DEPARTMENT OF THE INTERIOR

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Principal facts for 284 gravity stations in the Newcastle 1°X2° quadrangle, northeastern Wyoming

by Courteney Williamson[1] and S.L. Robbins[1]

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[1]U.S. Geological Survey
Denver, CO 80225

Table of Contents

Page

Introduction 1
Data Collection 1
Data Reduction 4
References 5
Appendix 1. Base Station Descriptions 7
Appendix 2. Principal Facts for 284 gravity stations ... 12
in the Newcastle, Wyoming 1°X2° quadrangle
Appendix 3. Description of Data Format Used for 23
Files on Diskette

Illustrations

Figure 1. Plot of gravity stations in the western 2
half of the Newcastle quadrangle, Wyoming
2. Plot of gravity stations in the eastern 4
half of the newcastle quadrangle, Wyoming
3. Description of base station BDGRR 8
4. Description of base station BGLPO 9
5. Description of base station BLK1 10
6. Description of base station BNCPO 11

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Introduction

This report contains principal facts, base station descriptions and station location plots for 284 gravity stations located in the Newcastle 1°X2° quadrangle between latitude 43° and 44° N and longitude 104° and 106° W (fig. 1 and 2). These data were collected and processed by the U.S. Geological Survey (USGS) as part of a study of the Evolution of Sedimentary Basins (ESB) program of the Powder River Basin. Data collected to the north and northwest of this quadrangle for the ESB study are in Williamson and Robbins (1991) and are used in Robbins (in press-a; in press-b), Robbins and Grow (1992; in press), and Robbins and Williamson (in press-a). The data in this report are used in the following publications: Robbins (in press-b), Robbins and Grow (1992; in press), and Robbins and Williamson (in press-b).

The principal facts for these gravity stations are presented in appendix 2. Information pertaining to base stations used, gravity meter used, elevation control, and reduction problems are given in the next two sections. Base station descriptions are presented in appendix 1, plots of station locations in figures 1 and 2, and a description of the data format for all the files on the diskette in appendix 3.

Data Collection

Gravity observations were made using La Coste and Romberg gravity meter G-161. The primary base station is a the post office in Newcastle, Wyoming and is the U.S. Defence Mapping Agency (DMA), St. Louis, MO, base station no. 0649-1 (Jablonski, 1974) (see fig 6, p.11) having a value of 980,128.80 mgal. Three secondary base stations were established and tied to the primary base by many repeated observations. One of these secondary bases (BGLPO) is located on the Gillette 1°X2° quadrangle, and the other two secondary bases (BDGRR and BLK1) are located on the Torrington 1°X2° quadrangle to the south. Gravity meter drift was determined from the daily ties to the primary and (or) secondary base stations.

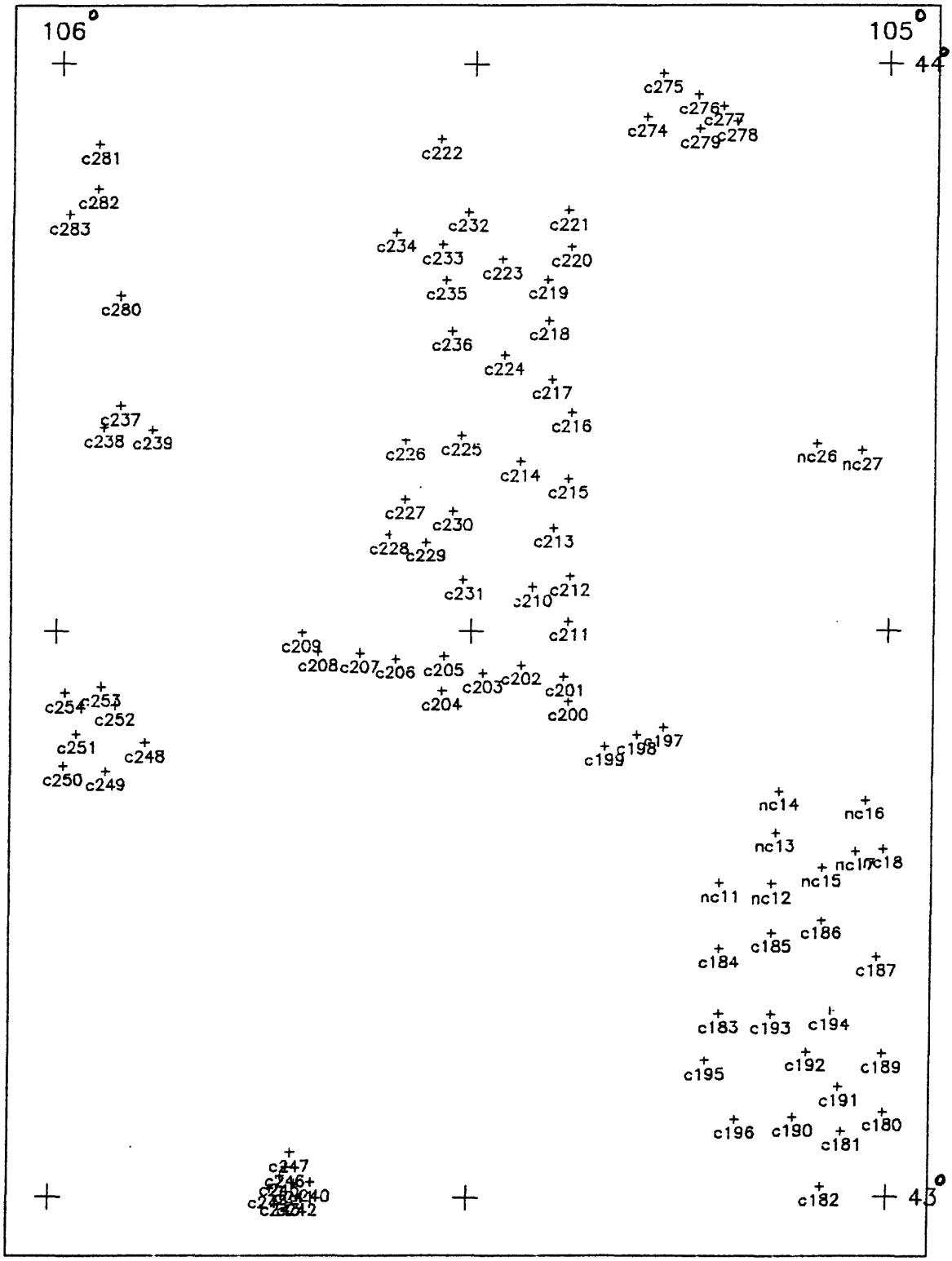

Figure 1. Plot of gravity stations in the western half of the Newcastle quadrangle, Wyoming. Scale 1:600,000.

