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SIROTEM SURVEY FOR FRESHWATER LENSES, PENONG, SOUTH AUSTRALIA

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NUNONG SHEET

17.	Traverse Locations, 1:100 000	S22132
	Apparent Resistivity Pseudo-sections	
18.	Area 1, Line 1	S22133
19.	Area 2, Line 1	S22134
20.	TEM Inversions, Early and Standard Times	S22135

PENONG SHEET

21.	Traverse Locations, 1:100 000	S22136
	Apparent Resistivity Pseudo-sections	
22.	Racecourse	S22137
23.	Windmill Flat, N-S Traverse	S22138
24.	Windmill Flat, E-W Traverse	S22139
25.	Windmill Flat, East Lens	S22140
26.	Area 1, Line 1	S22141
27.	Area 2, Line 1	S22142
28.	TEM Inversions, Early Times	S22143
29.	TEM Inversions, Standard Times	S22144

CUNDILLIPY SHEET

30.	Traverse Locations, 1:100 000	S22145
	Apparent Resistivity Pseudo-sections	
31.	Area 1, Line 1	S22146
32.	Area 1, Line 2	S22147
33.	Area 2, Line 1	S22148
34.	Area 3, Line 1	S22149
35.	Area 4, Line 1	S22150
36.	Area 5, Line 1	S22151
37.	Area 6, Line 1	S22152
38.	Area 6, Line 2	S22153
39.	Area 7, Line 1	S22154
40.	Area 9, Line 1	S22155
41.	Area 16, Line 1	S22156
42.	TEM Inversions, Early Times	S22157
43.	TEM Inversions, Standard Times	S22158

BOOKABIE SHEET

44.	Traverse Locations, 1:100 000	S22159
	Apparent Resistivity Pseudo-sections	
45.	Area 1, Line 1	S22160
46.	Area 2, Line 1	S22161
47.	Area 3, Line 1	S22162
48.	Area 3, Line 2	S22163
49.	Area 4, Line 1	S22164
50.	Area 5, Line 1	S22165
51.	Area 5, Line 2	S22166
52.	Area 6, Line 1	S22167
53.	Area 11, Line 1	S22168
54.	TEM Inversions, Early Times	S22169
55.	TEM Inversions, Standard Times	S22170

COORABIE SHEET

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Report on a SIROTEM Survey for Freshwater Lenses, Penong, South Australia

A R DODDS

There is an acute shortage in supply of potable water, for both human and stock consumption, in the area west of Ceduna. Various schemes have been suggested to alleviate this situation, one of which is to find additional low salinity groundwater lenses like those which already supply most of the area's water for human consumption and all water for stock. Local areas selected by South Australian Department of Mines and Energy hydrogeologists were tested with TEM soundings and traverses to determine the probability of such lenses being present. While the results were not fully definitive, they gave guidance to a subsequent drilling program.

INTRODUCTION

In the period preceding August, 1988, considerable pressure was brought to bear by residents of the area west of Ceduna to Coorabie for assistance in alleviating the worsening situation with regard to potable water for both humans (less than 1,500 mg/L total dissolved solids - TDS) and stock (less than 10,000 mg/L TDS). Proposals for extension of the Ceduna pipeline were favoured by the residents but rejected by Government because of cost. At present the main source of supply comprises lenses of low salinity water within the generally saline groundwater in the area. Such lenses are recharged by occasional heavy rains, which collect locally. Recharge potential is increased in areas where conditions of sparse vegetation and permeable sediments exist. The two prime water resources, at Penong and Charra Well, were found by local observation of ground conditions. It was anticipated that a combination of scientific techniques, including hydrogeological knowledge and surface observation together with geophysical surveys, would locate more of these lenses.

The initial assessment work was done by the Groundwater and Engineering Branch of the South Australian Department of Mines and Energy (SADME). This resulted in the selection of 50 locations at which some potential for the accumulation of fresh water was considered to exist. At the request of Peter Smith, Groundwater and Engineering Branch, the Geophysics Section of SADME surveyed 31 of these locations, using a Transient Electromagnetic (TEM) sounding method (SIROTEM) which was considered to combine a practicable speed of surveying with a reasonable chance of detecting the lenses, should they exist. The work was done between August 22 and September 9, 1988. Field work was done by N Dunstan, assisted by personnel from the Engineering and Water Supply Department and SADME. A R Dodds interpreted the results and wrote the report, and also supervised the project.

Follow up drilling failed to develop any significant low salinity lenses, although some minor resources were found.

GEOLOGY

The geological section comprises:

Recent unconsolidated siliceous coast dunes
(Semaphore Sand)
overlying
Pleistocene-Recent calcareous aeolianite
(Bridgewater Formation)
overlying
Tertiary fluvial unconsolidated sands (Pidinga
Formation)
overlying
Weathered Proterozoic basement.

Low salinity groundwater (TDS <10 000 mg/L) occurs in the coastal dunes and in the Bridgewater Formation, sometimes extending into the Tertiary Sands. This limits the depth of interest to 30 metres at most. The overall groundwater salinity level is in the range 1 000 to 40 000 mg/L TDS, and is ubiquitous (Roger Stokes & Assoc, 1987).

SURVEY DETAILS

Electrical methods are the only geophysical techniques likely to be useful for this problem, because they discriminate between waters of different salinity. The problem is essentially one-dimensional, and comprises the search for a moderately conductive layer above a very conductive one. Above this, again, is the very resistive layer of dry sand or aeolianite above the water-table.

Probably the most effective method for this problem would be Vertical Electrical Soundings (VES), which are sensitive to high resistivity layers and which provide considerable detail at shallow levels. However, the method has two disadvantages. Firstly, in this surficially dry environment the injection of current into the ground would be difficult and liable to cause noise problems. Secondly, the need here is for traverses rather than point soundings. Galvanic traverses, as opposed to VES, are both more difficult to carry out and contain less information than TEM methods, even when a multi-spacing traverse is done. For these reasons it was decided to use SIROTEM, a TEM technique well suited to such problems. Although the technique is best suited to the detection of conductors, the analysis of results for a model of a weak conductor over a strong one indicate that detection of the weak conductor should be feasible. However, strong extensive conductors will always dominate TEM results, sometimes to the total concealment of more resistive layers.

The TEM method comprises energising the ground by passing a pulse of current through a large loop of wire, laid out on the ground. At the termination of the pulse the collapsing electromagnetic field causes eddy currents to flow in the ground, the amplitude and duration of which are a function of the ground resistivity. The secondary field from these eddy currents is detected in the receiver loop and the induced voltage is measured at a sequence of times after the cut-off. These voltages are very small, so stacking of 256 to 4096 readings is done to improve the signal-to-noise ratio. These voltages are a measure of the apparent resistivity of the ground. Since the eddy currents flow more deeply in the ground at later times, the delay time can be related qualitatively to depth for interpretation purposes.

The single loop configuration was used for this survey, both current transmission and response voltage measurement being done on a single loop of wire. The loop size was 100 metres square for most areas, reducing to 50 metres where greater detail was required.

PRESENTATION OF RESULTS

The results are presented as apparent resistivity pseudo-sections for each survey line, at a scale of 1:100 000 (100 metres loop) or 1:50 000 (50 metres loop). The horizontal axis is the station location and the vertical axis the delay time, with the apparent resistivity for that station and delay time plotted at the intersection. The apparent resistivity values are then contoured, using a logarithmic contour interval.

While there is a relationship between the vertical axis (delay time) and depth, it is not possible to provide a direct conversion from one to the other. Only a full inversion of the data (see below) can do that. However, the pseudo-section comprises a qualitative mapping of resistivity variations in the vertical plane.

TEM INVERSIONS

After the results were plotted in pseudo-section form, readings were selected for inversion. These inversions, carried out at SADME using the AMIRA GRENDL software, assume a one-dimensional model, ie there is no variation in response other than in the z-direction (vertical). Thus, so far as possible, the readings to be modelled were selected at the centre of a sequence of laterally unchanging data. In some cases, readings were selected in less ideal surroundings if the location was considered sufficiently critical. 81 readings were inverted (Table 2).

The inversion process is automated, but requires the selection of a viable initial model, the number of layers selected being particularly critical. If too many or too few layers are selected the resultant model is bound to be in error. The initial thickness and resistivity of each layer is less critical. Data points can be weighted and model parameters fixed, if so desired.

The inversion results include statistics to help evaluate the reliability of the final model. These include a standard error (SE), which is an indicator of the general quality of the fit, confidence intervals for each final model parameter, which define how well the given parameter is resolved, and a predicted residual error (APRE) which indicates whether the number of layers selected is appropriate. The standard error at each data point is also provided to indicate whether the errors are randomly scattered (noise) or systematic (bad fit). A study of these and other data give a good idea as to whether further adjustment is required and what to do to improve the inversion.

The most obvious cause of problems is inhomogeneity in the horizontal direction, which may move the curve away from a layering shape or may just falsify the inversion. Instrument noise or electrical noise may interfere, but these would usually put random noise onto the curve, which can be identified in interpretation. It might reasonably be expected that, while too few layers might cause an insuperable problem to the inversion, too many layers should be resolvable by the software setting the thickness to zero, or making the resistivity the same as an adjoining layer. This is not achieved, the layer being usually left approximately at its initial values, so a better fit can be achieved by removing unnecessary layers.

The inversion results are presented as sections, giving the resistivity and thickness of each layer, and the confidence to be placed in each of these parameters. Also included are the SE and APRE figures. Separate inversion results are given for the SIROTEM early time and standard time windows. It is now possible to combine the two windows into one inversion, but the results were not reprocessed because of the time, both personal and computer, needed to do so.

DISCUSSION OF RESULTS

Charra Sheet (1:50 000)

Seven areas were tested on this map sheet (Figure 3). Area 1 is located in the sandhills on the coast, while the other six areas are in the general vicinity of two producing wells, Horse Well and Sheep Well, at Charra. Since the coastal area has markedly different geology from inland, Area 1 will be discussed separately from Areas 2 to 8.

Area 1

This area was chosen to test the area around a producing well in a coastal dune environment. Such an environment has the characteristics for the accumulation of freshwater lenses, with typically little vegetation to take up the rainfall combined with highly permeable sands to allow precipitation to penetrate the ground and accumulate below the high evaporation levels. Bielamah Well taps such a lens at a depth of 0.5 metres, the water having a resistivity Rw of 3.7 ohm-metres. There is no knowledge of the lateral or depth extent of this resource.

One TEM sounding was done over the well (Line 2), and two traverses were done to the west of it, Line 1 oriented north-south (Figure 5) and Line 3 oriented east-west (Figure 6). The approximate location of the lines is shown in Figure 4. All readings detected very low resistivities at depth, not surprisingly with sea-water so close. A resistive layer detected above this presumably correlates with the freshwater saturated sediments, since no response can be expected from the half-metre of dry sand above the water-table. Lateral variations in apparent resistivity seen in Figures 5 & 6 probably indicate changes in the resistivity and thickness of the upper, low salinity layer.

Inversions were done on data from the well and from four other stations, the results being shown in section form in Figure 7. All of these inversions gave excellent fits to the original data which, while not guaranteeing correctness, is at least encouraging. The two intermediate layers, both highly conductive, are very well defined, while the resistivity of the top layer and the depth to, and resistivity of, the bottom layer are less well known. The two conductive layers can be expected to be highly saline, with TDS levels of the order of, and perhaps exceeding, that of sea-water. The top layer is primarily freshwater, assuming a reasonable degree of lateral consistency in formation porosity, or could conceivably change to an impermeable strata. The layer of dry sand above the water-table is too thin to contribute much to the TEM response.

The relationship between the formation resistivity and the constitution of a layer (water content, salinity, porosity, etc) is too complex and imprecise to allow any absolute interpretation of these parameters. However, using the known parameters of the well salinity (1800 mg/L TDS) and water resistivity (3.7 ohm-metres) and assuming that the fluids in the most conductive layer have the salinity of sea-water (32 000 mg/L TDS and 0.2 ohm-metres), we can interpolate the other layers and relationships, as shown:

	Rf (ohm-m)	Rw (ohm-m)	TDS (mg/L)	
layer 1	8.1	3.7	1,800	bore-water
layer 2	1.0	0.46	14,000	
layer 3	0.43	0.2	32,000	sea-water
layer 4	1.0	0.46	14,000	

These conversions, using simple formulae, require a Formation Factor of 2.2 and a porosity for the sands of 60%. This is double what would be expected, so it is possible that the value of 3.7 ohm-metres used for the fluid resistivity of layer 1 is higher than the average for this layer, and that the water in this lens is generally of rather higher salinity than 1800 mg/L. It is also possible that layers 2 and 4 represent the sea-water at around 30 000 mg/L, and that layer 2 is a more saline tongue of seaward moving groundwater, as follows:

	Rf (ohm-m)	Rw (ohm-m)	TDS (mg/L)	
layer 1	8.1	1.8	3,600	bore-water
layer 2	1.0	0.22	30,000	sea-water
layer 3	0.43	0.1	65,000	
layer 4	1.0	0.22	30,000	sea-water

This assumption puts the porosity at 42% which, while closer to probability, is still high for unconsolidated sands. However, all results point towards a considerable resource of potable water up to 16 metres thick and with a proven length of 200 metres to the west. The northerly extent is far less well defined, although there is a resistive layer extending several hundred metres north from the well.

Areas 2 to 8

These areas are centred around the Charra Plain which hosts Horse and Sheep Wells, two producers of stock quality water (Figure 3). Each area was sectioned with one SIROTEM line except Area 8, where two parallel lines were surveyed.

The line for Area 2 extends south from Horse Well, and was surveyed with 50 metre square loops, in contrast to all other areas where 100 metre square loops were used. The results (Figure 8) show that the well is located at the junction between relatively resistive ground to the north and consistently conductive ground to the south. This contact has the appearance of a change in sediment characteristics rather than a shallowing of basement. It might be fault-controlled. While such an increase in apparent resistivity could indicate lower salinity groundwater, the impression here is that this is not the case, and that it might indicate tighter sediments and a lower water content. To the south of Horse Well changes are relatively minor and gradual, with groundwater conditions expected to be similarly minor and gradual. The higher resistivities at 3800N could indicate shallowing basement (Perhaps 27 metres, according to inversion).

Area 3, to the east of Area 2, shows mostly the higher resistivities indicative of lower porosities, with some increase in conductivity at the north end (Figure 9).

Area 4, further east again, has predominantly intermediate to low resistivities with two bands of higher values at 5700N and at the south end of the line (Figure 10). The latter may be caused by basement ridges cutting across the aquifers.

The line across area 5 extends from Horse Well to the north and overlaps the line across Area 2 (Figure 11). The mixture of high and low resistivities is similar to that seen further south and east, with probable similar causes. A test well at 6175N encountered basement at 25 metres depth, so it appears that here shallow basement is the cause of a lack of aquifer level resistivities.

Area 6 extends across Sheep Well and on to the west. The well is typified by low resistivities which persist as far as what appears to be shallowing basement at 6000W (Figure 12). This conclusion is confirmed by a test well at 6300W, which encountered basement at 30 metres. A second test well at 5800W, within the conductive zone, encountered only saline groundwater, with no freshwater lens. There is no indication in the geophysical results of the termination of the lens between Sheep Well and this point.

The two lines over Area 8, to the south of Areas 2 and 3, show high conductivities throughout (Figures 13 and 14). There is a 10-20 metre resistive layer overlying the saline aquifer, and this could be above the water-table (dry), low porosity material or an aquifer saturated with low salinity groundwater. The depth to low porosity basement rocks is of the order of 30 to 50 metres, with the wide range caused by equivalence problems in the resolution of the conductive layer.

Nunong Sheet (1:50 000)

The apparent resistivity pseudo-sections (Figures 18 & 19) for the two areas here (Figure 17) show very little lateral variation, indicating that the sub-surface geology is constant. Thus the results of the inversions can be taken as representing the whole line. The Early Time inversion has better error figures than the Standard Time inversion, and will therefore be used where the two are in conflict. However, apart from the deeper layers on Line 2, the results compare very well.

Both inversions (Figure 20) fit a three-layer case, with the appearance of a dry, resistive upper layer over a porous, saline saturated middle layer over resistive basement. The resistivity of the upper layer is not very well defined, but is in the range of 20-40 ohm-metres. The depth to the water-table is 17 metres in area 1 and 27-33 metres in area 2, assuming that the 1.1 ohm-metre layer represents the water-table. The formation resistivity for the groundwater saturated layer is 1.1 ohm-metres in both areas, which is slightly higher than the mean figure for the area but still indicates very saline water, approximating sea-water. Basement is at a depth of 61 metres in area 1 and 52 metres in area 2, both figures being well defined. The resistivity of basement is less well defined at 18 and 5.9 ohm-metres respectively. In any case these figures are low for fresh basement, and probably mean weathered rock. The standard time inversion results, which penetrate to greater depth and should define these figures more precisely, generally agree with the figures. The fourth layer in the standard time inversion for area 2, 0.1 ohm-metres at 125 metres depth, may indicate a basement conductor, perhaps a very conductive shear-zone, but could also be a superficial effect caused by maghemite in the surface soil, for instance.

If these water-table depths are larger than expected, it may be worth testing for a fresh-water lens at the base of layer 1. Such a feature would comprise an intermediate layer with a resistivity rather lower than that of layer 1, and could well be hidden by the stronger response of the underlying conductor.

Penong Sheet (1:50 000)

There are four areas for discussion here: Windmill Flat, Racecourse and Areas 1 and 2 (Figure 21). The location of Racecourse is shown on the Cundillipy sheet (Figure 30).

The Racecourse line was surveyed with 100 metre loops. The results (Figure 22) show a gradual shallowing of contours from south to north, the inversions of which indicate that both basement and the saline layer get closer to surface. The depth to the saline layer decreases by about 5 metres from 23 metres to 18 metres. It should be noted that the intermediate layer (layer 2) is not well defined by the inversion process for either resistivity or thickness, and is really not necessary to the model fit at all.

However, if it is taken out the depth to the saline layer will only vary slightly.

The thickness of the saline layer is in doubt because of equivalence problems, so that the depth to basement is similarly affected. However, the resistivity figures used, 0.8 to 1.3 ohm-metres, are of the right order unless there are major changes between this and Penong Townsite, for instance, so it is expected that the basement depths of 36 metres in the south to 27 metres in the north are approximately right. Basement resistivities are relatively high.

Windmill Flat (Penong Eastern Lens) covers the area providing the main water supply for Penong township. The fresh-water lens has become more saline in recent years due to overuse of the resource and a lack of recharge. Three lines were surveyed, two of 50 metre loops at right-angles to each other and one of 100 metre loops over the eastern part of lens.

The results (Figures 23 to 25) show only gentle changes at early times, and little variation in the later time responses. The inverted data for the saline environment shows a small range of 1.1 to 1.6 ohm-metres. This indicates consistency in both the rock porosity and the groundwater salinity. The depth to the water-table is likewise relatively invariant, with a range from 16 to 19 metres. The basement resistivity is usually high at 42 to 107 ohm-metres.

Attempts to include a moderately resistive (10-20 ohm-metre) layer, representing fresher water above the saline, were moderately successful (Figure 28). However, the quality of fit between the data and models without these layers were about as good as those with them. Thus, the moderately resistive layer (layer 2) is generally not essential to the model and the best that can be said is that, according to the SIROTEM data, a freshwater lens could be present but is by no means confirmed.

Areas 1 and 2 are very similar. The results (Figures 26 and 27) show little variation along the line. The saline layer has a consistent resistivity of 0.9 ohm-metres, indicating something akin to sea-water, at a depth of 13-16 metres. Twin inversions were done for each data-set, with and without the intermediate (fresh-water lens) layer. The inversions indicate, as before, that these could be present, but are not necessary to ensure a good fit. Basement is at a depth of 39-59 metres. All fits are good.

Cundillippy Sheet (1:50 000)

Nine sites were surveyed on this map sheet (Figure 30). Most showed a conductive saline layer consistently in the range 0.8 to 1.5 ohm-metres with a thickness of 27 to 63 metres. The depth to the saline layer varied from 8 to 28 metres, with most being less than 20 metres. The Basement resistivity is very variable from less than 10 to over 100 ohm-metres, but is usually poorly defined. In many cases, also, the conductive layer has a well defined conductivity-thickness product, but the two parameters are hard to separate. This affects the accuracy of depth to basement.

Area 1 (Figures 31 & 32), located 2 km south of Highview homestead, shows fairly flat results except that the depth to the saline layer increases at the south end from 8 to 16 metres, and to the west to 11 metres. The resistivity of this layer is also highest at the south end, but only by 40%. The depth to basement is consistent for the north-south line at about 50 metres, but decreases to the west to 36 metres. Overall the results are rather uninteresting.

Area 2 (Figure 33), located southeast of Highview homestead and 1 km east of area 1, also has a very flat response with only a gentle oscillation that inverts into a minor change in the depth to, and resistivity of, the saline layer. All figures are similar to area 1.

The line for area 3, located 1 km north of the highway and Highview homestead, passes a broken windmill. The apparent resistivity contours are less concentrated on this plot (Figure 34), which inverts to generally lower resistivities in both of the upper layers. The maximum resistivity occurs at the windmill, and this translates into an increase in the depth to the saline water and a slight increase in its resistivity. The poor correlation between the standing water depth of 6 metres and the inversion depth of 22 metres to saline has two possible explanations. Either the near surface sediments are of low permeability and confine the groundwater, or the top 16 metres of water are of low enough salinity to yield this resistivity.

Area 4 is located 3 km east of Highview and was covered with a survey line running north perpendicular to the road for 1 km. The plot (Figure 35) shows very flat results. The depth to the 0.9 ohm-metre saline layer is 10 to 15 metres, and the basement depth 73 to 86 metres. The top layer is more resistive than in area 2.

The results for area 5 (Figure 36) are constant laterally in the near surface, and are marked by higher resistivities for both of the top two layers. A marked resistivity high in the centre of the line extends from early to late times, and inversion translates this into a basement feature (higher basement resistivity), rather than that due to low salinity groundwater.

Area 6 is located near Manandilla Rockhole; the two lines surveyed intersecting at right-angles at 4800N on Line 1, and 5000E on Line 2. The results (Figures 37 & 38) show subtle variations with a minor resistivity low in the centre of Line 1. Inversions all show a saline layer at 0.8-0.9 ohm-metres at a depth of 9-10 metres. On line 2 the basement is at a depth of 62-68 metres, while at the north end of line 1, and by inference at the south end too, basement is much shallower at 28 metres. This indicates that the gentle gully evident in the surface features here is an expression of a much more pronounced basement feature.

The single line for area 7 (Figure 39), located at Inguree Well, has much more variation in response. The inversions were difficult, however, and only the one at the south end, 4100N, showed unique results of 16 metres depth to a 33 metre-thick saline layer at 1.2 ohm-metres, putting basement at 49 metres. The other two inversions both had equivalence problems, so that while the depths to the saline layer of 25 and 30 metres are well defined, the saline layer thickness and resistivity have to be estimated. This layer is certainly less dominant at the northern end of this traverse.

Area 9, north of Highview homestead, yielded very flat results (Figure 40). Inversions indicate 11-14 metres to the saline water at 0.8-0.9 ohm-metres, and a depth to basement of 54-61 metres.

Area 16, on Evanbrae homestead, is also uninteresting (Figure 41). A 0.9 ohm-metre saline layer is at a depth of 11-14 metres, while depth to basement is rather more variable, ranging from 69 metres in the south to 39 metres at the north end of the line. The top layer is moderately resistive, and get more resistive to the north.

Bookabie Sheet (1:50 000)

Seven sites were surveyed in this area (Figure 44). The results show great variation in the saline aquifer depth, thickness and resistivity, but a low resistivity layer is always present.

Results for area 1 (Figure 45) show little lateral variation in the early channels, but more at later times. Inversions indicate that this results from a decrease in the conductivity-thickness product of the saline layer, which gets deeper by some 4 metres and thinner by 8 metres between 5000E and 5500E. The interpretation is complicated by equivalence in this layer, which requires some assumptions to be made on the layer conductivity. Basement is at a depth of 34-38 metres and the water-table at 15-19 metres.

In area 2 the water-table (32-35 metres) and basement (58-77 metres) are much deeper. Figure 46 shows that variations along the line are relatively minor. A moderately resistive layer simulating a fresh-water lens was inserted in the inversion model, but was not resolved. Moreover, the APRE figure being undefined suggests that the layer is redundant. It can therefore be concluded that such a layer is unnecessary here and that there is no indication in the geophysics of a freshwater lens.

Results for the two lines surveyed in area 3 (Figures 47 & 48) show much higher and more variable resistivities. The saline aquifer may be present at the west end of line 1 and the north end of line 2. Depth to basement is uncertain, but may be at about 40-50 metres on line 1. A well at 5400E on line 1 intersected water at 28 metres depth, with 1 metre of fresh water overlying saline. This agrees with the inversion which resulted in an SWD of 29-30 metres (Figure 54).

Results for area 4 (Figure 49) are similar to area 3, but with much less lateral variation. Inversions show that both the aquifer (16-19 metres) and basement (33-50 metres) get deeper from the north end of the line to the south. The aquifer resistivity, at 1.3 ohm-metres, is more moderate than further east. A well at 5800N yields water of resistivity 8.5 ohm-metres at a standing water depth (SWD) of 4 metres. This discrepancy with the geophysical data, which show a formation resistivity of 1.3 ohm-metres at 16 metres depth, may be resolved in two ways. The SWD discrepancy may result from low permeability sediments between 4 and 16 metres. However, both discrepancies are resolved by the explanation that 10 ohm-metre water would give a formation resistivity of, perhaps, 20-30 ohm-metres, which is the resistivity of the layer overlying the saline aquifer. Thus it is suggested that the water salinity, low at surface, deteriorates at 16 metres depth to something much more saline. On this basis, the groundwater lens may get more saline but thicker to the south, towards 5000N, where the upper layer resistivity is 19 ohm-metres and its thickness 19 metres.

The lines on area 5 (Figures 50 & 51) cover a 300 metre wide high resistivity feature which may be elongate (a dyke) or circular in section (a pipe). Whichever is the case, the inversion at 5100N, in the centre, is evidently affected by the finite lateral extent of this feature. The inversion at 5600N looks better, indicating a saline layer between 15 and 48 metres. The high resistivity feature, which evidently extends close to surface, may be shallow basement or an intrusive, or may be a fault zone containing low permeability material.

Area 6 is near Glen Boree homestead, and yielded very invariant responses (Figure 52). A low resistivity saline layer extends from 13 metres to 48-58 metres. Basement is not very resistive.

Area 11 is located in sand dunes, and shows some variation along the line (Figure 53). Inversions indicate a low resistivity saline layer extending from 14-26 metres to basement at 80-85 metres depth.

Coorabie Sheet (1:50 000)

Four areas were surveyed (Figure 56). The results indicate a considerable range of depths to basement (15 to 155 metres) and of saline aquifer depths and thicknesses.

Area 1 has some of the lowest apparent resistivities encountered in this survey (Figure 57), which inversions indicate as caused by a saline aquifer formation resistivity of 0.5 ohm-metres at a depth of 8-11 metres. Basement depth varies from 32 metres at the south end of the line to 49 metres at 4500N and 19 metres at the north end. Some of the inversions show equivalence problems, and have to be adjusted to a reasonable aquifer resistivity, rather than the one given by the inversion process (eg Figure 61, 4200N). The inversion at 5000N probably encounters a side-look effect (conductive material to the side of the station, rather than below it) in interpreting a 0.7 ohm-metre layer at 223 metres, but this could only be fully resolved by extending the survey line.

Area 2 is located near Rocky Rise homestead. The survey results (Figure 58) show gently varying apparent resistivities across the section. Inversions indicate that the variations are caused by an increase in the depth to the saline layer from 14 to 15 metres and possibly an increase in the formation resistivity of the saline aquifer from 0.7 to 1.0 ohm-metres. The latter effect would, however, be partly offset by an increase in thickness from 13 to 22 metres. Depth to basement at 5400N is 37 metres, and at 5000N at least 27 metres and possibly as high as 33 metres.

Area 3 is located southeast of Wookata homestead. Resistivities are rather higher here, and again vary only marginally across the profile (Figure 59). The saline layer is at 21 metres depth, and may decrease in salinity slightly from north to south. Depth to basement increases from 38 metres at 4900N to 50 metres at 4300N.

Area 6, 5 km south of Wookata homestead, yielded consistently high resistivities with little variation laterally but decreasing with depth. Inversions indicate a depth to the saline layer of 85 to 92 metres and a depth to basement of 153 to 155 metres. These basement depths are the largest encountered in this survey, as are the depths to the saline layer. There is a topographic feature here, the area being at an elevation of 100 metres, compared to 20 metres for other areas. Thus the elevation of the water table is much the same as elsewhere.

WATER QUALITY AND BASEMENT ATTRIBUTES

Virtually all of the resistivity sections in this survey can be inverted using a three-layer model, with a resistive top layer, a conductive intermediate layer and a resistive bottom layer. Other layers are occasionally needed.

The top layer has an average thickness of 20 metres, with a range of 6-85 metres (Table 2). The formation resistivity is usually poorly defined because of the tendency of the TEM method to look through resistive layers unless they are thick (more than 20 metres, and a function of resistivity). It is interpreted as dry, and its resistivity is virtually independent of geology, unless perhaps clays are present. It may also include Bridgewater formation saturated with high resistivity groundwater, which appears, in most cases, to be inseparable from the dry layer by this method. It generally extends from the surface to the water-table, but may extend deeper if the sediments at the water-table are of low permeability and have a high resistivity for this reason.

The conductive layer is virtually ubiquitous with a resistivity which varies little, being in the range 0.5 to 2.0 ohm-metres, with a few outliers up to 5 ohm-metres. The average value overall is 1.3 ohm-metres, while the averages for the map sheets have extremes of 1.0 ohm-metres for Coorabie and Cundillipy to 1.6 ohm-metres for Charra. The thickness of this layer is not always well defined, usually because of difficulty in separating the two elements of the conductivity-thickness product, which is usually well-defined. It comprises essentially Pidinga Formation saturated with saline groundwater.

Finally, the bottom layer, often barely seen and usually only poorly defined as regards both depth and formation resistivity, is at an average depth of 56 metres with a range of 20-200 metres. Doubts regarding the depth to this layer primarily relate to the same difficulties as determining the thickness of the conductive layer above. The resistivity of the bottom layer, given an average value of 45 ohm-metres and a range of 3-450 ohm-metres, is frequently only poorly defined, which is not surprising considering that there may be a gradual interface and that it is often near the depth penetration limit of the instrument in this survey mode. It is interpreted as being fresh or weathered basement, the essential element being that it forms a lower confining bound to the saline groundwater. Weathered basement rock is generally more conductive than fresh rock, and is therefore interpreted as present when the interpreted bottom layer has a resistivity in the intermediate range.

Other layers are sometimes present, as in the case of Area 1 at Charra, which is within a few hundred metres of the coast and appears to have intertonguing of saline groundwater and sea-water.

The groundwater that we can detect, therefore, is saline and ubiquitous, and is very consistent so far as formation resistivity is concerned. The range of 0.5 to 2.0 ohm-metres translates into very saline groundwater, approximating and sometimes exceeding the salinity of sea-water. The depth to the saline layer, which may or may not be the water table, is 6-85 metres, with most values in the lower part of this range. Basement depth ranges from 15 to 200 metres.

The detectability of a layer of lower salinity groundwater overlying the very saline groundwater is the basic question addressed in this study. In the Penong area, over known low salinity lenses and over blind situations, inversions allowing for the presence of such a layer have been run in conjunction with inversions omitting such layers. In both cases the with and without inversions gave equally good fits. Moreover, when the low salinity (intermediate resistivity) layer was included its parameters of resistivity and thickness were very poorly resolved. The conclusion is, therefore, that the lenses are not directly detectable in this environment with this level of geological noise. Logically this is not surprising, since the detection of an intermediate resistivity layer (say, a sequence of 40/20/1 ohm-metres) is always difficult unless the intermediate layer is thick compared with the upper layer. Even low levels of geological noise can be critical.

The parameter of the depth to the highly saline layer is generally well resolved, and this may assist in detecting the lenses - it all depends on the depth to the water-table being known. When this is the case, an unexplained increase in the depth, which can be accurately determined by this method, may well indicate a low salinity lens sitting on top of the saline groundwater. Of course, it may also indicate low permeability sediments acting as confining beds to a confined aquifer, and if this is a possibility, only drilling will resolve the question.

CONCLUSIONS

The use of the TEM technique in the search for low salinity lenses in this environment has its limitations. While there is some response from the lenses, the inversion program used was unable to discriminate between this response and a thickening of the upper resistive layer.

Although the technique was not directly effective, it can still be used if there are indirect ways of detecting the likelihood of a lens being present. These are either a change in the general resistivity pattern, as occurs to the north of Sheep Well at Charra, where the saline aquifer vanishes and the sediments appear to lose porosity; or an increase in the depth to the saline layer, which can be accurately mapped by the technique, in an area where the standing water depth is established.

It is possible that improvements in the technique could make it more effective. The most important of these would be the acquisition of denser data at earlier delay times. This would give the inversion process more data in the critical, shallow zone. However, although this would improve the chances of discriminating between the layers, there is still no guarantee that the level of geologic noise would not hide the subtle differences between the model responses.

SUMMARY

This report describes TEM surveys done in the search for low salinity (< 10 000 mg/L) lenses within saline groundwater in the area west of Ceduna.

The selection of areas with the potential for such features was done by South Australian Department of Mines and Energy (SADME) hydrogeologists. Thirty-four such areas between Charra in the east and Coorabie in the west were geophysically tested with one or two traverses per area (Table 1).

The surveys detected a very conductive layer, with an average resistivity of 1.3 ohm-metres, at virtually every site, with a resistive near-surface layer and a slightly to very resistive layer beneath. Correlation with drilling information shows that the high conductivity is caused by very saline groundwater. The upper resistive layer is generally above the water-table, and therefore unsaturated, but could also include water with low salinity levels, at least in theory. The lower resistor, at the bottom of the sounding profile, is less permeable material, probably 3unweathered basement. Other layers were occasionally present.

Test surveys were done over the Windmill Flat (Eastern) lens, at Penong, which supplies much of the town's water. Inversions of these data showed that an intermediate resistivity layer over the low resistivity saline layer was acceptable but not necessary to obtaining good inversion statistics. The lens at this location is, therefore, not uniquely detectable by the TEM technique.

Tests with intermediate resistivity layers were tried at other locations, and generally detracted from the quality of the inversion fit, at the same time as yielding a very poorly defined intermediate layer.

While such results are disappointing, they do not totally negate the usefulness of the survey. The results will still map variations in the general resistivity profile which may have an effect on the presence or otherwise of groundwater. The method accurately maps the depth to the top of the saline layer, and since this must be pushed down by a superimposed lens, knowledge of standing water depths would provide the key as to whether a lower salinity layer might be present.

REFERENCE

Roger Stokes & Associates, 1987, Far West Coast Alternative Water Supplies.
Roger Stokes & Associates, Consulting Engineers Report for Department of Agriculture, South Australia.

TABLE 1
SIROTEM LINES

AREA>	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**11**	**16**
MAP SHEET 1:50 000											
CHARRA	1 5000N	1 3600N	1 5000N	1 5000N	1 4975N	1 5000N	1 6400W				
	- 5600N	- 5300N	- 5900N	- 6300N	- 6775N	- 6500N		- 5000W			
	2 5000N							2 5000E			
	- 5200N							- 6100E			
NUNONG	1 3650N	1 5000N									
	- 4950N	- 5400N									
PENONG	1 4500N	1 4600N									
	- 5000N	- 5000N									
CUNDILLIPY											
	1 4000N	1 4100N	1 5000E	1 4100N	1 5000E	1 4700N	1 4100N	1 4100N			
	- 5000N	- 5000N	- 6000E	- 5000N	- 5600E	- 5000N	- 5000N	- 5000N			
	2 4700E					2 4500E					
	- 5000E					- 5000E					
BOOKABIE	1 5000E	1 4300E	1 5000E	1 5000N	1 4800E	1 5000E				1 4100N	1 4600N
	- 5500E	- 5000E	- 5900E	- 6000N	- 5600E	- 5500E				- 5000N	- 5000N
			2 5000N		2 4700N						
			- 5400N		- 5000N						
COORABIE	1 4200N	1 5000N	1 4100N			1 5000N					
	- 5000N	- 5400N	- 5100N			- 5400N					

TABLE 2
SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
CHARRA	1	1	5000N	Good	Good	16	0.9	60	47	
	1	1	5205N	v Good	v Good	9	1.1	>55	?	
	1	1	5500N	v Good	Good	15	1	>59	?	
	1	2	Bielemah	v Good	v Good	15	0.7	>49	?	
			Well							
	1	3	5200N	Good	Good	15	1.1	61?	?	
	2	1	3800N	Fair	Fair	14	1.1	27	4.4	
	2	1	4150N	Good	Good	16	2	71	12	
	2	1	4500N	Fair	Fair	17	1.5	74	4.3	
Probably weathered basement										
	2	1	4650N	Good	Good	18	1.7	81	11	
Bore 318										
	2	1	5000N	Good	Good	25	2.2	85	65	Etinversion is better even at depth

TABLE 2
SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (m) (ohm-metres)	COMMENTS
CHARRA (cont'd)	2	1	5300N	Poor	Poor	?	5?	?	10?	Probably little water in the sediments
	4	1	5300N	Poor	Fair	26	1.1	41	181	
	5	1	5875N	Poor	Poor	20?	1.7	>20	?	May be fresh water between 12 and 20 metres
	5	1	6175N	Fair	Fair	26	3	42	11	Fresh water or lower formation porosity
	6	1	5000N	Bad	Poor	17	1.4	43	18	Not a good fit
	6	1	5300N	Good	Good	22	1.7	61	79	
	6	1	5800N	Fair	Fair	27	1.6	66	90	
	6	1	6300N	Poor	Good	35	?	41?	224	
	8	1	5000W	Poor	Poor					
			5200W	Poor	Good	10	1.2	47	7.7	

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
CHARRA (cont'd)	8	1	6400W	Poor	Poor					
				Fair	Good	21	0.9	54	20	
NUNONG	1	1	4150N							
			3650N	Good	v Good	17	1.1	61	17	
	2	1	5100N							
			5250N	Good	Fair	33	1.1	52	6.5	
PENONG	1	1	4500N	Good	Good	16	0.9	57	7.4	insert of fresh-water layer down-grades the definition
	1	1	4900N	Fair	Fair+	14	0.9	56	10	insert of fresh-water layer down-grades the definition
	1	1	5000N	Poor	Poor	6	1.4	69	5.1	Thicknesses badly defined shape of curve is wrong

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
PENONG	2	1	4600N							
(cont'd)			4800N	Fair	Fair	13	0.9	40	7.5	insert of fresh-water layer down-grades the definition
			5000N							
Windmill Flat		1	5000N	Good	Poor	14	1.5	56	9	possible lens at 9-14m depth
		1	5300N	Good	Fair	19	1.4	l62	13	possible intra-basement conductor
		2	5000E	Good	Poor	16	1.6	57	42	possible lens at 11-16m depth
		2	5300E	Fair	Poor	17	1.3	45?	13	possible lens at 12-17m depth
		3	5025E	Fair	Poor	18	1.5	53	107	possible lens at 13-18m depth
		3	5325E	Poor	Poor	17	1.1	41	118	possible lens at 12-17m depth

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
Racecourse	1	5000N	Fair	Poor	23	0.9	36	60	high APRE	indicates layer 2 (freshwater) is redundant
		1	5400N	Fair	Poor	18	0.8	27	43	
CUNDILLIPY										
	1	1	4000N	Fair	Good	16	1.4	53	28	
	1	1	4600N	Fair	Fair	8	1.2	36	4.8	
	1	1	5000N	Fair	Fair	8	1	48	8.4	
	1	2	4700E	Fair	Poor	11	1	36	16	
	2	1	4500E	Good	Good	15	1.5	52	16	
	2	1	4800E	Fair	Good	13	1.2	45	10	
	2	1	5000E	Fair	Poor	17	1.1	40	5.4	
	3	1	5000E	Excellent	V Good	18	0.8	62	6.7	
	3	1	5600E	Excellent	V Good	22	0.9	68	8	
	3	1	6000E	Good	Good	17	0.8	70	6	

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
CUNDILLIPY										
(cont'd)	4	1	4100N	Fair	Fair	12	0.9	51	3	
	4	1	4600N	Good	Fair	10	0.9	73	4	
	4	1	5000N	Fair	Fair	15	0.9	75	42	
	5	1	5300E	Excellent	V Good	26	1.6	50	5	
	5	1	5600E	Good	Fair	23	1.8	86	18	possibly fresh water 8-23m
	6	1	5000N	Fair	Fair	9	0.8	28	4.3	
	6	2	4500N							
			4700N	Fair	Good	9	0.8	65	42	depths fairly good - average used
	7	1	4100N	Fair	Good	16	1.2	49	61	ST ignored - poor definition
	7	1	4600N	Poor		25	?	39	175	Equivalence in layer 2 - estimate used in basement depth

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
CUNDILLIPY										
(cont'd)	7	1	5000N	Poor	Fair	30	?	40	193	ST ignored - poor definition. Equivalence in layer 2
	9	1	4100N	Bad	Bad	14	0.7	54	176	v poor fit - wrong shape
	9	1	4700N							
			5000N	Good	Good	14	0.8	62	90	Good correlation
	16	1	4600N	Good	V Good	14	0.9	69	9	Excellent inversion
	16	1	5000N	Good	Good	11	0.9	39	4.6	ST poor - layers wrong or lateral variation
BOOKABIE	1	1	5000E	Fair	Good	15	0.5	38	18	
	1	1	5500E	Fair	Fair	19	?	31	7	layer 2 equivalence, assumed res = 0.5 for basement depth

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
BOOKABIE										
(cont'd)	2	1	4900E							
			5000E	Good	Good	36	1.5	77	14	good match - ET for shallow and ST for deep
	2	1	4300E	Fair	Poor	37	1.1	58	11	Basement resistivity only certainty
	3	1	5000E	Poor	Fair	35	?	~37	450	Layer 2 equivalence
	3	1	5400E	Fair	Good	29	2.6	51	213	
	3	1	5800E							
			5900E	Fair	Fair	81?	?	?	26	poor fit
	4	1	5000N	Fair	Good	19	1.3	50	84	lateral variations may affect ST, but basically OK
	4	1	5900N							
			6000N	Fair	Good	16	1.3	33	25	?lateral variations/

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
BOOKABIE										
(cont'd)	5	1	5000E							
			5100E	Excellent	Excellent	65	4.4	~200	?	Strong lateral variation
	5	1	5600E	Good	Good	15	0.9	48	14	good definition
	6	1	5000E	Fair	Good	13	0.7	58	24	
	6	1	5500E	Poor	Poor	14	1	48	7.6	
	11	1	5000E	Fair	Good	14	1	80	63	lateral variations may invalidate inversion
	11	1	5300E	Bad	Fair	26	0.8	85	76	flat laterally
COORABIE	1	1	4500N	Good	Good	8	0.5	49	28	
	1	1	4900N							
			5000N	Poor	Poor	7	?	49	28	layer 2 equivalence
	2	1	5000N	Fair	Good	14	?	27	10	layer 2 equivalence

