GL03039 - 1 of 2

UNIVERSITY OF UTAH RESEARCH INSTITUTE

UURI

EARTH SCIENCE LABORATORY
420 CHIPETA WAY, SUITE 120
SALT LAKE CITY, UTAH 84108
TELEPHONE 801-581-5283

MEMORANDUM

June 22, 1981

TO: Duncan Foley

FROM: Claron E. Mackelprang

SUBJECT: Dipole-Dipole Resistivity Modeling San Bernardino area, California

Attached please find model results for the data submitted to ESL by Mr. Rodger H. Chapman of California Division of Mines and Geology regarding the captioned area. Only Line DD #1 (Urbeta) has barely sufficient data to warrant any degree of confidence in the model as shown. Line DD #2 (Harlem Springs) is very ambiguous due to the paucity of data provided. Three possible models are shown for this line, none of which give a good fit to the observed data along all the diagonals, but are however included to show the range in ambiguity present.

In evaluating the models, please note depths shown along the sides of the computer printouts are fractions of the dipole length. Numbers shown in the model are also related to assigned media resistivity (ohm-feet) in the order given. Locations of the respective electrodes are also shown across the pseudosection.

The models require intrinsic resistivities that range between 50 and 1500 ohm-feet in order to closely approximate the observed data. The lower resistivities may be related to the thermal fluids present. The higher resistivities could perhaps be explained by fresh water saturated sands or gravels. This is not intended as an interpretation of the data but rather as a means of explaining the sharp resisitivity contrasts required by the models in order to approximate the field data.

Claron E. Mackelprang

CEM:jp

attachments

STATE OF CALIFORNIA — THE RESOURCES AGENCY
EDMUND G. BROWN JR., Governor

DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY
SACRAMENTO DISTRICT OFFICE
2815 O STREET
SACRAMENTO, CA 95816
(Phone 916-445-5716)

67868 - Acct #
SC-CAL-SB - login

May 27, 1981

Mr. Terry Killpack
Earth Science Laboratory
420 Chipeta Way, Suite 120
Salt Lake City, Utah 84108

Dear Mr. Killpack:

I am enclosing copies of the two dipole-dipole pseudosections from the San Bernardino, California, project area that we discussed earlier by telephone. Also enclosed is a copy of a map from this area showing the locations of the two pseudosections. Unfortunately, this is an urban area and we have not been able to find suitable locations for additional dipole-dipole lines for our geothermal study. We have made a number of Schlumberger soundings at scattered points in the area, however.

We would appreciate it very much if you could assist us in obtaining two-dimensional models of the dipole-dipole data. Both pseudosections are plotted on a scale of one inch = 400 feet and the resistivity values shown are in ohm - feet. The dipole spacings for most of the data shown extend from N=1 to N=6. Section 1 crosses at least one fault (the Loma Linda fault) and a possible zone of hot water (up to about 50°C) at depths of less than 1000 feet, as indicated in nearby wells. Section 2 is located in an area of known hot water (also up to about 50°C), near Harlem Springs. Both areas are within the San Bernardino Valley and are characterized by relatively thick, unconsolidated Cenozoic sediments consisting of gravels, sands, and clays.

If you require additional information please let us know.

Sincerely yours,

Gordon W. Chase for

(called other person)

Rodger H. Chapman
Senior Geophysicist

Enclosure

RHC:jgb

SAN BERNARDINO
LINE DD #1 (URBETA) STANDARD MESH

IP2D MESH GEOMETRY CODING SHEET

X Nodes : 72 (standard 71)

Z Nodes : 12 (standard 12)

X Element Groups : 1 (# Width Groups)

X Element Group #'s : 71 (# Elements in Group)

X Element Spacing : 0.25
(a-units)

Z Element Groups : 9 (# Thickness Groups)

Z Element Group #'s : (# Elements in Group)
1, 1, 1, 1, 2, 2, 1, 1, 1

Z Element Spacing : 0.1, 0.2, 0.3, 0.4, 0.5, 1.0, 2.0, 4.0, 5.0
(a-units)

17 Electrode (X, Z) Node LOCATIONS

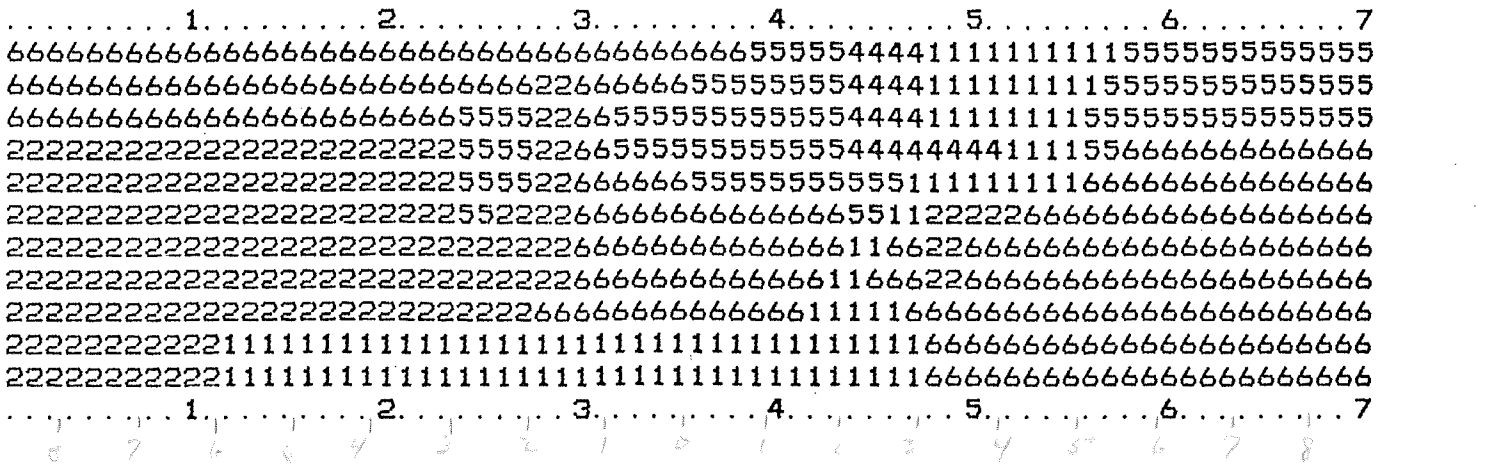
1. 4, 1	7. 28, 1	13. 52, 1
2. 8, 1	8. 32, 1	14. 56, 1
3. 12, 1	9. 36, 1	15. 60, 1
4. 16, 1	10. 40, 1	16. 64, 1
5. 20, 1	11. 44, 1	17. 68, 1
6. 24, 1	12. 48, 1	

