DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/105

KOPPERAMANNA; GASON; PANDIE PANDIE 1:250 000 SHEETS WATER WELL SURVEY

GEOLOGICAL SURVEY

by

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and

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ENGINEERING DIVISION

August, 1979

Eng.No. 77/66
D.M.No. 1146/70,
943/71,
944/71

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DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept.Bk.No. 79/105
Eng. No. 77/66
D.M. No. 1146/70, 943/71, 944/71

KOPPERAMANNA; GASON; PANDIE PANDIE 1:250 000 SHEETS WATER WELL SURVEY

ABSTRACT

A hydrological survey to update information on the 1:250 000 sheets - Kopperamanna, Gason and Pandie Pandie was carried out during April-May 1979. The above three sheets are incorporated into one report because of their topographic and hydrogeological similarities. Only 13 wells were located including 10 flowing wells which were photographed. Groundwater is used for stock and domestic purposes. The Tertiary-Quaternary aquifers which are mainly associated with drainage lines have quite variable salinities ranging from 407 to 9953 mg/l and yields range from 16 to 216 m^3/day. Standing water levels vary from 3 to 26 m below the surface.

The most important aquifer of the area is the Algebuckina Sandstone which is the main aquifer of the Great Artesian Basin. Its depth and water pressure increase in a northerly direction. Salinities range from 483 to 1059 mg/l with yields ranging from 1176 to 3279 m^3/day. Well head temperatures range between 76°C to 98°C.

Recharge to Tertiary-Quaternary sediments is derived from local rainfall enhanced along drainage lines. The Algebuckina Formation receives most of its recharge from south-west Queensland and New South Wales. There are no foreseeable pollution problems in the area.

INTRODUCTION

A water well survey of the 1:250 000 sheets Kopperamanna, Gason and Pandie Pandie was carried out during April-May 1979. The main objective was to provide basic data on the hydrogeology of the area and to assist the Drilling Branch of this Department with rehabilitation programmes (see Appendix I). Six of the flowing wells located on these sheets are included in the TCWQ Statewide water quality network and were sampled for Heavy Metals, Standard Full Analysis and Extended Full Analysis. A water sample from the remaining flowing wells was collected for

Standard Full Analysis only.

The three sheets, in the northern pastoral region of the State lie between latitudes 29° and 26° and longitudes 138° and 139°30', in order northwards: Kopperamanna, Gason and Pandie Pandie (Fig. 1). The Birdsville Track runs in a northerly direction through approximately the central portion of each sheet and provides the only access road either by Marree 80 km to the south, or Birdsville (Queensland) in the northeast. Pastoral stations include Etadunna, Mulka, Mungeranie, Clifton Hills, Pandie Pandie, Andrewilla, Kalamurina and Cowarie.

As the three sheets incorporated in this report are adjoining and are all located in the Great Artesian Basin, physical features and hydrogeology are comparable throughout the area.

PHYSICAL FEATURES

Topography

The region is divided into three broad zones:

1. The Simpson, Strzelecki and Tirari deserts which dominate the north, central west and much of the south, consisting of longitudinal sand dunes trending north-northwesterly with small lakes occurring in the interdunal corridors.
2. The Sturt Stony desert (Gason Dome) occupies the central portion and is a flat monotonous gibber plain with a few scattered mesas and buttes and longitudinal sand dunes.
3. The Warburton and Diamantina rivers and Cooper Creek form a network of channels and associated flood plains which follow a southwesterly course throughout the region.

Climate

The region has an arid climate with hot summers and cold dry winters. There is no dominant seasonal rainfall pattern but higher rainfall generally occurs during the summer months (often

due to thunderstorm activity). Rainfall from selected stations are listed below:

STATION	AVERAGE (mm)	RANGE (mm)
Clifton Hills	149	10(1965)-608(1955)
Mulka	124	31(1940)-721(1974)
Muloorina	141	47(1967)-439(1975)

(see Figs. 2a, 2b, 2c).

Average day temperatures range from 20°C in winter to 35°C in summer (Marree temperature records).

Vegetation

The severity of the climate reflects the sparseness of the vegetation which comprises canegrass and saltbush occurring on both the lower slopes of the dunes and gibber plains. Mulga, Gidgea and needlebush are found in the sandy deserts whilst the creeks and drainage channels are defined by lignum, saltbush, coolabah and various acacias. Ephemeral grasses and wild flowers bloom after heavy rainfall.

Land Use

Land usage is confined to cattle grazing as the area is located north of the dog proof fence.

SURFACE HYDROLOGY

The major drianage systems of this region, the Diamantina River and Cooper Creek, originate from areas of high relief in central and western Queensland. The Diamantina enters the area in the northeast and follows a southwesterly course into Goyder Lagoon, a large floodplain of braided channels and meanders. After exceptional rains the floodwaters of Goyder Lagoon (usually partially inundated every year) enter the more confined Warburton River system and flow on to Lake Eyre. Cooper Creek, with its associated floodplains enter the region in the central east and meanders along a southwesterly course eventually draining into Lake Eyre. Within these drainage systems there are numerous tributaries arising from localised areas of high

relief. All streams in this area are ephemeral. There are many water holes along the river during good rainfall years but in a drought they gradually dry up and become increasingly saline.

Numerous scattered swamps, salt lakes and claypans are found in interdunal corridors throughout the desert region.

HYDROGEOLOGY

Aquifers

Sediments of Tertiary-Quaternary age form the upper unconfined aquifer of the region. These mainly comprise alluvium, fine sands and gravels with sandy clays, feldspathic sandstone, occasional limestone beds and basal conglomerates. Many earlier wells were dug into this shallow aquifer along creeks where recharge after rains is of maximum benefit.

