DDS_42.PDF

GRAVITY DATA OF NEVADA

By

D.A. Ponce

1997

U.S. Geological Survey
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U.S. GEOLOGICAL SURVEY DIGITAL DATA SERIES DDS-42

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Box 25286, Building 810

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Library of Congress Cataloging-in-Publications Data

Ponce, David A.
Gravity data of Nevada [computer file] / by D.A. Ponce
1 computer laser optical disc : col. ; 4 3/4 in. -- (U.S. Geological Survey digital data series : DDS-42)
Computer data.
Title from disc label.
Audience: Geoscientists
1. Gravity anomalies--Nevada--Measurement. 2. Gravity anomalies--Southwestern States--Measurement. I. National Geophysical Data Center. II. Geological Survey (U.S.). III. Series: U.S. Geological Survey digital data series : DDS-42.
QB337.5 <1997 00001> <MRC>
526--DC12a

97-4516
CIP

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ABSTRACT

Gravity data for the entire state of Nevada and adjacent parts of California, Utah, and Arizona are available on CD-ROM. About 80,000 gravity stations were compiled primarily from the National Geophysical Data Center and the U.S. Geological Survey. Gravity data were reduced to the Geodetic Reference System of 1967 and adjusted to the International Gravity Standardization Net 1971 gravity datum. Data were processed to complete Bouguer and isostatic gravity anomalies by applying standard gravity corrections including terrain corrections and isostatic corrections. A 1_README.TXT file describes the contents of the CD-ROM and includes a description of the data reduction process, selected principal fact references, and a list of sources for data from the National Geophysical Data Center.

INTRODUCTION

Gravity data for the entire state of Nevada and adjacent parts of California, Utah, and Arizona are available on Compact Disc-Read Only Memory (CD-ROM). Data are organized into 19 files, one for each of the 18 1^0 x 2^0 quadrangles (fig. 1) that cover Nevada as well as a single file containing all the data (table 1). About 80,000 gravity stations (fig. 2) have been compiled from various sources including the National Geophysical Data Center (National Geophysical Data Center, 1988), U.S. Geological Survey (USGS), Nevada Bureau of Mines and Geology, California Division of Mines and Geology, University of Nevada at Reno, Stanford University, Northwestern University, Colorado School of Mines, Los Alamos National Laboratory, and University of Texas at Dallas. Data were processed to complete Bouguer and isostatic gravity anomalies by applying standard gravity corrections including terrain corrections to a radial distance of 167 km and isostatic corrections based on an Airy-Heiskanen model of local compensation (Heiskanen and Moritz, 1967).

ACKNOWLEDGMENTS

I would especially like to thank Donald Plouff of the USGS for recent recompilations of several quadrangles in the northwestern part of Nevada and J.W. Erwin of the Nevada Bureau of Mines and Geology for access to various data sets throughout Nevada and for supporting a cooperative effort to release gravity data and maps for Nevada. Michael Diggles of the USGS developed the final CD-ROM architecture and produced the master. In addition, I acknowledge the contributions of numerous personnel from various organizations for acquiring or providing gravity data including: G.A. Abrams, R.V. Allen, T.V. Bare, R.G. Bates, D.L. Berger, H.R. Blank, Jr., A.J. Bol, R.E. Bracken, B.R. Buchanan, S.F. Carle, J.E. Carlson, R.H. Chapman, L.L. Chau, B.A. Chuchel, A.H. Cogbill, Jr., A. Conradi, Jr., C.E. Corry, R.A. Crewdson, F.E. Currey, D.A. Dansereau, K.J. Danti, D.A. Dinter, T.J. Durbin, R.K. Edquist, C.F. Erdman, G.R. Erickson, D.G. Evans, E.A. Frick, J.D. Garing, M.L. Gerdes, J.F. Gibbs, J.I. Gimlett, J.M. Glen, R.H. Godson, V.J.S. Grauch, R.N. Harris, J. Hasbrouck, D.L. Healey, D.C. Hobach, K.D. Holden, R.C. Jachens, P.E. Jansma, D.R. Jefferris, M.F. Kane, C.R. Karish, A.M. Katzenstien, H.E. Kaufmann, D.R. Kietzman, J.D. Kibler, K.S. Kirchoff-Stein, N.E. Kitchen, S.B. Kohrn, S.C. Kuehn, V.E. Langenheim, J.H. Laudon, J.S. Lewis, R.B. Livermore, D.R. Mabey, J. Mariano, D.K. Maurer, C.H. Miller, E.G. Miller, M.E. Milling, R.L. Morin, C.K. Moss, H.W. Oliver, D.L. Peterson, R.W. Plume, W.L. Rambo, D. Reidy, S.L. Robbins, C.W. Roberts, J.R Rosenbaum,

H.F. Ryan, J.J. Rytuba, R.W. Saltus, C.H. Sandberg, D.H. Schaefer, H.L. Scheirer, K.M. Schmidt, E.D. Seals, L. Senior, D. Shiel, R.F. Sikora, E.H. Softky, J.B. Spielman, D.B. Snyder, S.L. Snyder, R.W. Tabor, J.M. Thomas, H.M. Van Buren, K. Velasco, S. Waddell, A. Wagini, R.R. Wahl, R. Ward, and C.W. Wilson.

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SYSTEM REQUIREMENTS

The data and text on this CD-ROM require either a Macintosh or compatible computer or an IBM or compatible personal computer. The Macintosh should have a 68020 or higher processor (PowerPC recommended), 8 megabytes RAM (16 MB recommended), Apple System Software version 7.0 or later (7.1.2 or later recommended), and a 13-inch color monitor that can display 256 colors. The PC should have a 386 or higher processor (Pentium recommended), Microsoft Windows 3.1 or higher (Windows 95 or Windows NT recommended), 8 megabytes RAM (16 MB recommended), and a VGA color monitor that can display 256 colors.

This CD-ROM was produced in accordance with the ISO 9660 and Macintosh HFS standards. All ASCII and PDF files can be accessed from PC, Macintosh, and Unix platforms, the display software packages provided are designed for use under a PC Windows-based or Macintosh system, as appropriate.

PORTABLE DOCUMENT FORMAT (PDF) FILE

In addition to the ASCII text (1_README.TXT) and data files (in the DATA directory), This disc contains Portable Document Format (PDF) files for viewing and searching documents. The ACROBAT directory contains installers for Adobe Acrobat Reader 3.0 for both Windows (PC directory) and Macintosh (MAC directory, INST_R30 installer). For Windows, a 16-bit version (RS16E30.EXE installer) is provided for Windows 3.1 and a 32-bit version (RS32E30.EXE installer) is provided for Windows NT and Windows 95. The Windows installers are self-extracting archives that open in the directory you specify. Once opened, run the Setup program to proceed. You can use the installers provided on this disc or download the latest version of Adobe Acrobat Reader free via the Internet from the Adobe homepage on the World Wide Web at http://www.adobe.com/ In order to view PDF files you will need a reader that can translate PDF

files. This CD-ROM contains a full-text index (INDEX.PDX) that is for use in searching the .PDF files for words or sets of words using the search tool in Acrobat Reader.