SAN BERNARDINO, CALIFORNIA
LINE D-D' #1 (URBETA)
MEDIA RESITIVITY (OHM-~~METERS~~ feet)

50.00	100.00	150.00	200.00	300.00	500.00

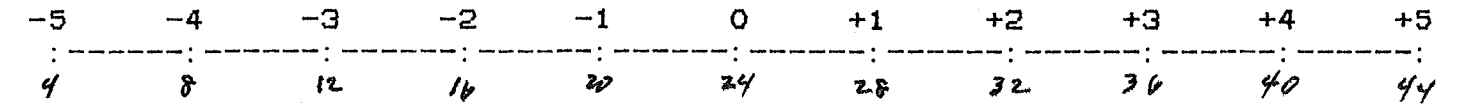
MEDIA PFE (%)

0.00	0.00	0.00	0.00	0.00	0.00

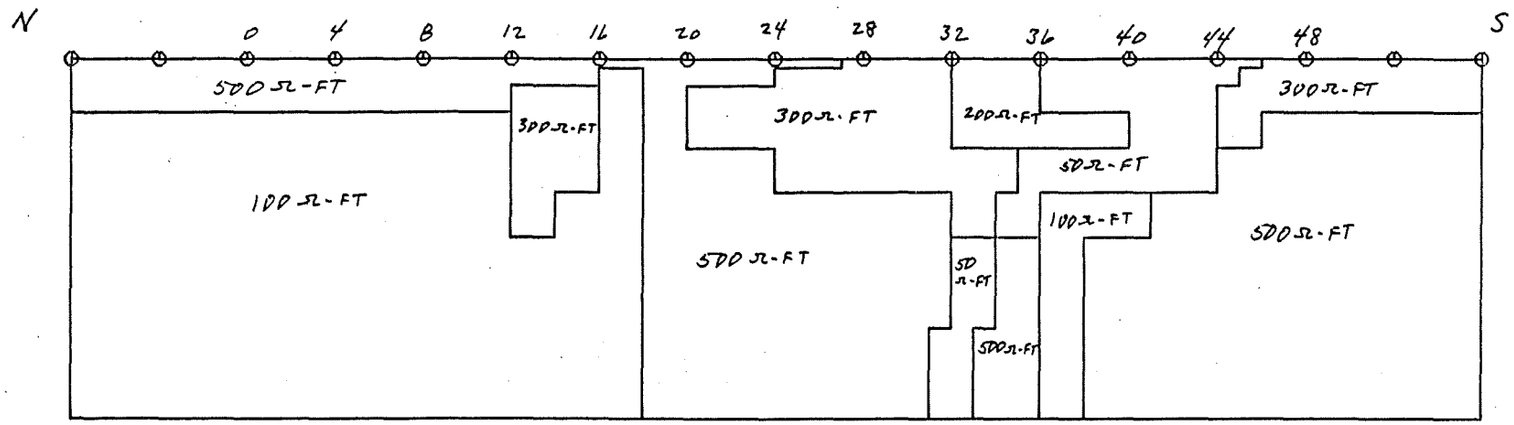


APPARENT RESISTIVITY (CALCULATED)

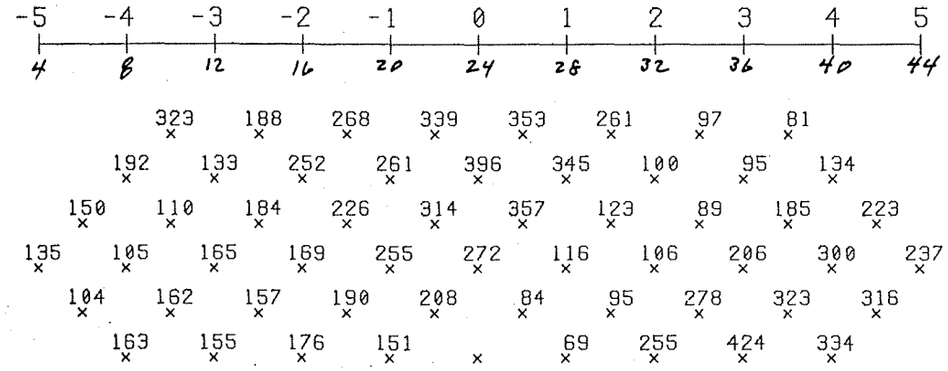
N



		163		333		272	88			
	323.	188.	268.	339.	353.	261.	97.	81.		
observed										
calculated	240		225		341		114		145	
	192.	133.	252.	261.	396.	345.	100.	95.	134.	
	160		229		369	130	100	239		
150.	110.	184.	226.	314.	357.	123.	89.	185.	223.	
	127		210		117		278			
135.	105.	165.	169.	255.	272.	116.	106.	206.	300.	237.
		152		128	80		315			
104.	162.	157.	190.	208.	84.	95.	278.	323.	316.	
		149				292				
	163.	155.	176.	151.	69.	255.	424.	334.		



