



Instituto Tecnológico  
GeoMinero de España

PROSPECCION ELECTRICA EN  
DEHESAS DE GUADIX Y GUADAHORTUNA  
(GRANADA).

EXPEDIENTE Nº

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ORGANICA Nº

PROGRAMA Nº

CONCEPTO Nº

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## 1.-Introducción

A petición de la oficina regional de ITGE en Granada, dentro del departamento de aguas, se propuso la realización de un trabajo de prospección eléctrica mediante SEV en la zona de Iznalloz.

La toma de datos se hizo con el equipo habitual del Instituto.

Para la interpretación se utilizó el paquete software RESIX-IP.

Este informe engloba dos áreas de este trabajo de Iznalloz las conocidas con el nombre de Dehesas de Guadix y Guadahortuna.

## 2.-Situación y objeto de estudio

Las dos zonas están situadas en las hojas topográficas a escala 1:50.000 n<sup>os</sup>:970 y 971. En ambos casos se pretende investigar la riqueza hidrológica de un río.

En Las Dehesas de Guadix, se trata del aluvial del río Fardes. La potencia del mismo se estima que puede llegar a 40 m como máximo. Se trata de detectar un sustrato margoso. Existen dos sondeos mecánicos (1 y 2) en el área (ver plano). Los dos con columna estratigráfica, lo que sirve de gran ayuda para la correlación en la interpretación posterior.

En el caso de Guadahortuna, se trata asimismo de modelizar el aluvial del río Guadahortuna. La potencia en este caso es mucho menor y se estima que puede tener un valor medio de unos 10 m.

## 3.-Ficha estadística de la toma de datos

Trabajos de campo: Entre Noviembre de 1989 y Febrero de 1990.

### Equipo de Personal:

Jefe de Equipo: D. Ignacio Arbe Escolar  
(Ingeniero de Minas)

Ayudante: D. Julián Coronel Campos  
(Ingeniero Técnico de Minas)

Operador: D. Juan Pablo Carrión Rebolledo

5 peones contratados en la zona de trabajo

## Material empleado

- Amperímetro marca Geotrón
- Milivoltímetro marca Geotrón
- Electrodos impolarizables de potencial
- Electrodos de corriente(barrenas).
- 1 Vehículo todo terreno
- Cables

El número total de SEV ha sido de 36 (ver planos 1 y 2), se han repartido de la siguiente manera:

### Dehesas de Guadix

SEV nºs: 58,59,60,61,62,63,64,65 ,66,67,68,69,70,71,72  
73,74,75,76,77

### Guadahortuna

SEV nºs: 49,49B,50,50B,51,51B,51C,52,52B,52C,53,53B,54  
55,56,57

## 4.-Zona de Dehesas de Guadix

### 4.1.-Contexto geológico

Regionalmente el área de estudio está comprendida en la zona Subbética.

Los SEV realizados se hallan situados sobre afloramientos de materiales postorogénicos neogenos y cuaternarios.

### 4.2.-Método utilizado

La interpretación se ha realizado mediante el programa RESIX-IP,utilizandose un ordenador HP modelo VECTRA QS/16 para el procesado de datos.Los ficheros correspondientes a todos los SEV realizados aparecen listados en ANEXO I.

#### 4.3.-Perfiles geoelectricos

Se han trazado nueve perfiles geoelectricos con objeto de cubrir de manera suficiente la zona de estudio. Estos perfiles son:

- Nº 1 SEV:74,75,76,77
- Nº 2 SEV:69,70,71,72,73
- Nº 3 SEV:66,67,68
- Nº 4 SEV:61,62,63,64,65,66
- Nº 5 SEV:58,59,60,61
- Nº 6 SEV:58,77
- Nº 7 SEV:76,59
- Nº 8 SEV:75,60
- Nº 9 SEV:74,60

Los perfiles aparecen dibujados en planos 3 y 4.

##### Perfil Nº1 (74-75-76-77)

Los SEV que lo componen se correlacionan bien entre sí. En los SEV nºs 74 y 75, se puede estimar que el sustrato conductor se encuentra a una profundidad de unos 50 m. En la otra mitad del perfil, se observa un adelgazamiento de los materiales superficiales: el sustrato conductor, aparece a unos 25 m.

##### Perfil Nº 2 (69,70,71,72,73)

Aparece un nivel conductor en todo el perfil; se puede tomar como profundidad media de este nivel unos 50 m.

##### Perfil Nº 3 (66,67,68)

En este perfil se observa que el sustrato conductor aparece bastante más superficial, una profundidad entre 20 y 25 m.

##### Perfil Nº 4 (61,62,63,64,65,66)

Es el más largo de todos ellos. El nivel de baja resistividad (sustrato), se presenta a una profundidad bastante uniforme:  $\approx$  50 m, si bien se hace más estrecho entre los SEV nºs 63 y 64.

##### Perfil Nº 5 (58,59,60,61)

En este caso el nivel superficial de arcillas con gravas es bastante más delgado que en los otros cortes, el sustrato se sitúa a una profundidad de unos 20 m a lo largo de todo el perfil.

## Perfiles Nqs 6,7,8,9 (58,77-59,76-75,60-74,60)

Englobamos estos cuatro perfiles dentro de un mismo apartado, porque se trata de perfiles de dos SEV cada uno y que son transversales a los anteriores y a la dirección de realización de los SEV. En todos ellos se observa bastante uniformidad en cuanto a la profundidad del sustrato conductor. Cabe mencionar que en el caso del SEV Nq 74, el nivel conductor aparece a una profundidad de 50 m. Esto es bastante lógico, ya que se encuentra muy próximo al cauce del río donde la potencia del aluvial debe ser más grande.

### 4.4.-Conclusiones

De lo anterior se deduce que la potencia del aluvial cuando menos, es de 20 m. Hay algunas zonas en las que el nivel resistivo superficial se engrosa y puede llegar hasta unos 50 m. Hay que decir también, que el objetivo buscado: detectar el sustrato conductor se ha conseguido en todos los perfiles.

## 5.-Zona de Guadahortuna

### 5.1.-Contexto geológico

Analógamente al caso anterior tectónicamente hablando el área de trabajo se encuentra dentro de la zona Subbética. La investigación se sitúa sobre materiales modernos (pliocuaternarios) postorogénicos que forman el aluvial del río Guadahortuna.

### 5.2.-Método utilizado

El método utilizado en esta segunda zona es en todo similar al usado para las Dehesas de Guadix: Los datos se han procesado en el mismo ordenador, y la interpretación se ha realizado con el mismo paquete software.

### 5.3.-Perfiles geoelectricos

Como se trata de modelizar un aluvial, se han trazado tanto perfiles a lo largo de su cauce como transversales al mismo. En total nueve perfiles:

#### Perfiles longitudinales

Perfil 1 SEV Nqs: 53,54,55,56,57

Perfil 7 SEV Nqs: 49,50,51,52

Perfil 8 SEV Nqs: 49B,50B,51B,52B,53B

Perfil 9 SEV Nqs: 51C,52C

### Perfiles transversales

Perfil 2 SEV N°s: 53,53B

Perfil 3 SEV N°s: 52,52B,52C

Perfil 4 SEV N°s: 51,51B,51C

Perfil 5 SEV N°s :50,50B

Perfil 6 SEV N°s :49,49B

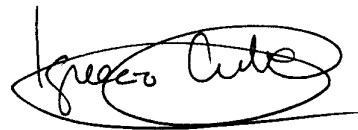
Aparecen todos ellos representados en planos 5 y 6, seguidamente se comentan los dos grupos de perfiles.

En los perfiles longitudinales, aparece una buena correlación entre ellos y también entre los SEV que los forman. Se observa en todos ellos un nivel débilmente resistivo desde la superficie del terreno hasta una profundidad de unos 7 m: el sustrato conductor está bastante somero.

En los perfiles transversales, que son más cortos, se confirma bastante lo anterior: la capa superficial de resistividad aproximada de  $20 \Omega \cdot m$ , siempre presenta potencias pequeñas entre 5 y 7 m cuando más.

#### 5.4.-Conclusiones

El objeto de la investigación realizada: encontrar la profundidad del sustrato conductor, se consigue en gran medida; ahora bien la diferenciación de niveles resistivos en los distintos SEV realizados, no ha sido demasiado fácil, pues han aparecido valores bastante similares.



Fdo. Ignacio Arbe

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ANEXO I

FICHEROS DE DATOS CORRESPONDIENTES A SEV REALIZADOS  
EN DEHESAS DE GUADIX (RIO FARDES) Y GUADAHORTUNA  
(PROVINCIA DE GRANADA)

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DEHESAS DE GUADIX

IZ-58.RPD, IZ-59.RPD, IZ-60.RPD, IZ-61.RPD, IZ-62.RPD, IZ-63.RPD  
IZ-64.RPD, IZ-65.RPD, IZ-66.RPD, IZ-67.RPD, IZ-68.RPD, IZ-69.RPD  
IZ-70.RPD, IZ-71.RPD, IZ-72.RPD, IZ-73.RPD, IZ-74.RPD, IZ-75.RPD  
IZ-75.RPD, IZ-76.RPD, IZ-77.RPD

GUADAHORTUNA

IZ49.RPD, IZ49B.RPD, IZ50.RPD, IZ50B.RPD, IZ51.RPD, IZ51B.RPD,  
IZ51C.RPD, IZ52.RPD, IZ52B.RPD, IZ52C.RPD, IZ53.RPD, IZ53B.RPD,  
IZ54.RPD, IZ55.RPD, IZ56.RPD, IZ57.RPD

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ANEXO II

CURVAS DE CAMPO CON INTERPRETACION ADOPTADA

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LISTADO DE COORDENADAS TOPOGRAFICAS DE LOS SEV CORRESPONDIENTES A

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LAS ZONAS DE DEHESAS DE GUADIX Y DE GUADAHORTUNA.  
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SEV N.	X (U.T.M.)	Y (U.T.M.)	Z (M)
49	466100	4156800	960
49B	465500	4157500	930
50	467800	4157700	930
50B	467650	4158050	960
51	468800	4158450	940
51B	468700	4158650	930
51C	468600	4158800	940
52	470250	4158700	930
52B	470200	4159000	940
52C	470100	4159300	960
53	471550	4159500	920
53B	471450	4159700	940
54	472750	4159800	920
55	474500	4160300	900
56	475800	4160200	880
57	475800	4159950	860
58	489550	4160750	650
59	490650	4160150	650
60	492300	4160350	675
61	493100	4159600	650
62	494600	4159650	580
63	495675	4159975	580
64	496500	4160400	580
65	496500	4160750	560
66	499500	4161200	550
67	498650	4162050	580
68	498825	4162550	525
69	497350	4163600	525
70	496125	4163750	550
71	495200	4163200	550
72	494500	4162450	550
73	493825	4161850	600
74	492500	4161000	600
75	491300	4161350	600
76	490400	4161500	650
77	489625	4161675	650

## DATA SET: I249

CLIENT: ITGE  
 LOCATION: iznalloz  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 960.00  
 SOUNDING COORDINATES: X: 466100.0000 Y: 4156800.0000

DATE: 2-2-90  
 SOUNDING: 49  
 AZIMUTH: 257  
 EQUIPMENT: geotron

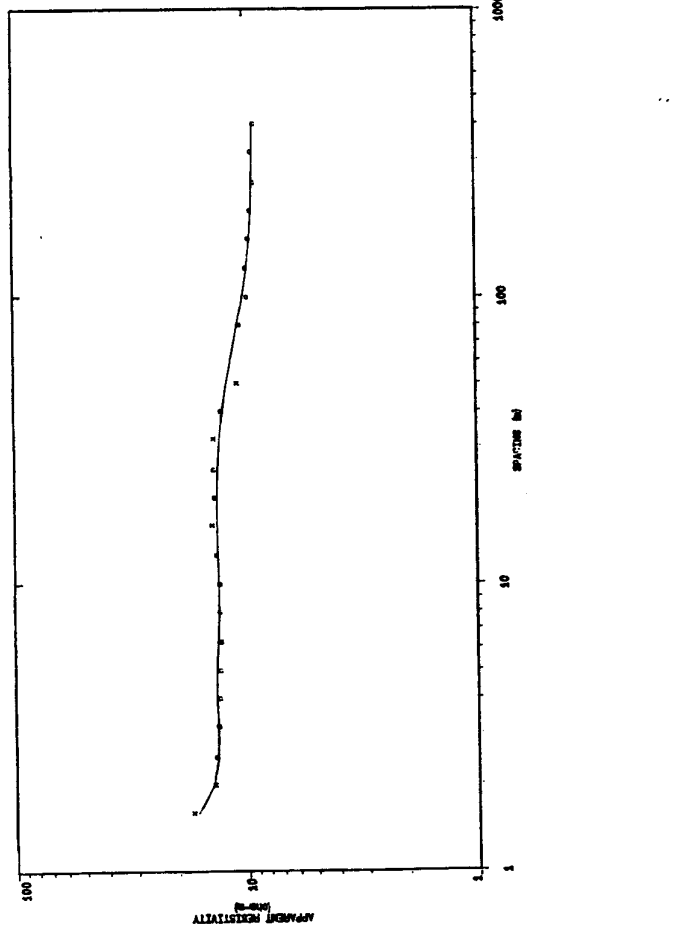
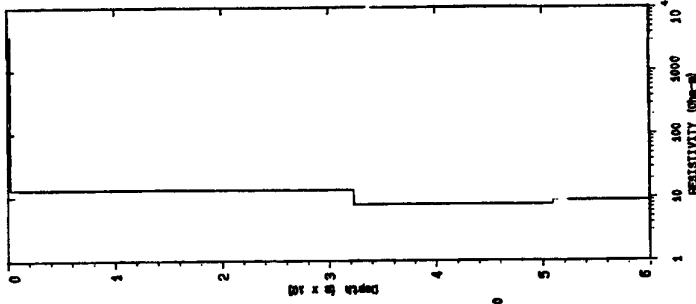
## Schlumberger Configuration

FITTING ERROR: 2.144 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
1	3967.5		0.213	960.0	5.389E-05
2	13.35		32.11	959.7	2.40
3	7.84		18.62	927.6	2.37
4	9.05			909.0	

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	17.39	16.46	5.34
2	2.00	14.01	14.16	-1.07
3	2.50	13.72	13.50	1.58
4	3.20	13.43	13.44	-0.0769
5	4.00	13.24	13.63	-2.99
6	5.00	13.14	13.61	-3.57
7	6.30	13.04	13.38	-2.60
8	8.00	13.14	13.22	-0.579
9	10.00	13.14	13.22	-0.626
10	12.60	13.53	13.32	1.54
11	16.00	14.12	13.40	5.08
12	20.00	13.72	13.39	2.41
13	25.00	13.82	13.28	3.89
14	32.00	13.82	13.02	5.75
15	40.00	12.84	12.65	1.50
16	50.00	10.88	12.13	-11.48
17	80.00	10.58	10.78	-1.88
18	100.0	9.79	10.21	-4.25
19	126.0	9.89	9.76	1.32
20	160.0	9.59	9.46	1.37
21	200.0	9.40	9.30	1.02
22	250.0	9.10	9.20	-1.20
23	320.0	9.30	9.15	1.60
24	400.0	9.00	9.11	-1.33



for: ITGE

by: I.T.G.E.

Data Set: IZ49 Date: 2-2-90

Equipment: geotron Sounding: 49

resistividad

izvalloz

granada

Azimuth: 257

DATA SET: IZ-49B

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 930.00  
 SOUNDING COORDINATES: X: 465500.0000 Y: 4157500.0000

DATE: 9-2-90  
 SOUNDING: 49B  
 AZIMUTH: 280  
 EQUIPMENT: GEOTRON

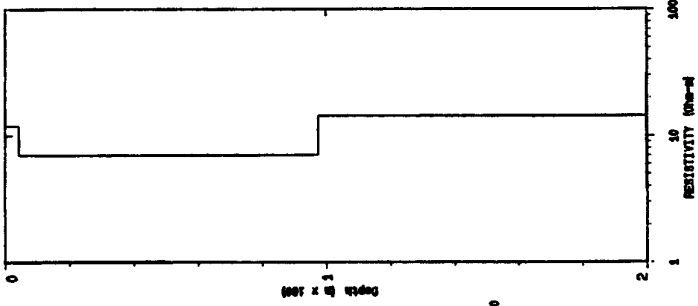
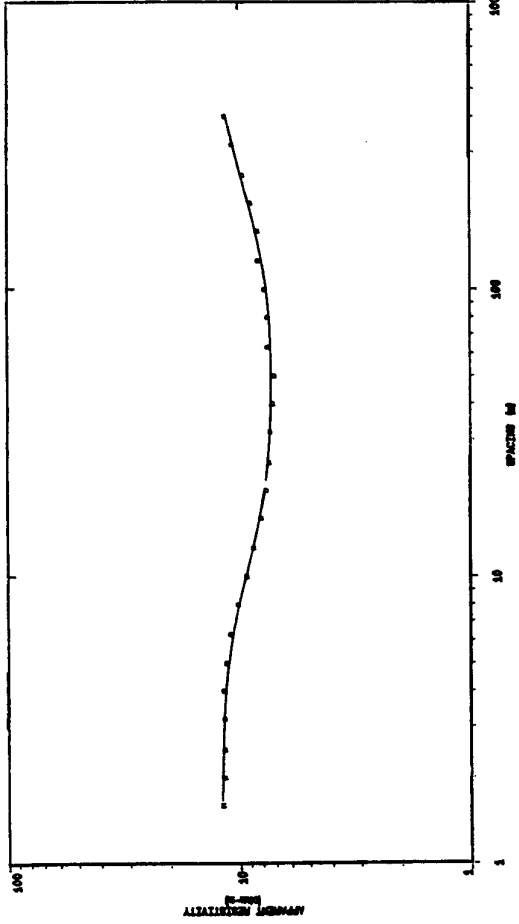
Schlumberger Configuration

FITTING ERROR: 1.335 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTA (Siemen)
				930.0	
1	12.71		4.32	925.6	0.339
2	7.37		117.3	808.3	15.90
3	16.15				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	12.60	12.67	-0.554
2	2.00	12.38	12.63	-2.05
3	2.50	12.38	12.57	-1.53
4	3.20	12.38	12.43	-0.460
5	4.00	12.49	12.22	2.09
6	5.00	12.16	11.89	2.17
7	6.30	11.61	11.39	1.88
8	8.00	10.73	10.71	0.217
9	10.00	9.86	9.99	-1.30
10	12.60	9.20	9.25	-0.535
11	16.00	8.54	8.61	-0.758
12	20.00	8.10	8.16	-0.756
13	25.00	7.88	7.87	0.187
14	32.00	7.77	7.67	1.30
15	40.00	7.56	7.58	-0.268
16	50.00	7.45	7.53	-1.14
17	63.00	7.55	7.53	0.203
18	80.00	7.55	7.60	-0.622
19	100.0	7.76	7.73	0.341
20	126.0	8.27	7.98	3.57
21	160.0	8.27	8.40	-1.46
22	200.0	8.90	8.96	-0.702
23	250.0	9.60	9.68	-0.878
24	320.0	10.70	10.61	0.807
25	400.0	11.50	11.49	0.00310



for:	itge	resistividad	
by:	I.T.G.E.	iznallos granada	
Data Set:	IZ498	Date:	9-2-90
Equipment:	geotron	Sounding:	49b
		Azimuth:	280

DATA SET: IZ-50

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 930.00  
 SOUNDING COORDINATES: X: 467800.0000 Y: 4157700.0000

DATE: 30-1-90  
 SOUNDING: 50  
 AZIMUTH: 241  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