TABLE 2

SUMMARY AND COMMENTS ON TEM INVERSIONS

	AREA	LINE	STN	QUALITY OF FIT	PARAMETER DEFINITION	CONDUCTOR DEPTH (m)	CONDUCTOR RESISTIVITY (ohm-metres)	BASEMENT DEPTH (m)	BASEMENT RESISTIVITY (ohm-metres)	COMMENTS
COORABIE										
(cont'd)	2	1	5400N	V Good	V Good	15	1	37	21	fully defined
	3	1	4300N							
			4500N	Good	Good	21	1.4	50	18	
	3	1	4900N							
			5000N	Good	Good	21	1.1	38	23	
	6	1	5000N							
			5200N							
			5400N	Good	Good	85	0.5	154	7	v good fit
						all round				

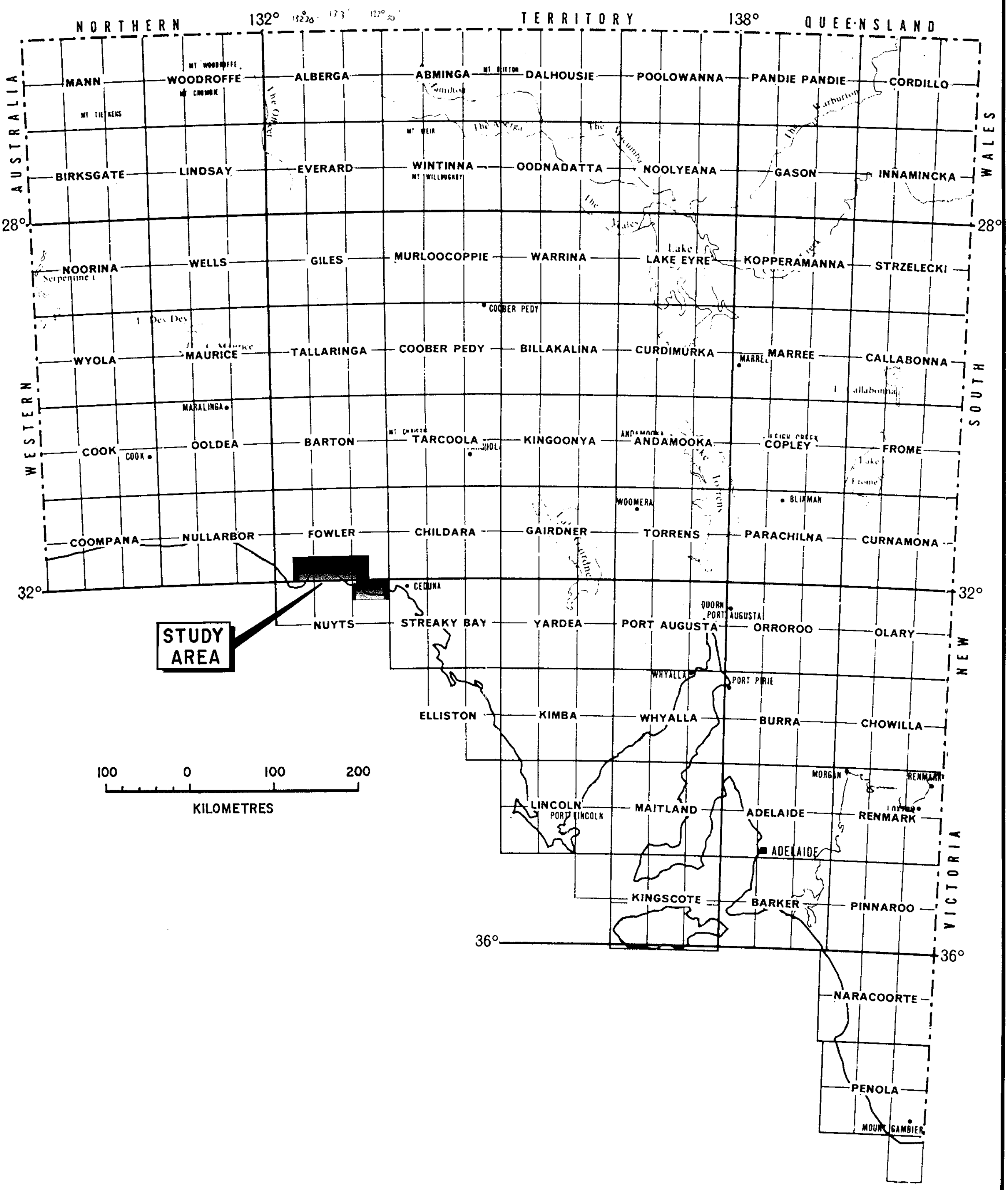


Figure 1

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: As shown
COMPILED: S.D.	PENONG GROUNDWATER STUDY	DATE: April '91
DRN: M.B. CKD:	LOCATION MAP	PLAN NUMBER S22119
13-11-91		

5287

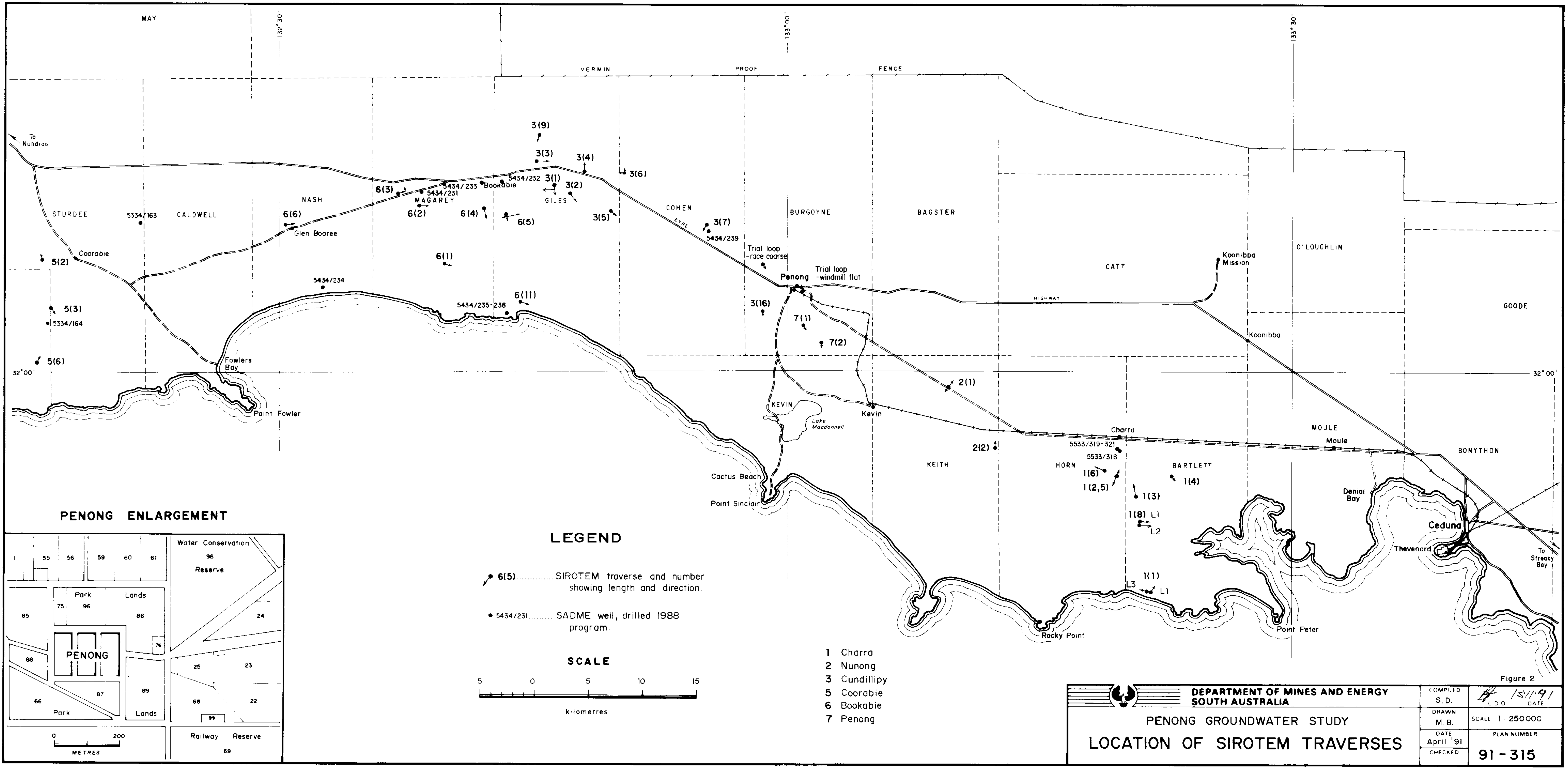


Figure 2

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY

LOCATION OF SIROTEM TRAVERSES

COMPILED S. D.	CDO 15.11.91 DATE
DRAWN M. B.	SCALE 1 : 250000
DATE April '91	PLAN NUMBER
CHECKED	91 - 315

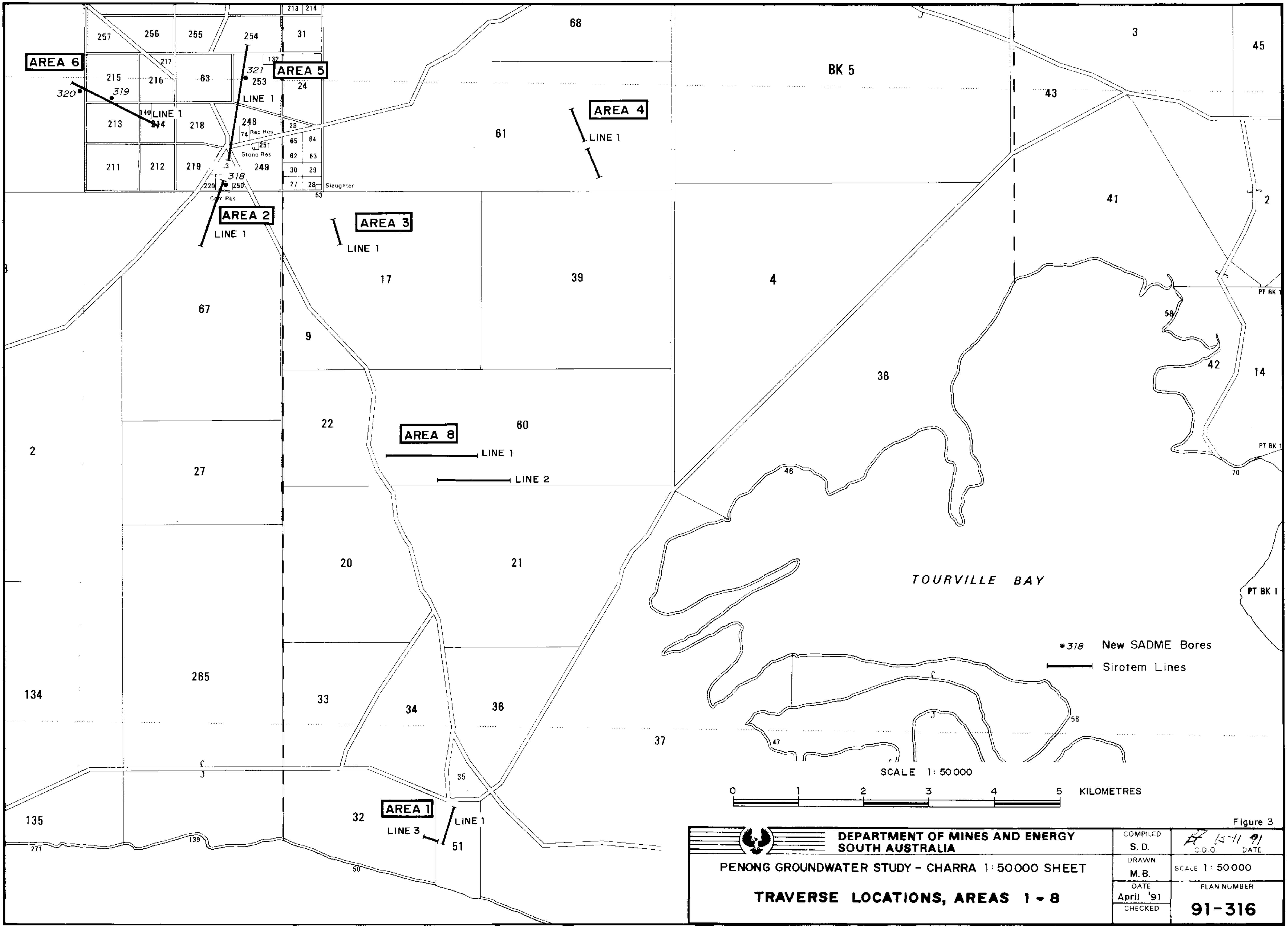


Figure 3

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

TRAVERSE LOCATIONS, AREAS 1 - 8

COMPILED S. D.	15-11-91 C.D.O. DATE
DRAWN M. B.	SCALE 1 : 50 000
DATE April '91	PLAN NUMBER
CHECKED	91-316

5287

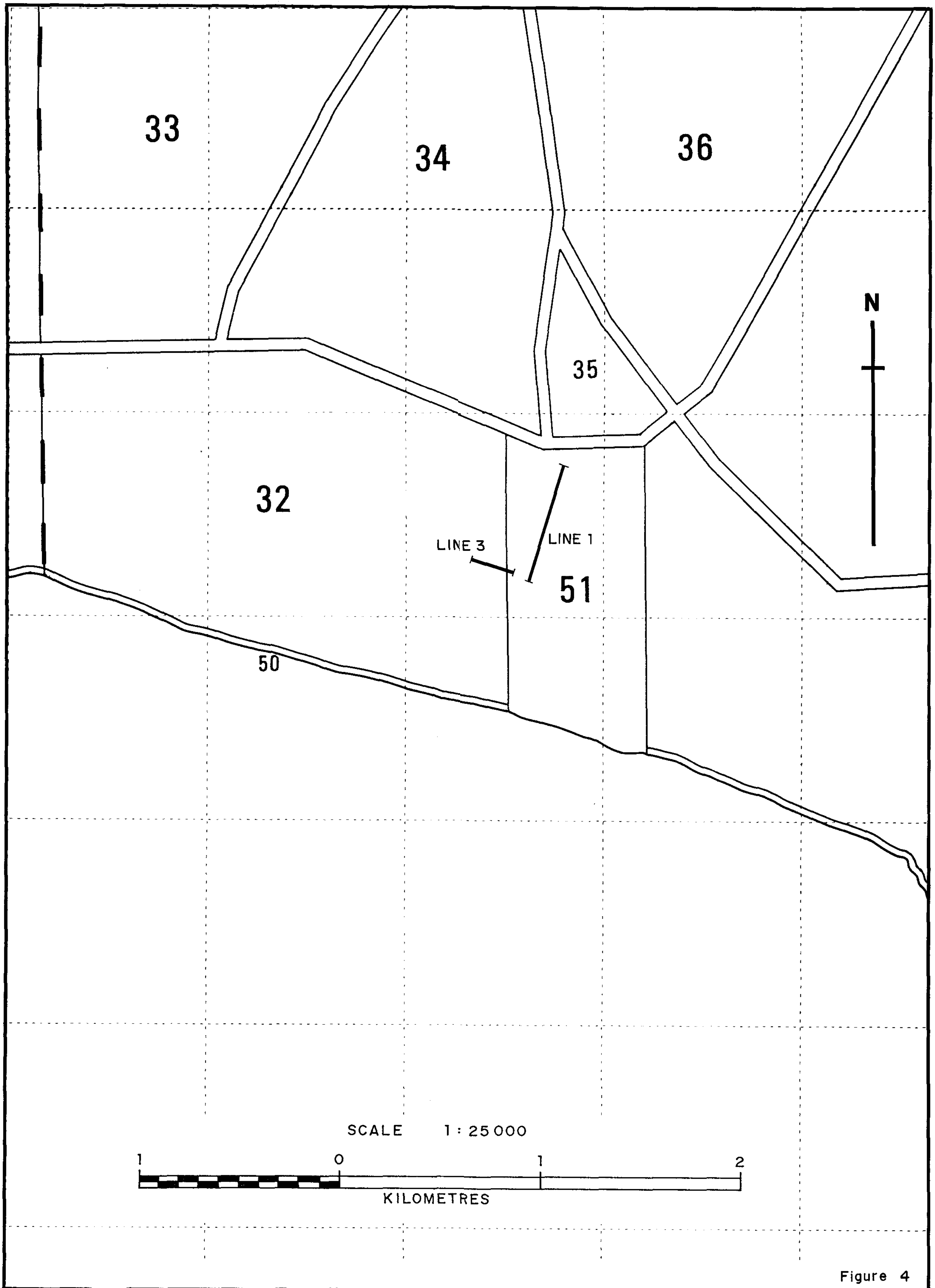


Figure 4

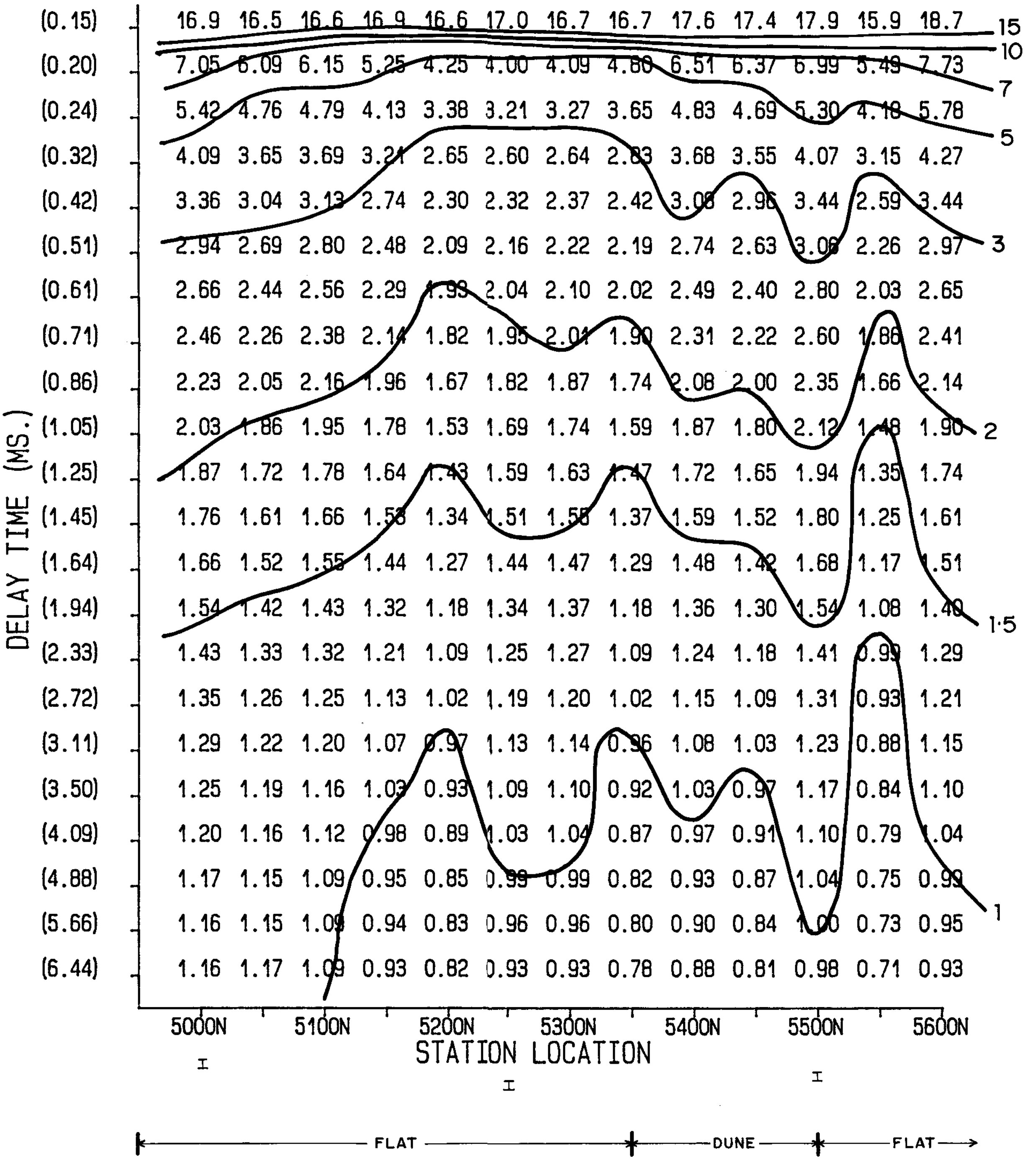
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

EXPANSION OF TRAVERSE LOCATIONS - AREA 1

COMPILED S.D.
13/11/91
C.D.O. DATE
DRAWN M. B.
SCALE 1 : 25000
DATE April '91
PLAN NUMBER
CHECKED
S22120

5287



(0.15)	16.9	16.5	16.6	16.9	16.6	17.0	16.7	16.7	17.6	17.4	17.9	15.9	18.7
(0.20)	7.05	6.09	6.15	5.25	4.25	4.00	4.09	4.80	6.51	6.37	6.99	5.49	7.73
(0.24)	5.42	4.76	4.79	4.13	3.38	3.21	3.27	3.65	4.83	4.69	5.30	4.18	5.78
(0.32)	4.09	3.65	3.69	3.21	2.65	2.60	2.64	2.83	3.68	3.55	4.07	3.15	4.27
(0.42)	3.36	3.04	3.13	2.74	2.30	2.32	2.37	2.42	3.08	2.96	3.44	2.59	3.44
(0.51)	2.94	2.69	2.80	2.48	2.09	2.16	2.22	2.19	2.74	2.63	3.06	2.26	2.97
(0.61)	2.66	2.44	2.56	2.29	1.93	2.04	2.10	2.02	2.49	2.40	2.80	2.03	2.65
(0.71)	2.46	2.26	2.38	2.14	1.82	1.95	2.01	1.90	2.31	2.22	2.60	1.86	2.41
(0.86)	2.23	2.05	2.16	1.96	1.67	1.82	1.87	1.74	2.08	2.00	2.35	1.66	2.14
(1.05)	2.03	1.86	1.95	1.78	1.53	1.69	1.74	1.59	1.87	1.80	2.12	1.48	1.90
(1.25)	1.87	1.72	1.78	1.64	1.43	1.59	1.63	1.47	1.72	1.65	1.94	1.35	1.74
(1.45)	1.76	1.61	1.66	1.58	1.34	1.51	1.58	1.37	1.59	1.52	1.80	1.25	1.61
(1.64)	1.66	1.52	1.55	1.44	1.27	1.44	1.47	1.29	1.48	1.42	1.68	1.17	1.51
(1.94)	1.54	1.42	1.43	1.32	1.18	1.34	1.37	1.18	1.36	1.30	1.54	1.08	1.40
(2.33)	1.43	1.33	1.32	1.21	1.09	1.25	1.27	1.09	1.24	1.18	1.41	0.99	1.29
(2.72)	1.35	1.26	1.25	1.13	1.02	1.19	1.20	1.02	1.15	1.09	1.31	0.93	1.21
(3.11)	1.29	1.22	1.20	1.07	0.97	1.13	1.14	0.96	1.08	1.03	1.23	0.88	1.15
(3.50)	1.25	1.19	1.16	1.03	0.93	1.09	1.10	0.92	1.03	0.97	1.17	0.84	1.10
(4.09)	1.20	1.16	1.12	0.98	0.89	1.03	1.04	0.87	0.97	0.91	1.10	0.79	1.04
(4.88)	1.17	1.15	1.09	0.95	0.85	0.99	0.99	0.82	0.93	0.87	1.04	0.75	0.99
(5.66)	1.16	1.15	1.09	0.94	0.83	0.96	0.96	0.80	0.90	0.84	1.00	0.73	0.95
(6.44)	1.16	1.17	1.09	0.93	0.82	0.93	0.93	0.78	0.88	0.81	0.98	0.71	0.93

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7,) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 7)

Figure 5

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED
S. D.

13·11·91
C.D.O. DATE

DRAWN
M.B.

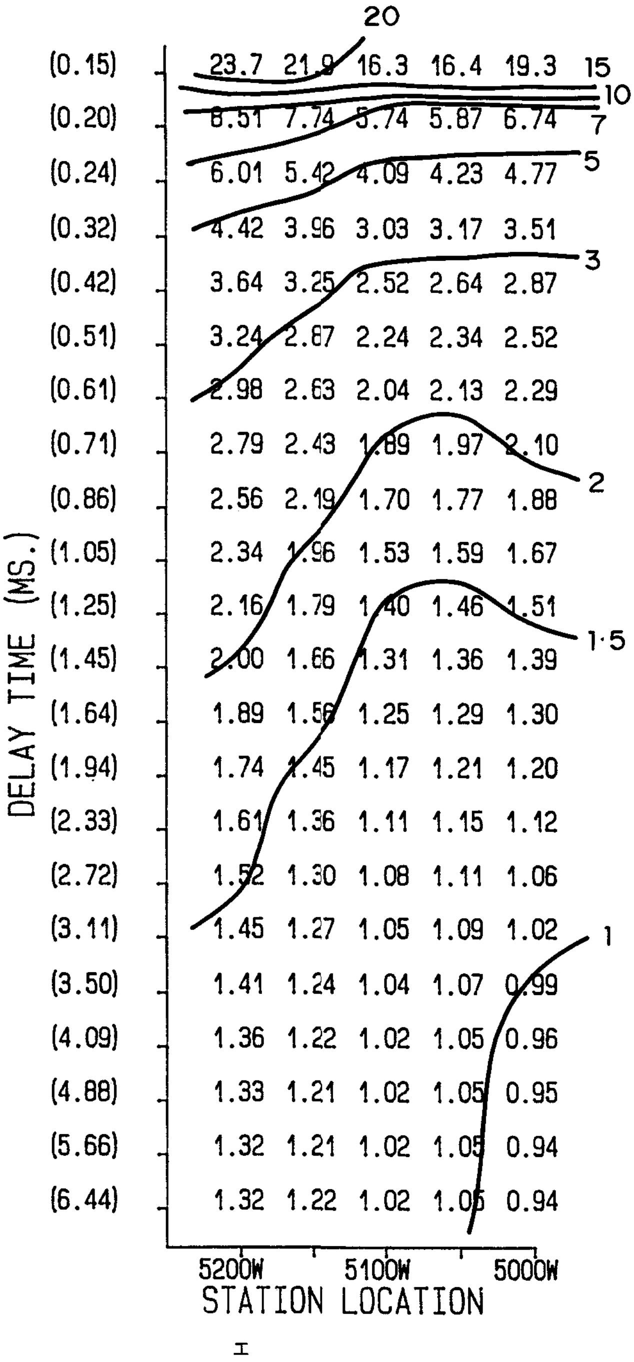
SCALE

DATE
March '91

CHECKED

PLAN NUMBER
S22121

5287



(0.15)	23.7	21.9	16.3	16.4	19.3
(0.20)	8.51	7.74	5.74	5.87	6.74
(0.24)	6.01	5.42	4.09	4.23	4.77
(0.32)	4.42	3.96	3.03	3.17	3.51
(0.42)	3.64	3.25	2.52	2.64	2.87
(0.51)	3.24	2.87	2.24	2.34	2.52
(0.61)	2.98	2.63	2.04	2.13	2.29
(0.71)	2.79	2.43	1.89	1.97	2.10
(0.86)	2.56	2.19	1.70	1.77	1.88
(1.05)	2.34	1.96	1.53	1.59	1.67
(1.25)	2.16	1.79	1.40	1.46	1.51
(1.45)	2.00	1.66	1.31	1.36	1.39
(1.64)	1.89	1.56	1.25	1.29	1.30
(1.94)	1.74	1.45	1.17	1.21	1.20
(2.33)	1.61	1.36	1.11	1.15	1.12
(2.72)	1.52	1.30	1.08	1.11	1.06
(3.11)	1.45	1.27	1.05	1.09	1.02
(3.50)	1.41	1.24	1.04	1.07	0.99
(4.09)	1.36	1.22	1.02	1.05	0.96
(4.88)	1.33	1.21	1.02	1.05	0.95
(5.66)	1.32	1.21	1.02	1.05	0.94
(6.44)	1.32	1.22	1.02	1.05	0.94

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5; 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 7)

Figure 6

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1: 50000 SHEET

AREA 1, LINE 3
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
13·11·91
C.D.O. DATE
DRAWN M. B.
SCALE
DATE March '91
CHECKED
PLAN NUMBER S22122

5287

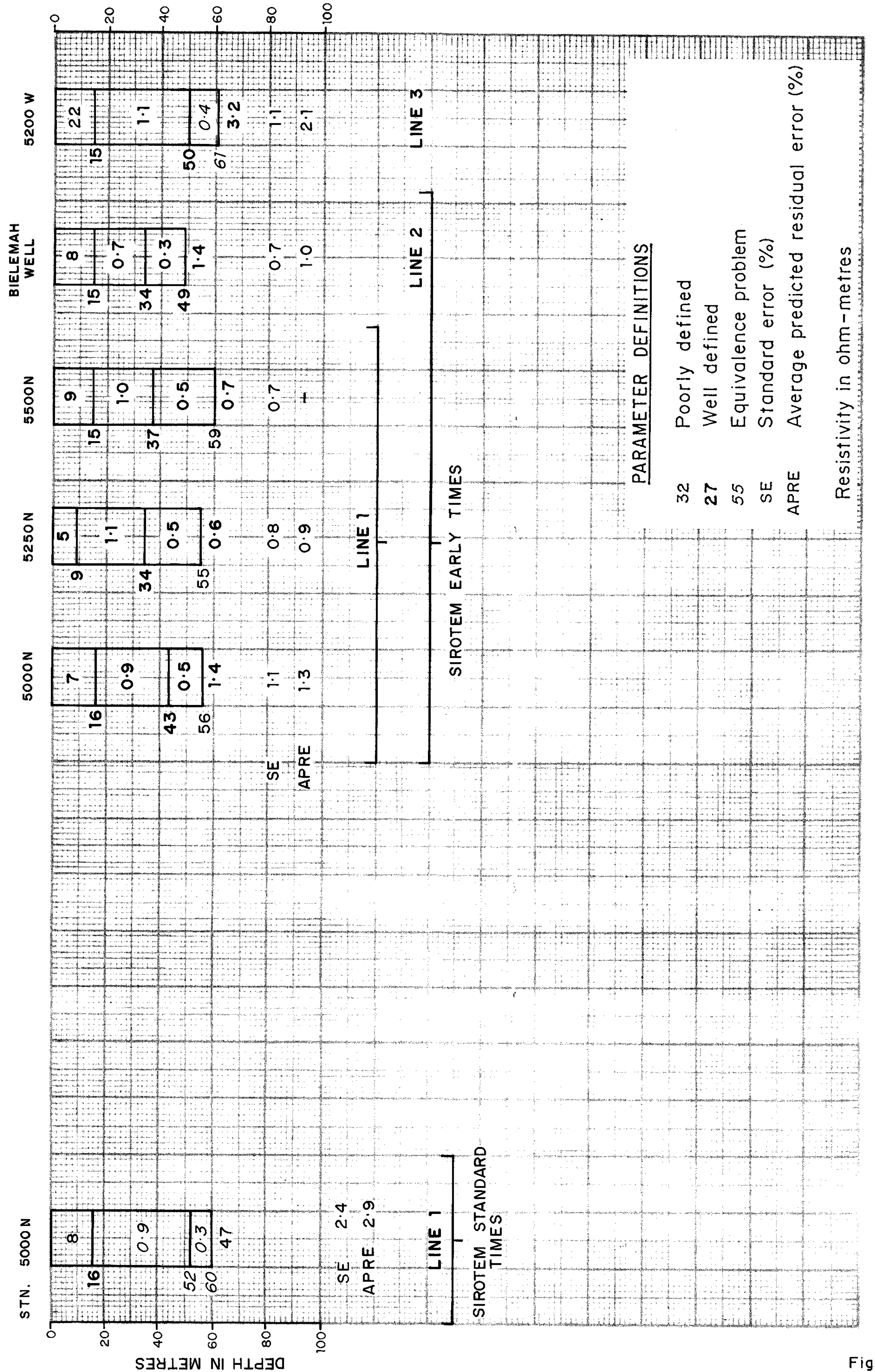


Figure 7

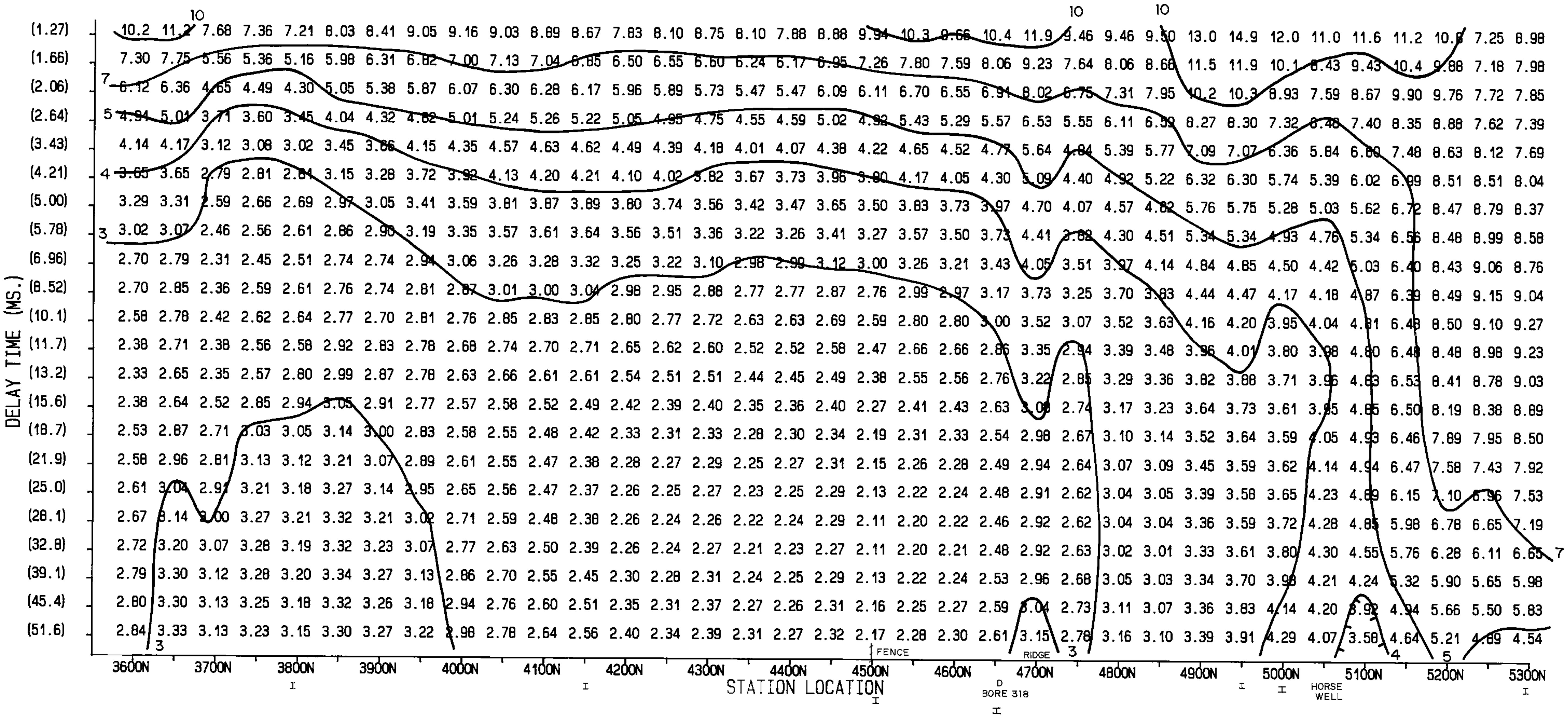
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 1 - TEM INVERSIONS
EARLY AND STANDARD TIMES

COMPILED S. D.	C.D.O. DATE '91
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S22123

5287



(1.27)	10.2	11.2	7.68	7.36	7.21	8.03	8.41	9.05	9.16	9.03	8.89	8.67	7.83	8.10	8.75	8.10	7.88	8.88	9.94	10.3	9.66	10.4	11.9	9.46	9.46	9.50	13.0	14.9	12.0	11.0	11.6	11.2	10.8	7.25	8.98
(1.66)	7.30	7.75	5.56	5.36	5.16	5.98	6.31	6.82	7.00	7.13	7.04	6.85	6.50	6.55	6.60	6.24	6.17	6.95	7.26	7.80	7.59	8.06	9.23	7.64	8.06	8.66	11.5	11.9	10.1	8.43	9.43	10.4	9.88	7.18	7.98
(2.06)	6.12	6.36	4.65	4.49	4.30	5.05	5.38	5.87	6.07	6.30	6.28	6.17	5.96	5.89	5.73	5.47	5.47	6.09	6.11	6.70	6.55	6.91	8.02	6.75	7.31	7.95	10.2	10.3	8.93	7.59	8.67	9.90	9.76	7.72	7.85
(2.64)	4.94	5.01	3.71	3.60	3.45	4.04	4.32	4.82	5.01	5.24	5.26	5.22	5.05	4.95	4.75	4.55	4.59	5.02	4.92	5.43	5.29	5.57	6.53	5.55	6.11	6.59	8.27	8.30	7.32	8.48	7.40	8.35	8.88	7.62	7.39
(3.43)	4.14	4.17	3.12	3.08	3.02	3.45	3.66	4.15	4.35	4.57	4.63	4.62	4.49	4.39	4.18	4.01	4.07	4.38	4.22	4.65	4.52	4.77	5.64	4.84	5.39	5.77	7.09	7.07	6.36	5.84	6.80	7.48	8.63	8.12	7.69
(4.21)	3.65	3.65	2.79	2.81	2.84	3.15	3.28	3.72	3.92	4.13	4.20	4.21	4.10	4.02	3.82	3.67	3.73	3.96	3.80	4.17	4.05	4.30	5.09	4.40	4.92	5.22	6.32	6.30	5.74	5.39	6.02	6.99	8.51	8.51	8.04
(5.00)	3.29	3.31	2.59	2.66	2.69	2.97	3.05	3.41	3.59	3.81	3.87	3.89	3.80	3.74	3.56	3.42	3.47	3.65	3.50	3.83	3.73	3.97	4.70	4.07	4.57	4.82	5.76	5.75	5.28	5.03	5.62	6.72	8.47	8.79	8.37
(5.78)	3.02	3.07	2.46	2.56	2.61	2.86	2.90	3.19	3.35	3.57	3.61	3.64	3.56	3.51	3.36	3.22	3.26	3.41	3.27	3.57	3.50	3.73	4.41	3.82	4.30	4.51	5.34	5.34	4.93	4.76	5.34	6.56	8.48	8.99	8.58
(6.96)	2.70	2.79	2.31	2.45	2.51	2.74	2.74	2.94	3.06	3.26	3.28	3.32	3.25	3.22	3.10	2.98	2.99	3.12	3.00	3.26	3.21	3.43	4.05	3.51	3.97	4.14	4.84	4.85	4.50	4.42	5.03	6.40	8.43	9.06	8.76
(8.52)	2.70	2.85	2.36	2.59	2.61	2.76	2.74	2.81	2.87	3.01	3.00	3.04	2.98	2.95	2.88	2.77	2.77	2.87	2.76	2.99	2.97	3.17	3.73	3.25	3.70	3.83	4.44	4.47	4.17	4.18	4.87	6.39	8.49	9.15	9.04
(10.1)	2.58	2.78	2.42	2.62	2.64	2.77	2.70	2.81	2.76	2.85	2.83	2.85	2.80	2.77	2.72	2.63	2.63	2.69	2.59	2.80	2.80	3.00	3.52	3.07	3.52	3.63	4.16	4.20	3.95	4.04	4.81	6.48	8.50	9.10	9.27
(11.7)	2.38	2.71	2.38	2.56	2.58	2.92	2.83	2.78	2.68	2.74	2.70	2.71	2.65	2.62	2.60	2.52	2.52	2.58	2.47	2.66	2.66	2.86	3.35	2.94	3.39	3.48	3.96	4.01	3.80	3.98	4.80	6.48	8.48	8.98	9.23
(13.2)	2.33	2.65	2.35	2.57	2.80	2.99	2.87	2.78	2.63	2.66	2.61	2.61	2.54	2.51	2.51	2.44	2.45	2.49	2.38	2.55	2.56	2.76	3.22	2.85	3.29	3.36	3.82	3.88	3.71	3.96	4.83	6.53	8.41	8.78	9.03
(15.6)	2.38	2.64	2.52	2.85	2.94	3.05	2.91	2.77	2.57	2.58	2.52	2.49	2.42	2.39	2.40	2.35	2.36	2.40	2.27	2.41	2.43	2.63	3.08	2.74	3.17	3.23	3.64	3.73	3.61	3.95	4.85	6.50	8.19	8.38	8.89
(18.7)	2.53	2.87	2.71	3.03	3.05	3.14	3.00	2.83	2.58	2.55	2.48	2.42	2.33	2.31	2.33	2.28	2.30	2.34	2.19	2.31	2.33	2.54	2.98	2.67	3.10	3.14	3.52	3.64	3.59	4.05	4.93	6.46	7.89	7.95	8.50
(21.9)	2.58	2.96	2.81	3.13	3.12	3.21	3.07	2.89	2.61	2.55	2.47	2.38	2.28	2.27	2.29	2.25	2.27	2.31	2.15	2.26	2.28	2.49	2.94	2.64	3.07	3.09	3.45	3.59	3.62	4.14	4.94	6.47	7.58	7.43	7.92
(25.0)	2.61	3.04	2.91	3.21	3.18	3.27	3.14	2.95	2.65	2.56	2.47	2.37	2.26	2.25	2.27	2.23	2.25	2.29	2.13	2.22	2.24	2.48	2.91	2.62	3.04	3.05	3.39	3.58	3.65	4.23	4.89	6.15	7.10	6.96	7.53
(28.1)	2.67	3.14	3.00	3.27	3.21	3.32	3.21	3.02	2.71	2.59	2.48	2.38	2.26	2.24	2.26	2.22	2.24	2.29	2.11	2.20	2.22	2.46	2.92	2.62	3.04	3.04	3.36	3.59	3.72	4.28	4.85	5.98	6.78	6.65	7.19
(32.8)	2.72	3.20	3.07	3.28	3.19	3.32	3.23	3.07	2.77	2.63	2.50	2.39	2.26	2.24	2.27	2.21	2.23	2.27	2.11	2.20	2.21	2.48	2.92	2.63	3.02	3.01	3.33	3.61	3.80	4.30	4.55	5.76	6.28	6.11	6.65
(39.1)	2.79	3.30	3.12	3.28	3.20	3.34	3.27	3.13	2.86	2.70	2.55	2.45	2.30	2.28	2.31	2.24	2.25	2.29	2.13	2.22	2.24	2.53	2.96	2.68	3.05	3.03	3.34	3.70	3.98	4.21	4.24	5.32	5.90	5.65	5.98
(45.4)	2.80	3.30	3.13	3.25	3.18	3.32	3.26	3.18	2.94	2.76	2.60	2.51	2.35	2.31	2.37	2.27	2.26	2.31	2.16	2.25	2.27	2.59	3.04	2.73	3.11	3.07	3.36	3.83	4.14	4.20	3.92	4.94	5.66	5.50	5.83
(51.6)	2.84	3.33	3.13	3.23	3.15	3.30	3.27	3.22	2.98	2.78	2.64	2.56	2.40	2.34	2.39	2.31	2.27	2.32	2.17	2.28	2.30	2.61	3.15	2.78	3.16	3.10	3.39	3.91	4.29	4.07	3.58	4.64	5.21	4.89	4.54

