DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/96

BILLA KALINA 1:250 000 SHEET WATER WELL SURVEY

GEOLOGICAL SURVEY

GROUNDWATER AND ENGINEERING SECTION

By

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and

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D.M. NO. 422/62
ENG. NO. 77/66

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BILLA KALINA 1:250 000 SHEET WATER WELL SURVEY

ABSTRACT

Approximately eighty water wells were located during a water well survey of BILLA KALINA 1:250 000 sheet. The purpose of the survey was to obtain all relevant information, sample the groundwater and photograph the headworks of all flowing wells.

Groundwater is obtained from the Cadna-Owie Formation and the underlying Permian sands. Well yields range from 4 to 280 kilolitres/day and salinities range from 600 mg/l to 26000 mg/l.

There are not considered to be any groundwater pollution problems.

INTRODUCTION

In conjunction with regional mapping a water well survey of the BILLA KALINA 1:250 000 Sheet was carried out between the 4th and 21st of September, 1978.

The sheet lies between latitudes 29° and 30° S and longitudes 135° and 136° 30' E and includes the following pastoral leases: The Twins, McDouall Peak, Ingomar, Anna Creek, Billa Kalina and Millers Creek.

PHYSICAL FEATURES

Topography

The area can be divided into four main regions.

(1) Stuart Range area, a region of well-eroded mesas, buttes and plateaux. From the main range a secondary plateau includes the whole of the south-western corner of the sheet.

(2) The major part of the sheet consists of large tracts of featureless stony rises dissected by small ephemeral streams.

(3) In the eastern part of the sheet gradients of the major creeks flatten forming large areas of swamps and salt lakes.

(4) The remaining part of the sheet is covered by longitudinal sand dunes and associated interdunal salt lakes and clay pans.

Climate

The area has an arid climate with long hot dry summers and short mild winters. High rainfall generally occurs in the summer months (Figs 2-4). Average annual rainfall in the western part of the sheet is slightly higher (e.g. The Twins 146 mm) than in the east (William Creek, 132 mm and Millers Creek, 131 mm).

Vegetation

Vegetation is predominantly low blue bush, salt bush and hardier stunted grasses e.g. Spinifex. Tracts of mulga scrub occur around the sandhills and along most water-courses. Ephemeral grasses and wild flowers bloom after heavy rains.

Land Use

Sheep and cattle grazing is the main land use south of the dog fence with only cattle grazing north of the dog fence.

SURFACE HYDROLOGY

Most creeks and drainage channels originate from a high plateau in the south-western part of the sheet. This is drained in a radial pattern over a secondary plateau to the plains. The deeply incised creeks give way to wide shallow channels which drain into numerous swamps, salt lakes and large claypans. Intermittent filling of claypans between the sand dunes occurs

during periods of heavy rain. All surface water in the region is of an ephemeral nature.

HYDROGEOLOGY

The main aquifer of the region is the Cadna-Owie Formation consisting of sands and sandstones. This confined aquifer is both artesian and sub-artesian, the western boundary of the artesian zone passing through the north-eastern corner of the sheet.

Natural outlets in the form of mound springs abound along the contact between basement and the Cadna-Owie Formation.

The sub-artesian aquifer is unconfined, consisting of fine to coarse-grained sands and sandstone. This formation varies in thickness throughout the sheet and is very thin in the vicinity of Mt. Woods. Possible Permian aquifers occur along the southern edge of the sheet, where the Cadna-Owie Formation is also thin. The Permian aquifer is unconfined and consists of sandstones of the Boorthanna and Stuart Range formations.

Recharge

Recharge to the confined aquifer in the artesian zone occurs mainly from the underlying Algebuckina Sandstone which is hydraulically connected to the Cadna-Owie Formation. Further west recharge occurs mainly through downward percolation as the aquifer is relatively close to the surface.

The sub-artesian aquifers are also recharged through local rainfall, the rate depending on permeability of overlying materials. Highly saline groundwater occurs in places of ineffective recharge.

Standing Water Levels

Standing water levels range from above the surface in the north-east to 90 metres below the surface and vary according to

the distance from the artesian zone of the Great Artesian Basin. With increasing distance from the artesian zone standing water levels are at progressively greater depths.

Salinity and Supply

The groundwater of the confined aquifer varies considerably in salinity, ranging from 5000 mg/l to 11 000 mg/l. Flows range from 20 to 110 m^3/day. Salinity of groundwater of the unconfined aquifer varies depending on recharge. Most of the fresh water occurs above very saline groundwater and if over pumped the well could become saline. Salinities range from 600 mg/l to 26 000 mg/l and use of the water is governed by human and stock tolerances. Supplies range from 4 m^3/day to 280 m^3/day.

