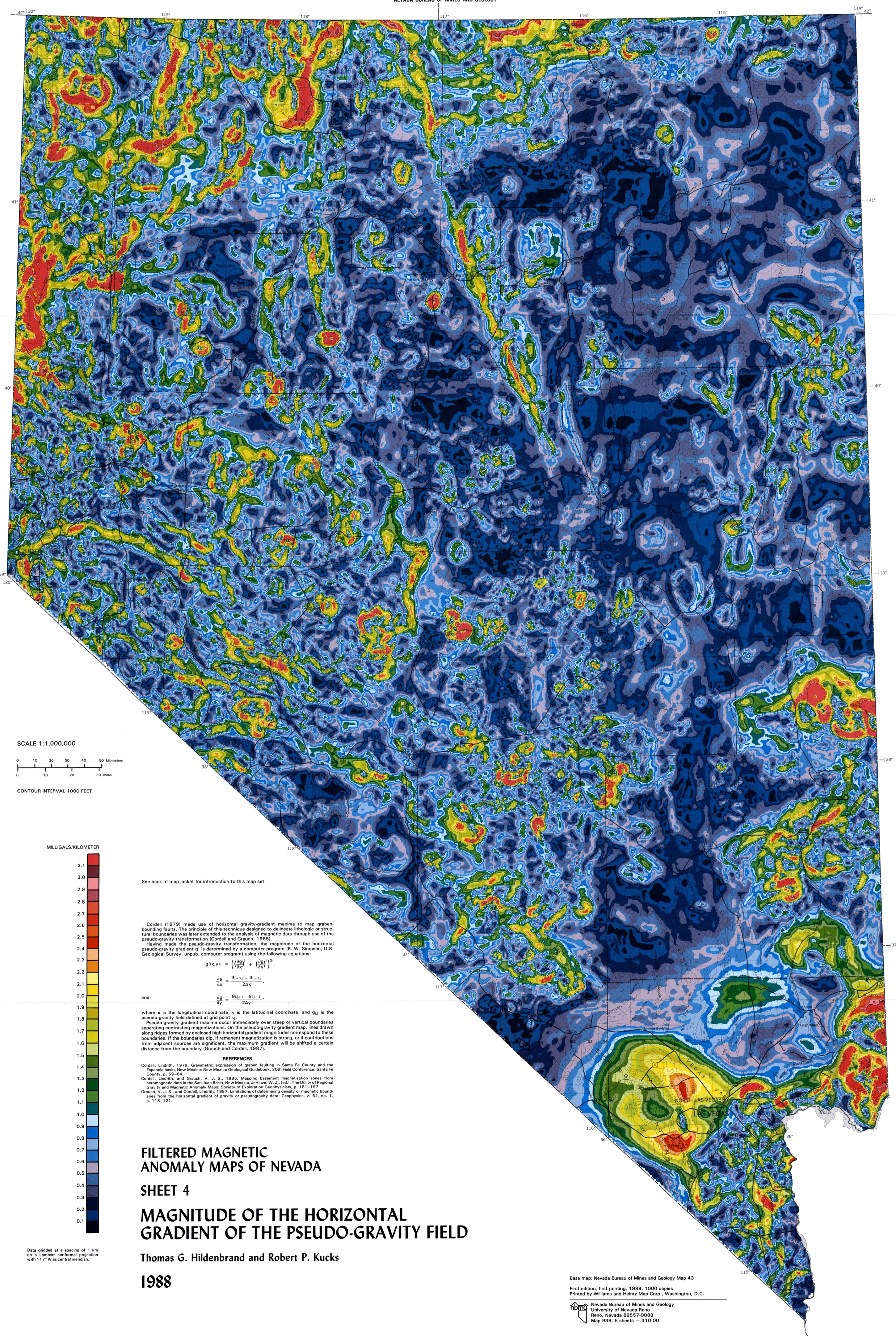
PREPARED BY THE U.S. GEOLOGICAL SURVEY
IN COOPERATION WITH
NEVADA BUREAU OF MINES AND GEOLOGY



SCALE 1:1,000,000

0 10 20 30 40 50 kilometers

0 10 20 30 miles

CONTOUR INTERVAL 1000 FEET

MILLIGALS/KILOMETER

3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1

Data gridded at a spacing of 1 km on a Lambert conformal projection with 117°W as central meridian.

See back of map jacket for introduction to this map set.

Cordell (1979) made use of horizontal gravity-gradient maxima to map graben-bounding faults. The principle of this technique designed to delineate lithologic or structural boundaries was later extended to the analysis of magnetic data through use of the pseudo-gravity transformation (Cordell and Grauch, 1985).

Having made the pseudo-gravity transformation, the magnitude of the horizontal pseudo-gravity gradient g′ is determined by a computer program (R. W. Simpson, U.S. Geological Survey, unpub. computer program) using the following equations:

$$|g'(x,y)| = \left(\left(\frac{\partial g}{\partial x}\right)^2 + \left(\frac{\partial g}{\partial y}\right)^2\right)^{1/2},$$

$$\frac{\partial g}{\partial x} = \frac{g_{i+1,j} - g_{i-1,j}}{2\Delta x},$$

and

$$\frac{\partial g}{\partial y} = \frac{g_{i,j+1} - g_{i,j-1}}{2\Delta y},$$

where x is the longitudinal coordinate, y is the latitudinal coordinate, and $g_{i,j}$ is the pseudo-gravity field defined at grid point i,j.

Pseudo-gravity gradient maxima occur immediately over steep or vertical boundaries separating contrasting magnetizations. On the pseudo-gravity gradient map, lines drawn along ridges formed by enclosed high horizontal gradient magnitudes correspond to these boundaries. If the boundaries dip, if remanent magnetization is strong, or if contributions from adjacent sources are significant, the maximum gradient will be shifted a certain distance from the boundary (Grauch and Cordell, 1987).

REFERENCES

Cordell, Lindrith, 1979, Gravimetric expression of graben faulting in Santa Fe County and the Espanola basin, New Mexico: New Mexico Geological Guidebook, 30th Field Conference, Santa Fe County, p. 59–64.

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Grauch, V. J. S., and Cordell, Lindrith, 1987, Limitations of determining density or magnetic boundaries from the horizontal gradient of gravity or pseudogravity data: Geophysics, v. 52, no. 1, p. 118–121.

FILTERED MAGNETIC ANOMALY MAPS OF NEVADA

SHEET 4

MAGNITUDE OF THE HORIZONTAL GRADIENT OF THE PSEUDO-GRAVITY FIELD

Thomas G. Hildenbrand and Robert P. Kucks

1988

Base map: Nevada Bureau of Mines and Geology Map 43

First edition, first printing, 1988: 1000 copies
Printed by Williams and Heintz Map Corp., Washington, D.C.

Nevada Bureau of Mines and Geology
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Reno, Nevada 89557-0088
Map 93B, 5 sheets — $10.00