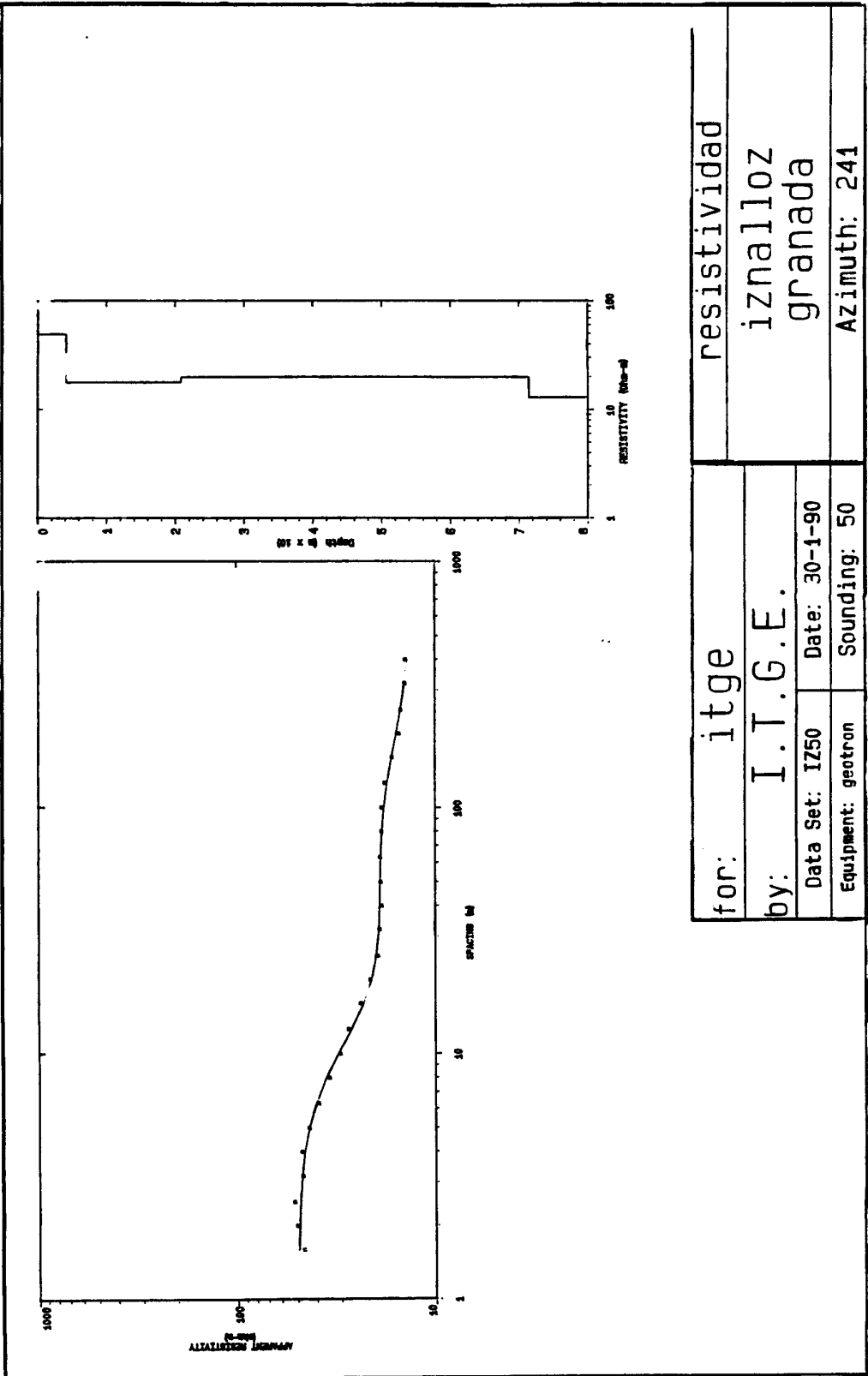
FITTING ERROR: 2.774 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				930.0	
1	49.57		4.14	925.8	0.083
2	17.83		16.66	909.1	0.934
3	19.95		50.54	858.6	2.53
4	13.02				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	46.26	49.26	-6.47
2	2.00	50.17	49.00	2.33
3	2.50	51.80	48.51	6.34
4	3.20	47.02	47.52	-1.05
5	4.00	47.35	45.98	2.88
6	5.00	43.44	43.60	-0.363
7	6.30	38.88	40.09	-3.10
8	8.00	34.32	35.50	-3.45
9	10.00	30.19	30.87	-2.26
10	12.60	27.47	26.49	3.57
11	16.00	23.76	23.03	3.04
12	20.00	21.31	20.96	1.65
13	25.00	19.46	19.81	-1.81
14	32.00	19.06	19.22	-0.844
15	40.00	18.58	19.02	-2.41
16	50.00	18.77	18.93	-0.872
17	63.00	18.87	18.81	0.296
18	80.00	18.57	18.54	0.175
19	100.0	18.57	18.07	2.68
20	126.0	17.78	17.37	2.31
21	160.0	16.39	16.47	-0.497
22	200.0	15.10	15.60	-3.35
23	250.0	14.80	14.83	-0.236
24	320.0	14.10	14.17	-0.533
25	400.0	14.00	13.76	1.69





for:	itge	resistividad
by:	I.T.G.E.	iznallos granada
Data Set:	IZ50	Date: 30-1-90
Equipment:	geotron	Sounding: 50
		Azimuth: 241

DATA SET: IZ50B

CLIENT: itge  
 LOCATION: iznallos  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 960.00  
 SOUNDING COORDINATES: X: 467650.0000 Y: 4158050.0000

DATE: 2-2-90  
 SOUNDING: 50b  
 AZIMUTH: 260  
 EQUIPMENT: geotron

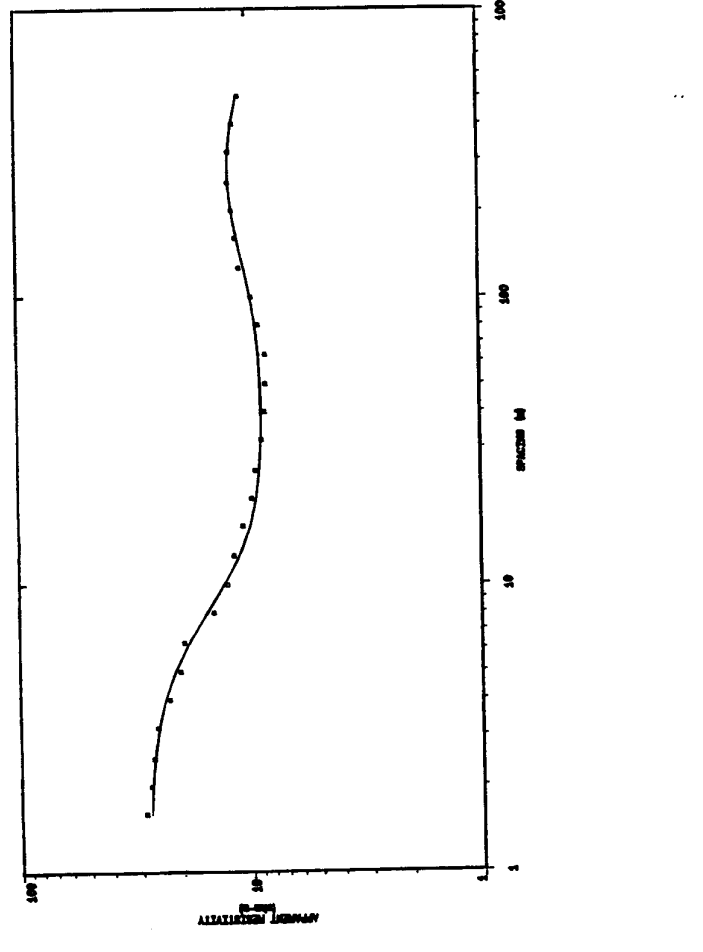
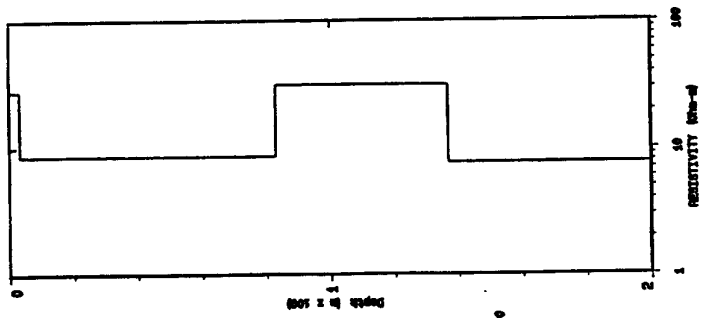
Schlumberger Configuration

FITTING ERROR: 4.003 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				960.0	
1	28.01		3.12	956.8	0.111
2	8.60		79.70	877.1	9.26
3	31.59		53.76	823.4	1.70
4	7.70				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	29.08	27.59	5.13
2	2.00	27.57	27.23	1.24
3	2.50	26.72	26.59	0.485
4	3.20	25.59	25.40	0.723
5	4.00	22.66	23.74	-4.75
6	5.00	20.39	21.45	-5.20
7	6.30	19.54	18.59	4.85
8	8.00	14.54	15.53	-6.82
9	10.00	12.65	13.04	-3.09
10	12.60	11.80	11.15	5.45
11	16.00	10.75	9.96	7.31
12	20.00	9.80	9.37	4.39
13	25.00	9.42	9.07	3.75
14	32.00	8.85	8.91	-0.693
15	40.00	8.56	8.87	-3.56
16	50.00	8.47	8.91	-5.21
17	63.00	8.47	9.05	-6.91
18	80.00	9.07	9.34	-2.98
19	100.0	9.68	9.78	-1.02
20	126.0	10.89	10.39	4.56
21	160.0	11.29	11.12	1.51
22	200.0	11.70	11.73	-0.331
23	250.0	12.10	12.10	-0.0674
24	320.0	12.00	12.08	-0.699
25	400.0	11.50	11.65	-1.34
26	500.0	10.80	10.94	-1.30



for: itge		resistividad	
by: I.T.G.E.		iznalloz granada	
Data Set: I7508	Date: 2-2-90	Azimuth: 260	
Equipment: geotron	Sounding: 50b		

DATA SET: 12-51

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 940.00  
 SOUNDING COORDINATES: X: 468800.0000 Y: 4158450.0000

DATE: 5-2-90  
 SOUNDING: 51  
 AZIMUTH: 268  
 EQUIPMENT: GEOTRON

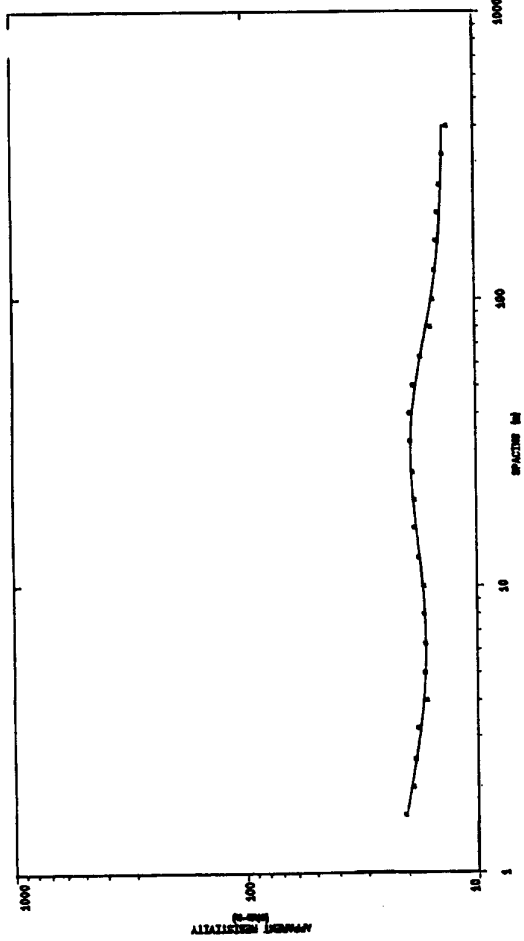
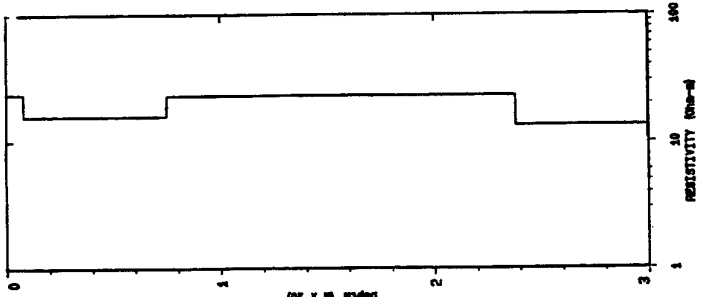
Schlumberger Configuration

FITTING ERROR: 2.086 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTIVITY (Siemen)
				940.0	
1	23.78		0.778	939.2	0.032
2	15.88		6.69	932.5	0.421
3	23.10		16.31	916.2	0.705
4	13.50				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	20.67	20.47	0.961
2	2.00	19.00	19.42	-2.21
3	2.50	18.58	18.44	0.733
4	3.20	18.06	17.59	2.61
5	4.00	16.49	17.06	-3.43
6	5.00	16.80	16.76	0.272
7	6.30	16.70	16.66	0.218
8	8.00	16.91	16.78	0.767
9	10.00	16.91	17.08	-1.00
10	12.60	17.74	17.56	1.03
11	16.00	18.57	18.17	2.14
12	20.00	18.46	18.71	-1.31
13	25.00	18.77	19.08	-1.63
14	32.00	19.18	19.14	0.228
15	40.00	19.28	18.80	2.50
16	50.00	18.57	18.12	2.40
17	63.00	17.17	17.18	-0.00754
18	80.00	15.49	16.16	-4.31
19	100.0	15.09	15.32	-1.54
20	126.0	14.79	14.67	0.825
21	160.0	14.59	14.21	2.59
22	200.0	14.30	13.95	2.43
23	250.0	14.00	13.78	1.54
24	320.0	13.60	13.67	-0.522
25	400.0	13.00	13.60	-4.68



for:	itge	resistividad
by:	I.T.G.E.	iznallos granada
Data Set:	IZ51	Date: 5-2-90
Equipment:	geotron	Sounding: 51
		Azimuth: 268

DATA SET: IZ-51B

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 930.00  
 SOUNDING COORDINATES: X: 468700.0000 Y: 4158650.0000

DATE: 5-2-90  
 SOUNDING: 51B  
 AZIMUTH: 268  
 EQUIPMENT: GEOTRON

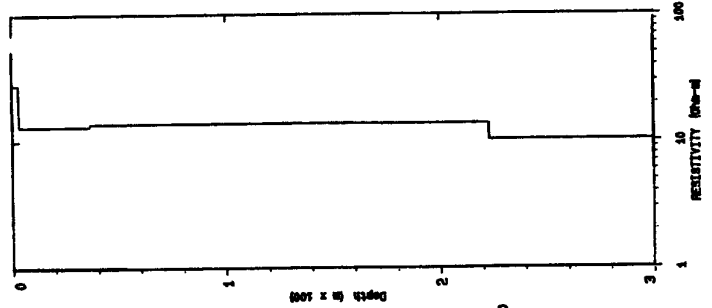
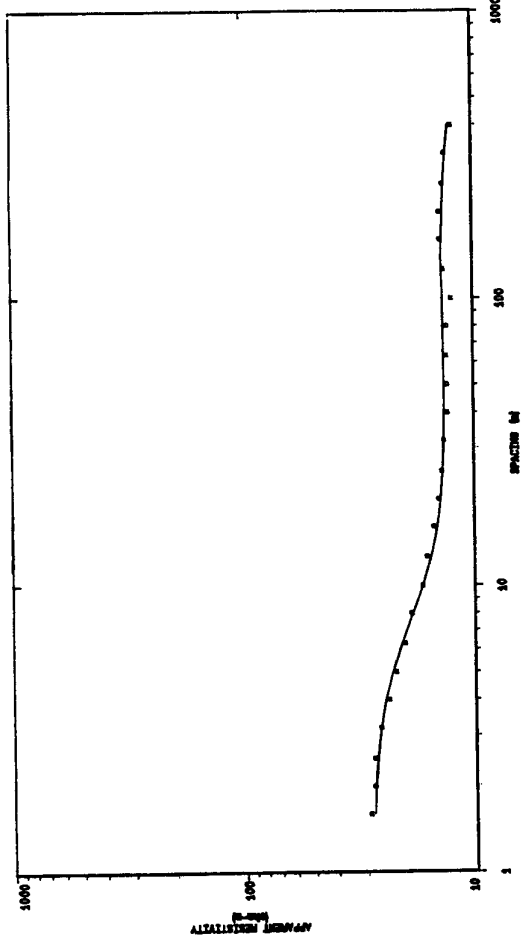
Schlumberger Configuration

FITTING ERROR: 2.610 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTA: (Siemen)
				930.0	
1	28.02		2.93	927.0	0.104
2	13.07		32.52	894.5	2.48
3	13.69		184.2	710.2	13.45
4	10.62				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	28.70	27.67	3.58
2	2.00	27.54	27.37	0.618
3	2.50	27.45	26.86	2.14
4	3.20	25.81	25.91	-0.393
5	4.00	23.69	24.61	-3.88
6	5.00	22.05	22.87	-3.69
7	6.30	20.13	20.74	-3.04
8	8.00	18.78	18.50	1.45
9	10.00	16.75	16.70	0.336
10	12.60	15.98	15.30	4.26
11	16.00	14.92	14.37	3.71
12	20.00	14.15	13.86	2.10
13	25.00	13.67	13.56	0.797
14	32.00	13.38	13.39	-0.0543
15	40.00	12.90	13.32	-3.23
16	50.00	12.90	13.30	-3.08
17	63.00	13.00	13.32	-2.45
18	80.00	12.90	13.36	-3.57
19	100.0	12.31	13.41	-8.94
20	126.0	13.30	13.43	-1.02
21	160.0	13.70	13.42	1.97
22	200.0	13.80	13.36	3.16
23	250.0	13.40	13.22	1.30
24	320.0	13.10	12.96	1.01
25	400.0	12.30	12.64	-2.79



for: itge		resistividad	
by: I.T.G.E.		iznallos	
Data Set: IZ51B		granada	
Equipment: geotron	Date: 5-2-90	Azimuth: 268	
Sounding: 51b			

DATA SET: IZ-51C

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 940.00  
 SOUNDING COORDINATES: X: 468600.0000 Y: 4158800.0000

DATE: 5-2-90  
 SOUNDING: 51B  
 AZIMUTH: 285  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

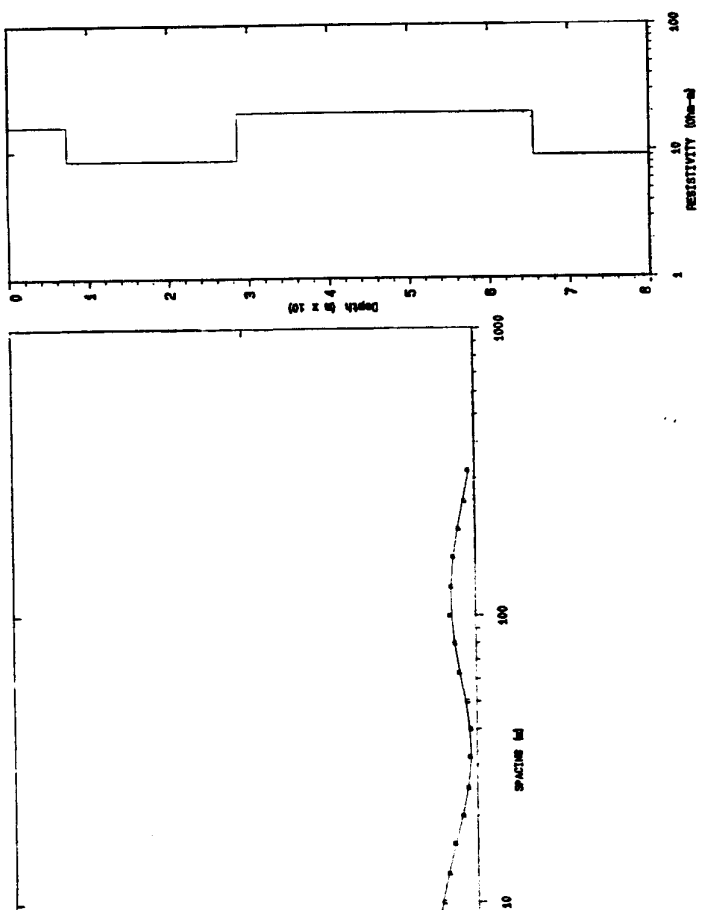
FITTING ERROR: 1.160 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				940.0	
1	15.93		7.27	932.7	0.456
2	8.54		21.16	911.5	2.47
3	19.86		38.30	873.2	1.92
4	9.19				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	16.36	15.91	2.73
2	2.00	16.05	15.90	0.951
3	2.50	15.75	15.88	-0.839
4	3.20	15.54	15.83	-1.87
5	4.00	15.54	15.76	-1.37
6	5.00	15.65	15.62	0.193
7	6.30	15.44	15.36	0.524
8	8.00	15.03	14.92	0.717
9	10.00	14.11	14.31	-1.44
10	12.60	13.40	13.48	-0.624
11	16.00	12.60	12.49	0.830
12	20.00	11.60	11.62	-0.190
13	25.00	11.00	10.97	0.248
14	32.00	10.80	10.66	1.29
15	40.00	10.70	10.77	-0.736
16	50.00	11.00	11.20	-1.89
17	63.00	11.90	11.82	0.641
18	80.00	12.40	12.42	-0.210
19	100.0	13.00	12.77	1.73
20	126.0	12.80	12.80	-0.0132
21	160.0	12.50	12.46	0.291
22	200.0	11.80	11.90	-0.865
23	250.0	11.10	11.24	-1.31
24	320.0	10.70	10.57	1.20





for: itge		resistividad	
by: I.T.G.E.		iznallos	
Data Set: IZ51C	Date: 5-2-90	granada	
Equipment: geotron	Sounding: 51C	Azimuth: 285	

