DEPARTMENT OF MINES

SOUTH AUSTRALIA

GEOLOGICAL SURVEY

METALLIC RESOURCES DIVISION

GEOCHEMICAL SURVEY OF THE TRURO 1:63,360 SHEET

by

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GEOCHEMICAL EXPLORATION SECTION

Rept.Bk.No. 76/100
G.S. No. 5773
D.M. No. 365/73

August, 1976

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept.Bk.No. 76/100
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D.M. No. 365/73

GEOCHEMICAL SURVEY OF THE TRURO 1:63 360 SHEET

ABSTRACT

2657 stream sediment samples were collected from the western portion of the Truro 1:63 360 sheet area, and analysed for Cu, Pb, Zn, Bi, Au, W, Mo, Mn, Co and Nb. Anomalous values, correlation coefficients and rolling means were calculated for Cu, Pb and Zn. Follow up soil and rock chip sampling in the Mt. Rufus - Dutton area indicated an interval near the boundary between the Sturt Tillite and the Tapley's Hill Formation with anomalous Cu, Pb, Zn and Au extending for a strike length of at least 5 km. Other features of interest include an anomalous area east of Mt. Rufus with one very high zinc value and scattered Pb and Zn anomalies over Cambrian rocks in the south-east of the study area.

INTRODUCTION

A program of geochemical stream sediment sampling has been carried out on the Truro 1:63,360 sheet area as part of a survey of ADELAIDE 1:250,000 sheet. The aims and methods of this survey have been described by Sibenaler and Rogers (1974). Reports on previously completed sheets in the ADELAIDE survey are by Sibenaler (1975), Robertson (1975), Eberhard (1976) and Schlichting (1976).

The Truro A & C sheets (Truro 1:50,000 sheet area) were sampled, together with the western edge of the Truro B sheet and a small area of the Truro D sheet (Sandleton 1:50,000 sheet area). The beginning of the deeper surficial deposits on the plains to the east was the eastern boundary of the sampling.

2657 samples were collected at an average sampling density of about 3.6 samples/km^2.

Some follow up soil and rock chip sampling was carried out on Truro A involving the collection of 157 soil samples in 4 traverses and 8 rock chip samples.

All analytical and location data are contained in the Department of Mines computer file MIANALYSIS. Sample locations and numbers are shown on base plans 76-514 A, B, C & D (not contained in this report).

TOPOGRAPHY

The almost flat lying country of the northern end of the Barossa Valley occupies the western part of the Truro sheet. The central area of outcrop of Proterozoic and Cambrian rocks is undulating to hilly in nature. Native scrub remains only in a few of the more rugged areas, while most of the land is used for crops and pasture. The eastern portion of the sheet is occupied by the plains of the Murray Basin.

All streams in the area are ephemeral. Drainage is to the west into the Barossa Valley or easterly towards the Murray Basin, the watershed being roughly through the middle of Truro A and C sheets.

Average annual rainfall at Truro (town) is 494 mm. (19.45 ins) and at Nuriootpa 521 mm (20.51 ins).

GEOLOGY

The geology of the Truro area is shown on Figs. 2 & 3.

The rocks in the area are folded and block faulted metasediments of Adelaidean (Upper Proterozoic) and Cambrian age. The Adelaidean rocks are mostly siltstones, tillites and sandstones

of the Umberatana and Wilpena Groups. Siltstone of the Burra Group crops out over a small area in the north of the map area.

Cambrian rocks cover a large area in the south and east of the map area. The Lower Cambrian rocks are mainly the Heatherdale Shale and the Angaston Marble. Underlying these are the Koonunga Phosphorite Member, a sedimentary phosphatic breccia and the Truro Volcanics. The Truro volcanics consist of trachyte, metabasalt and some sediments; they crop out over a small area north of Dutton and also about 10 km east of Truro (Forbes, Coats and Daily, 1972).

Lower to Middle Cambrian rocks of the Kanmantoo Group make up most of the ranges east of Truro. The rocks are meta-siltstone, greywacke and arkose together with the Karinya Shale Member (equivalent to the Nairne Pyrite Member).

Both the Adelaidean and Cambrian rocks in the Angaston to Truro region show pronounced regional metamorphism.

A few dolerite dykes cut Adelaidean rocks in the north west of the area. An isolated area of outcrop of Ordovician granitic rocks occurs on the plains in the south of the Truro D sheet.

Unconsolidated Quaternary sediments cover the Barossa Valley in the west of the Truro sheet and the plains of the Murray Basin in the east.

MINERALIZATION

No major mineralization has been discovered in the area of the Truro sheet.

A few copper workings are present, the most important being the Wheal Barton, south-east of Truro. This mine, located in lower Kanmantoo Group rocks, contained copper carbonates, cuprite and chalcocite. Mineralization was reported to extend for several

thousand metres along strike.

Copper workings are located on section 362, 2 miles north of Angaston in Lower Cambrian rocks and at Julia Creek in the north of Truro A in Adelaidean Tarcowie Siltstone. Minor copper workings are located near the boundary between the Truro Volcanics and the Kanmantoo Group rocks north of Truro. A lead and silver working is located in a similar stratigraphic position east of Truro.

Barite has been mined from Adelaidean rocks to the north of Truro A.

The Koonunga Phosphorite Member of the Lower Cambrian has been exploited for phosphate at Moculta north-east of Angaston, St. Kitts north west of Truro and Koonunga north of Nuriootpa.

GEOCHEMISTRY

Treatment of Results

Treatment of results was similar to that for the Adelaide 1:63,360 sheet (Robertson 1975). Samples were sieved to -80 mesh (B.S.S.) size and analysed by atomic absorbtion spectroscopy for Cu, Pb, Zn, Bi and Au. Semi-quantitative emission spectroscopy was used to analyse for W, Mo, Co, Mn, and Nb. Locations of samples and results were treated by computer, except for Mn, Co and Nb, for which analytical results only are given, and there were no W detections.

Cu, Pb and Zn values for each sample are shown on Fig.4. Au, Mo and Bi detections are shown on Fig.8. Means and standard deviations of Cu, Pb and Zn for Truro A, B, C & D are shown on Table 1.

TABLE I

	Cu	Pb	Zn
No. of samples	2631	2631	2631
Mean (p.p.m.)	20.9	8.5	38.6
Standard Deviation	12.3	6.85	35.0
Chosen Threshold Value	45	25	80

Values at about the top 2.5% level were selected as the threshold for anomalous values. The anomalous values for Cu, Pb and Zn are shown on Figs. 5, 6, & 7.

Most samples were below the detection limit for Au, Bi and Mo, and so for these, all detections are regarded as anomalous. For Au, the results are believed to be inaccurate due to problems of sampling for small quantities of gold. Values as shown should be treated with caution.

Correlation coefficients were computed for all Cu, Pb and Zn values (see Table 2).

TABLE 2

	Cu - Pb	Cu - Zn	Pb - Zn
Correlation Coefficient	.20	.18	.5

Rolling geometric means for Cu, Pb and Zn were computed (see Figs. 9, 10 & 11). These were calculated using a 2 km grid spacing (see Eberhard (1976) and Schlichting (1976) for method). Positive residual values greater than 15 p.p.m. for Cu, 10 p.p.m. for Pb and 30 p.p.m. for Zn are also shown. These show general agreement with the anomalous raw values.

The soil samples taken were anlysed as for the stream sediment samples. Results are shown on Fig. 12.

Results of rock chip samples are shown in Table 3.

Discussion

Anomalous metal values on Truro are generally scattered and of fairly low order. Ranges of values are Cu2-330 p.p.m., Pb 5-150 p.p.m., Zn 5-1400 p.p.m. and Au 0.05 - 0.1 p.p.m. Lead and zinc values show a good correlation, with Cu-Pb and Cu-Zn showing lesser correlations.

