PRINCIPAL FACTS OF GRAVITY OBSERVATIONS IN THE DRAGOON MOUNTAINS NATIONAL FOREST AND GILA SAN FRANCISCO RIVERS WILDERNESS AREAS, ARIZONA

by

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Principal Facts of Gravity Observations in the Dragoon Mountains National Forest and Gila San Francisco Rivers Wilderness Areas, Arizona

Studies Related to Wilderness

The Wilderness Act (Public Law 88-577, Sept. 3, 1964) and related Acts require the U.S. Geological Survey to survey certain areas on Federal lands to determine their mineral resource potential. Results must be made available to the public and be submitted to the Administration and the Congress. This report presents the results of a geophysical survey of the Dragoon Mountains Further Planning Area (RARE II) and the Gila-San Francisco Wilderness Study Area, Arizona.

INTRODUCTION

This report presents the principal facts of new gravity observations in the Dragoon Mountains Further Planning Area (RARE II) and in the area of the Gila San Francisco Wilderness Study Area, and includes complete Bouguer gravity and residual Bouguer gravity anomaly maps for the two areas. New gravity data were obtained in November, 1979 and May, 1980 by M. Brickey. Fifty-one gravity stations were established in the Dragoon Mountains area within the area shown in figure 1. Sixty-nine gravity stations were established in the Gila San Francisco River Wilderness Study Area also shown in figure 1. The Dragoons survey area is bounded by lat $31^{\circ}35'$N., to lat $32^{\circ}20'$N., and long $109^{\circ}35'$W., to long $110^{\circ}25'$W., and is located in the Dragoon, Cochise, St. David, and Pearce 15′ quadrangles. The Gila San Francisco survey area is bounded by lat $32^{\circ}45'$N., to lat $33^{\circ}15'$N., long $109^{\circ}15'$W., to long $109^{\circ}45'$W., and is located in the Bryce Mountain, the Clifton, the Safford, and the Guthrie 15′ quadrangles. The Bouguer gravity

anomaly maps also include data from the Department of Defense (DOD), Boler and others (1980), and Wynn (1980).

DATA COLLECTION

Brickey's gravity observations were made using a LaCoste-Romberg[1/] geodetic gravity meter G-24 and were tied to the DOD gravity base stations in Safford or Clifton, Arizona for the Gila San Francisco survey, and in Wilcox, Arizona for the Dragoon Mountains survey; all of which are part of the International Gravity Standardization Net, 1971 established by the Defense Mapping Agency Aerospace Center (1974). A description of the Clifton base is included in appendix A; descriptions of bases at Wilcox and Safford are available from the DOD.

Gravity loops were started and ended daily at these bases. The observed gravity values were corrected for meter drift by a linear interpolation between the base station measurements. Mean duration of these loops was eight hours. Maximum recorded meter drift was 0.09 mgal over a nine hour loop, but drift was seldom greater than 0.04 mgal on the average. Meter readings for bases at Safford and Clifton, converted to milligals and corrected for earth tides are plotted against observation time in appendix A. Characteristics of this drift data are fair indicators of the uncertainties in the meter readings for all stations.

ELEVATION CONTROL

Forty-two of the 51 station elevations in the Dragoon Mountains area were obtained from bench marks, spot elevations, or section corners found on 1:62,500 scale U.S. Geological Survey topographic maps. The remaining nine were estimated from contour intervals at known positions on the maps. Thirty-

[1/] Use of brand names is for descriptive purposes and does not constitute endorsement by the U.S. Geological Survey.

four of the 69 station elevations in the Gila San Francisco area were estimated from contour intervals at known positions on the maps. The others were obtained from benchmarks, spot elevations, or triangulation points. Tabulations of the elevation controls and uncertainties for each station in the two survey areas are listed in appendix B (for the Dragoon Mountains) and appendix F (for the Gila San Francisco).

DATA REDUCTION

Unpublished U.S. Geological Survey computer programs were used to process and prepare Bouguer anomaly contour maps for the two survey areas. Station coordinates were digitized from field maps and converted to geographic coordinates. Observed gravity values were corrected for earth-tide and linear meter-drift using the 1967 geodetic reference system (International Union of Geodesy and Geophysics, 1967) and the 1971 Potsdam gravity value (Morelli, 1971). Computer terrain corrections were calculated from each station out to 166.7 km* using the method of Plouff (1977). For corrections from 0 to 5 km, 30 second mean elevation data was used for the Gila San Francisco area and fifteen second mean elevation data was used for the Dragoon Mountains area. Both surveys used 1 minute elevation data for corrections from 5 to 21 km, and 3 minute elevation data for corrections from 21 to 166.7 km. An assumed density of 2.67 gm/cm^3 was used for terrain corrections. Earth curvature corrections and complete Bouguer (terrain corrected) anomaly values were calculated. The complete Bouguer anomaly values were gridded at a 1 km spacing using the method of Briggs (1974). The grids are contained within the survey area boundaries mentioned previously, shown in Figure 1.

MAP COMPILATION

Station data which appeared to be in error (based on abnormally high

*1 km = 3281 feet

elevation and terrain correction errors and spurious anomalies), as well as duplicate observations were deleted from the data set prior to compiling the maps. The criteria used in deciding which station was to be kept in a given group of duplicates are as follows: when not in error, U.S. Geological Survey data had priority over DOD data, which in turn had priority over private company data.

Computer plotted contour maps of the gridded data were produced using a linear interpolation technique for positioning contours, with optional contour smoothing with splines under tension (Cline, 1974). The contour maps produced for this report make use of the smoothing option with spline factor sigma=3. The first order least squares polynomial surface was generated and subtracted from the complete Bouguer gravity values to give first order residual values, which have been plotted as residual gravity maps (fig. 2 and fig. 3).

PRINCIPAL FACTS

The principal facts of the Dragoon Mountains data are tabulated in appendix C. The tabulations include only Brickey's gravity data; however, the gravity maps were generated from the total data available. The data are shown contoured as a complete Bouguer gravity map in appendix D. Figure 2 shows a residual Bouguer contour plot of the survey area, obtained by removing the first order polynomial surface from the complete Bouguer grid (appendix D). The first order polynomial surface is shown contoured in appendix E.

The principal facts of the Gila San Francisco Wilderness Study Area are tabulated in appendix F. The data are shown contoured as a complete Bouguer gravity map in appendix G. Figure 3 is the residual Bouguer contour plot of the Gila San Francisco survey area, obtained by removing a first order polynomial surface from the complete Bouguer grid (appendix G). The first order polynomial surface is shown contoured in appendix H.

SELECTED REFERENCES

Boler, F. M., Klein, D. P., Christopherson, K., and Hoover, D., 1980, Gravity observations - Clifton-Morenci area, Greenlee County, SE Arizona: U.S. Geological Survey Open-File Report 80-96, 18 p.

Briggs, I. C., 1974, Machine contouring using minimum curvature: Geophysics, v. 39, no. 1, p. 39-48.

Cline, A. K., 1974, Scalar and planar-valued curve fitting using spline under tension: Communications of the Association for Computing Machinery, v. 14, no. 4, p. 218-223.

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

Grant, F. S. and West, G. F., 1965, Interpretation theory in applied geophysics: New York, McGraw-Hill Book Co., p. 236-239.

