Ground-Water Exploration Using Deep Schlumberger Soundings at Edwards-AFB, California

Part I: Graham Ranch and Rogers Lake

By

Adel A.R. Zohdy and Robert J. Bisdorf

Denver, Colorado.

Open-File Report 90-536

1990

Introduction

In October 1989, the U.S. Geological Survey made 67 Schlumberger soundings (Kunetz, 1966; Zohdy and others, 1974) over an area of approximately 60 square kilometers in Edwards Air Force Base (AFB), California. Figure 1 shows the location of the sounding stations. Most of the soundings were expanded to maximum current-electrode spacings (AB/2) that ranged from about 600 m (2000 ft) to about 3.6 km (12,000 ft). The purpose of the survey was to help determine the depth to granitic basement rocks, to map the subsurface distribution of layers composed of sand and gravel which are potentially freshwater aquifers, and to delineate the subsurface distribution of layers rich in clay so that they may be avoided in future drilling.

The purpose of Part I of this report is to release the data of the 67 Schlumberger soundings obtained in October 1989, to provide an interpretation of the sounding curves, and to present maps and cross sections of interpreted resistivity based on the first 67 soundings.

Subsequent to the October 1989 survey, a second survey was made at Edwards AFB during the later part of April and early May, 1990, where an additional 73 Schlumberger soundings were made on Rogers (dry) Lake and along an east-west profile north of Edwards AFB. This brings the total number of soundings made on Edwards AFB and vicinity to 140 soundings. The interpretation and presentation of the results of these 73 soundings will comprise Part II of this report.

In the Graham Ranch area (Figure 2) two production wells, the Buckner well in the north and the Graham well in the south, supplied irrigation water to the Edwards area in the north. Approximately 2 years ago, the Buckner well collapsed. No information is available about the Buckner well other than it was about 98.5 m (232 ft) deep and that it collapsed at a depth of about 24.5 m (80 ft). The Graham well is about 162 m (532 ft) deep and it did not penetrate basement rocks. A third well, located about 245 m (800 ft) east-northeast of the Graham well, reached a depth of about 223 m (732 ft) and also did not penetrate basement rocks. A fourth well, located about 488 m (1600 ft) to the west of Graham well, is about 121 m (396 ft) deep and it penetrated basement rocks at a depth of about 119 m (390 ft). On the basis of this information from the drill holes and in search of a suitable location for a well to replace the Buckner well, a test well was drilled between the Buckner well and the Graham well. It penetrated a granitic basement at the unexpected shallow depth of about 78 m (245 ft). We shall refer to this well as the "Shallow-Basement test well."

The electrical resistivity survey was made following the drilling of the test well when it became evident that geophysical exploration should be used to minimize unexpected drilling results. Figure 3 shows a north-south cross section with contours of interpreted resistivity in ohm-meters which are based on the interpretation of the sounding data in the Graham Ranch area. The presence of high resistivity (100 to 450 ohm-m) material at shallow depth, beneath soundings 1, 2, and 3, indicates that the old Buckner well must have bottomed in weathered bedrock (granite or quartz monzonite) and that had the resistivity survey been made prior to the drilling of the "Shallow-Basement test well" the encounter of granitic rock at a depth of 78 m (245 ft) could have been predicted and therefore avoided by not drilling at that location. Furthermore, the cross section shows that the Graham well is in an area where the depth to the high resistivity geoelectric basement (granitic rock) is about 250 m (800 ft).

New Test Wells

Subsequent to the resistivity survey, 4 test wells were drilled and the geologic and hydrologic information obtained from them was in good agreement with the resistivity survey results. The locations of the four, new, test wells are shown in Figure 1. Except for the new test well in the Graham Ranch area, about 150 m (500 ft) east of sounding 33, the other three well locations were already preselected and were not based on the results of the resistivity survey. In fact these three new test wells were drilled immediately following the resistivity survey and before completing the interpretation of all the resistivity soundings.

The four new test wells are referred to as: 1) the Graham Ranch site near sounding 33, 2) the Branch Memorial Park site near sounding 38, 3) the Buckhorn site near sounding 49, and 4) the Holly site about 300 m (1000 ft) northeast of sounding 56.

Field Conditions and Measurement Procedures

The field conditions were generally favorable to making direct current electrical resistivity soundings. The contact resistance at most locations was quite reasonable except near soundings 49 and 50 where the material near the ground surface was hard and very compact. Of the 67 soundings, only one sounding (58) was distorted by cultural noise (buried cables, etc.) at current-electrode spacings (AB/2) greater than about 900 m (3000 ft).

The set of soundings (55 and 38 through 45) was made on 120th Street East which merges into Lancaster Blvd north of sounding 40. Signs on the road indicated the presence of a

buried pipeline. The possible detrimental effect on the resistivity measurements by a buried metallic-pipeline, aligned parallel to the direction of sounding expansion, was tested as follows. We placed the sounding station on the same side of the road where the pipeline is located, then during regular measurements, we carefully observed the voltage readings on the potentiometric chart recorder and looked for induced polarization (buildup and decay) voltages. Fortunately, none were observed, which in turn indicated that the pipeline is either non-metallic or that it is very well insulated with electrically non-conducting materials (plastic polymers, epoxy paint, etc.). The sounding curves obtained on this road were well behaved with no indication of unusually low resistivity "layers" which may be the result of a buried metallic pipeline. Furthermore, the interpretation of these soundings could be easily correlated with the interpretation of soundings obtained along another north-south profile located about 3 km (2 miles) to the west.

At large current-electrode spacings (greater than one kilometer), we took advantage of the presence of road signs with metallic posts by using them momentarily as current electrodes when they happened to be located within a few meters from the required current-electrode spacing. By connecting the current electrode cables to such metallic road-sign posts, it was possible to inject ample amounts of current at large current-electrode spacings and thus produce large potential differences between the potential electrodes.

All current-electrode and potential-electrode spacings were measured in feet and later converted to meters during interpretation. Current-electrode spacings ranging from 10 to 100 ft were measured using a cloth measuring tape. Current-electrode spacings greater than 100 ft were measured using truck mounted precision odometers. Three trucks were used for making the resistivity survey: an instrument truck (a carryall) that remained stationary at the center of the sounding, and two pickup trucks that were used to lay out the current cable and expand the distance between current electrodes. Communication between operator and crew was maintained using 90 watt FM radios. A 5 KVA generator was used for power supply and a potentiometric chart recorder was used for measuring the potential differences.

The sounding curves were plotted in the field as the measurements were made. This procedure is recommended in order to catch any mistakes made by the operator or the crew, and to recognize spurious readings caused by man made structures (fences, buried cables, etc), by current leakage, or by equipment malfunction. At the end of each sounding, a test for current leakage (Zohdy, 1968) was made. No current leakage effects were observed on any of the tests.

In this survey, the field sounding curves were composed of only three segments. The first segment was obtained by expanding the current-electrode spacing (AB/2) from 10 to 100 ft with the potential-electrode spacing (MN/2) held fixed at 2 ft. At AB/2 = 100 ft, the potential-electrode spacing (MN/2) was expanded from 2 to 20 ft and the second segment on the sounding curve was obtained by resuming the current-electrode spacing expansion from 100 to 1000 ft. At AB/2 = 1000 ft, the potential-electrode spacing (MN/2) was expanded from 20 to 200 ft and the third segment of the sounding curve was obtained by expanding the current-electrode spacing from 1000 ft to the maximum required spacing which was anywhere from 2000 to 12000 ft. The sounding requirement is satisfied when apparent resistivity measurements are obtained that indicate the detection of a highly resistive geoelectric basement. Such measurements when plotted on log-log scale form a rising branch on the sounding curve which is inclined to the abscissa axis at an angle of 45 degrees.

Soundings numbered: 4, 6, 8, 9, 12, 13, 23, 25, 28, 29, 30, 32, 33, 34, 36, 37, 46, 47, 48, 49, 53, and 54 were expanded to current-electrode spacings (AB/2) that are larger than the available straight line distance by following the road after it made a turn (even a right angle turn). The sounding data were plotted in the field as if the road was straight and were later corrected for non-linear geometry (Zohdy and Bisdorf, 1982).

Schlumberger Sounding Data

The field sounding curves and their interpretations are given in the appendix. The soundings are numbered consecutively from Edwards AFB 1 to Edwards AFB 67. All the sounding data were processed and interpreted using a new automatic interpretation method (Zohdy, 1989; Zohdy and Bisdorf, 1989). The automatic-data processing consists of: a) Converting the current-electrode spacings (AB/2) from feet to meters. b) Shifting the observed curve segments (obtained with different but fixed potential-electrode spacings (MN/2)) upward or downward to obtain a continuous unsegmented curve. Generally, the segment measured with the largest potential-electrode spacing is kept fixed in position and the other segments are shifted. c) Sampling the continuous curve at the rate of 6 points per logarithmic cycle to form a digitized-sounding curve. The sampling process is automatically made, from right to left, starting at the largest current-electrode spacing. The digitized curve is fed into the automatic interpretation program to obtain a model of the subsurface layering.

In the automatic interpretation program (Zohdy and Bisdorf, 1989) there are three options that may be used to put

one or more constraints on the interpreted model. Of these three options, we often used the option to fix the resistivity of the last layer (high resistivity basement). We fixed the resistivity of the basement rocks at 550 ohm-m on the basis of information obtained from soundings obtained over shallow basement. We occasionally used a second option to compress the layering thicknesses to obtain a better fit. The reason for exercising one or more of these options was to develop a consistent picture for the interpreted resistivity of the basement, and to obtain a better match between digitized and calculated curves.

Distorted Sounding Curves:

Few sounding curves were distorted by severe lateral inhomogeneities or by cultural features. For example: the curve of sounding 38 was distorted at short current electrode spacings by the limited lateral extent of a shallow resistive body (sand and gravel lens?) which caused the apparent resistivity to form a relatively sharp maximum (Alfano, 1959). The initial maximum on the curve is also distorted by the crossing of a shallow resistive material (cemented gravel) lying at right angles to the direction of expansion as indicated by the formation of cusps near the current-electrode spacings of AB/2 = 9 m and near AB/2 = 24 m. This sounding curve was best interpreted by discarding the first 7 points on the curve which were obtained between current-electrode spacings (AB/2) of about 3 and 30.5 m (10 and 100 ft).

Sounding 58 was distorted by buried cables, grounded power lines, and metal fences. The form of the distortions at current-electrode spacings greater than about 900 m (3000 ft) is such that they could not have been caused by lateral geologic inhomogeneities. The curve was interpreted after smoothing and extrapolating the last branch in accordance with information obtained from soundings obtained to the east and to the west of it.

Rock-Formation Resistivities at Edwards AFB

The interpretation of the resistivity soundings indicated that the resistivity of the granitic basement tends to be only few hundred ohm-meters and may be as low as 150 ohm-m. These relatively low resistivities persist to considerable depth, especially when the basement is composed of weathered quartz monzonite. These low resistivities are attributed to weathering and possible alteration by hydrothermal fluids to substantial depths. On the interpreted resistivity maps and cross sections, the depth to granitic basement is usually delineated by the 100 ohm-m contour.

Sand and gravel aquifers in the studied area are characterized by resistivities in the range from 30 to 70 ohm-m. Normally, the higher the resistivity the coarser the material and the lesser the clay content.

Clay-rich layers are characterized by resistivities of less than 15 ohm-m. Apparent resistivities of less than 10 ohm-m were measured on several sounding curves and interpreted resistivities of 3.5 to 5 ohm-m were obtained from the interpretation of some of these sounding curves. Such low resistivities most likely indicate pure clay layers. Soundings numbered 8C, 9C, 10, 11, 22, 24, 26, 29C, 30C, 32C, 39C, 44, 45, 52, 56SX, 66, and 67 show a 3.5 to 5 ohm-m clay layer generally occurring at shallow depths that range from about 1 to 30 meters.

Most measurements made on playas or dry lake beds indicated that the upper layer of the dry lake bed is generally characterized by an intermediate resistivity of about 20 to 25 ohm-m. This indicates that these were freshwater lakes.

Interpreted Resistivity Maps

Figure 4 (a to f) shows six maps of interpreted-resistivity at the depths of: 100 m, 200 m, 300 m, 400 m, 750 m, and 1000 m.

100 m depth map:

At a depth of 100 m (about 330 ft) the interpreted resistivity map (Figure 4-a) shows a linear trend of a steep resistivity gradient. The contours are aligned in a northeast-southwest direction and they separate a region of high resistivities (70 to 300 ohm-m) in the northwest from a region of medium resistivities (30 to 70 ohm-m) in the southeast. This sharp gradient may represent a geologic fault or the edge of a buried basin (or both).

Two moderately high resistivity anomalies (70 to 100 ohm-m) exist one to two kilometers south of the northeast trending boundary. These anomalies are located to the south of a gentle topographic ridge which is presumed to be a basement outcrop. There are three gentle topographic ridges in the area. One of these ridges (west of Lancaster Blvd) is being excavated for gravel on its southern flank. A short resistivity sounding (Edwards AFB 31) was made on top of that ridge and it showed relatively low resistivities ranging from about 33 to about 150 ohm-m in the upper 40 meters. The resistivities at depths greater than 40 meters are interpreted to be about 60 ohm-m. The resistivity interpretation (as shown later in the cross sections) indicates that these ridges are composed of highly

weathered granitic-rock and that geometrically they are in the form of blocks that are not rooted. It seems that these floating blocks are in the form of wedges with their narrow ends extending to the south and their somewhat abruptly truncated edge facing north. The two moderately high resistivity anomalies in Figure 4-a show part of the buried southern extension of these weathered basement blocks.

Moderately low-resistivity anomalies of 10 to 20 ohm-m are seen at the southeastern corner of the map and near the western edge of the map. The western anomaly is caused by a sounding (Edwards AFB 26) which was made on Buckhorn (dry) Lake. There, the resistivity of the top 15 meters is about 10 to 15 ohm-m then it drops to about 3.5 to 7 ohm-m down to a depth of about 80 meters, then it gradually rises to nearly 100 ohm-m at depths greater than 200 meters.

200 m depth map:

At a depth of 200 m (about 660 ft) the interpreted resistivity map (Figure 4-b) shows the migration of the sharp resistivity gradient to the southeast. The map also shows that in the area south of Graham Ranch, the 70 ohm-m contour in the west tends to wrap around the moderately low resistivity region to the east. This depicts the crude outline of a small basin, which at this depth is still open ended to the east and to the south.

The low resistivity anomaly in the southeastern edge of the map extends over a larger area than it does on the 100 m depth map.

300 m depth map:

At a depth of 300 m (about 980 ft) the interpreted resistivity map (Figure 4-c) shows a gradual closure of the small basin near Graham Ranch. It also shows the large extension of the low resistivity material in the southern portion of the map depicting the large areal distribution of a significant clayey layer in the south.

500 m depth map:

At a depth of 500 m (about 1650 ft) the interpreted resistivity map (Figure 4-d) shows the disappearance of the small basin near Graham Ranch where the previously medium resistivity anomaly of 30 to 70 ohm-m material is now replaced by high resistivity values ranging from 100 to greater than 450 ohm-m. It is interesting to note, however, that in the northern area certain soundings indicate relatively low-resistivity (100 to 200 ohm-m) basement rocks, compared to other soundings that indicate basement rocks with resistivities greater than 450 ohm-m. As mentioned earlier, these lower

resistivity basement rocks are either more weathered and fractured or they are made of a different lithologic composition in comparison to the higher resistivity basement rocks. In the southern half of the map, the low resistivity layer (clayey body) continues to exist and at this depth of 500 m it seems to have a northeast-southwest trend. Near the southeast corner of the map, a high resistivity anomaly is very evident at sounding 56. The test well drilled at the Holly site, approximately 300 m northeast of sounding 56 reportedly penetrated weathered granitic rock at a depth of about 300 m (1000 ft).

750 m depth map:

At a depth of 750 m (about 2460 ft) the interpreted resistivity map (Figure 4-e) shows that the edge of the resistive basement outlined by the 100 ohm-m contour remains almost at the same location as on the 500 m depth map. The map also shows that the high resistivity anomaly at the southeastern edge of the map is larger at this depth than at 500 m, and that the significant low resistivity (clayey body) is smaller at this depth as it is replaced on the east side by higher resistivity materials.

1000 m depth map:

At a depth of 1000 m (about 3300 ft) the interpreted resistivity map (Figure 4-f) shows that the high resistivity material (basement rocks) at the southeast corner of the map covers a much larger area than at a depth of 500 or 750 m. Furthermore, the high resistivity material divides the large basin in the southern half of the map into two parts: an east-northeast trending graben-like feature in the middle of the map, and a low resistivity basin in the southern part of the map.

Resistivity Cross Sections

Several interpreted resistivity cross sections were prepared. A short cross section, running north-south, and extending from sounding 1 to sounding 5 in the Graham Ranch area has already been discussed and shown in figure 3. Figure 5 shows the location of five other cross sections that are discussed below. There are two north-south cross sections: the Graham Ranch-Buckhorn Lake cross section (soundings 6 to 50) and the Lancaster Blvd cross section (soundings 37 to 55); two east-west cross sections: the Graham Ranch-Lancaster Blvd cross section (soundings 21 to 44) and the East-Avenue B cross section (soundings 50 to 57); and one northeast-southwest cross section on Rogers (dry) Lake: the Fly-By Line cross section (soundings 62 to 66).

The Graham Ranch-Buckhorn Lake and the Lancaster Blvd Cross Sections:

These two cross sections are oriented north-south and separated by a distance of about 3.2 km (2 miles). Several geoelectric features are common to both cross sections and therefore the two are presented together in Figure 6. The Graham Ranch-Buckhorn cross section extends from sounding 6 to sounding 50 over a distance of about 7 km whereas the Lancaster Blvd cross section extends from sounding 37 to sounding 55 over a distance of about 10 km.

Both cross sections show weathered basement rocks in the northern part. Particularly deep weathering is observed on the Lancaster Blvd cross section beneath soundings 36, 35, and 45 (Figure 6-a) where the basement rocks are represented by the thick section of 100 to 200 ohm-m material which is a relatively low resistivity value for a granitic basement.

Both cross sections show that the resistivity materials of about 70 to 100 ohm-m beneath soundings 44 and 43 on the Lancaster Blvd cross section (Figure 6-a) and beneath soundings 17, 27, and 52 on the Graham Ranch-Buckhorn cross section (Figure 6-b) are underlain by lower resistivity material ranging from about 30 to 70 ohm-m. This is strong evidence that the three low-lying northeast-southwest topographic ridges: in the Hospital Ridge area (east of Lancaster Blvd), in the Graham Ranch area (south of soundings 28, 29, and 30, on Figure 1), and northeast of Buckhorn Lake (about 2 km west of soundings 27 and 52 on Figure 1), may be blocks of highly weathered granitic rock that are "floating" on sedimentary rocks.

Both cross sections show a depression in the geoelectric basement at a depth of about 1000 m (3300 ft) beneath soundings 42 and 41 (Figure 6-a) and beneath soundings 52 and 51 (Figure 6-b). The depth to the geoelectric basement in this graben-like structure is about 1300 to 1500 m (about 4200 to 4900 ft).

The material within the resistivity contours of 30 to 70 ohm-m is interpreted to represent a major sand and gravel aquifer with good quality water, and with only relatively small component of clay layers. It is unlikely that the resistivity contours ranging from 30 to 70 ohm-m, located beneath the major clayey layer (less than 15 ohm-m) in the southern part of the cross sections, represent a good aquifer of substantial significance. The increase in resistivity from 20 to 450 ohm-m beneath the clayey layer mainly reflects the increased detectability (on the sounding curves) of the high resistivity basement rocks.

Drilling data from the Branch Memorial Park test well near sounding 38 (Figure 6-a) and the Buckhorn test well near sounding 49 (Figure 6-b) are in good general agreement with the interpreted resistivity data. The Branch Memorial Park test well was drilled to a depth of about 286 m (940 ft). Clay deposits were encountered in the upper 140 ft which is in agreement with the interpretation of sounding 38 that shows low resistivity (10 ohm-m) near the surface and from a depth of about 110 ft to about 235 ft (see sounding 38 in appendix). Unfortunately, the initial part of the curve of sounding 38 is distorted by lateral inhomogeneities and as mentioned earlier was discarded to simplify the interpretation.

The Buckhorn test well, near sounding 49 (Figure 6-b), was drilled to a depth of about 289 m (948 ft). It was drilled through sand and gravel material and bottomed in clayey deposits. This is in good agreement with the interpretation of sounding 49 and the predicted proximity at a depth of about 345 m (1130 ft) of a major clayey layer (15 ohm-m or less) of substantial thickness as indicated by the less than 15 ohm-m contour on Figure 6-b.

Graham Ranch-Lancaster Blvd Cross Section:

This is an east-west cross section that extends from sounding 21 in the west (west of Graham Ranch area) to sounding 43 (on Lancaster Blvd) over a distance of about 5.7 km. Figure 7 shows that weathered basement rock is very shallow in the western part of the cross section beneath soundings 21, 20, and 19. The interpreted resistivities are mostly in the range of 150 to 200 ohm-m to a depth of about 750 m (2500 ft). As mentioned earlier these relatively low resistivity values seem to be associated with weathered quartz monzonite. The great depth to which such low resistivity values persist is somewhat unusual.

To the east of sounding 19, a typical sand and gravel aquifer with resistivities ranging from 45 to 70 ohm-m gradually thickens as the depth to basement increases to about 400 m (1300 ft). To the east of sounding 30 the depth to basement increases further from about 350 m (1150 ft) to about 750 m (2460 ft). The medium to high resistivity (70 to 150 ohm-m) layer beneath soundings 30 and 43 on the eastern part of the section are possible indications of the floating weathered basement blocks, with the material beneath sounding 43 being an extension of the Hospital ridge east of Lancaster Blvd. The medium to high resistivity material beneath sounding 28 and sounding 15 may represent buried stream channels.

The new Graham Ranch test well, which was drilled on the basis of the resistivity interpretation, is located

approximately 550 m (1800 ft) north-northeast of sounding 28. It was drilled through a sedimentary section of mostly sand and gravel (with no clay layers of any significant thickness) to a total depth of 293.5 m (963 ft) and as predicted it did not penetrate basement rocks at that depth. The recommendation of this drilling site was based on the interpretation of soundings 33 and 34, which are located much closer to the site of the new Graham Ranch test well than sounding 28. In fact, the new Graham Ranch test well is located about 150 m east of sounding 33. The correlation between the resistivities measured on the resistivity log of the test well and those obtained from the interpretation of sounding 33 is excellent. Subsequent to the drilling of the test well, a contractor drilled a production well to a depth of 213 m (700 ft) at a distance of about 365 m (1200 ft) east of the new Graham Ranch test well. The water table in that area is at a depth of about 32 m (105 ft).

East-Avenue B Cross Section:

This is an east-west cross section (Figure 8) that extends from sounding 50 in the west to sounding 57 in the east over a distance of about 7 km. The cross section shows predominantly low to medium resistivities (15 to 20 ohm-m) which are characteristic of a clayey layer. In the western part of the cross section, beneath soundings 50, 53, and 54, the layers above this clayey layer, at depths between about 50 and 300 m (164 and 984 ft), have resistivities of 20 to 30 ohm-m which are characteristic of a clayey layer with more sand and gravel layers in it than the 15 to 20 ohm-m layer below it. This somewhat sandy layer becomes much thinner east of 120th street. The high resistivity geoelectric basement rises from a depth about 1500 m (4900 ft) beneath sounding 53 in the west to a depth of about 450 m (1475 ft) beneath sounding 56 in the east and then it drops off to somewhat greater depths beneath sounding 57 at the east end of the cross section.

Three test holes were drilled very close to one another at the Holly site which is located about 300 m (1000 ft) northeast of sounding 56. One of the test wells reached a depth of 328 m (1075 ft) where it hit a weathered granitic rock. A second well drilled about 6 m (20 ft) away hit the weathered granitic rock at a depth of 334 m (1095 ft), approximately 6 m deeper. Neither well penetrated the "basement" rocks sufficiently to obtain any high resistivity readings on the resistivity logs. However, a small sample of weathered granitic rock was obtained from the bottom of one of the test wells. A solid clay layer was encountered in the top 27.5 to 64 m (90 to 210 ft) followed by sand and gravel layers mixed with several clay layers to the bottom of the hole.

The above drilling information, regarding the solid clay layer and the depth to basement, is not in very good agreement

with the interpretation of sounding 56 (which is located about 300 m (1000 ft) to the southwest. Sounding 67 is located approximately 2.4 km due north of the Holly test wells and its interpretation does show a clay layer (with resistivity values in the range of 4 to 15 ohm-m) from a depth of about 17 m to 75 m (55 to 250 ft). This is in much better agreement with the drill hole information. On the other hand, the interpretation of sounding 67 shows a depth to a high resistivity basement at about 530 m (1750 ft). Thus the interpretation of both soundings 56 and 67 place the basement at a greater depth (450 m and 530 m, respectively) than the depth of 330 m reported from the test wells at the Holly site. By examining the cross section in Figure 7, however, it is not unreasonable to assume that the rise in the high resistivity basement surface from west to east could easily place the basement surface at a depth of about 330 m (1100 ft) to the east of sounding 56 before it deepens again to a depth of about 650 m (2100 ft) beneath sounding 57 at the eastern end of the cross section.

Block Diagram:

The north-south cross section of the Graham Ranch-Buckhorn Lake (Figure 6-a) and the east-west cross section of East-Avenue B (Figure 7) were combined, using the perspective feature in Deluxe Paint III (Silva, 1989), into the block diagram shown in Figure 9. The block diagram is approximately 8 km wide, 7 km long, and 1.5 km thick. The diagram speaks for itself and does not need additional description. It is presented to increase the visualization of the subsurface resistivity distribution in the studied area.

Fly-By Line Cross Section on Rogers (dry) Lake:

A small outcrop of granitic rock (few feet high) existed at one time on Rogers Lake (Larry D. Plews, Engineer at Edwards AFB, oral communication). The outcrop was removed by blasting so that it will not present a hazard to emergency aircraft landings on the lake bed. It has been theorized that there might be an east-west buried ridge of granitic rock beneath Rogers Lake. The assumed buried ridge would extend from granitic outcrops off the east shore of the lake bed to another outcrop approximately one kilometer off the west shore of the lake bed as it passes through the old outcrop on Rogers Lake. Indeed, the three outcrops do fall on a straight line that is aligned due east-west. It has also been theorized that if this buried ridge exists then it would act as a barrier to the groundwater flow beneath the lake bed.

We made sounding 59 (see Figure 1 for location and see appendix for data and interpretation) as close to the location of the old granitic outcrop as could be determined in the

field. The sounding did not show the expected high resistivities of a few hundreds of ohm-meters that would be characteristic of a granitic basement at shallow depth. Instead, the measured and interpreted resistivities were of the order of 50 to 60 ohm-m in the upper 10 m (30 ft), then the resistivity decreased to about 22 ohm-m down to a depth of about 30 m (about 95 ft) where it rose again to a moderate resistivity of about 40 ohm-m down to a depth of about 250 m (about 800 ft). Finally, the resistivity increased gradually toward what would be interpreted as a geoelectric basement (granitic rock with a resistivity of several hundred ohm-m) at a depth of about 1100 m (3600 ft).

Next, we made a set of seven soundings along the Fly-By Line which we used as a guide to follow along the lake bed. The intersection of the extension of runway 17-left and the Fly-By line was used to determine a point from which distances were measured. Using the truck mounted precision odometers, it was easy to determine the position of sounding stations on the lake bed and to accurately plot them on the map. Runway 17 on the lake bed is often used for landings of NASA space shuttles.

Figure 10 shows the Fly-By line cross section which extends from sounding 62 to sounding 66 over a distance of about 7 km. The western part of the section, beneath soundings 62, 63, 60, and 61, is characterized by a thick layer of predominantly 45 ohm-m material. This material is approximately 750 to 1000 m (about 2500 to 3000 ft) thick. It is underlain by a high resistivity material of several hundred ohm-meters which represents the geoelectric basement. The predominantly medium resistivity material (45 ohm-m) is probably the same as the material observed at sounding 59 (near the old outcrop) about 0.7 km to the north. The resistivity of this material is more typical of an alluvial fan (composed of coarse gravel, with some sand and few boulders) than of a buried granitic ridge. Furthermore, it does not seem that a geologic material with a resistivity in the range of 30 to 70 ohm-m will behave as much of a barrier to groundwater flow, on the contrary it will probably act as a good conduit to groundwater flow.

In the eastern half of the cross section, beneath soundings 64, 65 and 66, there is a small basin-like feature mostly filled with low resistivity materials ranging from about 7 to 15 ohm-m. The lower the resistivity of this material the more clayey it is likely to be and hence the more of a barrier to groundwater flow it might be.

Summary and Conclusions

The making and interpretation of the 67 deep Schlumberger soundings in the Graham Ranch and other areas on Edwards AFB has contributed significantly to the knowledge and visualization of the distribution of sand and gravel deposits, of clay deposits, and to the mapping of basement structures that are buried at depths ranging from a few tens of meters to nearly 2 km.

It seems that there are at least two types of clayey deposits in the studied areas: those with resistivities in the 10 to 20 ohm-m range and others with lower resistivities in the 3 to 7 ohm-m range. These latter materials are probably composed of pure clay or clay with greater salt content. Similarly, it seems that there are at least two types of basement rocks: highly weathered basement rocks, with resistivities that are barely greater than 100 ohm-m and generally less than 250 ohm-m; and less-weathered basement rocks with resistivities of a few hundred ohm-m. It seems that quartz monzonite tends to have lower resistivities than granite. In the interpretation of several soundings we have fixed the basement resistivity at 550 ohm-m. We did not measure, nor do we expect to measure, resistivities in the thousands of ohm-m for granitic rocks in this area. In part II of this report we will discuss the results of additional measurements made on granitic outcrops which confirmed our expectations.

The southern part of the surveyed area (near Branch Memorial Park road and near East-Avenue B) is characterized by the presence of a thick section of 10 to 15 ohm-m material. This thick section mostly lies at a depth greater than 300 m (about 1000 ft) which unfortunately is generally deeper than the maximum depth reached in most test wells in ground-water exploration and therefore it will not be tested by conventional shallow drilling. A layer with this range of resistivities (10 to 15 ohm-m) is usually interpreted as a clayey layer with low permeability or a sand and gravel layer with brackish or very marginal quality water (near or above 1000 mg/l total dissolved solids). Because of its considerable thickness, however, this 10 to 15 ohm-m layer should not be completely disregarded as a source for water supply. With its estimated thickness of nearly 1 km, it is unlikely that it is composed of one homogeneous layer and it is more likely that there are several layers of clean sand and gravel interbedded with pure clay layers. If tapped, these sand and gravel layers may produce an ample supply of freshwater (Zohdy and others, 1969). The only two caveats regarding this 10 to 15 ohm-m layer are: 1) that there are probably more clay layers than sand and gravel layers in it, and 2) that this layer, after all, may be composed of predominantly sand and gravel layers but is saturated with

brackish water.

The profile of soundings on Rogers Lake has shown that the possibility of a buried granitic ridge running from one side of the lake to the other and acting as a groundwater barrier is most unlikely. In Part II of this report we will present the interpretation of 73 deep Schlumberger soundings, most of which were made on Rogers Lake.

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Acknowledgements

We wish to acknowledge the cooperation of our colleagues Kenneth J. Hollett, Clark J. Londquist, and William F. McCaffery of the Water Resources Division in Sacramento, California, for paving the way to this investigation and for providing us with the geologic and geophysical logs obtained from the test wells.

We also acknowledge the cooperation of Mr. Larry D. Plews, (Engineer at Edwards AFB) and all the personnel at Edwards AFB who supported and facilitated the making of this geophysical survey.

Computers and Peripherals

The sounding interpretations were made on an IBM PC/XT computer equipped with a math co-processor. The resistivity maps and cross sections were generated on an Amiga 1000 desktop computer equipped with 4 megabytes of 32 bit RAM, and a math co-processor. The commercial program Deluxe Paint III was used exclusively in generating the color cross sections and in finalizing the resistivity maps which were calculated and generated in color using a program written and compiled in HiSoft BASIC Professional Amiga-version 1.05. The maps and cross sections were printed on a Xerox 4020 ink-jet color printer. The tabulations and log-log plots of the sounding curves shown in the appendix were made as follows. The data files from the automatic interpretation program were used to generate graphics and text files compatible with WordPerfect 5.0, using a program written in Microsoft QuickBASIC 4.5. The output from WordPerfect 5.0 was printed on an HP Laser Printer.

Appendix

On the following pages, the data for each sounding curve includes:

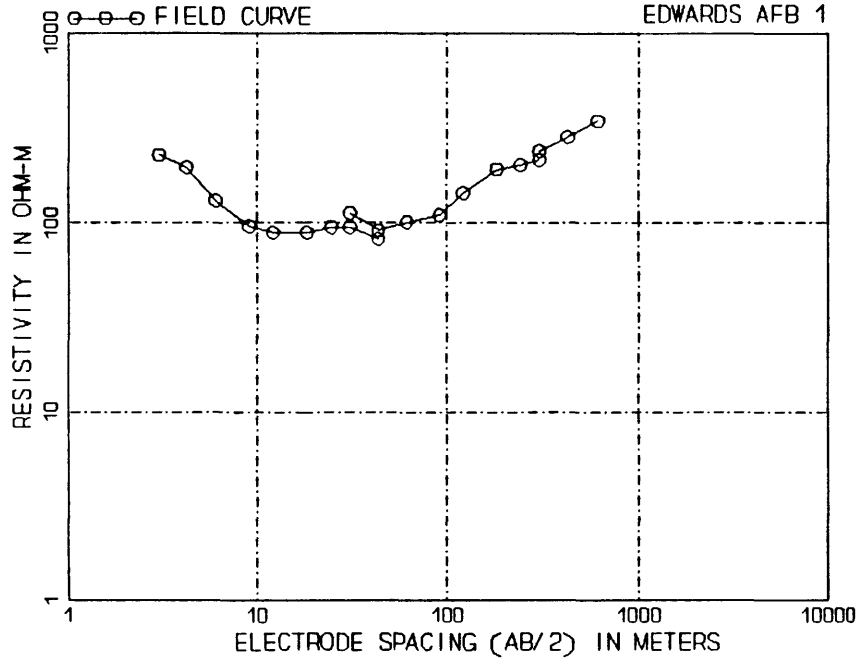
1) A sounding title which is designated by the name of the survey area followed by the sounding number. Several sounding numbers have the suffix C (for example Edwards AFB 4C). The suffix C indicates that the sounding data were corrected for non-linear road geometry. A few interpreted-sounding numbers have the suffix S and/or the suffix X (see for example: Edwards AFB 58S, Edwards AFB 47CX). The suffix S indicates that the sounding curve was smoothed prior to interpretation whereas the suffix X indicates that the sounding curve was extrapolated to larger current-electrode spacings in order to better define the final rising branch which depicts the detection of a high resistivity basement. In either case, the observed-sounding curve is always presented as it was originally measured (or after it has been corrected for non-linear road geometry) as a reminder of how the actual data looked prior to data processing and interpretation.

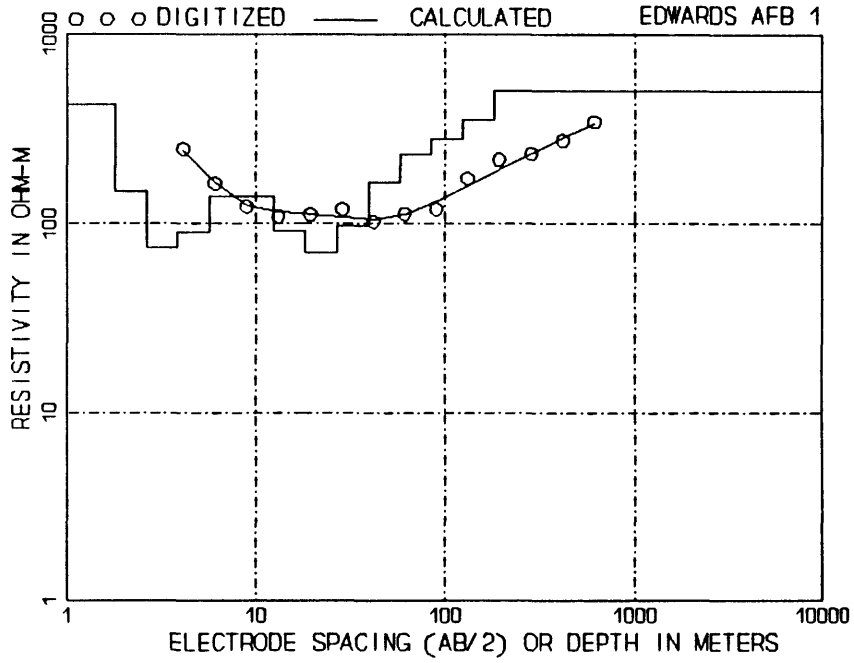
2) A tabulation of the current-electrode spacings (AB/2) in meters (and in feet) and corresponding apparent resistivities in ohm-meters.

3) A log-log plot of the field and corrected sounding-data points. Each set of data points that was made with the same potential-electrode spacing (MN/2) is connected with a solid line to form a continuous segment on the curve. Measurements were made at the fixed potential-electrode spacings of 2, 20, and 200 ft, respectively.

4) A tabulation of the automatically interpreted layering, with depths in meters (and in feet) and corresponding interpreted resistivities in ohm-meters.

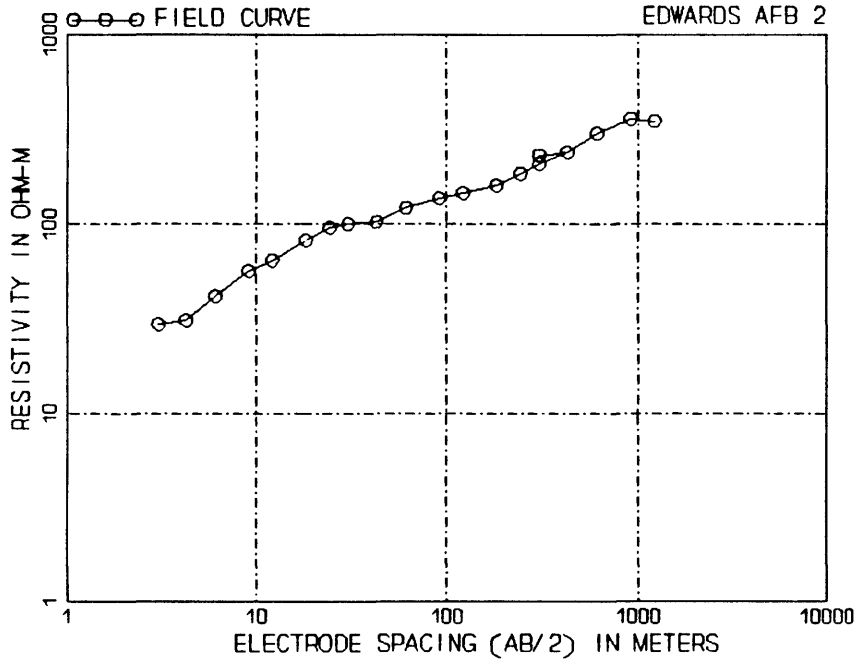
5) A log-log plot of the output of the automatic interpretation program. The circles represent the shifted-digitized sounding curve, the continuous curve represents the calculated sounding curve, and the step-function curve represents the interpreted layering model. Note that the abscissa is used to represent the current-electrode spacing for both the digitized and calculated sounding curves as well as the interpreted depth to the various layers. Similarly, the ordinate is used to represent the digitized and calculated apparent resistivities as well as the interpreted resistivity of the various layers in the step-function model.

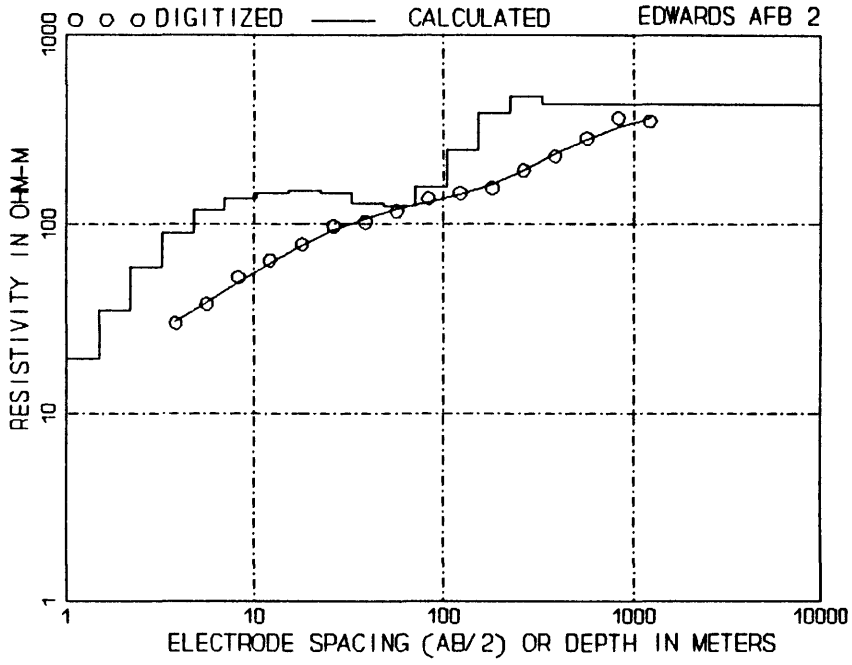




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	227.00	42.67 (140.00)	91.00
4.27 (14.00)	196.00	60.96 (200.00)	101.00
6.10 (20.00)	131.00	91.44 (300.00)	110.00
9.14 (30.00)	96.00	121.92 (400.00)	144.00
12.19 (40.00)	89.00	182.88 (600.00)	191.00
18.29 (60.00)	89.00	243.84 (800.00)	202.00
24.38 (80.00)	95.00	304.80 (1000.00)	215.00
30.48 (100.00)	95.00	304.80 (1000.00)	240.00
42.67 (140.00)	82.00	426.72 (1400.00)	284.00
30.48 (100.00)	112.50	609.60 (2000.00)	345.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.82 (5.96)	425.68	26.66 (87.48)	70.32
2.67 (8.75)	147.56	39.14 (128.40)	96.99
3.91 (12.84)	74.61	57.45 (188.47)	165.25
5.74 (18.85)	90.29	84.32 (276.64)	231.87
8.43 (27.66)	138.64	123.76 (406.05)	279.36
12.38 (40.60)	138.34	181.66 (595.99)	351.74
18.17 (59.60)	91.09	99999.00 (99999.00)	500.68





AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
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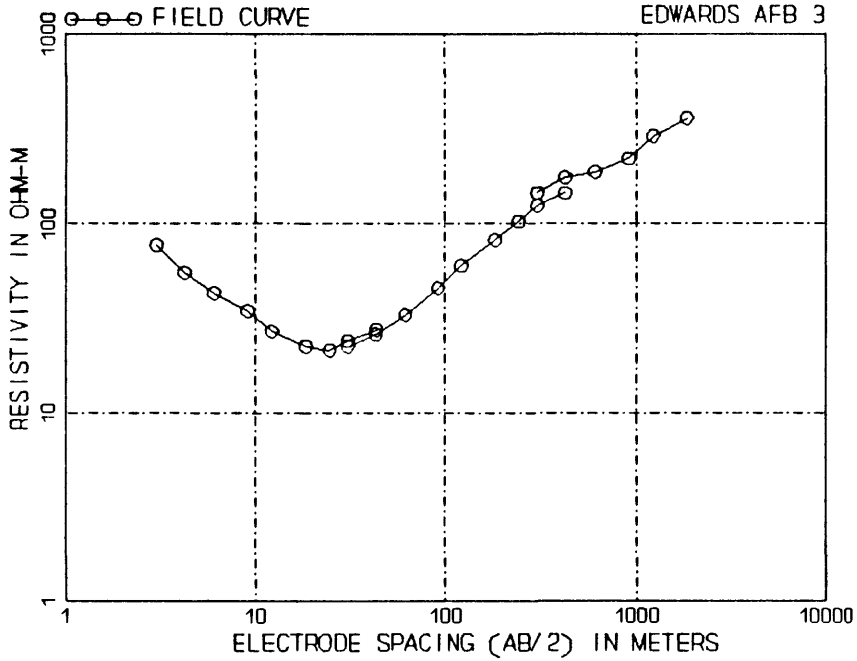
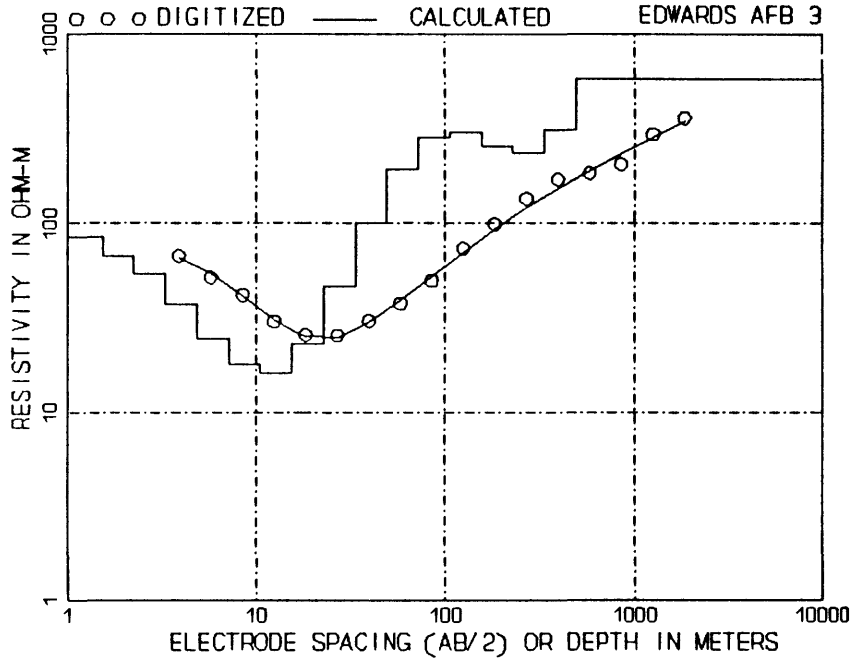
4.27 (14.00)	31.00	121.92 (400.00)	146.00
6.10 (20.00)	41.50	182.88 (600.00)	160.00
9.14 (30.00)	56.50	243.84 (800.00)	185.00
12.19 (40.00)	64.50	304.80 (1000.00)	208.00
18.29 (60.00)	82.50	426.72 (1400.00)	240.00
24.38 (80.00)	96.00	304.80 (1000.00)	230.00
30.48 (100.00)	100.00	426.72 (1400.00)	240.00
30.48 (100.00)	100.00	609.60 (2000.00)	301.00
42.67 (140.00)	103.00	914.40 (3000.00)	360.00
60.96 (200.00)	122.00	1219.20 (4000.00)	350.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.52 (4.98)	19.43	32.70 (107.28)	146.41
2.23 (7.31)	34.95	48.00 (157.46)	129.55
3.27 (10.73)	59.32	70.45 (231.13)	124.34
4.80 (15.75)	90.05	103.40 (339.25)	156.79
7.04 (23.11)	119.06	151.77 (497.95)	248.04
10.34 (33.92)	136.56	222.77 (730.88)	386.64
15.18 (49.79)	145.03	326.99 (1072.79)	474.63
22.28 (73.09)	150.88	99999.00 (99999.00)	430.52





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6.10 (20.00)	43.00	182.88 (600.00)	82.00
9.14 (30.00)	34.50	243.84 (800.00)	103.00
12.19 (40.00)	27.00	304.80 (1000.00)	125.00
18.29 (60.00)	22.50	426.72 (1400.00)	145.00
24.38 (80.00)	21.50	304.80 (1000.00)	145.00
30.48 (100.00)	24.00	426.72 (1400.00)	175.00
42.67 (140.00)	27.50	609.60 (2000.00)	188.00
30.48 (100.00)	22.50	914.40 (3000.00)	220.00
42.67 (140.00)	26.00	1219.20 (4000.00)	290.00
60.96 (200.00)	33.00	1828.80 (6000.00)	360.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.55 (5.09)	84.90	33.42 (109.63)	46.46
2.28 (7.47)	67.10	49.05 (160.92)	100.11
3.34 (10.96)	54.27	71.99 (236.20)	191.78
4.90 (16.09)	37.25	105.67 (346.69)	284.57
7.20 (23.62)	24.72	155.10 (508.87)	302.80
10.57 (34.67)	17.93	227.66 (746.92)	255.48
15.51 (50.89)	16.06	334.16 (1096.32)	234.77
22.77 (74.69)	22.95	490.48 (1609.19)	313.31
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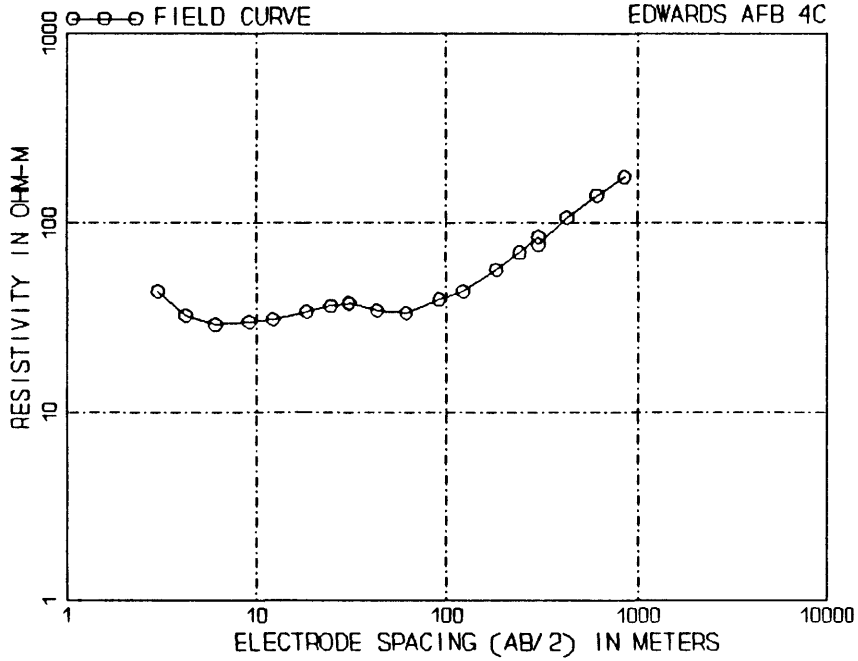