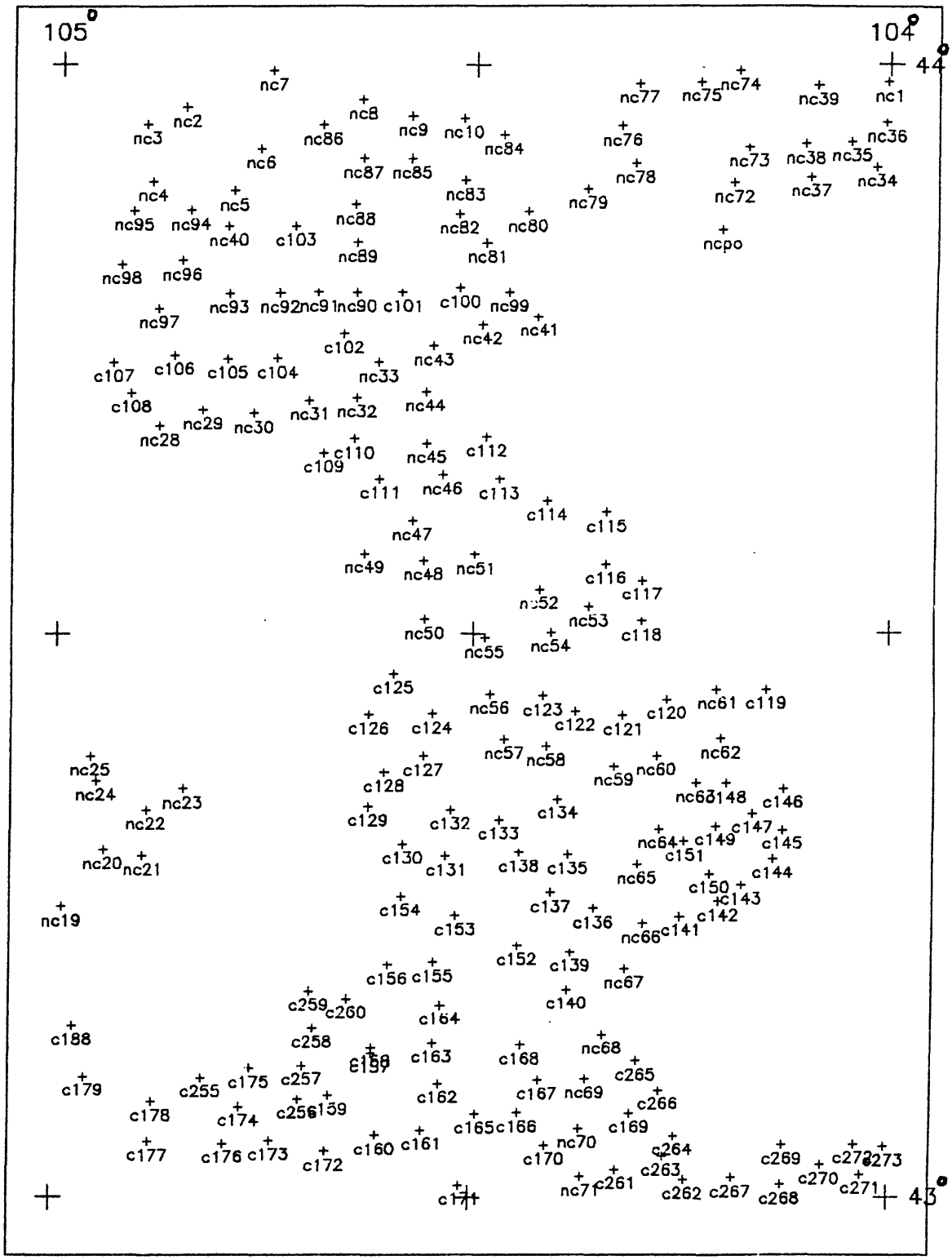

Figure 2. Plot of gravity stations in the eastern half of the Newcastle quadrangle, Wyoming. Scale 1:600,000.

Gravity observations for stations listed in appendix 2 were made at or near bench marks, spot elevations, or section corners with known elevations as shown on USGS 1:24,000-scale topographic maps. Map elevation contours are in 10, 20 or 40 foot intervals. Maps published prior to the mid-1960's have spot elevations printed in two colors; brown and black. Elevation printed in brown (photogrammetric) are accurate to within ±0.25 times the contour interval, while black elevations (surveyed in) are accurate to within ±0.05 times the contour interval (± 2 ft for a 40 ft interval). Maps published after the mid-1960's have only black elevations which are accurate to within ±0.25 times the contour interval. Bench marks are accurate to within ±.001 ft but are recorded here only to the nearest 0.1 ft.

Data Reduction

The observed gravity (O.G.) value for each station in this report is relative to the IGSN 1971 datum (Morelli, 1974). Inner zone terrain effects or corrections (T.C.'s) were determined manually, using topographic maps and templates, out to a distance of 0.59 km from each station. These T.C.'s, the O.G. values, the station locations (latitude and longitude), and the station elevations were entered into the computer program BOUGUER (Godson and Plouff, 1988). This program, using the GRS-1967 formulas (International Association of Geodesy, 1971), the assumed average crustal density of 2.67 g/cm^3, and digital terrain files to calculate T.C.'s out to a distance of 166.7 km, calculated the complete Bouguer anomaly (CBA) gravity values found in appendix 2. Using a 3-minute digital terrain file, the calculated CBA value, an assumed depth of compensation of 40 km below sea level, an assumed crustal density of 2.72 g/cm^3, and an assumed density contrast of the crust-mantle interface of 0.35 g/cm^3, the isostatic residual anomaly (IRA) gravity values were calculated using the computer program AIRYROOT (Simpson and others, 1983) which is based on the Airy-Heiskanen isostatic model.

All of the O.G. values in appendix 2 are accurate to within ±0.05 mGal relative to their local base station. T.C.'s are accurate to within ±10 % of the calculated value which in this data set is less than ±0.08 mgal. If the elevation used for a station is in error by 10 ft (a possibility for spot elevations printed in brown in the mountains), the error introduced into the CBA value would be 0.60 mGal. Therefore, the maximum error in a CBA could be as much as ±0.73 mgal in this report. However, most errors are probably less than ±0.20 mGal.

References

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Williamson Courteney, and Robbins S.L., 1991, Principal facts for 1040 gravity stations in the Gillette and Sheridan 1°X2° quadrangles, and Crow Indian Reservation, Wyoming, Montana, and South Dakota: U.S. Geological Survey Open-File Report 91-287, 59 p.

Appendix 1. Base Station Descriptions

The following are descriptions of four gravity base stations to which all of the field stations in appendix 1 are directly tied. BNCPO is the primary base with a observed gravity value of 980,128.80 mgal relative to the IGSN 1971 datum (Morelli, 1974). Stations BDGRR, BGLPO, and BLK1 are secondary bases that all have multiple ties to BNCPO with errors in the observed gravity values relative to the primary base of less than ±0.01 mgal.

GRAVITY BASE STATION # BDGRR	
CITY Douglas	**STATE** Wyoming
LATITUDE 42°45. 66' N	**LONGITUDE** 105° 23.16'W
ELEVATION 4818.2 ft (1468.59m)	
OBSERVED GRAVITY 979,942.1 mgal	**SBA** -185.87 mgal

LOCATION DESCRIPTION:

At Douglas, Converse County, in front of the Chicago, Burlington and Quincy Railroad station 23.5 ft north of the center line of the south Entrance, 4.0 ft west of the west face of the station 31.5 ft east of east rail, and in top of concrete base of semaphore (U15 1934)

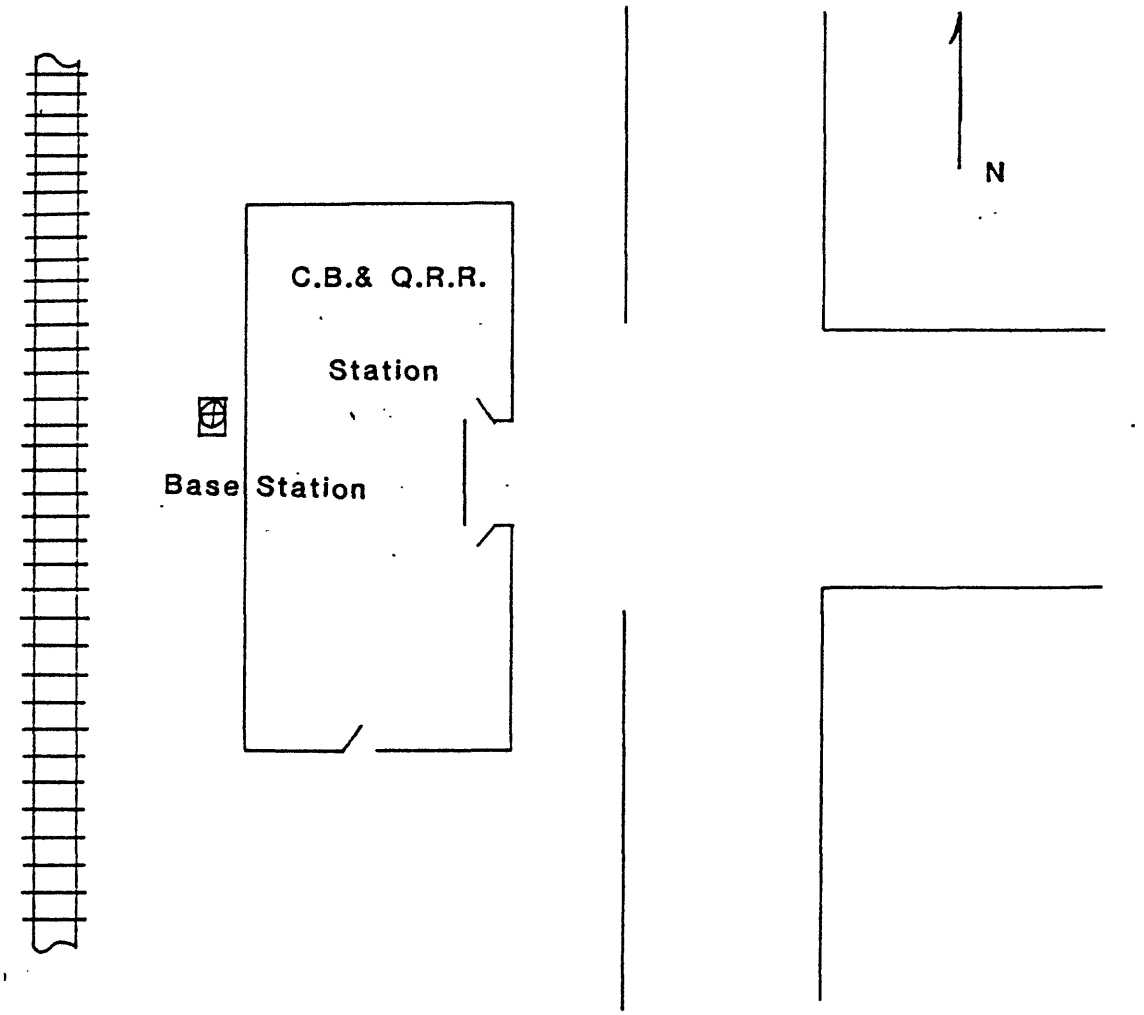

Figure 3. Description of base station BDGRR (Not to Scale).