Well Construction and Equipment

Most wells in the sub-artesian aquifer are cased through the upper unconsolidated material with either steel or PVC. Wells constructed in more recent years have either screens or slotted casing to prevent the influx of sands during pumping. Very few dug wells were located as most had collapsed due to lack of maintenance. Most wells are equipped with windmills or small motorised pumps.

Artesian wells are equipped with flow control valves and PVC headworks to control corrosion. Due to the close proximity of the pressure aquifer to the surface only one string of casing is generally used.

Groundwater Pollution

No groundwater pollution was detected at the time of the survey and it is unlikely that pollution will be a problem in the future because of the small population and lack of industries.

SUMMARY AND CONCLUSIONS

The artesian aquifer occurs only in the north-eastern corner of the sheet and most groundwater is obtained from the unconfined Cadna-Owie Formation and Permian aquifers. Although this water is quite variable in quality and quantity it is the only source of water for most stations.

Many wells have been abandoned because they have become too saline or because an influx of sand has blocked the casing. Fine sands seem to be a major problems in most older drilled wells, but more advanced drilling methods and screens seem to have overcome this. Very little new drilling is taking place; most activity is in replacement drilling and there appears to be a general trend towards dams for storing surface water.

The artesian wells on the sheet are all in reasonable condition and are equipped with flow control valves.

Most graziers are apparently satisfied with groundwater legislation as it may be used to conserve what little underground water is available.

K. DENNIS
FIELD ASSISTANT

N.Z. GERGES
TECHNICAL OFFICER

APPENDIX 1

FLOWING WELLS PHOTOGRAPHED

Well Name	Unit No.	Neg. No.
BAKE WELL BORE	6138 - 32	30269

BAKEWELL BORE

Flowing uncontrolled into lagoon (background).
No casing visible.

APPENDIX II

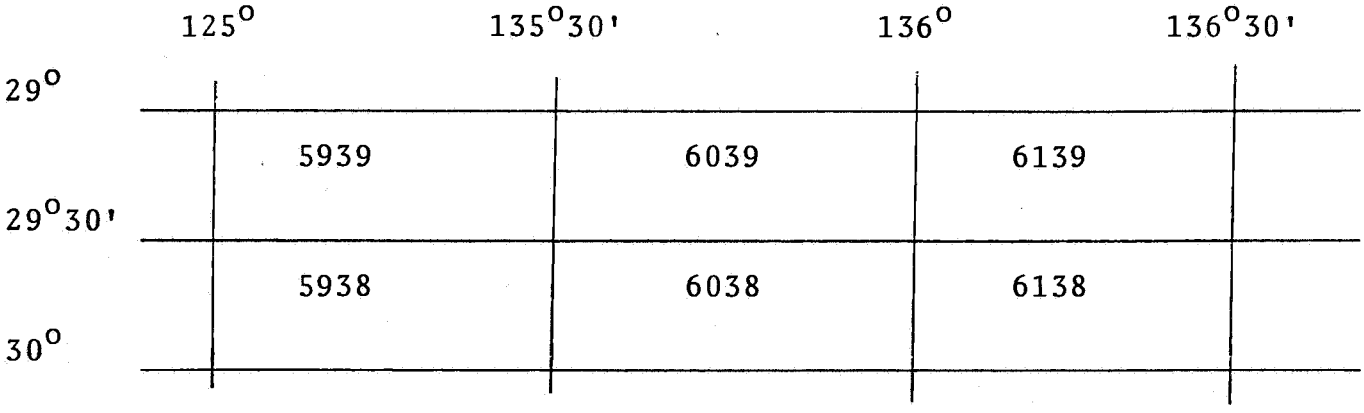
SUMMARY OF WATER WELL DATA

BILLA KALINA 1:250 000 SHEET

CONTENTS PAGE

(1:100 000 Sheets)

NO.	SHEET NAME
5938	Peak
5939	Engenina
6038	Miller's Creek
6039	Compeera
6138	Billa Kalina
6139	Irrapatana



BILLA KALINA 1:250 00 SHEET

NOTE: Wells are numbered serially in each 1:100 000 Sheet.