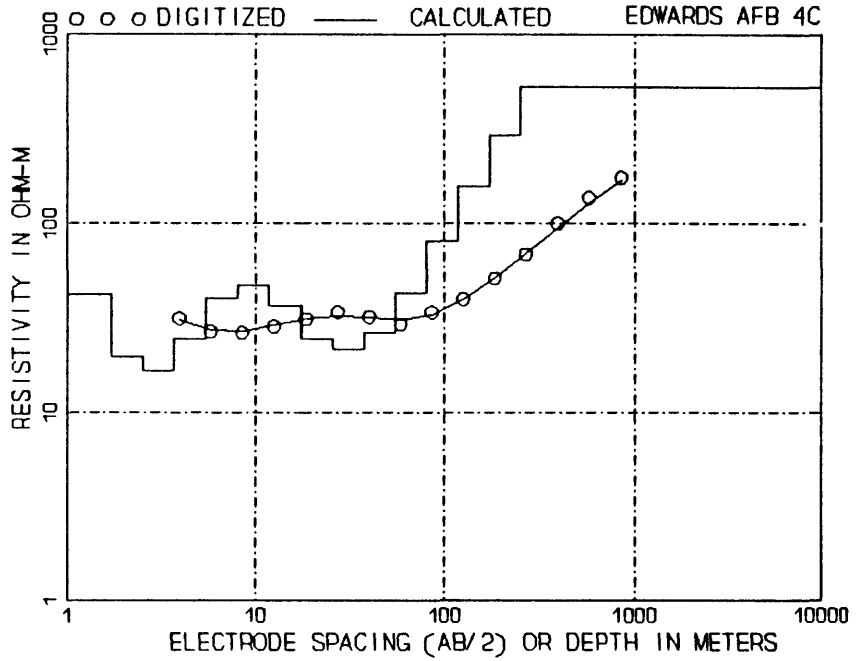

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3.05 (10.00)	43.50	60.96 (200.00)	33.50
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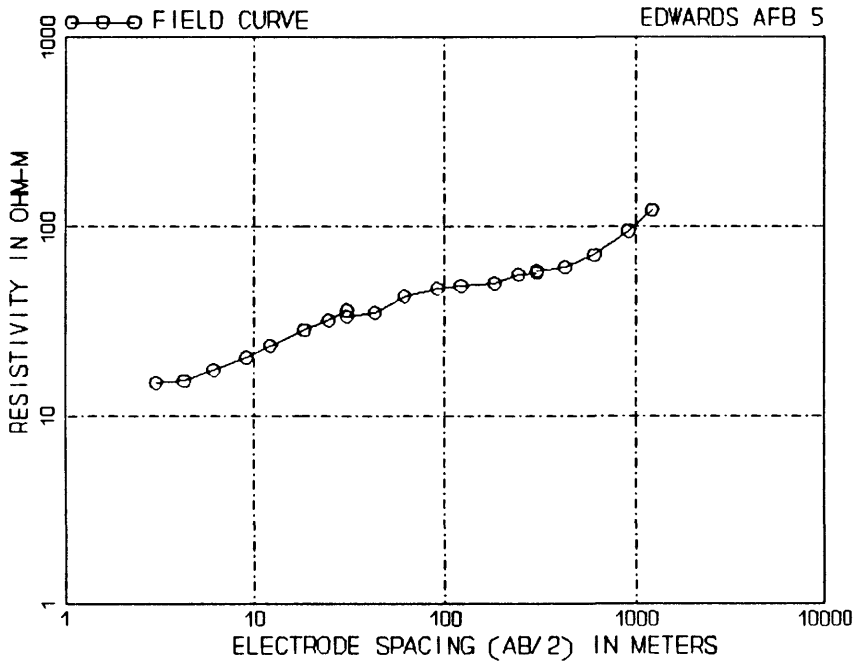
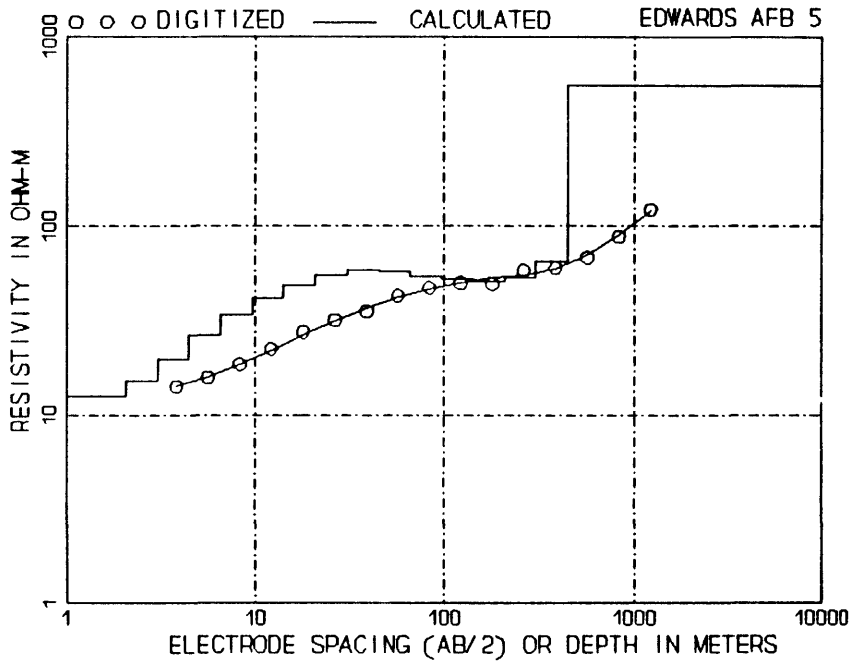
6.10 (20.00)	29.00	121.92 (400.00)	43.50
9.14 (30.00)	30.00	182.88 (600.00)	56.50
12.19 (40.00)	31.00	243.84 (800.00)	70.00
18.29 (60.00)	34.00	304.80 (1000.00)	85.00
24.38 (80.00)	36.50	304.80 (1000.00)	77.00
30.48 (100.00)	37.50	426.72 (1400.00)	107.00
30.48 (100.00)	38.00	609.60 (2000.00)	140.00
42.67 (140.00)	34.50	851.31 (2793.00)	175.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.73 (5.67)	42.29	25.37 (83.23)	24.53
2.54 (8.32)	19.79	37.24 (122.17)	21.61
3.72 (12.22)	16.62	54.66 (179.31)	26.69
5.47 (17.93)	24.71	80.22 (263.20)	42.74
8.02 (26.32)	40.06	117.75 (386.32)	81.02
11.78 (38.63)	47.30	172.83 (567.04)	157.39
17.28 (56.70)	36.49	253.69 (832.31)	292.56
		99999.00 (99999.00)	526.12





AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
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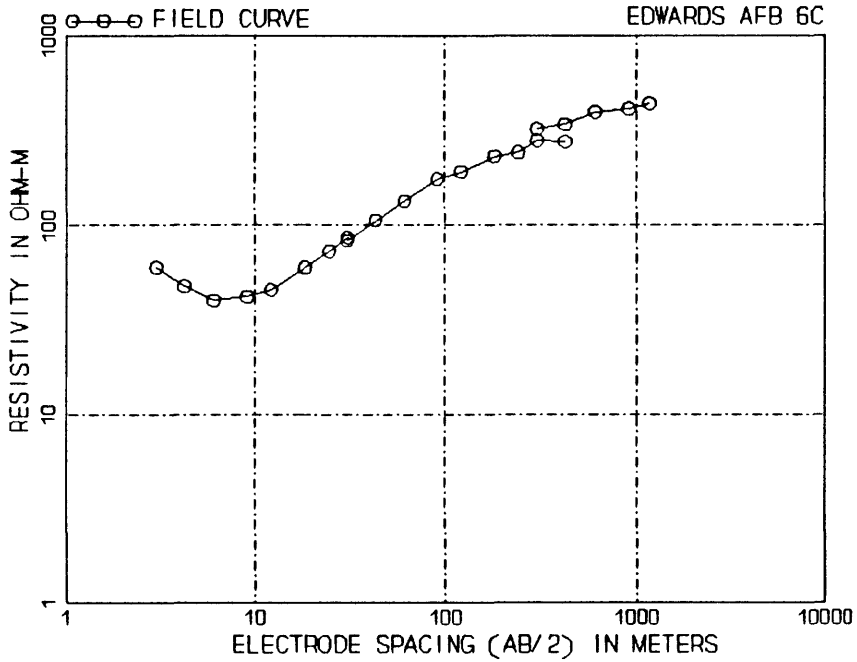
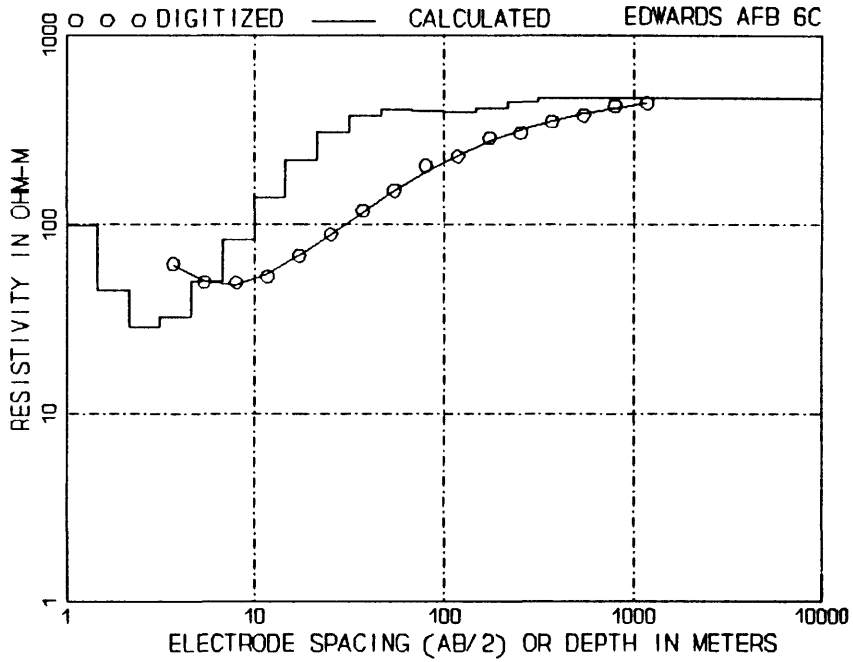
4.27 (14.00)	15.30	91.44 (300.00)	47.00
6.10 (20.00)	17.50	121.92 (400.00)	48.50
9.14 (30.00)	20.30	182.88 (600.00)	50.00
12.19 (40.00)	23.50	243.84 (800.00)	56.00
18.29 (60.00)	28.50	304.80 (1000.00)	57.00
24.38 (80.00)	32.00	304.80 (1000.00)	58.50
30.48 (100.00)	36.00	426.72 (1400.00)	61.00
30.48 (100.00)	33.50	609.60 (2000.00)	71.00
42.67 (140.00)	35.00	914.40 (3000.00)	95.00
		1219.20 (4000.00)	122.00

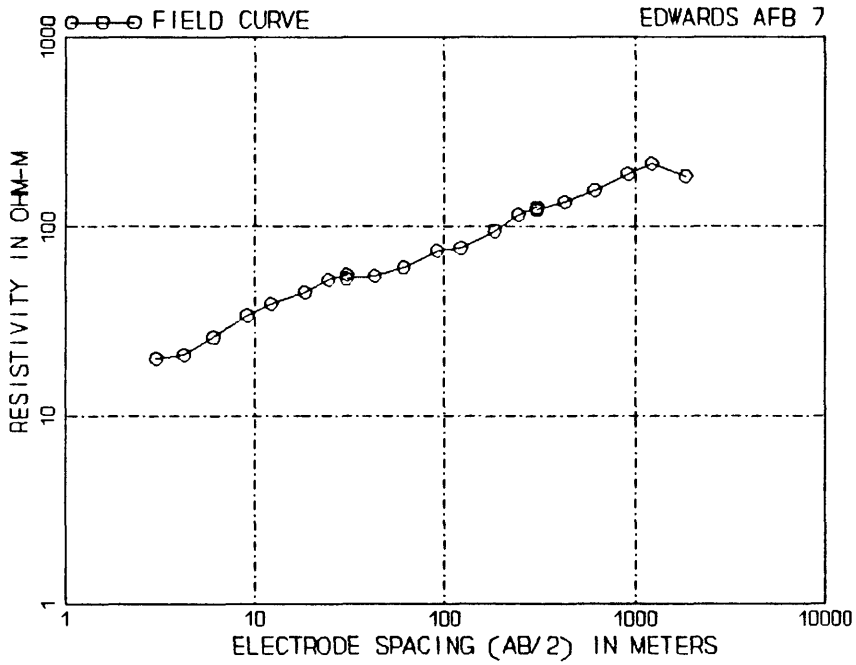
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
2.08 (6.83)	12.55	44.85 (147.16)	58.60
3.06 (10.03)	15.18	65.84 (216.00)	57.60
4.49 (14.72)	19.76	96.64 (317.04)	54.46
6.58 (21.60)	26.40	141.84 (465.36)	52.22
9.66 (31.70)	34.14	208.19 (683.05)	51.03
14.18 (46.54)	41.62	305.59 (1002.58)	53.41
20.82 (68.31)	48.61	448.54 (1471.59)	64.73
30.56 (100.26)	55.01	99999.00 (99999.00)	550.00

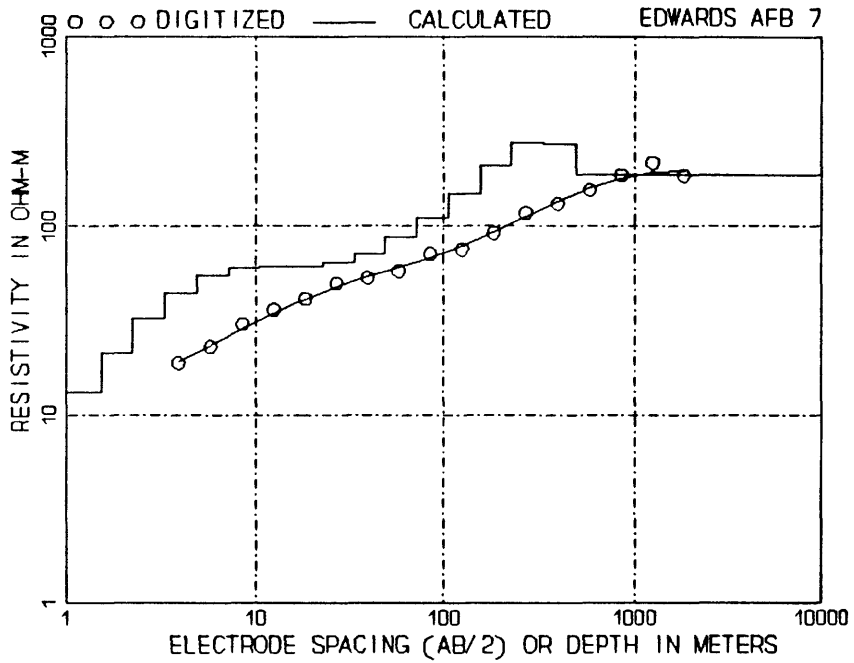




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	60.00	91.44 (300.00)	175.00
4.27 (14.00)	47.50	121.92 (400.00)	191.00
6.10 (20.00)	40.00	182.88 (600.00)	230.00
9.14 (30.00)	42.00	243.84 (800.00)	242.00
12.19 (40.00)	45.50	304.80 (1000.00)	280.00
18.29 (60.00)	60.00	426.72 (1400.00)	275.00
24.38 (80.00)	73.00	304.80 (1000.00)	320.00
30.48 (100.00)	86.00	426.72 (1400.00)	340.00
30.48 (100.00)	83.00	609.60 (2000.00)	395.00
42.67 (140.00)	106.00	914.40 (3000.00)	410.00
60.96 (200.00)	134.00	1172.57 (3847.00)	437.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.46 (4.79)	98.77	31.45 (103.18)	306.38
2.14 (7.03)	44.70	46.16 (151.44)	375.72
3.14 (10.32)	28.54	67.75 (222.29)	403.72
4.62 (15.14)	32.20	99.45 (326.27)	398.04
6.78 (22.23)	49.75	145.97 (478.90)	392.54
9.94 (32.63)	83.22	214.25 (702.93)	410.40
14.60 (47.89)	139.01	314.48 (1031.76)	443.59
21.43 (70.29)	218.38	99999.00 (99999.00)	469.28





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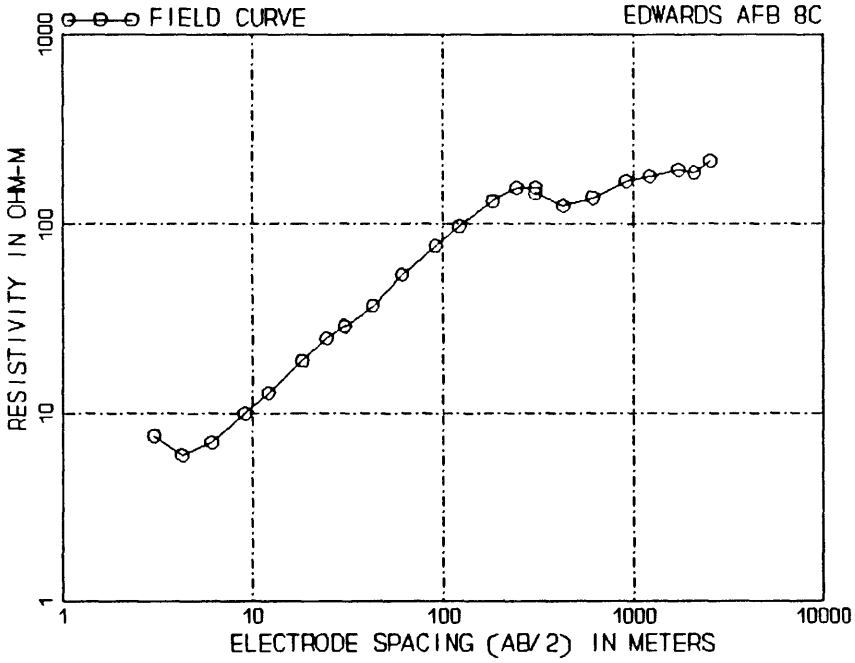
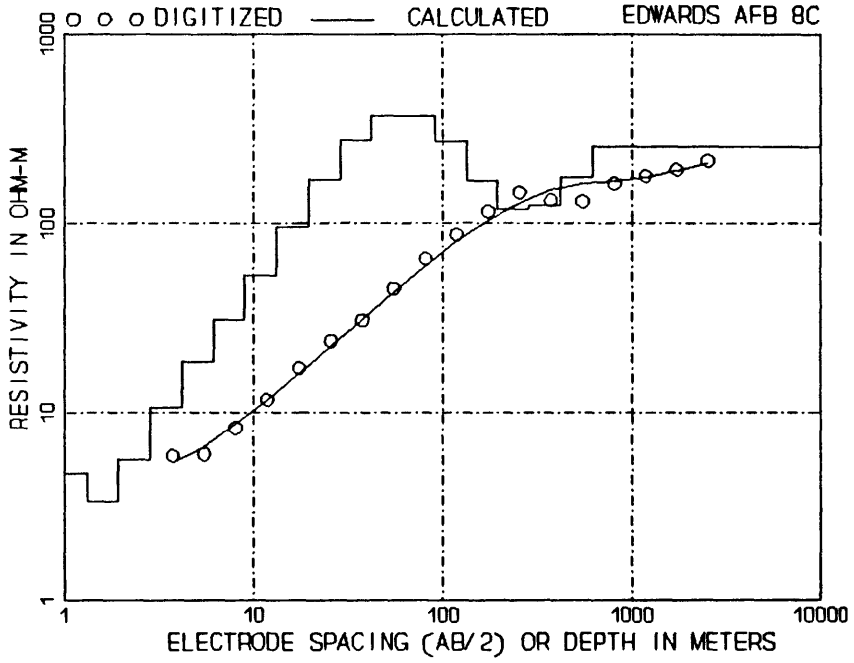
4.27 (14.00)	21.00	121.92 (400.00)	77.50
6.10 (20.00)	26.00	182.88 (600.00)	95.00
9.14 (30.00)	34.00	243.84 (800.00)	116.00
12.19 (40.00)	39.00	304.80 (1000.00)	126.00
18.29 (60.00)	45.00	304.80 (1000.00)	122.00
24.38 (80.00)	52.50	426.72 (1400.00)	135.00
30.48 (100.00)	56.00	609.60 (2000.00)	156.00
30.48 (100.00)	53.00	914.40 (3000.00)	190.00
42.67 (140.00)	55.00	1219.20 (4000.00)	215.00
60.96 (200.00)	61.00	1828.80 (6000.00)	185.00

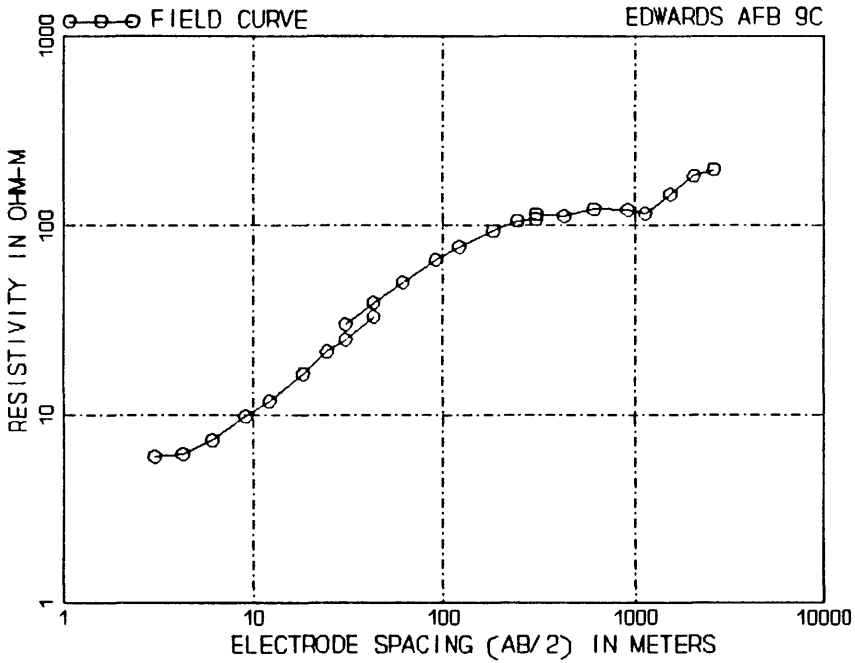
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.55 (5.09)	13.26	33.42 (109.63)	63.76
2.28 (7.47)	21.31	49.05 (160.92)	71.81
3.34 (10.96)	32.24	71.99 (236.20)	87.92
4.90 (16.09)	44.22	105.67 (346.69)	111.00
7.20 (23.62)	54.57	155.10 (508.87)	147.62
10.57 (34.67)	60.07	227.66 (746.92)	208.95
15.51 (50.89)	61.15	334.16 (1096.32)	273.91
22.77 (74.69)	61.46	490.48 (1609.19)	271.82
		99999.00 (99999.00)	186.85

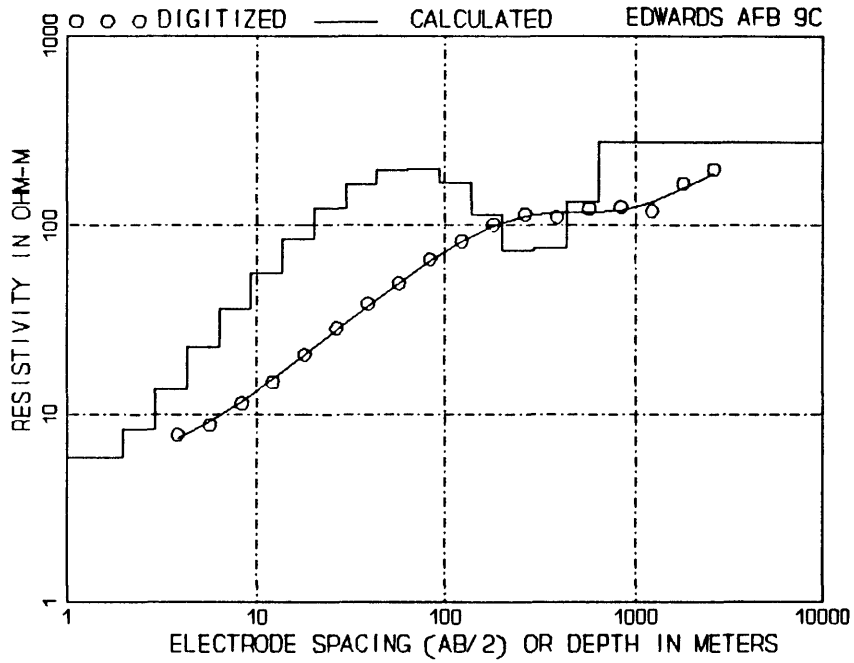




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	7.60	121.92 (400.00)	97.00
4.27 (14.00)	6.00	182.88 (600.00)	132.00
6.10 (20.00)	7.00	243.84 (800.00)	155.00
9.14 (30.00)	10.00	304.80 (1000.00)	155.00
12.19 (40.00)	12.80	304.80 (1000.00)	145.00
18.29 (60.00)	19.00	426.72 (1400.00)	125.00
24.38 (80.00)	25.00	609.60 (2000.00)	138.00
30.48 (100.00)	29.00	914.40 (3000.00)	168.00
30.48 (100.00)	28.80	1219.20 (4000.00)	178.00
42.67 (140.00)	37.00	1726.69 (5665.00)	193.00
60.96 (200.00)	54.00	2093.98 (6870.00)	186.00
91.44 (300.00)	77.00	2549.96 (8366.00)	214.60

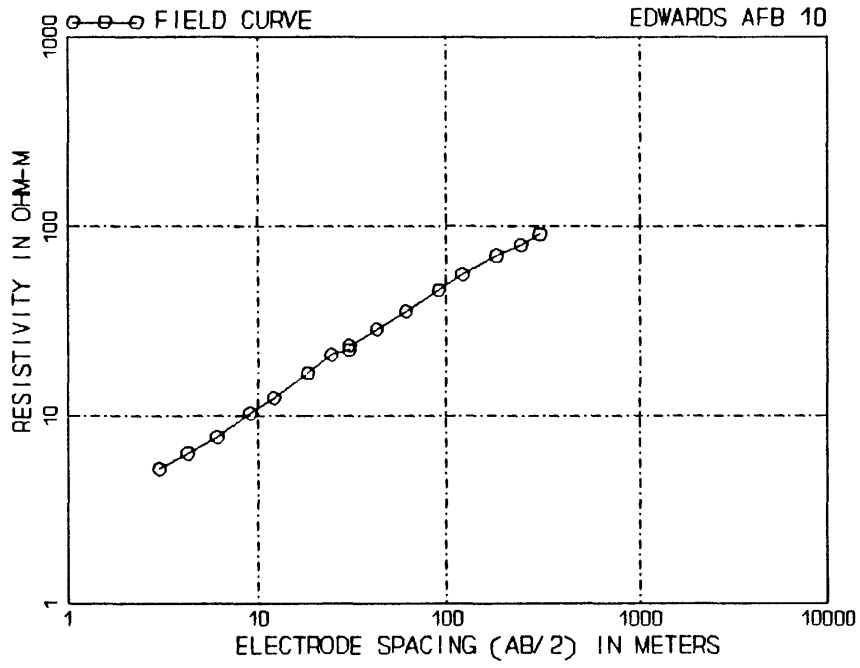
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.33 (4.35)	4.77	41.93 (137.58)	275.50
1.95 (6.39)	3.36	61.55 (201.94)	368.32
2.86 (9.37)	5.62	90.34 (296.40)	369.73
4.19 (13.76)	10.70	132.61 (435.06)	271.70
6.16 (20.19)	18.54	194.64 (638.58)	167.15
9.03 (29.64)	30.91	285.69 (937.31)	118.79
13.26 (43.51)	53.54	419.34 (1375.78)	125.59
19.46 (63.86)	96.22	615.50 (2019.37)	175.24
28.57 (93.73)	170.32	99999.00 (99999.00)	253.22

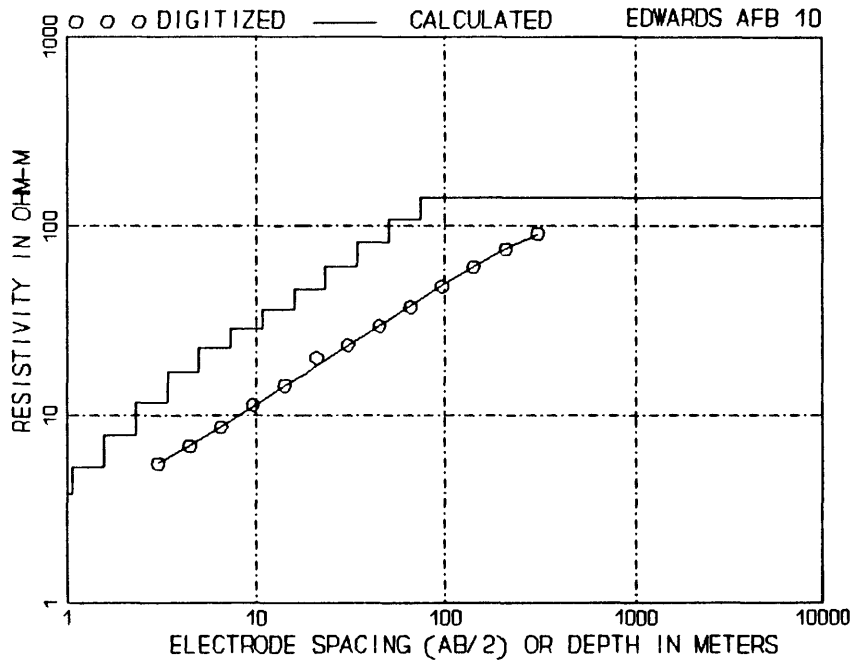




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	6.00	91.44 (300.00)	66.00
4.27 (14.00)	6.20	121.92 (400.00)	77.50
6.10 (20.00)	7.30	182.88 (600.00)	94.00
9.14 (30.00)	9.80	243.84 (800.00)	106.00
12.19 (40.00)	11.80	304.80 (1000.00)	108.00
18.29 (60.00)	16.50	304.80 (1000.00)	115.00
24.38 (80.00)	21.60	426.72 (1400.00)	112.00
30.48 (100.00)	25.00	609.60 (2000.00)	122.00
42.67 (140.00)	33.00	914.40 (3000.00)	121.00
30.48 (100.00)	30.00	1132.03 (3714.00)	116.00
42.67 (140.00)	39.00	1548.08 (5079.00)	146.00
60.96 (200.00)	50.00	2058.01 (6752.00)	183.00
		2630.73 (8631.00)	197.00

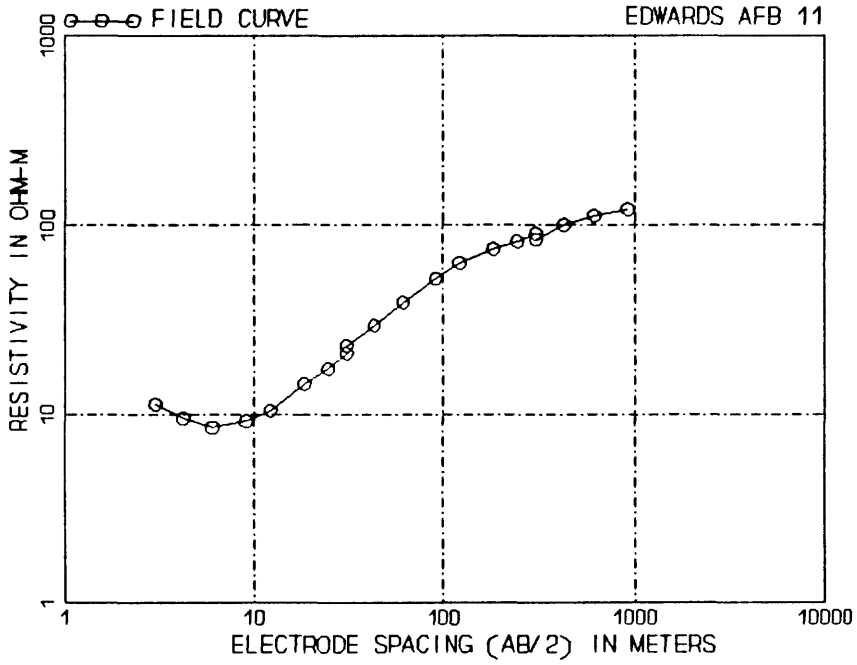
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.37 (4.49)	5.91	43.26 (141.94)	165.91
2.01 (6.59)	5.94	63.50 (208.33)	196.24
2.95 (9.67)	8.33	93.21 (305.79)	198.14
4.33 (14.19)	13.64	136.81 (448.84)	166.63
6.35 (20.83)	22.70	200.80 (658.81)	113.09
9.32 (30.58)	36.33	294.74 (967.00)	73.77
13.68 (44.88)	56.18	432.62 (1419.36)	75.71
20.08 (65.88)	84.88	635.00 (2083.33)	133.22
29.47 (96.70)	123.44	99999.00 (99999.00)	274.72

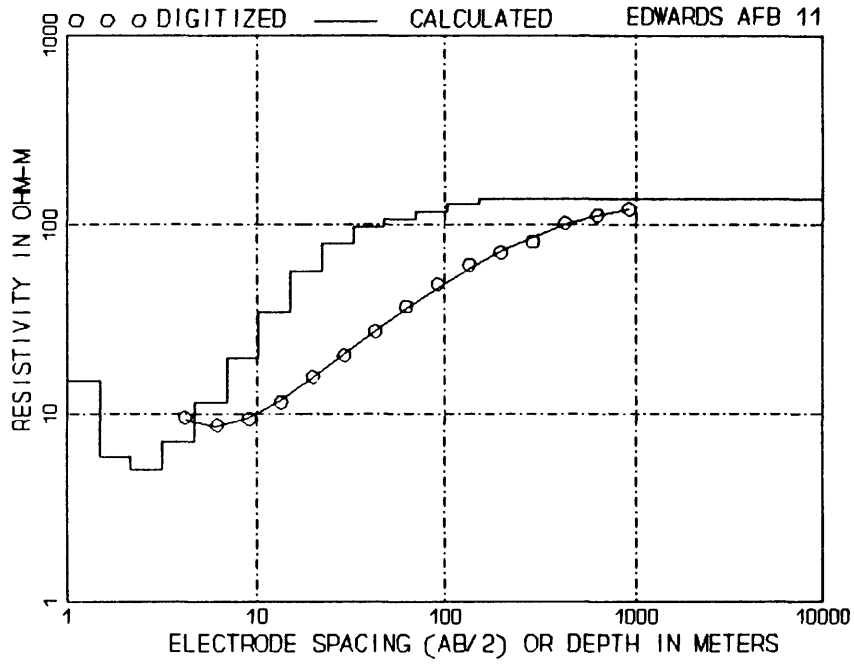




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	5.20	30.48 (100.00)	23.50
4.27 (14.00)	6.30	42.67 (140.00)	28.70
6.10 (20.00)	7.70	60.96 (200.00)	35.50
9.14 (30.00)	10.30	91.44 (300.00)	46.00
12.19 (40.00)	12.40	121.92 (400.00)	56.00
18.29 (60.00)	16.80	182.88 (600.00)	70.00
24.38 (80.00)	21.00	243.84 (800.00)	80.00
30.48 (100.00)	22.20	304.80 (1000.00)	91.00

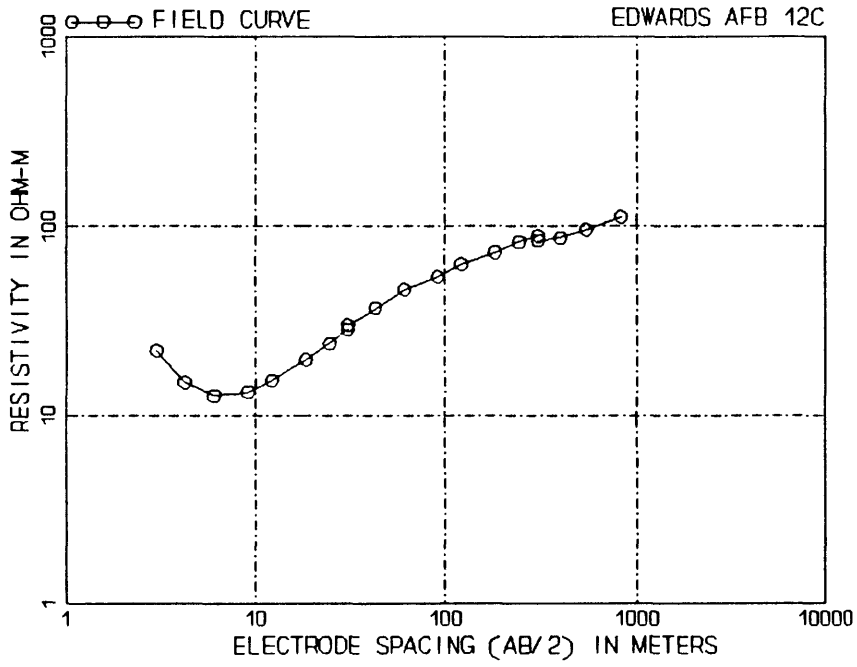
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.08 (3.54)	3.80	10.80 (35.43)	28.79
1.59 (5.20)	5.29	15.85 (52.00)	36.05
2.33 (7.63)	7.81	23.27 (76.33)	46.21
3.41 (11.20)	11.74	34.15 (112.04)	61.02
5.01 (16.44)	16.95	50.12 (164.45)	81.66
7.36 (24.14)	22.72	73.57 (241.38)	108.40
		99999.00 (99999.00)	140.30

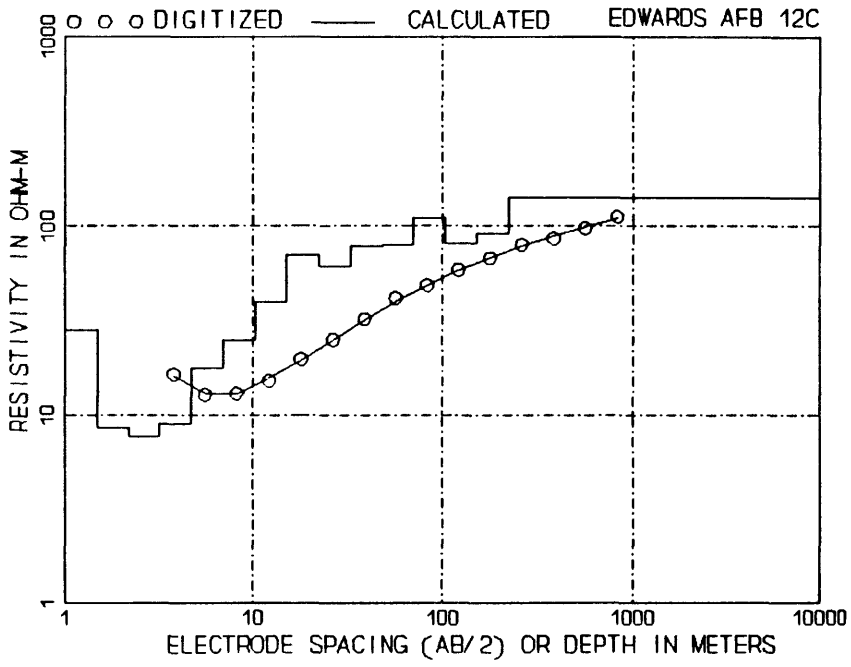




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	11.30	60.96 (200.00)	39.00
4.27 (14.00)	9.50	91.44 (300.00)	52.00
6.10 (20.00)	8.50	121.92 (400.00)	63.00
9.14 (30.00)	9.20	182.88 (600.00)	75.00
12.19 (40.00)	10.50	243.84 (800.00)	82.00
18.29 (60.00)	14.50	304.80 (1000.00)	90.00
24.38 (80.00)	17.50	304.80 (1000.00)	84.00
30.48 (100.00)	21.00	426.72 (1400.00)	100.00
30.48 (100.00)	23.00	609.60 (2000.00)	112.00
42.67 (140.00)	29.50	914.40 (3000.00)	121.00

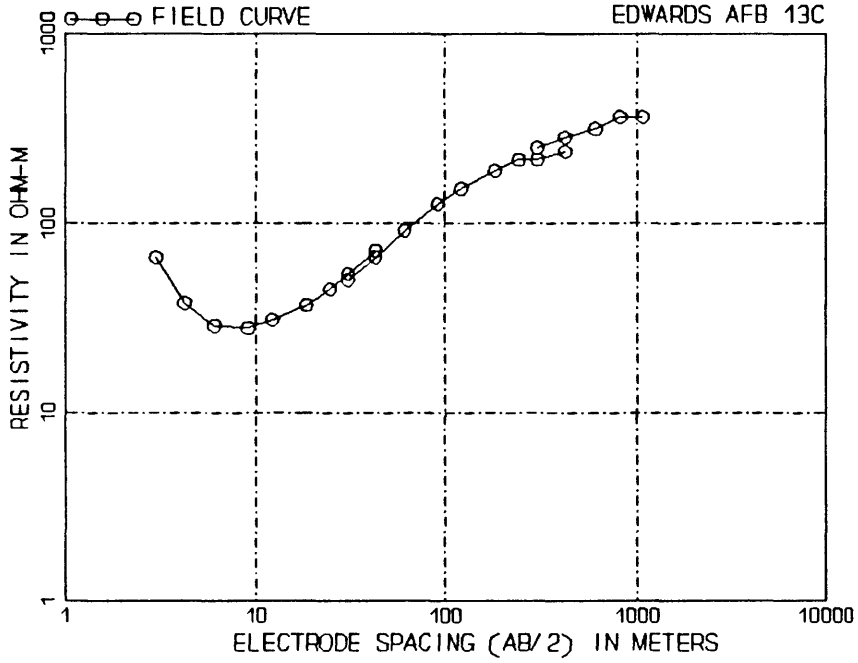
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.50 (4.93)	14.96	22.07 (72.41)	56.32
2.21 (7.24)	5.89	32.40 (106.29)	79.93
3.24 (10.63)	5.01	47.55 (156.01)	96.76
4.76 (15.60)	7.09	69.80 (228.99)	106.60
6.98 (22.90)	11.44	102.45 (336.11)	116.72
10.24 (33.61)	19.68	150.37 (493.35)	128.79
15.04 (49.33)	34.43	220.72 (724.13)	136.48
		99999.00 (99999.00)	135.94

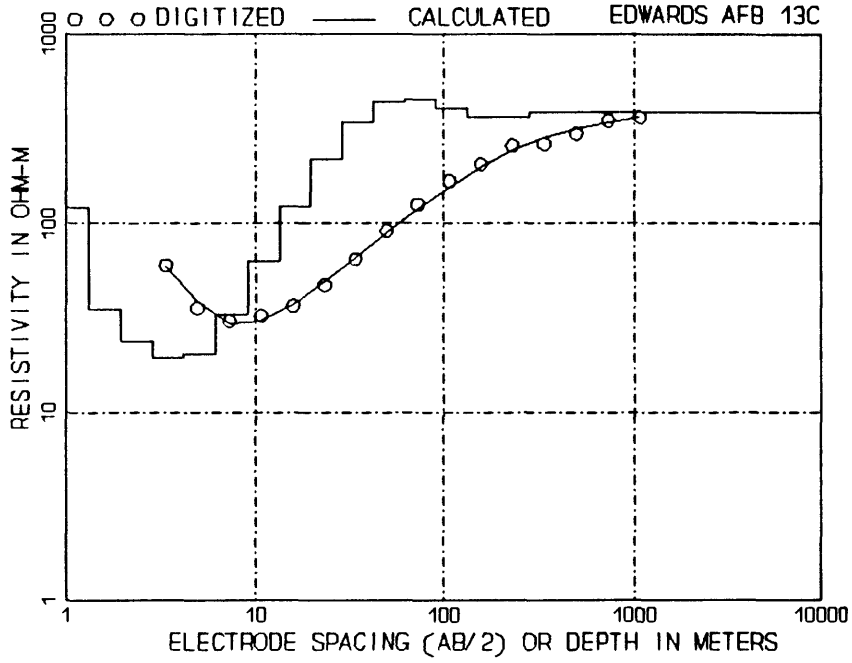




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	22.00	60.96 (200.00)	46.50
4.27 (14.00)	15.00	91.44 (300.00)	54.00
6.10 (20.00)	12.70	121.92 (400.00)	63.00
9.14 (30.00)	13.30	182.88 (600.00)	73.00
12.19 (40.00)	15.30	243.84 (800.00)	83.00
18.29 (60.00)	19.70	304.80 (1000.00)	89.00
24.38 (80.00)	24.00	304.80 (1000.00)	84.00
30.48 (100.00)	28.50	398.07 (1306.00)	86.80
30.48 (100.00)	30.00	544.98 (1788.00)	96.00
42.67 (140.00)	37.00	826.31 (2711.00)	112.00

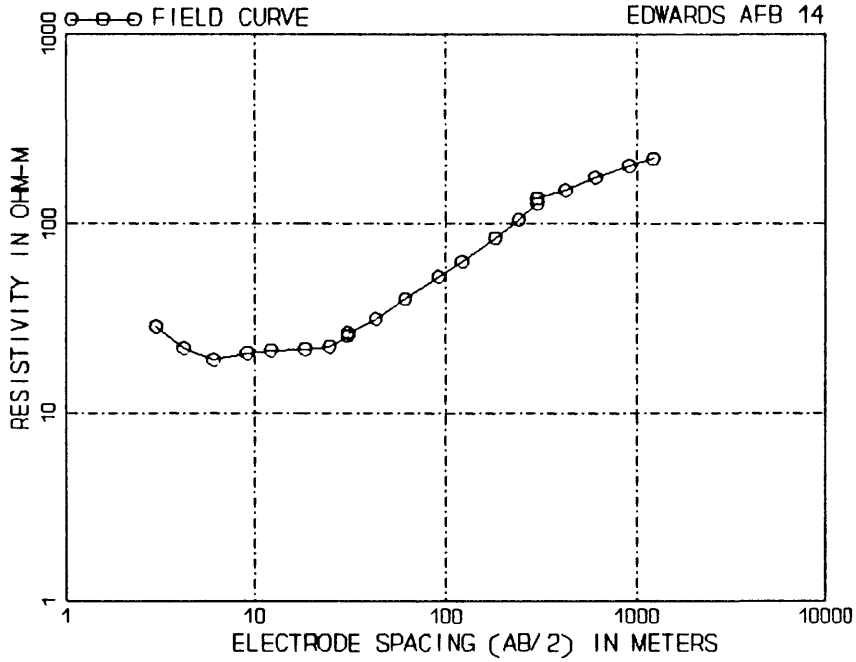
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.51 (4.95)	28.23	22.16 (72.71)	70.61
2.22 (7.27)	8.58	32.53 (106.72)	61.64
3.25 (10.67)	7.66	47.75 (156.65)	78.72
4.77 (15.66)	8.95	70.08 (229.92)	79.80
7.01 (22.99)	17.61	102.86 (337.48)	110.17
10.29 (33.75)	24.75	150.98 (495.36)	80.49
15.10 (49.54)	39.42	221.62 (727.08)	91.70
		99999.00 (99999.00)	140.36

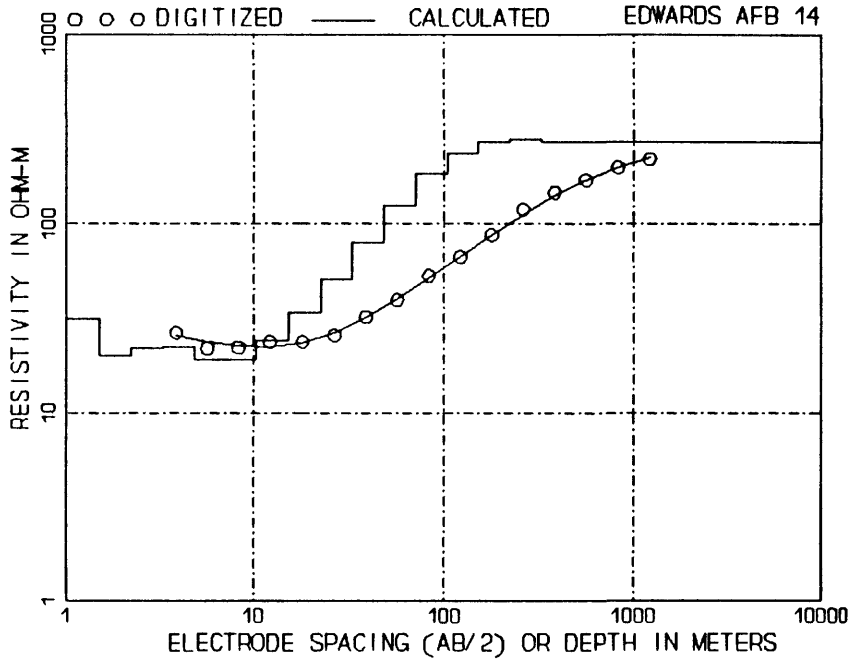




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	66.00	60.96 (200.00)	92.00
4.27 (14.00)	38.00	91.44 (300.00)	126.50
6.10 (20.00)	28.80	121.92 (400.00)	152.00
9.14 (30.00)	28.00	182.88 (600.00)	190.00
12.19 (40.00)	31.00	243.84 (800.00)	217.00
18.29 (60.00)	37.00	304.80 (1000.00)	217.00
24.38 (80.00)	45.00	426.72 (1400.00)	240.00
30.48 (100.00)	54.00	304.80 (1000.00)	250.00
42.67 (140.00)	72.00	426.72 (1400.00)	285.00
30.48 (100.00)	50.00	609.60 (2000.00)	315.00
42.67 (140.00)	66.50	817.78 (2683.00)	365.00
		1073.20 (3521.00)	363.00