GRAVITY BASE STATION # BNCPO	
CITY Newcastle	**STATE** Wyoming
LATITUDE 43° 51.33'N	**LONGITUDE** 104° 12.11'W
ELEVATION 4334 ft (1321 m)	
OBSERVED GRAVITY 980,128.80 mgals	**SBA** -127.03 mgals

LOCATION DESCRIPTION:

At Newcastle in U.S. Post Office (one story brick building) at corner of Main and Sumner Ave. In lobby against Northwest (front) wall; 2 meters NE of main entrance, between entrance vestibule and first window NE of vestibule, on Torrazzo floor. (ACIC 0649-1, IGB IS534-B).

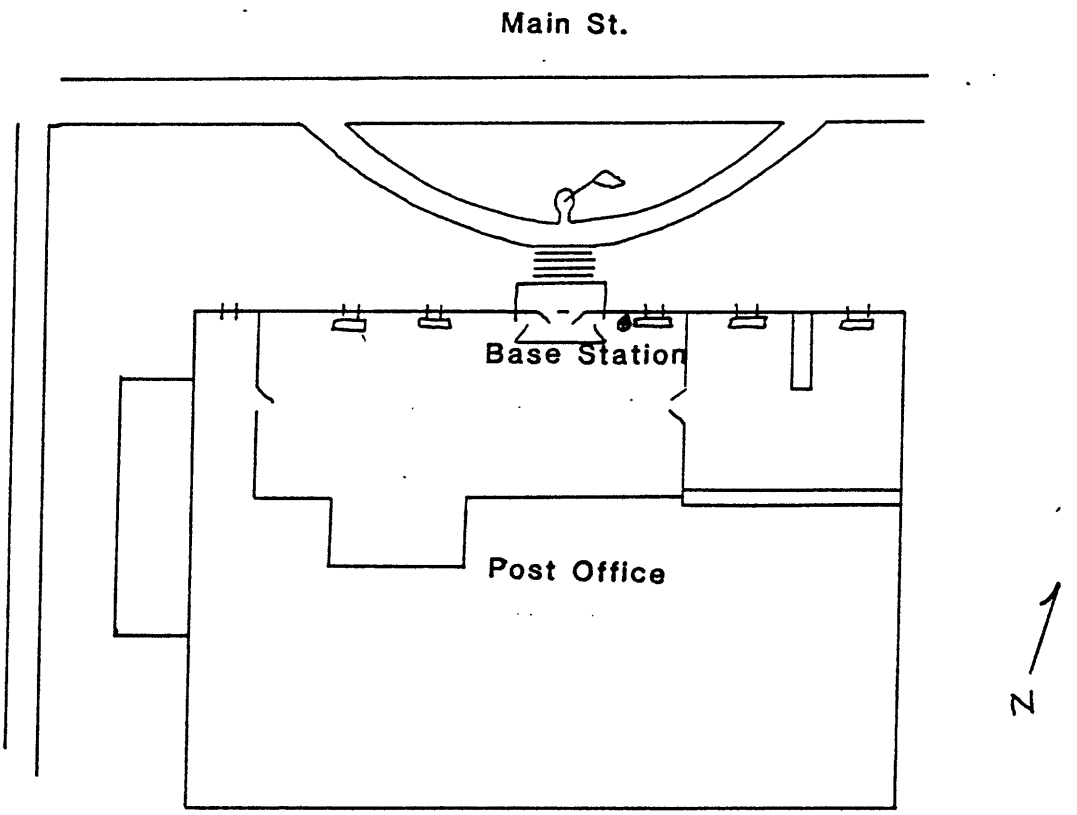

FIgure 4. Description of base station BGLPO (Not to Scale).

GRAVITY BASE STATION #BLK 1	
CITY Lusk	**STATE** Wyoming
LATITUDE 42° 45.60'N	**LONGITUDE** 104° 27.02'W
ELEVATION 5,032.8 ft (1534.00m)	
OBSERVED GRAVITY 980,013.64 mgal	**SBA** -101.39 mgal

LOCATION DESCRIPTION:

At Lusk at southeast corner of courthouse on corner of East 5th St. and South Elm St. 16 ft west of West Curb, 16.7 ft N of North Curb set in top of concrete post 1.0 ft above G.L. sect 8, T32N R 63W (F54 1934)

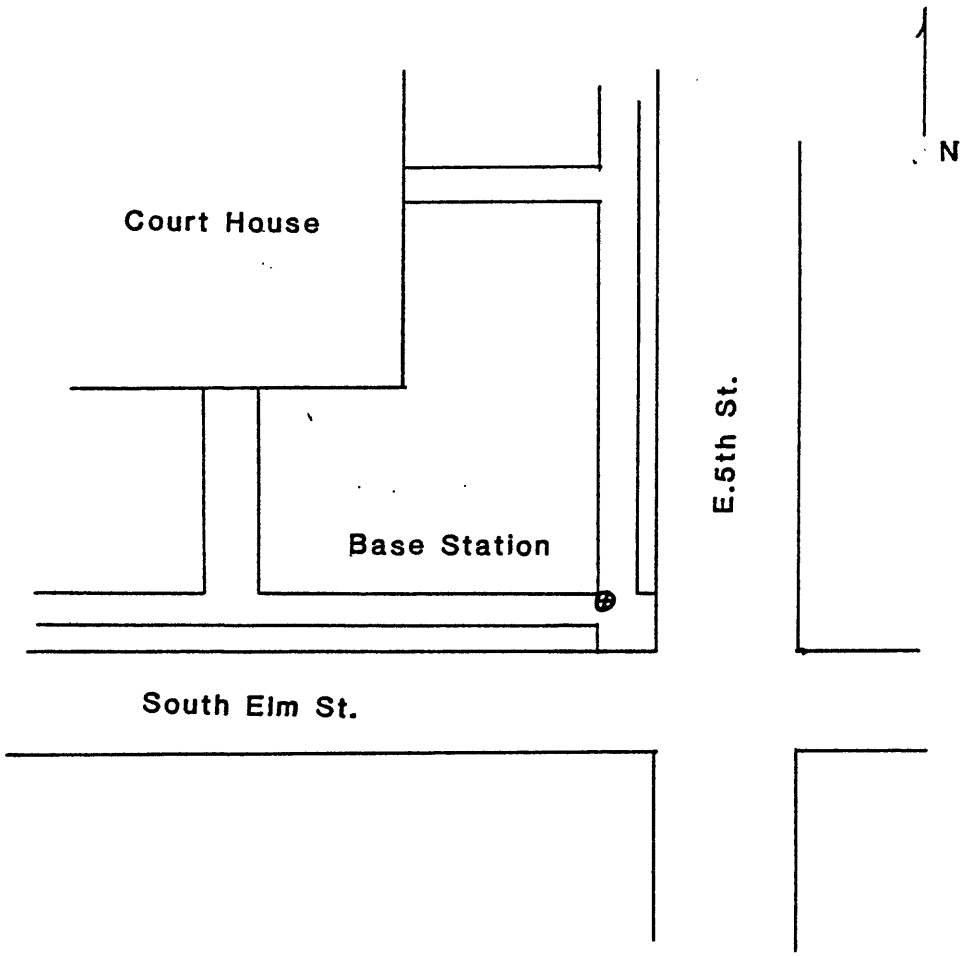

Figure 5. Description of base station BLK1 (Not to Scale).