Within the DDS_42.PDF file, links (highlighted text) are provided that allow you to jump to another part of document, change views, or display figures. Links to the World Wide Web will access the user's connection to the Internet and browser software if available. The CD-ROM also contains a full-text index (INDEX.PDX and associated subdirectory) that can be used to search for words or phrases using the search tool supplied with Acrobat Reader described above. If your version of Acrobat Reader has a "File" "Preferences" "General..." check box for "Open Cross-Document Links In Same Window," deselect it; this will keep the main document open when you view another PDF file.

RELATED WORLD WIDE WEB SITES

Western Region Geophysics—http://wrgis.wr.usgs.gov/docs/gump/gump.html
U.S. Geological Survey—http://www.usgs.gov
National Geophysical Data Center—http://www.ngdc.noaa.gov
Nevada Bureau of Mines and Geology—http://www.nbmg.unr.edu
State of Nevada—http://www.state.nv.us

GRAVITY DATA FORMAT AND REDUCTION

Principal facts of gravity data are contained in the DATA directory. The data files are listed in table 1 and are in the ASCII format described in table 2. Accuracy codes, if available, which describe location and observed gravity accuracies, are listed in table 3. Gravity data were reduced using the Geodetic Reference System of 1967 (International Union of Geodesy and Geophysics, 1971) and adjusted to the International Gravity Standardization Net 1971 (IGSN 71) gravity datum (Morelli, 1974). Observed gravity values were ultimately tied to an IGSN 71 network of base stations throughout Nevada described by Jablonski (1974). Gravity data were reduced to complete Bouguer and isostatic anomalies using a reduction density of 2.67 g/cm^3.

Gravity stations were processed by applying standard corrections to the data that include: a field reading to gravity unit conversion, which converts readings in arbitrary units to milligals by using manufacturer’s factors and a calibration constant determined by repeated measurements over established calibration loops; an earth-tide correction, which removes the effect of the tidal attraction of the sun and moon; the instrument drift correction, which accounts for nonelastic changes in the instrument's spring and temperature effects; a free-air correction, which accounts for the different elevation of each station; a Bouguer correction, which accounts for the attraction of rock material between the station and sea-level; a latitude correction, which takes into account the variation of the Earth's gravity at sea-level with latitude; the curvature correction, which corrects for the Earth's curvature; a terrain correction, which removes the effect of topography to a radial distance of 167 km; and an isostatic correction, which removes long-wavelength variations in the gravity field and is based on a model of isostatic compensation.

Terrain corrections nearest the station, inner-zone terrain corrections, were calculated using the Hayford-Bowie system (Swick, 1942), the Hammer (1939) system, or by using a digital elevation model and a computer procedure. Terrain corrections farther away from the station, outer-zone terrain corrections, were recomputed for all data using a digital elevation model (fig. 3) and a computer procedure by Godson and Plouff (1988). The extent of the inner-zone terrain correction varies from source to source and, if available, a one-letter code is used to denote its extent (table 1).

In general, for USGS data, terrain corrections consist of a three part process: a field terrain correction to a radial distance of 68 or 175 m, a manually estimated inner-zone correction to a radii of 2.29 or 8.95 km, and an outer-zone correction to a radius of 167 km using a computer procedure adapted from Godson and Plouff (1988). A terrain corrected, complete Bouguer gravity map of Nevada is shown in figure 4.

Isostatic corrections were removed from the Bouguer gravity field using a method by Jachens and Roberts (1981). The isostatic model is based on an Airy-Heiskanen model for local isostatic compensation of topographic loads with an assumed sea-level crustal thickness of 25 km, a crustal density of 2.67 g/cm^{-3}, and a density contrast across the base of the crust of 0.4 g/cm^{-3}. A discussion of the isostatic correction and its significance was given by Simpson and others (1986). An isostatic gravity map of the state of Nevada is shown in figure 5.

Table 1. List of gravity data files in the DATA directory

File name	Quadrangle	Number of stations	Range in lat (degrees)	Range in long (degrees)
CALIENTE.ISO	Caliente	4,786	37 - 38	114 - 116
DV.ISO	Death Valley	12,037	36 - 37	116 - 118
ELKO.ISO	Elko	2,121	40 - 41	114 - 116
ELY.ISO	Ely	2,821	39 - 40	114 - 116
GOLD.ISO	Goldfield	15,527	37 - 38	116 - 118
KINGMAN.ISO	Kingman	3,161	35 - 36	114 - 116
LASVEGAS.ISO	Las Vegas	4,318	36 - 37	114 - 116
LOVELOCK.ISO	Lovelock	1,743	40 - 41	118 - 120
LUND.ISO	Lund	8,454	38 - 39	114 - 116
MARIPOSA.ISO	Mariposa	2,804	37 - 38	116 - 118
MCD.ISO	McDermitt	1,991	41 - 42	116 - 118
MILLETT.ISO	Millett	3,460	39 - 40	116 - 118
RENO.ISO	Reno	2,198	39 - 40	118 - 120
TONOPAH.ISO	Tonopah	4,275	38 - 39	116 - 118
VYA.ISO	Vya	1,574	41 - 42	118 - 120
WALKER.ISO	Walker Lake	3,701	38 - 39	118 - 120
WELLS.ISO	Wells	1,661	41 - 42	114 - 116
WIN.ISO	Winnemucca	2,654	40 - 41	116 - 118
NEVADA.ISO	---	79,286	35 - 42	114 - 120

Table 2. Format of gravity data
[ft, feet; g/cc, grams/cubic-centimeter; mGal, milligal]

Column	FORTRAN format	Description
1-8	A8	Station name
10-11	F2.0	Latitude, in degrees
12-15	F4.2	Latitude, in minutes to 0.01 minute
17-19	F3.0	Longitude, in degrees
20-23	F4.2	Longitude, in minutes to 0.01 minute
24-29	F6.1	Elevation, in ft to 0.1 ft
30-36	F7.2	Observed gravity, in mGal to 0.01 mGal, without leading 9
37-40	A4	Four character accuracy code
41-46	F6.2	Free-air anomaly, in mGal to 0.01 mGal
47-52	F6.2	Simple Bouguer anomaly, in mGal to 0.01 mGal
53-57	F5.2	Inner-zone terrain correction, in mGal to 0.01 mGal
58-62	F5.2	Total terrain correction, in mGal to 0.01 mGal
63	A1	Terrain correction code denoting extent of inner-zone terrain correction and system, upper case denotes Hayford-Bowie system of zones, lower case denotes Hammer system of zones. Z, computer calculated from 0.0-0.59 km
64-69	F6.2	Complete Bouguer anomaly reduced for a density of 2.67 g/cc, in mGal to 0.01 mGal
70-75	F6.2	Isostatic gravity anomaly reduced for a density of 2.67 g/cc, in mGal to 0.01 mGal

Table 3. Explanation of 4-digit accuracy code
[alt, altimetry; blk, black; brn, brown; elev., elevation; NGS, National Geodetic Survey; NMD, National Mapping Division; PG, photogrammetry; USGS, U.S. Geological Survey; VABM, vertical angle bench mark]