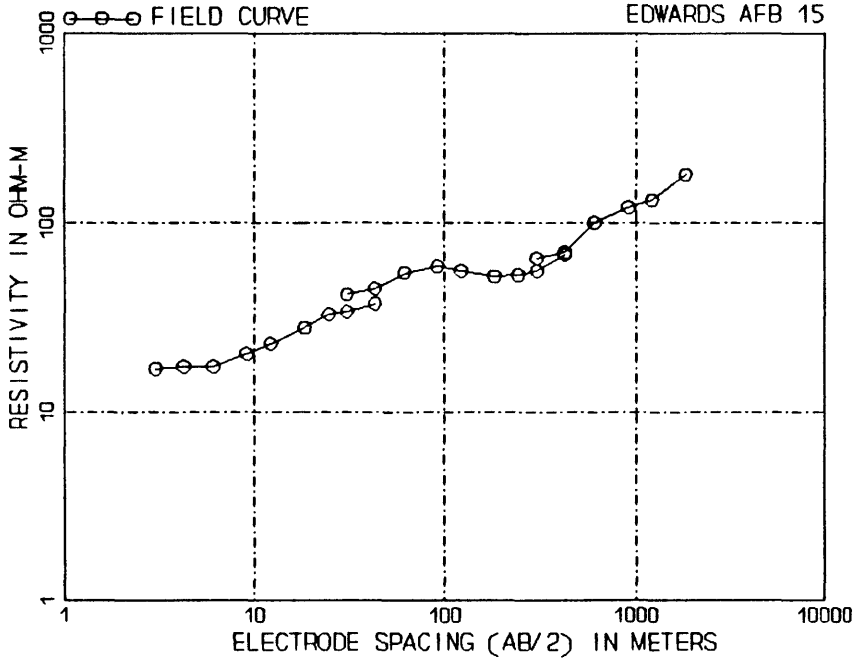
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.34 (4.38)	120.72	28.78 (94.43)	217.90
1.96 (6.43)	35.06	42.25 (138.61)	339.26
2.88 (9.44)	23.73	62.01 (203.45)	437.42
4.22 (13.86)	19.59	91.02 (298.62)	454.20
6.20 (20.34)	20.47	133.60 (438.32)	406.98
9.10 (29.86)	32.73	196.10 (643.36)	366.17
13.36 (43.83)	63.29	287.83 (944.32)	364.26
19.61 (64.34)	122.42	99999.00 (99999.00)	385.92

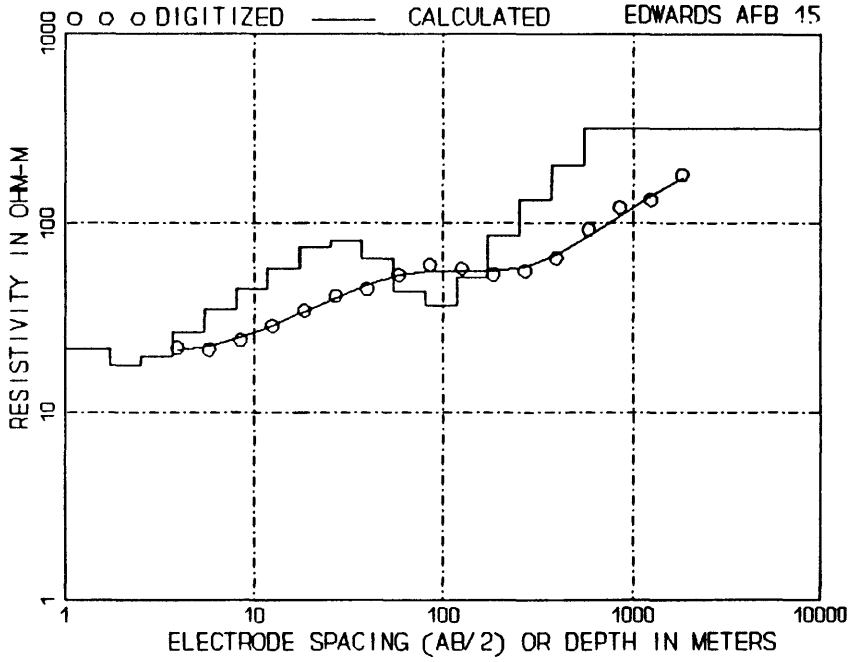




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	28.70	60.96 (200.00)	40.00
4.27 (14.00)	22.00	91.44 (300.00)	52.50
6.10 (20.00)	19.20	121.92 (400.00)	63.00
9.14 (30.00)	20.80	182.88 (600.00)	84.00
12.19 (40.00)	21.50	243.84 (800.00)	105.00
18.29 (60.00)	21.80	304.80 (1000.00)	128.00
24.38 (80.00)	22.50	304.80 (1000.00)	136.00
30.48 (100.00)	25.50	426.72 (1400.00)	150.00
30.48 (100.00)	26.50	609.60 (2000.00)	176.00
42.67 (140.00)	31.50	914.40 (3000.00)	202.00
		1219.20 (4000.00)	220.00

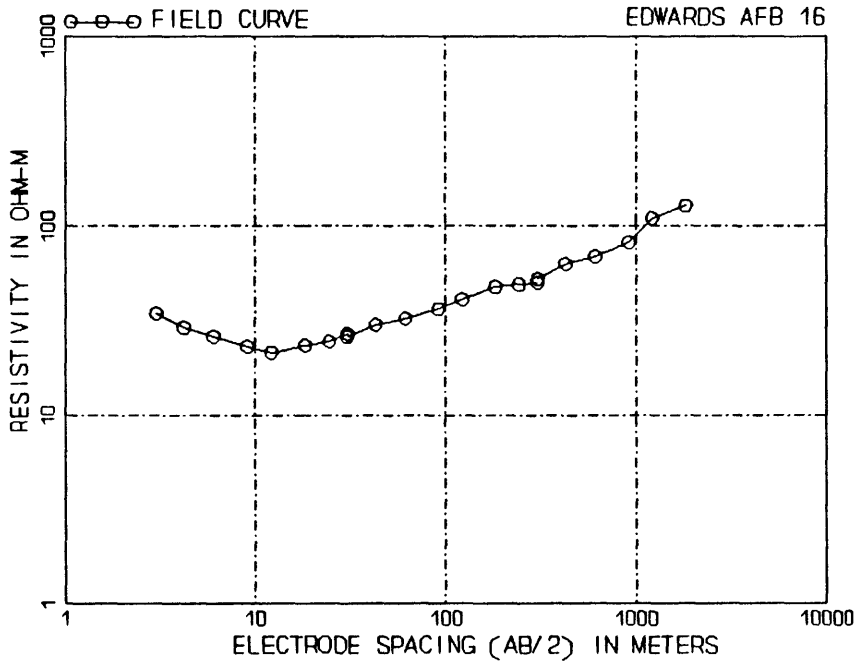
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.52 (4.98)	31.35	32.70 (107.28)	50.76
2.23 (7.31)	20.22	48.00 (157.46)	79.28
3.27 (10.73)	22.04	70.45 (231.13)	124.76
4.80 (15.75)	22.41	103.40 (339.25)	182.44
7.04 (23.11)	19.24	151.77 (497.95)	236.04
10.34 (33.92)	19.13	222.77 (730.88)	270.17
15.18 (49.79)	24.02	326.99 (1072.79)	279.79
22.28 (73.09)	34.04	99999.00 (99999.00)	270.19

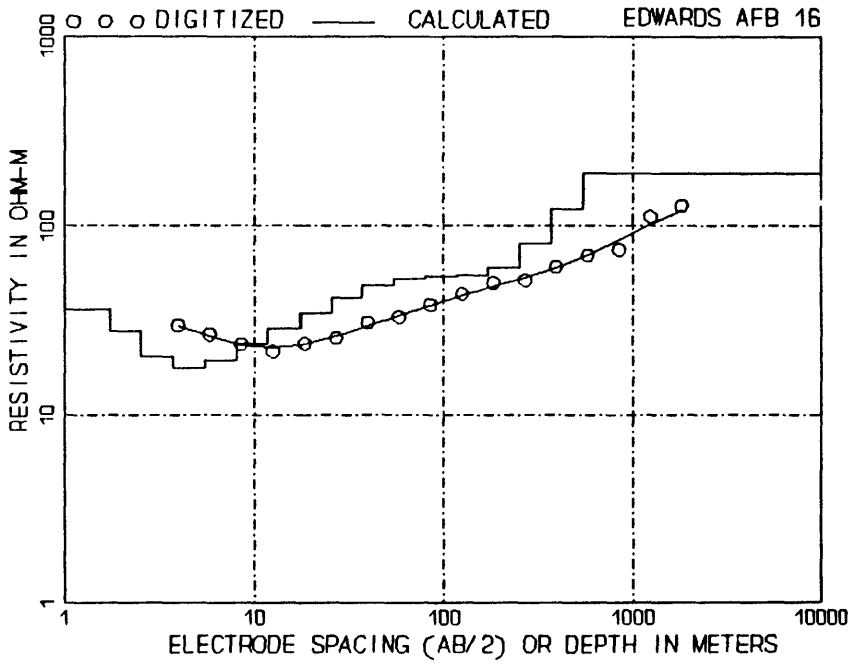




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	17.00	91.44 (300.00)	59.00
4.27 (14.00)	17.50	121.92 (400.00)	56.00
6.10 (20.00)	17.50	182.88 (600.00)	52.00
9.14 (30.00)	20.40	243.84 (800.00)	53.00
12.19 (40.00)	23.00	304.80 (1000.00)	56.00
18.29 (60.00)	28.00	426.72 (1400.00)	68.00
24.38 (80.00)	33.00	304.80 (1000.00)	65.00
30.48 (100.00)	34.00	426.72 (1400.00)	70.00
42.67 (140.00)	37.50	609.60 (2000.00)	100.00
30.48 (100.00)	42.00	914.40 (3000.00)	121.00
42.67 (140.00)	45.00	1219.20 (4000.00)	132.00
60.96 (200.00)	54.50	1828.80 (6000.00)	180.00

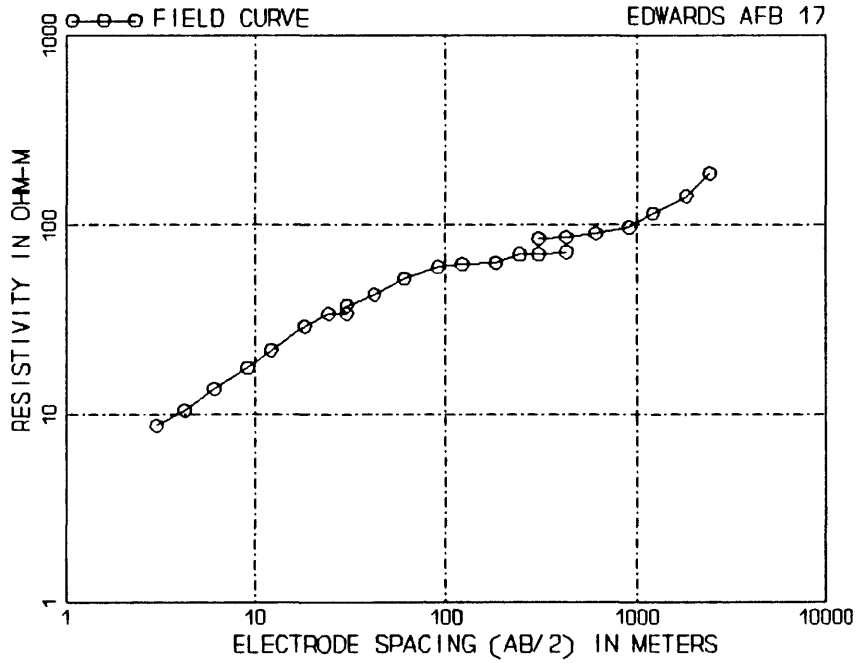
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.72 (5.65)	21.73	37.13 (121.81)	81.35
2.53 (8.30)	17.58	54.50 (178.80)	65.48
3.71 (12.18)	19.76	79.99 (262.44)	43.39
5.45 (17.88)	26.56	117.41 (385.21)	36.71
8.00 (26.24)	35.18	172.34 (565.41)	51.25
11.74 (38.52)	44.62	252.96 (829.91)	85.51
17.23 (56.54)	57.88	371.29 (1218.14)	132.87
25.30 (82.99)	74.67	544.98 (1787.98)	201.66
		99999.00 (99999.00)	318.36

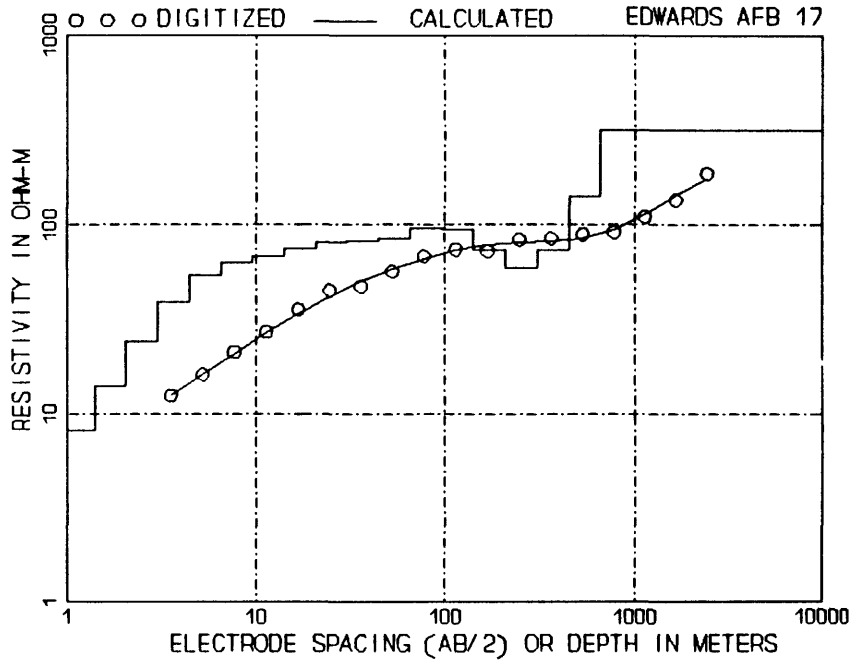




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	34.50	91.44 (300.00)	36.50
4.27 (14.00)	29.00	121.92 (400.00)	41.00
6.10 (20.00)	26.20	182.88 (600.00)	47.50
9.14 (30.00)	23.00	243.84 (800.00)	49.00
12.19 (40.00)	21.50	304.80 (1000.00)	50.00
18.29 (60.00)	23.50	304.80 (1000.00)	52.50
24.38 (80.00)	24.50	426.72 (1400.00)	63.00
30.48 (100.00)	27.00	609.60 (2000.00)	69.00
30.48 (100.00)	26.00	914.40 (3000.00)	82.00
42.67 (140.00)	30.00	1219.20 (4000.00)	110.00
60.96 (200.00)	32.50	1828.80 (6000.00)	128.00

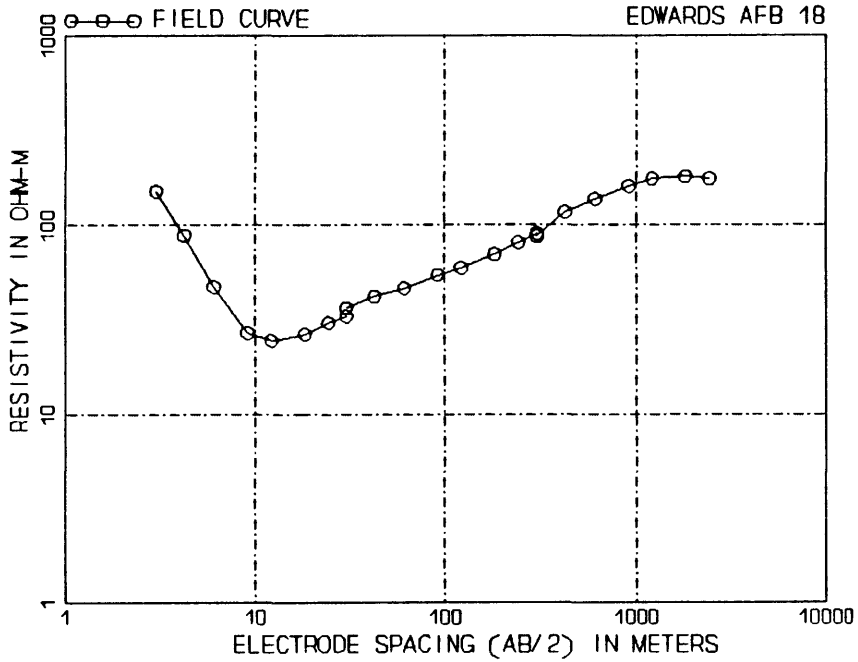
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.72 (5.65)	35.96	37.13 (121.81)	41.56
2.53 (8.30)	27.71	54.50 (178.80)	48.45
3.71 (12.18)	20.51	79.99 (262.44)	52.55
5.45 (17.88)	17.83	117.41 (385.21)	53.78
8.00 (26.24)	19.46	172.34 (565.41)	54.61
11.74 (38.52)	23.61	252.96 (829.91)	60.65
17.23 (56.54)	28.64	371.29 (1218.14)	81.34
25.30 (82.99)	34.46	544.98 (1787.98)	123.94
		99999.00 (99999.00)	188.74

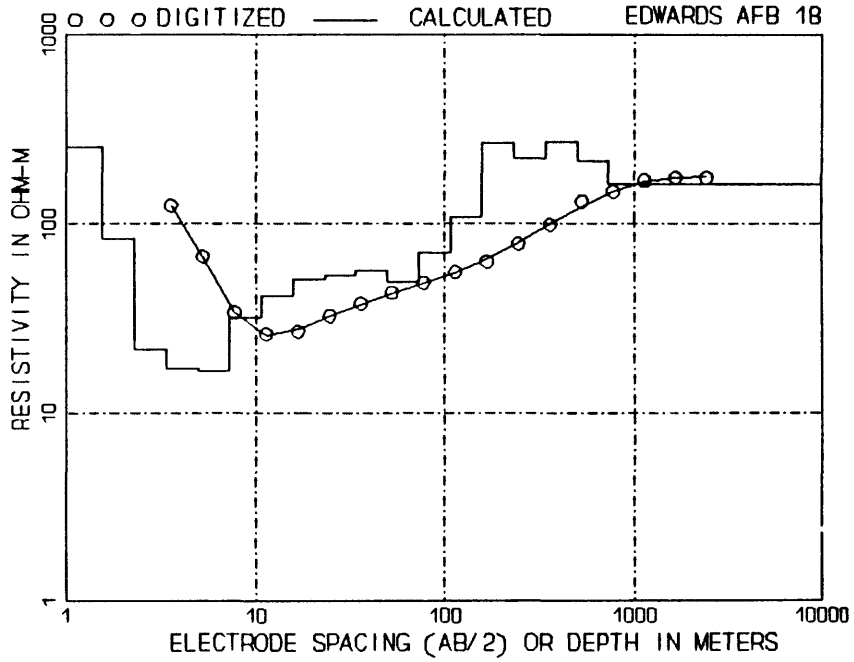




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	8.70	121.92 (400.00)	62.00
4.27 (14.00)	10.50	182.88 (600.00)	63.00
6.10 (20.00)	13.60	243.84 (800.00)	70.00
9.14 (30.00)	17.60	304.80 (1000.00)	70.00
12.19 (40.00)	21.80	426.72 (1400.00)	72.00
18.29 (60.00)	29.20	304.80 (1000.00)	85.00
24.38 (80.00)	34.00	426.72 (1400.00)	86.00
30.48 (100.00)	34.00	609.60 (2000.00)	90.00
30.48 (100.00)	37.50	914.40 (3000.00)	97.00
42.67 (140.00)	43.00	1219.20 (4000.00)	115.00
60.96 (200.00)	52.00	1828.80 (6000.00)	142.00
91.44 (300.00)	60.00	2438.40 (8000.00)	187.00

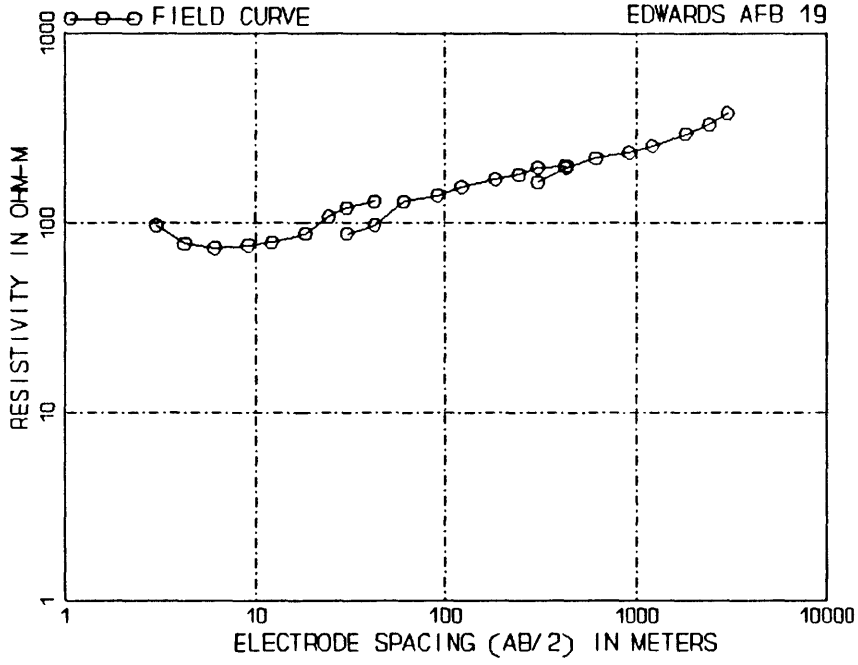
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.41 (4.62)	8.16	44.55 (146.18)	81.49
2.07 (6.78)	13.94	65.40 (214.56)	85.33
3.04 (9.96)	24.02	95.99 (314.93)	95.28
4.46 (14.62)	38.91	140.89 (462.25)	94.57
6.54 (21.46)	54.10	206.80 (678.49)	73.62
9.60 (31.49)	63.29	303.55 (995.89)	59.13
14.09 (46.23)	68.53	445.55 (1461.77)	73.94
20.68 (67.85)	75.09	653.97 (2145.58)	141.28
30.35 (99.59)	80.53	99999.00 (99999.00)	315.38

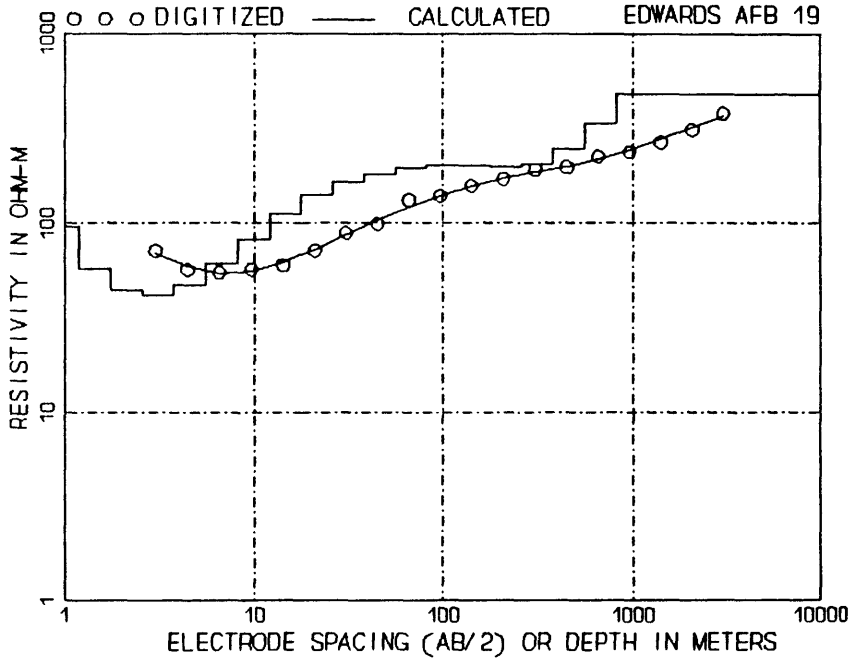




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	151.00	91.44 (300.00)	54.50
4.27 (14.00)	88.00	121.92 (400.00)	59.50
6.10 (20.00)	47.00	182.88 (600.00)	70.00
9.14 (30.00)	27.00	243.84 (800.00)	81.00
12.19 (40.00)	24.50	304.80 (1000.00)	90.00
18.29 (60.00)	26.50	304.80 (1000.00)	87.00
24.38 (80.00)	30.50	426.72 (1400.00)	117.00
30.48 (100.00)	33.00	609.60 (2000.00)	137.00
30.48 (100.00)	36.50	914.40 (3000.00)	160.00
42.67 (140.00)	42.00	1219.20 (4000.00)	175.00
60.96 (200.00)	46.50	1828.80 (6000.00)	180.00
		2438.40 (8000.00)	175.00

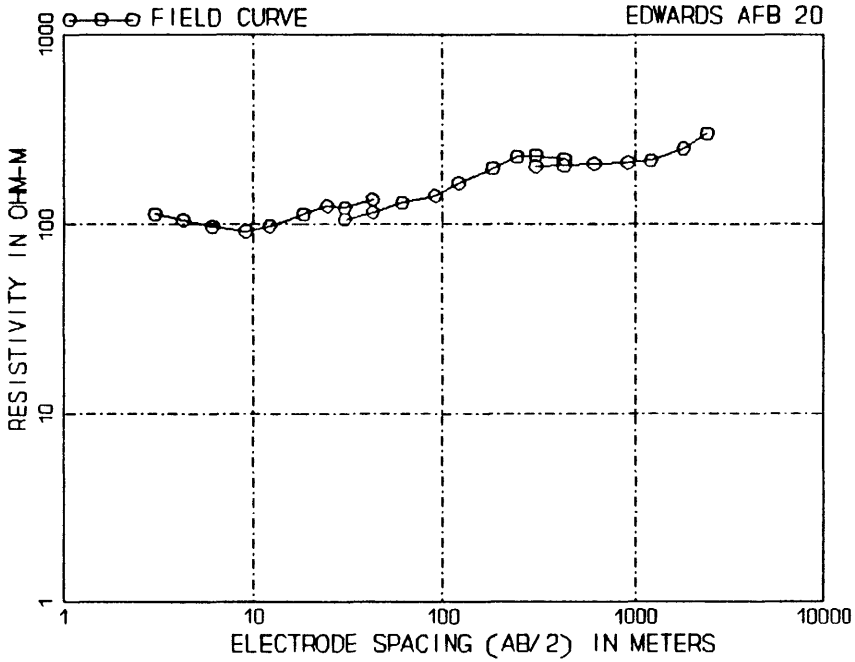
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.57 (5.14)	253.19	49.51 (162.42)	56.43
2.30 (7.54)	83.72	72.66 (238.40)	49.26
3.37 (11.07)	21.66	106.66 (349.92)	70.13
4.95 (16.24)	17.23	156.55 (513.61)	108.77
7.27 (23.84)	16.55	229.78 (753.88)	268.39
10.67 (34.99)	31.92	337.27 (1106.54)	221.02
15.65 (51.36)	41.41	495.05 (1624.19)	270.74
22.98 (75.39)	50.47	726.64 (2383.98)	215.45
33.73 (110.65)	52.99	99999.00 (99999.00)	161.75

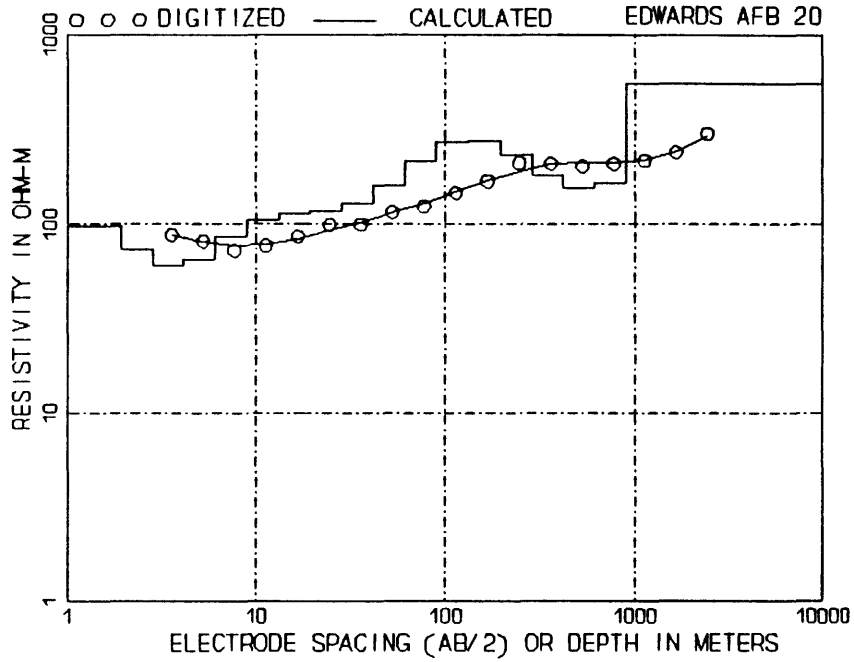




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	97.00	121.92 (400.00)	155.00
4.27 (14.00)	78.00	182.88 (600.00)	170.00
6.10 (20.00)	74.00	243.84 (800.00)	180.00
9.14 (30.00)	76.50	304.80 (1000.00)	195.00
12.19 (40.00)	79.00	426.72 (1400.00)	200.00
18.29 (60.00)	88.00	304.80 (1000.00)	164.00
24.38 (80.00)	108.00	426.72 (1400.00)	196.00
30.48 (100.00)	120.00	609.60 (2000.00)	220.00
42.67 (140.00)	130.00	914.40 (3000.00)	235.00
30.48 (100.00)	88.00	1219.20 (4000.00)	255.00
42.67 (140.00)	98.00	1828.80 (6000.00)	295.00
60.96 (200.00)	130.00	2438.40 (8000.00)	330.00
91.44 (300.00)	140.00	3048.00 (10000.00)	380.00

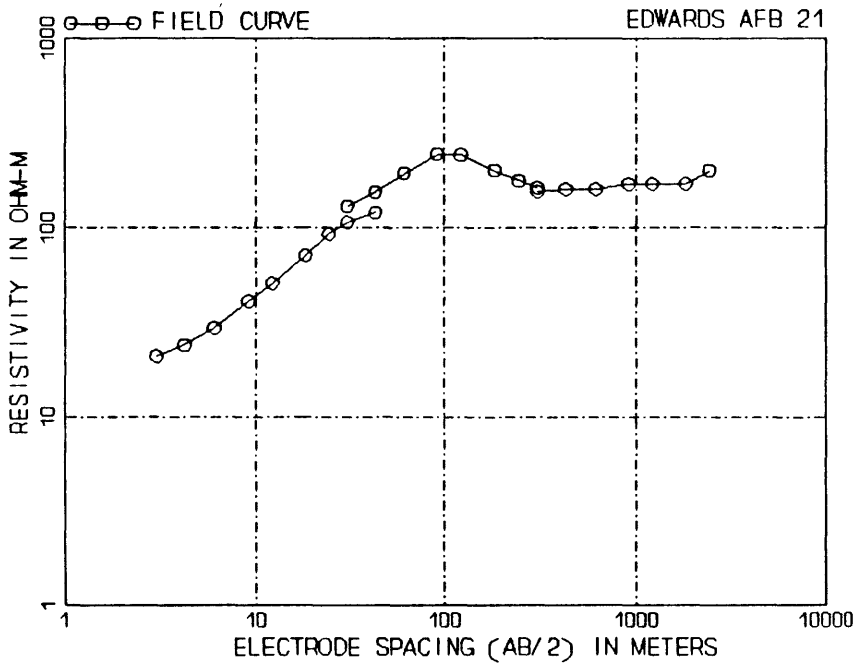
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.20 (3.94)	95.86	37.94 (124.49)	164.35
1.76 (5.78)	57.78	55.69 (182.72)	181.81
2.59 (8.48)	43.99	81.75 (268.20)	194.54
3.79 (12.45)	41.54	119.99 (393.66)	201.93
5.57 (18.27)	47.35	176.12 (577.81)	202.55
8.17 (26.82)	60.87	258.51 (848.11)	198.55
12.00 (39.37)	82.32	379.43 (1244.86)	205.18
17.61 (57.78)	111.20	556.93 (1827.21)	245.77
25.85 (84.81)	140.75	817.47 (2681.98)	336.49
		99999.00 (99999.00)	477.41

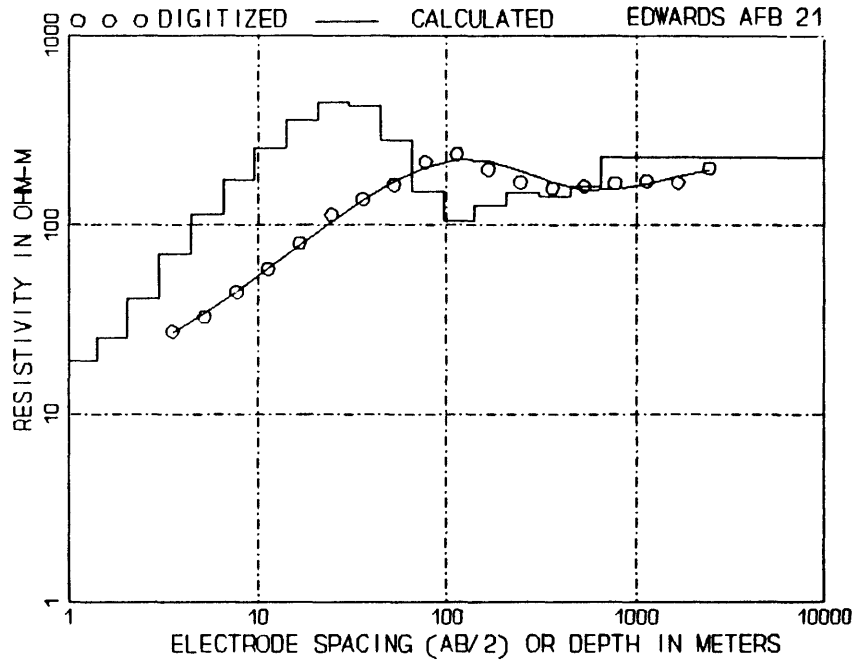




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	113.00	91.44 (300.00)	142.00
4.27 (14.00)	105.00	121.92 (400.00)	165.00
6.10 (20.00)	97.00	182.88 (600.00)	197.00
9.14 (30.00)	92.00	243.84 (800.00)	227.00
12.19 (40.00)	98.00	304.80 (1000.00)	230.00
18.29 (60.00)	113.00	426.72 (1400.00)	220.00
24.38 (80.00)	125.00	304.80 (1000.00)	202.00
30.48 (100.00)	122.00	426.72 (1400.00)	204.00
42.67 (140.00)	135.00	609.60 (2000.00)	208.00
30.48 (100.00)	106.00	914.40 (3000.00)	212.00
42.67 (140.00)	116.00	1219.20 (4000.00)	217.00
60.96 (200.00)	130.00	1828.80 (6000.00)	250.00
		2438.40 (8000.00)	300.00

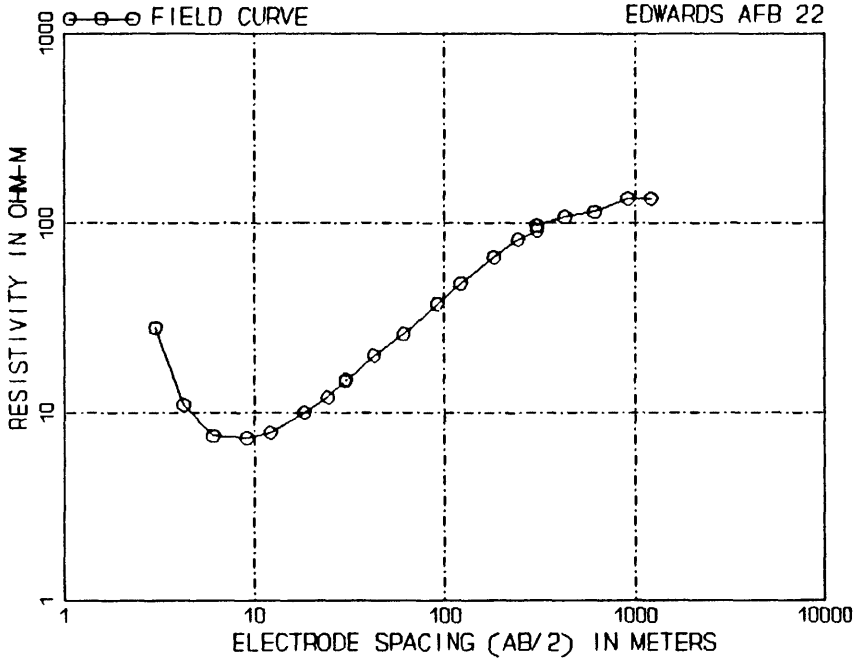
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.93 (6.34)	96.64	61.12 (200.52)	160.55
2.84 (9.31)	73.22	89.71 (294.32)	214.94
4.16 (13.66)	59.85	131.67 (432.00)	269.04
6.11 (20.05)	65.33	193.27 (634.09)	276.31
8.97 (29.43)	85.82	283.68 (930.72)	232.10
13.17 (43.20)	105.28	416.39 (1366.10)	180.90
19.33 (63.41)	113.48	611.17 (2005.17)	156.28
28.37 (93.07)	117.59	897.08 (2943.18)	166.00
41.64 (136.61)	129.49	99999.00 (99999.00)	550.00

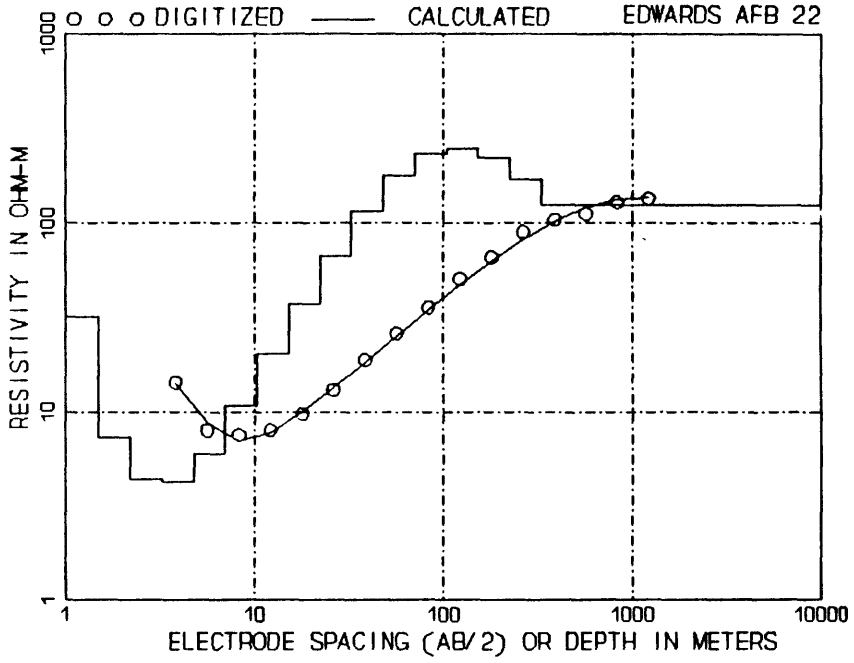




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	21.00	91.44 (300.00)	245.00
4.27 (14.00)	24.00	121.92 (400.00)	242.00
6.10 (20.00)	29.50	182.88 (600.00)	200.00
9.14 (30.00)	41.00	243.84 (800.00)	177.00
12.19 (40.00)	51.00	304.80 (1000.00)	163.00
18.29 (60.00)	71.50	304.80 (1000.00)	155.00
24.38 (80.00)	93.00	426.72 (1400.00)	160.00
30.48 (100.00)	107.00	609.60 (2000.00)	160.00
42.67 (140.00)	120.00	914.40 (3000.00)	170.00
30.48 (100.00)	130.00	1219.20 (4000.00)	170.00
42.67 (140.00)	154.00	1828.80 (6000.00)	170.00
60.96 (200.00)	194.00	2438.40 (8000.00)	200.00

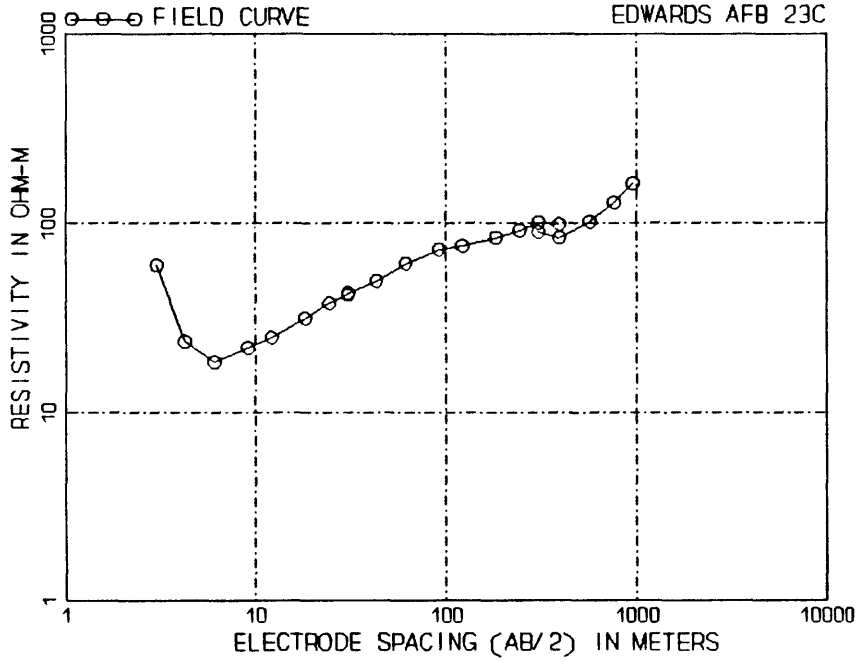
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.41 (4.62)	19.11	44.55 (146.18)	423.85
2.07 (6.78)	25.46	65.40 (214.56)	279.96
3.04 (9.96)	40.92	95.99 (314.93)	149.80
4.46 (14.62)	69.90	140.89 (462.25)	105.99
6.54 (21.46)	114.54	206.80 (678.49)	126.39
9.60 (31.49)	173.64	303.55 (995.89)	148.45
14.09 (46.23)	252.64	445.55 (1461.77)	142.12
20.68 (67.85)	357.52	653.97 (2145.58)	159.92
30.35 (99.59)	447.27	99999.00 (99999.00)	228.09

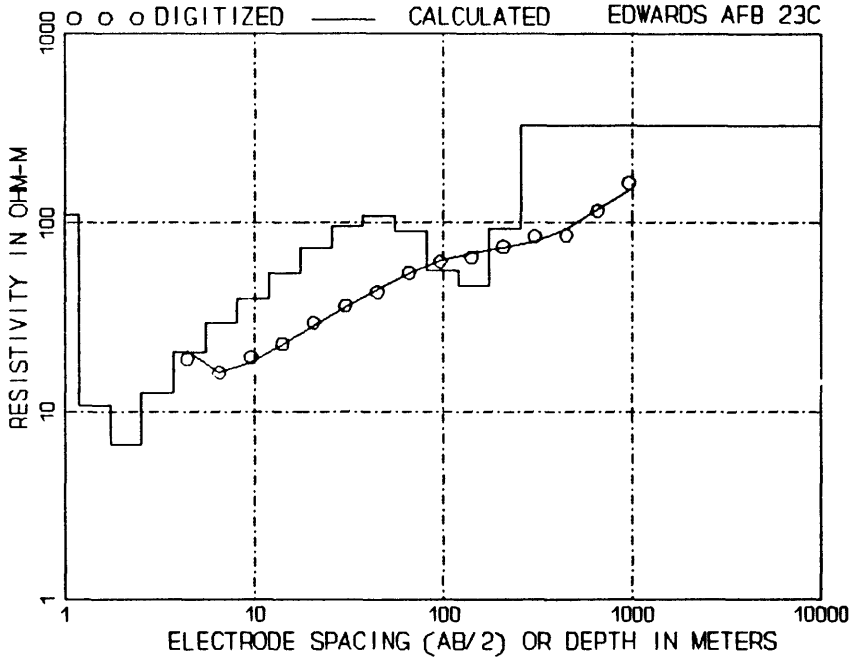




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	28.00	60.96 (200.00)	26.00
4.27 (14.00)	11.00	91.44 (300.00)	37.50
6.10 (20.00)	7.50	121.92 (400.00)	48.00
9.14 (30.00)	7.30	182.88 (600.00)	66.00
12.19 (40.00)	7.80	243.84 (800.00)	82.00
18.29 (60.00)	10.00	304.80 (1000.00)	92.00
24.38 (80.00)	12.00	304.80 (1000.00)	97.00
30.48 (100.00)	15.00	426.72 (1400.00)	108.00
30.48 (100.00)	14.60	609.60 (2000.00)	115.00
42.67 (140.00)	20.00	914.40 (3000.00)	135.00
		1219.20 (4000.00)	135.00

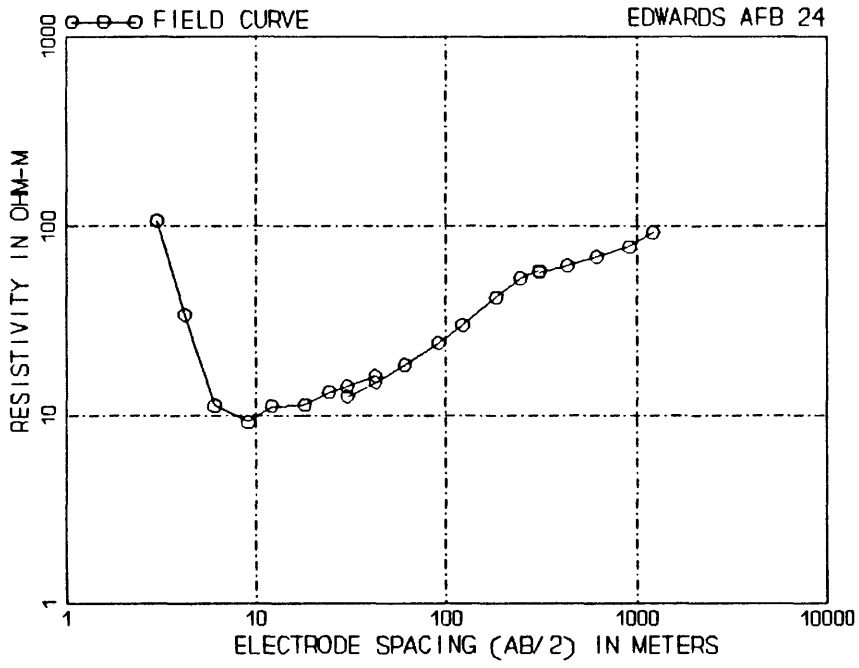
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.52 (4.98)	31.78	32.70 (107.28)	67.42
2.23 (7.31)	7.30	48.00 (157.46)	115.05
3.27 (10.73)	4.41	70.45 (231.13)	177.37
4.80 (15.75)	4.24	103.40 (339.25)	232.23
7.04 (23.11)	5.96	151.77 (497.95)	248.78
10.34 (33.92)	10.81	222.77 (730.88)	220.41
15.18 (49.79)	20.32	326.99 (1072.79)	170.42
22.28 (73.09)	37.51	99999.00 (99999.00)	124.98

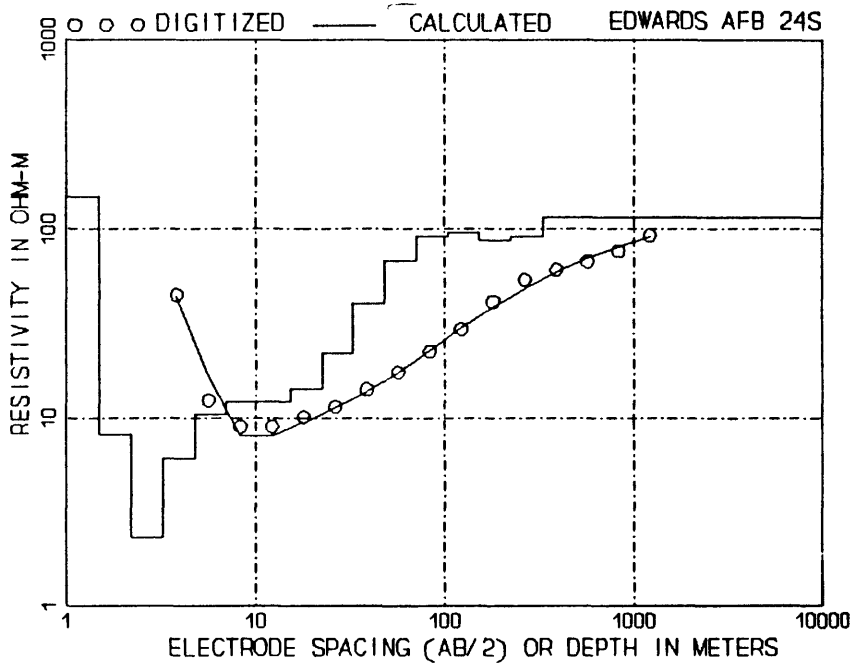




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	60.00	91.44 (300.00)	73.00
4.27 (14.00)	23.70	121.92 (400.00)	76.00
6.10 (20.00)	18.50	182.88 (600.00)	84.00
9.14 (30.00)	22.00	243.84 (800.00)	92.00
12.19 (40.00)	25.00	304.80 (1000.00)	101.00
18.29 (60.00)	31.50	391.67 (1285.00)	99.00
24.38 (80.00)	38.00	304.80 (1000.00)	90.00
30.48 (100.00)	42.00	391.67 (1285.00)	84.00
30.48 (100.00)	42.70	566.01 (1857.00)	102.00
42.67 (140.00)	49.50	759.56 (2492.00)	129.00
60.96 (200.00)	61.50	957.99 (3143.00)	162.00

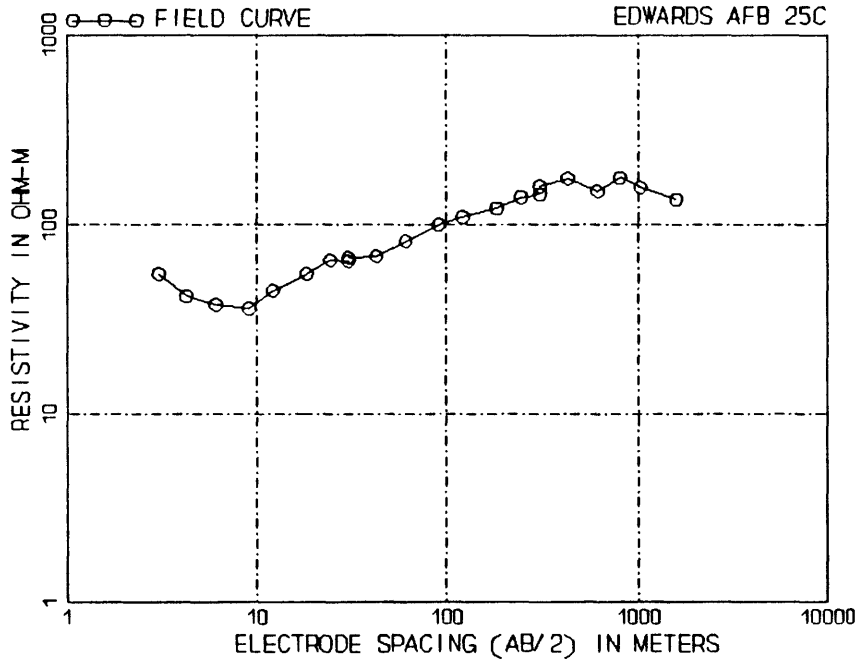
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.19 (3.91)	110.58	25.69 (84.29)	73.86
1.75 (5.74)	10.74	37.71 (123.73)	95.77
2.57 (8.43)	6.69	55.35 (181.61)	108.24
3.77 (12.37)	12.53	81.25 (266.56)	90.57
5.54 (18.16)	20.72	119.26 (391.26)	55.61
8.12 (26.66)	29.59	175.04 (574.29)	46.60
11.93 (39.13)	39.55	256.93 (842.94)	93.38
17.50 (57.43)	53.91	99999.00 (99999.00)	324.04