GRAVITY BASE STATION # BGLPO	
CITY GILLETTE	STATE WYOMING
LATITUDE 44° 17.47' N.	LONGITUDE 105° 30,11' W.
ELEVATION 4,550.0 ft (1,386.80 m)	
OBSERVED GRAVITY 980,158.09 mGal	SBA -124.22 mGal

LOCATION DESCRIPTION: Station is located at the Gillette Post Office in Gillette, Wyoming, near the northeast corner of 4th street and Kendrick Ave. Station location is on the concrete slab that surrounds the flagpole. It is on the southwest triangle next to the concrete block wall. No marker.

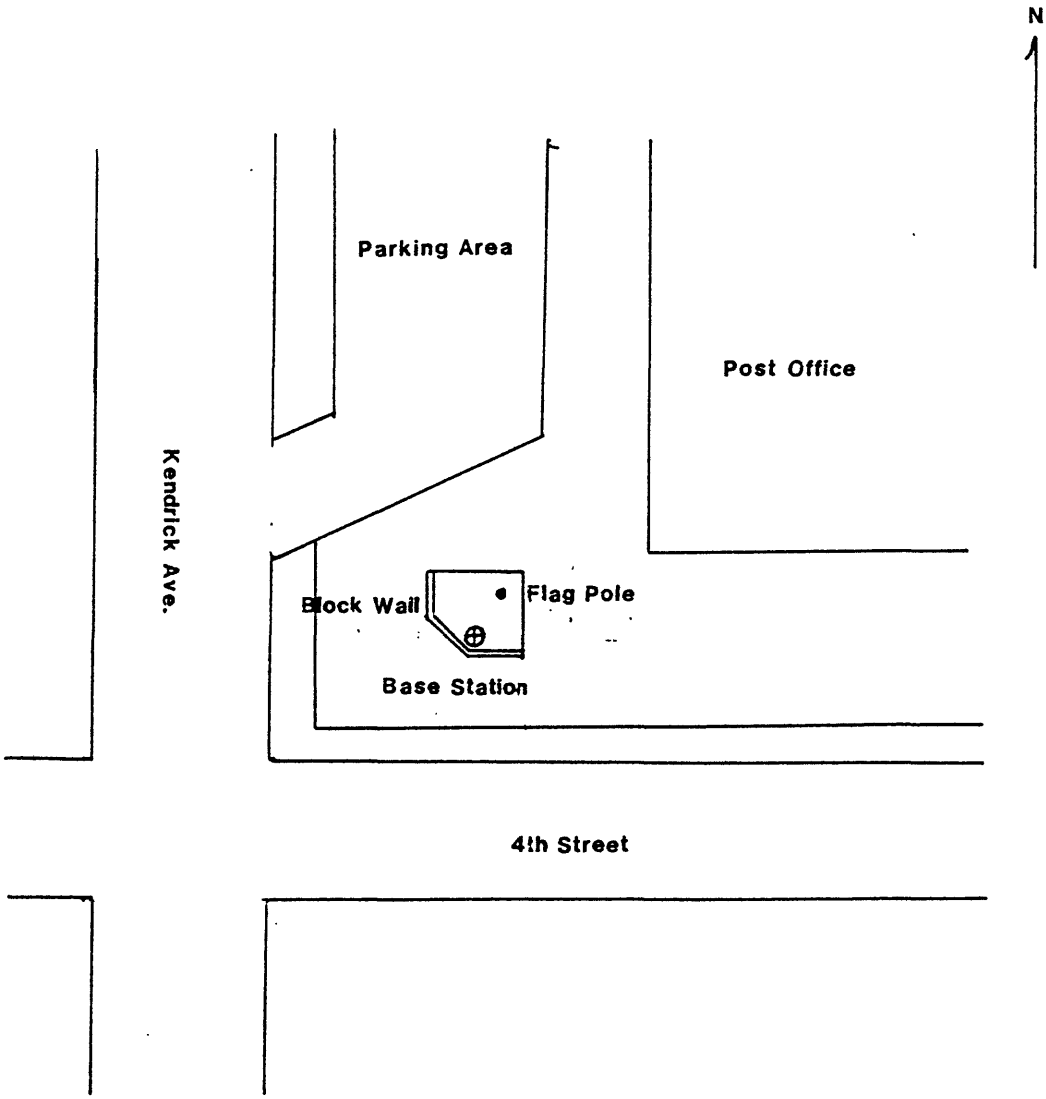

Figure 6. Description of base station BNCPO (Not to Scale).

Appendix 2. Principal Facts of Gravity Data

This appendix contains the principal facts for all 284 gravity stations presented in this report. The following discussion is an explanation of the headings used in the tables.

STA. # - An alphanumeric combination of up to eight characters used for station identification.

LAT. and LONG. - Values listed here are in degrees and minutes to the nearest hundredth of a minute.

ELEV. - This column lists the station elevation in feet to the nearest tenth.

The remaining columns contain gravity values to the nearest hundredth of a milligal. These columns are:

OBS. GRAV. - Observed gravity relative to the Newcastle, Wyoming post office primary base station (BNCPO).

F.A.A. - Free air anomaly.

S.B.A. - Simple Bouguer anomaly for a crustal density of 2.67 g/cm^3.

T.C.C. - Total terrain correction done by hand and computer, out to a distance of 166.7 km. from each station.

C.B.A. - Complete Bouguer anomaly for a crustal density of 2.67 g/cm^3. These values also include curvature corrections.

I.R.A. - Isostatic residual anomaly using an Airy-Heiskanen model with a compensation depth of 40 km. below sea level, an assumed crustal density of 2.67 g/cm^3, and a crust-mantle interface density contrast of 0.35 g/cm^3.

Appendix 2. - Principal facts for 284 gravity stations in the Newcastle, Wyoming 1°X2° quadrangle

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
BNCPO	43 51.33	104 12.11	4334.0	980128.80	20.79	-127.03	0.86	127.49	5.59
nc1	43 59.05	104 00.20	6539.0	980036.36	123.92	-99.10	2.45	98.17	33.71
nc2	43 57.72	104 51.08	4934.0	980088.84	27.59	-140.70	0.67	-141.43	-5.34
nc3	43 56.83	104 53.96	4737.0	980095.71	17.28	-144.29	0.24	-145.42	-8.76
nc4	43 53.87	104 53.46	4563.0	980101.84	11.52	-144.11	0.14	-145.32	-8.29
nc5	43 53.36	104 47.55	4516.0	980104.60	10.63	-143.39	0.16	-144.58	-8.43
nc6	43 55.57	104 45.68	4681.1	980101.89	20.11	-139.55	0.32	-140.60	-4.96
nc7	43 59.67	104 44.83	4767.0	980107.81	27.92	-134.66	0.53	-135.52	-0.47
nc8	43 58.13	104 38.33	4357.3	980138.20	22.13	-126.49	0.19	-127.62	6.99
nc9	43 57.27	104 34.72	4391.0	980130.80	19.19	-130.57	0.44	-131.46	2.94
nc10	43 57.16	104 31.01	4105.0	980153.41	15.08	-124.93	0.12	-126.08	8.10
nc11	43 16.62	105 11.98	4812.4	980001.49	-9.27	-173.41	0.10	-174.69	-25.82
nc12	43 16.55	105 08.25	4763.0	980006.81	-8.49	-170.94	0.03	-172.29	-24.55
nc13	43 19.29	105 07.99	4707.0	980016.08	-8.61	-169.15	0.00	-170.53	-23.59
nc14	43 21.56	105 07.72	4718.0	980019.68	-7.39	-168.31	0.15	-169.53	-23.23
nc15	43 17.42	105 04.67	4880.0	980003.24	-2.38	-168.82	0.15	-170.07	-23.65
nc16	43 21.04	105 01.60	4836.0	980014.48	-0.72	-165.66	0.26	-166.79	-22.19
nc17	43 18.28	105 02.27	4855.0	980007.11	-2.15	-167.74	0.32	-168.81	-23.33
nc18	43 18.40	105 00.30	4631.0	980024.31	-6.18	-164.13	0.07	-165.42	-20.57
nc19	43 15.53	104 59.42	4737.0	980014.24	-1.96	-163.53	0.15	-164.76	-19.42
nc20	43 18.54	104 56.48	4509.0	980035.09	-7.08	-160.87	0.02	-162.19	-18.51
nc21	43 18.24	104 53.70	4410.0	980043.49	-7.54	-157.95	-.03	-159.31	-16.38
nc22	43 20.68	104 53.44	4521.0	980039.81	-4.46	-158.65	0.00	-160.00	-17.72
nc23	43 21.82	104 50.81	4667.0	980033.63	1.38	-157.80	0.21	-158.96	-17.68
nc24	43 22.23	104 57.04	4666.0	980030.71	-2.25	-161.40	0.17	162.60	-19.62
nc25	43 23.54	104 57.48	4515.0	980042.79	-6.34	-160.34	0.05	-161.63	-18.81
nc26	43 39.99	105 05.12	4456.0	980080.04	0.58	-151.40	0.05	-152.68	-10.87
nc27	43 39.59	105 01.87	4408.0	980083.06	-0.31	-150.65	0.00	-151.98	-10.92

