THIRD REPORT = WINDOWARTA DIAPIR

## INTRODUCTION

The Windowarta Structure is 18 miles N.W. of Baratta H.S. on a good gravel road between Baratta and Holowilena H.S., in the S.E. of the Parachilna 1:250,000 sheet area.

Dalgarno and Johnson (1966) and Binks (1968a, b) used the name Baratta Diapir to describe the group of breccia structures in the S.E. of the Parachilna sheet N.E. of Orroroo (See Binks, 1968b, Fig.1).

It is proposed that the elongate Eastern structure and the Southern structure be referred to as the Baratta Diapir, and the Western structure as the Windowarta Diapir.

## GEOLOGY

### Structure

The structure is an irregular dolomite breccia within Tapley Hill Formation siltstone. The sediments of the Umberatana Group are folded into a broad arcuate syncline, plunging gently S.W. which terminates to the north-east against the Bibliando Dome. To the south-west, the synclinal axis changes to a southerly direction. The Windowarta structure is roughly elongated parallel to the fold axis.

### Breccia Rocks

The elements at the breccia are almost entirely dolomitic. The largest blocks are about a hundred feet in length, but most are only of the order of tens of feet in length. These blocks are set in a much finer-grained dolomitic breccia matrix.

A few small blocks of greywacke and quartzite outcrop in the western sector of the structure.

The dolomites range from dark brown to yellow. There is no doubt as to their sedimentary origin, as many of them contain a high proportion of quartz and labile components. The carbonate minerals have been recrystallized. It is suggested that the original carbonates were iron-rich species (siderite, ankerite), and have been recrystallized to produce dolomite with iron oxide blebs. Authigenic over-growths of quartz and felspar are common on detrital grains.

## Structure in Breccia

The dolomite blocks show no preferred or systematic orientation (as has been observed in similar structures eg. Beltana Diapir, Leeson 1966). No upturning of the rim rocks has been observed. Rather, the breccia appears to "overlie~~s~~" Tapley Hill Formation in several places on the margin of the structure. There, the breccia possesses a crude "foliation" parallel to the contact of the siltstone rim rocks and the breccia. A thin crush zone occurs at the contact.

In other areas, of the Windowarta structure the breccia has a definite intrus~~ion~~ive habit. Breccia "dykes" up to 5ft. wide were observed in the narrow "neck" joining the 2 breccia lobes in the North. Nearby, a thin horizontal dolomite breccia lens has been intruded in to Tapley Hill Formation.

A large block of siltstone from the Tapley Hill Formation forms the central part of the structure. This block has been rotated but apparently little dismembered.

It is tentatively suggested that some of the breccia has moved horizontally, producing a mushroom shaped diapir. The small elongate breccias marginal to the main bodies are probably controlled by linear faults.

## Igneous Rocks

A small plug of diorite was located near West Well. The diorite is a more felsic than those in other diapirs at the Flinders Ranges eg.

Worumba Diapir; Spry (1952). As in other areas, too, copper mineralization is associated with basic rocks.

## MINERALIZATION

Minor amounts of copper minerals is scattered throughout the breccia. The individual occurrences are very small, being confined to small dolomite blocks or small parts of larger blocks. Chalcopyrite and bornite are the primary copper minerals, these being oxidized to malachite, cuprite and native copper. The sulphides occur as small blebs and grains scattered parallel to the bedding laminae. However examination in polished section suggested that "patches of chalcopyrite mineralization are a late feature (P225/69 PS 12860). The mineralized rock is similar to that found at the Blinman Mine.

The low grade and small size of the mineralized patches preclude their being of economic interest. It is probable that a large block of dolomite containing low grade copper sulphide mineralization was broken up and scattered during brecciation and "intrusion". Recrystalization of the dolomite host must have affected the distribution of sulphide minerals, without ~~producting~~ producing economic concentration of copper minerals. In the Blinman Mine, this recrystallization may have produced the cross cutting veins of sulphides which constituted ore. (Coats, 1964).