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 50 m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10ⁿ
I Station at which data were inverted (see FIG. 15)

Figure 8

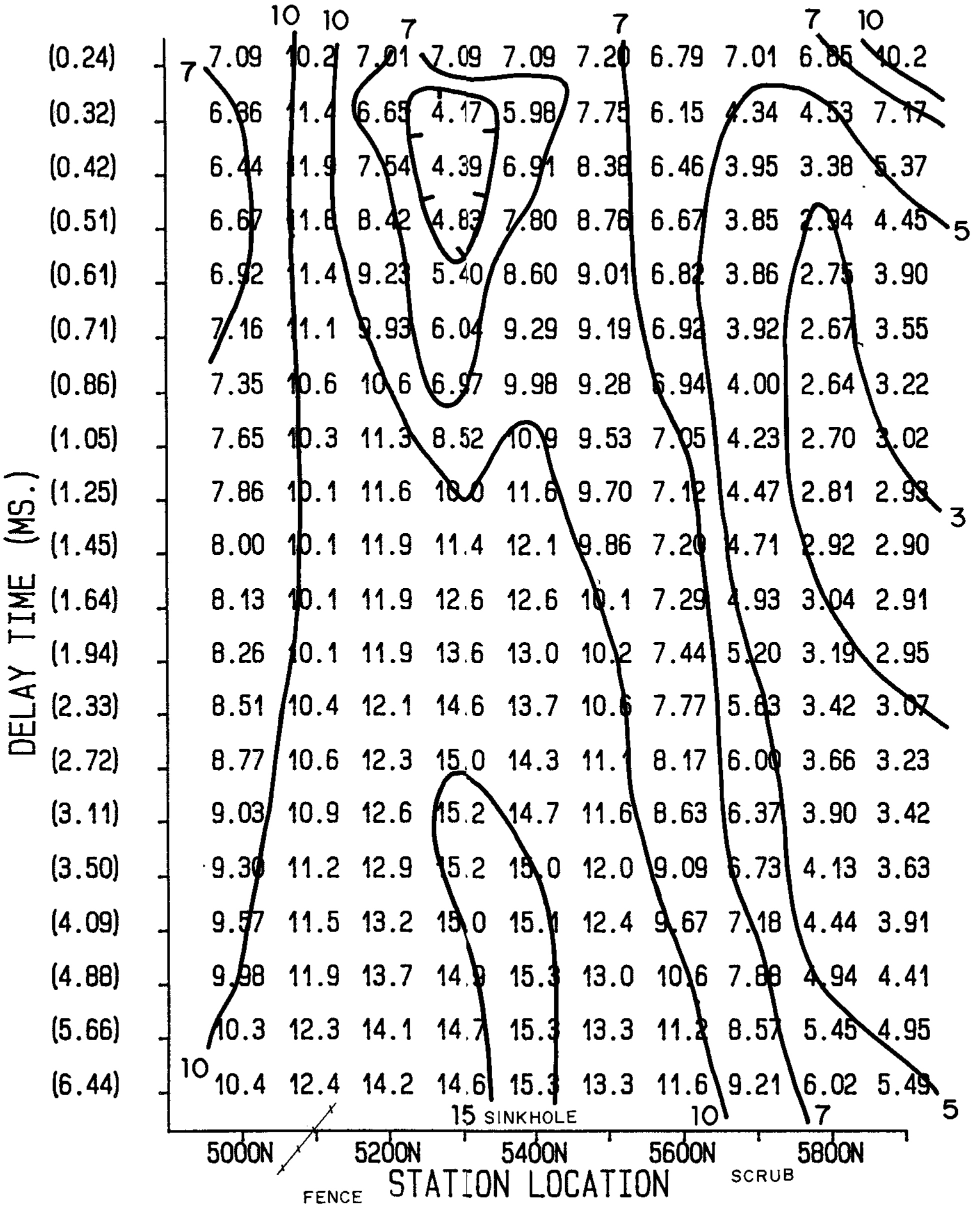
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13/11/91 C D O	DATE
DRAWN M.B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	91 - 317	



(0.24)	7.09	10.2	7.01	7.09	7.09	7.20	6.79	7.01	6.85	10.2
(0.32)	6.86	11.4	6.65	4.17	5.98	7.75	6.15	4.34	4.53	7.17
(0.42)	6.44	11.9	7.54	4.39	6.91	8.38	6.46	3.95	3.38	5.37
(0.51)	6.67	11.8	8.42	4.83	7.80	8.76	6.67	3.85	2.94	4.45
(0.61)	6.92	11.4	9.23	5.40	8.60	9.01	6.82	3.86	2.75	3.90
(0.71)	7.16	11.1	9.93	6.04	9.29	9.19	6.92	3.92	2.67	3.55
(0.86)	7.35	10.6	10.6	6.97	9.98	9.28	6.94	4.00	2.64	3.22
(1.05)	7.65	10.3	11.3	8.52	10.9	9.53	7.05	4.23	2.70	3.02
(1.25)	7.86	10.1	11.6	10.0	11.6	9.70	7.12	4.47	2.81	2.93
(1.45)	8.00	10.1	11.9	11.4	12.1	9.86	7.20	4.71	2.92	2.90
(1.64)	8.13	10.1	11.9	12.6	12.6	10.1	7.29	4.93	3.04	2.91
(1.94)	8.26	10.1	11.9	13.6	13.0	10.2	7.44	5.20	3.19	2.95
(2.33)	8.51	10.4	12.1	14.6	13.7	10.6	7.77	5.63	3.42	3.07
(2.72)	8.77	10.6	12.3	15.0	14.3	11.1	8.17	6.00	3.66	3.23
(3.11)	9.03	10.9	12.6	15.2	14.7	11.6	8.63	6.37	3.90	3.42
(3.50)	9.30	11.2	12.9	15.2	15.0	12.0	9.09	6.73	4.13	3.63
(4.09)	9.57	11.5	13.2	15.0	15.1	12.4	9.67	7.18	4.44	3.91
(4.88)	9.98	11.9	13.7	14.9	15.3	13.0	10.6	7.88	4.94	4.41
(5.66)	10.3	12.3	14.1	14.7	15.3	13.3	11.2	8.57	5.45	4.95
(6.44)	10.4	12.4	14.2	14.6	15.3	13.3	11.6	9.21	6.02	5.49

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

Figure 9

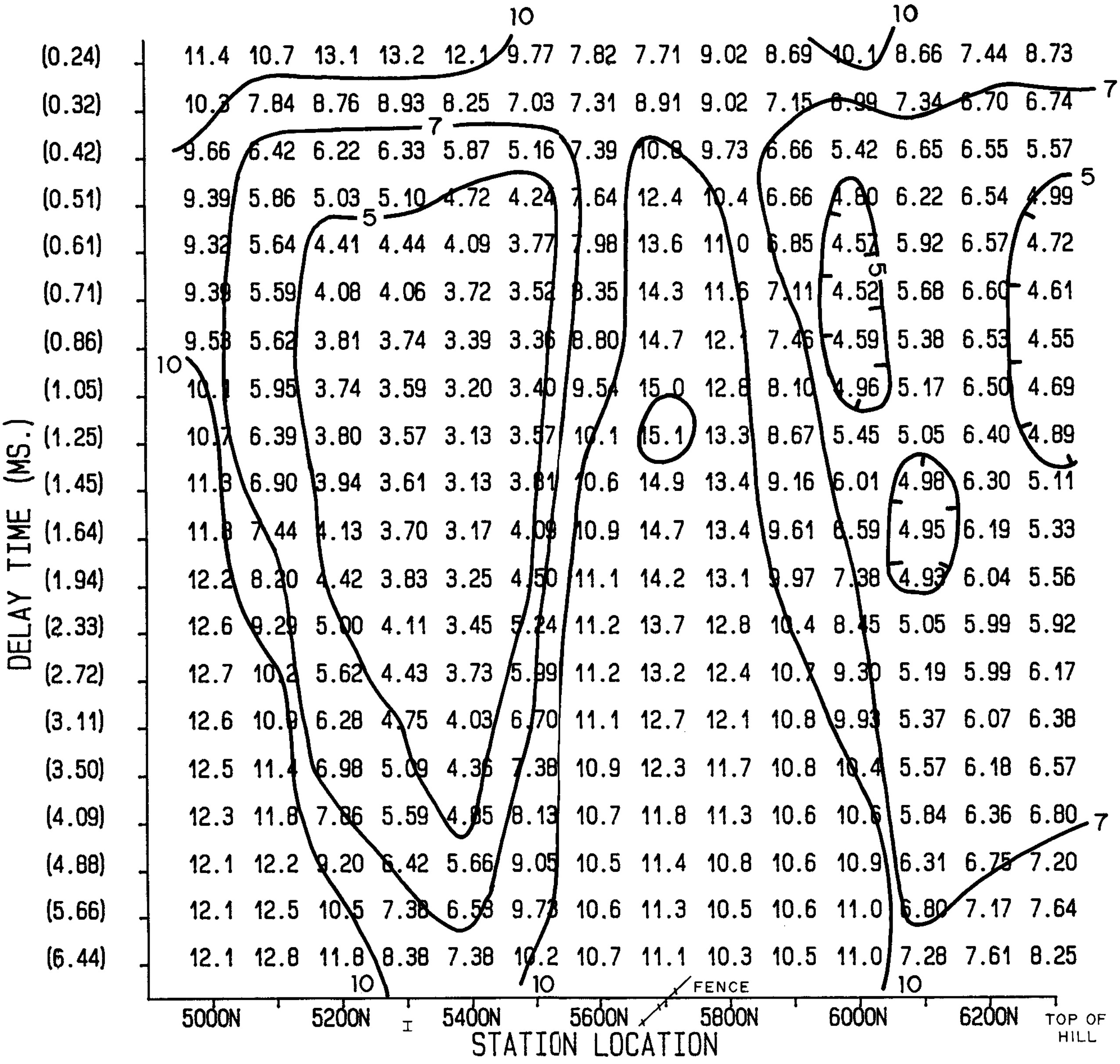
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 3, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M. B.
DATE March '91
CHECKED
B. 8/1-91 C.D.O. DATE
SCALE
PLAN NUMBER S22124

5287



(0.24)	11.4	10.7	13.1	13.2	12.1	9.77	7.82	7.71	9.02	8.69	10.1	8.66	7.44	8.73
(0.32)	10.3	7.84	8.76	8.93	8.25	7.03	7.31	8.91	9.02	7.15	6.99	7.34	6.70	6.74
(0.42)	9.66	6.42	6.22	6.33	5.87	5.16	7.39	10.8	9.73	6.66	5.42	6.65	6.55	5.57
(0.51)	9.39	5.86	5.03	5.10	4.72	4.24	7.64	12.4	10.4	6.66	4.80	6.22	6.54	4.99
(0.61)	9.32	5.64	4.41	4.44	4.09	3.77	7.98	13.6	11.0	6.85	4.57	5.92	6.57	4.72
(0.71)	9.38	5.59	4.08	4.06	3.72	3.52	8.35	14.3	11.6	7.11	4.52	5.68	6.60	4.61
(0.86)	9.58	5.62	3.81	3.74	3.39	3.36	8.80	14.7	12.1	7.46	4.59	5.38	6.53	4.55
(1.05)	10.1	5.95	3.74	3.59	3.20	3.40	9.54	15.0	12.8	8.10	4.96	5.17	6.50	4.69
(1.25)	10.7	6.39	3.80	3.57	3.13	3.57	10.1	15.1	13.3	8.67	5.45	5.05	6.40	4.89
(1.45)	11.3	6.90	3.94	3.61	3.13	3.81	10.6	14.9	13.4	9.16	6.01	4.98	6.30	5.11
(1.64)	11.8	7.44	4.13	3.70	3.17	4.09	10.9	14.7	13.4	9.61	6.59	4.95	6.19	5.33
(1.94)	12.2	8.20	4.42	3.83	3.25	4.50	11.1	14.2	13.1	9.97	7.38	4.93	6.04	5.56
(2.33)	12.6	9.29	5.00	4.11	3.45	5.24	11.2	13.7	12.8	10.4	8.45	5.05	5.99	5.92
(2.72)	12.7	10.2	5.62	4.43	3.73	5.99	11.2	13.2	12.4	10.7	9.30	5.19	5.99	6.17
(3.11)	12.6	10.9	6.28	4.75	4.03	6.70	11.1	12.7	12.1	10.8	9.93	5.37	6.07	6.38
(3.50)	12.5	11.4	6.98	5.09	4.36	7.38	10.9	12.3	11.7	10.8	10.4	5.57	6.18	6.57
(4.09)	12.3	11.8	7.86	5.59	4.85	8.13	10.7	11.8	11.3	10.6	10.6	5.84	6.36	6.80
(4.88)	12.1	12.2	9.20	6.42	5.66	9.05	10.5	11.4	10.8	10.6	10.9	6.31	6.75	7.20
(5.66)	12.1	12.5	10.5	7.38	6.58	9.73	10.6	11.3	10.5	10.6	11.0	6.80	7.17	7.64
(6.44)	12.1	12.8	11.8	8.38	7.38	10.2	10.7	11.1	10.3	10.5	11.0	7.28	7.61	8.25

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 15)

Figure 10

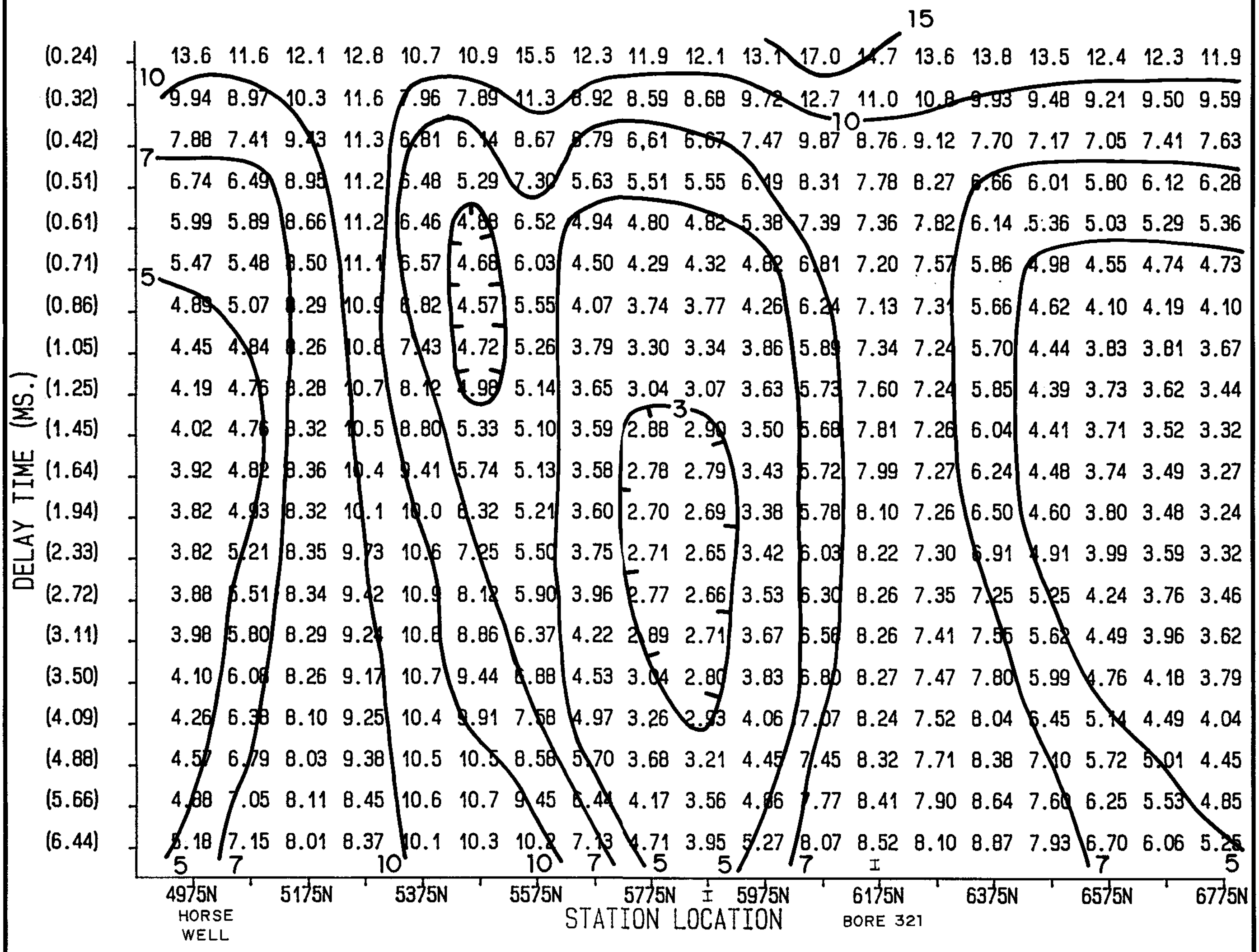
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 4, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED	S. D.	13·11·91 C.D.O.	DATE
DRAWN	M. B.	SCALE	
DATE	March '91	PLAN NUMBER	
CHECKED		S22125	

5287



(0.24)	13.6	11.6	12.1	12.8	10.7	10.9	15.5	12.3	11.9	12.1	13.1	17.0	14.7	13.6	13.8	13.5	12.4	12.3	11.9
(0.32)	9.94	8.97	10.3	11.6	7.96	7.89	11.3	8.92	8.59	8.68	9.72	12.7	11.0	10.8	9.93	9.48	9.21	9.50	9.59
(0.42)	7.88	7.41	9.43	11.3	6.81	6.14	8.67	6.79	6,61	6.67	7.47	9.87	8.76	9.12	7.70	7.17	7.05	7.41	7.63
(0.51)	6.74	6.49	8.95	11.2	5.48	5.29	7.30	5.63	5,51	5.55	6.49	8.31	7.78	8.27	6.66	6.01	5.80	6.12	6,28
(0.61)	5.99	5.89	8.66	11.2	6.46	4.88	6.52	4.94	4.80	4.82	5.38	7.39	7.36	7.82	6.14	5.36	5.03	5.29	5.36
(0.71)	5.47	5.48	8.50	11.1	6.57	4.68	6.03	4.50	4.29	4.32	4.82	6.81	7.20	7.57	5.86	4.98	4.55	4.74	4.73
(0.86)	4.89	5.07	8.29	10.9	6.82	4.57	5.55	4.07	3.74	3.77	4.26	6.24	7.13	7.31	5.66	4.62	4.10	4.19	4.10
(1.05)	4.45	4.84	8.26	10.8	7.43	4.72	5.26	3.79	3.30	3.34	3.86	5.89	7.34	7.24	5.70	4.44	3.83	3.81	3.67
(1.25)	4.19	4.76	8.28	10.7	8.12	4.98	5.14	3.65	3.04	3.07	3.63	5.73	7.60	7.24	5.85	4.39	3.73	3.62	3.44
(1.45)	4.02	4.76	8.32	10.5	8.80	5.33	5.10	3.59	2.88	2.90	3.50	5.68	7.81	7.26	6.04	4.41	3.71	3.52	3.32
(1.64)	3.92	4.82	8.36	10.4	9.41	5.74	5.13	3.58	2.78	2.79	3.43	5.72	7.99	7.27	6.24	4.48	3.74	3.49	3.27
(1.94)	3.82	4.93	8.32	10.1	10.0	6.32	5.21	3.60	2.70	2.69	3.38	5.78	8.10	7.26	6.50	4.60	3.80	3.48	3.24
(2.33)	3.82	5.21	8.35	9.73	10.6	7.25	5.50	3.75	2.71	2.65	3.42	6.03	8.22	7.30	6.91	4.91	3.99	3.59	3.32
(2.72)	3.88	5.51	8.34	9.42	10.9	8.12	5.90	3.96	2.77	2.66	3.53	6.30	8.26	7.35	7.25	5.25	4.24	3.76	3.46
(3.11)	3.98	5.80	8.29	9.24	10.8	8.86	6.37	4.22	2.89	2.71	3.67	6.56	8.26	7.41	7.55	5.62	4.49	3.96	3.62
(3.50)	4.10	6.08	8.26	9.17	10.7	9.44	6.88	4.53	3.04	2.80	3.83	6.80	8.27	7.47	7.80	5.99	4.76	4.18	3.79
(4.09)	4.26	6.38	8.10	9.25	10.4	9.91	7.58	4.97	3.26	2.93	4.06	7.07	8.24	7.52	8.04	6.45	5.14	4.49	4.04
(4.88)	4.57	6.79	8.03	9.38	10.5	10.5	8.58	5.70	3.68	3.21	4.45	7.45	8.32	7.71	8.38	7.10	5.72	5.01	4.45
(5.66)	4.88	7.05	8.11	8.45	10.6	10.7	9.45	6.44	4.17	3.56	4.86	7.77	8.41	7.90	8.64	7.60	6.25	5.53	4.85
(6.44)	5.18	7.15	8.01	8.37	10.1	10.3	10.2	7.13	4.71	3.95	5.27	8.07	8.52	8.10	8.87	7.93	6.70	6.06	5.25

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 15)

Figure 11

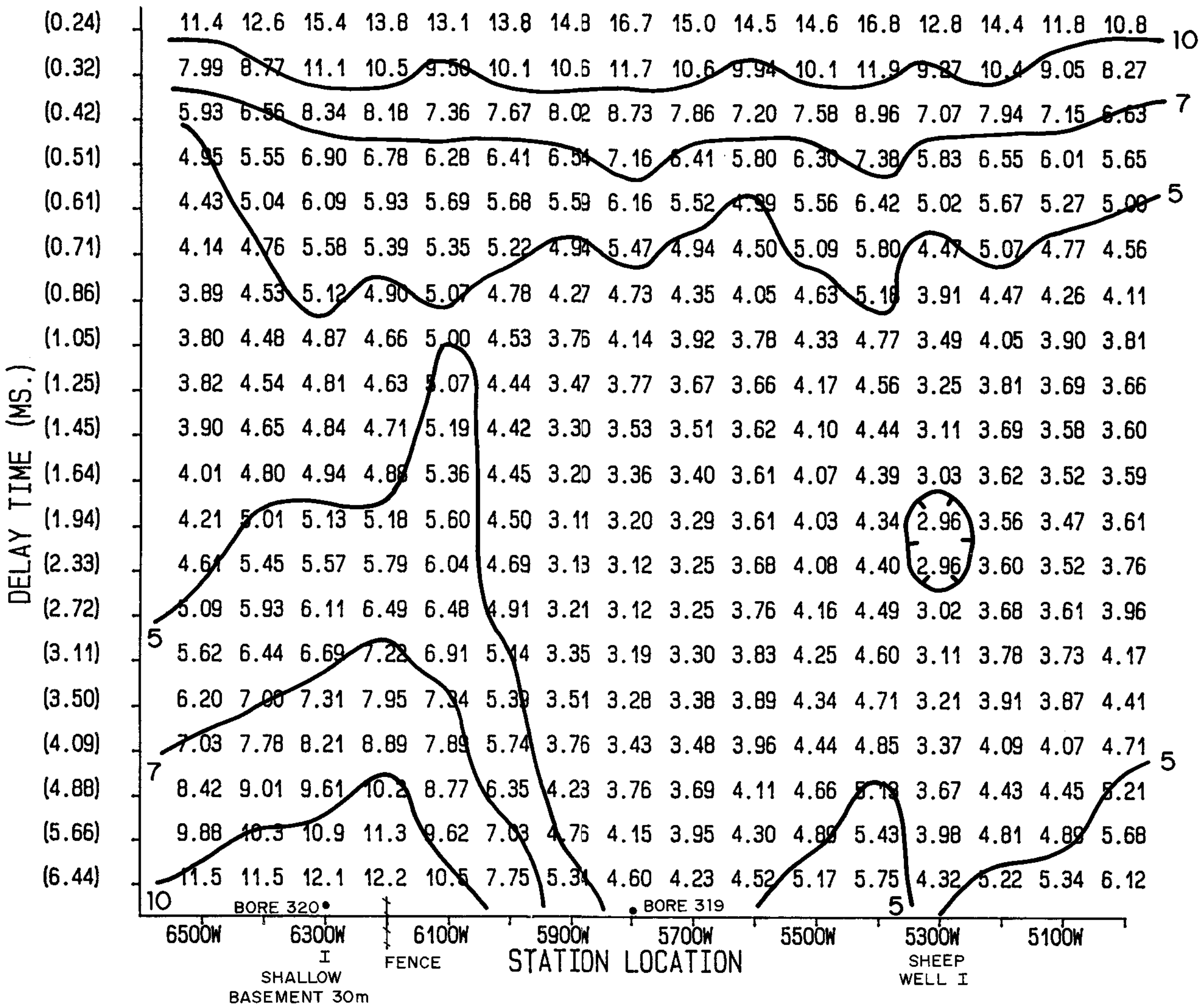
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 5, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13.11.91	C.D.O. DATE
DRAWN M.B.	SCALE	
DATE March '91	PLAN NUMBER S22126	
CHECKED		

5287



	6500W		6300W		6100W		5900W		5700W		5500W		5300W		5100W	
(0.24)	11.4	12.6	15.4	13.8	13.1	13.8	14.8	16.7	15.0	14.5	14.6	16.8	12.8	14.4	11.8	10.8
(0.32)	7.99	8.77	11.1	10.5	9.50	10.1	10.6	11.7	10.6	9.94	10.1	11.9	9.27	10.4	9.05	8.27
(0.42)	5.93	6.56	8.34	8.18	7.36	7.67	8.02	8.73	7.86	7.20	7.58	8.96	7.07	7.94	7.15	6.63
(0.51)	4.95	5.55	6.90	6.78	6.28	6.41	6.54	7.16	6.41	5.80	6.30	7.38	5.83	6.55	6.01	5.65
(0.61)	4.43	5.04	6.09	5.93	5.69	5.68	5.59	6.16	5.52	4.99	5.56	6.42	5.02	5.67	5.27	5.00
(0.71)	4.14	4.76	5.58	5.39	5.35	5.22	4.94	5.47	4.94	4.50	5.09	5.80	4.47	5.07	4.77	4.56
(0.86)	3.89	4.53	5.12	4.90	5.07	4.78	4.27	4.73	4.35	4.05	4.63	5.18	3.91	4.47	4.26	4.11
(1.05)	3.80	4.48	4.87	4.66	5.00	4.53	3.76	4.14	3.92	3.78	4.33	4.77	3.49	4.05	3.90	3.81
(1.25)	3.82	4.54	4.81	4.63	5.07	4.44	3.47	3.77	3.67	3.66	4.17	4.56	3.25	3.81	3.69	3.66
(1.45)	3.90	4.65	4.84	4.71	5.19	4.42	3.30	3.53	3.51	3.62	4.10	4.44	3.11	3.69	3.58	3.60
(1.64)	4.01	4.80	4.94	4.88	5.36	4.45	3.20	3.36	3.40	3.61	4.07	4.39	3.03	3.62	3.52	3.59
(1.94)	4.21	5.01	5.13	5.18	5.60	4.50	3.11	3.20	3.29	3.61	4.03	4.34	2.96	3.56	3.47	3.61
(2.33)	4.61	5.45	5.57	5.79	6.04	4.69	3.13	3.12	3.25	3.68	4.08	4.40	2.96	3.60	3.52	3.76
(2.72)	5.09	5.93	6.11	6.49	6.48	4.91	3.21	3.12	3.25	3.76	4.16	4.49	3.02	3.68	3.61	3.96
(3.11)	5.62	6.44	6.69	7.22	6.91	5.44	3.35	3.19	3.30	3.83	4.25	4.60	3.11	3.78	3.73	4.17
(3.50)	6.20	7.00	7.31	7.95	7.34	5.39	3.51	3.28	3.38	3.89	4.34	4.71	3.21	3.91	3.87	4.41
(4.09)	7.03	7.78	8.21	8.89	7.89	5.74	3.76	3.43	3.48	3.96	4.44	4.85	3.37	4.09	4.07	4.71
(4.88)	8.42	9.01	9.61	10.2	8.77	6.35	4.23	3.76	3.69	4.11	4.66	5.18	3.67	4.43	4.45	5.21
(5.66)	9.88	10.3	10.9	11.3	9.62	7.03	4.76	4.15	3.95	4.30	4.89	5.43	3.98	4.81	4.89	5.68
(6.44)	11.5	11.5	12.1	12.2	10.5	7.75	5.34	4.60	4.23	4.52	5.17	5.75	4.32	5.22	5.34	6.12

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 15)

Figure 12

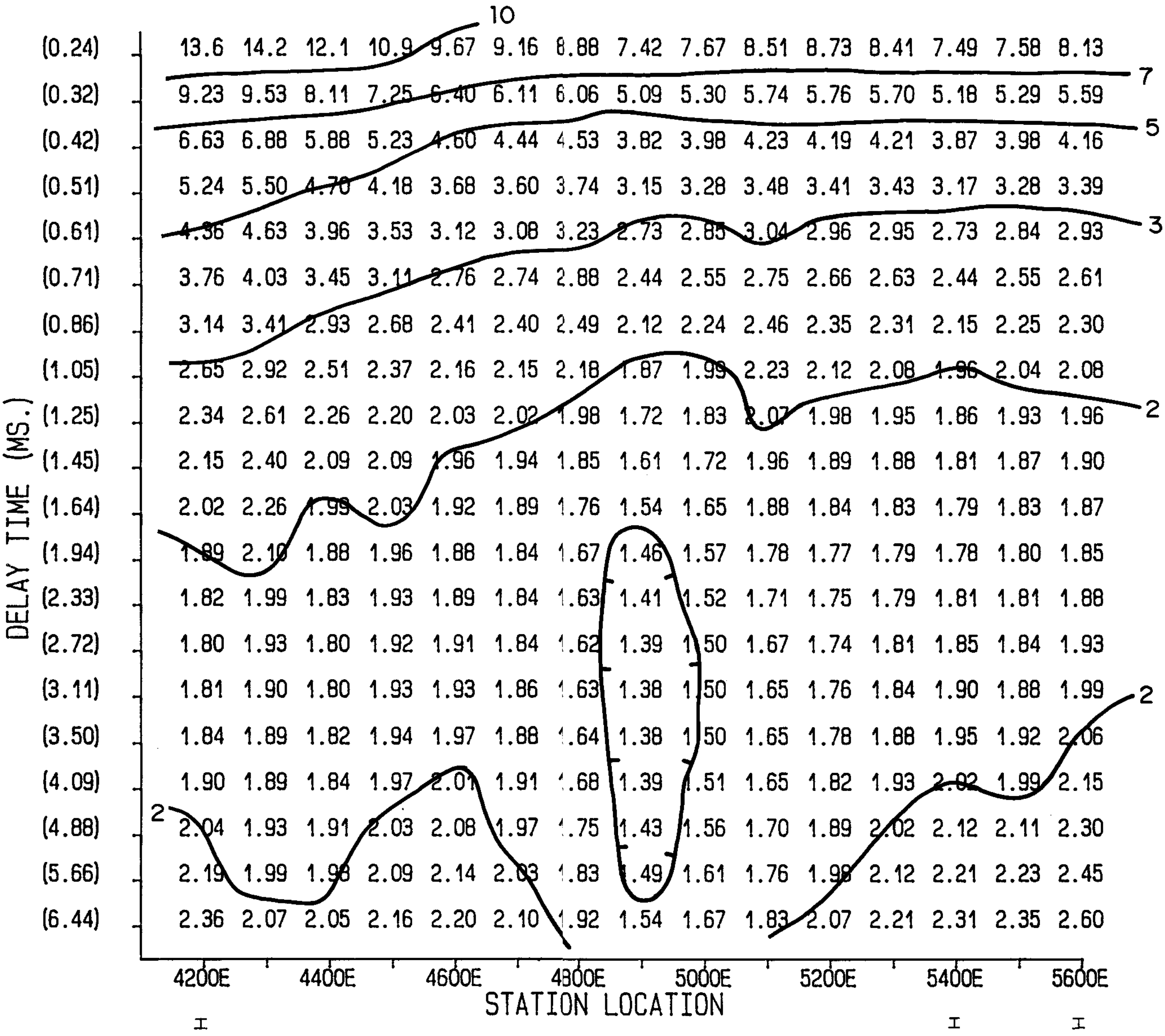
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 6, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13·11·91 C.D.O. DATE	
DRAWN M. B.	SCALE	
DATE March '91	PLAN NUMBER S22127	
CHECKED		

5287



(0.24)	13.6	14.2	12.1	10.9	9.67	9.16	8.88	7.42	7.67	8.51	8.73	8.41	7.49	7.58	8.13
(0.32)	9.23	9.53	8.11	7.25	6.40	6.11	6.06	5.09	5.30	5.74	5.76	5.70	5.18	5.29	5.59
(0.42)	6.63	6.88	5.88	5.23	4.60	4.44	4.53	3.82	3.98	4.23	4.19	4.21	3.87	3.98	4.16
(0.51)	5.24	5.50	4.70	4.18	3.68	3.60	3.74	3.15	3.28	3.48	3.41	3.43	3.17	3.28	3.39
(0.61)	4.36	4.63	3.96	3.53	3.12	3.08	3.23	2.73	2.85	3.04	2.96	2.95	2.73	2.84	2.93
(0.71)	3.76	4.03	3.45	3.11	2.76	2.74	2.88	2.44	2.55	2.75	2.66	2.63	2.44	2.55	2.61
(0.86)	3.14	3.41	2.93	2.68	2.41	2.40	2.49	2.12	2.24	2.46	2.35	2.31	2.15	2.25	2.30
(1.05)	2.65	2.92	2.51	2.37	2.16	2.15	2.18	1.87	1.99	2.23	2.12	2.08	1.96	2.04	2.08
(1.25)	2.34	2.61	2.26	2.20	2.03	2.02	1.98	1.72	1.83	2.07	1.98	1.95	1.86	1.93	1.96
(1.45)	2.15	2.40	2.09	2.09	1.96	1.94	1.85	1.61	1.72	1.96	1.89	1.88	1.81	1.87	1.90
(1.64)	2.02	2.26	1.99	2.03	1.92	1.89	1.76	1.54	1.65	1.88	1.84	1.83	1.79	1.83	1.87
(1.94)	1.89	2.10	1.88	1.96	1.88	1.84	1.67	1.46	1.57	1.78	1.77	1.79	1.78	1.80	1.85
(2.33)	1.82	1.99	1.83	1.93	1.89	1.84	1.63	1.41	1.52	1.71	1.75	1.79	1.81	1.81	1.88
(2.72)	1.80	1.93	1.80	1.92	1.91	1.84	1.62	1.39	1.50	1.67	1.74	1.81	1.85	1.84	1.93
(3.11)	1.81	1.90	1.80	1.93	1.93	1.86	1.63	1.38	1.50	1.65	1.76	1.84	1.90	1.88	1.99
(3.50)	1.84	1.89	1.82	1.94	1.97	1.88	1.64	1.38	1.50	1.65	1.78	1.88	1.95	1.92	2.06
(4.09)	1.90	1.89	1.84	1.97	2.01	1.91	1.68	1.39	1.51	1.65	1.82	1.93	2.02	1.99	2.15
(4.88)	2.04	1.93	1.91	2.03	2.08	1.97	1.75	1.43	1.56	1.70	1.89	2.02	2.12	2.11	2.30
(5.66)	2.19	1.99	1.98	2.09	2.14	2.03	1.83	1.49	1.61	1.76	1.98	2.12	2.21	2.23	2.45
(6.44)	2.36	2.07	2.05	2.16	2.20	2.10	1.92	1.54	1.67	1.83	2.07	2.21	2.31	2.35	2.60
	4200E		4400E		4600E		4800E		5000E		5200E		5400E		5600E

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 15)

Figure 13

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

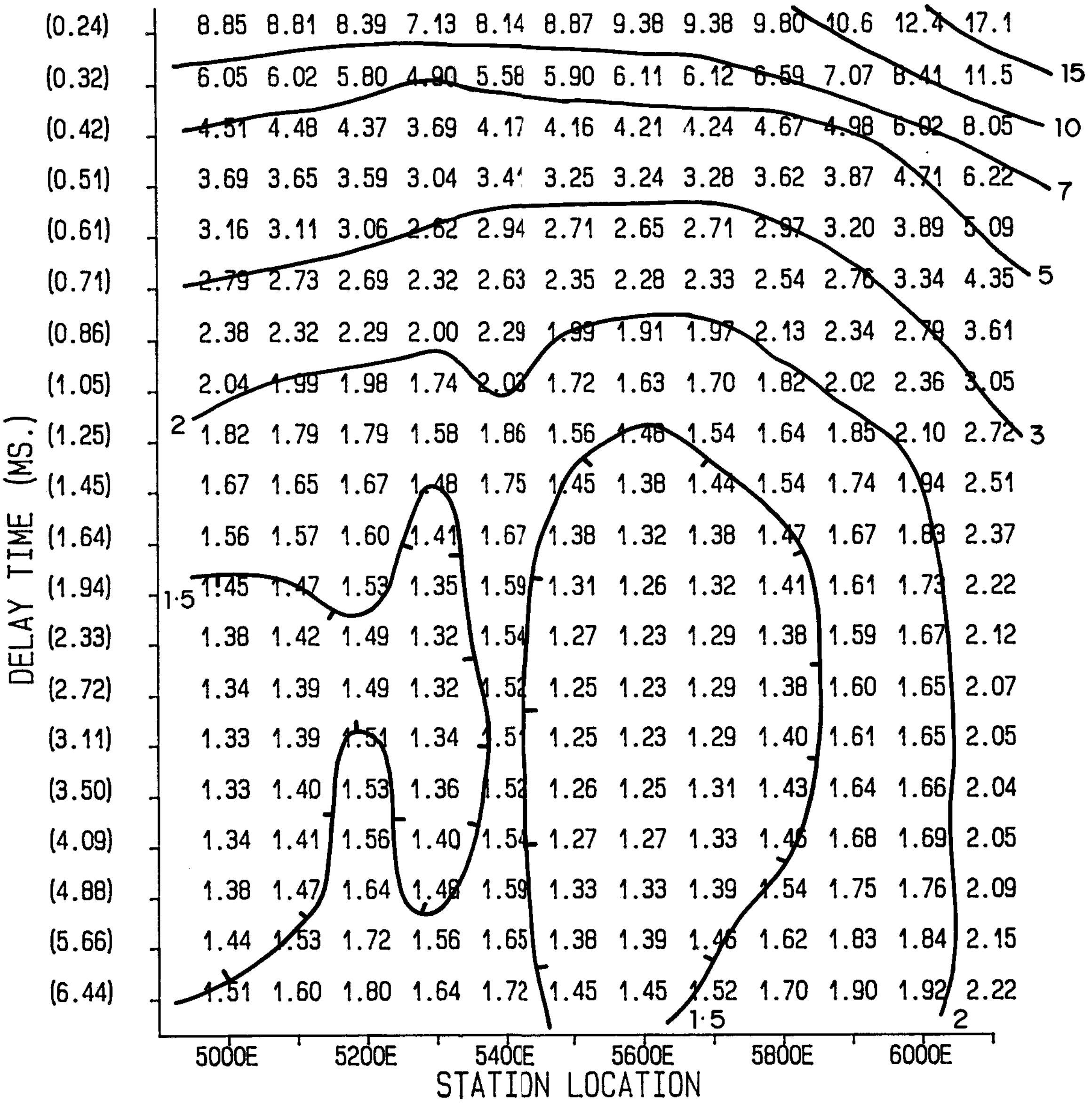
PENONG GROUNDWATER STUDY – CHARRA 1:50000 SHEET

AREA 8, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED	S. D.	C.D.O.	DATE 13·11·91
DRAWN	M. B.	SCALE	
DATE	March '91	PLAN NUMBER	
CHECKED		S22128	

5287



(0.24)	8.85	8.81	8.39	7.13	8.14	8.87	9.38	9.38	9.80	10.6	12.4	17.1
(0.32)	6.05	6.02	5.80	4.90	5.58	5.90	6.11	6.12	6.59	7.07	8.41	11.5
(0.42)	4.51	4.48	4.37	3.69	4.17	4.16	4.21	4.24	4.67	4.98	6.02	8.05
(0.51)	3.69	3.65	3.59	3.04	3.41	3.25	3.24	3.28	3.62	3.87	4.71	6.22
(0.61)	3.16	3.11	3.06	2.62	2.94	2.71	2.65	2.71	2.97	3.20	3.89	5.09
(0.71)	2.79	2.73	2.69	2.32	2.63	2.35	2.28	2.33	2.54	2.76	3.34	4.35
(0.86)	2.38	2.32	2.29	2.00	2.29	1.99	1.91	1.97	2.13	2.34	2.79	3.61
(1.05)	2.04	1.99	1.98	1.74	2.03	1.72	1.63	1.70	1.82	2.02	2.36	3.05
(1.25)	1.82	1.79	1.79	1.58	1.86	1.56	1.48	1.54	1.64	1.85	2.10	2.72
(1.45)	1.67	1.65	1.67	1.48	1.75	1.45	1.38	1.44	1.54	1.74	1.94	2.51
(1.64)	1.56	1.57	1.60	1.41	1.67	1.38	1.32	1.38	1.47	1.67	1.83	2.37
(1.94)	1.45	1.47	1.53	1.35	1.59	1.31	1.26	1.32	1.41	1.61	1.73	2.22
(2.33)	1.38	1.42	1.49	1.32	1.54	1.27	1.23	1.29	1.38	1.59	1.67	2.12
(2.72)	1.34	1.39	1.49	1.32	1.52	1.25	1.23	1.29	1.38	1.60	1.65	2.07
(3.11)	1.33	1.39	1.51	1.34	1.51	1.25	1.23	1.29	1.40	1.61	1.65	2.05
(3.50)	1.33	1.40	1.53	1.36	1.52	1.26	1.25	1.31	1.43	1.64	1.66	2.04
(4.09)	1.34	1.41	1.56	1.40	1.54	1.27	1.27	1.33	1.46	1.68	1.69	2.05
(4.88)	1.38	1.47	1.64	1.48	1.59	1.33	1.33	1.39	1.54	1.75	1.76	2.09
(5.66)	1.44	1.53	1.72	1.56	1.65	1.38	1.39	1.46	1.62	1.83	1.84	2.15
(6.44)	1.51	1.60	1.80	1.64	1.72	1.45	1.45	1.52	1.70	1.90	1.92	2.22

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

Figure 14

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET

AREA 8, LINE 2

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED
S. D.
C.D.O.
DATE 13·11
DRAWN
M. B.
SCALE
DATE
March '91
CHECKED
PLAN NUMBER
S 22129