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc28	43 40.96	104 52.75	4326.0	980091.69	-1.45	-148.99	0.06	-150.25	-11.62
nc29	43 41.80	104 49.64	4524.0	980079.69	3.90	-150.40	0.12	-151.63	-13.80
nc30	43 41.63	104 45.96	4418.0	980080.53	-4.97	-155.66	0.08	-156.91	-19.84
nc31	43 42.32	104 42.01	4339.0	980090.03	-3.94	-151.93	0.11	-153.14	-16.91
nc32	43 42.45	104 38.51	4230.8	980103.16	-1.17	-145.47	0.05	-146.72	-11.13
nc33	43 44.32	104 36.98	4390.1	980099.83	7.66	-142.08	0.11	-143.29	-8.05
nc34	43 54.58	104 01.02	6251.0	980048.49	115.73	-97.47	2.35	-96.63	35.44
nc35	43 55.90	104 02.84	6242.0	980040.41	104.82	-108.08	5.57	-104.02	28.32
nc36	43 56.91	104 00.32	6426.0	980041.74	121.91	-97.26	2.30	-96.47	35.51
nc37	43 54.06	104 05.77	4688.0	980117.95	39.09	-120.80	2.21	-119.96	12.78
nc38	43 55.78	104 06.16	4782.0	980113.76	41.14	-121.96	1.48	-121.86	10.96
nc39	43 58.86	104 05.25	5086.0	980103.32	54.63	-118.84	2.05	-118.21	14.50
nc40	43 51.52	104 47.94	4375.0	980108.77	4.32	-144.89	0.06	-146.16	-9.74
nc41	43 46.78	104 25.48	4075.0	980128.83	3.33	-135.66	0.16	-136.77	-2.99
nc42	43 46.34	104 29.51	4201.8	980118.16	5.24	-138.07	0.09	-139.28	-5.08
nc43	43 45.19	104 33.02	4151.0	980118.41	2.45	-139.13	0.03	-140.39	-5.75
nc44	43 42.78	104 33.55	4243.0	980106.86	3.18	-141.54	0.08	-142.76	-7.99
nc45	43 40.07	104 33.46	4278.0	980098.09	1.78	-144.13	0.13	-145.34	-10.51
nc46	43 38.42	104 32.31	4399.0	980087.24	4.79	-145.25	0.24	-146.34	-11.66
nc47	43 36.03	104 34.46	4221.0	980093.40	-2.18	-146.15	0.11	-147.34	-12.14
nc48	43 33.93	104 33.65	3990.0	980105.76	-8.37	-144.46	-0.07	-145.79	-10.62
nc49	43 34.31	104 37.90	4179.0	980089.64	-7.30	-149.83	0.08	-151.04	-14.99
nc50	43 30.78	104 33.53	3949.0	980103.17	-10.07	-144.76	-0.09	-146.10	-10.70
nc51	43 34.24	104 29.97	4250.0	980090.65	0.49	-144.47	0.10	-145.67	-11.25
nc52	43 32.38	104 25.26	4082.0	980099.22	-3.93	-143.15	0.04	-144.39	-10.83
nc53	43 31.44	104 21.63	3923.0	980110.24	-6.44	-140.24	-0.05	-141.54	-8.66
nc54	43 30.11	104 24.36	3979.0	980103.30	-6.11	-141.82	-0.04	-143.11	-9.66
nc55	43 29.80	104 29.19	4061.0	980095.25	-5.99	-144.50	0.00	-145.77	-11.26
nc56	43 26.85	104 28.79	3942.0	980098.55	-9.43	-143.88	0.06	-145.07	-10.39
nc57	43 24.46	104 27.71	3825.0	980104.69	-10.68	-141.14	-0.01	-142.38	-7.71

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc58	43 24.09	104 24.66	3809.0	980109.13	-7.19	-137.11	-0.05	-138.38	-4.41
nc59	43 23.06	104 19.72	3902.0	980109.99	3.96	-129.12	0.00	-130.36	2.53
nc60	43 23.58	104 16.66	3806.0	980123.27	7.43	-122.38	-0.06	-123.66	8.46
nc61	43 27.08	104 12.36	3675.0	980146.34	12.92	-112.42	-0.08	-113.70	17.34
nc62	43 24.47	104 12.01	3769.0	980140.09	19.44	-109.11	-0.06	-110.39	20.61
nc63	43 22.14	104 13.78	3746.0	980134.68	15.37	-112.39	-0.09	-113.69	17.83
nc64	43 19.68	104 16.49	3875.0	980117.79	14.31	-117.85	-0.07	-119.16	13.27
nc65	43 17.80	104 18.01	3951.0	980109.31	15.80	-118.95	0.00	-120.20	12.88
nc66	43 14.69	104 17.64	3889.0	980114.80	20.15	-112.49	-0.05	-113.78	19.71
nc67	43 12.28	104 18.85	4075.0	980099.72	26.18	-112.80	-0.03	-114.11	20.20
nc68	43 08.74	104 20.44	4049.7	980094.04	23.45	-114.67	0.02	-115.92	19.67
nc69	43 06.35	104 21.67	4111.0	980084.62	23.39	-116.82	-0.01	-118.11	18.47
nc70	43 03.67	104 22.12	4222.0	980080.91	34.15	-109.85	-0.02	-111.17	26.30
nc71	43 01.12	104 21.95	4295.0	980079.26	43.19	-103.30	0.01	-104.60	33.55
nc72	43 53.77	104 11.27	5063.0	980091.79	48.61	-124.07	1.31	-124.18	8.95
nc73	43 55.64	104 10.25	4772.0	980113.52	40.18	-122.58	1.77	-122.20	10.95
nc74	43 59.65	104 10.91	5182.0	980099.01	58.15	-118.59	2.20	-117.82	15.34
nc75	43 59.07	104 13.69	5098.0	980102.04	54.16	-119.72	1.85	-119.29	14.05
nc76	43 56.75	104 19.47	4414.5	980140.76	32.14	-118.42	1.14	-118.61	15.05
nc77	43 58.99	104 18.23	4556.8	980133.86	35.24	-120.18	1.17	-120.36	13.21
nc78	43 54.81	104 18.48	4295.5	980142.53	25.65	-120.86	1.37	-120.80	12.80
nc79	43 53.48	104 21.94	4217.0	980136.29	14.04	-129.79	0.32	-130.77	2.96
nc80	43 52.27	104 26.28	3985.0	980146.15	3.91	-132.00	0.09	-133.17	0.81
nc81	43 50.67	104 29.30	4142.0	980130.44	5.37	-135.90	0.10	-137.08	-2.88
nc82	43 52.17	104 31.28	4284.0	980122.77	8.79	-137.33	0.22	-138.42	-4.07
nc83	43 53.93	104 30.87	4038.0	980146.37	6.61	-131.11	0.07	-132.31	1.97
nc84	43 56.30	104 28.09	4042.0	980156.59	13.64	-124.22	0.14	-125.35	8.69
nc85	43 55.06	104 34.72	4169.0	980138.73	9.58	-132.61	0.07	-133.83	0.71
nc86	43 56.80	104 41.21	4436.3	980128.41	21.76	-129.55	0.20	-130.68	4.32
nc87	43 55.06	104 38.24	4332.0	980128.12	14.29	-133.46	0.15	-134.62	0.23