General elevation and location code--First digit

Code	Explanation	Code	Explanation
A	Altimetry, good control	P	On or near surveyed mark
B	On USGS or NGS level-line bench mark	Q	River gradient interpolation
C	Contour line interpolation	R	Lake elev. by leveling
D	Destroyed or not found reference mark	S	Sea level elev.
E	Near non-USGS level-line bench mark	T	Photogrammetry by USGS NMD
F	Map elev., blk or field checked	U	Unknown elev. source
G	Map elev., brn or not field checked	V	On vertical angle bench mark
H	Near vertical angle bench mark	W	Map elev., blue
I	Other special source	X	On or near boundary marker
K	Photogrammetry by other than USGS NMD	Y	Altimetry, poor control
N	Near USGS or NGS level-line bench mark	Z	Special source
M	On non-USGS level-line bench mark		

Elevation code--Second digit	Elevation accuracy (ft)	Approximate gravity effect (mGal)

1	On bench mark	0.2	0.01
2	Near bench mark	0.3	0.02
3	Transit or good alidade survey	1.0	0.06
4	VABM or black map elev.	2.0	0.12
5	Blk elev. on old map or good PG	4.0	0.24
6	Brn elev. or good PG on 20-ft contour map	10	0.6
7	Brn elev. on 80-ft contour map or good alt	20	1.2
8	Contour interpolation on 80-ft contour map	40	2.4
9	Contour interp. on 200-ft contour map, poor alt	80	4.8

Latitude code--Third digit (based at lat 37)		Latitude accuracy (min)	Distance accuracy (ft)	Approx. gravity effect (mGal)
1	Triangulation or special survey data	0.007	42	0.01
2	Location known to 0.04 in on 1:24,000 map	0.014	84	0.02
3	0.10 in, 1:24,000 or 0.04 in, 1:62,500 map	0.035	210	0.05
4	0.21 in, 1:24,000 or 0.08 in, 1:62,500 map	0.07	420	0.1
5	0.42 in, 1:24,000 or 0.16 in, 1:62,500 map	0.14	840	0.2
6	0.40 in, 1:62,500 or 0.1 in, 1:250,000 map	0.35	2,100	0.5
7	0.80 in, 1:62,500 or 0.2 in, 1:250,000 map	0.7	4,200	1.0
8	1.60 in, 1:62,500 or 0.4 in, 1:250,000 map	1.4	8,400	2.0
9	4.00 in, 1:62,500 or 1.0 in, 1:250,000 map	3.5	21,000	5.0

Observed gravity code--Fourth digit		Approximate gravity effect (mGal)
1	Local survey with special gravity meter	0.01
2	Multiple observations with LaCoste and Romberg meter	0.02
3	Average LaCoste and Romberg or multiple Worden meter	0.05
4	LaCoste and Romberg observation with small vibrations or average Worden meter	0.1
5	Data from loop with closure error this large	0.2
6	Data from loop with closure error this large	0.5
7	Data from loop with closure error this large	1
8	Data from loop with closure error this large	2
9	Data from loop with closure error this large	4

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Swick, C.A., 1942, Pendulum gravity measurements and isostatic reductions: U.S. Coast and Geodetic Survey Special Publication 232, 82 p.

Figure 1. Index map of Nevada showing 1 by 2 degrees quadrangles.

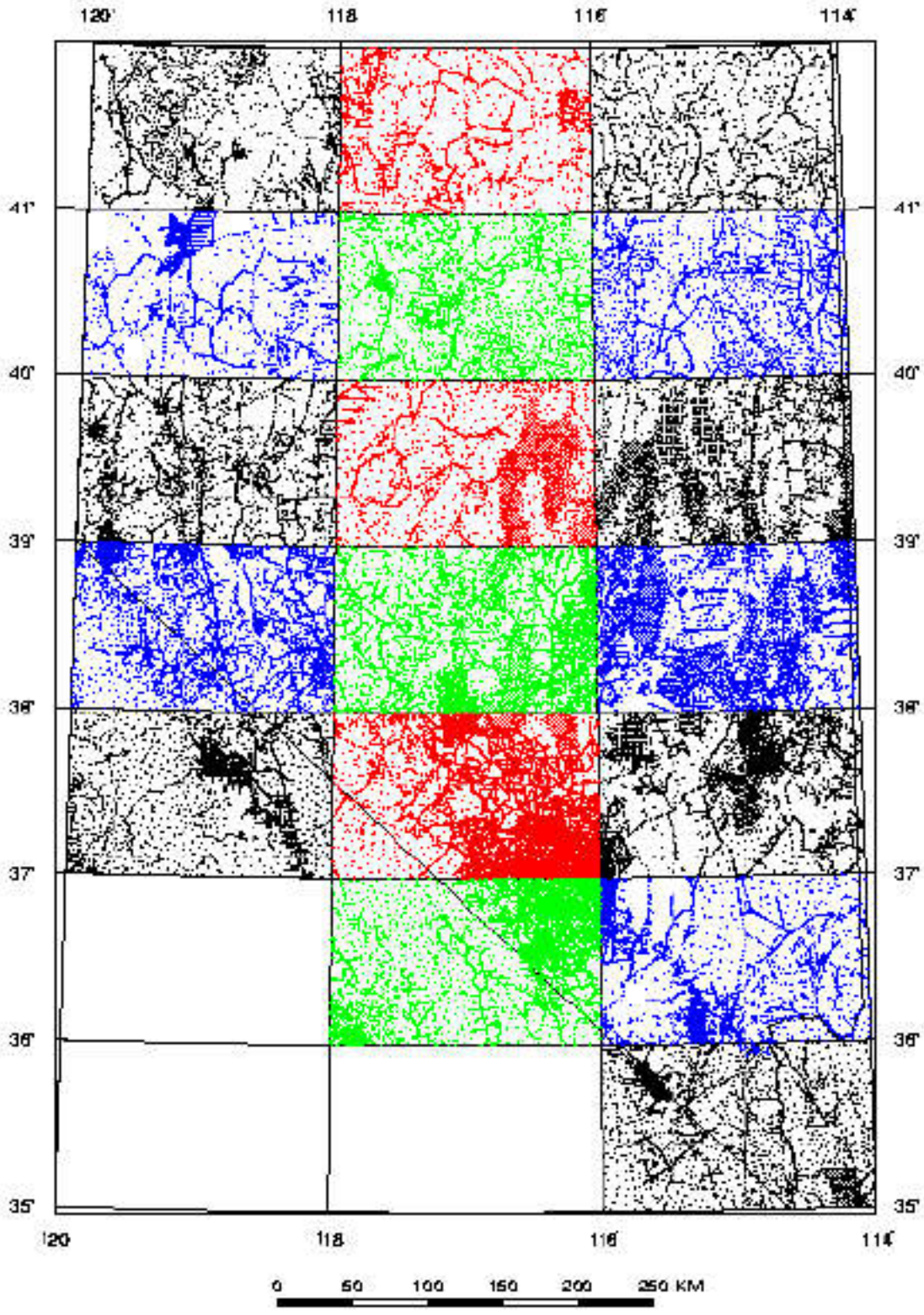

Figure 2. Gravity station location map.