The Cretaceous, relatively impermeable sediments, provide a confining bed for the pressure water of the main aquifer of the basin. These are the Winton Formation, comprising pyritic claystones, fine grained sands, silts, clays and lignite; predominantly grey-green, little quartz and mostly feldspathic. (Wells within the area that have been drilled into this formation have been abandoned due to poor supply and excess salinity, making it a poor aquifer in this part of the basin). The Oodnadatta Formation consisting of a marine sequence of sands, silts and clays with a fine grained basal sandstone and the Bulldog Shale, comprising mainly shale with calcareous nodules. (Wells tapping this aquifer are generally far too saline for anything but stock usage). Most artesian wells draw their supplies from the Algebuckina Sandstone of Late Jurassic Age comprising mainly fine to coarse sandstone, and this aquifer has been extensively developed for pastoral and domestic purposes.

Recharge

The unconfined aquifer is recharged through local rainfall and run-off along drainage channels. Most station wells were drilled or dug along watercourses to obtain maximum benefit from any recharge available. The artesian aquifer receives its main recharge from southwest Queensland and New South Wales.

Standing Water Level

Water levels in the Tertiary-Quaternary sediments range from 3 m to 26 m below the surface. Water in these sediments rises to various levels due to topographic effects and seasonal variations of recharge.

Wells in the artesian pressure aquifer flow continuously.

Salinity

Salinity of the groundwater varies depending on the aquifer penetrated. In the Tertiary-Quaternary aquifers salinities range from 407 to 9953 mg/l with an average of approximately 3500 mg/l. (Muddy Hole Bore on Clifton Hills Station penetrated groundwater of 43732 mg/l and was promptly backfilled).

Salinities of the artesian aquifers vary according to well head temperatures. When converted back to standard 25^{o}C they range from 483 to 1059 mg/l with an average of 700 mg/l. Well head temperatures range from 76^{o}C to 98^{o}C with salinities generally 500 to 1500 mg/l higher than before conversion to standard temperature (see Fig. 3).

Yield

Yields range from 16 to 216 m^3/day with an approximate average of 100 m^3/day in the unconfined aquifer. The flowing wells yield between 1176 to 3279 m^3/day with an average of 2160 m^3/day.

Well Construction and Equipment

Older wells (now completely abandoned) were hand dug and timbered to below the water table; all have been backfilled or partially backfilled (silted in) due to constant flooding and neglect. Drilled wells in the non-artesian area are steel cased and slotted in the aquifer. They are equipped with windmills with a pumpjack on standby for windless periods. Wells tapping the artesian aquifer are cased with steel or PVC and fitted with slotted liners, but more recently with screens. All of the artesian wells in the area are controlled by stop valves regulating their flow. (Goyders Lagoon Bore at Clifton Hills station is leaking below ground level as water bubbles at the surface 1 metre from the well head). Due to the distances from artesian wells that water is required, windmills have been strategically placed near tanks to pump the water to its various destinations.

GROUNDWATER POLLUTION

Due to the lack of industry and population, there does not seem to be any danger of groundwater pollution.

SUMMARY AND CONCLUSIONS

The entire area is dependent on artesian wells for their water supplies. Very few graziers utilise the unconfined aquifer and most wells within this aquifer have been backfilled or have 'silted in' through constant flooding. The neglect of these wells was caused by their excessive salinity and unreliability. Owners stated that they were economically impractical due to inaccessibility during wet weather and most tracks to these wells have been washed out and never re-graded. Attempted re-locating of these wells was impossible and in most cases the owners warned against attempting it. The area was surveyed during a rainy period making access to most wells very difficult. Station

personnel were very helpful and assisted greatly in the completion of this survey.

There has been no new water well drilling in the area since the last survey, done in the early 1960's. In 1970 the Bureau of Mineral Resources did some stratigraphic drilling and all but one hole was backfilled. This hole on Kalamurina station was cased and has been left abandoned due to very saline water. This Department has carried out rehabilitation work throughout the area and all flowing wells have been controlled. (With the exception of Goyders Lagoon Bore mentioned in "Well Construction and Equipment").

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APPENDIX I

PHOTOGRAPHS OF FLOWING WELLS

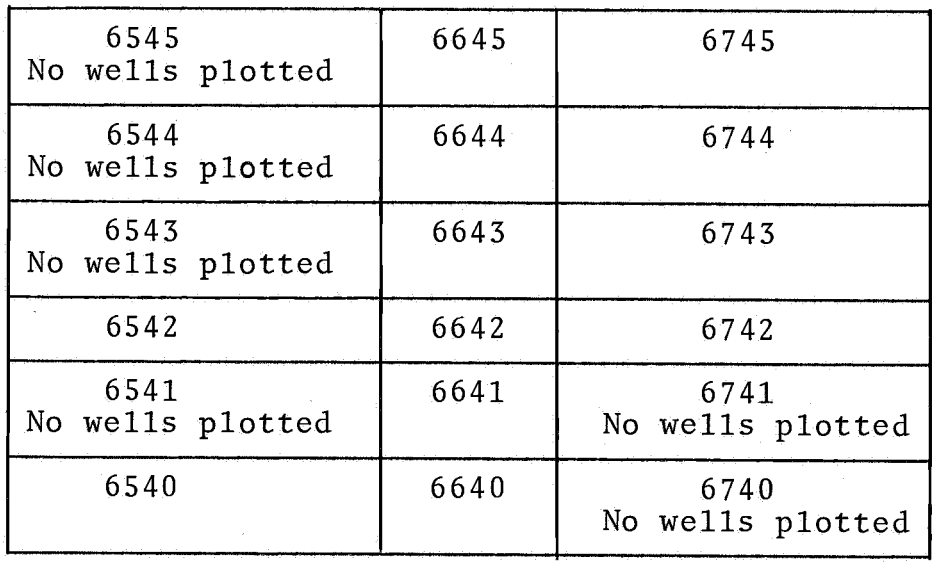
WELL NAME	COMMENT	UNIT NO.	NEG. NO.
New Kopperamanna Bore	Well Head	6440-01	30785
New Kopperamanna Bore	Discharge Pipe	6440-01	30786
Cannawaukaninna Bore	Well Head	6440-04	30787
Cannawaukaninna Bore	Cooling Pond	6440-04	30788
Mirra Mitta Bore	Well Head	6642-02	39789
Mirra Mitta Bore	Discharge Pipe & Pond	6642-02	30790
Mt. Gason Bore	Discharge Pipe & Pond	6643-02	30791
Mt. Gason Bore	Well Head	6643-02	30793
Goyders Lagoon Bore	Well Head	6643-01	30792
Goyders Lagoon Bore	Discharge Pipe & Pond	6643-01	30794
Pandie Burra Bore	Discharge Pipe & Cooling Channel	6744-01	39797
Pandie Burra Bore	Sampling Precautions	6744-01	30798
Mungeranie Bore	Sampling Point	6641-03	30796

Note: Film broke in camera and Mulka, Pandieburra and Mungeranie were not photographed. These should be photographed during next visit to the area.