5287

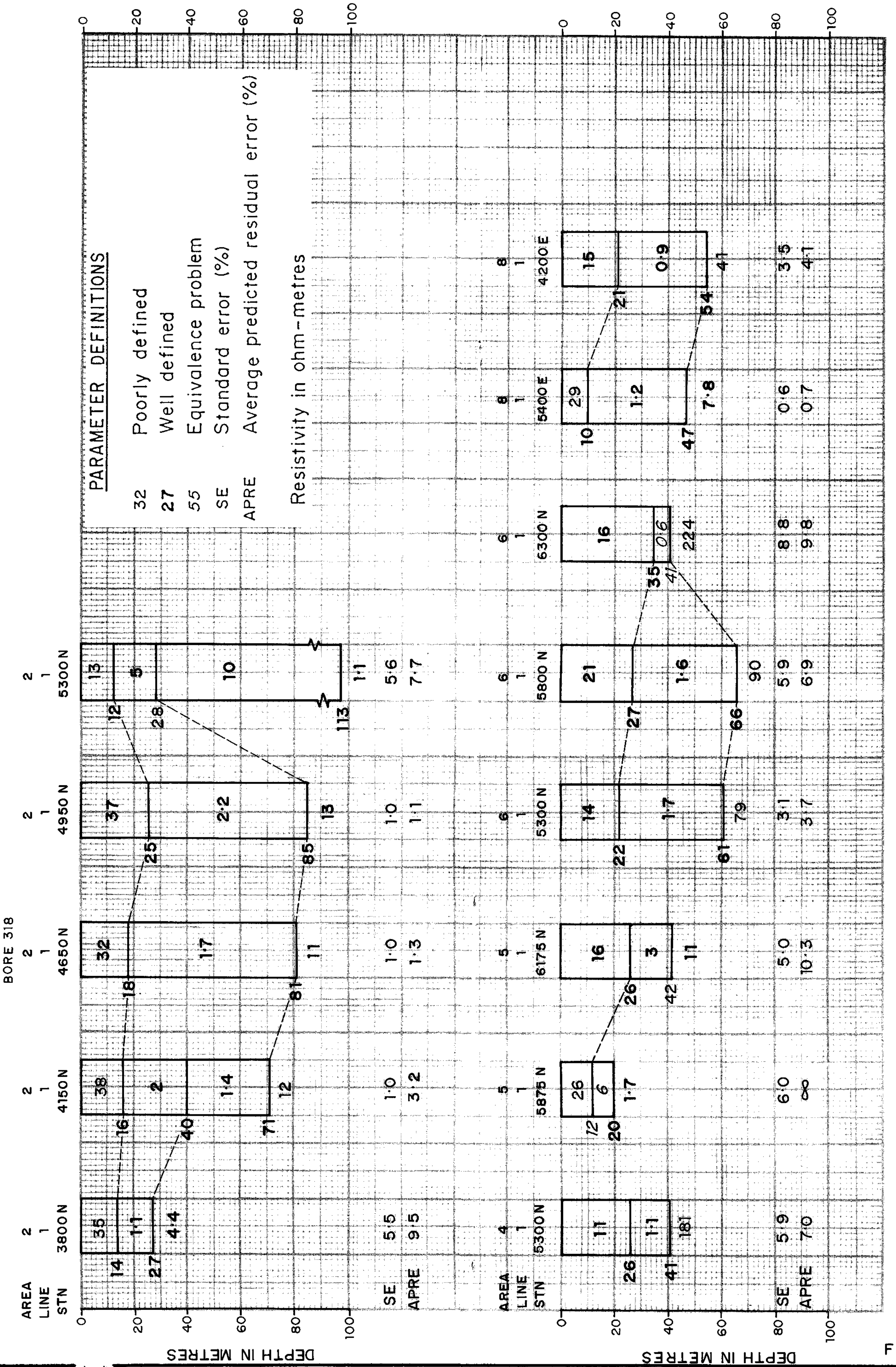


Figure 15

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY – CHARRA 1: 50 000 SHEET

TEM INVERSIONS – EARLY TIMES

COMPILED	S. D.	B 13·11·91 C.D.O.	DATE
DRAWN	M. B.	SCALE	
DATE	April '91	PLAN NUMBER	
CHECKED		S22130	

5287

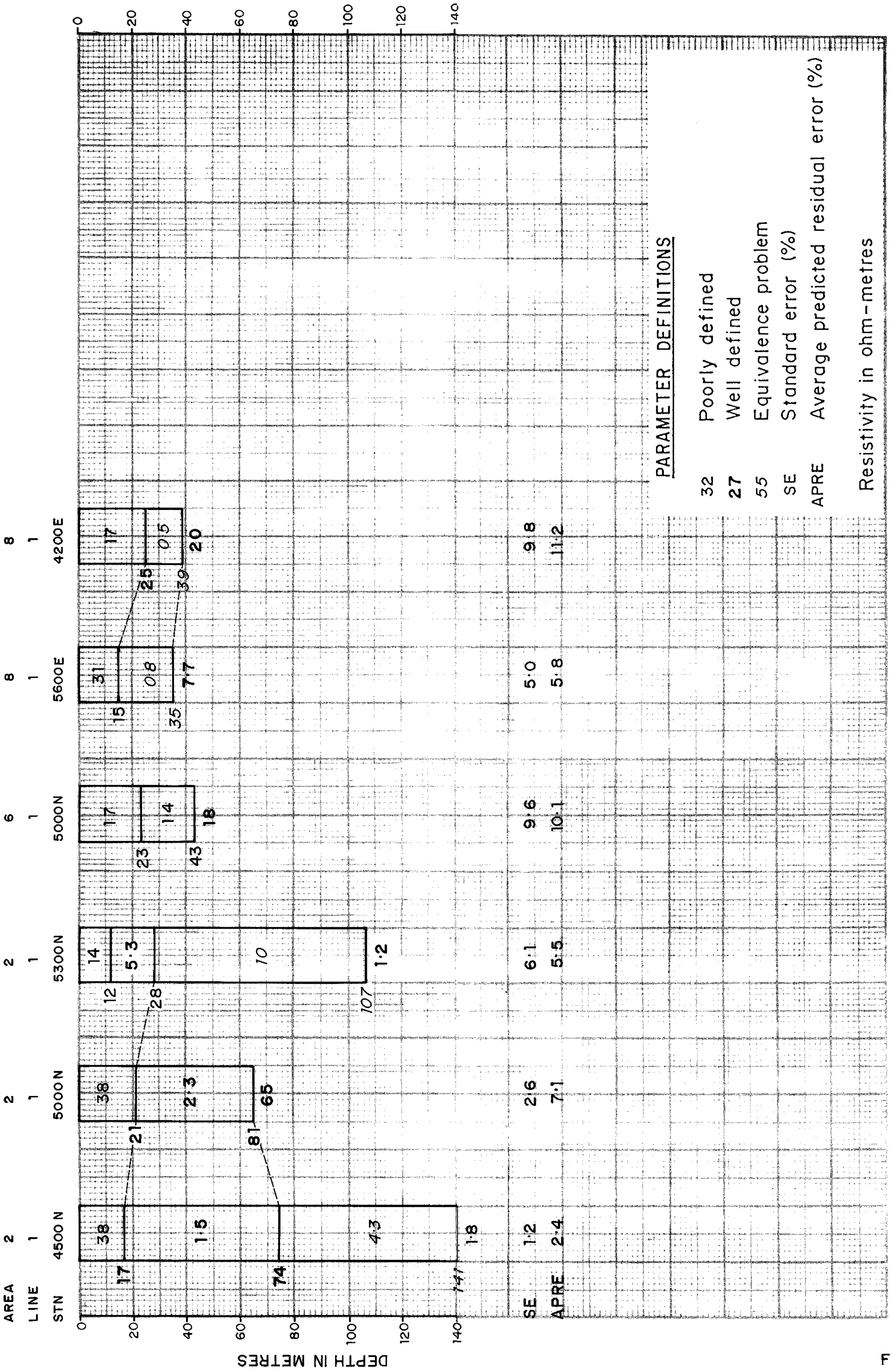


Figure 16

**DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA**

	COMPILED S. D.	C.D.O.	13.11.91 DATE
PENONG GROUNDWATER STUDY - CHARRA 1:50000 SHEET	DRAWN M. B.	SCALE	
TEM INVERSIONS - STANDARD TIMES	DATE April '91	PLAN NUMBER	
	CHECKED	**S22131**	

5287

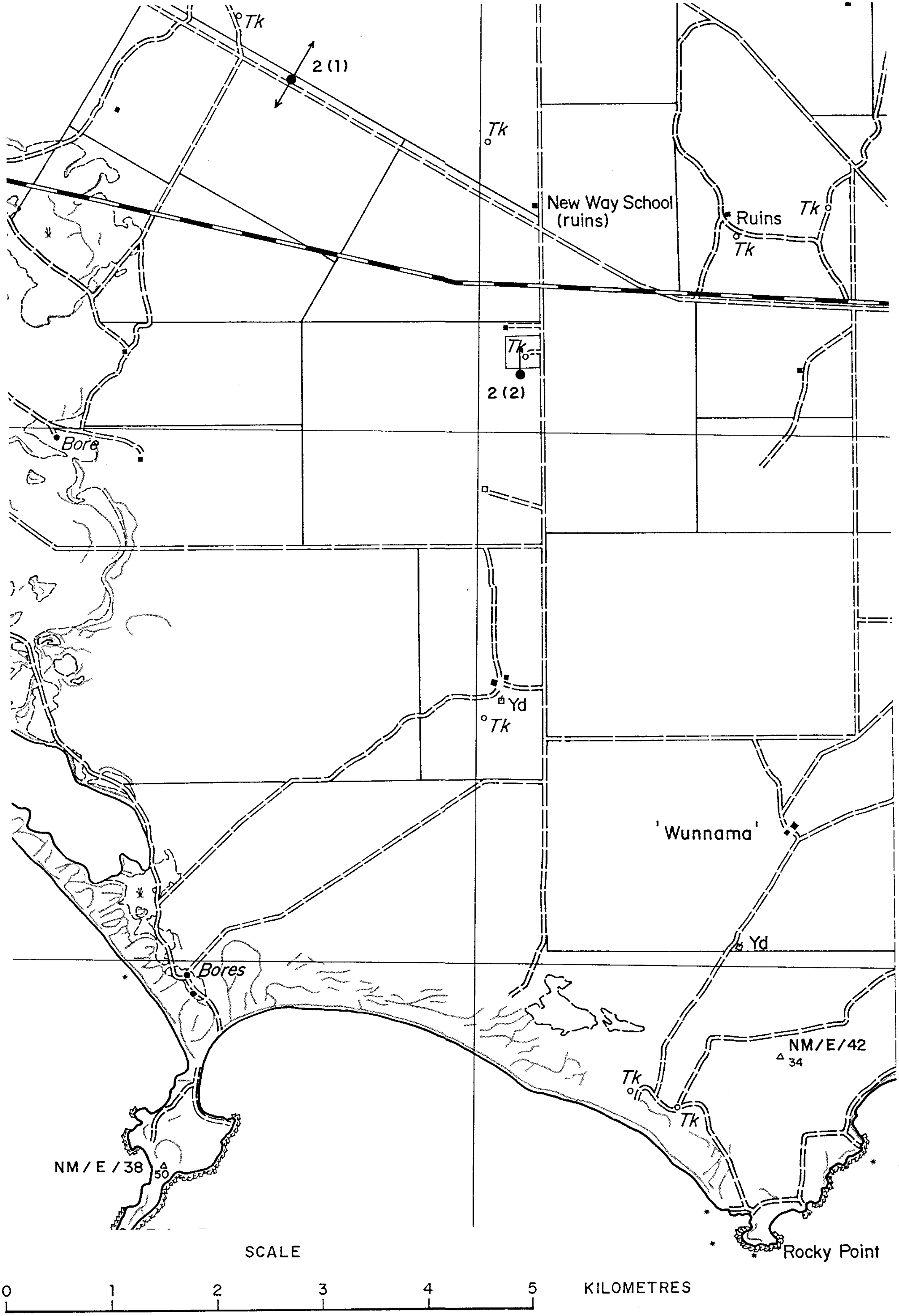


Figure 17

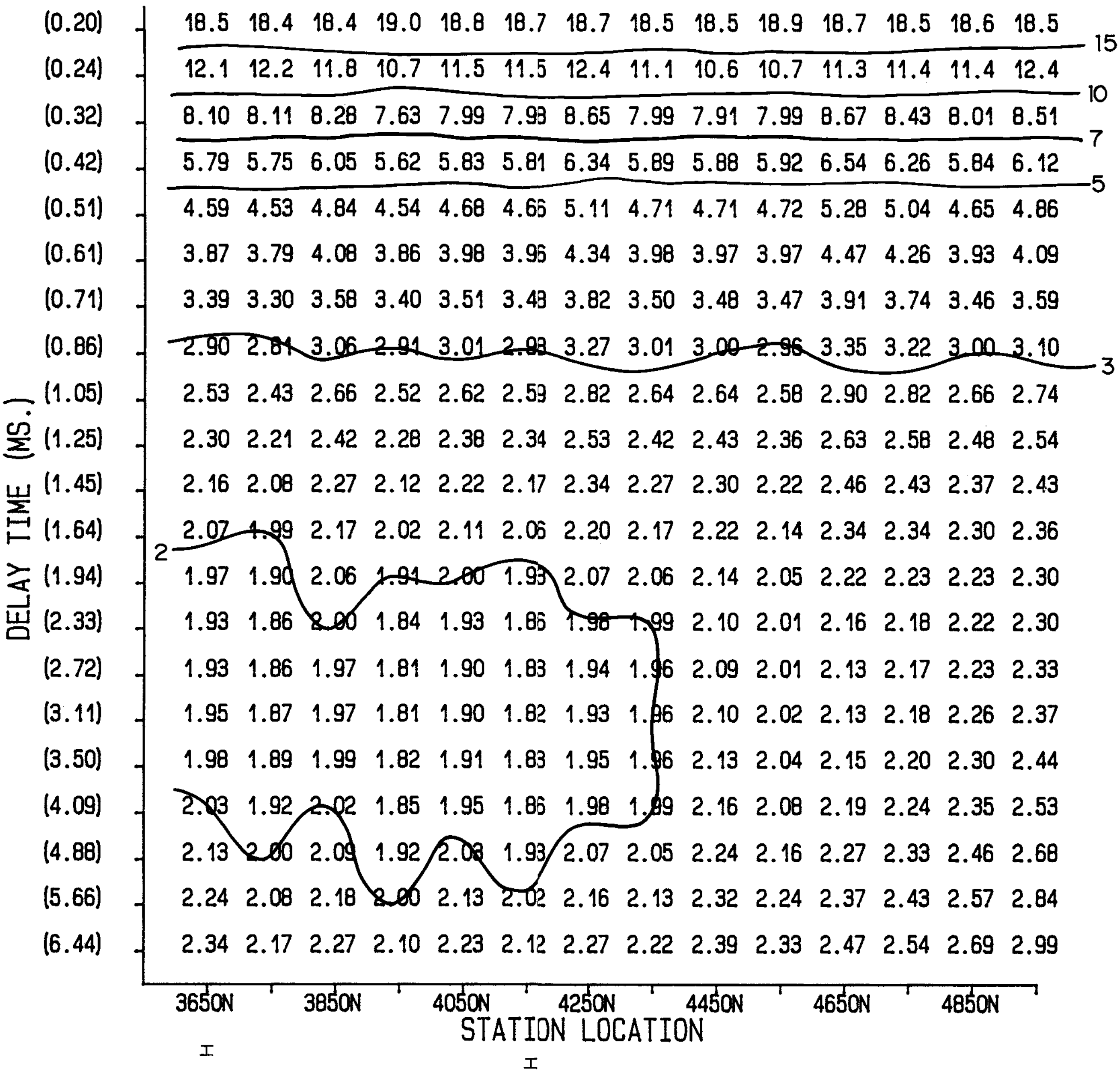
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY – NUNONG 1:50000 SHEET

TRAVERSE LOCATIONS

COMPILED S.D.	13·11·91 C.D.O. DATE	
DRAWN M.B.	SCALE 1:50 000	
DATE April '91	PLAN NUMBER	
CHECKED	S22132	

5287



(0.20)	18.5	18.4	18.4	19.0	18.8	18.7	18.7	18.5	18.5	18.9	18.7	18.5	18.6	18.5
(0.24)	12.1	12.2	11.8	10.7	11.5	11.5	12.4	11.1	10.6	10.7	11.3	11.4	11.4	12.4
(0.32)	8.10	8.11	8.28	7.63	7.99	7.98	8.65	7.99	7.91	7.99	8.67	8.43	8.01	8.51
(0.42)	5.79	5.75	6.05	5.62	5.83	5.81	6.34	5.89	5.88	5.92	6.54	6.26	5.84	6.12
(0.51)	4.59	4.53	4.84	4.54	4.68	4.66	5.11	4.71	4.71	4.72	5.28	5.04	4.65	4.86
(0.61)	3.87	3.79	4.08	3.86	3.98	3.96	4.34	3.98	3.97	3.97	4.47	4.26	3.93	4.09
(0.71)	3.39	3.30	3.58	3.40	3.51	3.48	3.82	3.50	3.48	3.47	3.91	3.74	3.46	3.59
(0.86)	2.90	2.81	3.06	2.91	3.01	2.98	3.27	3.01	3.00	2.96	3.35	3.22	3.00	3.10
(1.05)	2.53	2.43	2.66	2.52	2.62	2.59	2.82	2.64	2.64	2.58	2.90	2.82	2.66	2.74
(1.25)	2.30	2.21	2.42	2.28	2.38	2.34	2.53	2.42	2.43	2.36	2.63	2.58	2.48	2.54
(1.45)	2.16	2.08	2.27	2.12	2.22	2.17	2.34	2.27	2.30	2.22	2.46	2.43	2.37	2.43
(1.64)	2.07	1.99	2.17	2.02	2.11	2.06	2.20	2.17	2.22	2.14	2.34	2.34	2.30	2.36
(1.94)	1.97	1.90	2.06	1.91	2.00	1.93	2.07	2.06	2.14	2.05	2.22	2.23	2.23	2.30
(2.33)	1.93	1.86	2.00	1.84	1.93	1.86	1.98	1.99	2.10	2.01	2.16	2.18	2.22	2.30
(2.72)	1.93	1.86	1.97	1.81	1.90	1.83	1.94	1.96	2.09	2.01	2.13	2.17	2.23	2.33
(3.11)	1.95	1.87	1.97	1.81	1.90	1.82	1.93	1.96	2.10	2.02	2.13	2.18	2.26	2.37
(3.50)	1.98	1.89	1.99	1.82	1.91	1.83	1.95	1.96	2.13	2.04	2.15	2.20	2.30	2.44
(4.09)	2.03	1.92	2.02	1.85	1.95	1.86	1.98	1.99	2.16	2.08	2.19	2.24	2.35	2.53
(4.88)	2.13	2.00	2.09	1.92	2.08	1.93	2.07	2.05	2.24	2.16	2.27	2.33	2.46	2.68
(5.66)	2.24	2.08	2.18	2.00	2.13	2.02	2.16	2.13	2.32	2.24	2.37	2.43	2.57	2.84
(6.44)	2.34	2.17	2.27	2.10	2.23	2.12	2.27	2.22	2.39	2.33	2.47	2.54	2.69	2.99

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 20)

Figure 18

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

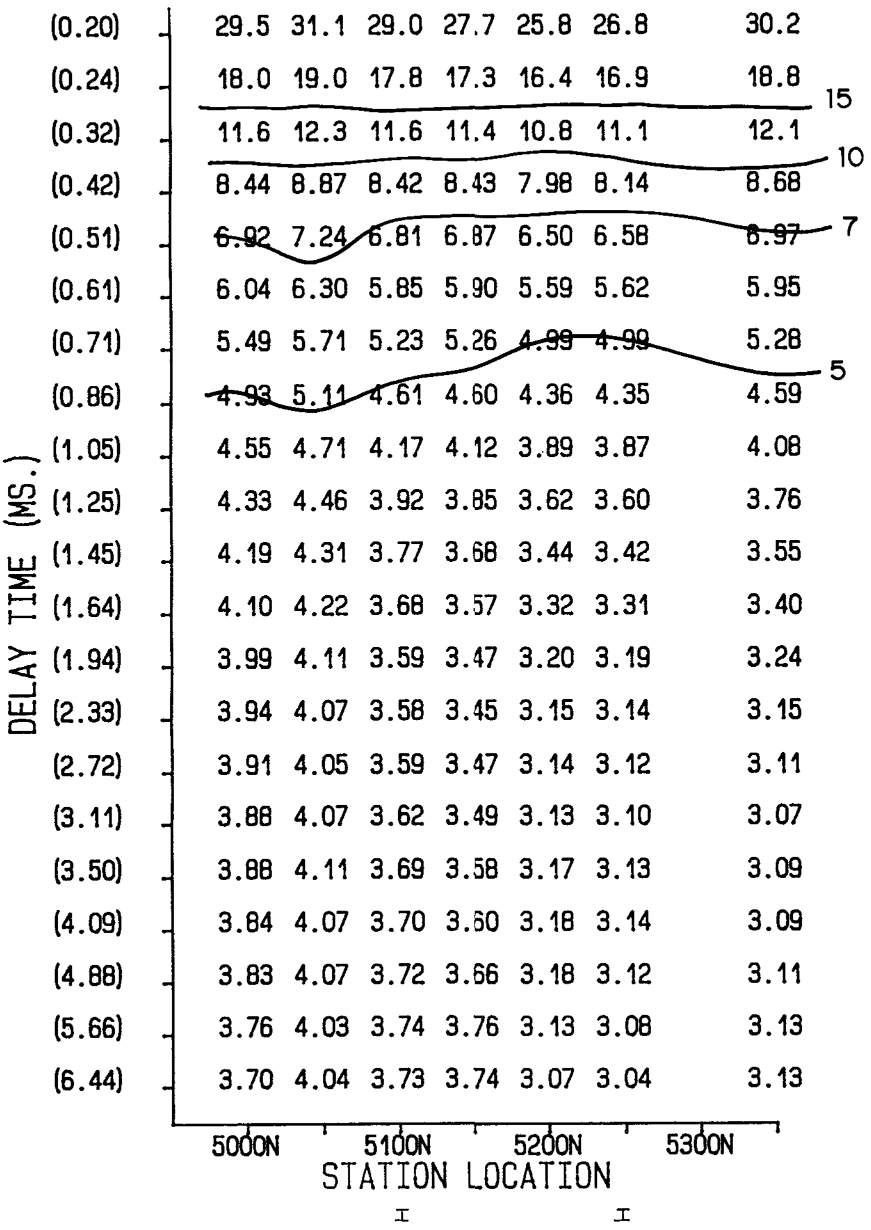
PENONG GROUNDWATER STUDY- NUNONG 1:50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S.D.	13·11·91 C.D.O.	DATE
DRAWN M.B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S22133	

5287



(0.20)	29.5	31.1	29.0	27.7	25.8	26.8	30.2
(0.24)	18.0	19.0	17.8	17.3	16.4	16.9	18.8
(0.32)	11.6	12.3	11.6	11.4	10.8	11.1	12.1
(0.42)	8.44	8.87	8.42	8.43	7.98	8.14	8.68
(0.51)	6.92	7.24	6.81	6.87	6.50	6.58	6.97
(0.61)	6.04	6.30	5.85	5.90	5.59	5.62	5.95
(0.71)	5.49	5.71	5.23	5.26	4.99	4.99	5.28
(0.86)	4.93	5.11	4.61	4.60	4.36	4.35	4.59
(1.05)	4.55	4.71	4.17	4.12	3.89	3.87	4.08
(1.25)	4.33	4.46	3.92	3.85	3.62	3.60	3.76
(1.45)	4.19	4.31	3.77	3.68	3.44	3.42	3.55
(1.64)	4.10	4.22	3.68	3.57	3.32	3.31	3.40
(1.94)	3.99	4.11	3.59	3.47	3.20	3.19	3.24
(2.33)	3.94	4.07	3.58	3.45	3.15	3.14	3.15
(2.72)	3.91	4.05	3.59	3.47	3.14	3.12	3.11
(3.11)	3.88	4.07	3.62	3.49	3.13	3.10	3.07
(3.50)	3.88	4.11	3.69	3.58	3.17	3.13	3.09
(4.09)	3.84	4.07	3.70	3.60	3.18	3.14	3.09
(4.88)	3.83	4.07	3.72	3.66	3.18	3.12	3.11
(5.66)	3.76	4.03	3.74	3.76	3.13	3.08	3.13
(6.44)	3.70	4.04	3.73	3.74	3.07	3.04	3.13

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 20)

Figure 19

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - NUNONG 1 : 50000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S. D.	13/1/91 C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S22134

5287

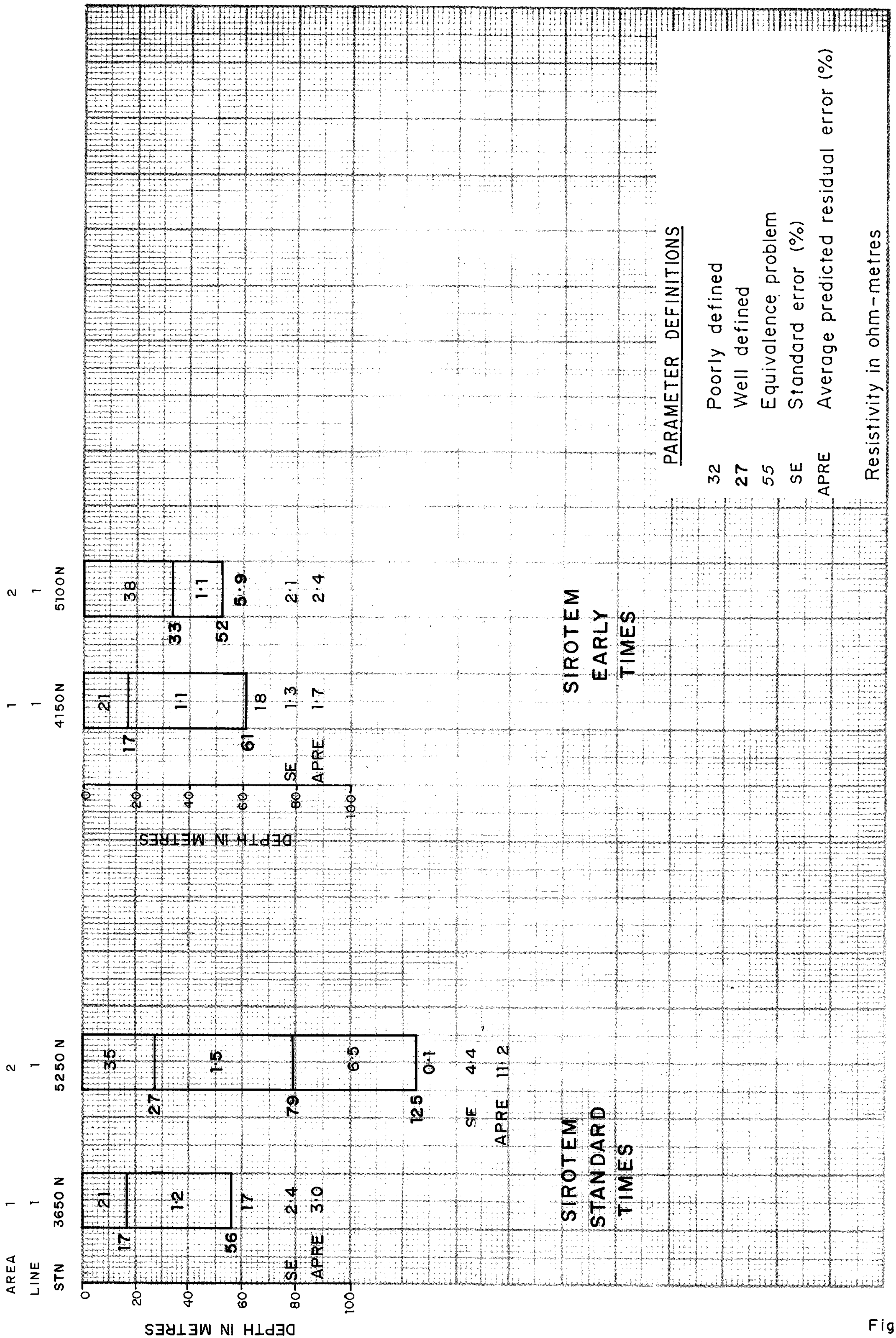


Figure 20

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - NUNONG 1 : 50000 SHEET

TEM INVERSIONS - EARLY AND STANDARD TIMES

COMPILED S. D.

13·11·91
C.D.O. DATE

DRAWN M. B.

SCALE

DATE April '91

CHECKED

PLAN NUMBER S22135

5287

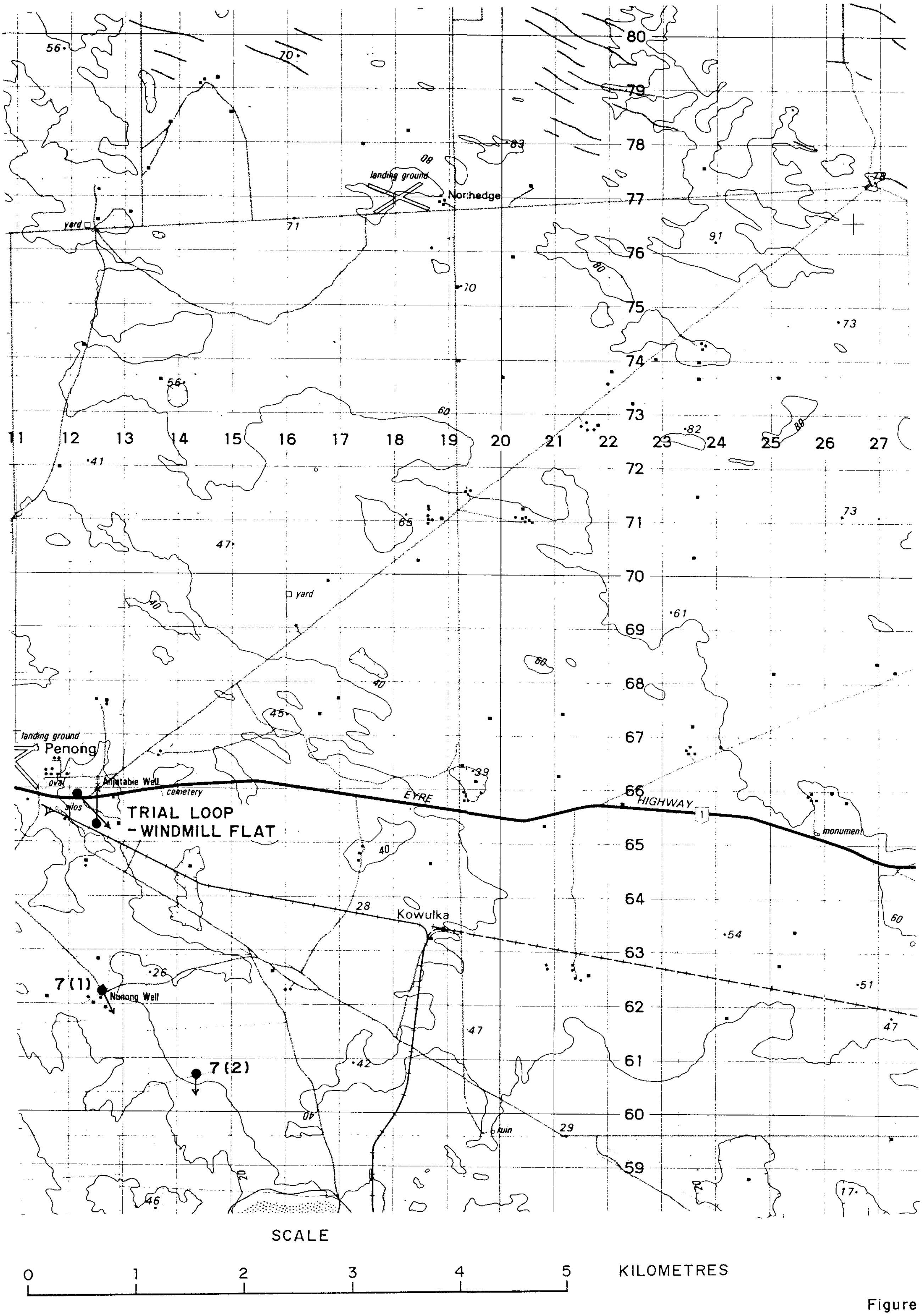


Figure 21

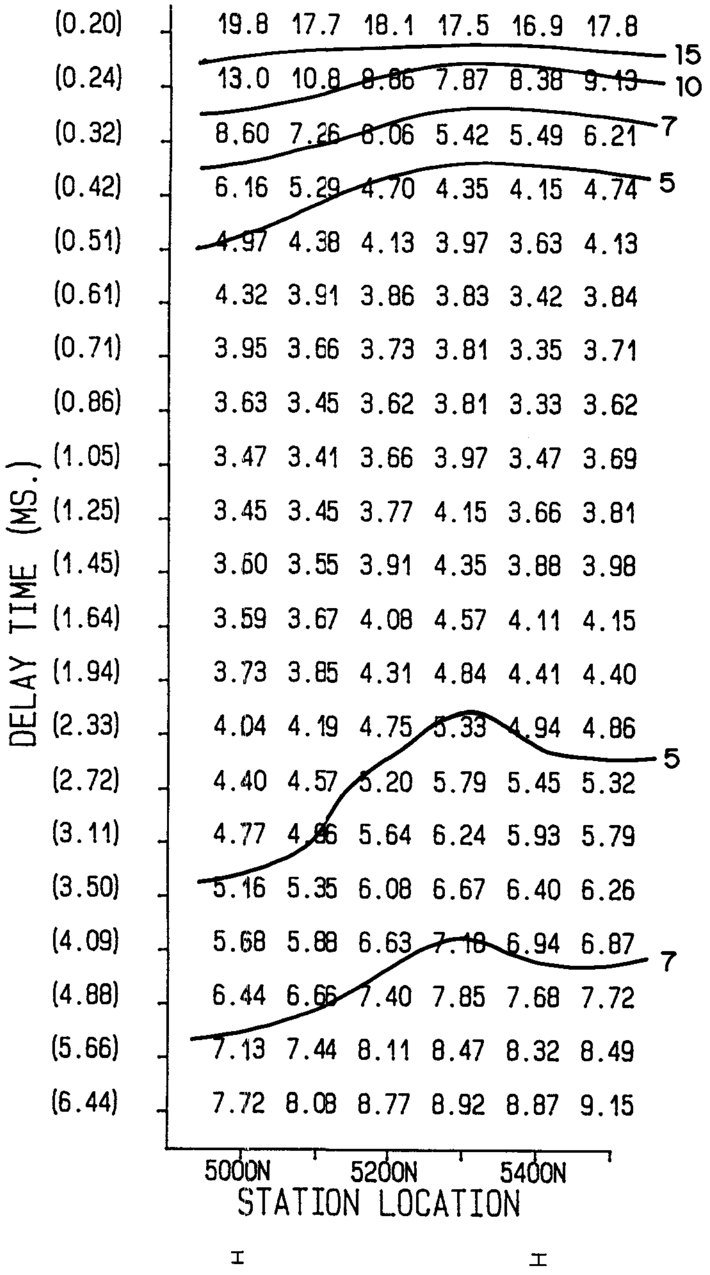
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1:50000 SHEET

TRAVERSE LOCATIONS

COMPILED S. D.	13·11·91 C.D.O. DATE	
DRAWN M. B.	SCALE 1 : 50 000	
DATE April '91	PLAN NUMBER S22136	
CHECKED		

5287



(0.20)	19.8	17.7	18.1	17.5	16.9	17.8
(0.24)	13.0	10.8	8.86	7.87	8.38	9.13
(0.32)	8.60	7.26	8.06	5.42	5.49	6.21
(0.42)	6.16	5.29	4.70	4.35	4.15	4.74
(0.51)	4.97	4.38	4.13	3.97	3.63	4.13
(0.61)	4.32	3.91	3.86	3.83	3.42	3.84
(0.71)	3.95	3.66	3.73	3.81	3.35	3.71
(0.86)	3.63	3.45	3.62	3.81	3.33	3.62
(1.05)	3.47	3.41	3.66	3.97	3.47	3.69
(1.25)	3.45	3.45	3.77	4.15	3.66	3.81
(1.45)	3.60	3.55	3.91	4.35	3.88	3.98
(1.64)	3.59	3.67	4.08	4.57	4.11	4.15
(1.94)	3.73	3.85	4.31	4.84	4.41	4.40
(2.33)	4.04	4.19	4.75	5.33	4.94	4.86
(2.72)	4.40	4.57	5.20	5.79	5.45	5.32
(3.11)	4.77	4.86	5.64	6.24	5.93	5.79
(3.50)	5.16	5.35	6.08	6.67	6.40	6.26
(4.09)	5.68	5.88	6.63	7.18	6.94	6.87
(4.88)	6.44	6.66	7.40	7.85	7.68	7.72
(5.66)	7.13	7.44	8.11	8.47	8.32	8.49
(6.44)	7.72	8.08	8.77	8.92	8.87	9.15

INSTRUMENT : SIROTEM MK. III
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 28, 29)

Figure 22

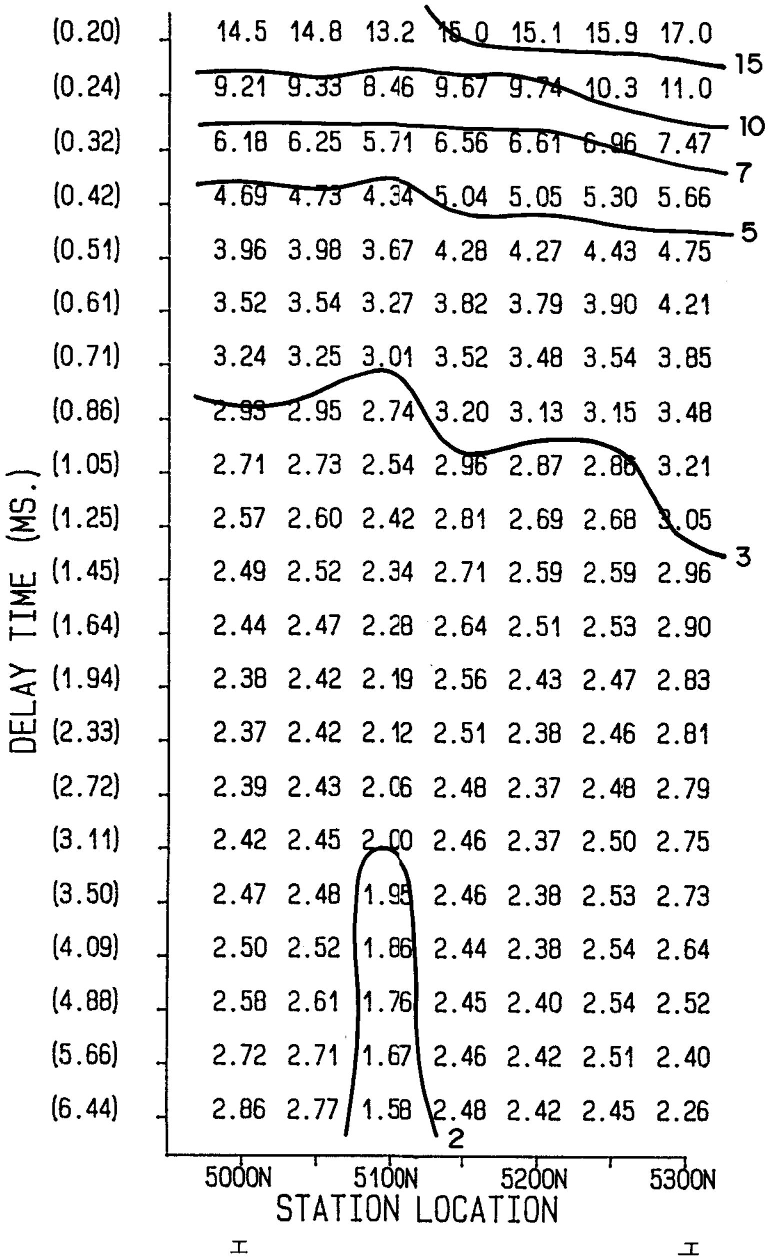
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1:50000 SHEET

PENONG TOWN-RACECOURSE
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13.11.91 C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER S22137
CHECKED	

5287



INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 50m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
⌶ STATION AT WHICH DATA WERE INVERTED (see FIG. 28, 29)

Figure 23

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

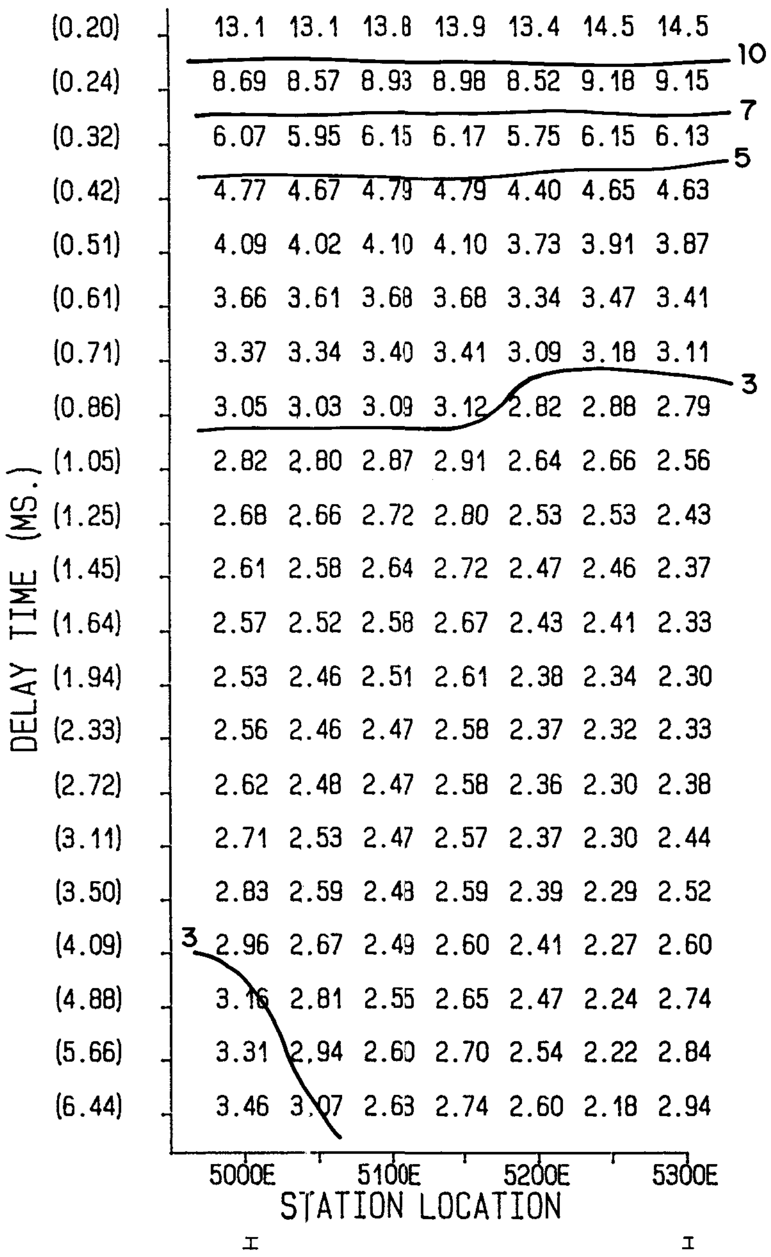
PENONG GROUNDWATER STUDY - PENONG 1:50 000 SHEET

