



Instituto Tecnológico
GeoMinero de España

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JUNTA DE ANDALUCÍA
Consejería de Obras Públicas y Transportes

CONVENIO DE COLABORACIÓN CON LA
CONSEJERÍA DE OBRAS PÚBLICAS Y TRANSPORTES
PARA EL DESARROLLO DEL PROGRAMA DE
ASISTENCIA EN
AGUAS SUBTERRÁNEAS
PARA ABASTECIMIENTOS

1996-2000

**ACTIVIDAD Nº 17. PLAN DE INTEGRACIÓN DE LOS
RECURSOS HÍDRICOS SUBTERRÁNEOS EN EL
ABASTECIMIENTO URBANO. PLAN BAHÍA DE CÁDIZ.
U.H.05.54 (ARCOS – BORNOS – ESPERA).**

Documento 17.1.- Investigación geofísica en Arcos de la Frontera (Cadiz)

***INVESTIGACION GEOFISICA EN
ARCOS DE LA FRONTERA (CADIZ).***

Madrid 19-Mayo-1998

INDICE

1.- INTRODUCCION

2.- LOCALIZACION DE LA ZONA DE TRABAJO

3.- OBJETIVOS

4.- GEOLOGIA

5.- TRABAJOS EFECTUADOS

6.- MEDIOS EMPLEADOS

7.- ANTECEDENTES

8.- SONDEOS MECANICOS

9.- INTERPRETACION Y REPRESENTACION

10.- CONCLUSIONES

ANEXO 1: CURVAS DE CAMPO E INTERPRETACIONES.

ANEXO 2: PLANOS DE POSICIONAMIENTO Y SECCIONES.

ANEXO 3: SOPORTE DIGITAL DE DATOS E INTERPRETACIONES.

1.- INTRODUCCION

Como consecuencia de una petición de la Dirección de Aguas Subterráneas del ITGE, Oficina Técnica Regional de Sevilla, un equipo de Prospección Eléctrica del área de Geofísica y Teledetección del ITGE se desplazó en Enero de 1997 a la localidad de Arcos de la Frontera (Cádiz) para realizar una campaña de prospección eléctrica de corriente continua modalidad Sondeos Eléctricos Verticales (SEV), dispositivo Schlumberger.

2.- LOCALIZACION DE LA ZONA DE TRABAJO

El área de estudio se subdivide en dos zonas la primera al Noreste de Arcos de la Frontera y la segunda al Noreste de la localidad de Bornos. Ambas quedan incluidas en la hoja topográfica 1:50.000 N° 1049 (Arcos de la Frontera). Corresponden la primera a los bordes Norte y Este del Embalse de Arcos y la segunda al Oeste del Embalse de Bornos.

La zona con moderado relieve topográfico presentó dificultades logísticas de acceso por la abundancia de precipitaciones en la época de trabajos de campo.

3.- OBJETIVOS

Esta campaña de prospección se dirige al conocimiento litológico del área cubierta por los SEV. En particular se interesa por el seguimiento del nivel de areniscas Terciarias Miocénicas aflorante en los bordes del área de estudio como la Sierra de los Barrancos o el enclave de la localidad de Arcos. La continuación y espesor de dicho nivel permite evaluar con mayor certeza la capacidad de explotación de este nivel acuífero que en la actualidad se emplea para riego y abastecimiento de las localidades próximas.

4.- GEOLOGIA

En el área de estudio afloran materiales Terciarios y Cuaternarios.

Del Terciario está bien representado el Mioceno con afloramientos de areniscas como en La Sierra de los barrancos y el asentamiento de la localidad de Arcos de la Frontera. También hay afloramientos de margas al Norte del embalse de Arcos y al Norte y Este de la Localidad de Bornos.

El Cuaternario ocupa gran parte de la superficie de estudio como consecuencia de los depósitos aluviales del río Guadalete así como por los glaciares del flanco Oeste de la Sierra de los Barrancos.

5.- TRABAJOS EFECTUADOS

Los trabajos de campo se realizaron entre Enero y Febrero de 1998. Debido a las abundantes lluvias ocurridas en la zona, los trabajos de campo se prolongaron mas de lo habitual. Se efectuaron 26 SEV con tres paramétricos. El 15 cercano al sondeo 1344-2-0046 (S-2046 en el plano de posicionamiento), el 17 en el sondeo 1344-2-0014 (S-2014 en el plano de posicionamiento) el 26 cercano al sondeo 1344-1-0035 (S-1035 en el plano de posicionamiento).

El siguiente cuadro refleja las características y fecha de realización de cada SEV.

NºSEV	AB/2 (m)	Fecha
1	1000	22-1-98
2	1000	23-1-98
3	1000	23-1-98
4	1000	26-1-98
5	1000	26-1-98
6	1000	27-1-98
7	1000	27-1-98
8	320	28-1-98
9	1000	28-1-98
10	1000	29-1-98
11	1000	29-1-98
12	1000	30-1-98
13	1000	06-2-98
14	1000	05-2-98
15	900	09-2-98
16	1000	10-2-98
17	1000	10-2-98
18	1000	11-2-98
19	1000	12-2-98
20	1000	13-1-98
21	1000	13-2-98
22	1000	16-2-98
23	1000	16-2-98
24	500	17-1-98
25	1000	09-2-98
26	500	09-2-98

6.- MEDIOS EMPLEADOS

Se utilizó el siguiente instrumental:

- Medición:
Resistivímetro : SYSCAL
Posicionamiento: GPS MAGELLAN
- Auxiliar:
Electrodos impolarizables, barrenas, radioteléfonos, cables y accesorios.
- Desplazamiento:
Vehículo todoterreno propiedad del ITGE.

Equipo humano:

- Personal auxiliar
5 peones contratados en la zona
- Operadores:
José María Llorente y Agustín Gonzalez.
- Supervisión de trabajos de Campo :
Ceferino Avilero Hurtado.
- Interpretación :
Ceferino Avilero Hurtado y Javier Navas Madrazo
- Elaboración del informe :
Javier Navas Madrazo

7.- ANTECEDENTES

Se dispone de la siguiente información sobre la zona:

- Cartografía Geológica 1:50.000, Hoja Número 1049 , Arcos de la frontera (ITGE).
- Informe Preliminar de la prospección Geofísica Realizada en Arcos de la Frontera (Cádiz). ITGE
Abril de 1991. Número Centro de Documentación 40069

8.- SONDEOS MECANICOS

La Oficina Técnica Regional de Sevilla, proporcionó la columna litológica de los siguientes sondeos mecánicos de la zona.

Sondeo: 1344.20046 Arcos I		
X: 253.200	Y:4.074.000	Z:85
0.	1.	Capa vegetal.
1.	3.0	Limos arcillosos.
3.0	4.5	Arcillas plásticas
4.5	181	Margas azules.
181	190	Limos grises.
190	201	Areniscas fosilíferas
201	343	Areniscas calcáreas
343	373	Areniscas grano fino
373	380	Limos grises azulados

Sondeo: 1344.20047 Arcos II		
X: 253.440	Y:4.073.625	Z:86
0	1	Capa vegetal
1	3	Limos arcillosos
3	5	Arcillas plásticas
5.	103	Margas azules
103	109	Limos gris azulados
109	118	Areniscas grises
118	265	Areniscas calcáreas
265	268	Areniscas grises
268	280	Arcillas arenosas

Sondeo: 1344.20048 Arcos III		
X: 253.200	Y:4.072.700	Z:85
1.0	1.5	Capa vegetal.
1.5	3.0	Arena fina
3.0	5.0	Limos arcillosos
5.0	8.5	Arcillas arenosas
8.5	10.5	Arenas arcillosas
10.5	11.0	Arcillas plásticas
11.0	181	Margas azules
181	197	Limos grises
197	202	Areniscas grises
202	301	Calcarenitas
301	317	Calcarenitas con matriz arcillosa.
317	323	Areniscas grises

Sondeo: 1344.10035 Arcos IV		
X: 252.210	Y:4.072.000	Z:88
0.	1.5	Capa vegetal.
1.5	5.5	Arena arcillosa
5.5	11	Arcillas plásticas
11	202	Margas
202	209	Limos
209	217	Areniscas grises
217	295	Areniscas calcáreas
295	304	Areniscas grises

Sondeo: 1344.10036 Arcos V		
X: 251.450	Y:4.071.520	Z:90
0.	12	Arcillas arenosas
12	15	Arenas finas
15	33	Arenas arcillosas
33	160	Margas
160	182	Limos gris azulados
182	192	Areniscas grises
192	251	Areniscas calcáreas
251	260	Areniscas grano fino

Sondeo: 1344.20022 Arcos		
X:253464	Y:4076372	Z:110
0.	4	Cuaternario
4	9	Arcillas plásticas
9	202	Margas azules tortoniense

Sondeo: 1344.20013 Bornos II		
X:255.00 7	Y:4.078.641	Z:100
0.	5	Areniscas calcáreas, grano fino
5	7	Areniscas calcáreas, algo arcillosa
7	20	Areniscas calcáreas grano medio
20	37	Areniscas calcáreas grano fino
37	125	Areniscas calcáreas grano grueso
125	144	Areniscas calcáreas grano medio
125	166	Areniscas calcáreas grano mas grueso

Sondeo: 1344.20016 Bornos		
X:255.28 4	Y:4.079.837	Z:200
0.	44	Areniscas grano muy fino
44	58	Areniscas grano grueso
58	64	Areniscas grano fino
64	70	Areniscas grano grueso
70	76	Areniscas grano fino
76	86	Areniscas grano grueso
86	107	Areniscas grano fino

Sondeo: 1344.20018 Bornos		
X:254.92 5	Y:4.078.264	Z:200
0.	166	Areniscas del mioceno de base. Grano de fino a grueso.

Sondeo: 1344.20049 Bornos		
X:255.15 0	Y:4.078.450	Z:190
0.	2	Derrubio de ladera
2	6	Arenisca grano fino
6	80	Arenisca grano fino-grueso
80	84	Arenisca grano grueso
84	154	Arenisca alternancia grano fino grueso
154	174	Arenisca grano grueso
174	186	Arenisca con nódulos arcillosos.

Sondeo: 1344.20014 Arcos		
X:254.13 0	Y:4.073.178	Z:140
0.	1	Arcillas con derrubio
1	11	Arcillas plásticas
11	13	Arcillas beige
13	37	Margas
37	40	Margas con indicios de arenisca
0	60	Areniscas beige, facies margosas
60	158	Areniscas beige
158	166	Arenisca con nódulos arcillosos.

Sondeo: 1344.20015 Arcos		
X:254.35 1	Y:4.073.939	Z:200
0.	4	Arcillas plásticas
4	10	Arcillas arenosas marrón
10	23	Arcillas arenosas amarillas
23	50	Areniscas margosas
50	119	Areniscas fosilíferas
119	126	Margas azules, tortoniense

Sondeo: 1344.20019 Arcos		
X:254.24 4	Y:4.072.872	Z:130
0.	12	Arcillas
12	36	Arcillas azules (mioceno)
36	130	Areniscas y arenas (mioceno)
130	135	Margocalizas. Areniscas y arenas

Sondeo: 1344.20023 Arcos		
X:253.75 7	Y:4.075.155	Z:100
0.	2	Tierra vegetal
2	12	Gravas y arenas
12	35	Arcillas arenosas
35	42	Areniscas grano fino, Mioceno
42	102	Areniscas grano grueso
102	108	Nodulos arcillosos, areniscas

Sondeo: 1344.20021 Bornos		
X:253.47 7	Y:4.078.572	Z:90
0	21	Areniscas . (Fisura metro 21)
21	28	Areniscas
28	32	Arcillas azules
32	90	Sin muestras

Sondeo: 1344.10015 Bornos		
X:251.85 5	Y:4.077.683	Z:140
0	4	Margas amarillentas
4	57	Margas azules
57	61	Margas azules arenosas
61	65	Arenisca azul
65	67	Margas arenosas
67	84	Arenisca blanco amarillenta
84	89	Margas arenosas
89	112	Arenisca blanco amarillenta.
112	122	Arenisca algo margosa
122	195	Arenisca
195	205	Margas gris azuladas

Sondeo: 1344.10016 Bornos		
X:251.97 2	Y:4.077.831	Z:159
0	61	Margas
61	65	Areniscas azules
65	67	Margas azules arenosas
67	84	Areniscas blancas
84	89	Margas arenosas
89	112	Areniscas
112	122	Areniscas algo margosas
122	195	Areniscas
195	205	Margas grises azuladas

Sondeo: 1344.10017 Bornos		
X:252.17 2	Y:4.077.730	Z:165
0	6	Arcillas
6	20	Calcarenitas azules
20	81	Calcarenitas amarillentas
81	91	Arcillas
91	120	Areniscas
120	--	Margas azules

Sondeo: 1344.10018 Bornos		
X:252.32 2	Y:4.077.679	Z:165
0	5	Arena fina
5	124	Areniscas y calcarenitas
124		Margas azules

Sondeo: 1344.10019 Bornos		
X:252.52	Y:4.077.528	Z:160
1		
0	12	Arcillas y limos
12	30	Margas azules
30	107	Calcarenitas y areniscas

Sondeo: 1344.10020 Bornos		
X:252.72	Y:4.077.376	Z:160
0		
0	48	Arcillas azules
48	103	Calcarenitas y areniscas

9.- INTERPRETACION Y REPRESENTACION.

La interpretación de las curvas de SEV se realizó por parte de los técnicos indicados del ITGE en sus oficinas de Madrid. Para este proceso se utilizó la aplicación RESIXIP de la compañía INTERPEX.

La representación gráfica de los resultados, plano de posicionamiento y secciones eléctricas se llevo a cabo con la aplicación CORTES del ITGE.

El Anexo 1 presenta el listado numérico la representación gráfica de datos de campo y la interpretación obtenida para cada SEV.

En Anexo 2 se presenta el plano de situación de los SEV así como las secciones geoelectricas interpretadas en 1 hoja DIN_A3 y 2 planos DIN_A1.

En el anexo 3 se adjunta un disco de 3.5" con el siguiente contenido:

- Ficheros ASCII ARCOS_??RPD, siendo (??) el número identificativo del SEV. Contienen las mediciones efectuadas en cada SEV, es decir, los valores de diferencia de potencial e intensidad para cada abertura de electrodos de corriente.
- Ficheros ASCII ARCOS_??MDL, siendo (??) el número identificativo del SEV. Contienen datos correspondientes a la interpretación de cada SEV (Espesores y resistividades).
- Fichero ASCII ARCOS.DAT, contiene toda la información del plano de posicionamiento, según el formato del programa CORTES del ITGE.
- Fichero ASCII ARCOS.COR, contiene toda la información de los cortes o secciones geoelectricas, según el formato del programa CORTES del ITGE.
- Fichero WORD INFORME. Contiene el texto del presente informe .

10.- CONCLUSIONES

De la interpretación efectuada de los SEV y con el apoyo de las columnas litológicas aportadas por los sondeos mecánicos, se han trazado 7 secciones o cortes geoelectricos que se presentan en el Anexo 2.

Con la información aportada por las secciones eléctricas se concluye que:

- En todos los cortes se detecta un nivel superficial con varias intercalaciones de orden métrico o decamétrico atribuibles a materiales Cuaternarios. Se trata de capas de resistividad variable correspondientes a terrazas aluviales compuestas por gravas, arenas, arena arcillosa, etc. Este nivel aumenta en potencia al alcanzar las estribaciones de la Sierra de los Barrancos. En los perfiles 4 y 5 este nivel tiene un espesor muy reducido y su que puede corresponder de forma indiferenciada a aluviones cuaternarios o margas Miocénicas en forma de suelo de cultivo o alterado.
- Bajo el recubrimiento Cuaternario se presenta un potente paquete de baja resistividad atribuido por correlación con los sondeos a margas del Mioceno. Este nivel pierde potencia o desaparece al alejarse del centro de la cubeta que ocupa el embalse de Arcos.
- Solo en los perfiles próximos a Arcos (1, 2, 3, 5 y 7) se ha identificado de forma clara un nivel resistivo, interpretado con apoyo en los sondeos mecánicos como areniscas englobando en dicho término litologías afines tales como calcarenitas y areniscas con nódulos arcillosos.
- El elevado espesor del nivel de margas en los perfiles 4 y 5 impide una certera evaluación de la resistividad de la capa que subyace y por tanto impide su clasificación salvo en el caso del SEV 20.



J. Javier Navas Madrazo

Madrid 19 de Mayo de 1998

ANEXO 1: CURVAS DE CAMPO E INTERPRETACIONES.

DATA SET: ARCOS 1

CLIENT: I.T.G.E.	DATE: 22-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 1(3)
COUNTY: CADIZ	AZIMUTH: 20
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 100.00	
SOUNDING COORDINATES: E: 250504.0000 N: 4075620.0000	

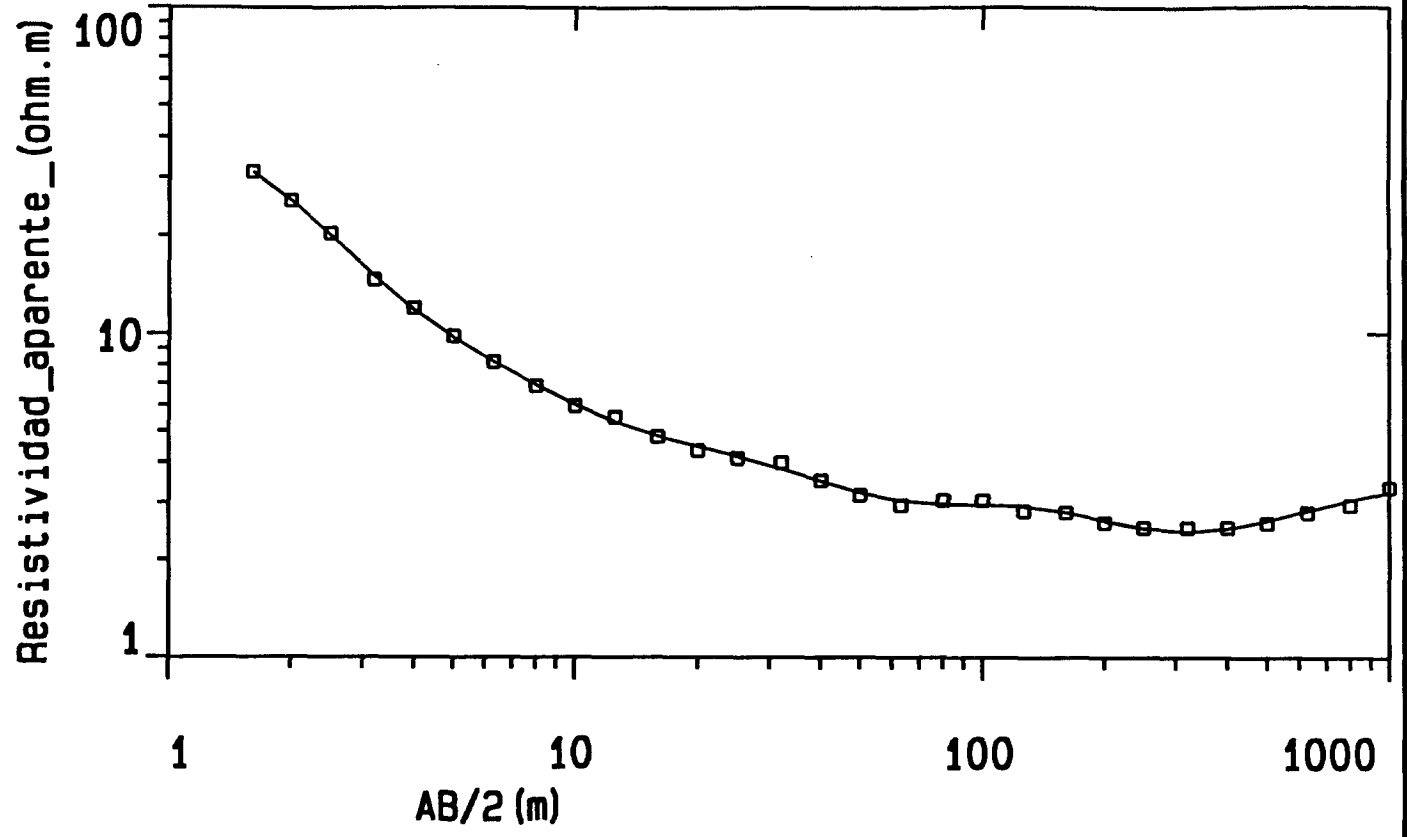
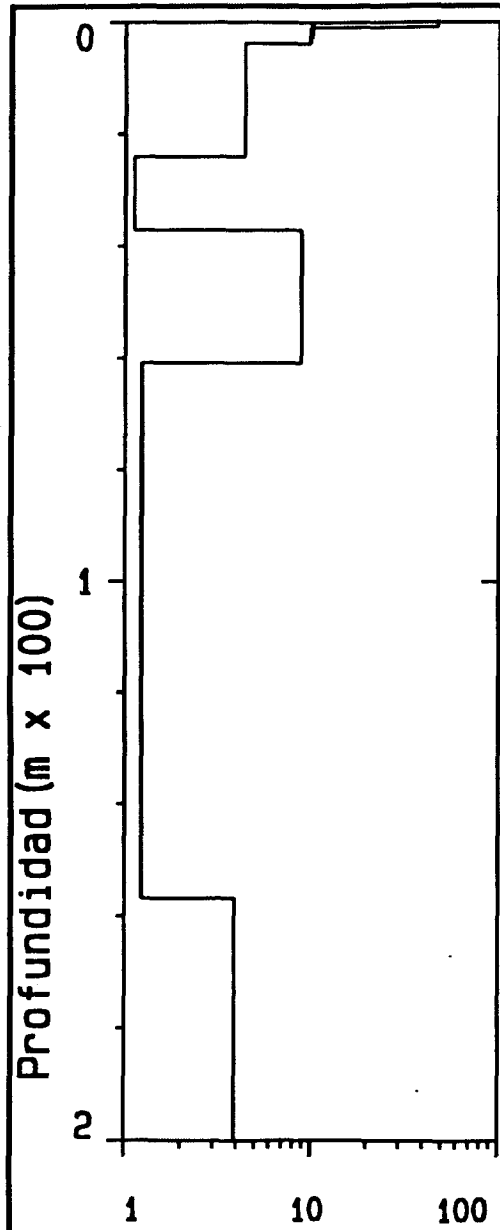
Schlumberger Configuration

FITTING ERROR: 2.172 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	31.30	31.34	-0.134
2	2.00	25.55	25.57	-0.0907
3	2.50	20.25	19.98	1.33
4	3.20	14.61	14.97	-2.41
5	4.00	11.96	11.81	1.29
6	5.00	9.78	9.71	0.666
7	6.30	8.17	8.19	-0.288
8	8.00	6.90	6.97	-0.933
9	10.00	5.99	6.05	-1.02
10	12.60	5.52	5.34	3.23
11	16.00	4.81	4.83	-0.295
12	20.00	4.34	4.48	-3.02
13	25.00	4.11	4.17	-1.38
14	32.00	3.99	3.82	4.38
15	40.00	3.51	3.50	0.367
16	50.00	3.17	3.22	-1.58
17	63.00	2.94	3.04	-3.19
18	80.00	3.06	2.97	2.85
19	100.0	3.06	2.96	3.16
20	126.0	2.83	2.92	-3.26
21	160.0	2.80	2.80	-0.355
22	200.0	2.60	2.65	-1.68
23	250.0	2.51	2.50	0.124
24	320.0	2.51	2.44	2.69
25	400.0	2.51	2.49	0.479
26	500.0	2.60	2.64	-1.64
27	630.0	2.80	2.84	-1.47
28	800.0	2.95	3.05	-3.56
29	1000.0	3.35	3.24	3.27

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				100.0	
1	46.99		0.910	99.08	0.0193
2	9.78		2.89	96.19	0.295
3	4.40		20.27	75.92	4.59
4	1.11		13.01	62.91	11.66
5	8.84		23.72	39.18	2.68
6	1.22		96.09	-56.90	78.29
7	3.91				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 1	Date: 22-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 1(3)	Azimuth: 201

Resistividad (ohm.m)

DATA SET: ARCOS 2

CLIENT: I.T.G.E.	DATE: 23-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 2(3)
COUNTY: CADIZ	AZIMUTH: 20
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 80.00	
SOUNDING COORDINATES: E: 252338.0000 N: 4075315.0000	

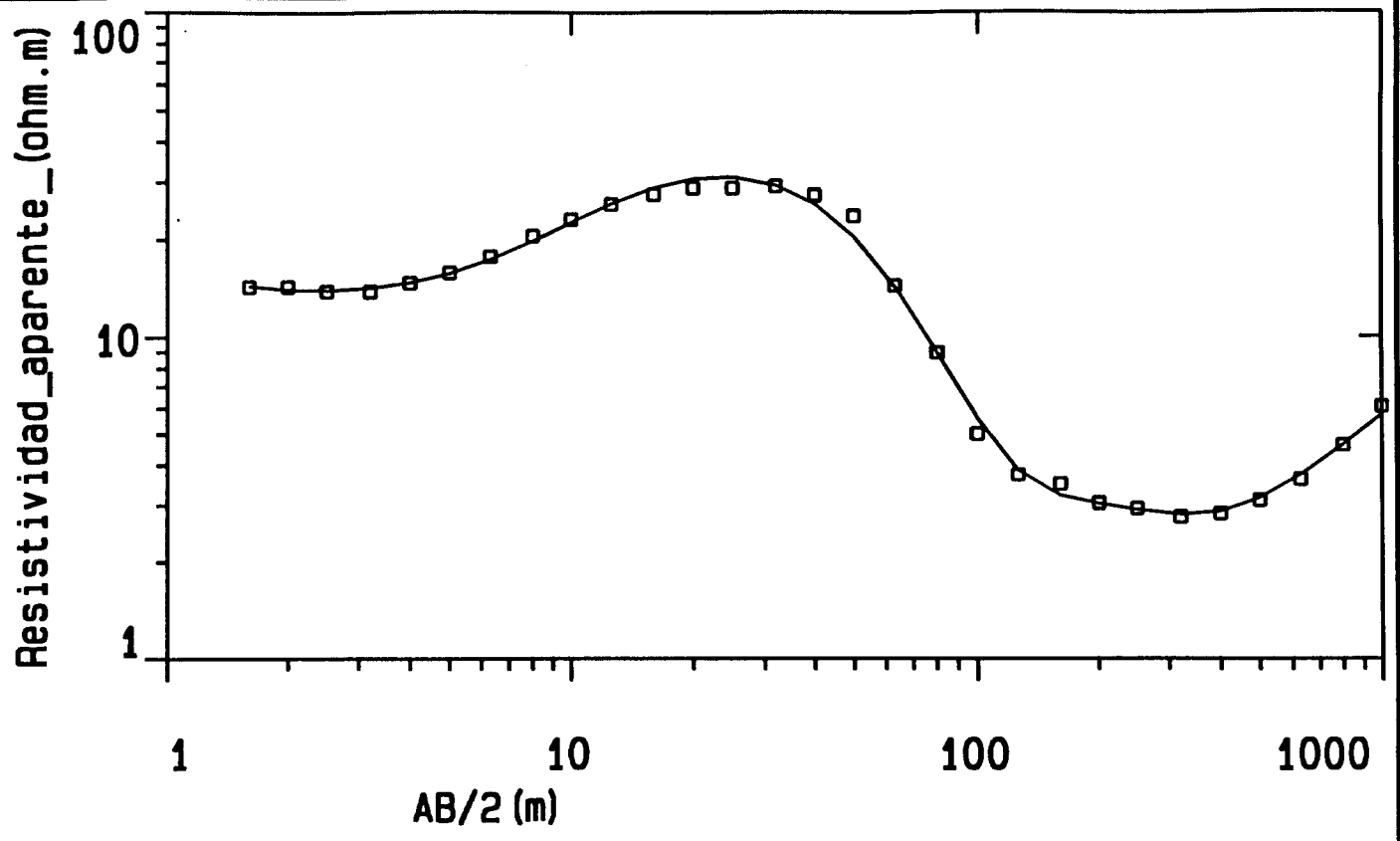
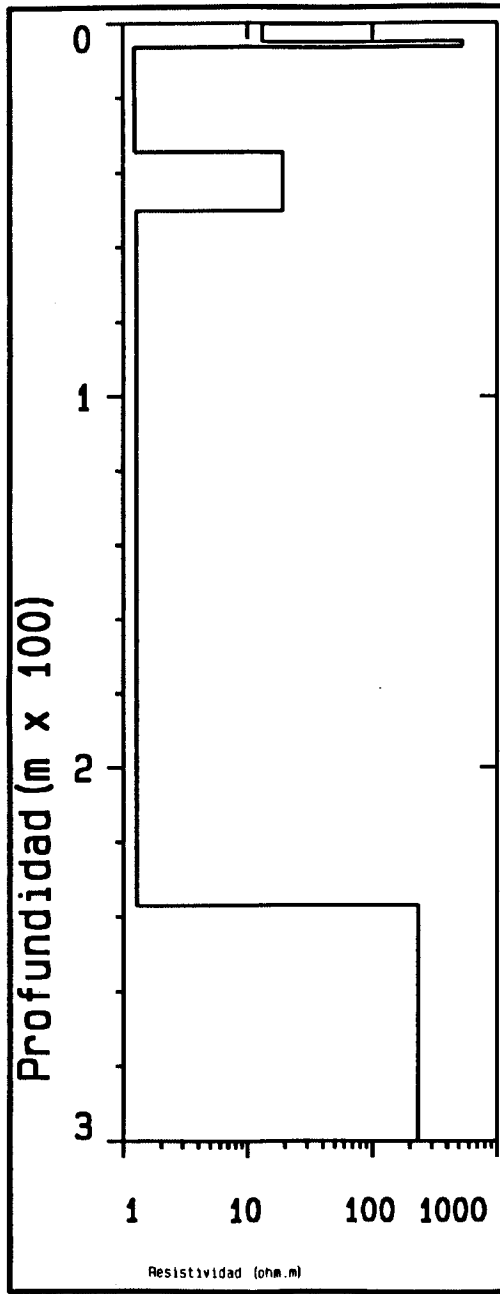
Schlumberger Configuration