Hammer, S., 1939, Terrain corrections for gravimeter stations: Geophysics, v. 4, p. 184-194.

International Union of Geodesy and Geophysics, 1967, Resolution no. 1, XIV General Assembly: Bulletin Geodesique, v. 86, p. 367.

Morelli, C., 1971, The International Gravity Standardization Net 1971 (IGSN 71), International Association of Geodesy, Publication speciale no. 4.

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, 45 p.

Wynn, J. C., 1980, Principle facts for gravity stations and base station net in the Silver City 1^{o} x 2^{o} degree Quadrangle, Arizona and New Mexico: U.S. Geological Survey Open File Report no. 80-...(in press), p.

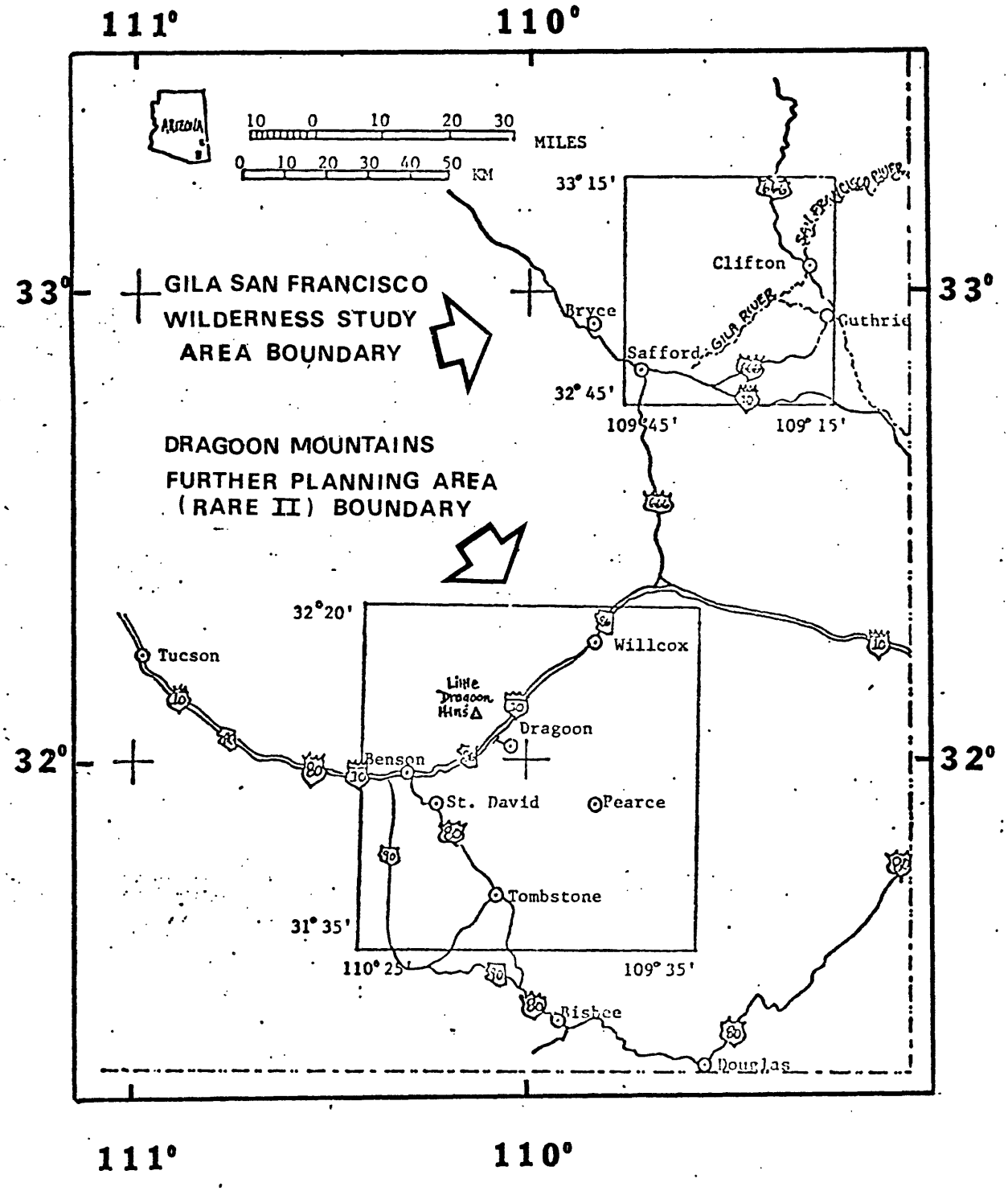


Figure 1. -- Index map showing location of this report.