WINDMILL FLAT - N-S TRAVERSE

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S.D.	13·11·91 C.D.O. DATE	
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER S22138	
CHECKED		

5287



(0.20)	13.1	13.1	13.8	13.9	13.4	14.5	14.5
(0.24)	8.69	8.57	8.93	8.98	8.52	9.18	9.15
(0.32)	6.07	5.95	6.15	6.17	5.75	6.15	6.13
(0.42)	4.77	4.67	4.79	4.79	4.40	4.65	4.63
(0.51)	4.09	4.02	4.10	4.10	3.73	3.91	3.87
(0.61)	3.66	3.61	3.68	3.68	3.34	3.47	3.41
(0.71)	3.37	3.34	3.40	3.41	3.09	3.18	3.11
(0.86)	3.05	3.03	3.09	3.12	2.82	2.88	2.79
(1.05)	2.82	2.80	2.87	2.91	2.64	2.66	2.56
(1.25)	2.68	2.66	2.72	2.80	2.53	2.53	2.43
(1.45)	2.61	2.58	2.64	2.72	2.47	2.46	2.37
(1.64)	2.57	2.52	2.58	2.67	2.43	2.41	2.33
(1.94)	2.53	2.46	2.51	2.61	2.38	2.34	2.30
(2.33)	2.56	2.46	2.47	2.58	2.37	2.32	2.33
(2.72)	2.62	2.48	2.47	2.58	2.36	2.30	2.38
(3.11)	2.71	2.53	2.47	2.57	2.37	2.30	2.44
(3.50)	2.83	2.59	2.48	2.59	2.39	2.29	2.52
(4.09)	2.96	2.67	2.49	2.60	2.41	2.27	2.60
(4.88)	3.16	2.81	2.55	2.65	2.47	2.24	2.74
(5.66)	3.31	2.94	2.60	2.70	2.54	2.22	2.84
(6.44)	3.46	3.07	2.63	2.74	2.60	2.18	2.94

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 50m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 28)

Figure 24

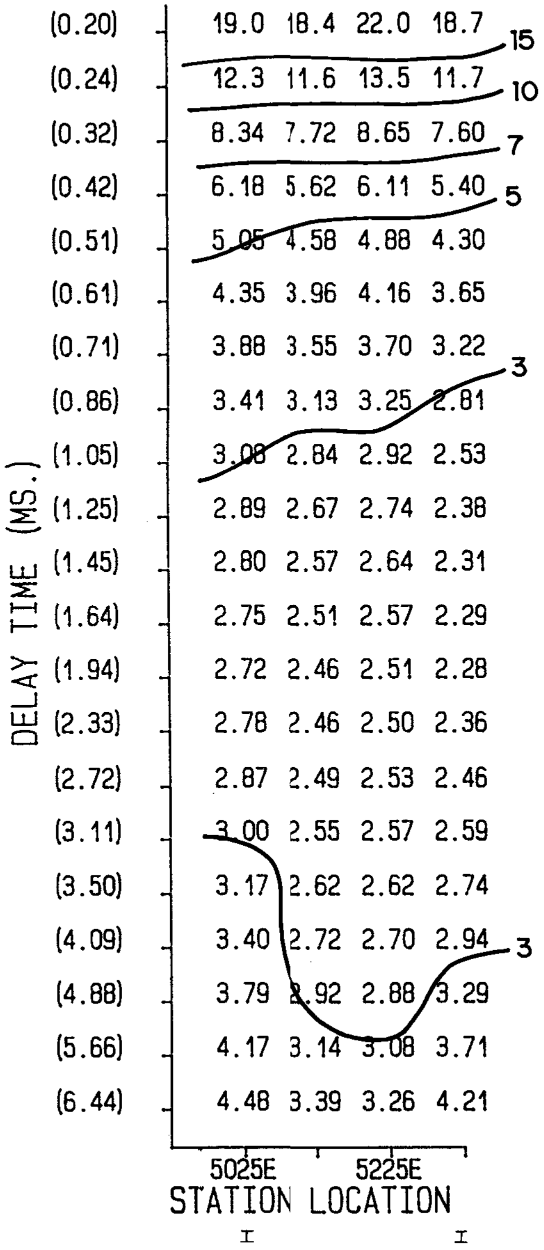
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1:50000 SHEET

WINDMILL FLAT - E-W TRAVERSE
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	C.D.O. DATE 13/11/91
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S22139

5287



(0.20)	19.0	18.4	22.0	18.7
(0.24)	12.3	11.6	13.5	11.7
(0.32)	8.34	7.72	8.65	7.60
(0.42)	6.18	5.62	6.11	5.40
(0.51)	5.05	4.58	4.88	4.30
(0.61)	4.35	3.96	4.16	3.65
(0.71)	3.88	3.55	3.70	3.22
(0.86)	3.41	3.13	3.25	2.81
(1.05)	3.08	2.84	2.92	2.53
(1.25)	2.89	2.67	2.74	2.38
(1.45)	2.80	2.57	2.64	2.31
(1.64)	2.75	2.51	2.57	2.29
(1.94)	2.72	2.46	2.51	2.28
(2.33)	2.78	2.46	2.50	2.36
(2.72)	2.87	2.49	2.53	2.46
(3.11)	3.00	2.55	2.57	2.59
(3.50)	3.17	2.62	2.62	2.74
(4.09)	3.40	2.72	2.70	2.94
(4.88)	3.79	2.92	2.88	3.29
(5.66)	4.17	3.14	3.08	3.71
(6.44)	4.48	3.39	3.26	4.21

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 28, 29)

Figure 25

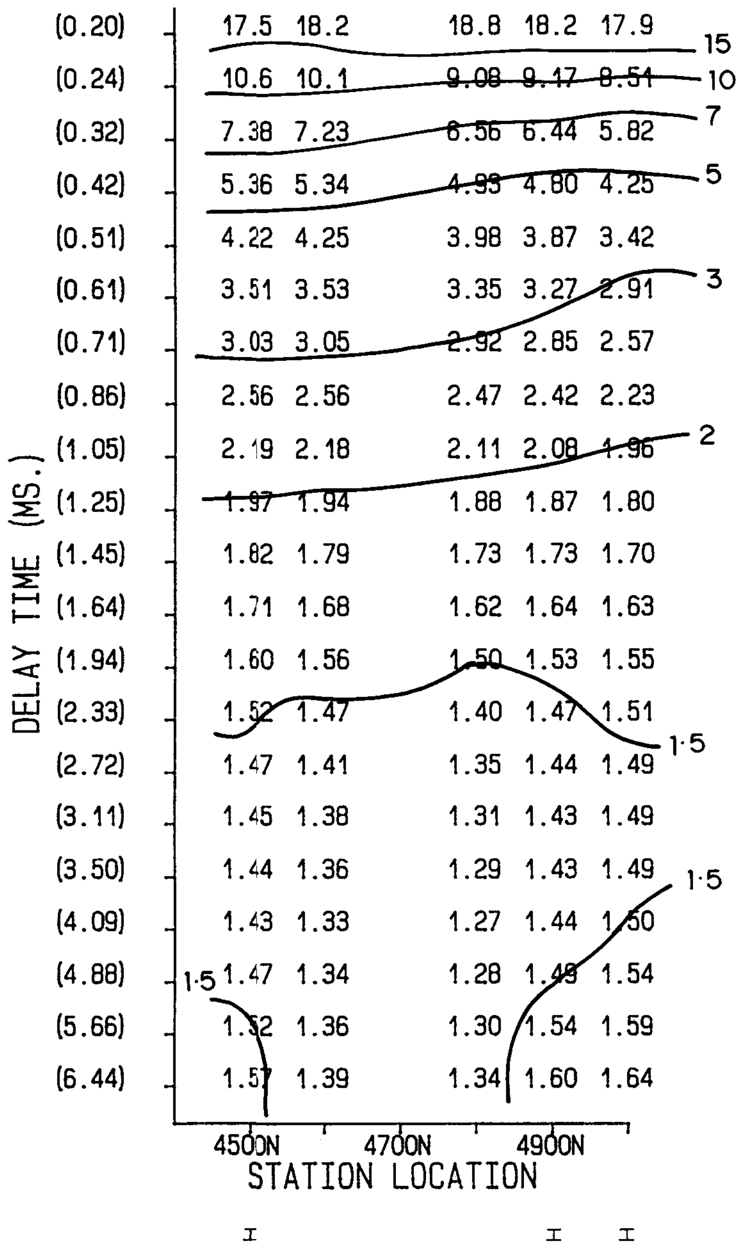
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1 : 50000 SHEET

WINDMILL FLAT, EAST LENS
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M.B.
DATE April '91
CHECKED
C.D.O. DATE 13.11.91
SCALE
PLAN NUMBER S22140

5287



INSTRUMENT : SIROTEM MK. II

CONFIGURATION : 100m SQ. SINGLE LOOP

RESISTIVITIES IN OHM - METRES

CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 28, 29)

Figure 26

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

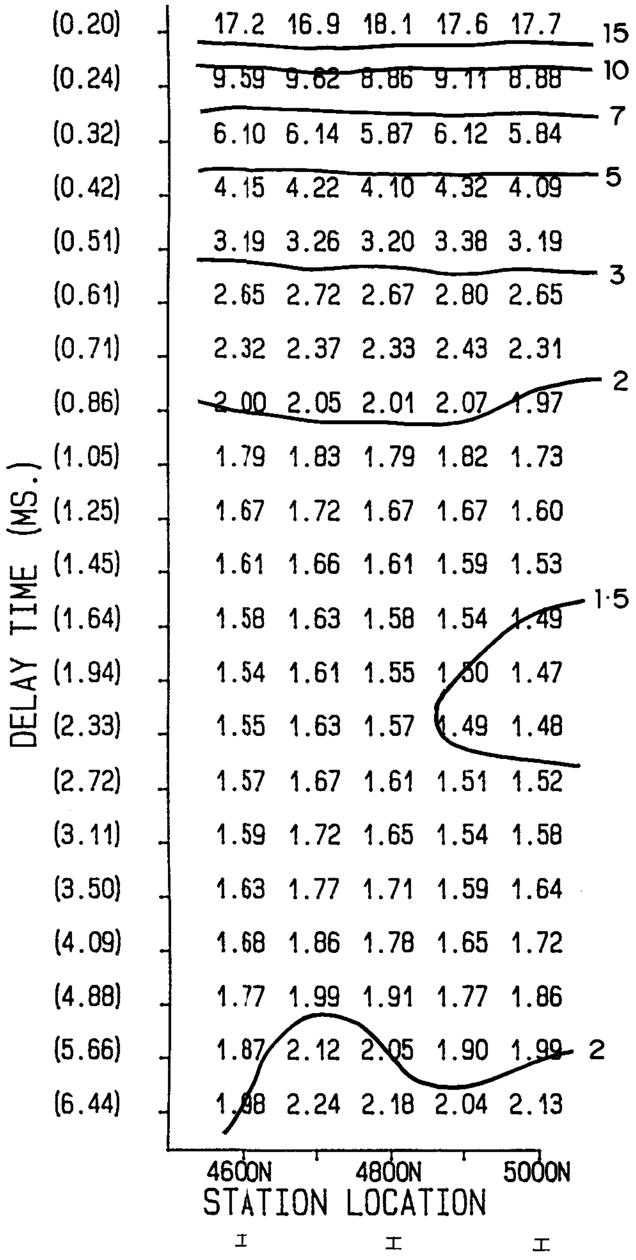
PENONG GROUNDWATER STUDY - PENONG 1 : 50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	C.D.O.	DATE 13/11/91
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S 22141	

5287



(0.20)	17.2	16.9	18.1	17.6	17.7
(0.24)	9.59	9.62	8.86	9.11	8.88
(0.32)	6.10	6.14	5.87	6.12	5.84
(0.42)	4.15	4.22	4.10	4.32	4.09
(0.51)	3.19	3.26	3.20	3.38	3.19
(0.61)	2.65	2.72	2.67	2.80	2.65
(0.71)	2.32	2.37	2.33	2.43	2.31
(0.86)	2.00	2.05	2.01	2.07	1.97
(1.05)	1.79	1.83	1.79	1.82	1.73
(1.25)	1.67	1.72	1.67	1.67	1.60
(1.45)	1.61	1.66	1.61	1.59	1.53
(1.64)	1.58	1.63	1.58	1.54	1.49
(1.94)	1.54	1.61	1.55	1.50	1.47
(2.33)	1.55	1.63	1.57	1.49	1.48
(2.72)	1.57	1.67	1.61	1.51	1.52
(3.11)	1.59	1.72	1.65	1.54	1.58
(3.50)	1.63	1.77	1.71	1.59	1.64
(4.09)	1.68	1.86	1.78	1.65	1.72
(4.88)	1.77	1.99	1.91	1.77	1.86
(5.66)	1.87	2.12	2.05	1.90	1.99
(6.44)	1.98	2.24	2.18	2.04	2.13

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 28)

Figure 27

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1 : 50000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S. D.	13/1/91 C.D.O. DATE	
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER S22142	
CHECKED		

5287

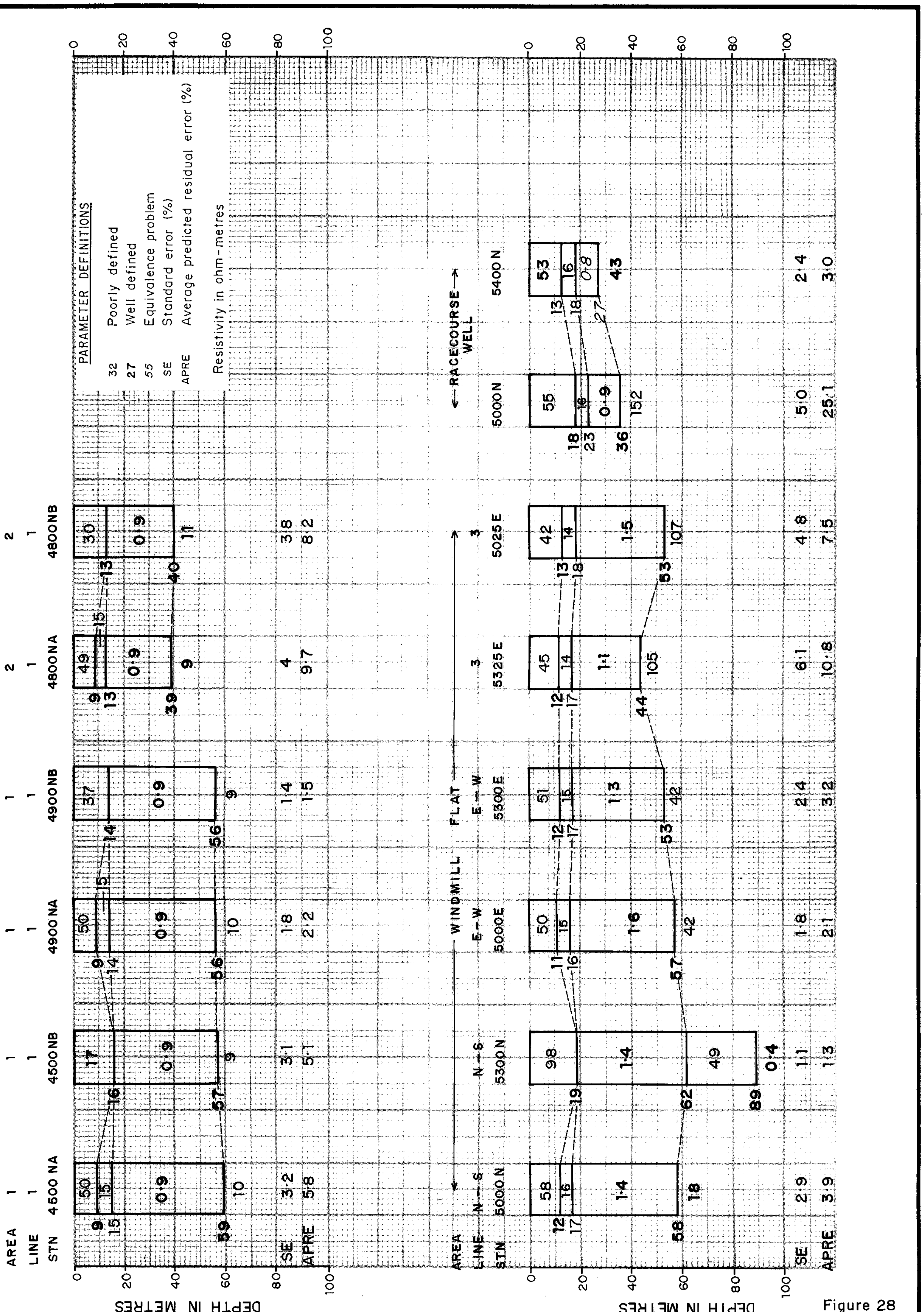


Figure 28

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1:50 000 SHEET

TEM INVERSIONS - EARLY TIMES

COMPILED
S. D.

13·11·91
C.D.O. DATE

DRAWN
M. B.

SCALE

DATE
April '91

CHECKED

PLAN NUMBER
S22143

5287

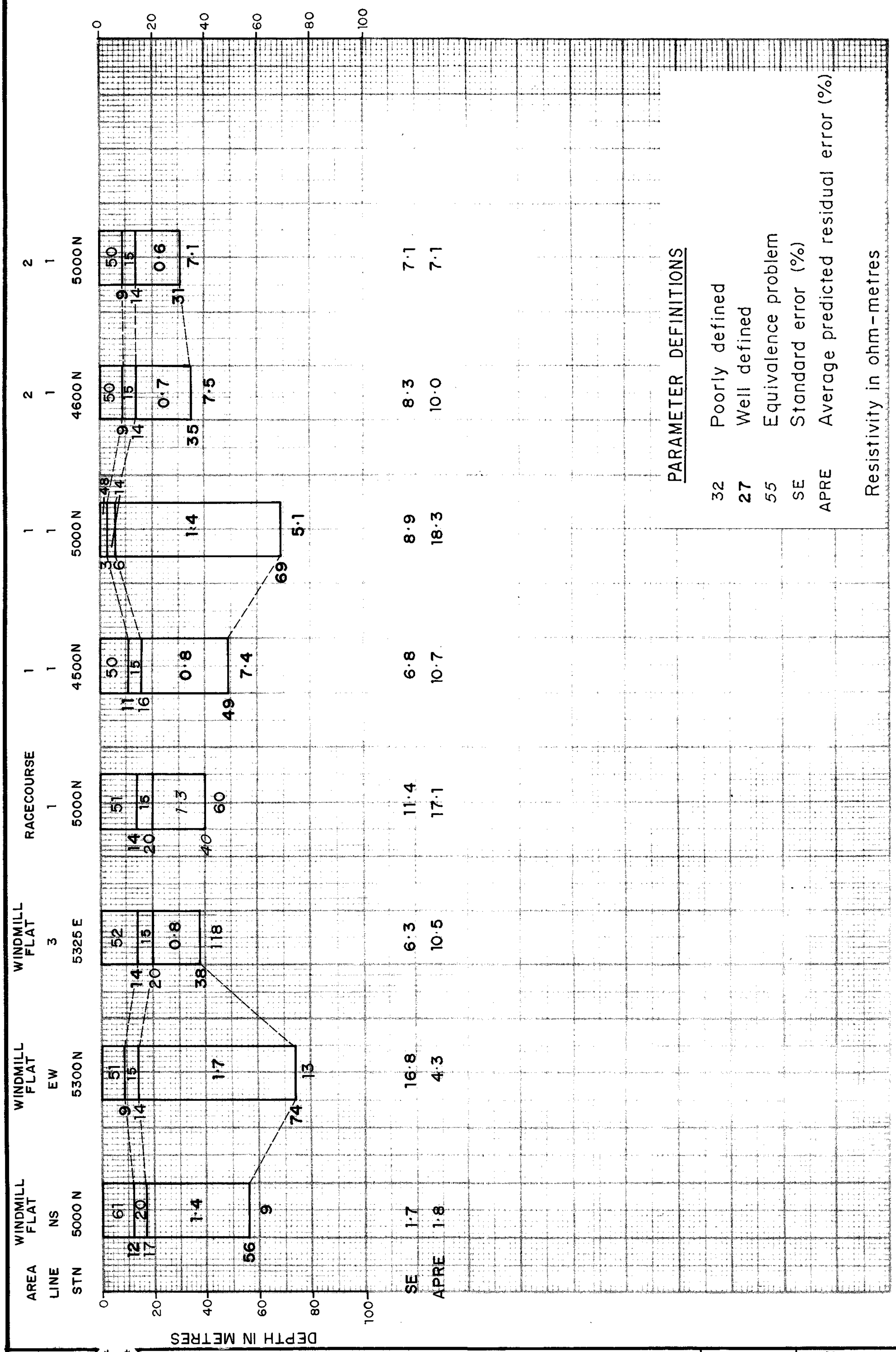


Figure 29

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - PENONG 1:50 000 SHEET

TEM INVERSIONS - STANDARD TIMES

COMPILED S. D.	13.11.91 C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S22144

5287

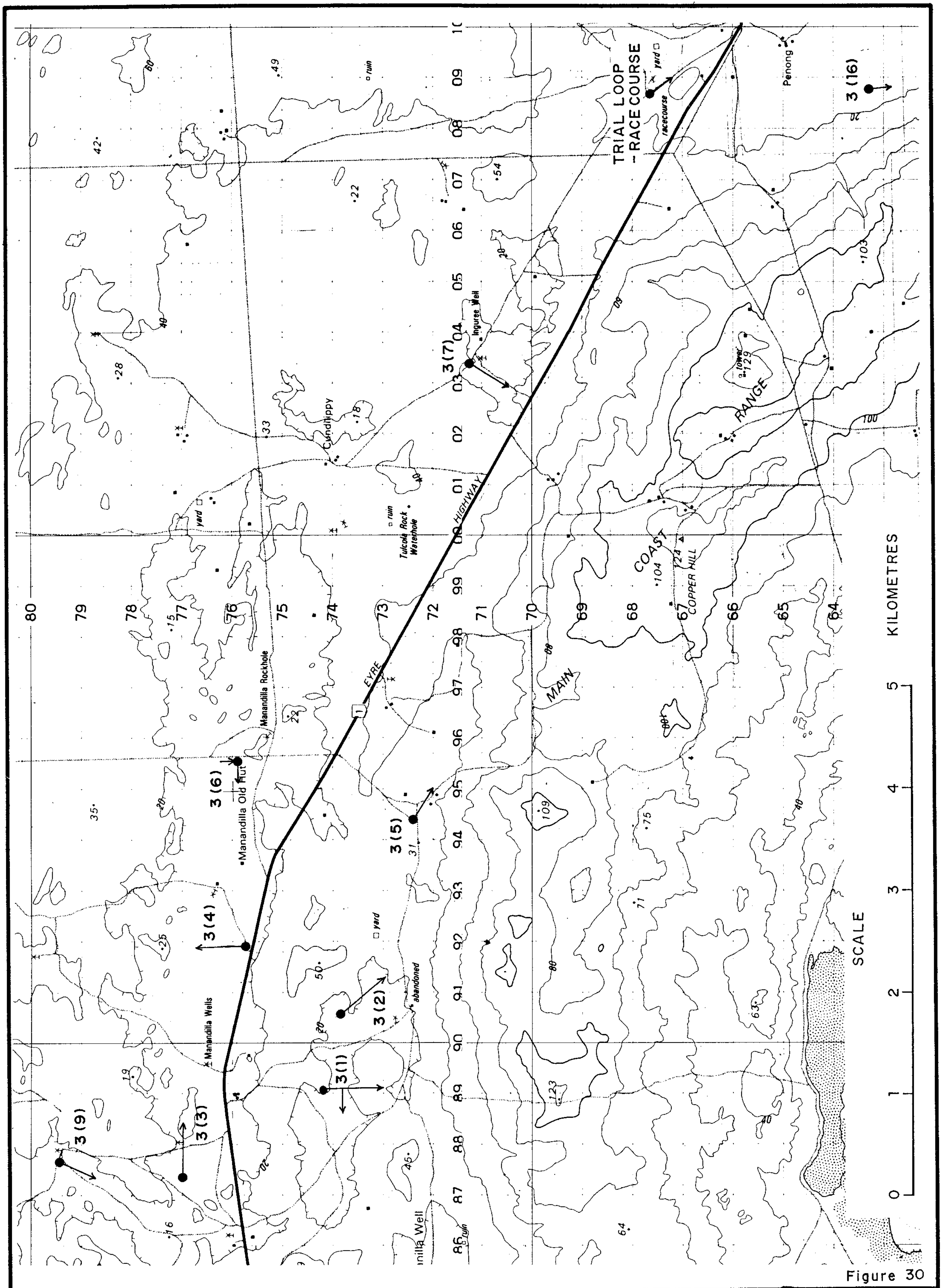


Figure 30

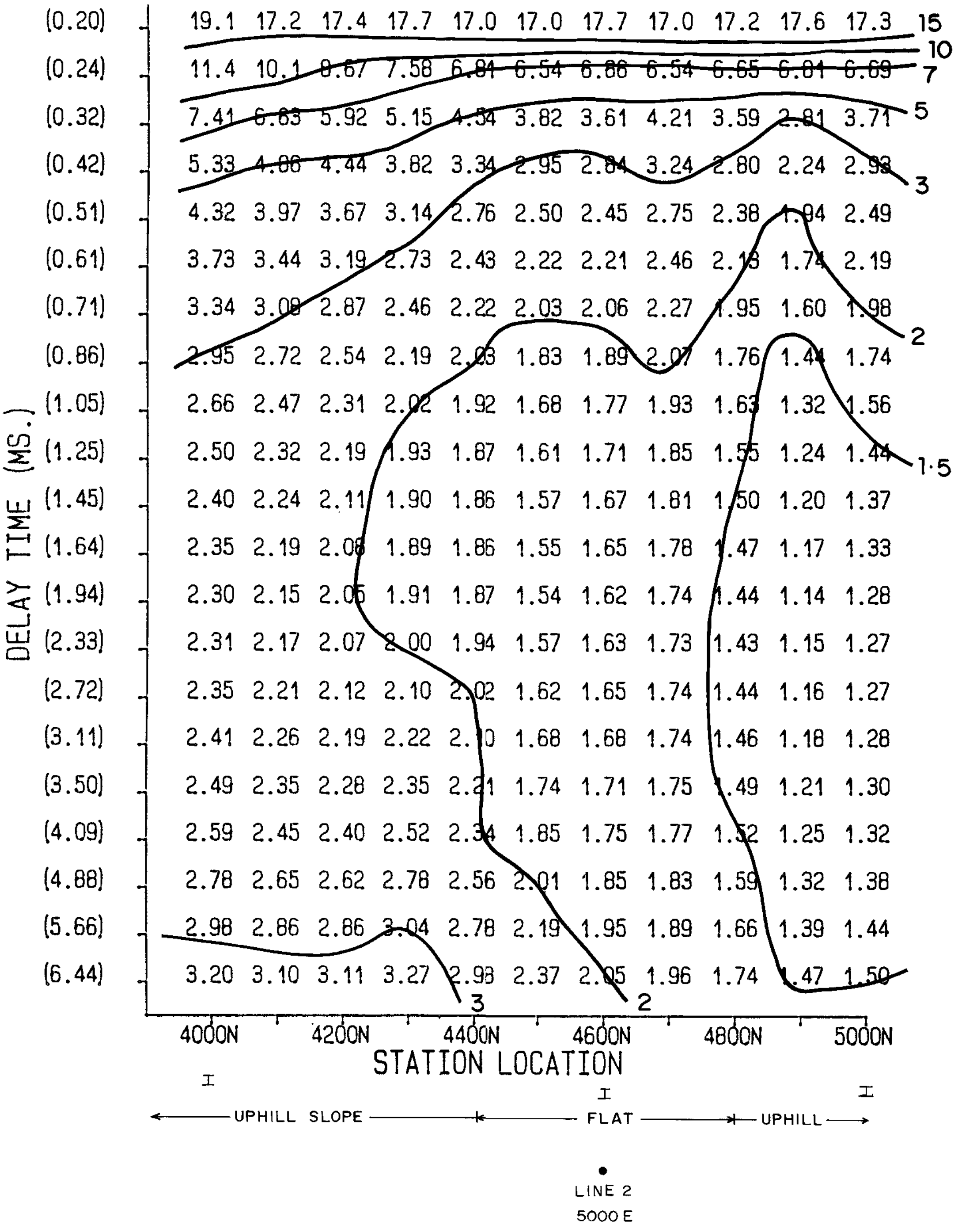
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

TRAVERSE LOCATIONS

COMPILED S. D.	13·11·91 C.D.O. DATE
DRAWN M. B.	SCALE 1 : 50000
DATE April '91	PLAN NUMBER
CHECKED	S 22145

5287



(0.20)	19.1	17.2	17.4	17.7	17.0	17.0	17.7	17.0	17.2	17.6	17.3
(0.24)	11.4	10.1	8.67	7.58	6.81	6.54	6.86	6.54	6.65	6.81	6.69
(0.32)	7.41	6.63	5.92	5.15	4.54	3.82	3.61	4.21	3.59	2.81	3.71
(0.42)	5.33	4.86	4.44	3.82	3.34	2.95	2.84	3.24	2.80	2.24	2.93
(0.51)	4.32	3.97	3.67	3.14	2.76	2.50	2.45	2.75	2.38	1.94	2.49
(0.61)	3.73	3.44	3.19	2.73	2.43	2.22	2.21	2.46	2.18	1.74	2.19
(0.71)	3.34	3.08	2.87	2.46	2.22	2.03	2.06	2.27	1.95	1.60	1.98
(0.86)	2.95	2.72	2.54	2.19	2.03	1.83	1.89	2.07	1.76	1.44	1.74
(1.05)	2.66	2.47	2.31	2.02	1.92	1.68	1.77	1.93	1.63	1.32	1.56
(1.25)	2.50	2.32	2.19	1.93	1.87	1.61	1.71	1.85	1.55	1.24	1.44
(1.45)	2.40	2.24	2.11	1.90	1.86	1.57	1.67	1.81	1.50	1.20	1.37
(1.64)	2.35	2.19	2.08	1.89	1.86	1.55	1.65	1.78	1.47	1.17	1.33
(1.94)	2.30	2.15	2.05	1.91	1.87	1.54	1.62	1.74	1.44	1.14	1.28
(2.33)	2.31	2.17	2.07	2.00	1.94	1.57	1.63	1.73	1.43	1.15	1.27
(2.72)	2.35	2.21	2.12	2.10	2.02	1.62	1.65	1.74	1.44	1.16	1.27
(3.11)	2.41	2.26	2.19	2.22	2.10	1.68	1.68	1.74	1.46	1.18	1.28
(3.50)	2.49	2.35	2.28	2.35	2.21	1.74	1.71	1.75	1.49	1.21	1.30
(4.09)	2.59	2.45	2.40	2.52	2.34	1.85	1.75	1.77	1.52	1.25	1.32
(4.88)	2.78	2.65	2.62	2.78	2.56	2.01	1.85	1.83	1.59	1.32	1.38
(5.66)	2.98	2.86	2.86	3.04	2.78	2.19	1.95	1.89	1.66	1.39	1.44
(6.44)	3.20	3.10	3.11	3.27	2.98	2.37	2.05	1.96	1.74	1.47	1.50

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 31

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

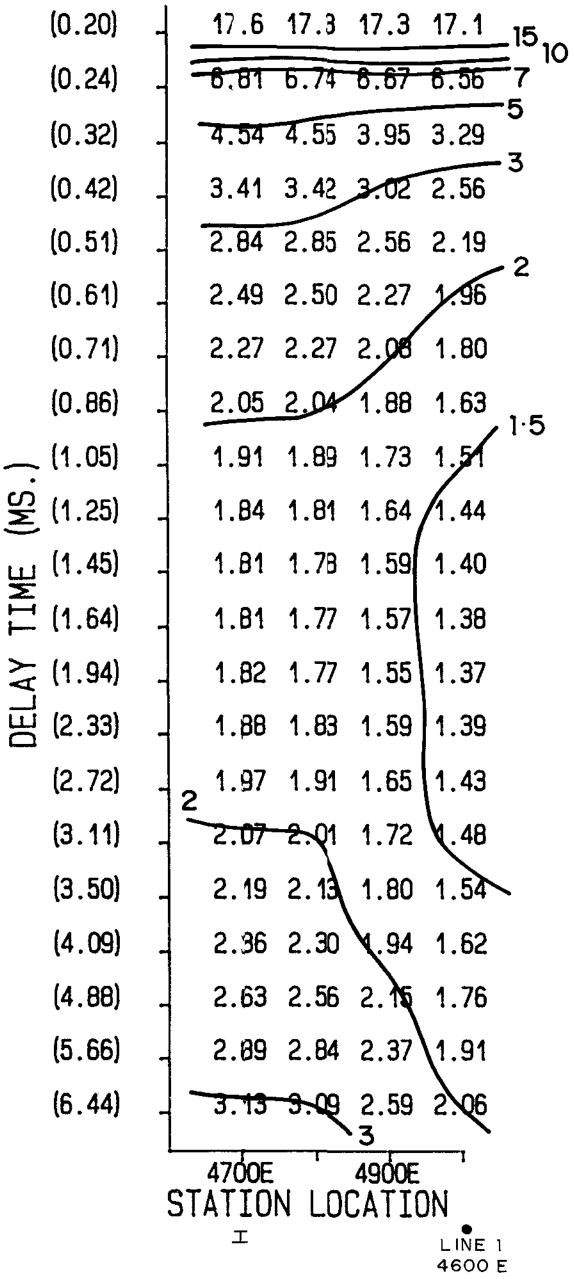
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S.D.	B 13/11/91 C.D.O. DATE		
DRAWN M.B.	SCALE		
DATE April '91	PLAN NUMBER S22146		
CHECKED			

5287



INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 43)

Figure 32

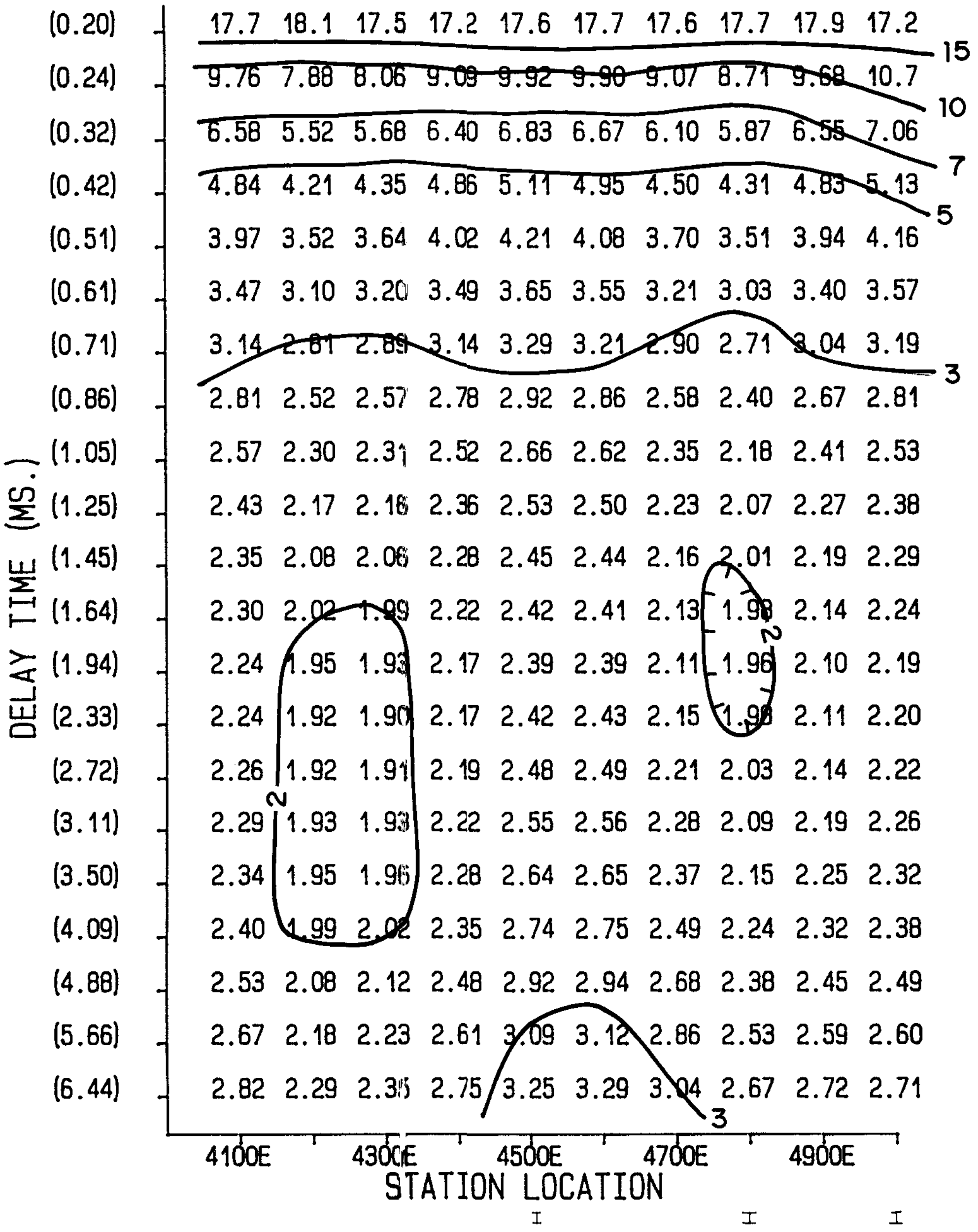
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 1, LINE 2
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	C.D.O.	DATE 13.
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER S22147	
CHECKED		

5287



(0.20)	17.7	18.1	17.5	17.2	17.6	17.7	17.6	17.7	17.9	17.2
(0.24)	9.76	7.88	8.06	9.09	9.92	9.90	9.07	8.71	9.68	10.7
(0.32)	6.58	5.52	5.68	6.40	6.83	6.67	6.10	5.87	6.55	7.06
(0.42)	4.84	4.21	4.35	4.86	5.11	4.95	4.50	4.31	4.83	5.13
(0.51)	3.97	3.52	3.64	4.02	4.21	4.08	3.70	3.51	3.94	4.16
(0.61)	3.47	3.10	3.20	3.49	3.65	3.55	3.21	3.03	3.40	3.57
(0.71)	3.14	2.81	2.89	3.14	3.29	3.21	2.90	2.71	3.04	3.19
(0.86)	2.81	2.52	2.57	2.78	2.92	2.86	2.58	2.40	2.67	2.81
(1.05)	2.57	2.30	2.31	2.52	2.66	2.62	2.35	2.18	2.41	2.53
(1.25)	2.43	2.17	2.16	2.36	2.53	2.50	2.23	2.07	2.27	2.38
(1.45)	2.35	2.08	2.06	2.28	2.45	2.44	2.16	2.01	2.19	2.29
(1.64)	2.30	2.02	1.99	2.22	2.42	2.41	2.13	1.98	2.14	2.24
(1.94)	2.24	1.95	1.93	2.17	2.39	2.39	2.11	1.96	2.10	2.19
(2.33)	2.24	1.92	1.90	2.17	2.42	2.43	2.15	1.98	2.11	2.20
(2.72)	2.26	1.92	1.91	2.19	2.48	2.49	2.21	2.03	2.14	2.22
(3.11)	2.29	1.93	1.93	2.22	2.55	2.56	2.28	2.09	2.19	2.26
(3.50)	2.34	1.95	1.96	2.28	2.64	2.65	2.37	2.15	2.25	2.32
(4.09)	2.40	1.99	2.02	2.35	2.74	2.75	2.49	2.24	2.32	2.38
(4.88)	2.53	2.08	2.12	2.48	2.92	2.94	2.68	2.38	2.45	2.49
(5.66)	2.67	2.18	2.23	2.61	3.09	3.12	2.86	2.53	2.59	2.60
(6.44)	2.82	2.29	2.35	2.75	3.25	3.29	3.04	2.67	2.72	2.71

INSTRUMENT : SIROTEM MK. II

CONFIGURATION : 100m SQ. SINGLE LOOP

RESISTIVITIES IN OHM - METRES

CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 33

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

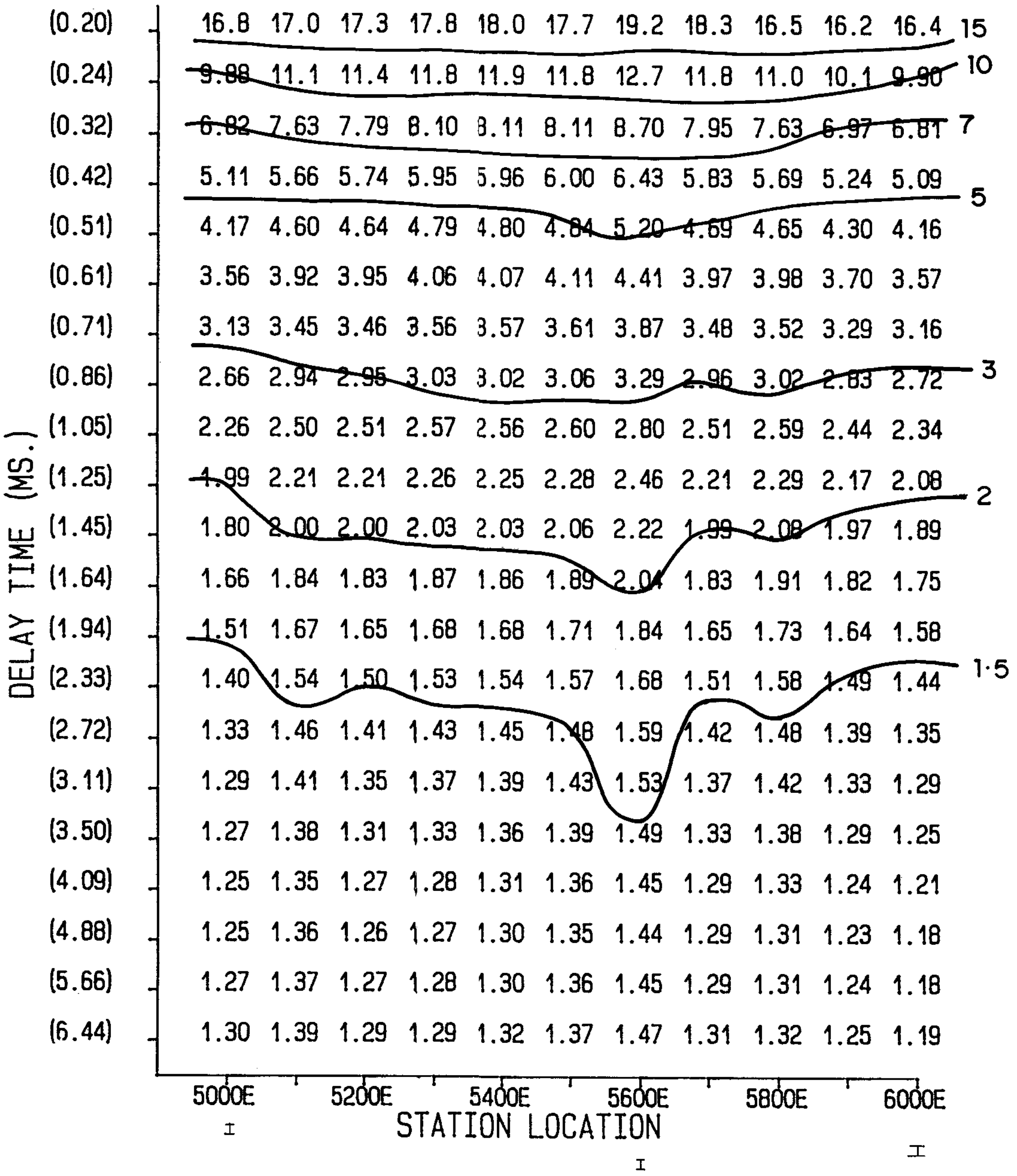
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED	S. D.	13-11-91	C.D.O. DATE
DRAWN	M. B.	SCALE	
DATE	April '91	PLAN NUMBER	
CHECKED		S 22148	