The association of copper minerals with dolerite intrusions is a common feature, observed in many areas eg. Blinman Diapir, Burr Diapir. The copper minerals occur in carbonate veins. There is no good reason to suggest a connection between the mineralization in the dolomite and that associated with the dolerites and diorite.

The small veins are unlikely to be an economic source of copper.

## GEOCHEMISTRY

Samples of stream sediments were collected from minor creeks and tributaries. Previous work in nearby areas eg. Baratta and other diapirs (Blinman, Mt. ~~Greingers~~ Grainger) indicated that the -80 mesh fraction was the most suitable for analysis. The samples were collected and prepared by the usual methods (Langsford, 1969) and analysed by A.A.S (AMDEL) for Cu, Pb and

and Zn (Table 1).

TABLE I - All results

| Metal | Mean | S.D. | Anomalous M+2SD |
|---|---|---|---|
| Cu | 19 | 6 | 31 |
| Pb | 19 | 7 | 33 |
| Zn | 50 | 12 | 74 |

The results for Cu and Pb are low and show little variation. Zinc shows high values, but again variation is small. There is no correlation between the Cu, Pb, Zn anomalies.

TABLE II

| | Cu M | Cu SD | Pb M | Pb SD | Zn M | Zn SD |
|---|---|---|---|---|---|---|
| Within Diapir | 18 | 6 | 21 | 5 | 47 | 9 |
| Outside Diapir | 20 | 7 | 18 | 7 | 52 | 12 |

It can be seen from Table II that there is no significant difference in stream sediment metal content between the diapirs and host sediments.

## Copper

No pronounced anomalies are present. No anomalies are associated with the minor copper showings. The calcareous environment inhibits the chemical mobility of copper.

## Lead

A few lead values are weakly anomalous.

## Zinc

An area of anomalous zinc values (75-95 ppm.) occurs immediately north of the structure. However those are low and of little interest. No zinc mineralization was observed in this area. The only sample site anomalous in all 3 metals is in this area.

## CONCLUSIONS

No interestingly anomalous zones were outlined. There is no correlation between Cu, Pb and Zn anomalies. There is no significant contrast in metal content of the streams draining diapir and host sediments.

No further work is recommended.