In the middle of the Truro A sheet a band of anomalies about 10 km long runs approximately north-south through Mt. Rufus. Cu values up to 210 p.p.m. occur in the south; northwards Cu values decrease but some Pb and Zn anomalies are present. Several gold detections are also recorded.

Four soil sampling traverses were carried out across this anomalous area (as shown in Fig. 12). Each traverse showed a distinct Cu anomaly with widths of 50-150 m. Peak copper values range from 450 p.p.m. in the southern traverse to 95 p.p.m. in the north. The northernmost soil traverse also has peaks of Pb 90 p.p.m. and Zn 150 p.p.m. coinciding with the copper anomaly. There are several gold detections on the southern traverse.

Six rock chip samples were also taken along the southern traverse (see Table 3). The peak rock chip copper value of 2,380 p.p.m. at 900 m coincided with the peak soil value of 450 p.p.m.

All the anomalies seem to be along strike and apparently are related to a particular stratigraphic interval near the boundary of the Tindelpina Shale Member at the base of the Tapley Hill Formation with the underlying Sturt Tillite. The Tindelpina Shale has been suggested previously as a possible location of syngentic base metal mineralisation.

A few anomalous Cu values are located on Truro C north of Truro township. These are approximately on line with the belt of anomalies to the north but are located on Lower Cambrian rocks instead of the Umberatana Group.

A stream sediment sample about 2 km east of Mt. Rufus contained 55 p.p.m. Cu, 150 p.p.m. Pb and 1400 p.p.m. Zn. Two rock chip samples (G 2715 and 2716/75) were taken near this stream anomaly (see Table 3). One of these, a ferruginous siltstone with no obvious mineralization, contained 0.73% Zn and 0.18% Pb. This is an area of Adelaidean Tarcowie Siltstone separated from the Truro Volcanics (Cambrian), just to the north, by a fault zone. A few other lower order anomalous stream values were also obtained.

In the north-east of Truro-C rocks of the Lower Kanmantoo Group and Lower Cambrian Heatherdale Shale (with a small outcrop of Truro Volcanics) have associated anomalous Pb and Zn values. The anomalies are scattered and of low order (Pb 25-90 p.p.m. and Zn 80-170 p.p.m.).

A single point anomaly of 330 p.p.m. Cu south-east of Truro is near the Wheal Barton copper mine. The copper is almost certainly derived from the tailings dumped around the mine.

TABLE 3

ROCK CHIP RESULTS

	G 2715/75	2716/75	2717/75	2718/75	2719/75	2720/75	2721/75	2722/75
Location	Near Pb, Zn anomaly East of Mt. Rufus		Soil Sampling - Line 1 1-825 m	1-850 m	1-900 m	1-925 m	1-950 m	1-150 m
Description	Ferruginous Pyritic Quartz Vein	Ferruginous Siltstone						
Cu ppm	200	110	32	370	2380	1340	480	45
Pb ppm	42	1800	30	8	10	8	10	12
Zn ppm	100	7300	75	35	32	35	38	32
Au ppm	<0.05	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Anomalous Zn values are more numerous and scattered than Cu and Pb. Some high Zn values may be due to local contamination, associated with pasture control.

Gold detections (Fig.8) are few and scattered; the most interesting are in the area of the belt of Cu anomalies in the middle of Truro A.

A few molybdenum detections are located 3 km. north-west of Moculta (on Truro C) on folded Tarcowie Siltstone.

The main feature of the map of Cu rolling mean contours (Fig. 9) is the north-south trending high through the middle of Truro A and extending into Truro C. In part, this corresponds with the belt of Cu anomalies mentioned above, but also extends into Cambrian rocks. The high also corresponds with a north-south trending fold axis suggesting a structural control for the distribution of copper.

The Pb contours (Fig. 10) show minor highs in the north east of Truro A and along the eastern side of Truro C. The Zn contours (Fig.11) have a peak in the north-west of Truro A and increase eastwards across Truro C, with high values over the Lower Cambrian rocks, associated with high Pb values.

CONCLUSIONS & RECOMMENDATIONS

The stream sediment sampling programme on the Truro 1:63 360 sheet produced mainly low order anomalies but it did point to some interesting features.

A band of anomalous Cu values runs north-south through the middle of Truro A with some associated Pb, Zn and Au

anomalies. Soil sampling indicated that a particular stratigraphic interval near the boundary of the Tapley Hill Formation with the underlying Sturt Tillite was the source of the anomalies. The copper values obtained in the rock chip samples over the highest soil anomaly are encouraging. The persistence along about 5 km. strike length of the soil and stream anomalies warrants detailed investigation.

A few anomalous Cu, Pb and Zn values are located east of Mt. Rufus on Adelaidean Tarcowie Siltstone. One stream sample contained 150 p.p.m. Pb and 1400 p.p.m. Zn. A rock chip sample taken nearby, contained 0.73% Zn and 0.18% Pb.

In the east of Truro C, scattered Pb and Zn anomalies are associated with Kanmantoo Group and Lower Cambrian rocks. No specific area stands out, but these rocks may be worthy of further investigation for Pb/Zn mineralization.

The rest of the Truro sheet produced only a few isolated base metal and Au values.

R. S. Robertson

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GEOLOGIST.

13th August, 1976
RSR:JK

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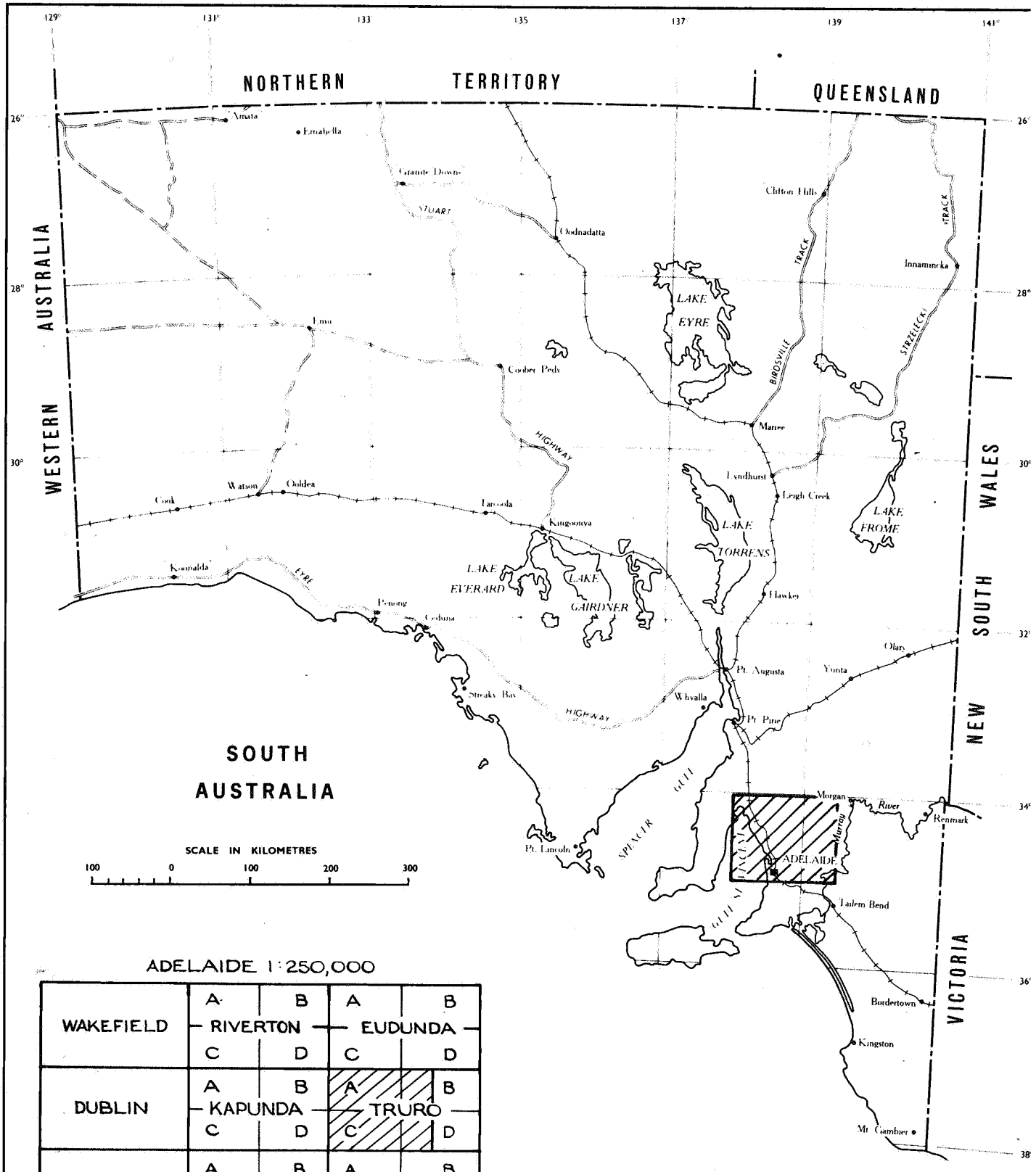