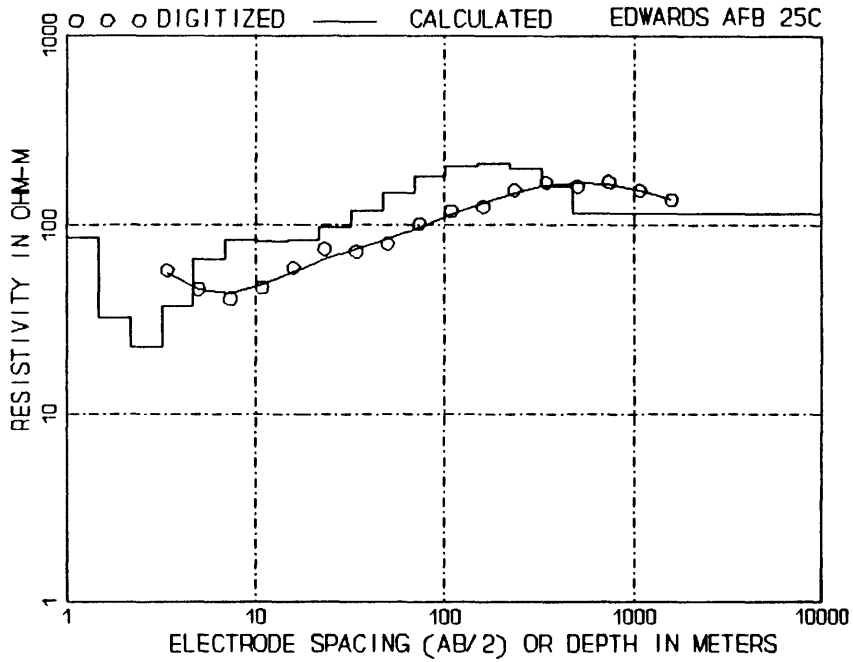




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	107.00	60.96 (200.00)	18.50
4.27 (14.00)	34.00	91.44 (300.00)	24.20
6.10 (20.00)	11.25	121.92 (400.00)	30.00
9.14 (30.00)	9.20	182.88 (600.00)	42.00
12.19 (40.00)	11.20	243.84 (800.00)	53.00
18.29 (60.00)	11.40	304.80 (1000.00)	58.00
24.38 (80.00)	13.30	304.80 (1000.00)	57.00
30.48 (100.00)	14.20	426.72 (1400.00)	62.00
42.67 (140.00)	16.20	609.60 (2000.00)	69.00
30.48 (100.00)	12.60	914.40 (3000.00)	78.00
42.67 (140.00)	15.00	1219.20 (4000.00)	92.50

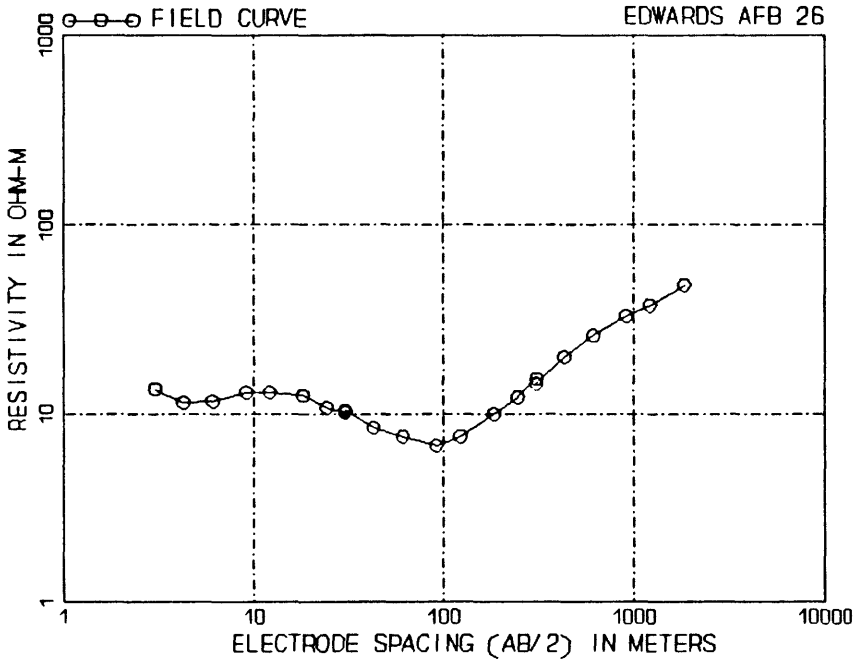
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.52 (4.98)	148.56	32.70 (107.28)	21.85
2.23 (7.31)	8.13	48.00 (157.46)	40.05
3.27 (10.73)	2.34	70.45 (231.13)	68.71
4.80 (15.75)	6.10	103.40 (339.25)	92.19
7.04 (23.11)	10.39	151.77 (497.94)	95.30
10.34 (33.92)	12.13	222.77 (730.88)	88.03
15.18 (49.79)	12.30	326.99 (1072.79)	90.89
22.28 (73.09)	14.25	30479.70 (99999.00)	116.35

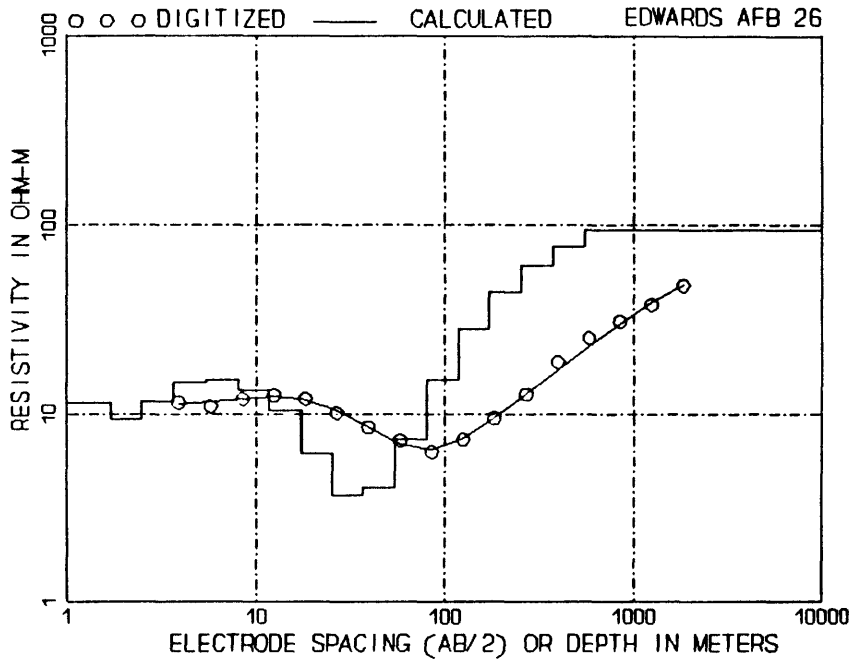




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	55.00	91.44 (300.00)	100.00
4.27 (14.00)	42.00	121.92 (400.00)	110.00
6.10 (20.00)	38.00	182.88 (600.00)	122.00
9.14 (30.00)	36.00	243.84 (800.00)	140.00
12.19 (40.00)	45.00	304.80 (1000.00)	145.00
18.29 (60.00)	55.00	304.80 (1000.00)	160.00
24.38 (80.00)	65.00	426.72 (1400.00)	176.00
30.48 (100.00)	64.00	609.60 (2000.00)	150.00
30.48 (100.00)	67.00	800.71 (2627.00)	177.00
42.67 (140.00)	68.00	1029.00 (3376.00)	157.00
60.96 (200.00)	82.00	1583.74 (5196.00)	136.00

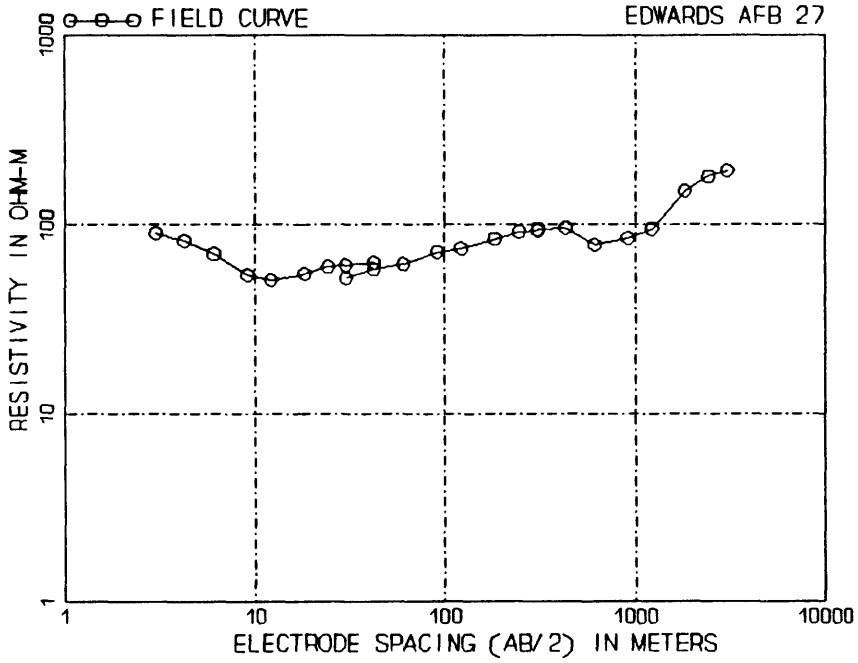
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.49 (4.90)	86.35	32.15 (105.49)	97.46
2.19 (7.19)	32.39	47.20 (154.84)	119.84
3.22 (10.55)	22.63	69.27 (227.27)	148.25
4.72 (15.48)	37.25	101.68 (333.59)	180.89
6.93 (22.73)	65.99	149.24 (489.65)	203.93
10.17 (33.36)	83.29	219.06 (718.70)	210.40
14.92 (48.96)	82.20	321.54 (1054.91)	197.64
21.91 (71.87)	83.32	471.95 (1548.39)	160.63
		99999.00 (99999.00)	116.00

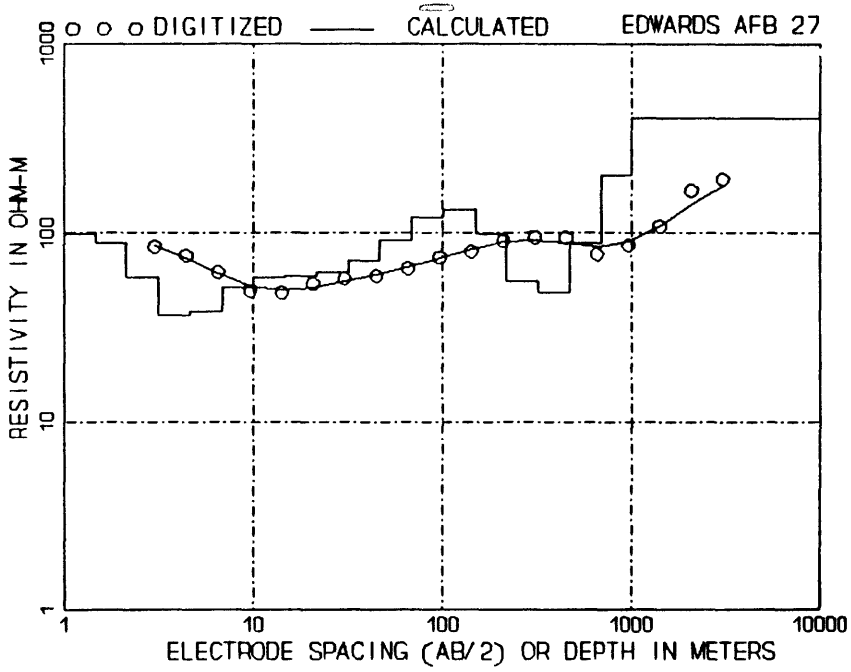




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	13.50	91.44 (300.00)	6.80
4.27 (14.00)	11.50	121.92 (400.00)	7.60
6.10 (20.00)	11.70	182.88 (600.00)	10.00
9.14 (30.00)	13.00	243.84 (800.00)	12.30
12.19 (40.00)	13.00	304.80 (1000.00)	15.30
18.29 (60.00)	12.50	304.80 (1000.00)	14.50
24.38 (80.00)	10.80	426.72 (1400.00)	20.00
30.48 (100.00)	10.20	609.60 (2000.00)	26.00
30.48 (100.00)	10.40	914.40 (3000.00)	33.00
42.67 (140.00)	8.40	1219.20 (4000.00)	37.50
60.96 (200.00)	7.60	1828.80 (6000.00)	48.00

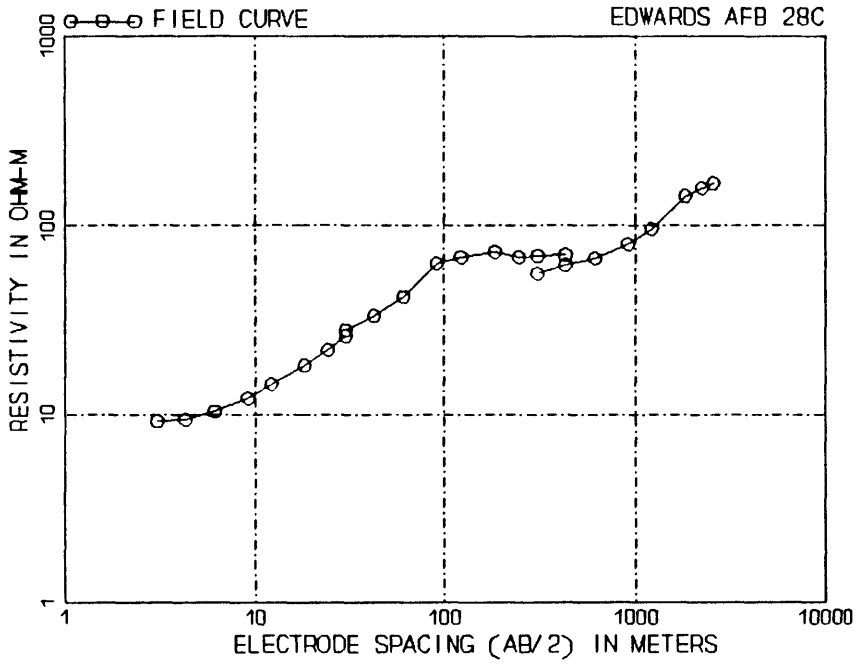
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.72 (5.65)	11.41	37.13 (121.81)	3.70
2.53 (8.30)	9.45	54.50 (178.80)	4.05
3.71 (12.18)	11.63	79.99 (262.44)	7.33
5.45 (17.88)	14.66	117.41 (385.21)	15.09
8.00 (26.24)	15.18	172.34 (565.41)	28.24
11.74 (38.52)	13.44	252.96 (829.91)	44.51
17.23 (56.54)	10.42	371.29 (1218.14)	60.73
25.30 (82.99)	6.20	544.98 (1787.98)	76.67
		99999.00 (99999.00)	94.54

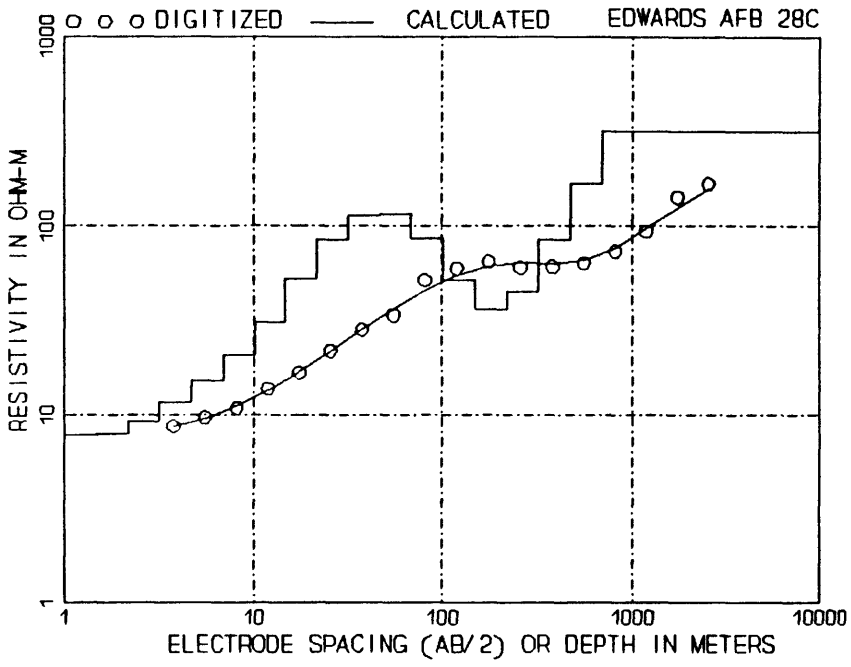




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	90.00	91.44 (300.00)	72.00
4.27 (14.00)	82.00	121.92 (400.00)	75.00
6.10 (20.00)	70.00	182.88 (600.00)	84.00
9.14 (30.00)	54.00	243.84 (800.00)	92.00
12.19 (40.00)	51.00	304.80 (1000.00)	93.00
18.29 (60.00)	55.00	304.80 (1000.00)	95.00
24.38 (80.00)	60.00	426.72 (1400.00)	96.50
30.48 (100.00)	61.00	609.60 (2000.00)	78.50
42.67 (140.00)	63.00	914.40 (3000.00)	85.00
30.48 (100.00)	52.00	1219.20 (4000.00)	95.00
42.67 (140.00)	58.00	1828.80 (6000.00)	150.00
60.96 (200.00)	62.00	2438.40 (8000.00)	180.00
		3048.00 (10000.00)	193.00

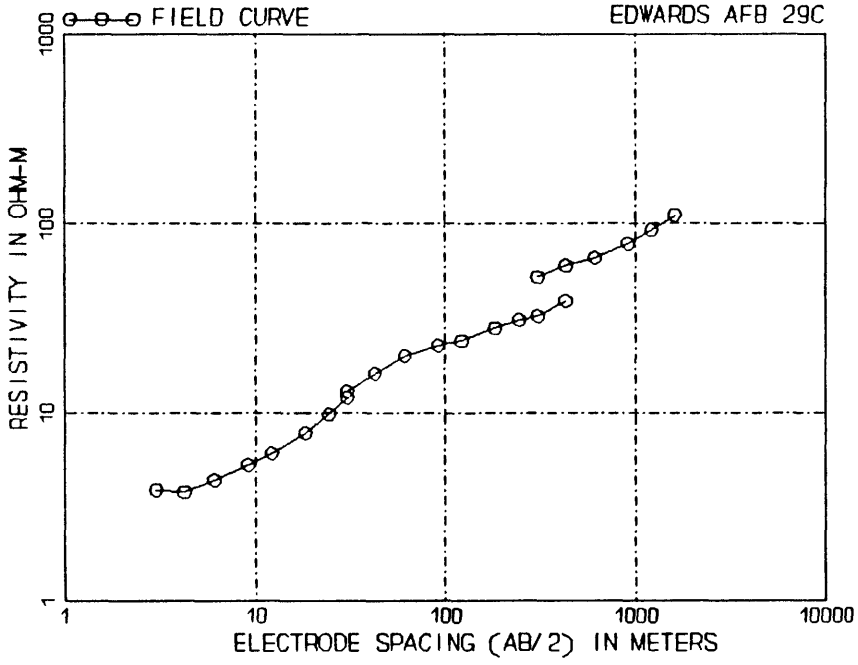
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.48 (4.86)	99.00	46.84 (153.69)	71.73
2.17 (7.13)	89.19	68.76 (225.58)	91.12
3.19 (10.47)	58.35	100.92 (331.11)	120.16
4.68 (15.37)	36.98	148.13 (486.00)	133.14
6.88 (22.56)	38.21	217.43 (713.35)	98.58
10.09 (33.11)	51.29	319.14 (1047.06)	55.47
14.81 (48.60)	58.85	468.44 (1536.87)	48.58
21.74 (71.34)	59.62	687.57 (2255.81)	89.40
31.91 (104.71)	62.47	1009.22 (3311.08)	200.41
		99999.00 (99999.00)	407.59

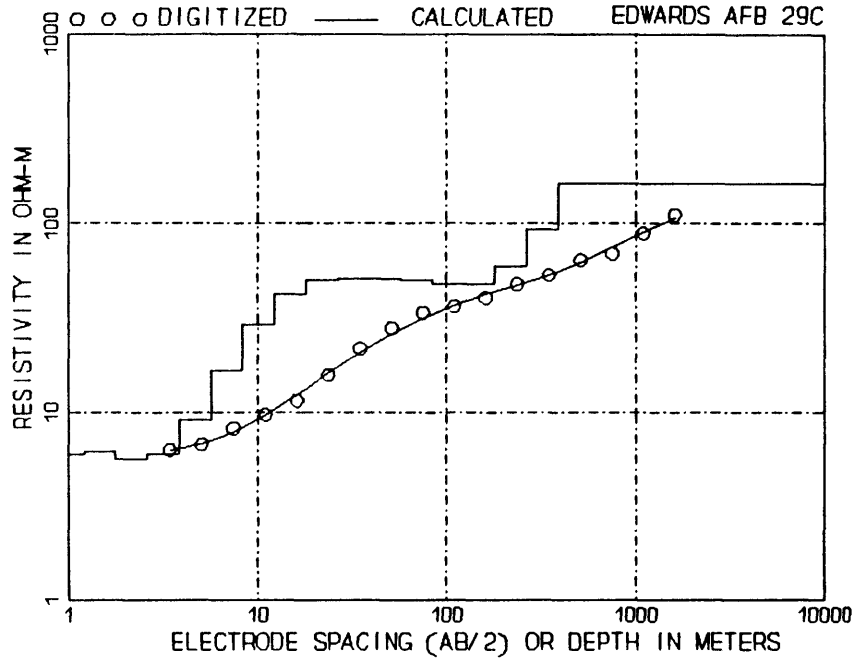




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	9.20	121.92 (400.00)	68.00
4.27 (14.00)	9.40	182.88 (600.00)	72.50
6.10 (20.00)	10.40	243.84 (800.00)	68.00
9.14 (30.00)	12.20	304.80 (1000.00)	69.00
12.19 (40.00)	14.50	426.72 (1400.00)	70.00
18.29 (60.00)	18.20	304.80 (1000.00)	56.00
24.38 (80.00)	22.00	426.72 (1400.00)	62.00
30.48 (100.00)	26.00	609.60 (2000.00)	67.00
30.48 (100.00)	28.00	914.40 (3000.00)	80.00
42.67 (140.00)	33.30	1219.20 (4000.00)	96.00
60.96 (200.00)	42.00	1828.80 (6000.00)	143.00
91.44 (300.00)	63.00	2231.44 (7321.00)	158.00
		2568.24 (8426.00)	167.00

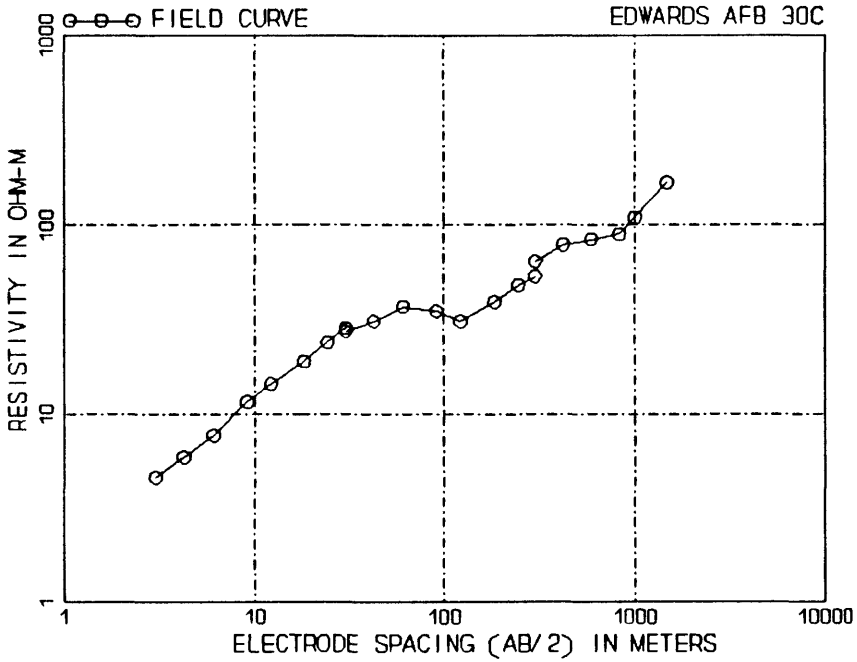
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.48 (4.87)	7.79	46.93 (153.96)	113.57
2.18 (7.15)	7.92	68.88 (225.98)	115.70
3.20 (10.49)	9.18	101.10 (331.70)	85.90
4.69 (15.40)	11.62	148.40 (486.87)	51.46
6.89 (22.60)	15.20	217.82 (714.62)	36.30
10.11 (33.17)	20.65	319.71 (1048.92)	45.06
14.84 (48.69)	31.11	469.27 (1539.61)	84.79
21.78 (71.46)	52.07	688.80 (2259.83)	168.20
31.97 (104.89)	84.32	99999.00 (99999.00)	315.46

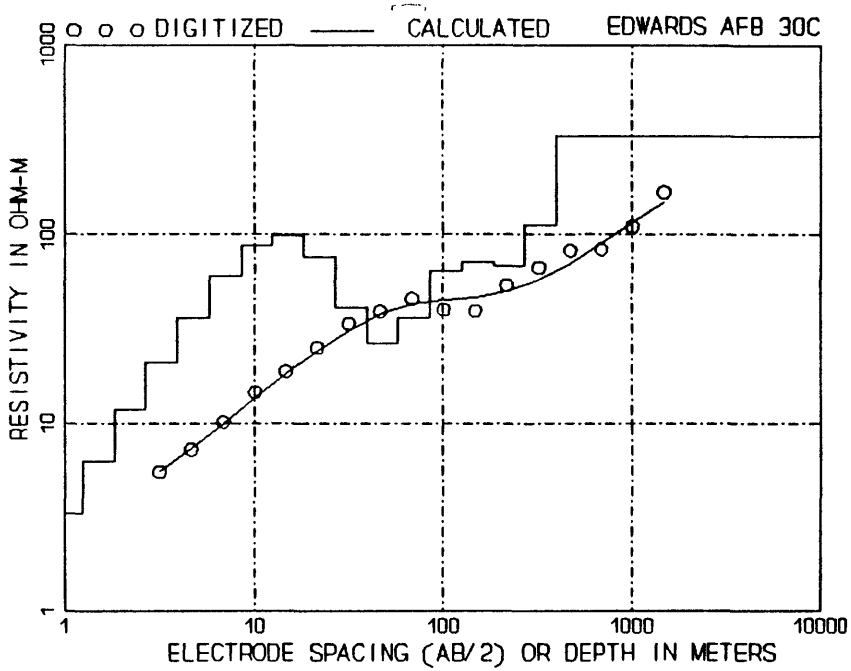




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	3.90	91.44 (300.00)	22.70
4.27 (14.00)	3.80	121.92 (400.00)	24.00
6.10 (20.00)	4.40	182.88 (600.00)	28.00
9.14 (30.00)	5.30	243.84 (800.00)	31.00
12.19 (40.00)	6.10	304.80 (1000.00)	32.50
18.29 (60.00)	7.80	426.72 (1400.00)	39.00
24.38 (80.00)	9.80	304.80 (1000.00)	52.00
30.48 (100.00)	12.00	426.72 (1400.00)	60.00
30.48 (100.00)	13.00	609.60 (2000.00)	66.00
42.67 (140.00)	16.20	914.40 (3000.00)	78.50
60.96 (200.00)	20.00	1219.20 (4000.00)	92.50
		1609.95 (5282.00)	111.00

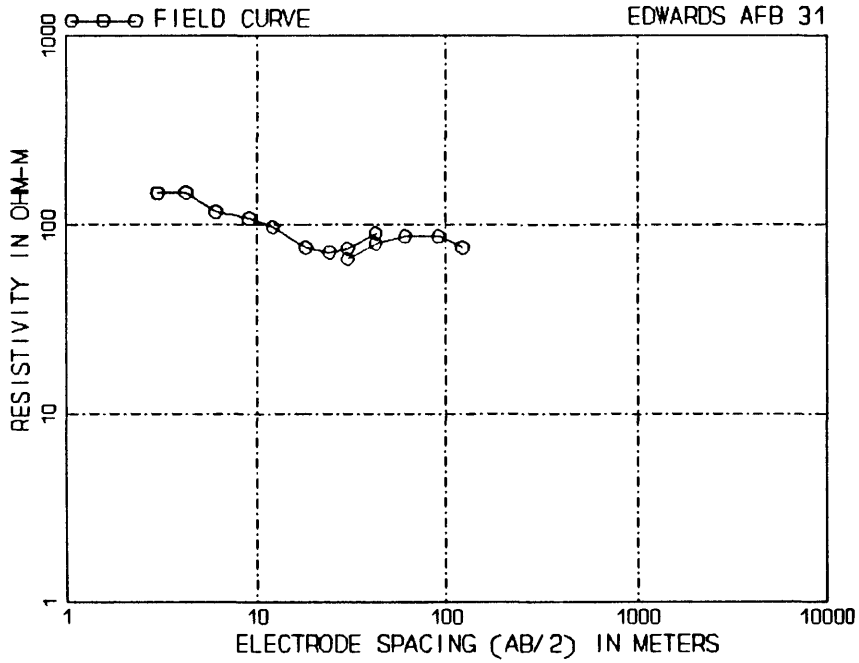
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.23 (4.03)	6.02	26.48 (86.86)	49.82
1.80 (5.92)	6.17	38.86 (127.50)	51.07
2.65 (8.69)	5.67	57.04 (187.14)	50.50
3.89 (12.75)	6.01	83.72 (274.68)	50.20
5.70 (18.71)	9.12	122.89 (403.18)	48.13
8.37 (27.47)	16.75	180.38 (591.78)	47.52
12.29 (40.32)	29.10	264.75 (868.62)	58.99
18.04 (59.18)	42.19	388.61 (1274.96)	93.67
		99999.00 (99999.00)	162.14

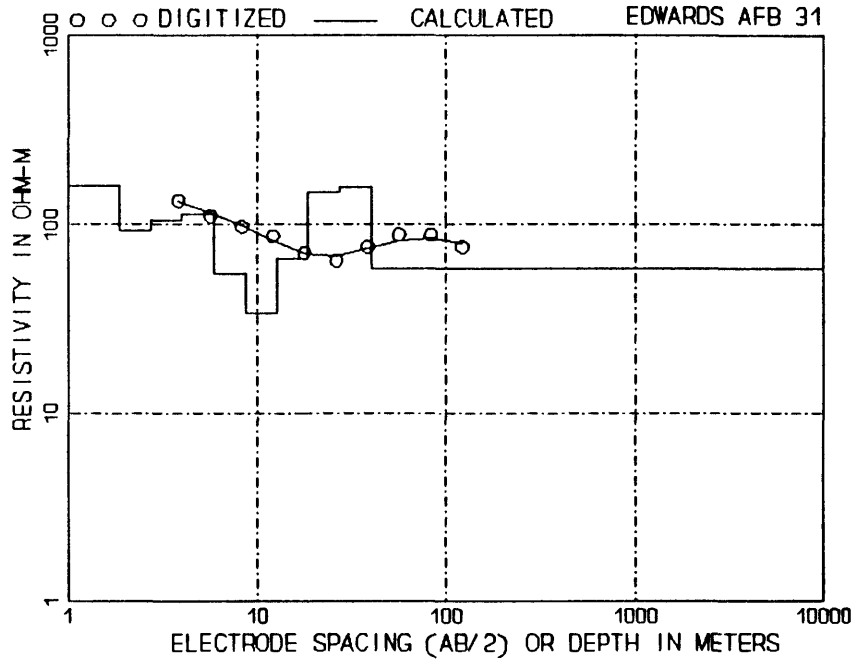




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	4.60	91.44 (300.00)	35.00
4.27 (14.00)	5.90	121.92 (400.00)	31.00
6.10 (20.00)	7.70	182.88 (600.00)	39.00
9.14 (30.00)	11.60	243.84 (800.00)	48.00
12.19 (40.00)	14.40	297.18 (975.00)	53.50
18.29 (60.00)	19.00	297.18 (975.00)	64.40
24.38 (80.00)	24.00	416.05 (1365.00)	78.90
30.48 (100.00)	28.50	586.74 (1925.00)	84.00
30.48 (100.00)	27.40	828.75 (2719.00)	89.50
42.67 (140.00)	31.00	1004.62 (3296.00)	109.50
60.96 (200.00)	37.00	1477.67 (4848.00)	167.00

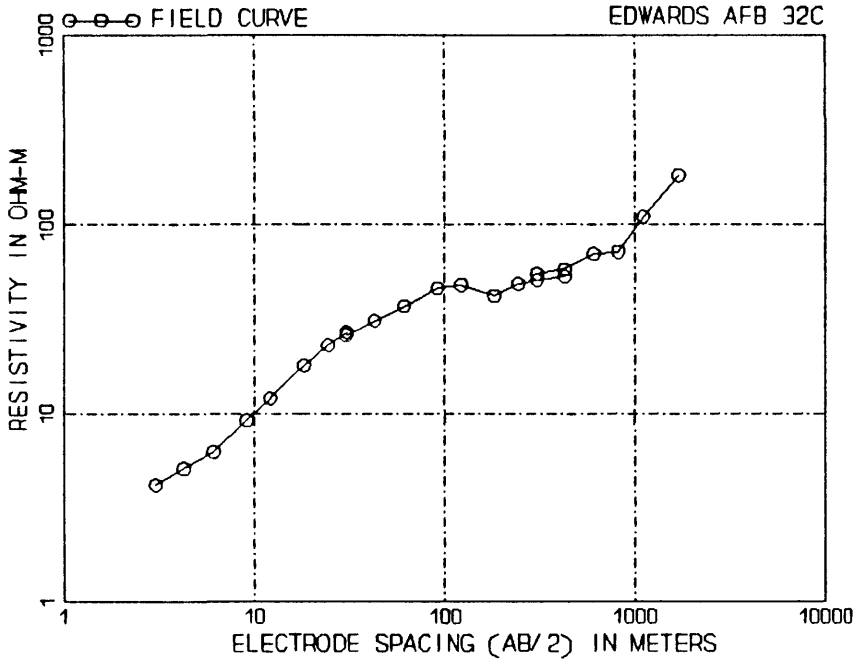
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.25 (4.11)	3.34	27.00 (88.58)	75.54
1.84 (6.04)	6.25	39.63 (130.02)	41.04
2.70 (8.86)	11.80	58.17 (190.85)	26.49
3.96 (13.00)	21.03	85.38 (280.12)	36.01
5.82 (19.08)	36.22	125.32 (411.17)	64.41
8.54 (28.01)	59.85	183.95 (603.51)	71.46
12.53 (41.12)	87.59	270.00 (885.83)	68.48
18.39 (60.35)	99.09	396.31 (1300.22)	112.85
		99999.00 (99999.00)	333.33

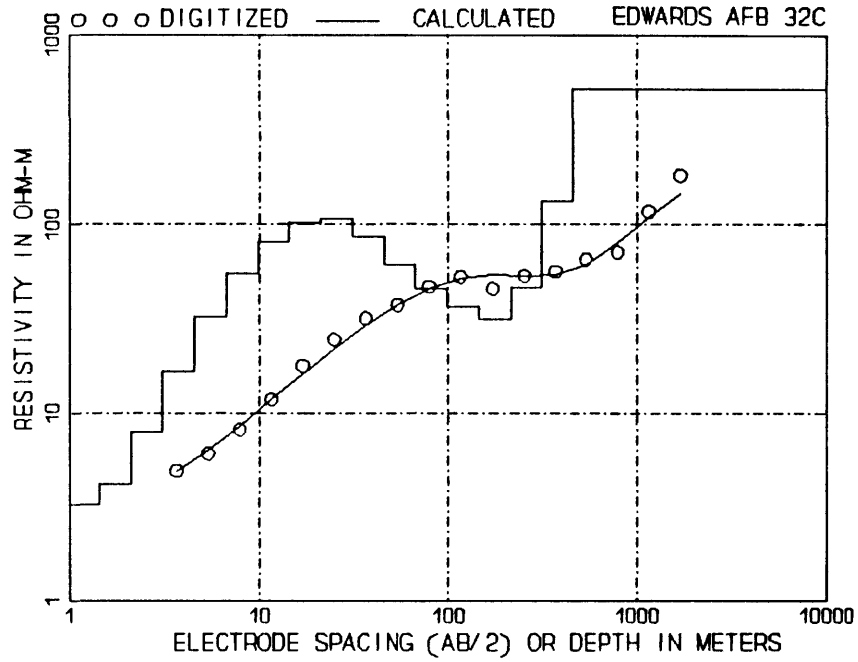




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	147.00	30.48 (100.00)	75.00
4.27 (14.00)	148.00	42.67 (140.00)	90.00
6.10 (20.00)	117.00	30.48 (100.00)	66.00
9.14 (30.00)	108.00	42.67 (140.00)	80.00
12.19 (40.00)	97.50	60.96 (200.00)	87.00
18.29 (60.00)	76.00	91.44 (300.00)	87.00
24.38 (80.00)	72.00	121.92 (400.00)	76.00

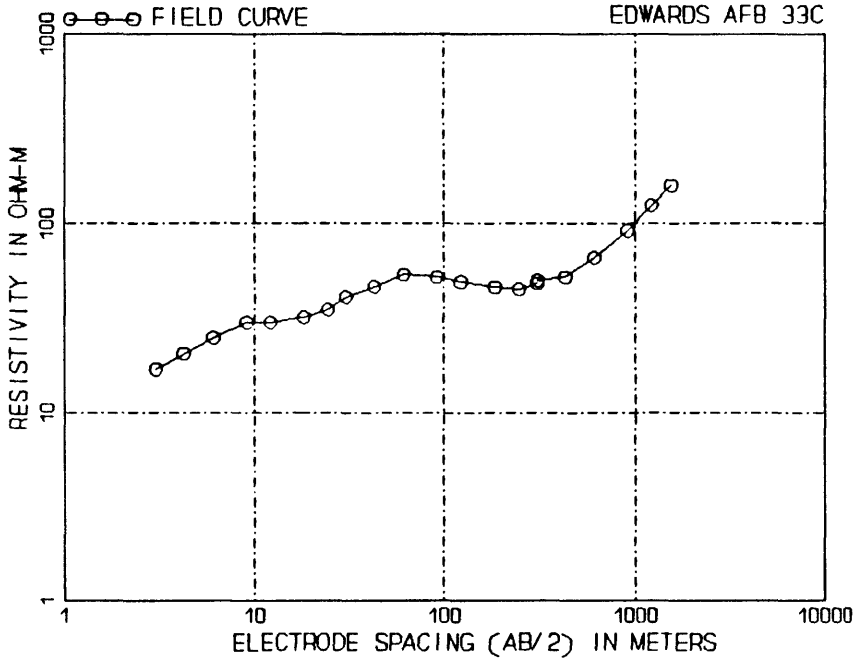
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.87 (6.15)	161.10	12.77 (41.88)	33.95
2.75 (9.02)	92.72	18.74 (61.47)	66.70
4.04 (13.24)	104.54	27.50 (90.23)	146.88
5.93 (19.44)	113.26	40.37 (132.44)	156.88
8.70 (28.53)	54.73	99999.00 (99999.00)	58.60

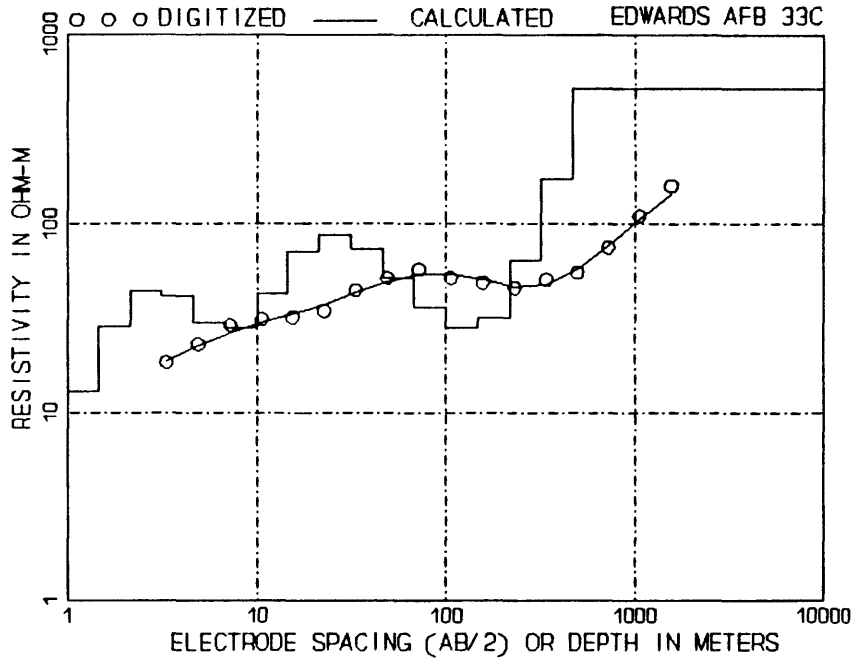




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	4.20	91.44 (300.00)	46.00
4.27 (14.00)	5.10	121.92 (400.00)	48.00
6.10 (20.00)	6.25	182.88 (600.00)	42.00
9.14 (30.00)	9.20	243.84 (800.00)	48.50
12.19 (40.00)	12.00	304.80 (1000.00)	51.00
18.29 (60.00)	18.00	426.72 (1400.00)	53.00
24.38 (80.00)	23.00	304.80 (1000.00)	55.00
30.48 (100.00)	27.00	426.72 (1400.00)	58.00
30.48 (100.00)	26.00	609.60 (2000.00)	70.00
42.67 (140.00)	31.00	822.66 (2699.00)	72.00
60.96 (200.00)	37.00	1111.91 (3648.00)	110.00
		1695.30 (5562.00)	182.00

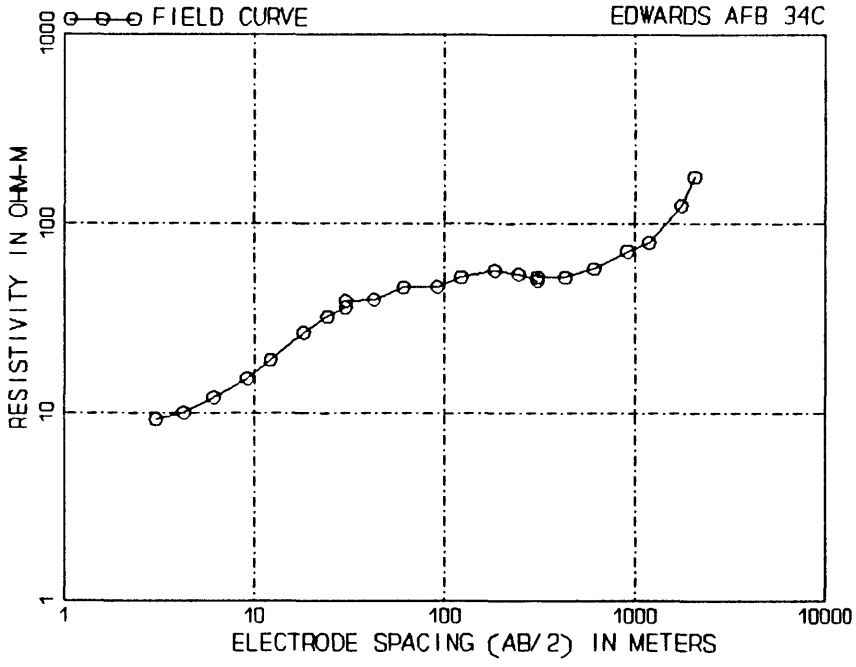
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.44 (4.72)	3.29	30.98 (101.63)	106.32
2.11 (6.92)	4.22	45.47 (149.17)	86.66
3.10 (10.16)	7.95	66.74 (218.95)	61.21
4.55 (14.92)	16.67	97.96 (321.38)	45.68
6.67 (21.90)	32.27	143.78 (471.72)	36.82
9.80 (32.14)	54.58	211.04 (692.39)	31.57
14.38 (47.17)	80.59	309.77 (1016.29)	46.43
21.10 (69.24)	102.52	454.67 (1491.71)	133.09
		99999.00 (99999.00)	522.06

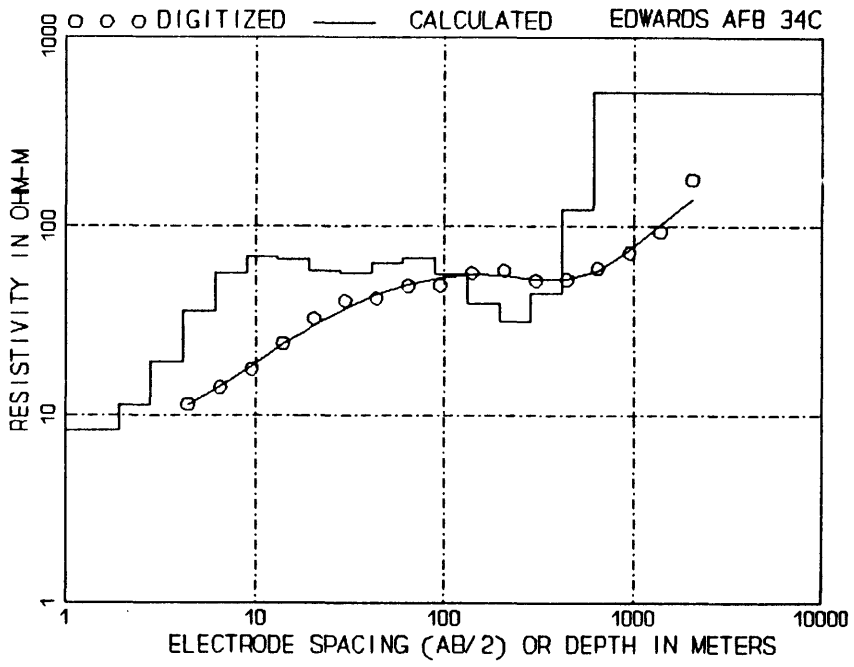




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	17.00	91.44 (300.00)	52.00
4.27 (14.00)	20.50	121.92 (400.00)	49.00
6.10 (20.00)	25.00	182.88 (600.00)	46.00
9.14 (30.00)	30.00	243.84 (800.00)	45.00
12.19 (40.00)	30.00	304.80 (1000.00)	48.20
18.29 (60.00)	32.00	304.80 (1000.00)	50.00
24.38 (80.00)	35.00	426.72 (1400.00)	52.00
30.48 (100.00)	41.00	609.60 (2000.00)	66.00
30.48 (100.00)	41.00	914.40 (3000.00)	92.00
42.67 (140.00)	46.50	1219.20 (4000.00)	125.00
60.96 (200.00)	53.80	1550.21 (5086.00)	159.00

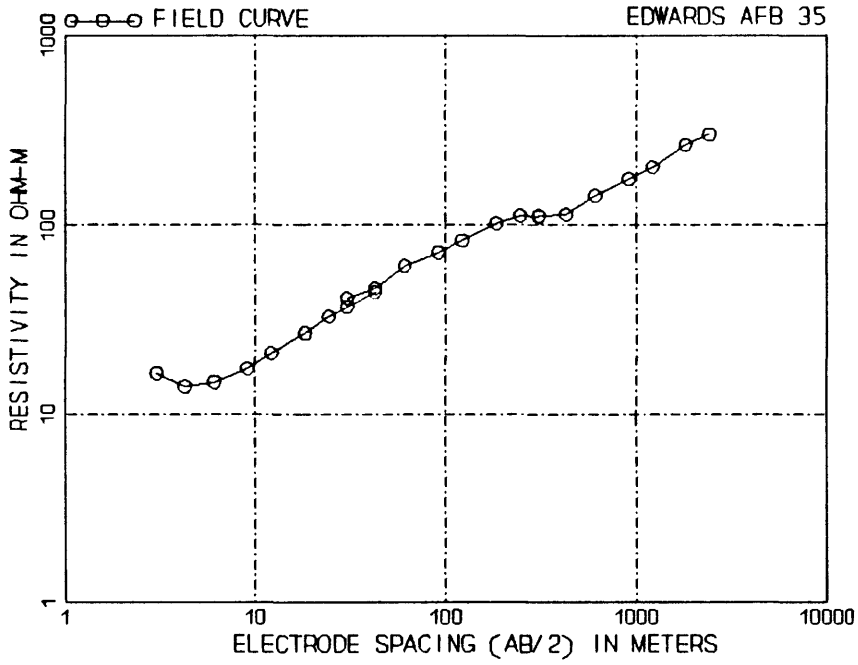
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.46 (4.79)	13.08	31.47 (103.26)	87.48
2.14 (7.03)	28.64	46.20 (151.56)	74.21
3.15 (10.33)	43.98	67.81 (222.46)	51.30
4.62 (15.16)	41.61	99.53 (326.53)	36.04
6.78 (22.25)	30.16	146.08 (479.28)	28.17
9.95 (32.65)	28.30	214.42 (703.49)	31.91
14.61 (47.93)	42.96	314.73 (1032.58)	63.88
21.44 (70.35)	71.32	461.96 (1515.61)	172.00
		99999.00 (99999.00)	515.63