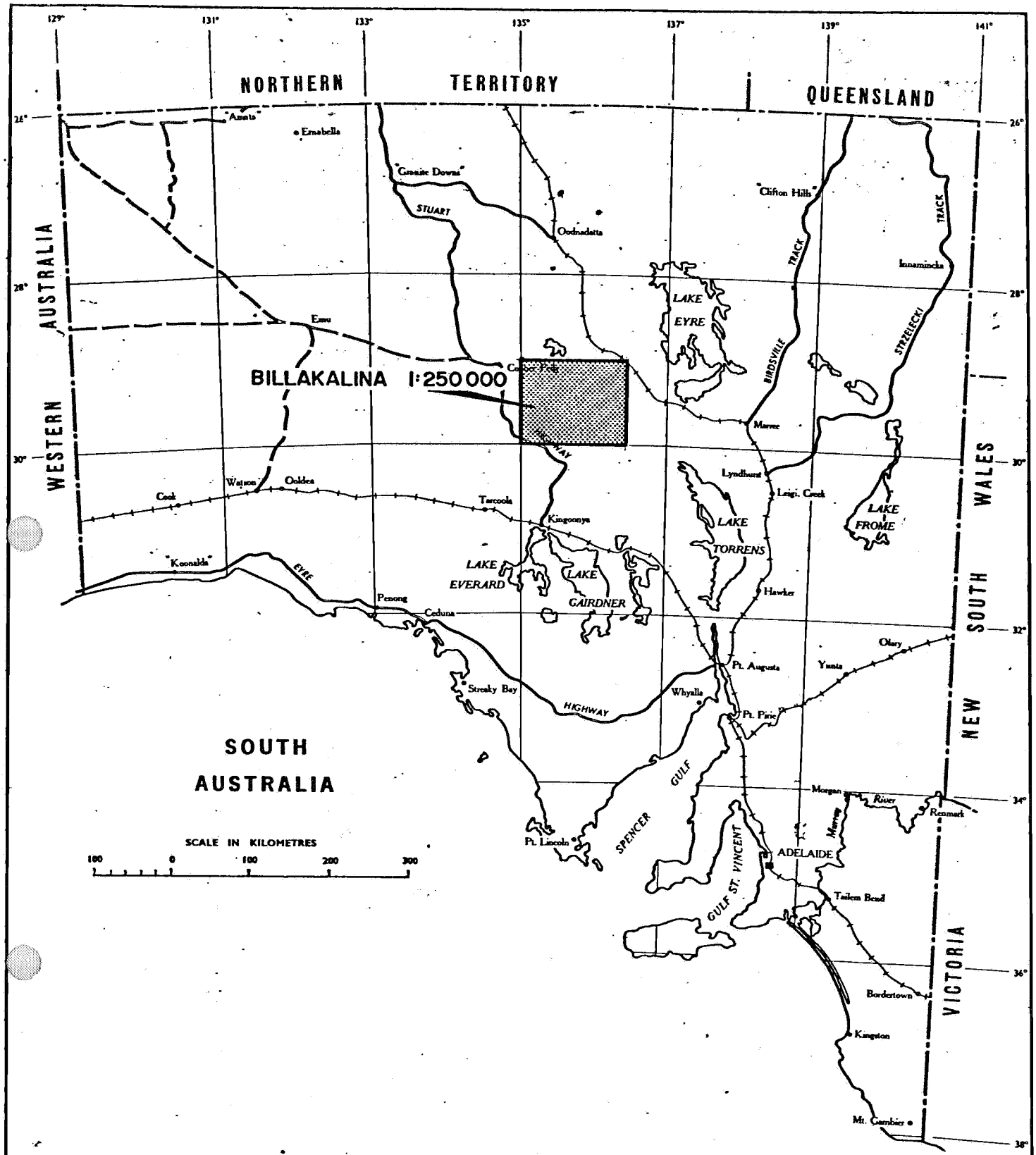


Fig. 1

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Compiled. K. Dennis	BILLAKALINA 1:250000 WATER WELL SURVEY	Date: 8th March 1979
Drn. TE / Ckd.	LOCALITY PLAN	Drg. No. S 13930