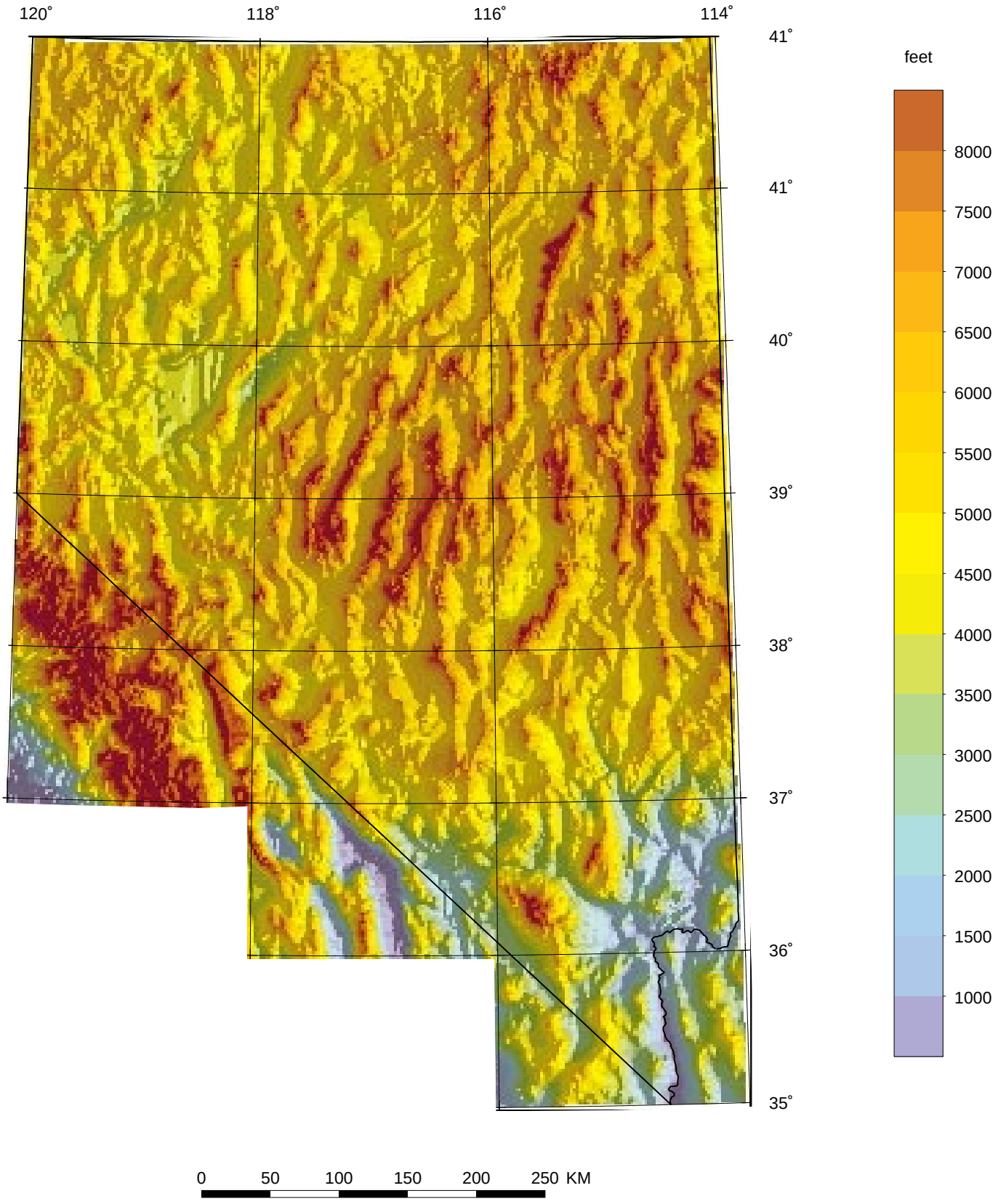

Figure 3. Topographic map of Nevada.

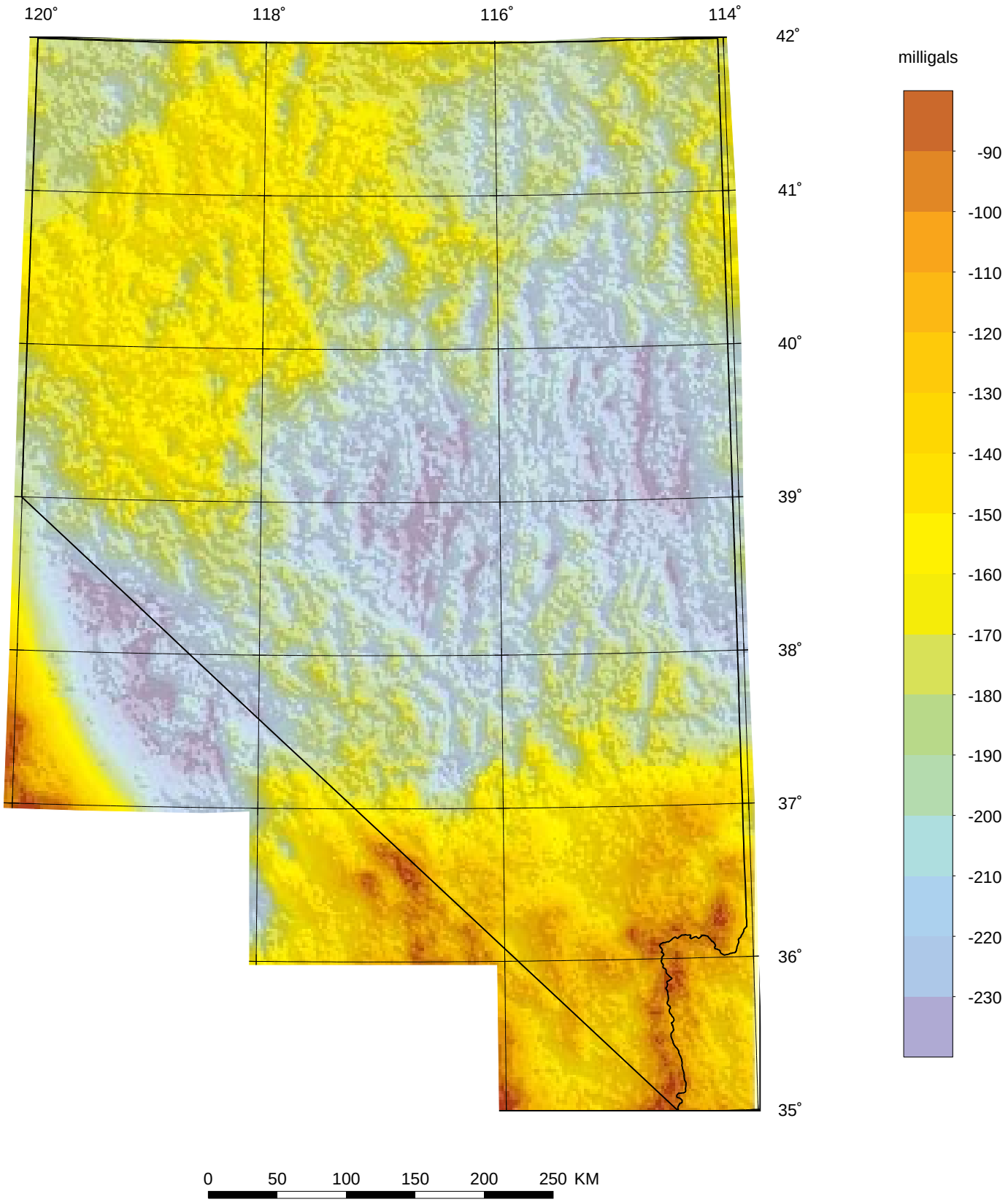

Figure 4. Complete Bouguer gravity map of Nevada.