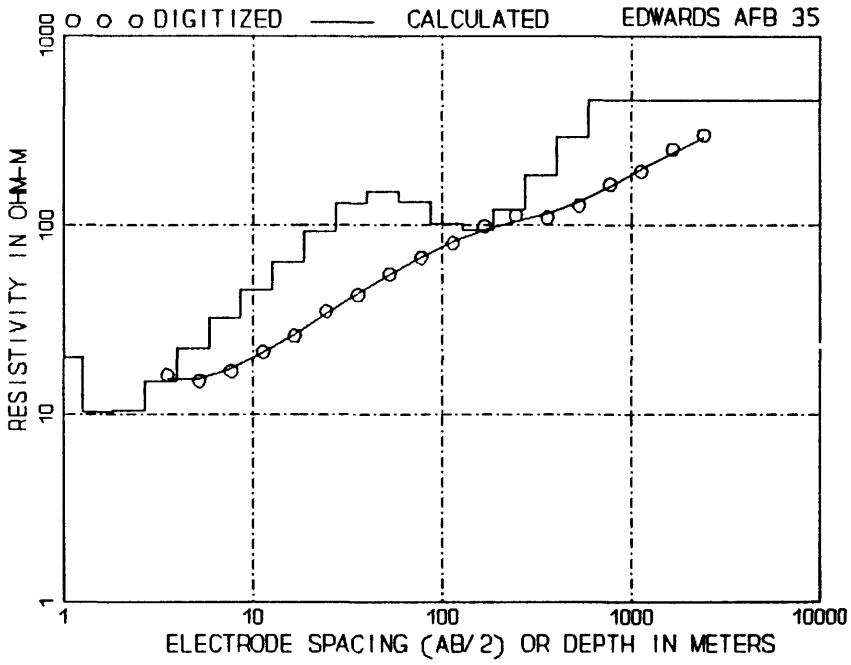




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	9.20	91.44 (300.00)	46.50
4.27 (14.00)	10.00	121.92 (400.00)	52.00
6.10 (20.00)	12.00	182.88 (600.00)	56.50
9.14 (30.00)	15.20	243.84 (800.00)	54.00
12.19 (40.00)	19.00	304.80 (1000.00)	50.00
18.29 (60.00)	26.50	304.80 (1000.00)	52.00
24.38 (80.00)	32.20	426.72 (1400.00)	52.00
30.48 (100.00)	36.00	609.60 (2000.00)	58.00
30.48 (100.00)	39.00	914.40 (3000.00)	72.00
42.67 (140.00)	39.80	1185.67 (3890.00)	80.00
60.96 (200.00)	46.00	1750.77 (5744.00)	125.00
		2041.86 (6699.00)	177.00

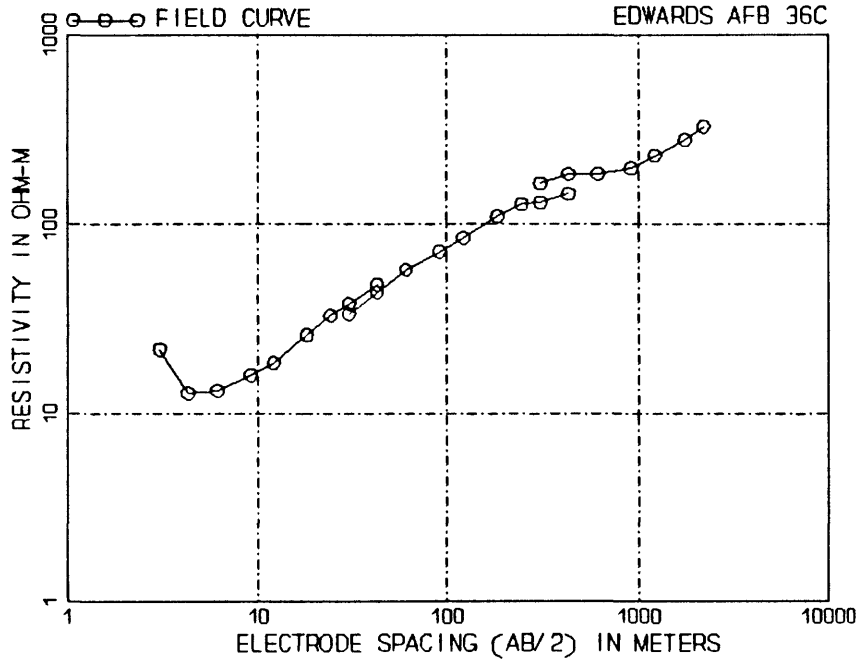
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.92 (6.31)	8.33	41.45 (136.01)	56.67
2.82 (9.27)	11.23	60.85 (199.63)	64.39
4.15 (13.60)	19.19	89.31 (293.01)	68.17
6.08 (19.96)	35.38	131.09 (430.09)	55.50
8.93 (29.30)	56.54	192.41 (631.28)	38.89
13.11 (43.01)	69.76	282.43 (926.59)	31.51
19.24 (63.13)	67.48	414.54 (1360.05)	44.21
28.24 (92.66)	58.70	608.47 (1996.28)	123.03
		99999.00 (99999.00)	514.25

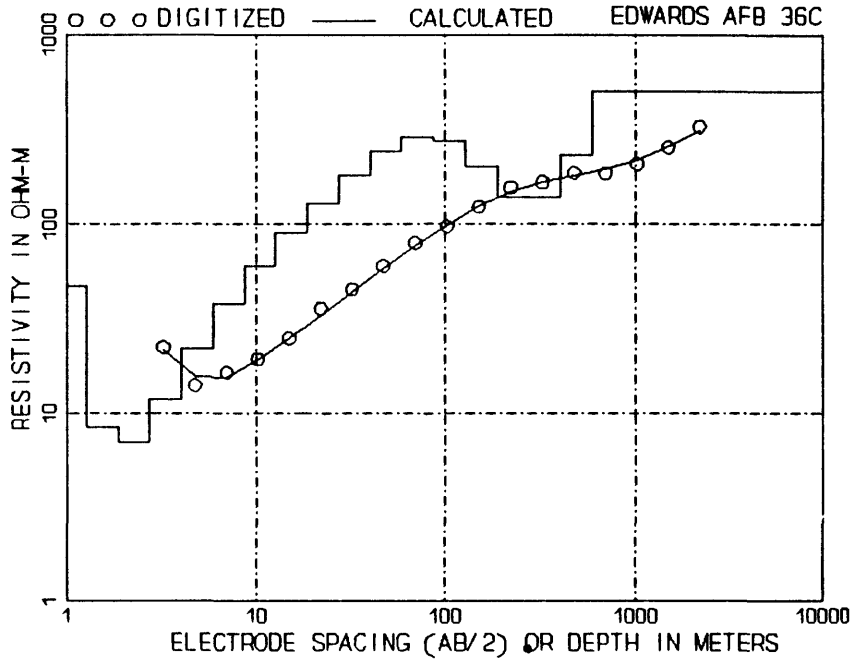




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	16.50	91.44 (300.00)	72.00
4.27 (14.00)	14.00	121.92 (400.00)	83.00
6.10 (20.00)	14.80	182.88 (600.00)	102.00
9.14 (30.00)	17.50	243.84 (800.00)	112.00
12.19 (40.00)	21.00	304.80 (1000.00)	111.00
18.29 (60.00)	26.80	304.80 (1000.00)	112.00
24.38 (80.00)	33.00	426.72 (1400.00)	114.00
30.48 (100.00)	37.00	609.60 (2000.00)	143.00
42.67 (140.00)	44.00	914.40 (3000.00)	175.00
30.48 (100.00)	41.00	1219.20 (4000.00)	202.00
42.67 (140.00)	46.50	1828.80 (6000.00)	265.00
60.96 (200.00)	61.00	2438.40 (8000.00)	300.00

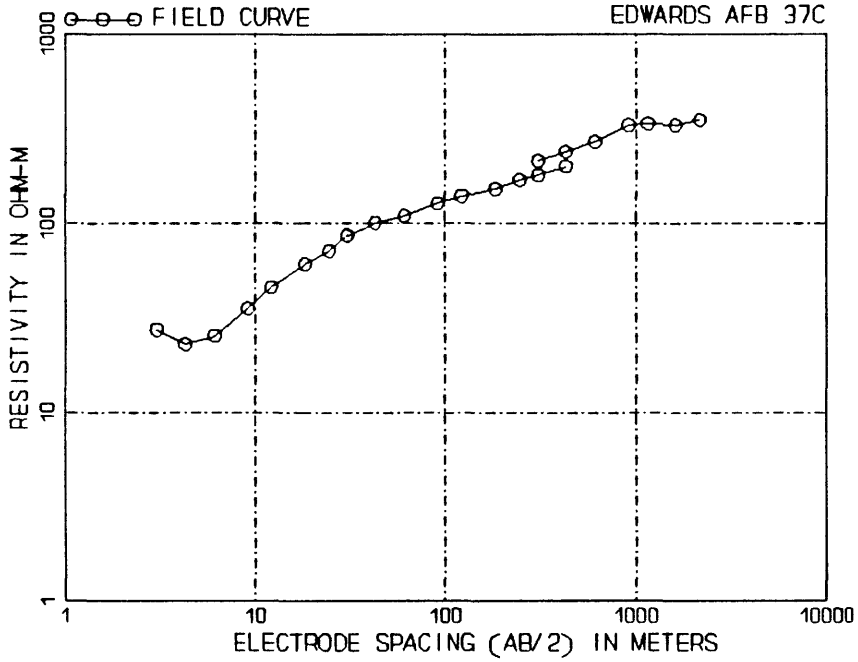
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.27 (4.16)	20.13	40.10 (131.56)	130.12
1.86 (6.11)	10.31	58.86 (193.10)	150.52
2.73 (8.96)	10.53	86.39 (283.44)	131.99
4.01 (13.16)	14.97	126.80 (416.03)	101.96
5.89 (19.31)	22.50	186.12 (610.64)	94.61
8.64 (28.34)	32.59	273.19 (896.30)	120.03
12.68 (41.60)	45.74	400.99 (1315.59)	184.03
18.61 (61.06)	64.40	588.58 (1931.02)	294.23
27.32 (89.63)	93.14	99999.00 (99999.00)	457.90

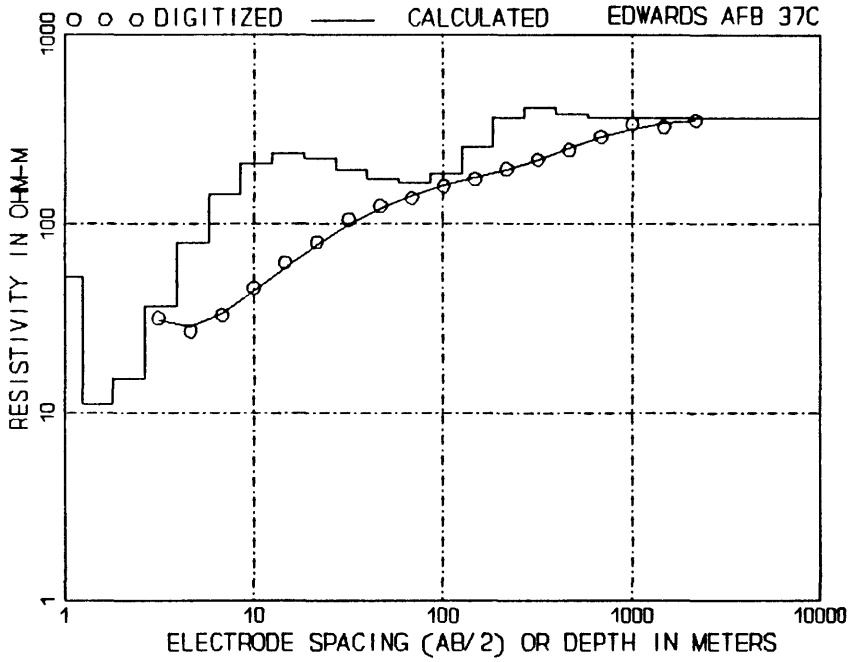




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	21.80	91.44 (300.00)	72.00
4.27 (14.00)	12.80	121.92 (400.00)	85.00
6.10 (20.00)	13.20	182.88 (600.00)	110.00
9.14 (30.00)	16.00	243.84 (800.00)	128.00
12.19 (40.00)	18.50	304.80 (1000.00)	130.00
18.29 (60.00)	26.00	426.72 (1400.00)	145.00
24.38 (80.00)	33.00	304.80 (1000.00)	164.00
30.48 (100.00)	38.00	426.72 (1400.00)	184.00
42.67 (140.00)	48.00	609.60 (2000.00)	185.00
30.48 (100.00)	33.50	914.40 (3000.00)	198.00
42.67 (140.00)	43.50	1219.20 (4000.00)	230.00
60.96 (200.00)	57.70	1759.31 (5772.00)	278.50
		2199.44 (7216.00)	328.00

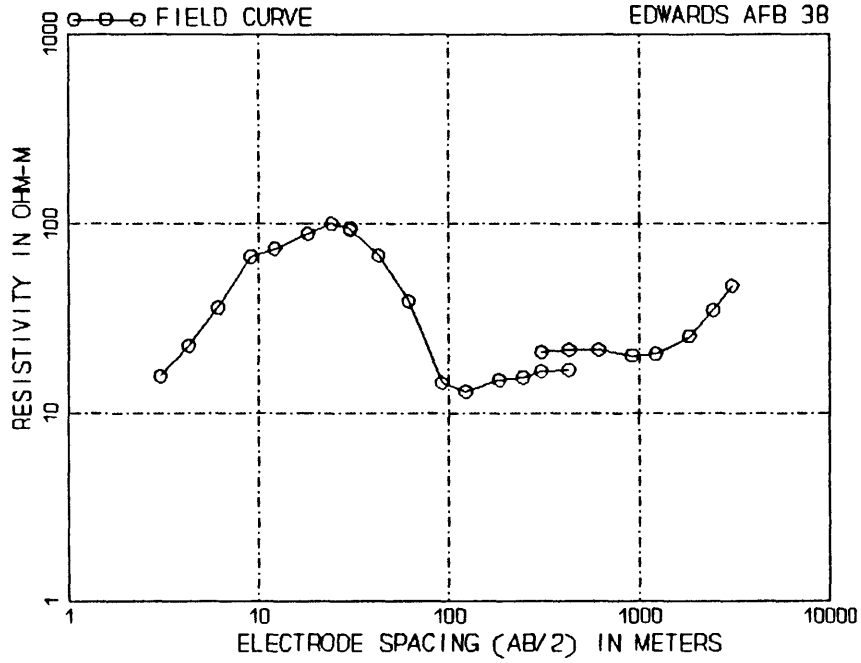
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.27 (4.17)	46.82	40.19 (131.85)	181.47
1.87 (6.12)	8.42	58.99 (193.53)	243.59
2.74 (8.98)	6.96	86.58 (284.06)	288.42
4.02 (13.19)	11.92	127.09 (416.95)	273.69
5.90 (19.35)	21.84	186.54 (612.00)	201.28
8.66 (28.41)	37.67	273.80 (898.29)	138.87
12.71 (41.70)	60.25	401.88 (1318.51)	138.25
18.65 (61.20)	90.36	589.88 (1935.31)	233.30
27.38 (89.83)	129.46	99999.00 (99999.00)	502.05

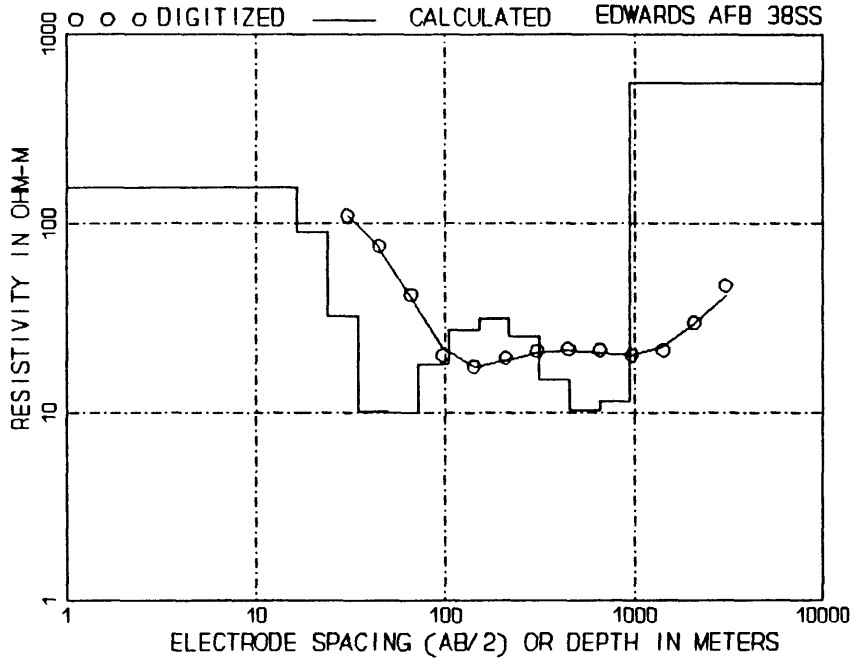




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	27.50	121.92 (400.00)	140.00
4.27 (14.00)	23.00	182.88 (600.00)	152.00
6.10 (20.00)	25.50	243.84 (800.00)	170.00
9.14 (30.00)	35.50	304.80 (1000.00)	180.00
12.19 (40.00)	46.00	426.72 (1400.00)	200.00
18.29 (60.00)	61.00	304.80 (1000.00)	214.00
24.38 (80.00)	72.00	426.72 (1400.00)	240.00
30.48 (100.00)	87.00	609.60 (2000.00)	270.00
30.48 (100.00)	86.00	914.40 (3000.00)	330.00
42.67 (140.00)	101.00	1156.41 (3794.00)	338.00
60.96 (200.00)	110.00	1609.95 (5282.00)	330.00
91.44 (300.00)	128.00	2155.24 (7071.00)	352.00

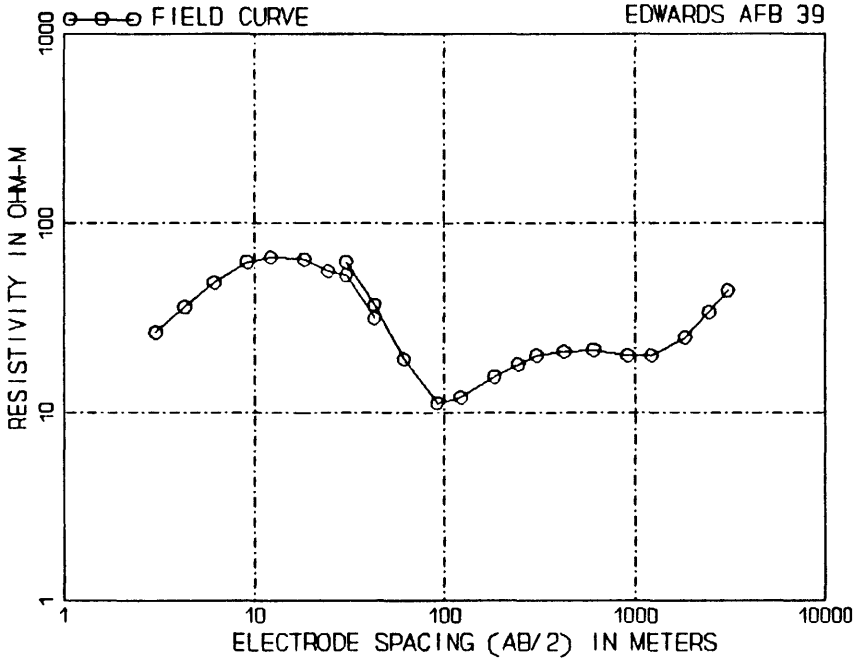
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.25 (4.09)	52.49	39.38 (129.20)	193.20
1.83 (6.00)	11.16	57.80 (189.64)	171.67
2.68 (8.80)	15.23	84.84 (278.36)	164.71
3.94 (12.92)	36.88	124.53 (408.57)	184.07
5.78 (18.96)	79.74	182.79 (599.70)	255.81
8.48 (27.84)	144.36	268.30 (880.24)	364.93
12.45 (40.86)	208.57	393.81 (1292.02)	411.47
18.28 (59.97)	236.44	578.03 (1896.42)	383.37
26.83 (88.02)	222.41	99999.00 (99999.00)	364.23

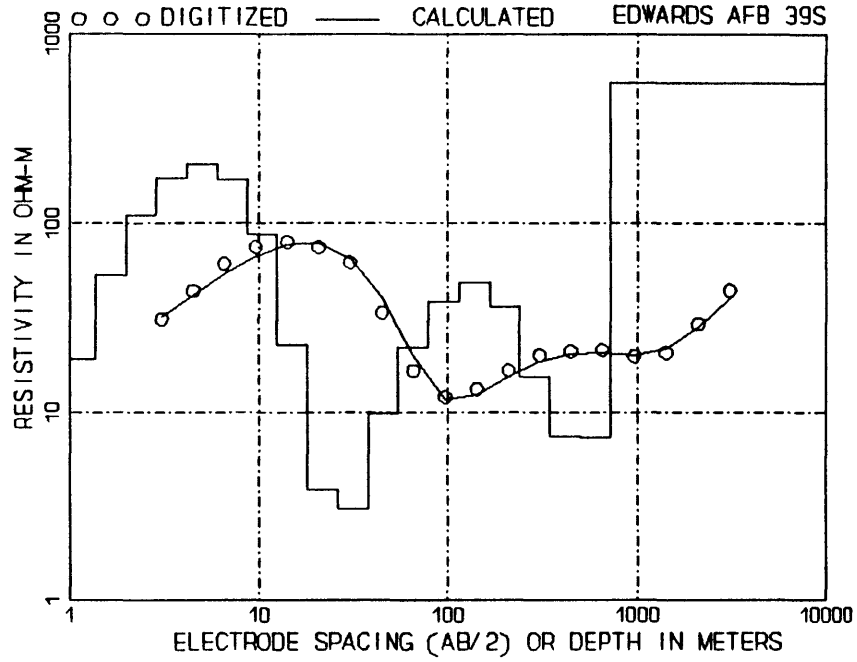




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	15.70	121.92 (400.00)	13.00
4.27 (14.00)	22.80	182.88 (600.00)	15.00
6.10 (20.00)	36.00	243.84 (800.00)	15.50
9.14 (30.00)	67.50	304.80 (1000.00)	16.60
12.19 (40.00)	74.00	426.72 (1400.00)	17.00
18.29 (60.00)	89.00	304.80 (1000.00)	21.00
24.38 (80.00)	100.00	426.72 (1400.00)	21.70
30.48 (100.00)	95.00	609.60 (2000.00)	21.70
30.48 (100.00)	93.00	914.40 (3000.00)	20.20
42.67 (140.00)	68.00	1219.20 (4000.00)	20.60
60.96 (200.00)	39.00	1828.80 (6000.00)	25.50
91.44 (300.00)	14.50	2438.40 (8000.00)	35.00
		3048.00 (10000.00)	47.00

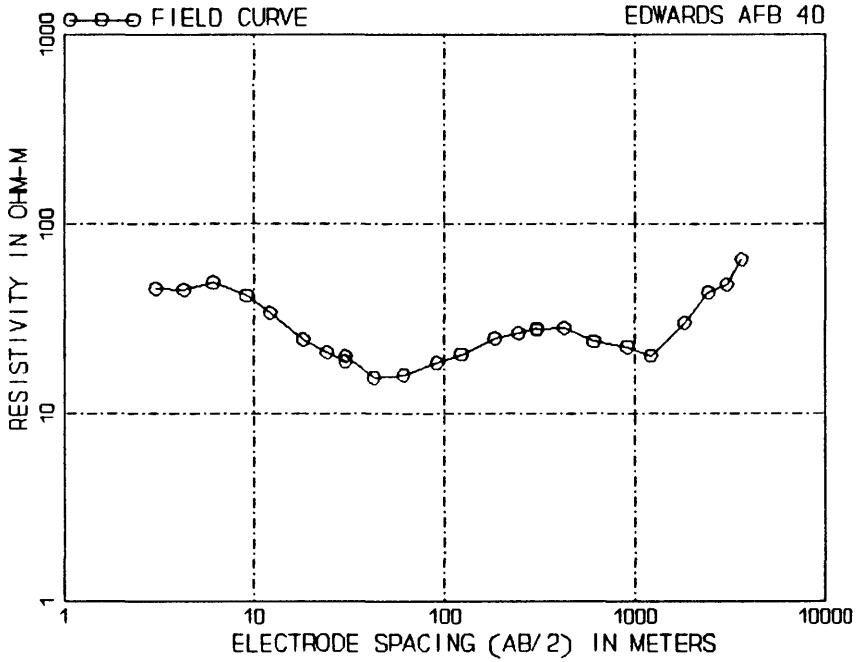
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
16.46 (54.00)	154.99	150.11 (492.49)	27.17
23.79 (78.05)	89.99	216.97 (711.86)	31.49
34.39 (112.82)	32.44	313.62 (1028.95)	25.49
49.71 (163.08)	10.13	453.32 (1487.28)	15.04
71.85 (235.72)	9.93	655.25 (2149.78)	10.28
103.85 (340.72)	18.00	947.13 (3107.38)	11.46
		99999.00 (99999.00)	550.00

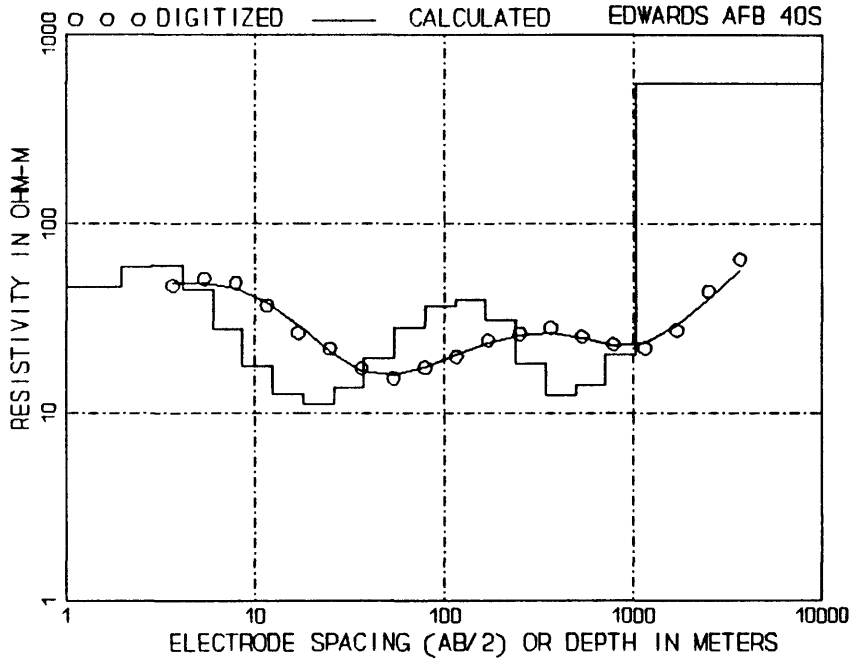




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	26.50	91.44 (300.00)	11.20
4.27 (14.00)	36.00	121.92 (400.00)	12.00
6.10 (20.00)	48.50	182.88 (600.00)	15.50
9.14 (30.00)	62.50	243.84 (800.00)	18.00
12.19 (40.00)	66.00	304.80 (1000.00)	20.00
18.29 (60.00)	64.50	304.80 (1000.00)	20.00
24.38 (80.00)	56.00	426.72 (1400.00)	21.00
30.48 (100.00)	53.00	609.60 (2000.00)	21.50
42.67 (140.00)	31.50	914.40 (3000.00)	20.00
30.48 (100.00)	62.50	1219.20 (4000.00)	20.00
42.67 (140.00)	37.00	1828.80 (6000.00)	25.00
60.96 (200.00)	19.20	2438.40 (8000.00)	34.00
		3048.00 (10000.00)	44.00

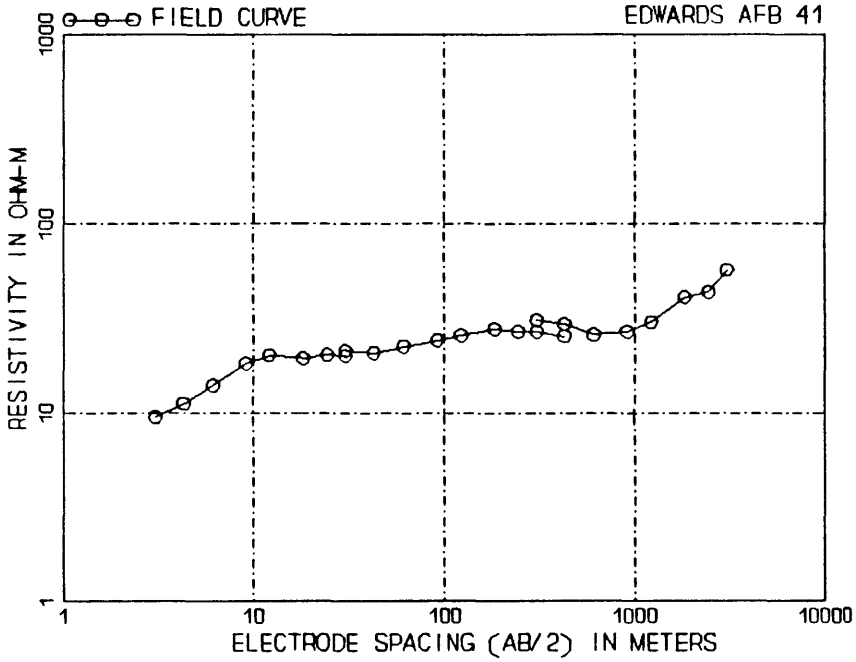
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.37 (4.50)	19.12	37.78 (123.94)	3.05
1.98 (6.50)	52.79	54.60 (179.15)	9.79
2.87 (9.40)	111.10	78.93 (258.95)	22.02
4.14 (13.59)	174.09	114.08 (374.29)	38.50
5.99 (19.64)	204.23	164.90 (541.02)	48.86
8.65 (28.39)	170.39	238.36 (782.01)	36.15
12.51 (41.04)	87.33	344.53 (1130.35)	15.36
18.08 (59.32)	22.84	498.00 (1633.85)	7.41
26.14 (85.75)	3.91	719.83 (2361.63)	7.31
		99999.00 (99999.00)	550.00

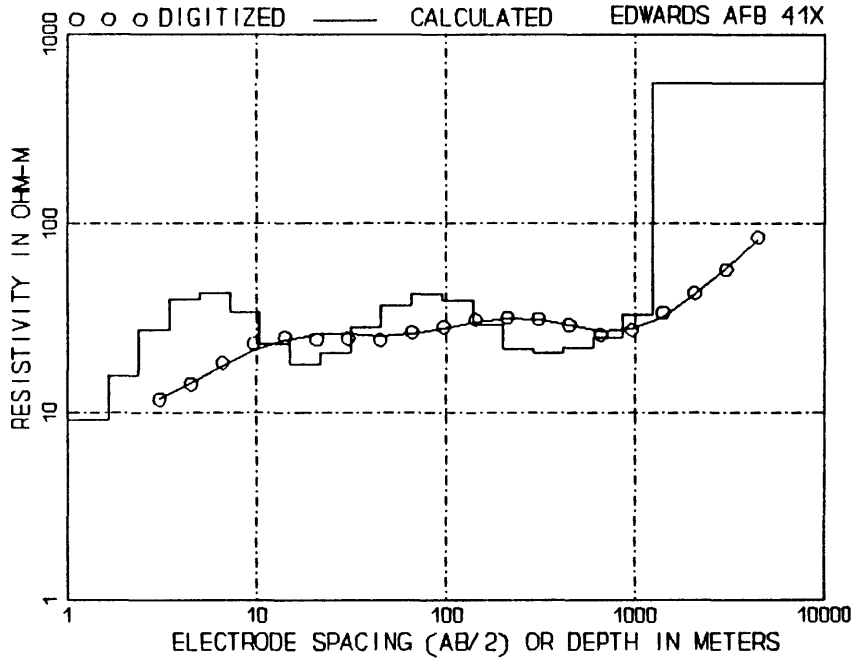




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	45.50	121.92 (400.00)	20.50
4.27 (14.00)	45.00	182.88 (600.00)	25.00
6.10 (20.00)	49.00	243.84 (800.00)	26.50
9.14 (30.00)	42.00	304.80 (1000.00)	28.00
12.19 (40.00)	34.00	304.80 (1000.00)	27.60
18.29 (60.00)	24.60	426.72 (1400.00)	28.20
24.38 (80.00)	21.00	609.60 (2000.00)	24.00
30.48 (100.00)	18.80	914.40 (3000.00)	22.50
30.48 (100.00)	20.00	1219.20 (4000.00)	20.20
42.67 (140.00)	15.50	1828.80 (6000.00)	30.00
60.96 (200.00)	16.00	2438.40 (8000.00)	43.50
91.44 (300.00)	18.50	3048.00 (10000.00)	47.80
		3657.60 (12000.00)	65.40

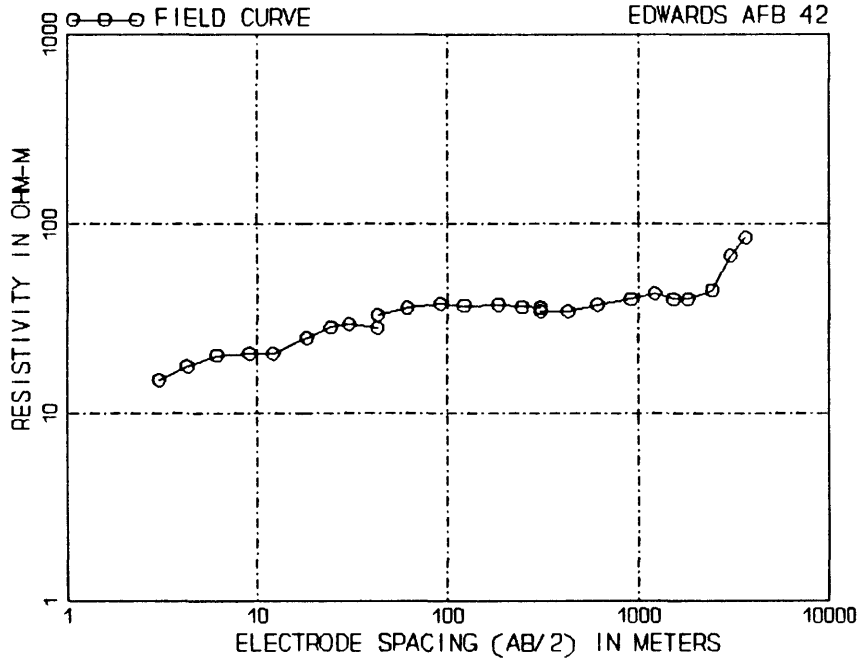
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.98 (6.48)	46.08	54.40 (178.47)	19.60
2.85 (9.37)	58.96	78.63 (257.97)	28.27
4.13 (13.54)	60.37	113.66 (372.89)	36.97
5.96 (19.57)	45.05	164.28 (538.98)	39.50
8.62 (28.29)	27.61	237.46 (779.07)	30.94
12.46 (40.89)	17.58	343.23 (1126.10)	18.33
18.01 (59.10)	12.60	496.12 (1627.70)	12.48
26.04 (85.42)	11.16	717.12 (2352.75)	14.10
37.63 (123.47)	13.62	1036.55 (3400.75)	20.31
		99999.00 (99999.00)	550.00

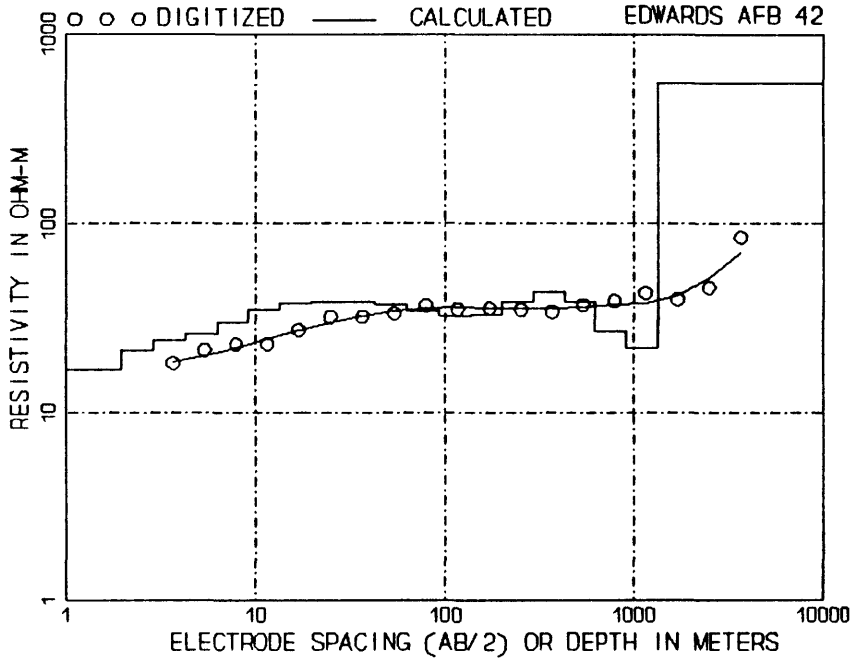




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	9.50	121.92 (400.00)	25.70
4.27 (14.00)	11.20	182.88 (600.00)	27.80
6.10 (20.00)	14.00	243.84 (800.00)	27.00
9.14 (30.00)	18.30	304.80 (1000.00)	27.00
12.19 (40.00)	20.20	426.72 (1400.00)	25.50
18.29 (60.00)	19.50	304.80 (1000.00)	31.00
24.38 (80.00)	20.30	426.72 (1400.00)	29.50
30.48 (100.00)	20.00	609.60 (2000.00)	26.00
30.48 (100.00)	21.30	914.40 (3000.00)	27.00
42.67 (140.00)	20.80	1219.20 (4000.00)	30.30
60.96 (200.00)	22.50	1828.80 (6000.00)	41.00
91.44 (300.00)	24.30	2438.40 (8000.00)	43.60
		3048.00 (10000.00)	57.00

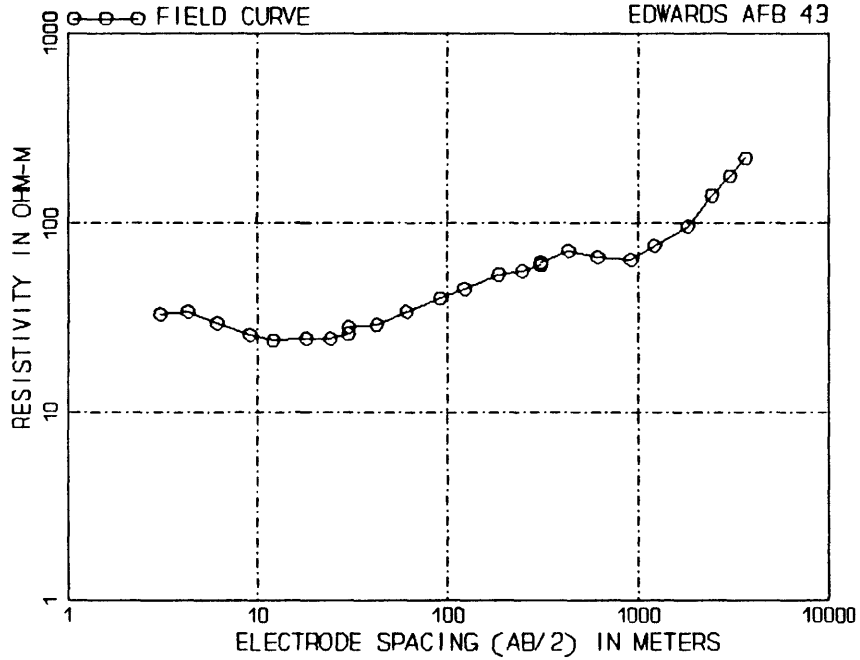
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	9.11	65.53 (214.98)	36.86
2.38 (7.81)	15.54	94.71 (310.74)	42.11
3.44 (11.28)	27.18	136.90 (449.15)	39.13
4.97 (16.31)	39.67	197.88 (649.22)	29.16
7.18 (23.57)	42.74	286.03 (938.41)	21.72
10.39 (34.07)	33.89	413.44 (1356.42)	20.64
15.01 (49.25)	22.93	597.60 (1960.62)	22.11
21.70 (71.19)	18.11	863.79 (2833.96)	25.12
31.36 (102.89)	20.54	1248.56 (4096.32)	32.82
45.33 (148.73)	28.16	99999.00 (99999.00)	550.00

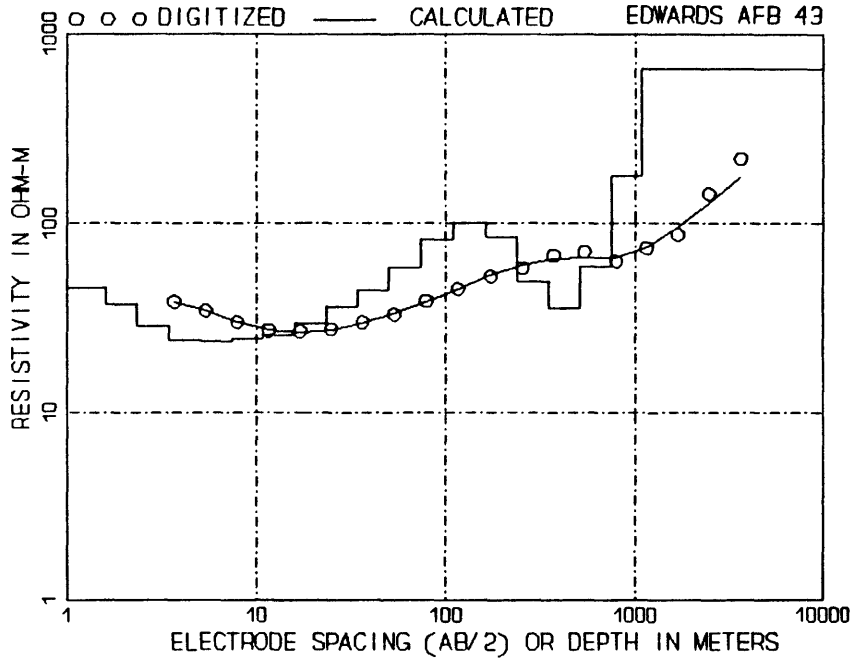




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	15.00	182.88 (600.00)	37.50
4.27 (14.00)	17.70	243.84 (800.00)	36.50
6.10 (20.00)	20.20	304.80 (1000.00)	36.00
9.14 (30.00)	20.70	304.80 (1000.00)	34.50
12.19 (40.00)	20.70	426.72 (1400.00)	34.50
18.29 (60.00)	25.00	609.60 (2000.00)	37.50
24.38 (80.00)	28.50	914.40 (3000.00)	40.00
30.48 (100.00)	29.50	1219.20 (4000.00)	43.00
42.67 (140.00)	28.20	1524.00 (5000.00)	40.00
42.67 (140.00)	33.00	1828.80 (6000.00)	40.00
60.96 (200.00)	36.00	2438.40 (8000.00)	44.50
91.44 (300.00)	38.00	3048.00 (10000.00)	68.00
121.92 (400.00)	37.00	3657.60 (12000.00)	85.00

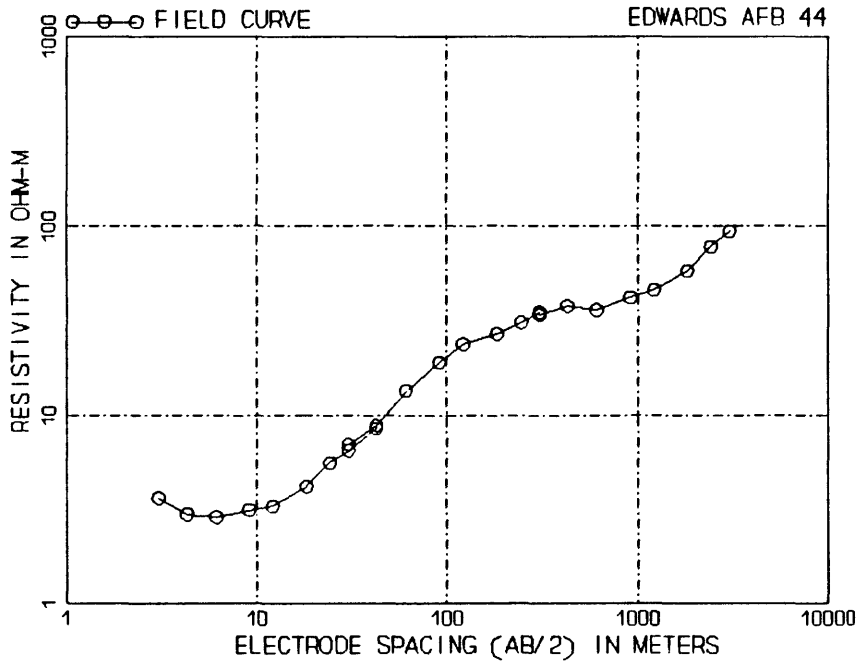
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.98 (6.48)	16.79	62.46 (204.92)	37.28
2.90 (9.51)	21.27	91.68 (300.77)	34.56
4.26 (13.96)	24.02	134.56 (441.48)	32.32
6.25 (20.49)	26.03	197.51 (648.00)	33.13
9.17 (30.08)	30.09	289.91 (951.13)	38.33
13.46 (44.15)	35.16	425.52 (1396.07)	43.47
19.75 (64.80)	37.99	624.58 (2049.16)	38.55
28.99 (95.11)	38.73	916.76 (3007.75)	26.87
42.55 (139.61)	38.70	1345.62 (4414.77)	22.16
		99999.00 (99999.00)	550.00

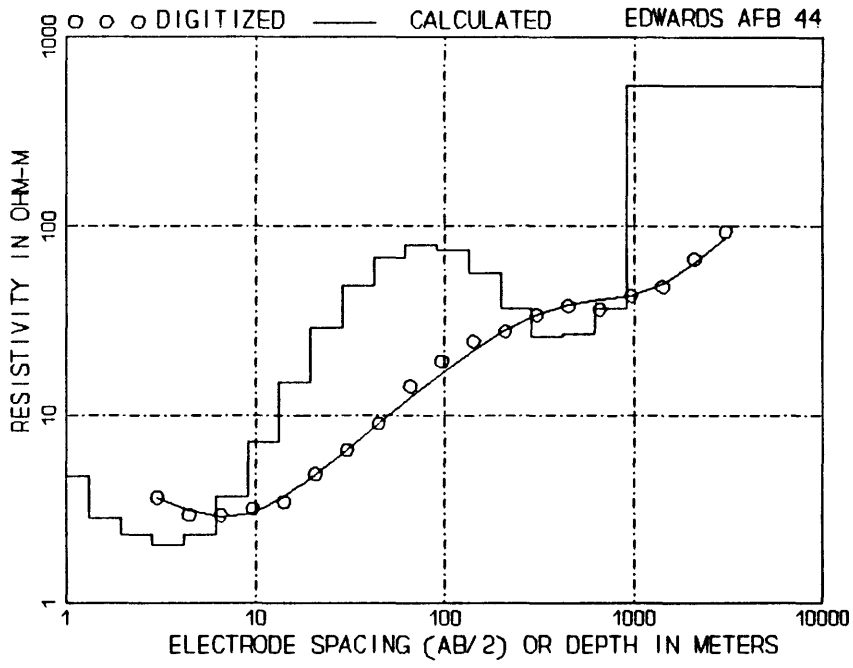




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	33.00	121.92 (400.00)	45.00
4.27 (14.00)	34.00	182.88 (600.00)	53.50
6.10 (20.00)	29.50	243.84 (800.00)	56.00
9.14 (30.00)	25.80	304.80 (1000.00)	60.00
12.19 (40.00)	24.00	304.80 (1000.00)	62.00
18.29 (60.00)	24.50	426.72 (1400.00)	71.50
24.38 (80.00)	24.50	609.60 (2000.00)	66.00
30.48 (100.00)	26.00	914.40 (3000.00)	64.00
30.48 (100.00)	28.20	1219.20 (4000.00)	76.00
42.67 (140.00)	29.00	1828.80 (6000.00)	96.00
60.96 (200.00)	34.00	2438.40 (8000.00)	140.00
91.44 (300.00)	40.00	3048.00 (10000.00)	177.00
		3657.60 (12000.00)	220.00

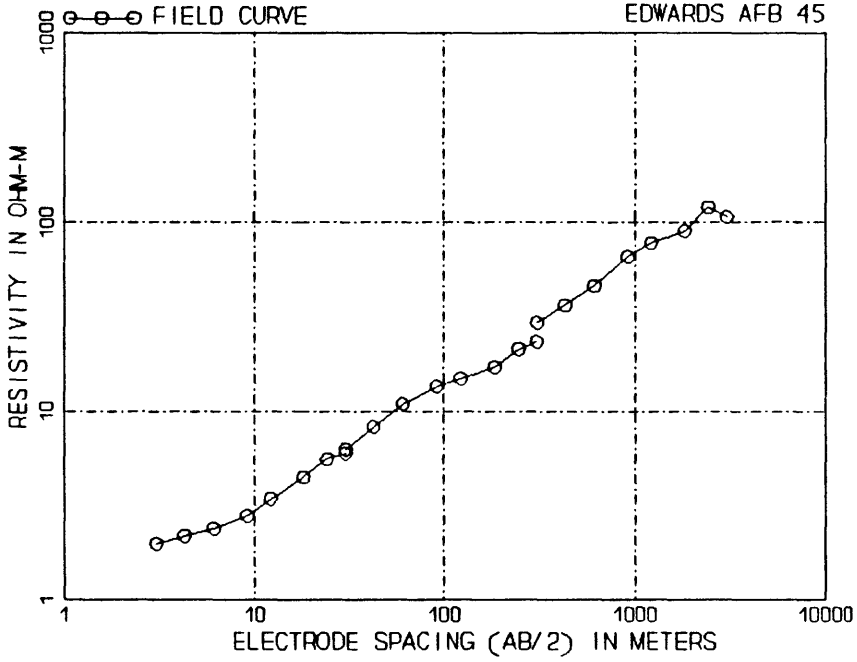
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.60 (5.25)	45.54	50.59 (165.98)	44.46
2.35 (7.70)	37.49	74.26 (243.63)	58.48
3.45 (11.31)	28.62	109.00 (357.60)	82.01
5.06 (16.60)	24.28	159.98 (524.88)	101.24
7.43 (24.36)	23.84	234.82 (770.42)	84.54
10.90 (35.76)	24.43	344.67 (1130.82)	49.02
16.00 (52.49)	25.86	505.91 (1659.82)	35.81
23.48 (77.04)	29.65	742.58 (2436.28)	59.64
34.47 (113.08)	35.94	1089.95 (3575.97)	178.76
		99999.00 (99999.00)	660.62