P.F. No. 55850 994.2

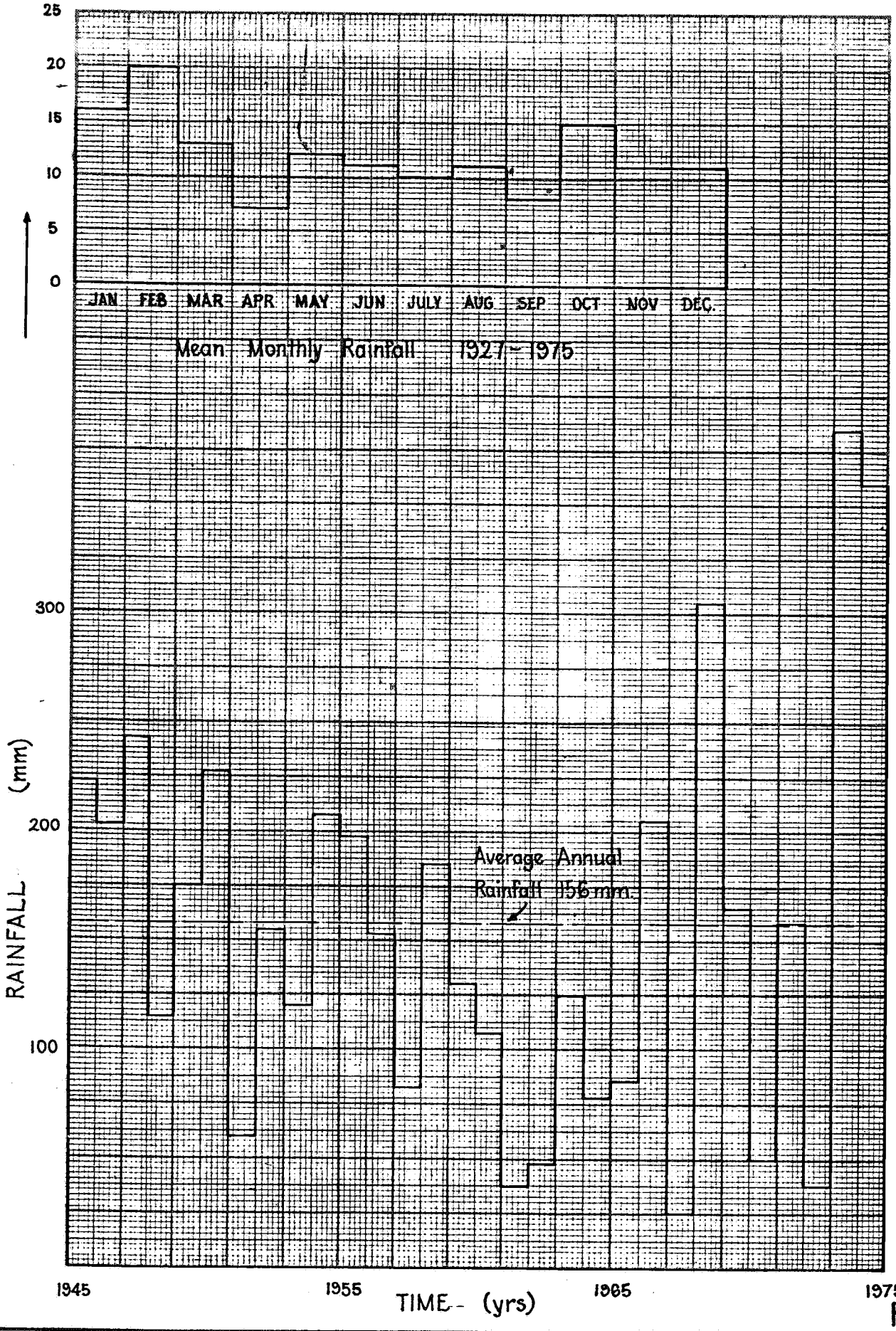
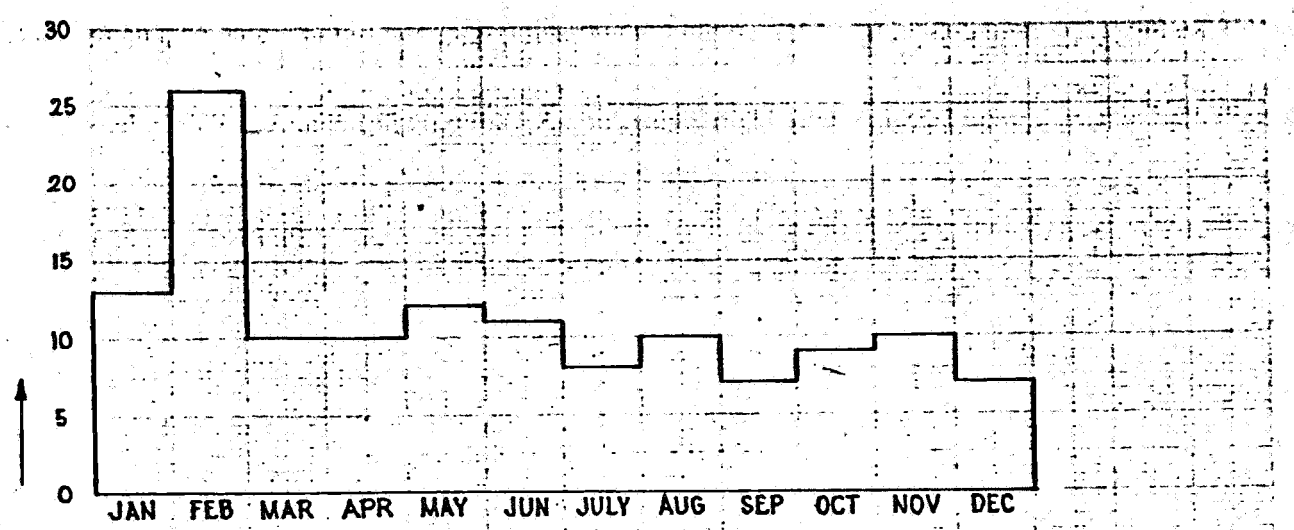