ADELAIDE 1:250,000

WAKEFIELD	A	B	A	B
	RIVERTON		EUDUNDA	
	C	D	C	D
DUBLIN	A	B	A	B
	KAPUNDA		TRURO	
	C	D	C	D
VINCENT	A	B	A	B
	GAWLER		CAMBRAI	
	C	D	C	D
SEMAPHORE	A	B	A	B
	ADELAIDE		MANNUM	
	C	D	C	D

FIG. 1

DEPARTMENT OF MINES — SOUTH AUSTRALIA

Compiled. R.S.R.	ADELAIDE STREAM SAMPLING TRURO AREA LOCALITY PLAN	Date: November 1974
Drn. A.F. Ckd. A.F.		Drg. No. S11786c

P.F. No. 5585C 994 2

6729

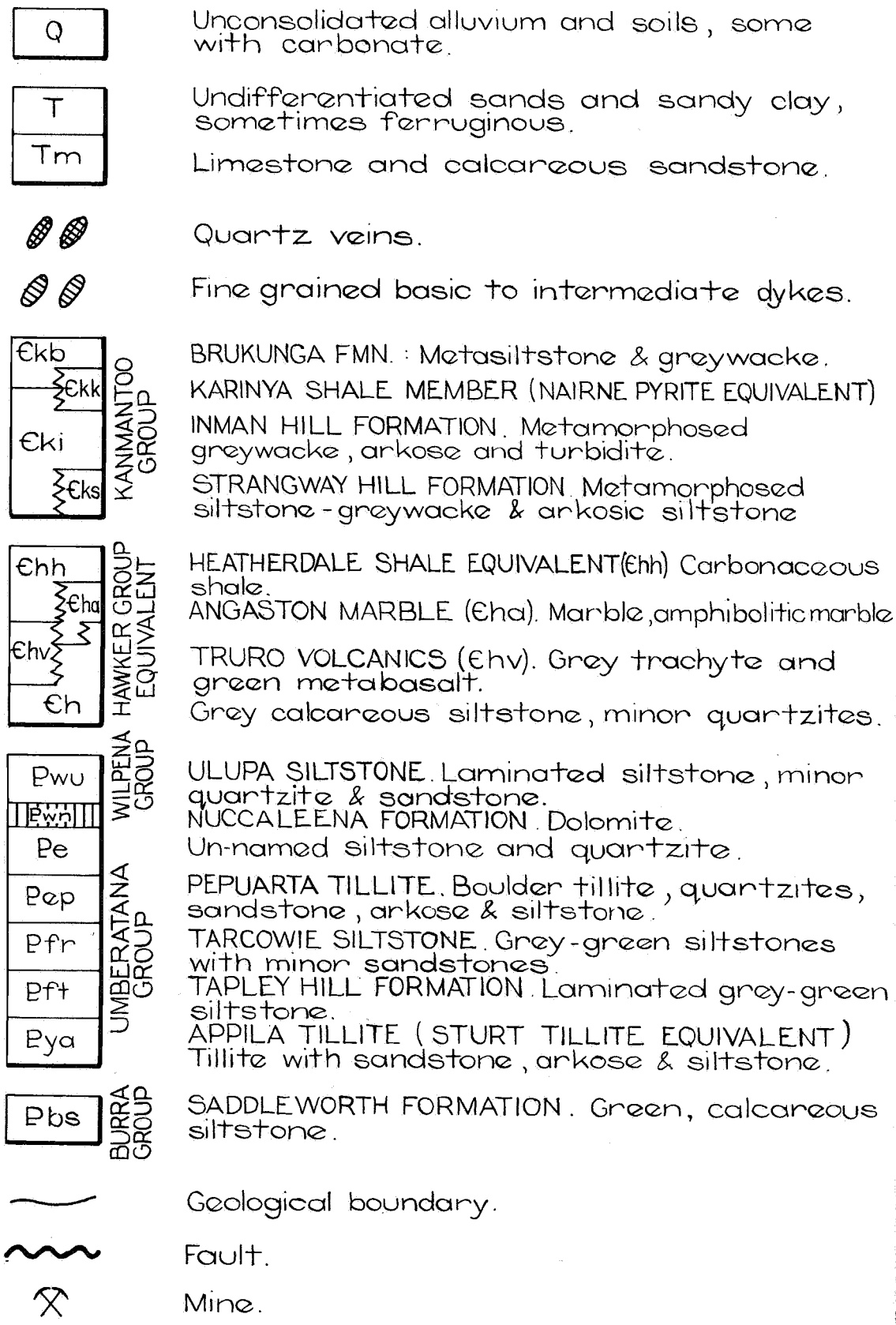


Fig. 2

	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale
Compiled R.S.R.	TRURO A,B,C & D	Date 2nd April '76
Drn J.W. Ckd A.F.	**GEOLOGICAL REFERENCE** (FOR FIG. 3)	Drg. No. SI2252

FIG.3

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

Compiled by R.S. Robertson
from ADELAIDE 1:250,000 sheet
(B.P. Thomson 1969)

For Geological Reference
see Fig. 2 (Drg. No. S12252).

DEPARTMENT OF MINES—SOUTH AUSTRALIA				
ADELAIDE STREAM SAMPLING GEOLOGICAL PLAN TRURO AREA				
	COMPILED R.S.R.	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F.	DATE 3-6-76	76-415

6729

34° 15'

34° 22½'

139° 00'

139° 15'

139° 20'

BAKER RIVER

NUBIOOTTA

Penrice

FIG. 4

SCALE IN KILOMETRES

0 1 2 3 4 5 6

Stream sediment Sample location → 15 Copper in p.p.m. 8 Lead in p.p.m. 32 Zinc in p.p.m.