APPENDIX II

SUMMARY OF WATER WELL DATA

CONTENTS



PANDIE PANDIE
1:250 000 SHEET
1:100 000 enlargement

GASON
1:250 000 SHEET
1:100 000 enlargement

KOPPERAMANNA
1:250 000 SHEET
1:100 000 enlargement

Note - Wells are numbered serially in each 1:100 000 SHEET.

SUMMARY OF WATER WELLS 1:100000 SHEET No 6540

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6540000WW00001	26.5	24.7	9537	—		—	unequipped	BLAZES WELL	Abandoned - Caved in.
WW00002	13.1	DRY	—	—		—	"	No1 Well.	" " "
WW00003	Filled in.	—	—	—		—	"	No2 Well	" " "
WW00004	" "	—	—	—		—	"	—	" " "
WW00005	18.3	—	—	—		—	—	—	" " "
WW00006	18.3	—	—	—		—	—	WIRE YARD WELL	" " "
WW00007	6.1	—	—	—		—	—	—	" " "

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SUMMARY OF WATER WELLS 1:100000 SHEET No 6542

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6542000WW00001	19.6	10.1	2515	39		152mm - 127mm 0-183 -0-183	w/mill & pumpjack	COWARIE H/S BORE.	STOCK & Domestic - Bailer sample.
WP00002	—	DRY	4168	—	—	—	—	KALLAMURINA CROSSING	RIVER SAMPLE.
WW00003	27.4	21.3	745	216		152mm 0-19.6m.	w/mill & pumpjack	ONE TREE BORE.	Abandoned - unable to sample.
WW00004	21.9	18.3	800	—		—	unequipped	COWARIE DAM BORE	Abandoned - Back filled.
SW00005	14.7	3.0	1235	172		152mm 0-15m	unequipped	BUREAU MINERAL RECOURCES.	STRATIGRAPHIC WELL - Abandoned - Bailer Sample.

SUMMARY OF WATER WELLS 1:100000 SHEET No 6640

(3)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6640000WW00001	992.5	Flows	869	2052		127mm 0-927m	DOUBLE GATE VALVE	NEW KOPPERAMANNA BORE	Stock & Domestic - Well head in good condition.
WW00002	914.4	Flows	845	3279		—	—	OLD KOPPERAMANNA BORE	Abandoned - Cemented off.
WW00003	21.3	14.9	1155	—		—	unequipped	ETADUNNA WELL	Abandoned - Caved in.
WW00004	867.8	Flows	1059	2376		165mm 0-840m	Double gate valve	CANNAWAUKANINNA BORE	Stock & Domestic - well head in good condition.
WW00005	—	-	—	—		—	—	KOPPERAMANNA MISSION STATION WELL	Abandoned - Backfilled.
WW00006	15.2	14.6	—	—		—	—	—	Abandoned - Caved in.
WW00007	21.3	—	—	—		—	—	MAYLANDS WELL	" " "
WW00008	6.1	—	—	—		—	—	—	Abandoned - silted in.
WW00009	42.7	6.1	11511	Large		open hole	unequipped	MOSQUITO CK. BORE.	Abandoned - unable to locate.
WW00010	18.9	17.1	—	—		—	—	ISA CREEK WELL	Backfilled - unfit for stock.

SUMMARY OF WATER WELLS 1:100000 SHEET No 6641

(4)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM-mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6641000WW00001	—	—	—	—		—	—	MUNGERADIE DEEP WELL	UNABLE TO LOCATE.
WW00002	—	—	—	—		—	—	MUNGERADIE SHALLOW WELL	" " "
WW00003	1027.2	Flows	700	2212		—	DOUBLE GATE VALVE.	MUNGERADIE BORE	STOCK & Domestic. Well head in good condition
MW00004	—	—	—	—	—	—	—	KUNTHA HILL BORE	MINERAL BORE - BACKFILLED.
WW00005	30.5	23.5	—	16		—	unequipped.	MULKA HILL WELL	Abandoned - Backfilled
WW00006	1050.0	Flows	817	2385		152 - 203 / 0-592m 0-1020m	valve controlled	MULKA BORE.	Stock & Domestic - Well head in good condition.
WW00007	—	—	—	—		—	—	SCOBIES WELL	Abandoned - Backfilled
WW00008	24.4	DRY	—	—		—	—	APATOONGANNIE WELL	DRY, Abandoned - Backfilled.
WW00009	Filled	—	—	—		—	—	WHITE WELL	BACKFILLED - Abandoned.
WW00010	18.3	—	—	—		—	—	MURRAPATIRRINA WELL	" "

SUMMARY OF WATER WELLS 1:100000 SHEET No 1642

(5)

UNIT No	DEPTH m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT	WELL NAME.	REMARKS.
6642000ww00001	9.1	4.3	9953	—		—	unequipped	BERLINO T/S WELL	Abandoned - partly backfilled.
" 00002	1077.0	Flows	724	2052		127mm / 0 - 444m	5" gate valve & 5" 5way head	MIRRA MITTA BORE	STOCK & Domestic usage.
" 00003	6.1	4.9	4727	soakage		—	unequipped	TILPAMULLINA WELL	Abandoned - partially backfilled.
" 00004	30.5+	25.9	—	—		—	—	—	Abandoned - Backfilled.
" 00005	7.6	Surface	Salt	—		—	—	—	Backfilled - due to constant flooding.
" 00006	9.1	Surface	Salt	—		—	—	—	" " " " "
" 00007	21.3	DRY	—	-		—	—	-	Abandoned - Backfilled
" mw00008	152.4	—	—	-		—	—	BUREAU MINERAL RESOURCES	Stratigraphic Bore - Backfilled
" mw00009	12.2	—	—	—		—	—	" "	" " "
" mw00010	12.2	-	-	-		-	-	" "	" " "
" mw00011	9.1	-	-	-		-	—	" "	" " "
" mw00012	12.2	-	-	-		—	—	" "	" " "
" mw00013	10.7	-	-	-		—	—	" "	" " "