Fig. 2

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE Graphical
COMPILED K. Dennis	BILLAKALINA 1:250000 WATER WELL SURVEY	DATE 30th July 1979
DRN TE CKD	RAINFALL DATA 1945-1975	PLAN NUMBER S 13932
EVR.	THE TWINS STATION	



Mean Monthly Rainfall 1930 - 1975

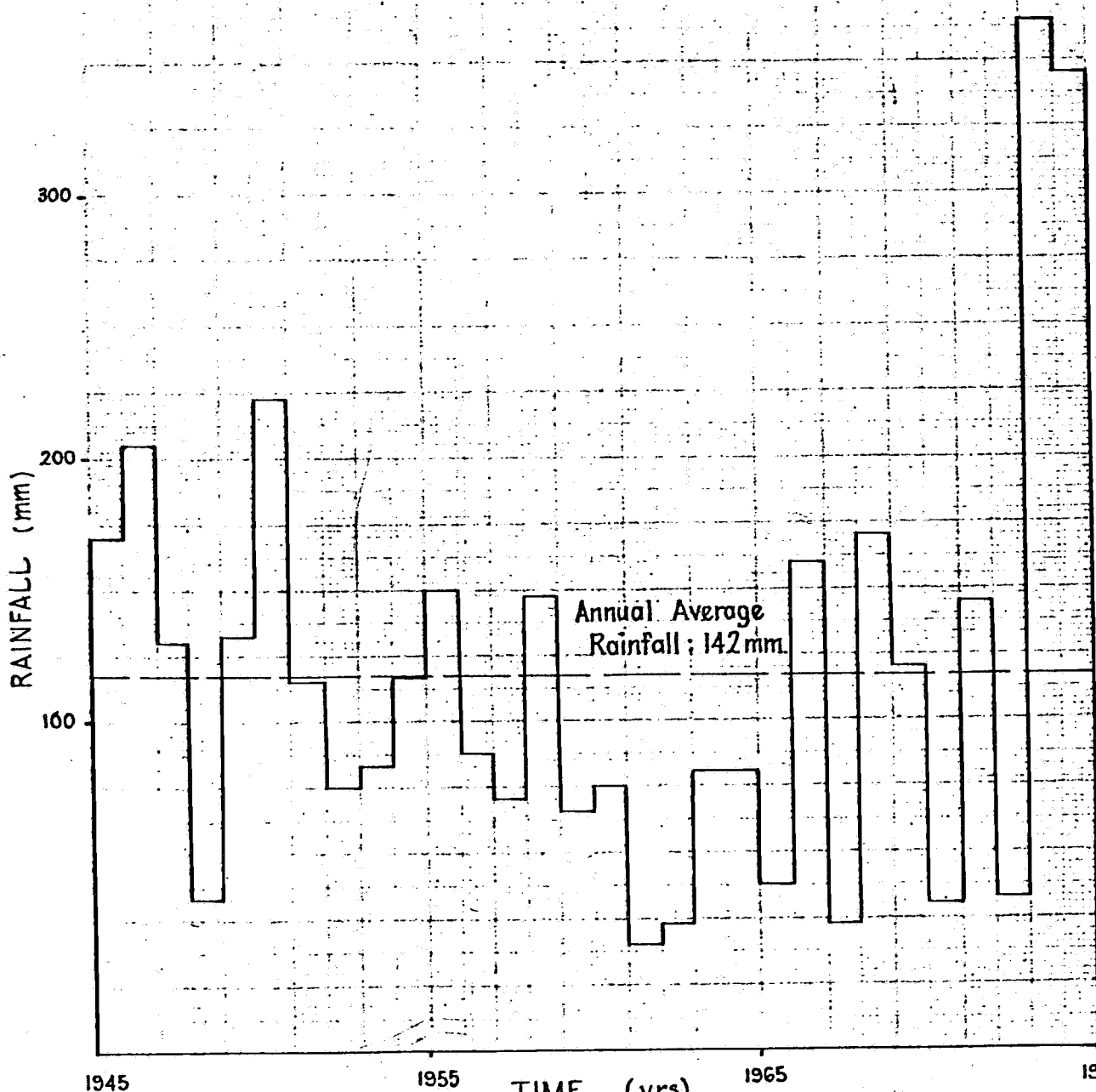


Fig. 3

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE Graphical
COMPILED K. Dennis	BILLAKALINA 1:250000 WATER WELL SURVEY	DATE 30th July 1979
DRN TE / CKD	RAINFALL DATA 1945-1975	PLAN NUMBER S 13933
	MILLERS CREEK STATION	

