UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Lassen Known Geothermal Resource Area, California: Audio-magnetotelluric, Telluric Profiling, and Self-Potential Studies

by

K. R. Christopherson, D. B. Hoover, V. Lewis,

B. Radtke, and R. M. Senterfit

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This report is preliminary and has not been edited or reviewed for conformity with U.S. Geological standards and nomenclature.

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During the summer of 1979, geophysical work was done in the Lassen KGRA in northeastern California to assess the geothermal potential of the area. As part of the study, 68 audio-magnetotelluric (AMT) soundings were made and 2 telluric and self-potential (SP) profiles were done. For descriptions of these techniques and the equipment used see Hoover et al (1978), Corwin and Hoover (1979), and Beyer (1977).

The AMT station locations are shown in figure 1. The scalar resistivities (table 1) were contoured for 7.5 and 27 hertz data at north-south and east-west E-line orientations (figures 2 through 5). The contour maps are complex, reflecting both lateral changes in geology and geothermal activity.

The locations of the telluric and self-potential traverses are given in figure 6. The profiles for traverse 1 (figure 7) show varied SP and telluric responses. The variations are probably geologically related with the drop in SP voltage and telluric resistivity on the east end of the traverse caused by a lateral lithology change.

The profiles for traverse 2 (figure 8) show a sharp drop in SP voltage combined with a sharp increase in telluric resistivity near station 6. This could be associated with large-scale intrusive features (a ring dike?) which trend to the northwest.