SUMMARY OF WATER WELLS 1:100000 SHEET No 6643

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6643000ww00001	1478.3	Flows	483	2160		167mm 0-1436m	DOUBLE GATE VALVE	GOYDERS LAGOON BORE.	STOCK & Domestic. Leaking below ground level.
ww00002	1347.0	Flows	710	1641		—	" " "	MT GASON BORE	STOCK & Domestic. Well head in good condition.
ww00003	16.8	13.4	407	Good		—	unequipped	TWIN WELLS WELL	Abandoned - Tracks washed out. Unable to locate.
SW00004	47.2	—	—	—		—	—	Bureau Mineral Recources.	Stratigraphic Bore - Backfilled

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SUMMARY OF WATER WELLS 1:100000 SHEET No 6644

(7)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT	WELL NAME.	REMARKS.
6644000WW00001	70.1	—	—	—		—	—	BUREAU MINERAL RESOURCES	Stratigraphic well - Backfilled.

SUMMARY OF WATER WELLS 1:100000 SHEET No 6645

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM.-mm / DEPTH m.	EQUIPMENT	WELL NAME.	REMARKS.
6645000WW00001	37.5	10.7	Salt	—		—	—	HOUSE BORE	Abandoned - Backfilled.
WW00002	26.8	10.1	"	—		—	—	—	" "
WW00003	15.5	—	—	69		—	—	H/S WELL	" "
WW00004	14.3	—	Salt	172		—	—	GNARROWIE WELL	" "
WW00005	—	—	7854	—		—	—	—	" "

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SUMMARY OF WATER WELLS 1:100000 SHEET No 1742

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6742000WW00001	1514.4	Flows	769	2255		165mm - 203mm 0-1492.0 0-778.0	DOUBLE VALVE HEAD	KALLADEINA BORE	STOCK & DOMESTIC - GOOD CONDITION.
00002	3761.5	—	—	—		342mm - 241mm 223m - 203m	unequipped.	——	Plugged & Abandoned - dry oil well.

SUMMARY OF WATER WELLS 1:100000 SHEET No '743

(10)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM. mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6743000WW00001	182.9	—	—	—		—	—	MELON CREEK BORE	Abandoned - Backfilled.
WW00002	—	—	7283	—		—	—	TALLARANIE WELL	" "
WW00003	10.9	10.4	2436	—		—	—	DAMPARANIE WELL	" "
SW00004	18.3	—	—	—		—	—	BUREAU MINERAL RESOURCES	Stratigraphic well - BACKFILLED.
SW00005	—	—	—	—	—	—	—	" " "	" " "
SW00006	24.4	—	—	—	—	—	—	" " "	" " "
SW00007	20.1	—	—	—	—	—	—	" " "	" " "

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SUMMARY OF WATER WELLS 1:100000 SHEET No 6744.

(11)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD Kl/DAY	AQUIFER	Casing DIAM-mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6744000 WW00001	2210.7	flows.	542	1176		—	Gate Valve.	PANDIE BURRA BORE.	stock usage. Oil bore, now completed water well.
WW00002	9.4	4.6	8225	—		—	unequipped	—	Abandoned - Backfilled.
WW00003	—	—	6297	—		—	—	CORKWOOD WELL	" "
WW00004	6.7	—	11852	small		—	—	—	" "
WW00005	90.2	5.5	43732	small		—	—	MUDDY HOLE BORE	" "
SW00006	16.8	—	—	—		—	—	BUREAU MINERAL RECOURCES	Stratigraphic well - Backfilled
SW00007	70.1	—	—	—		—	—	" " "	" " "

SUMMARY OF WATER WELLS 1:100000 SHEET No 6745

(12)

UNIT No	DEPTH. m	SWL m	SALINITY mg/l	YIELD kl/DAY	AQUIFER	Casing DIAM- mm / DEPTH m.	EQUIPMENT.	WELL NAME.	REMARKS.
6745000WW00001	18·30	—	salty	56		—	—	TIN HOLE 3 BORE.	ABANDONED - BACKFILLED.
WW00002	8·20	—	good	39		—	—	—	ABANDONED - SILTED IN.

II-12

PLATE 1

GOYDERS LAGOON BORE (Artesian).
Showing well headworks beginning to deteriorate. Bottom left corner shows hole where leakage occurs from casing below ground level.
Neg. 30792

PLATE 2

MIRRA MITTA BORE (Artesian).
Showing well headworks recently rehabilitated. Small leak in discharge pipe to left of photo.
Neg. 30789

PLATE 3

PANDIE BURRA BORE (Artesian).
Showing discharge line with cooling channels.
Neg. 30798

PLATE 4

PANDIE BURRA BORE (Artesian).
Showing precautions needed for sampling. This sampling method applies to all wells in this part of the Great Artesian Basin.
Neg. 30798