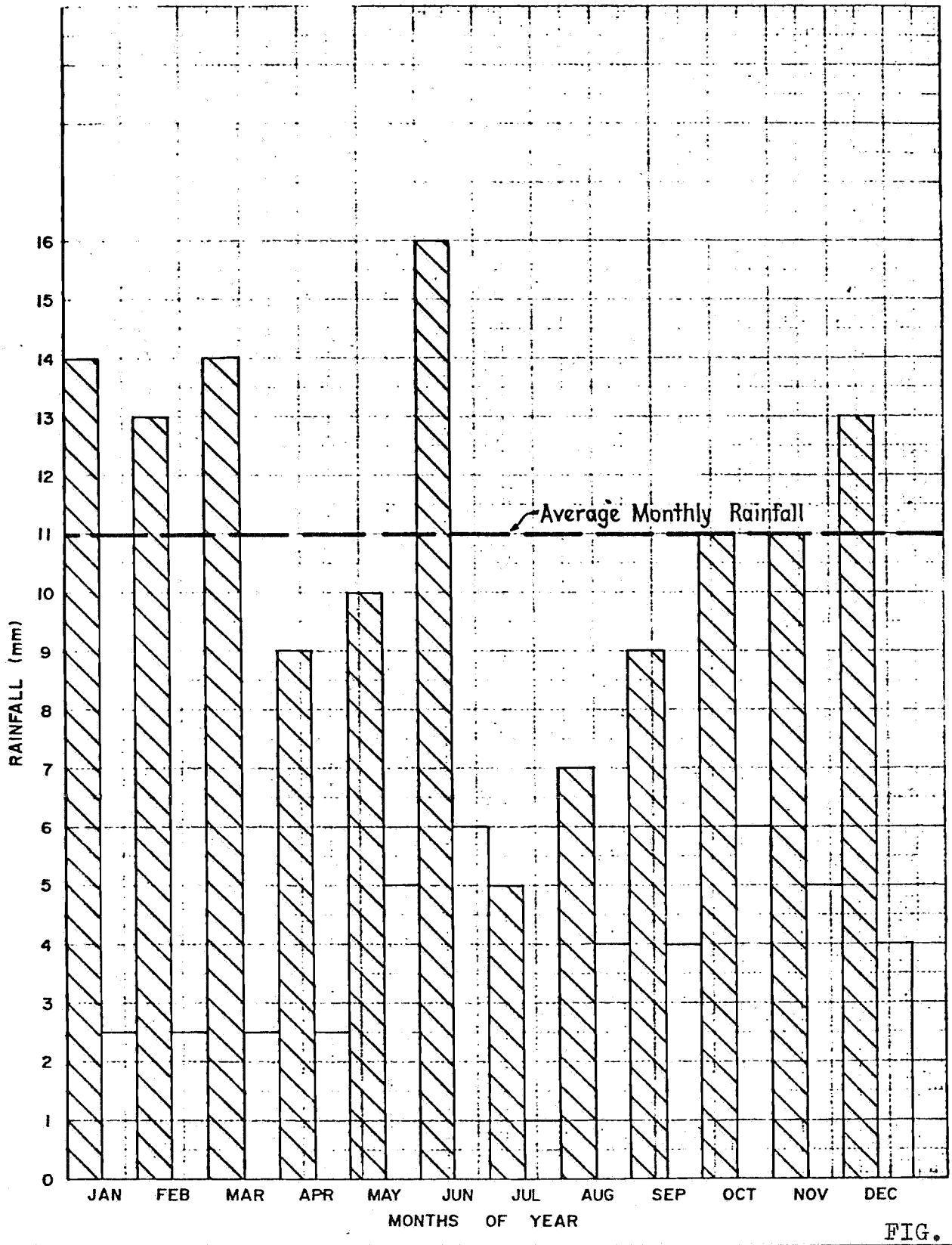