N. Langsford

NL:JB
1.12.1969

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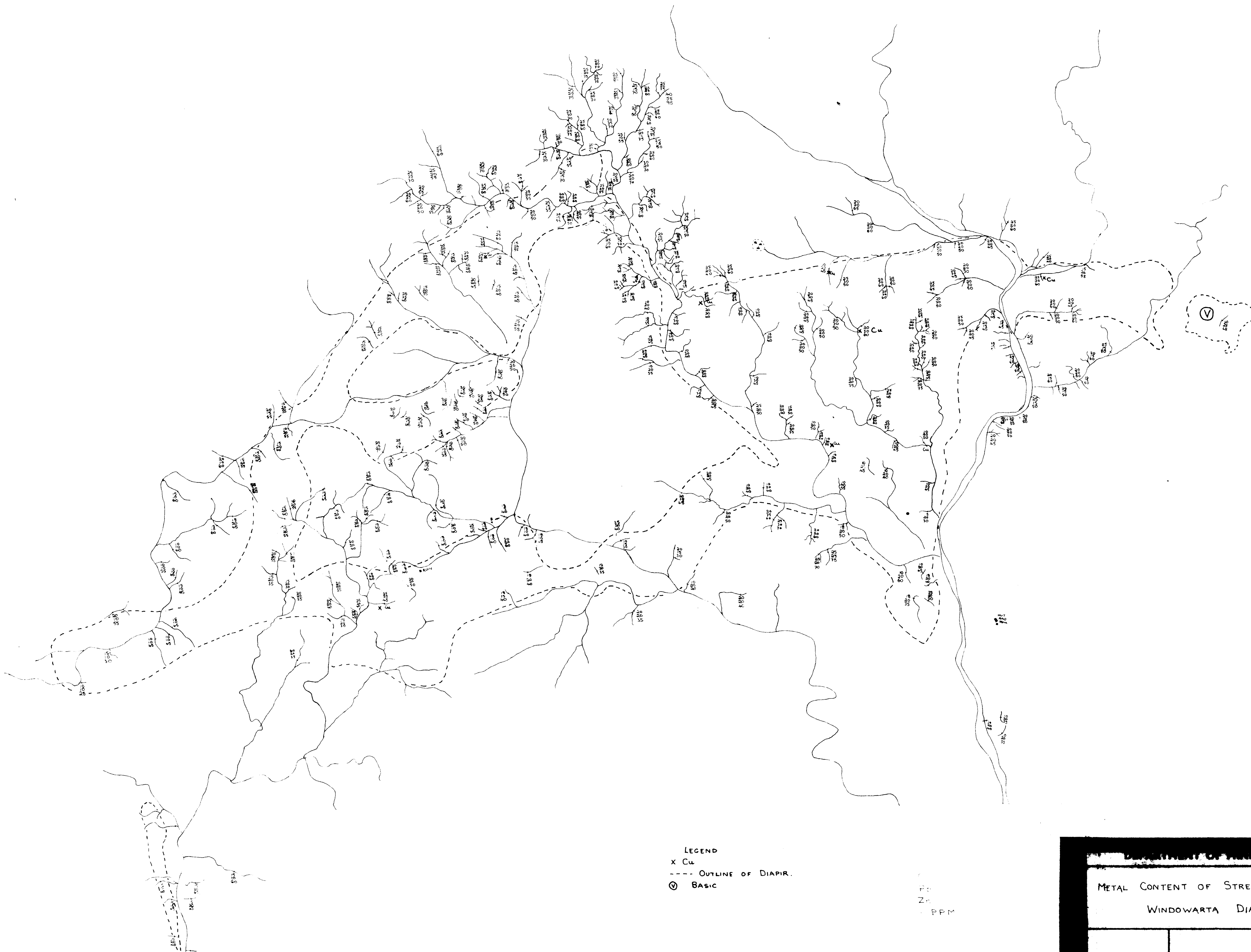
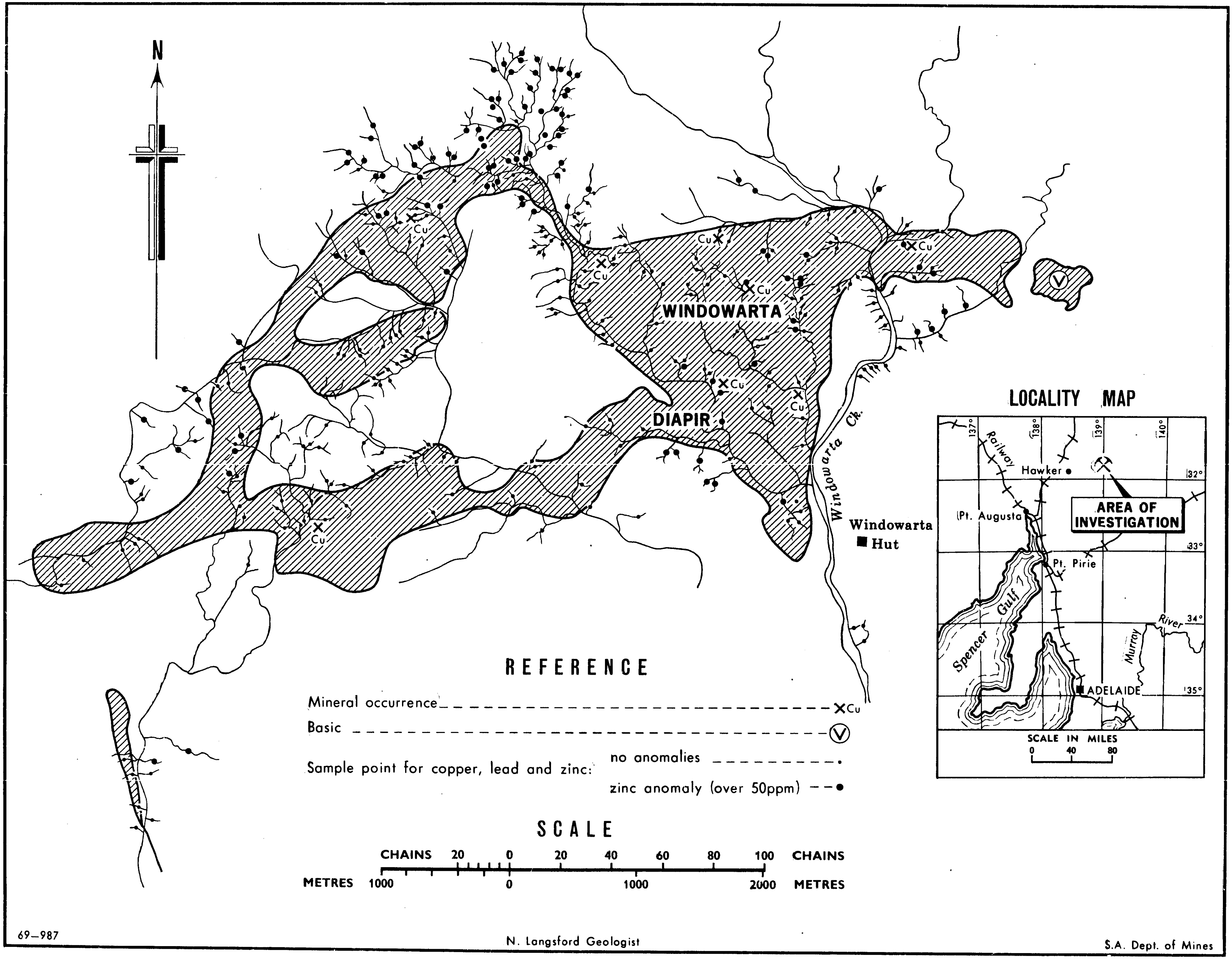