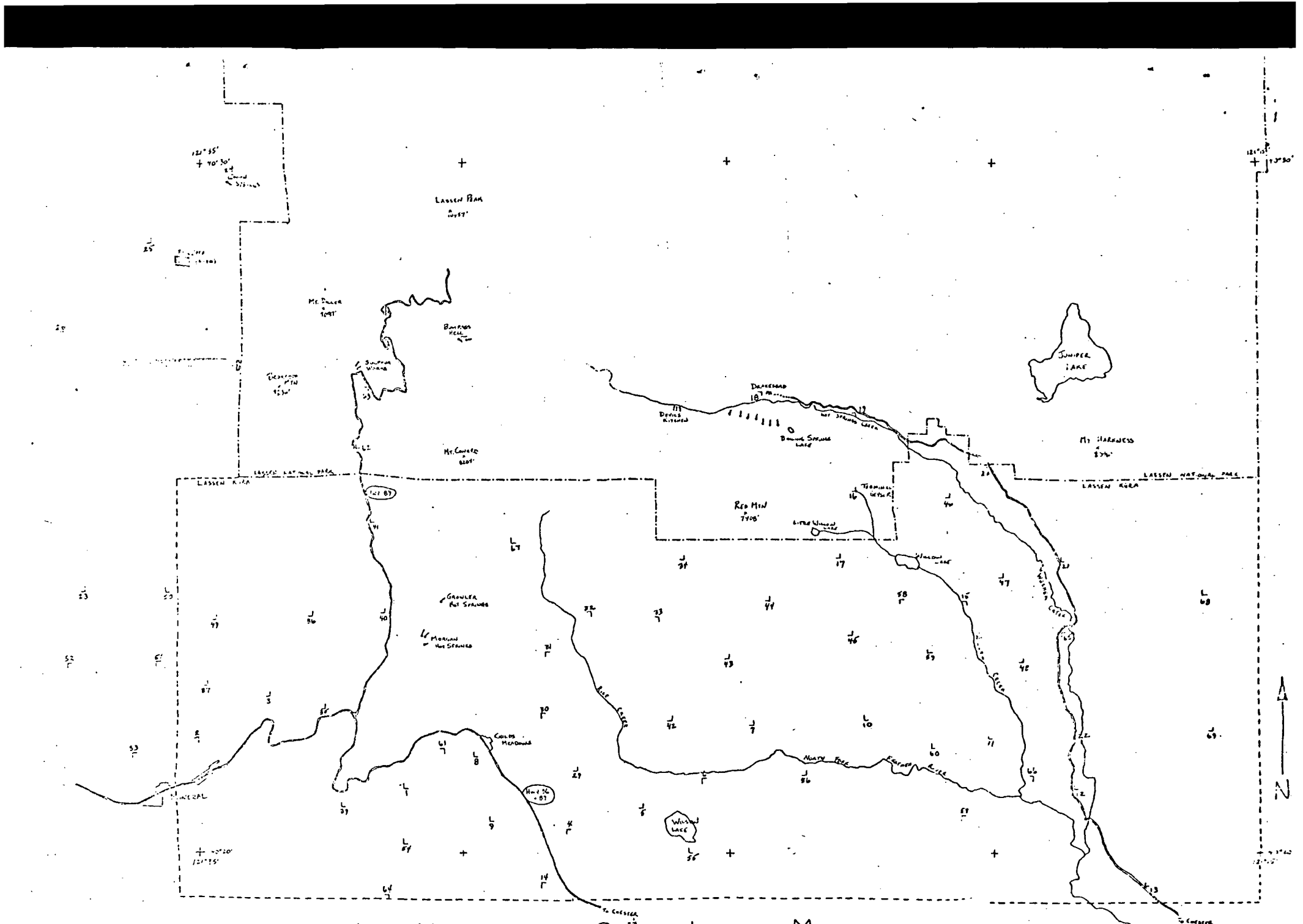


FIG. 1: AUDIO-MAGNETOTELLURIC STATION LOCATION MAP
LASSEN KNOWN GEOTHERMAL RESOURCE AREA, CA

STATION LOCATION — L

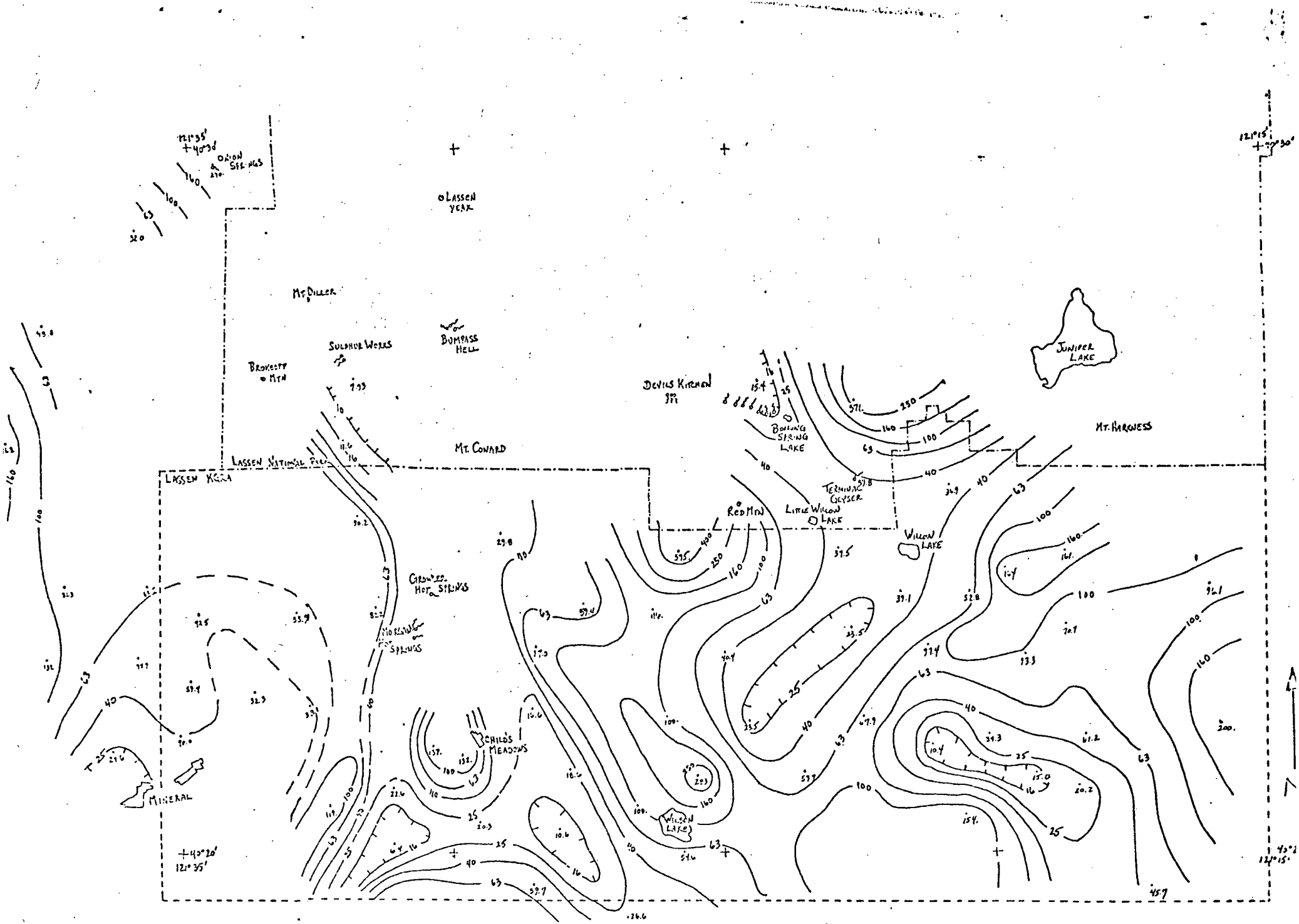


FIG. 2: AUDIO-MAGNETOTELLURIC APPARENT RESISTIVITY MAP
7.5 HERTZ · E-LINE N-S
LASSEN KNOWN GEOTHERMAL RESOURCE AREA CA

LOGARITHMIC CONTOURS IN OHM-METERS
SCALE: 1 0 1 MILE

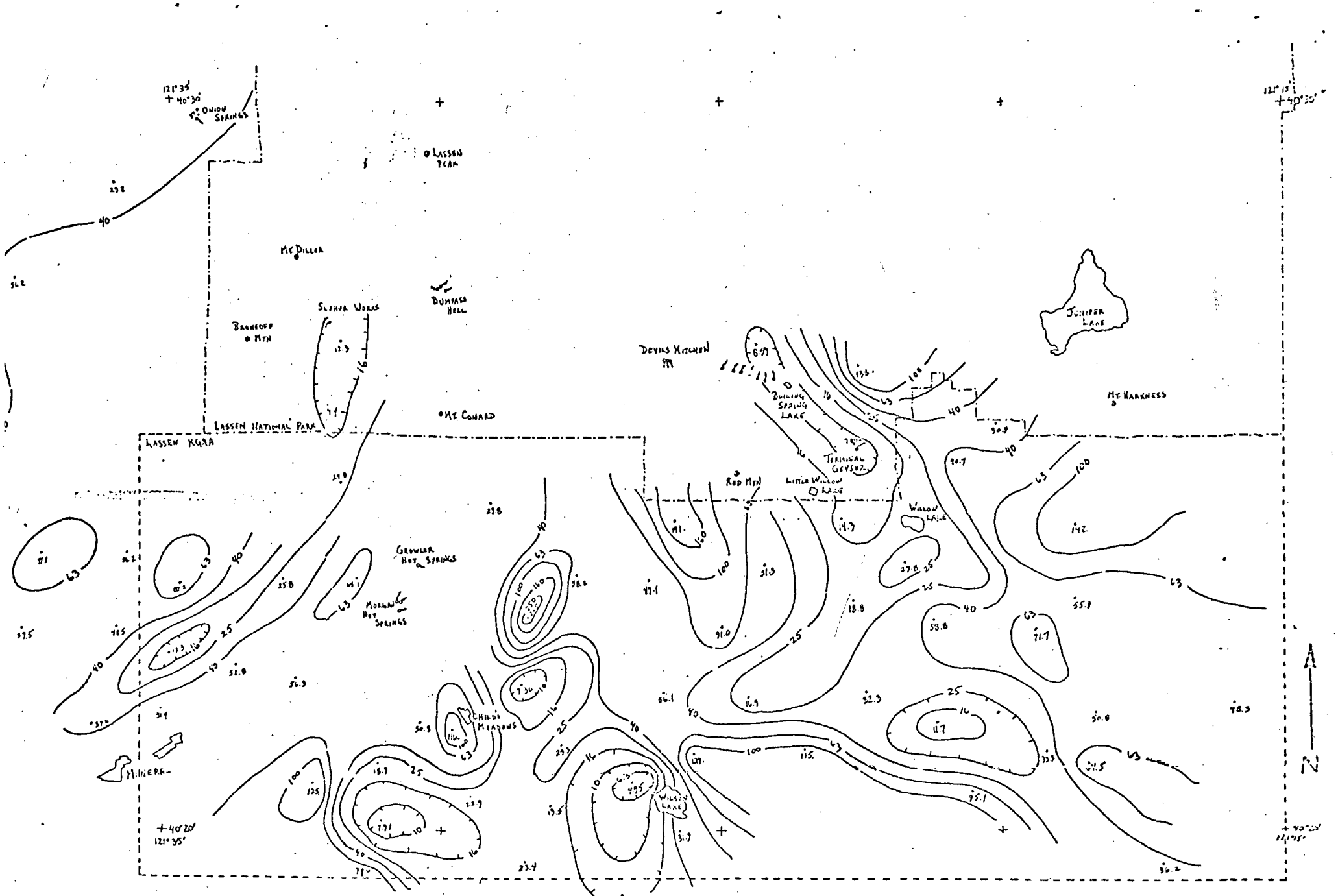


FIG. 3: AUDIO-MAGNETOTELLURIC APPARENT RESISTIVITY MAP
7.5 HERTZ : E-LINE E-W
LASSEN KNOWN GEOTHERMAL RESOURCE AREA, CA

LOGARITHMIC CONTOURS IN OHM-METERS