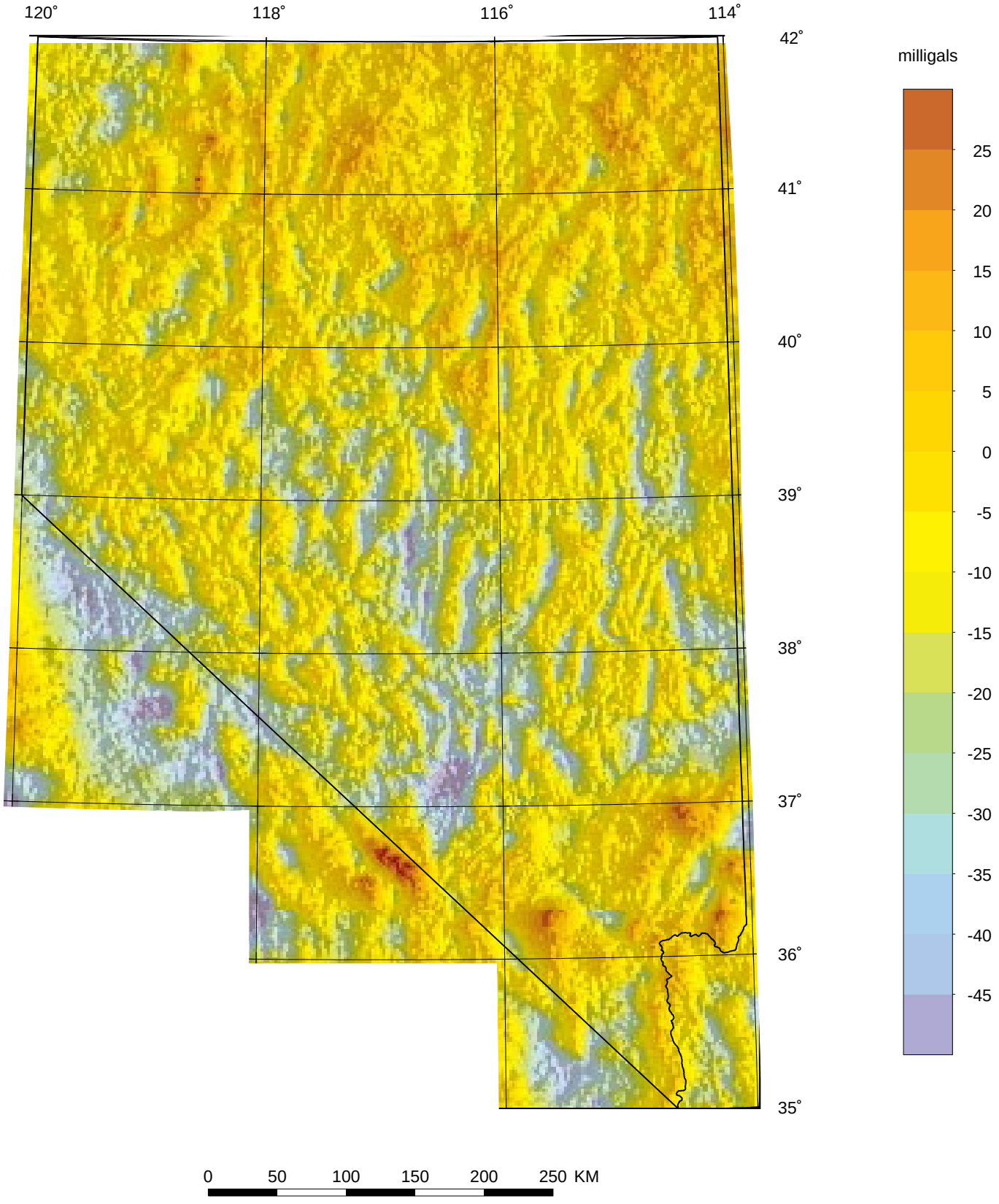

Figure 5. Isostatic gravity map of Nevada.

APPENDIX--LIST OF SOURCES FOR DATA FROM THE NATIONAL GEOPHYSICAL DATA CENTER

A list of gravity sources from data obtained from the National Geophysical Data Center for Nevada and adjacent parts of California, Utah, and Arizona is shown below. Their data and source list are available from the National Geophysical Data Center, National Oceanic and Atmospheric Administration, Mail Code E/GCX2, 325 Broadway, Boulder, Colorado 80303, USA. These data are from the Department of Defense—Defense Mapping Agency gravity files and their source codes are contained in the first four digits of the gravity station name (table 2).

432 R. M. PERRY
PRINCIPAL FACTS OF GRAVITY STATIONS, EDWARDS AIR FORCE BASE AREA
AIR FORCE GEOPHYSICS LABORATORY (AFGL)
Survey Year 1960

483 G. A. THOMPSON
GRAVITY MEASUREMENTS BETWEEN HAZEL AND AUSTIN, NEVADA, A STUDY OF BASIN-RANGE STRUCTURE
STANFORD UNIVERSITY
Survey Year 1954

764 W. E. BONINI
IDAHO, WYOMING, MONTANA, WASHINGTON AND OREGON GRAVITY ANOMALIES
IDAHO BUREAU OF MINES AND GEOLOGY
Survey Year 1959

933 GRAVITY OBSERVATIONS IN CLARK COUNTY, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1959

1083 NATIONAL GRAVIMETER BASE NETWORK
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
Date Unknown

2078 G. P. WOOLLARD
TRIP SS, ROCKIES
UNKNOWN
Date Unknown

2113 GRAVITY SURVEY, EDWARDS AIR FORCE BASE AREA
AIR FORCE GEOPHYSICS LABORATORY (AFGL)
Survey Year 1963

2149 CRUSTAL STUDIES, LINE SEVEN, EUREKA - FALLON NEVADA PROFILE
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1963

2179 GRAVITY REDUCTIONS, NEVADA BASIN AND RANGE PROJECT
GROUP 1 - NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Date Unknown

2207 GRAVITY DATA, OWENS VALLEY, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1957

2231 D. R. MABEY
GRAVITY DATA IN DEATH VALLEY, CALIFORNIA PB-210 683
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1955

2235 GRAVITY DATA, CARSON SINK, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Date Unknown

2293 GRAVITY DATA IN SIERRA NEVADA, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1961

2381 GRAVITY DATA, CHANNEL ISLANDS, CALIFORNIA AND OTHER U.S. DATA
NAVOCEANO
DMAH/TC
Survey Year 1963

2388 GRAVITY DATA, INDIAN WELLS REGION, CALIFORNIA
NAVOCEANO
Survey Year 1963

2493 NEVADA TEST SITE GRAVITY SURVEY, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1963

2515 R. G. BATES
GRAVITY OBSERVATIONS IN PAHRUMP, MESQUITE AND
IVANPAH VALLEYS, CALIFORNIA AND NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1965

2516 D. R. MABEY
PRINCIPAL FACTS OF GRAVITY STATIONS IN THE
WESTERN MOJAVE DESERT, CALIFORNIA PB-206 674
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1954

2531 OREGON STATE GRAVITY DATA
OREGON STATE UNIVERSITY
Survey Year 1965

2649 J. I. GIMLETT
THE GRAVIMETRIC METHOD APPLIED TO BASIN EXPLORATION, EXEMPLIFIED
BY A STUDY OF WARM SPRINGS VALLEY, WASHOE COUNTY, NEVADA
STANFORD UNIVERSITY
Survey Year 1965

