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PRINCIPAL FACTS FOR GRAVITY STATIONS IN PART OF THE CENTRAL VIRGINIA PIEDMONT

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INTRODUCTION

Principal facts for 477 new gravity measurements, recorded for eleven 7.5 minute quadrangles located in the central Virginia Piedmont are reported here (see figure 1 for location). These new measurements are part of a study area of 16 quadrangles chosen to support ongoing geologic investigations of plutons and faults in the region. Gravity measurements by Johnson (1971,1973) and Wise and Johnson (1980) were used as a base data set to which the new measurements were added. The number of new measurements in each quadrangle was governed by the number of remaining unutilized reference elevations. Most new stations were at road intersections with elevations marked on U.S. Geological Survey 7.5 minute topographic maps. These have an accuracy of $\pm$ 3 feet ($\pm$ 0.9m) (national map accuracy standards, unpublished, 1980) which leads to a Bouguer gravity uncertainty of $\pm$ 0.18 milligals. About 40 bench mark reference elevations were also used, repeating measurements by Johnson (1971, 1973) which serve as a cross check between older and newer surveys. The mean of the differences of Bouguer gravity between identical stations of the two surveys is .01 milligal with a standard deviation of .09 milligal. Eleven stations were referred to the water level of Lake Anna. The elevation of the water surface was checked by tape measure against a bench mark (USGS, 65DOP 1966, reset 1969) located on a bridge (Va. Rte. 208) over the lake.

A detailed gravity profile of 61 measurements spaced approximately 100m apart along 6 km of Rtes. 600 and 629 at Lahore, Va. (figure 1) was added to study mafic rocks in the vicinity. Elevations for this profile were measured with an alidade and stadia-rod survey tied to local bench marks. Accuracy of the profile elevations is $\pm$ 0.5 foot.

These data were collected during 1981 using LaCoste and Romberg gravity meters G2 and G77. Meter G77 was provided by Stanley S. Johnson of the Virginia Division of Mineral Resources, Charlottesville, Va.

All stations were tied to one base station, bench mark NC17 at the US Geological Survey National Center, Reston Va., (location map, figure 2), with readings at the beginning and end of each field day. Base NC17 has an adopted gravity value of 980084.05 milligals determined from a tie to base station "Washington C" (IGB 11687c, 980103.63 milligals; International Association of Geodesy, 1971b, p.45) at the U.S. Department of Commerce Building, on 14th Street NW, Washington, DC. Earth tide and drift corrections were computed for all stations. Station latitude and longitude was scaled directly from the topographic maps to a precision of $\pm$ 0.01 minute. Anomalies were calculated using the 1967 Geodetic Reference System formula (International Association of Geodesy, 1971a, p.60):

$$F = 978031.85\ (1 + 0.005278895\ \sin^2 L + 0.000023462\ \sin^4 L)\ \text{milligals}$$

where L is station latitude in degrees. No terrain corrections were applied because of the gentle topography.