SCALE: 1 0 1 MILE

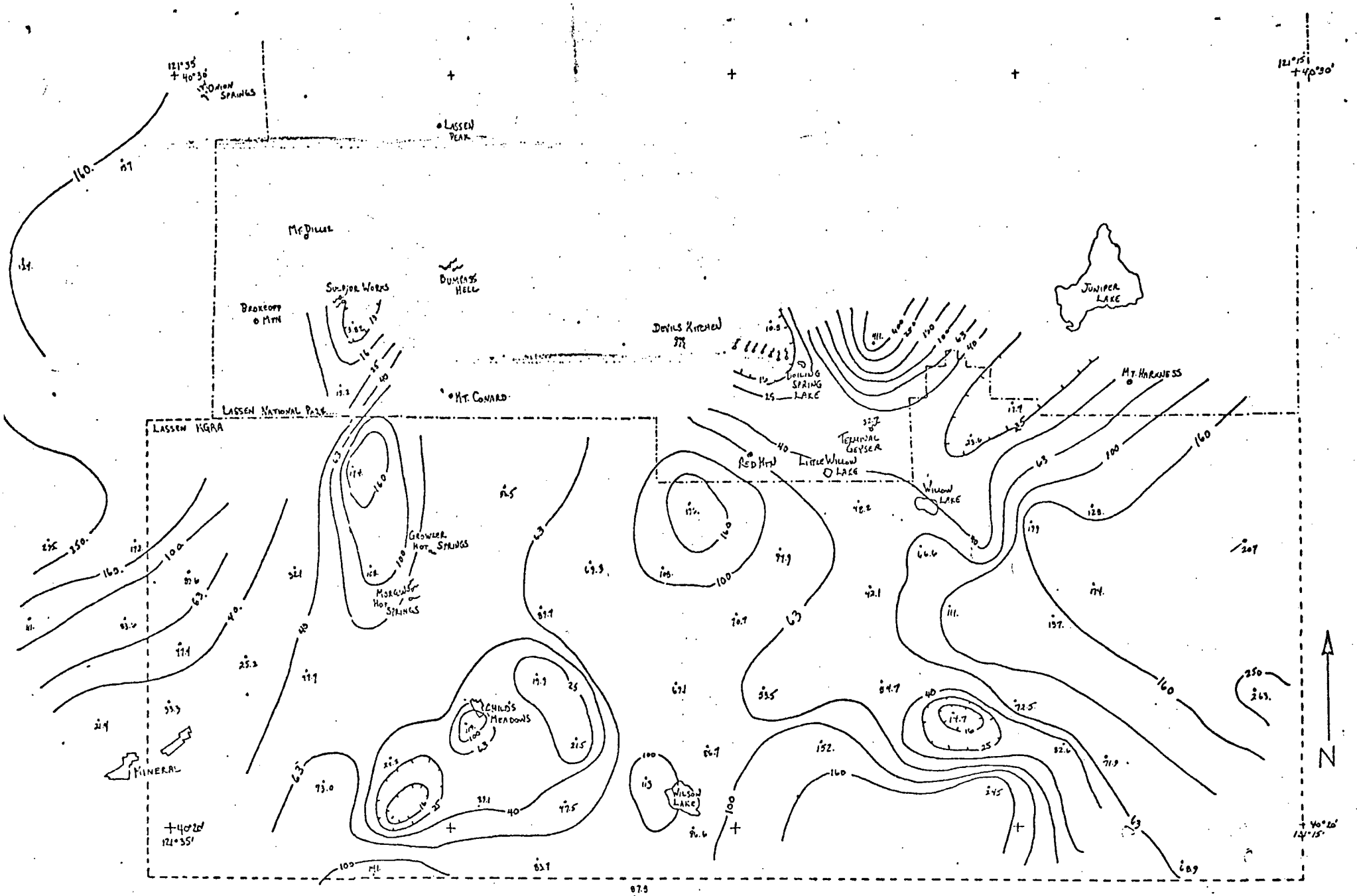


FIG. 4: AUDIO-MAGNETOTELLURIC APPARENT RESISTIVITY MAP
27 HERTZ : E-LINE N-S
LASSEN KNOWN GEOTHERMAL RESOURCE AREA, CA

LOGARITHMIC CONTOURS IN OHM-METERS
SCALE: 1 0 1 MILE

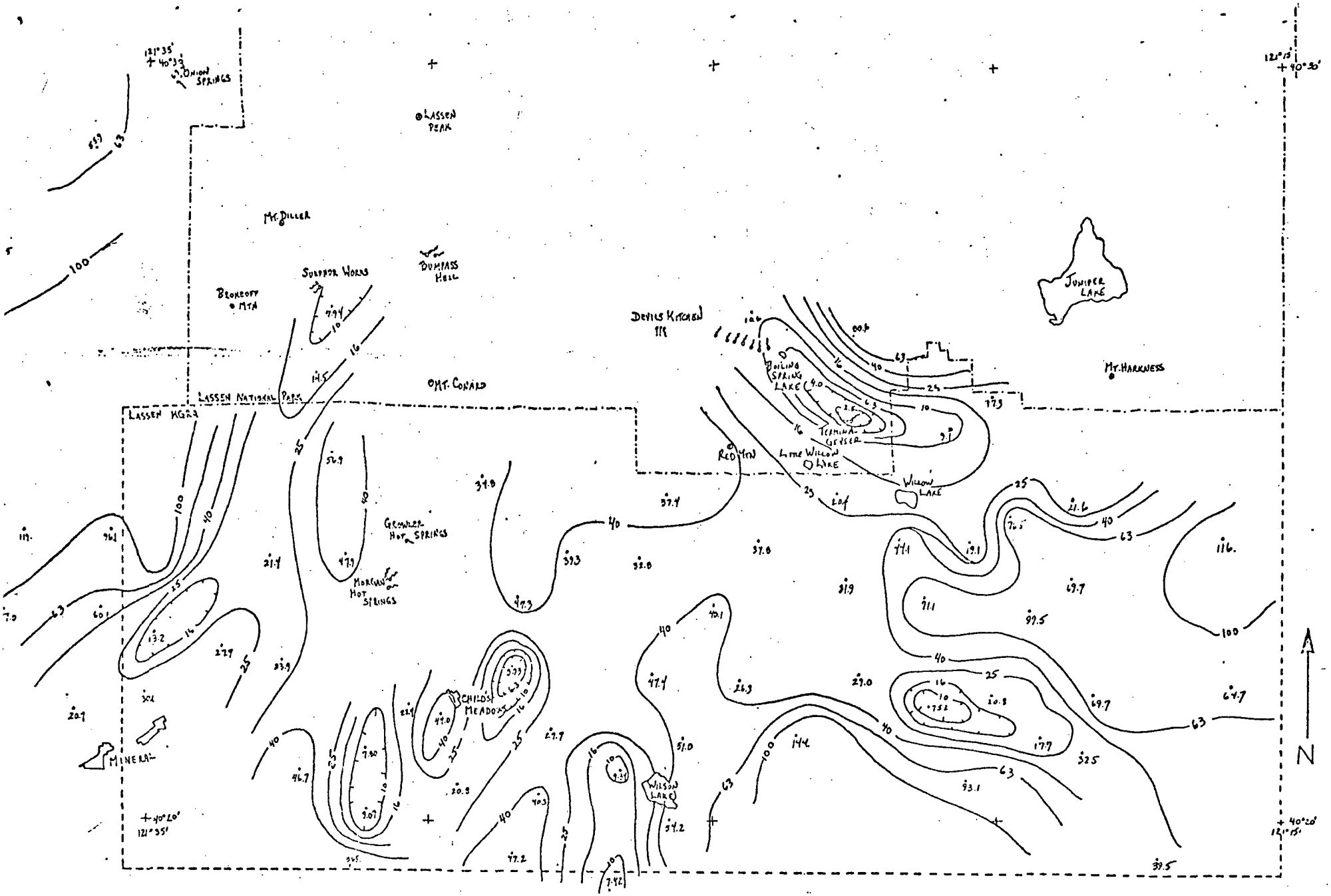


FIG. 5: AUDIO-MAGNETOTELLURIC APPARENT RESISTIVITY MAP
27 HERTZ : E-LINE E-W
LASSEN KNOWN GEOTHERMAL RESOURCE AREA, CA

LOGARITHMIC CONTOURS IN OHM-METERS
SCALE: 1 0 1 MILE
1 KILOMETER

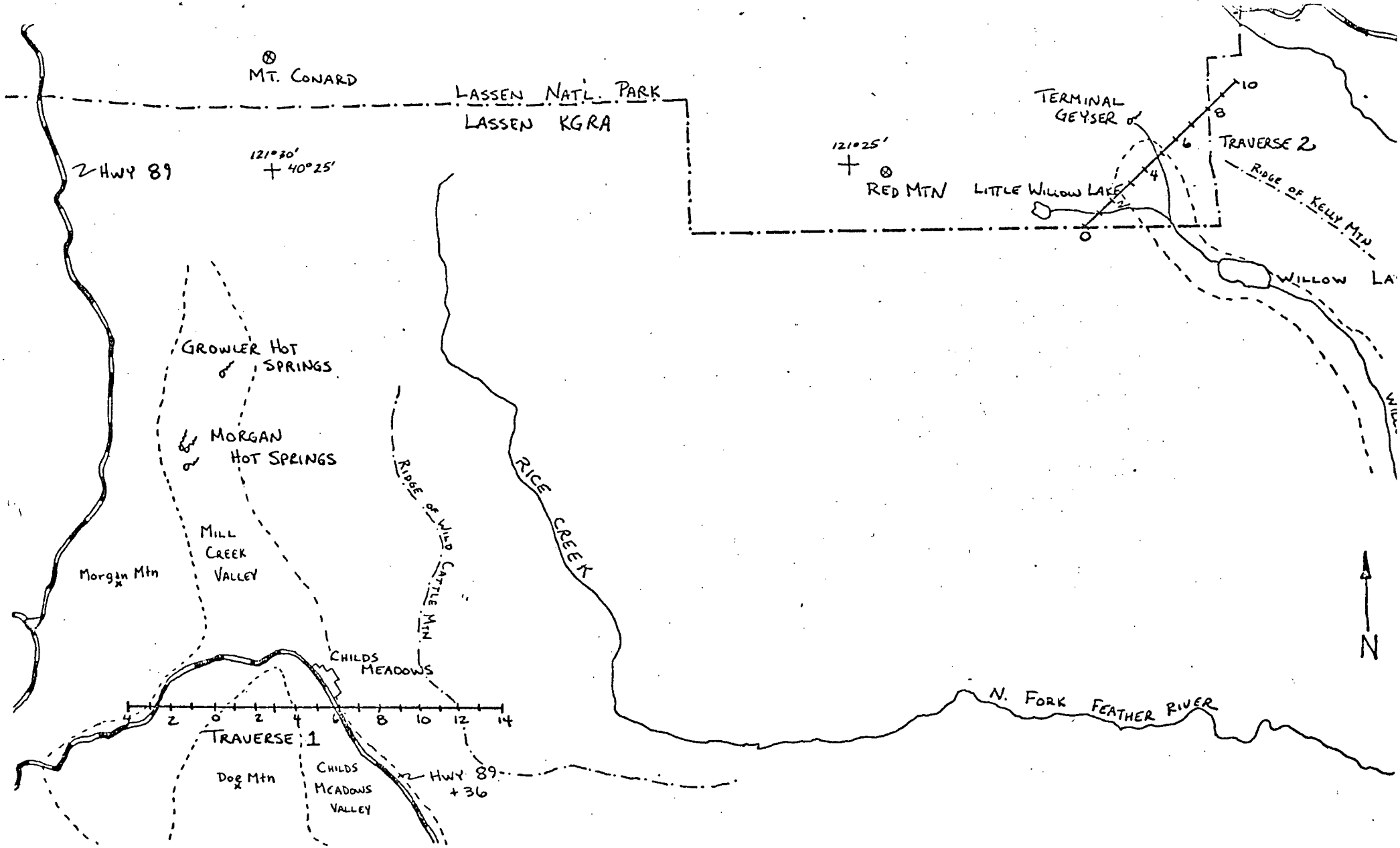
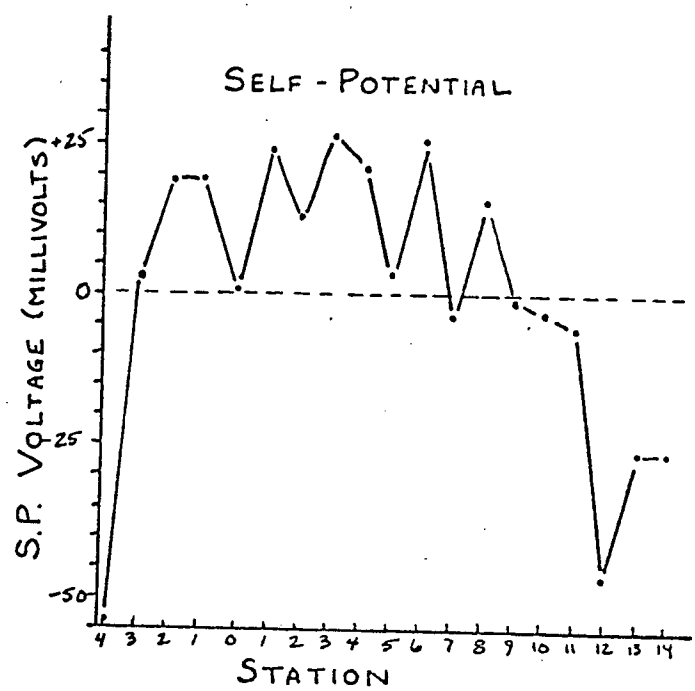