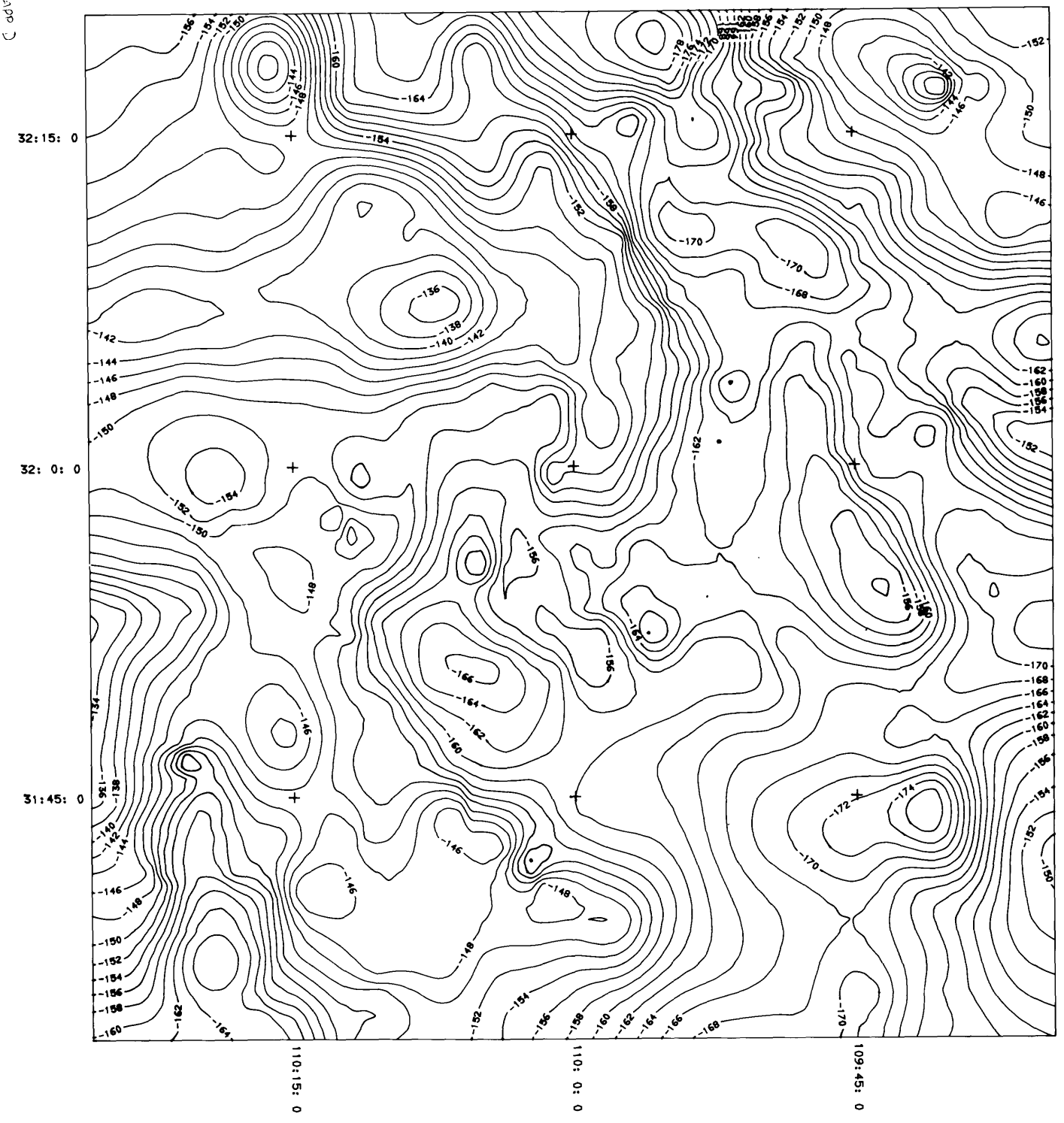


Figure 2.--Residual complete Bouguer anomaly contour map of the Dragoon Mountains survey area. The boundary of map is the boundary of the study area. Contour interval, 2 mgals.

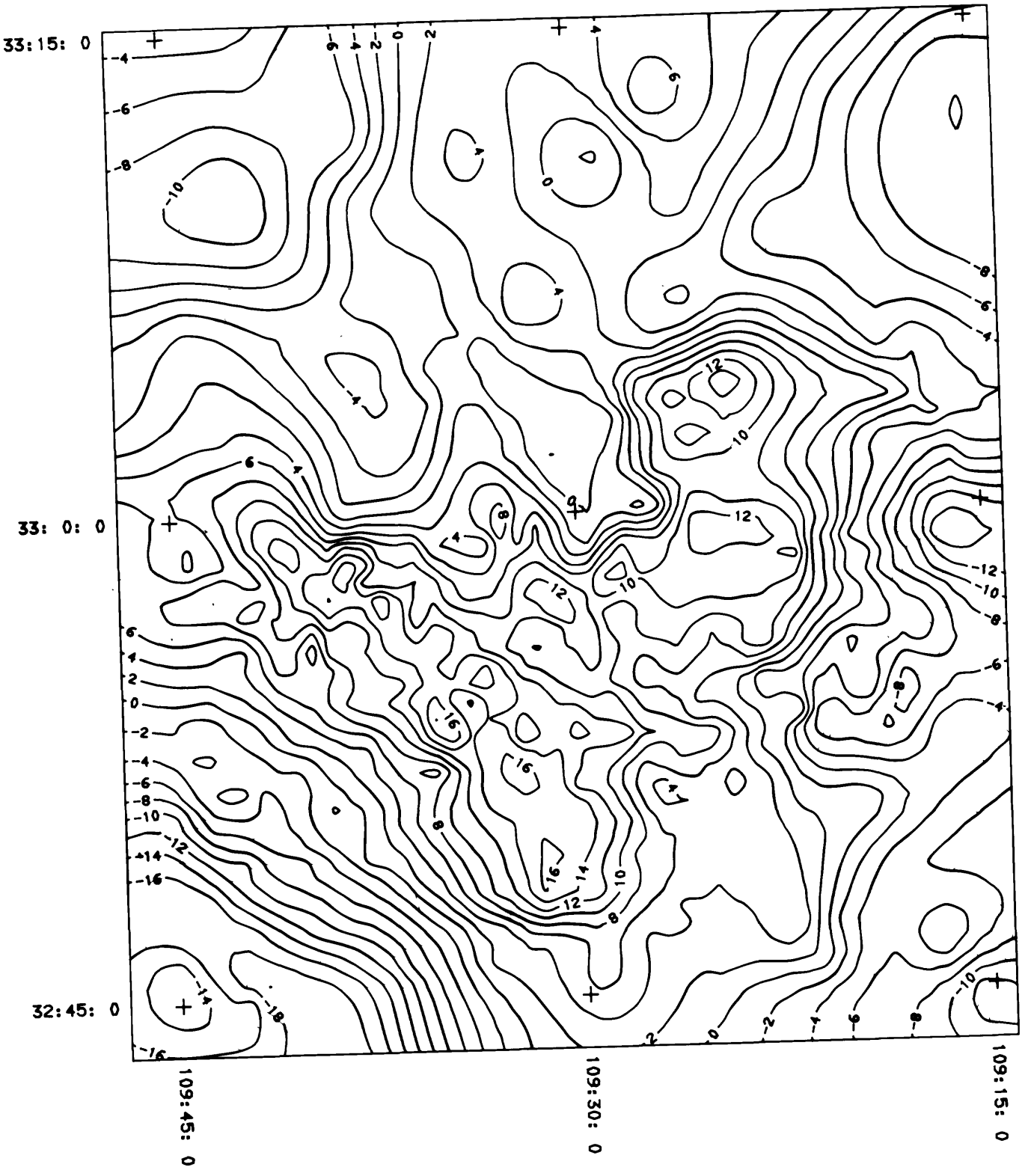
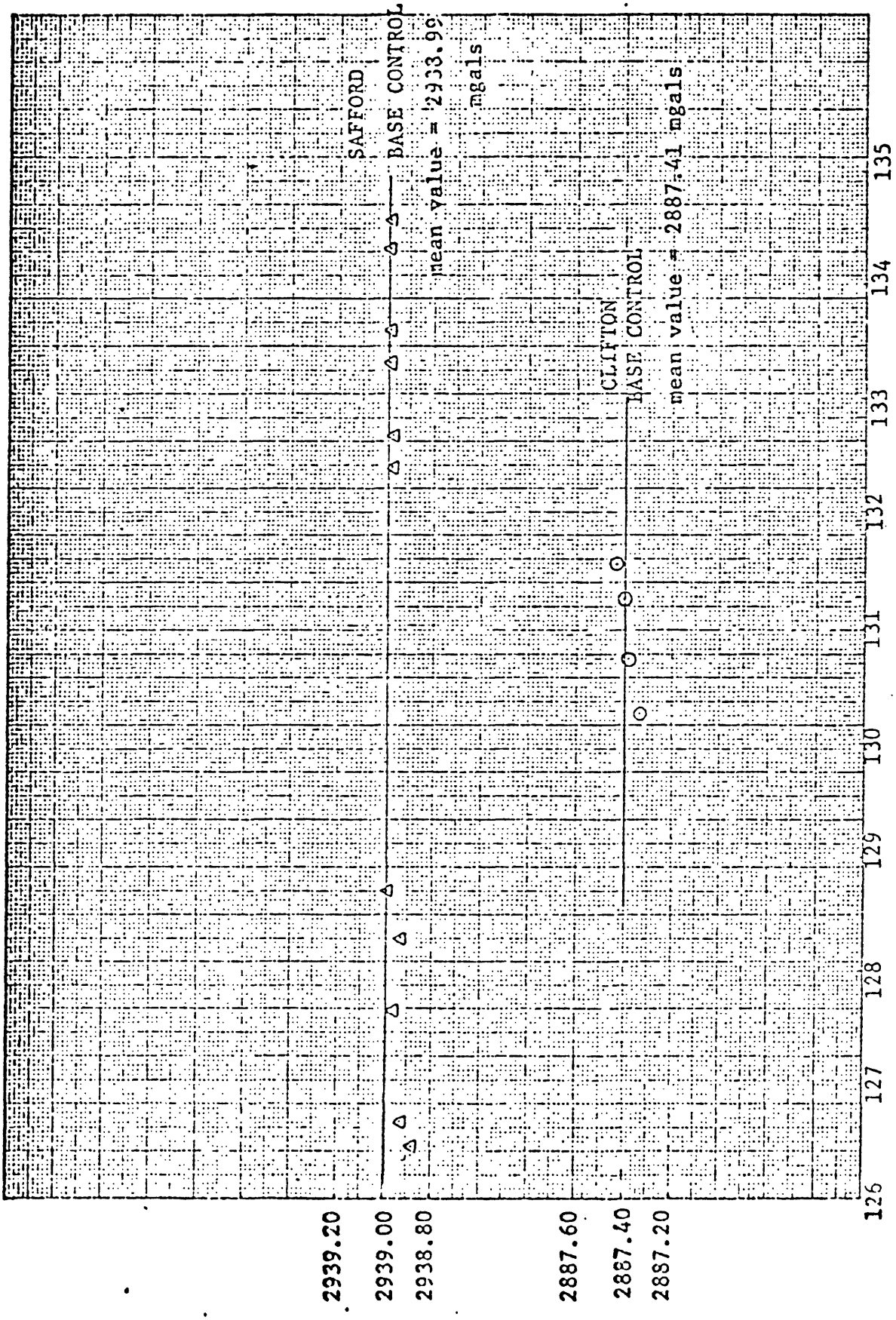