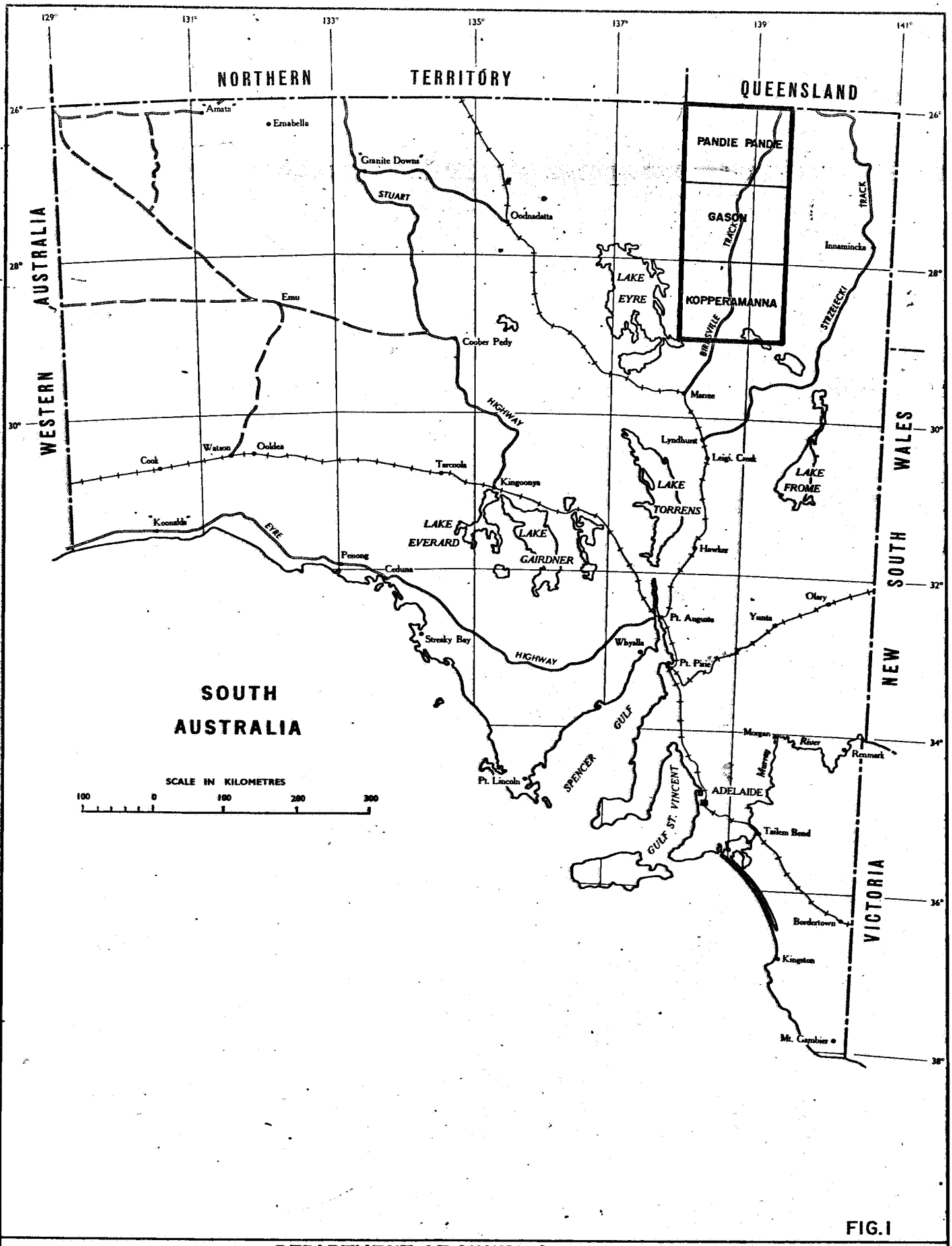


FIG.1

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Compiled. J. SAFTA	KOPPERAMANNA, GASON, PANDIE PANDIE	Date: AUG. 1, 1979
Drn. E. C. / Ckd.	1:250 000 WATER WELL SURVEY	Drg. No.
	LOCALITY PLAN	S14213