5287



(0.20)	16.8	17.0	17.3	17.8	18.0	17.7	19.2	18.3	16.5	16.2	16.4
(0.24)	9.88	11.1	11.4	11.8	11.9	11.8	12.7	11.8	11.0	10.1	9.90
(0.32)	6.82	7.63	7.79	8.10	8.11	8.11	8.70	7.95	7.63	6.97	6.81
(0.42)	5.11	5.66	5.74	5.95	5.96	6.00	6.43	5.83	5.69	5.24	5.09
(0.51)	4.17	4.60	4.64	4.79	4.80	4.84	5.20	4.69	4.65	4.30	4.16
(0.61)	3.56	3.92	3.95	4.06	4.07	4.11	4.41	3.97	3.98	3.70	3.57
(0.71)	3.13	3.45	3.46	3.56	3.57	3.61	3.87	3.48	3.52	3.29	3.16
(0.86)	2.66	2.94	2.95	3.03	3.02	3.06	3.29	2.96	3.02	2.83	2.72
(1.05)	2.26	2.50	2.51	2.57	2.56	2.60	2.80	2.51	2.59	2.44	2.34
(1.25)	1.99	2.21	2.21	2.26	2.25	2.28	2.46	2.21	2.29	2.17	2.08
(1.45)	1.80	2.00	2.00	2.03	2.03	2.06	2.22	1.99	2.08	1.97	1.89
(1.64)	1.66	1.84	1.83	1.87	1.86	1.89	2.04	1.83	1.91	1.82	1.75
(1.94)	1.51	1.67	1.65	1.68	1.68	1.71	1.84	1.65	1.73	1.64	1.58
(2.33)	1.40	1.54	1.50	1.53	1.54	1.57	1.68	1.51	1.58	1.49	1.44
(2.72)	1.33	1.46	1.41	1.43	1.45	1.48	1.59	1.42	1.48	1.39	1.35
(3.11)	1.29	1.41	1.35	1.37	1.39	1.43	1.53	1.37	1.42	1.33	1.29
(3.50)	1.27	1.38	1.31	1.33	1.36	1.39	1.49	1.33	1.38	1.29	1.25
(4.09)	1.25	1.35	1.27	1.28	1.31	1.36	1.45	1.29	1.33	1.24	1.21
(4.88)	1.25	1.36	1.26	1.27	1.30	1.35	1.44	1.29	1.31	1.23	1.18
(5.66)	1.27	1.37	1.27	1.28	1.30	1.36	1.45	1.29	1.31	1.24	1.18
(6.44)	1.30	1.39	1.29	1.29	1.32	1.37	1.47	1.31	1.32	1.25	1.19

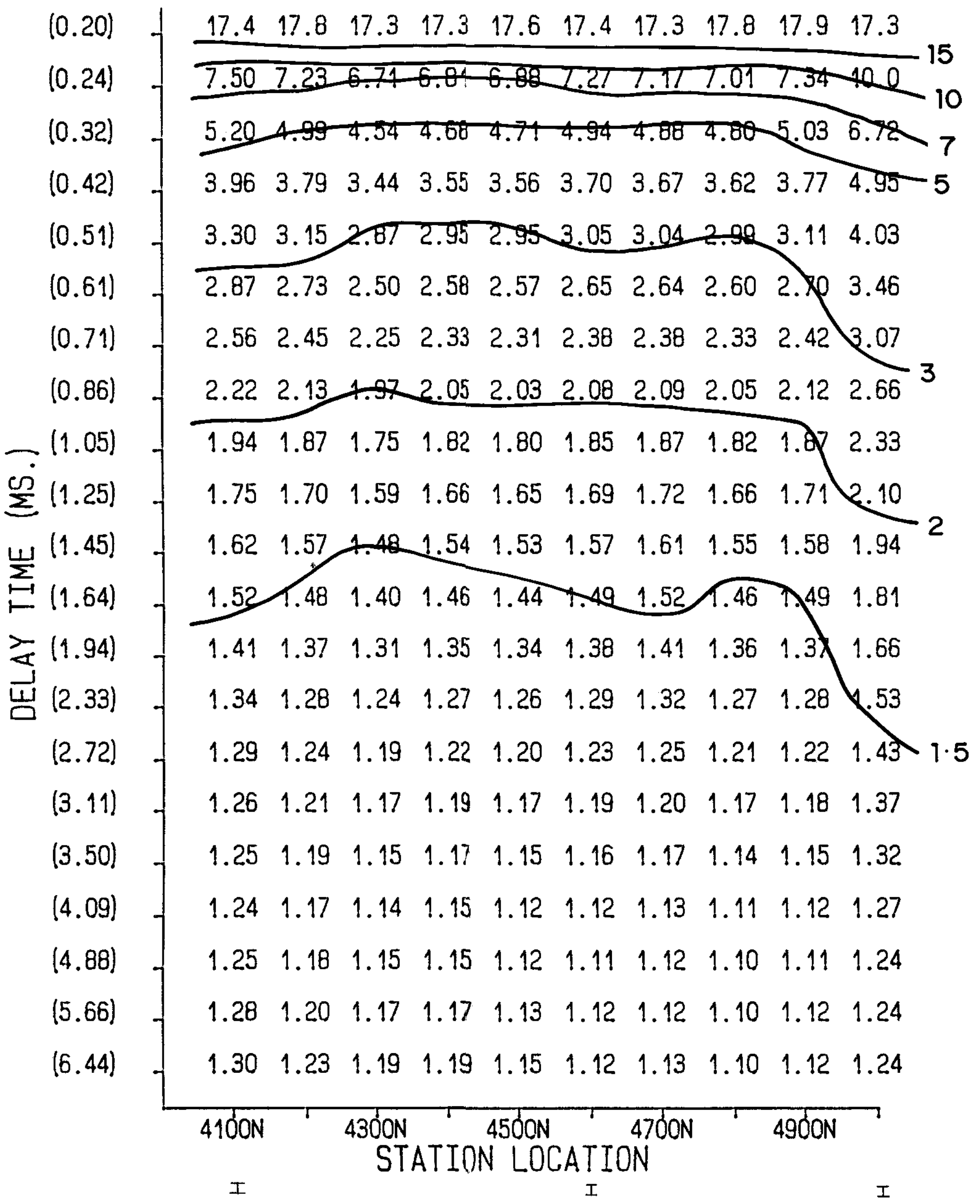
INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 34

DEPARTMENT OF MINES AND ENERGY **SOUTH AUSTRALIA**	COMPILED S.D.	13·11·91 C.D.O. DATE
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET	DRAWN M.B.	SCALE
AREA 3, LINE 1 **APPARENT RESISTIVITY PSEUDO - SECTION**	DATE April '91 CHECKED	PLAN NUMBER **S22149**

5287



(0.20)	17.4	17.8	17.3	17.3	17.6	17.4	17.3	17.8	17.9	17.3
(0.24)	7.50	7.23	6.71	6.81	6.88	7.27	7.17	7.01	7.34	10.0
(0.32)	5.20	4.99	4.54	4.68	4.71	4.94	4.88	4.80	5.03	6.72
(0.42)	3.96	3.79	3.44	3.55	3.56	3.70	3.67	3.62	3.77	4.95
(0.51)	3.30	3.15	2.87	2.95	2.95	3.05	3.04	2.98	3.11	4.03
(0.61)	2.87	2.73	2.50	2.58	2.57	2.65	2.64	2.60	2.70	3.46
(0.71)	2.56	2.45	2.25	2.33	2.31	2.38	2.38	2.33	2.42	3.07
(0.86)	2.22	2.13	1.97	2.05	2.03	2.08	2.09	2.05	2.12	2.66
(1.05)	1.94	1.87	1.75	1.82	1.80	1.85	1.87	1.82	1.87	2.33
(1.25)	1.75	1.70	1.59	1.66	1.65	1.69	1.72	1.66	1.71	2.10
(1.45)	1.62	1.57	1.48	1.54	1.53	1.57	1.61	1.55	1.58	1.94
(1.64)	1.52	1.48	1.40	1.46	1.44	1.49	1.52	1.46	1.49	1.81
(1.94)	1.41	1.37	1.31	1.35	1.34	1.38	1.41	1.36	1.37	1.66
(2.33)	1.34	1.28	1.24	1.27	1.26	1.29	1.32	1.27	1.28	1.53
(2.72)	1.29	1.24	1.19	1.22	1.20	1.23	1.25	1.21	1.22	1.43
(3.11)	1.26	1.21	1.17	1.19	1.17	1.19	1.20	1.17	1.18	1.37
(3.50)	1.25	1.19	1.15	1.17	1.15	1.16	1.17	1.14	1.15	1.32
(4.09)	1.24	1.17	1.14	1.15	1.12	1.12	1.13	1.11	1.12	1.27
(4.88)	1.25	1.18	1.15	1.15	1.12	1.11	1.12	1.10	1.11	1.24
(5.66)	1.28	1.20	1.17	1.17	1.13	1.12	1.12	1.10	1.12	1.24
(6.44)	1.30	1.23	1.19	1.19	1.15	1.12	1.13	1.10	1.12	1.24

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 35

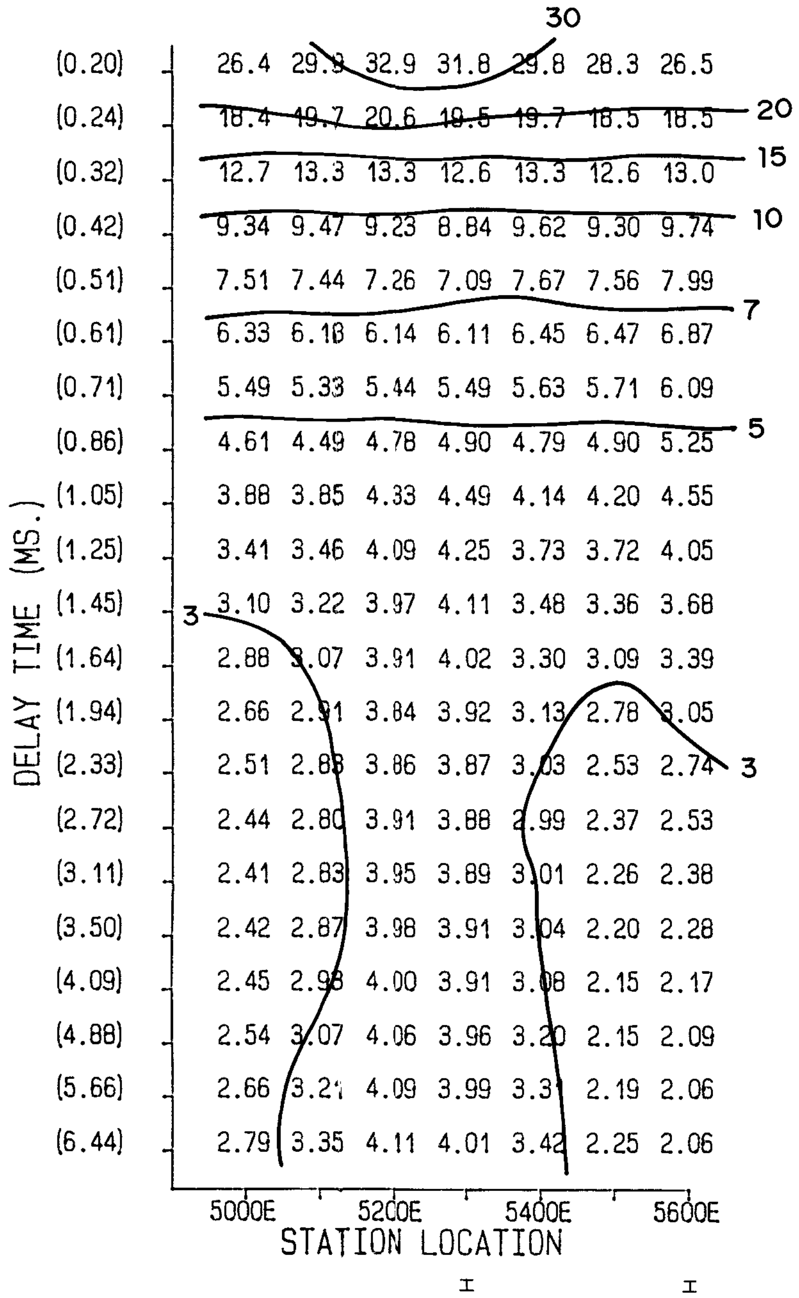
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 4, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M. B.
DATE April '91
CHECKED
13/11/91
C.D.O. DATE
SCALE
PLAN NUMBER
S22150

5287



(0.20)	26.4	29.9	32.9	31.8	29.8	28.3	26.5
(0.24)	18.4	19.7	20.6	19.5	19.7	18.5	18.5
(0.32)	12.7	13.3	13.3	12.6	13.3	12.6	13.0
(0.42)	9.34	9.47	9.23	8.84	9.62	9.30	9.74
(0.51)	7.51	7.44	7.26	7.09	7.67	7.56	7.99
(0.61)	6.33	6.18	6.14	6.11	6.45	6.47	6.87
(0.71)	5.49	5.33	5.44	5.49	5.63	5.71	6.09
(0.86)	4.61	4.49	4.78	4.90	4.79	4.90	5.25
(1.05)	3.88	3.85	4.33	4.49	4.14	4.20	4.55
(1.25)	3.41	3.46	4.09	4.25	3.73	3.72	4.05
(1.45)	3.10	3.22	3.97	4.11	3.48	3.36	3.68
(1.64)	2.88	3.07	3.91	4.02	3.30	3.09	3.39
(1.94)	2.66	2.91	3.84	3.92	3.13	2.78	3.05
(2.33)	2.51	2.88	3.86	3.87	3.03	2.53	2.74
(2.72)	2.44	2.80	3.91	3.88	2.99	2.37	2.53
(3.11)	2.41	2.83	3.95	3.89	3.01	2.26	2.38
(3.50)	2.42	2.87	3.98	3.91	3.04	2.20	2.28
(4.09)	2.45	2.98	4.00	3.91	3.08	2.15	2.17
(4.88)	2.54	3.07	4.06	3.96	3.20	2.15	2.09
(5.66)	2.66	3.21	4.09	3.99	3.31	2.19	2.06
(6.44)	2.79	3.35	4.11	4.01	3.42	2.25	2.06

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

⌶ STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 36

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

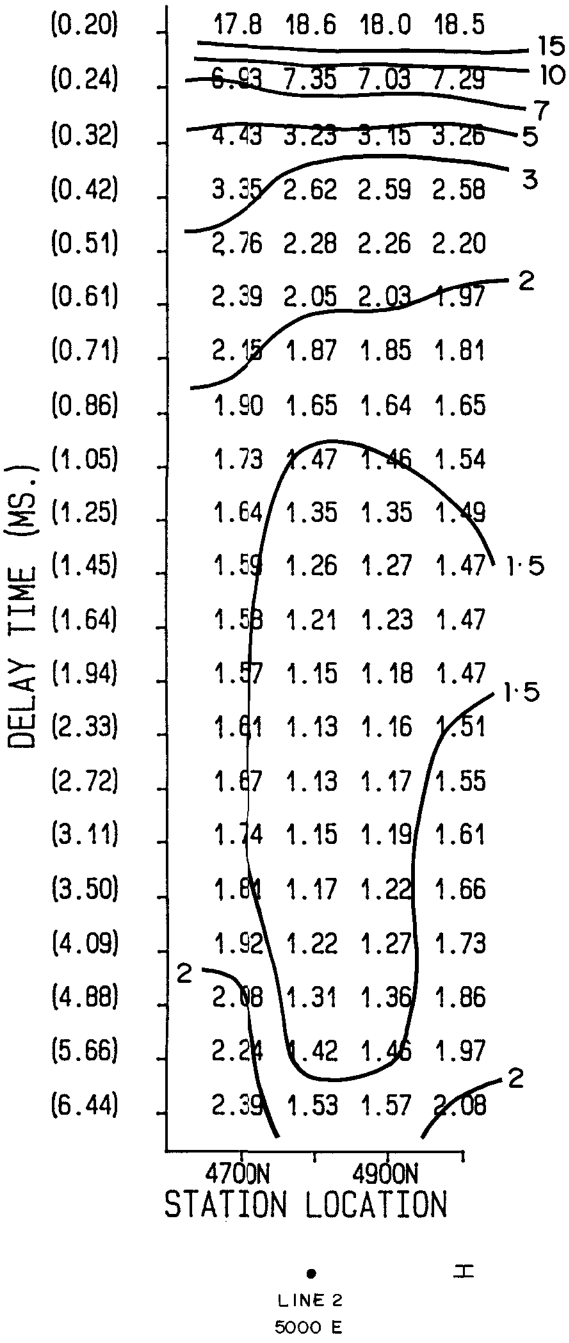
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 5, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED	S. D.	C.D.O.	13·11·91 DATE
DRAWN	M. B.	SCALE	
DATE	April '91	PLAN NUMBER	S22151
CHECKED			

5287



INSTRUMENT : SIROTEM MK. II

CONFIGURATION : 100m SQ. SINGLE LOOP

RESISTIVITIES IN OHM - METRES

CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 43)

Figure 37

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 6, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S. D.

DRAWN M.B.

DATE April '91

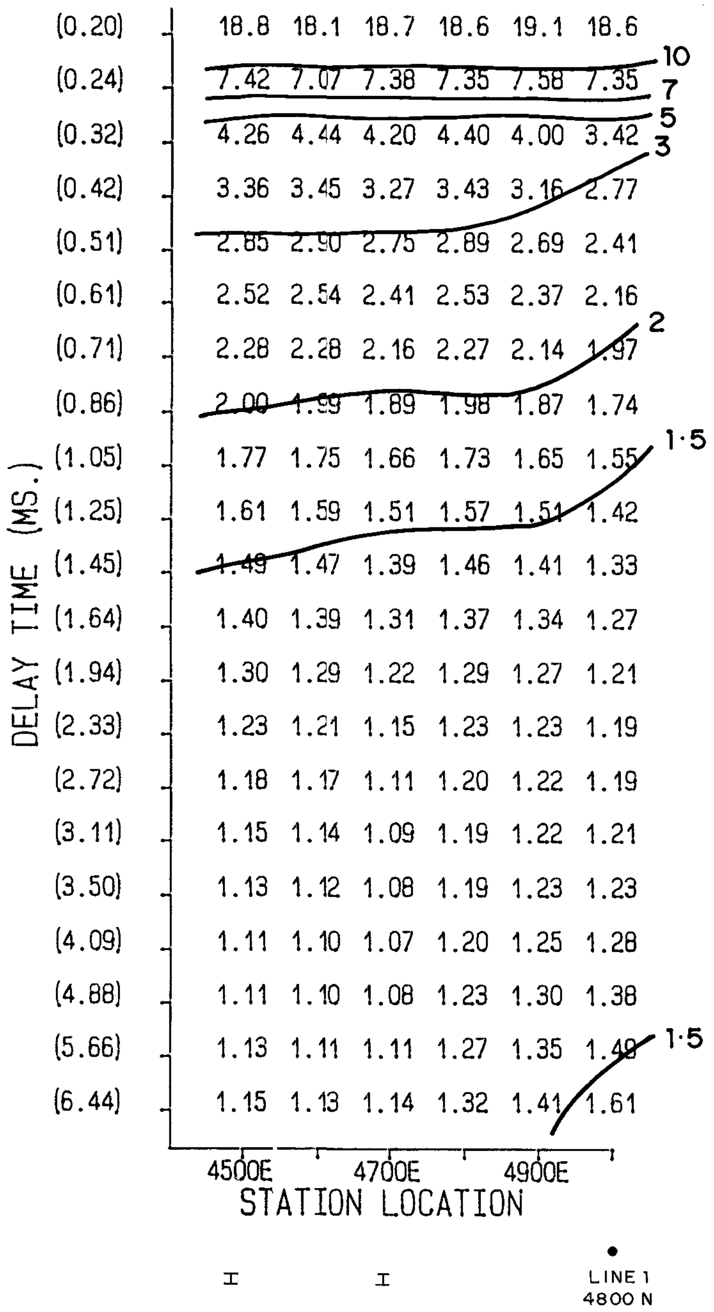
CHECKED

13·11·91
C.D.O. DATE

SCALE

PLAN NUMBER S22152

5287



(0.20)	18.8	18.1	18.7	18.6	19.1	18.6
(0.24)	7.42	7.07	7.38	7.35	7.58	7.35
(0.32)	4.26	4.44	4.20	4.40	4.00	3.42
(0.42)	3.36	3.45	3.27	3.43	3.16	2.77
(0.51)	2.85	2.90	2.75	2.89	2.69	2.41
(0.61)	2.52	2.54	2.41	2.53	2.37	2.16
(0.71)	2.28	2.28	2.16	2.27	2.14	1.97
(0.86)	2.00	1.99	1.89	1.98	1.87	1.74
(1.05)	1.77	1.75	1.66	1.73	1.65	1.55
(1.25)	1.61	1.59	1.51	1.57	1.51	1.42
(1.45)	1.49	1.47	1.39	1.46	1.41	1.33
(1.64)	1.40	1.39	1.31	1.37	1.34	1.27
(1.94)	1.30	1.29	1.22	1.29	1.27	1.21
(2.33)	1.23	1.21	1.15	1.23	1.23	1.19
(2.72)	1.18	1.17	1.11	1.20	1.22	1.19
(3.11)	1.15	1.14	1.09	1.19	1.22	1.21
(3.50)	1.13	1.12	1.08	1.19	1.23	1.23
(4.09)	1.11	1.10	1.07	1.20	1.25	1.28
(4.88)	1.11	1.10	1.08	1.23	1.30	1.38
(5.66)	1.13	1.11	1.11	1.27	1.35	1.48
(6.44)	1.15	1.13	1.14	1.32	1.41	1.61

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 38

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

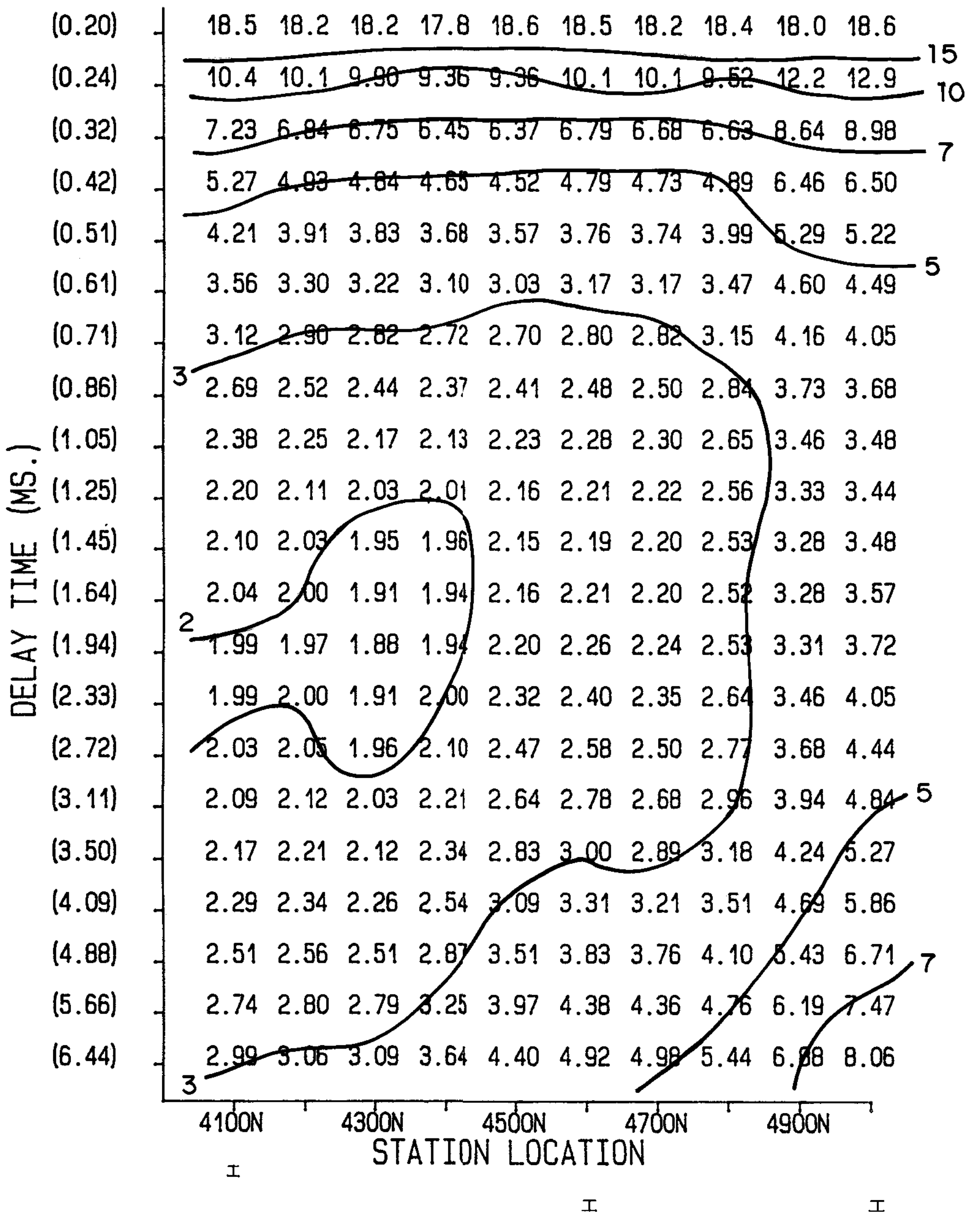
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50 000 SHEET

AREA 6, LINE 2

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S.D.
DRAWN M.B.
DATE April '91
CHECKED
13·11·91.
C.D.O. DATE
SCALE
PLAN NUMBER S22153

5287



(0.20)	18.5	18.2	18.2	17.8	18.6	18.5	18.2	18.4	18.0	18.6
(0.24)	10.4	10.1	9.90	9.36	9.36	10.1	10.1	9.52	12.2	12.9
(0.32)	7.23	6.84	6.75	6.45	6.37	6.79	6.68	6.63	8.64	8.98
(0.42)	5.27	4.93	4.84	4.65	4.52	4.79	4.73	4.89	6.46	6.50
(0.51)	4.21	3.91	3.83	3.68	3.57	3.76	3.74	3.99	5.29	5.22
(0.61)	3.56	3.30	3.22	3.10	3.03	3.17	3.17	3.47	4.60	4.49
(0.71)	3.12	2.90	2.82	2.72	2.70	2.80	2.82	3.15	4.16	4.05
(0.86)	2.69	2.52	2.44	2.37	2.41	2.48	2.50	2.84	3.73	3.68
(1.05)	2.38	2.25	2.17	2.13	2.23	2.28	2.30	2.65	3.46	3.48
(1.25)	2.20	2.11	2.03	2.01	2.16	2.21	2.22	2.56	3.33	3.44
(1.45)	2.10	2.03	1.95	1.96	2.15	2.19	2.20	2.53	3.28	3.48
(1.64)	2.04	2.00	1.91	1.94	2.16	2.21	2.20	2.52	3.28	3.57
(1.94)	1.99	1.97	1.88	1.94	2.20	2.26	2.24	2.53	3.31	3.72
(2.33)	1.99	2.00	1.91	2.00	2.32	2.40	2.35	2.64	3.46	4.05
(2.72)	2.03	2.05	1.96	2.10	2.47	2.58	2.50	2.77	3.68	4.44
(3.11)	2.09	2.12	2.03	2.21	2.64	2.78	2.68	2.96	3.94	4.84
(3.50)	2.17	2.21	2.12	2.34	2.83	3.00	2.89	3.18	4.24	5.27
(4.09)	2.29	2.34	2.26	2.54	3.09	3.31	3.21	3.51	4.69	5.86
(4.88)	2.51	2.56	2.51	2.87	3.51	3.83	3.76	4.10	5.43	6.71
(5.66)	2.74	2.80	2.79	3.25	3.97	4.38	4.36	4.76	6.19	7.47
(6.44)	2.99	3.06	3.09	3.64	4.40	4.92	4.98	5.44	6.88	8.06

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 39

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

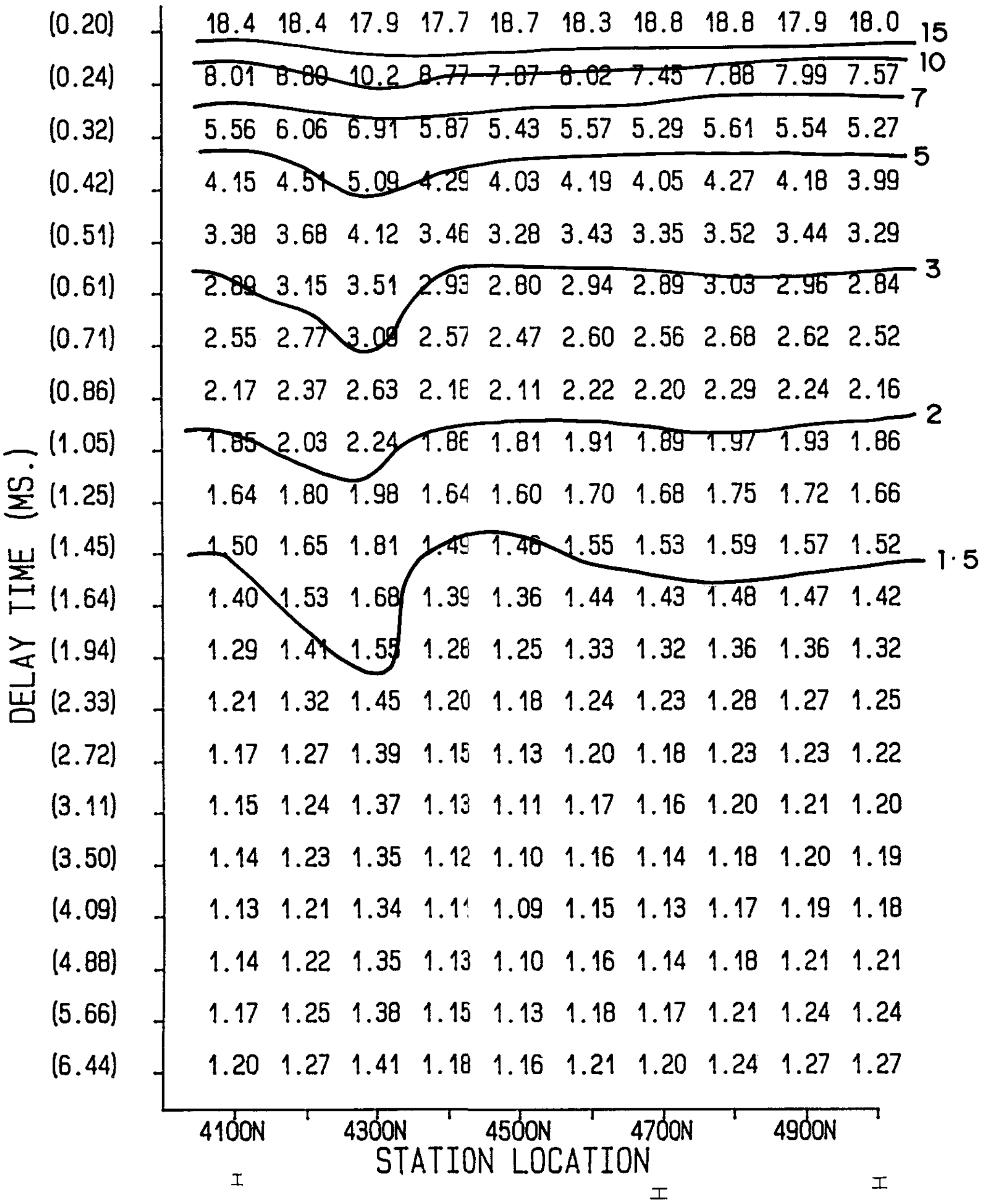
COMPILED S. D.	B 13-11-91 C.D.O. DATE	
DRAWN M.B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S22154	

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 7, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

5287



(0.20)	18.4	18.4	17.9	17.7	18.7	18.3	18.8	18.8	17.9	18.0
(0.24)	8.01	8.80	10.2	8.77	7.87	8.02	7.45	7.88	7.99	7.57
(0.32)	5.56	6.06	6.91	5.87	5.43	5.57	5.29	5.61	5.54	5.27
(0.42)	4.15	4.51	5.09	4.29	4.03	4.19	4.05	4.27	4.18	3.99
(0.51)	3.38	3.68	4.12	3.46	3.28	3.43	3.35	3.52	3.44	3.29
(0.61)	2.89	3.15	3.51	2.93	2.80	2.94	2.89	3.03	2.96	2.84
(0.71)	2.55	2.77	3.09	2.57	2.47	2.60	2.56	2.68	2.62	2.52
(0.86)	2.17	2.37	2.63	2.18	2.11	2.22	2.20	2.29	2.24	2.16
(1.05)	1.85	2.03	2.24	1.86	1.81	1.91	1.89	1.97	1.93	1.86
(1.25)	1.64	1.80	1.98	1.64	1.60	1.70	1.68	1.75	1.72	1.66
(1.45)	1.50	1.65	1.81	1.49	1.46	1.55	1.53	1.59	1.57	1.52
(1.64)	1.40	1.53	1.68	1.39	1.36	1.44	1.43	1.48	1.47	1.42
(1.94)	1.29	1.41	1.55	1.28	1.25	1.33	1.32	1.36	1.36	1.32
(2.33)	1.21	1.32	1.45	1.20	1.18	1.24	1.23	1.28	1.27	1.25
(2.72)	1.17	1.27	1.39	1.15	1.13	1.20	1.18	1.23	1.23	1.22
(3.11)	1.15	1.24	1.37	1.13	1.11	1.17	1.16	1.20	1.21	1.20
(3.50)	1.14	1.23	1.35	1.12	1.10	1.16	1.14	1.18	1.20	1.19
(4.09)	1.13	1.21	1.34	1.11	1.09	1.15	1.13	1.17	1.19	1.18
(4.88)	1.14	1.22	1.35	1.13	1.10	1.16	1.14	1.18	1.21	1.21
(5.66)	1.17	1.25	1.38	1.15	1.13	1.18	1.17	1.21	1.24	1.24
(6.44)	1.20	1.27	1.41	1.18	1.16	1.21	1.20	1.24	1.27	1.27

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 40

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

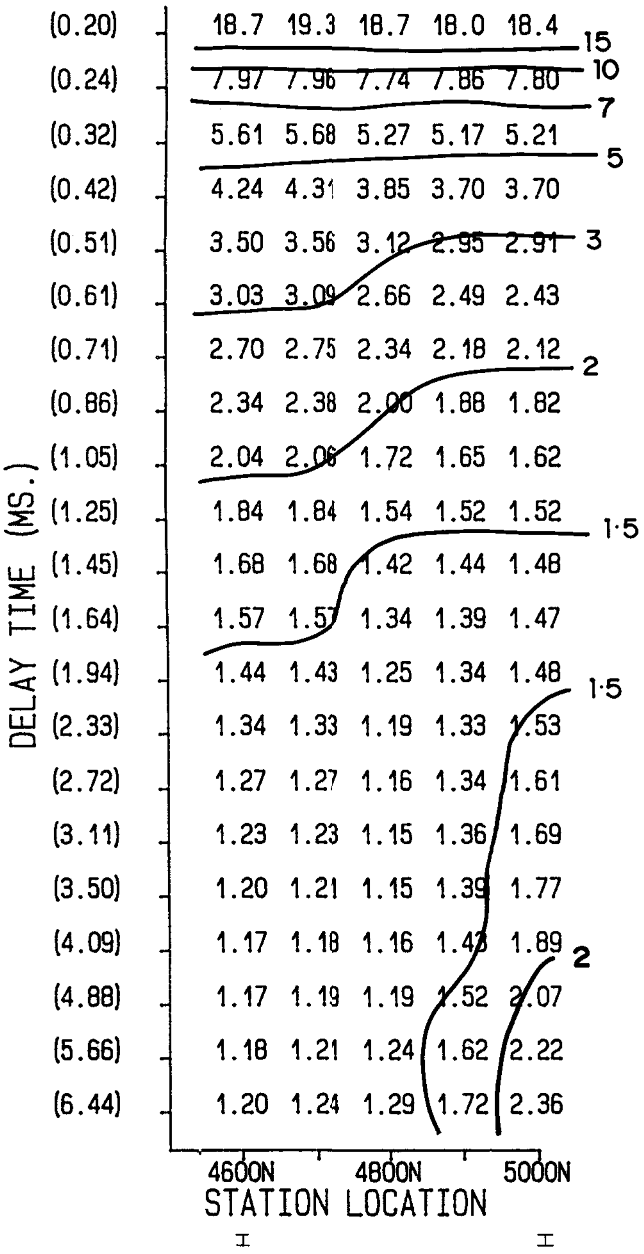
PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

AREA 9, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13·11·91 C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER S22155
CHECKED	

5287



(0.20)	18.7	19.3	18.7	18.0	18.4
(0.24)	7.97	7.96	7.74	7.86	7.80
(0.32)	5.61	5.68	5.27	5.17	5.21
(0.42)	4.24	4.31	3.85	3.70	3.70
(0.51)	3.50	3.56	3.12	2.95	2.91
(0.61)	3.03	3.09	2.66	2.49	2.43
(0.71)	2.70	2.75	2.34	2.18	2.12
(0.86)	2.34	2.38	2.00	1.88	1.82
(1.05)	2.04	2.06	1.72	1.65	1.62
(1.25)	1.84	1.84	1.54	1.52	1.52
(1.45)	1.68	1.68	1.42	1.44	1.48
(1.64)	1.57	1.57	1.34	1.39	1.47
(1.94)	1.44	1.43	1.25	1.34	1.48
(2.33)	1.34	1.33	1.19	1.33	1.53
(2.72)	1.27	1.27	1.16	1.34	1.61
(3.11)	1.23	1.23	1.15	1.36	1.69
(3.50)	1.20	1.21	1.15	1.39	1.77
(4.09)	1.17	1.18	1.16	1.43	1.89
(4.88)	1.17	1.19	1.19	1.52	2.07
(5.66)	1.18	1.21	1.24	1.62	2.22
(6.44)	1.20	1.24	1.29	1.72	2.36

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 42, 43)

Figure 41

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET
AREA 16, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S.D.
DRAWN M.B.
DATE April '91
CHECKED
13·11·91
C.D.O. DATE
SCALE
PLAN NUMBER
S22156

5287

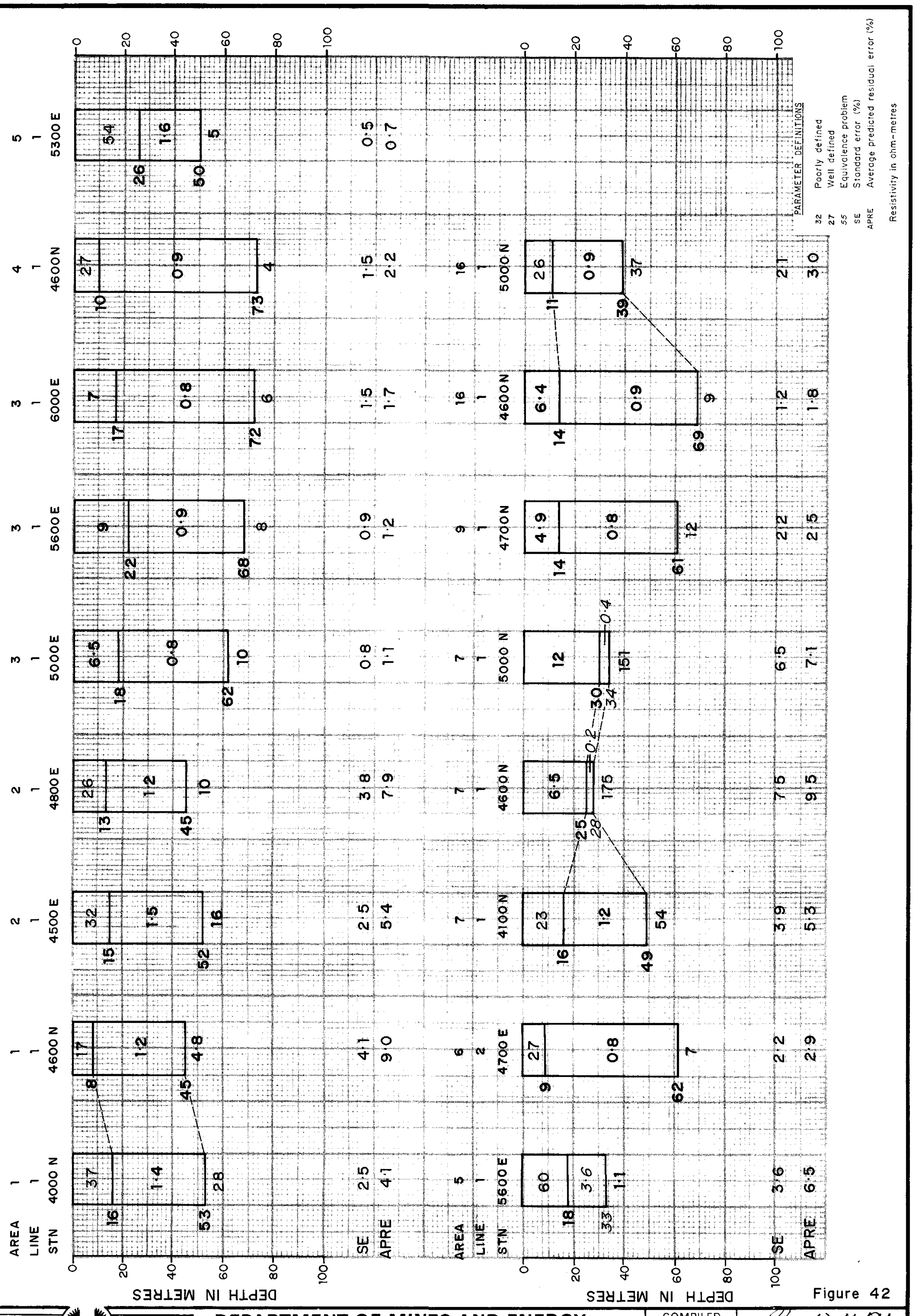


Figure 42

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

TEM INVERSIONS - EARLY TIMES

COMPILED S. D.	13.11.91 C.D.O. DATE
DRAWN M.B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S 22157