DATA SET: IZ-52

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 930.00  
 SOUNDING COORDINATES: X: 470250.0000 Y: 4158700.0000

DATE: 6-2-90  
 SOUNDING: 52  
 AZIMUTH: 248  
 EQUIPMENT: GEOTRON

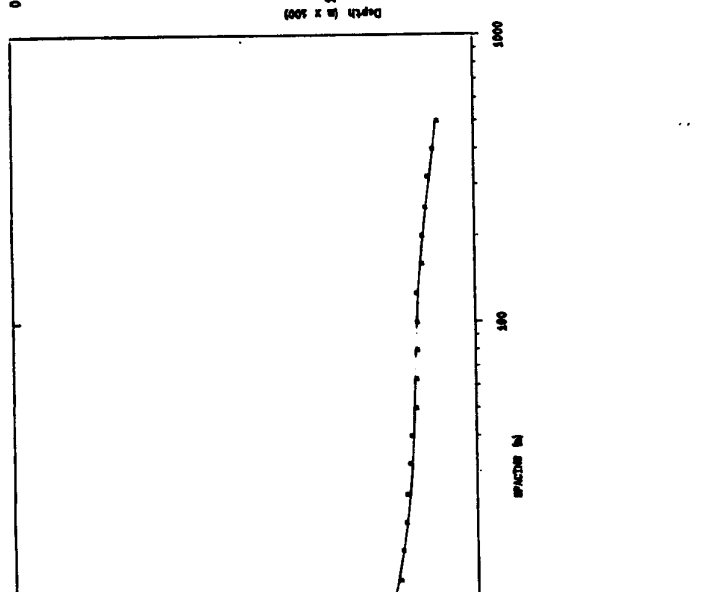
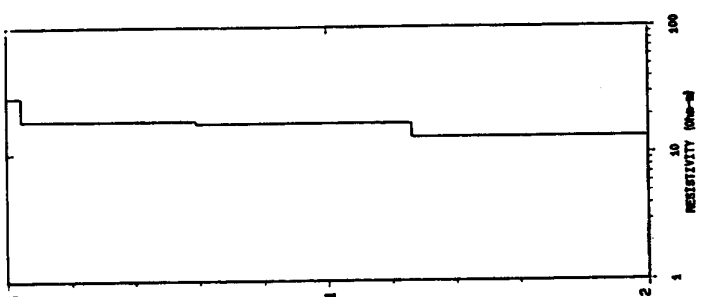
Schlumberger Configuration

FITTING ERROR: 1.828 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTIVITY (Siemens)
				930.0	
1	28.12		4.56	925.4	0.162
2	18.26		64.13	861.2	3.51
3	18.25		36.28	825.0	1.98
4	13.86				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	27.34	28.06	-2.64
2	2.00	27.72	28.01	-1.03
3	2.50	28.59	27.91	2.37
4	3.20	28.11	27.70	1.43
5	4.00	27.82	27.37	1.59
6	5.00	26.38	26.84	-1.77
7	6.30	25.99	26.02	-0.100
8	8.00	25.41	24.85	2.19
9	10.00	23.20	23.57	-1.60
10	12.60	21.56	22.20	-2.98
11	16.00	20.98	20.95	0.132
12	20.00	20.21	20.04	0.812
13	25.00	20.01	19.40	3.08
14	32.00	19.34	18.93	2.09
15	40.00	18.95	18.66	1.52
16	50.00	18.08	18.47	-2.16
17	63.00	17.98	18.31	-1.83
18	80.00	17.78	18.14	-1.98
19	100.0	17.78	17.92	-0.793
20	126.0	17.88	17.61	1.49
21	160.0	16.80	17.17	-2.23
22	200.0	16.80	16.65	0.876
23	250.0	16.20	16.07	0.777
24	320.0	15.80	15.45	2.19
25	400.0	15.00	14.97	0.166
26	500.0	14.30	14.60	-2.15



RESISTIVIDAD	
GRANADA ANDALUCIA	
Azimuth: 24P	
for:	ITGE
by:	I.T.G.E.
Data Set: IZ-52	Date: 6-2-90
Equipment: GEOTRON	Sounding: 52

DATA SET: 52B

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 940.00  
 SOUNDING COORDINATES: X: 470200.0000 Y: 4159000.0000

DATE: 6-2-90  
 SOUNDING: 52B  
 AZIMUTH: 285  
 EQUIPMENT: GEOTRON

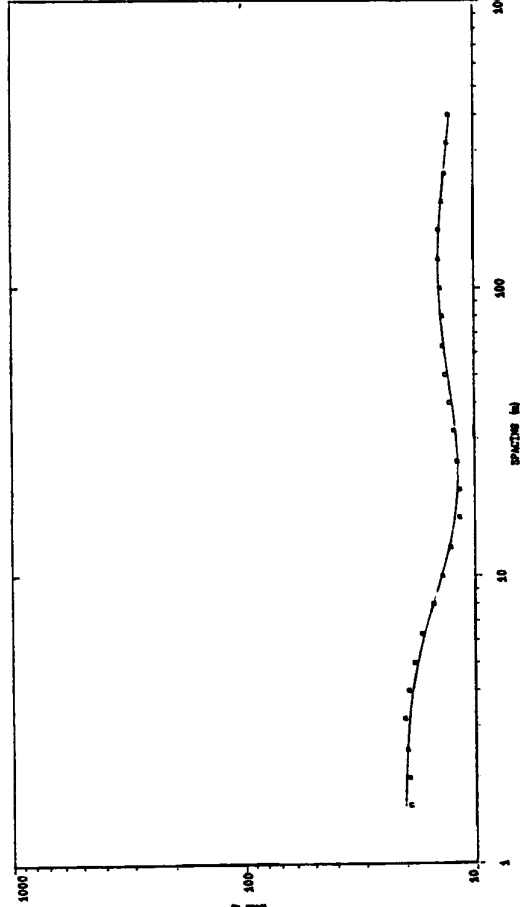
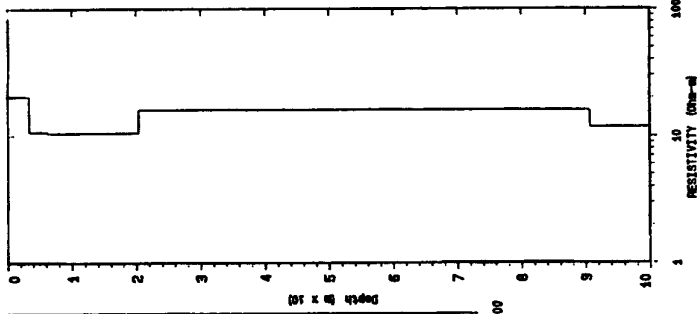
Schlumberger Configuration

FITTING ERROR: 1.626 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTIVITY (Siemen)
				940.0	
1	19.78		4.65	935.3	0.235
2	5.55		3.20	932.1	0.577
3	13.48		16.10	916.0	1.19
4	15.15		67.40	848.6	4.44
5	12.11				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	18.91	19.69	-4.09
2	2.00	19.11	19.61	-2.62
3	2.50	19.50	19.46	0.206
4	3.20	20.00	19.15	4.21
5	4.00	19.21	18.66	2.83
6	5.00	18.02	17.89	0.746
7	6.30	16.74	16.73	0.0813
8	8.00	14.87	15.19	-2.15
9	10.00	13.59	13.66	-0.532
10	12.60	12.51	12.34	1.35
11	16.00	11.42	11.55	-1.07
12	20.00	11.42	11.39	0.293
13	25.00	11.72	11.64	0.704
14	32.00	12.11	12.13	-0.129
15	40.00	12.61	12.62	-0.0816
16	50.00	13.10	13.07	0.189
17	63.00	13.60	13.48	0.832
18	80.00	13.60	13.80	-1.51
19	100.0	13.89	13.98	-0.592
20	126.0	14.09	14.01	0.571
21	160.0	14.09	13.89	1.42
22	200.0	13.60	13.66	-0.475
23	250.0	13.30	13.36	-0.507
24	320.0	13.00	13.02	-0.222
25	400.0	12.80	12.76	0.295



RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: 285

for: ITGE

by: I.T.G.E.

Data Set: IZ52B Date: 6-2-90

Equipment: GEOTRAN Sounding: 52b

DATA SET: 52C

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 960.00  
 SOUNDING COORDINATES: X: 470100.0000 Y: 4159300.0000

DATE: 6-2-90  
 SOUNDING: 52c  
 AZIMUTH: 245  
 EQUIPMENT: GEOTRON

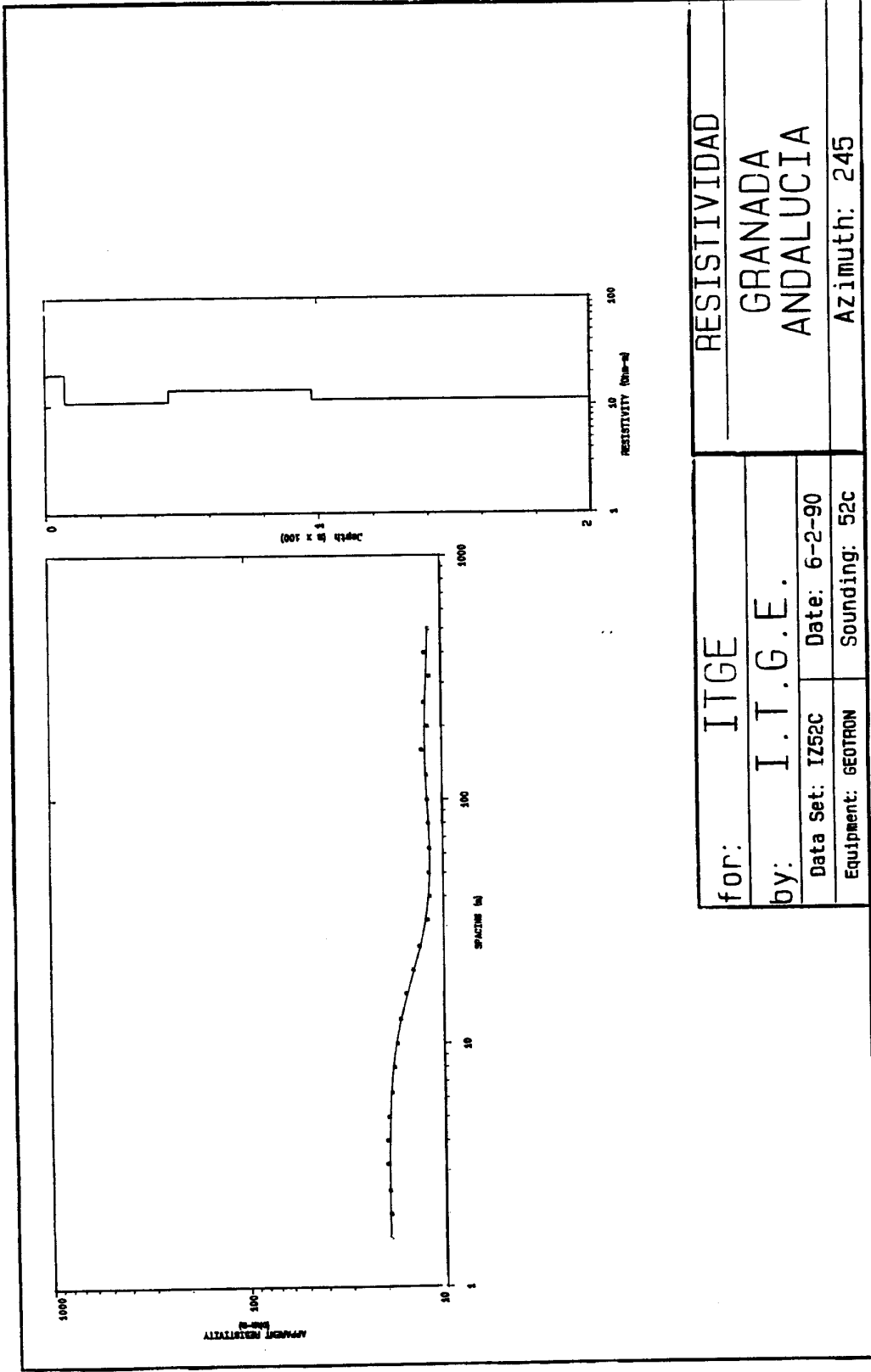
Schlumberger Configuration

FITTING ERROR: 1.970 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				960.0	
1	22.34		1.06	958.9	0.0476
2	22.63		6.62	952.3	0.292
3	11.70		36.43	915.8	3.11
4	15.88		46.58	869.2	2.93
5	11.02				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	22.25	22.39	-0.620
2	2.00	22.13	22.40	-1.20
3	2.50	22.36	22.41	-0.188
4	3.20	22.83	22.39	1.91
5	4.00	22.83	22.32	2.22
6	5.00	22.48	22.16	1.43
7	6.30	21.56	21.84	-1.29
8	8.00	20.87	21.26	-1.87
9	10.00	20.06	20.41	-1.76
10	12.60	19.25	19.20	0.281
11	16.00	17.67	17.66	0.0203
12	20.00	16.19	16.16	0.186
13	25.00	15.06	14.82	1.56
14	32.00	13.59	13.72	-0.978
15	40.00	13.25	13.11	1.02
16	50.00	12.80	12.82	-0.234
17	63.00	12.69	12.78	-0.732
18	80.00	12.80	12.89	-0.762
19	100.0	12.90	13.04	-1.03
20	126.0	13.01	13.12	-0.803
21	160.0	13.77	13.04	5.28
22	200.0	12.80	12.82	-0.204
23	250.0	12.30	12.50	-1.63
24	320.0	11.50	12.10	-5.27
25	400.0	12.20	11.78	3.36
26	500.0	11.60	11.53	0.521



DATA SET: 53

CLIENT: ITGE	DATE: 7-2-90
LOCATION: GRANADA	SOUNDING: 53
COUNTY: ANDALUCIA	AZIMUTH: 250
PROJECT: RESISTIVIDAD	EQUIPMENT: GEOTRON
ELEVATION: 920.00	
SOUNDING COORDINATES: X: 471550.0000 Y: 4159500.0000	

Schlumberger Configuration

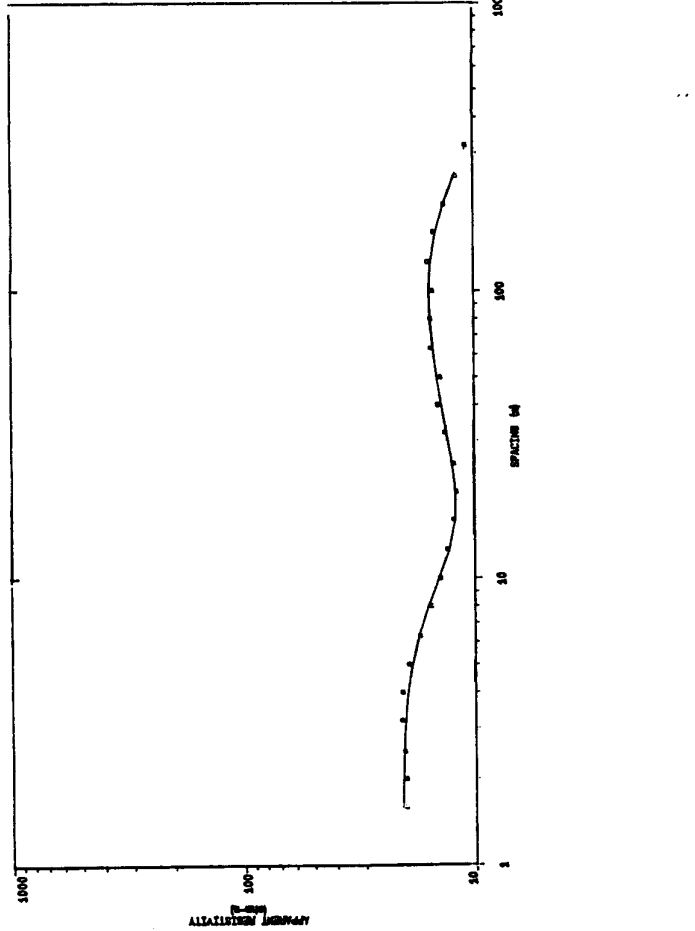
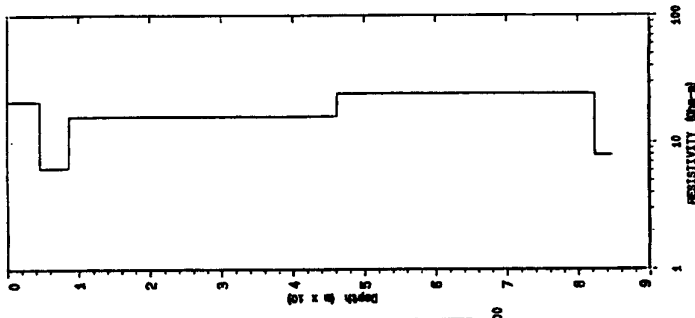
FITTING ERROR: 2.536 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				920.0	
1	20.87		4.54	915.4	0.217
2	6.27		4.09	911.3	0.652
3	15.88		37.47	873.8	2.35
4	24.19		36.18	837.6	1.49
5	7.94				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	20.03	20.76	-3.67
2	2.00	20.03	20.68	-3.24
3	2.50	20.32	20.51	-0.930
4	3.20	20.82	20.17	3.11
5	4.00	20.72	19.63	5.25
6	5.00	19.33	18.78	2.83
7	6.30	17.25	17.52	-1.58
8	8.00	15.46	15.87	-2.62
9	10.00	14.08	14.25	-1.24
10	12.60	13.08	12.89	1.52
11	16.00	12.28	12.14	1.15
12	20.00	11.98	12.10	-1.00
13	25.00	12.28	12.51	-1.90
14	32.00	13.39	13.22	1.27
15	40.00	14.39	13.89	3.50
16	50.00	13.99	14.51	-3.74
17	63.00	15.38	15.08	1.98
18	80.00	15.38	15.49	-0.745
19	100.0	15.08	15.63	-3.64
20	126.0	15.78	15.38	2.51
21	160.0	14.88	14.61	1.84
22	200.0	13.40	13.47	-0.561
23	250.0	11.90	12.12	-1.93
24	320.0	10.80	10.70	0.873





RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: 250

for: ITGE

by: I.T.G.E.