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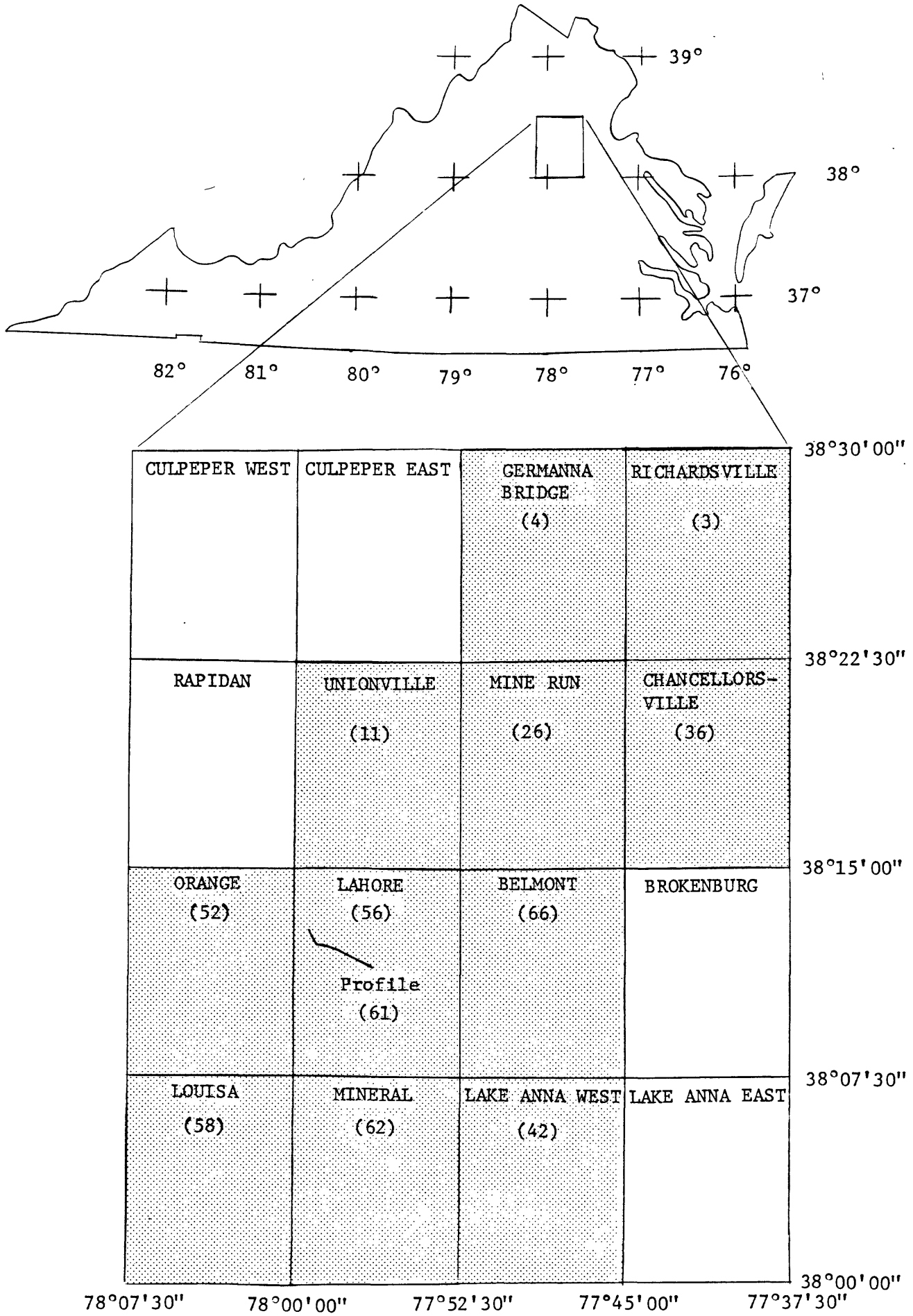

Fig. 1 Location of study area in state of Virginia. Number of new measurements in each quadrangle is shown in parentheses. Shading indicates quadrangles with new measurements.