DEPARTMENT OF MINES - SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING COPPER, LEAD & ZINC RESULTS TRURO AREA

	COMPILED R.S.R.	DRN J.M.W.	SCALE 1:50.000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F.	DATE 3-6-76	76-411

6729

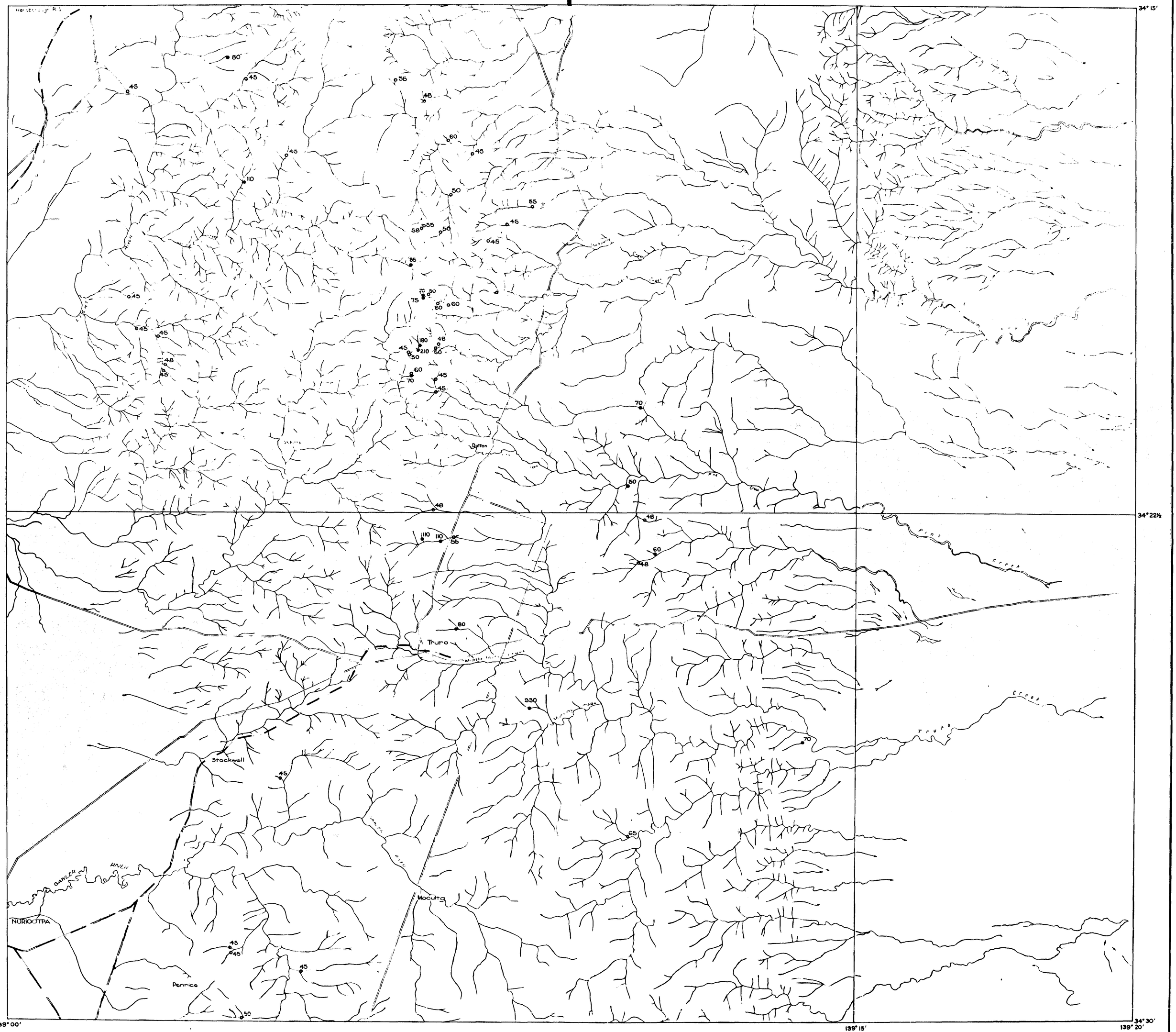


FIG.5

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

Anomalous Copper Values.

- ⊙ ≥ 45 p.p.m.
- ● ≥ 70 p.p.m

DEPARTMENT OF MINES-SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING
ANOMALOUS COPPER VALUES
TRURO AREA

	COMPILED R.S.R.	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F.	DATE 3-6-76	76-408

6729

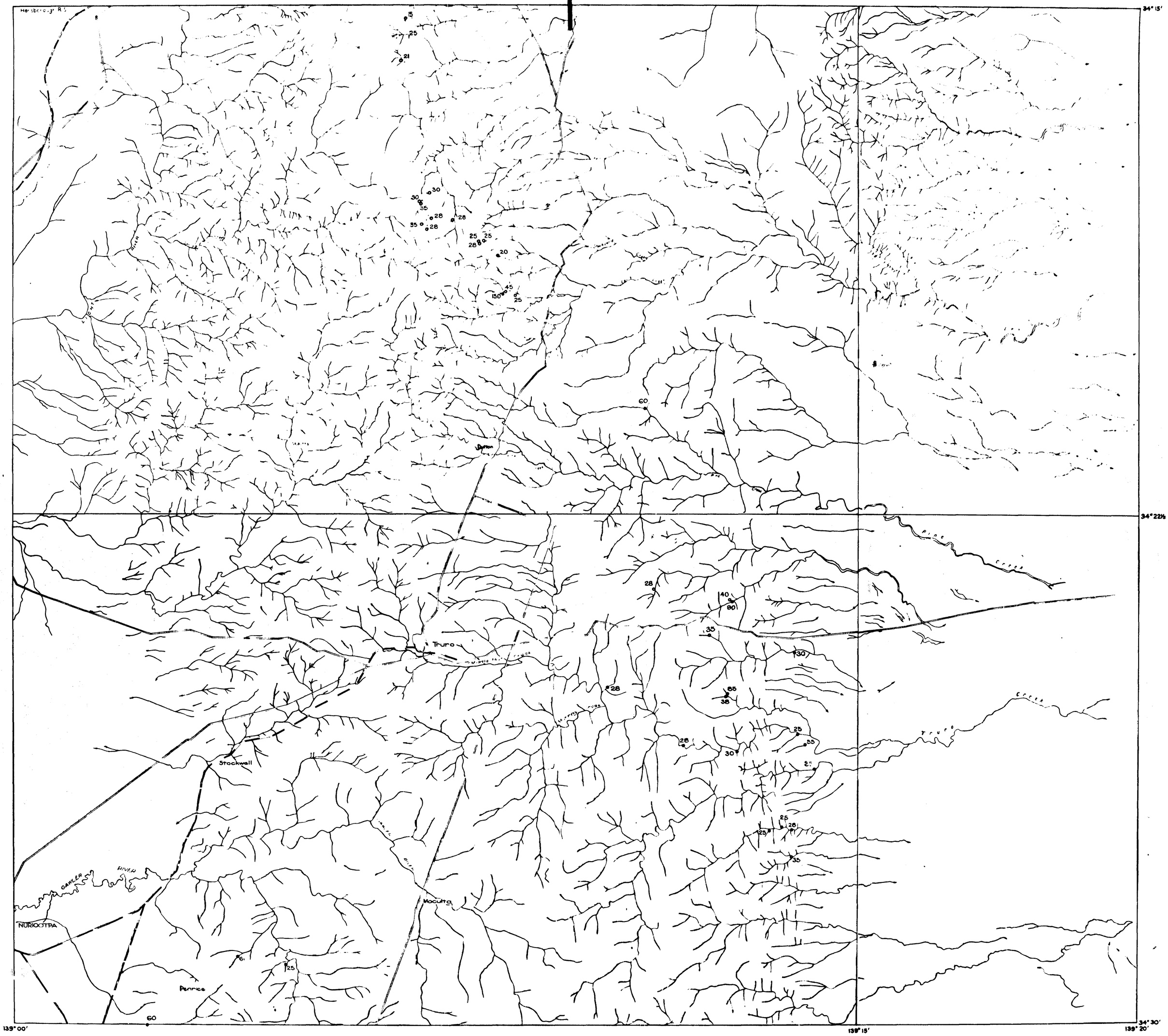


FIG.6

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

Anomalous Lead Values

- ○ > 25 ppm
- ● > 50 ppm.