Data Set: IZ53 Date: 7-2-90

Equipment: GEOTRON Sounding: 53

DATA SET: 53B

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 940.00  
 SOUNDING COORDINATES: X: 471450.0000 Y: 4159700.0000

DATE: 7-2-90  
 SOUNDING: 53B  
 AZIMUTH: 245  
 EQUIPMENT: GEOTRON

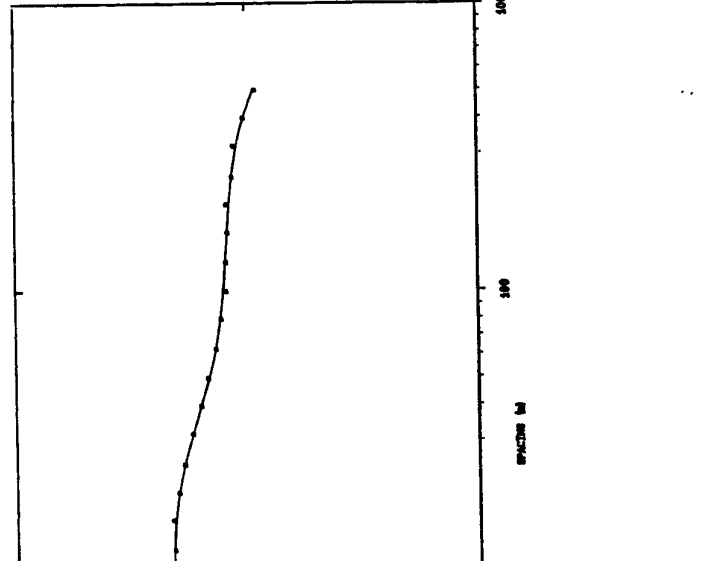
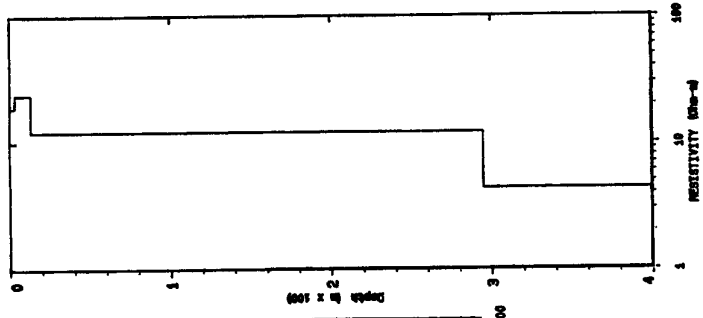
Schlumberger Configuration

FITTING ERROR: 1.333 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				940.0	
1	18.89		2.96	937.0	0.157
2	24.00		10.12	926.9	0.422
3	12.14		281.4	645.4	23.17
4	4.38				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	19.32	18.97	1.81
2	2.00	19.12	19.04	0.408
3	2.50	18.91	19.15	-1.28
4	3.20	19.12	19.36	-1.26
5	4.00	19.43	19.65	-1.12
6	5.00	20.26	20.04	1.09
7	6.30	20.57	20.51	0.289
8	8.00	21.30	20.98	1.47
9	10.00	20.99	21.29	-1.44
10	12.60	21.09	21.34	-1.17
11	16.00	21.30	20.97	1.55
12	20.00	20.12	20.19	-0.334
13	25.00	18.94	19.00	-0.324
14	32.00	17.43	17.39	0.224
15	40.00	15.92	15.93	-0.0148
16	50.00	14.85	14.67	1.20
17	63.00	13.68	13.70	-0.146
18	80.00	12.94	13.04	-0.795
19	100.0	12.30	12.65	-2.84
20	126.0	12.30	12.38	-0.630
21	160.0	12.09	12.14	-0.455
22	200.0	12.20	11.90	2.44
23	250.0	11.50	11.55	-0.508
24	320.0	11.30	10.98	2.76
25	400.0	10.20	10.23	-0.358
26	500.0	9.10	9.25	-1.73



for: itge

by: I.T.G.E.

Data Set: 538 Date: 7-2-90

Equipment: geotron Sounding: 53b

resistividad

iznalloz granada

Azimuth: 245

DATA SET: 54

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 920.00  
 SOUNDING COORDINATES: X: 472750.0000 Y: 4159800.0000

DATE: 8-2-90  
 SOUNDING: 54  
 AZIMUTH: 261  
 EQUIPMENT: GEOTRON

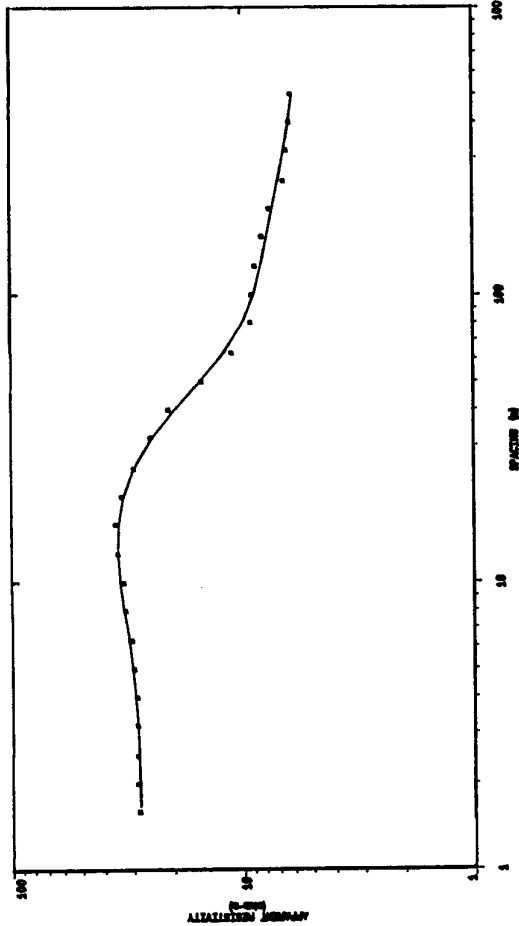
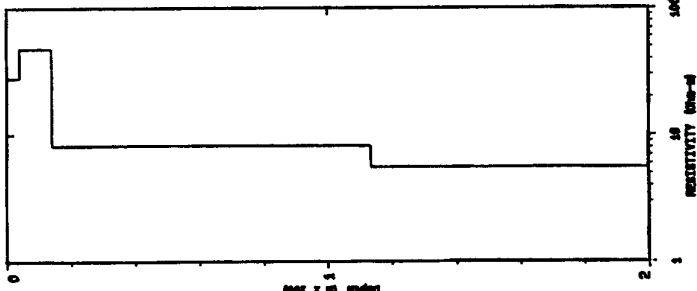
Schlumberger Configuration

FITTING ERROR: 3.498 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				920.0	
1	28.02		3.97	916.0	0.141
2	47.99		10.02	906.0	0.208
3	8.21		99.28	806.7	12.08
4	5.58				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	28.35	28.13	0.761
2	2.00	28.83	28.23	2.08
3	2.50	28.83	28.41	1.47
4	3.20	28.83	28.75	0.279
5	4.00	28.83	29.28	-1.55
6	5.00	29.70	30.10	-1.33
7	6.30	30.37	31.27	-2.95
8	8.00	32.30	32.72	-1.28
9	10.00	32.88	33.99	-3.36
10	12.60	34.81	34.77	0.106
11	16.00	35.60	34.48	3.14
12	20.00	33.34	32.76	1.73
13	25.00	29.51	29.53	-0.0347
14	32.00	25.00	24.55	1.82
15	40.00	20.88	19.62	6.04
16	50.00	15.00	15.24	-1.57
17	63.00	11.10	11.92	-7.38
18	80.00	9.15	9.88	-7.92
19	100.0	9.06	8.86	2.11
20	126.0	8.76	8.26	5.75
21	160.0	8.18	7.78	4.82
22	200.0	7.60	7.36	3.08
23	250.0	6.60	6.95	-5.31
24	320.0	6.40	6.53	-2.10
25	400.0	6.20	6.22	-0.475
26	500.0	6.10	6.00	1.57



for:	itge	resistividad	
by:	I.T.G.E.	iznallos granada	
Data Set:	IZ54	Date:	8-2-90
Equipment:	geotron	Sounding:	iz54
		Azimuth:	261

DATA SET: 55

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 900.00  
 SOUNDING COORDINATES: X: 474500.0000 Y: 4160300.0000

DATE: 8-2-90  
 SOUNDING: 55  
 AZIMUTH: 264  
 EQUIPMENT: GEOTRON

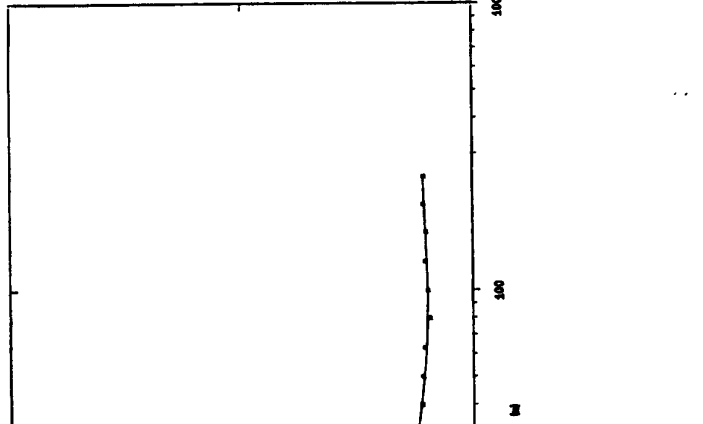
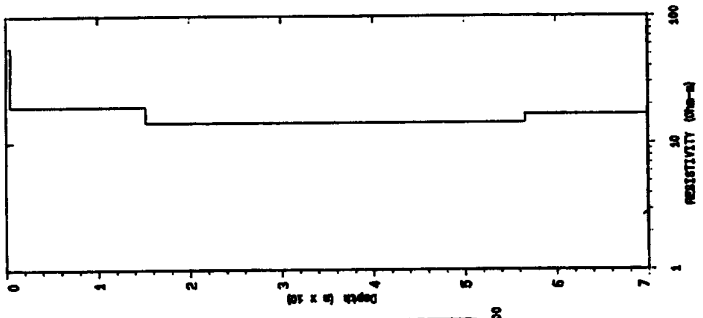
Schlumberger Configuration

FITTING ERROR: 2.554 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				900.0	
1	43.59		0.496	899.5	0.0114
2	19.49		14.19	885.3	0.728
3	14.57		43.03	842.2	2.95
4	16.83				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	28.30	25.87	8.55
2	2.00	23.10	23.50	-1.76
3	2.50	22.50	21.90	2.65
4	3.20	21.30	20.83	2.17
5	4.00	19.80	20.28	-2.46
6	5.00	19.20	19.96	-3.96
7	6.30	18.30	19.74	-7.87
8	8.00	19.60	19.57	0.141
9	10.00	19.40	19.41	-0.0884
10	12.60	19.60	19.21	1.96
11	16.00	19.18	18.91	1.41
12	20.00	18.56	18.51	0.269
13	25.00	17.94	18.00	-0.279
14	32.00	17.02	17.32	-1.81
15	40.00	16.60	16.72	-0.682
16	50.00	16.40	16.20	1.20
17	63.00	16.09	15.83	1.63
18	80.00	15.27	15.64	-2.44
19	100.0	15.58	15.64	-0.395
20	126.0	15.99	15.76	1.42
21	160.0	15.88	15.96	-0.443
22	200.0	16.30	16.15	0.873
23	250.0	16.20	16.33	-0.839



for: itge		resistividad	
by: I.T.G.E.		iznalloz granada	
Data Set: IZ55	Date: 8-2-90	Azimuth: 264	
Equipment: geotron	Sounding: iz55		

DATA SET: 56

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 880.00  
 SOUNDING COORDINATES: X: 475800.0000 Y: 4160200.0000

DATE: 9-2-90  
 SOUNDING: 56  
 AZIMUTH: 278  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

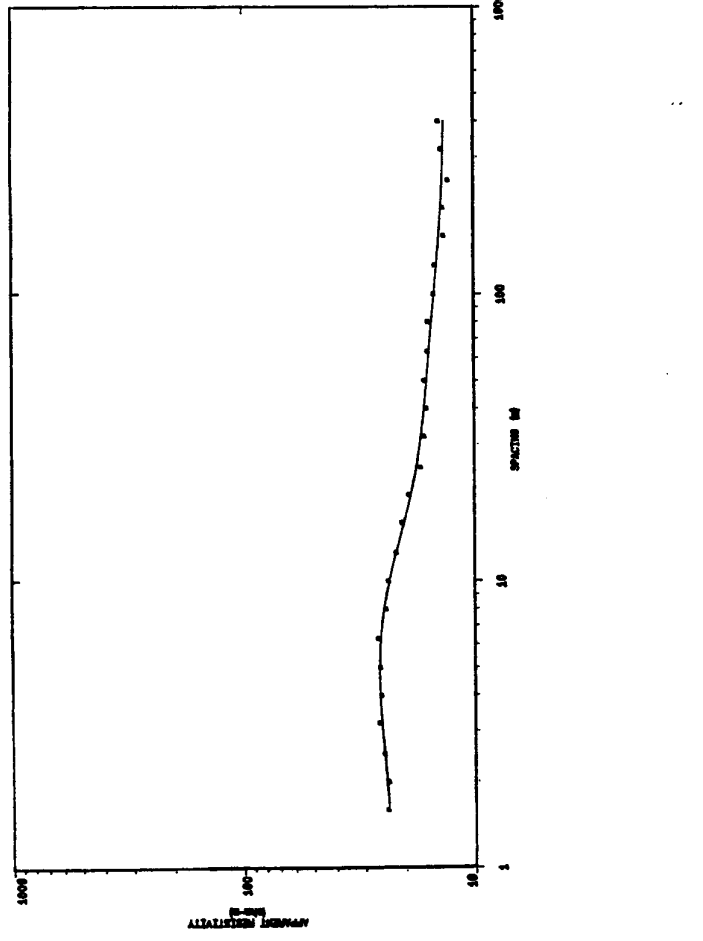
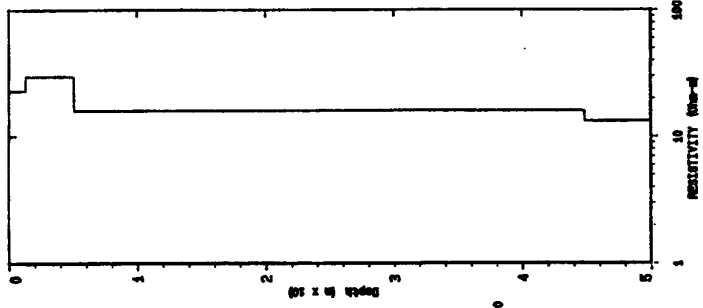
FITTING ERROR: 2.642 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				880.0	
1	22.87		1.28	878.7	0.0561
2	29.87		3.75	874.9	0.125
3	16.00		39.77	835.1	2.48
4	13.30				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	23.91	23.73	0.750
2	2.00	23.80	24.20	-1.67
3	2.50	24.82	24.79	0.145
4	3.20	26.05	25.46	2.28
5	4.00	25.54	25.92	-1.49
6	5.00	25.85	26.09	-0.955
7	6.30	26.36	25.81	2.06
8	8.00	24.42	24.94	-2.13
9	10.00	23.70	23.62	0.321
10	12.60	21.86	21.96	-0.429
11	16.00	20.67	20.21	2.22
12	20.00	19.28	18.81	2.41
13	25.00	17.09	17.75	-3.86
14	32.00	16.49	16.95	-2.73
15	40.00	16.10	16.44	-2.13
16	50.00	16.40	16.04	2.16
17	63.00	15.90	15.65	1.52
18	80.00	15.80	15.24	3.52
19	100.0	14.90	14.84	0.365
20	126.0	14.70	14.45	1.68
21	160.0	13.50	14.10	-4.46
22	200.0	13.60	13.84	-1.83
23	250.0	12.90	13.66	-5.93
24	320.0	13.80	13.52	1.95
25	400.0	14.20	13.45	5.27





for:	itge	resistividad
by:	I.T.G.E.	iznallos granada
Data Set:	Iz56	Date: 9-2-90
Equipment:	geotron	Sounding: iz56
		Azimuth: 278

DATA SET: 57

CLIENT: ITGE  
LOCATION: GRANADA  
COUNTY: ANDALUCIA  
PROJECT: RESISTIVIDAD  
ELEVATION: 860.00  
SOUNDING COORDINATES: X: 475800.0000 Y: 4159950.0000

DATE: 9-2-90  
SOUNDING: 57  
AZIMUTH: 264  
EQUIPMENT: GEOTRON

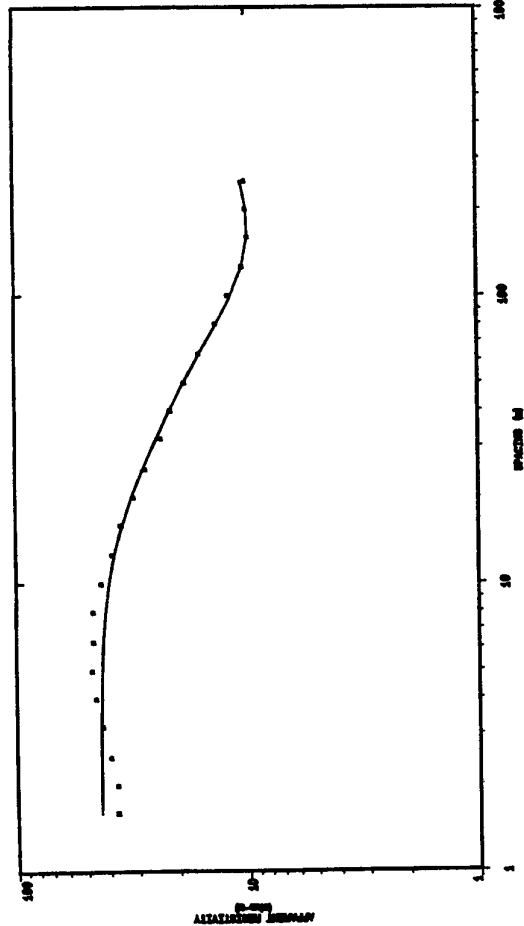
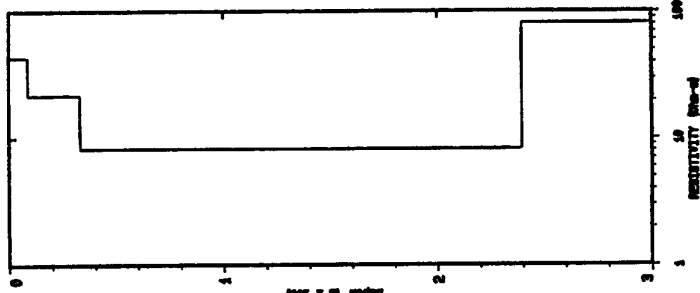
Schlumberger Configuration

FITTING ERROR: 7.055 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
1	43.28		11.04	860.0 848.9	0.255
2	17.64		30.57	818.3	1.73
3	7.64		188.0	630.3	24.61
4	82.34				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	37.14	43.27	-16.48
2	2.00	37.23	43.25	-16.17
3	2.50	39.78	43.22	-8.64
4	3.20	43.04	43.17	-0.291
5	4.00	45.86	43.07	6.07
6	5.00	47.62	42.90	9.90
7	6.30	47.00	42.56	9.44
8	8.00	47.09	41.90	11.01
9	10.00	43.39	40.83	5.90
10	12.60	38.73	39.06	-0.856
11	16.00	35.37	36.33	-2.73
12	20.00	30.98	32.98	-6.43
13	25.00	27.53	29.11	-5.74
14	32.00	23.61	24.80	-5.05
15	40.00	21.46	21.32	0.638
16	50.00	18.66	18.39	1.43
17	63.00	16.09	15.83	1.59
18	80.00	13.61	13.56	0.414
19	100.0	12.00	11.79	1.67
20	126.0	10.38	10.47	-0.901
21	160.0	9.80	9.75	0.543
22	200.0	10.00	9.70	2.90
23	250.0	10.10	10.26	-1.61



for: resistividad

iznalloz  
granada

Azimuth: 264

for: itge

by: I.T.G.E.