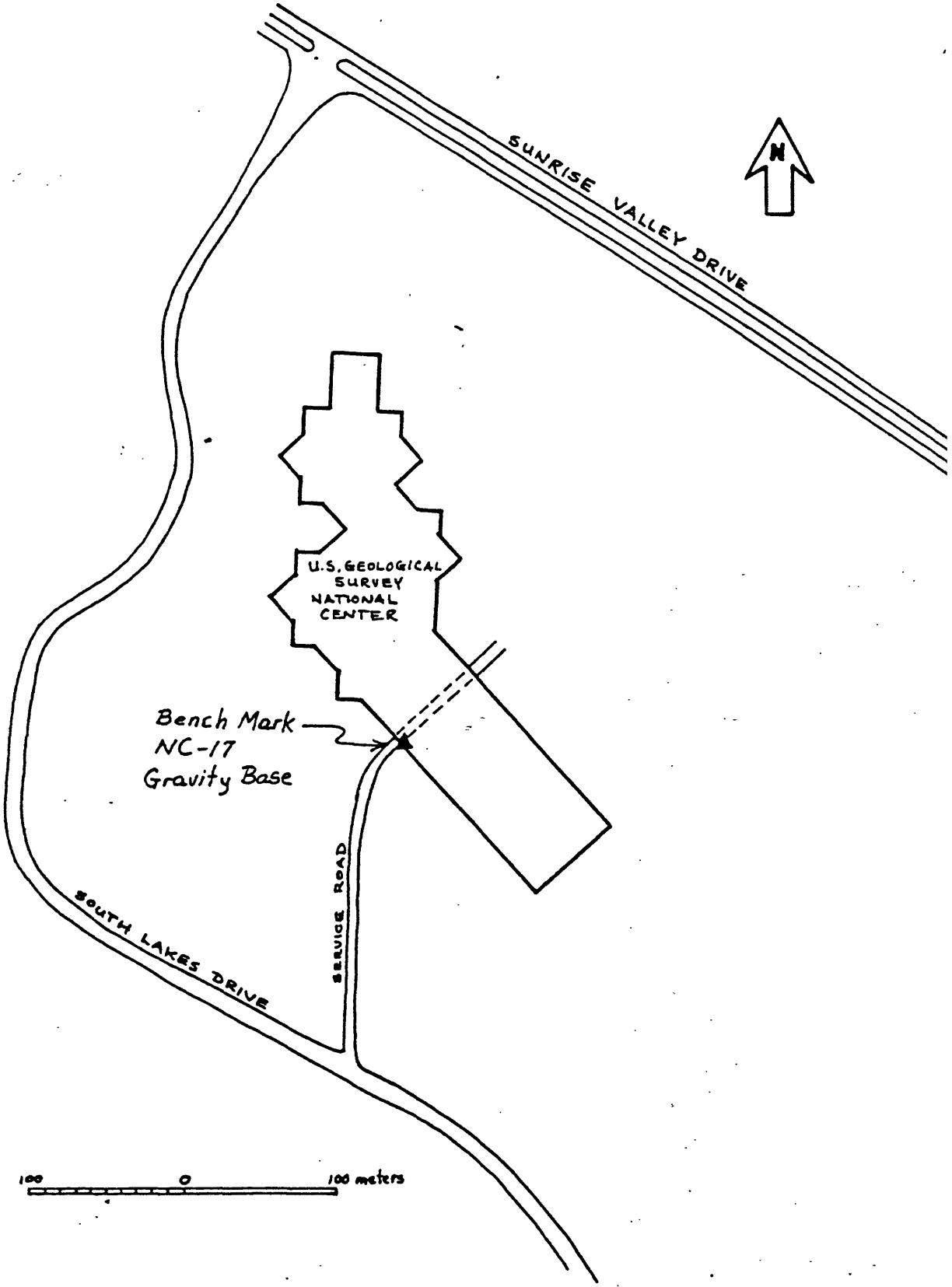

Fig. 2 Location of gravity base station NC-17 at the U.S. Geological Survey National Center in Reston, Virginia.

PRINCIPAL FACTS FOR GRAVITY DATA

GRAVITY BASE· BENCH MARK NC17 AT USGS NATIONAL CENTER, RESTON, VA
OBSERVED GRAVITY AT BASE: 980084.05 MGALS (IGSN 71)
GEODETIC REFERENCE SYSTEM 1967
BOUGUER REDUCTION DENSITY: 2.67 GM/CC
LATITUDE AND LONGITUDE IN DEGREES AND MINUTES
ELEVATIONS IN FEET
GRAVITY IN MILLIGALS

ORANGE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
OR BASE1	38 14.51	78 2.77	469.5	979979.64	10.47	-5.55
OR BASE2	38 8.54	78 0.28	292.0	979978.36	1.23	-8.73
OR01	38 14.15	78 3.24	490.0	979976.42	9.70	-7.01
OR02	38 13.54	78 4.40	372.0	979978.75	1.83	-10.86
OR03	38 13.93	78 5.08	438.0	979978.83	7.54	-7.40
OR04	38 14.08	78 5.67	480.0	979981.45	13.89	-2.48
OR05	38 14.13	78 6.65	506.0	979980.99	15.80	-1.45
OR06	38 13.40	78 6.43	463.0	979978.59	10.43	-5.36
OR07	38 12.60	78 6.91	465.0	979973.97	7.17	-8.69
OR08	38 13.52	78 7.25	528.0	979978.13	15.91	-2.10
OR09	38 12.12	78 6.54	429.0	979971.27	1.79	-12.84
OR10	38 11.70	78 6.18	501.0	979965.55	3.45	-13.63
OR11	38 11.54	78 6.60	479.0	979967.00	3.07	-13.27
OR12	38 10.77	78 5.56	466.0	979965.60	1.57	-14.32
OR13	38 9.66	78 5.24	435.0	979965.49	0.17	-14.66
OR14	38 8.94	78 4.33	413.0	979967.25	0.92	-13.17
OR15	38 8.54	78 4.32	295.6	979973.87	-2.92	-13.00
OR16	38 7.97	78 3.84	415.0	979967.16	2.44	-11.72
OR17	38 8.09	78 6.05	467.0	979960.41	0.40	-15.53
OR18	38 8.52	78 6.24	433.0	979962.99	-0.85	-15.61
OR19	38 13.59	78 1.89	454.0	979977.50	8.21	-7.27
OR20	38 12.23	78 0.72	439.0	979979.56	10.86	-4.12
OR21	38 12.12	78 0.15	404.0	979983.49	11.66	-2.12
OR22	38 10.04	78 0.85	446.0	979975.97	11.13	-4.08
OR23	38 10.66	78 1.05	445.0	979976.54	10.70	-4.48
OR24	38 10.91	78 0.99	429.0	979977.95	10.24	-4.39
OR25	38 10.75	78 1.90	455.0	979973.00	7.97	-7.55
OR26	38 10.87	78 2.25	470.0	979971.39	7.59	-8.44
OR27	38 12.81	78 6.67	482.0	979973.14	7.63	-8.81
OR28	38 12.68	78 6.33	441.0	979972.41	3.24	-11.81
OR29	38 12.92	78 4.86	468.0	979971.32	4.33	-11.63
OR30	38 12.47	78 4.81	428.0	979972.87	2.78	-11.82
OR32	38 11.78	78 4.11	483.0	979968.23	4.32	-12.15
OR34	38 11.20	78 4.19	479.0	979967.07	3.64	-12.70
OR35	38 11.15	78 2.75	465.2	979970.27	5.61	-10.25
OR36	38 9.74	78 0.74	447.0	979975.32	11.02	-4.23
OR37	38 9.35	78 0.03	396.0	979981.10	12.57	-0.94
OR38	38 9.73	78 2.31	303.0	979979.72	1.89	-8.45
OR39	38 9.33	78 2.94	433.0	979969.28	4.26	-10.51
OR40	38 7.75	78 0.88	370.0	979970.55	1.92	-10.70

