USGS-474-260

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UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Stop 954, Box 25046
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COMPLETE BOUGUER GRAVITY MAP OF THE NEVADA PART OF THE GOLDFIELD AND MARIPOSA 2° SHEETS

By

D. L. Healey, R. R. Wahl, and F. E. Currey

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ABSTRACT

The complete Bouguer gravity map of the Nevada part of the Goldfield and Mariposa 2° sheets results from a compilation of gravity data from several sources. The majority of these data were obtained by field crews from the U.S. Geological Survey; however, some data from the U.S. Department of Defense, Defense Mapping Agency, are scattered over the map. East of long 117°15', most of the gravity stations were obtained as part of the gravity survey of the Nevada Test Site and adjacent areas. In the vicinity of Yucca Flat (southeast corner of map), the gravity stations are too numerous to show. The purpose of this map is to make these gravity data available to the public.

INTRODUCTION

The accompanying map shows the complete Bouguer gravity map of the Nevada part of the Goldfield and Mariposa 2° sheets. The contour interval is 5 mGals and the map scale is 1:250,000. Also shown are the gravity stations (solid dots) and the gravity base stations (triangles) established during the gravity survey.

East of long 117°15', the majority of the gravity stations were established by field crews from the USGS (U.S. Geological Survey). The gravity stations in this area were obtained as part of a gravity study of the NTS (Nevada Test Site) and contiguous areas. The study was sponsored by the DOE (U.S. Department of Energy, formerly the U.S. Energy Research and Development Administration).

The principal gravity datum was 979,604.7 mGals at the Las Vegas, Nev., airport (Woollard, 1958). Supplementary gravity bases were established throughout the area as needed. A description of the Goldfield base is given in Healey (1976a).

In the area north of lat 37°30' and east of long 117°15' and also between lat 37°00' and 37°30' and long 116°45' and 117°15', most of the gravity station locations were established by planetable surveying. The surveying was done by field crews from the USGS. With minor exceptions, the remainder of the gravity stations were established where elevations were listed on the topographic maps.

Two areas on the accompanying map lack gravity coverage. One area, adjacent to Stonewall Mountain and centered near lat 37°30' and long 117°00', was not covered by modern topographic mapping when the fieldwork was being done; also the rough topography precluded planetable

surveying. The second area, located along the north border of the map between Ralston Valley and Reveille Range, was outside the area of interest. Restrictive time schedules and limited access did not permit additional work in this area.

In the southeast corner of the map, gravity stations are not shown in the 15-minute quadrangle bounded by lat 37° to 37°15' and long 116° to 116°15'. The gravity study of the NTS has been concentrated in this quadrangle and several thousand stations have been established. These stations are far too numerous to show.

SOURCES OF GRAVITY DATA

The list of "Sources of gravity data" shown on the accompanying map are cited fully in the references. The list includes the sources for the gravity data and also the reports in which some of these data are published.

The stations obtained from the Department of Defense (written commun., 1974) total about 200 and are widely scattered over the map. Likewise, the stations obtained from Mabey (written commun., 1963) are few in number and are scattered along bench-mark lines.

REDUCTION OF DATA

The data have been reduced to the complete Bouguer values by standard reduction procedures (Nettleton, 1976). The reduction density was 2.67 Mg/m^3. Corrections for latitude, elevation, and instrument drift were applied. After January 1971, corrections for Earth tides were also applied. Prior to that time, repeated base observations were made to account for this correction. Terrain corrections through Zone H (Hammer, 1939) were either hand computed or estimated from adjacent stations for each station. The total terrain corrections were determined to a radial distance of 166.7 km by the Plouff (1966) computer program. This program utilizes two sets of maps (card decks) where the topography is digitized in 1x1 minute and 3x3 minutes of latitude and longitude.

The accuracy of the data herein reported was summarized by Healey (1976a, p. 3). However, in the Yucca Flat area (southeast corner of map), the stations are thought to be accurate to within ±0.2 mGal, as opposed to the 0.3 mGal in other valleys. This increased accuracy results from a better evaluation of the applied terrain correction and a tighter base-station network.

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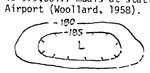
EXPLANATION

GRAVITY STATION

GRAVITY BASE STATION

Datum is 979,604.7 mGals at station P-100 at the Las Vegas Airport (Woollard, 1958).



Gravity contour, dashed where not accurately known.
Contour interval is 5 mGal.
Areas of high gravity are shown by "H."
Areas of low gravity are shown by "L" and hachures.
Reduction density is 2.67 Mg/m³.
Terrain corrections were made to a radial distance of 166.7 km.
Gravity stations are too numerous to show in the southeast corner of the map.