Figure 3.--Residual complete Bouguer anomaly contour map, Gila San Francisco Wilderness Study Area. Contour interval, 2 mgals.

Base Control. Graph shows meter drift data in mgals, tide corrected.



APPENDIX B

U.S. GEOLOGICAL SURVEY
GRAVITY BASE STATION

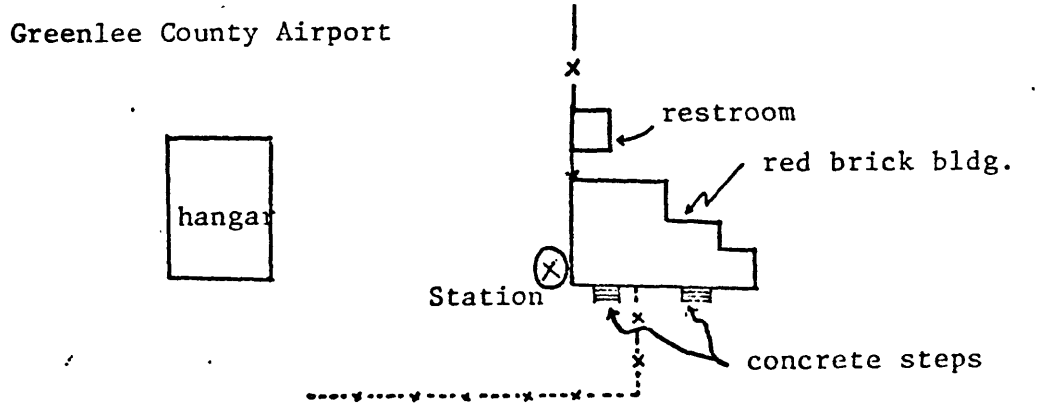
STATE/COUNTRY	STATION DESIGNATION	OBSERVED GRAVITY
Arizona	Clifton	979154.40 mgals (1971)
NEAREST TOWN Clifton	LONGITUDE 109°12.6' W	LATITUDE 32°57.48' N
ELEVATION 1156.7 m	TOPOGRAPHIC MAP(S) York Valley 15'	

DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE

DESCRIPTION/SKETCH

(Revised April, 1979; Boler, 1980)

Station site is located at the Clifton Airport (Greenlee County Airport) at the southwest corner of red brick building, under wall phone. The airport is approximately 10 miles south of Clifton.



APPENDIX C

EXPLANATION FOR PRINCIPAL FACTS LIST

Date: 11/06/80

Area: Dragoons

Data Source: M. Brickey, 1979

BASE STATION LIST

STATION	LATITUDE deg min	LONGITUDE deg min	ELEVATION ft	G R A V I T Y observed	BASE CODE
WILCOX	32 14.57	109 53.53	4183.0	979083.11	3

TERRAIN CORRECTIONS

Hand Correction: none.
Computer Correction: Plouff zones A through Z.
Digitized terrain data spacing for computer terrain corrections is 15 seconds.
TC columns of principal facts list contain total computer correction.

ELEVATION CONTROL AND UNCERTAINTIES

Table of Elevation Control Codes and Uncertainties

	type of control			
	contour interpolatn	spot elev* pre-1970 brn post-1970 blk	spot elev** pre-1970 blk	bench mark
uncertainty (fraction of the contour interval)	0.5	0.3	0.1	<1 ft
contour interval in ft	elevation uncertainties given as code:uncertainty in ft			
80	1:40.00	2:24.00	3: 7.99	4:<1 ft

* This column refers to spot elevations printed in black on USGS quadrangle maps published after 1970 or in brown on maps published before 1970. Spot elevations are determined by photogrammetry or third or lower order leveling at section corners, wells, triangulation points prominent topographic features, etc.

** This column refers to spot elevations printed in black on USGS quadrangle maps published before 1970. The elevations have been field checked.