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
OR41	38 7.66	78 1.36	387.0	979968.48	1.58	-11.62
OR42	38 9.42	78 3.39	438.0	979968.05	3.37	-11.57
OR43	38 9.58	78 3.68	437.0	979967.66	2.65	-12.26
OR44	38 10.19	78 4.84	448.0	979966.00	1.13	-14.15
OR45	38 14.54	78 0.87	473.0	979980.23	11.34	-4.79
OR46	38 14.73	78 1.08	473.0	979980.62	11.45	-4.68
OR47	38 14.65	78 3.08	435.0	979980.34	7.71	-7.12
OR48	38 14.54	78 3.58	433.0	979979.70	7.05	-7.72
OR49	38 14.67	78 4.70	437.0	979986.21	13.74	-1.16
OR50	38 14.95	78 5.18	450.0	979987.92	16.27	0.92
OR51	38 11.13	78 7.15	473.0	979966.47	2.58	-13.56
OR52	38 10.75	78 6.51	473.0	979964.72	1.38	-14.75

LAHORE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
LH BASE1	38 14.36	77 57.64	478.0	979988.19	20.03	3.73
LH BASE2	38 13.89	77 56.99	404.0	979997.35	22.92	9.14
LH BASE3	38 7.57	77 54.25	346.1	979973.83	3.21	-8.59
LH BASE4	38 11.44	77 56.46	381.2	979995.89	22.91	9.91
LH BASE5	38 11.94	77 58.16	373.9	979993.55	19.15	6.40
LH01	38 10.69	77 59.55	424.0	979984.01	16.15	1.69
LH02	38 14.71	77 57.87	477.0	979987.79	19.03	2.76
LH03	38 14.03	77 57.63	462.0	979989.85	20.67	4.92
LH04	38 13.49	77 57.79	484.0	979988.49	22.17	5.67
LH05	38 12.81	77 57.92	398.0	979996.93	23.52	9.95
LH06	38 12.39	77 58.12	404.0	979994.49	22.26	8.48
LH07	38 12.14	77 58.72	337.0	979994.38	16.21	4.72
LH08	38 13.33	77 59.74	451.0	979983.21	14.02	-1.36
LH09	38 13.51	77 59.90	458.0	979982.35	13.56	-2.06
LH10	38 11.38	77 58.17	352.0	979993.67	18.03	6.02
LH11	38 10.37	77 59.13	353.0	979989.47	15.40	3.36
LH12	38 9.28	77 59.96	404.0	979979.95	12.27	-1.50
LH13	38 9.03	77 58.59	390.0	979977.06	8.43	-4.87
LH14	38 9.25	77 57.96	364.0	979979.62	8.23	-4.19
LH15	38 8.52	77 58.05	380.0	979974.00	5.18	-7.78
LH16	38 7.73	77 55.61	347.0	979975.00	4.23	-7.60
LH17	38 7.78	77 54.57	359.0	979973.34	3.63	-8.62
LH18	38 9.55	77 55.84	358.0	979980 77	8.37	-3.84
LH19	38 10.11	77 56.18	366.0	979985.37	12.91	0.42
LH20	38 10.50	77 56.80	372.0	979989.62	17.15	4.46
LH21	38 10.99	77 56.76	368.0	979994.51	20.94	8.39
LH22	38 11.70	77 56.99	375.0	979996.96	23.01	10.22
LH23	38 11.21	77 55.66	270.0	979997.94	14.83	5.63
LH24	38 10.53	77 53.36	290.0	979987.40	7.17	-2.72
LH25	38 10.41	77 52.67	400.0	979978.65	8.94	-4.70
LH26	38 11.42	77 54.69	377.0	979989.47	16.12	3.26
LH27	38 11.74	77 54.61	400.0	979988.85	17.20	3.55
LH28	38 12.74	77 55.39	419.0	979994.67	23.34	9.05
LH29	38 13.50	77 55.46	472.0	979994.69	27.23	11.13
LH30	38 13.87	77 55.18	458.0	979997.28	27.96	12.34
LH31	38 14.46	77 55.06	477.0	979997.09	28.69	12.43