FITTING ERROR: 4.894 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	14.27	14.35	-0.593
2	2.00	14.27	13.98	2.00
3	2.50	13.84	13.92	-0.545
4	3.20	13.79	14.16	-2.64
5	4.00	14.69	14.70	-0.0936
6	5.00	15.75	15.68	0.405
7	6.30	17.65	17.30	1.97
8	8.00	20.40	19.71	3.37
9	10.00	22.97	22.54	1.84
10	12.60	25.58	25.73	-0.591
11	16.00	27.43	28.72	-4.70
12	20.00	28.74	30.61	-6.50
13	25.00	28.74	31.03	-7.98
14	32.00	29.06	29.27	-0.713
15	40.00	27.23	25.55	6.17
16	50.00	23.51	20.27	13.77
17	63.00	14.35	14.25	0.660
18	80.00	8.91	8.90	0.143
19	100.0	4.99	5.57	-11.57
20	126.0	3.72	3.84	-3.28
21	160.0	3.48	3.21	7.82
22	200.0	3.03	3.02	0.439
23	250.0	2.92	2.89	0.938
24	320.0	2.75	2.80	-1.73
25	400.0	2.81	2.86	-1.79
26	500.0	3.10	3.14	-1.54
27	630.0	3.60	3.72	-3.36
28	800.0	4.60	4.61	-0.267
29	1000.0	6.05	5.71	5.53

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				80.00	
1	58.36		0.235	79.76	0.00403
2	13.15		4.74	75.01	0.360
3	533.7		1.50	73.51	0.00282
4	1.23	*	27.99	45.51	22.75
5	19.04		15.69	29.82	0.823
6	1.27	*	186.9	-157.1	146.7
7	230.9				

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 2	Date: 23-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 2(3)	Azimuth: 20

DATA SET: ARCOS 3

CLIENT: I.T.G.E.	DATE: 23-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 3(3)
COUNTY: CADIZ	AZIMUTH: 20
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 110.00	
SOUNDING COORDINATES: E: 251377.0000 N: 4075546.0000	

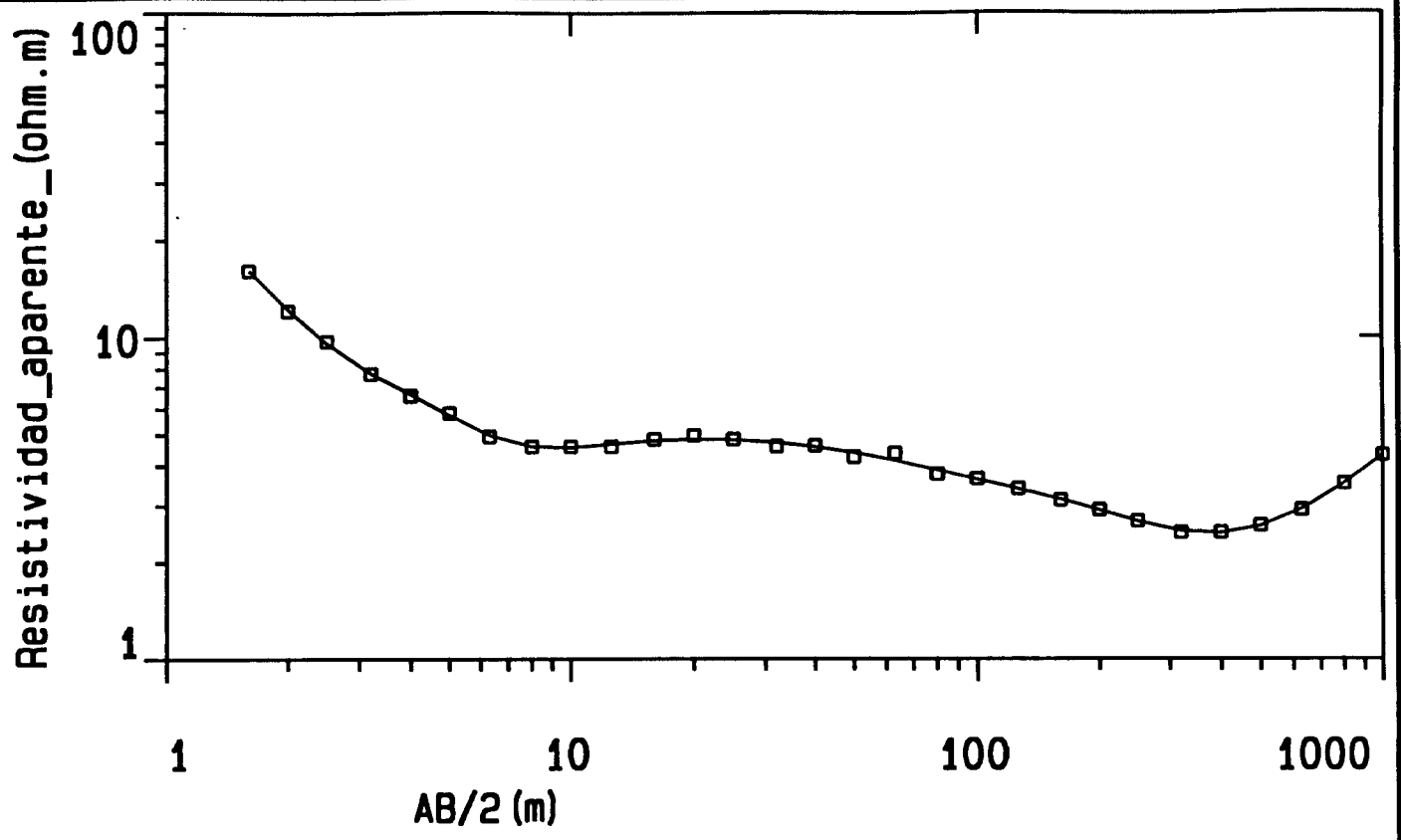
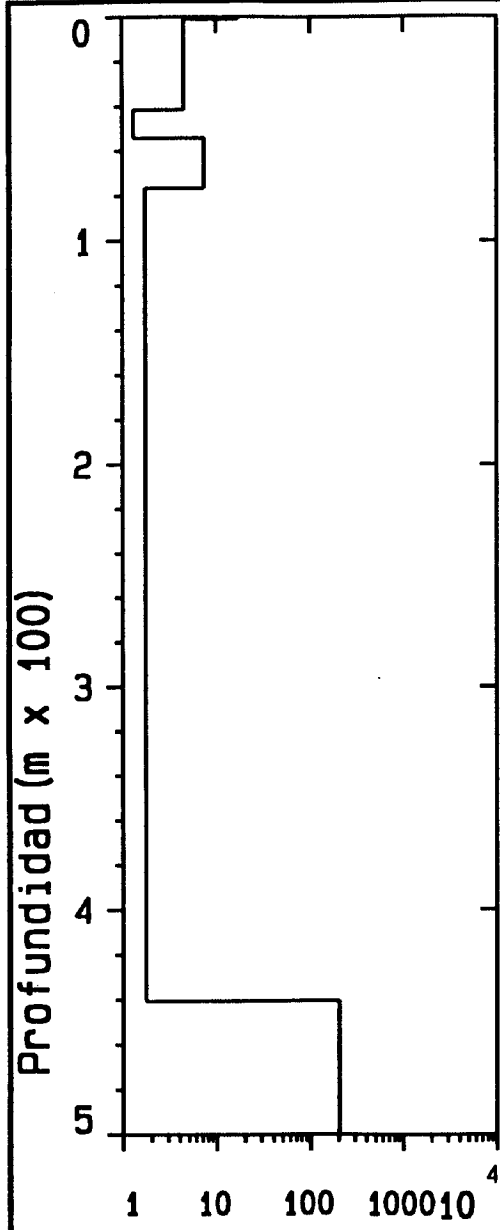
Schlumberger Configuration

FITTING ERROR: 1.607 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	16.09	16.08	0.0629
2	2.00	12.06	12.19	-1.02
3	2.50	9.72	9.57	1.53
4	3.20	7.71	7.73	-0.266
5	4.00	6.59	6.66	-1.14
6	5.00	5.81	5.73	1.32
7	6.30	4.91	4.96	-1.00
8	8.00	4.58	4.58	0.0167
9	10.00	4.56	4.54	0.496
10	12.60	4.58	4.65	-1.68
11	16.00	4.81	4.77	0.909
12	20.00	4.93	4.81	2.38
13	25.00	4.81	4.79	0.498
14	32.00	4.58	4.69	-2.55
15	40.00	4.59	4.56	0.689
16	50.00	4.22	4.37	-3.36
17	63.00	4.35	4.13	5.04
18	80.00	3.74	3.85	-2.95
19	100.0	3.62	3.60	0.459
20	126.0	3.38	3.36	0.408
21	160.0	3.11	3.12	-0.439
22	200.0	2.90	2.89	0.180
23	250.0	2.68	2.67	0.483
24	320.0	2.47	2.49	-1.01
25	400.0	2.47	2.45	0.464
26	500.0	2.60	2.58	0.594
27	630.0	2.90	2.91	-0.668
28	800.0	3.50	3.50	-0.174
29	1000.0	4.30	4.28	0.318

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	5509.2		0.202	110.0 109.7	3.671E-05
2	17.05		1.04	108.7	0.0612
3	4.52		40.24	68.50	8.89
4	1.31		12.63	55.87	9.61
5	7.46		22.41	33.45	3.00
6	1.74		364.1	-330.7	208.8
7	202.2				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 3	Date: 23-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 3(3)	Azimuth: 20

DATA SET: ARCOS 4

CLIENT: I.T.G.E.	DATE: 26-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 4(2)
COUNTY: CADIZ	AZIMUTH: 42
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 104.00	
SOUNDING COORDINATES: E: 251127.0000 N: 4074819.0000	

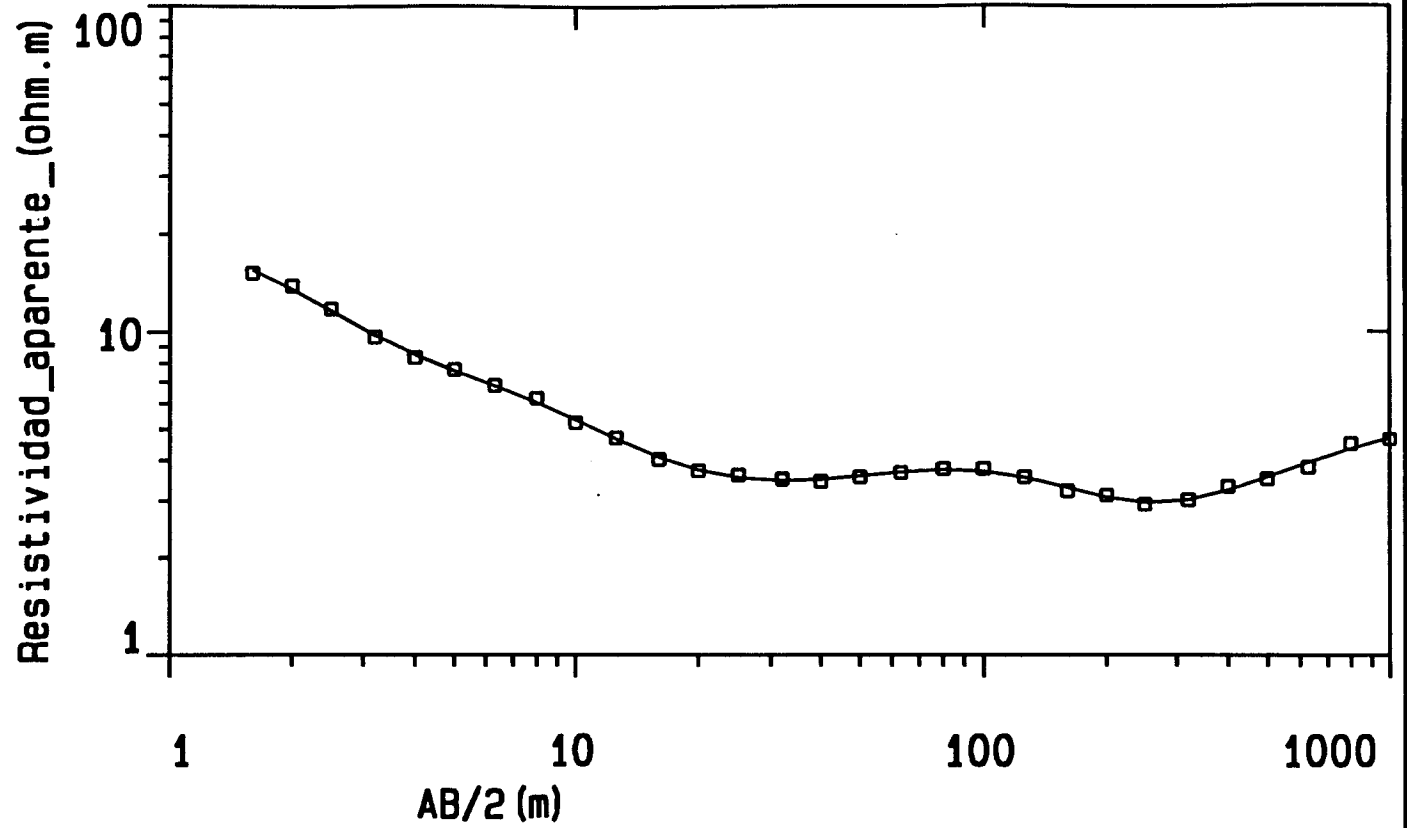
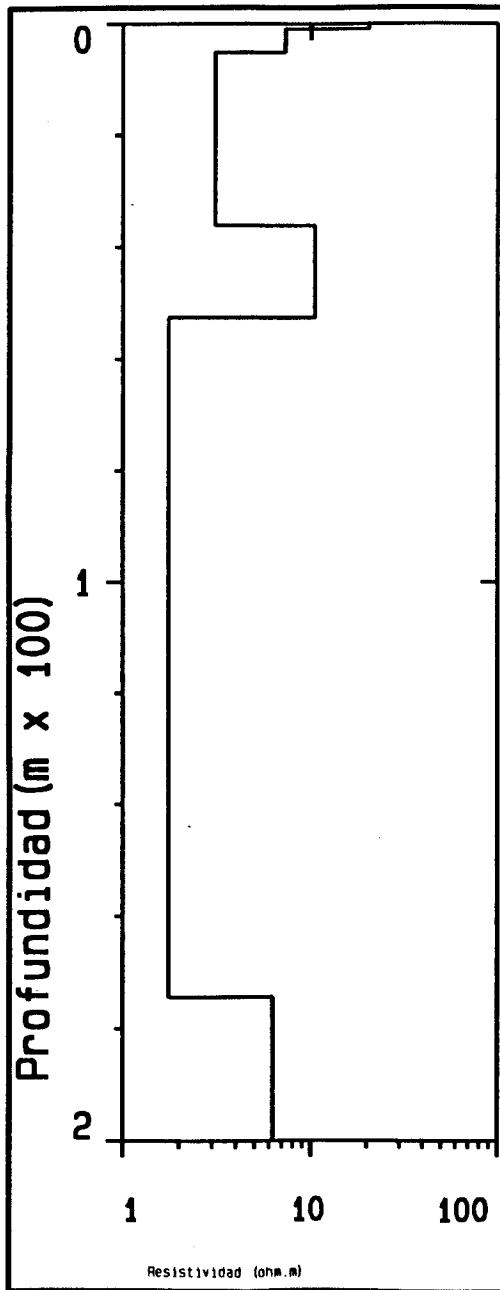
Schlumberger Configuration

FITTING ERROR: 1.745 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	15.13	15.45	-2.06
2	2.00	13.84	13.51	2.40
3	2.50	11.73	11.58	1.32
4	3.20	9.62	9.75	-1.32
5	4.00	8.33	8.50	-2.04
6	5.00	7.62	7.58	0.631
7	6.30	6.80	6.80	0.0185
8	8.00	6.21	6.04	2.75
9	10.00	5.24	5.34	-1.95
10	12.60	4.69	4.66	0.706
11	16.00	4.03	4.09	-1.35
12	20.00	3.71	3.73	-0.612
13	25.00	3.60	3.53	1.90
14	32.00	3.49	3.45	0.975
15	40.00	3.44	3.48	-1.37
16	50.00	3.54	3.57	-0.748
17	63.00	3.65	3.68	-0.692
18	80.00	3.76	3.74	0.543
19	100.0	3.76	3.70	1.65
20	126.0	3.54	3.53	0.252
21	160.0	3.21	3.29	-2.32
22	200.0	3.11	3.07	1.50
23	250.0	2.92	2.95	-1.13
24	320.0	3.02	3.01	0.202
25	400.0	3.31	3.22	2.52
26	500.0	3.50	3.54	-1.39
27	630.0	3.80	3.93	-3.46
28	800.0	4.50	4.33	3.63
29	1000.0	4.65	4.69	-1.01

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	20.52		0.916	104.0	0.0446
2	7.27		4.20	103.0	0.578
3	3.09		30.99	98.87	10.00
4	10.55		16.37	67.88	1.55
5	1.74		121.9	51.50	69.72
6	6.27			-70.43	

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 4	Date: 26-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 4(2)	Azimuth: 42

DATA SET: ARCOS 5

CLIENT: I.T.G.E.	DATE: 26-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 5(1)
COUNTY: CADIZ	AZIMUTH: 60
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 78.00	
SOUNDING COORDINATES: E: 251336.0000 N: 4073786.0000	

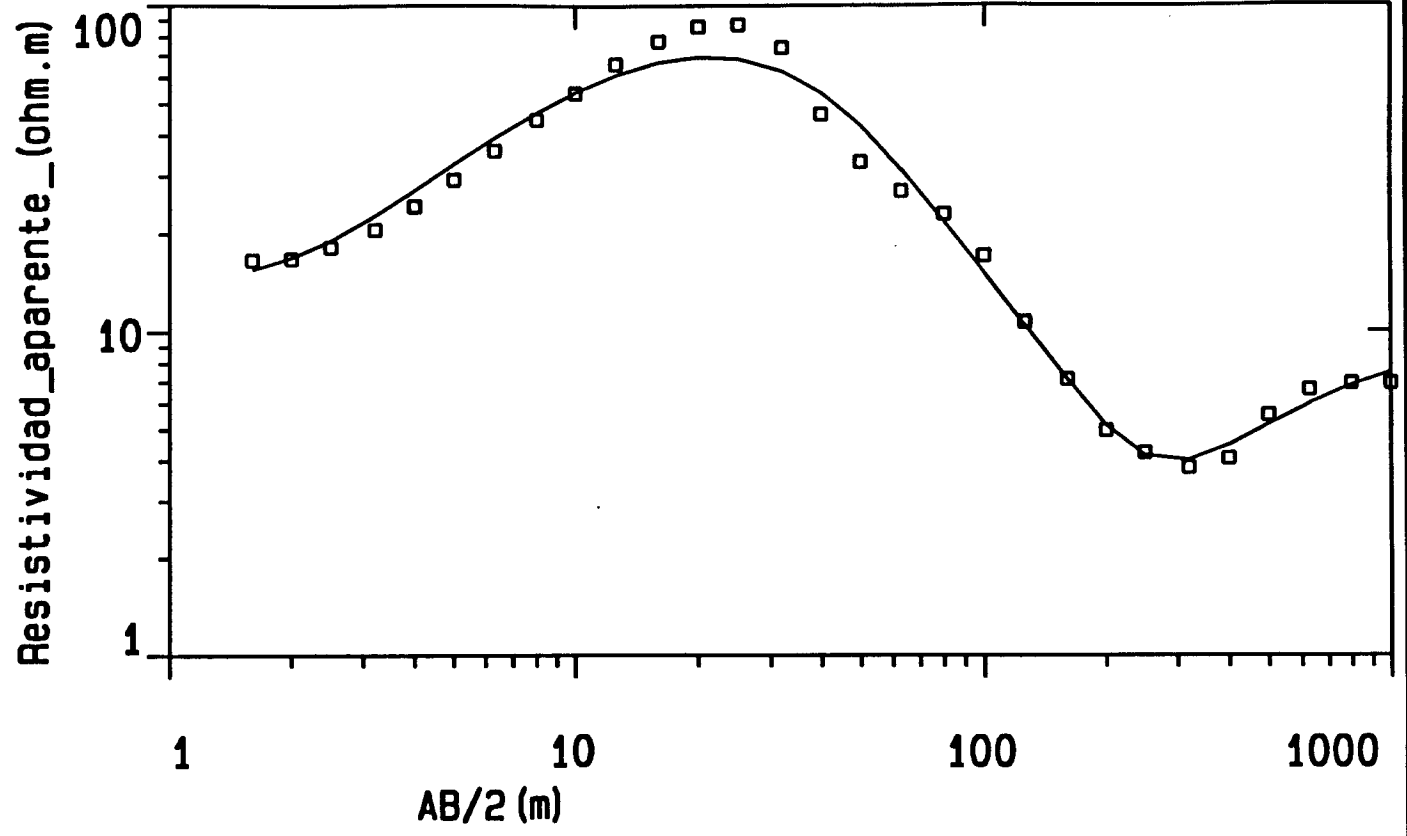
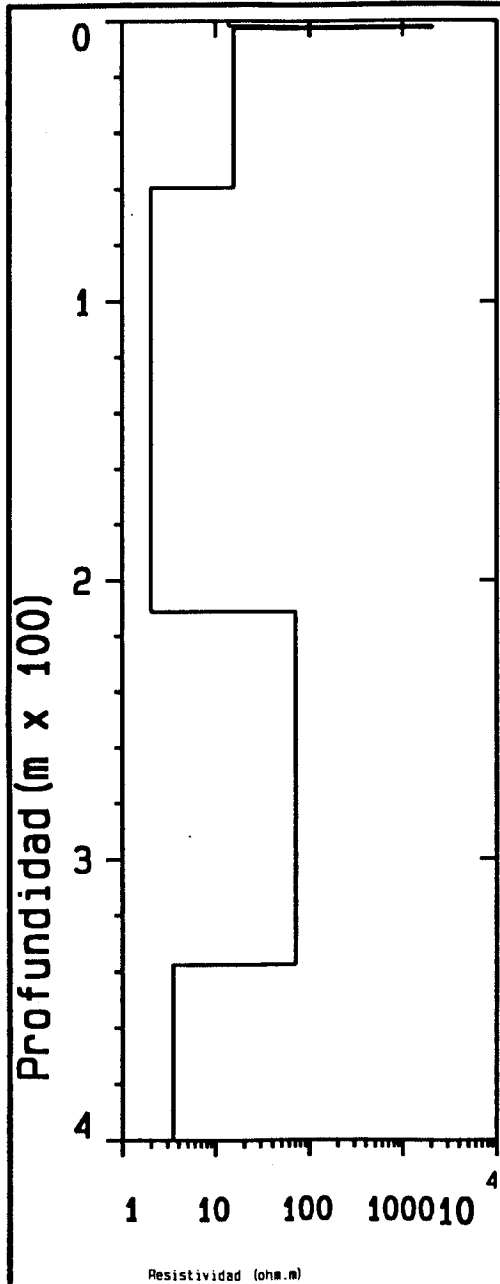
Schlumberger Configuration

FITTING ERROR: 12.121 PERCENT

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	16.56	15.48	6.52
2	2.00	16.76	16.87	-0.676
3	2.50	18.15	19.06	-5.03
4	3.20	20.53	22.67	-10.40
5	4.00	24.20	27.09	-11.95
6	5.00	29.16	32.59	-11.74
7	6.30	35.81	39.23	-9.54
8	8.00	44.54	46.80	-5.08
9	10.00	53.73	54.08	-0.658
10	12.60	65.96	61.10	7.37
11	16.00	77.63	66.71	14.06
12	20.00	86.01	69.31	19.41
13	25.00	87.33	68.38	21.69
14	32.00	74.15	62.65	15.50
15	40.00	46.16	53.71	-16.34
16	50.00	33.03	42.70	-29.29
17	63.00	26.93	31.36	-16.43
18	80.00	22.84	21.68	5.08
19	100.0	17.03	15.12	11.21
20	126.0	10.66	10.42	2.19
21	160.0	7.09	7.11	-0.237
22	200.0	4.95	5.13	-3.65
23	250.0	4.20	4.14	1.55
24	320.0	3.79	4.00	-5.57
25	400.0	4.04	4.44	-10.04
26	500.0	5.50	5.15	6.31
27	630.0	6.60	5.97	9.44
28	800.0	6.90	6.80	1.39
29	1000.0	6.90	7.44	-7.96

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				78.00	
1	13.63		1.83	76.16	0.134
2	74.86		0.304	75.85	0.00407
3	2056.7		0.686	75.16	3.338E-04
4	15.64		56.68	18.48	3.62
5	2.00	*	151.7	-133.2	75.88
6	71.36		126.2	-259.5	1.76
7	3.46				

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA CADIZ
Data Set: ARCOS 5	Date: 26-01-98	
Equipment: SYSCAL R2E	Sounding: 5(1)	Azimuth: 60

DATA SET: ARCOS 6

CLIENT: I.T.G.E.	DATE: 27-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 6(1)
COUNTY: CADIZ	AZIMUTH: 20
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 95.00	
SOUNDING COORDINATES: E: 250009.0000 N: 4074909.0000	

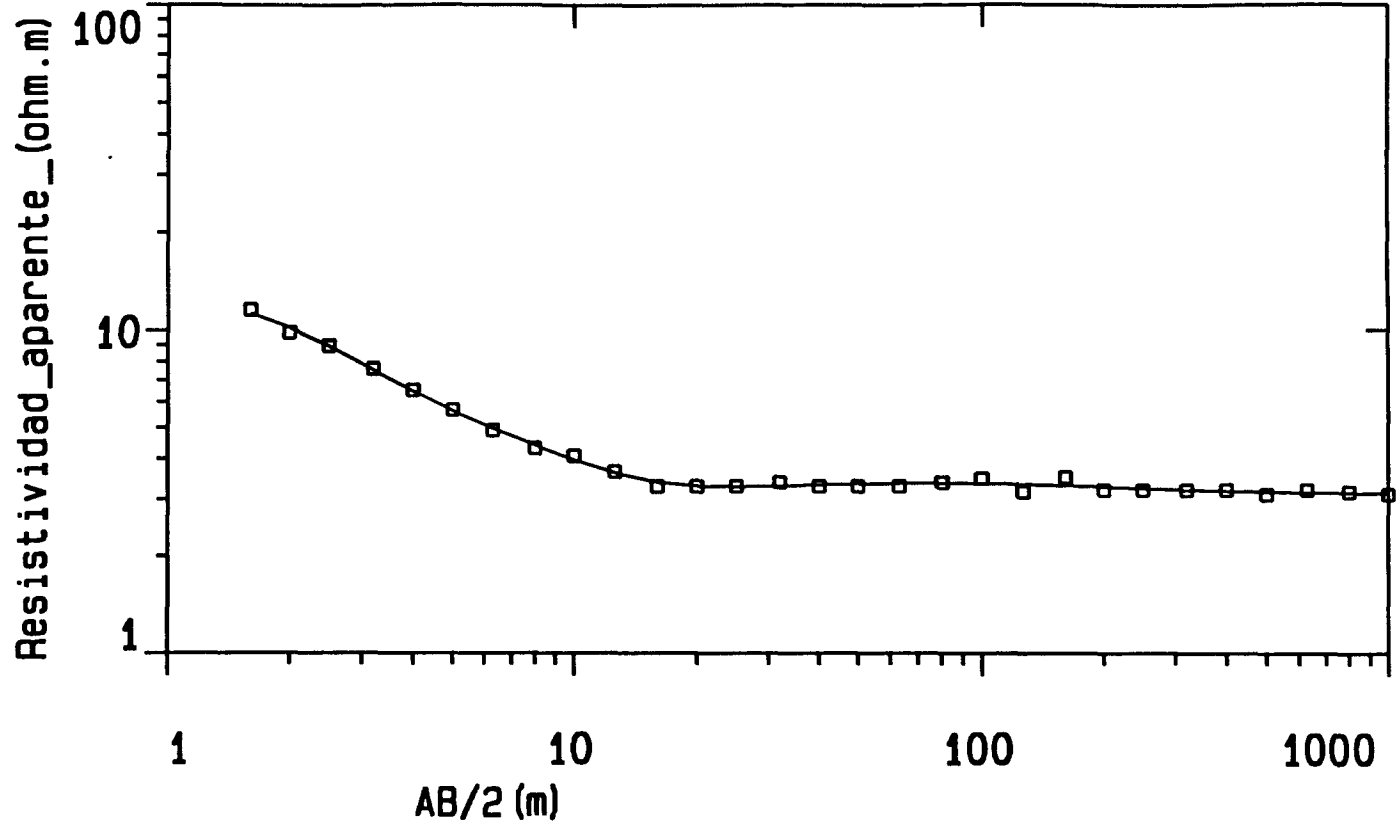
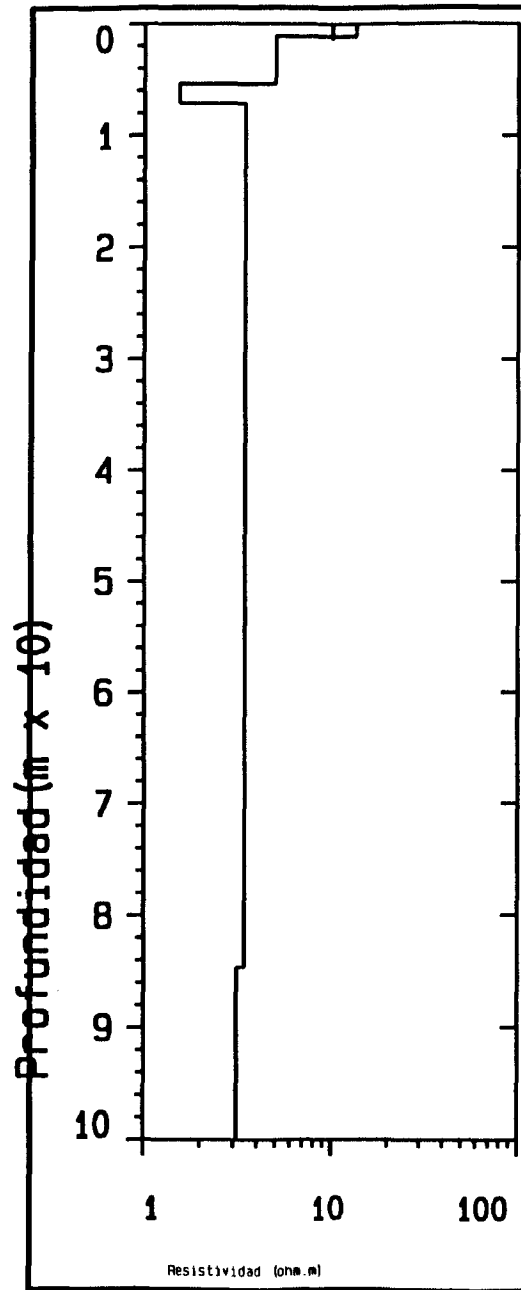
Schlumberger Configuration