1528

P.F. No. 55850 994.2

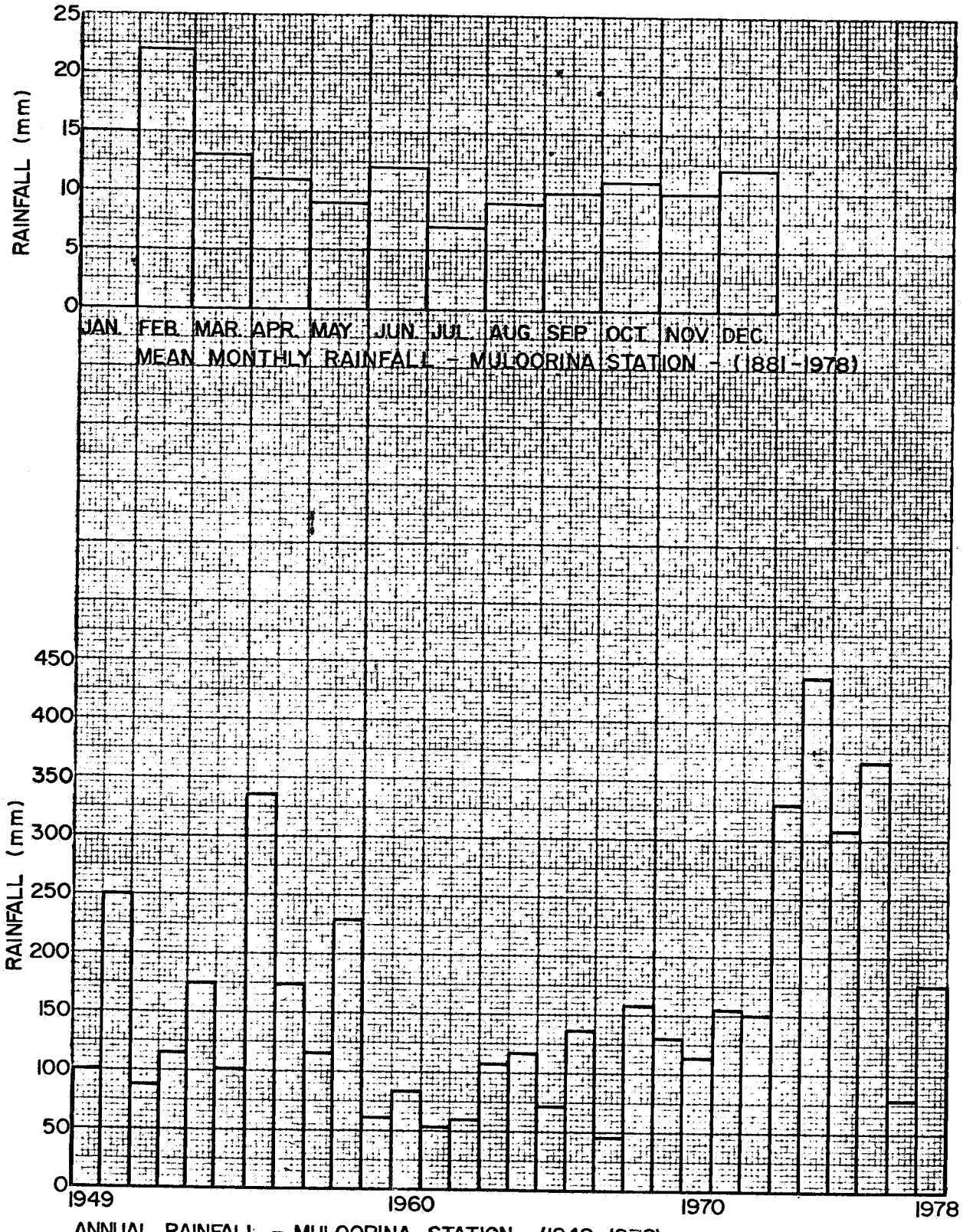


FIG. 2a

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE
COMPILED J. SAFTA	KOPPERAMANNA, GASON, PANDIE PANDIE 1:250 