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
LH32	38 14.03	77 53.84	346.0	979998.13	18.04	6.24
LH33	38 14.17	77 53.40	359.0	979995.99	16.92	4.68
LH34	38 14.53	77 52.55	443.0	979987.81	16.11	1.00
LH35	38 13.40	77 56.88	392.0	980000.17	25.33	11.96
LH36	38 12.18	77 56.62	383.0	979998.11	24.21	11.15
LH37	38 7.74	77 55.04	349.4	979974.00	3.44	-8.47
LH38	38 10.12	77 54.97	252.0	979991.66	8.46	-0.14
LH39	38 8.96	77 54.25	324.0	979979.32	4.59	-6.46
LH40	38 8.85	77 54.04	330.0	979979.12	5.11	-6.14
LH41	38 8.63	77 54.13	314.0	979978.46	3.27	-7.44
LH42	38 8.41	77 54.26	256.0	979981.72	1.40	-7.33
LH43	38 8.90	77 53.60	250.0	979983.23	1.63	-6.90
LH44	38 9.37	77 52.83	354.0	979978.42	5.91	-6.16
LH45	38 8.84	77 52.56	253.0	979983.59	2.36	-6.27
LH46	38 8.53	77 55.51	253.0	979982.62	1.84	-6.79
LH47	38 11.27	77 52.52	441.0	979976.88	9.77	-5.27
LH48	38 12.41	77 52.71	498.0	979976.36	12.94	-4.04
LH49	38 13.65	77 52.64	466.0	979983.13	14.89	-1.01
LH50	38 14.46	77 56.35	378.0	979999.61	21.90	9.01
LH51	38 14.95	77 56.06	483.0	979993.20	24.65	8.18

MINERAL QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
MN01	38 6.42	77 55.01	322.0	979971.95	0.75	-10.23
MN02	38 5.56	77 53.26	361.4	979970.32	4.08	-8.24
MN03	38 4.53	77 52.93	409.0	979965.83	5.58	-8.37
MN04	38 2.69	77 52.90	425.0	979964.53	8.47	-6.02
MN05	38 2.16	77 53.29	444.0	979963.70	10.21	-4.94
MN06	38 1.48	77 53.94	459.0	979960.81	9.72	-5.93
MN07	38 1.06	77 54.25	467.0	979959.25	9.53	-6.40
MN08	38 0.68	77 54.48	463.9	979958.11	8.65	-7.17
MN09	38 0.49	77 53.45	449.0	979962.66	12.08	-3.24
MN10	38 1.51	77 52.68	389.0	979968.13	10.41	-2.85
MN11	38 0.14	77 54.43	467.0	979957.89	9.51	-6.41
MN12	38 0.95	77 54.77	462.0	979958.14	8.11	-7.65
MN13	38 0.63	77 55.67	447.0	979957.03	6.06	-9.19
MN14	38 1.41	77 55.67	489.0	979955.70	7.54	-9.14
MN15	38 1.44	77 56.17	477.0	979955.58	6.24	-10.03
MN16	38 1.48	77 56.45	486.0	979954.86	6.31	-10.26
MN17	38 1.47	77 56.88	471.0	979955.06	5.11	-10.95
MN18	38 1.23	77 57.45	478.0	979954.42	5.48	-10.82
MN19	38 0.95	77 58.11	494.0	979952.01	4.99	-11.86
MN20	38 1.08	77 58.70	465.0	979953.10	3.16	-12.70
MN21	38 1.20	77 59.60	433.0	979954.43	1.31	-13.46
MN22	38 0.36	77 58.61	428.0	979955.09	2.72	-11.87
MN23	38 1.61	77 59.68	454.0	979953.91	2.16	-13.32
MN24	38 2.67	77 59.08	310.0	979965.22	-1.62	-12.20
MN25	38 2.80	77 58.32	425.0	979959.32	3.10	-11.39
MN26	38 3.89	77 58.10	400.0	979963.55	3.39	-10.26
MN27	38 4.48	77 58.00	381.0	979965.80	2.99	-10.01