FIG. 6: TELLURIC TRAVERSES LOCATION MAP - LASSEN KGRA, CA



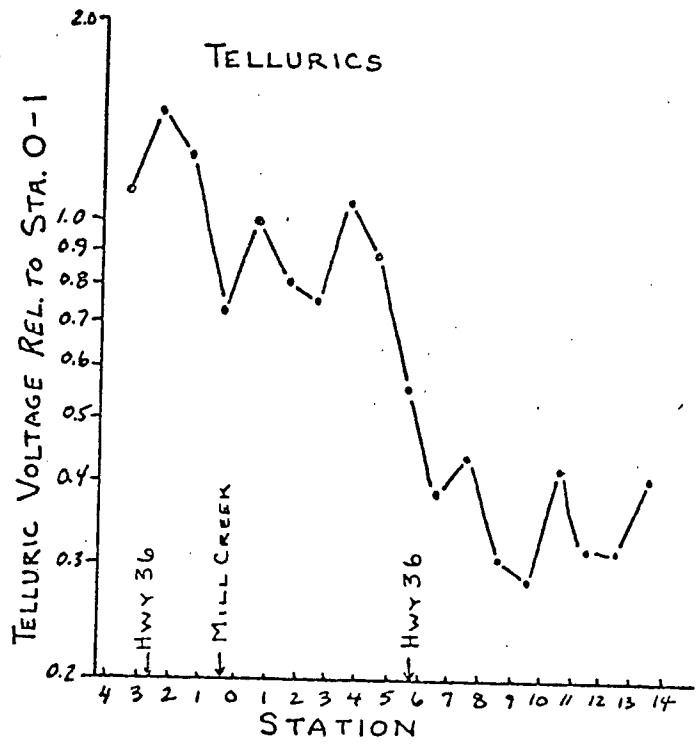


FIG. 7: PROFILES - TRAVERSE 1
LASSEN KGRA, CA

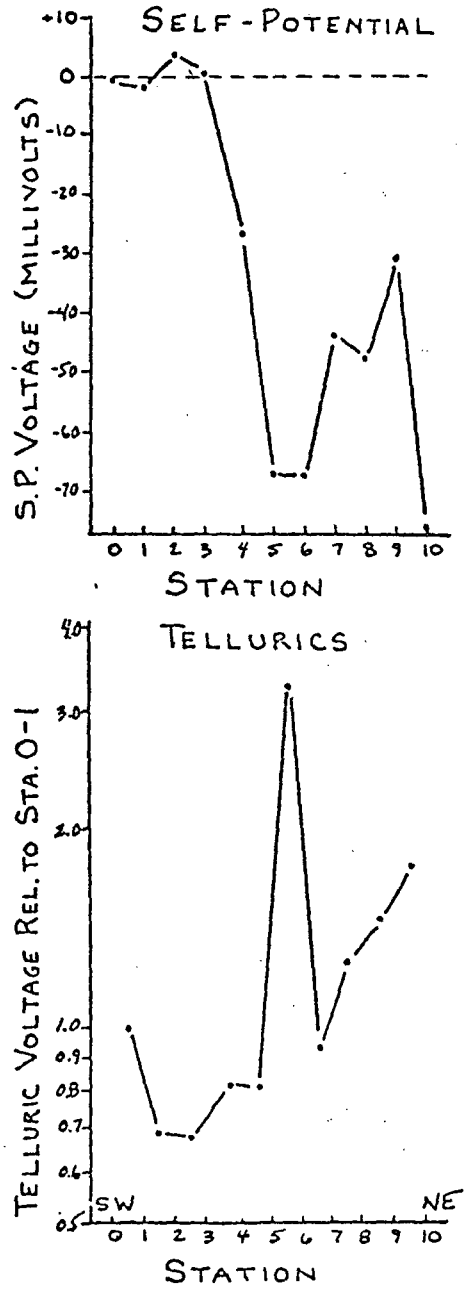


FIG. 8: PROFILES - TRAVERSE 2
LASSEN KGRA, CA

TABLE 1 : U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG LASSEN KGRA, CA
JUNE 1979

ρa = observed apparent resistivity in ohm-meters
N = number of observations
Er = standard error in ohm meters — = no data

"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	13.6K
1NS	ρa	22.6	30.4	15.0	25.2	33.6	52.5	—	—	—	43.0	39.9	103.
	N	4	7	9	8	6	7				5	5	1
	Er	1.23	2.46	2.40	1.26	1.95	5.51				5.13	1.05	—
1EW	ρa	18.9	11.9	12.6	7.80	15.2	19.9	—	—	—	17.9	76.0	636.
	N	10	7	11	6	9	7				7	1	1
	Er	0.70	2.04	0.51	0.66	0.81	2.42				2.02	—	—
2NS	ρa	40.0	45.8	43.7	33.3	50.9	70.6	—	—	—	71.1	48.1	181.
	N	8	8	8	8	7	9				7	5	1
	Er	3.38	4.51	3.45	4.71	4.85	6.43				5.31	2.04	—
2EW	ρa	51.4	76.2	45.1	30.1	33.4	51.6	—	—	—	47.2	52.3	74.5
	N	8	6	10	10	10	9				8	1	1
	Er	6.79	12.8	2.72	1.07	0.81	6.63				0.68	—	—
3NS	ρa	32.3	32.2	21.8	25.2	28.3	38.4	—	—	—	34.0	29.6	51.3
	N	9	9	9	7	7	8				8	4	1
	Er	3.57	4.25	1.09	1.72	1.30	2.02				2.09	3.31	—
3EW	ρa	52.8	38.0	40.9	27.7	37.5	30.9	—	—	—	45.3	39.3	189.
	N	9	9	9	10	7	5				6	1	1
	Er	3.80	3.48	2.41	1.79	1.80	4.02				1.13	—	—
4NS	ρa	10.6	14.0	22.7	47.5	101.	?46.2	—	—	—	?6.84	21.0	84.6
	N	11	7	11	7	8	4				8	1	1
	Er	1.23	3.31	2.79	6.83	21.6	14.3				0.42	—	—
4EW	ρa	19.5	21.3	30.7	40.3	106.	86.7	—	—	—	?7.70	73.9	185.
	N	11	8	8	7	8	8				7	1	1
	Er	1.35	1.72	2.70	3.12	7.48	9.19				099	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