FITTING ERROR: 2.300 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	11.51	11.23	2.44
2	2.00	9.79	10.15	-3.72
3	2.50	8.92	8.90	0.199
4	3.20	7.58	7.53	0.639
5	4.00	6.52	6.46	0.950
6	5.00	5.66	5.62	0.634
7	6.30	4.89	4.96	-1.39
8	8.00	4.31	4.40	-2.07
9	10.00	4.09	3.97	2.95
10	12.60	3.64	3.61	0.862
11	16.00	3.29	3.38	-2.85
12	20.00	3.29	3.29	0.0402
13	25.00	3.29	3.27	0.571
14	32.00	3.38	3.29	2.58
15	40.00	3.29	3.31	-0.818
16	50.00	3.29	3.33	-1.45
17	63.00	3.29	3.35	-1.86
18	80.00	3.38	3.35	0.769
19	100.0	3.47	3.35	3.57
20	126.0	3.15	3.33	-5.63
21	160.0	3.50	3.30	5.63
22	200.0	3.20	3.26	-2.16
23	250.0	3.20	3.23	-1.08
24	320.0	3.20	3.20	-0.00285
25	400.0	3.20	3.17	0.785
26	500.0	3.10	3.15	-1.80
27	630.0	3.20	3.14	1.80
28	800.0	3.15	3.13	0.548
29	1000.0	3.10	3.12	-0.868

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	13.43		1.13	95.00 93.86	0.0843
2	4.97		4.29	89.57	0.864
3	1.53		1.74	87.82	1.13
4	3.40		77.45	10.37	22.72
5	3.11				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 6	Date: 27-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 6(1)	Azimuth: 20

DATA SET: ARCOS 7

CLIENT: I.T.G.E.	DATE: 27-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 7(1)
COUNTY: CADIZ	AZIMUTH: 15
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 105.00	
SOUNDING COORDINATES: E: 249781.0000 N: 4073907.0000	

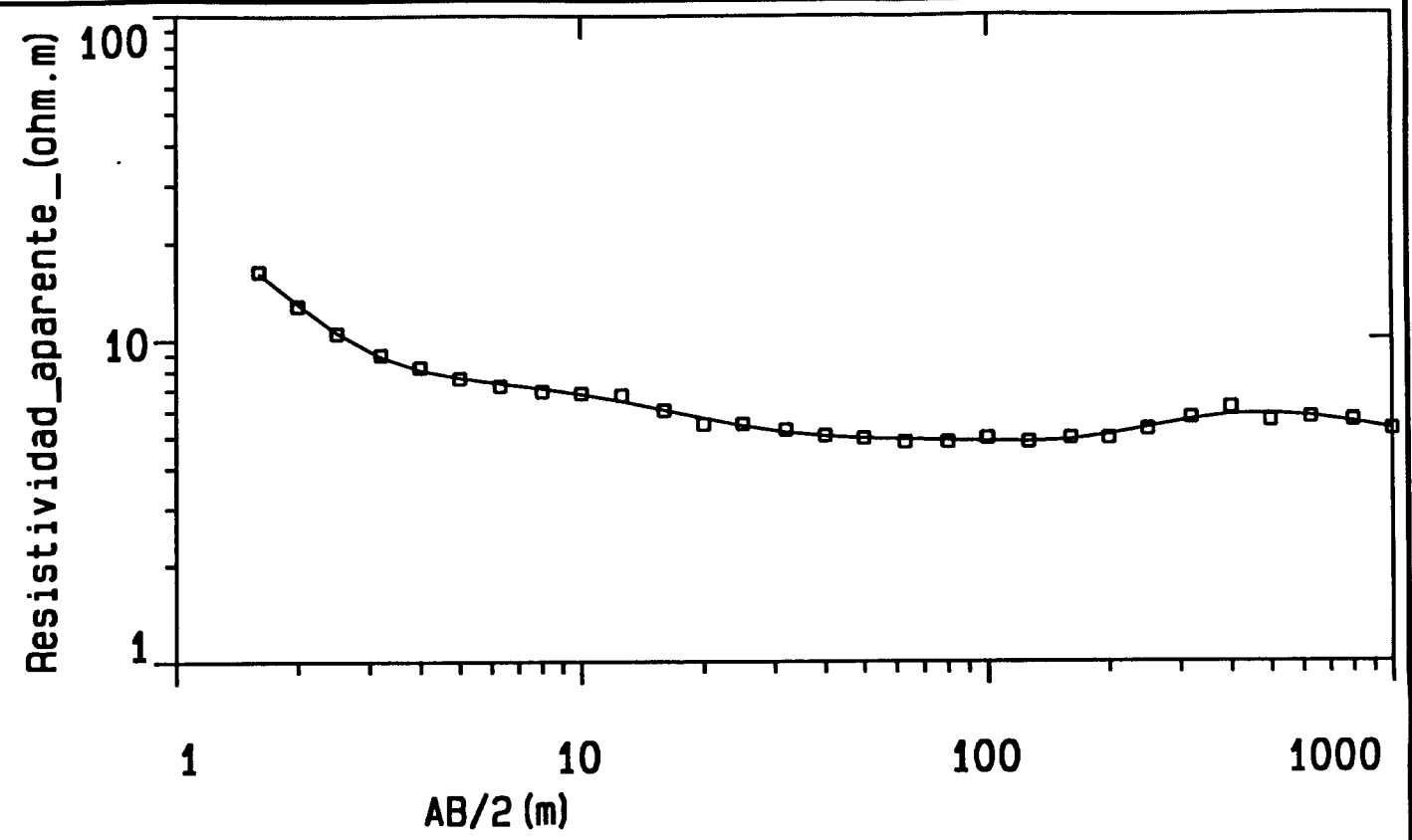
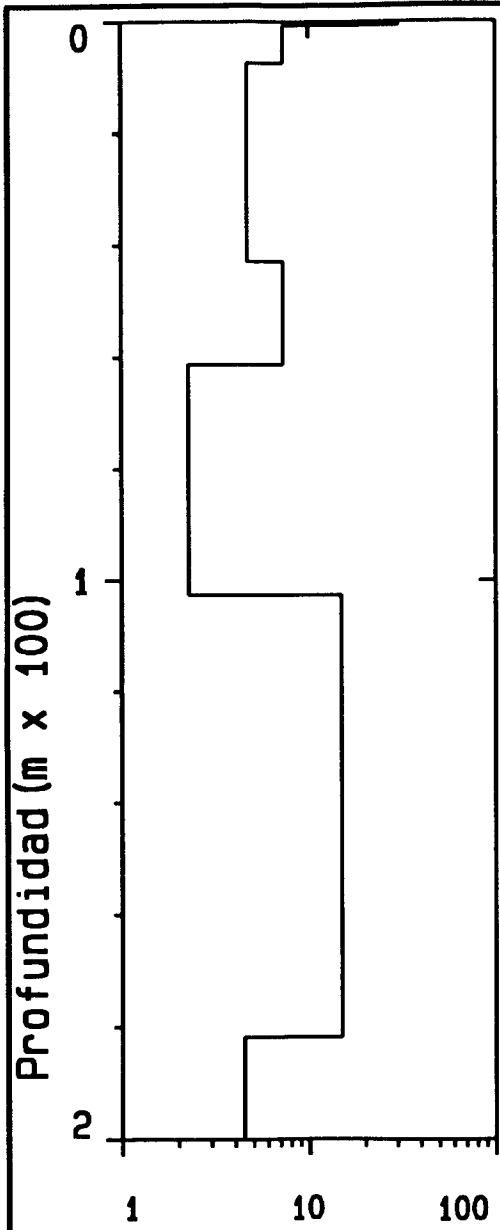
Schlumberger Configuration

FITTING ERROR: 2.116 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	16.29	16.12	1.08
2	2.00	12.74	12.94	-1.60
3	2.50	10.47	10.53	-0.607
4	3.20	8.98	8.87	1.31
5	4.00	8.19	8.06	1.62
6	5.00	7.60	7.62	-0.292
7	6.30	7.21	7.33	-1.72
8	8.00	6.91	7.06	-2.18
9	10.00	6.82	6.78	0.547
10	12.60	6.71	6.44	4.07
11	16.00	6.03	6.05	-0.310
12	20.00	5.45	5.69	-4.42
13	25.00	5.45	5.39	1.08
14	32.00	5.24	5.15	1.72
15	40.00	5.04	5.01	0.501
16	50.00	4.93	4.94	-0.181
17	63.00	4.82	4.89	-1.61
18	80.00	4.82	4.86	-0.939
19	100.0	4.93	4.83	2.02
20	126.0	4.82	4.81	0.0587
21	160.0	4.93	4.88	1.03
22	200.0	4.93	5.05	-2.51
23	250.0	5.26	5.32	-1.19
24	320.0	5.70	5.63	1.16
25	400.0	6.13	5.82	5.15
26	500.0	5.60	5.86	-4.71
27	630.0	5.70	5.75	-0.902
28	800.0	5.60	5.51	1.47
29	1000.0	5.25	5.25	-0.166

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				105.0	
1	30.35		0.671	104.3	0.0221
2	7.27		6.82	97.50	0.937
3	4.68		35.30	62.19	7.53
4	7.27		18.45	43.74	2.53
5	2.27		41.37	2.37	18.20
6	14.90		79.20	-76.83	5.31
7	4.46				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 7	Date: 27-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 7(1)	Azimuth: 15

DATA SET: ARCOS 8

CLIENT: I.T.G.E.	DATE: 12-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 8(2)
COUNTY: CADIZ	AZIMUTH: 21
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 90.00	
SOUNDING COORDINATES: E: 252060.0000 N: 4074651.0000	

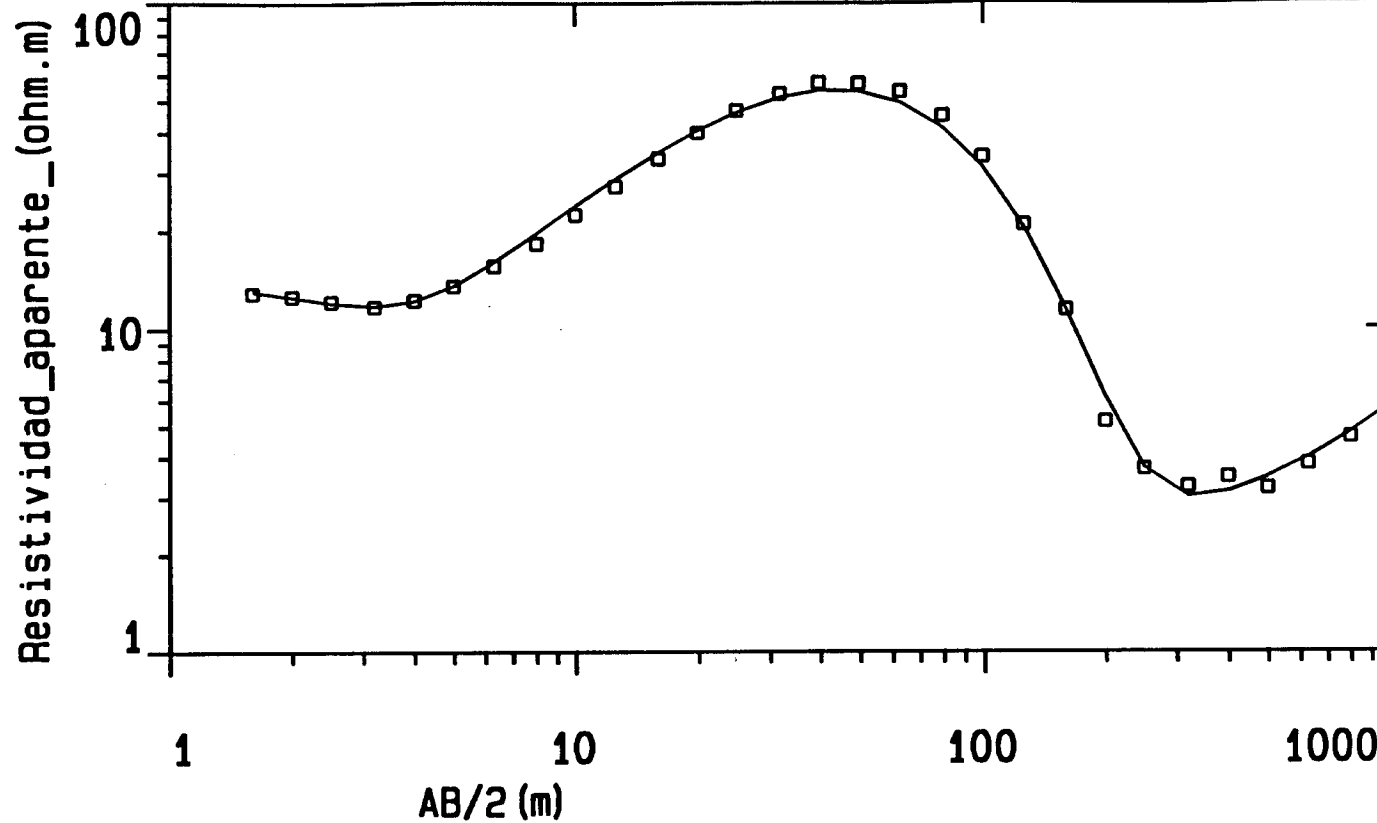
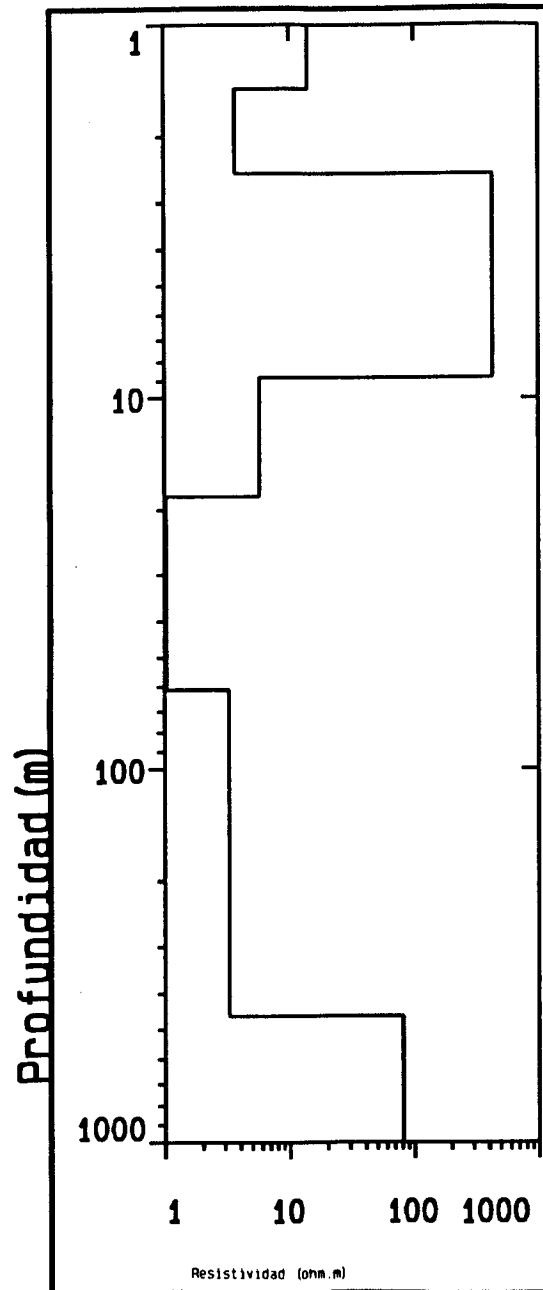
Schlumberger Configuration

FITTING ERROR: 6.130 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	12.89	13.04	-1.14
2	2.00	12.57	12.52	0.366
3	2.50	12.14	12.00	1.13
4	3.20	11.71	11.74	-0.211
5	4.00	12.25	12.17	0.659
6	5.00	13.53	13.52	0.00887
7	6.30	15.55	16.00	-2.91
8	8.00	18.21	19.61	-7.66
9	10.00	22.34	23.79	-6.49
10	12.60	27.27	28.83	-5.72
11	16.00	33.25	34.66	-4.24
12	20.00	39.86	40.41	-1.38
13	25.00	46.68	45.98	1.49
14	32.00	52.34	51.05	2.46
15	40.00	56.55	53.65	5.11
16	50.00	56.33	53.40	5.20
17	63.00	53.49	49.41	7.61
18	80.00	44.95	41.33	8.06
19	100.0	33.69	31.26	7.19
20	126.0	20.78	20.46	1.52
21	160.0	11.40	11.41	-0.110
22	200.0	5.14	6.14	-19.55
23	250.0	3.68	3.71	-0.659
24	320.0	3.24	3.01	6.91
25	400.0	3.46	3.12	9.69
26	500.0	3.20	3.46	-8.43
27	630.0	3.80	3.98	-4.93
28	800.0	4.60	4.75	-3.32
29	1000.0	6.10	5.72	6.15

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	14.07		1.48	90.00	0.105
2	3.71		1.02	88.51	0.274
3	433.2		6.29	87.49	0.0145
4	5.74		9.64	81.19	1.67
5	1.03		42.69	71.55	41.36
6	3.23		398.9	28.86	123.1
7	81.48			-370.0	

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 8	Date: 12-02-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 8(2)	Azimuth: 21

DATA SET: ARCOS 9

CLIENT: I.T.G.E.	DATE: 28-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 9(1)
COUNTY: CADIZ	AZIMUTH: 60
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 95.00	
SOUNDING COORDINATES: E: 250470.0000 N: 4073849.0000	

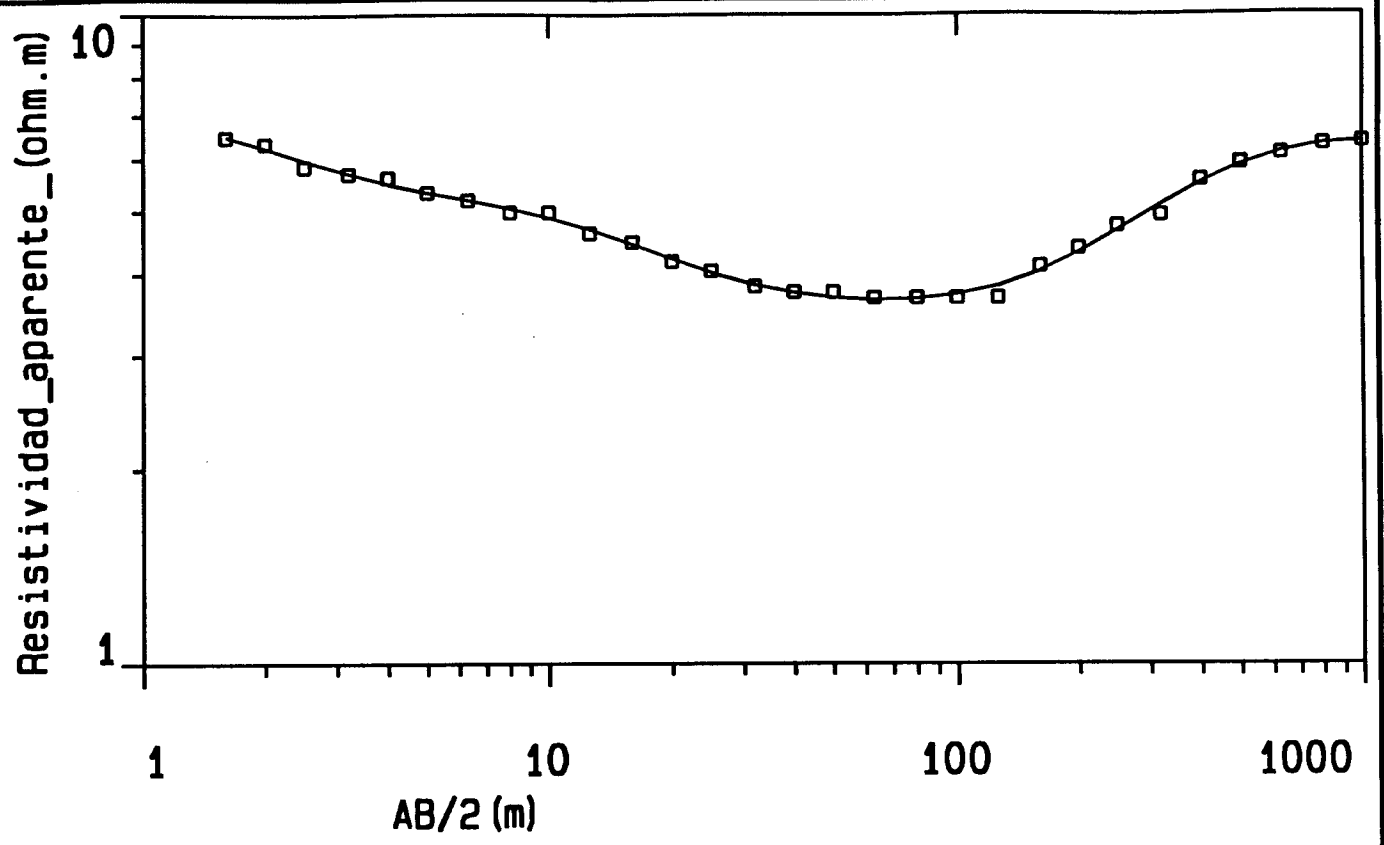
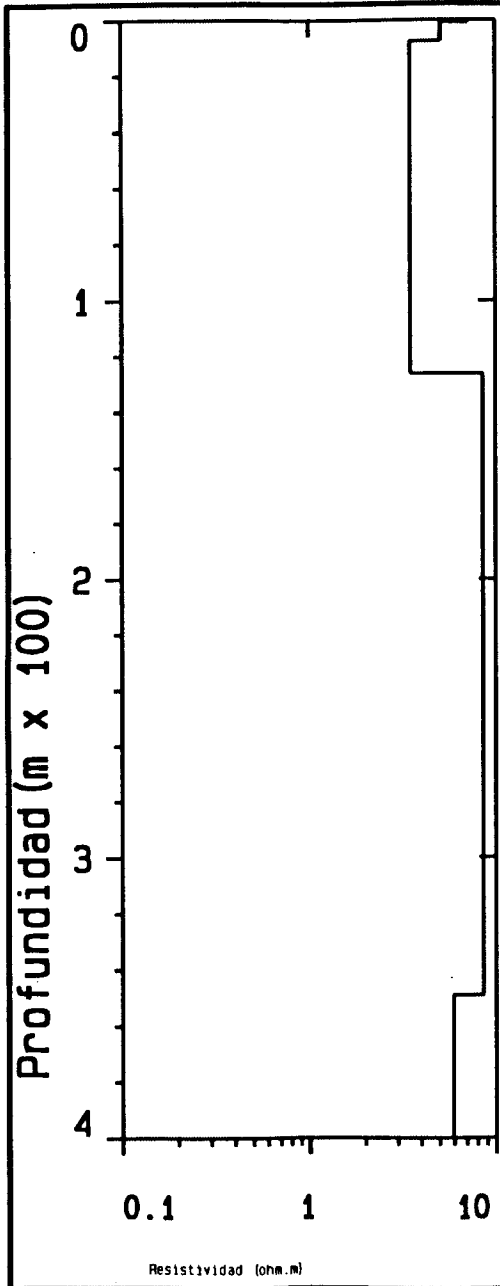
Schlumberger Configuration

FITTING ERROR: 1.555 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	6.48	6.49	-0.206
2	2.00	6.33	6.24	1.55
3	2.50	5.83	5.97	-2.38
4	3.20	5.69	5.70	-0.230
5	4.00	5.61	5.50	2.08
6	5.00	5.33	5.33	-0.137
7	6.30	5.18	5.19	-0.113
8	8.00	4.97	5.04	-1.43
9	10.00	4.97	4.87	1.83
10	12.60	4.61	4.67	-1.44
11	16.00	4.46	4.43	0.610
12	20.00	4.17	4.21	-0.856
13	25.00	4.03	4.01	0.517
14	32.00	3.81	3.84	-0.608
15	40.00	3.74	3.73	0.272
16	50.00	3.74	3.67	1.95
17	63.00	3.66	3.64	0.607
18	80.00	3.66	3.65	0.284
19	100.0	3.66	3.71	-1.18
20	126.0	3.66	3.82	-4.29
21	160.0	4.09	4.02	1.75
22	200.0	4.37	4.29	1.62
23	250.0	4.73	4.65	1.75
24	320.0	4.91	5.09	-3.65
25	400.0	5.55	5.49	0.991
26	500.0	5.90	5.85	0.808
27	630.0	6.10	6.12	-0.461
28	800.0	6.30	6.29	0.0595
29	1000.0	6.35	6.35	-0.00973

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				95.00	
1	7.13		0.914	94.08	0.128
2	5.14		6.69	87.38	1.30
3	3.51		118.6	-31.23	33.70
4	8.57		222.9	-254.2	26.00
5	5.93				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 9	Date: 28-01-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 9(1)	Azimuth: 60

DATA SET: ARCOS 10

CLIENT: I.T.G.E.	DATE: 29-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 10(6)
COUNTY: CADIZ	AZIMUTH: N-S
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 117.00	
SOUNDING COORDINATES: E: 253206.0000 N: 4072102.0000	

