UNITED STATES DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

Principal facts for gravity stations in the Sangre de Cristo Mountains, Rio Grande and Isabel National Forests, south-central Colorado

by

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Open-File Report 93-1 8
1993

INTRODUCTION

A gravity study was conducted in Sangre de Cristo Mountains and vicinity in August and September, 1983. The data were obtained as part of a study to evaluate mineral potential in the area.

DATA COLLECTION

Gravity observations were made using LaCoste-Romberg[1] gravity meter g-551. The gravity stations were referenced to the U.S. Department of Defense (DOD) gravity base station in Alamosa (Appendix a; Defense Mapping Agency, 1974). Gravity loops were started and closed daily. Access was by helicopter, secondary roads and jeep trails.

ELEVATION CONTROL

The station elevations were obtained from benchmarks, spot elevations and section corners on 1:24,000 scale USGS topographic maps. The elevation uncertainty is assumed to be one-half the contour interval; the maximum elevation correction to the anomaly would be .6 mGals.

DATA REDUCTION

Computer programs of the USGS Branch of Geophysics were used to calculate principal facts and terrain-corrected gravity values. A program written by M.W. Webring (USGS, 1984, unpub. program) was used to reduce gravimeter readings to observed gravity values by calculating and correcting for earth-tides and linear meter drift. The theoretical gravity value was calculated using the 1967 formula of the Geodetic Reference System (International Association of Geodesy, 1971). Terrain corrections were digitally computed using a program by R.H. Godson (USGS, 1978, unpub. program) correcting for the gravity effects of terrain 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. The data were reduced to the complete Buoguer anomaly using a reduction density of 2.67 g/cc^3. For a complete description of gravity reduction equations and approximations used by the USGS Branch of Geophysics see Cordell and others (1982). The computed terrain corrections use mean elevation digital data on a 15-second grid for corrections at distances from the station of 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. Complete Bouguer anomalies were calculated for reduction densities of 2.67 g/cm^3 and 2.45 g/cm^3. The corrections and gravity anomaly values are listed in table 1.

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[1]Use of trade names in this report is for descriptive purposes only, and does not constitue endorsement by U. S. Geological Survey.

REFERENCES CITED:

Cordell, Lindrith, Keller, G.R., and Hildenbrand, T.G., 1982, Bouguer gravity map of the Rio Grande Rift, Colorado, New Mexico, and Texas: U.S. Geological Survey GP-949.

Defense Mapping Agency, 1974, World Relative Gravity Reference Network, North America, Part, 2: Defense Mapping Agency Aerospace Center Reference Publication 25, with supplement updating gravity values to the International Gravity Standardization Net 1971, Aerospace Center, St. Louis, AFS, MO, 1635 p.

International Association of Geodesy, 1971, Geodetic Reference System, 1967, International Association of Geodesy, Special Publication, no. 3, 116 p.

Plouff, D., 1977, Preliminary documentation for a FORTRAN program to compute gravity terrain corrections based on topography digitized on a geographic grid: U.S. Geological Survey Open-File Report 77-535, 43 p.