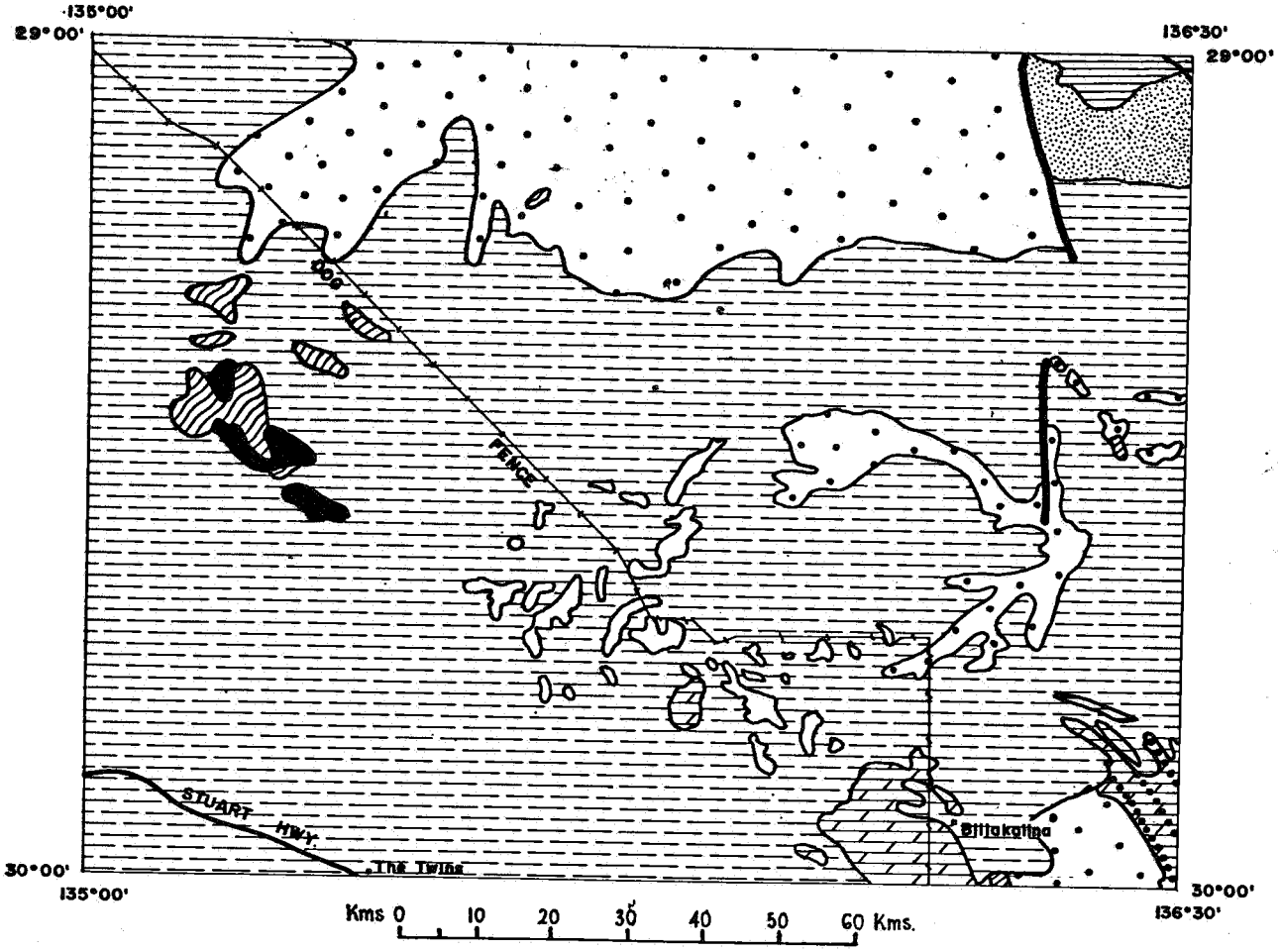