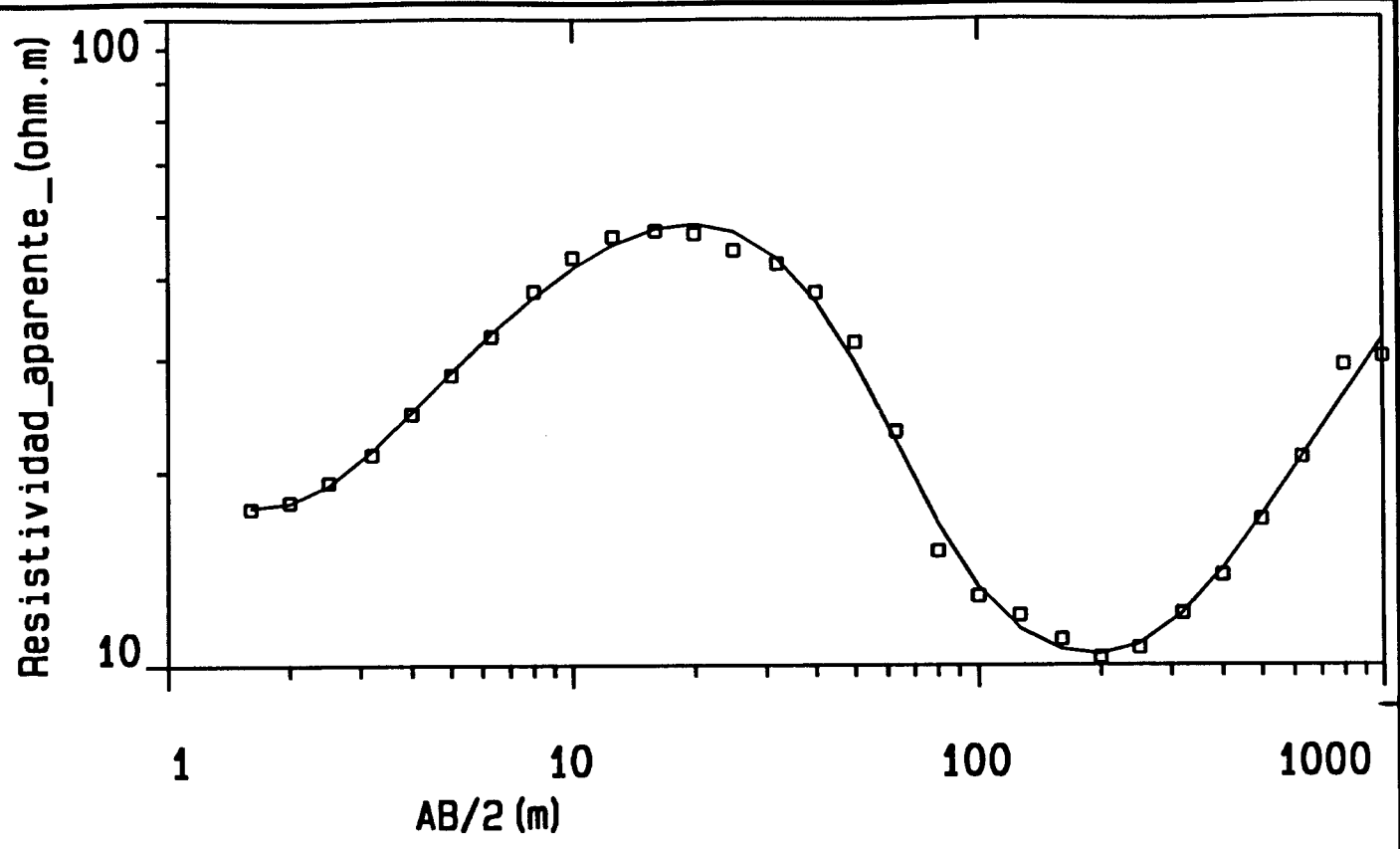
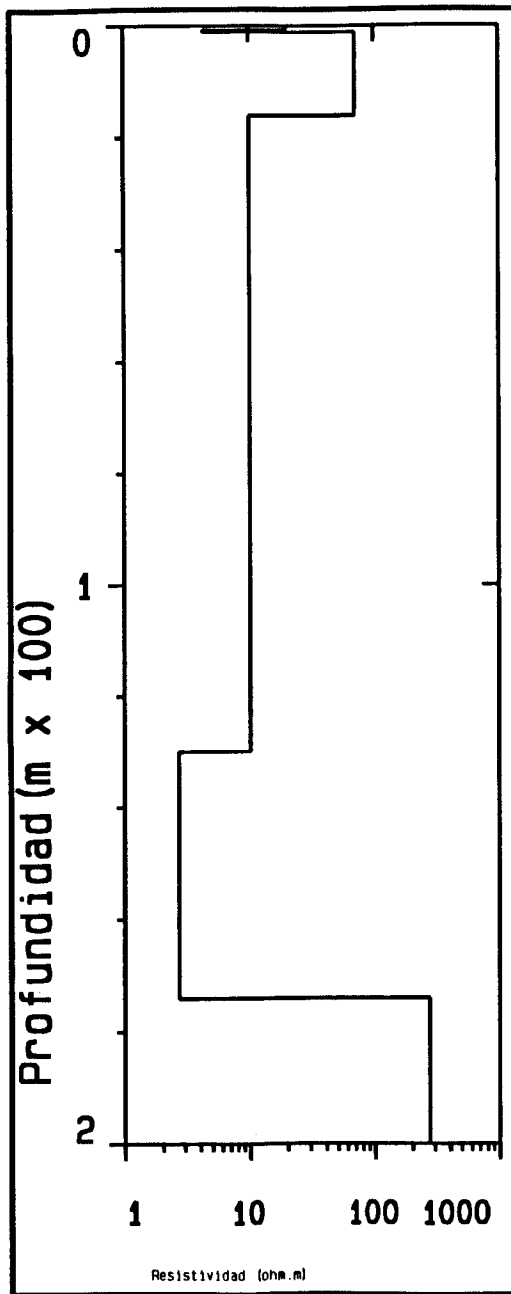
Schlumberger Configuration

FITTING ERROR: 4.134 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	17.57	17.62	-0.325
2	2.00	17.95	17.91	0.254
3	2.50	19.27	19.09	0.940
4	3.20	21.28	21.58	-1.41
5	4.00	24.61	24.75	-0.583
6	5.00	28.25	28.51	-0.938
7	6.30	32.43	32.75	-1.00
8	8.00	38.08	37.25	2.17
9	10.00	42.87	41.29	3.69
10	12.60	46.21	44.91	2.81
11	16.00	47.14	47.51	-0.783
12	20.00	46.67	48.30	-3.48
13	25.00	43.96	46.98	-6.86
14	32.00	41.94	42.72	-1.85
15	40.00	37.89	36.64	3.30
16	50.00	31.71	29.44	7.13
17	63.00	23.08	22.29	3.41
18	80.00	15.07	16.59	-10.09
19	100.0	12.80	13.24	-3.39
20	126.0	11.97	11.41	4.71
21	160.0	10.98	10.59	3.54
22	200.0	10.28	10.41	-1.29
23	250.0	10.63	10.78	-1.41
24	320.0	12.03	12.03	0.0100
25	400.0	13.79	14.09	-2.15
26	500.0	16.80	17.05	-1.52
27	630.0	21.00	21.05	-0.285
28	800.0	29.15	26.22	10.04
29	1000.0	30.05	32.08	-6.77

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	19.62		0.881	117.0	0.0449
2	4.32		0.308	116.1	0.0712
3	70.57		14.94	115.8	0.211
4	10.16		113.8	100.8	11.19
5	2.70		44.14	-12.97	16.32
6	274.4			-57.12	

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 10	Date: 29-01-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 10 (6)	Azimuth: N-S	

DATA SET: ARCOS 11

CLIENT: I.T.G.E.	DATE: 29-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 11(6)
COUNTY: CADIZ	AZIMUTH: 12
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 118.00	
SOUNDING COORDINATES: E: 252925.0000 N: 4071330.0000	

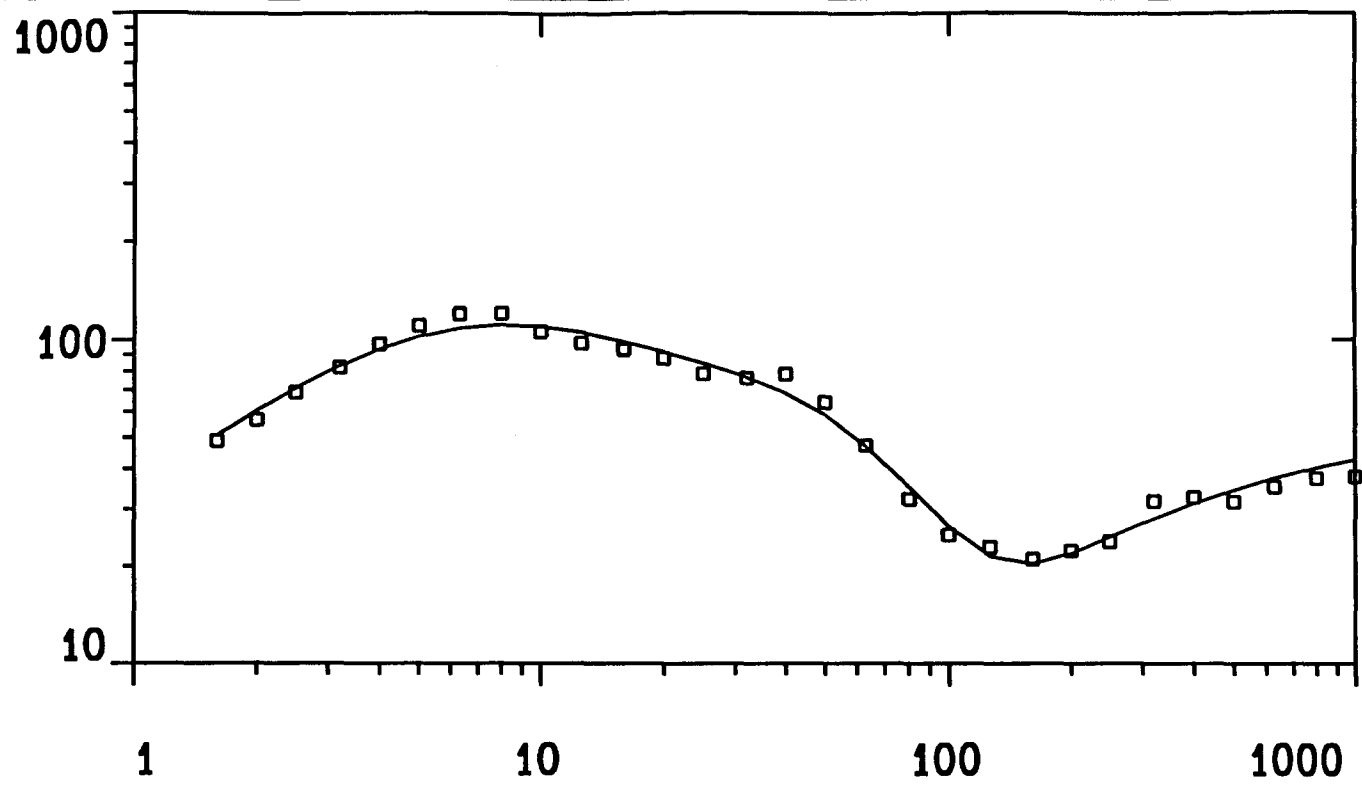
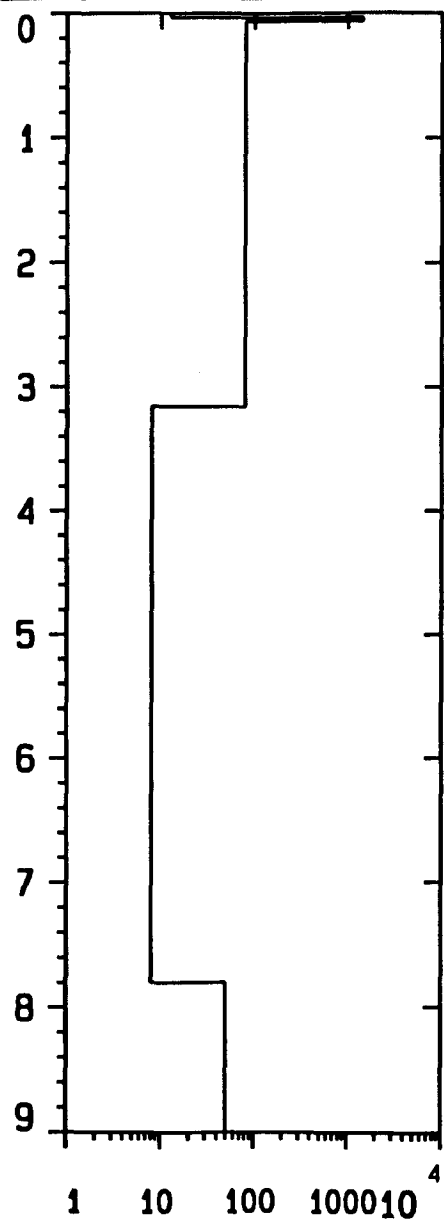
Schlumberger Configuration

FITTING ERROR: 7.315 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	48.67	50.69	-4.16
2	2.00	56.56	60.43	-6.83
3	2.50	68.68	70.98	-3.35
4	3.20	81.98	82.97	-1.20
5	4.00	96.80	93.26	3.66
6	5.00	110.3	102.0	7.54
7	6.30	119.9	108.3	9.68
8	8.00	120.3	111.0	7.74
9	10.00	105.9	109.8	-3.72
10	12.60	97.67	105.4	-7.91
11	16.00	93.48	98.62	-5.49
12	20.00	87.65	91.55	-4.44
13	25.00	78.29	84.44	-7.86
14	32.00	76.08	76.39	-0.404
15	40.00	78.08	68.19	12.67
16	50.00	64.08	58.43	8.81
17	63.00	47.12	46.92	0.428
18	80.00	32.14	35.16	-9.40
19	100.0	24.94	26.49	-6.23
20	126.0	22.87	21.43	6.29
21	160.0	21.02	20.31	3.35
22	200.0	22.28	21.82	2.04
23	250.0	23.75	24.51	-3.21
24	320.0	31.74	27.95	11.92
25	400.0	32.53	31.14	4.24
26	500.0	31.50	34.28	-8.83
27	630.0	35.00	37.34	-6.70
28	800.0	37.35	40.19	-7.62
29	1000.0	37.60	42.50	-13.03

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				118.0	
1	12.94		0.358	117.6	0.0277
2	1452.3		0.314	117.3	2.166E-04
3	79.89		30.88	86.44	0.386
4	8.00	*	46.48	39.95	5.81
5	50.00	*			

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 11	Date: 29-01-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 11(6)	Azimuth: 12	

DATA SET: ARCOS 12

CLIENT: I.T.G.E.	DATE: 30-01-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 12(6)
COUNTY: CADIZ	AZIMUTH: N-S
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 120.00	
SOUNDING COORDINATES: E: 252809.0000 N: 4070658.0000	

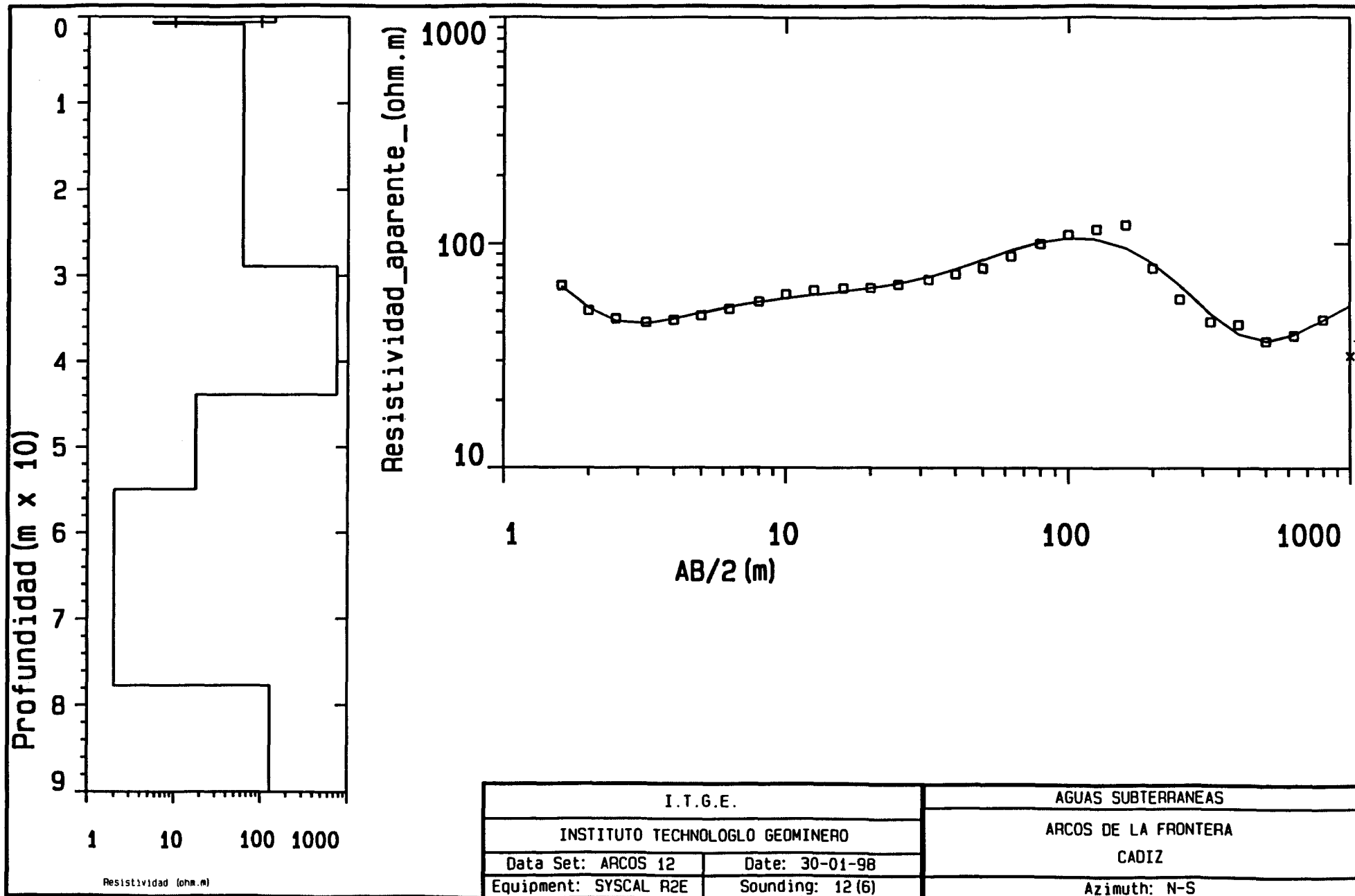
Schlumberger Configuration

FITTING ERROR: 6.968 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	65.06	64.38	1.05
2	2.00	50.33	51.77	-2.84
3	2.50	46.30	45.23	2.30
4	3.20	44.48	44.08	0.899
5	4.00	45.59	46.12	-1.16
6	5.00	47.71	49.08	-2.87
7	6.30	51.04	52.10	-2.07
8	8.00	55.18	54.87	0.559
9	10.00	59.46	57.11	3.96
10	12.60	61.93	59.15	4.49
11	16.00	63.07	61.18	2.99
12	20.00	63.27	63.34	-0.0994
13	25.00	65.44	66.19	-1.14
14	32.00	68.74	70.80	-3.00
15	40.00	73.02	76.79	-5.15
16	50.00	77.60	84.51	-8.89
17	63.00	87.85	93.39	-6.30
18	80.00	99.89	101.4	-1.54
19	100.0	109.3	105.5	3.49
20	126.0	114.8	104.1	9.31
21	160.0	120.7	95.55	20.86
22	200.0	77.90	81.80	-5.00
23	250.0	56.68	65.32	-15.24
24	320.0	44.96	48.88	-8.72
25	400.0	43.54	39.54	9.20
26	500.0	36.60	36.71	-0.305
27	630.0	38.80	39.34	-1.39
28	800.0	45.80	45.51	0.622
29	1000.0	31.60	52.75	-66.94

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	144.3		0.660	119.3	0.00457
2	5.49		0.172	119.1	0.0314
3	62.28		28.08	91.08	0.450
4	748.6		14.96	76.11	0.0199
5	17.83		11.06	65.05	0.620
6	2.01		22.76	42.28	11.32
7	130.0	*			

"*" INDICATES FIXED PARAMETER



Profundidad (m x 10)

Resistividad_aparente_(ohm.m)

AB/2 (m)

Resistividad (ohm.m)

DATA SET: ARCOS 13

CLIENT: I.T.G.E.	DATE: 06-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 13(7)
COUNTY: CADIZ	AZIMUTH: 60
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 105.00	
SOUNDING COORDINATES: E: 252939.0000 N: 4072235.0000	

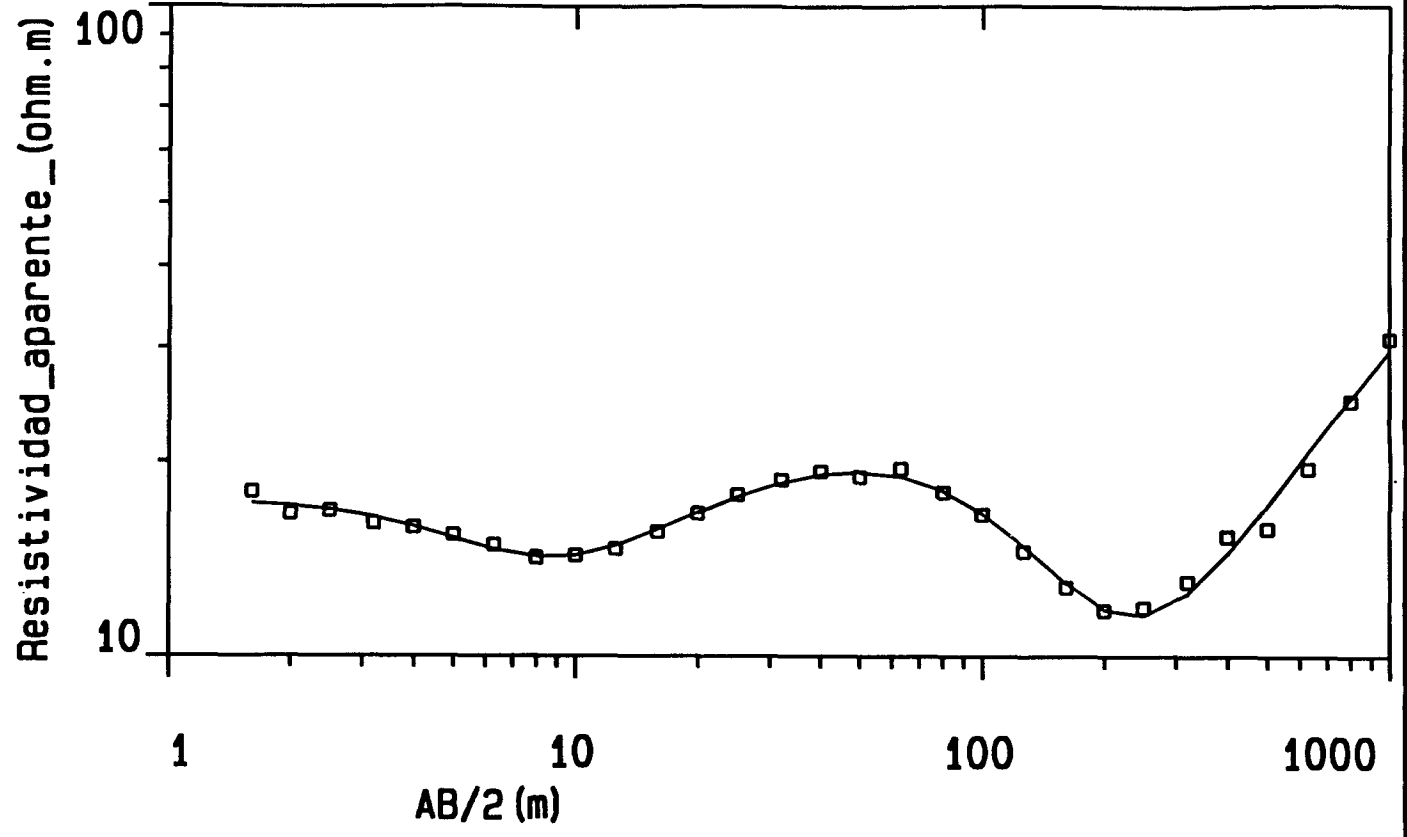
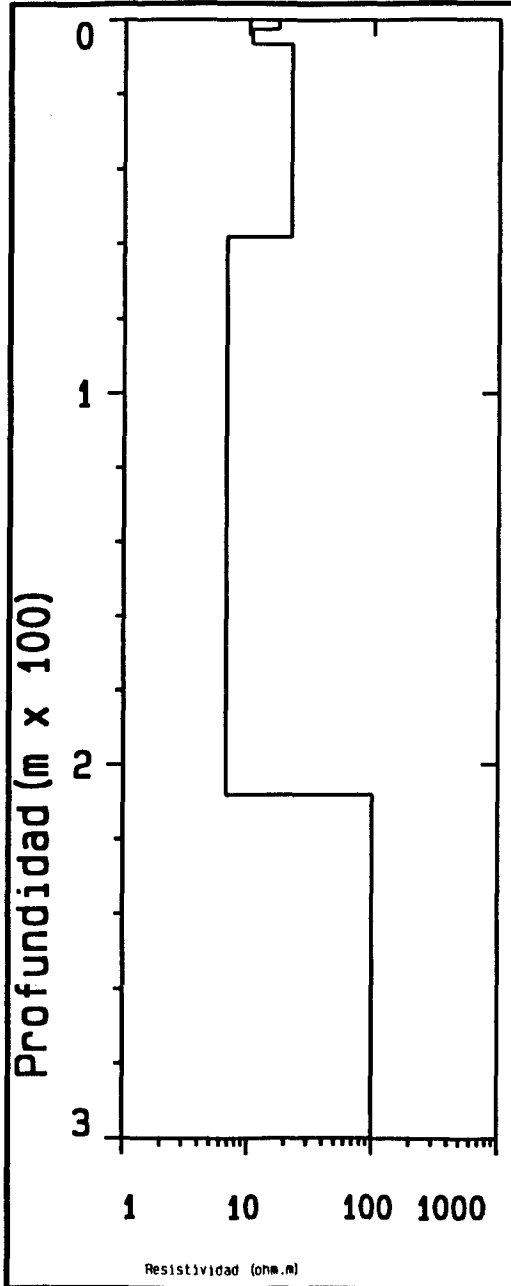
Schlumberger Configuration

FITTING ERROR: 2.953 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	17.97	17.23	4.12
2	2.00	16.57	17.08	-3.07
3	2.50	16.79	16.83	-0.269
4	3.20	16.04	16.40	-2.29
5	4.00	15.82	15.86	-0.273
6	5.00	15.39	15.23	1.01
7	6.30	14.85	14.63	1.52
8	8.00	14.21	14.26	-0.354
9	10.00	14.32	14.31	0.0864
10	12.60	14.64	14.81	-1.19
11	16.00	15.58	15.69	-0.743
12	20.00	16.62	16.67	-0.292
13	25.00	17.77	17.63	0.792
14	32.00	18.71	18.52	1.03
15	40.00	19.26	19.05	1.08
16	50.00	18.92	19.23	-1.62
17	63.00	19.49	18.93	2.86
18	80.00	17.90	18.01	-0.616
19	100.0	16.54	16.61	-0.401
20	126.0	14.50	14.80	-2.02
21	160.0	12.77	12.98	-1.56
22	200.0	11.78	11.81	-0.266
23	250.0	11.89	11.56	2.83
24	320.0	13.05	12.50	4.17
25	400.0	15.31	14.41	5.86
26	500.0	15.75	17.14	-8.85
27	630.0	19.50	20.68	-6.07
28	800.0	24.80	25.02	-0.908
29	1000.0	30.90	29.68	3.94

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				105.0	
1	17.42		2.52	102.4	0.145
2	15.15		0.173	102.2	0.0114
3	10.49		3.92	98.37	0.374
4	22.19		51.51	46.86	2.32
5	6.72		150.0	* -103.1	22.30
6	100.4	*			

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 13	Date: 06-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 13 (7)	Azimuth: 60	

DATA SET: ARCOS 14

CLIENT: I.T.G.E.
 LOCATION: BORNOS
 COUNTY: CADIZ
 PROJECT: AGUAS SUBTERRANEAS
 ELEVATION: 115.00
 SOUNDING COORDINATES: E: 257383.0000 N: 4079576.0000