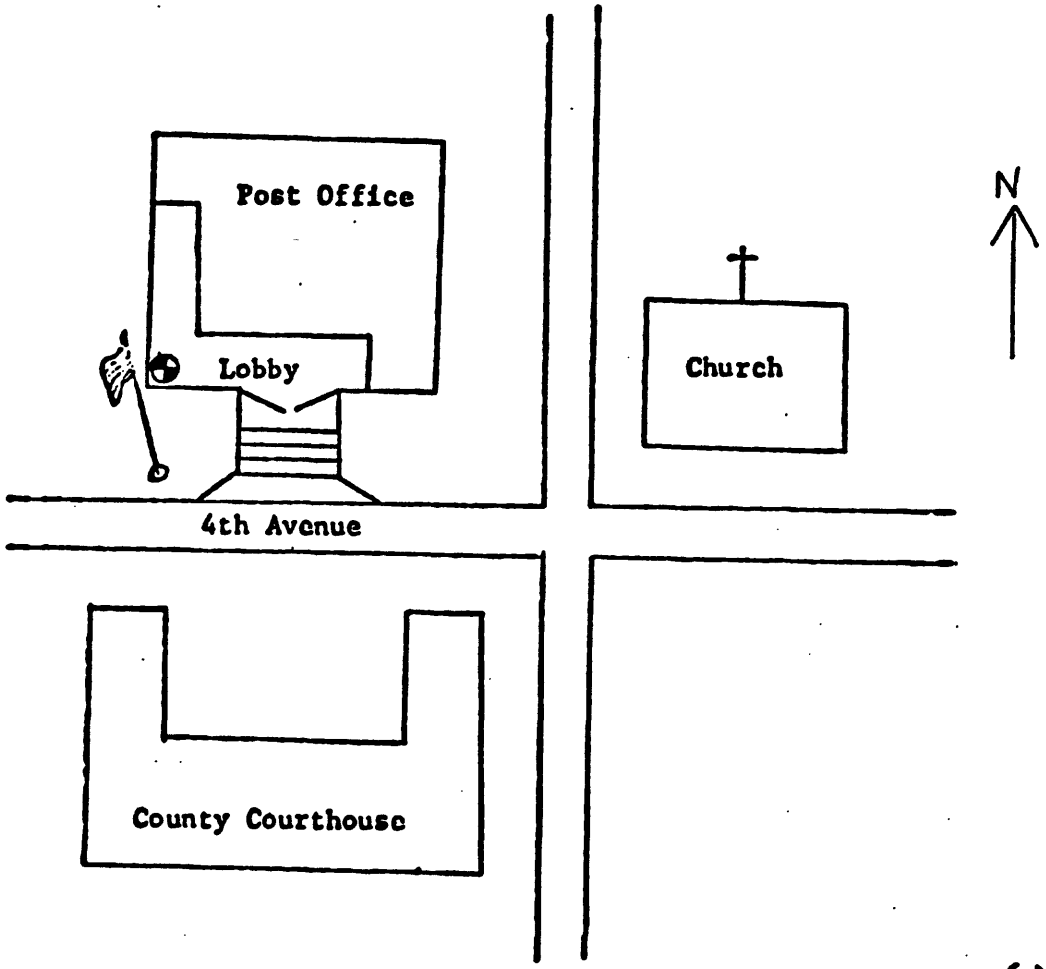
GRAVITY BASE STATION

LATITUDE: 37° 28.21'N (1)	STATION DESIGNATION: ALAMOSA
LONGITUDE: 105° 52.16'W (1)	
ELEVATION: 2300.9 METERS (1)	COUNTRY/STATE: USA/Colorado

REFERENCE CODE NUMBERS	ADOPTED GRAVITY VALUE	
ACIC 4016-1 IGB 11975B	g= 979 234.98 mgals	
	ESTIMATED ACCURACY	DATE
	± 0.1 mgals	MONTH/YEAR 1971

DESCRIPTION AND/OR SKETCH

The station is located at the Post Office in Alamosa, on the corner of San Juan Avenue and 4th Avenue, in the southwest corner of the Post Office lobby. It is marked with a USAF Gravity disc. (1)



(1)