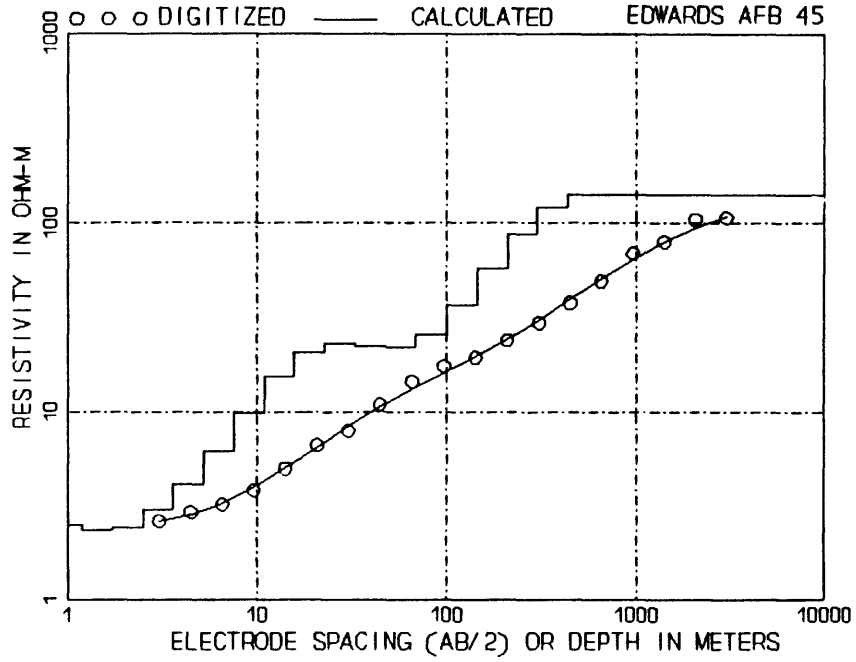




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	3.65	91.44 (300.00)	19.00
4.27 (14.00)	3.00	121.92 (400.00)	23.80
6.10 (20.00)	2.90	182.88 (600.00)	27.00
9.14 (30.00)	3.15	243.84 (800.00)	31.00
12.19 (40.00)	3.30	304.80 (1000.00)	35.00
18.29 (60.00)	4.20	304.80 (1000.00)	34.00
24.38 (80.00)	5.60	426.72 (1400.00)	38.00
30.48 (100.00)	6.50	609.60 (2000.00)	36.00
42.67 (140.00)	8.50	914.40 (3000.00)	42.00
30.48 (100.00)	7.00	1219.20 (4000.00)	46.00
42.67 (140.00)	8.80	1828.80 (6000.00)	58.00
60.96 (200.00)	13.50	2438.40 (8000.00)	78.00
		3048.00 (10000.00)	94.00

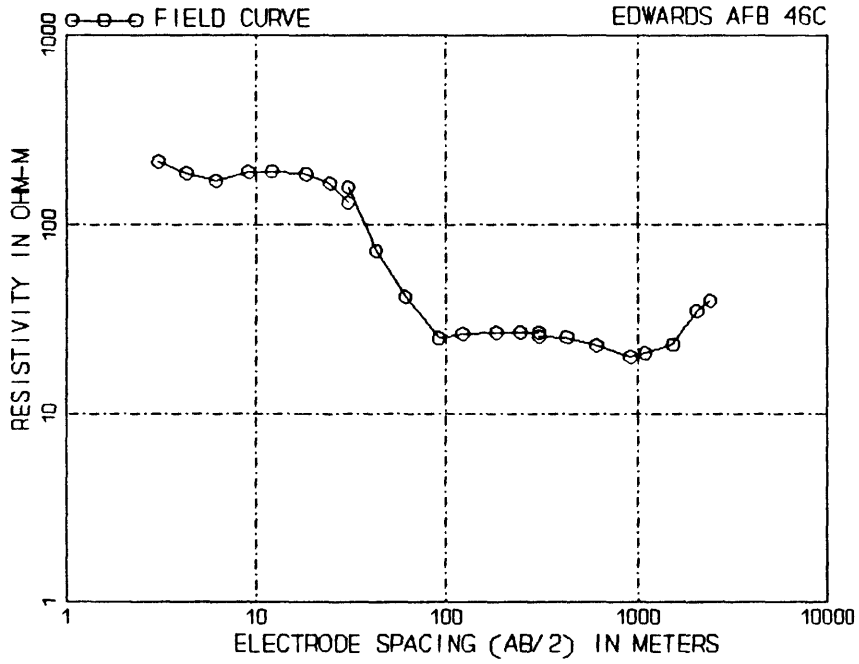
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.33 (4.37)	4.73	42.16 (138.32)	48.30
1.96 (6.42)	2.85	61.88 (203.02)	67.77
2.87 (9.42)	2.34	90.83 (298.00)	79.01
4.22 (13.83)	2.05	133.32 (437.40)	74.98
6.19 (20.30)	2.32	195.69 (642.02)	56.79
9.08 (29.80)	3.71	287.23 (942.35)	36.82
13.33 (43.74)	7.19	421.59 (1383.18)	26.14
19.57 (64.20)	14.88	618.81 (2030.23)	26.72
28.72 (94.23)	28.87	908.30 (2979.97)	36.77
		99999.00 (99999.00)	550.00

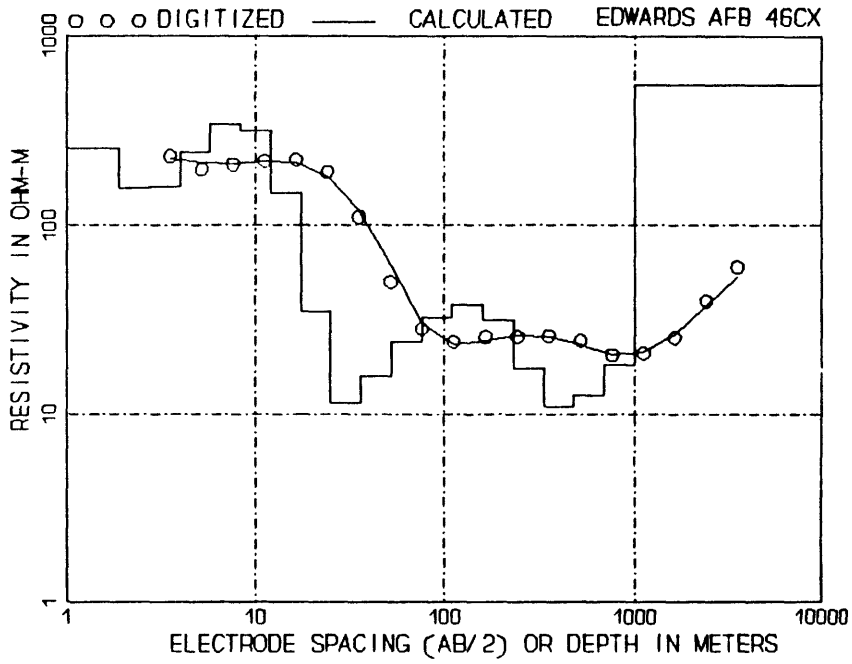




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	2.00	121.92 (400.00)	15.00
4.27 (14.00)	2.20	182.88 (600.00)	17.20
6.10 (20.00)	2.40	243.84 (800.00)	21.50
9.14 (30.00)	2.80	304.80 (1000.00)	23.50
12.19 (40.00)	3.45	304.80 (1000.00)	29.50
18.29 (60.00)	4.50	426.72 (1400.00)	36.50
24.38 (80.00)	5.60	609.60 (2000.00)	46.00
30.48 (100.00)	6.00	914.40 (3000.00)	66.00
30.48 (100.00)	6.30	1219.20 (4000.00)	78.00
42.67 (140.00)	8.30	1828.80 (6000.00)	90.00
60.96 (200.00)	11.00	2438.40 (8000.00)	120.00
91.44 (300.00)	13.60	3048.00 (10000.00)	107.00

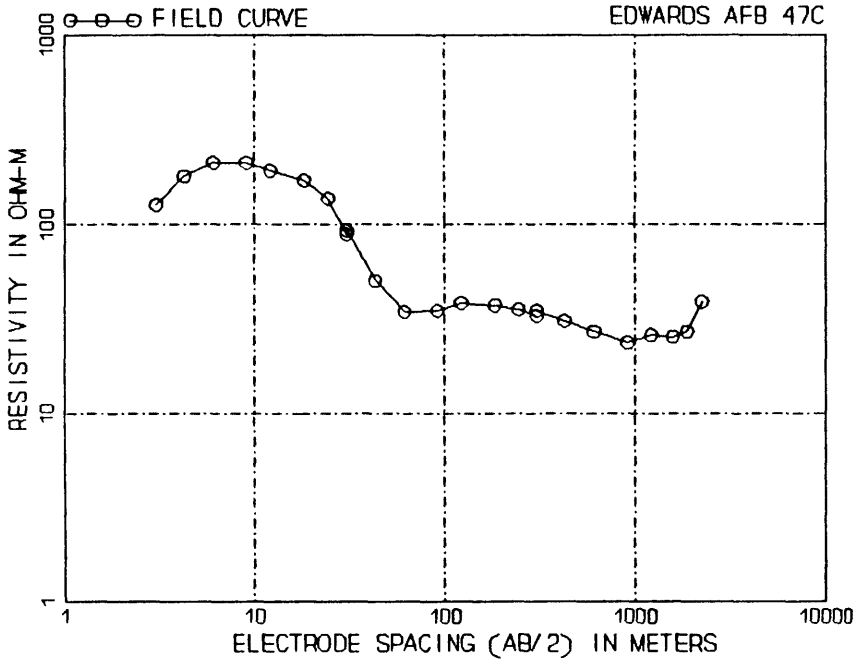
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.20 (3.94)	2.53	33.05 (108.42)	22.88
1.73 (5.69)	2.35	47.77 (156.72)	22.30
2.51 (8.22)	2.42	69.05 (226.53)	22.00
3.62 (11.89)	3.02	99.80 (327.43)	25.63
5.24 (17.18)	4.15	144.26 (473.28)	36.57
7.57 (24.84)	6.14	208.51 (684.10)	57.47
10.94 (35.90)	9.84	301.40 (988.83)	87.87
15.82 (51.89)	15.35	435.65 (1429.29)	120.10
22.86 (75.01)	20.61	629.70 (2065.96)	140.30
		99999.00 (99999.00)	141.17

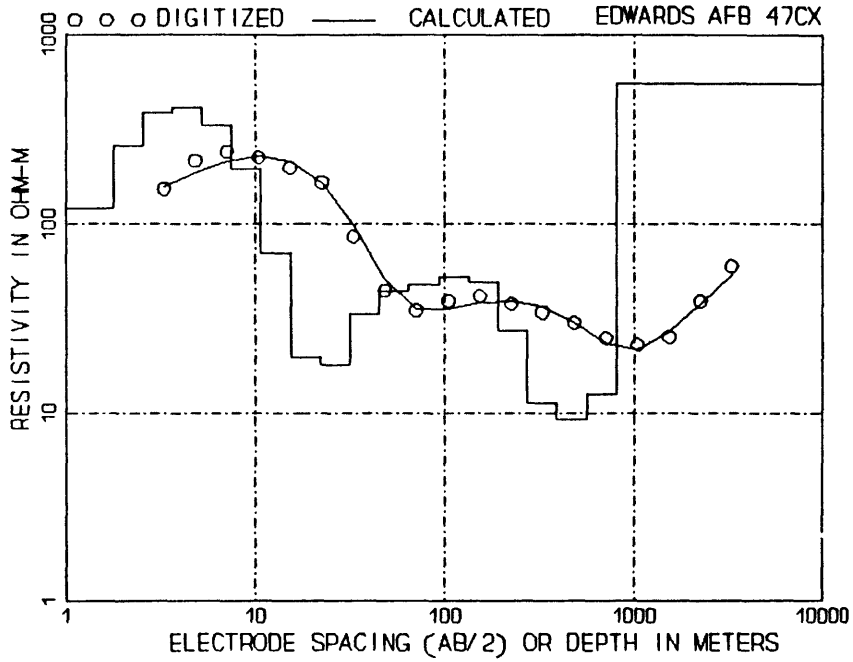




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	215.00	121.92 (400.00)	26.50
4.27 (14.00)	187.00	182.88 (600.00)	27.00
6.10 (20.00)	170.00	243.84 (800.00)	27.00
9.14 (30.00)	190.00	304.80 (1000.00)	27.00
12.19 (40.00)	191.00	304.80 (1000.00)	25.80
18.29 (60.00)	185.00	426.72 (1400.00)	25.50
24.38 (80.00)	165.00	609.60 (2000.00)	23.00
30.48 (100.00)	131.00	914.40 (3000.00)	20.00
30.48 (100.00)	157.00	1090.27 (3577.00)	20.96
42.67 (140.00)	73.00	1530.10 (5020.00)	23.30
60.96 (200.00)	41.50	2045.51 (6711.00)	35.00
91.44 (300.00)	25.20	2407.31 (7898.00)	39.80

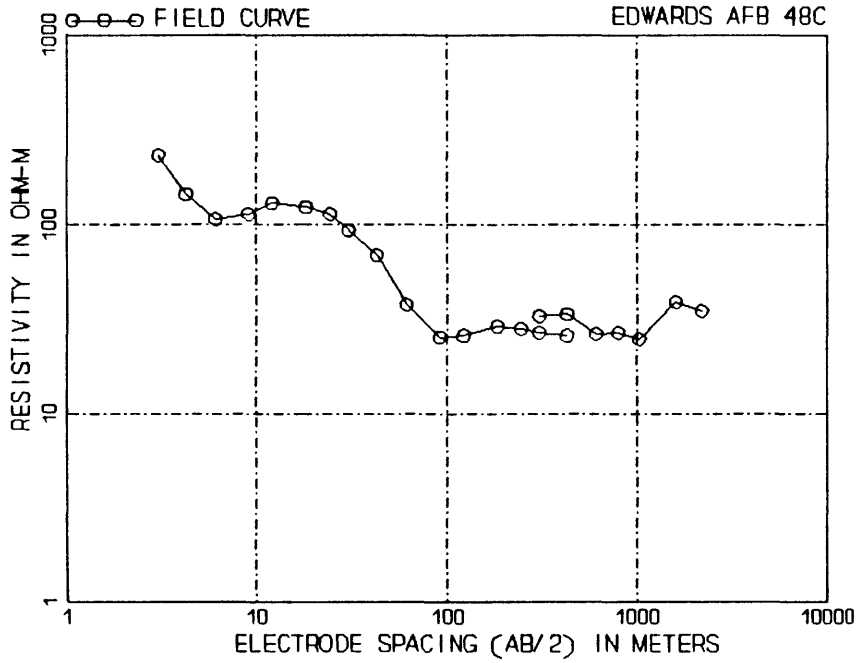
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.91 (6.26)	253.44	52.55 (172.42)	15.88
2.76 (9.05)	156.62	75.96 (249.22)	24.14
3.99 (13.08)	161.02	109.80 (360.23)	32.28
5.76 (18.91)	243.54	158.71 (520.69)	37.83
8.33 (27.33)	342.61	229.40 (752.62)	31.25
12.04 (39.50)	315.34	331.58 (1087.87)	17.39
17.40 (57.09)	148.13	479.28 (1572.45)	11.00
25.15 (82.52)	34.91	692.78 (2272.89)	12.53
36.36 (119.28)	11.52	1001.37 (3285.32)	18.32
		99999.00 (99999.00)	550.00

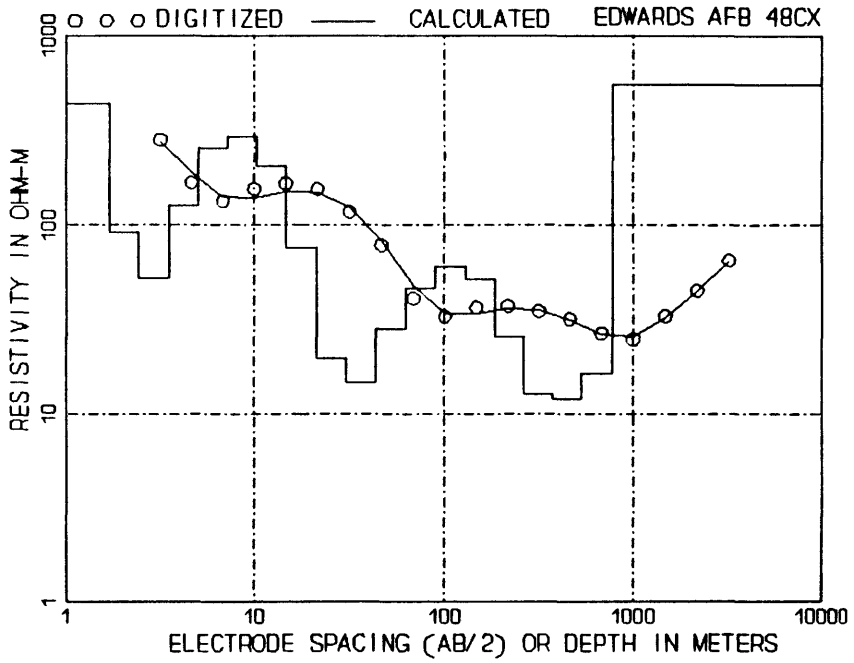




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	127.00	121.92 (400.00)	38.50
4.27 (14.00)	180.00	182.88 (600.00)	37.50
6.10 (20.00)	212.00	243.84 (800.00)	35.50
9.14 (30.00)	212.00	304.80 (1000.00)	33.00
12.19 (40.00)	192.00	304.80 (1000.00)	35.00
18.29 (60.00)	170.00	426.72 (1400.00)	31.00
24.38 (80.00)	137.00	609.60 (2000.00)	27.20
30.48 (100.00)	89.00	914.40 (3000.00)	23.70
30.48 (100.00)	93.00	1219.20 (4000.00)	26.00
42.67 (140.00)	50.50	1583.74 (5196.00)	25.50
60.96 (200.00)	34.50	1882.14 (6175.00)	27.20
91.44 (300.00)	35.00	2239.98 (7349.00)	39.16

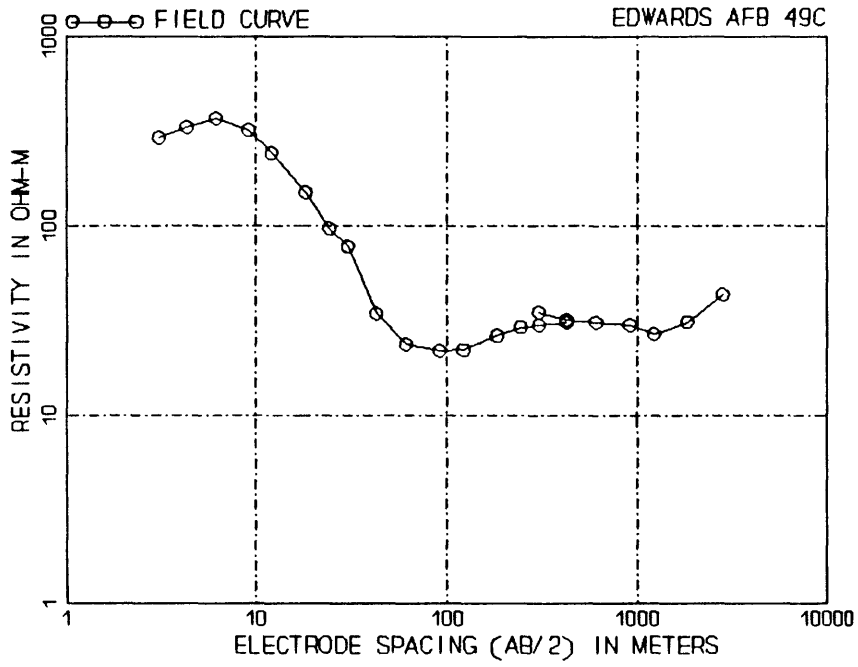
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.78 (5.82)	121.13	45.24 (148.44)	33.55
2.54 (8.35)	258.07	64.83 (212.71)	43.90
3.65 (11.96)	388.49	92.91 (304.82)	48.03
5.22 (17.14)	412.37	133.14 (436.81)	52.58
7.49 (24.56)	332.30	190.79 (625.95)	49.51
10.73 (35.20)	194.61	273.40 (896.99)	27.33
15.37 (50.44)	69.86	391.79 (1285.40)	11.26
22.03 (72.28)	19.83	561.44 (1842.00)	9.25
31.57 (103.58)	17.96	804.55 (2639.60)	12.64
		99999.00 (99999.00)	550.00

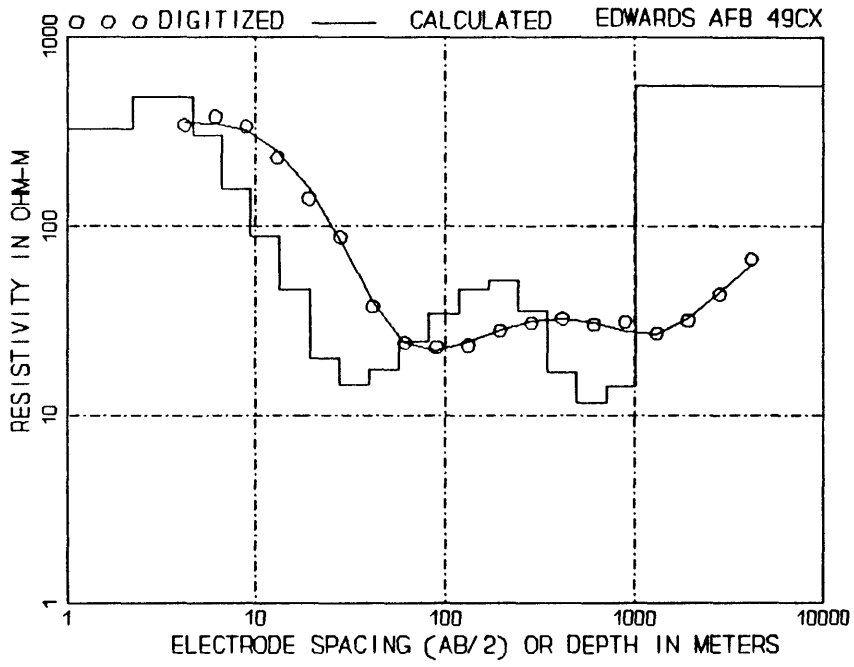




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	233.00	121.92 (400.00)	26.00
4.27 (14.00)	145.00	182.88 (600.00)	29.00
6.10 (20.00)	107.00	243.84 (800.00)	28.20
9.14 (30.00)	114.00	304.80 (1000.00)	27.00
12.19 (40.00)	130.00	426.72 (1400.00)	26.00
18.29 (60.00)	124.00	304.80 (1000.00)	33.00
24.38 (80.00)	114.00	426.72 (1400.00)	33.80
30.48 (100.00)	94.00	609.60 (2000.00)	26.50
30.48 (100.00)	93.00	800.40 (2626.00)	27.00
42.67 (140.00)	69.00	1029.00 (3376.00)	24.90
60.96 (200.00)	38.00	1583.74 (5196.00)	39.00
91.44 (300.00)	25.50	2163.78 (7099.00)	35.00

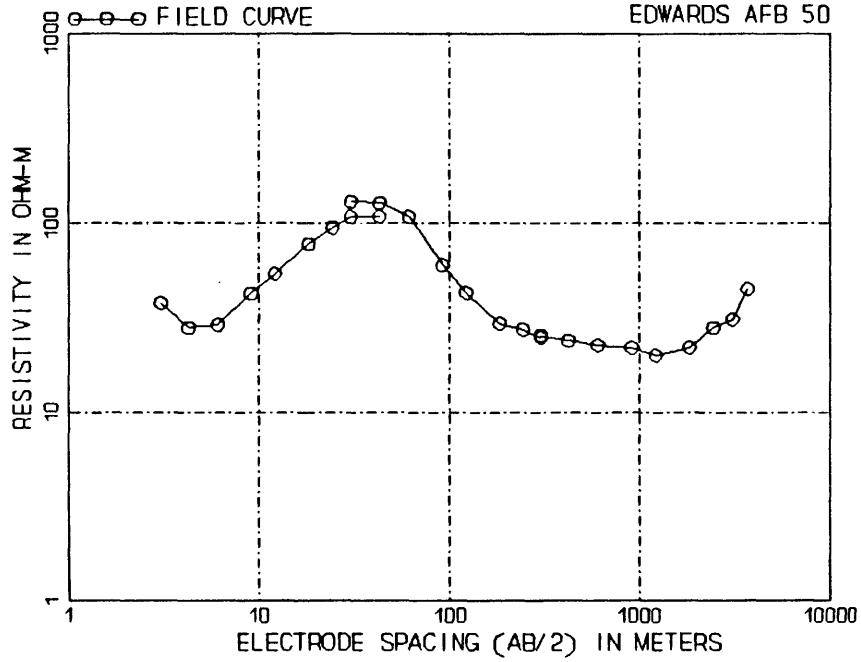
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.72 (5.63)	435.19	43.70 (143.39)	14.73
2.46 (8.06)	91.40	62.63 (205.47)	28.10
3.52 (11.55)	52.27	89.75 (294.45)	46.20
5.05 (16.56)	126.07	128.61 (421.95)	60.00
7.23 (23.73)	253.96	184.30 (604.66)	51.44
10.36 (34.00)	293.84	264.10 (866.48)	25.66
14.85 (48.73)	204.24	378.46 (1241.67)	12.83
21.28 (69.82)	76.36	542.34 (1779.33)	12.05
30.50 (100.06)	19.85	777.18 (2549.81)	16.47
		99999.00 (99999.00)	550.00

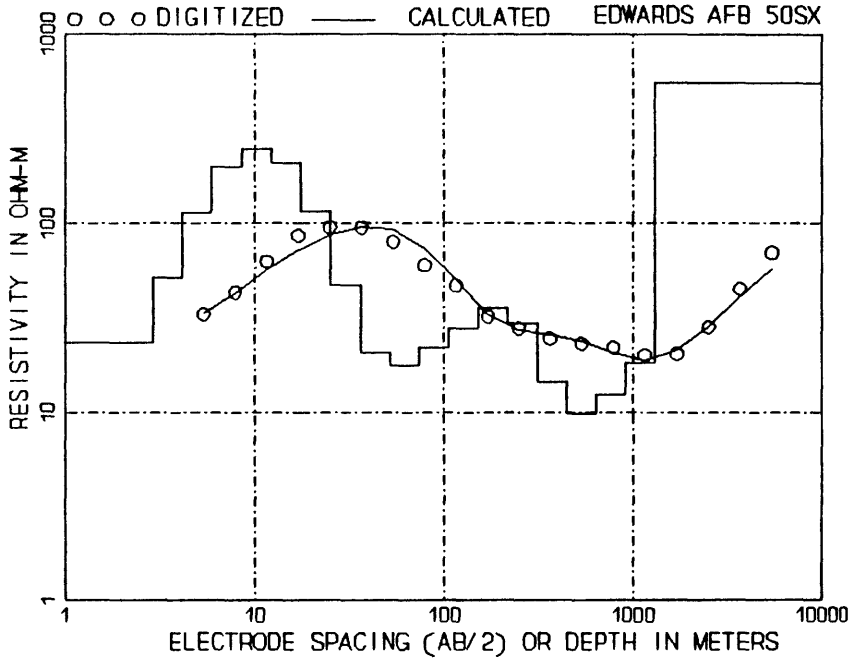




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	292.00	121.92 (400.00)	22.20
4.27 (14.00)	331.00	182.88 (600.00)	26.40
6.10 (20.00)	370.00	243.84 (800.00)	29.30
9.14 (30.00)	320.00	304.80 (1000.00)	30.00
12.19 (40.00)	242.00	426.72 (1400.00)	31.00
18.29 (60.00)	150.00	304.80 (1000.00)	35.00
24.38 (80.00)	97.00	426.72 (1400.00)	32.00
30.48 (100.00)	78.50	609.60 (2000.00)	31.00
30.48 (100.00)	78.00	914.40 (3000.00)	30.00
42.67 (140.00)	34.50	1219.20 (4000.00)	27.00
60.96 (200.00)	23.80	1828.80 (6000.00)	31.20
91.44 (300.00)	22.00	2826.41 (9273.00)	43.60

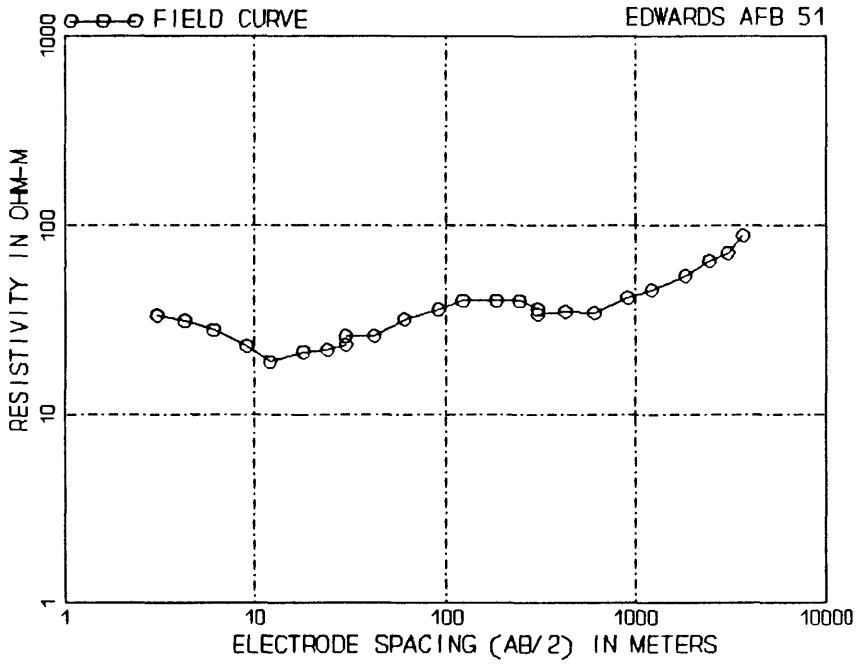
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
2.24 (7.35)	328.37	57.09 (187.30)	17.32
3.21 (10.53)	479.52	81.81 (268.40)	24.46
4.60 (15.09)	477.63	117.23 (384.62)	34.48
6.59 (21.63)	303.66	167.99 (551.16)	46.46
9.45 (30.99)	157.11	240.74 (789.82)	51.55
13.54 (44.42)	89.17	344.98 (1131.83)	35.68
19.40 (63.65)	46.21	494.36 (1621.93)	16.81
27.80 (91.21)	19.97	708.43 (2324.24)	11.61
39.84 (130.70)	14.47	1015.19 (3330.66)	14.24
		99999.00 (99999.00)	550.00

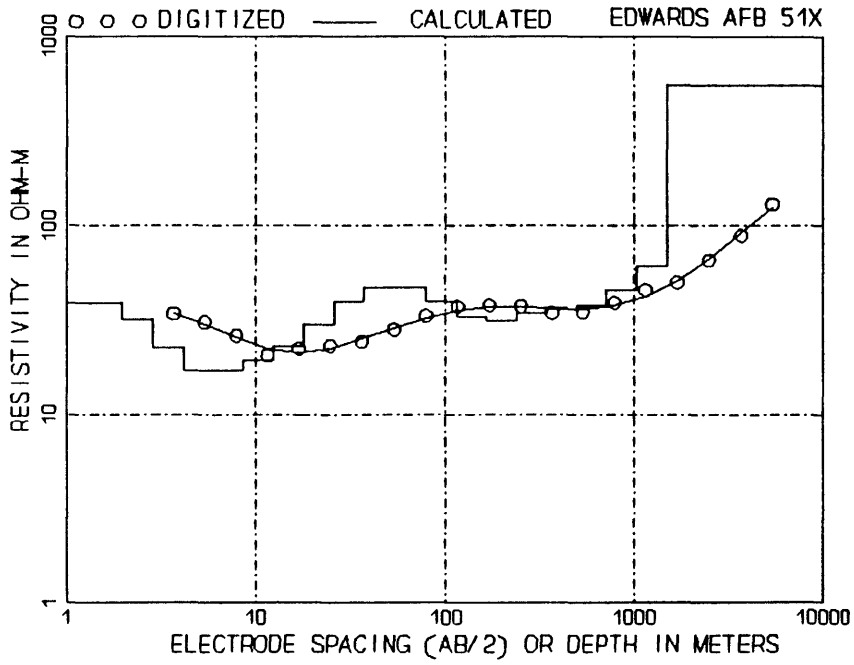




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	38.00	121.92 (400.00)	43.00
4.27 (14.00)	28.00	182.88 (600.00)	29.50
6.10 (20.00)	29.00	243.84 (800.00)	27.50
9.14 (30.00)	42.50	304.80 (1000.00)	25.00
12.19 (40.00)	54.00	304.80 (1000.00)	25.50
18.29 (60.00)	78.00	426.72 (1400.00)	24.00
24.38 (80.00)	95.00	609.60 (2000.00)	22.80
30.48 (100.00)	108.00	914.40 (3000.00)	22.00
42.67 (140.00)	109.00	1219.20 (4000.00)	20.00
30.48 (100.00)	130.00	1828.80 (6000.00)	22.00
42.67 (140.00)	128.00	2438.40 (8000.00)	28.00
60.96 (200.00)	108.00	3048.00 (10000.00)	31.00
91.44 (300.00)	60.00	3657.60 (12000.00)	45.00

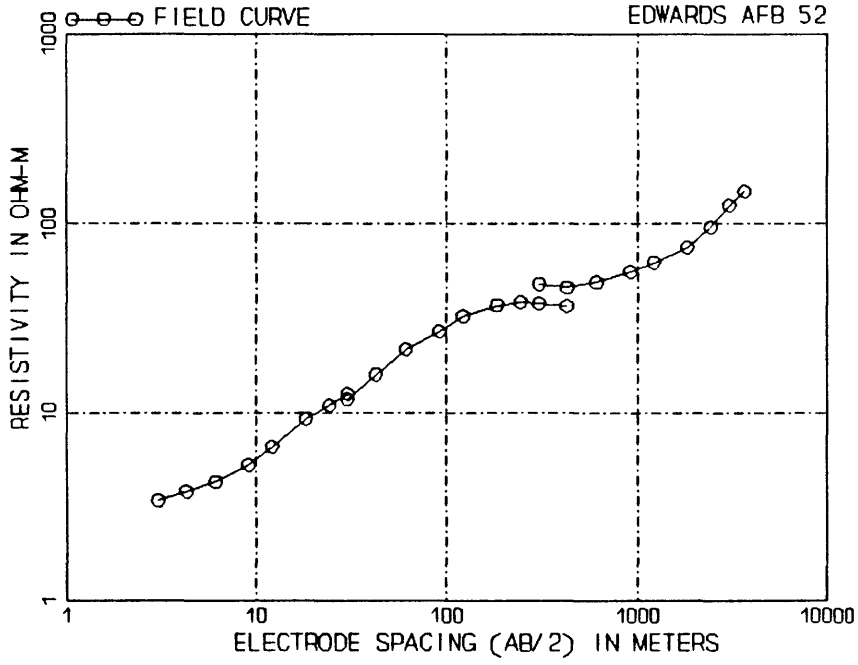
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
2.90 (9.51)	23.44	73.88 (242.38)	17.66
4.15 (13.63)	51.67	105.87 (347.33)	22.16
5.95 (19.53)	113.17	151.71 (497.73)	27.80
8.53 (27.99)	197.38	217.40 (713.25)	35.79
12.23 (40.11)	246.29	311.53 (1022.10)	29.78
17.52 (57.48)	207.45	446.43 (1464.68)	14.43
25.10 (82.36)	115.16	639.74 (2098.90)	9.82
35.98 (118.03)	46.75	916.76 (3007.75)	12.42
51.55 (169.14)	20.72	1313.73 (4310.14)	18.23
		99999.00 (99999.00)	550.00

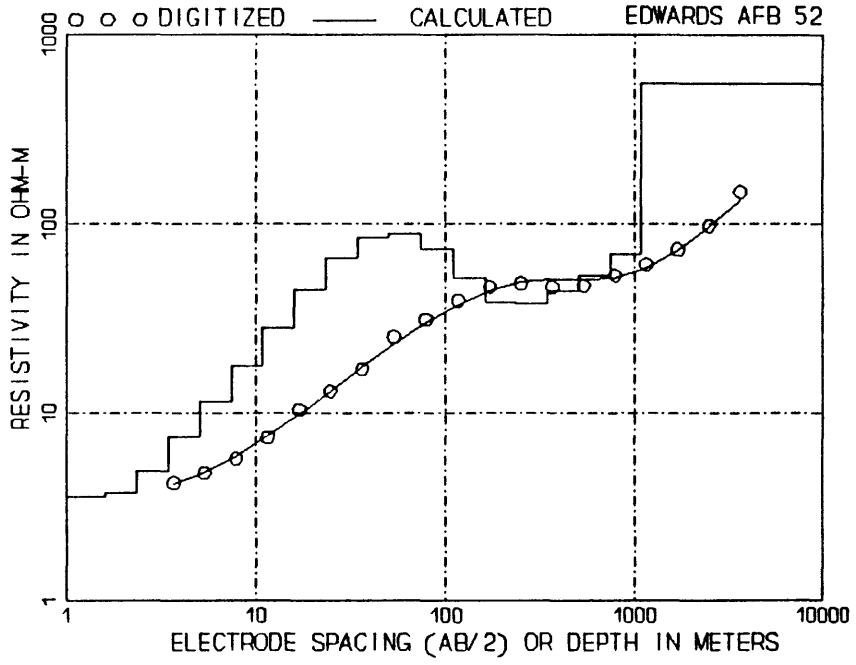




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	33.40	121.92 (400.00)	40.00
4.27 (14.00)	31.30	182.88 (600.00)	40.00
6.10 (20.00)	28.00	243.84 (800.00)	40.00
9.14 (30.00)	23.00	304.80 (1000.00)	36.00
12.19 (40.00)	19.00	304.80 (1000.00)	34.00
18.29 (60.00)	21.50	426.72 (1400.00)	35.00
24.38 (80.00)	22.00	609.60 (2000.00)	34.50
30.48 (100.00)	23.40	914.40 (3000.00)	41.50
30.48 (100.00)	26.00	1219.20 (4000.00)	45.50
42.67 (140.00)	26.20	1828.80 (6000.00)	54.00
60.96 (200.00)	32.00	2438.40 (8000.00)	65.00
91.44 (300.00)	36.00	3048.00 (10000.00)	71.80
		3657.60 (12000.00)	89.00

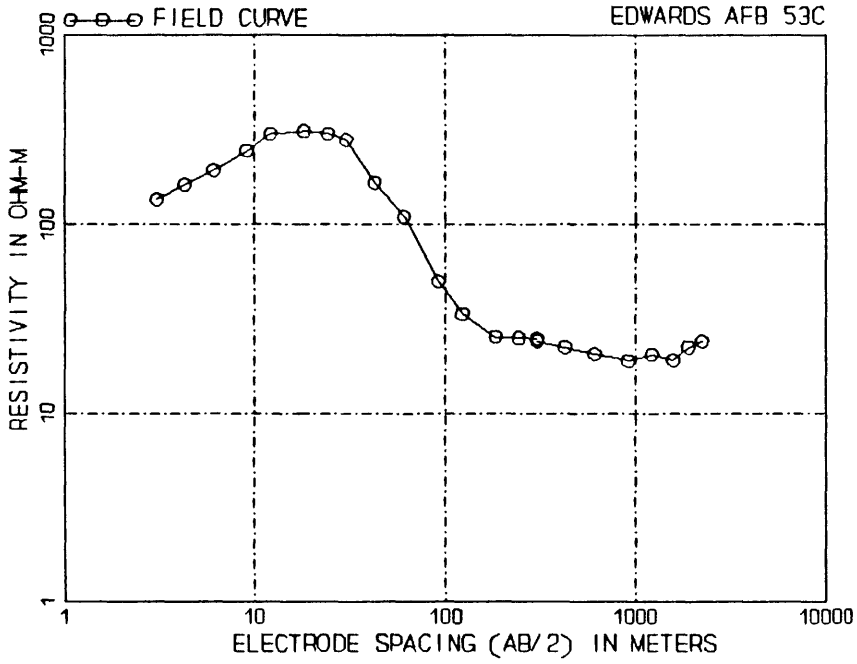
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.98 (6.48)	39.11	78.63 (257.97)	46.86
2.85 (9.37)	32.09	113.66 (372.89)	39.84
4.13 (13.54)	22.78	164.28 (538.98)	32.84
5.96 (19.57)	17.14	237.46 (779.07)	31.62
8.62 (28.29)	17.06	343.23 (1126.10)	34.38
12.46 (40.89)	19.44	496.12 (1627.70)	35.89
18.01 (59.10)	23.18	717.12 (2352.75)	37.71
26.04 (85.42)	29.99	1036.55 (3400.75)	45.40
37.63 (123.47)	39.36	1498.27 (4915.58)	61.51
54.40 (178.47)	46.75	99999.00 (99999.00)	550.00

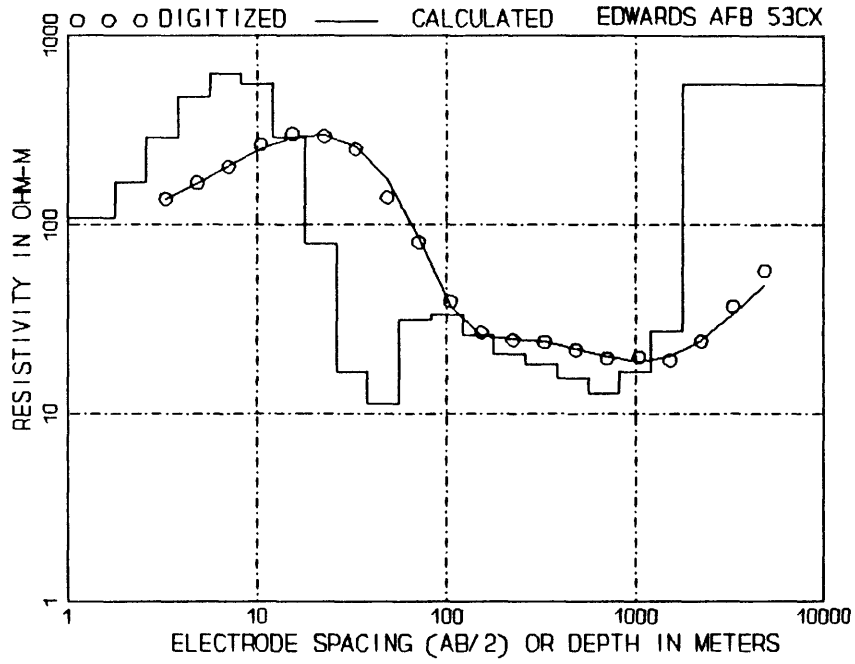




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	3.42	182.88 (600.00)	37.00
4.27 (14.00)	3.82	243.84 (800.00)	38.50
6.10 (20.00)	4.30	304.80 (1000.00)	38.00
9.14 (30.00)	5.30	426.72 (1400.00)	36.70
12.19 (40.00)	6.60	304.80 (1000.00)	48.00
18.29 (60.00)	9.25	426.72 (1400.00)	46.00
24.38 (80.00)	11.00	609.60 (2000.00)	49.00
30.48 (100.00)	12.60	914.40 (3000.00)	56.00
30.48 (100.00)	11.80	1219.20 (4000.00)	62.50
42.67 (140.00)	16.00	1828.80 (6000.00)	75.00
60.96 (200.00)	21.70	2438.40 (8000.00)	96.00
91.44 (300.00)	27.00	3048.00 (10000.00)	125.00
121.92 (400.00)	32.50	3657.60 (12000.00)	148.00

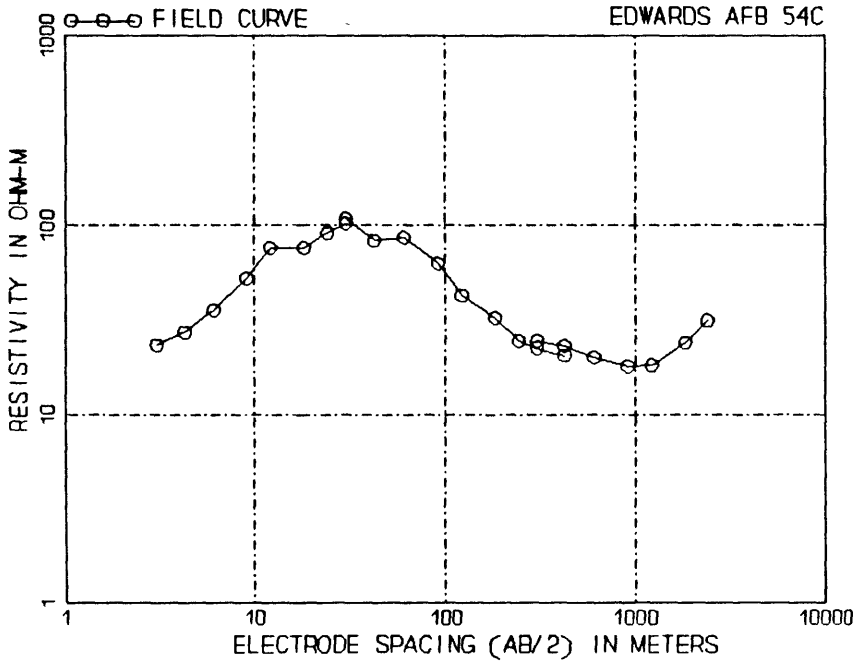
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.60 (5.25)	3.60	50.59 (165.98)	84.73
2.35 (7.70)	3.77	74.26 (243.63)	89.25
3.45 (11.31)	4.93	109.00 (357.60)	73.83
5.06 (16.60)	7.43	159.98 (524.88)	51.50
7.43 (24.36)	11.40	234.82 (770.42)	38.51
10.90 (35.76)	17.70	344.67 (1130.82)	37.90
16.00 (52.49)	28.33	505.91 (1659.82)	43.89
23.48 (77.04)	44.84	742.58 (2436.28)	52.84
34.47 (113.08)	65.87	1089.95 (3575.97)	68.86
		99999.00 (99999.00)	550.00

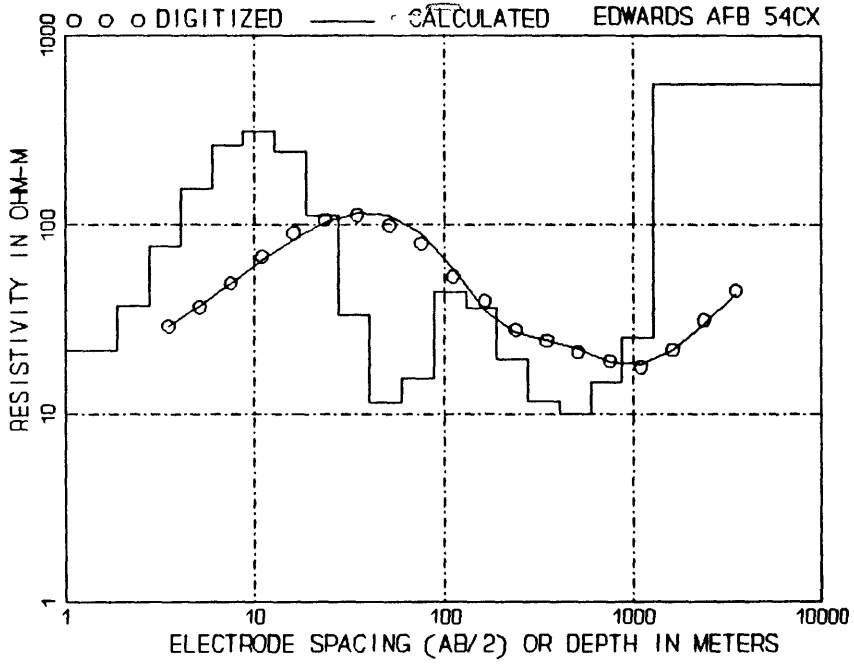




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	135.00	121.92 (400.00)	33.70
4.27 (14.00)	162.00	182.88 (600.00)	25.50
6.10 (20.00)	193.00	243.84 (800.00)	25.20
9.14 (30.00)	245.00	304.80 (1000.00)	25.00
12.19 (40.00)	300.00	304.80 (1000.00)	24.30
18.29 (60.00)	310.00	426.72 (1400.00)	22.50
24.38 (80.00)	300.00	609.60 (2000.00)	20.70
30.48 (100.00)	280.00	914.40 (3000.00)	19.00
30.48 (100.00)	280.00	1219.20 (4000.00)	20.50
42.67 (140.00)	166.00	1578.25 (5178.00)	19.20
60.96 (200.00)	110.00	1897.38 (6225.00)	22.50
91.44 (300.00)	50.00	2239.98 (7349.00)	24.20

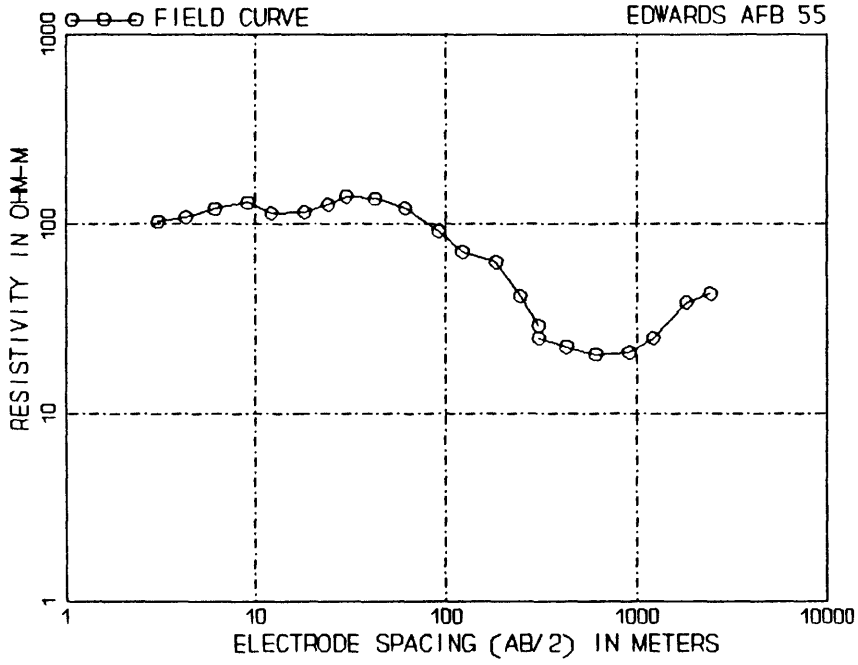
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.78 (5.82)	108.71	82.41 (270.37)	31.42
2.61 (8.55)	166.93	120.96 (396.85)	33.60
3.83 (12.55)	286.23	177.54 (582.49)	26.13
5.61 (18.42)	476.03	260.60 (854.98)	20.79
8.24 (27.04)	624.72	382.51 (1254.94)	18.26
12.10 (39.68)	552.54	561.44 (1842.00)	15.44
17.75 (58.25)	286.67	824.08 (2703.68)	12.84
26.06 (85.50)	79.96	1209.59 (3968.46)	16.60
38.25 (125.49)	16.61	1775.43 (5824.90)	27.51
56.14 (184.20)	11.39	99999.00 (99999.00)	550.00