000 WATER WELL SURVEY RAINFALL STATISTICS MULOORINA STATION	DATE AUG. 1, 1979
DRN E.C. / CKD		PLAN NUMBER S14214

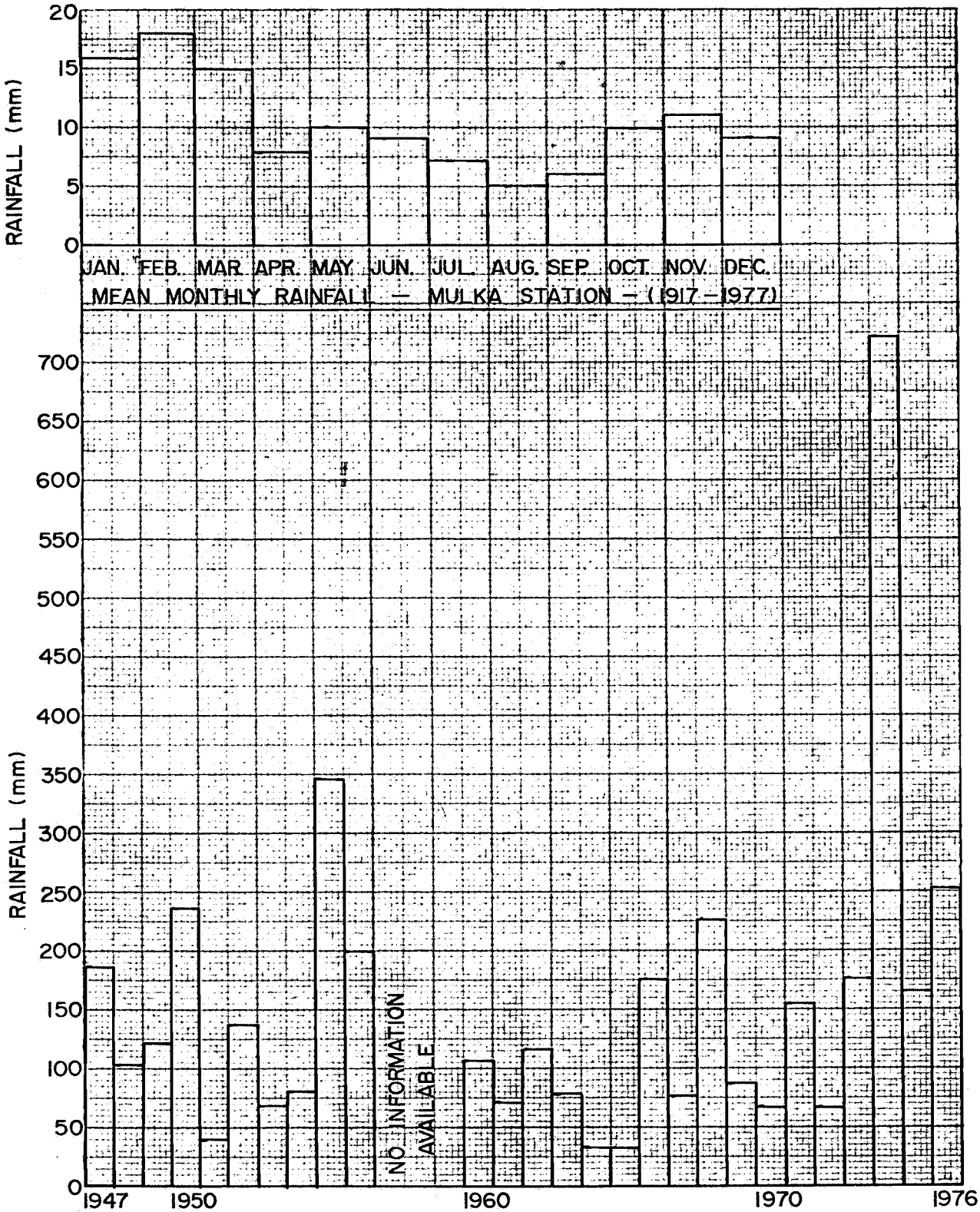
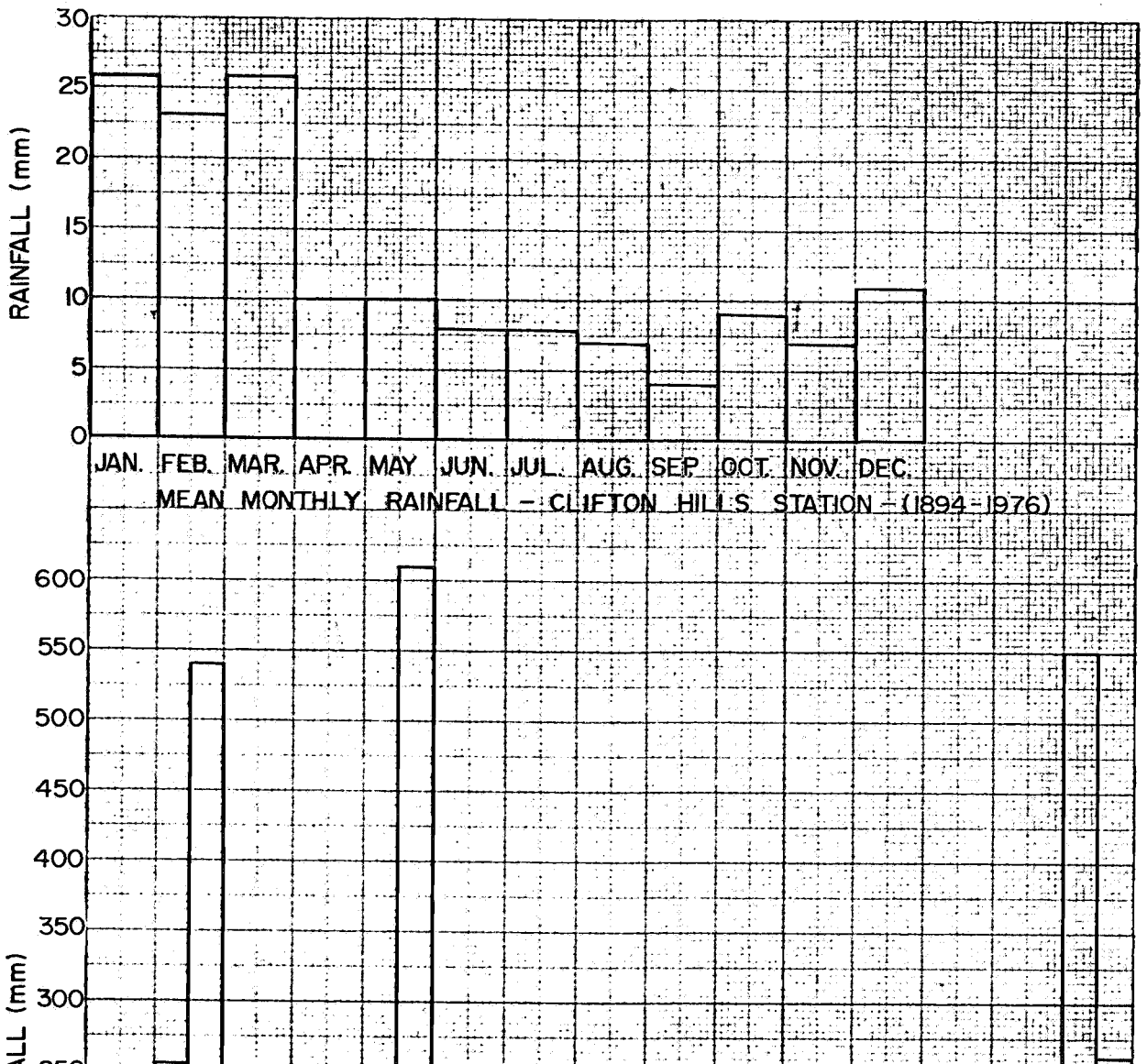