DATE: 05-02-98
 SOUNDING: 14(5)
 AZIMUTH: 44
 EQUIPMENT: SYSCAL R2E

Schlumberger Configuration

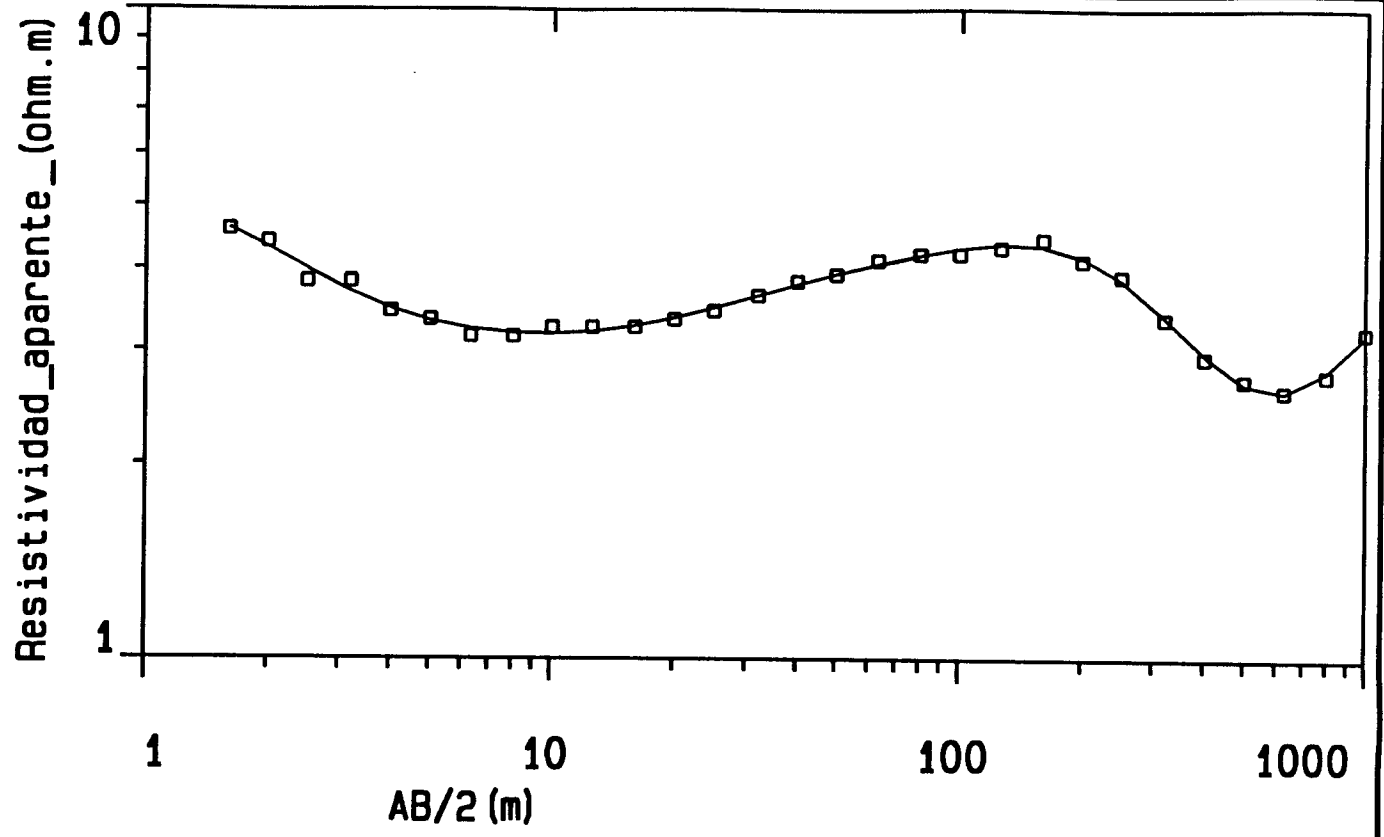
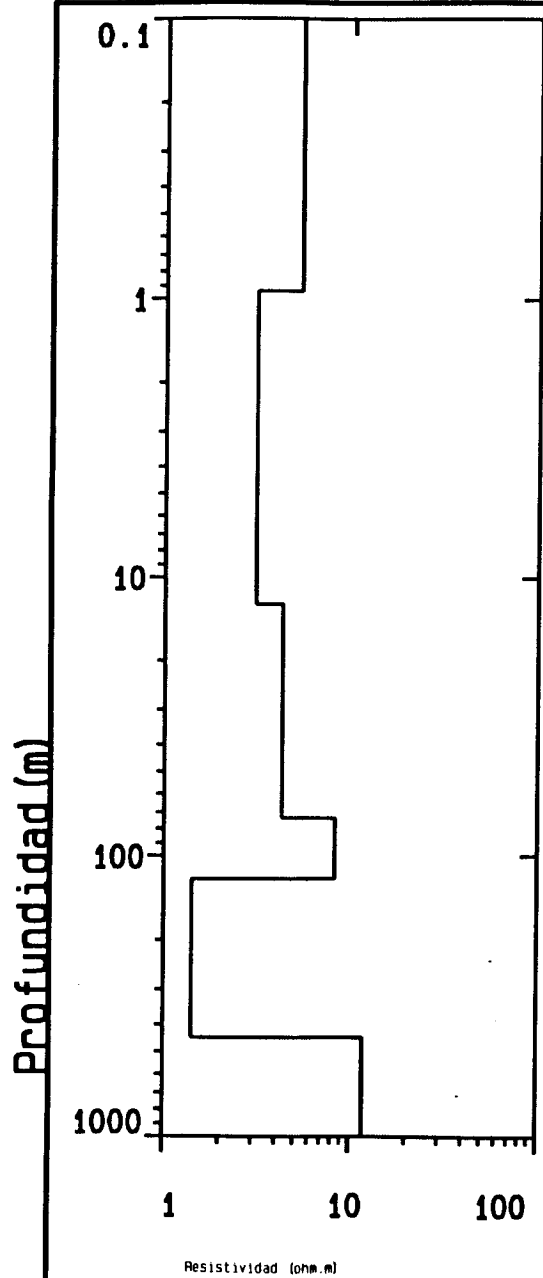
FITTING ERROR: 1.646 PERCENT

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	4.59	4.60	-0.402
2	2.00	4.39	4.30	2.13
3	2.50	3.82	3.99	-4.33
4	3.20	3.82	3.68	3.71
5	4.00	3.44	3.47	-0.799
6	5.00	3.34	3.32	0.658
7	6.30	3.15	3.23	-2.49
8	8.00	3.15	3.18	-1.06
9	10.00	3.25	3.18	2.14
10	12.60	3.25	3.20	1.39
11	16.00	3.25	3.26	-0.502
12	20.00	3.34	3.35	-0.390
13	25.00	3.44	3.48	-1.12
14	32.00	3.63	3.63	-0.0964
15	40.00	3.82	3.78	0.999
16	50.00	3.92	3.92	-0.186
17	63.00	4.11	4.06	1.18
18	80.00	4.21	4.19	0.357
19	100.0	4.21	4.30	-2.09
20	126.0	4.31	4.36	-1.22
21	160.0	4.44	4.33	2.39
22	200.0	4.11	4.16	-1.29
23	250.0	3.90	3.85	1.16
24	320.0	3.35	3.38	-0.741
25	400.0	2.92	2.95	-1.17
26	500.0	2.70	2.66	1.25
27	630.0	2.60	2.59	0.219
28	800.0	2.75	2.78	-1.45
29	1000.0	3.20	3.17	0.702

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	5.36		0.937	115.0	
2	3.06		11.56	114.0	0.174
3	4.30		60.73	102.4	3.77
4	8.33		47.70	41.75	14.09
5	1.41		324.4	-5.94	5.72
6	11.76			-330.3	228.8

ALL PARAMETERS ARE FREE

* INSTITUTO TECHNOLOGLO GEOMINERO *



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		BORNOS	
Data Set: ARCOS 14	Date: 05-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 14(5)	Azimuth: 44	

DATA SET: ARCOS 15

CLIENT: I.T.G.E.	DATE: 09-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 15(2)
COUNTY: CADIZ	AZIMUTH: N-S
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 90.00	
SOUNDING COORDINATES: E: 253193.0000 N: 4074252.0000	

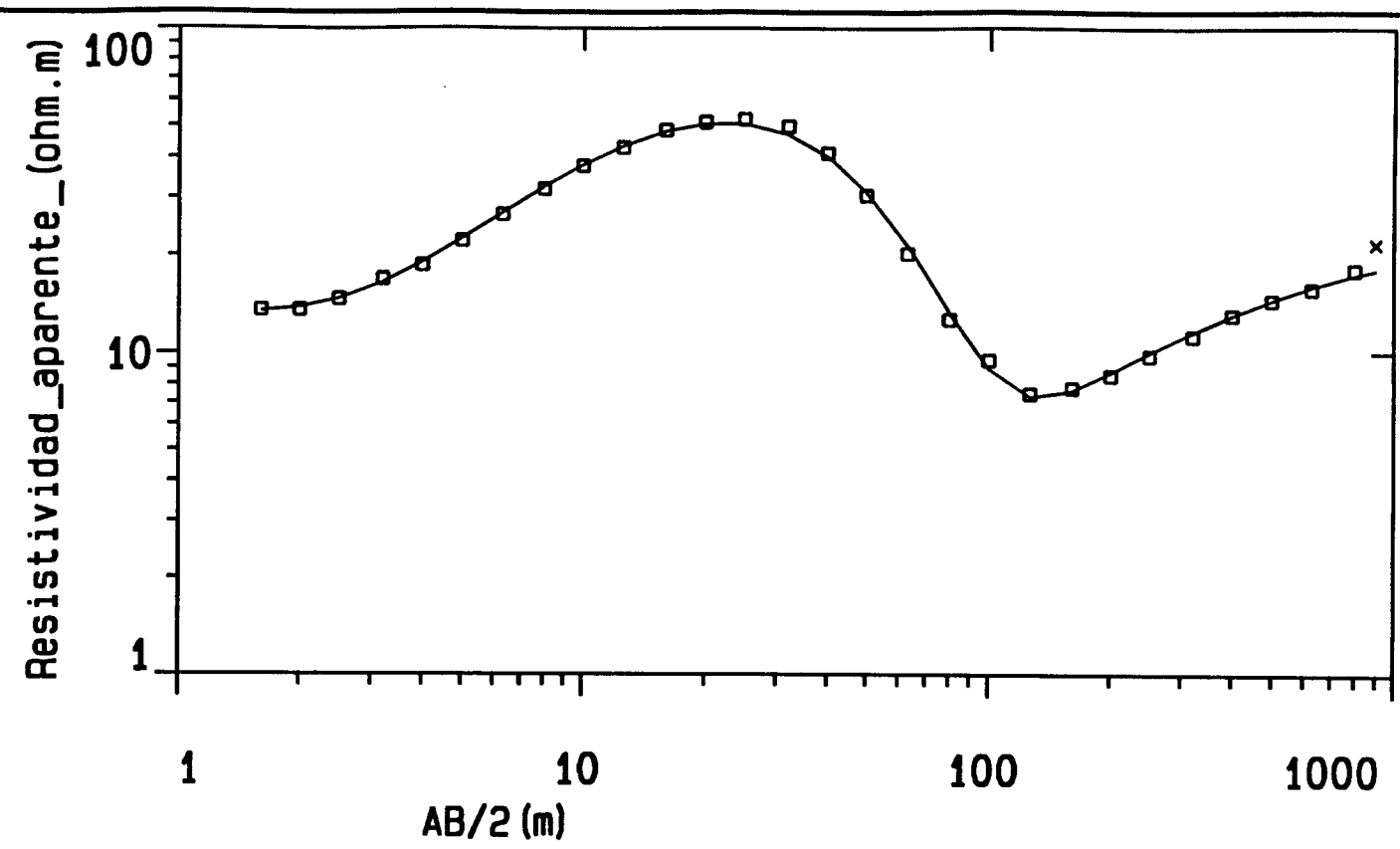
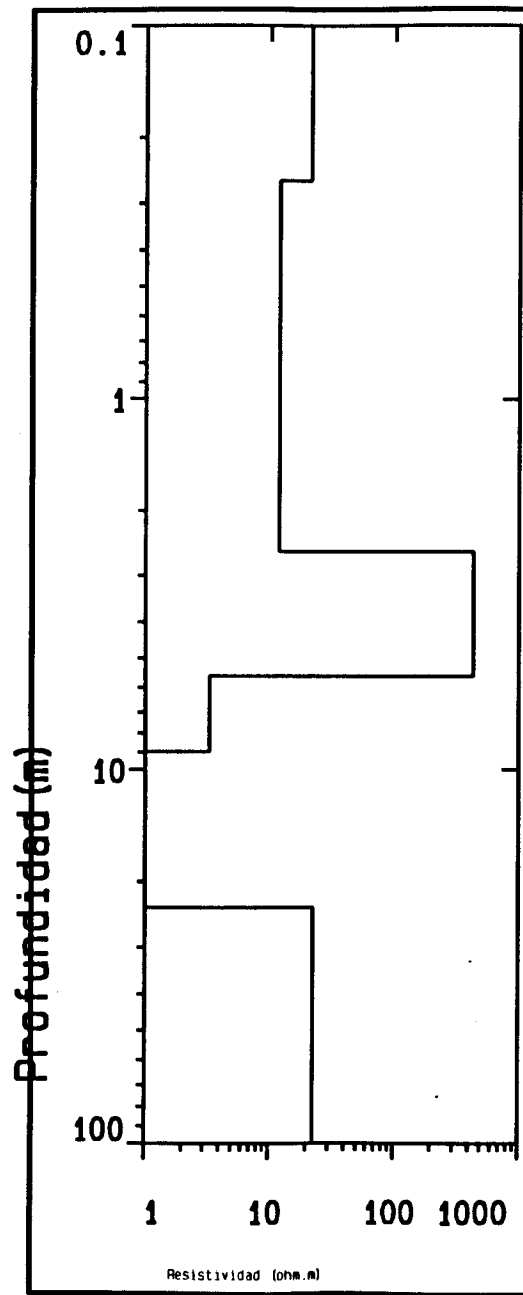
Schlumberger Configuration

FITTING ERROR: 2.767 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	13.53	13.41	0.877
2	2.00	13.53	13.76	-1.68
3	2.50	14.60	14.65	-0.313
4	3.20	16.84	16.45	2.34
5	4.00	18.60	18.98	-2.06
6	5.00	22.10	22.44	-1.54
7	6.30	26.58	26.94	-1.33
8	8.00	31.84	32.33	-1.55
9	10.00	37.51	37.74	-0.609
10	12.60	42.84	43.21	-0.847
11	16.00	48.28	47.92	0.730
12	20.00	51.15	50.56	1.13
13	25.00	52.17	50.60	3.01
14	32.00	49.61	46.85	5.55
15	40.00	41.05	40.05	2.43
16	50.00	30.44	31.00	-1.84
17	63.00	20.15	21.29	-5.64
18	80.00	12.62	13.26	-5.10
19	100.0	9.44	8.87	6.01
20	126.0	7.42	7.27	2.07
21	160.0	7.74	7.58	2.04
22	200.0	8.48	8.65	-2.04
23	250.0	9.75	9.98	-2.28
24	320.0	11.24	11.55	-2.78
25	400.0	13.04	13.03	0.112
26	500.0	14.50	14.50	-0.0487
27	630.0	15.70	15.97	-1.74
28	800.0	18.00	17.37	3.47
29	900.0	21.60	18.00	16.62

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	21.27		0.260	90.00	
2	11.92		2.31	89.73	0.0122
3	431.3		3.01	87.42	0.194
4	3.31		3.36	84.40	0.00700
5	1.00	*	14.49	81.03	1.01
6	22.65			66.54	14.49

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 15	Date: 09-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 15 (2)	Azimuth: N-S	

DATA SET: ARCOS 16

CLIENT: I.T.G.E.	DATE: 10-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 16(2)
COUNTY: CADIZ	AZIMUTH: 166
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 150.00	
SOUNDING COORDINATES: E: 253918.0000 N: 4073905.0000	

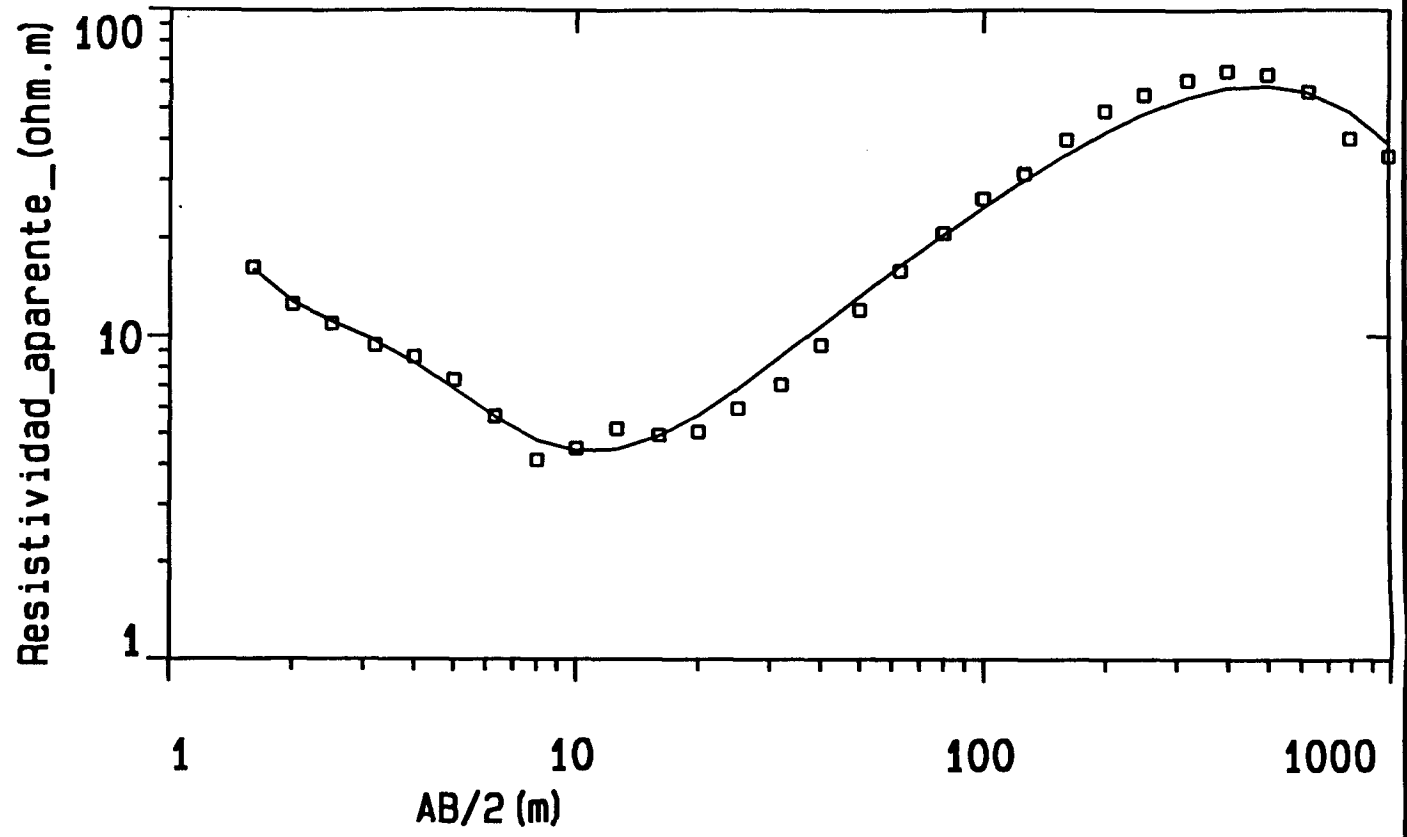
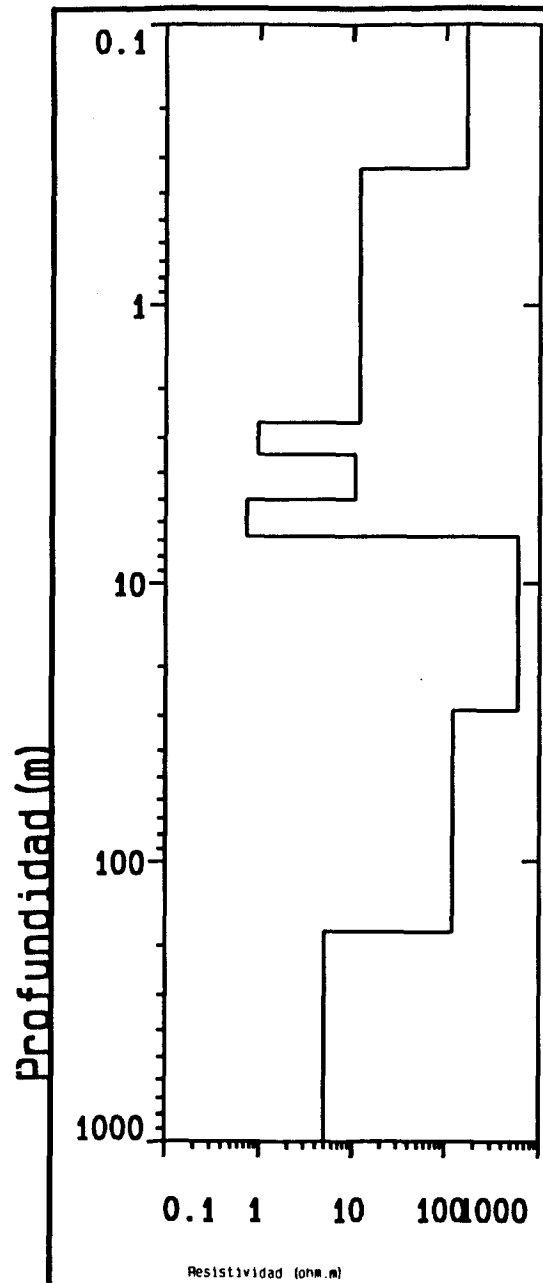
Schlumberger Configuration

FITTING ERROR: 10.536 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	16.22	16.03	1.15
2	2.00	12.49	12.74	-1.98
3	2.50	10.93	11.11	-1.61
4	3.20	9.37	9.67	-3.21
5	4.00	8.65	8.28	4.28
6	5.00	7.33	6.87	6.26
7	6.30	5.64	5.62	0.470
8	8.00	4.14	4.76	-14.95
9	10.00	4.49	4.41	1.67
10	12.60	5.16	4.46	13.59
11	16.00	4.94	4.90	0.795
12	20.00	5.05	5.68	-12.52
13	25.00	5.95	6.86	-15.34
14	32.00	7.07	8.64	-22.20
15	40.00	9.38	10.70	-14.07
16	50.00	12.02	13.23	-10.09
17	63.00	15.85	16.40	-3.48
18	80.00	20.60	20.36	1.19
19	100.0	26.33	24.72	6.12
20	126.0	31.36	29.92	4.60
21	160.0	39.89	35.96	9.85
22	200.0	49.11	42.00	14.47
23	250.0	54.98	48.01	12.68
24	320.0	60.81	53.82	11.48
25	400.0	64.65	57.35	11.29
26	500.0	63.20	58.22	7.87
27	630.0	55.90	55.46	0.781
28	800.0	40.10	48.43	-20.77
29	1000.0	35.50	38.82	-9.37

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	166.6		0.326	150.0	0.00196
2	11.81		2.31	149.6	0.196
3	0.956		0.795	147.3	0.831
4	10.51		1.55	146.5	0.147
5	0.730		1.78	145.0	2.44
6	592.8		21.97	143.2	0.0370
7	120.5		150.0	121.2	1.24
8	5.00	*		* -28.75	

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 16	Date: 10-02-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 16 (2)	Azimuth: 166

DATA SET: ARCOS 17

CLIENT: I.T.G.E. DATE: 10-02-98
 LOCATION: ARCOS DE LA FRONTERA SOUNDING: 17(1)
 COUNTY: CADIZ AZIMUTH: 155
 PROJECT: AGUAS SUBTERRANEAS EQUIPMENT: SYSCAL R2E
 ELEVATION: 130.00
 SOUNDING COORDINATES: E: 254037.0000 N: 4073187.0000

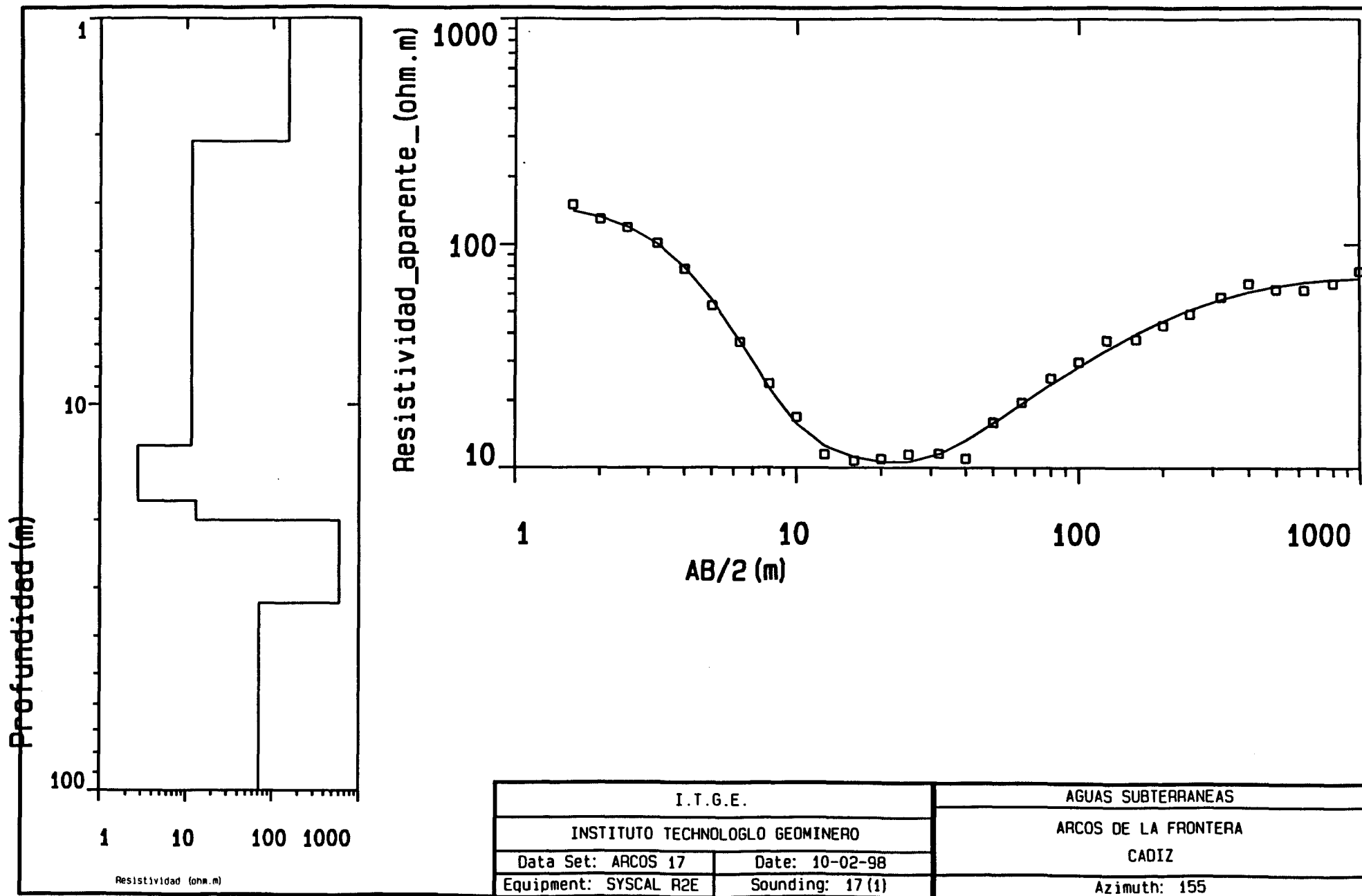
Schlumberger Configuration

FITTING ERROR: 6.382 PERCENT

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	149.9	140.6	6.24
2	2.00	129.7	132.5	-2.10
3	2.50	118.9	120.0	-0.899
4	3.20	101.0	100.5	0.495
5	4.00	77.51	78.84	-1.71
6	5.00	53.13	56.44	-6.23
7	6.30	36.40	36.63	-0.630
8	8.00	23.86	22.75	4.65
9	10.00	16.87	15.76	6.57
10	12.60	11.49	12.53	-9.04
11	16.00	10.75	11.17	-3.89
12	20.00	10.94	10.61	2.94
13	25.00	11.49	10.61	7.64
14	32.00	11.58	11.50	0.742
15	40.00	11.02	13.24	-20.20
16	50.00	15.94	15.84	0.617
17	63.00	19.57	19.32	1.29
18	80.00	25.15	23.64	5.99
19	100.0	29.69	28.29	4.71
20	126.0	37.08	33.64	9.26
21	160.0	37.42	39.60	-5.82
22	200.0	43.30	45.34	-4.70
23	250.0	48.84	50.97	-4.35
24	320.0	58.11	56.71	2.40
25	400.0	66.70	61.17	8.29
26	500.0	62.70	64.73	-3.25
27	630.0	62.30	67.43	-8.24
28	800.0	66.75	69.25	-3.75
29	1000.0	75.70	70.25	7.19

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				130.0	
1	151.4		2.07	127.9	0.0137
2	11.48		10.72	117.1	0.933
3	2.72		5.05	112.1	1.85
4	13.04		2.20	109.9	0.169
5	598.3		12.89	97.04	0.0215
6	71.23				

ALL PARAMETERS ARE FREE



DATA SET: ARCOS 18

CLIENT: I.T.G.E.	DATE: 11-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 18(2)
COUNTY: CADIZ	AZIMUTH: 160
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 80.00	
SOUNDING COORDINATES: E: 253339.0000 N: 4073276.0000	