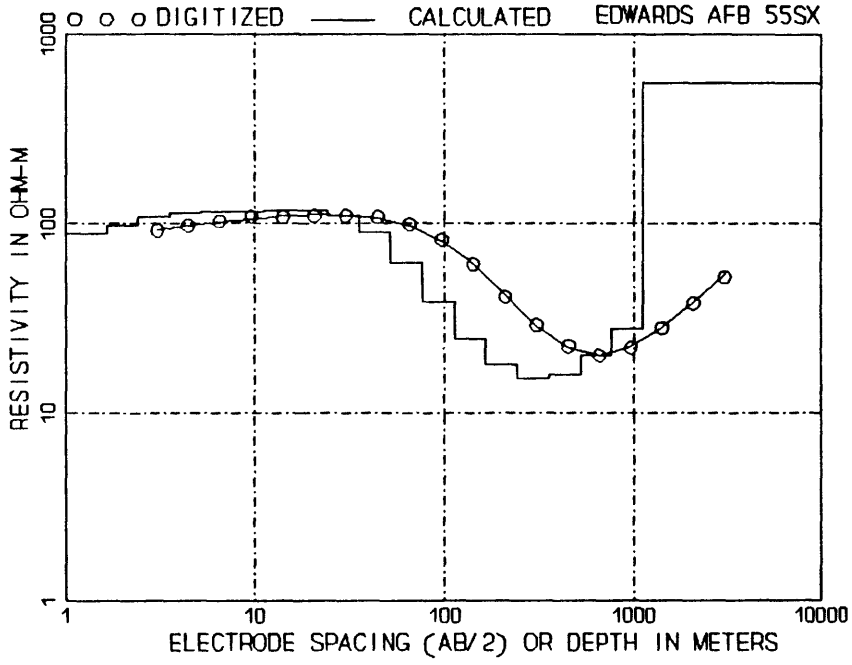




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	23.30	121.92 (400.00)	42.50
4.27 (14.00)	27.20	182.88 (600.00)	32.50
6.10 (20.00)	35.50	243.84 (800.00)	24.50
9.14 (30.00)	52.50	304.80 (1000.00)	22.50
12.19 (40.00)	76.00	426.72 (1400.00)	20.50
18.29 (60.00)	76.00	304.80 (1000.00)	24.50
24.38 (80.00)	91.00	426.72 (1400.00)	23.00
30.48 (100.00)	102.00	609.60 (2000.00)	20.00
30.48 (100.00)	108.00	914.40 (3000.00)	18.00
42.67 (140.00)	83.00	1219.20 (4000.00)	18.20
60.96 (200.00)	86.00	1828.80 (6000.00)	24.00
91.44 (300.00)	63.00	2376.53 (7797.00)	31.30

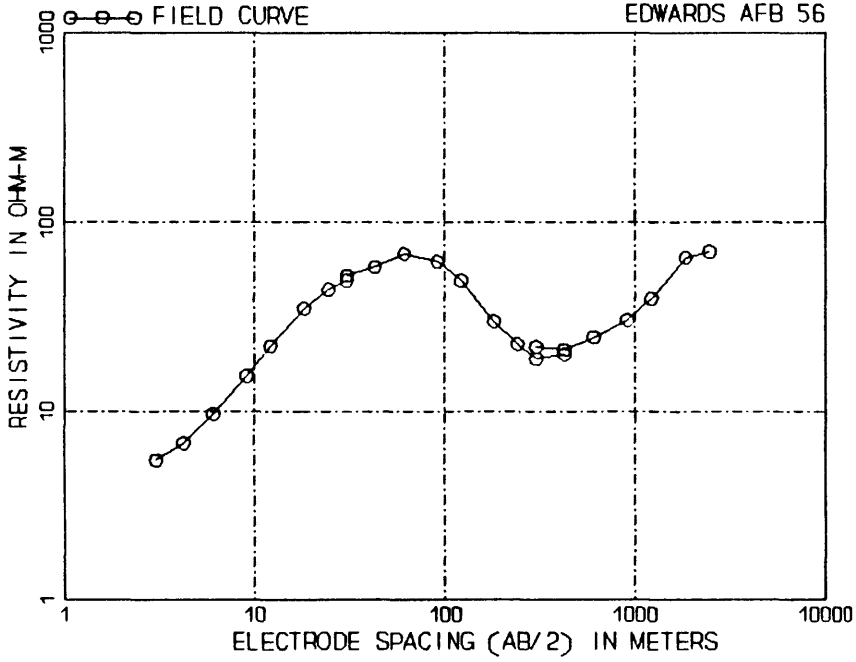
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.88 (6.18)	21.57	59.57 (195.43)	11.43
2.76 (9.07)	37.26	87.43 (286.85)	15.40
4.06 (13.31)	76.81	128.33 (421.04)	44.31
5.96 (19.54)	156.33	188.37 (618.00)	36.31
8.74 (28.68)	260.59	276.48 (907.10)	19.42
12.83 (42.10)	311.80	405.82 (1331.44)	11.71
18.84 (61.80)	241.32	595.67 (1954.29)	9.93
27.65 (90.71)	112.22	874.32 (2868.50)	14.74
40.58 (133.14)	33.66	1283.32 (4210.38)	25.42
		99999.00 (99999.00)	550.00

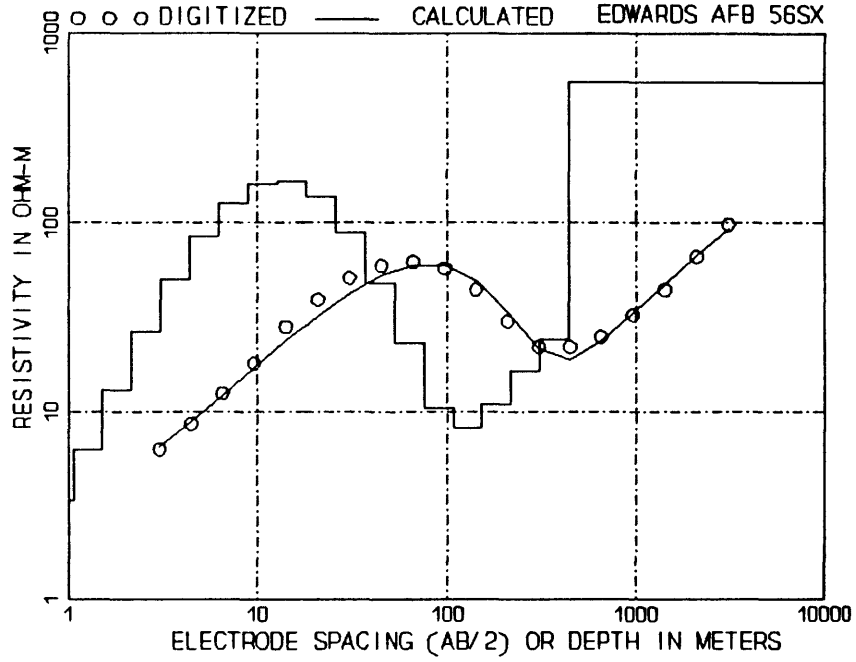




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	103.00	91.44 (300.00)	92.00
4.27 (14.00)	109.00	121.92 (400.00)	71.50
6.10 (20.00)	120.00	182.88 (600.00)	63.00
9.14 (30.00)	130.00	243.84 (800.00)	41.50
12.19 (40.00)	114.00	304.80 (1000.00)	29.00
18.29 (60.00)	116.00	304.80 (1000.00)	25.00
24.38 (80.00)	127.00	426.72 (1400.00)	22.50
30.48 (100.00)	140.00	609.60 (2000.00)	20.50
30.48 (100.00)	140.00	914.40 (3000.00)	21.00
42.67 (140.00)	136.00	1219.20 (4000.00)	25.00
60.96 (200.00)	121.00	1828.80 (6000.00)	38.50
		2438.40 (8000.00)	42.80

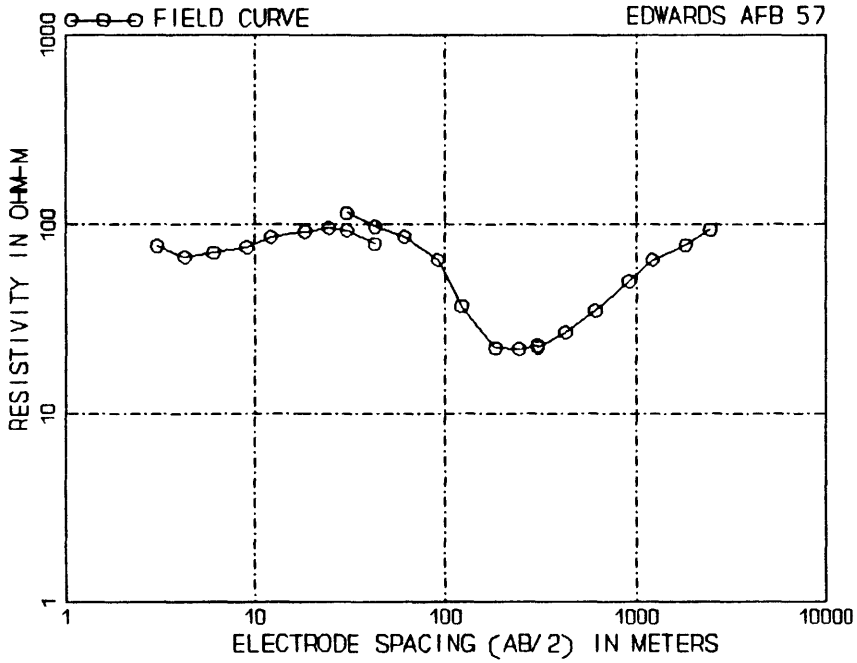
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	88.35	52.05 (170.76)	89.67
2.42 (7.93)	98.09	76.40 (250.65)	61.98
3.55 (11.63)	107.91	112.14 (367.90)	38.34
5.20 (17.08)	113.84	164.59 (540.00)	24.59
7.64 (25.06)	115.03	241.59 (792.61)	17.87
11.21 (36.79)	115.16	354.60 (1163.40)	15.19
16.46 (54.00)	116.92	520.49 (1707.63)	16.00
24.16 (79.26)	117.50	763.97 (2506.46)	20.08
35.46 (116.34)	109.87	1121.35 (3678.98)	27.73
		99999.00 (99999.00)	550.00

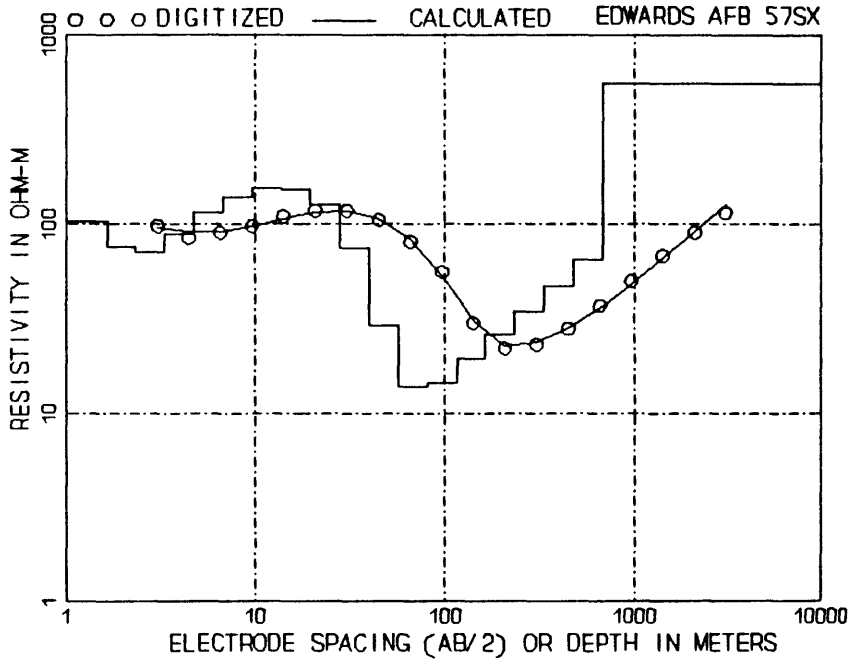




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	5.50	121.92 (400.00)	49.00
4.27 (14.00)	6.80	182.88 (600.00)	30.00
6.10 (20.00)	9.70	243.84 (800.00)	22.70
9.14 (30.00)	15.50	304.80 (1000.00)	19.00
12.19 (40.00)	22.20	426.72 (1400.00)	20.00
18.29 (60.00)	35.00	304.80 (1000.00)	22.00
24.38 (80.00)	44.00	426.72 (1400.00)	21.20
30.48 (100.00)	49.00	609.60 (2000.00)	24.70
30.48 (100.00)	52.00	914.40 (3000.00)	30.50
42.67 (140.00)	58.00	1219.20 (4000.00)	39.50
60.96 (200.00)	68.00	1828.80 (6000.00)	65.00
91.44 (300.00)	62.00	2438.40 (8000.00)	70.00

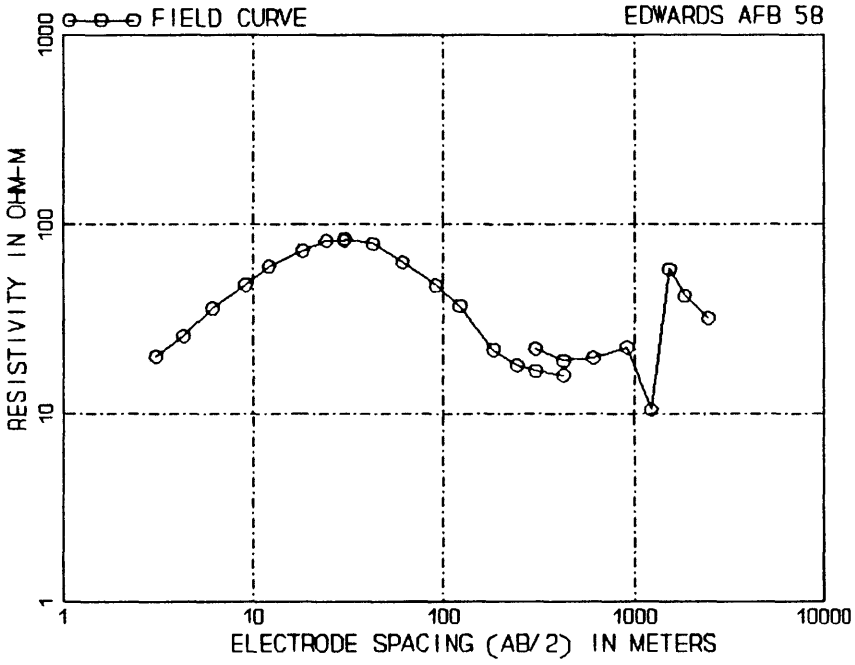
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.07 (3.50)	3.37	25.86 (84.86)	136.52
1.52 (4.99)	6.28	36.86 (120.93)	88.65
2.17 (7.11)	12.97	52.53 (172.34)	47.59
3.09 (10.13)	26.58	74.86 (245.60)	23.04
4.40 (14.44)	50.33	106.68 (350.00)	10.50
6.27 (20.57)	85.28	152.03 (498.79)	8.16
8.94 (29.32)	126.48	216.66 (710.82)	10.99
12.74 (41.78)	159.66	308.76 (1012.99)	16.35
18.15 (59.54)	165.58	440.02 (1443.62)	24.31
		99999.00 (99999.00)	550.00

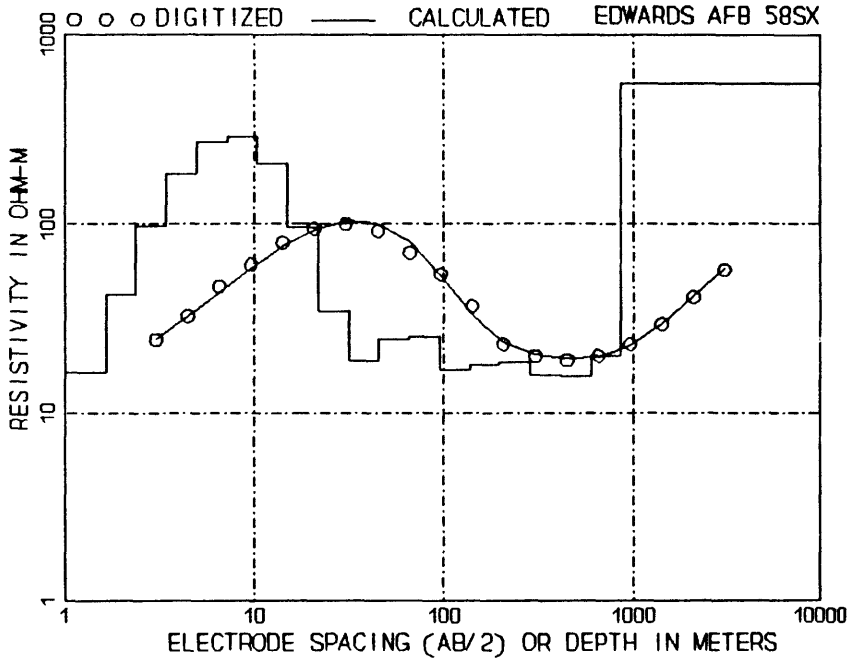




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	77.00	91.44 (300.00)	65.00
4.27 (14.00)	67.00	121.92 (400.00)	37.00
6.10 (20.00)	71.00	182.88 (600.00)	22.20
9.14 (30.00)	76.00	243.84 (800.00)	22.00
12.19 (40.00)	86.00	304.80 (1000.00)	23.00
18.29 (60.00)	92.00	304.80 (1000.00)	22.50
24.38 (80.00)	96.00	426.72 (1400.00)	27.00
30.48 (100.00)	93.00	609.60 (2000.00)	35.00
42.67 (140.00)	79.00	914.40 (3000.00)	50.00
30.48 (100.00)	115.00	1219.20 (4000.00)	65.00
42.67 (140.00)	97.00	1828.80 (6000.00)	78.00
60.96 (200.00)	86.00	2438.40 (8000.00)	94.00

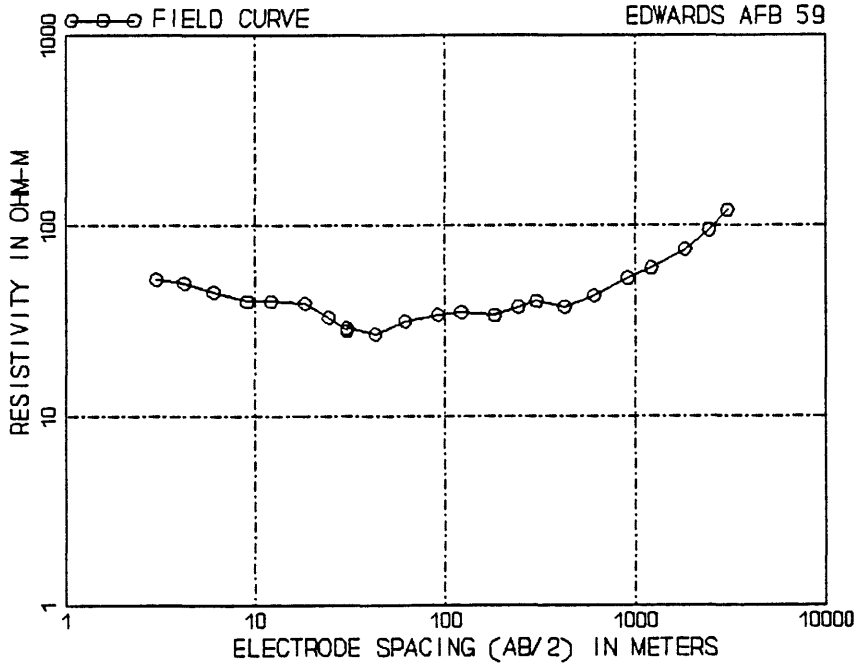
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	103.79	39.90 (130.92)	75.21
2.35 (7.70)	75.61	56.87 (186.58)	28.89
3.34 (10.97)	71.83	81.04 (265.89)	13.83
4.76 (15.63)	88.39	115.49 (378.92)	14.39
6.79 (22.27)	114.93	164.59 (540.00)	19.51
9.67 (31.74)	139.97	234.56 (769.56)	26.12
13.79 (45.23)	154.76	334.27 (1096.70)	34.43
19.65 (64.46)	153.33	476.37 (1562.90)	46.73
28.00 (91.87)	127.62	678.88 (2227.30)	65.34
		99999.00 (99999.00)	550.00

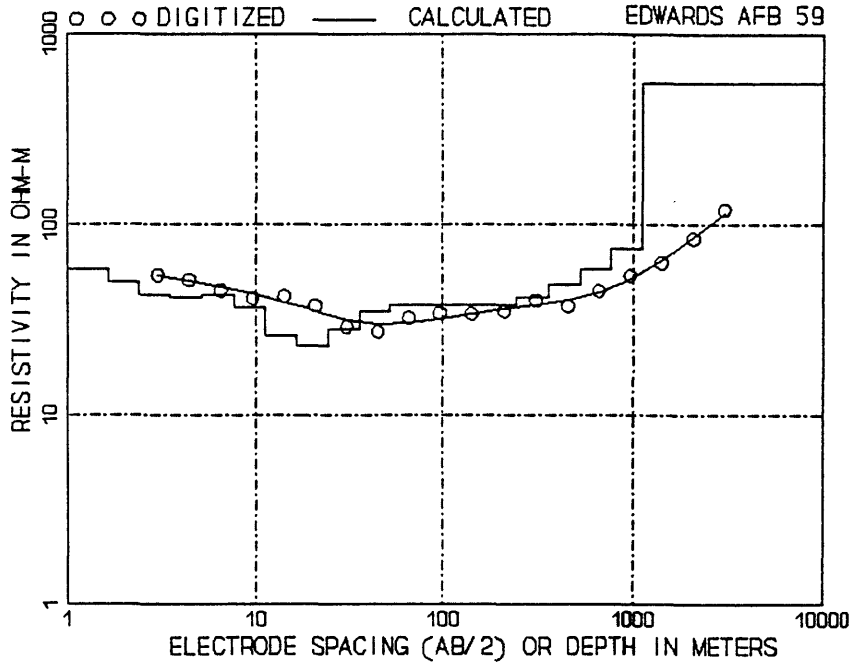




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	20.00	121.92 (400.00)	37.00
4.27 (14.00)	25.70	182.88 (600.00)	21.80
6.10 (20.00)	36.00	243.84 (800.00)	18.00
9.14 (30.00)	48.00	304.80 (1000.00)	16.80
12.19 (40.00)	60.00	426.72 (1400.00)	16.00
18.29 (60.00)	73.00	304.80 (1000.00)	22.00
24.38 (80.00)	82.00	426.72 (1400.00)	19.00
30.48 (100.00)	82.00	609.60 (2000.00)	19.70
30.48 (100.00)	84.00	914.40 (3000.00)	22.40
42.67 (140.00)	79.00	1219.20 (4000.00)	10.50
60.96 (200.00)	63.00	1524.00 (5000.00)	58.00
91.44 (300.00)	47.50	1828.80 (6000.00)	42.00
		2438.40 (8000.00)	32.00

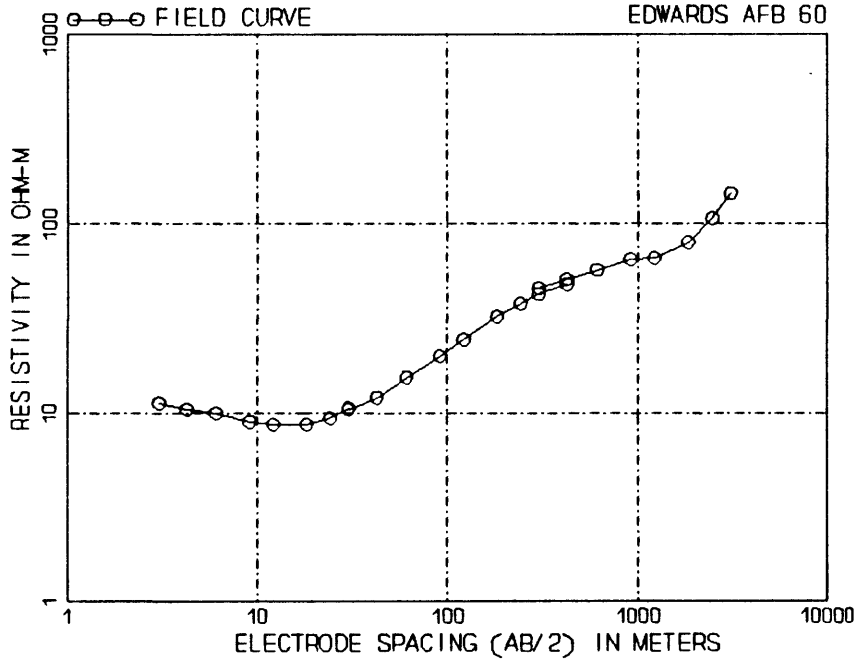
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	16.47	45.33 (148.73)	18.79
2.38 (7.81)	42.09	65.53 (214.98)	24.73
3.44 (11.28)	97.51	94.71 (310.74)	25.25
4.97 (16.31)	183.12	136.90 (449.15)	16.92
7.18 (23.57)	269.67	197.88 (649.22)	17.88
10.39 (34.07)	289.82	286.03 (938.41)	18.57
15.01 (49.25)	207.20	413.44 (1356.42)	15.85
21.70 (71.19)	95.38	597.60 (1960.62)	15.59
31.36 (102.89)	34.61	863.79 (2833.96)	20.10
		99999.00 (99999.00)	550.00

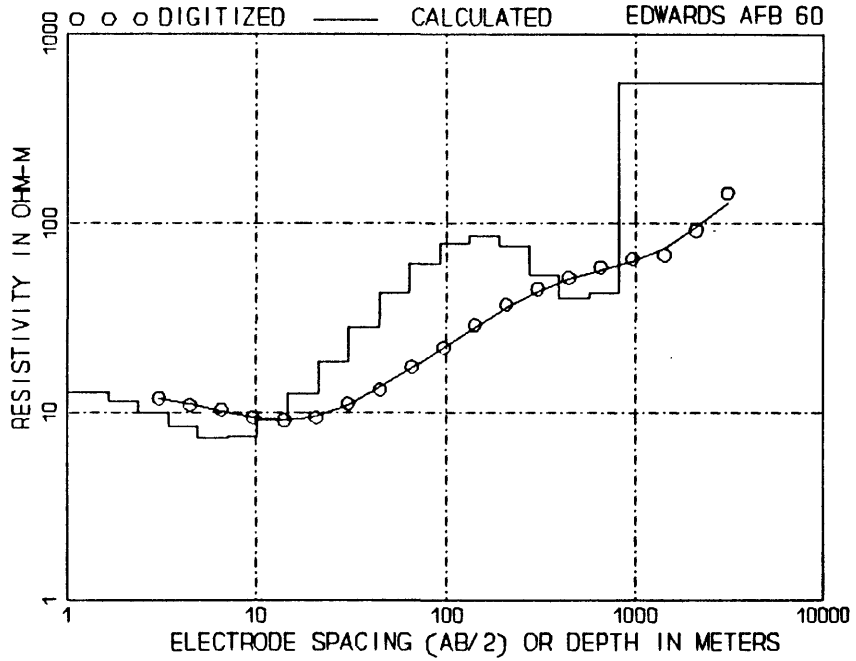




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	52.50	121.92 (400.00)	35.00
4.27 (14.00)	50.00	182.88 (600.00)	33.70
6.10 (20.00)	45.00	243.84 (800.00)	37.50
9.14 (30.00)	40.00	304.80 (1000.00)	40.00
12.19 (40.00)	40.00	304.80 (1000.00)	40.00
18.29 (60.00)	39.00	426.72 (1400.00)	37.50
24.38 (80.00)	33.00	609.60 (2000.00)	43.00
30.48 (100.00)	28.00	914.40 (3000.00)	53.00
30.48 (100.00)	29.00	1219.20 (4000.00)	60.00
42.67 (140.00)	27.00	1828.80 (6000.00)	75.00
60.96 (200.00)	31.50	2438.40 (8000.00)	95.00
91.44 (300.00)	34.00	3048.00 (10000.00)	120.00

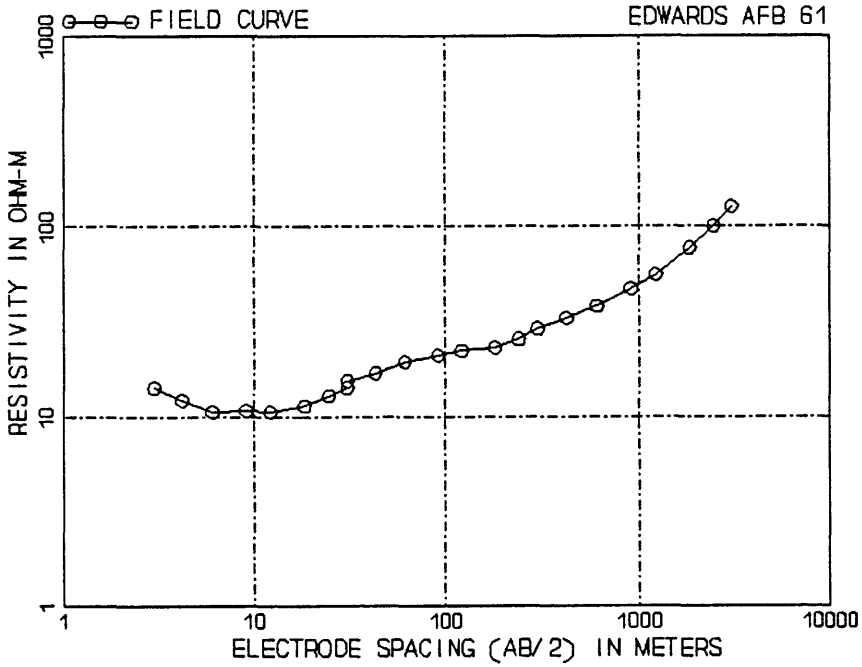
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	58.19	52.05 (170.76)	34.97
2.42 (7.93)	50.10	76.40 (250.65)	37.66
3.55 (11.63)	42.92	112.14 (367.90)	38.05
5.20 (17.08)	41.61	164.59 (540.00)	37.78
7.64 (25.06)	42.93	241.59 (792.61)	38.05
11.21 (36.79)	36.56	354.60 (1163.40)	41.48
16.46 (54.00)	25.92	520.49 (1707.63)	48.37
24.16 (79.26)	22.87	763.97 (2506.46)	58.49
35.46 (116.34)	28.28	1121.35 (3678.98)	75.15
		99999.00 (99999.00)	550.00

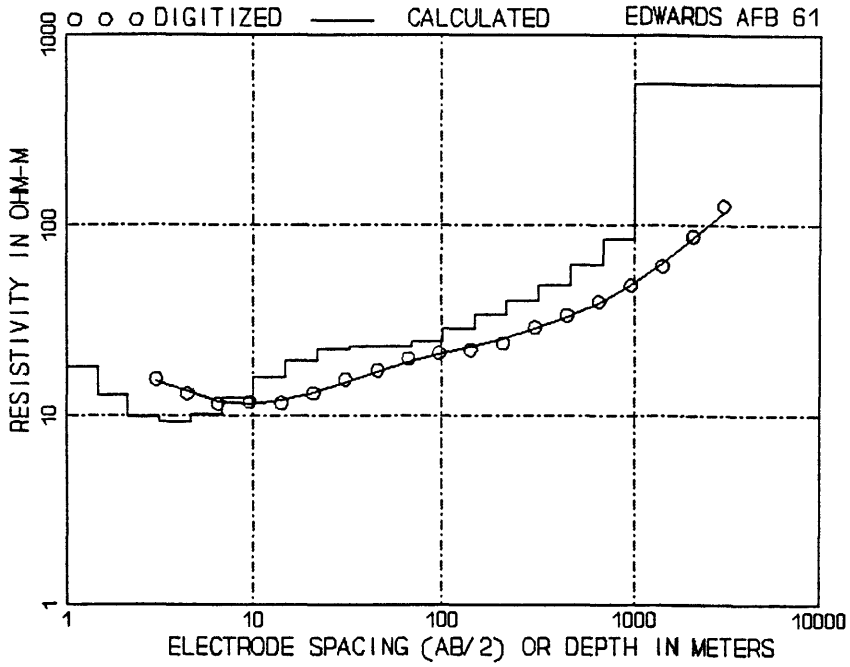




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	11.30	121.92 (400.00)	24.50
4.27 (14.00)	10.50	182.88 (600.00)	32.50
6.10 (20.00)	10.00	243.84 (800.00)	38.00
9.14 (30.00)	9.00	304.80 (1000.00)	42.50
12.19 (40.00)	8.70	426.72 (1400.00)	48.00
18.29 (60.00)	8.70	304.80 (1000.00)	45.50
24.38 (80.00)	9.40	426.72 (1400.00)	51.00
30.48 (100.00)	10.60	609.60 (2000.00)	57.00
30.48 (100.00)	10.50	914.40 (3000.00)	65.00
42.67 (140.00)	12.10	1219.20 (4000.00)	66.00
60.96 (200.00)	15.50	1828.80 (6000.00)	80.00
91.44 (300.00)	20.00	2438.40 (8000.00)	107.00
		3048.00 (10000.00)	145.00

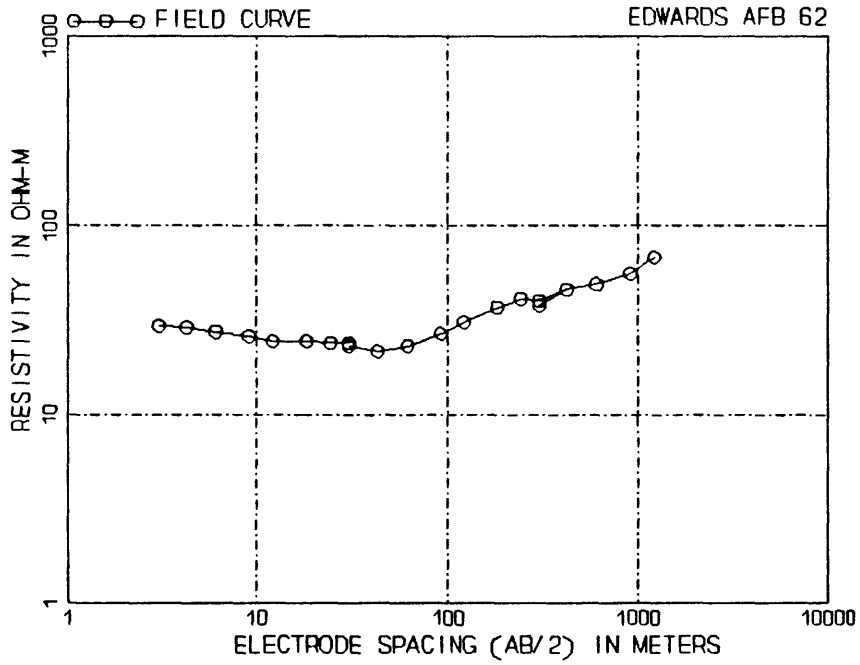
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.65 (5.40)	12.72	44.16 (144.87)	28.34
2.37 (7.78)	11.45	63.64 (208.78)	42.72
3.42 (11.22)	10.03	91.71 (300.90)	60.88
4.93 (16.17)	8.41	132.18 (433.67)	78.43
7.10 (23.30)	7.28	190.50 (625.01)	86.31
10.23 (33.58)	7.40	274.56 (900.77)	75.50
14.75 (48.39)	9.05	395.70 (1298.21)	53.56
21.26 (69.74)	12.53	570.28 (1871.01)	40.40
30.64 (100.52)	18.59	821.90 (2696.54)	42.85
		99999.00 (99999.00)	550.00

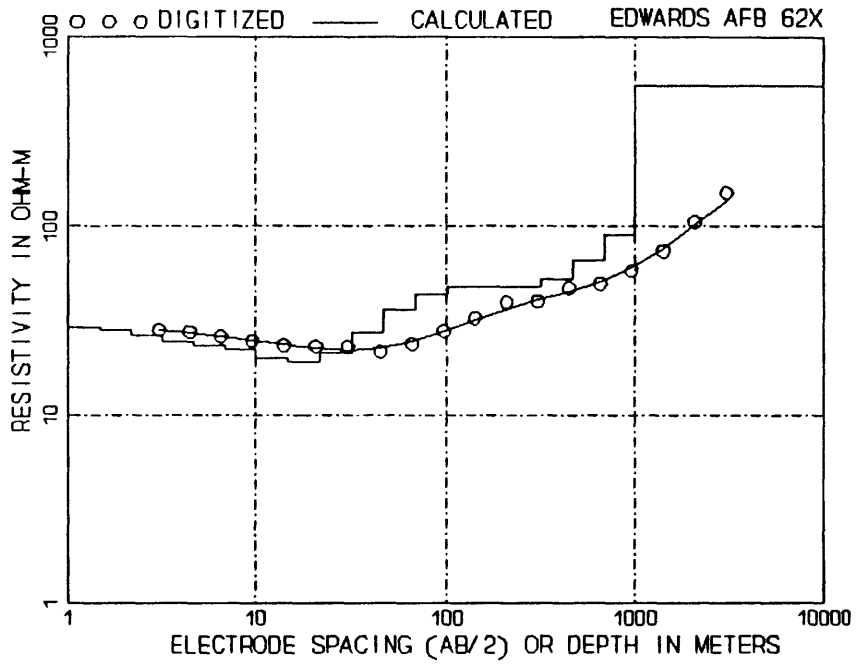




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	14.20	121.92 (400.00)	22.20
4.27 (14.00)	12.20	182.88 (600.00)	23.00
6.10 (20.00)	10.60	243.84 (800.00)	25.60
9.14 (30.00)	10.80	304.80 (1000.00)	29.00
12.19 (40.00)	10.60	304.80 (1000.00)	29.00
18.29 (60.00)	11.40	426.72 (1400.00)	33.00
24.38 (80.00)	12.90	609.60 (2000.00)	38.20
30.48 (100.00)	14.20	914.40 (3000.00)	47.00
30.48 (100.00)	15.50	1219.20 (4000.00)	56.00
42.67 (140.00)	17.00	1828.80 (6000.00)	77.00
60.96 (200.00)	19.50	2438.40 (8000.00)	100.00
91.44 (300.00)	21.00	3048.00 (10000.00)	127.00

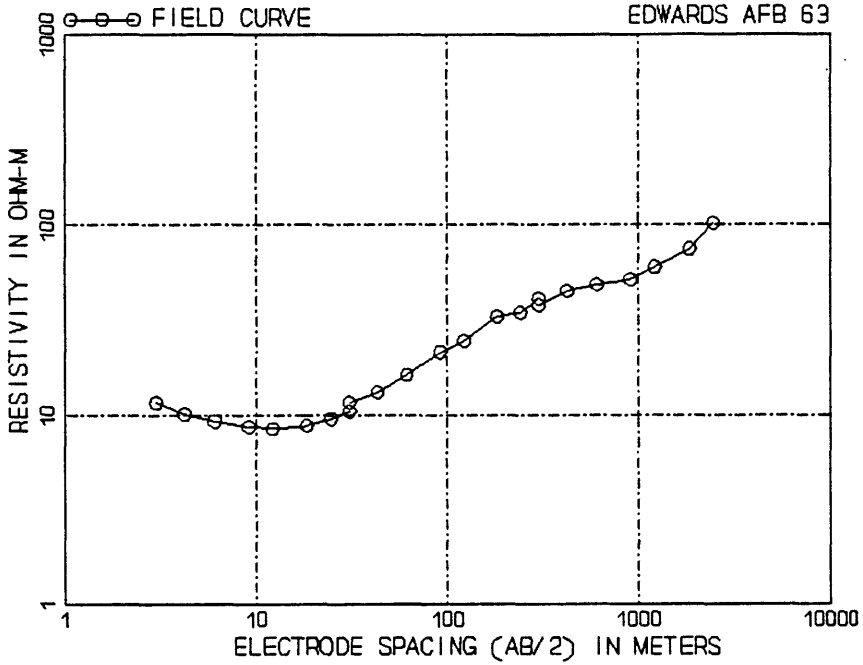
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.48 (4.86)	18.06	46.84 (153.69)	23.08
2.17 (7.13)	12.72	68.76 (225.58)	23.10
3.19 (10.47)	9.88	100.92 (331.11)	24.62
4.68 (15.37)	9.24	148.13 (486.00)	28.55
6.88 (22.56)	10.10	217.43 (713.35)	33.93
10.09 (33.11)	12.40	319.14 (1047.06)	40.00
14.81 (48.60)	15.87	468.44 (1536.87)	48.26
21.74 (71.34)	19.60	687.57 (2255.81)	62.12
31.91 (104.71)	22.29	1009.22 (3311.08)	84.41
		99999.00 (99999.00)	550.00

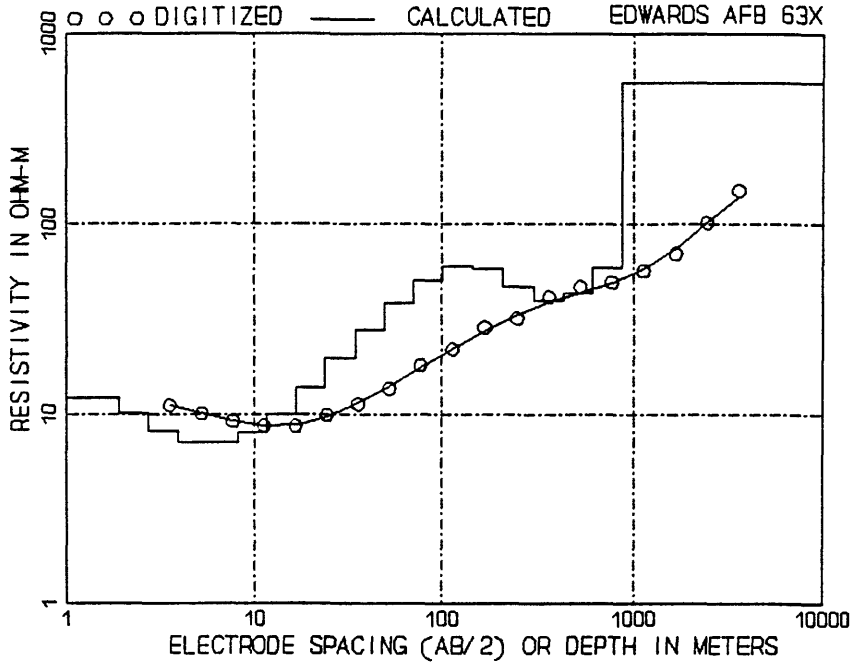




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	29.50	91.44 (300.00)	27.00
4.27 (14.00)	29.00	121.92 (400.00)	31.00
6.10 (20.00)	27.50	182.88 (600.00)	37.00
9.14 (30.00)	26.20	243.84 (800.00)	41.20
12.19 (40.00)	24.50	304.80 (1000.00)	40.00
18.29 (60.00)	24.50	426.72 (1400.00)	46.00
24.38 (80.00)	24.00	304.80 (1000.00)	38.00
30.48 (100.00)	24.00	426.72 (1400.00)	46.00
30.48 (100.00)	23.00	609.60 (2000.00)	49.00
42.67 (140.00)	21.70	914.40 (3000.00)	56.00
60.96 (200.00)	23.20	1219.20 (4000.00)	68.00

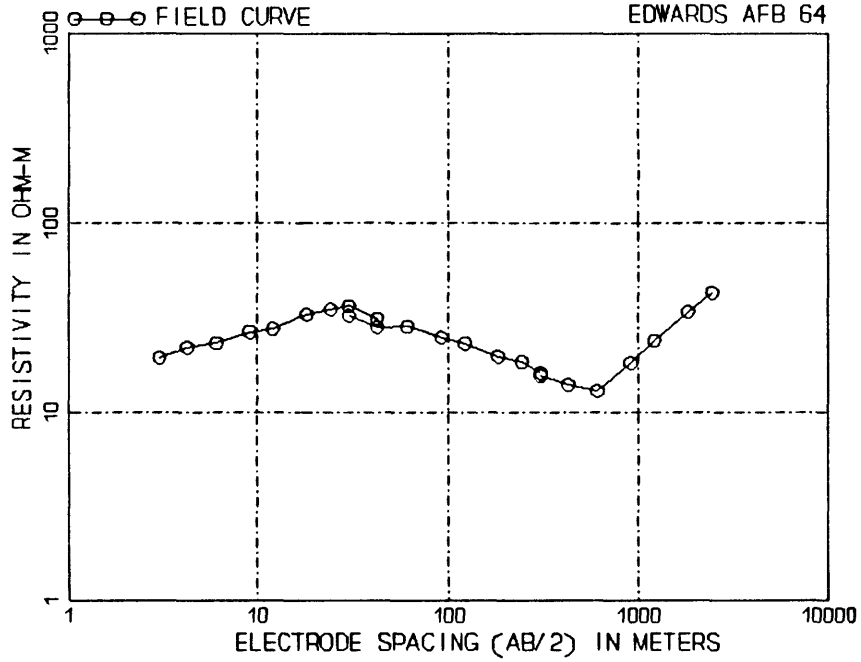
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.48 (4.86)	29.34	46.84 (153.69)	27.41
2.17 (7.13)	28.21	68.76 (225.58)	36.01
3.19 (10.47)	26.32	100.92 (331.11)	43.69
4.68 (15.37)	24.49	148.13 (486.00)	47.68
6.88 (22.56)	23.38	217.43 (713.35)	47.96
10.09 (33.11)	22.25	319.14 (1047.06)	47.60
14.81 (48.60)	20.22	468.44 (1536.87)	52.02
21.74 (71.34)	19.06	687.57 (2255.81)	65.83
31.91 (104.71)	21.25	1009.22 (3311.08)	90.22
		99999.00 (99999.00)	550.00

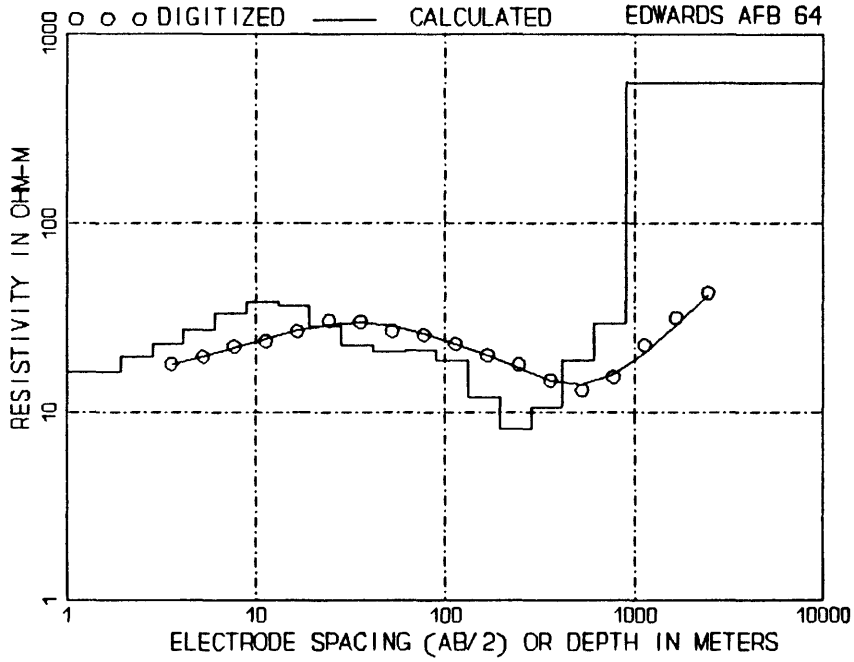




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	11.60	91.44 (300.00)	21.50
4.27 (14.00)	10.10	121.92 (400.00)	24.50
6.10 (20.00)	9.30	182.88 (600.00)	33.00
9.14 (30.00)	8.70	243.84 (800.00)	34.50
12.19 (40.00)	8.50	304.80 (1000.00)	41.00
18.29 (60.00)	8.80	304.80 (1000.00)	38.00
24.38 (80.00)	9.60	426.72 (1400.00)	45.00
30.48 (100.00)	10.50	609.60 (2000.00)	48.50
30.48 (100.00)	11.70	914.40 (3000.00)	51.50
42.67 (140.00)	13.20	1219.20 (4000.00)	60.00
60.96 (200.00)	16.30	1828.80 (6000.00)	74.60
		2438.40 (8000.00)	102.00

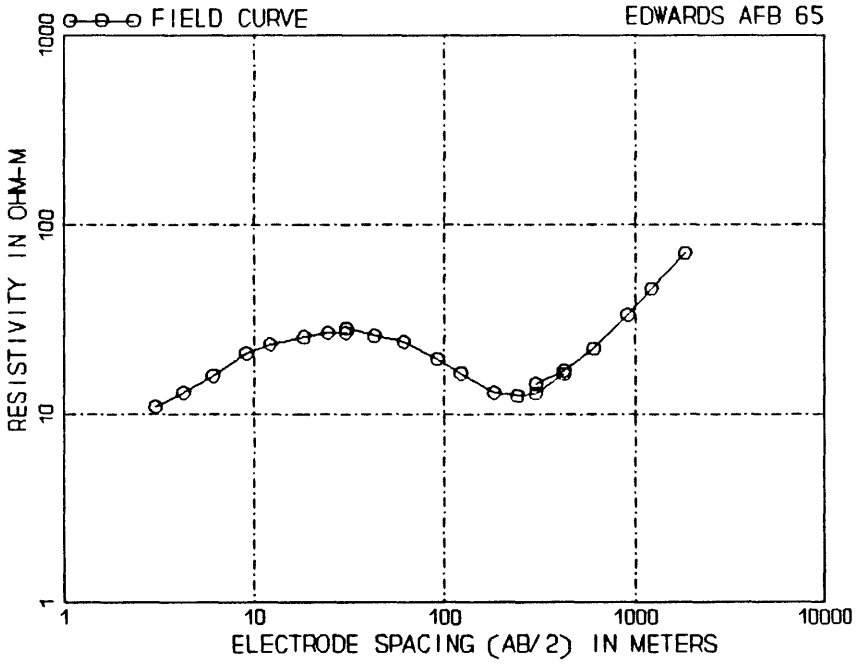
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.93 (6.34)	12.26	49.25 (161.58)	27.85
2.77 (9.09)	10.08	70.58 (231.55)	38.24
3.97 (13.02)	8.21	101.14 (331.82)	50.57
5.69 (18.66)	7.15	144.93 (475.50)	60.03
8.15 (26.74)	7.10	207.69 (681.40)	58.30
11.68 (38.32)	7.98	297.62 (976.45)	47.24
16.74 (54.91)	9.98	426.50 (1399.27)	39.86
23.98 (78.69)	13.77	611.17 (2005.17)	43.81
34.37 (112.76)	19.74	875.82 (2873.43)	58.97
		99999.00 (99999.00)	550.00