PRINCIPAL FACTS

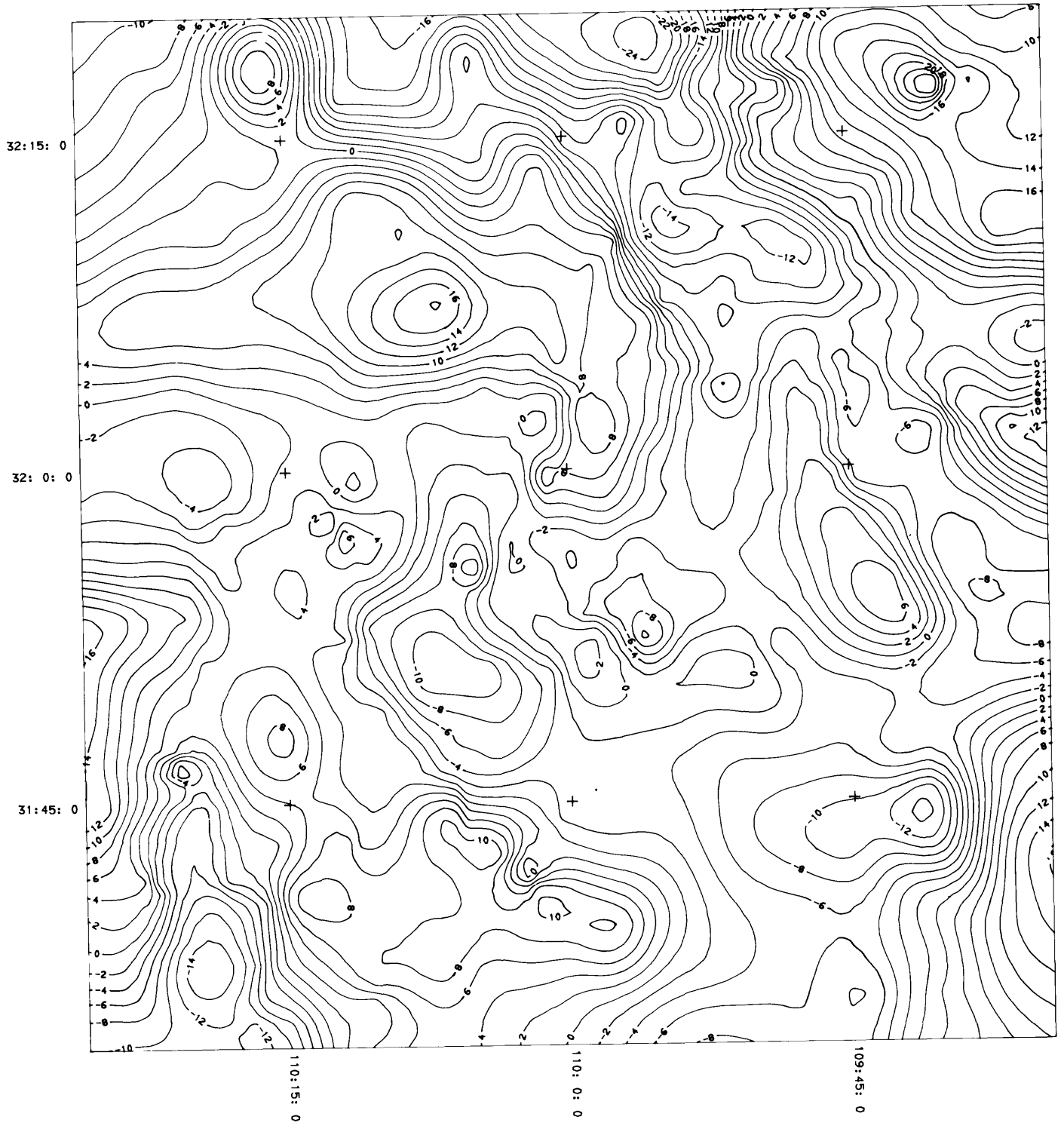
Area: Dragoons
Data source: M. Brickey, 1979

STATION	LATITUDE deg min	LONGITUDE deg min	ELEVATION ft code	GRAVITY observed	tc	cba	BASE CODE
DR- 40	32 3.81	-109 59.53	4854.0 12	979049.91	2.09	-147.11	3
DR- 41	31 57.55	-110 1.33	5610.0 2	978984.81	3.59	-157.03	3
DR- 42	31 56.84	-110 1.33	6546.0 2	978914.56	14.25	-159.65	3
DR- 43	31 56.76	-110 3.08	5253.0 2	979006.60	4.03	-155.08	3
DR- 44	31 56.00	-109 56.46	5004.0 2	979013.39	2.27	-163.91	3
DR- 45	31 53.77	-109 55.15	5018.0 2	979010.50	1.71	-163.51	3
DR- 46	32 2.47	-109 59.17	4780.0 12	979054.38	1.52	-145.82	3
DR- 47	32 0.73	-109 59.65	5464.0 13	979004.88	4.81	-148.77	3
DR- 48	31 59.09	-110 0.42	6272.0 2	978944.07	12.05	-151.79	3
DR- 49	31 53.44	-109 59.02	7118.0 2	978873.03	15.67	-160.91	3
DR- 50	31 53.66	-109 58.14	6760.0 2	978894.30	13.89	-163.16	3
DR- 51	31 51.10	-109 57.39	6662.0 2	978900.25	16.91	-156.60	3
DR- 52	31 50.11	-109 54.63	5618.0 2	978972.39	4.39	-158.12	3
D1	32 5.50	-109 56.30	4290.0 4	979084.29	0.17	-150.65	3
D2	32 1.29	-110 0.79	4759.0 3	979046.25	0.84	-154.29	3
D3	32 1.29	-110 0.76	4731.0 1	979043.35	0.82	-158.88	3
D4	32 1.28	-109 57.74	4643.0 3	979059.69	0.91	-147.70	3
D5	31 56.92	-109 54.88	4503.0 2	979050.04	0.64	-160.09	3
D6	31 58.67	-109 57.86	4919.0 2	979033.90	1.75	-152.62	3
D7	31 56.05	-109 52.82	4490.0 2	979048.42	0.38	-161.56	3
D8	31 51.67	-109 53.83	4879.0 2	979020.79	0.89	-159.52	3
D9	31 50.80	-109 59.55	5132.0 2	979009.48	1.23	-154.18	3
D10	31 52.49	-109 57.26	5780.0 1	978963.88	3.28	-161.26	3
D11	31 58.67	-109 54.87	4451.0 2	979056.69	0.47	-159.08	3
D12	31 57.80	-110 2.80	4975.0 3	979025.42	1.56	-156.76	3
D13	31 58.02	-110 1.10	5470.7 3	978996.09	3.58	-154.72	3
D14	31 55.30	-110 2.24	4865.0 1	979029.62	1.49	-155.83	3
D15	31 52.70	-110 1.55	4839.0 3	979027.91	1.93	-155.20	3
D16	31 54.01	-109 59.29	7071.0 2	978877.55	15.82	-159.83	3
D17	31 54.30	-109 53.04	4625.0 1	979035.18	0.49	-164.26	3
D18	31 55.63	-109 57.86	4895.0 1	979021.15	5.07	-159.37	3
D19	32 4.75	-109 58.67	4421.0 3	979076.53	0.32	-149.41	3
D20	32 3.13	-109 58.96	4745.0 3	979055.52	1.59	-147.59	3
D21	32 3.04	-110 0.76	4560.0 3	979059.82	0.51	-155.31	3
D22	32 4.76	-110 0.68	4886.0 3	979052.66	0.88	-144.94	3
D23	32 4.77	-110 1.69	4725.0 3	979059.55	0.55	-148.03	3
D24	32 0.42	-110 0.77	4980.0 3	979034.51	1.49	-150.99	3
D25	32 1.28	-109 58.74	4786.0 3	979050.30	1.75	-147.70	3
D26	31 52.34	-109 55.89	5030.0 1	979000.30	4.38	-168.40	3
D27	31 51.24	-109 57.99	5445.0 1	978987.81	2.80	-156.16	3