LEGEND
X Cu
---- OUTLINE OF DIAPIR.
Ⓥ BASIC

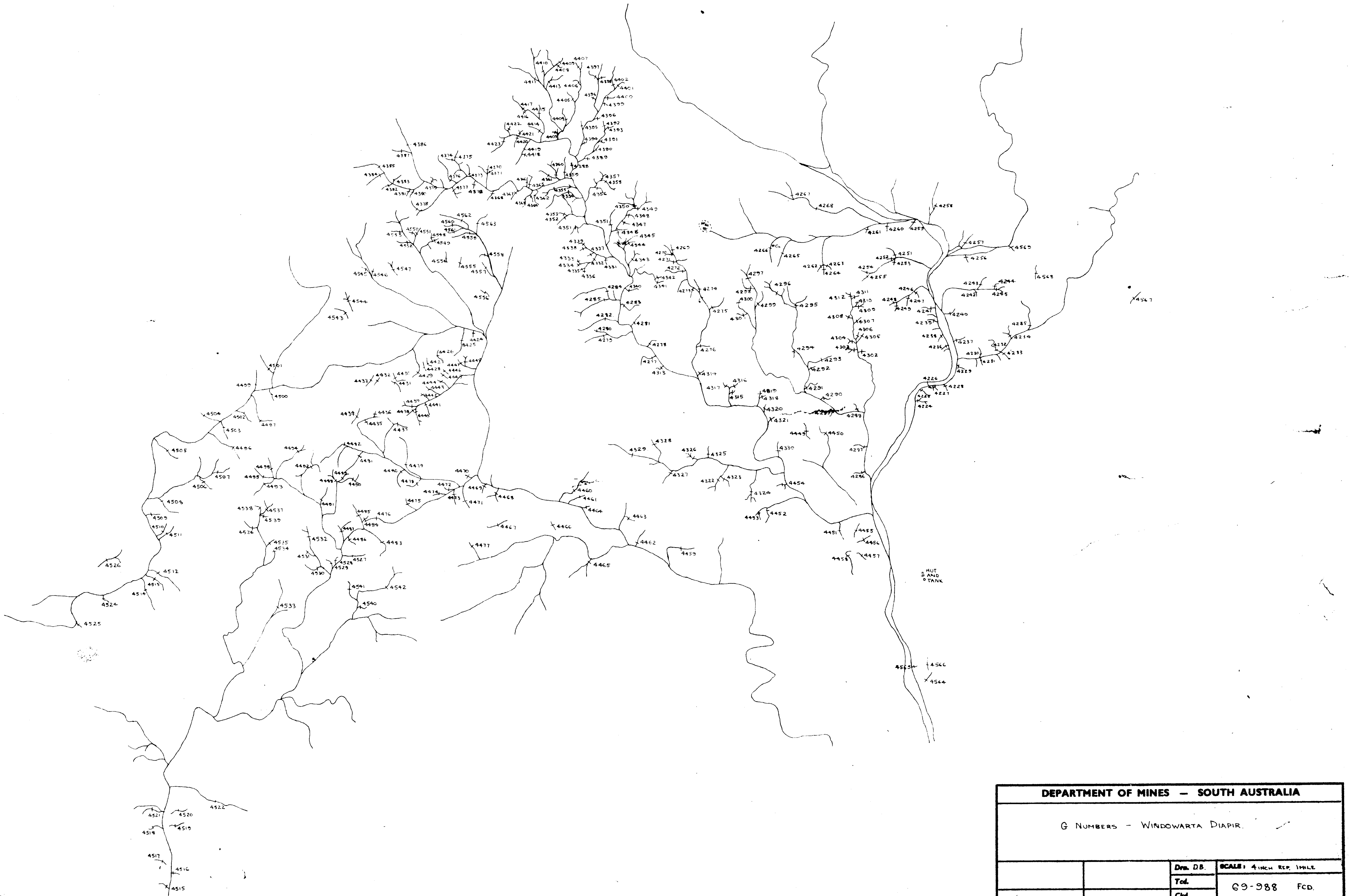
DEPARTMENT OF MINES — SOUTH AUSTRALIA

METAL CONTENT OF STREAM SEDIMENTS.
WINDOWARTA DIAPIR.

| | | | |
|---|---|---|---|
| | | Drn. DB. | SCALE: 4 INCH REP. 1 MILE. |
| | | Tcd. | 69-987 FCD. |
| | | Ckd. | |
| Director of Mines | | Exd. | DATE: 2/12/69 |



N
WINDOWARTA
DIAPIR
Cu
V
Windowarta Ck.
Windowarta
Hut
LOCALITY MAP
Railway
Hawker
Pt. Augusta
Pt. Pirie
Spencer
Gulf
Murray
River
ADELAIDE
AREA OF INVESTIGATION
137°
138°
139°
140°
32°
33°
34°
35°
SCALE IN MILES
0 40 80
REFERENCE
Mineral occurrence — Cu
Basic — V
Sample point for copper, lead and zinc: no anomalies
zinc anomaly (over 50ppm)
SCALE
CHAINS 20 0 20 40 60 80 100 CHAINS
METRES 1000 0 1000 2000 METRES
69–987
N. Langsford Geologist
S.A. Dept. of Mines

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G NUMBERS — WINDOWARTA DIAPIR.

| | | | |
|---|---|---|---|
| | | Drn. DB. | SCALE: 4 INCH REP. 1 MILE |
| | | Tcd. | 69-988 FCD. |
| | | Ckd. | |
| Director of Mines | | Exd. | DATE: 2 12 69 |