U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF–2160–B

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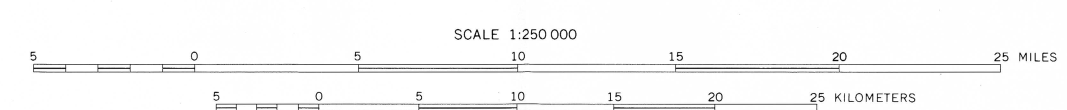

EXPLANATION

Bouguer gravity contour—Contour interval 5 mGal. Hachures indicate closed gravity lows

Gravity station

INTRODUCTION

This map is part of a folio of maps of the Hailey and western part of the Idaho Falls 1° x 2° quadrangles, bounded by latitudes 43°-44° N. and longitudes 113°-116° W. Other maps in this folio showing various geologic aspects of the same area will be published in this same series but with different letter suffixes (MF-2160-A, B, C, and so on). MF-2160-A is an aeromagnetic anomaly map (McCafferty and Abrams, 1991).

This complete Bouguer gravity anomaly map was produced as part of the Hailey CUSMAP (Conterminous U.S. Mineral Assessment Program) to assist in the studies of the mineral resources and tectonic setting of the area. This map will aid the assessment by indicating buried intrusive complexes, delineating major faults and shear zones, and identifying localities that might be hydrothermally altered or mineralized (Kleinkopf and others, 1989).

The study area encompasses parts of the Idaho batholith, Basin and Range physiographic province, and Snake River Plain. The geology of the study area is complex (Worl and Johnson, 1989); outcrops range in age from Precambrian to Holocene and the rock lithologies represent nearly every known tectonic setting and depositional mechanism (Cluer, 1987). Mines and prospects for precious metals are located throughout the study area (Worl and Johnson, 1989).

BOUGUER GRAVITY ANOMALY MAP

The complete Bouguer gravity anomaly map shows variations in the gravitational field derived from horizontal variations in the density of surface and subsurface rocks. The map was made using data from 2,698 gravity stations compiled by Bankey and others (1985). The gravity stations are located on the map to indicate the spacing of the data. The data are available from the Data Service Officer, EROS Data Center, U.S. Geological Survey, Sioux Falls, SD 57198.

Various computer programs were used to calculate the terrain-corrected Bouguer gravity anomaly values. The theoretical gravity values were calculated using the 1967 formula of the Geodetic Reference System (International Association of Geodesy and Geophysics, 1971). Terrain corrections were computed using a program by R.H. Godson (U.S. Geological Survey, unpub. program, 1978); the gravity effects of terrain were corrected from each station to a radius of 166.7 km using the method of Plouff (1977). Godson's program also calculates Earth curvature corrections and complete (terrain-corrected) Bouguer gravity anomaly values. Cordell and others (1982) gives a complete description of gravity-reduction equations and approximations used. These computed terrain corrections use mean elevation digital data on a 15-second grid for corrections from 0.59 to 5 km, 1-minute terrain data for corrections from 5 to 21 km, and 3-minute terrain data for corrections from 21 to 166.7 km. Terrain located less than 0.59 km from a station may not be corrected for by the above procedure due to the coarseness of the terrain model. A density of 2.67 g/cm^3 was used to calculate terrain corrections, giving one complete Bouguer gravity value per station.

The data were projected on a Lambert conformal conic system, with a central meridian of 114° and a base latitude of 0°, then gridded to an interval of 1 km using a minimum curvature algorithm (Briggs, 1974; Webring, 1981). The grid spacing has a large effect on the nature of the resulting map; calculations made using a smaller grid spacing emphasize shorter wavelength anomalies whereas those using a larger grid spacing tend to suppress shorter wavelength anomalies and emphasize broader wavelength anomalies. The data density exerts a strong influence on the wavelength and hence the size of features that can be identified. The data set represents approximately one station per 9 km; however, the density coverage varies widely from dense distribution along roads to very sparse distribution in remote areas. Very sparse data cause considerable loss of important detail for smaller features. Some of the isolated anomalies (that is, one-station anomalies) may be artifacts of the data- reduction procedure and may not represent true density variations. The data were contoured (Godson and Webring, 1982) at an interval of 5 mGal. The Bouguer gravity values range from a low of -240 mGal to a high of -71 mGal.

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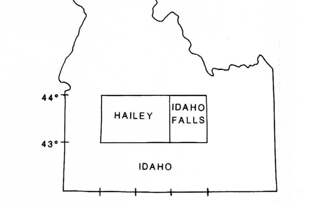

INDEX MAP SHOWING LOCATION OF STUDY AREA

COMPLETE BOUGUER GRAVITY ANOMALY MAP OF THE HAILEY AND WESTERN PART OF THE IDAHO FALLS 1° X 2° QUADRANGLES, IDAHO

By
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