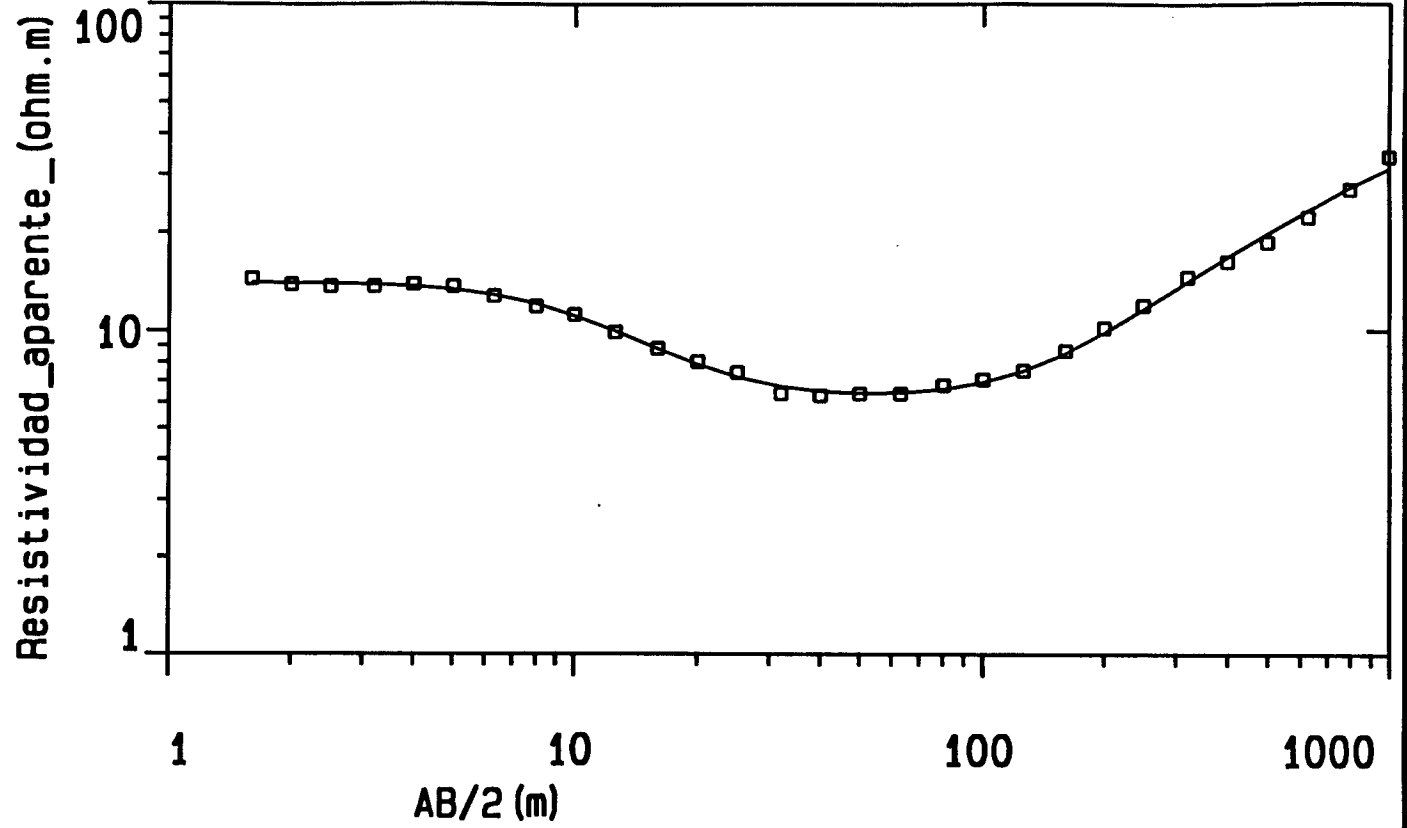
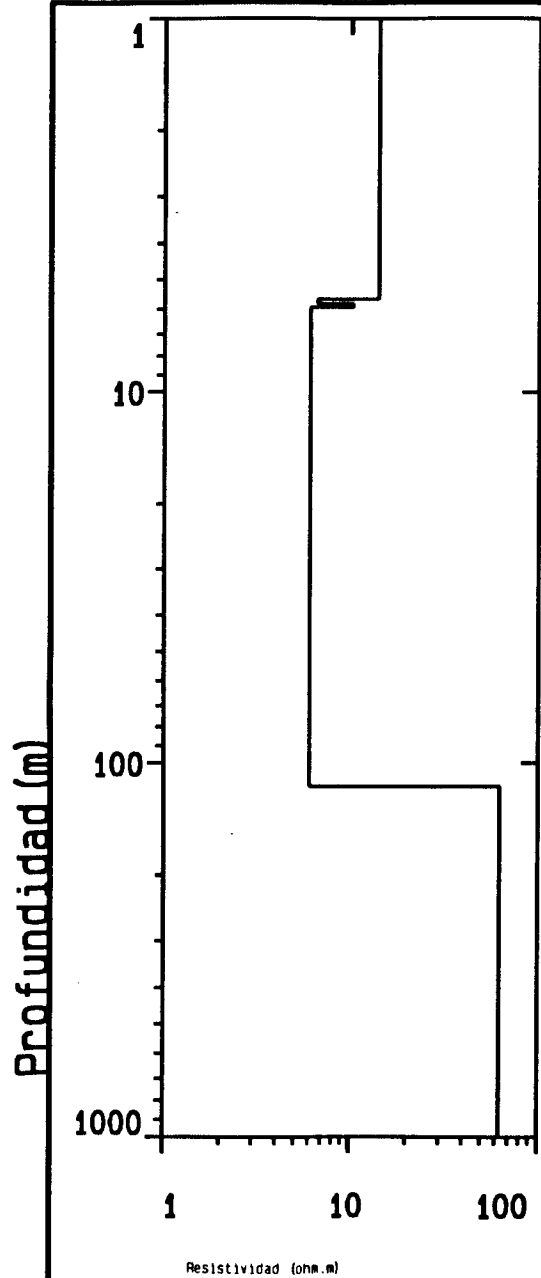
Schlumberger Configuration

FITTING ERROR: 3.039 PERCENT

No.	Spacing (m)	PA DATA	(ohm-m) SYNTHETIC	DIFFERENCE (percent)
1	1.60	14.42	13.99	2.93
2	2.00	13.82	13.97	-1.03
3	2.50	13.63	13.92	-2.15
4	3.20	13.63	13.82	-1.40
5	4.00	13.82	13.64	1.30
6	5.00	13.63	13.34	2.05
7	6.30	12.74	12.85	-0.858
8	8.00	11.85	12.07	-1.86
9	10.00	11.17	11.10	0.595
10	12.60	9.87	9.94	-0.738
11	16.00	8.77	8.76	0.163
12	20.00	7.98	7.83	1.83
13	25.00	7.38	7.16	3.01
14	32.00	6.38	6.70	-4.96
15	40.00	6.29	6.48	-3.05
16	50.00	6.38	6.39	-0.204
17	63.00	6.38	6.42	-0.568
18	80.00	6.75	6.58	2.57
19	100.0	7.03	6.90	1.84
20	126.0	7.49	7.49	0.0587
21	160.0	8.62	8.47	1.75
22	200.0	10.17	9.82	3.51
23	250.0	11.92	11.60	2.64
24	320.0	14.54	14.08	3.13
25	400.0	16.18	16.74	-3.43
26	500.0	18.60	19.77	-6.32
27	630.0	22.20	23.28	-4.86
28	800.0	26.90	27.24	-1.27
29	1000.0	33.90	31.18	8.01

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	14.02		5.63	80.00 74.36	0.401
2	6.58		0.161	74.20	0.0245
3	10.29		0.128	74.07	0.0124
4	6.06		109.7	-35.71	18.09
5	62.61				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 18	Date: 11-02-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 18 (2)	Azimuth: 160

DATA SET: ARCOS 19

CLIENT: I.T.G.E.	DATE: 12-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 19(2)
COUNTY: CADIZ	AZIMUTH: 40
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 90.00	
SOUNDING COORDINATES: E: 251472.0000 N: 4074684.0000	

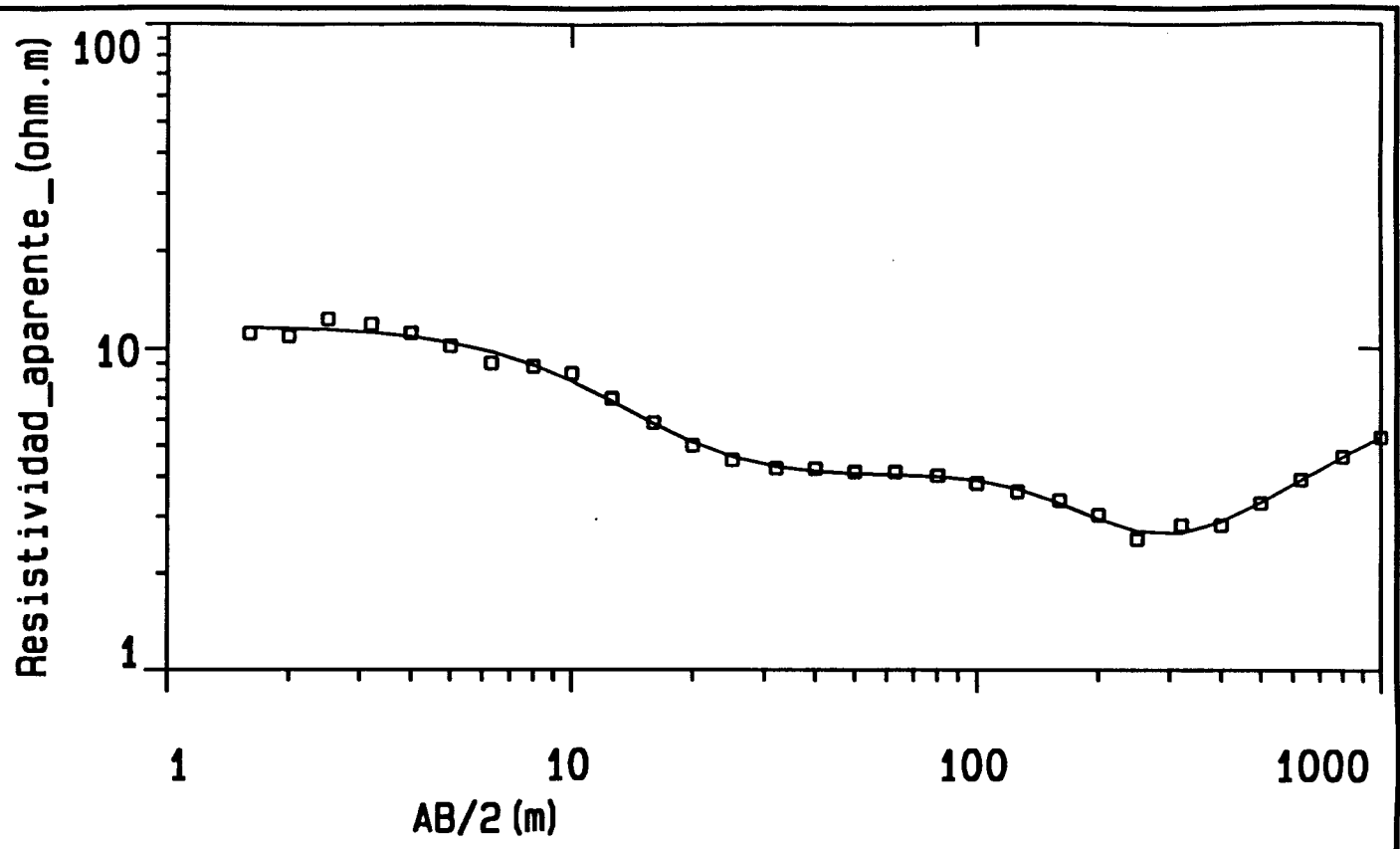
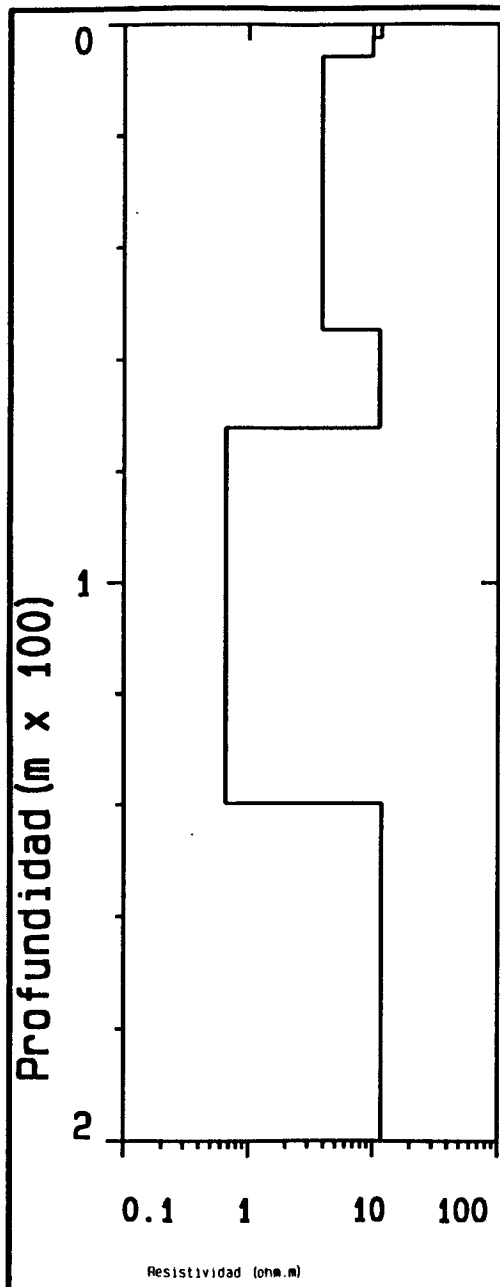
Schlumberger Configuration

FITTING ERROR: 3.586 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	11.11	11.58	-4.22
2	2.00	10.90	11.51	-5.61
3	2.50	12.27	11.39	7.18
4	3.20	11.85	11.17	5.73
5	4.00	11.11	10.85	2.29
6	5.00	10.16	10.39	-2.34
7	6.30	8.99	9.74	-8.34
8	8.00	8.78	8.87	-1.04
9	10.00	8.35	7.91	5.34
10	12.60	6.98	6.85	1.92
11	16.00	5.86	5.84	0.317
12	20.00	4.98	5.10	-2.30
13	25.00	4.49	4.60	-2.49
14	32.00	4.24	4.28	-1.03
15	40.00	4.22	4.14	1.95
16	50.00	4.11	4.07	1.02
17	63.00	4.11	4.03	1.93
18	80.00	4.00	3.98	0.561
19	100.0	3.79	3.87	-2.20
20	126.0	3.57	3.64	-2.09
21	160.0	3.35	3.30	1.71
22	200.0	3.03	2.94	2.82
23	250.0	2.54	2.69	-5.88
24	320.0	2.81	2.66	5.46
25	400.0	2.81	2.88	-2.55
26	500.0	3.30	3.31	-0.429
27	630.0	3.90	3.89	0.133
28	800.0	4.60	4.58	0.236
29	1000.0	5.30	5.29	0.0449

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				90.00	
1	11.66		2.40	87.59	0.206
2	9.91		3.30	84.28	0.333
3	3.87		48.80	35.48	12.59
4	11.30		17.63	17.84	1.56
5	0.658		67.54	-49.69	102.6
6	11.83				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA
Data Set: ARCOS 19	Date: 12-02-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 19 (2)	Azimuth: 40

DATA SET: ARCOS 20

CLIENT: I.T.G.E.	DATE: 13-02-98
LOCATION: BORNOS	SOUNDING: 20(5)
COUNTY: CADIZ	AZIMUTH: 42
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 135.00	
SOUNDING COORDINATES: E: 256479.0000 N: 4079748.0000	

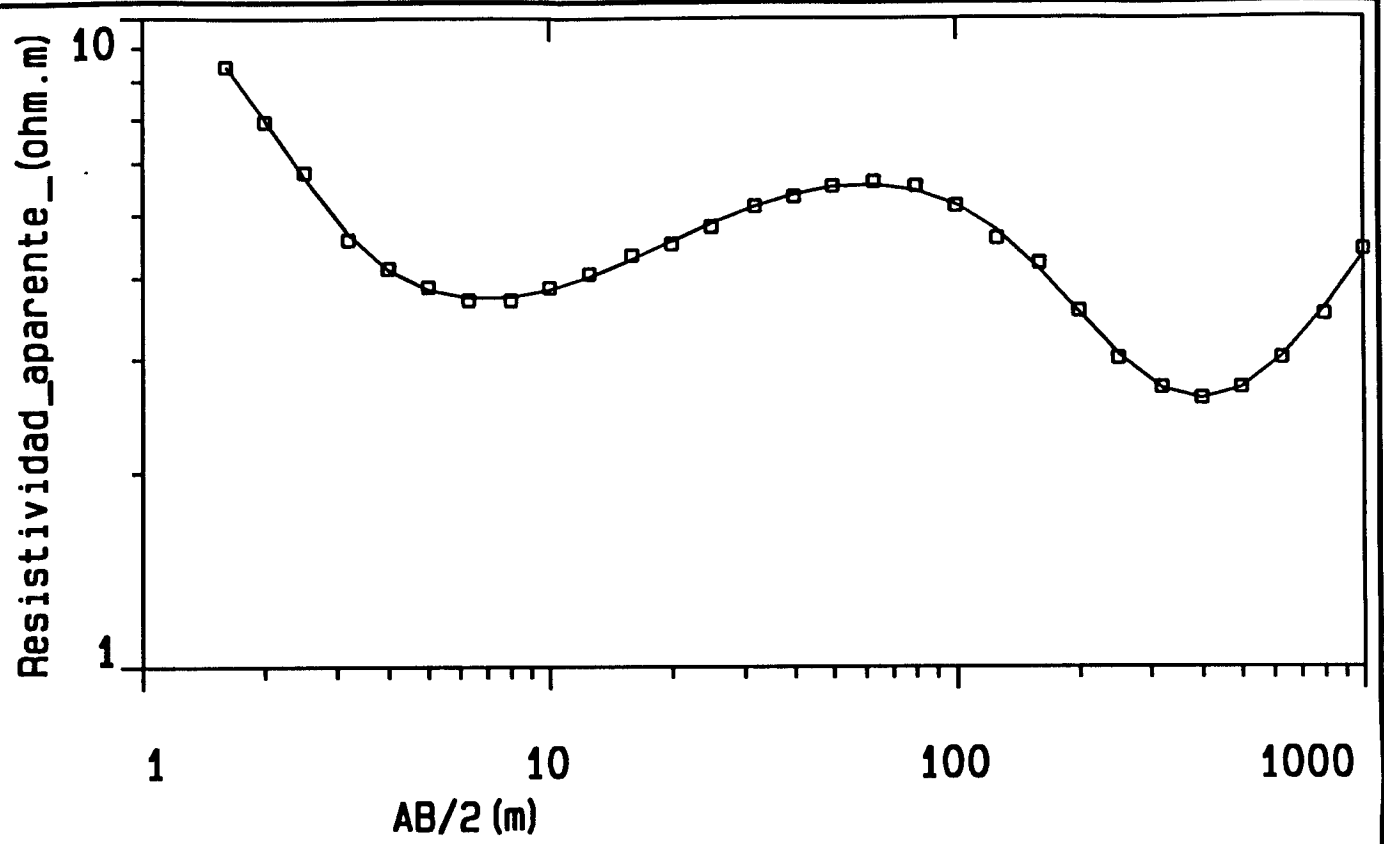
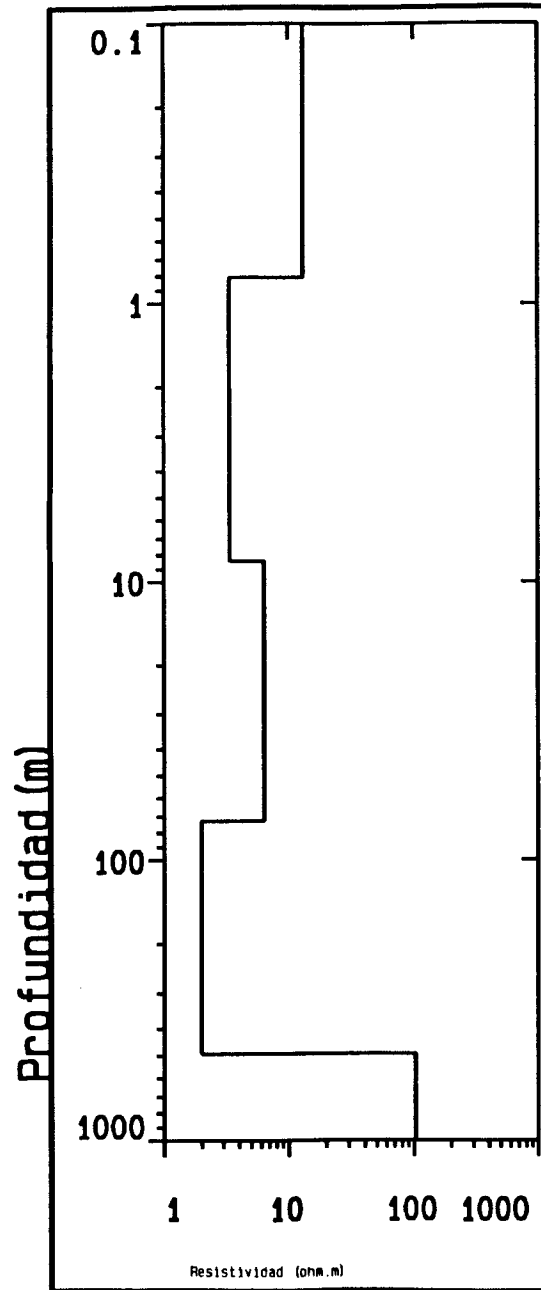
Schlumberger Configuration

FITTING ERROR: 1.219 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	8.43	8.44	-0.0927
2	2.00	6.94	6.98	-0.571
3	2.50	5.79	5.69	1.84
4	3.20	4.56	4.66	-2.00
5	4.00	4.12	4.10	0.523
6	5.00	3.86	3.83	0.921
7	6.30	3.69	3.72	-0.915
8	8.00	3.69	3.73	-1.16
9	10.00	3.85	3.82	0.817
10	12.60	4.04	4.00	0.957
11	16.00	4.31	4.25	1.34
12	20.00	4.50	4.54	-0.929
13	25.00	4.77	4.83	-1.28
14	32.00	5.14	5.14	0.0591
15	40.00	5.32	5.36	-0.712
16	50.00	5.51	5.50	0.0840
17	63.00	5.60	5.54	1.05
18	80.00	5.51	5.43	1.41
19	100.0	5.13	5.16	-0.485
20	126.0	4.57	4.71	-2.93
21	160.0	4.20	4.11	2.06
22	200.0	3.55	3.53	0.516
23	250.0	3.00	3.03	-1.30
24	320.0	2.70	2.69	0.233
25	400.0	2.60	2.59	0.242
26	500.0	2.70	2.69	0.207
27	630.0	3.00	3.00	-0.327
28	800.0	3.50	3.57	-2.10
29	1000.0	4.40	4.33	1.55

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	13.16		0.808	135.0 134.1	0.0614
2	3.42		7.59	126.6	2.21
3	6.37		64.02	62.57	10.04
4	1.98		419.6	-357.1	211.8
5	102.9				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		BORNOS	
Data Set: ARCOS 20		Date: 13-02-98	
Equipment: SYSCAL R2E		Sounding: 20 (5)	
		Azimuth: 42	

DATA SET: ARCOS 21

CLIENT: I.T.G.E.	DATE: 13-02-98
LOCATION: BORNOS	SOUNDING: 21(4)
COUNTY: CADIZ	AZIMUTH: 25
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 110.00	
SOUNDING COORDINATES: E: 256466.0000 N: 4078981.0000	

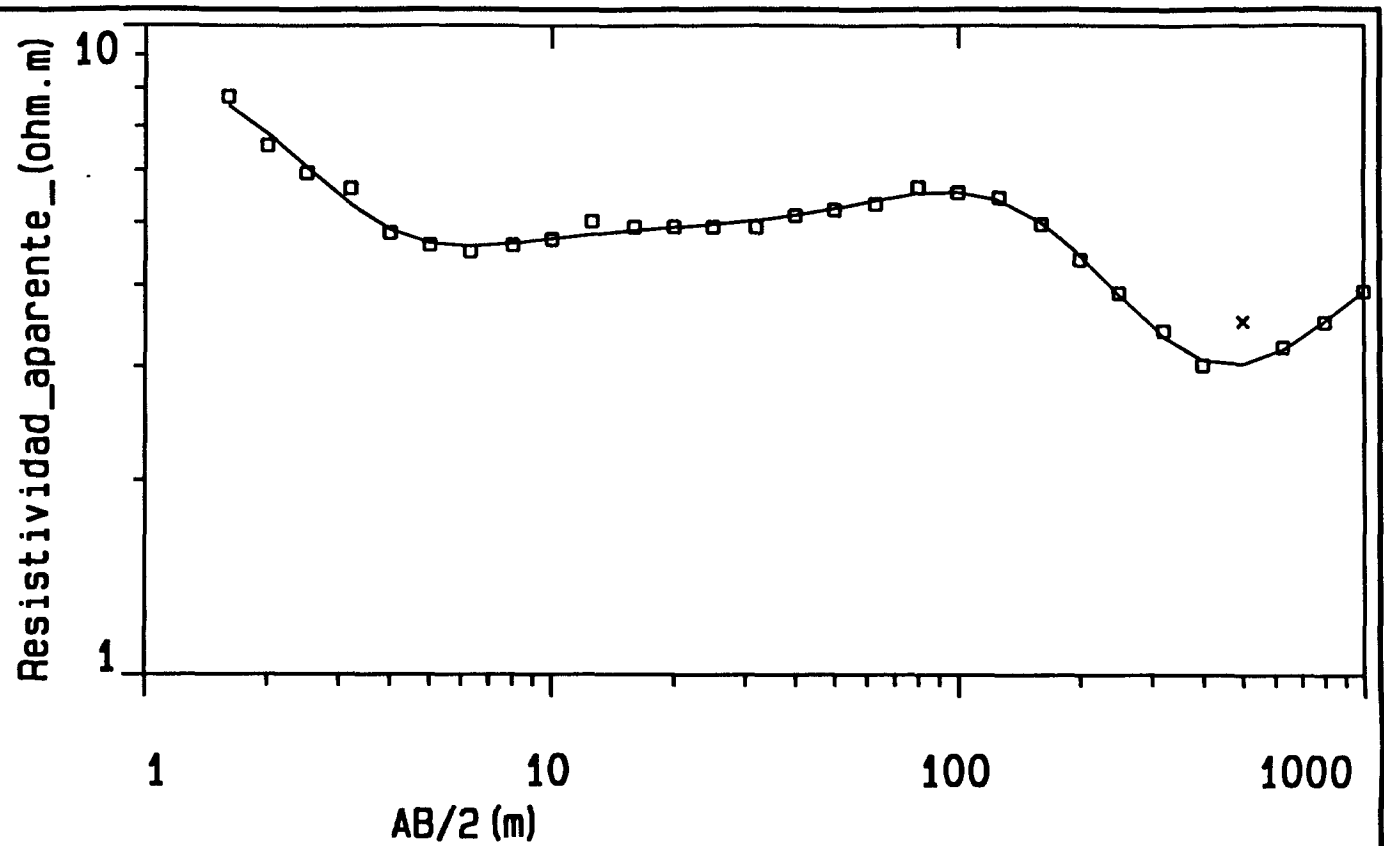
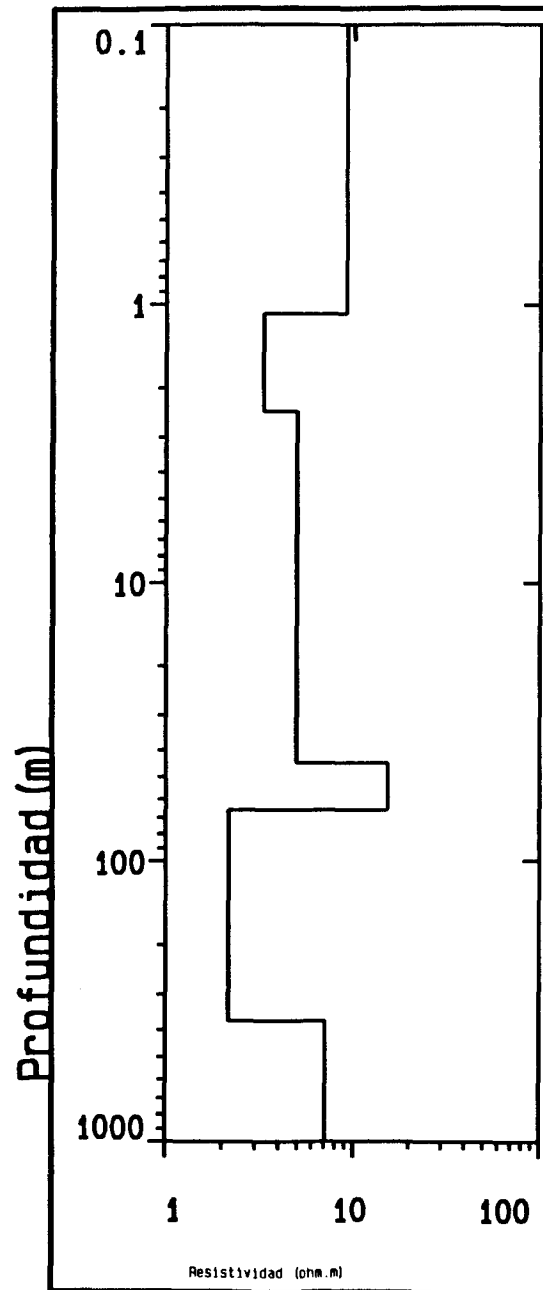
Schlumberger Configuration