APPARENT RESISTIVITY - COMPUTED



SAN BERNARDINO, CALIFORNIA
Line O-O' #1 (URBETA)
HS: 1" = 800'

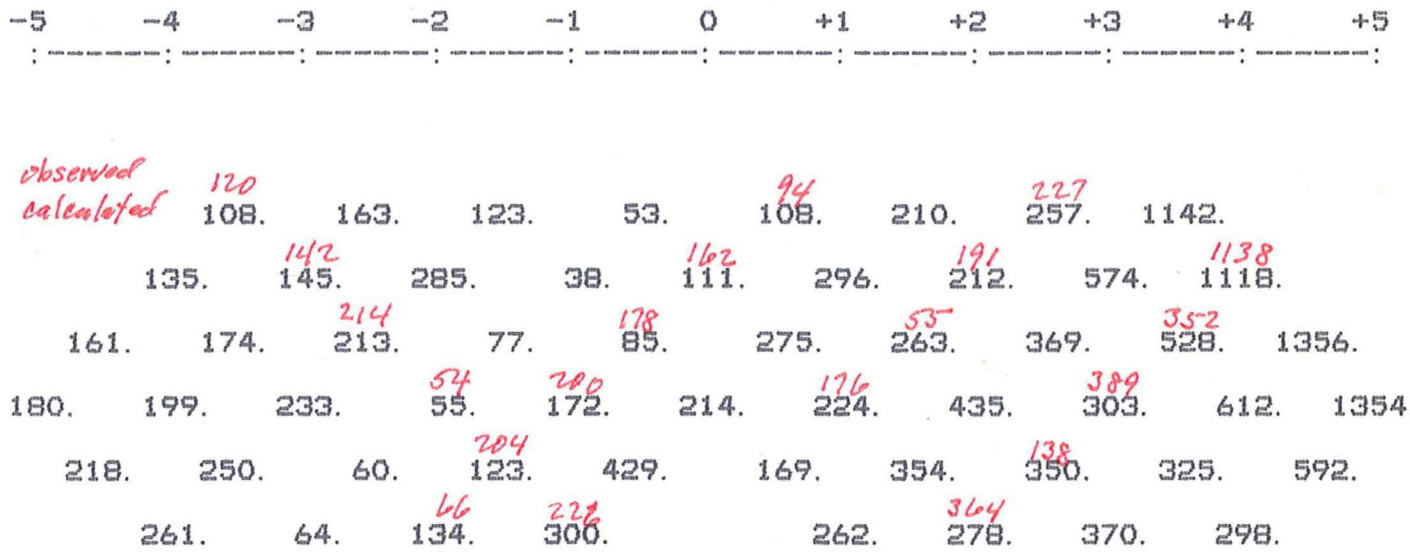
SAN BERNARDINO, CALIFORNIA
LINE D-D' #2 (HARLEM SPRINGS)
MEDIA RESITIVITY (OHM-~~METERS~~ feet

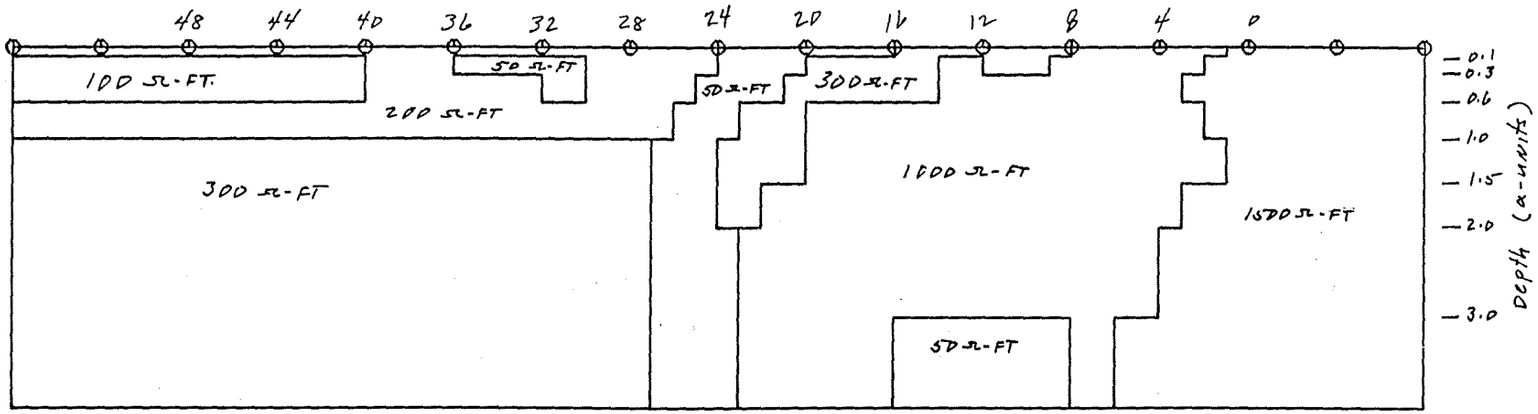
50.00	100.00	200.00	300.00	500.00
1000.00	1500.00			