DEPARTMENT OF MINES-SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING
ANOMALOUS LEAD VALUES
TRURO AREA

	COMPILED R.S.R	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F	DATE 3-6-76	76-410

6729

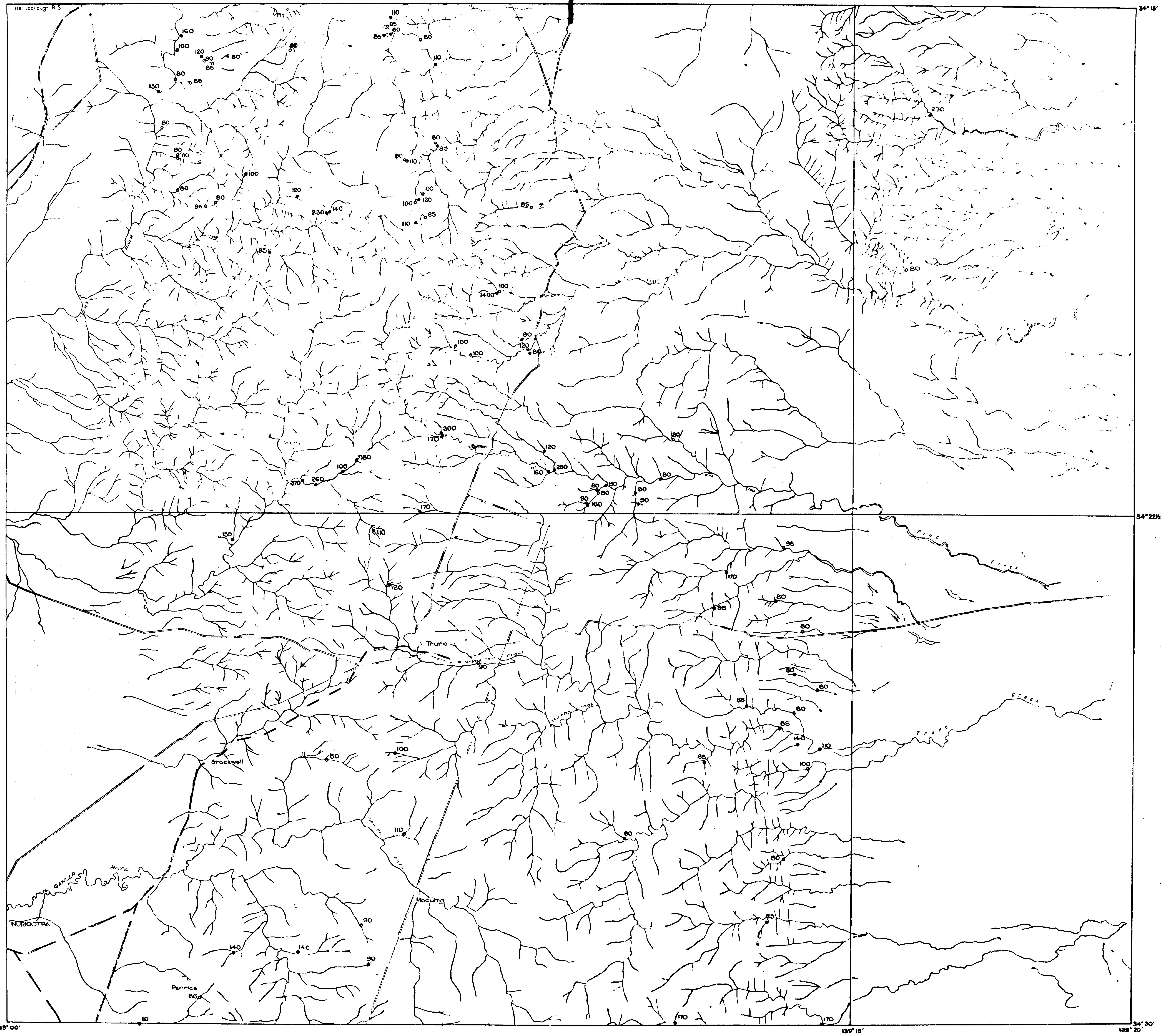


FIG. 7

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

Anomalous Zinc Values

∘ ≥ 80 p.p.m.

• ≥ 110 p.p.m.

DEPARTMENT OF MINES-SOUTH AUSTRALIA			
ADELAIDE STREAM SAMPLING ANOMALOUS ZINC VALUES TRURO AREA			
COMPILED R.S.R.	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES	CKD A.F.	DATE 3·6·76	76-409

6729

1177

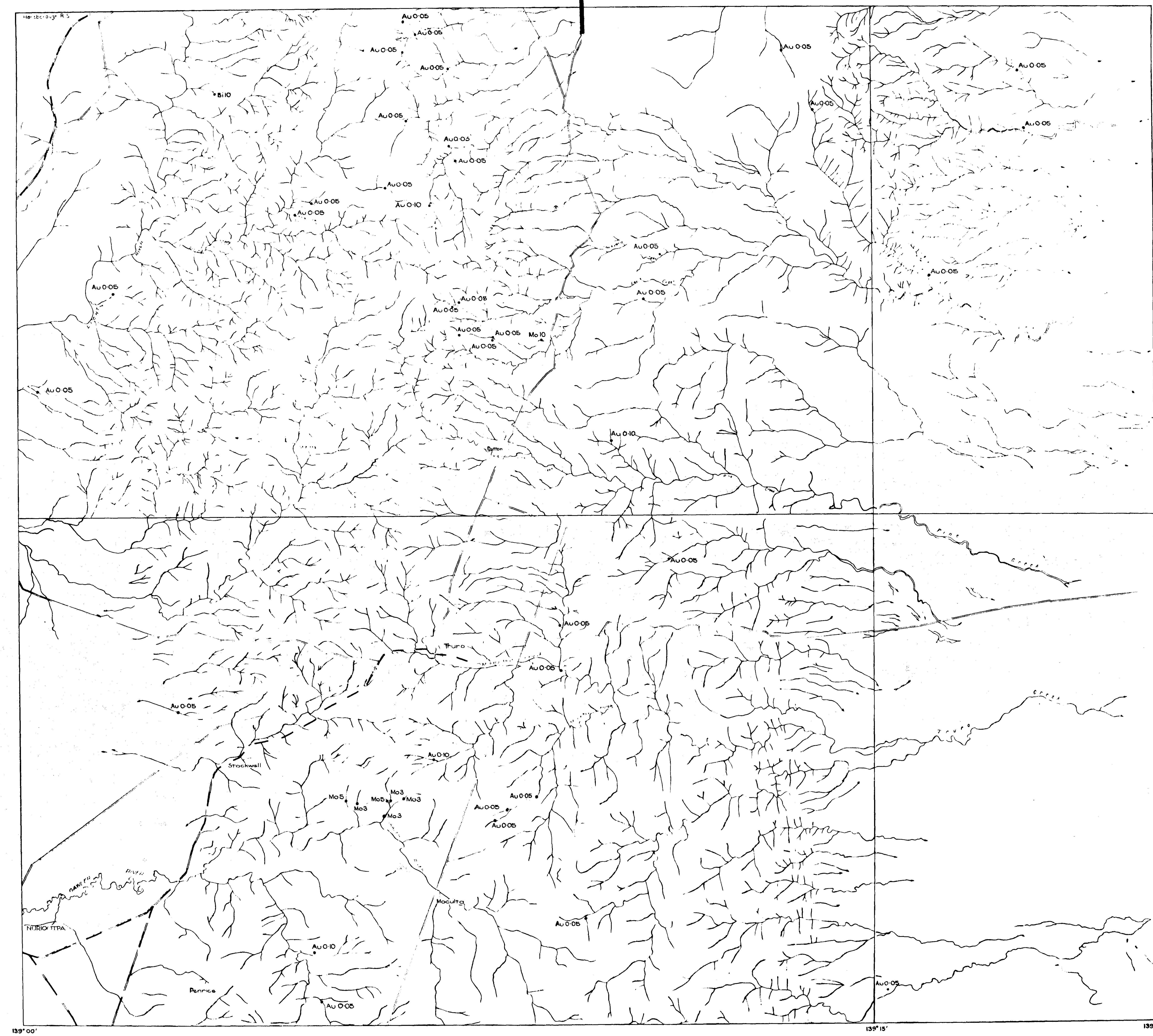
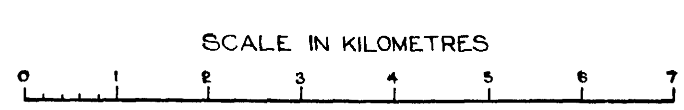