2660 GRAVITY DATA IN EUREKA VALLEY, CALIFORNIA AND GOLDFIELD, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1965

2665 R. H. CHAPMAN
CALIFORNIA GRAVITY BASE STATION NETWORK
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1965

2695 GRAVITY DATA, NORTHERN NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1958

2696 GRAVITY DATA, BULL RUN, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1958

2702 GRAND CANYON GRAVITY SURVEY, ARIZONA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1965

2713 T. R. LAFEHR
GRAVITY SURVEY IN SOUTHERN CASCADE RANGE, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1965

2716 R. C. FAREWELL
GRAVITY DATA IN MADERA COUNTY, CALIFORNIA PART XXXI-REVISED
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1961

2733 NATIONAL GRAVITY BASE NET AND EXCENTERS
DMAHTC/GSS
Survey Year 1967

2773 GRAVITY DATA IN ALTURAS, CALIFORNIA AREA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1967

2774 GRAVITY DATA IN FRESNO, CALIFORNIA AREA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1966

2777 GRAVITY DATA IN MARIPOSA, CALIFORNIA AREA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1966

2853 GRAVITY DATA FOR THE KINGMAN AND TRONA MAP SHEETS, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1960

3046 J. W. ERWIN
GRAVITY DATA FOR THE BATTLE MOUNTAIN AREA, NEVADA
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1967

3047 J. W. ERWIN
GRAVITY DATA FOR THE TONAPAH AREA, NEVADA
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1967

3048 J. W. ERWIN
GRAVITY DATA FOR THE YERINGTON AREA, NEVADA
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1967

3113 PRINCIPAL FACTS FOR GRAVITY STATIONS, BAKERSFIELD, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
DMAH/TC

Survey Year 1968
3136 S. L. ROBBINS
GRAVITY DATA IN CALIFORNIA, FRESNO AMS SHEET
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1970
3182 W. F. HANNA
GRAVITY DATA IN BAKERSFIELD AMS SHEET, PART XII, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1969
3236 S. L. ROBBINS
GRAVITY DATA FOR THE MARIPOSA AMS SHEET, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1969
3238 S. L. ROBBINS
GRAVITY DATA IN THE MARIPOSA, SACRAMENTA AND
WALKER LAKE AMS SHEETS, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1969
3260 W. L. RAMBO
GRAVITY DATA IN CHICO RENO, SACRAMENTO AND
WALKER LAKE AMS SHEETS, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1969
3277 ARIZONA REGIONAL GRAVITY SURVEY AND BASE NETWORK
DMAH/TC
Survey Year 1969
3358 J. R. MONTGOMERY
GRAVITY DATA IN UTAH
UNIVERSITY OF UTAH
Survey Year 1970
3373 S. L. ROBBINS
GRAVITY DATA IN WALKER LAKE AMS SHEET, PART 23, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1970
3377 H. W. OLIVER
PRINCIPAL FACTS AND PLOTS FOR GRAVITY STATIONS IN SOUTHERN
SIERRA NEVADA AND VICINITY, CALIFORNIA PB-231 185/AS
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1970
3379 ARIZONA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1970
3382 CALIFORNIA GRAVITY FOR ALTURAS AMS SHEET
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1970
3383 GRAVITY DATA FOR DEATH VALLEY AMS SHEET IN CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1970
3385 GRAVITY DATA FOR TRONA AMS SHEET IN CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1970
3391 S. L. ROBBINS
GRAVITY DATA IN CHICO, SACRAMENTO AND
SUSANVILLE AMS SHEETS, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1970
3450 ARIZONA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1971
3463 ARIZONA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1971
3502 PEMBERTON
TRIP AD, SERIES PI, 938
UNIVERSITY OF WISCONSIN
Survey Year 1954
3503 G. P. WOOLLARD
TRIP AE, SERIES B
PRINCETON UNIVERSITY
Survey Year 1939
3507 J. MACK R. M. IVERSON
TRIP AI, SERIES M

UNIVERSITY OF WISCONSIN
Survey Year 1955
3516 F. PRESS
TRIP AS, SERIES FP
UNIVERSITY OF WISCONSIN
Date Unknown
3575 J. C. ROSE
TRIP TT, SERIES F
UNIVERSITY OF WISCONSIN
Survey Year 1949
3578 W. E. BLACK
TRIP TW, SERIES F
UNIVERSITY OF WISCONSIN
Survey Year 1950
3598 N. A. OSTENSO
TRIP ZZ, SERIES NI
UNIVERSITY OF WISCONSIN
Survey Year 1953
3667 S. L. ROBBINS
GRAVITY DATA IN SUSANVILLE AMS SHEET, PART 30, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1971
3682 OREGON STATE GRAVITY BASE NETWORK
DMAH/TC
Survey Year 1971
3683 ARIZONA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1971
3754 M. F. KANE J. E. CARLSON
GRAVITY OBSERVATIONS AND BOUGUER VALUES FOR CLARK COUNTY, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1971
3816 NEVADA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1972
3817 NEVADA GRAVITY BASE SURVEY
DMAH/TC
Survey Year 1972
3871 OREGON STATE REGIONAL GRAVITY ANOMALY SURVEY REPORT NUMBER 56D
DMAH/TC
Date Unknown
3872 NEVADA REGIONAL GRAVITY SURVEY 79-B
DMAH/TC
Survey Year 1972
3891 GRAVITY DATA, WINNEMUCCA SHEET
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1972
3915 NEVADA REGIONAL GRAVITY SURVEY
DMAH/TC
Survey Year 1973
3973 IDAHO REGIONAL SURVEY 94-B
DMAH/TC
Survey Year 1973
4078 R. H. CHAPMAN C. BISHOP
SOURCE DATA FOR BOUGUER ANOMALY MAP OF CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1964
4099 GRAVITY DATA IN THE UNITED STATES, NORTH - SOUTH PROFILES
DMAH/TC
HAWAII INSTITUTE OF GEOPHYSICS (HIG)
Survey Year 1967
4548 A. H. COGBILL
GRAVITY DATA IN MINERAL COUNTY, NEVADA
NORTHWESTERN UNIVERSITY
Survey Year 1974
4603 S. L. ROBBINS AND OTHERS
GRAVITY DATA ON THE MARIPOSA AND GOLDFIELD QUADRANGLES
CALIFORNIA AND NEVADA PB-241 469/AS
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1975
4604 S. L. ROBBINS
GRAVITY FOR THE FRESNO QUADRANGLE, CALIFORNIA PB-241 577/AS

U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1975

4673 AMS RIDGECREST QUADRANGLE, CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Survey Year 1975

4674 AMS COSO PEAK, MATURANGO PEAK, AND HAIWEE RESERVOIR QUADRANGLES CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4675 AMS LAMONT, ONYX, CROSS MOUNTAIN, AND HAIWEE RESERVOIR QUADRANGLES IN CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4676 AMS LITTLE LAKE QUADRANGLE, CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4677 AMS INYOKERN QUADRANGLE, CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4678 AMS SEARLES LAKE, TRONA, SALTDALE, RANDSBURG, AND MOUNT SPRINGS CANYON QUADRANGLES, CALIFORNIA
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4735 R. H. CHAPMAN
GRAVITY DATA, ALTURAS AREA OF CALIFORNIA (TERRAIN CORRECTED)
CALIFORNIA DIVISION OF MINES AND GEOLOGY (CDMG)
Date Unknown