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc88	43 52.64	104 38.79	4335.0	980119.03	9.14	-138.72	0.16	-139.88	-4.81
nc89	43 50.68	104 38.63	4392.0	980109.72	8.14	-141.66	0.19	-142.80	-7.63
nc90	43 48.04	104 38.61	4368.0	980105.97	6.11	-142.87	0.12	-144.07	-8.76
nc91	43 48.07	104 41.40	4372.7	980104.29	4.82	-144.32	0.14	-145.50	-9.79
nc92	43 48.02	104 44.14	4318.0	980105.75	1.22	-146.05	0.06	-147.31	-11.16
nc93	43 47.98	104 47.82	4336.3	980102.82	0.07	-147.83	0.03	-149.11	-12.33
nc94	43 52.36	104 50.70	4609.0	980096.46	12.74	-144.46	0.25	-145.57	-8.80
nc95	43 52.33	104 54.81	4736.0	980087.50	15.76	-145.77	0.48	-146.66	-9.16
nc96	43 49.74	104 51.26	4420.0	980102.04	4.50	-146.25	0.04	-147.54	-10.34
nc97	43 47.19	104 52.90	4410.0	980095.91	1.28	-149.13	0.08	-150.38	-12.53
nc98	43 49.53	104 55.64	4509.0	980094.70	5.85	-147.94	0.16	-149.13	-11.05
nc99	43 48.06	104 27.57	4032.0	980133.15	1.67	-135.84	0.07	-137.04	-3.03
nc100	43 48.28	104 31.14	4165.0	980122.56	3.26	-138.80	0.10	-139.99	-5.61
nc101	43 48.08	104 35.35	4205.0	980117.81	2.56	-140.86	0.02	-142.13	-7.26
nc102	43 45.84	104 39.52	4259.0	980110.20	3.41	-141.86	0.03	-143.13	-7.57
nc103	43 51.54	104 43.11	4432.0	980107.18	8.06	-143.10	0.11	-144.33	-8.64
nc104	43 44.53	104 44.31	4285.0	980101.37	-1.00	-147.15	0.02	-148.44	-11.97
nc105	43 44.49	104 47.91	4469.0	980089.17	4.15	-148.27	0.12	-149.49	-12.33
nc106	43 44.68	104 51.79	4674.0	980074.16	8.12	-151.29	0.25	-152.41	-14.47
nc107	43 44.29	104 56.15	4444.0	980087.42	0.35	-151.22	0.06	-152.50	-13.55
nc108	43 42.71	104 54.84	4564.0	980078.06	4.65	-151.01	0.30	-152.06	-13.19
nc109	43 39.56	104 40.90	4316.0	980084.47	-7.50	-154.70	0.04	-155.98	-19.75
nc110	43 40.29	104 38.72	4170.0	980099.29	-7.50	-149.73	0.01	-151.01	-15.25
nc111	43 38.22	104 36.89	4075.0	980104.02	-8.58	-147.57	-0.01	-148.85	-13.31
nc112	43 40.39	104 29.15	4322.0	980097.55	4.90	-142.51	0.21	-143.62	-9.49
nc113	43 38.20	104 28.20	4372.0	980090.21	5.56	-143.56	0.35	-144.53	-10.54
nc114	43 37.06	104 24.72	4266.0	980094.70	1.80	-143.70	0.14	-144.87	-11.45
nc115	43 36.46	104 20.40	4035.0	980109.69	-4.02	-141.65	0.01	-142.90	-10.17
nc116	43 33.73	104 20.43	3923.0	980113.07	-7.05	-140.86	0.00	-142.10	-9.44
nc117	43 32.86	104 17.81	3856.0	980118.77	-6.35	-137.86	-0.02	-139.12	-6.94

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc118	43 30.69	104 17.81	4063.0	980105.38	2.99	-135.58	0.09	-136.76	-4.61
nc119	43 27.07	104 08.82	3710.3	980157.05	26.97	-99.58	-0.04	-100.83	29.48
nc120	43 26.56	104 15.95	3922.0	980118.59	9.17	-124.60	0.08	-125.76	6.06
nc121	43 25.72	104 19.19	3928.0	980111.42	3.83	-130.14	-0.02	-131.41	1.16
nc122	43 25.95	104 22.54	4135.0	980092.46	3.98	-137.05	0.16	-138.17	-4.86
nc123	43 26.74	104 24.96	4028.0	980096.84	-2.89	-140.27	0.00	-141.54	-7.74
nc124	43 25.80	104 32.90	3885.0	980099.24	-12.52	-145.02	-0.04	-146.30	-10.51
nc125	43 27.93	104 35.74	4262.0	980076.91	-2.61	-147.98	0.25	-149.03	-12.81
nc126	43 25.77	104 37.45	3981.0	980091.91	-10.78	-146.56	0.04	-147.77	-10.83
nc127	43 23.58	104 33.53	4240.0	980072.74	-2.31	-146.92	0.05	-148.17	-11.90
nc128	43 22.73	104 36.31	4140.0	980075.96	-7.20	-148.41	0.00	-149.69	-12.56
nc129	43 20.89	104 37.49	4437.0	980053.70	1.23	-150.11	0.14	-151.30	-13.52
nc130	43 18.86	104 34.95	4351.0	980058.97	1.47	-146.93	0.16	-148.09	-10.61
nc131	43 18.22	104 31.88	4215.0	980068.75	-0.57	-144.33	0.01	-145.62	-8.86
nc132	43 20.71	104 31.54	4234.0	980070.69	-0.59	-145.00	0.08	-146.22	-10.01
nc133	43 20.19	104 28.02	4079.0	980083.42	-1.65	-140.77	-0.03	-142.07	-6.71
nc134	43 21.30	104 23.80	3990.0	980095.80	0.69	-135.39	-0.06	-136.71	2.61
nc135	43 18.31	104 23.02	3814.0	980105.30	-1.85	-131.93	-0.10	-133.26	1.08
nc136	43 15.46	104 21.17	3917.0	980101.92	8.74	-124.85	-0.10	-126.20	8.13
nc137	43 16.29	104 24.26	4007.0	980088.76	2.79	-133.88	0.00	-135.14	-0.11
nc138	43 18.43	104 26.57	3879.0	980095.89	-5.33	-137.63	-0.01	-138.88	-3.61
nc139	43 13.18	104 22.80	4143.0	980081.63	13.13	-128.18	0.16	-129.30	5.96
nc140	43 11.17	104 23.03	4295.0	980071.10	19.92	-126.57	0.15	-127.74	8.03
nc141	43 15.03	104 14.90	4015.7	980118.70	35.45	-101.51	-0.02	-102.80	29.87
nc142	43 15.81	104 12.15	4068.0	980115.34	35.83	-102.91	0.00	-104.19	27.60
nc143	43 16.68	104 10.52	3960.9	980122.65	31.76	-103.33	-0.02	-104.60	26.62
nc144	43 18.06	104 08.26	4088.0	980116.92	35.90	-103.53	0.08	-104.72	25.76
nc145	43 19.61	104 07.57	4134.0	980117.42	38.39	-102.61	0.33	-103.56	26.61
nc146	43 21.83	104 07.57	3961.0	980132.39	33.76	-101.34	0.09	-102.50	27.55
nc147	43 20.51	104 09.75	3929.0	980129.44	29.79	-104.22	-0.02	-105.48	25.18