Data Set: IZ57 Date: 9-2-90

Equipment: geotron Sounding: IZ57

DATA SET: IZ-58

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 650.00  
 SOUNDING COORDINATES: X: 489550.0000 Y: 4160750.0000

DATE: 27-10-89  
 SOUNDING: 58  
 AZIMUTH: 0-38-N  
 EQUIPMENT: GEOTRON

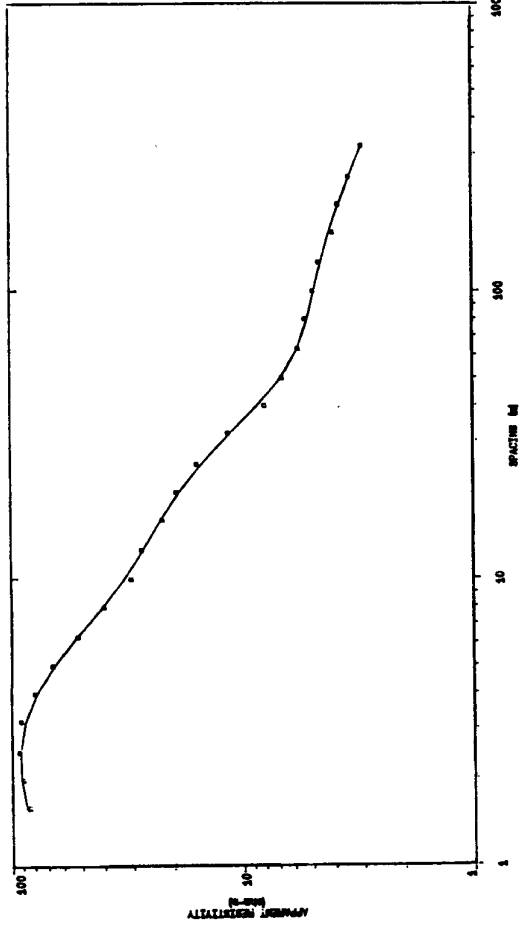
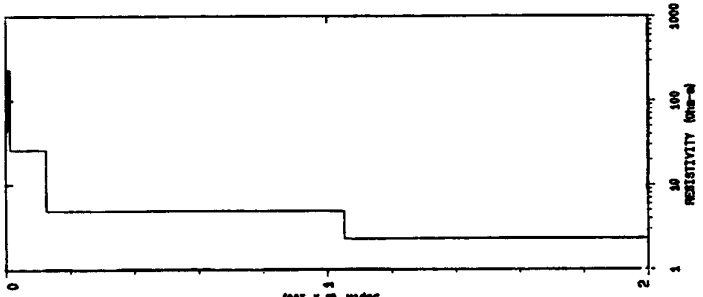
Schlumberger Configuration

FITTING ERROR: 2.850 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				650.0	
1	44.76		0.462	649.5	0.0103
2	236.0		0.803	648.7	0.00340
3	26.14		11.26	637.4	0.430
4	4.94		92.61	544.8	18.73
5	2.33				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	84.13	86.79	-3.16
2	2.00	89.86	91.39	-1.70
3	2.50	93.24	92.02	1.30
4	3.20	91.19	87.10	4.48
5	4.00	79.21	77.79	1.79
6	5.00	66.52	65.42	1.65
7	6.30	51.68	52.00	-0.617
8	8.00	39.81	40.20	-0.990
9	10.00	30.29	32.27	-6.53
10	12.60	27.22	26.74	1.75
11	16.00	22.12	22.50	-1.73
12	20.00	19.24	18.80	2.30
13	25.00	15.73	15.05	4.32
14	32.00	11.48	11.22	2.24
15	40.00	7.97	8.52	-6.92
16	50.00	6.70	6.75	-0.794
17	63.00	5.70	5.72	-0.479
18	80.00	5.30	5.17	2.33
19	100.0	4.90	4.84	1.14
20	126.0	4.60	4.52	1.66
21	160.0	4.00	4.15	-3.78
22	200.0	3.80	3.76	0.897
23	250.0	3.40	3.37	0.612
24	320.0	3.00	3.00	-0.248



RESISTIVIDAD	
GRANADA ANDALUCIA	
for: ITGE	
by: I.T.G.E.	
Data Set: IZ-58	Date: 27-10-89
Equipment: GEOTRON	Sounding: 58
Azimuth: 0-38-N	

DATA SET: IZ-59

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 650.00  
 SOUNDING COORDINATES: X: 490650.0000 Y: 4160150.0000

DATE: 27-10-89  
 SOUNDING: 59  
 AZIMUTH: 0-28-N  
 EQUIPMENT: GEOTRON

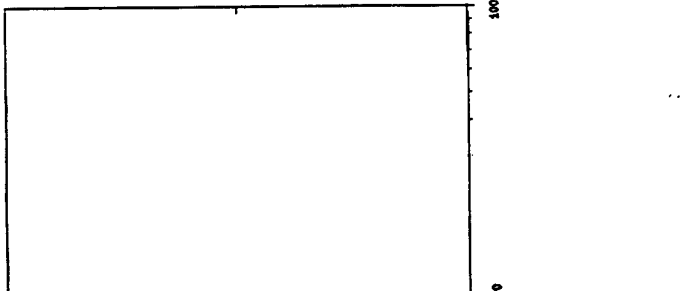
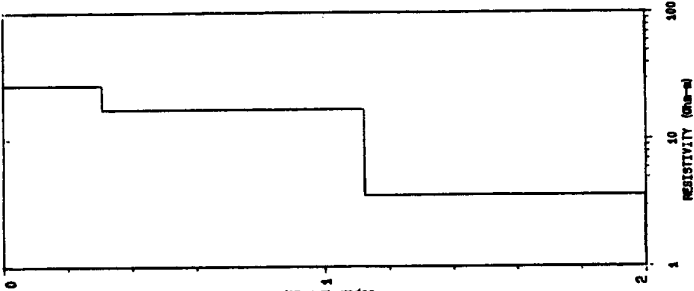
Schlumberger Configuration

FITTING ERROR: 4.399 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				650.0	
1	26.85		3.06	646.9	0.114
2	17.24		8.16	638.7	0.473
3	3.65				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	26.13	26.67	-2.04
2	2.00	25.44	26.50	-4.17
3	2.50	25.44	26.21	-3.02
4	3.20	27.29	25.66	5.97
5	4.00	26.94	24.87	7.66
6	5.00	23.35	23.77	-1.77
7	6.30	21.97	22.28	-1.43
8	8.00	20.23	20.45	-1.07
9	10.00	18.15	18.55	-2.18
10	12.60	16.07	16.40	-2.02
11	16.00	14.10	13.94	1.08
12	20.00	11.75	11.48	2.26
13	25.00	9.68	9.06	6.39
14	32.00	6.20	6.80	-9.65
15	40.00	5.26	5.37	-2.07
16	50.00	4.70	4.52	3.70
17	63.00	4.30	4.08	4.97
18	80.00	3.90	3.88	0.495
19	100.0	3.60	3.78	-5.23



for: ITGE  
 by: I.I.G.E.  
 Data Set: IZ-59 Date: 27-10-89  
 Equipment: GEOTRON Sounding: 59

RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: 0-28-N

DATA SET: 12-60

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 675.00  
 SOUNDING COORDINATES: X: 492300.0000 Y: 4160350.0000

DATE: 26-10-89  
 SOUNDING: 60  
 AZIMUTH: 0-28-N  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

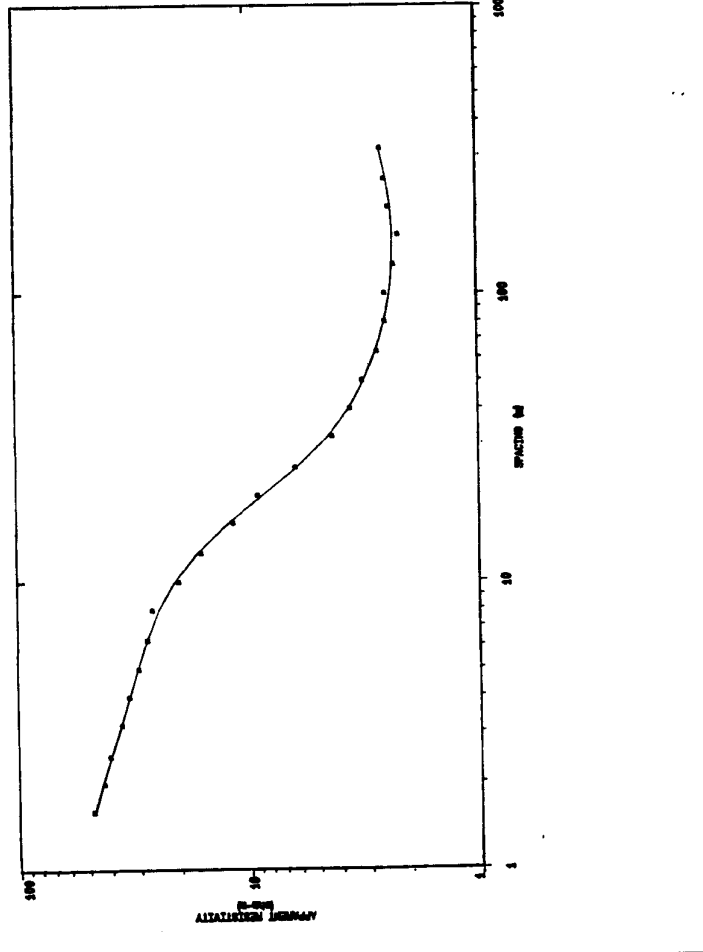
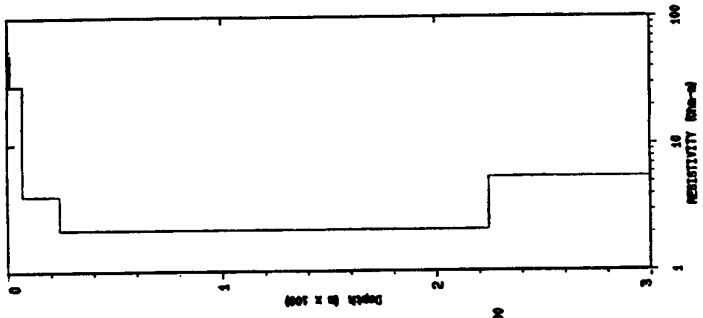
FITTING ERROR: 3.055 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				675.0	
1	55.88		0.982	674.0	0.0175
2	29.36		5.85	668.1	0.199
3	3.95		17.36	650.7	4.38
4	2.14		200.2	450.5	93.53
5	5.51				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	48.07	47.57	1.05
2	2.00	43.16	44.01	-1.97
3	2.50	40.60	40.19	1.00
4	3.20	35.98	36.20	-0.623
5	4.00	33.33	33.10	0.670
6	5.00	30.18	30.41	-0.775
7	6.30	27.62	27.72	-0.339
8	8.00	26.25	24.54	6.48
9	10.00	20.15	20.93	-3.88
10	12.60	16.12	16.63	-3.14
11	16.00	11.63	12.14	-4.35
12	20.00	9.08	8.59	5.39
13	25.00	6.22	6.07	2.45
14	32.00	4.28	4.42	-3.19
15	40.00	3.57	3.60	-0.955
16	50.00	3.16	3.10	1.81
17	63.00	2.72	2.75	-1.03
18	80.00	2.50	2.51	-0.250
19	100.0	2.50	2.38	4.99
20	126.0	2.29	2.31	-1.21
21	160.0	2.18	2.30	-5.82
22	200.0	2.40	2.34	2.12
23	250.0	2.50	2.44	2.26
24	320.0	2.60	2.62	-0.791





RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: 0-28-N

for: ITGE  
 by: I.T.G.E.  
 Data Set: IZ-60 Date: 26-10-89  
 Equipment: GEOTRON Sounding: 60

DATA SET: IZ-61

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 650.00  
 SOUNDING COORDINATES: X: 493100.0000 Y: 4159600.0000

DATE: 16-10-89  
 SOUNDING: 61  
 AZIMUTH: E-28-S  
 EQUIPMENT: GEOTRON

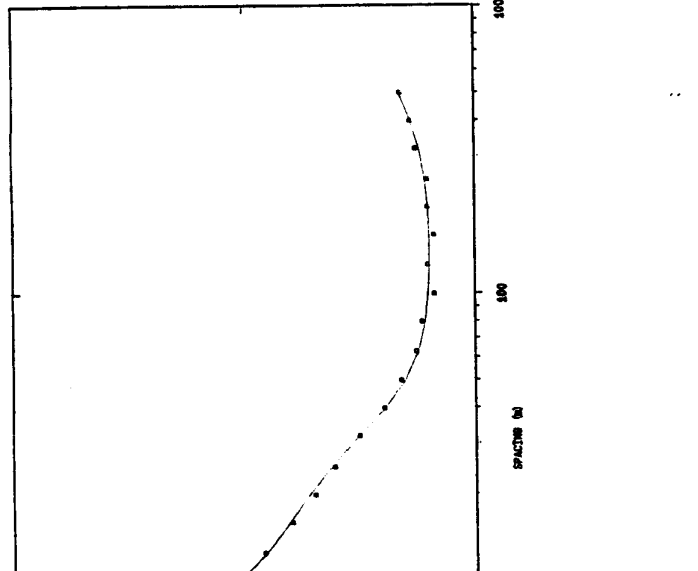
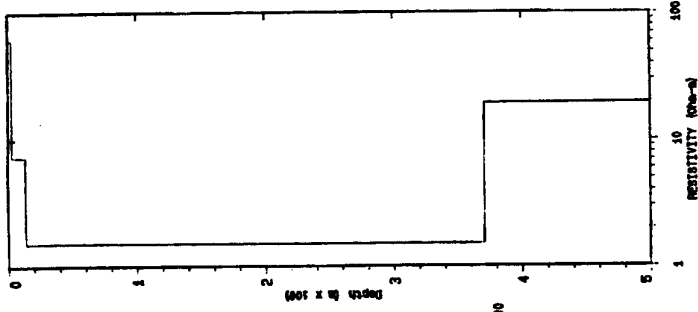
Schlumberger Configuration

FITTING ERROR: 4.519 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				650.0	
1	61.76		2.40	647.5	0.0389
2	7.31		10.92	636.6	1.49
3	1.52		357.2	279.4	234.9
4	19.54				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	65.21	58.99	9.54
2	2.00	59.64	56.77	4.80
3	2.50	52.05	53.18	-2.17
4	3.20	44.93	47.13	-4.89
5	4.00	36.75	39.74	-8.11
6	5.00	29.28	31.17	-6.44
7	6.30	22.29	22.47	-0.805
8	8.00	15.77	15.22	3.42
9	10.00	11.62	10.74	7.50
10	12.60	8.30	8.07	2.76
11	16.00	6.30	6.46	-2.54
12	20.00	5.00	5.30	-6.18
13	25.00	4.10	4.23	-3.28
14	32.00	3.20	3.18	0.565
15	40.00	2.50	2.46	1.32
16	50.00	2.10	2.01	4.19
17	63.00	1.80	1.76	2.20
18	80.00	1.70	1.64	3.45
19	100.0	1.50	1.59	-6.20
20	126.0	1.60	1.57	1.65
21	160.0	1.50	1.57	-4.96
22	200.0	1.60	1.59	0.344
23	250.0	1.60	1.63	-2.48
24	320.0	1.80	1.73	3.56
25	400.0	1.90	1.88	0.688
26	500.0	2.10	2.12	-1.17



RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: E-28-S

for: ITGE  
 by: I.T.G.E.  
 Data Set: IZ-61 Date: 16-10-89  
 Equipment: GEOTRON Sounding: 61

DATA SET: IZ62

CLIENT: itge	DATE: 26-10-89
LOCATION: iznalloz	SOUNDING: IZ62
COUNTY: granada	AZIMUTH: E-28-S
PROJECT: resistividad	EQUIPMENT: geotron
ELEVATION: 580.00	
SOUNDING COORDINATES: X: 494600.0000 Y: 4159650.0000	

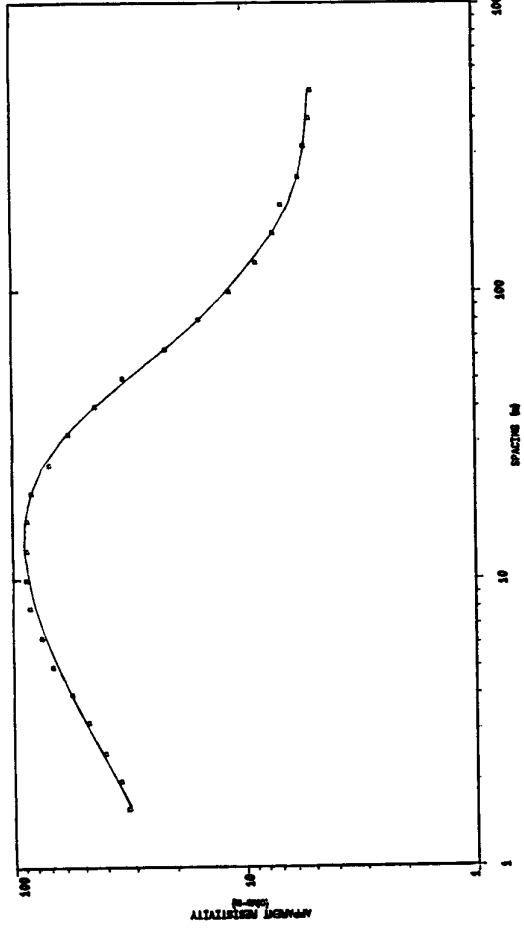
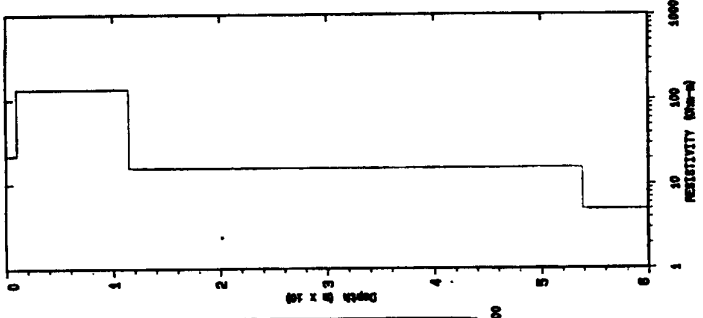
Schlumberger Configuration

FITTING ERROR: 3.432 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				580.0	
1	21.94		0.990	579.0	0.0451
2	133.3		10.49	568.5	0.0787
3	15.61		42.37	526.1	2.71
4	4.99				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	32.36	31.36	3.08
2	2.00	34.89	36.08	-3.39
3	2.50	40.62	41.92	-3.20
4	3.20	47.89	49.45	-3.25
5	4.00	56.36	56.93	-1.00
6	5.00	68.03	64.77	4.79
7	6.30	75.52	72.87	3.51
8	8.00	84.77	80.54	4.98
9	10.00	88.29	86.21	2.35
10	12.60	87.41	89.47	-2.35
11	16.00	86.92	88.77	-2.13
12	20.00	82.97	83.45	-0.574
13	25.00	69.28	73.50	-6.09
14	32.00	57.35	58.52	-2.02
15	40.00	43.95	44.00	-0.123
16	50.00	33.31	31.30	6.03
17	63.00	21.68	21.67	0.0408
18	80.00	15.57	15.37	1.25
19	100.0	11.43	11.72	-2.56
20	126.0	8.77	9.17	-4.65
21	160.0	7.39	7.37	0.246
22	200.0	6.80	6.30	7.29
23	250.0	5.70	5.70	-0.00266
24	320.0	5.40	5.36	0.640
25	400.0	5.10	5.21	-2.17
26	500.0	5.00	5.12	-2.44



for: ITGE		RESISTIVIDAD	
by: I.T.G.E.		GRANADA ANDALUCIA	
Data Set: IZ-62	Date: 26-10-89	Azimuth: E-28-S	
Equipment: 6EOTRON	Sounding: 62		

DATA SET: I263

CLIENT: itge  
 LOCATION: iznalloz  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 580.00  
 SOUNDING COORDINATES: X: 495675.0000 Y: 4159975.0000

DATE: 25-10-89  
 SOUNDING: I263  
 AZIMUTH: E-26-N  
 EQUIPMENT: geotron

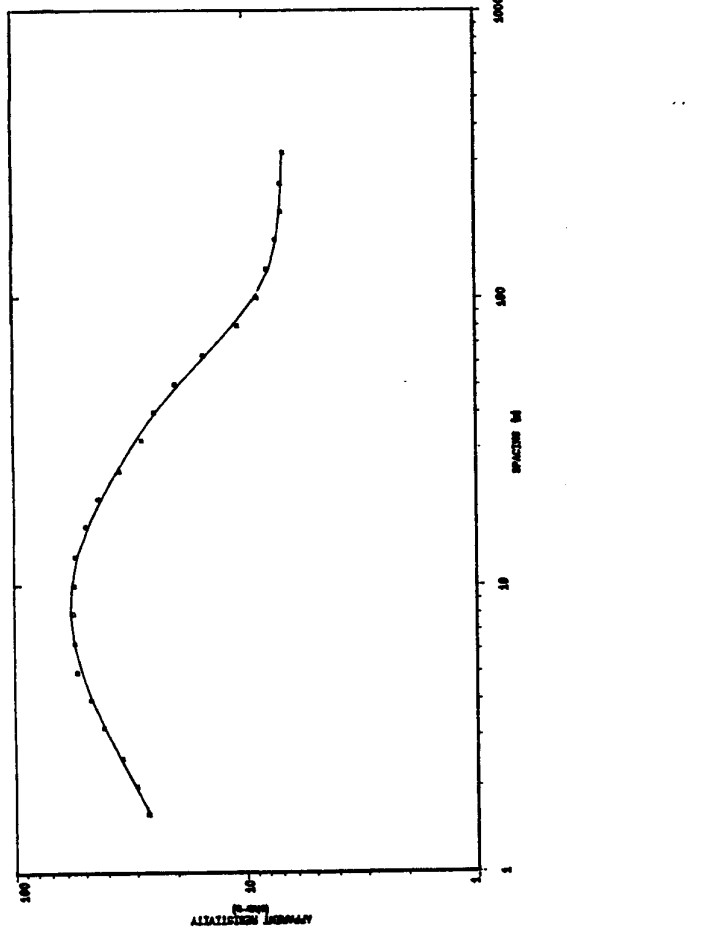
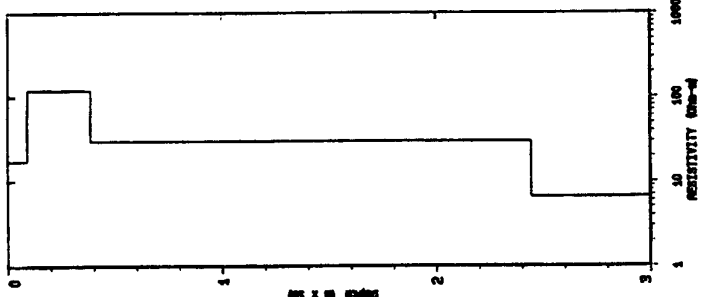
Schlumberger Configuration