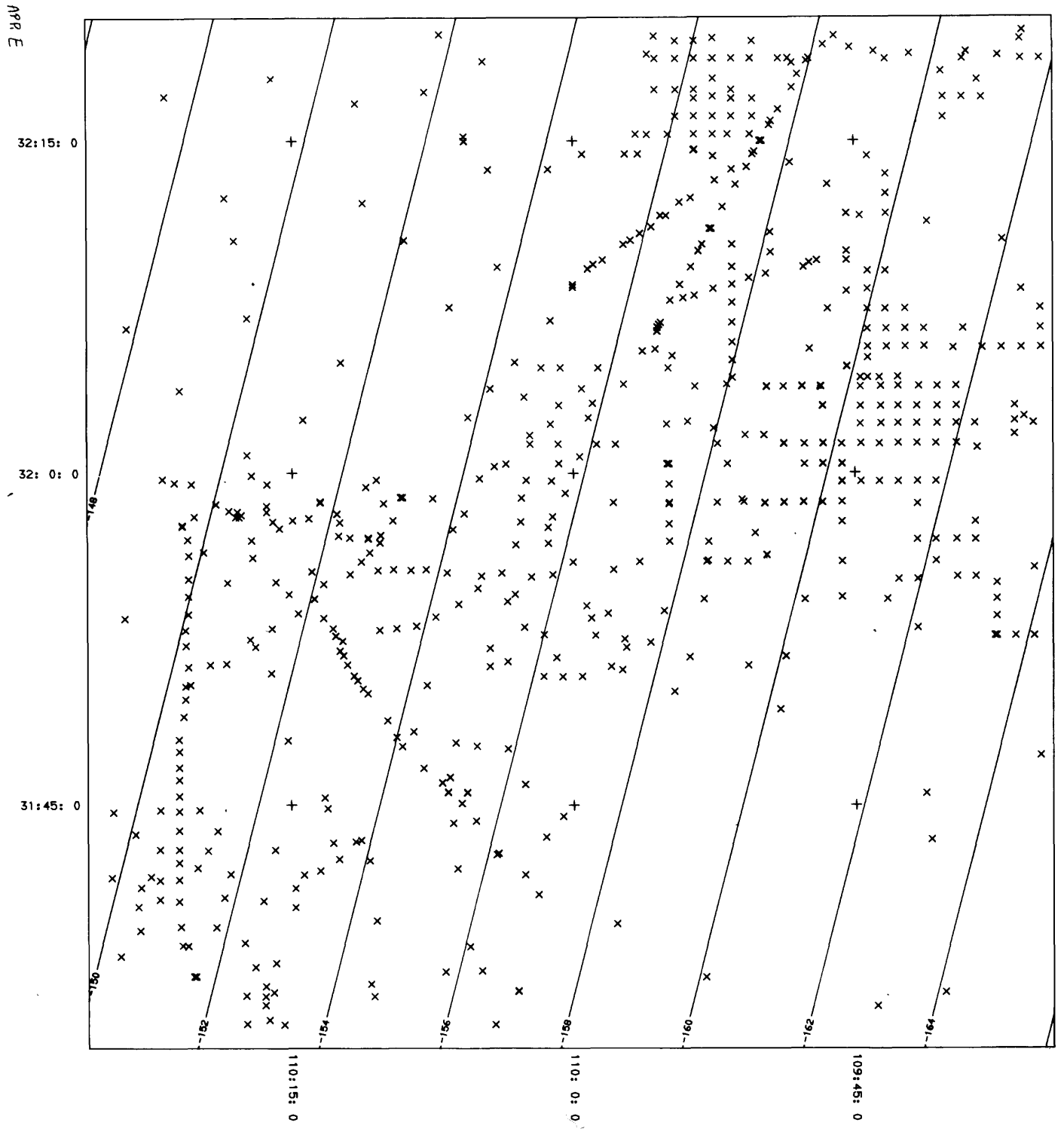
PRINCIPAL FACTS

Area: Dragoons
Data source: M. Brickey, 1979

STATION	LATITUDE deg	min	LONGITUDE deg	min	ELEVATION ft	code	GRAVITY observed	tc	cba	BASE CODE
D29	31	51.65	-110	0.92	4967.0	3	979017.38	1.35	-157.18	3
D30	31	54.19	-110	3.51	4733.0	3	979036.87	0.81	-155.65	3
D31	31	55.98	-110	0.01	5323.0	3	978995.08	4.99	-160.41	3
D32	31	55.41	-110	1.10	4960.0	1	979021.31	3.03	-157.07	3
D33	31	59.63	-110	1.17	5040.0	1	979032.31	1.93	-148.09	3
D34	31	58.87	-110	2.77	4732.0	3	979040.59	1.45	-157.67	3
D35	32	0.41	-109	54.90	4323.0	3	979067.13	0.31	-158.80	3
D36	32	0.40	-110	3.59	4551.0	3	979056.46	0.61	-155.53	3
D37	32	3.43	-110	2.60	4707.0	4	979055.02	0.52	-151.84	3
D38	32	4.74	-109	54.92	4223.0	3	979083.88	0.13	-154.07	3



Complete Bouguer map, Dragoon Mountains survey area. Reduction density, 2.67 g/cm^3; contour interval, 2 mgals.



First order polynomial surface, Dragoon Mountains survey area. Contour interval, 2 mgals. Stations are shown as 0.

APPENDIX F

EXPLANATION FOR PRINCIPAL FACTS LIST

Date: 11/06/80

Area: Gila San Francisco Area

Data Source: M. Brickey,1980

BASE STATION LIST

STATION	LATITUDE deg min	LONGITUDE deg min	ELEVATION ft	G R A V I T Y observed	BASE CODE
CLIFTON	32 57.48	109 12.60	3794.9	979154.40	1
SAFFORD	32 51.13	109 39.22	3130.0	979206.13	2

TERRAIN CORRECTIONS

Hand Correction: none.
Computer Correction: Plouff zones A through Z.
Digitized terrain data spacing for computer terrain corrections is 30 seconds.
TC columns of principal facts list contain total computer correction.

ELEVATION CONTROL AND UNCERTAINTIES

Table of Elevation Control Codes and Uncertainties

	type of control			
	contour interpolatn	spot elev* pre- 1970 brn post-1970 blk	spot elev** pre-1970 blk	bench mark
uncertainty (fraction of the contour interval)	0.5	0.3	0.1	<1 ft
contour interval in ft	elevation uncertainties given as code:uncertainty in ft			
80	1:40.00	2:24.00	3: 7.99	4:<1 ft

* This column refers to spot elevations printed in black on USGS quadrangle maps published after 1970 or in brown on maps published before 1970. Spot elevations are determined by photogrammetry or third or lower order leveling at section corners, wells, triangulation points prominent topographic features, etc.

** This column refers to spot elevations printed in black on USGS quadrangle maps published before 1970. The elevations have been field checked.