MEDIA PFE (%)

0.00	0.00	0.00	0.00	0.00
0.00	0.00			

APPARENT RESISTIVITY (CALCULATED)





APPARENT RESISTIVITY - COMPUTED

W E

-5 -4 -3 -2 -1 0 1 2 3 4 5

44 40 36 32 28 24 20 16 12 8 4

108 163 123 53 108 210 257 1142

135 145 285 38 111 296 212 574 1118

161 174 213 77 85 275 263 369 528 1356

180 199 233 55 172 214 224 435 303 612 1354

218 250 60 123 429 169 354 350 325 592

261 64 134 300 262 278 370 298

SAN BERNARDINO, CALIFORNIA
LINE D-D' #2 (HARLEM SPRINGS)

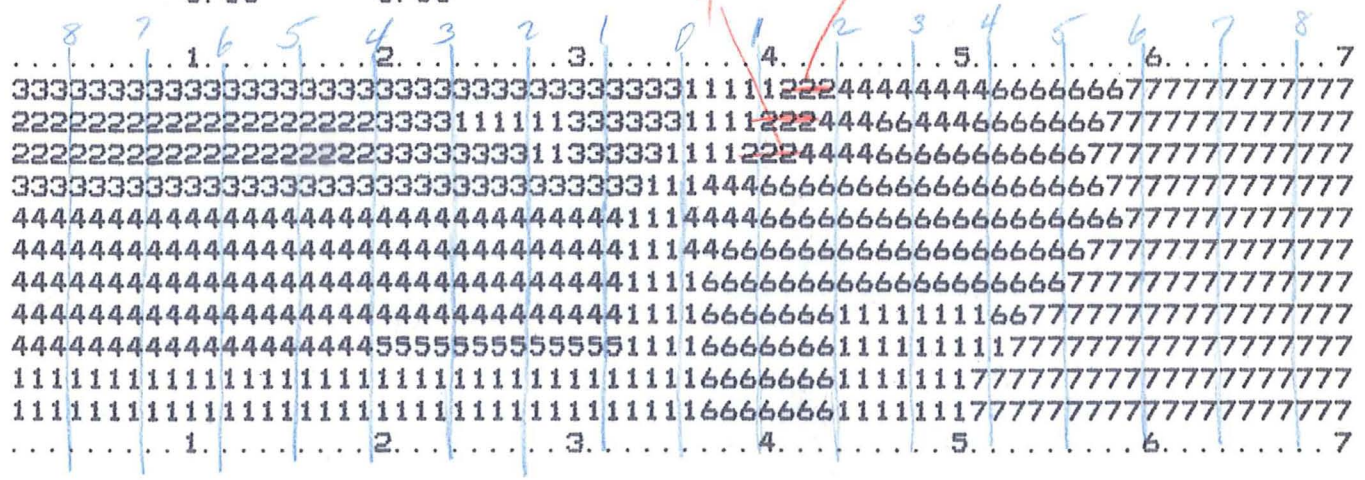
HS: 1" = 800'

SAN BERNARDINO, CALIFORNIA
LINE D-D' #2 (HARLEM SPRINGS)
MEDIA RESITIVITY (OHM-METERS)

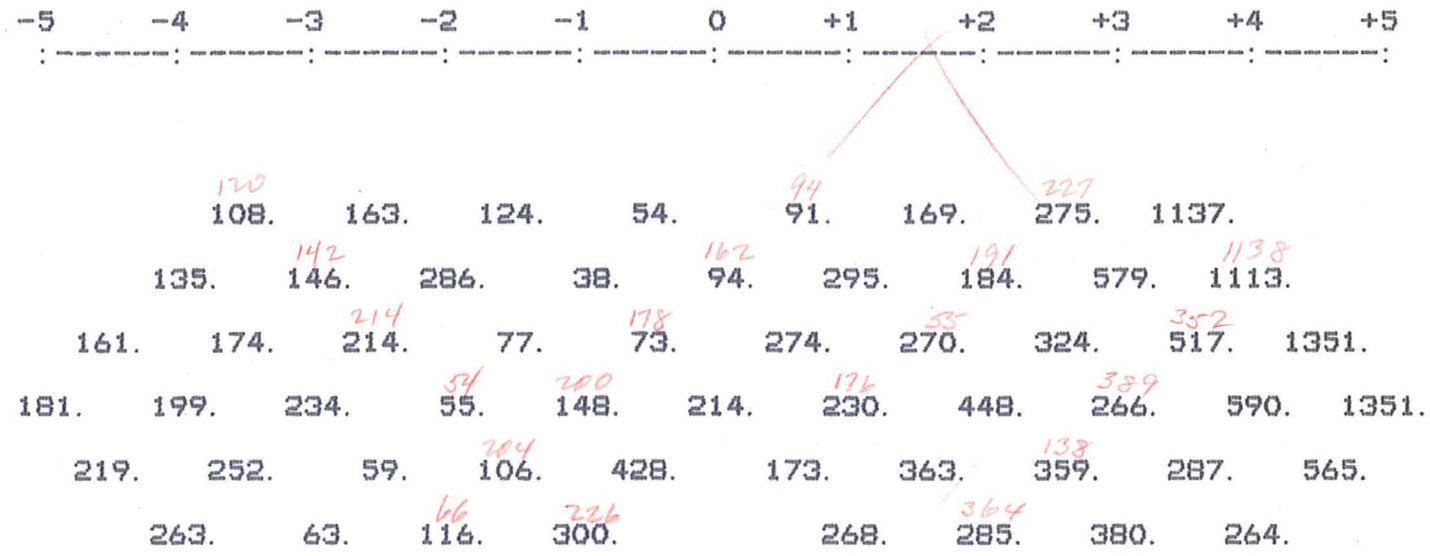
50.00	100.00	200.00	300.00	500.00
1000.00	1500.00			