FIG.8



DEPARTMENT OF MINES–SOUTH AUSTRALIA				
ADELAIDE STREAM SAMPLING SILVER, MOLYBDENUM & BISMUTH VALUES TRURO AREA				
DIRECTOR OF MINES	COMPILED R.S.R.	DRN J.M.W. CKD A.F.	SCALE 1:50,000 DATE	PLAN NUMBER 76-725

6729

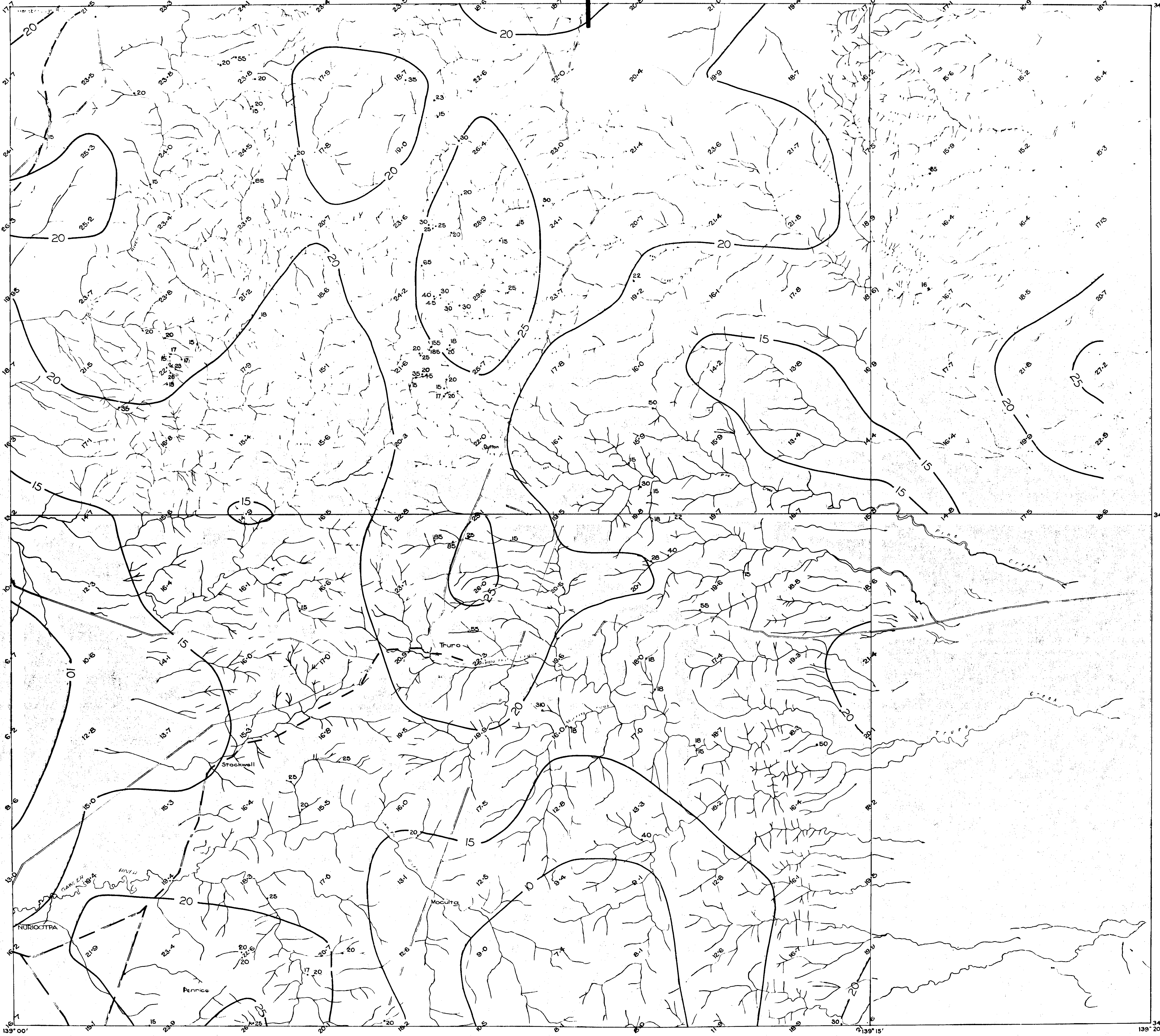


FIG.9

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

Rolling Mean Contours of Copper with positive residuals ≥ 15 p.p.m.

8.1 .... Grid values.

DEPARTMENT OF MINES–SOUTH AUSTRALIA			
ADELAIDE STREAM SAMPLING GEOMETRIC ROLLING MEAN OF COPPER TRURO AREA			
COMPILED R.S.R	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES	CKD A.F.	DATE 3-6-76	76–413