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
MN28	38 4.99	77 57.51	373.0	979967.14	2.83	-9.89
MN29	38 5.42	77 57.05	375.6	979967.59	2.89	-9.92
MN30	38 5.77	77 57.73	257.0	979974.73	-1.63	-10.40
MN31	38 5.82	77 58.26	317.0	979970.97	0.18	-10.64
MN32	38 6.01	77 59.16	401.0	979965.32	2.15	-11.53
MN33	38 6.42	77 58.58	373.0	979968.10	1.70	-11.03
MN34	38 6.49	77 58.13	360.0	979968.76	1.03	-11.25
MN35	38 6.81	77 57.01	320.0	979972.19	0.23	-10.68
MN36	38 5.20	77 56.38	270.0	979973.29	-1.02	-10.23
MN37	38 4.94	77 55.43	370.8	979966.17	1.72	-10.92
MN38	38 5.39	77 55.33	364.0	979967.21	1.47	-10.95
MN39	38 5.63	77 55.39	363.0	979967.59	1.40	-10.98
MN40	38 4.67	77 55.67	386.0	979964.78	2.16	-11.01
MN41	38 4.37	77 56.23	400.9	979963.34	2.56	-11.11
MN42	38 4.13	77 55.52	373.0	979964.98	1.93	-10.80
MN43	38 3.83	77 56.84	398.0	979963.26	3.00	-10.58
MN44	38 3.66	77 56.98	417.0	979961.39	3.16	-11.06
MN45	38 2.03	77 57.66	448.5	979956.39	3.51	-11.79
MN46	38 0.45	77 57.15	454.0	979954.59	4.54	-10.95
MN47	38 2.40	77 55.25	486.0	979957.22	7.33	-9.25
MN48	38 3.26	77 55.92	394.0	979962.49	2.68	-10.75
MN49	38 4.11	77 55.55	287.0	979969.72	-1.39	-11.18
MN50	38 2.89	77 54.78	462.0	979959.66	6.79	-8.97
MN51	38 3.26	77 54.50	456.0	979960.30	6.33	-9.23
MN52	38 3.54	77 54.22	430.0	979962.65	5.82	-8.85
MN53	38 3.92	77 53.85	436.0	979962.48	5.66	-9.21
MN54	38 4.22	77 53.48	425.0	979963.58	5.29	-9.21
MN55	38 7.02	77 52.76	324.0	979976.57	4.68	-6.37
MN56	38 7.33	77 52.67	337.9	979976.50	5.46	-6.06
MN57	38 7.36	77 53.31	343.0	979974.34	3.74	-7.96
MN58	38 7.34	77 54.21	338.0	979974.04	3.00	-8.53
MN59	38 6.47	77 53.20	254.0	979978.96	1.29	-7.37
MN60	38 6.93	77 54.88	250.0	979978.12	-0.60	-9.13
MN61	38 5.87	77 53.59	250.0	979977.21	0.04	-8.49
MN62	38 7.31	77 59.63	271.0	979976.09	-1.21	-10.45

BELMONT QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
BE BASE1	38 14.93	77 51.91	442.0	979987.77	15.39	0.32
BE BASE2	38 13.38	77 50.36	539.0	979974.40	13.42	-4.97
BE01	38 7.68	77 52.21	322.0	979976.48	3.43	-7.55
BE02	38 8.41	77 51.92	330.0	979977.33	3.97	-7.29
BE03	38 8.72	77 51.99	354.0	979976.42	4.86	-7.21
BE04	38 9.84	77 50.63	379.0	979975.78	4.93	-7.99
BE05	38 9.91	77 50.17	374.0	979977.01	5.59	-7.17
BE06	38 9.83	77 49.68	427.0	979974.06	7.74	-6.82
BE07	38 9.48	77 49.43	411.0	979974.01	6.70	-7.32
BE08	38 9.11	77 49.18	411.0	979972.94	6.17	-7.85
BE09	38 8.71	77 49.00	409.0	979972.97	6.60	-7.35
BE10	38 8.57	77 48.84	385.0	979975.20	6.78	-6.35