5287

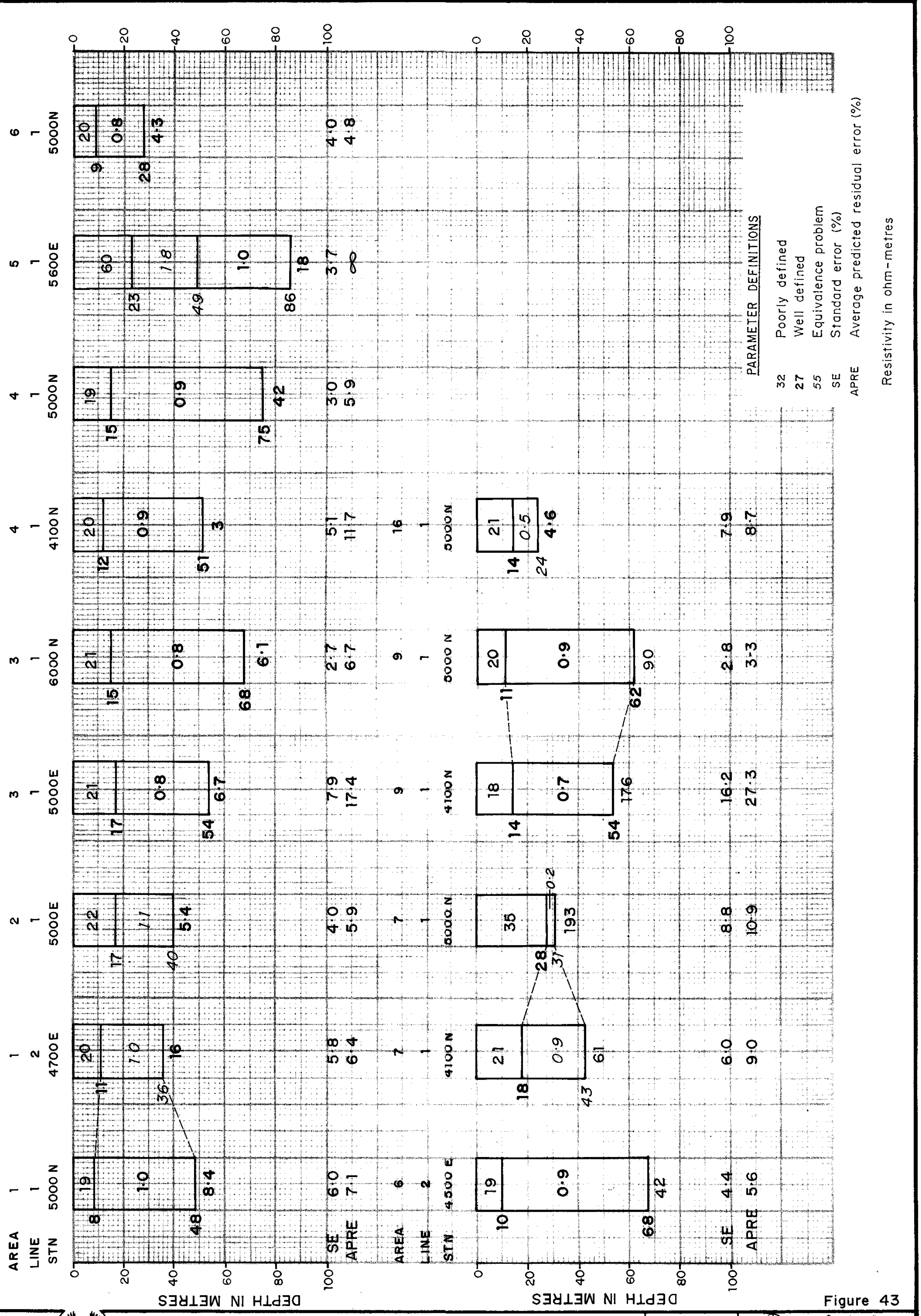


Figure 43

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - CUNDILLIPY 1:50000 SHEET

TEM INVERSIONS - STANDARD TIMES

COMPILED S. D.
DRAWN M. B.
DATE April '91
CHECKED

B 13/... C.D.O. DATE

SCALE

PLAN NUMBER S 22158

5287

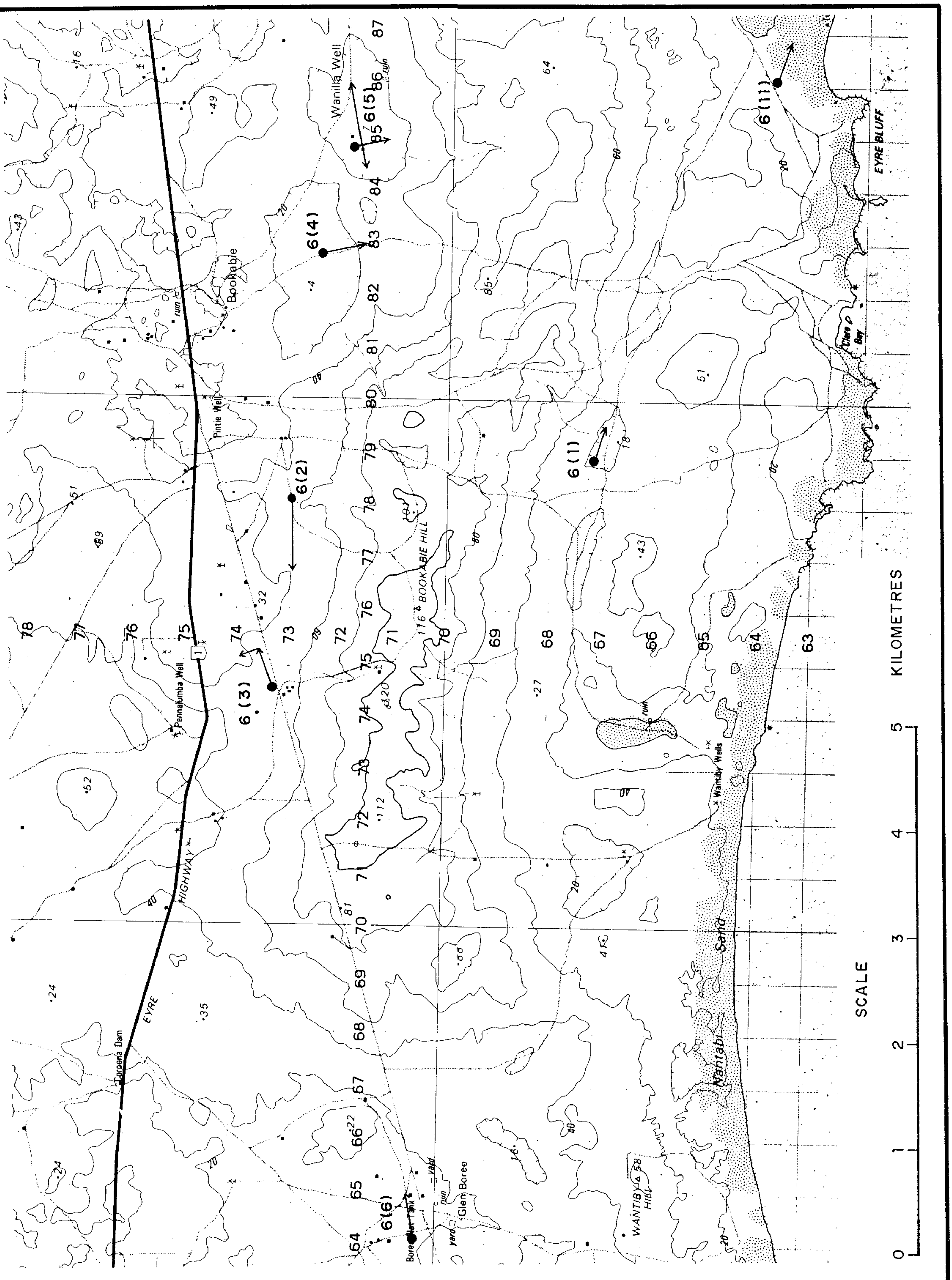


Figure 44

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1 : 50000 SHEET

TRAVERSE LOCATIONS

COMPILED S.D.

13.11.91
C.D.O. DATE

DRAWN M.B.

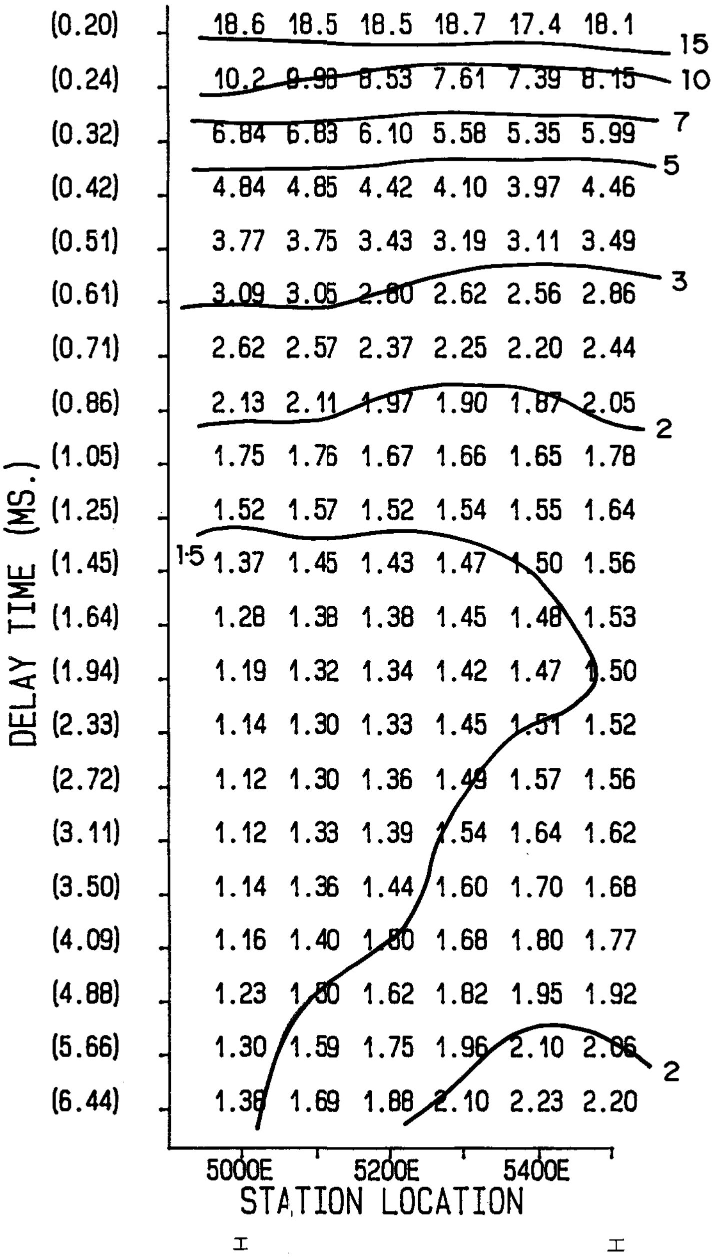
SCALE 1 : 50 000

DATE April '91

PLAN NUMBER S22159

CHECKED

5287



(0.20)	18.6	18.5	18.5	18.7	17.4	18.1
(0.24)	10.2	9.98	8.53	7.61	7.39	8.15
(0.32)	6.84	6.83	6.10	5.58	5.35	5.99
(0.42)	4.84	4.85	4.42	4.10	3.97	4.46
(0.51)	3.77	3.75	3.43	3.19	3.11	3.49
(0.61)	3.09	3.05	2.80	2.62	2.56	2.86
(0.71)	2.62	2.57	2.37	2.25	2.20	2.44
(0.86)	2.13	2.11	1.97	1.90	1.87	2.05
(1.05)	1.75	1.76	1.67	1.66	1.65	1.78
(1.25)	1.52	1.57	1.52	1.54	1.55	1.64
(1.45)	1.37	1.45	1.43	1.47	1.50	1.56
(1.64)	1.28	1.38	1.38	1.45	1.48	1.53
(1.94)	1.19	1.32	1.34	1.42	1.47	1.50
(2.33)	1.14	1.30	1.33	1.45	1.51	1.52
(2.72)	1.12	1.30	1.36	1.49	1.57	1.56
(3.11)	1.12	1.33	1.39	1.54	1.64	1.62
(3.50)	1.14	1.36	1.44	1.60	1.70	1.68
(4.09)	1.16	1.40	1.50	1.68	1.80	1.77
(4.88)	1.23	1.50	1.62	1.82	1.95	1.92
(5.66)	1.30	1.59	1.75	1.96	2.10	2.06
(6.44)	1.38	1.69	1.88	2.10	2.23	2.20

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
⌶ STATION AT WHICH DATA WERE INVERTED (see FIG. 55)

Figure 45

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

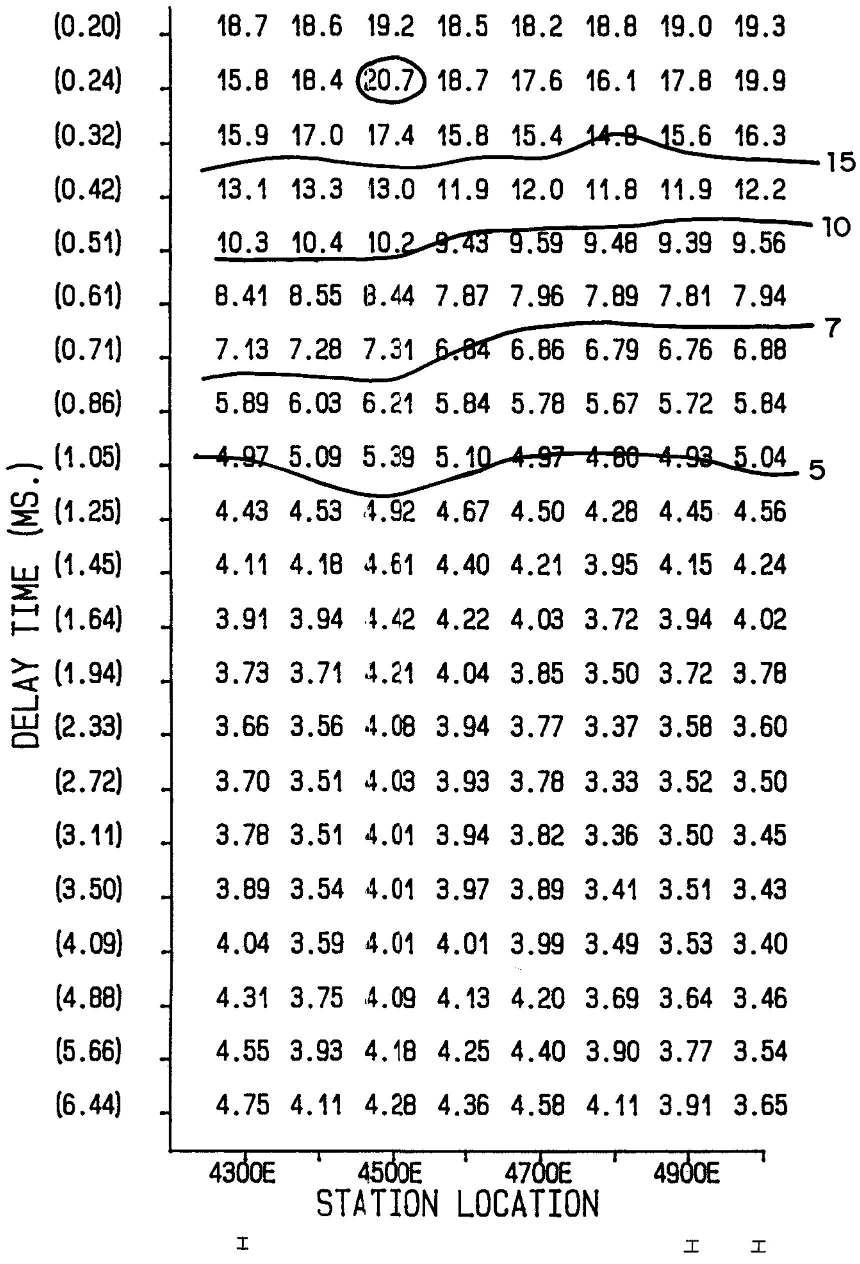
PENONG GROUNDWATER STUDY - BOOKABIE 1 : 50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED	S. D.	C.D.O.	DATE 13·11·91
DRAWN	M. B.	SCALE	
DATE	April '91	PLAN NUMBER	S22160
CHECKED			

5287



(0.20)	18.7	18.6	19.2	18.5	18.2	18.8	19.0	19.3
(0.24)	15.8	18.4	20.7	18.7	17.6	16.1	17.8	19.9
(0.32)	15.9	17.0	17.4	15.8	15.4	14.8	15.6	16.3
(0.42)	13.1	13.3	13.0	11.9	12.0	11.8	11.9	12.2
(0.51)	10.3	10.4	10.2	9.43	9.59	9.48	9.39	9.56
(0.61)	8.41	8.55	8.44	7.87	7.96	7.89	7.81	7.94
(0.71)	7.13	7.28	7.31	6.84	6.86	6.79	6.76	6.88
(0.86)	5.89	6.03	6.21	5.84	5.78	5.67	5.72	5.84
(1.05)	4.97	5.09	5.39	5.10	4.97	4.80	4.93	5.04
(1.25)	4.43	4.53	4.92	4.67	4.50	4.28	4.45	4.56
(1.45)	4.11	4.18	4.61	4.40	4.21	3.95	4.15	4.24
(1.64)	3.91	3.94	4.42	4.22	4.03	3.72	3.94	4.02
(1.94)	3.73	3.71	4.21	4.04	3.85	3.50	3.72	3.78
(2.33)	3.66	3.56	4.08	3.94	3.77	3.37	3.58	3.60
(2.72)	3.70	3.51	4.03	3.93	3.78	3.33	3.52	3.50
(3.11)	3.78	3.51	4.01	3.94	3.82	3.36	3.50	3.45
(3.50)	3.89	3.54	4.01	3.97	3.89	3.41	3.51	3.43
(4.09)	4.04	3.59	4.01	4.01	3.99	3.49	3.53	3.40
(4.88)	4.31	3.75	4.09	4.13	4.20	3.69	3.64	3.46
(5.66)	4.55	3.93	4.18	4.25	4.40	3.90	3.77	3.54
(6.44)	4.75	4.11	4.28	4.36	4.58	4.11	3.91	3.65

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 54, 55)

Figure 46

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

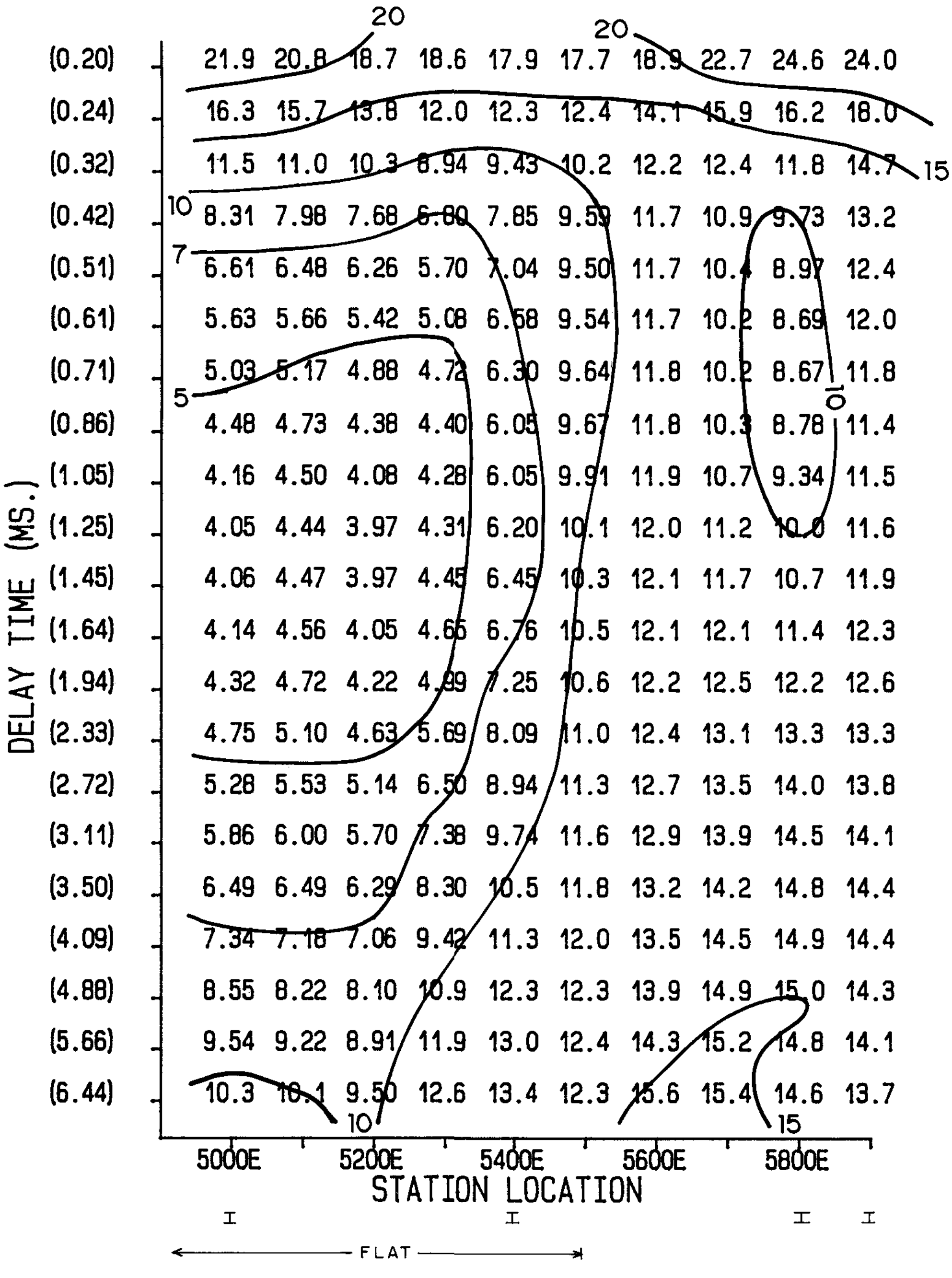
PENONG GROUNDWATER STUDY - BOOKABIE 1: 50000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S.D.
DRAWN M.B.
DATE April '91
CHECKED
C.D.O. 13·11·91. DATE
SCALE
PLAN NUMBER **S22161**

5287



(0.20)	21.9	20.8	18.7	18.6	17.9	17.7	18.9	22.7	24.6	24.0
(0.24)	16.3	15.7	13.8	12.0	12.3	12.4	14.1	15.9	16.2	18.0
(0.32)	11.5	11.0	10.3	8.94	9.43	10.2	12.2	12.4	11.8	14.7
(0.42)	8.31	7.98	7.68	6.80	7.85	9.59	11.7	10.9	9.73	13.2
(0.51)	6.61	6.48	6.26	5.70	7.04	9.50	11.7	10.4	8.97	12.4
(0.61)	5.63	5.66	5.42	5.08	6.58	9.54	11.7	10.2	8.69	12.0
(0.71)	5.03	5.17	4.88	4.72	6.30	9.64	11.8	10.2	8.67	11.8
(0.86)	4.48	4.73	4.38	4.40	6.05	9.67	11.8	10.3	8.78	11.4
(1.05)	4.16	4.50	4.08	4.28	6.05	9.91	11.9	10.7	9.34	11.5
(1.25)	4.05	4.44	3.97	4.31	6.20	10.1	12.0	11.2	10.0	11.6
(1.45)	4.06	4.47	3.97	4.45	6.45	10.3	12.1	11.7	10.7	11.9
(1.64)	4.14	4.56	4.05	4.65	6.76	10.5	12.1	12.1	11.4	12.3
(1.94)	4.32	4.72	4.22	4.99	7.25	10.6	12.2	12.5	12.2	12.6
(2.33)	4.75	5.10	4.63	5.69	8.09	11.0	12.4	13.1	13.3	13.3
(2.72)	5.28	5.53	5.14	6.50	8.94	11.3	12.7	13.5	14.0	13.8
(3.11)	5.86	6.00	5.70	7.38	9.74	11.6	12.9	13.9	14.5	14.1
(3.50)	6.49	6.49	6.29	8.30	10.5	11.8	13.2	14.2	14.8	14.4
(4.09)	7.34	7.18	7.06	9.42	11.3	12.0	13.5	14.5	14.9	14.4
(4.88)	8.55	8.22	8.10	10.9	12.3	12.3	13.9	14.9	15.0	14.3
(5.66)	9.54	9.22	8.91	11.9	13.0	12.4	14.3	15.2	14.8	14.1
(6.44)	10.3	10.1	9.50	12.6	13.4	12.3	15.6	15.4	14.6	13.7

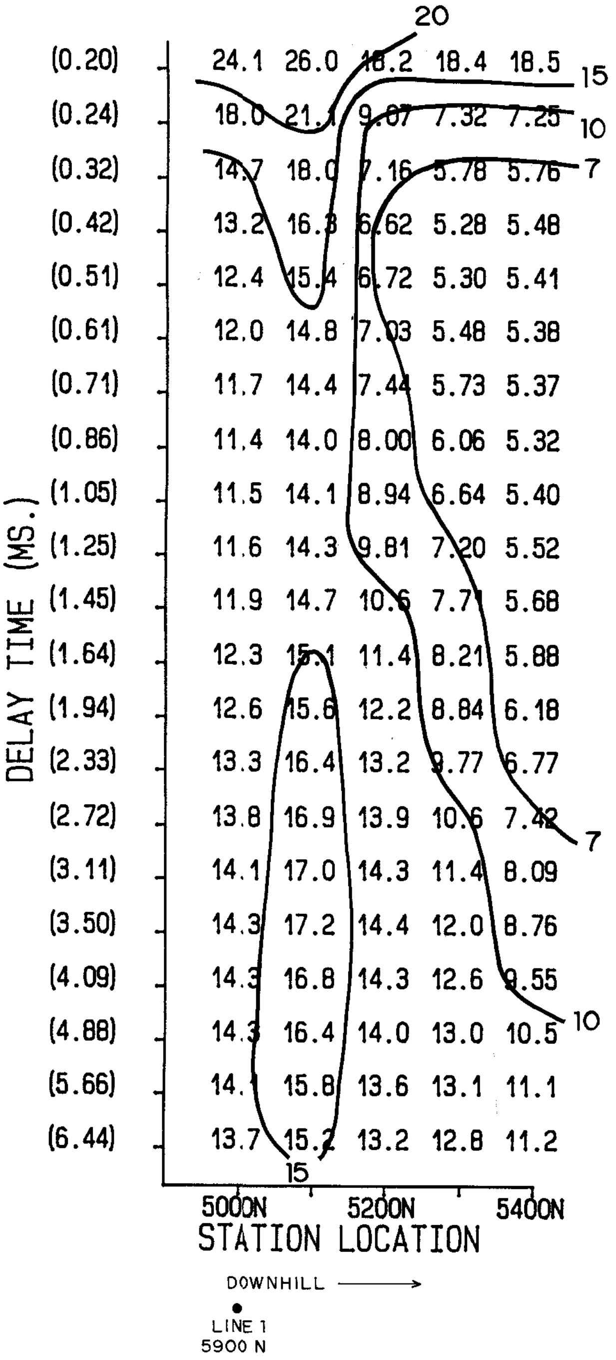
LINE 2
5000 N

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 54, 55)

Figure 47

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	COMPILED S. D.	B 13·11·91. C.D.O. DATE
PENONG GROUNDWATER STUDY - BOOKABIE 1 : 50 000 SHEET	DRAWN M. B.	SCALE
AREA 3, LINE 1 APPARENT RESISTIVITY PSEUDO - SECTION	DATE April '91 CHECKED	PLAN NUMBER S22162

5287



(0.20)	24.1	26.0	18.2	18.4	18.5
(0.24)	18.0	21.1	9.07	7.32	7.25
(0.32)	14.7	18.0	7.16	5.78	5.76
(0.42)	13.2	16.3	6.62	5.28	5.48
(0.51)	12.4	15.4	6.72	5.30	5.41
(0.61)	12.0	14.8	7.03	5.48	5.38
(0.71)	11.7	14.4	7.44	5.73	5.37
(0.86)	11.4	14.0	8.00	6.06	5.32
(1.05)	11.5	14.1	8.94	6.64	5.40
(1.25)	11.6	14.3	9.81	7.20	5.52
(1.45)	11.9	14.7	10.6	7.71	5.68
(1.64)	12.3	15.1	11.4	8.21	5.88
(1.94)	12.6	15.6	12.2	8.84	6.18
(2.33)	13.3	16.4	13.2	9.77	6.77
(2.72)	13.8	16.9	13.9	10.6	7.42
(3.11)	14.1	17.0	14.3	11.4	8.09
(3.50)	14.3	17.2	14.4	12.0	8.76
(4.09)	14.3	16.8	14.3	12.6	9.55
(4.88)	14.3	16.4	14.0	13.0	10.5
(5.66)	14.1	15.8	13.6	13.1	11.1
(6.44)	13.7	15.2	13.2	12.8	11.2

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

Figure 48

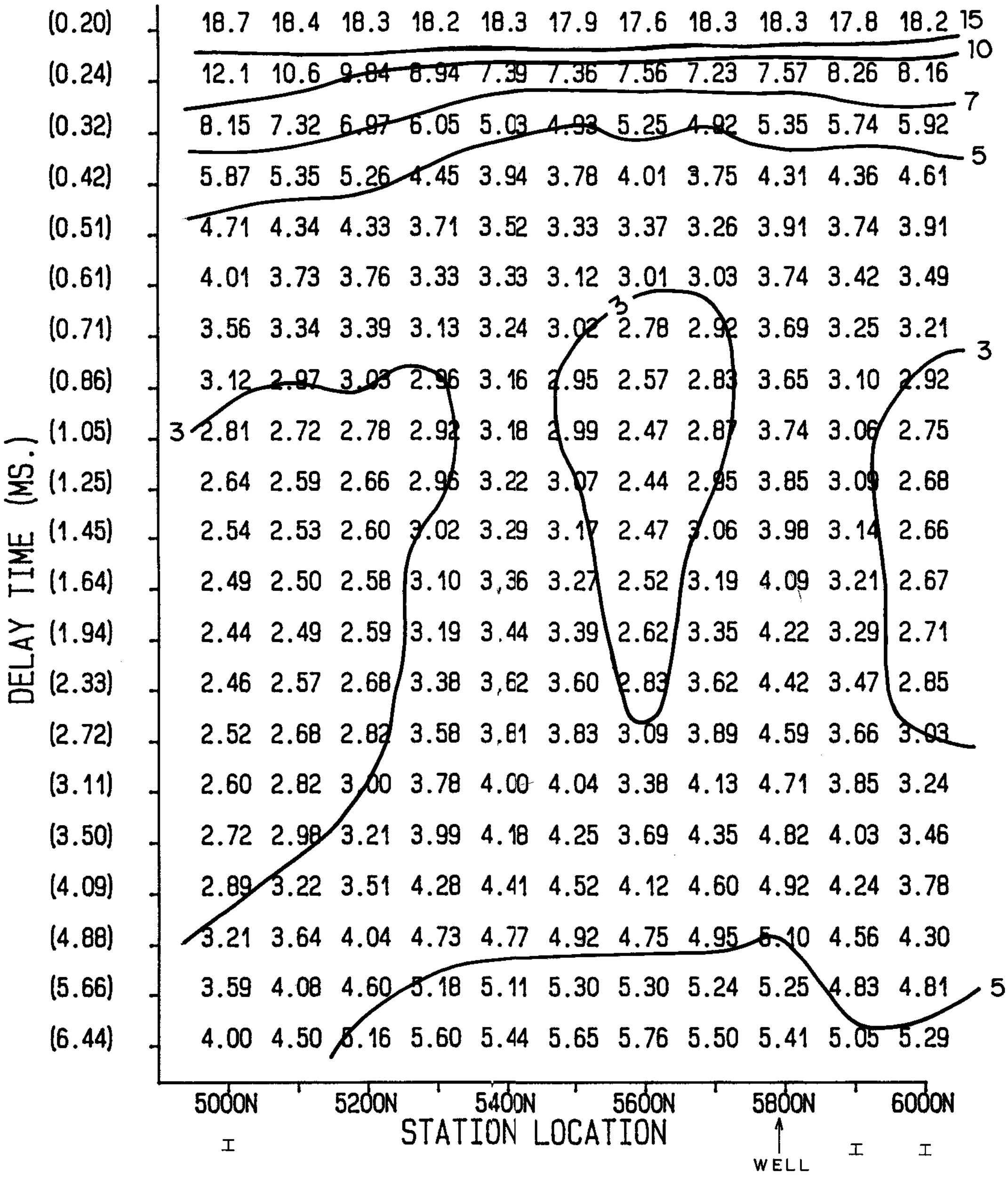
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1:50000 SHEET

AREA 3, LINE 2
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M. B.
DATE April '91
CHECKED
13.11.91
C.D.O. DATE
SCALE
PLAN NUMBER S22163

5287



	5000N		5200N		5400N		5600N		5800N		6000N
(0.20)	18.7	18.4	18.3	18.2	18.3	17.9	17.6	18.3	18.3	17.8	18.2
(0.24)	12.1	10.6	9.84	8.94	7.39	7.36	7.56	7.23	7.57	8.26	8.16
(0.32)	8.15	7.32	6.97	6.05	5.03	4.93	5.25	4.92	5.35	5.74	5.92
(0.42)	5.87	5.35	5.26	4.45	3.94	3.78	4.01	3.75	4.31	4.36	4.61
(0.51)	4.71	4.34	4.33	3.71	3.52	3.33	3.37	3.26	3.91	3.74	3.91
(0.61)	4.01	3.73	3.76	3.33	3.33	3.12	3.01	3.03	3.74	3.42	3.49
(0.71)	3.56	3.34	3.39	3.13	3.24	3.02	2.78	2.92	3.69	3.25	3.21
(0.86)	3.12	2.97	3.03	2.96	3.16	2.95	2.57	2.83	3.65	3.10	2.92
(1.05)	2.81	2.72	2.78	2.92	3.18	2.99	2.47	2.87	3.74	3.06	2.75
(1.25)	2.64	2.59	2.66	2.96	3.22	3.07	2.44	2.85	3.85	3.09	2.68
(1.45)	2.54	2.53	2.60	3.02	3.29	3.17	2.47	3.06	3.98	3.14	2.66
(1.64)	2.49	2.50	2.58	3.10	3,36	3.27	2.52	3.19	4.09	3.21	2.67
(1.94)	2.44	2.49	2.59	3.19	3.44	3.39	2.62	3.35	4.22	3.29	2.71
(2.33)	2.46	2.57	2.68	3.38	3,62	3.60	2.83	3.62	4.42	3.47	2.85
(2.72)	2.52	2.68	2.82	3.58	3,81	3.83	3.09	3.89	4.59	3.66	3.03
(3.11)	2.60	2.82	3.00	3.78	4.00	4.04	3.38	4.13	4.71	3.85	3.24
(3.50)	2.72	2.98	3.21	3.99	4.18	4.25	3.69	4.35	4.82	4.03	3.46
(4.09)	2.89	3.22	3.51	4.28	4.41	4.52	4.12	4.60	4.92	4.24	3.78
(4.88)	3.21	3.64	4.04	4.73	4.77	4.92	4.75	4.95	5.10	4.56	4.30
(5.66)	3.59	4.08	4.60	5.18	5.11	5.30	5.30	5.24	5.25	4.83	4.81
(6.44)	4.00	4.50	5.16	5.60	5.44	5.65	5.76	5.50	5.41	5.05	5.29

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 54, 55)

Figure 49

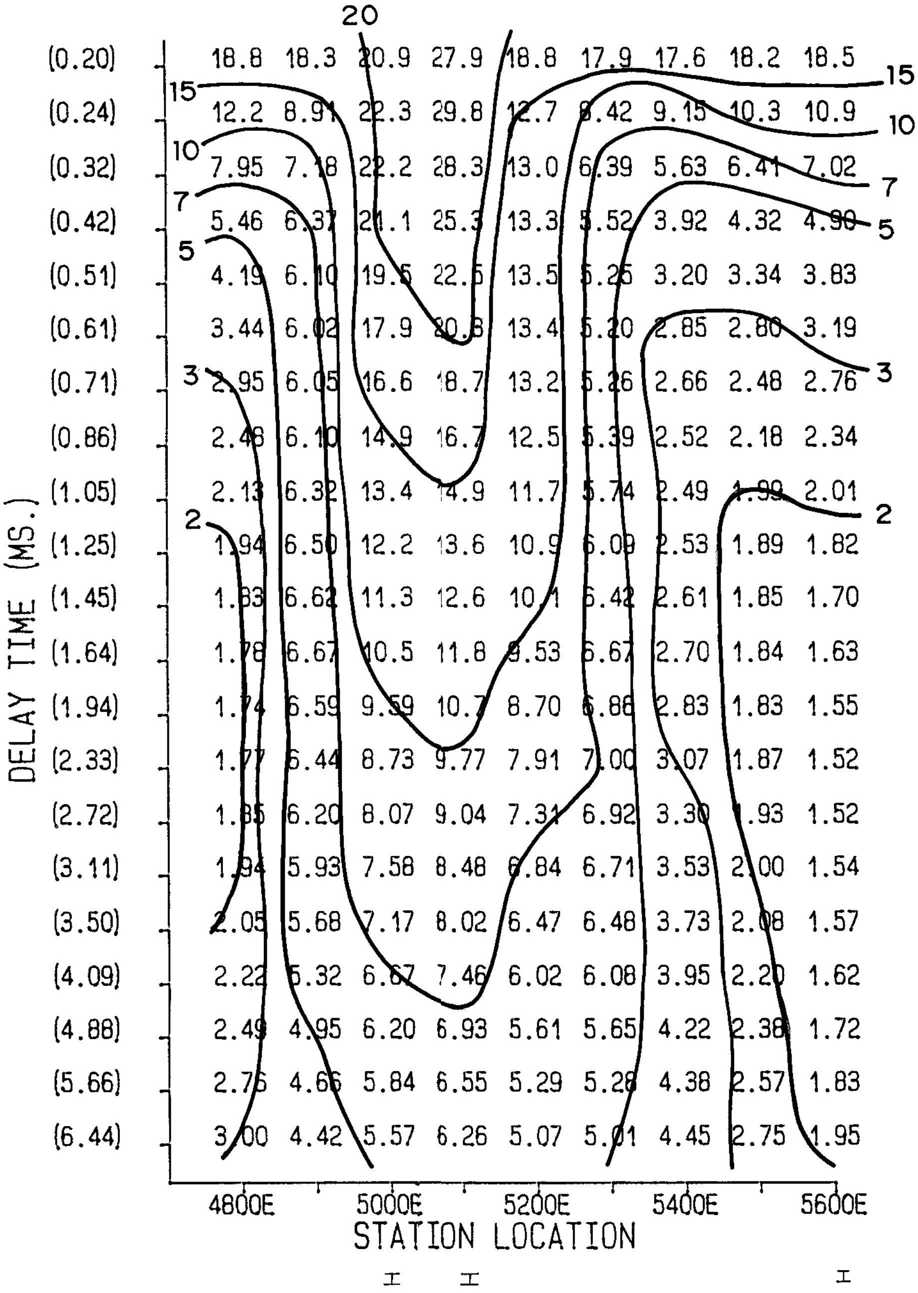
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1:50000 SHEET

AREA 4, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M.B.
DATE April '91
CHECKED
13·11·91.
C.D.O. DATE
SCALE
PLAN NUMBER S22164

5287



(0.20)	18.8	18.3	20.9	27.9	18.8	17.9	17.6	18.2	18.5
(0.24)	12.2	8.91	22.3	29.8	12.7	8.42	9.15	10.3	10.9
(0.32)	7.95	7.18	22.2	28.3	13.0	6.39	5.63	6.41	7.02
(0.42)	5.46	6.37	21.1	25.3	13.3	5.52	3.92	4.32	4.90
(0.51)	4.19	6.10	19.5	22.5	13.5	5.25	3.20	3.34	3.83
(0.61)	3.44	6.02	17.9	20.8	13.4	5.20	2.85	2.80	3.19
(0.71)	2.95	6.05	16.6	18.7	13.2	5.26	2.66	2.48	2.76
(0.86)	2.48	6.10	14.9	16.7	12.5	5.39	2.52	2.18	2.34
(1.05)	2.13	6.32	13.4	14.9	11.7	5.74	2.49	1.99	2.01
(1.25)	1.94	6.50	12.2	13.6	10.9	6.09	2.53	1.89	1.82
(1.45)	1.83	6.62	11.3	12.6	10.1	6.42	2.61	1.85	1.70
(1.64)	1.78	6.67	10.5	11.8	9.53	6.67	2.70	1.84	1.63
(1.94)	1.74	6.59	9.59	10.7	8.70	6.86	2.83	1.83	1.55
(2.33)	1.77	6.44	8.73	9.77	7.91	7.00	3.07	1.87	1.52
(2.72)	1.85	6.20	8.07	9.04	7.31	6.92	3.30	1.93	1.52
(3.11)	1.94	5.93	7.58	8.48	6.84	6.71	3.53	2.00	1.54
(3.50)	2.05	5.68	7.17	8.02	6.47	6.48	3.73	2.08	1.57
(4.09)	2.22	5.32	6.67	7.46	6.02	6.08	3.95	2.20	1.62
(4.88)	2.49	4.95	6.20	6.93	5.61	5.65	4.22	2.38	1.72
(5.66)	2.76	4.66	5.84	6.55	5.29	5.28	4.38	2.57	1.83
(6.44)	3.00	4.42	5.57	6.26	5.07	5.01	4.45	2.75	1.95

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 54, 55)

Figure 50

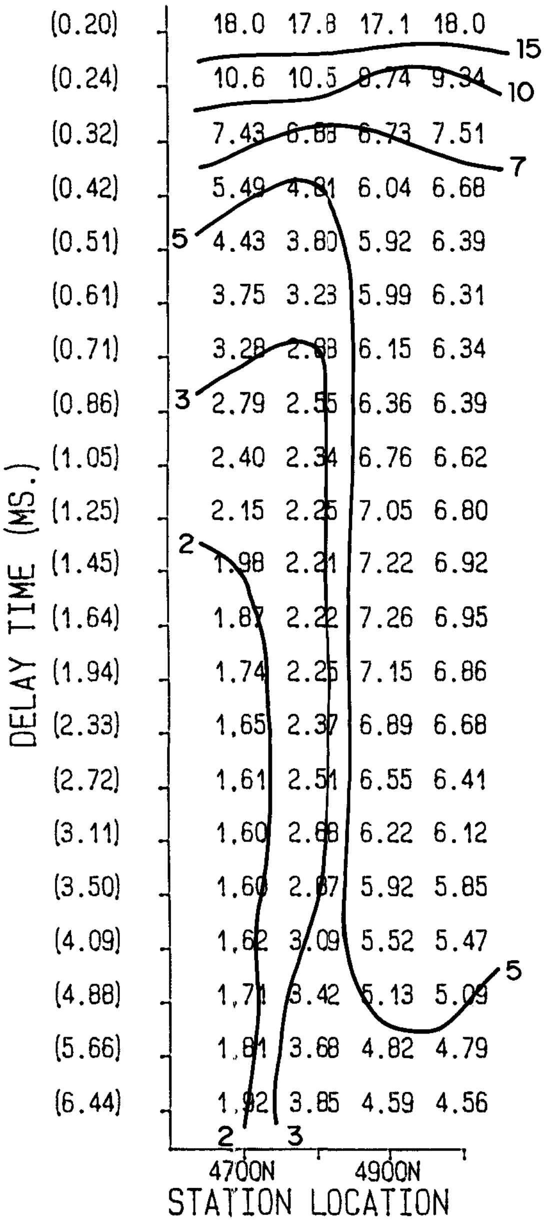
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1:50000 SHEET