FITTING ERROR: 2.068 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	7.76	7.53	2.95
2	2.00	6.53	6.81	-4.25
3	2.50	5.92	6.05	-2.12
4	3.20	5.61	5.31	5.46
5	4.00	4.80	4.85	-1.18
6	5.00	4.59	4.63	-0.797
7	6.30	4.49	4.58	-1.96
8	8.00	4.59	4.63	-0.751
9	10.00	4.69	4.70	-0.249
10	12.60	5.00	4.77	4.55
11	16.00	4.90	4.84	1.20
12	20.00	4.90	4.89	0.121
13	25.00	4.90	4.95	-0.984
14	32.00	4.90	5.02	-2.49
15	40.00	5.10	5.11	-0.148
16	50.00	5.21	5.23	-0.443
17	63.00	5.32	5.38	-1.22
18	80.00	5.64	5.51	2.17
19	100.0	5.53	5.54	-0.126
20	126.0	5.42	5.38	0.880
21	160.0	4.94	4.97	-0.654
22	200.0	4.36	4.43	-1.66
23	250.0	3.87	3.85	0.617
24	320.0	3.39	3.32	1.94
25	400.0	3.00	3.05	-1.78
26	500.0	3.50	3.01	13.78
27	630.0	3.20	3.18	0.596
28	800.0	3.50	3.50	-0.229
29	1000.0	3.90	3.89	0.0115

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	9.13		1.07	110.0 108.9	0.117
2	3.29		1.34	107.5	0.406
3	4.95		41.94	65.63	8.47
4	15.34		21.33	44.29	1.39
5	2.16		306.9	-262.6	141.7
6	7.10				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS
INSTITUTO TECHNOLOGLO GEMINERO		BORNOS
Data Set: ARCOS 21	Date: 13-02-98	CADIZ
Equipment: SYSCAL R2E	Sounding: 21 (4)	Azimuth: 25

DATA SET: ARCOS 22

CLIENT: I.T.G.E.	DATE: 16-02-98
LOCATION: BORNOS	SOUNDING: 22(4)
COUNTY: CADIZ	AZIMUTH: 67
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 120.00	
SOUNDING COORDINATES: E: 256997.0000 N: 4079618.0000	

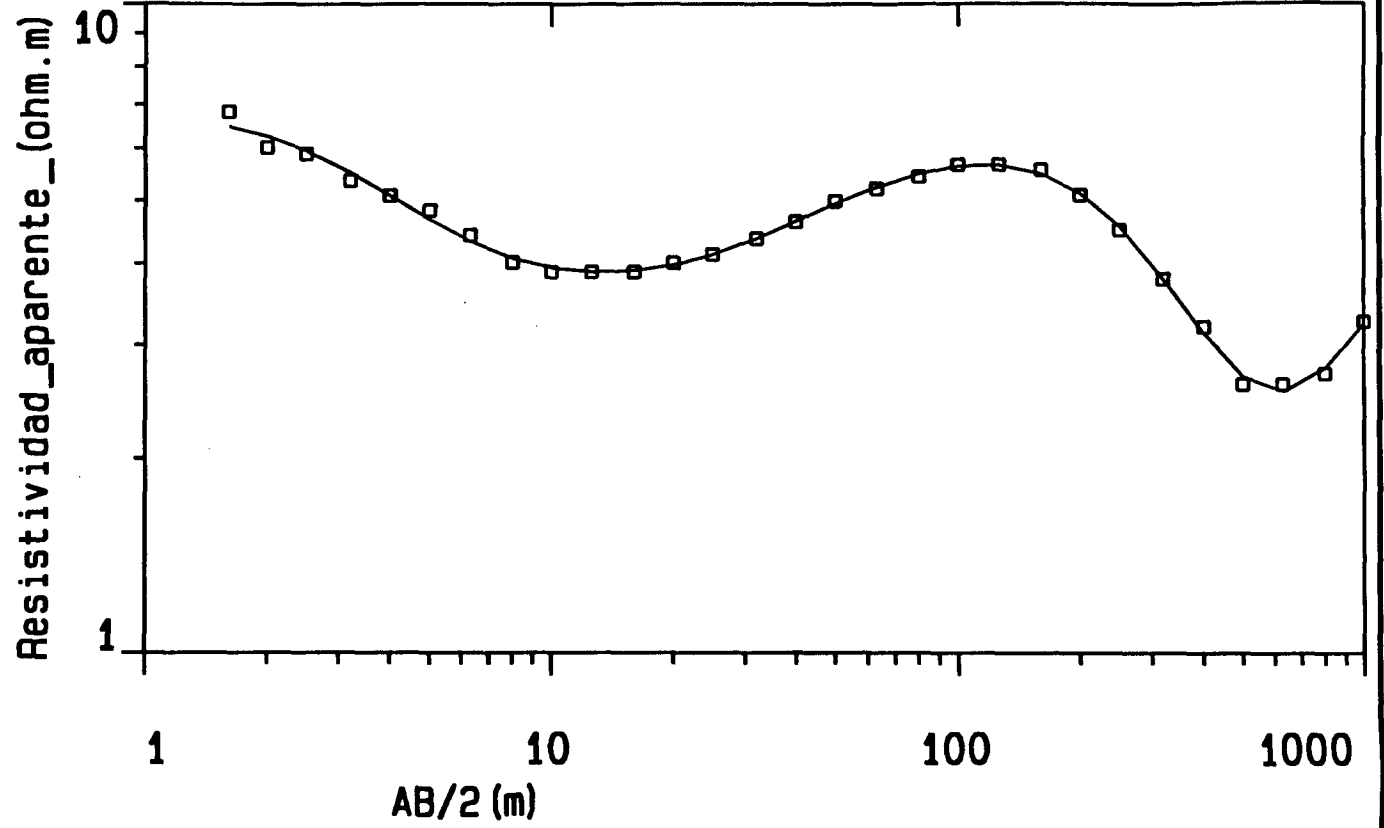
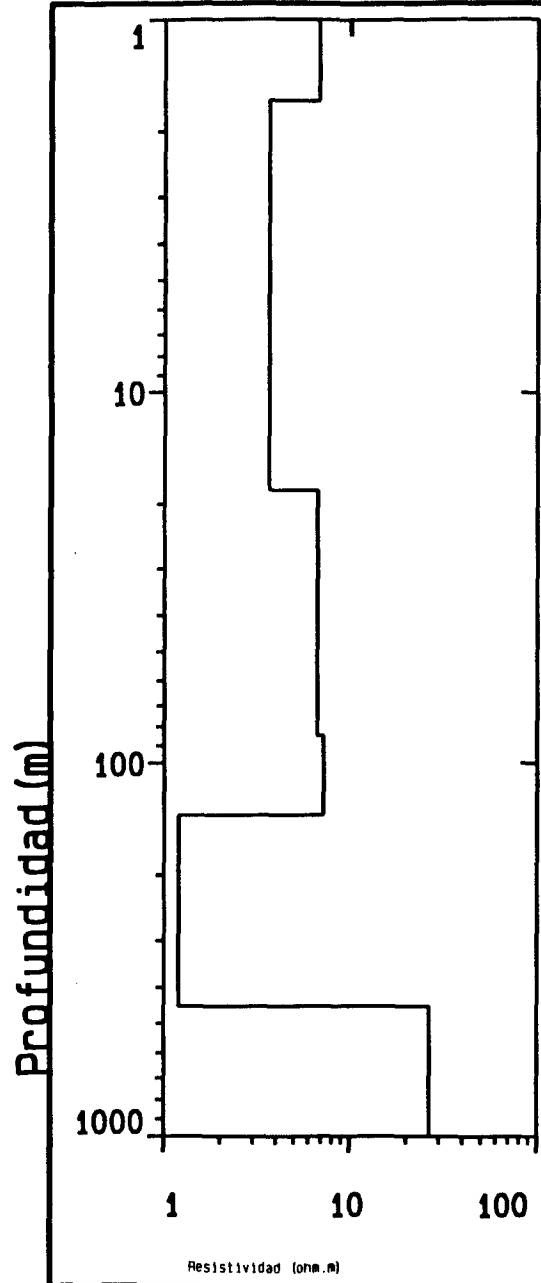
Schlumberger Configuration

FITTING ERROR: 1.885 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	6.81	6.47	5.06
2	2.00	6.01	6.25	-3.97
3	2.50	5.88	5.94	-1.09
4	3.20	5.34	5.50	-3.03
5	4.00	5.07	5.07	0.110
6	5.00	4.81	4.66	3.11
7	6.30	4.41	4.31	2.16
8	8.00	4.00	4.06	-1.46
9	10.00	3.87	3.93	-1.51
10	12.60	3.87	3.87	-0.0206
11	16.00	3.87	3.89	-0.373
12	20.00	3.99	3.96	0.696
13	25.00	4.11	4.11	0.0531
14	32.00	4.36	4.35	0.0843
15	40.00	4.61	4.63	-0.231
16	50.00	4.96	4.92	0.750
17	63.00	5.19	5.22	-0.581
18	80.00	5.42	5.48	-0.991
19	100.0	5.65	5.63	0.504
20	126.0	5.65	5.65	0.142
21	160.0	5.55	5.48	1.31
22	200.0	5.08	5.11	-0.602
23	250.0	4.49	4.54	-1.21
24	320.0	3.78	3.77	0.0484
25	400.0	3.19	3.12	2.09
26	500.0	2.60	2.67	-2.82
27	630.0	2.60	2.53	2.48
28	800.0	2.70	2.75	-1.98
29	1000.0	3.25	3.22	0.804

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				120.0	
1	6.79		1.65	118.3	0.243
2	3.64		16.68	101.6	4.57
3	6.67		66.01	35.64	9.89
4	7.20		54.01	-18.36	7.49
5	1.19		310.9	-329.3	259.8
6	26.59				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		BORNOS	
Data Set: ARCOS 22	Date: 16-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 22 (4)	Azimuth: 67	

DATA SET: ARCOS 23

CLIENT: I.T.G.E.	DATE: 16-02-98
LOCATION: BORNOS	SOUNDING: 23(4)
COUNTY: CADIZ	AZIMUTH: 20
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 120.00	
SOUNDING COORDINATES: E: 256099.0000 N: 4078313.0000	

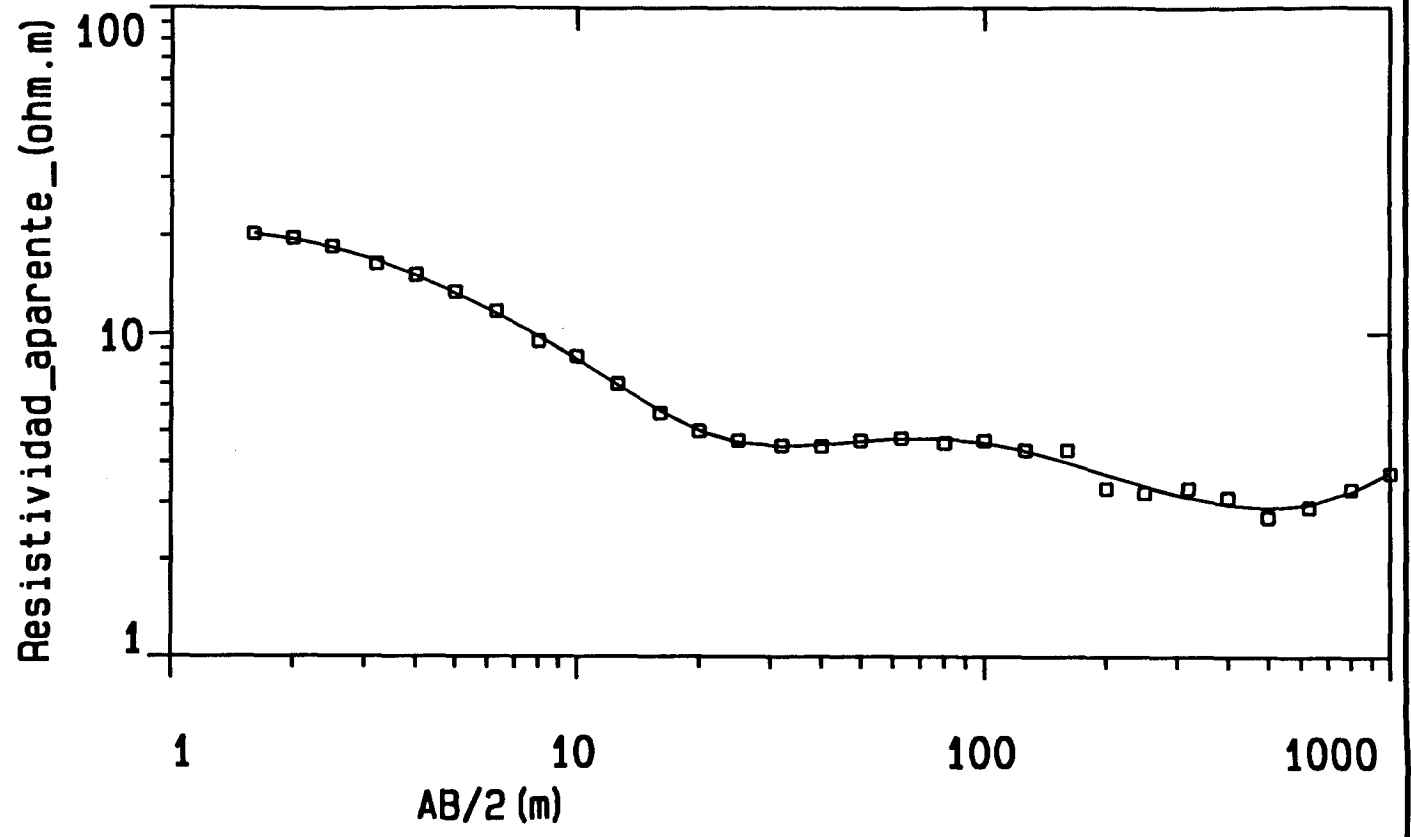
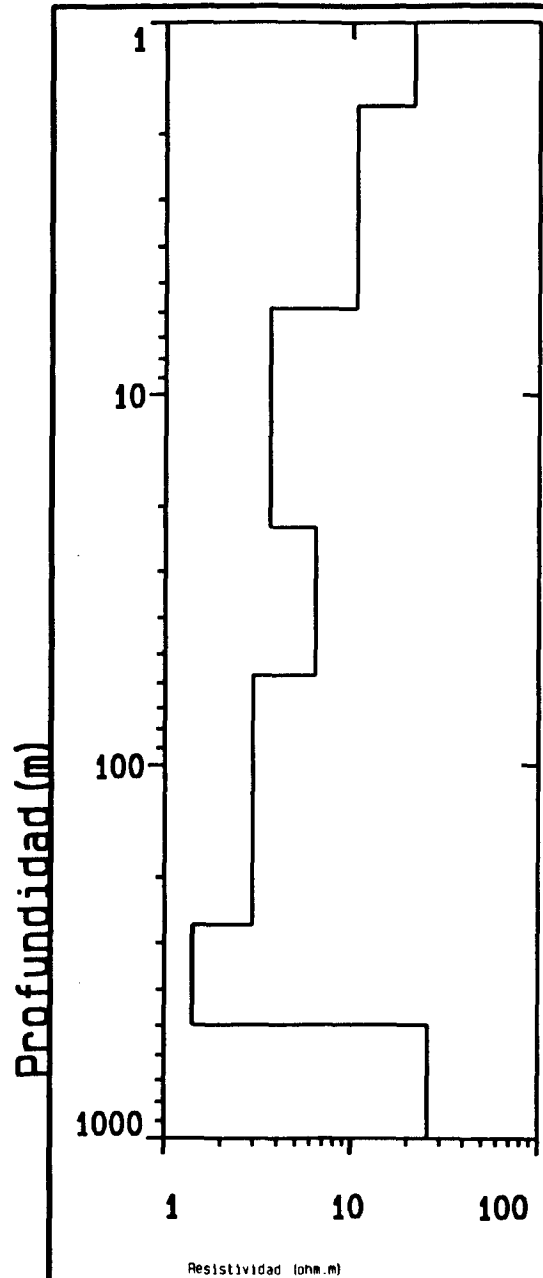
Schlumberger Configuration

FITTING ERROR: 3.575 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	20.19	20.24	-0.242
2	2.00	19.62	19.47	0.735
3	2.50	18.47	18.36	0.571
4	3.20	16.36	16.74	-2.31
5	4.00	15.12	15.04	0.542
6	5.00	13.39	13.27	0.939
7	6.30	11.67	11.51	1.39
8	8.00	9.47	9.81	-3.53
9	10.00	8.48	8.31	1.95
10	12.60	6.98	6.91	0.965
11	16.00	5.65	5.74	-1.63
12	20.00	4.99	5.00	-0.258
13	25.00	4.65	4.60	1.17
14	32.00	4.49	4.47	0.392
15	40.00	4.47	4.52	-1.07
16	50.00	4.65	4.63	0.428
17	63.00	4.74	4.72	0.454
18	80.00	4.56	4.71	-3.26
19	100.0	4.65	4.58	1.53
20	126.0	4.34	4.33	0.271
21	160.0	4.35	3.99	8.20
22	200.0	3.31	3.66	-10.56
23	250.0	3.21	3.37	-5.00
24	320.0	3.31	3.11	6.01
25	400.0	3.10	2.95	4.89
26	500.0	2.70	2.88	-6.84
27	630.0	2.90	2.95	-1.92
28	800.0	3.30	3.24	1.74
29	1000.0	3.70	3.73	-0.880

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	21.37		1.67	120.0	
2	10.59		4.17	118.3	0.0784
3	3.65		16.97	114.1	0.394
4	6.38		34.44	97.17	4.64
5	2.97		211.2	62.73	5.39
6	1.41		228.6	-148.5	70.99
7	25.72			-377.1	161.9

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEMINERO		BORNOS	
Data Set: ARCOS 23		CADIZ	
Equipment: SYSCAL R2E	Date: 16-02-98	Azimuth: 20	
	Sounding: 23(4)		

DATA SET: ARCOS 24

CLIENT: I.T.G.E.	DATE: 17-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: 24(3)
COUNTY: CADIZ	AZIMUTH: 55
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 80.00	
SOUNDING COORDINATES: E: 253134.0000 N: 4074891.0000	

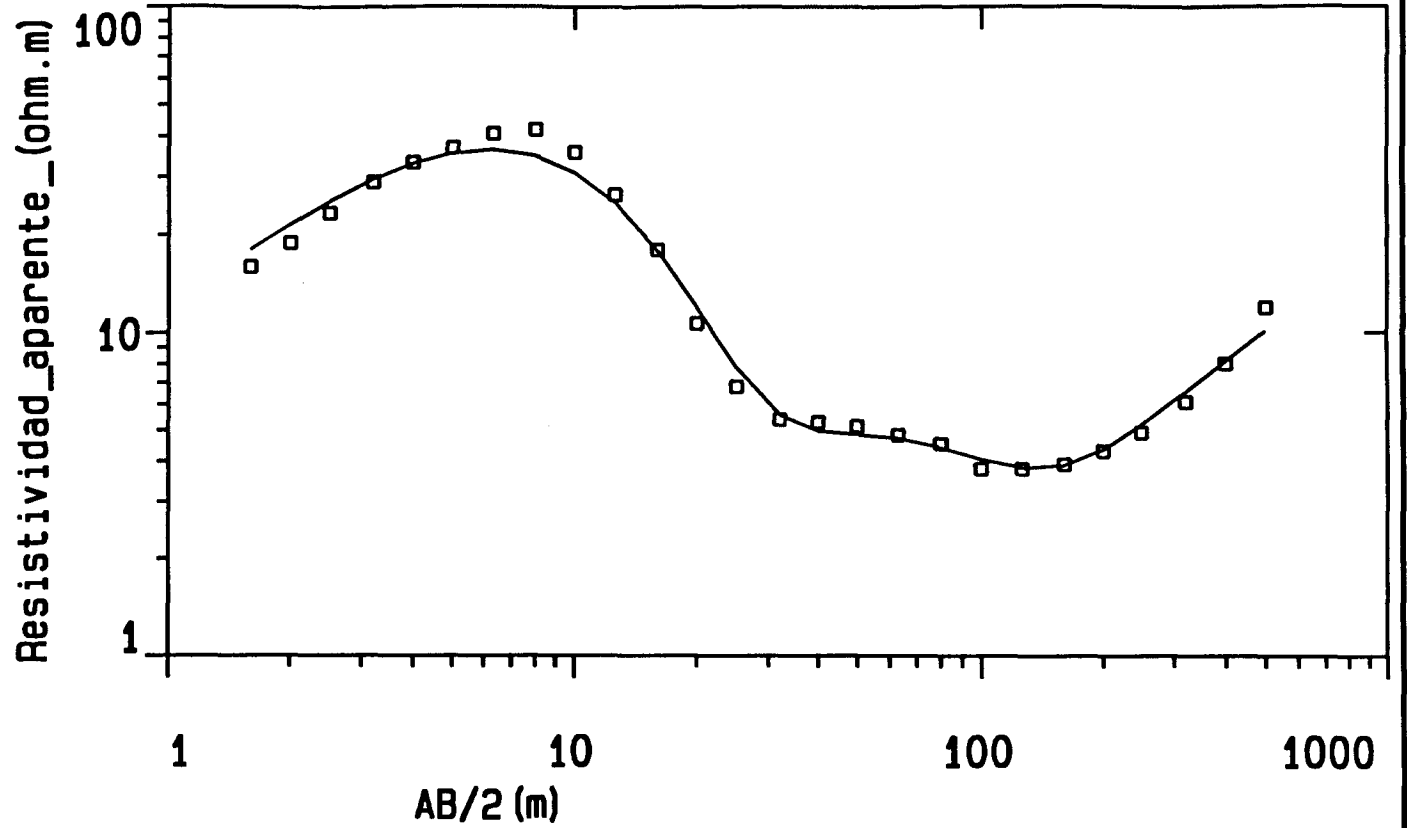
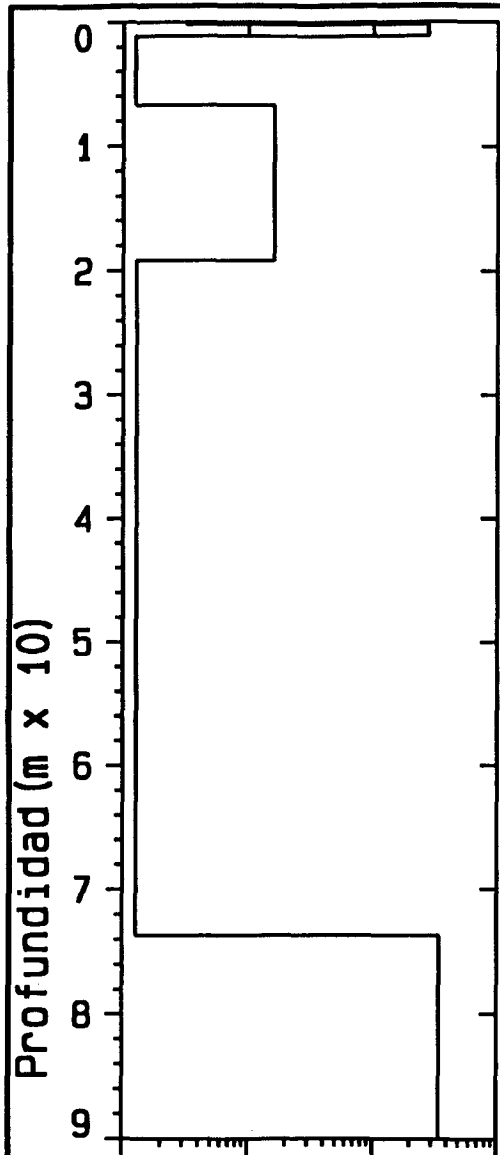
Schlumberger Configuration

FITTING ERROR: 8.921 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	15.89	17.94	-12.91
2	2.00	18.79	21.45	-14.15
3	2.50	23.21	25.25	-8.82
4	3.20	28.76	29.51	-2.61
5	4.00	33.17	32.95	0.660
6	5.00	36.83	35.44	3.77
7	6.30	40.74	36.34	10.81
8	8.00	41.75	34.83	16.56
9	10.00	35.70	30.98	13.22
10	12.60	26.49	24.93	5.86
11	16.00	17.91	17.79	0.685
12	20.00	10.62	11.86	-11.71
13	25.00	6.78	7.77	-14.60
14	32.00	5.37	5.55	-3.40
15	40.00	5.27	4.95	6.08
16	50.00	5.11	4.83	5.51
17	63.00	4.81	4.70	2.22
18	80.00	4.50	4.40	2.29
19	100.0	3.78	4.05	-7.00
20	126.0	3.78	3.81	-0.592
21	160.0	3.90	3.87	0.571
22	200.0	4.30	4.33	-0.838
23	250.0	4.90	5.18	-5.81
24	320.0	6.10	6.53	-7.20
25	400.0	8.00	8.12	-1.61
26	500.0	11.85	10.10	14.71

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
1	3.13		0.246	80.00	
2	278.5		0.926	79.75	0.0787
3	1.24	*	5.52	78.82	0.00333
4	16.10		12.45	73.29	4.42
5	1.27	*	54.51	60.84	0.772
6	347.6			6.33	42.76

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 24	Date: 17-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: 24 (3)	Azimuth: 55	

Resistividad (ohm.m)

DATA SET: ARCOS 25

CLIENT: I.T.G.E.	DATE: 09-02-98
LOCATION: ARCOS DE LA FRONTERA	SOUNDING: SM(1)
COUNTY: CADIZ	AZIMUTH: 350
PROJECT: AGUAS SUBTERRANEAS	EQUIPMENT: SYSCAL R2E
ELEVATION: 80.00	
SOUNDING COORDINATES: E: 253424.0000 N: 4073326.0000	

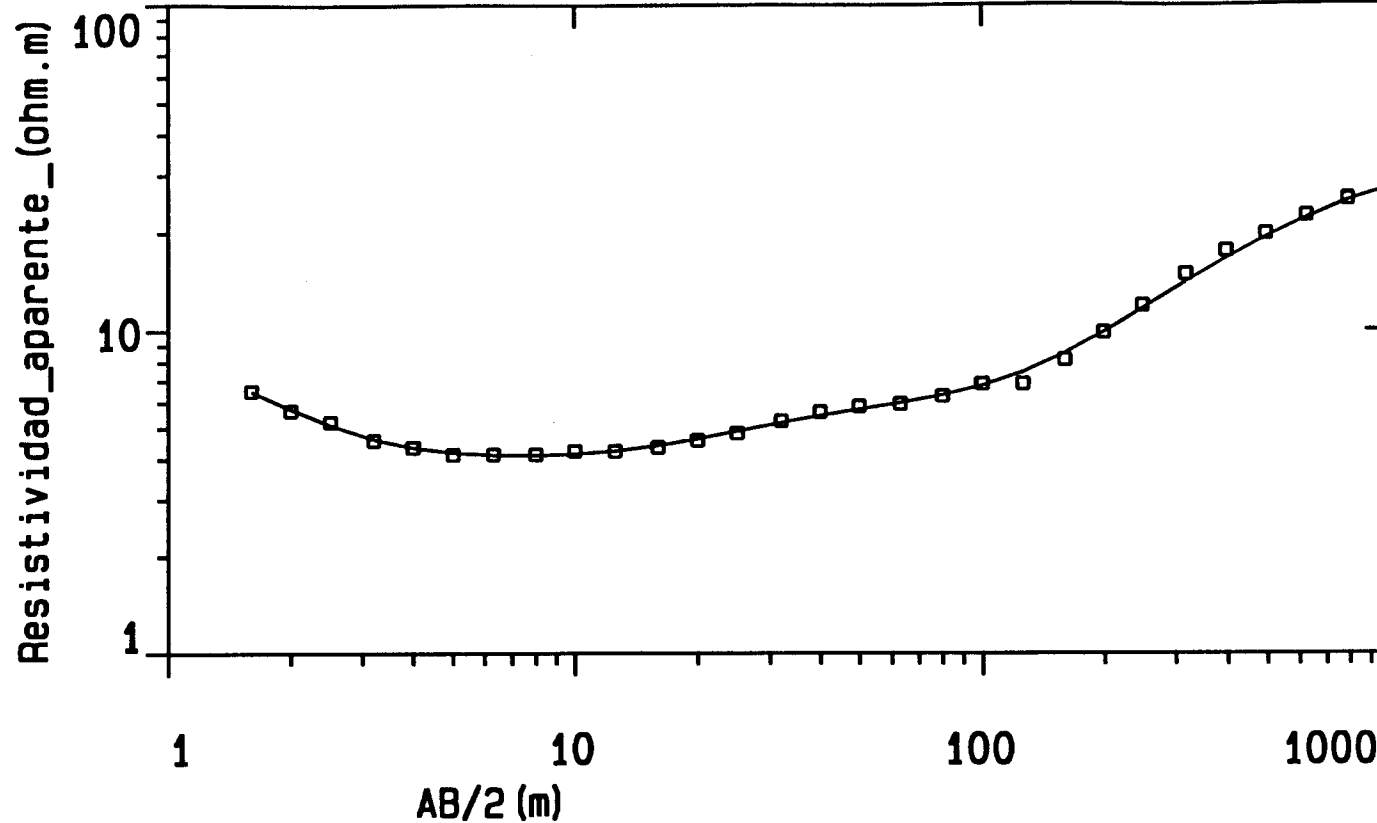
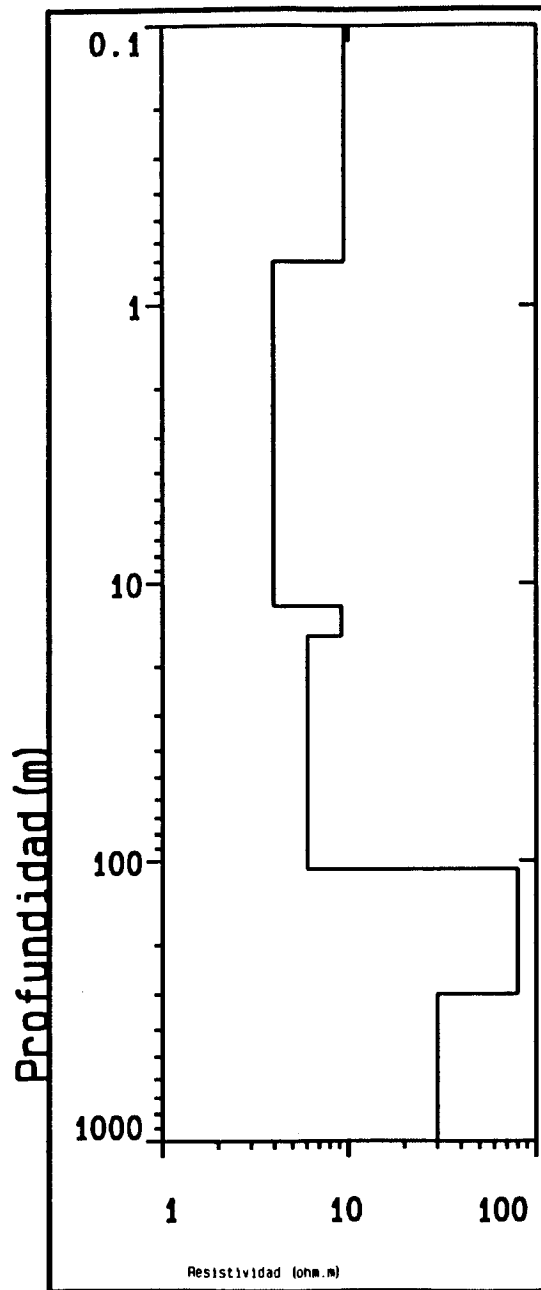
Schlumberger Configuration