MEDIA PFE (%)

0.00	0.00	0.00	0.00	0.00
0.00	0.00			



APPARENT RESISTIVITY (CALCULATED)

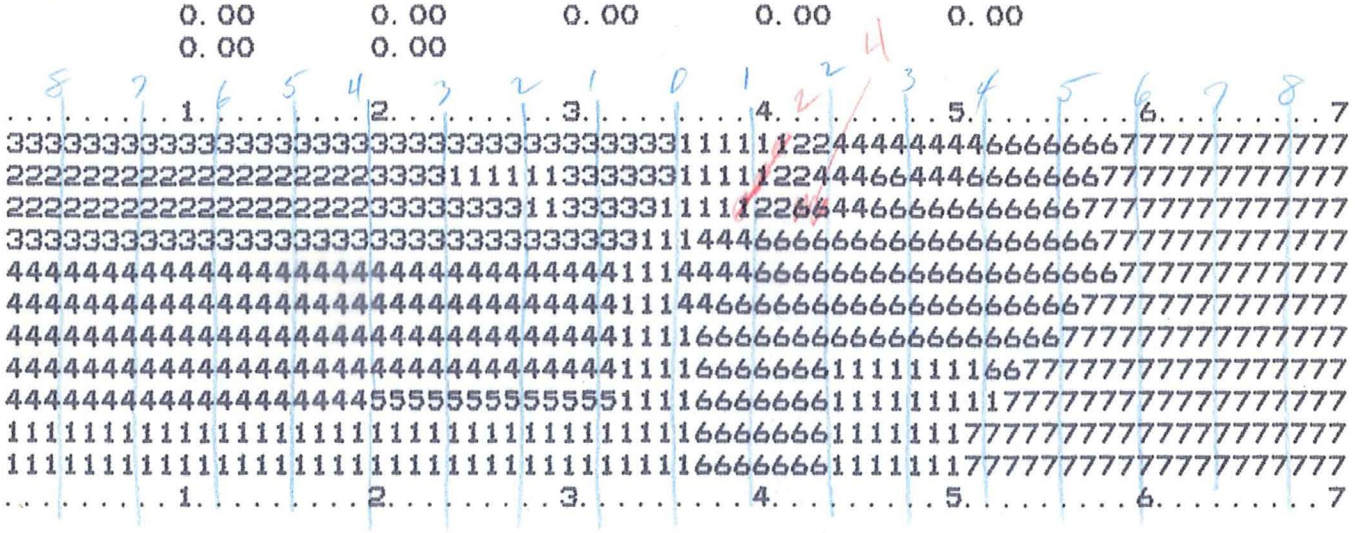


SAN BERNARDINO, CALIFORNIA
LINE D-D' #2 (HARLEM SPRINGS)
MEDIA RESITIVITY (OHM-METERS)

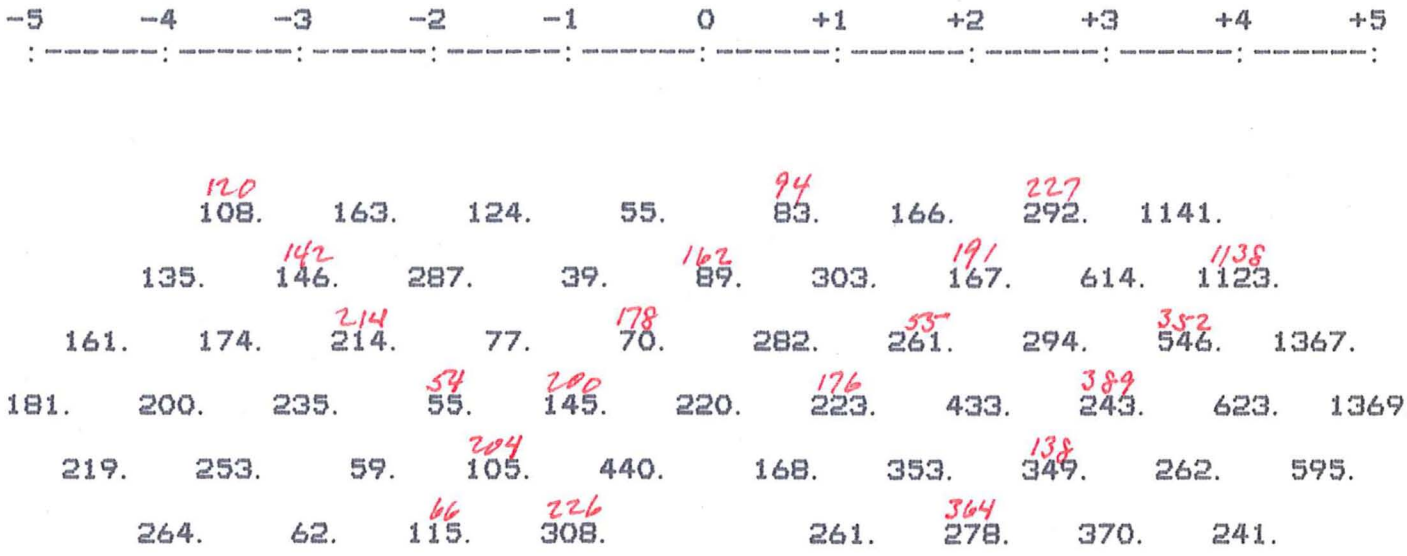
50.00	100.00	200.00	300.00	500.00
1000.00	1500.00			