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc148	43 22.11	104 11.63	3862.0	980131.38	23.02	-108.70	-0.03	-109.96	21.05
nc149	43 19.84	104 12.36	4000.0	980118.86	26.89	-109.54	0.14	-110.66	20.71
nc150	43 17.28	104 12.77	4177.0	980107.08	35.60	-106.87	0.21	-107.95	23.81
nc151	43 18.99	104 14.62	4006.0	980113.99	23.87	-112.77	0.06	-113.97	18.07
nc152	43 13.51	104 26.65	3992.0	980083.57	0.38	-135.78	-0.08	-137.11	-0.83
nc153	43 15.10	104 31.13	3968.0	980081.18	-6.66	-142.00	-0.05	-143.30	-6.10
nc154	43 16.11	104 35.05	3982.5	980078.71	-9.29	-145.12	0.00	-146.37	-8.29
nc155	43 12.63	104 32.68	4339.2	980051.92	2.69	-145.31	0.20	-146.43	-8.20
nc156	43 12.50	104 35.95	4052.0	980068.20	-7.83	-146.04	0.04	-147.27	-8.06
nc157	43 07.75	104 37.06	4198.0	980053.68	-1.48	-144.66	0.03	-145.93	-5.10
nc158	43 08.04	104 37.05	4205.0	980050.57	-4.36	-147.78	0.01	-149.07	-8.33
nc159	43 05.46	104 40.10	4535.0	980024.64	4.61	-150.07	0.17	-151.25	-8.83
nc160	43 03.32	104 36.72	4452.0	980037.95	13.34	-138.51	0.12	-139.73	2.32
nc161	43 03.59	104 33.43	4511.0	980038.35	18.87	-134.98	0.06	-136.27	4.70
nc162	43 06.11	104 32.22	4568.0	980031.57	13.66	-142.15	0.25	-143.25	-3.39
nc163	43 08.28	104 32.68	4485.0	980037.10	8.12	-144.85	0.11	-146.08	-6.70
nc164	43 10.35	104 32.13	4432.7	980043.19	6.18	-145.00	0.19	-146.15	-7.49
nc165	43 04.45	104 29.55	4372.9	980053.11	19.36	-129.79	0.01	-131.10	8.43
nc166	43 04.53	104 26.52	4428.0	980055.55	26.86	-124.17	0.06	-125.44	13.15
nc167	43 06.29	104 25.08	4355.3	980061.37	23.20	-125.35	0.07	-126.60	11.05
nc168	43 08.18	104 26.37	4214.0	980067.66	13.36	-130.37	0.04	-131.62	5.90
nc169	43 04.49	104 18.44	4248.0	980088.21	42.65	-102.23	0.04	-103.50	32.59
nc170	43 02.77	104 24.55	4268.0	980077.51	36.43	-109.14	0.00	-110.45	28.04
nc171	43 00.67	104 30.68	4471.0	980043.34	24.50	-128.00	0.07	-129.27	11.75
nc172	43 02.45	104 40.31	4438.0	980034.91	10.28	-141.08	0.00	-142.42	0.99
nc173	43 03.03	104 44.28	4697.0	980007.37	6.22	-153.98	0.29	-155.06	-10.63
nc174	43 04.86	104 46.46	4771.0	980003.00	6.05	-156.68	0.69	-157.37	-12.85
nc175	43 06.93	104 45.75	4563.0	980020.25	0.63	-155.00	0.23	-156.12	-12.45
nc176	43 02.88	104 47.57	4802.0	979996.62	5.56	-158.22	0.48	-159.13	-13.65
nc177	43 02.96	104 52.97	4798.0	979994.58	3.02	-160.62	0.23	-161.78	-14.67

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc178	43 05.10	104 52.77	4750.0	980001.47	2.18	-159.82	0.35	-160.85	-14.48
nc179	43 06.47	104 57.68	4630.0	980007.99	-4.64	-162.55	0.06	-163.86	-16.42
nc180	43 04.48	105 00.27	4703.5	979997.96	-4.77	-165.19	0.04	-166.52	-17.65
nc181	43 03.47	105 03.26	4628.0	979999.55	-8.75	-166.60	-0.05	-168.01	-17.89
nc182	43 00.59	105 04.69	4665.0	979990.92	-9.57	-168.68	0.00	-170.05	-18.52
nc183	43 09.68	105 11.96	4792.0	979992.94	-9.29	-172.73	-0.02	-174.14	-23.25
nc184	43 13.12	105 11.96	4646.0	980006.39	-14.74	-173.20	-0.06	-174.63	-24.77
nc185	43 13.94	105 08.24	4684.0	980008.42	-10.38	-170.13	-0.02	-171.52	-23.06
nc186	43 14.63	105 04.70	4712.9	980010.61	-6.51	-167.25	0.03	-168.60	-21.42
nc187	43 12.66	105 00.74	4473.8	980026.48	-10.14	-162.73	-0.01	-164.08	-17.55
nc188	43 09.19	104 58.55	4442.7	980024.62	-9.70	-161.23	0.01	-162.56	-15.69
nc189	43 07.55	105 00.36	4442.5	980020.99	-10.89	-162.41	-0.03	-163.77	-15.84
nc190	43 04.21	105 06.64	4678.0	979995.59	-9.13	-168.68	0.01	-170.04	-19.10
nc191	43 05.79	105 03.45	4513.0	980011.57	-11.03	-164.96	-0.03	-166.33	-16.89
nc192	43 07.66	105 05.75	4556.0	980010.01	-11.36	-166.75	-0.02	-168.13	-18.57
nc193	43 09.64	105 08.24	4854.0	979991.72	-4.63	-170.18	0.05	-171.53	-21.80
nc194	43 09.83	105 04.06	4891.0	979992.81	-0.34	-167.16	0.23	-168.33	-19.96
nc195	43 07.21	105 12.91	4717.0	979993.23	-12.34	-173.22	-0.01	-174.61	-22.65
nc196	43 04.11	105 10.77	4841.0	979982.62	-6.62	-171.73	0.07	-173.05	-20.77
nc197	43 24.96	105 16.06	4915.0	980009.76	-3.92	-171.56	0.27	-172.69	-24.74
nc198	43 24.56	105 18.03	4940.0	980005.96	-4.77	-173.26	0.31	-174.35	-25.72
nc199	43 23.97	105 20.37	4944.0	980002.64	-6.82	-175.45	0.27	-176.58	-27.12
nc200	43 26.36	105 23.00	4946.0	980006.67	-6.21	-174.90	0.26	-176.04	-26.44
nc201	43 27.63	105 23.32	4805.0	980017.59	-10.45	-174.33	0.08	-175.64	-26.27
nc202	43 28.25	105 26.42	4725.0	980021.33	-15.16	-176.32	0.01	-177.68	-27.60
nc203	43 27.83	105 29.18	4689.2	980021.33	-17.89	-177.83	-0.03	-179.23	-28.29
nc204	43 26.90	105 32.08	4724.0	980015.92	-18.63	-179.76	-0.01	-181.14	-29.15
nc205	43 28.70	105 31.97	4807.0	980013.35	-16.12	-180.07	0.00	-181.45	-29.99
nc206	43 28.59	105 35.44	5107.0	979992.52	-8.58	-182.76	0.28	-183.91	-31.51
nc207	43 28.88	105 38.04	5171.0	979988.02	-7.50	-183.87	0.48	-184.82	-31.84

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc208	43 28.94	105 41.08	5258.5	979981.88	-5.51	-184.86	0.37	-185.93	-32.22
nc209	43 29.96	105 42.30	5285.0	979982.18	-4.25	-184.51	0.25	-185.70	-32.00
nc210	43 32.34	105 25.66	4869.0	980020.97	-8.14	-174.21	0.08	-175.53	-26.68
nc211	43 30.55	105 23.06	4787.1	980025.08	-9.04	-172.31	0.01	-173.68	-25.10
nc212	43 32.92	105 22.94	4881.0	980023.61	-5.25	-171.73	0.05	-173.07	-25.09
nc213	43 35.52	105 24.13	4795.0	980034.07	-6.79	-170.33	0.01	-171.71	-24.03
nc214	43 39.06	105 26.56	4905.0	980033.68	-2.18	-169.47	0.06	-170.81	-23.38
nc215	43 38.16	105 23.11	4910.0	980033.11	-0.92	-168.38	0.11	-169.67	-22.87
nc216	43 41.65	105 22.89	4809.0	980049.19	0.41	-163.61	0.03	-164.97	-19.04
nc217	43 43.40	105 24.31	4822.0	980051.33	1.13	-163.33	0.06	-164.66	-18.82
nc218	43 46.48	105 24.54	4859.0	980054.16	2.80	-162.93	0.30	-164.02	-18.90
nc219	43 48.68	105 24.65	4954.0	980051.77	6.02	-162.94	0.12	-164.23	-19.65
nc220	43 50.38	105 22.96	4824.0	980067.02	6.49	-158.04	0.19	-159.24	-15.45
nc221	43 52.27	105 23.22	4816.0	980071.93	7.80	-156.46	0.21	-157.64	-14.29
nc222	43 56.02	105 32.44	4875.0	980069.48	5.25	-161.03	0.15	-162.27	-18.22
nc223	43 49.72	105 27.98	4816.0	980060.77	0.48	-163.78	0.07	-165.09	-20.08
nc224	43 44.66	105 27.74	5157.8	980026.58	6.04	-169.87	0.57	-170.73	-24.44
nc225	43 40.43	105 30.83	5113.0	980019.80	1.43	-172.96	0.21	-174.18	-26.09
nc226	43 40.17	105 34.85	5032.0	980025.75	0.16	-171.47	0.14	-172.75	-23.68
nc227	43 37.05	105 34.83	5036.0	980016.61	-3.90	-175.67	0.10	-176.98	-27.06
nc228	43 35.14	105 35.98	5166.0	980003.04	-2.38	-178.58	0.21	-179.80	-29.09
nc229	43 34.75	105 33.32	4943.0	980017.39	-8.40	-176.99	0.06	-178.34	-28.16
nc230	43 36.40	105 31.39	5007.0	980018.05	-4.21	-174.99	0.09	-176.31	-27.03
nc231	43 32.72	105 30.65	4798.0	980023.30	-13.07	-176.71	0.05	-178.05	-28.00
nc232	43 52.22	105 30.48	4785.0	980067.43	0.46	-162.74	0.26	-163.86	-19.06
nc233	43 50.50	105 32.27	5001.0	980048.29	4.22	-166.35	0.14	-167.62	-21.99
nc234	43 51.14	105 35.65	4976.0	980049.73	2.34	-167.38	0.20	-168.59	-22.50
nc235	43 48.63	105 32.00	4928.0	980049.34	1.22	-166.86	0.16	-168.10	-21.99
nc236	43 45.91	105 31.58	4934.0	980043.80	0.35	-167.94	0.14	-169.20	-22.41
nc237	43 41.99	105 55.51	5208.0	980018.19	6.39	-171.24	0.58	-172.09	-19.43