4756 W. F. HANNA R. SIKORA
GRAVITY DATA IN THE BAKERSFIELD 1 X 2 DEGREE QUADRANGLE CALIFORNIA PB-238 122/AS
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1973

4771 S. L. ROBBINS AND OTHERS
PRINCIPAL FACTS FOR GRAVITY STATIONS ON THE MARIPOSA AND PART OF THE GOLDFIELD 1 X 2 DEGREE QUADRANGLES CALIFORNIA AND NEVADA PB-241 469/AS
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1974

4781 PRINCIPAL FACTS FOR GRAVITY STATIONS ON THE WALKER LAKE 1 X 2 DEGREE QUADRANGLE, CALIFORNIA AND NEVADA PB-251 249/AS
U. S. GEOLOGICAL SURVEY (USGS)
Date Unknown

4787 PRINCIPAL GRAVITY FACTS FOR CHARLES SHELDON ANTELOPE RANGE NEVADA AND OREGON OPEN-FILE REPORT 76-0601
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4788 PRINCIPAL GRAVITY FACTS FOR MCDERMITT, NEVADA
OPEN-FILE REPORT 77-0536
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4832 D. L. PETERSON
PRINCIPAL FACTS FOR GRAVITY STATIONS IN STEAMBOAT HILLS AND WABUSKA, NEVADA OPEN-FILE REPORT 75-0443
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1975

4834 D. L. PETERSON D. A. DANSEREAU
PRINCIPAL FACTS FOR GRAVITY STATIONS IN GERLACH AND SAN EMIDIO KNOWN GEOTHERMAL RESOURCES AREAS (KGRA), NEVADA
OPEN-FILE REPORT 75-0668
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4835 D. L. HEALEY
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE WESTERN PART OF THE GOLDFIELD 2 DEGREE SHEET, NEVADA OPEN-FILE REPORT 76-0057
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4836 D. L. HEALEY
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE NEVADA PORTION OF THE MARIPOSA 2 DEGREE SHEET OPEN-FILE REPORT 76-0058
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4837 D. L. HEALEY

PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE WESTERN PART OF
THE TONOPAH 2 DEGREE SHEET, NEVADA OPEN-FILE REPORT 76-0059
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4838 D. L. HEALEY
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE NEVADA PORTION OF
THE WALKER LAKE 2 DEGREE SHEET OPEN-FILE REPORT 76-0060
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4839 D. L. PETERSON D. A. DANSEREAU
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE ELKO HOT SPRINGS
KNOWN GEOTHERMAL RESOURCE AREA (KGRA), NEVADA
OPEN-FILE REPORT 76-0151
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4852 GRAVITY DATA, DRY LAKE, NEVADA
DMAHTC/GSS
Date Unknown

4869 D. L. PETERSON D. B. HOOVER
PRINCIPAL FACTS FOR A GRAVITY SURVEY OF BALTAZOR KNOWN
GEOTHERMAL RESOURCE AREA, NEVADA, OPEN-FILE REPORT 77-0067-C
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4877 RALSTON VALLEY GRAVITY DATA
DMAHTC/GSS
Date Unknown

4932 C. W. WILSON D. L. PETERSON
PRINCIPAL FACTS FOR GRAVITY STATIONS IN CLAYTON VALLEY, NEVADA
OPEN-FILE REPORT 77-0256
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

4933 D. L. PETERSON J. H. HASSEMER
PRINCIPAL FACTS FOR A GRAVITY SURVEY OF PINTO HOT SPRINGS KNOWN
GEOTHERMAL RESOURCE AREA, NEVADA, OPEN-FILE REPORT 77-0067-B
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

4935 D. L. PETERSON H. E. KAUFMANN
PRINCIPAL FACTS FOR A GRAVITY SURVEY OF SALT WELLS BASIN,
CHURCHILL COUNTY, NEVADA, OPEN-FILE REPORT 77-0067-D
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

4936 D. L. HEALEY F. E. CURREY
PRINCIPAL FACTS FOR GRAVITY STATIONS IN CENTRAL NEVADA, NYE,
ESMERALDA, LANDER, EUREKA AND WHITE PINE COUNTIES, NEVADA
OPEN-FILE REPORT 77-0510
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

4943 GRAVITY DATA - SACRAMENTO, CALIFORNIA
DMAHTC/GSS
Survey Year 1978

4944 GRAVITY DATA - MOHAVE, CALIFORNIA
DMAHTC/GSS
Survey Year 1978

4960 S. L. ROBBINS H. W. OLIVER
R. F. SIKORA W. L. RAMBO
C. W. ROBERTS
PRINCIPAL FACTS FOR GRAVITY IN THE CHICO QUADRANGLE
CALIFORNIA PB-276 770
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

4965 W. F. ISHERWOOD D. PLOUFF
PRINCIPAL FACTS FOR GRAVITY OBSERVATIONS IN THE COSO
HOT SPRINGS AREA, CALIFORNIA, OPEN-FILE REPORT 78-0298
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1976

4999 A. H. COGBILL
REGIONAL GRAVITY SURVEY OF WESTERN NEVADA
NORTHWESTERN UNIVERSITY
Survey Year 1976

5018 D. L. PETERSON H. E. KAUFMANN
PRINCIPAL FACTS FOR A GRAVITY SURVEY OF THE DOUBLE HOT SPRINGS
KNOWN GEOTHERMAL RESOURCE AREA, HUMBOLDT COUNTY, NEVADA

OPEN-FILE REPORT 78-0107-A
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

5019 D. L. PETERSON H. E. KAUFMANN
GRAVITY SURVEY OF GERLACH EXTENSION KNOWN GEOTHERMAL RESOURCE AREA, PERSHING COUNTY, NEVADA OPEN-FILE REPORT 78-0107-B
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

5020 D. L. PETERSON H. E. KAUFMANN
PRINCIPAL FACTS FOR A GRAVITY SURVEY OF THE FLY RANCH EXTENSION KNOWN GEOTHERMAL RESOURCE AREA, PERSHING COUNTY, NEVADA
OPEN-FILE REPORT 78-0107-C
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1977

5037 ARIZONA AND NEVADA GRAVITY DATA
DMAHTC/GSS
Survey Year 1979

5057 W. F. HANNA
MT. PINOS GRAVITY CALIBRATION LOOP, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1968

5068 J. W. ERWIN
MILLETT, NEVADA GRAVITY SURVEY
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1978

5069 J. W. ERWIN
RENO, NEVADA GRAVITY SURVEY
UNIVERSITY OF NEVADA, MACKAY SCHOOL OF MINES
Survey Year 1978

5116 GRAVITY DATA, NEVADA
DMAHTC/GSS
Survey Year 1968

5130 GRAVITY DATA FOR NEVADA
DMAHTC/GSS
Survey Year 1969

5144 GRAVITY DATA FOR THE STATE OF NEVADA
DMAHTC/GSS
Survey Year 1971

5163 NEVADA REGIONAL GRAVITY SURVEY
DMAHTC/GSS
Survey Year 1972

5171 NEVADA REGIONAL GRAVITY SURVEY
DMAHTC/GSS
Survey Year 1972

5237 S. H. BIEHLER
GRAVITY STATIONS IN SOUTHERN CALIFORNIA
UNIVERSITY OF CALIFORNIA
Date Unknown

5241 D. REIDY M. F. KANE
D. L. HEALEY D. L. PETERSON
H. E. KAUFMANN
PRINCIPAL FACTS FOR A SET OF REGIONAL GRAVITY DATA FOR THE LAS VEGAS 1 X 2 DEGREE SHEET, NEVADA OPEN-FILE REPORT 78-1012
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1978