MEDIA PFE (%)

0.00	0.00	0.00	0.00	0.00
0.00	0.00			



APPARENT RESISTIVITY (CALCULATED)

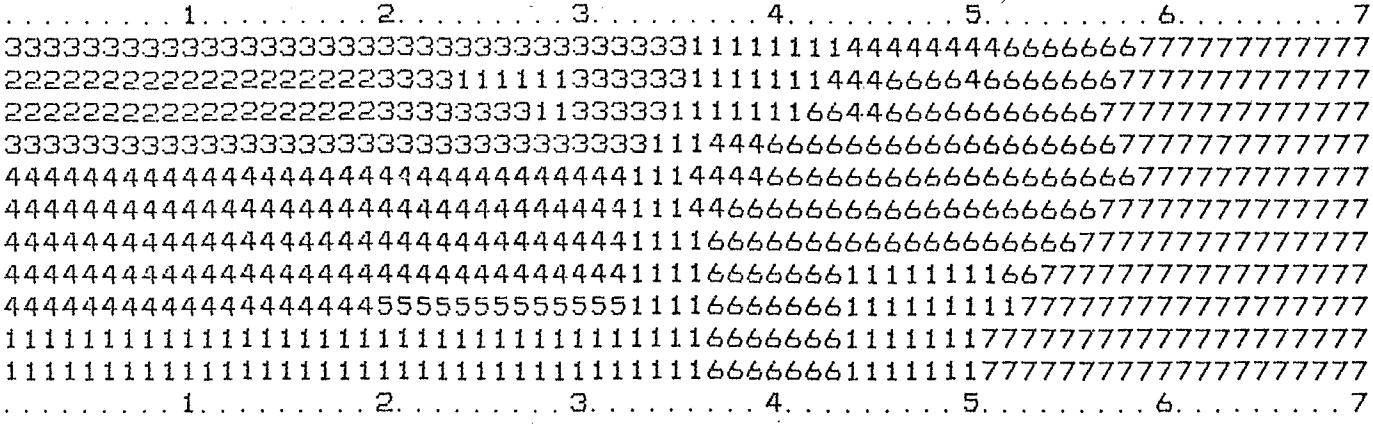


SAN BERNARDINO, CALIFORNIA
LINE D-D' #2 (HARLEM SPRINGS)
MEDIA RESITIVITY (OHM-~~METERS~~) feet

50.00	100.00	200.00	300.00	500.00
1000.00	1500.00			

MEDIA PFE (%)

0.00	0.00	0.00	0.00	0.00
0.00	0.00			



APPARENT RESISTIVITY (CALCULATED)

-5	-4	-3	-2	-1	0	+1	+2	+3	+4	+5

observed / calculated

	140					94		227		
	108.	163.	124.	57.		67.	151.	246.	1145.	
		142			162		191		1138	
	135.	146.	288.	40.	68.	294.	196.	392.	1121.	
		214		178			63		352	
161.	174.	216.	81.	52.	275.	321.	269.	354.	1366.	
		84	200		176		389			
181.	200.	237.	58.	104.	215.	275.	416.	228.	404.	1369.
			204				138			
220.	255.	62.	74.	434.	208.	340.	342.	248.	386.	
		66?	226			364				
	266.	65.	81.	305.	252.	272.	365.	230.		

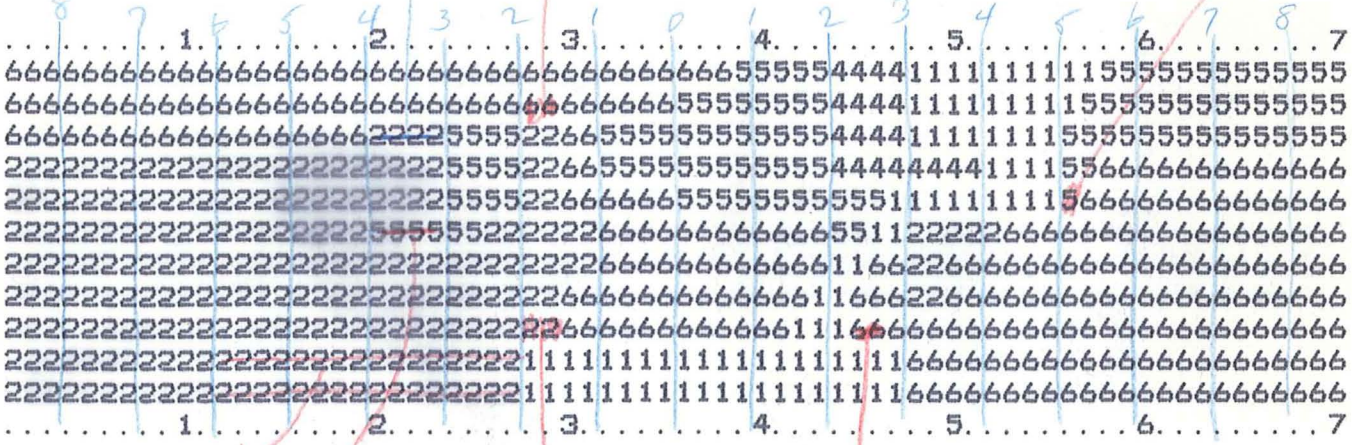
SAN BERNARDINO, CALIFORNIA
LINE D-D' #1 (URBETA)
MEDIA RESITIVITY (OHM-METERS)
50.00 100.00 150.00 200.00 300.00
500.00
MEDIA PFE (%)
0.00 0.00 0.00 0.00 0.00
0.00