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc238	43 40.83	105 56.67	5001.0	980027.72	-1.78	-172.35	0.51	-173.25	-19.99
nc239	43 40.73	105 53.18	5226.0	980014.55	6.34	-171.90	0.33	-173.01	-20.38
nc240	43 00.82	105 41.22	5421.0	979919.17	-10.62	-195.51	0.25	-196.71	-33.27
nc241	43 00.77	105 42.42	5481.0	979914.28	-9.79	-196.73	0.24	-197.95	-34.12
nc242	43 00.08	105 42.12	5524.0	979910.78	-8.21	-196.62	0.39	-197.69	-33.66
nc243	43 00.11	105 43.33	5575.0	979906.59	-7.65	-197.80	0.30	-198.97	-34.58
nc244	43 00.49	105 44.18	5548.0	979908.65	-8.70	-197.93	0.22	-199.17	-34.69
nc245	43 01.14	105 43.43	5396.0	979919.92	-12.69	-196.73	0.26	-197.93	-33.95
nc246	43 01.59	105 43.03	5484.0	979914.67	-10.35	-197.40	0.31	-198.55	-34.88
nc247	43 02.36	105 42.73	5447.0	979918.44	-11.21	-197.00	0.26	-198.19	-34.93
nc248	43 24.12	105 53.51	5446.0	979959.08	-3.43	-189.18	0.34	-190.30	-32.12
nc249	43 22.61	105 56.29	5546.0	979949.50	-1.34	-190.50	0.32	-191.64	-32.31
nc250	43 22.86	105 59.37	5531.0	979952.99	0.37	-188.28	0.27	-189.47	-29.53
nc251	43 24.57	105 58.48	5508.0	979956.89	-0.47	-188.33	0.39	-189.40	-30.26
nc252	43 26.09	105 55.67	5414.0	979965.21	-3.27	-187.93	0.39	-188.99	-30.99
nc253	43 27.06	105 56.68	5423.7	979966.29	-2.74	-187.73	0.55	-188.63	-30.74
nc254	43 26.73	105 59.27	5423.8	979966.75	-1.78	-186.77	0.21	-188.01	-29.44
nc255	43 06.40	104 49.21	4370.0	980030.55	-6.40	-155.45	0.00	-156.78	-11.91
nc256	43 05.26	104 42.24	4701.0	980010.89	6.75	-153.58	0.37	-154.58	-11.46
nc257	43 07.08	104 41.97	4649.0	980016.88	5.13	-153.44	0.27	-154.53	-12.04
nc258	43 09.09	104 41.29	4621.0	980022.11	4.69	-152.92	0.58	-153.70	-12.00
nc259	43 11.09	104 41.56	4344.0	980043.47	-2.99	-151.15	0.14	-152.33	-11.11
nc260	43 10.68	104 38.83	4368.0	980042.78	-0.81	-149.79	-0.01	-151.12	-10.59
nc261	43 01.49	104 19.44	4282.0	980079.51	41.67	-104.38	0.04	-105.65	31.59
nc262	43 00.94	104 14.48	4478.0	980065.66	47.07	-105.66	0.23	-106.77	29.03
nc263	43 02.17	104 16.04	4534.0	980063.85	48.67	-105.97	0.30	-107.02	28.94
nc264	43 03.26	104 15.27	4410.0	980073.75	45.27	-105.14	0.09	-106.38	29.03
nc265	43 07.31	104 18.02	4281.0	980089.59	42.89	-103.12	0.15	-104.28	30.94
nc266	43 05.73	104 16.35	4408.0	980077.91	45.53	-104.81	0.19	-105.95	29.15
nc267	43 01.04	104 11.06	4222.0	980082.71	39.91	-104.09	0.09	-105.30	29.35

Appendix 2. - Continued

STA.	LAT.	LONG.	ELEV.	OBS. GRAV.	F.A.A.	S.B.A.	T.T.C.	C.B.A.	I.R.A.
nc268	43 00.65	104 07.60	4171.0	980084.73	37.72	-104.54	0.07	-105.76	27.85
nc269	43 02.76	104 07.49	4275.0	980083.12	42.71	-103.10	0.33	-104.07	28.95
nc270	43 01.71	104 04.77	4159.0	980090.00	40.27	-101.58	0.21	-102.66	29.73
nc271	43 01.20	104 01.89	3992.0	980099.74	35.08	-101.08	15.04	-102.22	73.03
nc272	43 02.81	104 02.38	4088.0	980097.69	39.63	-99.80	0.09	-100.99	30.33
nc273	43 02.64	104 00.26	4153.0	980092.10	40.40	-101.24	0.36	-102.17	28.49
nc274	43 57.20	105 17.53	4691.0	980094.60	11.29	-148.71	0.08	-150.00	-9.08
nc275	43 59.52	105 16.39	4606.0	980103.91	9.12	-147.98	0.09	-149.25	-9.15
nc276	43 58.38	105 13.75	4731.0	980096.89	15.56	-145.80	0.17	-147.01	-7.11
nc277	43 57.76	105 11.93	4993.0	980078.47	22.70	-147.60	0.75	-148.26	-8.56
nc278	43 56.94	105 11.00	5043.0	980073.25	23.41	-148.59	0.77	-149.23	-9.51
nc279	43 56.58	105 13.66	4887.0	980084.52	20.57	-146.11	0.32	-147.19	-6.87
nc280	43 47.77	105 55.60	5218.0	980032.60	13.03	-164.94	0.50	-165.87	-15.11
nc281	43 55.72	105 57.28	4572.0	980089.13	-3.13	-159.07	0.03	-160.39	-11.94
nc282	43 53.39	105 57.33	4719.0	980075.11	0.17	-160.78	0.06	-162.09	-12.86
nc283	43 52.01	105 59.36	4995.0	980054.94	8.02	-162.34	0.64	-163.11	-13.03

Appendix 3. Description of Data Format Used for Files on Diskette

File 1. (NCUSGS.ASC) 284 gravity stations occupied by the U.S.G.S. within the Newcastle, Wyoming 1°X2° quadrangle.

The 5 1/4 in., double sided, double density (360k bytes) diskette is in IBM format and contains the above file in an ASCII format different from Appendix 2. The format is as follows:

Col 1 - 8	Station identification
Col 9 -11	Latitude in degrees
Col 12 - 16	Latitude in decimal minutes to nearest hundredth
Col 17 - 20	Longitude in degrees, positive west
Col 21 - 25	Longitude in decimal minutes to nearest hundredth
Col 26 - 33	Elevation in feet to nearest tenth
Col 34 - 43	Observed gravity in milligals to nearest hundredth.
Col 44 - 50	Free air anomaly in milligals to nearest hundredth.
Col 51 - 58	Simple Bouguer anomaly in milligals to nearest hundredth, reduction density of 2.67 g/cm^3
Col 59 - 64	Total terrain correction in milligals to nearest hundredth
Col 65 - 72	Complete Bouguer anomaly in milligals to nearest hundredth, reduction density of 2.67 g/cm^3
Col 73 - 80	Isostatic residual anomaly in milligals to nearest hundredth.

Diskette