PRINCIPAL FACTS

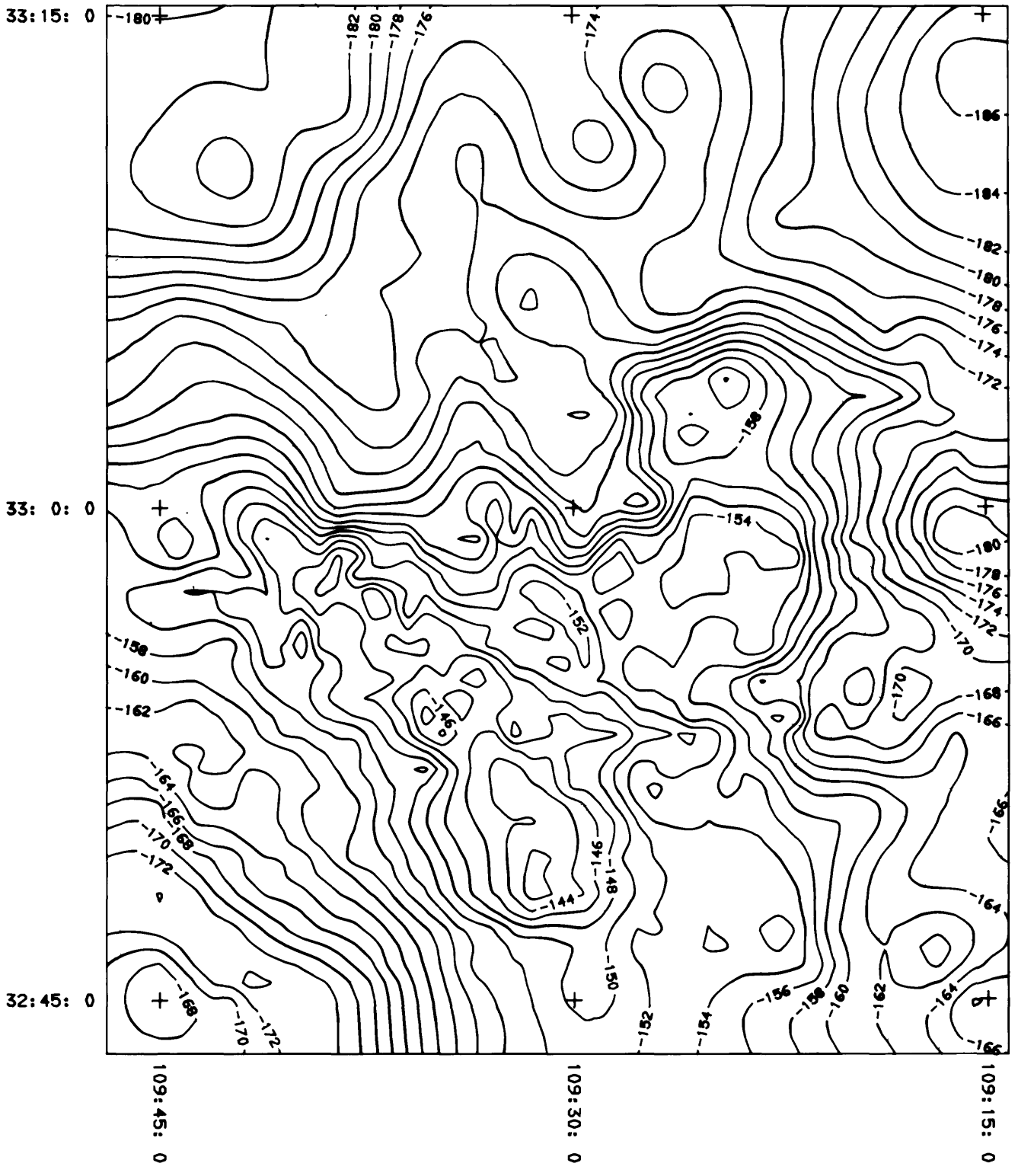
Area: Gila San Francisco Area
Data source: M. Brickey,1980

STATION	LATITUDE deg	min	LONGITUDE deg	min	ELEVATION ft	code	G R A V I T Y observed	tc	cba	BASE CODE
SAFFORD	32	51.13	-109	39.22	3130.0	5	979206.14	0.37	-160.11	2
SAFF- 1	32	55.63	-109	38.56	3925.0	1	979172.67	1.71	-150.95	2
SAFF- 2	32	56.27	-109	38.11	4410.0	1	979142.07	3.51	-151.66	2
SAFF- 3	32	56.39	-109	35.57	4505.0	1	979140.95	2.44	-148.34	2
SAFF- 4	32	56.12	-109	36.21	5000.0	1	979108.95	2.71	-150.11	2
SAFF- 5	32	55.72	-109	36.29	4890.0	1	979117.95	3.55	-146.30	2
SAFF- 6	32	56.62	-109	32.78	4040.0	1	979166.83	1.62	-151.38	2
SAFF- 7	32	54.56	-109	34.15	4140.0	1	979162.63	3.92	-144.47	2
SAFF- 8	32	55.23	-109	37.79	3810.0	1	979194.57	2.42	-134.66	2
SAFF- 9	32	58.14	-109	41.55	4100.0	1	979160.38	1.50	-156.45	2
SAFF- 10	32	57.36	-109	41.03	3990.0	1	979174.05	1.28	-148.50	2
SAFF- 11	32	57.43	-109	41.98	3800.0	1	979181.42	1.81	-152.04	2
SAFF- 12	32	55.97	-109	42.60	3445.0	1	979194.00	1.05	-159.41	2
SAFF- 13	32	55.94	-109	40.91	3670.0	1	979188.04	1.35	-151.60	2
SAFF- 14	32	55.25	-109	40.80	3545.0	1	979192.82	1.23	-153.45	2
SAFF- 15	32	55.55	-109	40.03	3625.0	1	979189.51	1.87	-151.76	2
SAFF- 16	32	55.07	-109	39.86	3540.0	1	979192.22	1.41	-153.93	2
SAFF- 17	32	52.06	-109	40.44	3127.0	1	979205.84	0.46	-161.77	2
SAFF- 18	32	55.16	-109	23.37	4600.0	1	979124.68	0.77	-158.91	2
SAFF- 19	32	55.53	-109	23.47	4570.0	1	979129.12	0.76	-156.78	2
SAFF- 20	32	56.10	-109	23.55	4485.0	1	979138.09	1.11	-153.32	2
SAFF- 21	32	56.14	-109	24.10	4644.0	5	979125.37	1.71	-156.00	2
SAFF- 22	32	55.70	-109	23.21	4460.0	1	979138.69	1.19	-153.59	2
SAFF- 23	32	56.35	-109	22.78	4565.0	1	979130.34	1.89	-155.85	2
SAFF- 24	32	54.57	-109	23.05	4680.0	1	979111.76	1.11	-165.90	2
SAFF- 25	33	3.19	-109	24.89	4000.0	1	979172.39	2.36	-156.50	1
SAFF- 26	33	3.65	-109	27.63	4140.0	1	979159.12	5.16	-159.25	1
SAFF- 27	33	6.40	-109	32.10	4844.0	3	979118.23	1.09	-165.92	1
SAFF- 28	33	4.30	-109	37.34	4935.0	3	979101.77	1.50	-173.64	1
SAFF- 29	33	5.01	-109	38.76	5091.0	2	979093.79	1.26	-173.51	1
SAFF- 30	33	6.51	-109	38.14	4300.0	1	979143.00	3.20	-171.71	1
SAFF- 31	33	5.78	-109	33.02	4938.0	2	979107.29	1.20	-170.28	1
SAFF- 32	33	4.89	-109	31.36	5215.0	1	979090.64	2.74	-167.61	1
SAFF- 33	32	58.83	-109	18.26	3605.0	3	979175.71	0.58	-172.55	1
SAFF- 34	32	59.39	-109	18.98	3685.0	1	979173.18	0.55	-171.11	1
SAFF- 35	32	59.95	-109	17.87	3820.0	1	979162.81	0.49	-174.24	1
SAFF- 36	32	55.37	-109	18.23	5078.0	3	979080.34	7.75	-167.99	1
SAFF- 37	32	56.27	-109	18.65	3920.0	1	979159.20	1.82	-165.49	1
SAFF- 38	32	56.02	-109	17.24	3980.0	1	979154.56	1.52	-166.50	1
SAFF- 39	32	56.31	-109	17.87	4020.0	1	979151.54	2.16	-166.89	1

