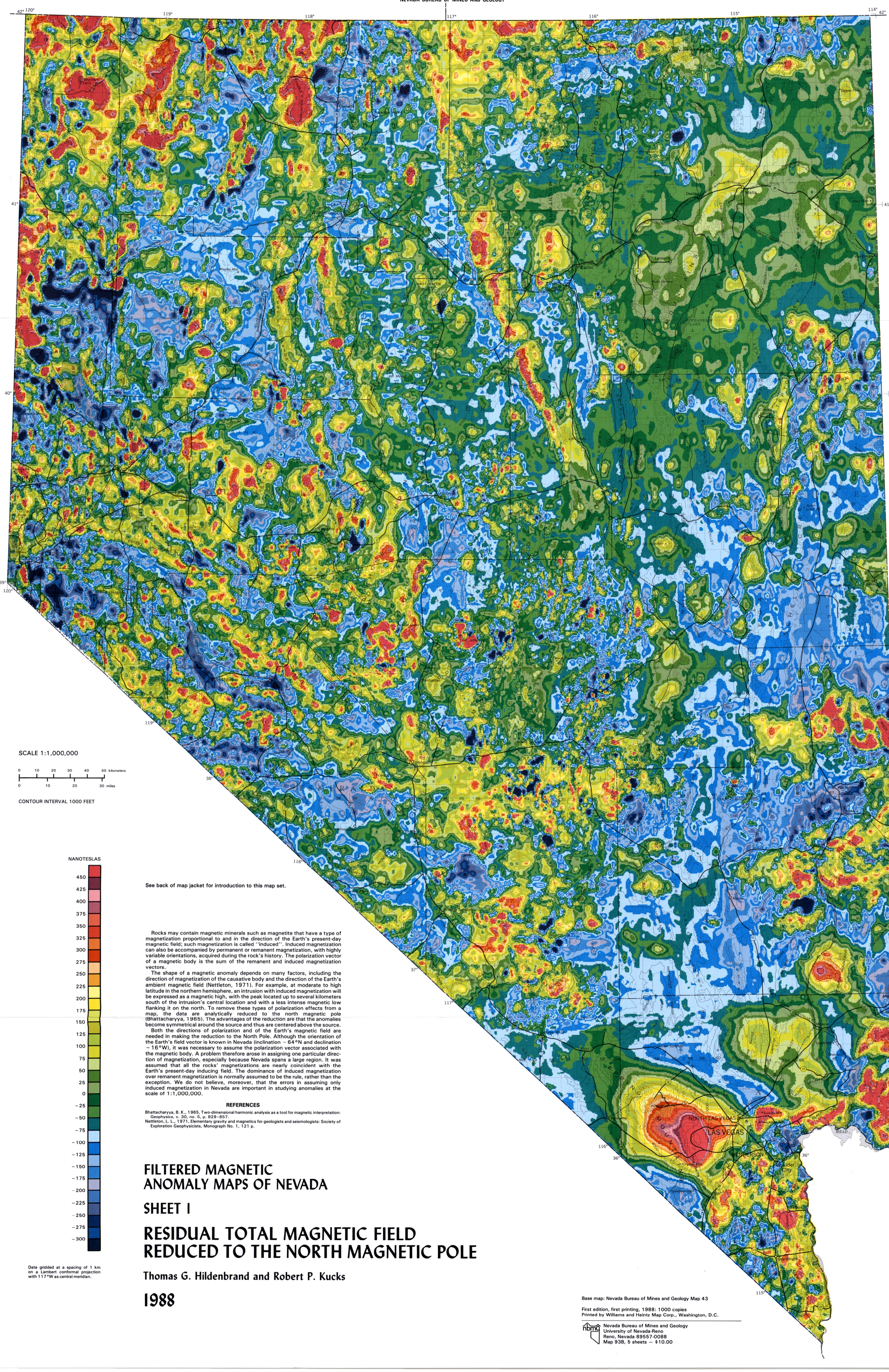
NEVADA BUREAU OF MINES AND GEOLOGY

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

MAP 93B FILTERED MAGNETIC ANOMALY MAPS OF NEVADA
SHEET 1 RESIDUAL TOTAL MAGNETIC FIELD REDUCED TO THE NORTH MAGNETIC POLE



SCALE 1:1,000,000

0 10 20 30 40 50 kilometers
0 10 20 30 miles

CONTOUR INTERVAL 1000 FEET

NANOTESLAS

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.

Rocks may contain magnetic minerals such as magnetite that have a type of magnetization proportional to and in the direction of the Earth's present-day magnetic field; such magnetization is called "induced". Induced magnetization can also be accompanied by permanent or remanent magnetization, with highly variable orientations, acquired during the rock's history. The polarization vector of a magnetic body is the sum of the remanent and induced magnetization vectors.

The shape of a magnetic anomaly depends on many factors, including the direction of magnetization of the causative body and the direction of the Earth's ambient magnetic field (Nettleton, 1971). For example, at moderate to high latitude in the northern hemisphere, an intrusion with induced magnetization will be expressed as a magnetic high, with the peak located up to several kilometers south of the intrusion's central location and with a less intense magnetic low flanking it on the north. To remove these types of polarization effects from a map, the data are analytically reduced to the north magnetic pole (Bhattacharyya, 1965). The advantages of the reduction are that the anomalies become symmetrical around the source and thus are centered above the source.

Both the directions of polarization and of the Earth's magnetic field are needed in making the reduction to the North Pole. Although the orientation of the Earth's field vector is known in Nevada (inclination ~ 64°N and declination ~ 16°W), it was necessary to assume the polarization vector associated with the magnetic body. A problem therefore arose in assigning one particular direction of magnetization, especially because Nevada spans a large region. It was assumed that all the rocks' magnetizations are nearly coincident with the Earth's present-day inducing field. The dominance of induced magnetization over remanent magnetization is normally assumed to be the rule, rather than the exception. We do not believe, moreover, that the errors in assuming only induced magnetization in Nevada are important in studying anomalies at the scale of 1:1,000,000.

REFERENCES

Bhattacharyya, B. K., 1965, Two-dimensional harmonic analysis as a tool for magnetic interpretation: Geophysics, v. 30, no. 5, p. 829–857.

Nettleton, L. L., 1971, Elementary gravity and magnetics for geologists and seismologists: Society of Exploration Geophysicists, Monograph No. 1, 121 p.

FILTERED MAGNETIC ANOMALY MAPS OF NEVADA

SHEET 1

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Base map: Nevada Bureau of Mines and Geology Map 43

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