FITTING ERROR: 2.593 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
1	17.32		0.909	580.0	0.0525
2	120.2		2.93	579.0	0.0244
3	30.11		20.57	576.1	0.683
4	6.64			555.5	

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	26.69	26.30	1.46
2	2.00	29.88	30.43	-1.81
3	2.50	34.56	35.31	-2.17
4	3.20	41.48	41.25	0.551
5	4.00	47.01	46.64	0.790
6	5.00	53.82	51.50	4.30
7	6.30	54.99	55.30	-0.578
8	8.00	55.62	57.18	-2.79
9	10.00	54.99	56.55	-2.83
10	12.60	54.35	53.40	1.73
11	16.00	49.04	48.04	2.03
12	20.00	43.21	42.00	2.79
13	25.00	35.04	35.86	-2.33
14	32.00	27.78	29.48	-6.08
15	40.00	24.52	24.13	1.56
16	50.00	19.92	19.17	3.77
17	63.00	15.06	14.66	2.64
18	80.00	10.69	11.11	-3.96
19	100.0	8.74	8.98	-2.69
20	126.0	7.96	7.78	2.31
21	160.0	7.28	7.20	1.09
22	200.0	6.90	6.96	-0.873
23	250.0	6.90	6.82	1.02
24	320.0	6.70	6.74	-0.745



for:	itge	resistividad
by:	I.T.G.E.	iznallos granada
Data Set: IZ63	Date: 25-10-89	Azimuth: E-26-N
Equipment: geotron	Sounding: IZ63	

DATA SET: I264

CLIENT: itge  
LOCATION: iznalloz  
COUNTY: granada  
PROJECT: resistividad  
ELEVATION: 580.00  
SOUNDING COORDINATES: X: 496500.0000 Y: 4160400.0000

DATE: 25-10-89  
SOUNDING: 64  
AZIMUTH: E-36-N  
EQUIPMENT: geotron

Schlumberger Configuration

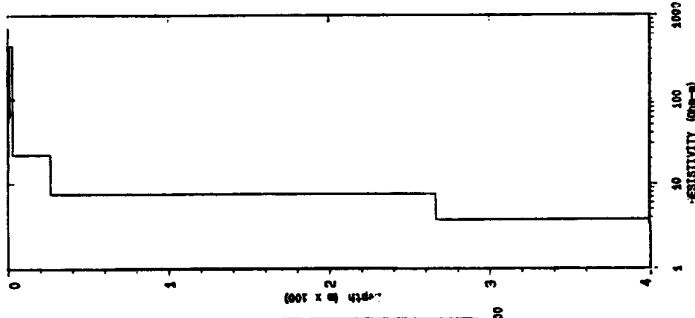
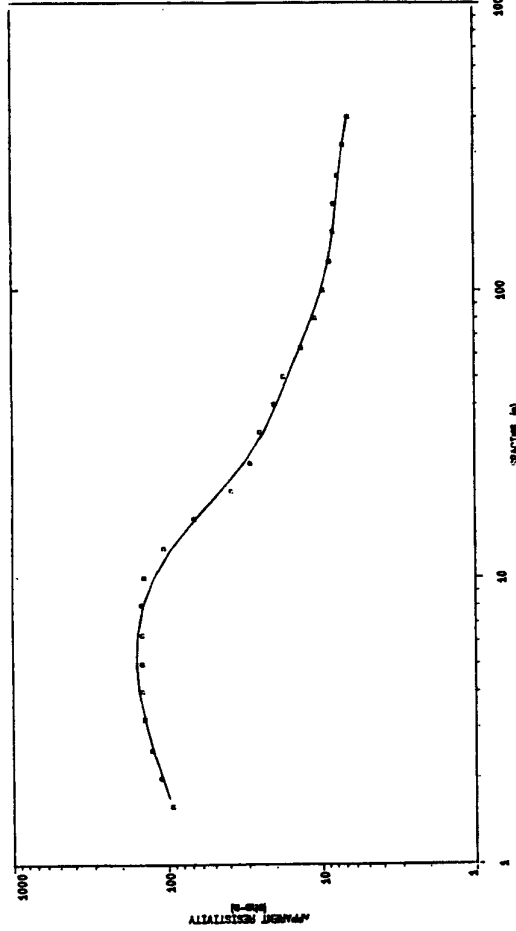
FITTING ERROR: 6.552 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
1	53.55		0.745	579.2	0.0139
2	440.0		2.01	577.2	0.00457
3	22.25		23.89	553.3	1.07
4	7.67		239.8	313.4	31.23
5	3.81			580.0	

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	93.82	93.69	0.139
2	2.00	110.8	108.6	1.93
3	2.50	127.2	124.6	1.97
4	3.20	141.6	141.5	0.102
5	4.00	146.8	153.4	-4.55
6	5.00	146.4	159.5	-8.97
7	6.30	145.9	157.1	-7.62
8	8.00	147.2	143.5	2.51
9	10.00	141.6	121.7	14.07
10	12.60	105.1	93.75	10.80
11	16.00	66.73	65.42	1.96
12	20.00	38.16	44.65	-17.00
13	25.00	28.56	31.23	-9.34
14	32.00	24.64	23.22	5.75
15	40.00	19.95	19.22	3.66
16	50.00	17.44	16.25	6.81
17	63.00	13.29	13.57	-2.10
18	80.00	10.80	11.29	-4.57
19	100.0	9.55	9.77	-2.35
20	126.0	8.61	8.78	-1.91
21	160.0	8.20	8.17	0.411
22	200.0	8.10	7.78	3.89
23	250.0	7.60	7.44	1.99
24	320.0	7.00	7.03	-0.487
25	400.0	6.50	6.57	-1.14





for: itge

by: I.T.G.E.

Data Set: 1764 Date: 25-10-89

Equipment: geotron Sounding: 64

resistividad

iznalloz  
granada

Azimuth: E-16-N

DATA SET: I265

CLIENT: itge  
 LOCATION: iznalloz  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 560.00  
 SOUNDING COORDINATES: X: 496500.0000 Y: 4160750.0000

DATE: 25-10-89  
 SOUNDING: 65  
 AZIMUTH: E-24-N  
 EQUIPMENT: geotron

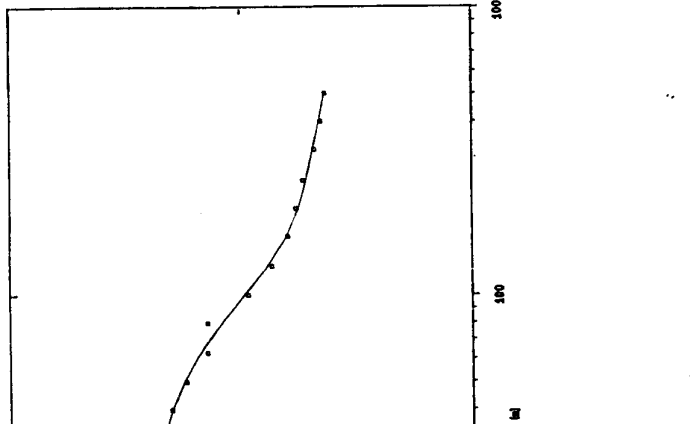
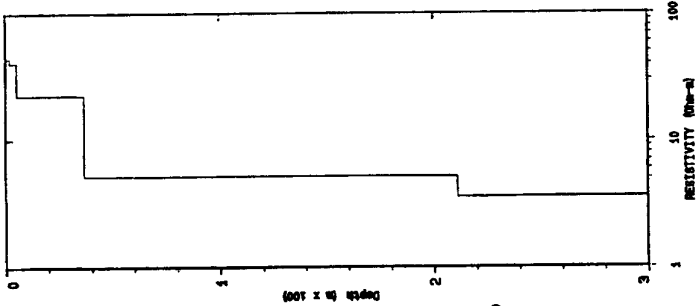
Schlumberger Configuration

FITTING ERROR: 4.729 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				560.0	
1	44.65		1.63	558.3	0.0366
2	41.03		3.33	555.0	0.0813
3	22.51		31.45	523.5	1.39
4	5.19		174.4	349.1	33.56
5	3.57				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	42.28	44.23	-4.62
2	2.00	44.71	43.93	1.72
3	2.50	46.87	43.47	7.25
4	3.20	45.25	42.69	5.65
5	4.00	42.37	41.68	1.62
6	5.00	37.69	40.31	-6.94
7	6.30	36.88	38.43	-4.19
8	8.00	34.27	35.94	-4.86
9	10.00	33.37	33.23	0.417
10	12.60	30.85	30.32	1.71
11	16.00	27.39	27.57	-0.647
12	20.00	26.24	25.42	3.11
13	25.00	23.74	23.64	0.406
14	32.00	20.86	21.84	-4.69
15	40.00	20.09	20.04	0.244
16	50.00	17.40	17.85	-2.64
17	63.00	14.05	15.16	-7.89
18	80.00	14.05	12.19	13.24
19	100.0	9.33	9.67	-3.55
20	126.0	7.37	7.67	-4.07
21	160.0	6.29	6.36	-1.09
22	200.0	5.80	5.65	2.43
23	250.0	5.40	5.23	3.13
24	320.0	4.80	4.87	-1.59
25	400.0	4.50	4.58	-1.98
26	500.0	4.30	4.32	-0.604



RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: E-24 N

for: ITGE  
 by: I.T.G.E.  
 Data Set: IZ-65 Date: 25-10-89  
 Equipment: 6ELECTRON Sounding: 65

DATA SET: I266

CLIENT: itge  
 LOCATION: iznaloz  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 550.00  
 SOUNDING COORDINATES: X: 499500.0000 Y: 4161200.0000

DATE: 24-10-90  
 SOUNDING: 66  
 AZIMUTH: N-2-E  
 EQUIPMENT: geotron

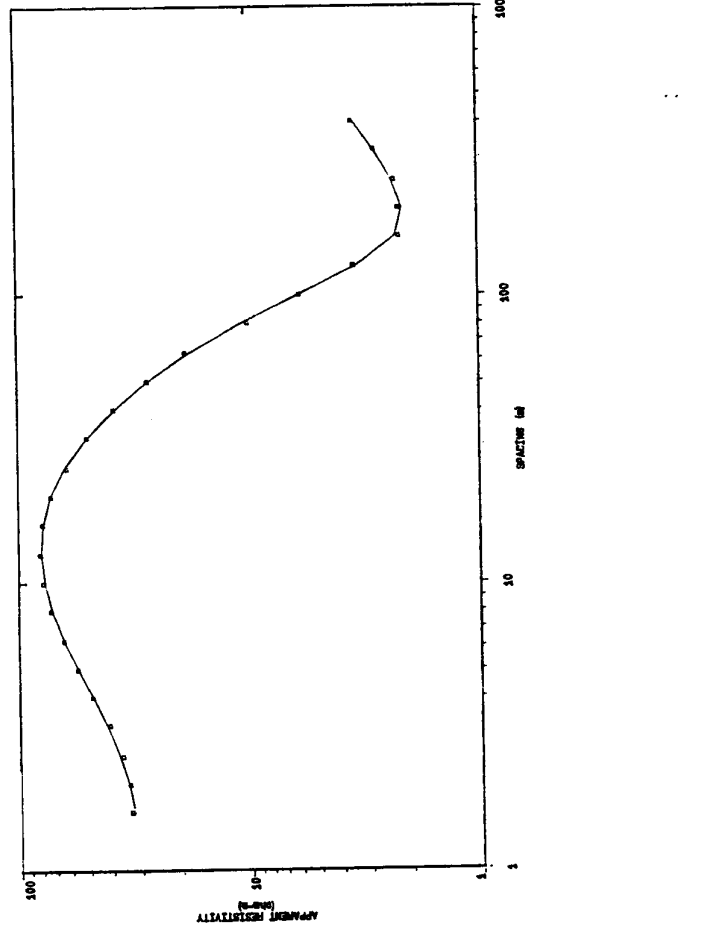
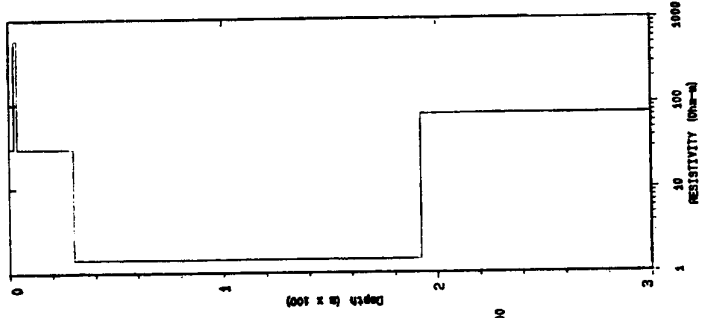
Schlumberger Configuration

FITTING ERROR: 2.243 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				550.0	
1	29.92		2.15	547.8	0.0719
2	582.8		1.49	546.3	0.00256
3	29.68		26.23	520.1	0.884
4	1.46		162.3	357.7	111.1
5	75.56				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	33.29	32.35	2.82
2	2.00	33.93	34.22	-0.826
3	2.50	36.36	37.21	-2.33
4	3.20	41.23	42.26	-2.50
5	4.00	48.76	48.49	0.558
6	5.00	56.29	55.98	0.560
7	6.30	64.23	64.27	-0.0590
8	8.00	72.98	72.21	1.05
9	10.00	79.05	77.80	1.58
10	12.60	81.00	80.47	0.644
11	16.00	79.10	78.83	0.343
12	20.00	72.40	72.89	-0.676
13	25.00	61.59	63.30	-2.76
14	32.00	50.24	50.26	-0.0470
15	40.00	38.56	38.24	0.840
16	50.00	27.44	27.37	0.263
17	63.00	18.75	17.99	4.04
18	80.00	10.05	10.60	-5.47
19	100.0	5.97	5.97	-0.115
20	126.0	3.45	3.33	3.58
21	160.0	2.20	2.27	-3.41
22	200.0	2.20	2.12	3.20
23	250.0	2.30	2.34	-2.12
24	320.0	2.80	2.82	-0.805
25	400.0	3.50	3.43	1.83



RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: N-2 -E

for: ITGE

by: I.T.G.E.

Data Set: IZ-66 Date: 24-10-89

Equipment: GEOTRON Sounding: 66

DATA SET: 12-67

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 580.00  
 SOUNDING COORDINATES: X: 4996500000 Y: 4162050.0000

DATE: 24-10-89  
 SOUNDING: 67  
 AZIMUTH: N-32 -0  
 EQUIPMENT: GEOTRON

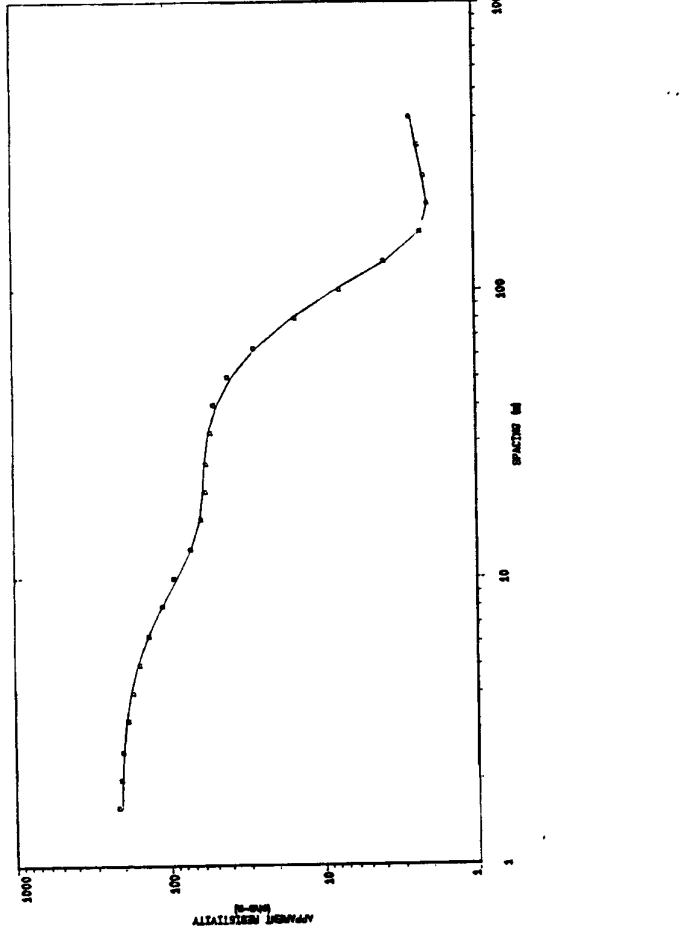
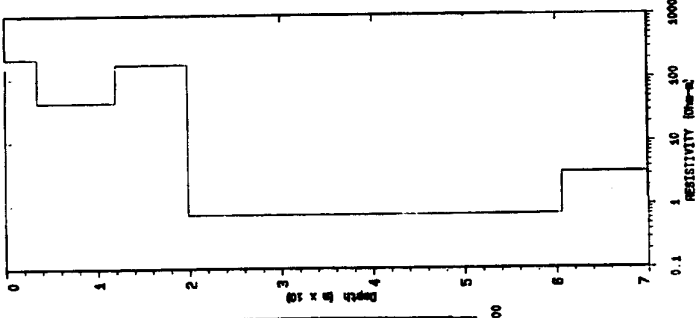
Schlumberger Configuration

FITTING ERROR: 3.332 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANC (Siemens)
				550.0	
1	212.3		3.44	546.5	0.0162
2	42.93		8.50	538.0	0.198
3	170.9		7.85	530.1	0.0459
4	0.720		40.73	489.4	56.57
5	3.30				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m)	SYNTHETIC	DIFFERENCE (percent)
1	1.60	219.6	209.3	4.65	
2	2.00	210.9	206.8	1.93	
3	2.50	203.9	202.2	0.828	
4	3.20	188.2	193.3	-2.71	
5	4.00	173.9	180.4	-3.72	
6	5.00	156.5	162.0	-3.52	
7	6.30	136.6	137.9	-0.958	
8	8.00	110.7	110.9	-0.149	
9	10.00	93.25	88.50	5.09	
10	12.60	72.54	71.96	0.805	
11	16.00	62.05	62.97	-1.47	
12	20.00	57.50	59.83	-4.05	
13	25.00	57.12	58.28	-2.01	
14	32.00	52.95	54.73	-3.35	
15	40.00	50.42	48.10	4.61	
16	50.00	40.82	38.30	6.16	
17	63.00	27.41	26.53	3.19	
18	80.00	14.70	15.38	-4.61	
19	100.0	7.52	7.93	-5.42	
20	126.0	3.88	3.75	3.18	
21	160.0	2.23	2.21	1.12	
22	200.0	2.00	1.99	0.209	
23	250.0	2.10	2.13	-1.74	
24	320.0	2.30	2.34	-2.16	
25	400.0	2.60	2.53	2.42	



RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: N-32 -0

for: I.T.

by: I.T.G.E.