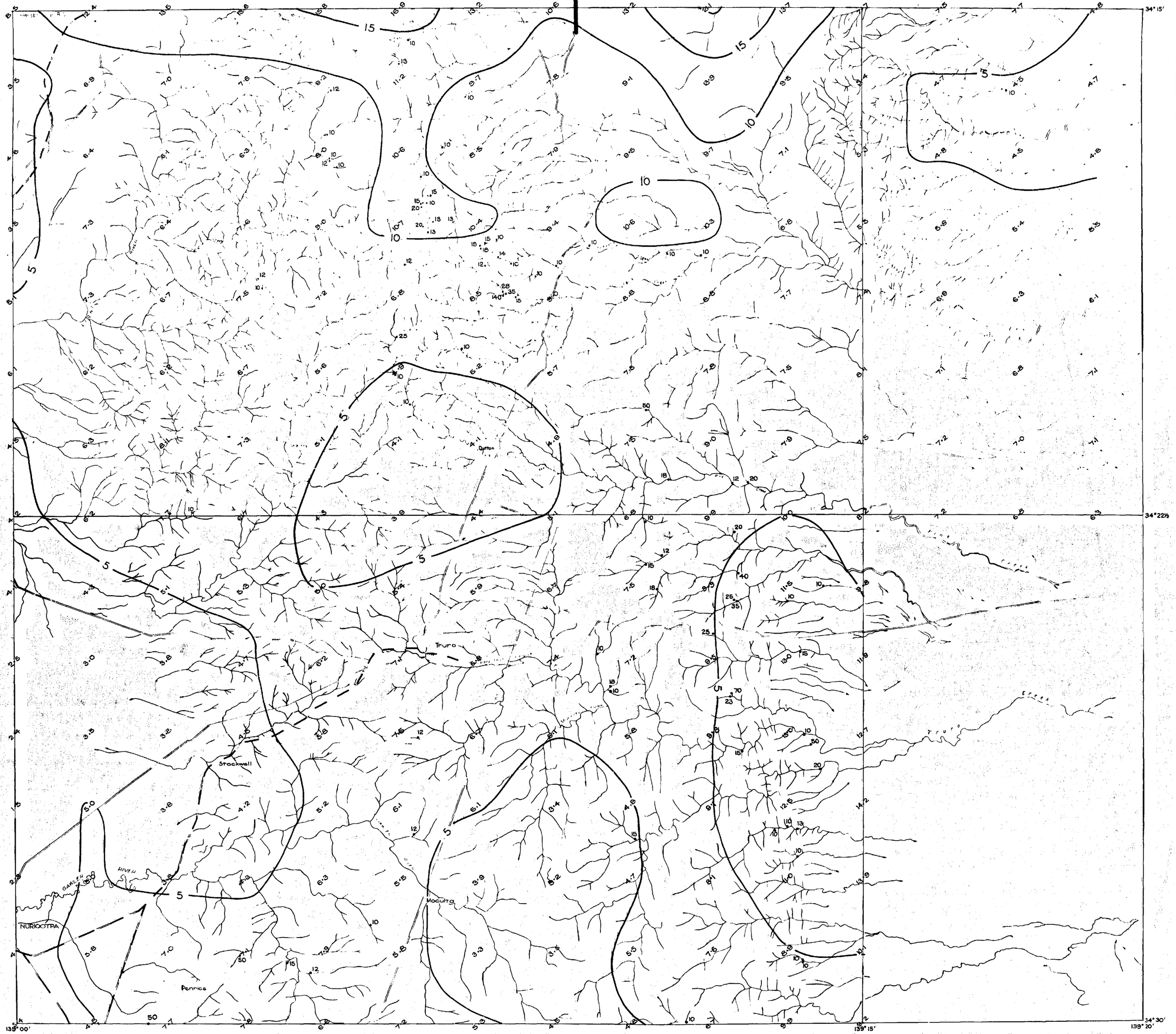


FIG.10

Rolling mean contours of lead with positive residuals ≥ 10 p.p.m.

3.5...Grid Values

DEPARTMENT OF MINES-SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING
GEOMETRIC ROLLING MEAN OF LEAD
TRURO AREA

	COMPILED R.S.R	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F	DATE 3-6-76	76-414