FIG. 3A

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE —
COMPILED K. Dennis	BILLAKALINA 1:250 000 WATER WELL SURVEY	DATE 14th March 1979
DRN TE / CKD	RAINFALL MEANS AND MEDIUMS FOR WILLIAM CREEK	PLAN NUMBER S 13934



LEGEND

QUATERNARY

Playa lake deposits: gypseous clay and halite crusts.

Aeolian and fluviatile sands and lacustrine gypsum beds.

TERTIARY

Etadunna Formation: lacustrine dolomite clay and sand.

Eyre Formation: fluviatile sediments, carbonaceous and conglomeratic sands, silcreted on tablelands.

CRETACEOUS

Bulldog Shale.

Cadna-Owie Formation: transgressive marginal marine to non-marine calcareous sandstones, siltstones, shales.

PERMIAN

Boorthanna Formation: basal diamictite.

PRECAMBRIAN

Granite

Lincoln Complex: granites and gneisses, migmatites, granulite augen gneisses, quartzofeldspathic gneiss relics of older basement complexes reworked by Kimban tectonism.

Fault

Fig. 4

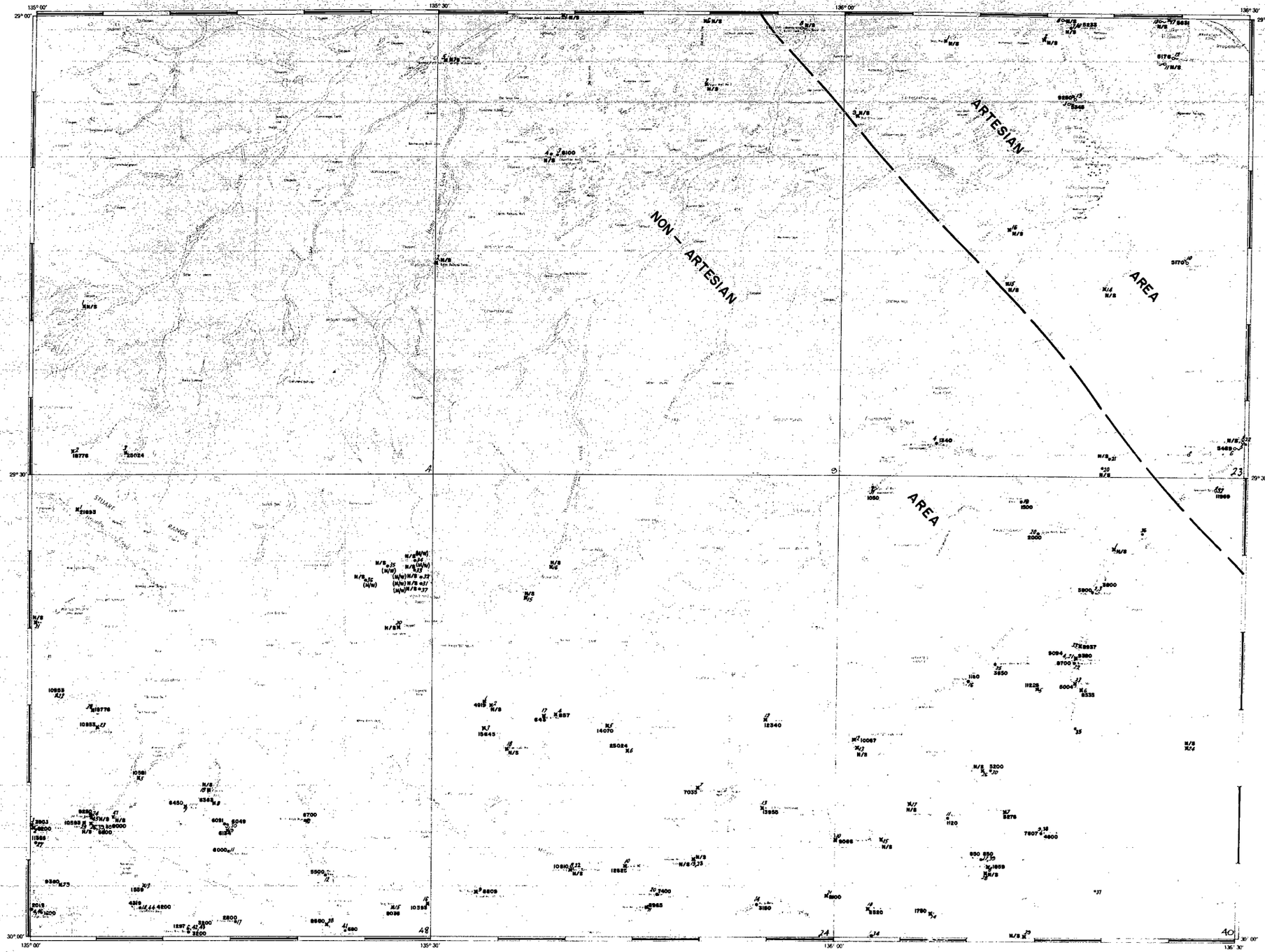
	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:1000000
COMPILED: K. Dennis	BILLAKALINA 1:250000 WATER WELL SURVEY	DATE: 16th March 1979
DRN: TE CKD:	GENERALIZED GEOLOGY	PLAN NUMBER S 13931

BILLAKALINA

DEPARTMENT OF MINES—SOUTH AUSTRALIA

AUSTRALIA 1:250,000

BORE LOCATION SERIES



REFERENCE

Flowing Well (Artesian) 5/0
Mound Spring ..... S
Not sampled during survey ..... N/S
Mineral Exploration Well ..... (M/W)
Abandoned well ..... M
Bore, well
Salinity ie. mg/L ..... 12 = 1380
Tank
Dam
Main Road
Road
Track
Railway
Ephemeral Stream
Ephemeral Swamp
Claypan
Triangulation Station
Astronomical Station
Mine

The location of bores on this plan is derived from Departments and private sources.
Bore detail may be available from Departmental records upon application

Base compilation from Division of National Mapping published map

ADJOINING 1:250,000 SHEETS

MURLOOCOPPIE	WARRINA	LAKE EYRE
COOBER PEDY	BILLAKALINA	CURDIMURKA
TARCOOLA	KINGOONYA	ANDAMOOKA

SCALE
1:250,000

KILOMETRES 0 5 0 5 10 15 20 25 KILOMETRES

MILES 0 1 2 3 4 6 8 10 12 14 16 18 20 MILES

1:100,000 ENLARGEMENTS

5939	6039	6139
5938	6038	6138

Fig. 5

DEPARTMENT OF MINES AND ENERGY— SOUTH AUSTRALIA

BILLAKALINA 1:250000 WATER WELL SURVEY

WELL LOCATIONS AND SALINITIES

	COMPILED K. Dennis	DRN T. Earl	SCALE 1:250000	PLAN NUMBER
DIRECTOR GENERAL		CKD	DATE 16th March 79	79-249