REFERENCE SOURCE

(1) 03405

BOUGUER GRAVITY DATA

Sangre de Cristo
Gravity, 1983
2g-551

STATION IDENTIFICATION proj	sta-id	LOCATIONS LATITUDE deg	min	LONGITUDE deg	min	ELE (in m)	ST	GRAVITY OBSERVED	THEORETICAL	CORRECTIONS TERRAIN (d1=2.67)	BOUGUER	CURV	SPECIAL	ANOMALIES FREE air	COMPLETE-BOUGUER d1=2.67	d2=2.45
	2H	37	50.64	-105	33.21	3189.73	CO	979099.99	979978.42	18.34	-356.93	-1.08	0.00	105.20	-234.44	-206.46
	3H	37	51.46	-105	30.92	3798.42	CO	978966.15	979979.62	35.17	-425.04	-0.47	0.00	157.70	-232.64	-200.48
	4H	37	51.16	-105	28.75	3939.54	CO	978938.94	979979.18	38.08	-440.83	0.29	0.00	174.40	-228.64	-195.43
	5H	37	50.97	-105	27.77	3462.83	CO	979051.59	979978.91	16.00	-387.49	-0.83	0.00	140.47	-231.86	-201.18
	6H	37	39.41	-105	29.97	3547.57	CO	978993.48	979962.04	17.02	-396.97	-0.75	0.00	125.33	-255.37	-224.00
	7H	37	39.64	-105	29.20	3640.84	CO	978983.74	979962.38	17.70	-407.41	-0.65	0.00	144.00	-246.36	-214.20
	9H	37	40.32	-105	26.76	3070.86	CO	979118.82	979963.37	5.96	-343.63	-1.17	0.00	102.46	-236.38	-208.46
	10H	37	40.54	-105	25.42	2941.32	CO	979146.19	979963.69	4.26	-329.13	-1.25	0.00	89.58	-236.54	-209.67
	11H	37	40.86	-105	22.62	2857.50	CO	979171.71	979964.16	3.88	-319.75	-1.30	0.00	88.81	-228.37	-202.23
	13G	37	49.81	-105	35.27	2426.82	CO	979247.73	979977.21	3.59	-271.56	-1.47	0.00	19.02	-250.42	-228.22
	14G	37	49.16	-105	39.32	2351.53	CO	979234.54	979976.27	1.15	-263.14	-1.49	0.00	-16.43	-279.91	-258.20
	15G	37	49.55	-105	41.23	2334.77	CO	979230.33	979976.33	0.89	-261.26	-1.49	0.00	-26.37	-288.24	-266.66
	16G	37	48.36	-105	42.90	2323.19	CO	979228.67	979975.09	0.57	-259.96	-1.49	0.00	-29.86	-290.75	-269.26
	17G	37	47.67	-105	49.43	2296.36	CO	979253.22	979974.09	0.20	-256.96	-1.50	0.00	-12.58	-270.84	-249.56
	G50	37	51.69	-105	24.42	2781.30	CO	979196.66	979979.95	3.24	-311.23	-1.34	0.00	74.47	-234.86	-209.37
	G51	37	51.73	-105	23.68	2724.30	CO	979202.90	979980.02	2.99	-304.85	-1.37	0.00	63.08	-240.15	-215.16
	G52	37	52.04	-105	22.28	2589.28	CO	979230.63	979980.47	2.07	-289.74	-1.42	0.00	48.74	-240.35	-216.53
	G53	37	52.70	-105	21.29	2541.42	CO	979239.85	979981.43	1.85	-284.38	-1.44	0.00	42.25	-241.72	-218.33
	G54	37	53.54	-105	19.88	2490.22	CO	979258.07	979982.66	1.98	-278.66	-1.46	0.00	43.46	-234.67	-211.75
	G55	38	07.37	-105	35.31	2793.19	CO	979201.01	980002.88	7.04	-312.56	-1.33	0.00	59.55	-247.30	-222.02
	G56	37	53.36	-105	20.73	2494.79	CO	979255.29	979982.40	1.74	-279.17	-1.45	0.00	42.34	-236.54	-213.56
	G57	37	38.77	-105	31.60	3076.34	CO	979110.08	979961.11	12.21	-344.24	-1.16	0.00	97.67	-235.53	-208.07
	G58	37	37.77	-105	35.72	2247.60	CO	979238.98	979959.65	7.78	-251.51	-1.51	0.00	-27.41	-272.65	-252.44
	G59	37	37.20	-105	38.65	2308.25	CO	979232.10	979958.82	1.09	-258.29	-1.50	0.00	-14.76	-273.46	-252.15
	G61	37	38.50	-105	32.88	2634.69	CO	979198.11	979960.71	7.50	-294.82	-1.41	0.00	49.98	-238.75	-214.96
	G63	37	51.53	-105	26.16	3108.35	CO	979132.38	979979.73	7.32	-347.82	-1.14	0.00	111.21	-230.43	-202.28

Table 1