SOURCES OF GRAVITY DATA
(For complete citations see "References Cited" in accompanying text)

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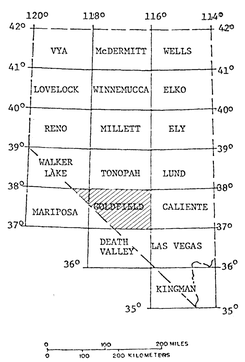
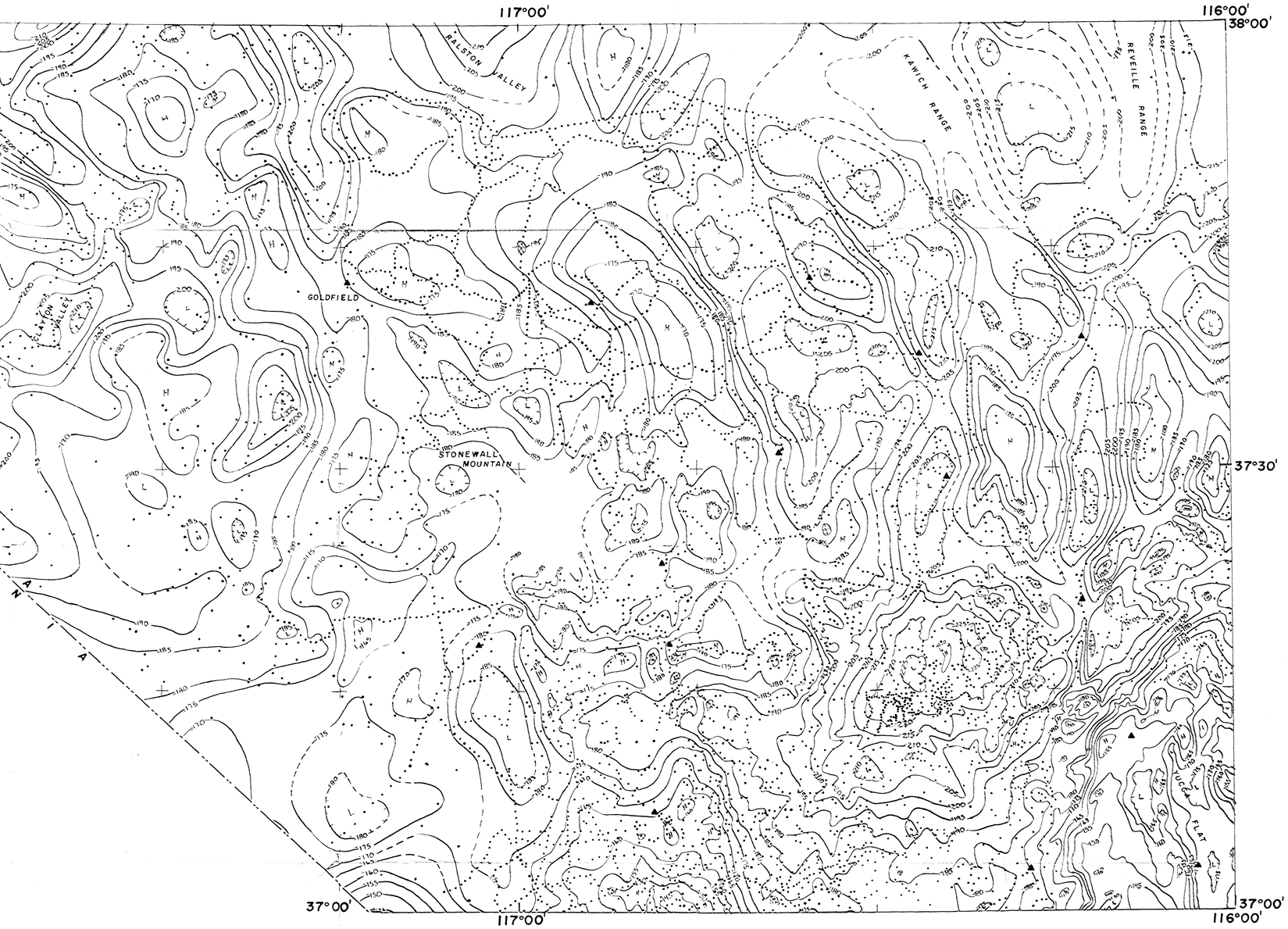


Index map of Nevada showing area of this map



SCALE: 250,000

5 0 5 10 15 20 MILES
5 0 5 10 15 20 25 30 KILOMETERS

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1978