APPARENT RESISTIVITY (CALCULATED)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

		324.	187.	266.	337.	352.	262.	97.	81.	
	193.	131.	246.	251.	385.	344.	101.	95.	134.	
151.	107.	177.	216.	296.	344.	122.	89.	187.	224.	
136.	100.	157.	162.	243.	255.	110.	105.	208.	303.	238.
99.	154.	152.	185.	198.	79.	91.	274.	327.	319.	
	154.	151.	175.	148.	65.	239.	416.	338.		

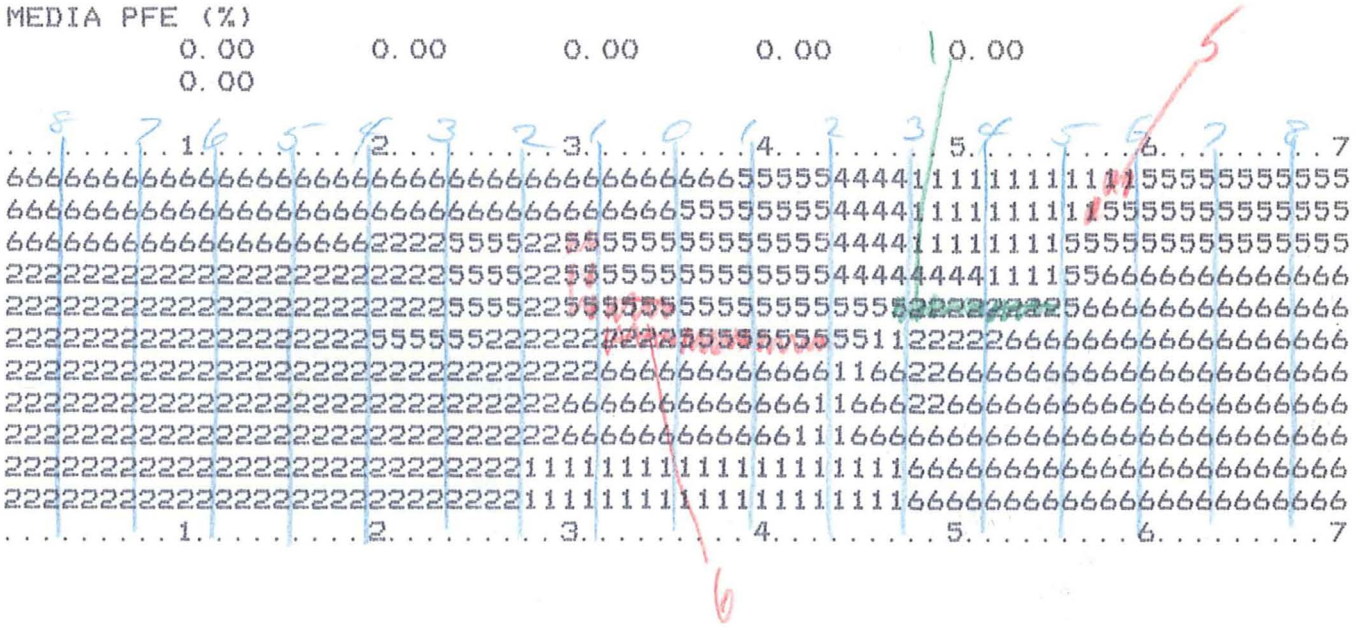
SAN BERNARDINO, CALIFORNIA
LINE D-D' #1 (URBETA)
MEDIA RESITIVITY (OHM-METERS)
50.00 100.00 150.00 200.00 300.00
500.00
MEDIA PFE (%)
0.00 0.00 0.00 0.00 0.00
0.00



APPARENT RESISTIVITY (CALCULATED)

203. 209. 275. 348. 350. 262. 97. 81.
180. 163. 186. 253. 405. 341. 101. 95. 134.
157. 148. 179. 165. 298. 364. 121. 89. 186. 224.
146. 134. 168. 169. 185. 258. 118. 105. 209. 306. 240.
127. 159. 160. 193. 151. 80. 98. 274. 333. 325.
156. 154. 182. 156. 66. 262. 423. 348.

SAN BERNARDINO, CALIFORNIA
LINE D-D' #1 (URBETA)
MEDIA RESITIVITY (OHM-METERS)
50.00 100.00 150.00 200.00 300.00
500.00
MEDIA PFE (%)
0.00 0.00 0.00 0.00 0.00
0.00



APPARENT RESISTIVITY (CALCULATED)

-5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5

205. 205. 261. 300. 342. 264. 101. 84.