AREA 5, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13/1/91 C.D.O. DATE	
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S22165	

5287



(0.20)	18.0	17.8	17.1	18.0
(0.24)	10.6	10.5	8.74	9.34
(0.32)	7.43	6.88	6.73	7.51
(0.42)	5.49	4.81	6.04	6.68
(0.51)	4.43	3.80	5.92	6.39
(0.61)	3.75	3.23	5.99	6.31
(0.71)	3.28	2.88	6.15	6.34
(0.86)	2,79	2.55	6.36	6.39
(1.05)	2,40	2.34	6.76	6.62
(1.25)	2.15	2.25	7.05	6.80
(1.45)	1.98	2.21	7.22	6.92
(1.64)	1.87	2.22	7.26	6.95
(1.94)	1,74	2.25	7.15	6.86
(2.33)	1,65	2.37	6.89	6.68
(2.72)	1,61	2.51	6.55	6.41
(3.11)	1,60	2.88	6.22	6.12
(3.50)	1,60	2.87	5.92	5.85
(4.09)	1,62	3.09	5.52	5.47
(4.88)	1,71	3.42	5.13	5.09
(5.66)	1,81	3.68	4.82	4.79
(6.44)	1,92	3.85	4.59	4.56

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

Figure 51

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

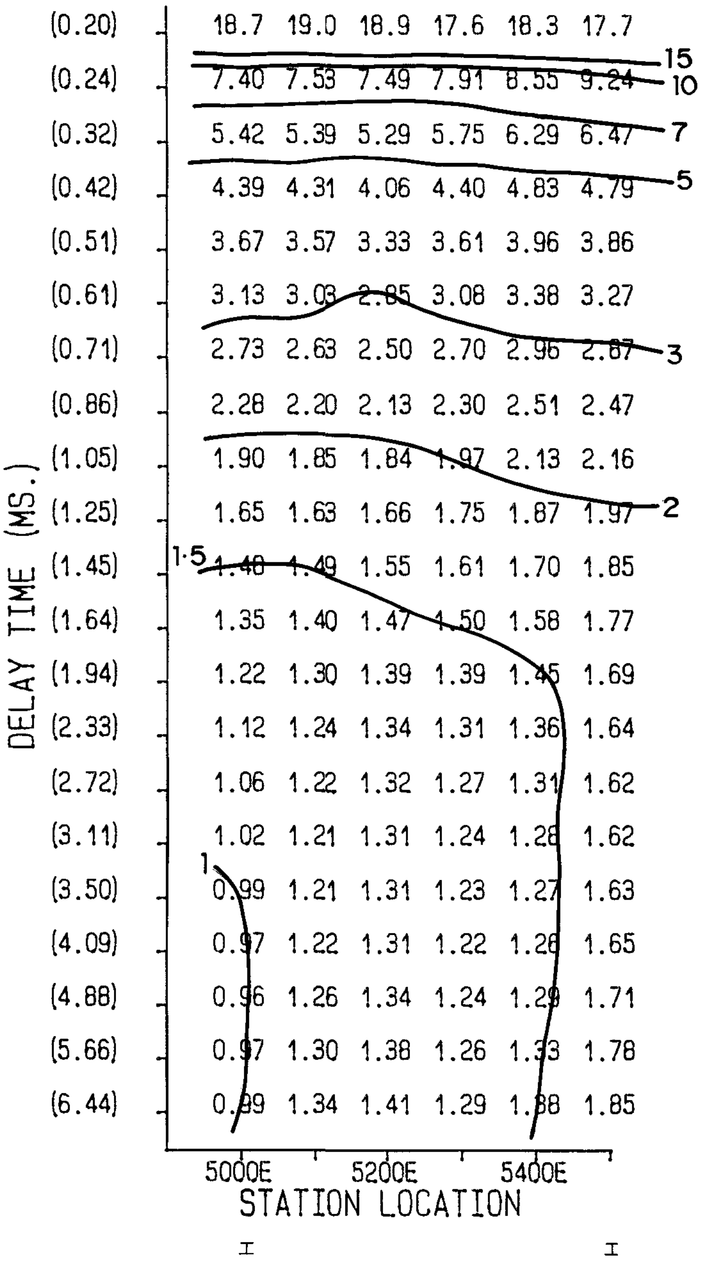
PENONG GROUNDWATER STUDY - BOOKABIE 1:50000 SHEET

AREA 5, LINE 2

APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S. D.	B 13.11.91. C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S 22166

5287



(0.20)	18.7	19.0	18.9	17.6	18.3	17.7
(0.24)	7.40	7.53	7.49	7.91	8.55	9.24
(0.32)	5.42	5.39	5.29	5.75	6.29	6.47
(0.42)	4.39	4.31	4.06	4.40	4.83	4.79
(0.51)	3.67	3.57	3.33	3.61	3.96	3.86
(0.61)	3.13	3.03	2.85	3.08	3.38	3.27
(0.71)	2.73	2.63	2.50	2.70	2.96	2.87
(0.86)	2.28	2.20	2.13	2.30	2.51	2.47
(1.05)	1.90	1.85	1.84	1.97	2.13	2.16
(1.25)	1.65	1.63	1.66	1.75	1.87	1.97
(1.45)	1.48	1.49	1.55	1.61	1.70	1.85
(1.64)	1.35	1.40	1.47	1.50	1.58	1.77
(1.94)	1.22	1.30	1.39	1.39	1.45	1.69
(2.33)	1.12	1.24	1.34	1.31	1.36	1.64
(2.72)	1.06	1.22	1.32	1.27	1.31	1.62
(3.11)	1.02	1.21	1.31	1.24	1.28	1.62
(3.50)	0.99	1.21	1.31	1.23	1.27	1.63
(4.09)	0.97	1.22	1.31	1.22	1.28	1.65
(4.88)	0.96	1.26	1.34	1.24	1.29	1.71
(5.66)	0.97	1.30	1.38	1.26	1.33	1.78
(6.44)	0.99	1.34	1.41	1.29	1.38	1.85

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n

I STATION AT WHICH DATA WERE INVERTED (see FIG. 55)

Figure 52

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

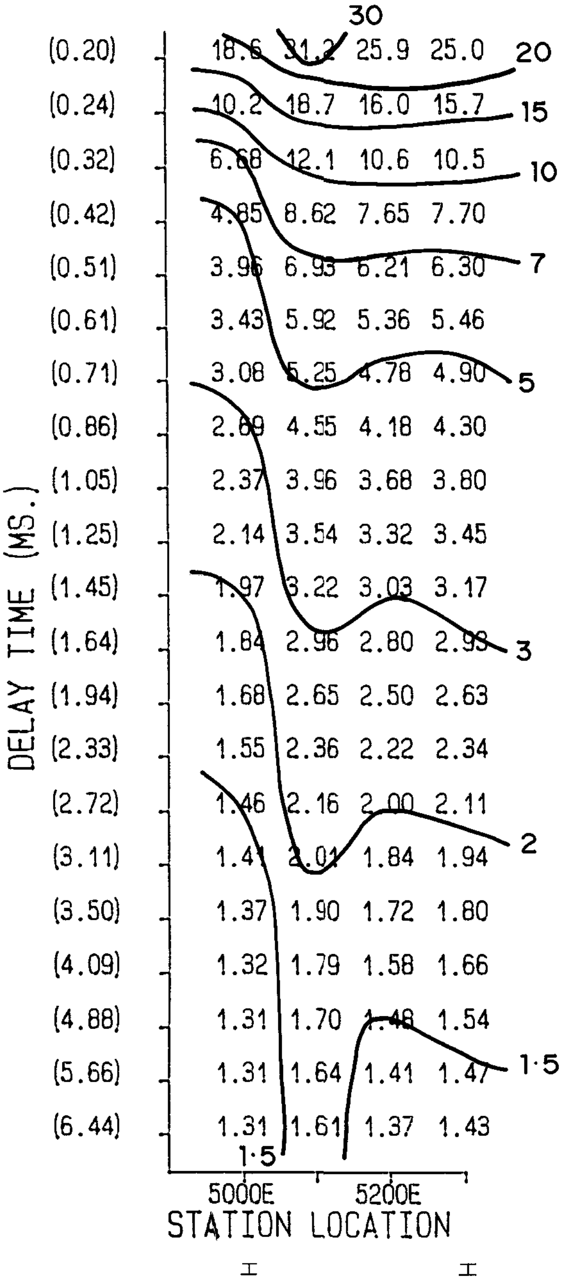
PENONG GROUNDWATER STUDY - BOOKABIE 1 : 50 000 SHEET

AREA 6, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.
DRAWN M. B.
DATE April '91
CHECKED

C.D.O. 13.1.91 DATE
SCALE
PLAN NUMBER S22167

5287



INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 55)

Figure 53

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1 : 50000 SHEET

AREA 11, LINE 1
APPARENT RESISTIVITY PSEUDO-SECTION

COMPILED S. D.	13·11·91 C.D.O. DATE
DRAWN M. B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S 22168

5287

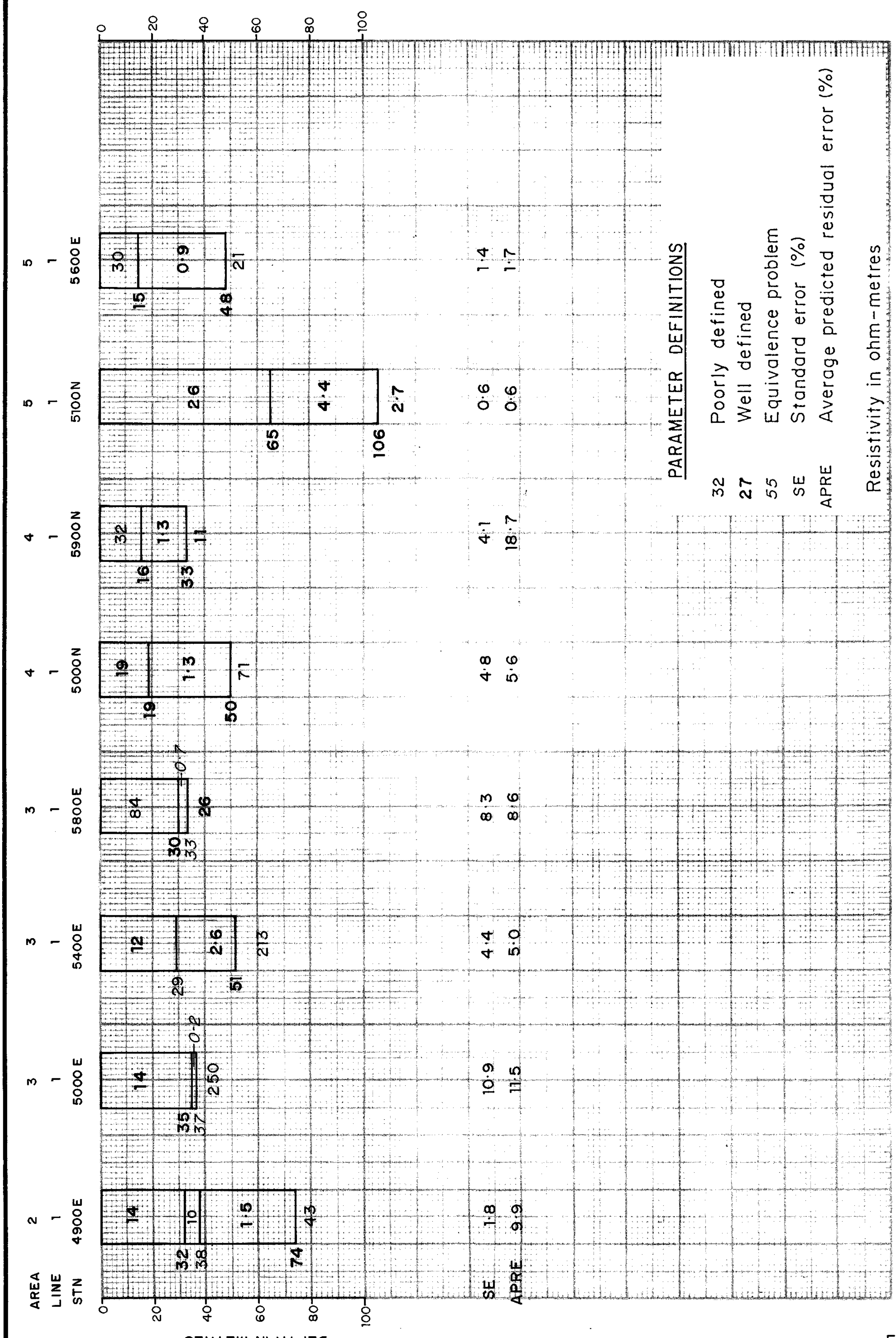


Figure 54

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1: 50 000 SHEET

TEM INVERSIONS - EARLY TIMES

COMPILED S.D.

13·11·91 C.D.O. DATE

DRAWN M.B.

SCALE

DATE April '91

CHECKED

PLAN NUMBER
S22169

5287

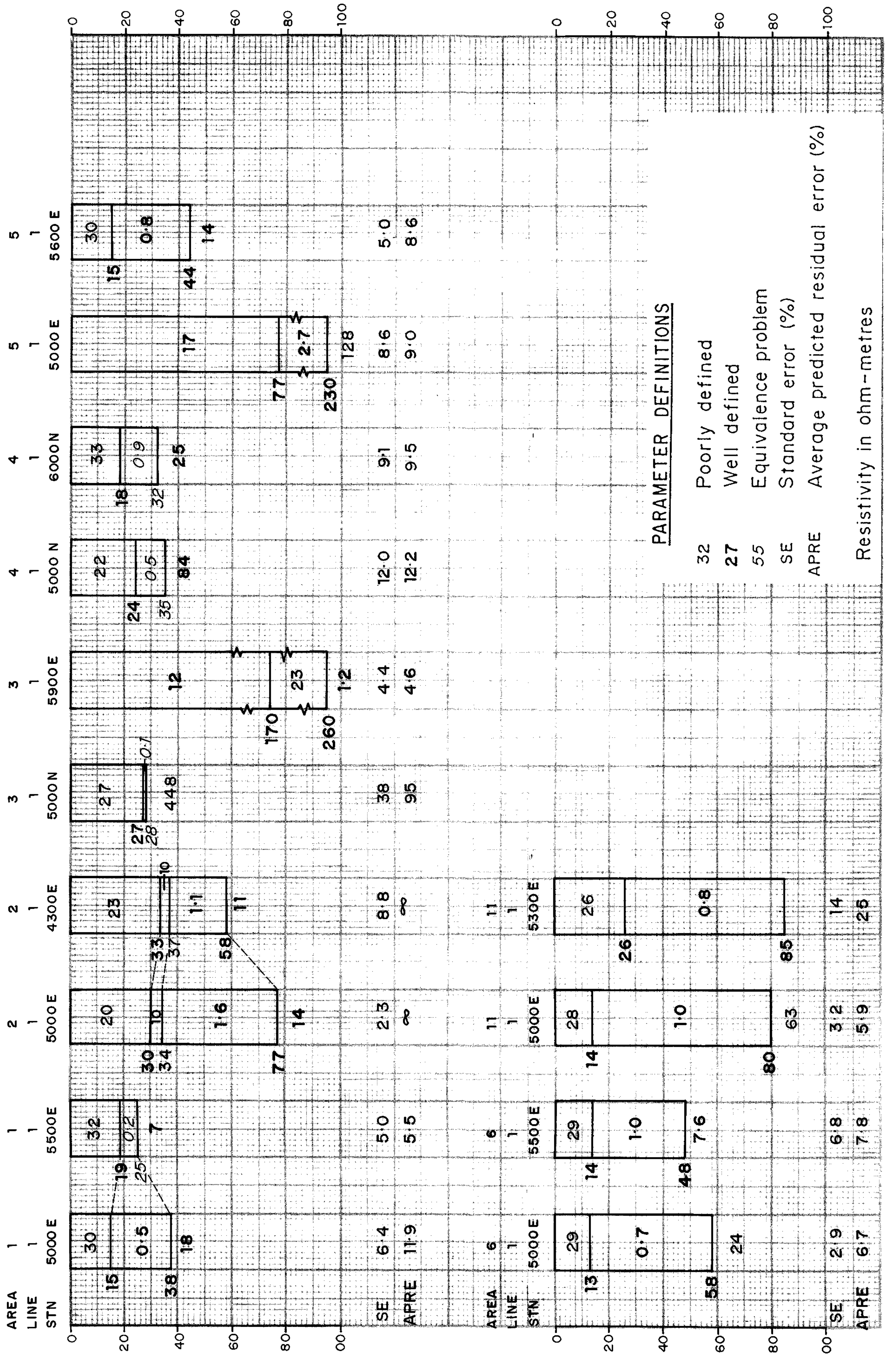


Figure 55

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - BOOKABIE 1:50 000 SHEET

TEM INVERSIONS - STANDARD TIMES

COMPILED S.D.	C.D.O. 13·11·91 DATE	
DRAWN M.B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S22170	

5287

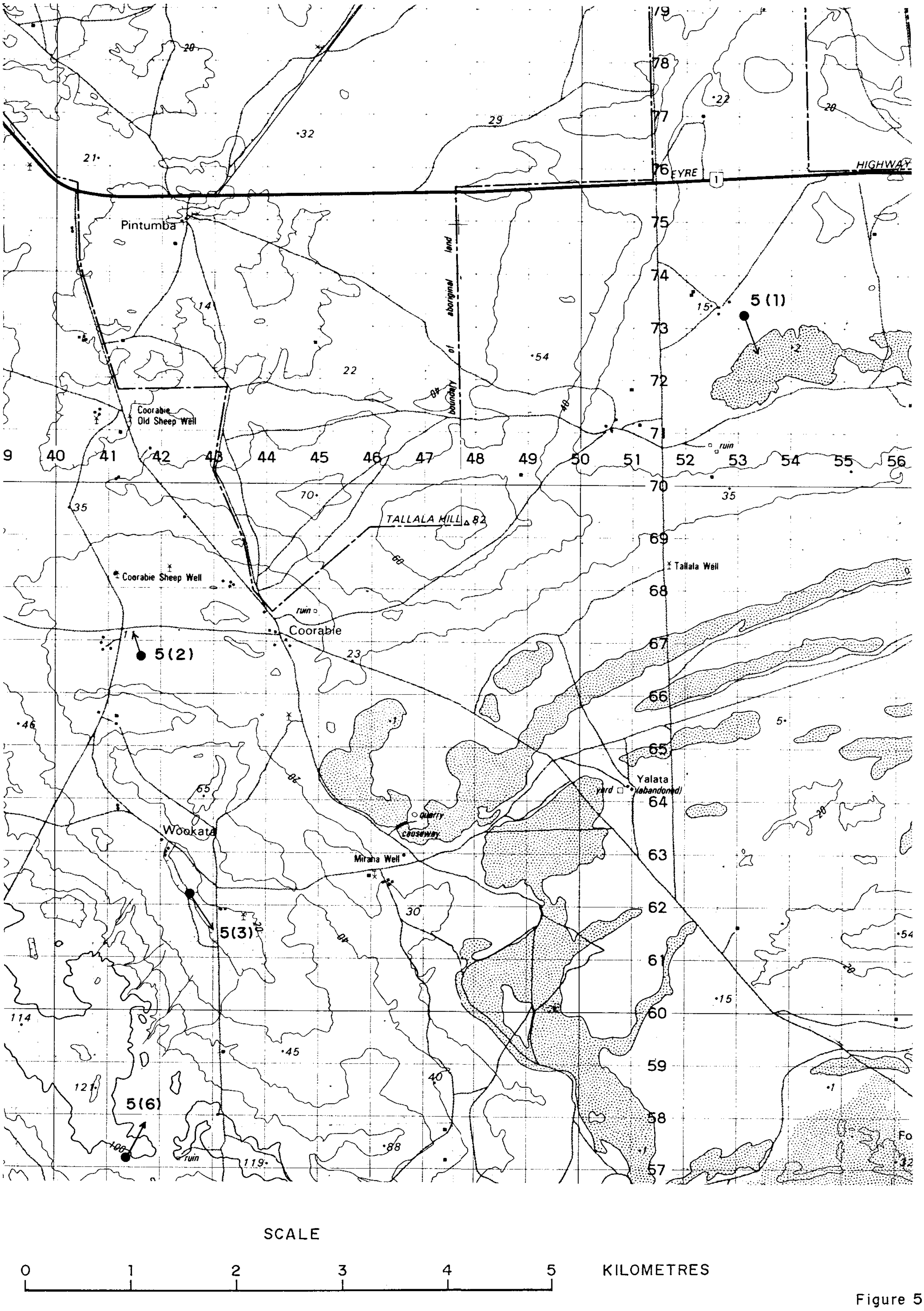


Figure 56

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - COORABIE 1:50 000 SHEET

TRAVERSE LOCATIONS

COMPILED
S. D.

13·11·91
C.D.O. DATE

DRAWN
M.B.

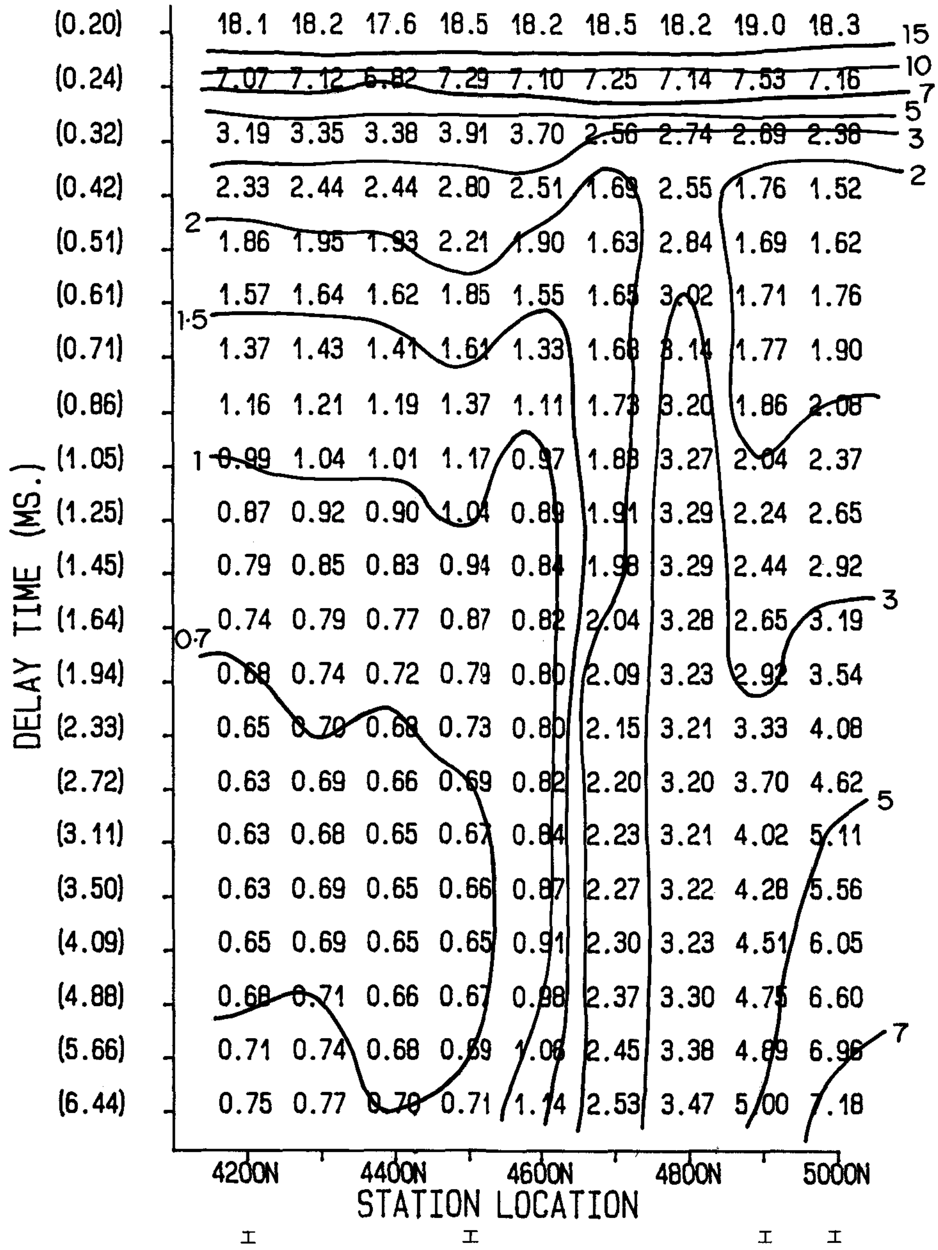
SCALE 1:50 000

DATE
April '91

PLAN NUMBER
S 22171

CHECKED

5287



INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 61)

Figure 57

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

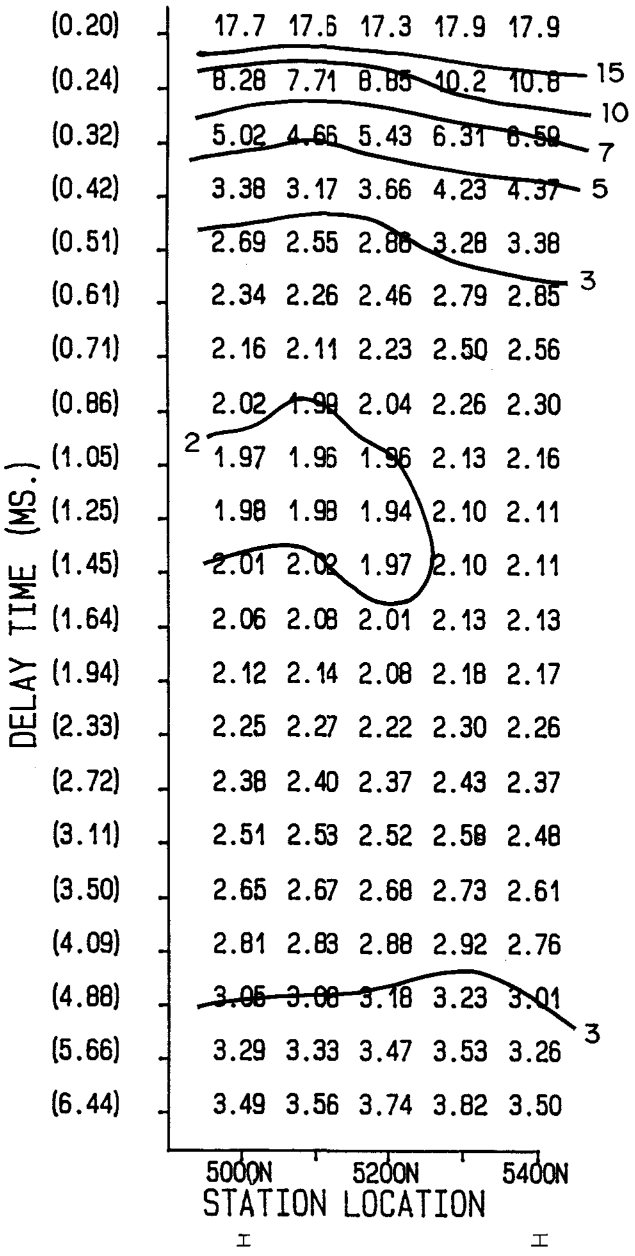
PENONG GROUNDWATER STUDY – COORABIE 1 : 50000 SHEET

AREA 1, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	13.11.91. C.D.O. DATE
DRAWN M.B.	SCALE
DATE April '91	PLAN NUMBER S22172
CHECKED	

5287



INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOCP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 61)

Figure 58

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

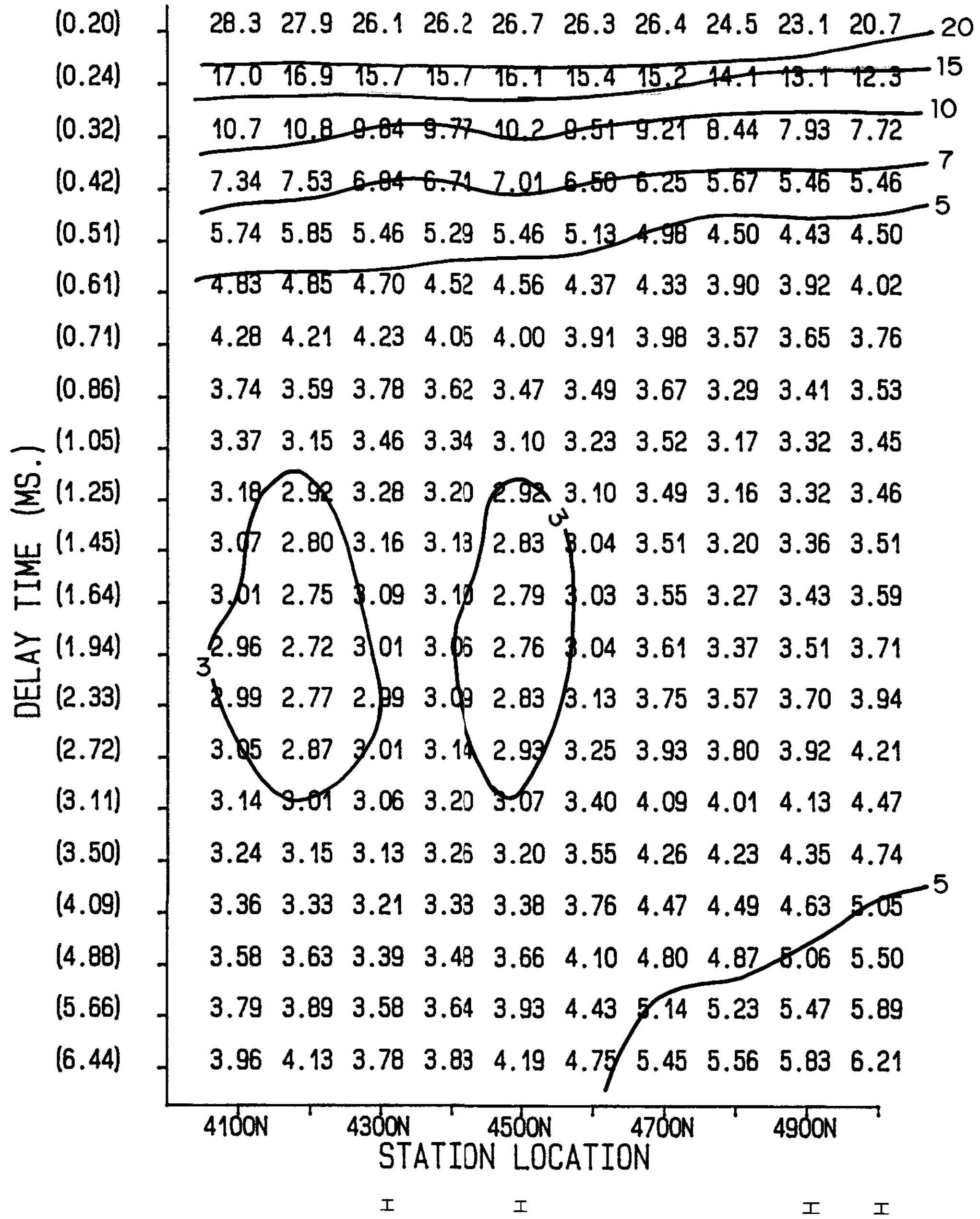
PENONG GROUNDWATER STUDY - COORABIE 1:50 000 SHEET

AREA 2, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S.D.	B 13·11·91. C.D.O. DATE
DRAWN M.B.	SCALE
DATE April '91	PLAN NUMBER
CHECKED	S22173

5287



(0.20)	28.3	27.9	26.1	26.2	26.7	26.3	26.4	24.5	23.1	20.7
(0.24)	17.0	16.9	15.7	15.7	16.1	15.4	15.2	14.1	13.1	12.3
(0.32)	10.7	10.8	9.84	9.77	10.2	9.51	9.21	8.44	7.93	7.72
(0.42)	7.34	7.53	6.84	6.71	7.01	6.50	6.25	5.67	5.46	5.46
(0.51)	5.74	5.85	5.46	5.29	5.46	5.13	4.98	4.50	4.43	4.50
(0.61)	4.83	4.85	4.70	4.52	4.56	4.37	4.33	3.90	3.92	4.02
(0.71)	4.28	4.21	4.23	4.05	4.00	3.91	3.98	3.57	3.65	3.76
(0.86)	3.74	3.59	3.78	3.62	3.47	3.49	3.67	3.29	3.41	3.53
(1.05)	3.37	3.15	3.46	3.34	3.10	3.23	3.52	3.17	3.32	3.45
(1.25)	3.18	2.92	3.28	3.20	2.92	3.10	3.49	3.16	3.32	3.46
(1.45)	3.07	2.80	3.16	3.13	2.83	3.04	3.51	3.20	3.36	3.51
(1.64)	3.01	2.75	3.09	3.10	2.79	3.03	3.55	3.27	3.43	3.59
(1.94)	2.96	2.72	3.01	3.06	2.76	3.04	3.61	3.37	3.51	3.71
(2.33)	2.99	2.77	2.99	3.09	2.83	3.13	3.75	3.57	3.70	3.94
(2.72)	3.05	2.87	3.01	3.14	2.93	3.25	3.93	3.80	3.92	4.21
(3.11)	3.14	3.01	3.06	3.20	3.07	3.40	4.09	4.01	4.13	4.47
(3.50)	3.24	3.15	3.13	3.26	3.20	3.55	4.26	4.23	4.35	4.74
(4.09)	3.36	3.33	3.21	3.33	3.38	3.76	4.47	4.49	4.63	5.05
(4.88)	3.58	3.63	3.39	3.48	3.66	4.10	4.80	4.87	5.06	5.50
(5.66)	3.79	3.89	3.58	3.64	3.93	4.43	5.14	5.23	5.47	5.89
(6.44)	3.96	4.13	3.78	3.83	4.19	4.75	5.45	5.56	5.83	6.21

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
I STATION AT WHICH DATA WERE INVERTED (see FIG. 61)

Figure 59

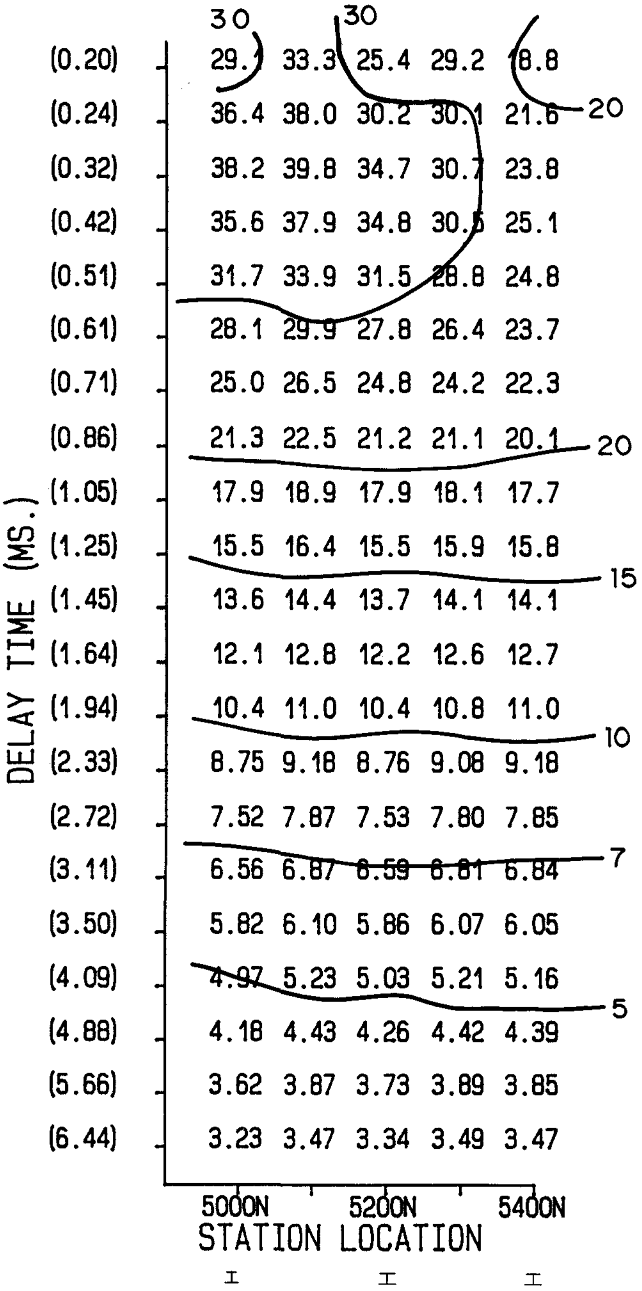
DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - COORABIE 1:50 000 SHEET

AREA 3, LINE 1
APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	C.D.O.	13·11·91 DATE
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER	
CHECKED	S22174	

5287



(0.20)	29.1	33.3	25.4	29.2	18.8
(0.24)	36.4	38.0	30.2	30.1	21.6
(0.32)	38.2	39.8	34.7	30.7	23.8
(0.42)	35.6	37.9	34.8	30.5	25.1
(0.51)	31.7	33.9	31.5	28.8	24.8
(0.61)	28.1	29.9	27.8	26.4	23.7
(0.71)	25.0	26.5	24.8	24.2	22.3
(0.86)	21.3	22.5	21.2	21.1	20.1
(1.05)	17.9	18.9	17.9	18.1	17.7
(1.25)	15.5	16.4	15.5	15.9	15.8
(1.45)	13.6	14.4	13.7	14.1	14.1
(1.64)	12.1	12.8	12.2	12.6	12.7
(1.94)	10.4	11.0	10.4	10.8	11.0
(2.33)	8.75	9.18	8.76	9.08	9.18
(2.72)	7.52	7.87	7.53	7.80	7.85
(3.11)	6.56	6.87	6.59	6.81	6.84
(3.50)	5.82	6.10	5.86	6.07	6.05
(4.09)	4.97	5.23	5.03	5.21	5.16
(4.88)	4.18	4.43	4.26	4.42	4.39
(5.66)	3.62	3.87	3.73	3.89	3.85
(6.44)	3.23	3.47	3.34	3.49	3.47

INSTRUMENT : SIROTEM MK. II
CONFIGURATION : 100m SQ. SINGLE LOOP
RESISTIVITIES IN OHM - METRES
CONTOUR INTERVAL LOGARITHMIC (1, 1·5, 2, 3, 5, 7, 10, 15) x 10^n
⌶ STATION AT WHICH DATA WERE INVERTED (see FIG. 61)

Figure 60

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

PENONG GROUNDWATER STUDY - COORABIE 1 : 50000 SHEET

AREA 6, LINE 1

APPARENT RESISTIVITY PSEUDO - SECTION

COMPILED S. D.	C.D.O.	13·11·91 DATE
DRAWN M. B.	SCALE	
DATE April '91	PLAN NUMBER S22175	
CHECKED		

5287

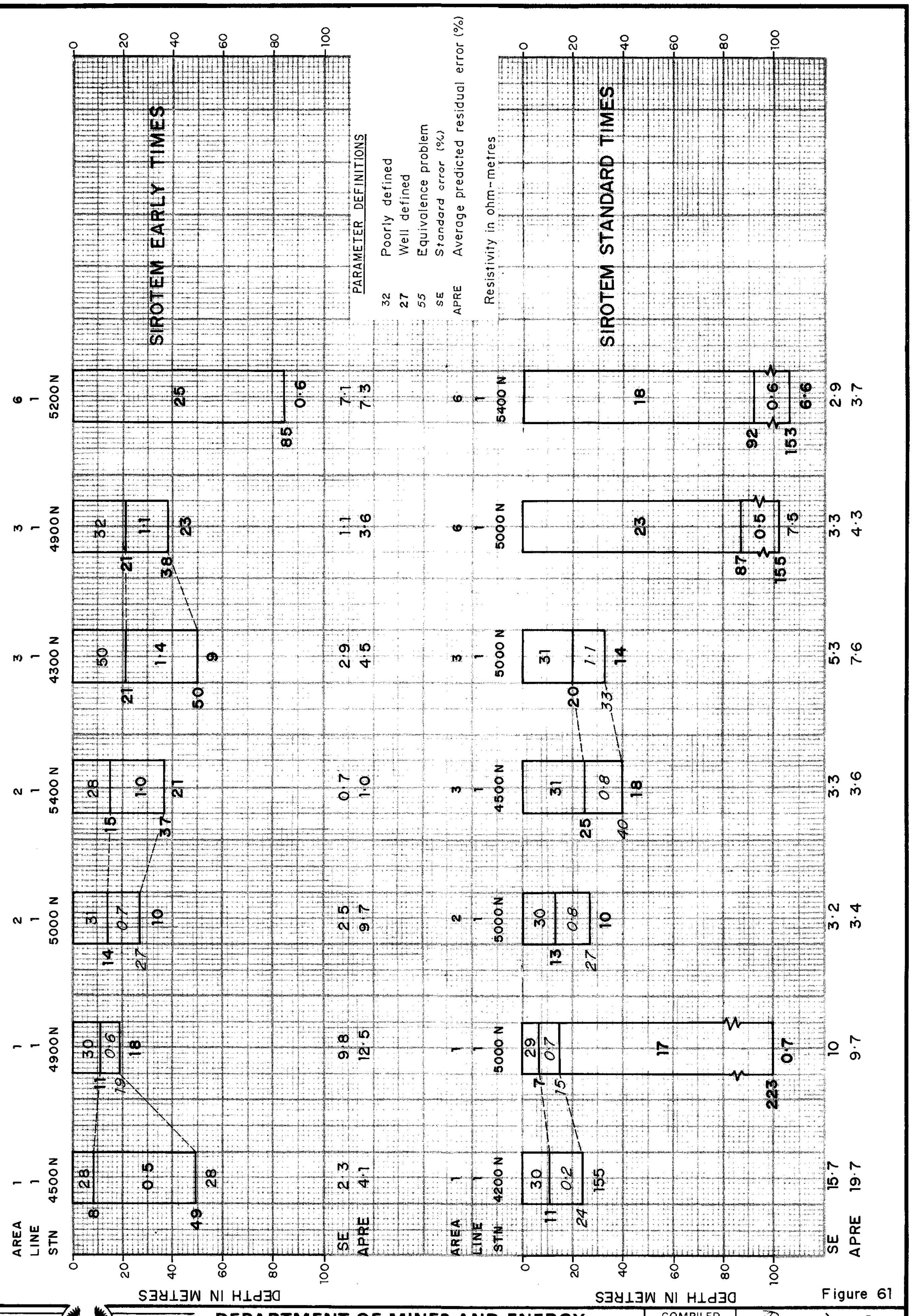


Figure 61

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

COMPILED
S.D.

B 13.11.91
C.D.O. DATE

PENONG GROUNDWATER STUDY - COORABIE 1: 50000 SHEET

DRAWN
M.B.

SCALE

TEM INVERSIONS - EARLY AND STANDARD TIMES

DATE
April '91

CHECKED

PLAN NUMBER
S22176

5287