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:- = no data

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		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
5NS	ρa	100.	66.6	77.9	113.	161.	435.	—	—	—	111.	87.1	327
	N	8	9	8	10	8	8				7	1	1
	Er	13.1	5.82	4.02	10.6	27.2	106				8.35	—	—
5EW	ρa	4.95	5.14	7.42	9.34	25.1	49.0	—	—	—	62.1	147.	107.
	N	12	9	10	10	10	7				7	1	1
	Er	0.28	0.49	0.26	0.72	1.35	4.64				6.44	—	—
6NS	ρa	283.	119.	63.2	86.7	133.	206.	—	—	—	79.4	92.3	154.
	N	8	6	11	9	9	8				8	7	1
	Er	24.4	20.0	4.78	10.5	7.38	12.0				4.52	5.78	—
6EW	ρa	129.	80.2	48.7	51.0	118.	168.	—	—	—	27.1	125.	261.
	N	7	6	9	10	9	8				7	1	1
	Er	24.8	22.7	3.96	4.79	9.48	19.8				2.34	—	—
7NS	ρa	23.5	30.7	27.5	53.5	121.	159.	—	—	—	90.9	189.	486.
	N	10	7	8	8	10	7				9	1	1
	Er	1.87	3.12	2.93	6.51	12.4	9.94				4.23	—	—
7EW	ρa	16.9	19.1	21.7	26.3	63.1	97.1	—	—	—	25.3	560.	343
	N	8	10	9	9	7	6				9	1	1
	Er	1.42	1.72	1.26	1.62	3.15	13.2				1.51	—	—
8NS	ρa	132.	87.4	113.	119.	103.	? 27.6	—	—	—	? 0.55	10.2	10.6
	N	10	7	8	10	11	7				8	1	1
	Er	8.23	11.2	13.1	6.79	4.52	5.22				0.04	—	—
8EW	ρa	116.	76.5	82.2	44.0	39.8	14.2	—	—	—	? 7.13	59.5	32.3
	N	14	12	12	11	13	11				6	1	6
	Er	3.94	3.59	4.00	1.74	2.95	0.82				0.75	—	0.69

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA

JUNE 1979

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Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
9NS	ρa	20.3	32.1	81.9?	39.1	59.5	87.7	—	—	—	85.2	111.	200.
	N	5	5	4	6	8	5				6	1	1
	Er	1.94	6.50	19.8	8.12	2.36	4.69				6.60	—	—
9EW	ρa	22.9	20.3	44.2?	20.8	60.0	213.?	—	—	—	227.	244.	502.
	N	6	8	6	6	8	4				7.	1	1
	Er	1.80	3.01	2.07	2.73	4.30	17.6				7.87	—	—
10NS	ρa	67.9	39.8	45.1	54.7	32.4	20.7	—	—	—	52.3	279.	369.
	N	6	5	6	9	7	7				5	1	1
	Er	10.6	9.83	3.25	5.53	1.80	3.70				1.41	—	—
10EW	ρa	32.3	19.5	28.8	29.0	44.8	27.9	—	—	—	59.3	342.	1061.
	N	9	11	9	12	10	6				4	1	1
	Er	2.38	1.60	2.52	2.57	2.75	3.10				9.61	—	—
11NS	ρa	34.3	54.4	49.4	72.5	67.9	44.8	—	—	—	30.3	40.4	141.
	N	9	7	8	8	8	7				10	1	1
	Er	4.35	8.02	12.9	5.04	4.33	3.42				0.96	—	—
11EW	ρa	24.3	20.0	33.0	20.8	7.62?	17.8	—	—	—	13.0	137.	1.00?
	N	12	7	8	10	12	6				6	1	1
	Er	1.18	1.99	2.50	1.25	0.49	2.36				0.51	—	—
12NS	ρa	20.2	25.5	31.4	71.9	53.3	178	—	—	—	150.	591.	480.
	N	5	7	7	8	8	5				7	1	1
	Er	2.73	1.55	2.25	13.4	4.82	37.2				5.10	—	—
12EW	ρa	64.5	46.5	48.5	32.5	32.8	56.6	—	—	—	187.	474.	956.
	N	9	10	11	12	9	6				9	1	1
	Er	5.36	3.75	2.30	1.43	1.39	3.14				14.7	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG — LASSEN KGRA, CA — JUNE 1979

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Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
13NS	ρa	45.7	70.5	56.8	68.9	45.6	115.	—	—	—	192.	764.	1297.
	N	10	8	9	10	8	8				7	1	1
	Er	5.98	6.72	4.22	4.92	2.68	40.7				5.59	—	—
13EW	ρa	36.2	35.8	47.4	39.5	58.2	74.2	—	—	—	344.	696.	1038.
	N	8	7	8	8	12	10				8	1	1
	Er	2.13	2.55	1.45	6.13	2.59	2.60				18.4	—	—
14NS	ρa	59.7	54.4	49.8	83.7	188.	192.	—	—	—	36.9	154.	198.
	N	10	9	9	10	8	9				7	1	1
	Er	4.75	6.08	3.74	8.51	7.32	8.40				1.17	—	—
14EW	ρa	23.4	33.3	45.2	47.2	125.	146.	—	—	—	85.2	136.	345.
	N	9	11	10	7	10	7				9	1	1
	Er	1.94	1.72	2.45	3.48	4.52	6.91				2.94	—	—
15NS	ρa	52.8	36.8	38.6	30.4	39.5	36.3	—	—	—	9.35?	104.	35.5
	N	10	9	9	10	10	10				9	1	8
	Er	3.34	4.30	2.67	3.45	3.27	1.69				0.62	—	0.89
15EW	ρa	16.3	23.1	23.8	19.1	24.6	30.8	—	—	—	23.5	149.	65.0
	N	10	10	11	10	13	10				8	1	10
	Er	1.05	2.14	1.69	1.23	1.12	1.58				1.61	—	1.14
16NS	ρa	39.8	26.4	41.6	32.7	14.4	4.07	—	—	—	5.86	20.6	32.1
	N	9	9	12	9	10	8				12	1	1
	Er	4.54	2.65	3.10	3.02	0.80	0.14				0.34	—	—
16EW	ρa	7.86	4.94	1.40	2.13	3.33	3.69	—	—	—	3.58	8.18	28.2
	N	5	5	7	11	12	10				9	1	1
	Er	1.47	0.64	0.24	0.15	0.19	0.10				0.17	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

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Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
17NS	ρa	37.5	42.2	32.9	48.2	88.0	79.9	—	—	—	124.	388.	258.
	N	12	8	11	11	10	8				8	1	1
	Er	4.92	3.85	2.05	2.67	4.70	1.19				13.5	—	—
17EW	ρa	14.3	13.9	16.8	20.4	53.1	97.7	—	—	—	140.	306.	139.
	N	10	7	9	11	10	12				9	1	1
	Er	0.88	1.45	0.97	1.61	2.24	8.48				9.33	—	—
18NS	ρa	15.4	15.5	8.98	10.8	14.9	13.9	—	—	—	16.9	53.2	107
	N	7	8	10	10	11	11				8	1	1
	Er	2.10	2.69	0.85	0.78	0.82	1.25				1.62	—	—
18EW	ρa	8.59	9.31	10.2	10.6	16.6	15.8	—	—	—	16.5	59.5	37.3
	N	7	7	9	9	12	9				9	1	1
	Er	0.72	1.75	0.89	1.13	0.95	1.61				1.10	—	—
19NS	ρa	371.	472.	569.	411.	373.	246.	—	—	—	53.8	57.6	247.
	N	9	9	9	10	8	7				10	1	1
	Er	27.6	50.1	143.	29.3	31.9	27.1				3.97	—	—
19EW	ρa	138.	118.	138.	80.6	88.9	?13.4	—	—	—	27.6	81.7	150
	N	10	11	8	11	10	6				7	1	1
	Er	12.2	10.9	16.8	3.08	2.52	1.07				1.65	—	—
20NS	ρa	33.1	39.8	22.0	17.7	9.15	11.5	—	—	—	34.1	179.	312.
	N	7	8	10	10	6	9				8	1	1
	Er	3.95	4.72	2.54	1.48	1.80	1.52				1.80	—	—
20EW	ρa	30.9	24.0	25.2	17.3	23.3	38.4	—	—	—	99.2	169.	156.
	N	10	11	12	11	13	11				9	1	1
	Er	1.92	1.81	1.92	0.58	0.65	1.22				2.97	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