Data Set: IZ-67 Date: 14-10-89

Equipment: GECTRON Sounding: 67

DATA SET: 12-68

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 525.00  
 SOUNDING COORDINATES: X: 498825.0000 Y: 4162550.0000

DATE: 17-10-89  
 SOUNDING: 68  
 AZIMUTH: E-10-S  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

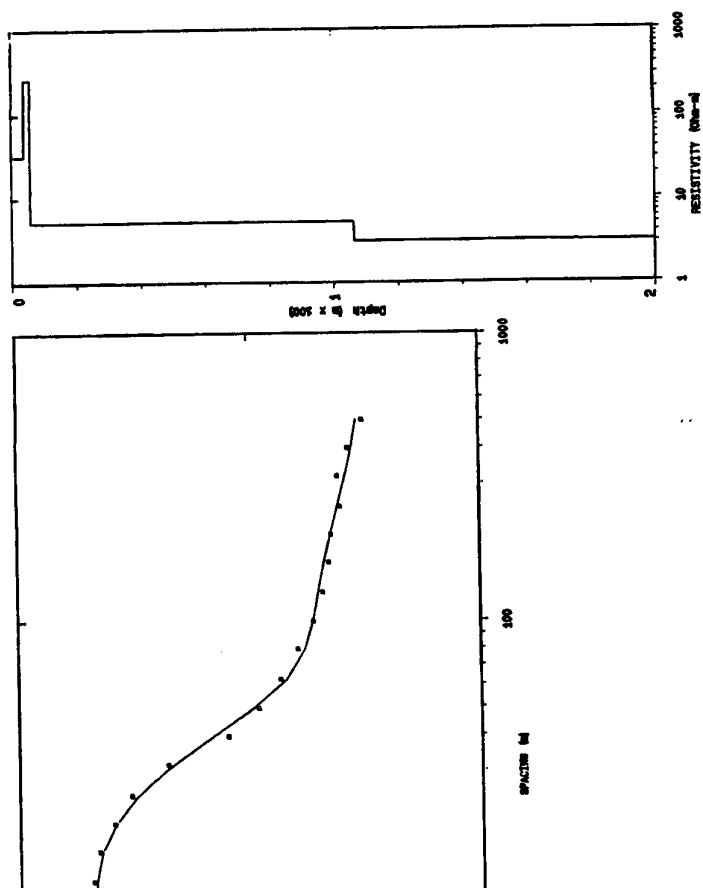
FITTING ERROR: 5.153 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				525.0	
1	32.40		3.86	521.1	0.119
2	265.2		1.95	519.1	0.00738
3	5.23		100.6	418.5	19.21
4	3.10				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	34.50	32.76	5.02
2	2.00	34.10	33.06	3.04
3	2.50	32.70	33.59	-2.75
4	3.20	34.10	34.65	-1.63
5	4.00	35.20	36.24	-2.95
6	5.00	37.50	38.56	-2.82
7	6.30	40.80	41.64	-2.06
8	8.00	45.10	44.94	0.337
9	10.00	47.30	47.15	0.310
10	12.60	48.80	47.38	2.90
11	16.00	45.70	44.50	2.61
12	20.00	39.40	38.81	1.48
13	25.00	33.00	30.97	6.12
14	32.00	22.80	21.65	5.00
15	40.00	12.50	14.50	-16.03
16	50.00	9.20	9.62	-4.63
17	63.00	7.40	6.92	6.46
18	80.00	6.20	5.75	7.17
19	100.0	5.30	5.31	-0.273
20	126.0	4.80	5.02	-4.71
21	160.0	4.50	4.73	-5.12
22	200.0	4.40	4.42	-0.649
23	250.0	4.00	4.11	-2.91
24	320.0	4.10	3.79	7.40
25	400.0	3.70	3.56	3.70
26	500.0	3.20	3.39	-6.10





RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: E-10-S

for: ITGE  
 by: I.T.G.E.  
 Data Set: IZ-68 Date: 17-10-89  
 Equipment: GEOTRON Sounding: 68

DATA SET: 12-69

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 525.00  
 SOUNDING COORDINATES: X: 497350.0000 Y: 4163600.0000

DATE: 17-10-89  
 SOUNDING: 69  
 AZIMUTH: E-40 -S  
 EQUIPMENT: GEOTRON

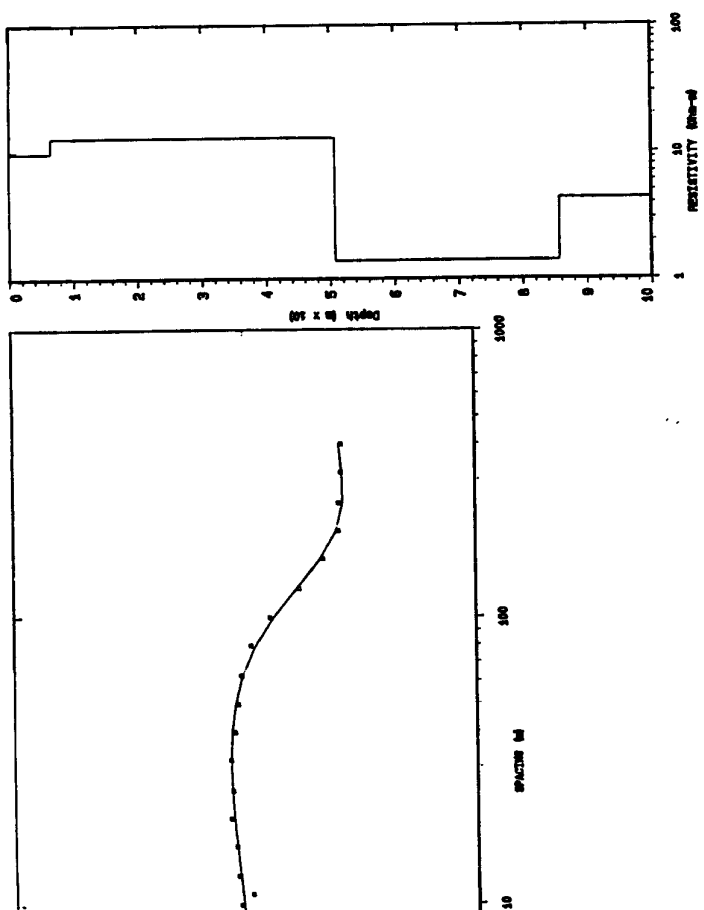
Schlumberger Configuration

FITTING ERROR: 3.502 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				525.0	
1	9.81		6.45	518.5	0.657
2	12.95		44.28	474.2	3.41
3	1.39		34.86	439.3	24.95
4	4.37				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	9.83	9.81	0.212
2	2.50	9.65	9.83	-1.79
3	3.20	9.56	9.85	-2.95
4	4.00	9.65	9.88	-2.33
5	5.00	10.20	9.94	2.51
6	6.30	10.56	10.04	4.88
7	8.00	10.74	10.21	4.91
8	10.00	10.65	10.43	1.99
9	10.90	9.47	10.54	-11.24
10	12.60	10.92	10.73	1.69
11	16.00	11.12	11.08	0.363
12	20.00	11.72	11.39	2.84
13	25.00	11.52	11.62	-0.882
14	32.00	11.72	11.72	0.0329
15	40.00	11.22	11.58	-3.18
16	50.00	10.82	11.15	-3.02
17	63.00	10.43	10.32	1.06
18	80.00	9.45	9.03	4.50
19	100.0	7.80	7.53	3.34
20	126.0	5.85	5.97	-2.17
21	160.0	4.58	4.69	-2.53
22	200.0	3.90	3.99	-2.55
23	250.0	3.90	3.74	4.08
24	320.0	3.80	3.75	1.07
25	400.0	3.80	3.87	-1.96



RESISTIVIDAD

GRANADA  
ANDALUCIA

for: ITGE

by: I.T.G.E.

Data Set: IZ-69 Date: 17-10-89

Equipment: GEOTRON Sounding: 69

Azimuth: E-40 -S

DATA SET: 12-70

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 550.00  
 SOUNDING COORDINATES: X: 496125.0000 Y: 4163750.0000

DATE: 13-10-89  
 SOUNDING: 70  
 AZIMUTH: E-4-S  
 EQUIPMENT: GEOTRON

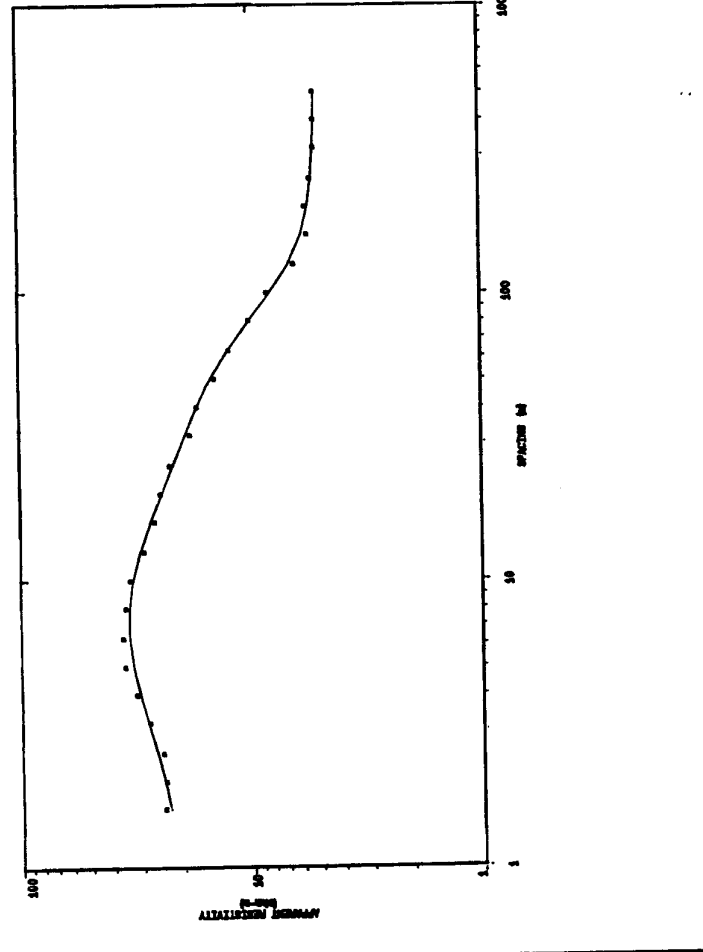
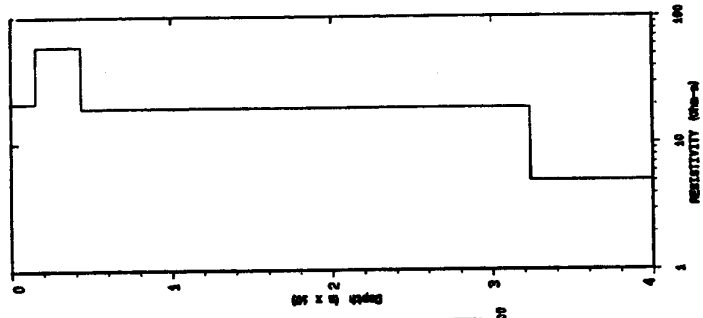
Schlumberger Configuration

FITTING ERROR: 3.851 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				550.0	
1	20.99		1.53	548.4	0.0729
2	58.72		2.80	545.6	0.0477
3	19.10		28.02	517.6	1.46
4	5.08				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	24.17	22.98	4.89
2	2.00	23.96	24.27	-1.30
3	2.50	24.59	26.06	-5.99
4	3.20	28.04	28.51	-1.68
5	4.00	31.91	30.84	3.35
6	5.00	35.78	32.85	8.20
7	6.30	36.41	34.10	6.34
8	8.00	35.37	34.12	3.50
9	10.00	33.59	32.86	2.16
10	12.60	29.30	30.45	-3.94
11	16.00	26.27	27.33	-4.01
12	20.00	24.76	24.38	1.53
13	25.00	22.44	21.76	3.03
14	32.00	18.37	19.25	-4.81
15	40.00	17.09	17.12	-0.213
16	50.00	14.30	14.89	-4.17
17	63.00	12.33	12.44	-0.920
18	80.00	10.05	9.99	0.528
19	100.0	8.39	8.10	3.39
20	126.0	6.42	6.74	-4.97
21	160.0	5.59	5.92	-5.93
22	200.0	5.70	5.53	2.82
23	250.0	5.40	5.34	1.05
24	320.0	5.20	5.23	-0.598
25	400.0	5.20	5.17	0.467
26	500.0	5.20	5.14	1.09



for: ITGE		RESISTIVIDAD	
by: I.T.G.E.		GRANADA	
Data Set: IZ-70		ANDALUCIA	
Date: 13-10-89	Equipment: GEOTRON	Azimuth: E-4-S	
Sounding: 70			

DATA SET: IZ-71

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 550.00  
 SOUNDING COORDINATES: X: 495200.0000 Y: 4163200.0000

DATE: 13-10-89  
 SOUNDING: 71  
 AZIMUTH: N-40-E  
 EQUIPMENT: GEOTRON

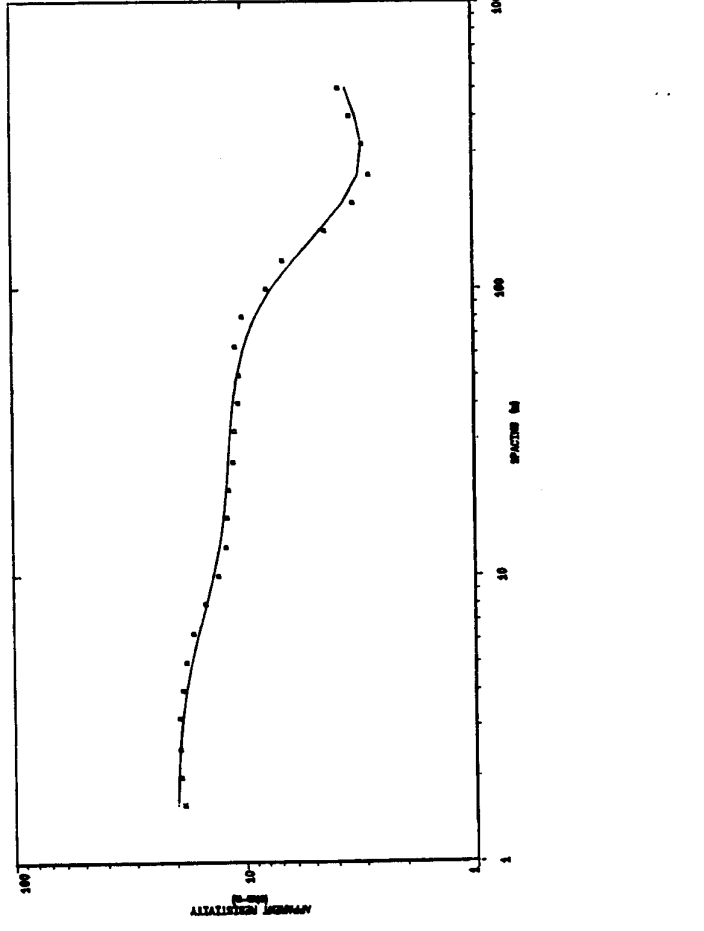
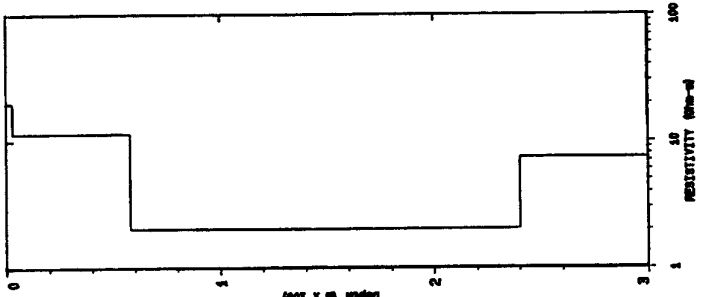
Schlumberger Configuration

FITTING ERROR: 6.428 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				550.0	
1	20.05		2.83	547.1	0.141
2	11.51		55.08	492.0	4.78
3	2.04		182.2	309.8	89.22
4	7.45				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	18.50	19.84	-7.21
2	2.00	19.18	19.67	-2.53
3	2.50	19.28	19.36	-0.461
4	3.20	19.37	18.82	2.86
5	4.00	18.70	18.07	3.33
6	5.00	18.02	17.09	5.17
7	6.30	16.77	15.90	5.16
8	8.00	14.84	14.66	1.18
9	10.00	13.01	13.66	-4.98
10	12.60	12.05	12.86	-6.76
11	16.00	11.86	12.29	-3.63
12	20.00	11.67	11.94	-2.33
13	25.00	11.10	11.68	-5.18
14	32.00	10.92	11.41	-4.49
15	40.00	10.54	11.09	-5.24
16	50.00	10.45	10.63	-1.76
17	63.00	10.81	9.91	8.36
18	80.00	10.08	8.82	12.45
19	100.0	7.88	7.52	4.59
20	126.0	6.69	6.02	9.96
21	160.0	4.40	4.60	-4.74
22	200.0	3.30	3.64	-10.49
23	250.0	2.80	3.12	-11.76
24	320.0	3.00	3.01	-0.537
25	400.0	3.40	3.20	5.88
26	500.0	3.80	3.54	6.81



RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: N-40-E

for: ITGE

by: I.T.G.E.

Data Set: IZ-71 Date: 13-10-89

Equipment: GEOTRON Sounding: 71

DATA SET: IZ-72

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 550.00  
 SOUNDING COORDINATES: X: 494500.0000 Y: 4162450.0000

DATE: 11-10-89  
 SOUNDING: 72  
 AZIMUTH: E-4 -N  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

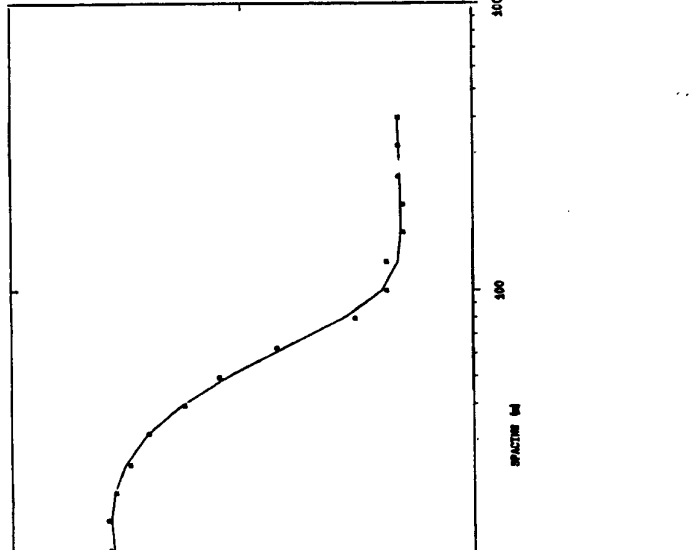
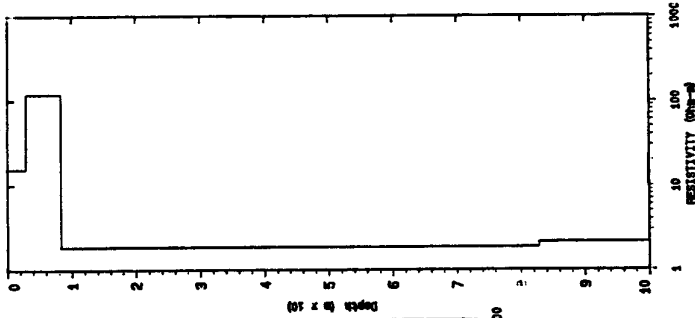
FITTING ERROR: 4.750 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				550.0	
1	15.60		2.90	547.0	0.186
2	120.5		5.41	541.6	0.0449
3	1.87		74.50	467.1	39.82
4	2.16				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	17.24	16.10	6.61
2	2.00	16.15	16.51	-2.22
3	2.50	16.83	17.22	-2.33
4	3.20	18.32	18.55	-1.24
5	4.00	19.95	20.42	-2.36
6	5.00	22.80	23.04	-1.03
7	6.30	25.79	26.45	-2.55
8	8.00	30.81	30.37	1.44
9	10.00	34.75	33.84	2.60
10	12.60	37.87	36.54	3.50
11	16.00	38.66	37.55	2.85
12	20.00	35.63	36.21	-1.62
13	25.00	30.77	32.39	-5.25
14	32.00	25.51	25.65	-0.566
15	40.00	17.88	18.46	-3.24
16	50.00	12.62	11.76	6.84
17	63.00	7.12	6.62	7.03
18	80.00	3.25	3.64	-12.09
19	100.0	2.37	2.48	-4.49
20	126.0	2.37	2.12	10.69
21	160.0	2.00	2.05	-2.64
22	200.0	2.00	2.05	-2.66
23	250.0	2.10	2.07	1.40
24	320.0	2.10	2.09	0.207
25	400.0	2.10	2.11	-0.690





RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: E-4 -N

for: ITGE  
 by: I.T.C.E.  
 Data Set: IZ-72 Date: 11-10-89  
 Equipment: GEOTRONS Sounding: 72