FIG. 2b

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE
COMPILED J. SAFTA	KOPPERAMANNA, GASON, PANDIE PANDIE 1:250 000 WATER WELL SURVEY RAINFALL STATISTICS	DATE AUG. 2, 1979
DRN E.C. / CKD	MULKA STATION	PLAN NUMBER S14215

1528

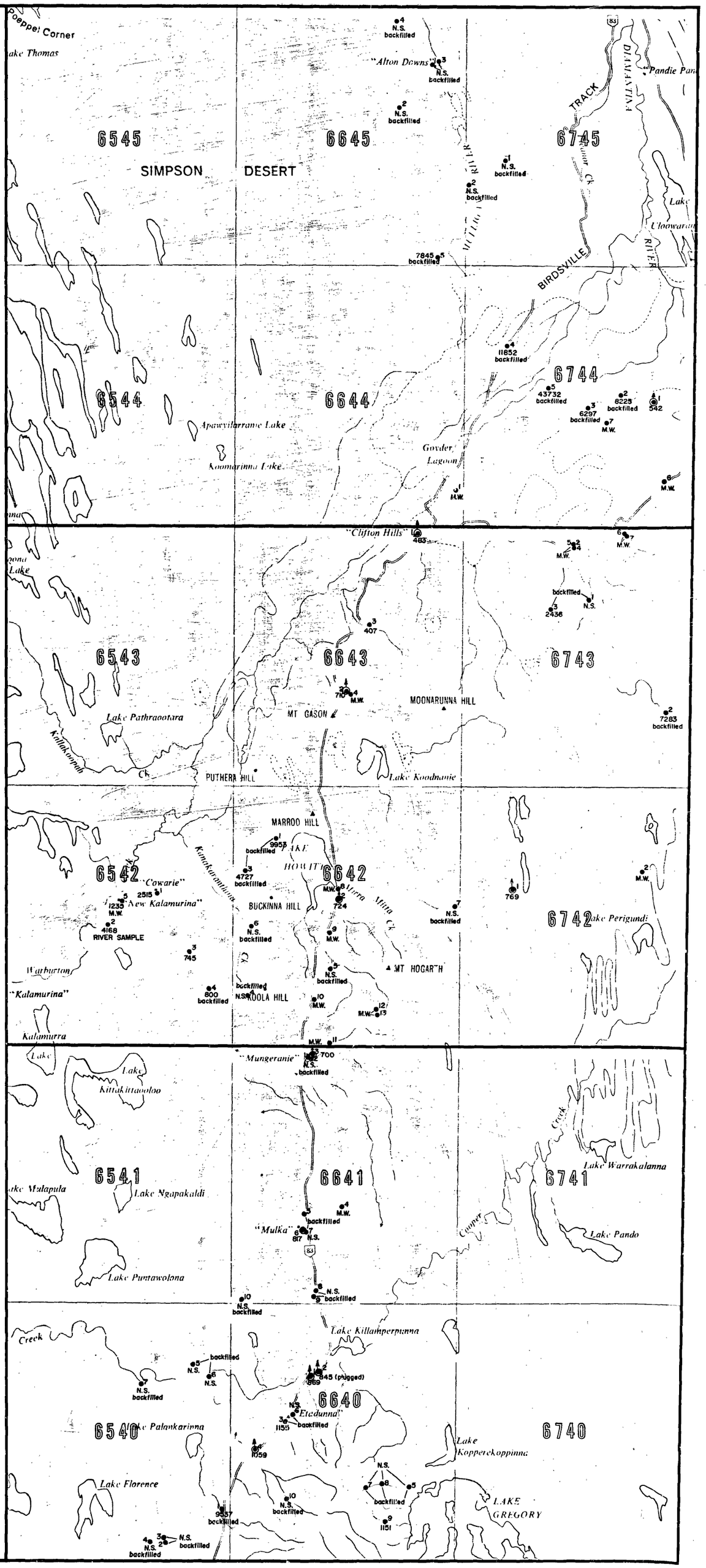


ANNUAL RAINFALL – CLIFTON HILLS STATION – (1946-1975)

FIG. 2c

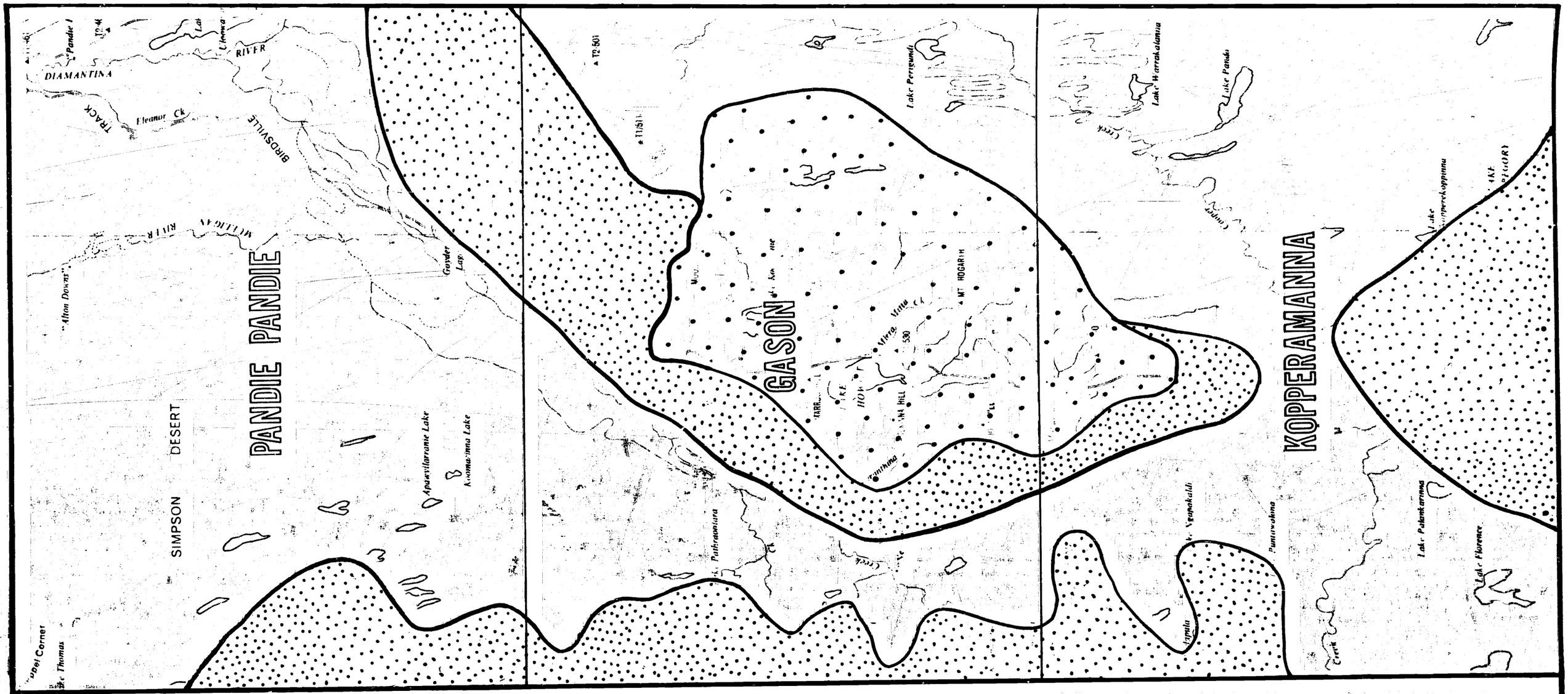
	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE
COMPILED J. SAFTA	KOPPERAMANNA, GASON, PANDIE PANDIE 1:250 000 WATER WELL SURVEY RAINFALL STATISTICS	DATE AUG. 2, 1979
DRN E.C. / CKD EPK	CLIFTON HILLS STATION	PLAN NUMBER S14216

1528



		DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA
COMPILED J. SAFTA		KOPPERAMANNA, GASON, PANDIE PANDIE 1:250 000 WATER WELL SURVEY
DRN E.C.	CHD	WELL LOCATIONS AND SALINITIES
		SCALE 1:500 000
		DATE AUGUST 7, 1979
		PLAN NUMBER 79-607

FIG. 3



LEGEND

CAINZOIC:
Sand sheets and sand dunes . .

Sand, silt and clay silcreted in places, and lake deposits . . .

MESOZOIC:
Winton formation–
feldspathic sandstone . . . . .

SCALE 1:1,000,000

KILOMETRES 20 0 20 40 60 80 100 KILOMETRES

FIG. 4

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE 1:1,000,000
COMPILED J. SAFTA	KOPPERAMANNA, GASON, PANDIE PANDIE	DATE AUGUST 21, 1979
DRN E.C. CKD	1:250,000 WATER WELL SURVEY	PLAN NUMBER
	GENERALIZED GEOLOGY	79-608

1538