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		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
21NS	ρa	161.	168.	115.	128.	123.	96.7	—	—	—	28.7	134.	170.
	N	8	5	13	10	9	8				9	1	1
	Er	21.7	16.4	9.61	8.53	5.70	10.1				1.54	—	—
21EW	ρa	142.	8.18?	5.10	21.6	17.1	64.1	—	—	—	84.7	156.	96.9
	N	5	7	4	6	5	8				7	1	4
	Er	18.0	0.85	1.11	4.49	2.97	15.0				5.50	—	4.89
22NS	ρa	61.2	107.	70.2	105.	65.3	37.8	—	—	—	56.0	275.	383.
	N	8	8	12	8	6	10				9	1	1
	Er	5.27	18.5	6.14	8.98	3.79	1.14				2.55	—	—
22EW	ρa	50.8	49.8	61.0	69.7	96.8	99.5	—	—	—	256.	237.	28.7
	N	10	12	11	10	12	12				9	1	1
	Er	4.58	3.44	2.21	3.75	7.06	5.37				14.4	—	—
23NS	ρa	26.6	39.6	47.8	87.8	111.	184.	—	—	—	52.5	103.	?1.19
	N	9	7	10	11	11	11				7	1	1
	Er	2.96	6.59	2.91	7.77	11.1	14.8				3.97	—	—
23EW	ρa	15.0	7.49	9.54	7.42	17.2	30.6	—	—	—	24.4	111.	
	N	6	6	7	8	11	9				6	1	
	Er	2.54	0.35	1.11	0.87	1.70	4.03				1.98	—	—
24NS	ρa	240.	129.	91.4	134.	203.	155.	—	—	—	135.	788.	395.
	N	5	9	7	9	7	7				6	1	1
	Er	17.7	24.2	22.1	12.3	8.85	20.7				8.33	—	—
24EW	ρa	37.0	35.9	53.7	69.4	208.	269.	—	—	—	87.9	1008.	1643.
	N	12	9	13	12	11	9				7	1	1
	Er	2.22	3.63	2.67	3.51	7.24	16.4				1.38	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
25NS	ρa	52.0	57.9	105.	157.	341.	277.	—	—	—	11.3	36.9	46.5
	N	8	7	7	5	11	10				9	1	1
—	Er	7.95	6.02	11.3	12.0	27.1	17.9				0.42	—	—
25EW	ρa	29.2	30.3	41.2	55.9	131.	123.	—	—	—	12.2	52.9	51.4
	N	18	13	13	11	13	12				8	1	6
	Er	2.04	2.07	2.65	2.84	7.81	4.58				1.34	—	3.84
26NS	ρa	48.8	76.5	74.1	124.	260.	242.	—	—	—	104.	229.	446.
	N	9	10	12	11	9	10				6	1	1
	Er	5.09	10.9	4.46	5.42	19.2	23.5				13.8	—	—
26EW	ρa	56.2	43.5	65.1	77.5	164.	252.	—	—	—	74.6	279.	154.
	N	9	12	12	13	13	8				7	1	3
	Er	6.34	3.85	4.11	3.96	5.04	22.5				6.05	—	2.33
27NS	ρa	168.	245.	283.	238.	1176.?	684.	—	—	—	202.	737.	804.
	N	8	11	12	6	6	7				7	1	1
	Er	20.3	28.9	19.1	27.3	78.8	95.9				5.09	—	—
27EW	ρa	33.8	59.6	95.1	102.	368.	587.	—	—	—	167.	575.	185.
	N	7	12	11	12	13	10				10	1	1
	Er	5.11	4.81	5.37	5.07	16.5	42.0				11.3	—	—
28NS	ρa	81.3	136.	98.7	295.	303.	230.	—	—	—	169.	809.	852.
	N	10	6	8	12	6	12				8	1	1
	Er	7.02	4.78	6.70	19.8	29.3	17.2				9.54	—	—
28EW	ρa	71.1	74.5	91.9	119.	281.	262.	—	—	—	169.	355.	213.
	N	13	9	11	12	9	10				9	1	1
	Er	6.82	7.54	3.72	3.95	6.02	11.6				9.35	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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— = no data

"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
29NS	ρa	18.6	25.6	20.3	21.5	21.7	3.74	—	—	—	14.4	123.	147.
	N	14	12	11	9	8	7	—	—	—	8	1	1
	Er	1.13	1.71	2.20	1.93	1.09	0.80	—	—	—	0.77	—	—
29EW	ρa	29.3	27.9	26.9	27.7	44.9	8.77	—	—	—	11.3	237.	43.0
	N	12	10	12	12	12	7	—	—	—	6	1	1
	Er	1.63	1.64	1.51	1.00	2.61	0.86	—	—	—	1.23	—	—
30NS	ρa	16.6	15.8	10.2	19.9	23.2	24.9	—	—	—	21.7	57.6	148.
	N	9	9	8	11	13	6	—	—	—	10	1	1
	Er	1.10	1.73	0.44	2.07	0.64	4.22	—	—	—	1.33	—	—
30EW	ρa	9.36	12.8	8.28	5.93		7.16	—	—	—	2.82	51.3	149.
	N	8	8	11	13		5	—	—	—	8	1	1
	Er	0.92	1.99	0.52	0.57		1.00	—	—	—	0.35	—	—
31NS	ρa	97.0	73.0	70.8	89.7	148.	352.	—	—	—	13.8	892.	17.2
	N	10	8	8	10	9	6	—	—	—	7	1	1
	Er	5.16	9.20	3.60	8.94	10.9	139.	—	—	—	1.7	—	—
31EW	ρa	265.	254.	115.	47.3	50.3	30.8	—	—	—	716.	254.	—
	N	2	6	7	11	9	7	—	—	—	6	1	—
	Er	26.5	53.3	16.5	3.71	2.79	2.10	—	—	—	49.1	1	—
32NS	ρa	59.4	49.8	51.9	69.3	88.8	135.	—	—	—	400.	827.	1850.
	N	14	13	11	10	15	7	—	—	—	7.	1	1
	Er	6.67	5.23	2.69	5.09	10.1	21.3	—	—	—	19.0	—	—
32EW	ρa	58.2	38.9	43.3	39.3	100.	196.	—	—	—	108.	1193.	716.
	N	13	9	9	11	15	8	—	—	—	9	1	1
	Er	4.60	5.49	2.85	2.32	3.30	26.3	—	—	—	5.87	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG LASSEN KGRA, CA

JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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"NOTE" - Telluric line orientation indicated with station numbers.

Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
33NS	ρa	116.	54.9	70.6	108.	69.6	31.3	—	—	—	344.	793.	4040.
	N	5	7	5	11	6	8				13	1	1
	Er	25.8	6.27	12.6	6.20	4.74	4.35				9.71	—	—
33EW	ρa	49.1	51.4	38.7	32.8	45.9	79.9	—	—	—	183.	3180.	660.
	N	14	15	14	8	15	11				8	1	1
	Er	5.01	6.08	1.84	2.63	2.87	6.67				13.7	—	—
34NS	ρa	595.?	512.?	162.	196.	131.	348.	—	—	—	627.	2240.	2115.
	N	3	5	5	8	7	11				9	1	1
	Er	131.	47.6	24.3	20.7	27.5	48.8				32.1	—	-
34EW	ρa	191.	72.9	70.0	57.4	118.	76.1	—	—	—	270.	1011.	8195.
	N	8	12	14	12	10	6				9	1	1
	Er	23.6	7.25	5.83	5.54	16.0	14.4				15.1	—	—
35NS	ρa	38.1	50.0	30.7	47.7	52.0	67.8	—	—	—	89.9	1074.	378.
	N	8	9	7	11	9	9				8	1	1
	Er	4.52	4.90	4.16	3.64	2.52	8.31				4.80	—	—
35EW	ρa	56.3	36.5	29.8	23.9	27.7	52.9	—	—	—	86.7		
	N	12	9	11	10	9	9				8		
	Er	2.88	3.57	2.34	1.51	1.68	5.92				8.91		
36NS	ρa	53.9	79.8	21.6	32.1	109.?	248.?	—	—	—	39.9	36.6	288.
	N	12	2	12	10	5	5				7	1	1
	Er	5.40	5.84	1.71	3.93	8.73	25.4				1.40	—	—
36EW	ρa	25.8	55.5	26.7	21.4	95.7	65.6	—	—	—	34.8	162.	4730.
	N	11	6	8	6	8	5				7	1	1
	Er	3.64	7.26	2.25	2.46	16.1	6.36				4.21	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG — LASSEN KGRA, CA — JUNE 1979

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"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
37NS	ρa	59.4	27.0	27.9	47.4	23.0	14.4	—	—	—	152.	452.	645.
	N	7	6	6	9	5	7				10	1	1
	Er	6.67	4.33	3.47	6.75	1.90	2.65				4.07	—	—
37EW	ρa	13.3	6.79	14.1	13.2	18.5	16.5	—	—	—	50.0	810.	1195.
	N	11	9	11	12	10	6				8	1	1
	Er	1.17	0.48	0.73	0.96	1.22	1.92				3.63	—	—
39NS	ρa	119.	129.	73.9	73.0	97.6	107.	—	—	—	32.1	122.	116.
	N	8	5	11	10	9	8				10	1	1
	Er	6.73	11.9	6.08	14.6	6.86	14.7				1.60	—	—
39EW	ρa	125.	126.	64.6	46.7	53.8	58.5	—	—	—	41.2	130.	335.
	N	7	9	7	13	15	11				10	1	1
	Er	10.2	12.3	4.23	4.31	3.80	3.60				2.90	—	—
40NS	ρa	82.2	80.6	74.9	108.	193.	109.	—	—	—	71.3	108.	313.
	N	10	8	10	11	12	9				8	1	1
	Er	7.71	6.23	2.36	5.24	10.7	13.9				5.27	—	—
40EW	ρa	65.1	37.7	55.3	49.9	139.	183.	—	—	—	149.	237.	419.
	N	6	7	11	14	12	12				7	1	1
	Er	13.2	2.67	5.83	3.06	4.30	13.4				13.5	—	—
41NS	ρa	90.2	103.	88.7	174.	434.	657.	—	—	—	50.6	161.	171.
	N	5	6	9	8	8	8				8	1	1
	Er	19.0	8.68	3.93	12.1	18.5	57.8				1.28	—	—
41EW	ρa	24.8	27.3	56.6	56.9	149.	177.	—	—	—	71.9	313.	167.
	N	6	8	11	9	11	7				8	1	1
	Er	3.07	4.38	5.09	3.71	8.90	17.6				8.24	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG LASSEN KGRA, CA

JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
42NS	ρa	100.	79.8	50.0	69.1	97.4	27.5	—	—	—	37.0	40.8	206.
	N	8	7	11	12	11	7				6	1	1
	Er	12.8	6.07	3.78	4.88	6.54	4.78				3.60	—	—
42EW	ρa	56.1	50.0	57.4	47.4	70.4	46.1	—	—	—	22.2	255.	431.
	N	10	8	13	10	10	6				7	1	1
	Er	3.01	3.59	3.33	3.79	4.63	5.97				2.98	—	—
43NS	ρa	40.4	92.6	34.8	70.7	112.	151.	—	—	—	178.	520.	1195.
	N	8	10	11	11	9	5				8	1	1
	Er	3.88	16.7	1.32	5.62	10.2	44.6				9.70	—	—
43EW	ρa	91.0	104.	51.1	40.1	98.9	205.	—	—	—	108.	1780.	2410.
	N	7	7	11	11	9	9				9	1	1
	Er	8.00	10.6	4.39	2.45	3.75	18.0				19.8	—	—
44NS	ρa	65.7	102.	78.0	97.9	91.9	160.	—	—	—	286.	865.	1330.
	N	8	6	7	10	12	4				10	1	1
	Er	7.17	10.2	5.61	4.81	6.20	29.4				13.9	—	—
44EW	ρa	51.3	35.6	43.6	37.8	65.9	23.2	—	—	—	111.	2680.	549.
	N	10	5	8	13	10	9				8	1	1
	Er	1.91	12.3	3.00	2.89	8.14	3.27				7.18	—	—
45NS	ρa	23.5	45.3	27.3	42.1	62.5	58.7	—	—	—	62.4	70.7	366.
	N	7	8	9	10	11	10				7	1	1
	Er	2.46	3.61	2.13	3.53	3.48	7.18				3.10	—	—
45EW	ρa	18.8	18.2	31.0	31.9	67.3	218.	—	—	—	96.5	488.	252.
	N	12	12	11	8	12	9				7	1	1
	Er	1.60	1.91	2.64	5.12	2.04	16.0				5.58	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG — LASSEN KGRA, CA — JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
46NS	ρa	36.9	29.2	23.7	23.6	9.23	11.9	—	—	—	39.2	115.	239.
	N	7	8	10	11	9	9				8	1	1
	Er	3.49	3.46	1.66	1.58	1.24	1.37				1.18	—	—
46EW	ρa	40.7	30.1	17.2	9.61	22.0	21.5	—	—	—	338	54.5	3720.
	N	9	7	7	12	10	12				9	1	1
	Er	4.51	2.23	0.99	0.55	3.09	1.01				1.49	—	—
47NS	ρa	164.	178.	208.	199.	149.	107.	—	—	—	61.4	87.1	198.
	N	7	4	11	5	12	12				10	1	1
	Er	20.7	43.4	21.0	26.6	10.9	10.3				2.16	—	—
47EW	ρa	81.8	207?	74.3	76.5	57.4	78.4	—	—	—	55.8	82.3	182.
	N	4	6	10	13	14	15				11	1	5
	Er	14.8	28.3	6.39	4.47	2.03	4.72				1.54	—	3.43
48NS	ρa	93.3	91.3	114.	157.	231.	121.	—	—	—	152.	588.	719.
	N	11	11	11	11	11	10				7	1	1
	Er	6.45	12.1	6.24	13.7	18.8	10.3				12.3	—	—
48EW	ρa	71.7	80.2	93.2	99.5	197.	166.	—	—	—	195.	303.	1820.
	N	9	7	9	12	12	9				9	1	1
	Er	8.62	5.66	8.75	7.23	7.34	14.28				12.4	—	—
49NS	ρa	42.5	45.9	34.1	89.6	148.	54.6	—	—	—	72.9	45.3	408.
	N	9	11	10	11	9	9				10	1	1
	Er	4.87	5.21	2.27	8.22	16.9	4.62				6.33	—	—
49EW	ρa	82.2	58.3	80.8	112.	300	248.	—	—	—	233.	848.	1020.
	N	8	11	9	10	12	10				9	1	1
	Er	10.1	6.90	7.40	7.12	14.4	20.5				12.9	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG LASSEN KGRA, CA
JUNE 1979

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"NOTE" - Telluric line orientation indicated with station numbers.

Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
50NS	ρa	63.7	80.4	97.1	172.	284.	112.	—	—	—	95.2	313.	176.
	N	11	9	11	10	9	10				8	1	1
	Er	2.95	10.0	4.50	12.9	33.8	10.8				8.76	—	—
50EW	ρa	56.2	65.7	82.1	96.1	235.	406.	—	—	—	190.	618.	470.
	N	9	8	11	12	11	10				8	1	1
	Er	5.51	8.45	4.21	4.70	5.71	23.4				16.9	—	—
51NS	ρa	45.7	75.1	59.6	83.6	116.	64.7	—	—	—	56.1	87.1	96.1
	N	9	10	12	12	12	9				10	1	1
	Er	4.23	5.39	4.63	4.23	5.12	8.94				1.50	—	—
51EW	ρa	48.5	52.8	52.5	60.1	146.	117.	—	—	—	79.0	253.	215.
	N	6	10	11	11	11	8				10	1	1
	Er	7.03	2.76	3.55	2.06	8.94	15.5				6.63	—	—
52NS	ρa	132.	163.	131.	111.	143.	116.	—	—	—	55.1	134.	94.5
	N	3	4	6	9	12	7				10	1	1
	Er	37.8	38.0	13.7	7.99	6.71	8.2				2.68	—	—
52EW	ρa	57.5	49.2	128.	97.0	212.	132.	—	—	—	27.9	59.5	59.5
	N	12	10	7	8	10	10				9	1	1
	Er	5.68	3.26	16.8	7.79	17.2	14.0				2.76	—	—
53NS	ρa	24.6	24.7	22.1	21.4	17.8	12.4	—	—	—	22.0	32.3	44.2
	N	12	14	15	10	13	9				10	1	1
	Er	2.25	1.62	1.10	1.06	0.96	1.00				1.53	—	—
53EW	ρa	37.6	31.4	33.8	20.7	19.5	14.0	—	—	—	18.0	42.6	253
	N	11	11	10	13	11	11				10	1	1
	Er	3.65	1.55	2.37	0.73	0.74	1.11				1.22	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG — LASSEN KGRA, CA — JUNE 1979

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"NOTE" - Telluric line orientation indicated with station numbers.

Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
54NS	ρa	10.4	8.98	11.9	14.8	21.1	16.5	—	—	—	21.2	15.1	196.
	N	11	9	13	13	13	8				10	1	1
	Er	0.61	0.48	0.63	1.15	1.23	0.96				0.88	—	—
54EW	ρa	7.91	5.46	7.63	9.07	16.6	16.2	—	—	—	26.9	34.1	38.4
	N	10	8	10	11	10	10				9	1	1
	Er	1.00	0.22	0.36	0.37	1.03	1.29				1.07	—	—
55NS	ρa	54.6	89.8	61.1	96.6	215.	261.	—	—	—	279.	348.	552.
	N	9	8	10	10	9	7				8	1	1
	Er	6.88	8.05	3.35	5.73	11.9	26.3				23.6	—	—
55EW	ρa	31.9	22.0	41.5	54.2	129.	229.	—	—	—	180.	367	87.5
	N	6	7	9	11	11	10				8	1	1
	Er	6.78	1.33	2.01	2.65	5.78	9.35				5.31	—	—
56NS	ρa	59.7	79.4	95.4	152.	216.	199.	—	—	—	125.	130.	711.
	N	13	10	8	13	9	9				7	6	1
	Er	3.98	4.60	1.98	12.3	8.68	30.4				5.96	5.98	—
56EW	ρa	115.	118.	132.	144.	298.	313.	—	—	—	370.	786.	871.
	N	5	8	12	9	11	10				8	1	1
	Er	13.1	10.9	6.93	6.07	12.8	23.9				29.5	—	—
57NS	ρa	154.	194.	143.	245.	270.	166.	—	—	—	320.	1364.	968.
	N	10	9	13	12	10	8				10	1	1
	Er	14.7	13.1	4.77	14.4	20.3	16.2				14.7	—	—
57EW	ρa	95.1	75.3	92.8	93.1	223.	352.	—	—	—	289.	643.	836.
	N	5	8	10	11	12	10				9	1	1
	Er	9.37	8.93	7.80	3.48	12.4	21.6				18.8	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG — LASSEN KGRA, CA — JUNE 1979

ρa = observed apparent resistivity in ohm-meters
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"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
58NS	ρa	39.1	34.0	33.1	66.6	124.	435.	—	—	—	173.	191.	382.
	N	6	7	6	9	9	9				8	1	1
	Er	4.83	2.94	4.37	6.87	10.6	34.7				8.32	—	—
58EW	ρa	29.8	64.7	45.7	44.1	139.	298.	—	—	—	414.	582.	310.
	N	6	8	11	7	11	11				7	1	4
	Er	3.71	11.3	3.69	3.58	6.97	13.9				17.3	—	16.8
59NS	ρa	97.4	141.	75.3	111.	205.	377.	—	—	—	123.	64.2	162.
	N	7	6	9	11	9	10				11	9	1
	Er	12.8	14.6	4.66	4.50	17.5	19.6				4.97	1.76	—
59EW	ρa	58.8	75.1	50.1	71.1	175.	326.	—	—	—	350.	243.	387.
	N	10	11	11	7	11	9				11	11	1
	Er	6.15	14.0	3.20	6.40	10.6	9.82				15.0	11.2	—
60NS	ρa	10.4	11.8	9.03	14.7	23.4	49.6	—	—	—	132.	146.	126.
	N	6	7	11	9	8	7				8	6	1
	Er	1.86	0.72	1.71	1.07	1.79	5.53				6.98	5.16	—
60EW	ρa	11.7	7.39	8.62	7.52	13.4	24.1	—	—	—	163.	136.	137.
	N	11	9	10	10	11	8				8	6	5
	Er	1.08	0.44	0.55	0.44	0.52	1.34				5.75	7.82	6.09
61NS	ρa	137.	389.?	116.	40.6	474	30.4	—	—	—	21.1	13.7	69.9
	N	5	4	5	5	9	7				6	7	1
	Er	18.1	54.6	12.3	3.24	133	5.31				1.07	1.34	—
61EW	ρa	50.8	40.9	39.9	22.4	34.6	36.3	—	—	—	47.8	45.0	199.
	N	9	12	8	9	11	8				7	1	1
	Er	4.60	2.37	3.05	1.04	1.67	1.57				2.63	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

ρa = observed apparent resistivity in ohm-meters
N = number of observations
Er = standard error in ohm meters — = no data

"NOTE" - Telluric line orientation indicated with station numbers.

Sta. No.		FREQUENCY 7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
62NS	ρa	11.6	15.1	12.3	19.2	31.8	11.5	—	—	—	10.0	15.9	83.7
	N	9	9	10	11	5	8	—	—	—	6	1	1
	Er	0.95	1.01	0.46	1.09	0.84	0.78	—	—	—	0.21	—	—
62EW	ρa	14.4	10.8	16.7	14.5	36.5	43.2	—	—	—	21.3	59.5	133.
	N	7	8	9	10	12	9	—	—	—	8	1	1
	Er	1.10	0.66	0.91	0.67	1.22	7.88	—	—	—	2.24	—	—
63NS	ρa	7.93	8.31	7.48	8.82	11.9	5.71	—	—	—	2.78	3.70	44.2
	N	9	10	11	9	10	11	—	—	—	8	7	1
	Er	0.66	1.06	0.36	0.49	0.79	0.55	—	—	—	0.16	0.22	—
63EW	ρa	12.3	9.99	11.0	7.94	11.2	7.57	—	—	—	4.71	20.2	63.9
	N	7	11	10	12	9	10	—	—	—	11	1	1
	Er	1.37	0.84	0.42	0.41	0.55	0.37	—	—	—	0.27	—	—
64NS	ρa	72.1	61.9	72.7	141.	471.?	243.	—	—	—	29.6	—	—
	N	10	12	5	5	6	8	—	—	—	8	43.4	110.
	Er	3.55	5.32	9.07	16.3	25.0	20.4	—	—	—	2.44	6	1
64EW	ρa	78.6	104.	102.	← power line 265.	1144.	122. →	—	—	—	27.3	5.18	—
	N	3	4	6	6	4	8	—	—	—	9	45.0	85.0
	Er	12.7	24.5	23.6	28.4	36.1	8.36	—	—	—	1.22	1	1
65NS	ρa	70.7	118.	88.8	174.	172.	267.	—	—	—	53.9	—	—
	N	9	9	9	10	9	8	—	—	—	8	—	—
	Er	6.15	23.2	13.8	12.7	19.9	35.1	—	—	—	5.56	—	—
65EW	ρa	55.9	49.8	77.1	69.7	133.	116.	—	—	—	93.0	—	—
	N	7	9	11	11	9	10	—	—	—	9	—	—
	Er	5.52	4.81	4.65	1.70	6.94	6.53	—	—	—	3.82	—	—

U.S. GEOLOGICAL SURVEY A.M.T. DATA LOG

LASSEN KGRA, CA
JUNE 1979

ρa = observed apparent resistivity in ohm-meters
N = number of observations
Er = standard error in ohm meters
- = no data

"NOTE" - Telluric line orientation indicated with station numbers.

		FREQUENCY											
Sta. No.		7.5	10	14	27	76	285	685	1.2K	3.3K	6.7K	10.2K	18.6K
66NS	ρa	15.0	60.6	31.0	32.6	35.3	68.0	—	—	—	90.7	115.	2460.
	N	9	7	6	9	8	6				6	1	1
	Er	1.64	7.94	4.11	3.23	2.18	7.16				14.4	—	—
66EW	ρa	35.3	55.2	26.4	17.7	30.8	55.1	—	—	—	145.	145.	859.
	N	8	10	10	10	10	10				7	1	1
	Er	3.89	6.53	1.23	0.90	1.76	2.70				5.94	—	—
67NS	ρa	29.8	40.3	30.5	56.5	92.0	39.3	—	—	—	36.3	125.	59.7
	N	9	6	10	8	10	6				6	1	4
	Er	4.72	3.30	1.64	3.67	6.56	3.46				1.67	—	0.86
67EW	ρa	39.8	26.9	28.8	34.8	61.2	17.8	—	—	—	31.6	169.	64.5
	N	8	6	10	9	8	9				8	1	5
	Er	2.23	3.99	2.38	2.58	3.81	1.17				3.30	—	1.93
68NS	ρa	96.1	160.	164.	207.	393.	283.	—	—	—	67.9	189.	72.3
	N	7	7	8	12	8	8				6	1	5
	Er	5.48	16.3	8.36	16.7	20.5	16.6				6.40	—	2.93
68EW	ρa	67.7	126.	87.0	116.	209.	311.	—	—	—	174.	40.6	217
	N	6	7	9	6	9	6				6	1	5
	Er	7.02	18.3	7.51	9.33	14.6	79.8				11.0	—	8.59
69NS	ρa	200.	355.	195.	263.	302.	201.	—	—	—	84.2	72.2	39.8
	N	7	11	10	11	12	12				9	1	6
	Er	16.9	30.0	11.6	23.3	31.8	11.3				4.26	—	1.68
69EW	ρa	48.3	69.5	61.5	64.7	117.	158.	—	—	—	200.	291.	219.
	N	12	6	12	10	10	10				9	1	6
	Er	3.15	8.80	2.25	3.57	3.75	6.38				15.0	—	0.94

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