DATA SET: IZ-73

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 600.00  
 SOUNDING COORDINATES: X: 493825.0000 Y: 4161850.0000

DATE: 11-10-89  
 SOUNDING: 73  
 AZIMUTH: E-20-70  
 EQUIPMENT: GEOTRON

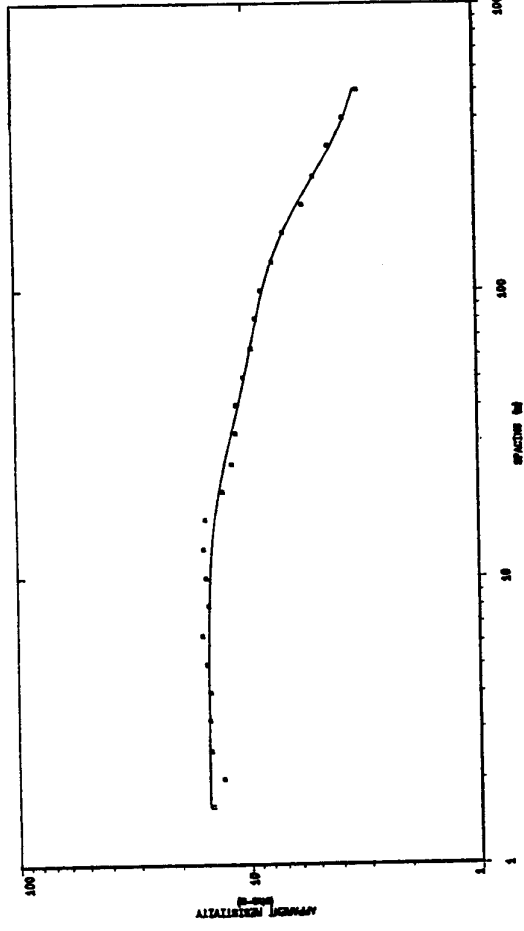
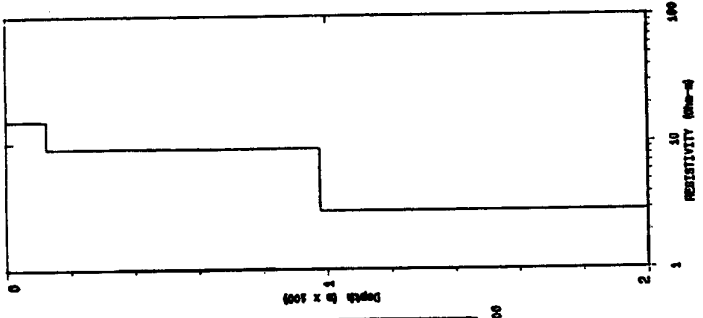
Schlumberger Configuration

FITTING ERROR: 4.950 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				600.0	
1	15.10		12.48	587.5	0.826
2	9.00		85.19	502.3	9.45
3	2.91				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	14.70	15.10	-2.69
2	2.00	13.07	15.10	-15.51
3	2.50	14.80	15.09	-1.98
4	3.20	14.99	15.09	-0.620
5	4.00	14.80	15.07	-1.82
6	5.00	15.38	15.04	2.15
7	6.30	16.05	14.99	6.57
8	8.00	14.99	14.89	0.666
9	10.00	15.38	14.72	4.25
10	12.60	15.67	14.43	7.89
11	16.00	15.37	13.95	9.25
12	20.00	12.83	13.32	-3.82
13	25.00	11.65	12.53	-7.57
14	32.00	11.16	11.59	-3.86
15	40.00	11.06	10.78	2.50
16	50.00	10.28	10.09	1.81
17	63.00	9.46	9.50	-0.358
18	80.00	9.06	8.95	1.22
19	100.0	8.55	8.39	1.79
20	126.0	7.63	7.70	-0.896
21	160.0	6.82	6.81	0.0603
22	200.0	5.60	5.88	-5.09
23	250.0	5.00	4.97	0.536
24	320.0	4.30	4.14	3.68
25	400.0	3.70	3.62	2.11
26	500.0	3.20	3.30	-3.32



RESISTIVIDAD  
 GRANADA  
 ANDALUCIA  
 Azimuth: E-20-70

for: ITGE

by: I.T.G.E.

Data Set: IZ-73 Date: 11-10-89

Equipment: GEOTRON Sounding: 73

DATA SET: 12-74

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 600.00  
 SOUNDING COORDINATES: X: 492500.0000 Y: 4161000.0000

DATE: 10-10-89  
 SOUNDING: 74  
 AZIMUTH: 96  
 EQUIPMENT: GEOTRON

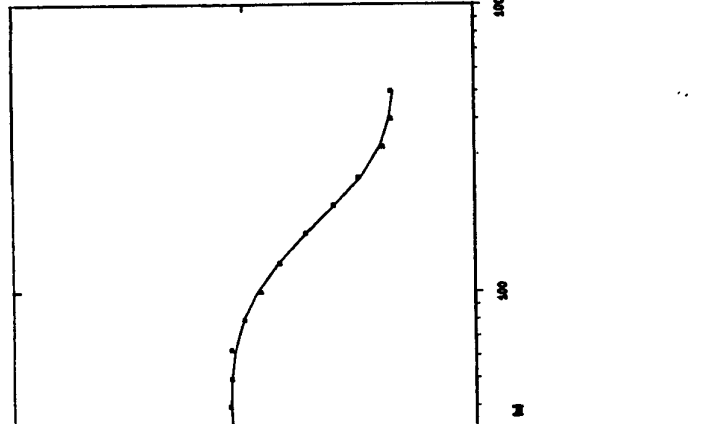
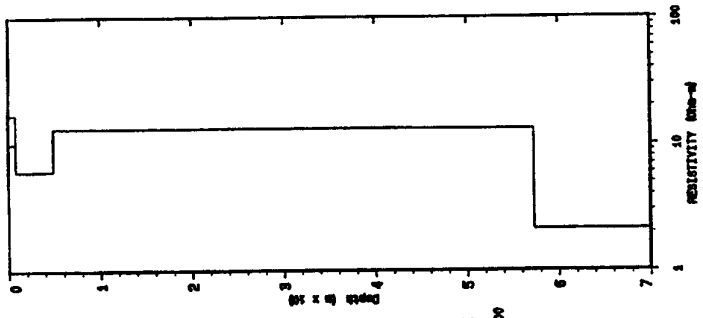
Schlumberger Configuration

FITTING ERROR: 2.017 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				600.0	
1	17.10		0.779	599.2	0.0456
2	6.08		4.12	595.1	0.676
3	13.31		52.34	542.7	3.93
4	2.12				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	11.76	11.79	-0.272
2	2.00	10.09	10.21	-1.17
3	2.50	9.21	8.84	3.92
4	3.20	7.54	7.79	-3.23
5	4.00	7.21	7.28	-0.985
6	5.00	7.21	7.14	0.907
7	6.30	7.43	7.31	1.62
8	8.00	7.65	7.74	-1.14
9	10.00	8.43	8.31	1.35
10	12.60	8.98	9.01	-0.291
11	16.00	9.63	9.75	-1.22
12	20.00	10.50	10.40	0.953
13	25.00	10.61	10.95	-3.25
14	32.00	11.58	11.40	1.59
15	40.00	11.69	11.59	0.890
16	50.00	11.48	11.50	-0.255
17	63.00	11.48	11.05	3.69
18	80.00	10.04	10.11	-0.712
19	100.0	8.50	8.80	-3.49
20	126.0	7.07	7.14	-0.993
21	160.0	5.43	5.40	0.594
22	200.0	4.10	4.04	1.22
23	250.0	3.20	3.12	2.27
24	320.0	2.50	2.57	-2.87
25	400.0	2.30	2.34	-1.97
26	500.0	2.30	2.24	2.36



for: ITGE		RESISTIVIDAD	
by: I.T.G.E.		GRANADA	
Data Set: IZ-74		ANDALUCIA	
Date: 10-10-89	Equipment: GEOTRON	Azimuth: 96	
Sounding: 74			

DATA SET: IZ-75

CLIENT: ITGE	DATE: 10-10-89
LOCATION: GRANADA	SOUNDING: 75
COUNTY: ANDALUCIA	AZIMUTH: 98
PROJECT: RESISTIVIDAD	EQUIPMENT: GEOTRON
ELEVATION: 600.00	
SOUNDING COORDINATES: X: 491300.0000 Y: 4161350.0000	

Schlumberger Configuration

FITTING ERROR: 4.062 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				600.0	
1	16.32		3.23	596.7	0.198
2	5.91		45.99	550.7	7.77
3	1.62		25.93	524.8	15.92
4	3.42				

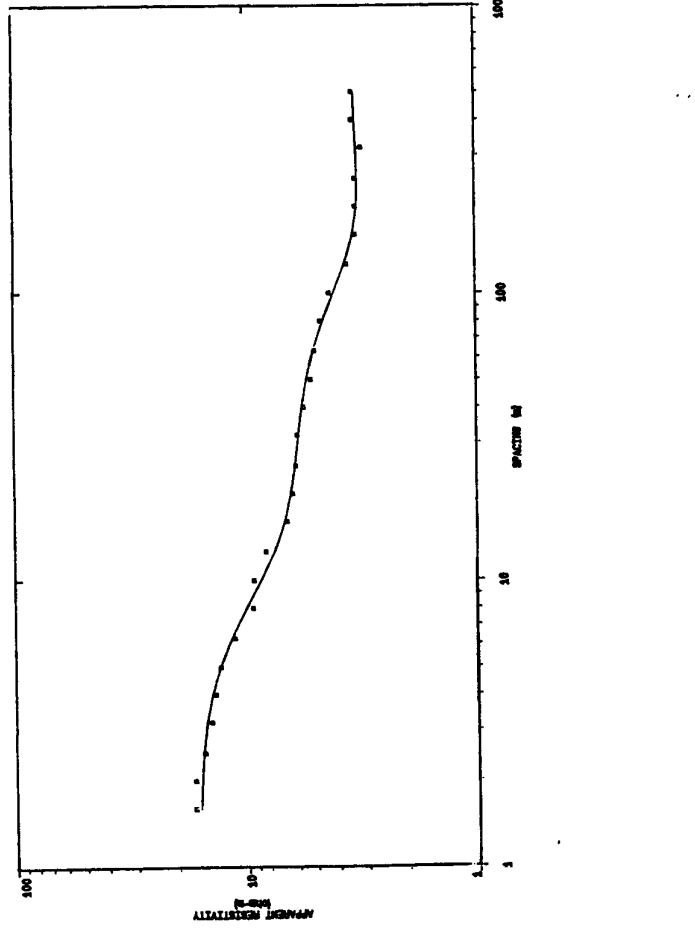
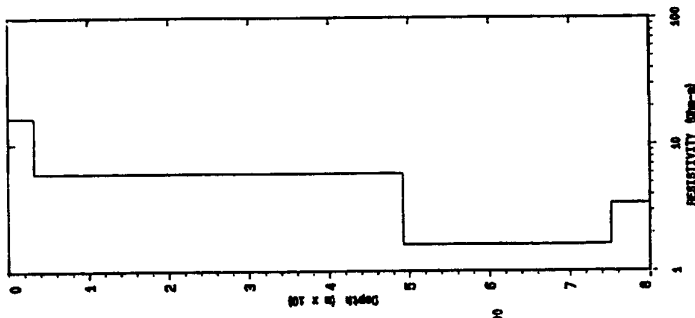
ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	17.01	16.12	5.21
2	2.00	17.01	15.95	6.21
3	2.50	15.41	15.65	-1.52
4	3.20	14.35	15.08	-5.05
5	4.00	13.73	14.26	-3.85
6	5.00	13.02	13.12	-0.752
7	6.30	11.25	11.65	-3.56
8	8.00	9.39	10.02	-6.75
9	10.00	9.30	8.64	7.04
10	12.60	8.24	7.54	8.39
11	16.00	6.67	6.80	-1.99
12	20.00	6.27	6.39	-1.76
13	25.00	6.08	6.13	-0.794
14	32.00	5.98	5.91	1.21
15	40.00	5.59	5.70	-1.99
16	50.00	5.20	5.43	-4.59
17	63.00	5.00	5.07	-1.43
18	80.00	4.70	4.59	2.24
19	100.0	4.30	4.11	4.36

\*

I.T.G.E.

\*



RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: 98

for: ITGE

by: I.T.G.E.

Data Set: IZ-75 Date: 10-10-89

Equipment: GEOTRON Sounding: 75

DATA SET: IZ-76

CLIENT: ITGE  
 LOCATION: GRANADA  
 COUNTY: ANDALUCIA  
 PROJECT: RESISTIVIDAD  
 ELEVATION: 650.00  
 SOUNDING COORDINATES: X: 490400.0000 Y: 4161500.0000

DATE: 30-10-89  
 SOUNDING: 76  
 AZIMUTH: 98  
 EQUIPMENT: GEOTRON

Schlumberger Configuration

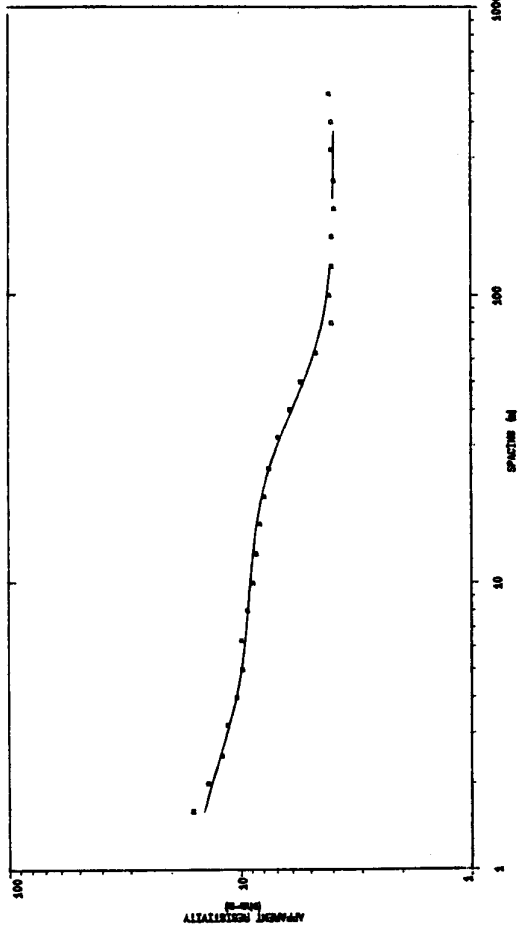
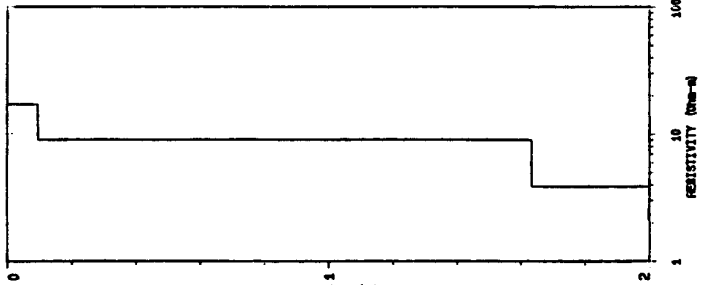
FITTING ERROR: 3.718 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANC (Siemens)
				650.0	
1	17.10		0.949	649.0	0.0554
2	9.05		15.38	633.6	1.69
3	3.88				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	16.13	14.45	10.39
2	2.00	13.85	13.38	3.44
3	2.50	12.07	12.26	-1.55
4	3.20	11.38	11.16	1.93
5	4.00	10.39	10.39	-0.0406
6	5.00	9.80	9.86	-0.668
7	6.30	9.89	9.50	3.98
8	8.00	9.30	9.25	0.575
9	10.00	8.81	9.05	-2.75
10	12.60	8.51	8.82	-3.66
11	16.00	8.23	8.50	-3.25
12	20.00	7.86	8.07	-2.67
13	25.00	7.49	7.50	-0.0561
14	32.00	6.84	6.71	1.88
15	40.00	6.10	5.97	2.21
16	50.00	5.46	5.29	2.97
17	63.00	4.68	4.75	-1.63
18	80.00	3.99	4.38	-9.71
19	100.0	4.09	4.17	-2.07
20	126.0	3.99	4.05	-1.51
21	160.0	3.99	3.98	0.259
22	200.0	3.90	3.94	-1.24
23	250.0	3.90	3.92	-0.646
24	320.0	4.00	3.90	2.26
25	400.0	4.00	3.90	2.48
26	500.0	4.10	3.89	4.99





RESISTIVIDAD

GRANADA  
ANDALUCIA

Azimuth: 98

for: IIGÉ

by: I.T.G.E.

Data Set: I276 Date: 30-10-90

Equipment: 650TRON Sounding: 76

DATA SET: 1277

CLIENT: ITGE  
 LOCATION: iznalloz  
 COUNTY: granada  
 PROJECT: resistividad  
 ELEVATION: 650.00  
 SOUNDING COORDINATES: X: 489625.0000 Y: 4161675.0000

DATE: 30-10-89  
 SOUNDING: 77  
 AZIMUTH: N-28-0  
 EQUIPMENT: geotron

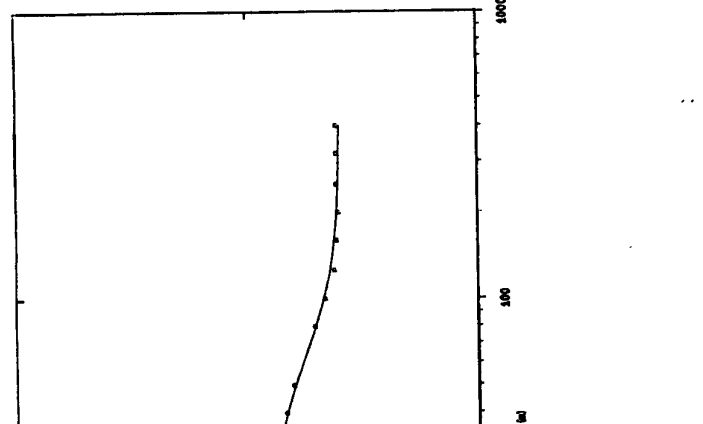
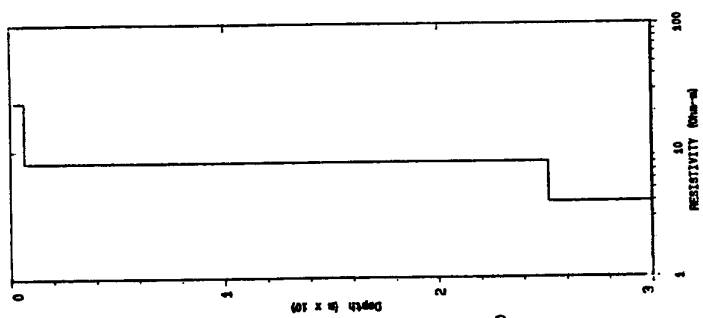
Schlumberger Configuration

FITTING ERROR: 3.421 PERCENT

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (meters)	ELEVATION (meters)	CONDUCTANCE (Siemens)
				650.0	
1	24.32		0.644	649.3	0.0265
2	8.14		24.50	624.8	3.00
3	3.93				

ALL PARAMETERS ARE FREE

No.	Spacing (m)	DATA	PA (ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	15.13	14.37	5.00
2	2.00	12.83	12.24	4.62
3	2.50	11.20	10.61	5.30
4	3.20	9.77	9.46	3.15
5	4.00	8.62	8.88	-3.03
6	5.00	8.23	8.56	-3.98
7	6.30	7.95	8.38	-5.45
8	8.00	7.95	8.27	-4.02
9	10.00	8.04	8.19	-1.85
10	12.60	8.71	8.12	6.82
11	16.00	8.30	8.02	3.40
12	20.00	7.89	7.88	0.170
13	25.00	7.69	7.66	0.347
14	32.00	7.28	7.29	-0.208
15	40.00	6.87	6.83	0.542
16	50.00	6.35	6.27	1.35
17	80.00	5.12	5.08	0.842
18	100.0	4.61	4.66	-1.18
19	126.0	4.20	4.37	-4.08
20	160.0	4.10	4.19	-2.20
21	200.0	4.00	4.09	-2.32
22	250.0	4.10	4.03	1.61
23	320.0	4.10	3.99	2.55
24	400.0	4.10	3.97	3.06



for:	ITGE	resistividad	
by:	I.T.G.E.	iznalloz granada	
Data Set:	I277	Date:	30-10-89
Equipment:	geotron	Sounding:	77
		Azimuth:	N-28-0