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
BE11	38 8.24	77 47.66	379.0	979976.42	7.92	-5.01
BE12	38 9.07	77 47.67	408.0	979974.54	7.55	-6.37
BE13	38 7.90	77 47.14	369.0	979977.45	8.50	-4.08
BE14	38 8.94	77 46.57	366.0	979978.69	7.94	-4.54
BE15	38 9.61	77 46.93	401.0	979976.05	7.61	-6.07
BE16	38 10.21	77 48.52	435.0	979973.46	7.34	-7.50
BE17	38 9.06	77 49.64	423.0	979972.68	7.11	-7.31
BE18	38 8.67	77 50.46	394.0	979974.78	7.06	-6.38
BE19	38 8.22	77 50.71	374.0	979975.19	6.24	-6.51
BE20	38 14.67	77 51.16	483.0	979982.57	14.43	-2.04
BE21	38 14.43	77 50.51	509.0	979979.40	14.06	-3.30
BE22	38 13.64	77 49.96	527.0	979975.61	13.12	-4.86
BE23	38 13.77	77 48.93	433.0	979980.54	9.02	-5.75
BE24	38 13.30	77 49.55	479.5	979976.95	10.49	-5.87
BE25	38 13.25	77 48.48	402.0	979981.55	7.87	-5.84
BE26	38 13.33	77 47.72	421.0	979980.56	8.55	-5.81
BE27	38 14.27	77 47.36	367.0	979986.45	7.99	-4.53
BE28	38 14.43	77 45.77	402.0	979982.96	7.55	-6.16
BE29	38 14.01	77 45.12	370.0	979984.17	6.37	-6.25
BE30	38 13.04	77 50.57	542.0	979973.20	13.00	-5.49
BE31	38 12.95	77 51.33	527.0	979974.25	12.77	-5.21
BE32	38 13.02	77 51.80	504.0	979976.62	12.87	-4.32
BE33	38 12.77	77 52.49	490.0	979978.25	13.55	-3.16
BE34	38 12.35	77 50.85	486.7	979974.57	10.18	-6.42
BE35	38 11.78	77 51.21	442.0	979975.89	8.13	-6.95
BE36	38 11.33	77 51.26	433.7	979975.03	7.15	-7.65
BE37	38 10.11	77 51.88	383.0	979976.40	5.53	-7.53
BE38	38 10.06	77 52.29	295.0	979983.17	4.10	-5.96
BE39	38 9.61	77 51.88	340.0	979978.88	4.70	-6.89
BE40	38 10.99	77 51.11	409.0	979975.84	6.13	-7.82
BE41	38 11.23	77 50.42	394.0	979977.66	6.19	-7.25
BE42	38 11.13	77 50.10	408.0	979976.62	6.61	-7.30
BE43	38 11.92	77 50.28	484.0	979973.48	9.46	-7.04
BE44	38 12.50	77 50.31	508.0	979973.56	10.95	-6.38
BE45	38 13.18	77 47.05	414.0	979980.23	7.78	-6.34
BE46	38 13.16	77 46.01	391.0	979981.51	6.93	-6.41
BE47	38 13.06	77 45.65	383.0	979981.58	6.39	-6.67
BE48	38 11.38	77 46.48	424.0	979976.66	7.79	-6.67
BE49	38 11.46	77 45.41	410.0	979978.25	7.95	-6.04
BE50	38 10.86	77 45.80	395.0	979979.05	8.21	-5.26
BE51	38 10.64	77 45.46	375.0	979981.56	9.17	-3.62
BE52	38 10.95	77 45.04	378.0	979982.34	9.77	-3.12
BE53	38 10.11	77 45.05	374.3	979981.42	9.74	-3.03
BE54	38 11.56	77 47.08	436.0	979975.62	7.62	-7.25
BE55	38 11.61	77 47.47	452.0	979975.12	8.55	-6.87
BE56	38 10.69	77 48.17	416.0	979975.93	7.32	-6.87
BE57	38 12.12	77 48.43	450.0	979976.03	8.52	-6.83
BE58	38 12.03	77 48.75	427.0	979977.14	7.60	-6.96
BE59	38 12.38	77 48.53	446.0	979976.60	8.34	-6.88
BE60	38 12.74	77 48.62	438.9	979977.56	8.10	-6.87
BE61	38 13.11	77 49.20	465.0	979977.29	9.74	-6.12
BE62	38 7.55	77 51.12	250.0	979981.19	1.56	-6.96
BE63	38 8.07	77 52.02	250.0	979981.79	1.40	-7.13
BE64	38 7.76	77 46.20	337.0	979980.66	8.91	-2.59