1977

6729

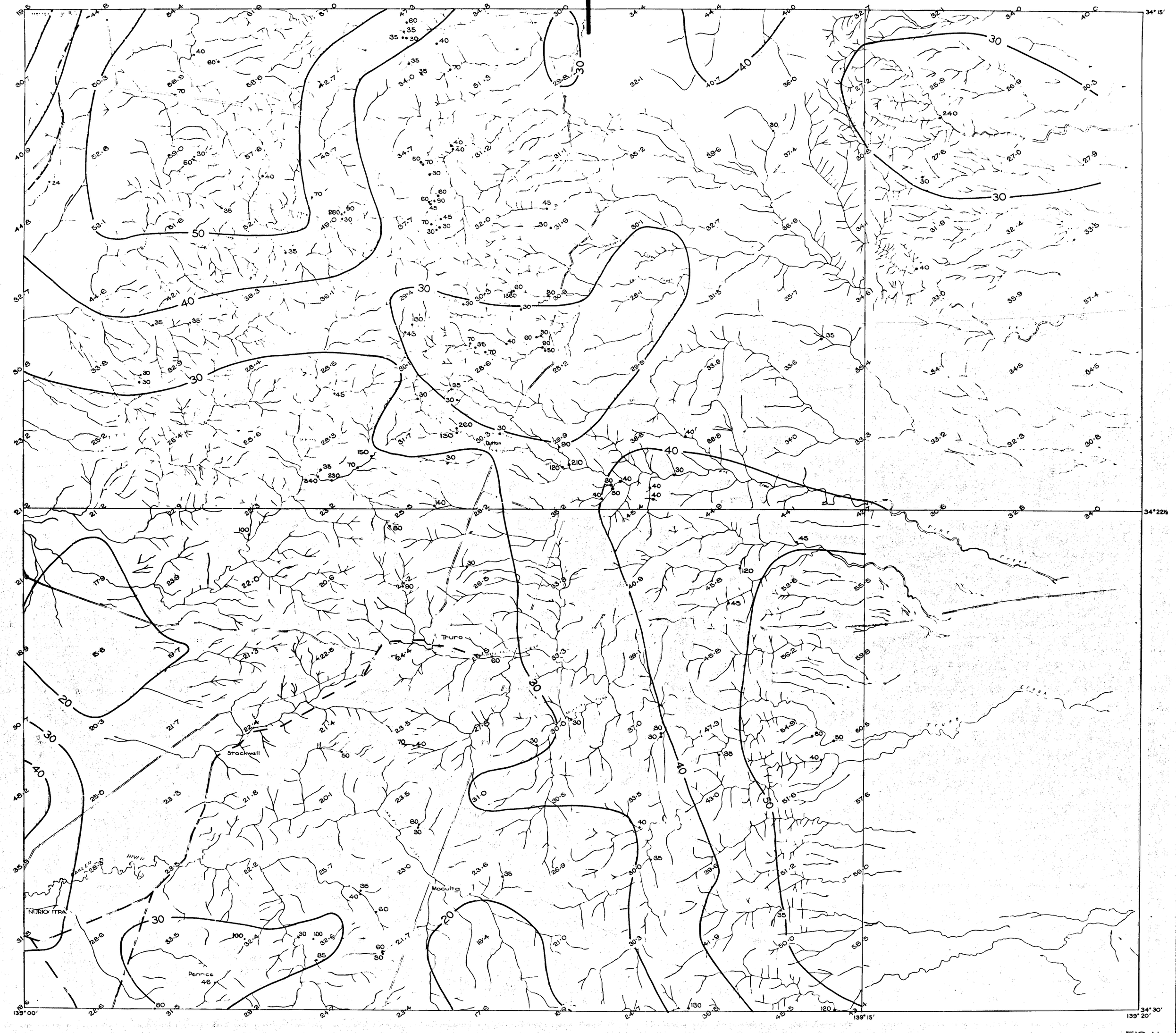


FIG. 11

SCALE IN KILOMETRES

0 1 2 3 4 5 6 7

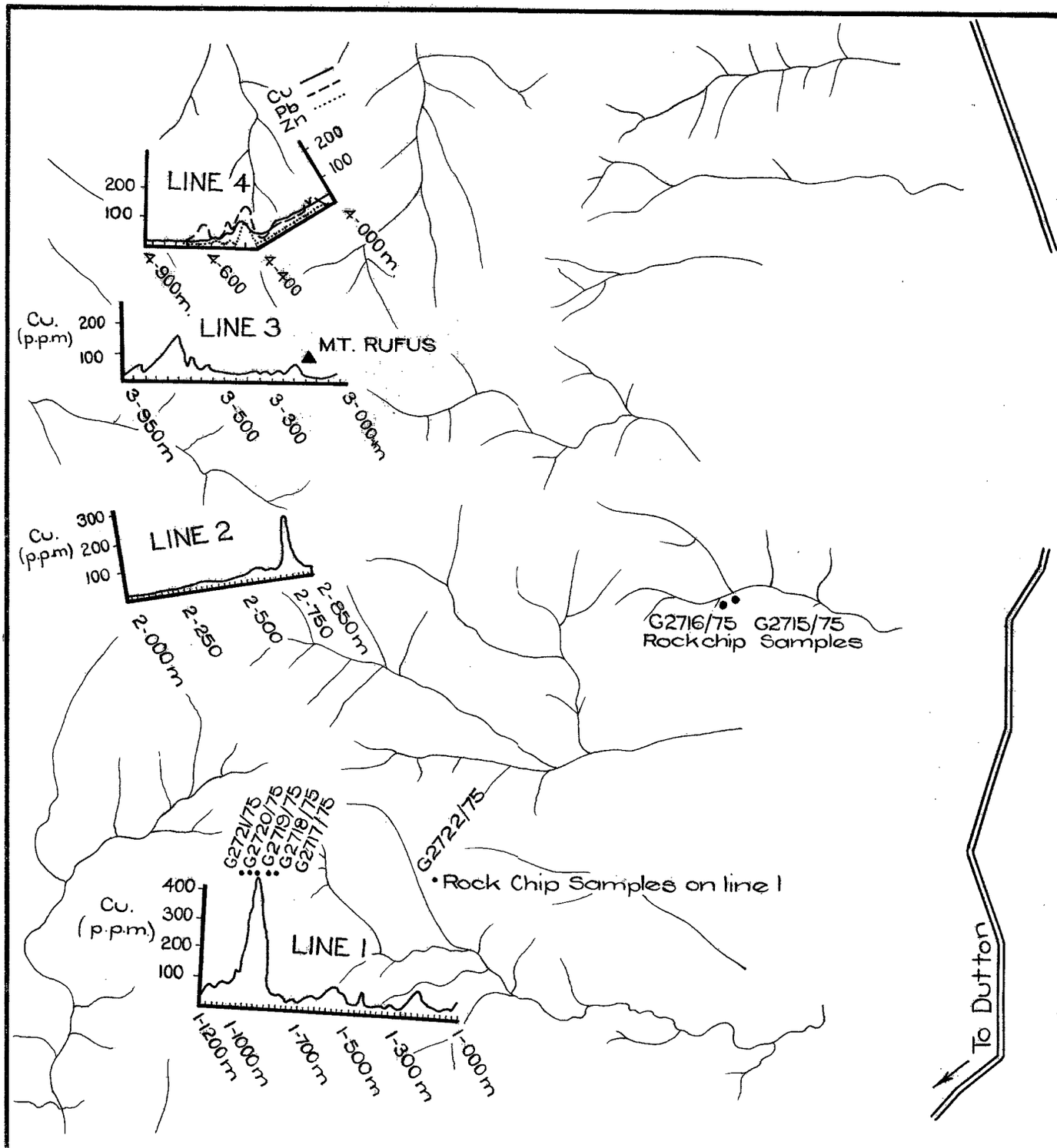
Rolling Mean Contours of Zinc
Positive residuals ≥ 30 p.p.m.

23.5 ..... Grid Values.

DEPARTMENT OF MINES - SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING
GEOMETRIC ROLLING MEAN OF ZINC
TRURO AREA

	COMPILED R.S.R.	DRN J.M.W.	SCALE 1:50,000	PLAN NUMBER
DIRECTOR OF MINES		CKD A.F.	DATE 3-6-76	76-412



4 Traverses. Samples at 25 m. intervals.

Line 1	1-000 m	G5722/74	Line 3	3-000 m	G5969/74
	to			to	
	1-1200 m	G5769/74		3-950m	G6007/74
Line 2	2-000 m	G5934/74	Line 4	4-000m	G6008/74
	to			to	
	2-850m	G5968/74		4-900 m	G6044/74

	DEPARTMENT OF MINES — SOUTH AUSTRALIA	Scale : 1:25,000
Compiled : R.S.R.	ADELAIDE STREAM SAMPLING SOIL SAMPLING TRAVERSES NEAR MT. RUFUS	Date : 3-6-76
Drn. J.W. | Ckd. A.F.		Drg. No. S12251

750—8.74 F332 O

TRURO-A

34°15'00"

139°00'00"

139°15'00"

Hansborough R.S.

▲ MT. RUFUS

St. Kitts

Dutton

Stockyard Creek

Lewis Creek

Pine Creek

Pine Creek

34°22'30"

SCALE 1:25000

METRES 1000 0 1 2 3 KILOMETRES

YARDS 1000 0 2 MILES

NOTE

Numbers underlined should read G ... /73

All other numbers should read G ... /74

INDEX TO ADJOINING SHEETS

KAPUNDA		A	B
		C	D
A	B	TRURO	
C	D		
GAWLER		CAMBRAI	

Enlargement of DTM Truro 60 chain base

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING

'G' NUMBERS

TRURO-A

GEOCHEMICAL EXPLORATION SECTION	GEOLOGIST	Drn.	SCALE: 1:25 000
		Tcd.	
Director of Mines	76-514 A	Ckd.	
		Exd.	DATE:

TRURO – B

34°15'00"

139°30'00"

Creek

Levis

34°22'30"

SCALE 1: 25000

METRES 1000 0 1 2 3 KILOMETRES

YARDS 1000 0 1 2 MILES

§ 74 ..... Should read G 74/76

§ 7000 ..... Should read G 7000/73

INDEX TO ADJOINING SHEETS

A	B	A	B
KAPUNDA		TRURO	
C	D	C	D
A	B	A	B
GAWLER		CAMBRAI	
C	D	C	D

Enlargement from Dtl. Truro 40 chain base

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING

G. Nos

TRURO - B

GEOCHEMICAL EXPLORATION SECTION	GEOLOGIST	Drn.	SCALE: 1:25 000
		Tcd.	
Director of Mines	76-514 B	Ckd.	
		Exd.	DATE:

TRURO – C

34° 22' 30"

34° 30' 00"

Truro

Middle Hut Creek

South Para Creek

Murray Creek

Stockwell

GAWLER RIVER

NURIOOTPA

Ponrica

Moculta

SCALE 1:25 000

METRES 1000 0 1 2 3 KILOMETRES

YARDS 1000 0 2 MILES

Note: Numbers not underlined should read G...../73
Numbers underlined should read G...../74

INDEX TO ADJOINING SHEETS

A	B	A	B
KAPUNDA		TRURO	
C	D		D
A	B	A	B
GAWLER		CAMBRAI	
C	D	C	D

DEPARTMENT OF MINES – SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING

TRURO – C

MINERAL EXPLORATION SECTION	GEOLOGIST	Drn.	SCALE: 1:25000
		Tcd.	
Director of Mines	76-514C	Chd.	
		Encl.	DATE:

TRURO - D

34° 22' 30"

139° 15' 00"

1625

1621

1620

1619

1618

Pine Creek

1622

Truro Creek

1650

1656

1655

Red Creek

139° 30' 00"

34° 30' 00"

SCALE 1:25000

Metres 1000 0 1 2 3 Metres

Yards 1000 0 1 2 Yards

All samples collected in 1974.

f 99 ..... Should read G 99/74

f 7000 ..... Should read G 7000/73

INDEX TO ADJOINING SHEETS

A	B	A	B
KAPUNDA		TRURO	
C	D	C	D
A	B	A	B
GAWLER		CAMBRAI	
C	D	C	D

Enlarged from Dtl. Truro 40 chain base

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ADELAIDE STREAM SAMPLING

G. NOS

TRURO-D

GEOCHEMICAL EXPLORATION SECTION	GEOLOGIST	Drn.	SCALE 1:25000
		Tcd.	
		Ckd.	
Director of Mines	76-514 D	Exd.	DATE: