

TEC-5

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GRAVITY AND MAGNETIC SURVEY OF THE VALE KGRA, MALHEUR COUNTY, OREGON

A gravity and magnetic survey was conducted during June 1974 in the vicinity of the KGRA at Vale, Oregon. The survey is a low cost attempt to examine the geothermal potential of the area.

Approximately 115 gravity and magnetic stations were observed in the area. La Coste gravitimeter and Geometrics 816 magnetometer were used in the observations. Elevations were obtained from benchmarks and USGS sources. Density factor of 0.063 milligals per foot was used in the calculations. Five maps were prepared to outline the author's data and interpretation.

GRAVITY MAP. Gravity map is dominated by a ten milligal high and twenty milligal low. The trend of the map is NNW suggesting the major structural grain. The positive anomaly is elliptic and the negative anomaly elongated in character.

MAGNETIC MAP. The magnetic map has a grouping of positive anomalies in the vicinity of the gravity high. The negative magnetic anomaly is elongated in the vicinity of the gravity low. The major trend of the map is NNW with a suggestion of a ENE trend.

RESIDUAL GRAVITY MAP. The broad contours are related to the deep sources and thin contours to shallow sources. The deep anomaly is related to a basic intrusive at depth of $1\frac{1}{2}$ miles. NNW and ENE lineaments are suggested crossing in the vicinity of the intrusive. The negative anomaly (not shown) is due to an acidic lithologic condition, or graben or structurally destroyed area reducing density acting like a physical graben. Instead of using the geophysicist's cliché of more data needed I will assume the latter since it provides a deep source of water.

RESIDUAL MAGNETIC MAP. This map is the most important map of the five, since it has the superposition of shallow (thin lines) anomalies over the deep (broad lines) anomaly. Additional shallow anomalies exist along previously mentioned trends. Depths again are approximately $1\frac{1}{2}$ and $\frac{1}{2}$ miles for the deep and shallow anomalies. The 200 gammas versus 10 milligals suggest an intermediate intrusive at depth with magmatic segregation and more basic fingers approaching the surface.

INTERPRETATION MAP. The interpretation map outlines the deep (broad lines) intrusive and the shallow fault controlled extensions (thin lines). The major NNW fault and the minor ENE cross-fault are illustrated, with broken lines. This fault pattern suggests that the northwest quadrant of the positive gravity and magnetic deep anomaly is in best communication with the water source on the northwest and the heat source to the southeast. Other areas on this map must be rated secondary in regards to geothermal potential.

In conclusion, the Vale hot springs area appears to have excellent geothermal potential. It has the major fault, water and heat sources. Additional work should be conducted to the south and southeast. The prime area is between sec. 33 and sec. 30 and 19, T18S, R45E.

Thank you for permitting me to conduct this survey. I would appreciate comments.


Kenneth H. Koenen

(2)

	1	2	3	4	5	6	7	8	9		
3	11.65	2220	72.57	224.08							632
	10.83	2203	74.49	24.11							773
	10.35	2211	75.29	24.93							730
	11.08	2215	76.32	26.95							844
	11.29	2239	80.51	32.86							913
	12.88	2280	73.43	29.95							1107
	14.57	2373	64.91	28.98							1082
	16.39	2976	22.04	25.92							1209
	16.82	2896	30.57	29.84							1231
4	17.17	2986	22.46	27.75							1187
	12.43	2246	72.81	26.74							942
	12.98	2249	70.44	25.11							891
	13.58	2260	65.52	21.48							773
	14.21	2261	65.95	22.60							794
	15.52	2260	65.16	23.06							716
	16.18	2281	62.25	22.13							717
	16.63	2308	59.39	21.14							695
	15.52	2290	64.38	24.17							863
	17.47	2290	59.16	20.90							707
5	17.48	2285	60.89	22.32							711
	18.09	2301	58.36	21.41							746
	17.79	2328	55.90	20.35							685
	17.19	2281	60.31	21.20							642
	16.80	2290	59.54	20.61							738
	17.12	2298	60.27	22.16							861
	16.15	2290	58.91	19.33							783
	16.16	2272	60.83	20.13							711
	15.52	2275	60.99	19.84							700
	14.84	2276	60.94	19.17							697
6	14.20	2272	60.90	218.24							682

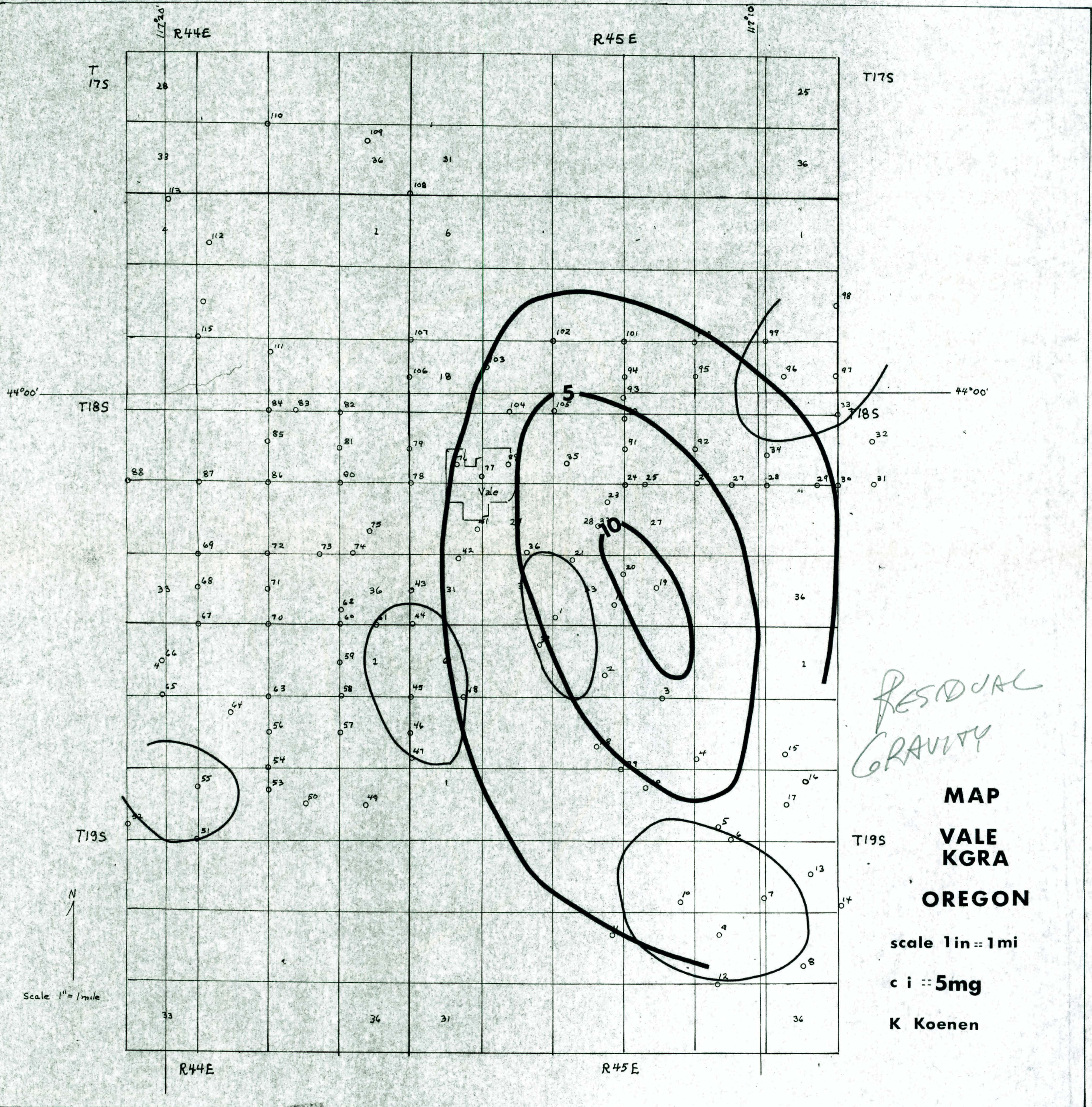
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6	14.21	2271	63.39	220.67						
	13.88	2270	60.98	17.79						679
	15.51	2288	58.71	18.36						683
	15.77	2298	58.23	18.77						731
	15.48	2314	57.23	18.49						
	14.82	2324	56.13	17.36						730
	14.18	2395	49.90	14.97						599
	13.51	2429	46.76	13.30						552
	12.88	2424	46.44	12.03						538
7	14.20	2352	53.43	15.81						633
	13.52	2365	51.86	14.38						635
	12.89	2391	49.62	13.14						616
	12.90	2312	56.76	15.32						
	12.90	2281	60.69	17.29						662
	12.49	2287	61.44	18.01						697
	11.30	2257	70.16	23.65						902
	11.46	2242	73.55	26.26						714
	11.60	2316	62.22	19.73						726
	10.98	2373	59.99	18.47						845
8	11.60	2392	52.82 52.83 48.10	15.12						
	10.96	2455	54.73	13.72						716
	10.29	2468	46.58	12.35						695
	10.30	2531	39.81	9.56						656
	10.29	2526	38.79	8.22						583
	10.81	2482	42.29	9.47						638
	11.59	2457	44.32	10.70						589
	11.58	2472	41.25	8.57						516
	11.54	2512	39.40	9.20						609
	11.26	2241	76.71	29.15						958
9	10.42	2231	79.14	30.11						757

4040 ft = 125 ft

VALE, ORE

(4)

	1	2	3	4	5	6	7	8	9	
9	10.98	2229	80.53	231.94						733
	10.99	2223	77.83	23.87						837
	10.04	2232	78.26	28.92						786
	9.68	2256	75.93	27.74						809
	9.68	2233	75.40	25.76						824
	9.67	2212	76.89	25.92						787
	9.70	2207	76.40	25.14						659
	8.42	2297	71.92	25.05						735
	9.04	2297	71.88	25.63						756
100	9.04	2363	67.27	25.18						885
	9.04	2314	70.78	25.60						768
	9.03	2295	75.23	28.84						657
	9.50	2250	71.78	23.03						767
	10.32	2240	75.85	27.29						
	10.29	2240	80.01	31.42						757
	9.70	2526	46.99	15.83						768
	9.02	2395	55.89	15.80						881
	6.44	2277	69.44	19.33						1052
	5.42	2298	68.28	18.47						919
110	5.13	2448	47.88	07.23						608
	9.21	2636	29.84	05.12						583
	7.22	2747	21.02	01.30						506
	6.44	2645	27.80	00.88						452
										510
115	8.98	2675	24.80	02.31						496



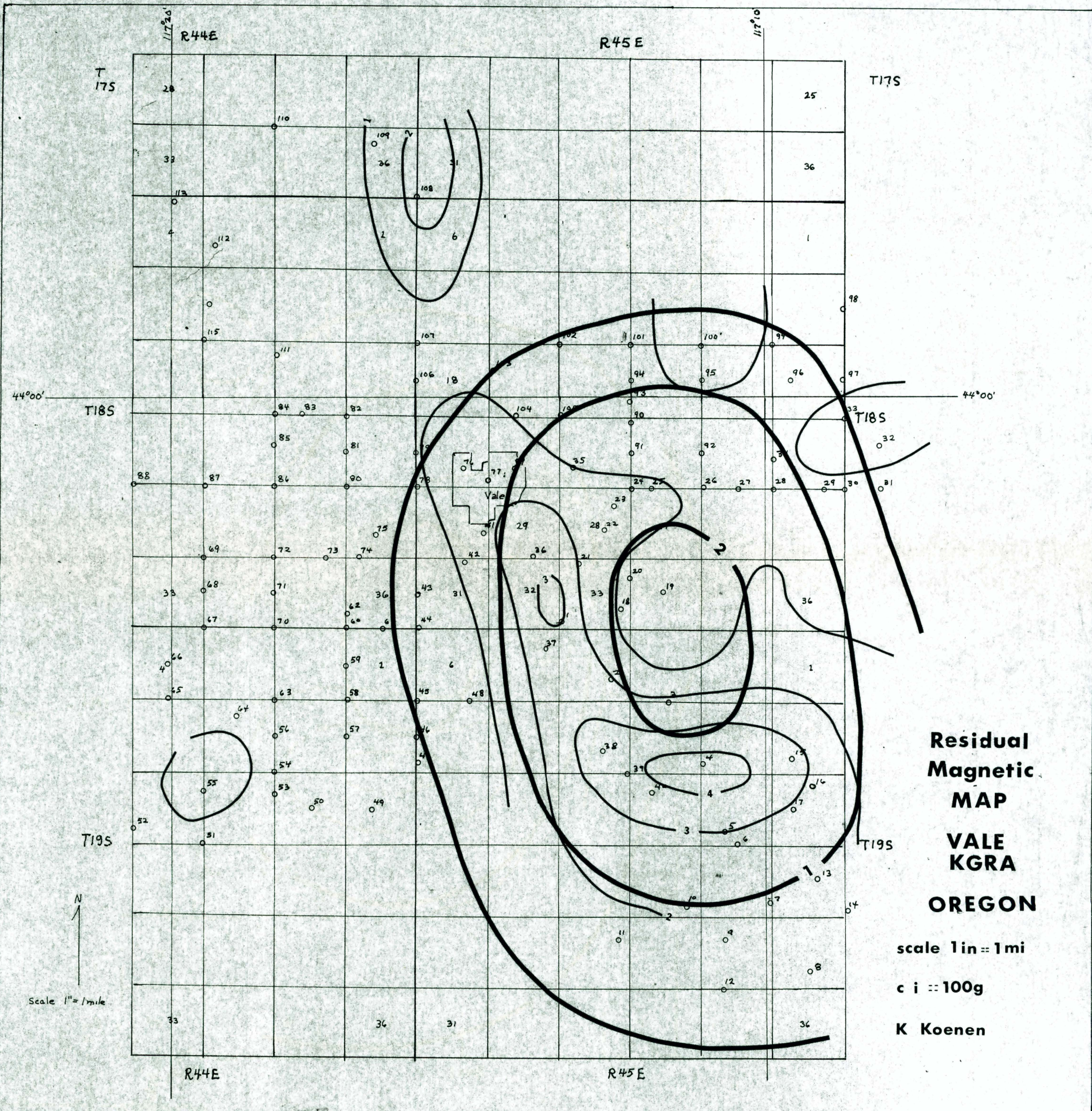
*RESIDUAL
GRAVITY*

**MAP
VALE
KGRA
OREGON**

scale 1 in = 1 mi

c i = 5mg

K Koenen



**Residual
Magnetic
MAP**

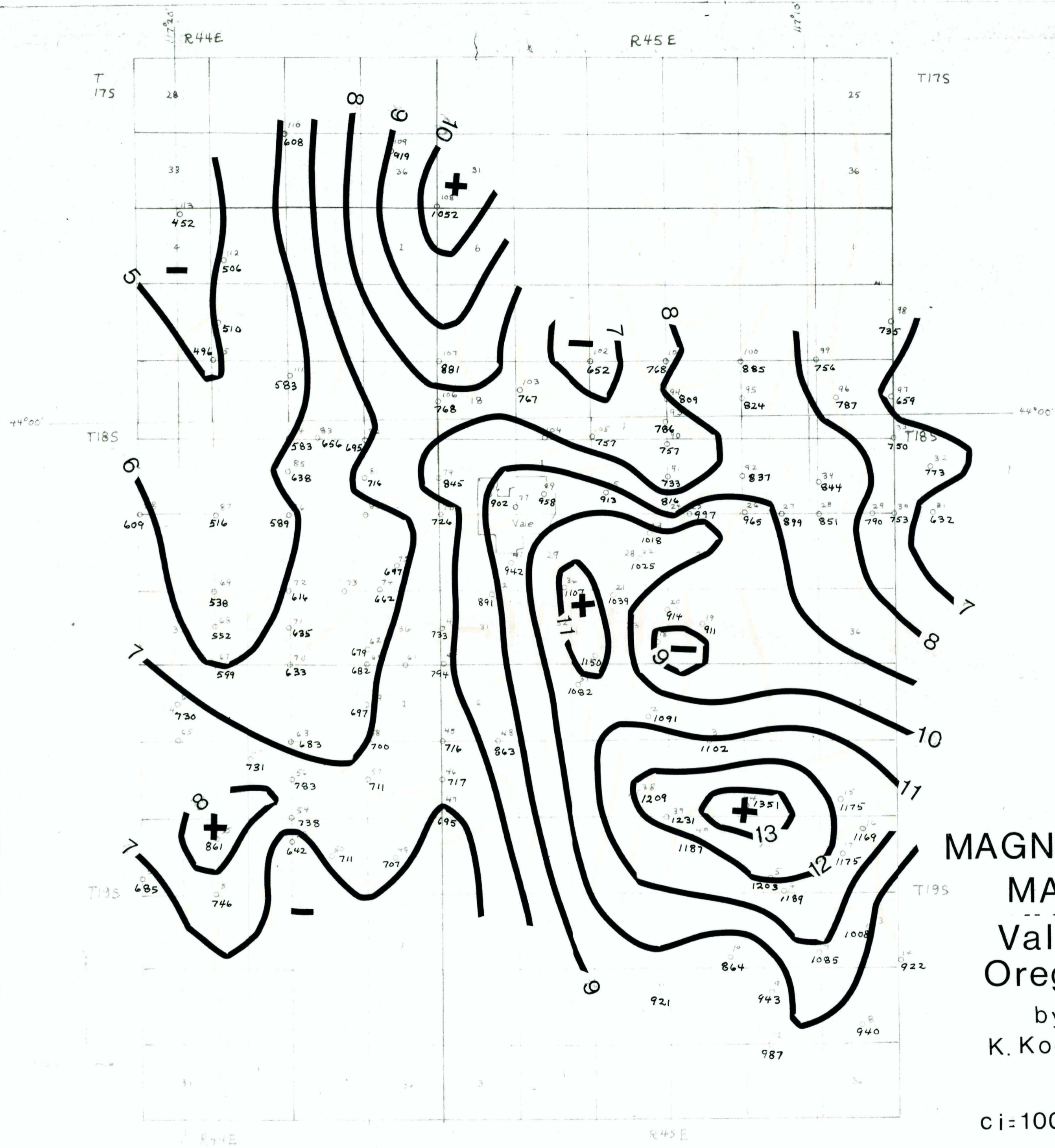
**VALE
KGRA**

OREGON

scale 1 in = 1 mi

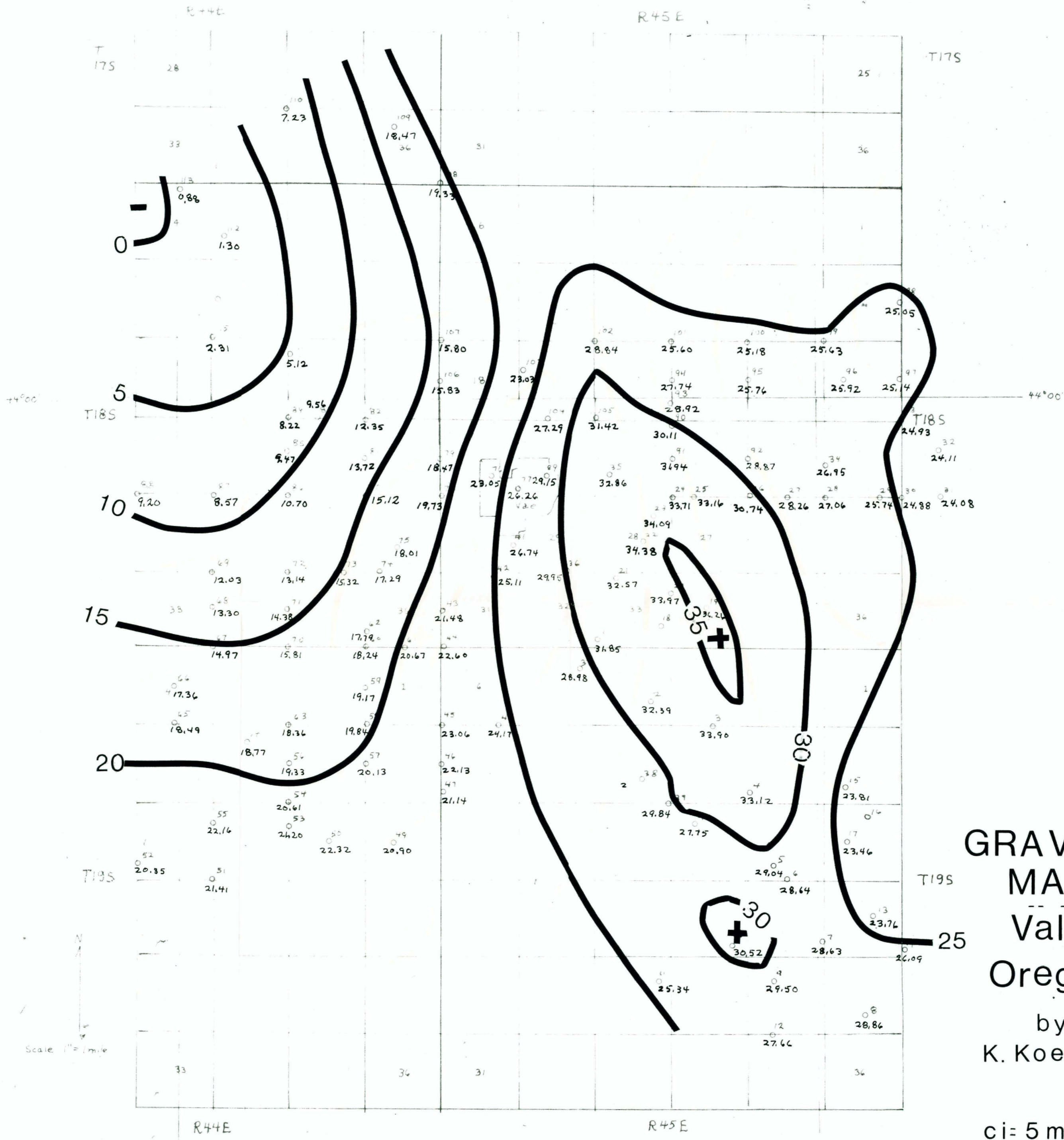
c i = 100g

K Koenen



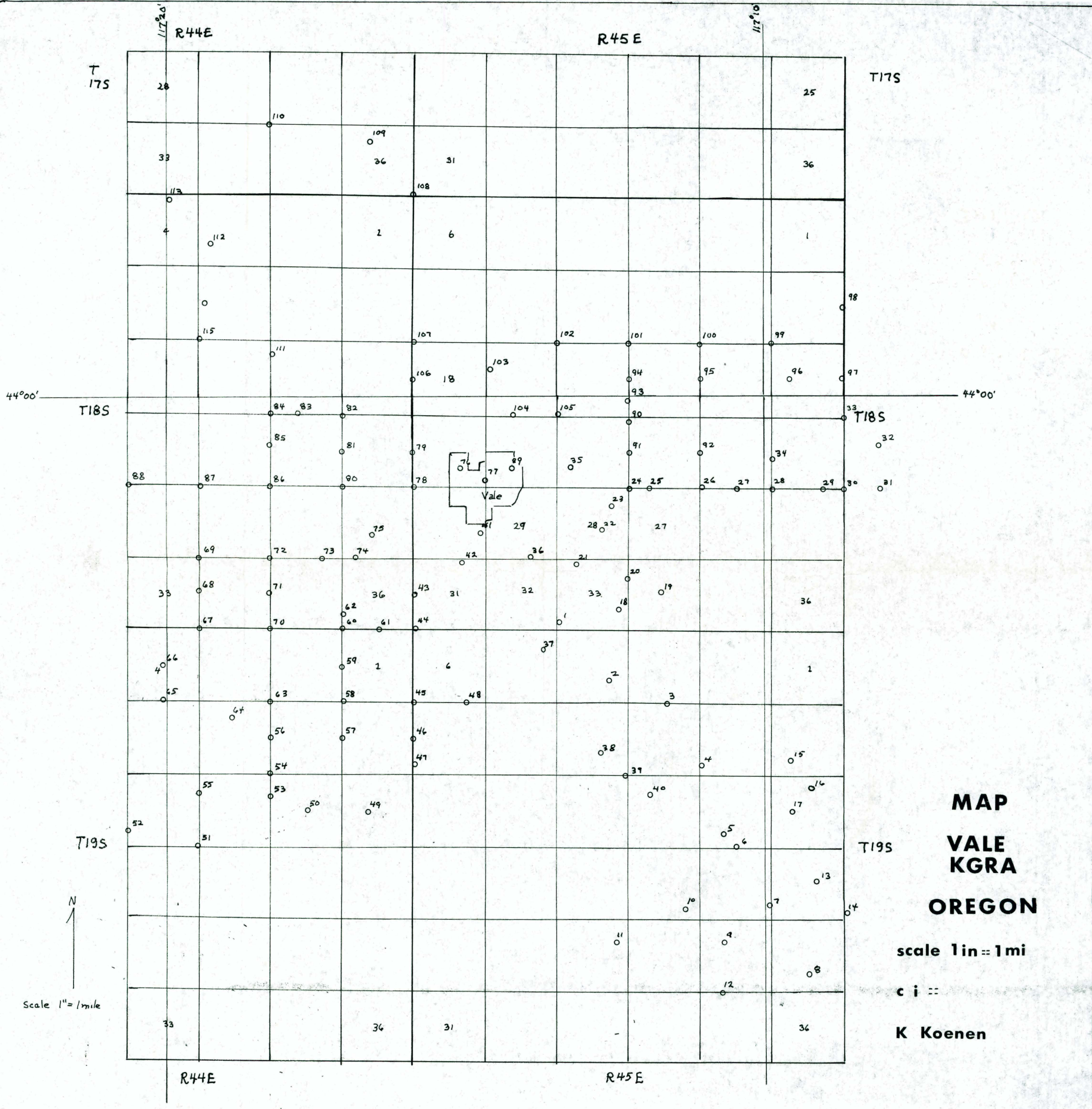
MAGNETIC
MAP
Vale,
Oregon
by
K. Koenen

ci=100g



GRAVITY
MAP
Vale
Oregon
by
K. Koenen

ci = 5 mg



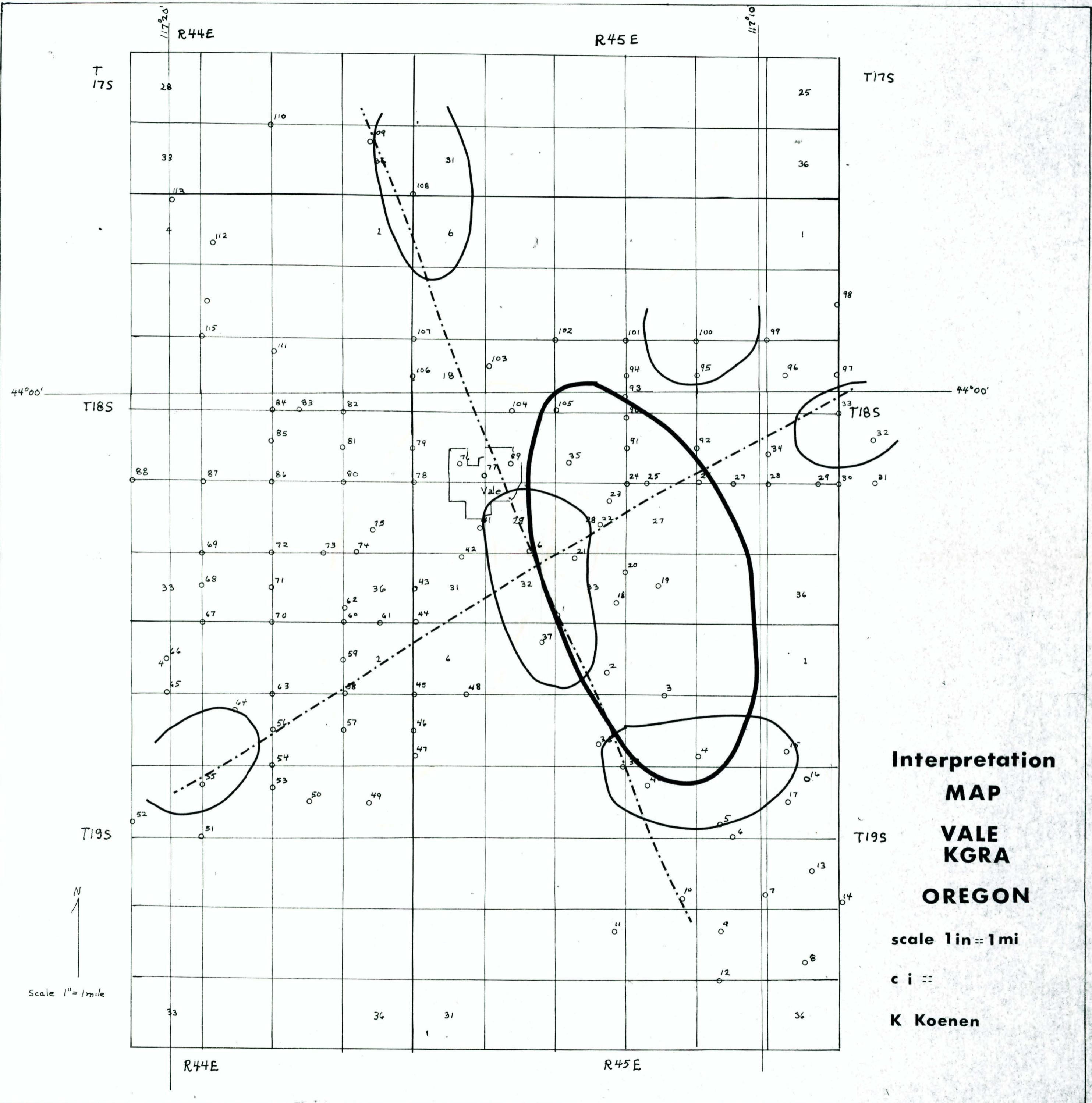
**MAP
VALE
KGRA
OREGON**

scale 1 in = 1 mi

c i ::

K Koenen

N
↑
Scale 1" = 1 mile



**Interpretation
MAP**

**VALE
KGRA**

OREGON

scale 1 in = 1 mi

c i ::

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GRAVITY AND MAGNETIC PROFILE ACROSS THE BRADY HOT SPRINGS, NEVADA

A gravity and magnetic profile was conducted along 25 miles of interstate 80 across the Brady Hot Springs, Churchill County, Nevada. The survey was conducted to provide a low cost interpretation of the geothermal potential of the area for the August KGRA sale.

Approximately 65 gravity and magnetic stations were observed in the area. LaCoste gravitimeter and Geometrics 816 magnetometer were used in the observations. Elevations were obtained from the Nevada Highway Department and USGS sources. Density factor of 0.067 milligals per foot was used in the calculations. Plan and profile presentation was used at a scale of 1/62500. The general area of the KGRA is outlined in a broken line.

GRAVITY PROFILE. The gravity profile is graphed with small circles increasing from southwest to northeast broadly due to isostatic conditions. However sharper deviations are explained by a combination of shallow intrusives, major fault, graben and buried intrusive.

MAGNETIC PROFILE. The magnetic profile is graphed with dots and decreases from southwest to northeast. As with the gravity profile an intermediate regional magnetic line has been drawn to separate shallow and deep anomalies.

INTERPRETATION. The local variations of the gravity and magnetic profiles have corresponding small encircled numbers from 1 to 10. These small intrusives or dikes are basic in character and range from near surface to $\frac{1}{2}$ mile depth. The intermediate regional gravity (broad line A) has been idealized in the vicinity of Brady Hot Springs by a combination major fault and graben (broad line C-C). The northeast flank of the C-C line has a greater gravity displacement suggesting a major fault in this area. Line A-A has inflection points at station 10 and 52 suggesting a superimposed deeply buried intrusive. This anomaly has been separated in the bottom of the plate and outlined as residual gravity anomaly D-D.

The regional magnetics has a similiar form with the exception that shallow features are more accentuated and the deeper anomalies more subdued in magnitude. The intermediate regional magnetic line B-B has been idealized to show the fault displacement. Gradient changes at station 14 and 50 outline the buried intrusive which was separated as residual magnetic anomaly E-E. The geophysical fault relationship is 150 gammas to 8 milligals. The buried intrusive relationship is 350 gammas to 4 milligals, or basic in character, buried at a depth of $2\frac{1}{2}$ miles.

The geologic sequence would be as follows: 1. Major fault. 2. Broad basic intrusive. 3. Tension graben formation. 4. Later movements with shallow extensions of the basic intrusive.

In conclusion, the Brady Area has definite geothermal potential. The major fault, graben water reservoir, and deeply buried intrusive are all present in the area. Line F-F was obtained from gravity station 60 to the profile shows the possible strike direction of the above features. The southwest portion of the graben is located over the intrusive suppling the combination of heat and water sources. Hence the prime area for the Geothermal Lease Sale are leasing units 4, followed by 3, 1, and 2.

Thank you for permitting me to conduct this survey. I welcome comments.


Kenneth H. Koenen

BRADY'S HOT SPRINGS, NEV

①

LAT Corr ELEV Obs Gr. B.G. 5f. 067 M+G

1	2	3	4	5	6	7	8	9
1	46.38		4125	5285		282.84		53270
2	47.27		4157	5761		88.86		3067
3	48.18		4110	6347		90.07		3426
4	49.07		4073	6459		88.41		3393
5	49.97		4028	7074		90.64		2893
6	50.83		4021	7226		90.84		2801
7	51.75		4025	7086		88.78		2874
8	52.60		4026	7209		89.23		2797
9	53.58		4027	7425		90.48		2894
10	54.18		4028	7506		90.76		3466
11	54.65		4028	7572		90.95		2648
12	55.14		4033	7781		92.88		2931
13	55.60		4033	7867		93.28		2842
14	56.10		4037	7794		92.32		2605
15	56.57		4037	7947		93.38		3168
16	57.08		4045	79.88		93.82		3054
17	57.47		4045	80.71		94.26		2642
18	57.74		4043	80.89		94.03		3145
19	57.98		4044	80.98		93.95		3197
20	58.25		4046	8106		93.89		3097
21	58.52		4050	8055		93.38		2844
22	58.78		4054	8099		93.83		3273
23	59.02		4058	8021		93.08		2927
24	59.28		4061	8060		93.41		3060
25	59.56		4066	8123		94.09		3153
26	59.83		4071	8155		94.43		3465
27	60.08		4076	8169		94.70		3305
28	60.33		4071	8168		94.06		3186
29	60.60		4067	8190		93.79		2718
30	60.88		4069	8146		93.20		3497

BRADY'S HOT SPRINGS
NEVADA

10.67

MAG

	1	2	3	4	5	6	7	8	9
3	61.18		4072	80.60		92.24			53185
	61.45		4075	79.36		90.94			3261
	61.82		4068	78.68		89.42			3153
	62.22		4086	77.51		89.05			3001
	62.52		4093	76.89		88.60			3134
	62.81		4112	76.24		88.93			3320
	63.12		4129	75.42		88.94			3396
	63.40		4149	74.27		88.85			3306
	63.66		4171	72.26		88.06			3142
4	63.94		4188	70.50		87.16			3189
	64.20		4205	69.25		86.78			3401
	64.42		4223	69.38		87.90			3310
	64.60		4238	70.36		89.71			3740
	64.78		4252	70.45		90.55			3059
	65.15		4289	67.73		89.94			3134
	65.46		4308	70.74		93.92			3292
	65.81		4313	74.48		98.27			3337
	66.12		4319	76.79		100.04			3230
	66.46		4290	77.34		98.31			2976
5	66.82		4256	81.93		100.26			2726
	67.44		4200	86.03		99.99			2704
	68.16		4196	85.73		98.70			2792
	68.84		4164	88.50		98.65			2993
									3168
									3158
									3195
									3154
									3131
									3133
	68.16		4209	82.40		96.24			3035

BRADY HOT SPRINGS NEV.

3

MAG

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53066
 3114
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 3285
 324°
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**BRADY
HOT SPRING
KGRA
NEVADA**

**GRAVITY
MAGNETIC
PROFILE**

scale 1:62,500
k. koenen