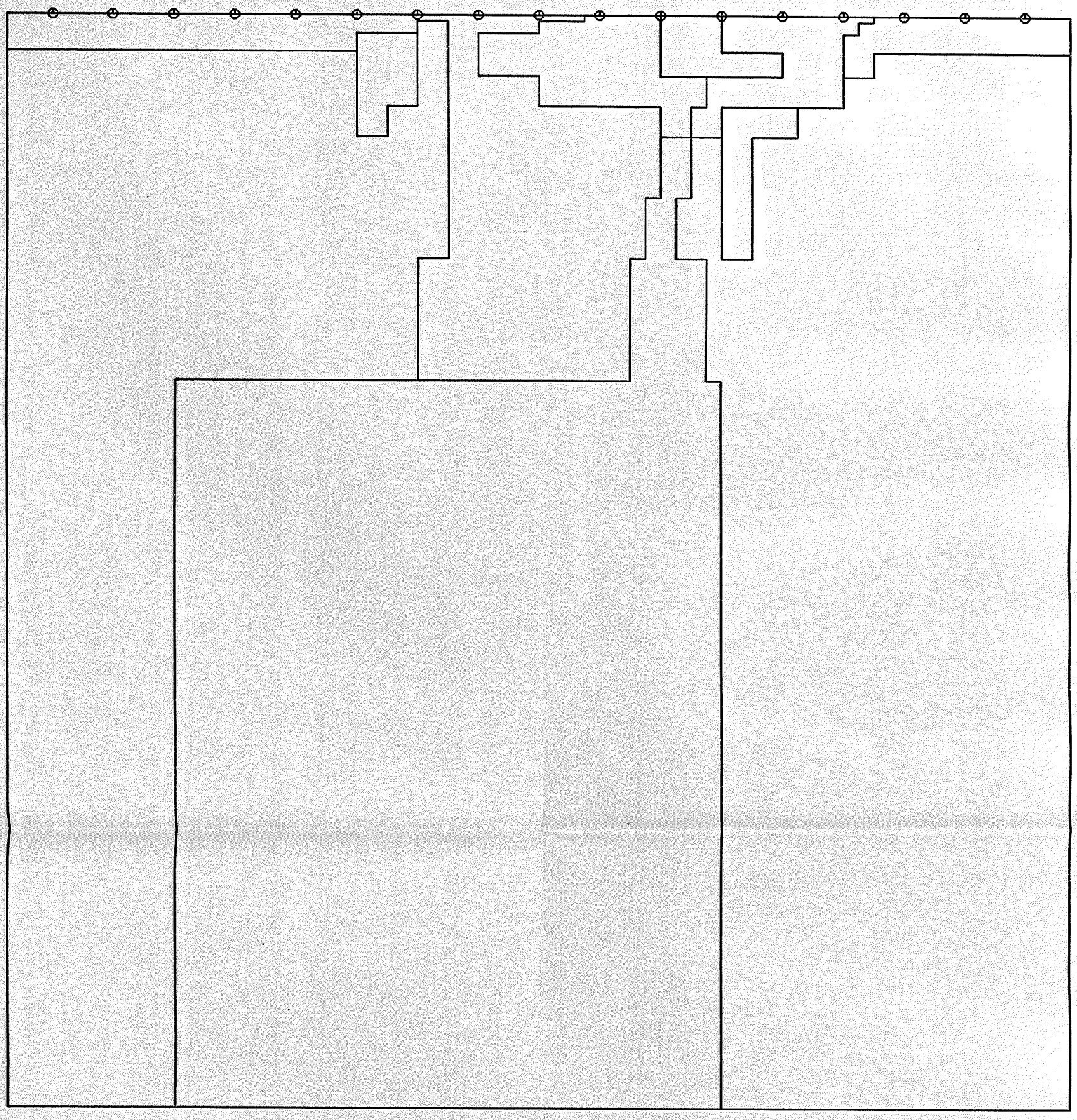
183. 155. 178. 240. 308. 319. 108. 109. 106.

160. 137. 168. 159. 279. 267. 120. 105. 142. 321.

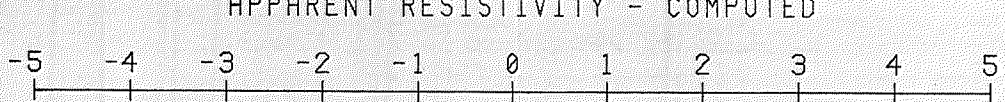
149. 121. 155. 164. 182. 248. 93. 112. 147. 417. 300.

113. 145. 156. 195. 155. 86. 84. 166. 424. 384.

141. 150. 185. 164. 79. 127. 469. 383.



APPARENT RESISTIVITY - COMPUTED



323 188 268 339 353 261 97 81

192 133 252 261 396 345 100 95 134

150 110 184 226 314 357 123 89 185 223

135 105 165 169 255 272 116 106 206 300 237

104 162 157 190 208 84 95 278 323 316

163 155 176 151 69 255 424 334

Line D-D' #1

hs 1" = 800'

SAN BERNARDINO

DD #1 (Urbeta)

S N

48 44 40 36 32 28 24 20 16 12 8 4 0

4 5 4 3 2 1 0 1 2 3 4 5 6

400 – 73 88 272 333 163 229 – 400

145 114 341 225 240

800 – 239 100 130 369 229 160 – 800

278 117 210 127

1200 – 276 315 67 80 128 152 – 1200

292 75 149

1600 – 77 – 1600

1" = 400 feet (V+H)

100 = Values in ohm feet

SAN BERNARDINO

DD #2 (Harlem Springs)

W — E

48 44 40 36 32 28 24 20 16 12 8 4 0

1 2 3 4 5 6

400 –

120 94 227 894

142 162 191 1138

800 –

214 178 55 352

54 200 176 389

1200 –

204 NA 138

66± 226 262 364

1600 –

– 400 – 800 – 1200 – 1600

1" = 400 feet (V+H)

* = Values in ohm feet

100

NA = No data available