FITTING ERROR: 2.662 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	6.52	6.51	0.282
2	2.00	5.65	5.74	-1.45
3	2.50	5.22	5.10	2.26
4	3.20	4.57	4.61	-0.983
5	4.00	4.35	4.34	0.0928
6	5.00	4.13	4.20	-1.60
7	6.30	4.13	4.13	0.121
8	8.00	4.13	4.11	0.451
9	10.00	4.24	4.15	2.14
10	12.60	4.24	4.24	-0.0379
11	16.00	4.35	4.40	-1.22
12	20.00	4.57	4.62	-0.969
13	25.00	4.80	4.88	-1.64
14	32.00	5.24	5.18	1.22
15	40.00	5.58	5.44	2.42
16	50.00	5.80	5.69	1.87
17	63.00	5.91	5.96	-0.748
18	80.00	6.25	6.29	-0.653
19	100.0	6.81	6.73	1.21
20	126.0	6.81	7.40	-8.70
21	160.0	8.11	8.45	-4.25
22	200.0	9.82	9.84	-0.179
23	250.0	11.88	11.64	2.05
24	320.0	14.85	14.05	5.39
25	400.0	17.48	16.53	5.41
26	500.0	19.70	19.20	2.52
27	630.0	22.40	22.01	1.72
28	800.0	25.10	24.78	1.24
29	1000.0	27.40	27.07	1.18

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				80.00	
1	9.53		0.698	79.30	0.0732
2	3.95		11.43	67.86	2.89
3	9.20		3.37	64.49	0.366
4	6.03		91.97	-27.47	15.24
5	80.00		192.5	-220.0	2.40
6	30.00				

ALL PARAMETERS ARE FREE



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEOMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 25	Date: 09-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: SM (1)	Azimuth: 350	

DATA SET: ARCOS 26

CLIENT: I.T.G.E.
 LOCATION: ARCOS DE LA FRONTERA
 COUNTY: CADIZ
 PROJECT: AGUAS SUBTERRANEAS
 ELEVATION: 80.00
 SOUNDING COORDINATES: E: 252143.0000 N: 4072033.0000

DATE: 11-02-98
 SOUNDING: SM(7)
 AZIMUTH: 73
 EQUIPMENT: SYSCAL R2E

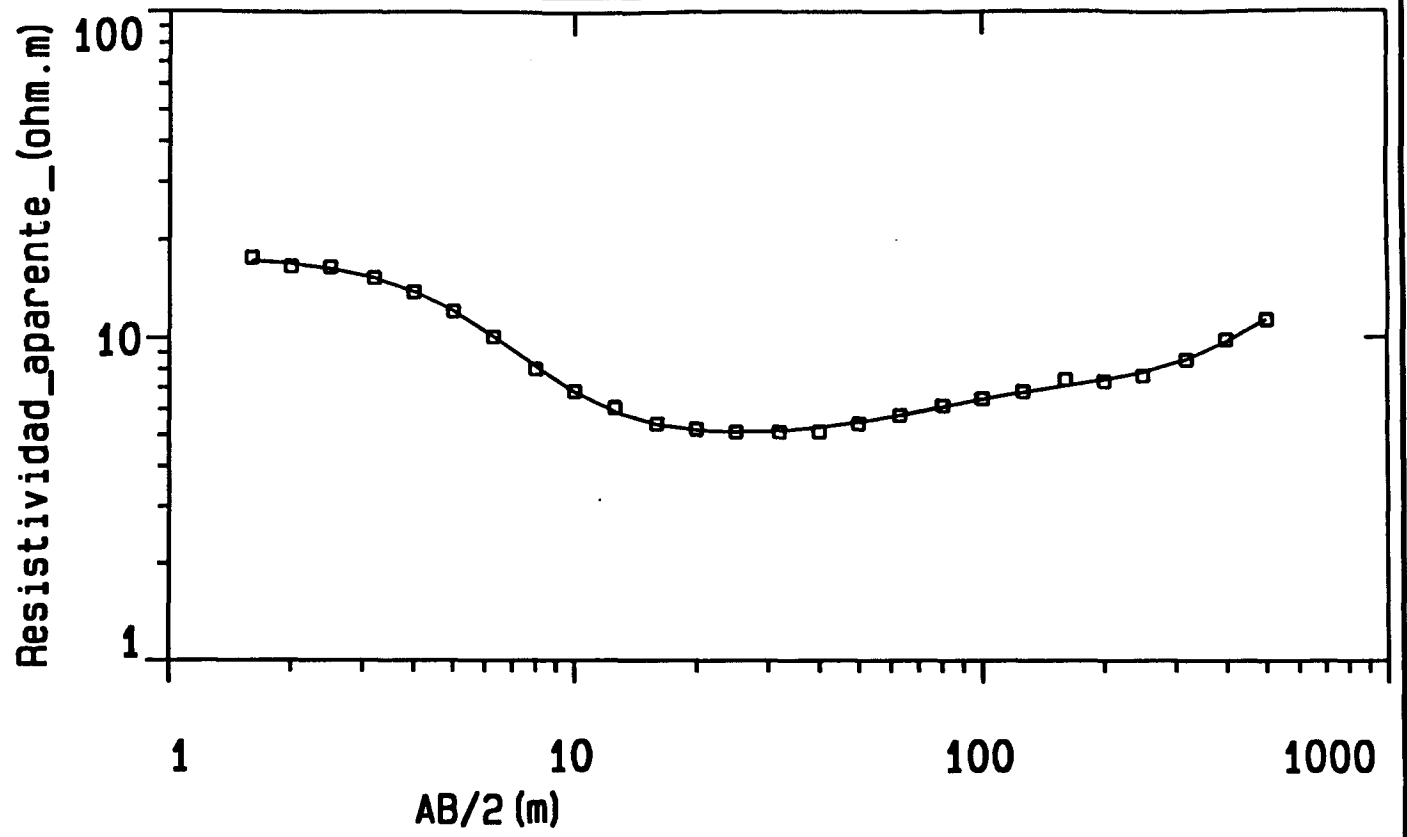
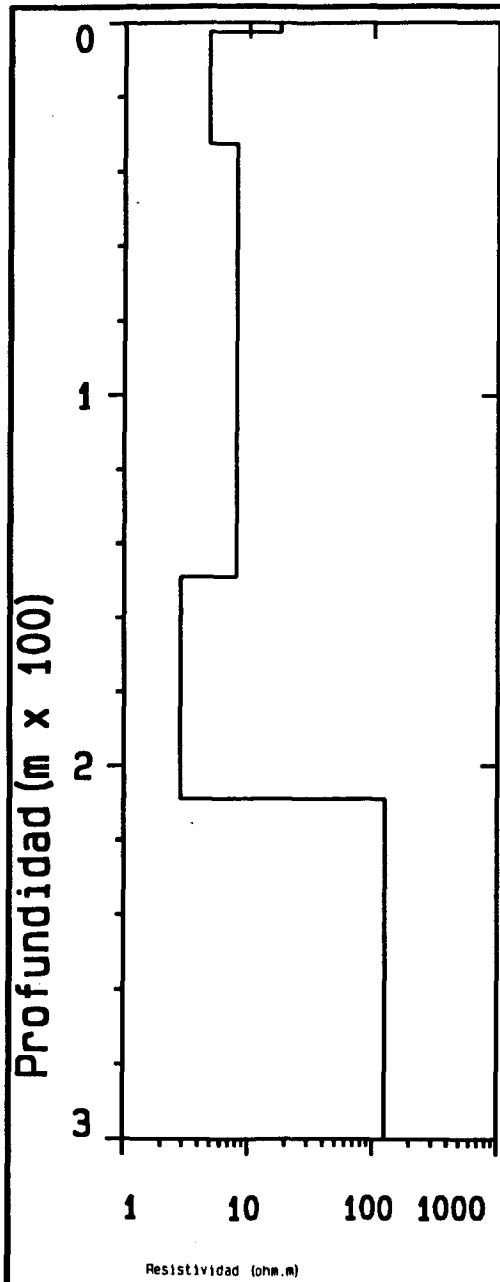
Schlumberger Configuration

FITTING ERROR: 1.621 PERCENT

No.	Spacing (m)	PA (ohm-m)		DIFFERENCE (percent)
		DATA	SYNTHETIC	
1	1.60	17.58	17.20	2.11
2	2.00	16.51	16.85	-2.06
3	2.50	16.40	16.26	0.896
4	3.20	15.23	15.20	0.214
5	4.00	13.74	13.81	-0.508
6	5.00	12.04	12.05	-0.141
7	6.30	10.01	10.06	-0.451
8	8.00	7.99	8.15	-2.08
9	10.00	6.83	6.79	0.578
10	12.60	6.07	5.88	3.12
11	16.00	5.42	5.38	0.696
12	20.00	5.20	5.17	0.578
13	25.00	5.09	5.10	-0.210
14	32.00	5.09	5.14	-0.901
15	40.00	5.11	5.26	-3.02
16	50.00	5.42	5.46	-0.849
17	63.00	5.73	5.75	-0.361
18	80.00	6.15	6.10	0.812
19	100.0	6.46	6.43	0.468
20	126.0	6.77	6.76	0.245
21	160.0	7.40	7.07	4.36
22	200.0	7.30	7.38	-1.17
23	250.0	7.60	7.79	-2.56
24	320.0	8.50	8.53	-0.446
25	400.0	9.80	9.65	1.45
26	500.0	11.30	11.33	-0.324

L #	RESISTIVITY (ohm-m)	CHARGEABILITY (pfe)	THICKNESS (m)	ELEVATION (m)	CONDUCTANCE (Siemens)
				80.00	
1	17.63		2.70	77.29	0.153
2	4.80		29.93	47.35	6.23
3	8.00	*	116.3	-68.96	14.53
4	2.86		59.93	-128.8	20.95
5	126.3				

"*" INDICATES FIXED PARAMETER



I.T.G.E.		AGUAS SUBTERRANEAS	
INSTITUTO TECHNOLOGLO GEMINERO		ARCOS DE LA FRONTERA	
Data Set: ARCOS 26	Date: 11-02-98	CADIZ	
Equipment: SYSCAL R2E	Sounding: SM (7)	Azimuth: 73	

ANEXO 2: PLANOS DE POSICIONAMIENTO Y SECCIONES.

PLANO DE SITUACION

PROYECTO: PROSPECCION GEOELECTRICA

LOCALIDAD: Arcos de la Frontera (Cadiz)

FECHA: 25-1-98

AUTOR: AREA DE GEOFISICA (ITGE)

ESCALA: 50000

LEYENDA

◊ 24 NUMERO DE SEV.

X 3-3 NUMERO DE COLUMNA

C 2 NUMERO DE CORTE

— RIO

— CARRETERA PRINCIPAL

— CARRETERA SECUNDARIA

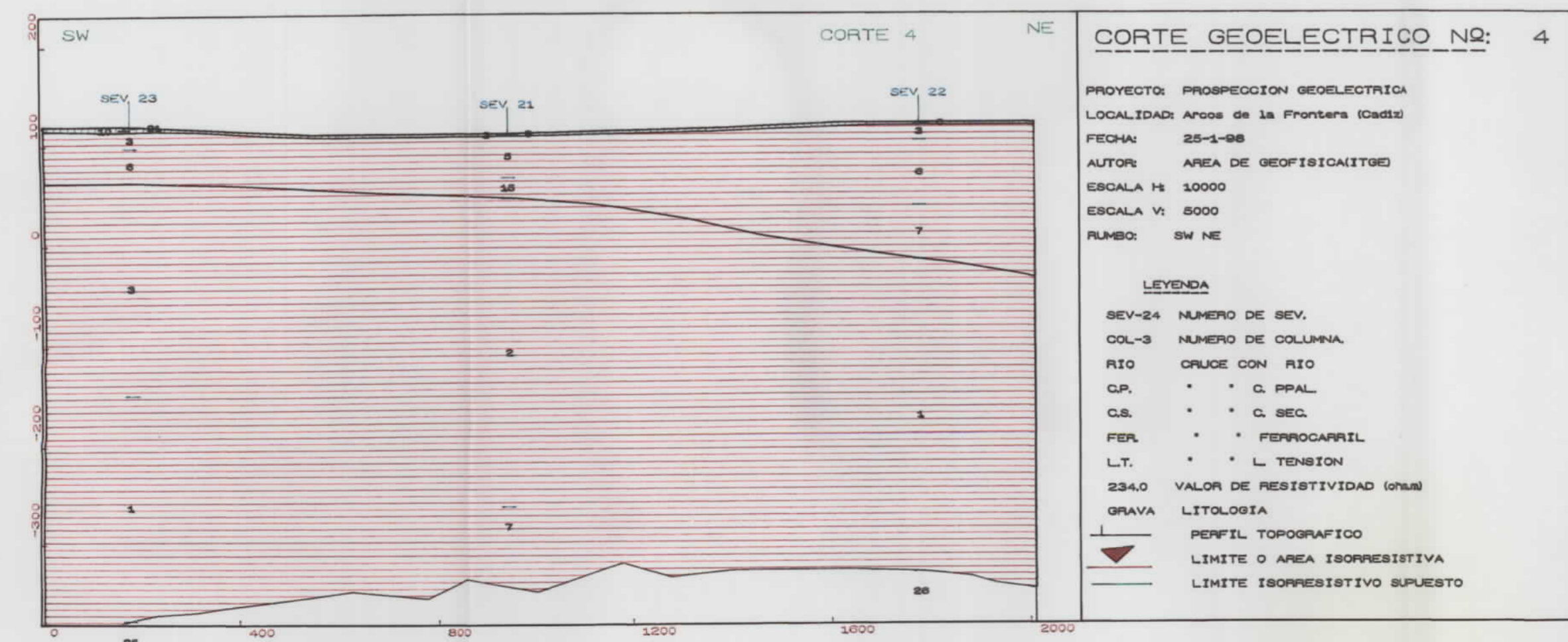
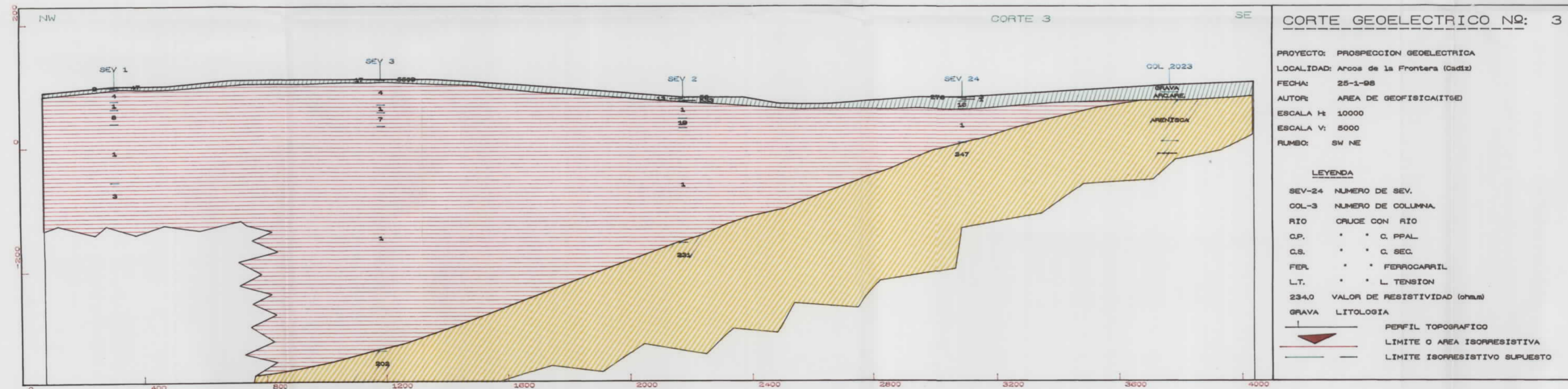
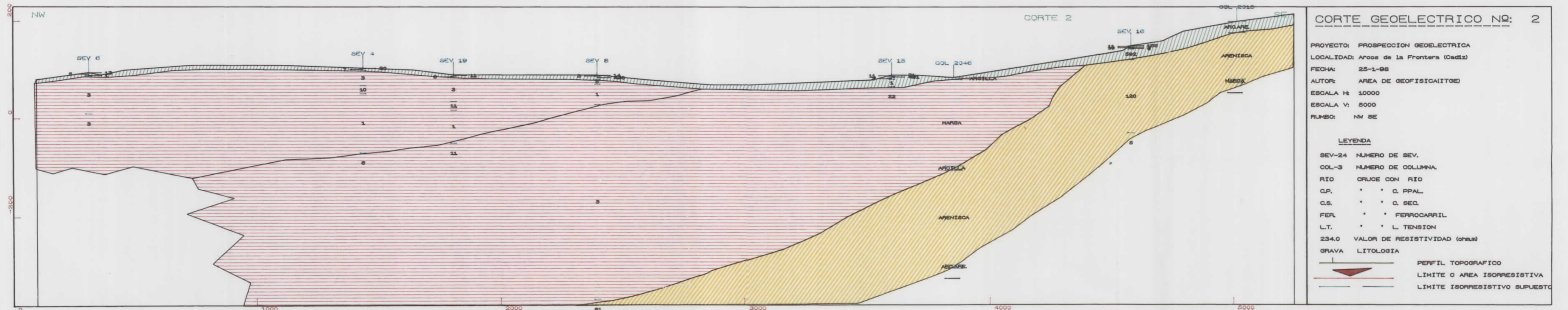
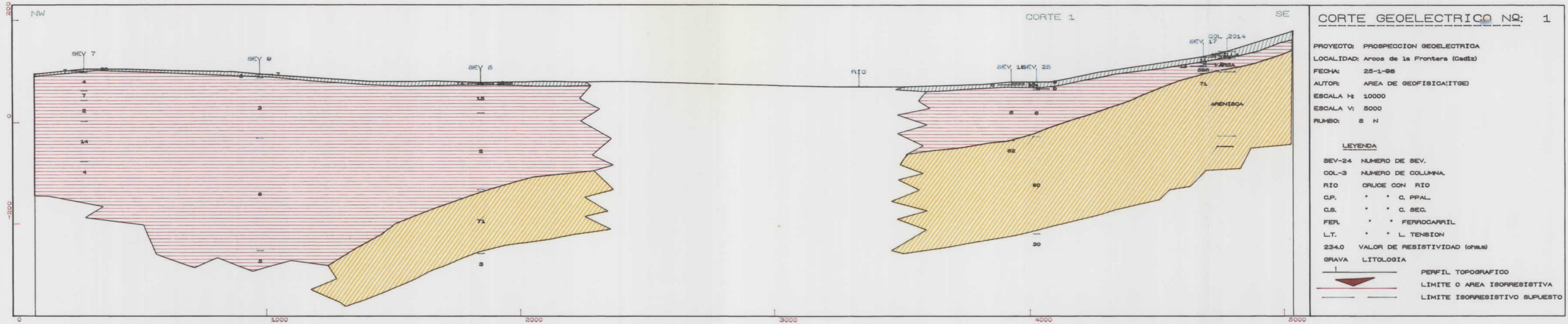
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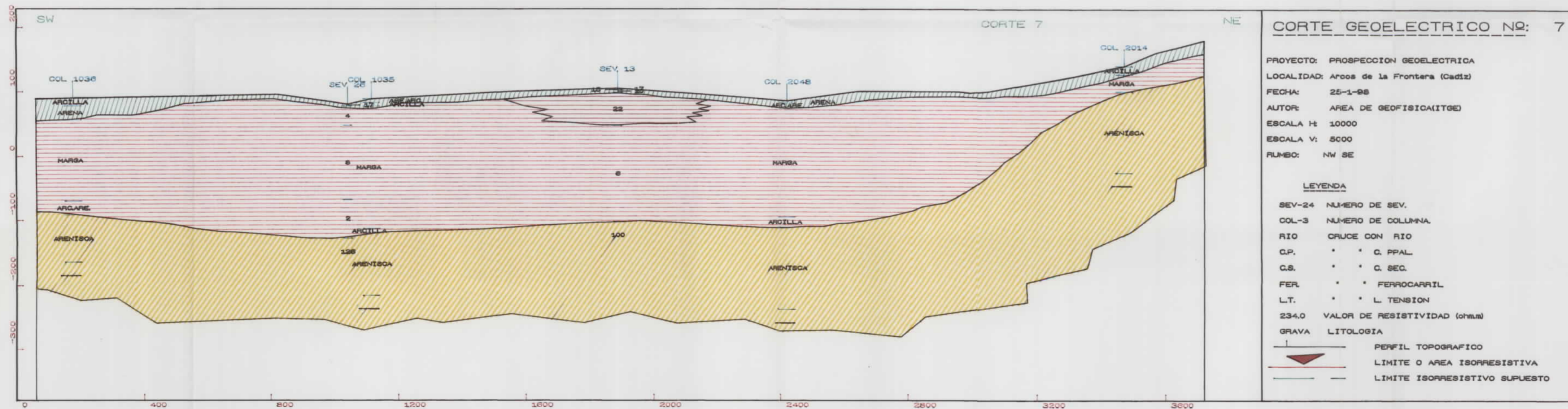
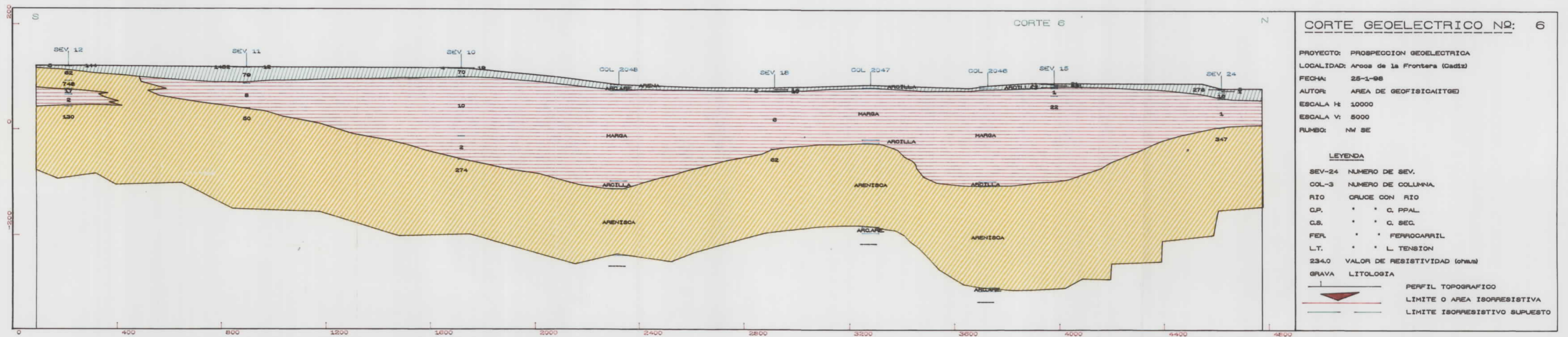
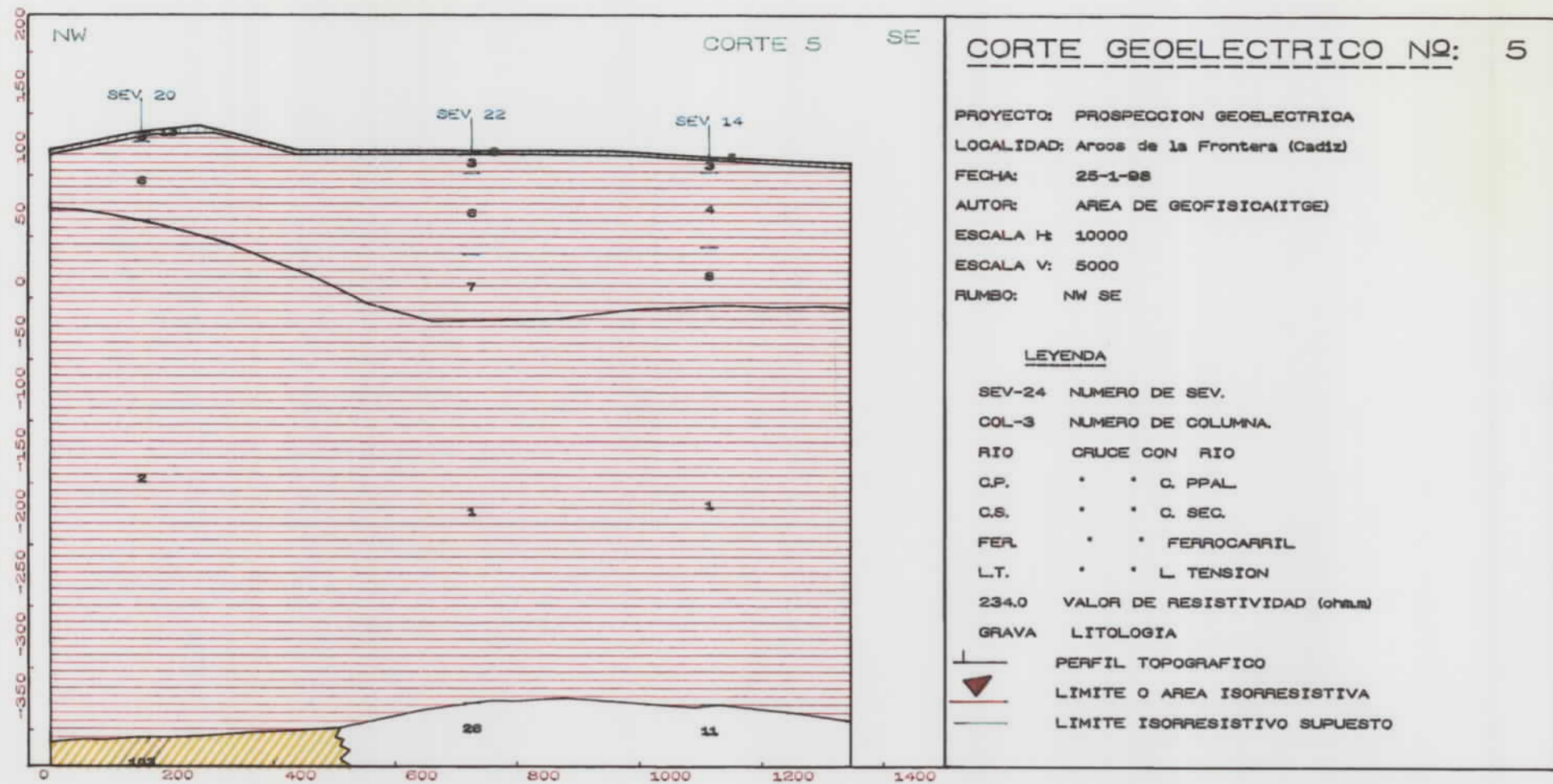
— L. TENSION

Lepe

POBLACION







ANEXO 3: SOPORTE DIGITAL DE DATOS E INTERPRETACIONES.