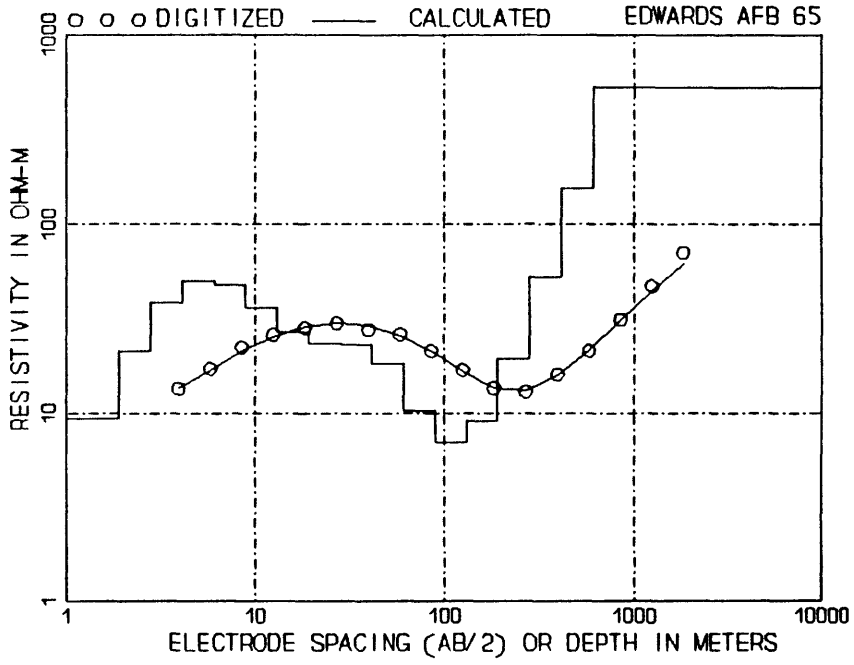




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	19.50	91.44 (300.00)	25.00
4.27 (14.00)	22.00	121.92 (400.00)	23.20
6.10 (20.00)	23.30	182.88 (600.00)	19.70
9.14 (30.00)	26.70	243.84 (800.00)	18.50
12.19 (40.00)	27.70	304.80 (1000.00)	16.10
18.29 (60.00)	33.00	304.80 (1000.00)	15.60
24.38 (80.00)	35.00	426.72 (1400.00)	14.00
30.48 (100.00)	36.50	609.60 (2000.00)	13.00
42.67 (140.00)	31.20	914.40 (3000.00)	18.30
30.48 (100.00)	32.50	1219.20 (4000.00)	24.00
42.67 (140.00)	28.20	1828.80 (6000.00)	34.00
60.96 (200.00)	28.50	2438.40 (8000.00)	43.00

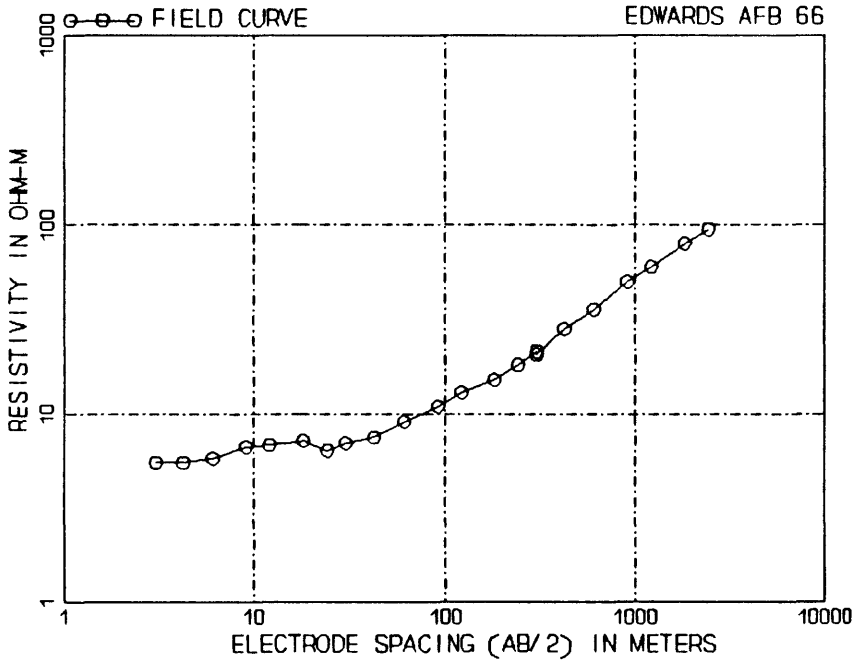
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.93 (6.34)	16.45	61.12 (200.52)	20.95
2.84 (9.31)	19.71	89.71 (294.32)	21.27
4.16 (13.66)	23.21	131.67 (432.00)	18.85
6.11 (20.05)	27.30	193.27 (634.09)	12.08
8.97 (29.43)	33.38	283.68 (930.72)	8.20
13.17 (43.20)	38.59	416.39 (1366.10)	10.63
19.33 (63.41)	36.45	611.17 (2005.17)	18.77
28.37 (93.07)	28.65	897.08 (2943.18)	29.79
41.64 (136.61)	22.69	99999.00 (99999.00)	550.00

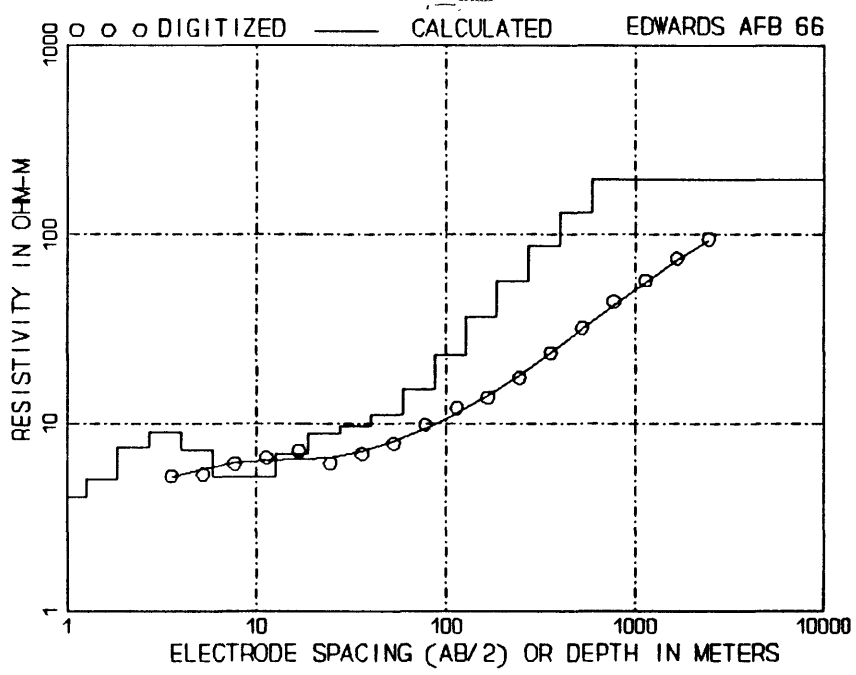




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	11.00	91.44 (300.00)	19.60
4.27 (14.00)	13.00	121.92 (400.00)	16.50
6.10 (20.00)	16.00	182.88 (600.00)	13.00
9.14 (30.00)	21.00	243.84 (800.00)	12.50
12.19 (40.00)	23.50	304.80 (1000.00)	12.90
18.29 (60.00)	25.60	426.72 (1400.00)	16.30
24.38 (80.00)	27.00	304.80 (1000.00)	14.40
30.48 (100.00)	27.00	426.72 (1400.00)	17.00
30.48 (100.00)	28.50	609.60 (2000.00)	22.20
42.67 (140.00)	26.00	914.40 (3000.00)	33.50
60.96 (200.00)	24.20	1219.20 (4000.00)	46.00
		1828.80 (6000.00)	71.00

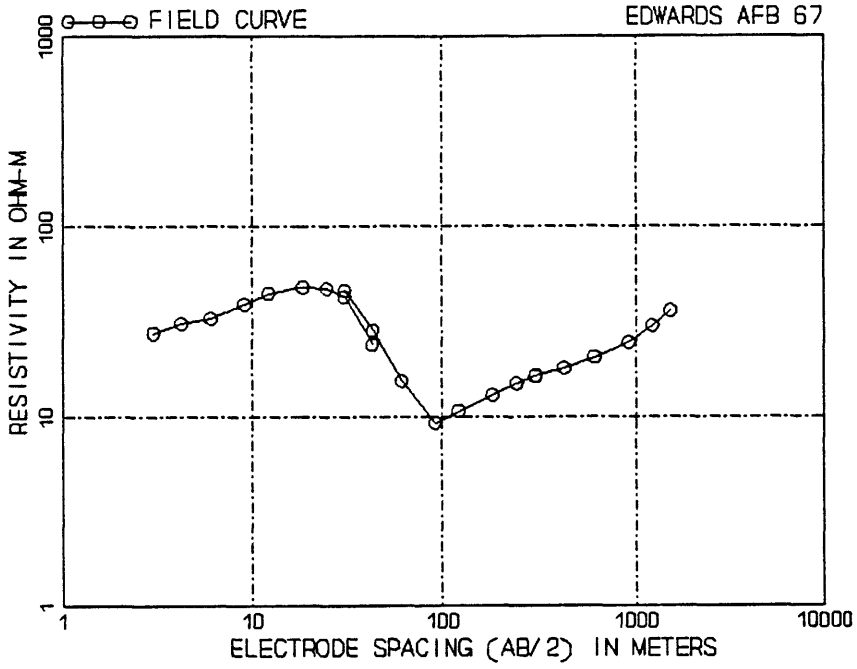
DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.91 (6.28)	9.34	41.25 (135.35)	23.03
2.81 (9.22)	21.21	60.55 (198.66)	18.33
4.13 (13.53)	38.57	88.88 (291.60)	10.29
6.06 (19.87)	50.00	130.46 (428.01)	6.96
8.89 (29.16)	47.56	191.49 (628.23)	9.14
13.05 (42.80)	36.37	281.06 (922.12)	19.42
19.15 (62.82)	26.86	412.54 (1353.49)	52.08
28.11 (92.21)	23.48	605.53 (1986.65)	156.16
		99999.00 (99999.00)	528.21

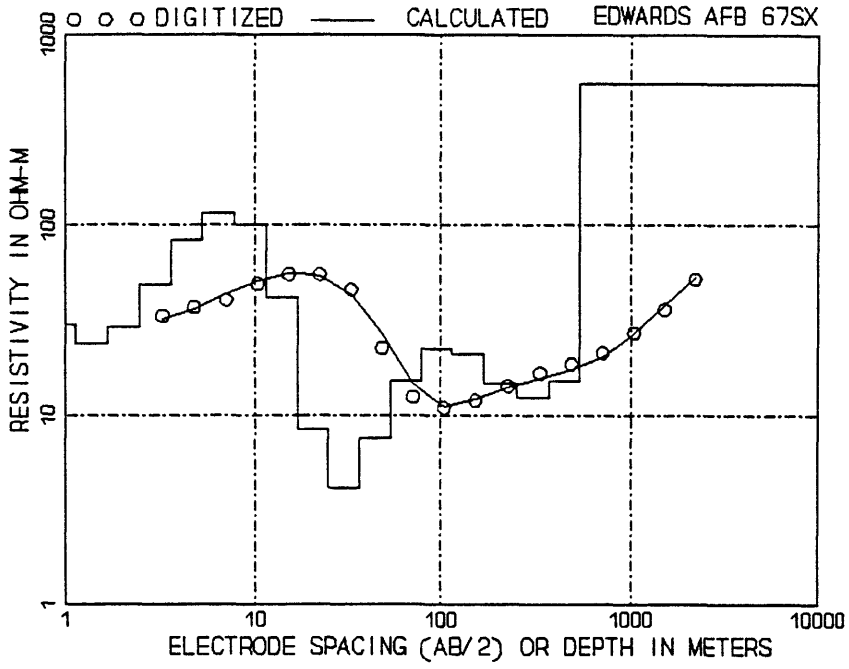




AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	5.50	91.44 (300.00)	11.00
4.27 (14.00)	5.50	121.92 (400.00)	13.00
6.10 (20.00)	5.80	182.88 (600.00)	15.20
9.14 (30.00)	6.70	243.84 (800.00)	18.20
12.19 (40.00)	6.85	304.80 (1000.00)	21.50
18.29 (60.00)	7.20	304.80 (1000.00)	20.60
24.38 (80.00)	6.40	426.72 (1400.00)	28.20
30.48 (100.00)	7.00	609.60 (2000.00)	35.80
30.48 (100.00)	7.00	914.40 (3000.00)	50.00
42.67 (140.00)	7.50	1219.20 (4000.00)	60.00
60.96 (200.00)	9.10	1828.80 (6000.00)	80.00
		2438.40 (8000.00)	95.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.27 (4.16)	4.06	40.10 (131.56)	9.74
1.86 (6.11)	5.07	58.86 (193.10)	11.15
2.73 (8.96)	7.47	86.39 (283.44)	15.11
4.01 (13.16)	8.91	126.80 (416.03)	23.20
5.89 (19.31)	7.27	186.12 (610.64)	36.63
8.64 (28.34)	5.23	273.19 (896.30)	56.95
12.68 (41.60)	5.17	400.99 (1315.59)	87.12
18.61 (61.06)	6.92	588.58 (1931.02)	131.72
27.32 (89.63)	8.82	99999.00 (99999.00)	196.16





AB/2, m (ft)	App. Res.	AB/2, m (ft)	App. Res.
3.05 (10.00)	27.50	60.96 (200.00)	15.40
4.27 (14.00)	31.00	91.44 (300.00)	9.30
6.10 (20.00)	33.00	121.92 (400.00)	10.70
9.14 (30.00)	39.00	182.88 (600.00)	13.00
12.19 (40.00)	44.50	243.84 (800.00)	15.00
18.29 (60.00)	48.00	304.80 (1000.00)	16.50
24.38 (80.00)	47.00	304.80 (1000.00)	16.30
30.48 (100.00)	42.50	426.72 (1400.00)	18.00
42.67 (140.00)	24.00	609.60 (2000.00)	20.50
30.48 (100.00)	46.00	914.40 (3000.00)	24.50
42.67 (140.00)	28.50	1219.20 (4000.00)	30.00
		1524.00 (5000.00)	36.00

DEPTH, m (ft)	RESIS.	DEPTH, m (ft)	RESIS.
1.15 (3.77)	29.89	36.34 (119.23)	4.15
1.69 (5.53)	23.83	53.34 (175.00)	7.53
2.48 (8.12)	29.04	78.29 (256.86)	15.25
3.63 (11.92)	48.23	114.92 (377.03)	22.49
5.33 (17.50)	83.12	168.68 (553.40)	21.12
7.83 (25.69)	115.29	247.58 (812.28)	14.80
11.49 (37.70)	100.33	363.40 (1192.26)	12.41
16.87 (55.34)	41.25	533.40 (1750.00)	15.07
24.76 (81.23)	8.48	99999.00 (99999.00)	550.00

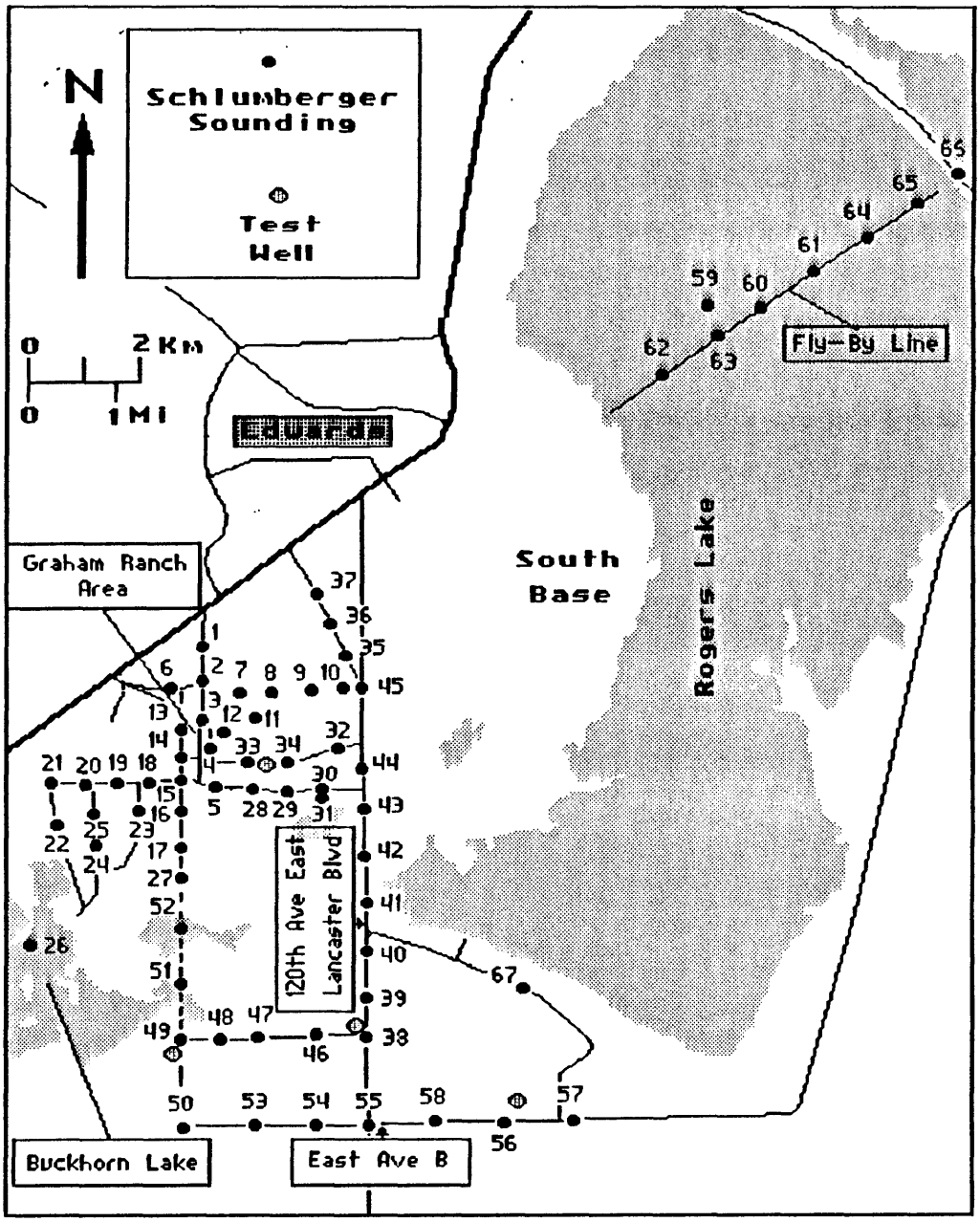


Figure 1. Map showing location of Schlumberger sounding stations and test wells.

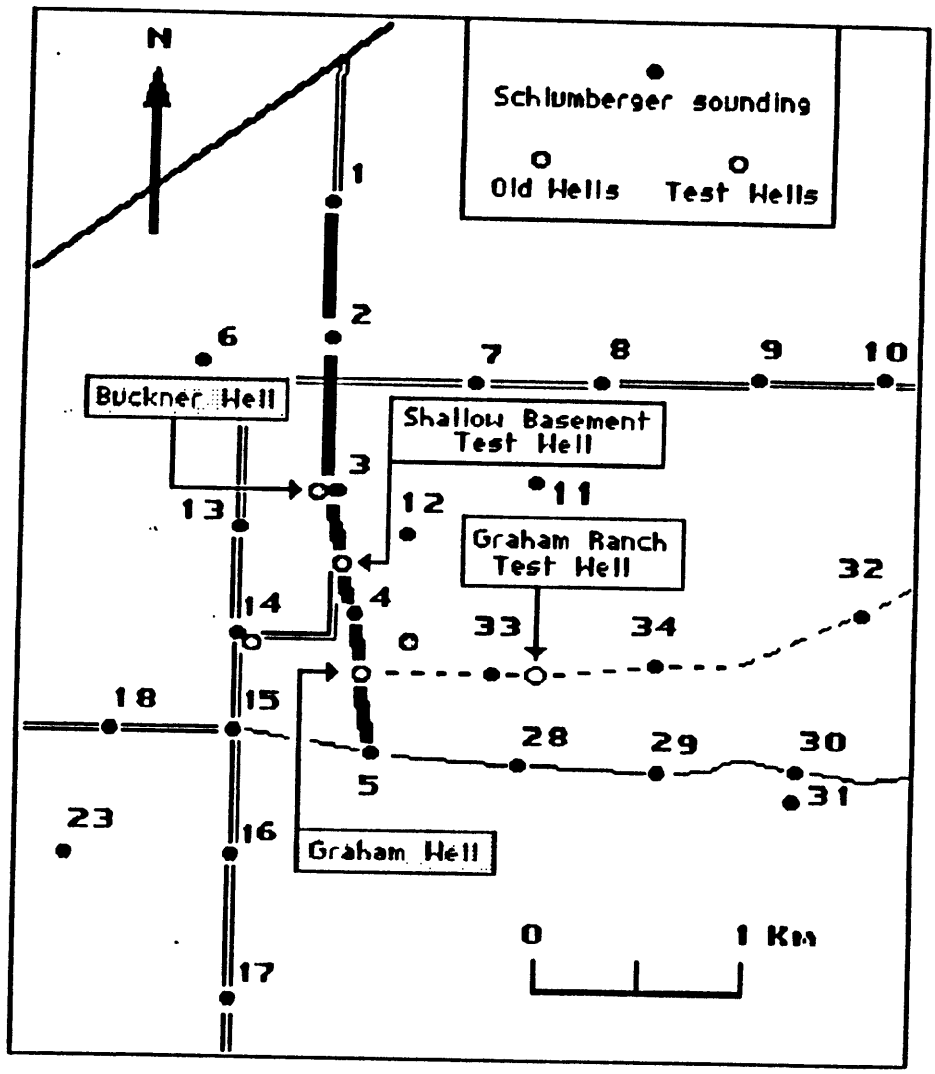


Figure 2. Map showing location of wells, Schlumberger soundings, and resistivity cross section in Graham Ranch area.

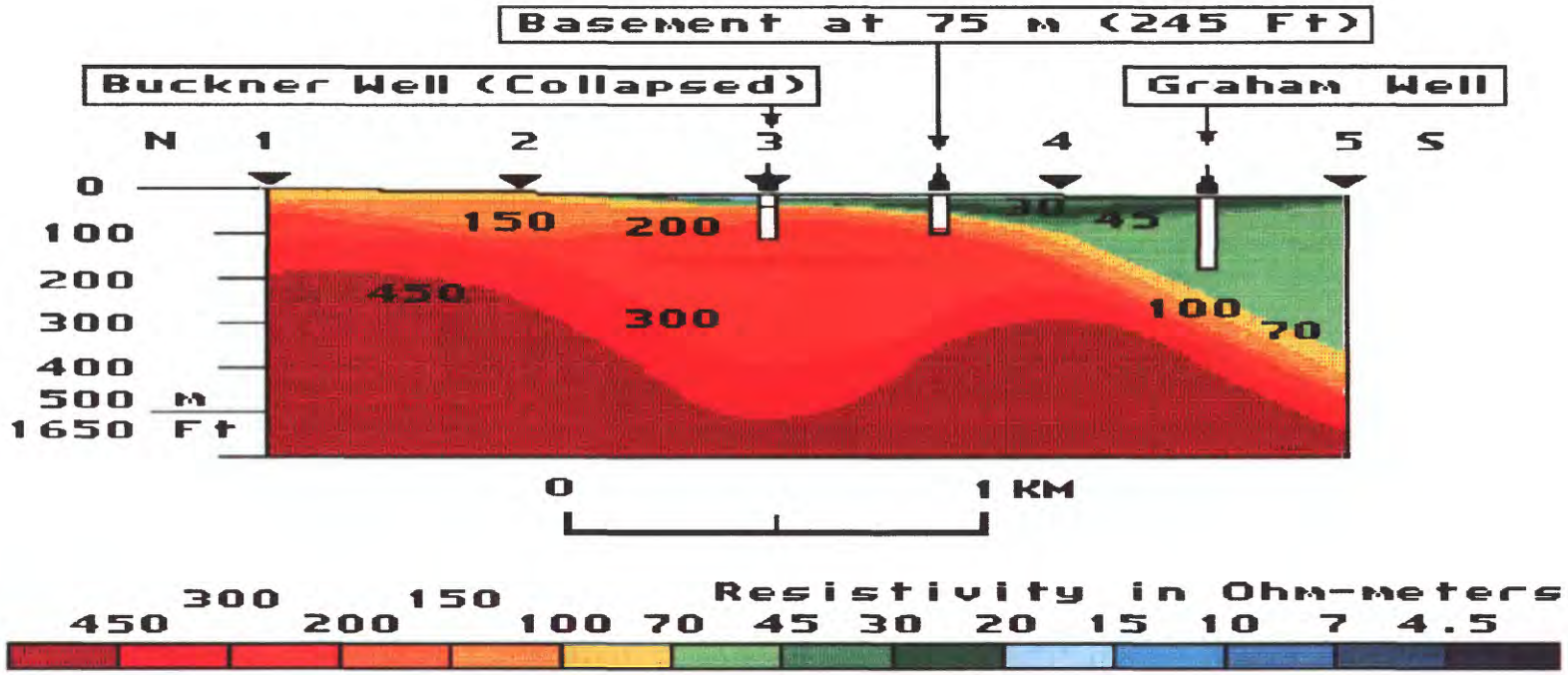


Figure 3. A north-south interpreted resistivity cross section in the Graham Ranch area.

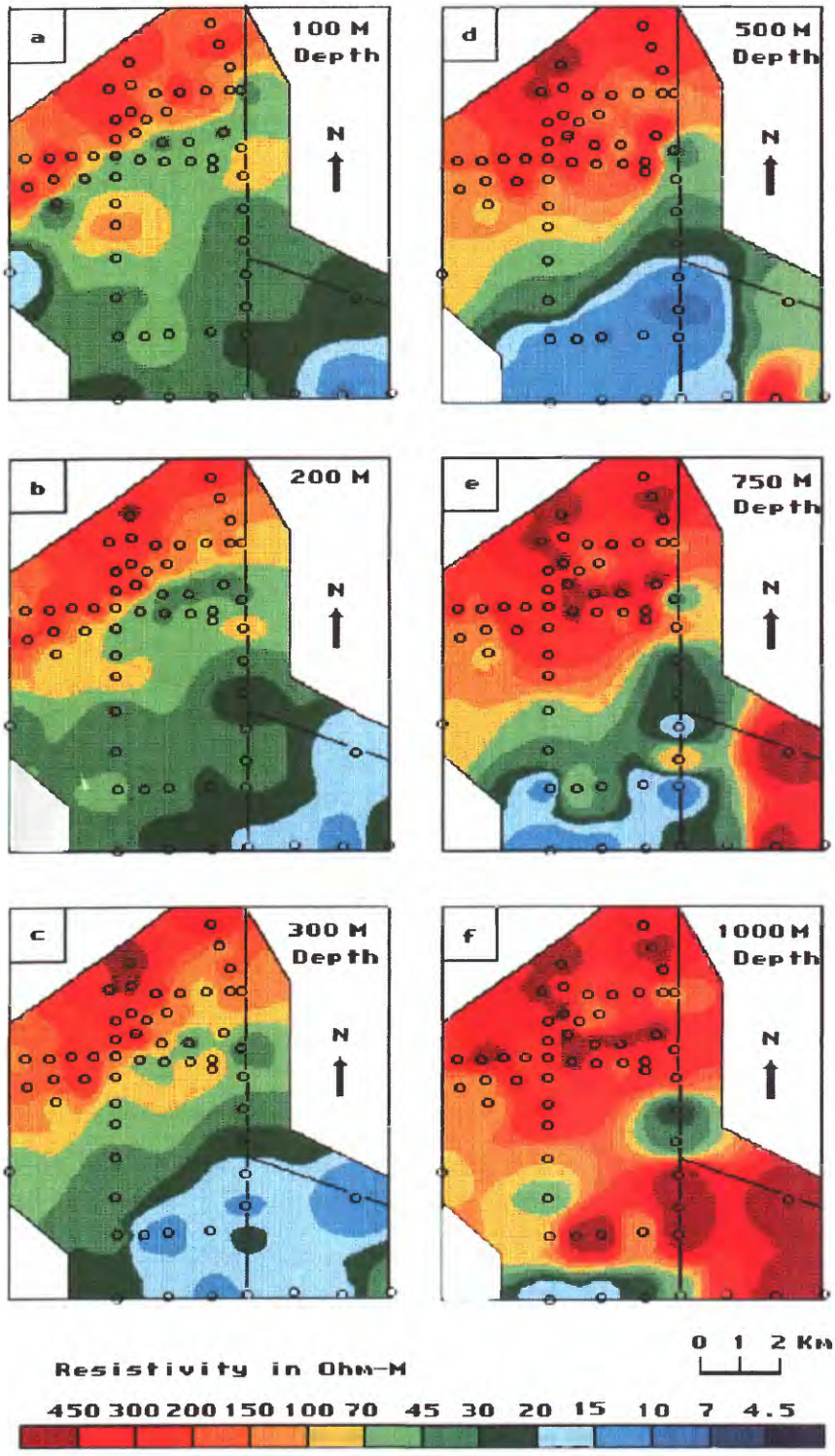


Figure 4. Maps of interpreted resistivity at various depths .

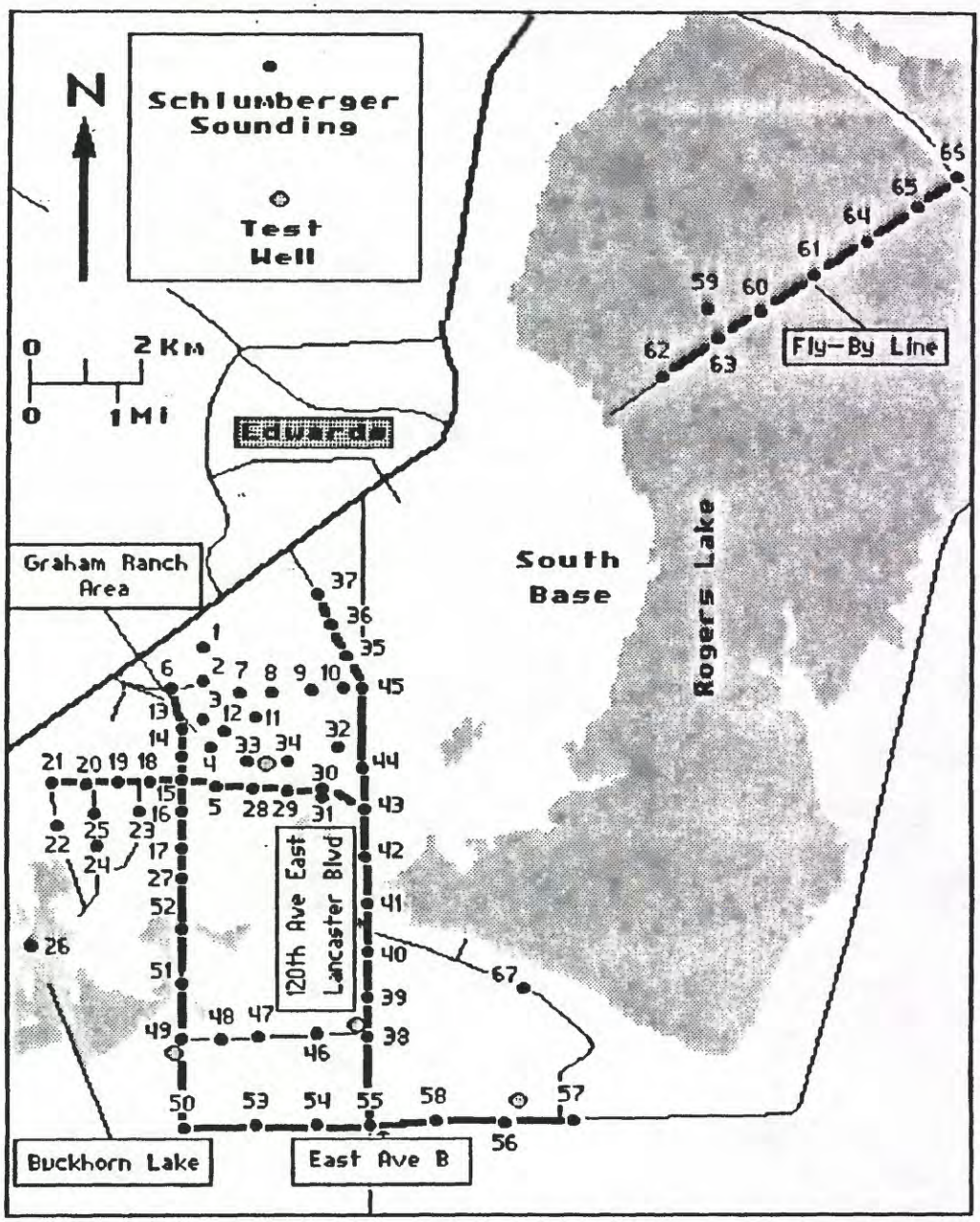


Figure 5. Map showing location of resistivity cross sections (thick lines).

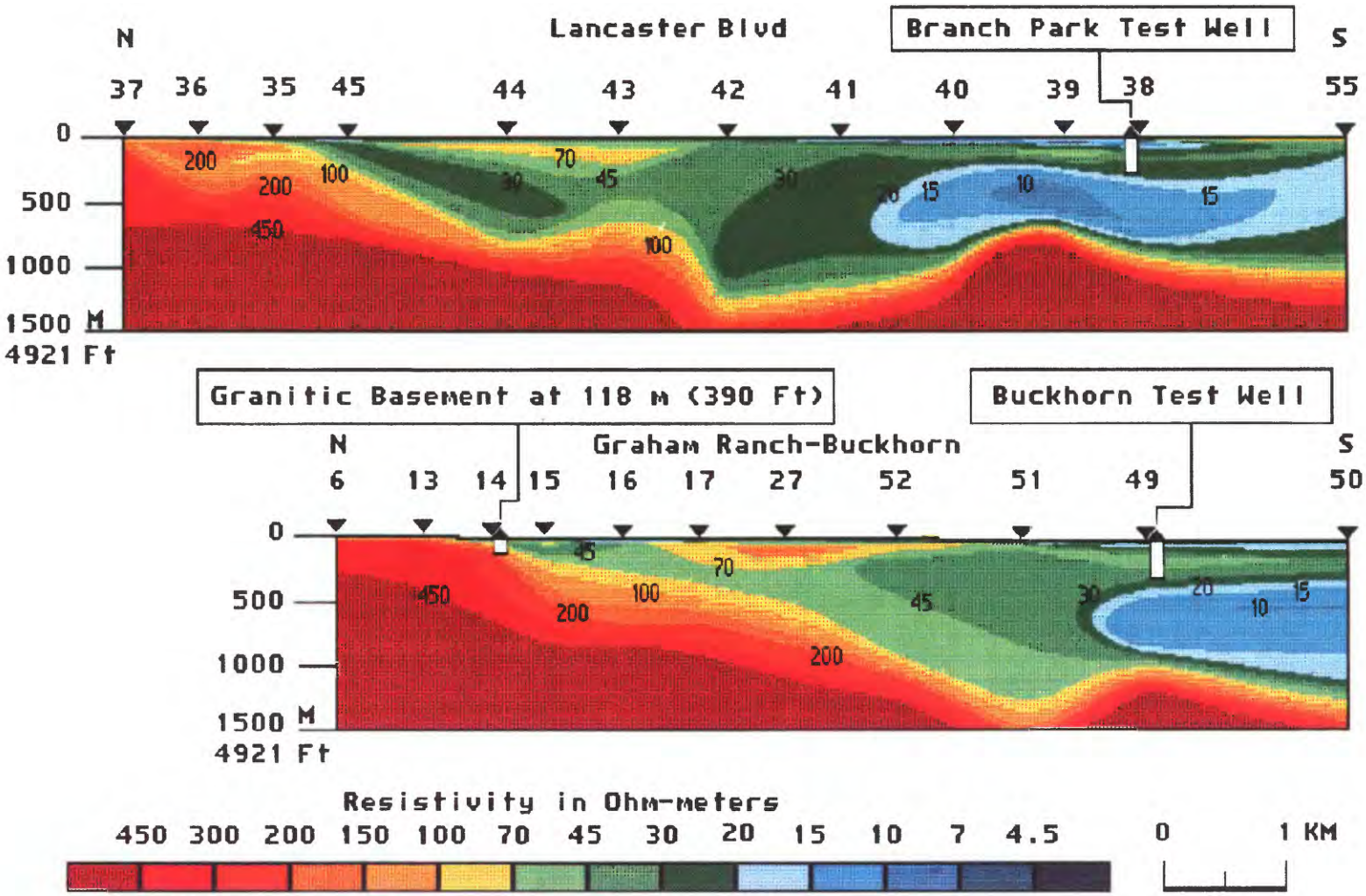


Figure 6. Interpreted resistivity cross sections: a) Lancaster Blvd (top), b) Graham Ranch-Buckhorn (bottom).

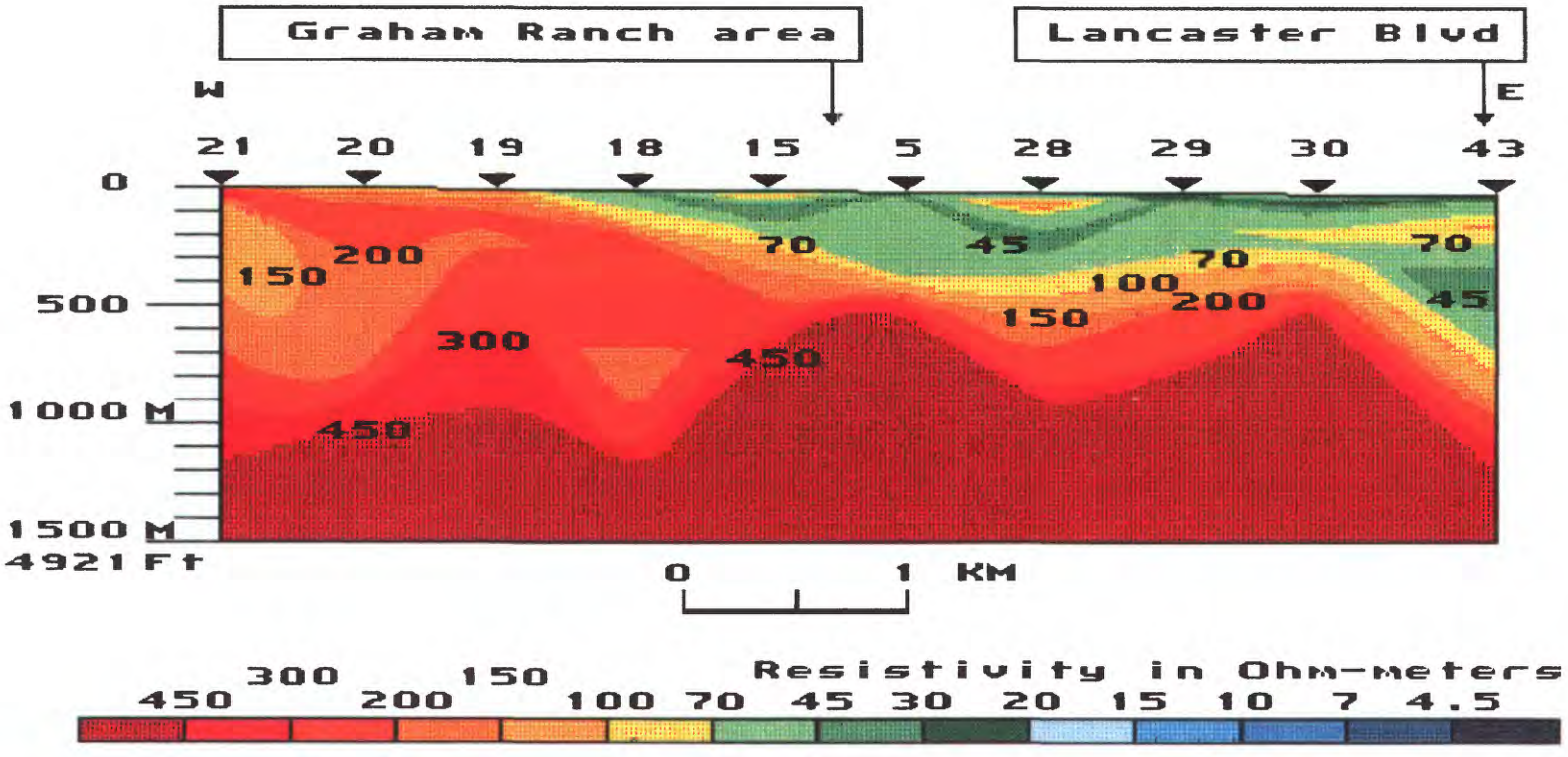


Figure 7. Interpreted resistivity cross section Graham Ranch - Lancaster Blvd.

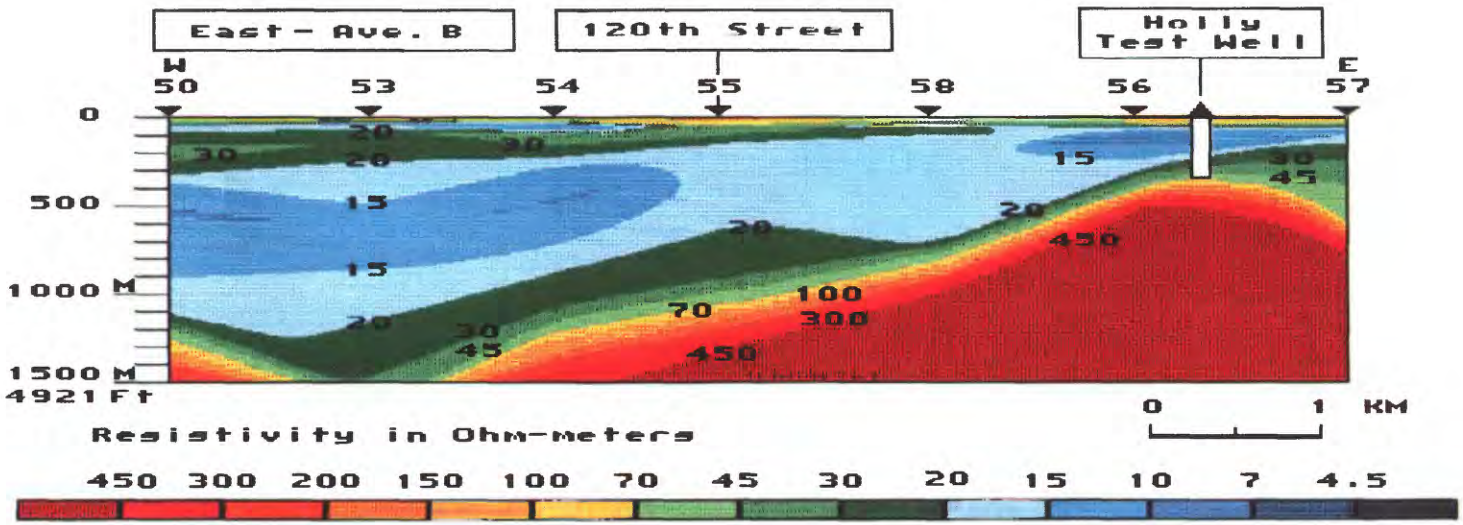


Figure 8. Interpreted resistivity cross section along East Ave B.

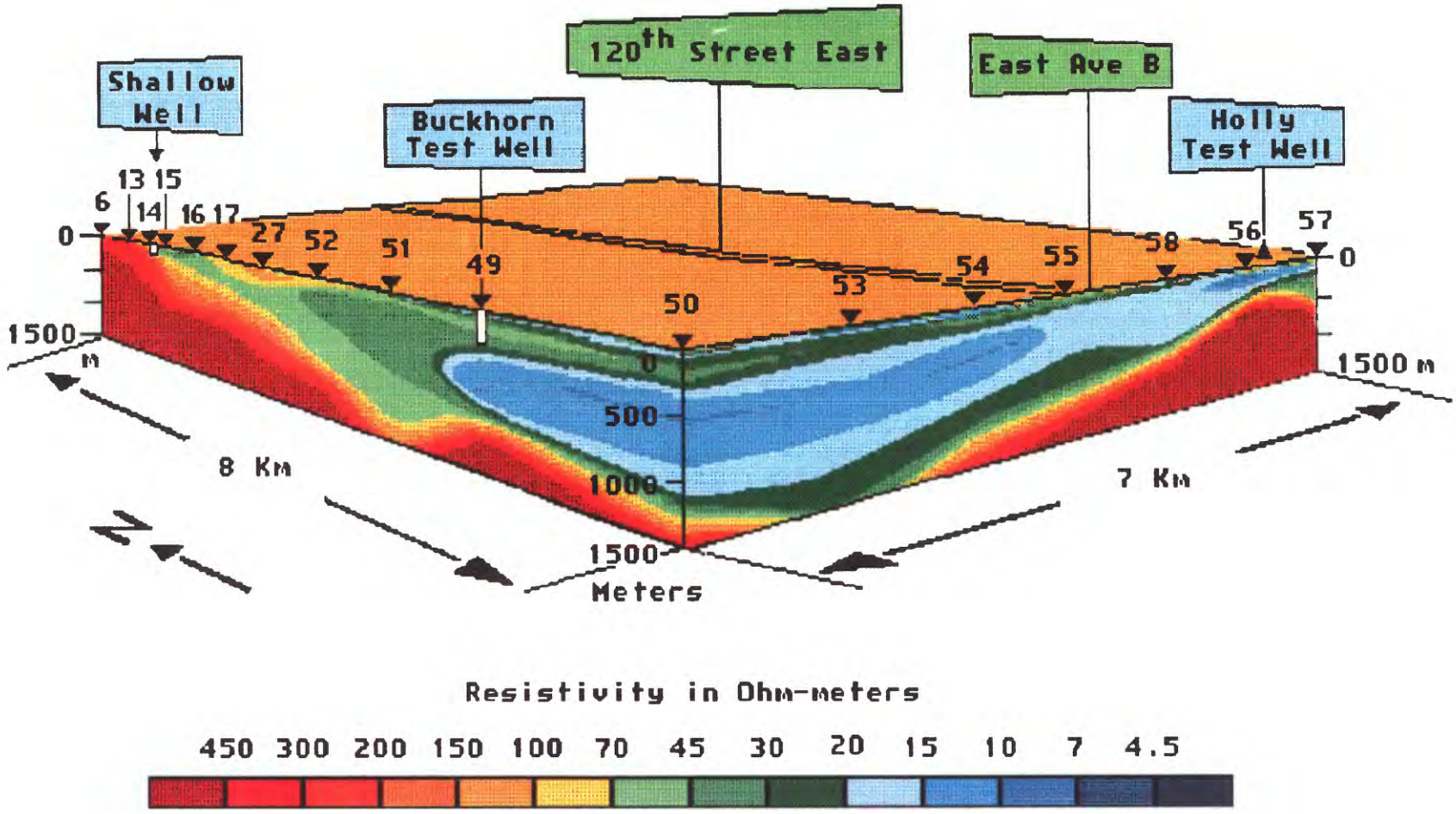


Figure 9 - Block diagram showing Graham Ranch-Buckhorn Lake cross section combined with East Avenue B cross section.

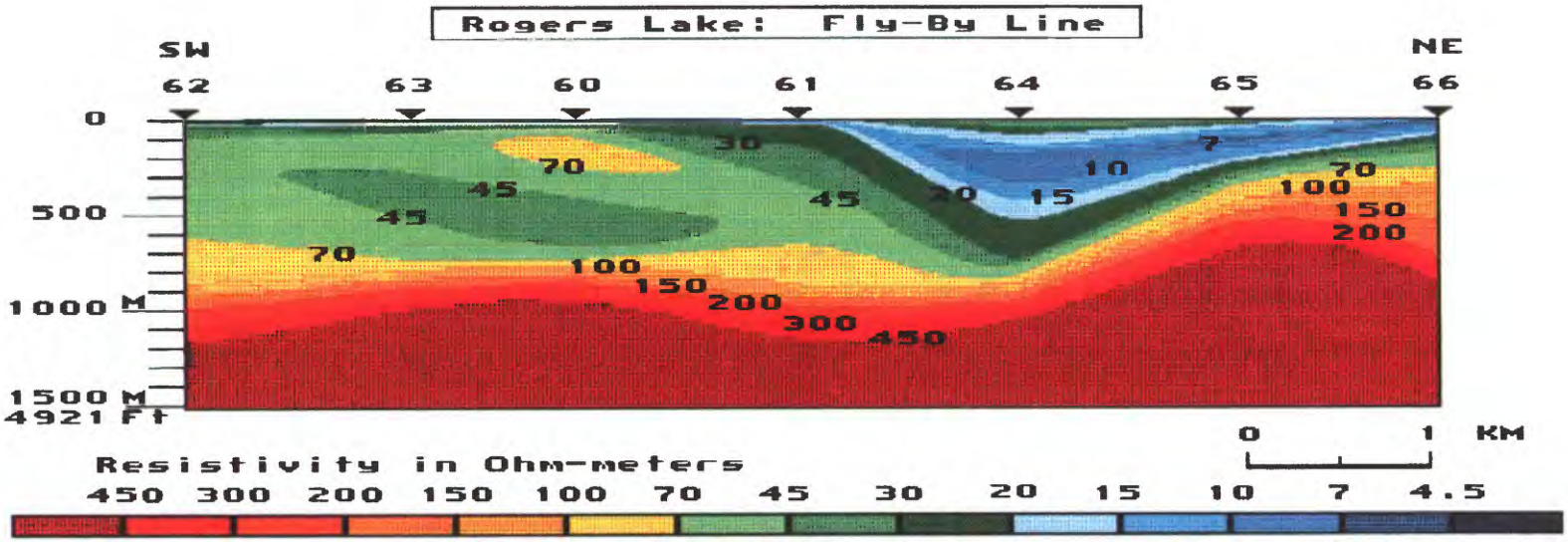


Figure 10. Interpreted resistivity cross section along the Fly-By Line on Rogers Lake.