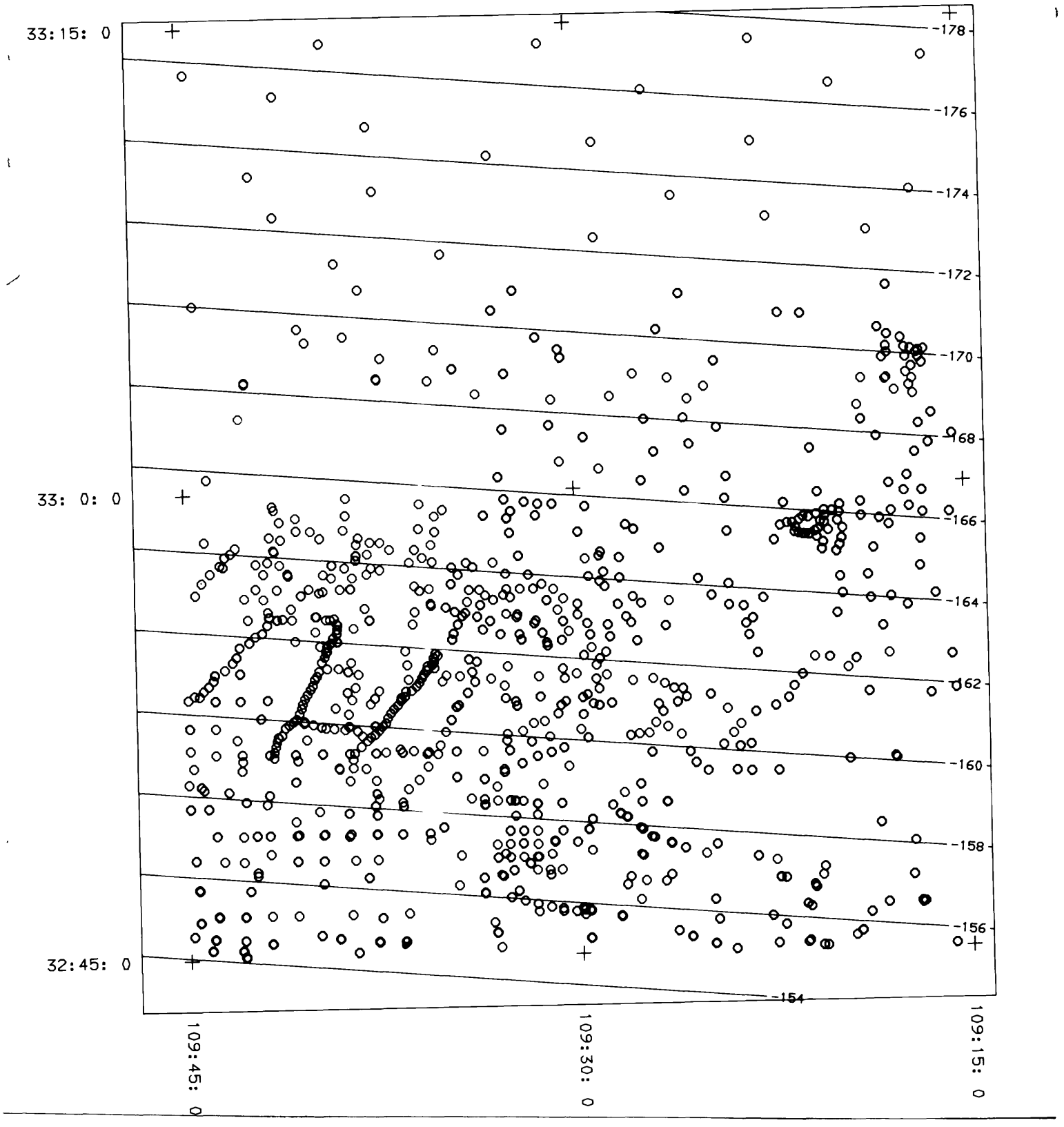
PRINCIPAL FACTS

Area: Gila San Francisco Area
Data source: M. Brickey,1980

STATION	LATITUDE deg	min	LONGITUDE deg	min	ELEVATION ft	code	GRAVITY observed	tc	cba	BASE CODE
SAFF- 41	32	58.60	-109	29.88	5656.0	2	979057.89	6.65	-161.41	2
SAFF- 42	32	57.82	-109	29.09	4657.0	2	979128.60	2.08	-153.93	2
SAFF- 43	32	58.65	-109	27.72	5505.0	2	979071.33	6.88	-156.85	2
SAFF- 44	32	59.84	-109	25.73	4569.0	2	979136.63	2.90	-153.12	2
SAFF- 45	33	1.11	-109	26.88	5008.0	2	979106.43	3.30	-158.43	2
SAFF- 46	33	1.35	-109	25.52	4448.0	2	979139.73	4.35	-157.87	2
SAFF- 47	33	0.20	-109	27.39	5608.0	2	979057.27	6.00	-167.75	2
SAFF- 48	33	0.61	-109	29.01	6069.0	2	979031.47	7.24	-165.30	2
SAFF- 49	33	1.64	-109	29.60	6337.0	2	979013.70	10.11	-165.58	2
SAFF- 50	32	55.52	-109	26.57	3904.0	4	979170.41	1.46	-154.56	2
SAFF- 51	32	56.46	-109	24.77	4418.0	4	979136.09	3.85	-157.08	2
SAFF- 52	32	55.64	-109	27.89	3778.0	4	979176.89	1.69	-155.55	2
SAFF- 53	32	55.04	-109	27.67	3705.0	4	979178.96	2.30	-156.40	2
SAFF- 54	32	56.33	-109	26.41	3968.0	4	979167.59	2.82	-153.31	2
SAFF- 55	32	57.01	-109	25.28	4005.0	1	979165.85	4.10	-152.50	2
SAFF- 56	33	0.27	-109	24.12	4256.0	3	979150.31	4.32	-157.31	2
SAFF- 57	32	59.58	-109	24.20	3777.0	2	979185.25	1.72	-152.63	2
SAFF- 58	32	58.51	-109	24.13	4180.0	3	979156.84	5.50	-151.72	2
SAFF- 59	33	1.86	-109	24.43	4418.0	2	979145.23	1.91	-157.31	2
SAFF- 60	33	2.04	-109	30.89	7004.0	5	978960.24	19.70	-170.07	2
SAFF- 61	33	2.88	-109	30.80	6388.0	2	979011.40	8.20	-168.45	2
SAFF- 62	33	0.87	-109	30.53	6635.0	3	978988.23	14.37	-167.89	2
SAFF- 63	33	1.93	-109	32.69	4733.0	2	979116.93	2.94	-165.85	2
SAFF- 64	33	3.73	-109	32.60	5006.0	2	979098.04	2.64	-171.20	2
SAFF- 65	32	59.39	-109	21.95	3350.0	4	979205.94	2.91	-155.99	2
SAFF- 66	33	2.80	-109	25.55	4510.0	2	979136.68	4.31	-159.26	2
SAFF- 67	33	5.06	-109	26.69	4693.0	2	979120.44	3.22	-168.77	2
SAFF- 68	33	2.18	-109	27.23	4815.0	2	979116.36	2.75	-162.06	2
SAFF- 69	33	2.94	-109	28.53	5538.0	2	979065.94	5.86	-167.19	2



Complete Bouguer map, Gila San Francisco survey area. Reduction density, 2.67 g/cm^3; contour interval, 2 mgals.



First order polynomial surface, Gila San Francisco survey area. Contour interval, 2 mgals. Stations are shown as 0.