5258 C. E. CORRY
GRAVITY DATA IN NEVADA * 2716 ETC.
CLIMAX MOLYBDENUM
Date Unknown

5271 GRAVITY DATA FOR GARDEN/COAL, HAMLIN, SNAKE EAST, WHITE RIVER AND WHIRLWIND VALLEYS, NEVADA
DMAHTC/GSS
Survey Year 1979

5280 CALIFORNIA LAND GRAVITY SURVEY 2626
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)
Date Unknown

5503 R. A. CREWDSON
GEOPHYSICAL STUDIES IN THE BLACK ROCK DESERT GEOTHERMAL PROSPECT, NEVADA
COLORADO SCHOOL OF MINES
Survey Year 1976

5651 R. T. GREEN K. L. COOK

PRINCIPAL FACTS OF GRAVITY STATIONS FOR THE SOUTHWESTERN PART OF
THE SOUTHERN UTAH GEOTHERMAL BELT, WASHINGTON COUNTY, UTAH
UNIVERSITY OF UTAH
U. S. DEPARTMENT OF ENERGY
Survey Year 1980

5675 GRAVITY DATA IN NEVADA AND CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1980

5704 GRAVITY DATA IN THE VALLEYS OF UTAH AND NEVADA
DMAHTC/GSS
Survey Year 1980

5786 GRAVITY DATA IN THE VALLEYS OF UTAH AND NEVADA
DMAHTC/GSS
Survey Year 1980

5788 D. H. SCHAEFER D. K. MAURER
PRINCIPAL FACTS FOR GRAVITY STATIONS IN LEMMON VALLEY,
WASHOE COUNTY, NEVADA OPEN-FILE REPORT 80-0071
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1979

5829 REGIONAL GRAVITY DATA IN NEVADA
DMAHTC/GSS
Survey Year 1980

5840 D. SNYDER
GRAVITY DATA IN THE TONOPAH, NEVADA 1 X 2 DEGREE QUADRANGLE
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1980

5845 GRAVITY SURVEY IN RAILROAD VALLEY, NEVADA
DMAHTC/GSS
Survey Year 1981

5869 D. H. SCHAEFER D. K. MAUER
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE WESTERN ARM OF THE
BLACK ROCK DESERT, NEVADA OPEN-FILE REPORT 80-0577
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1979

5870 GRAVITY DATA IN THE KOBEN AND LITTLE SMOKEY VALLEYS, NEVADA
DMAHTC/GSS
Survey Year 1981

5871 GRAVITY DATA IN THE LITTLE SMOKEY AND ANTELOPE VALLEYS, NEVADA
DMAHTC/GSS
Survey Year 1981

5874 D. L. HEALEY R. R. WAHL
F. E. CURREY
COMPLETE BOUGUER GRAVITY MAP OF THE TONOPAH
1 X 2 DEGREE QUADRANGLE, NEVADA * 4936
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1980

5893 GRAVITY DATA IN THE NEVADA VALLEYS OF: STONE CABIN, LONG, BUTTE,
PENOYER, COAL, GARDEN, AND REVEILLE
DMAHTC/GSS
Survey Year 1981

5907 GRAVITY DATA IN MONITOR VALLEY AND GRANTS RANGE VALLEY
DMAHTC/GSS
Survey Year 1981

5918 GRAVITY DATA IN THE SOUTHWESTERN UNITED STATES AND MEXICO
UNIVERSITY OF ARIZONA
Date Unknown

5962 D. H. SCHAFER
BASIN AND RANGE GRAVITY DATA IN NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Date Unknown

5966 D. B. SNYDER H. W. OLIVER
PRELIMINARY RESULTS OF GRAVITY INVESTIGATIONS OF THE CALICO HILLS,
NEVADA TEST SITE, NYE COUNTY, NEVADA OPEN-FILE REPORT 81-0101
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1979

6050 D. A. PONCE
PRELIMINARY GRAVITY INVESTIGATIONS OF THE WAHMONIE SITE,
NEVADA TEST SITE, NYE COUNTY, NEVADA OPEN-FILE REPORT 81-0522
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1981

6126 J. W. ERWIN
GRAVITY DATA FOR THE WELLS ONE BY TWO DEGREE AREA IN NEVADA

NEVADA BUREAU OF MINES AND GEOLOGY
Survey Year 1979

6136 GRAVITY DATA IN MESQUITE VALLEY AND SURROUNDING AREAS, NEVADA
MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)
Date Unknown

6199 FINAL WSMC AREA GRAVITY DATA SET * 5948, 5949, 5952, 5953, 5957, 5961, 5987, 5994, 5997, 6017, 6034, 6045, 6046, 6058, 6097, 6133, 6138, 6145, 6150, 6168
DMAHTC/GSS
Survey Year 1982

6206 HIG GRAVITY DATA COVERING THE UNITED STATES
NATIONAL GEODETIC SURVEY
HAWAII INSTITUTE OF GEOPHYSICS (HIG)
Date Unknown

6235 FINAL WSMC AREA GRAVITY DATA SET, CALIFORNIA - CONTRACTOR DATA * 6190,6198
DMAHTC/GSS
STRATA SEARCH, INCORPORATED
Survey Year 1982

6266 GRAVITY DATA IN THE VICINITY OF LUND, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1982

6267 GRAVITY DATA IN THE VICINITY OF TONOPAH, CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1982

6405 P. E. JANSMA D. B. SNYDER
D. A. PONCE
PRINCIPAL FACTS OF GRAVITY STATIONS WITH GRAVITY AND MAGNETIC PROFILES FROM THE SOUTHWEST NEVADA TEST SITE, NYE COUNTY, NEVADA AS OF JANUARY, 1982
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1982

6410 D. B. SNYDER C. W. ROBERTS
R. W. SALTUS R. F. SIKORA
PRINCIPAL FACTS FOR GRAVITY STATIONS IN THE STATE OF CALIFORNIA
U. S. GEOLOGICAL SURVEY (USGS)
Date Unknown

6586 D. A. PONCE W. F. HANNA
PRELIMINARY APPRAISAL OF GRAVITY AND MAGNETIC DATA AT SYNCLINE RIDGE, WESTERN YUCCA FLAT, NEVADA TEST SITE, NYE COUNTY, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
Survey Year 1982

6590 A. J. BOL D. B. SNYDER
D. L. HEALEY R. W. SALTUS
PRINCIPAL FACTS, ACCURACIES, SOURCES, AND BASE STATION DESCRIPTIONS FOR 3672 GRAVITY STATIONS IN THE LUND AND TONOPAH 1 X 2 DEGREE QUADRANGLES, NEVADA
U. S. GEOLOGICAL SURVEY (USGS)
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