LOUISA QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
L001	38 7.41	78 4.04	441.0	979963.95	2.49	-12.55
L002	38 7.22	78 2.48	447.0	979965.64	5.02	-10.22
L003	38 7.26	78 3.21	430.7	979966.48	4.27	-10.42
L004	38 6.95	78 5.26	475.0	979959.76	2.17	-14.03
L005	38 6.82	78 6.38	534.3	979955.09	3.27	-14.95
L007	38 6.14	78 7.10	522.0	979954.46	2.48	-15.32
L008	38 5.17	78 6.72	530.0	979953.76	3.95	-14.12
L009	38 5.43	78 6.60	521.0	979954.38	3.34	-14.42
L010	38 5.69	78 6.39	516.0	979955.27	3.38	-14.22
L011	38 4.67	78 6.88	516.0	979954.17	3.78	-13.82
L012	38 5.39	78 4.84	488.0	979958.27	4.19	-12.45
L013	38 5.88	78 4.51	461.0	979960.62	3.28	-12.44
L014	38 6.51	78 2.98	304.0	979973.45	0.42	-9.94
L015	38 4.86	78 3.15	480.0	979960.94	6.88	-9.49
L016	38 4.86	78 4.26	447.0	979961.63	4.47	-10.78
L017	38 4.50	78 3.35	477.0	979960.46	6.65	-9.62
L018	38 2.98	78 3.83	526.0	979956.83	9.85	-8.09
L019	38 3.11	78 4.71	529.8	979955.92	9.11	-8.96
L020	38 2.43	78 6.16	461.0	979957.59	5.30	-10.42
L021	38 2.23	78 6.79	463.0	979958.11	6.30	-9.49
L022	38 2.19	78 5.96	459.0	979956.99	4.86	-10.79
L023	38 2.03	78 5.06	524.0	979956.02	10.24	-7.63
L024	38 1.83	78 5.22	519.0	979956.57	10.61	-7.09
L025	38 1.49	78 5.58	504.0	979957.47	10.60	-6.59
L026	38 1.24	78 5.66	495.0	979959.95	12.60	-4.28
L027	38 0.65	78 5.49	474.6	979960.34	11.93	-4.25
L028	38 0.52	78 5.32	462.0	979960.53	11.13	-4.63
L029	38 0.07	78 5.02	457.0	979959.39	10.18	-5.41
L030	38 0.86	78 3.54	485.0	979956.60	8.86	-7.68
L031	38 1.71	78 2.88	508.0	979955.72	8.90	-8.42
L032	38 1.18	78 2.20	481.0	979953.67	5.09	-11 32
L033	38 1.92	78 1.68	513.0	979953.43	6.78	-10.72
L034	38 2.30	78 2.51	543.0	979953.94	9.55	-8.97
L035	38 2.66	78 2.30	504.0	979956.92	8.34	-8.85
L036	38 2.93	78 1.85	488.0	979956.89	6.41	-10.24
L037	38 3.55	78 2.07	462.0	979959.35	5.52	-10.24
L038	38 4.87	78 2.09	390.0	979964.20	1.66	-11.64
L039	38 5.32	78 2.47	448.0	979962.38	4.64	-10.64
L040	38 1.52	78 0.25	468.4	979952.62	2.36	-13.62
L041	38 1.03	78 0.46	425.0	979954.39	0.76	-13.73
L042	38 1.04	78 0.78	428.0	979954.81	1.45	-13.15
L043	38 0.78	78 1.04	494.0	979949.88	3.11	-13.74
L044	38 0.40	78 1.48	482.0	979949.76	2.41	-14.03
L045	38 0.58	78 0.59	448.4	979951.19	0.42	-14.87
L046	38 0.01	78 0.26	422.0	979952.59	0.17	-14.22
L047	38 0.10	78 0.91	468.0	979949.74	1.52	-14.45
L048	38 2.44	78 0.25	364.0	979961.77	0.34	-12.07
L049	38 2.98	78 0.09	395.0	979961.07	1.77	-11.70
L050	38 4.26	78 0.23	391.0	979965.11	3.56	-9.78
L051	38 5.65	78 0.61	386.0	979965.17	1.11	-12.05
L052	38 5.40	78 0.94	390.0	979965.23	1.92	-11.38

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
LO53	38 5.32	78 1.45	412.0	979963.08	1.95	-12.10
LO54	38 6.05	78 1.80	399.0	979964.29	0.87	-12.74
LO55	38 6.85	78 0.67	291.0	979973.35	-1.40	-11.32
LO56	38 7.07	78 0.22	313.0	979972.72	-0.28	-10.95
LO57	38 6.90	78 1.28	291.0	979972.75	-2.07	-11.99
LO58	38 6.42	78 2.30	292.0	979972.66	-1.36	-11.32
LO59	38 6.47	78 1.57	293.0	979971.70	-2.30	-12.30

LAKE ANNA WEST QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
LA BASE1	38 7.01	77 47.50	364.0	979976.13	8.02	-4.40
LA01	38 7.13	77 51.96	352.0	979973.48	4.06	-7.94
LA02	38 6.13	77 47.80	332.0	979977.75	7.91	-3.41
LA03	38 5.47	77 48.05	347.4	979976.17	8.75	-3.10
LA04	38 5.16	77 48.78	272.0	979979.59	5.53	-3.75
LA05	38 4.99	77 50.31	313.0	979974.99	5.03	-5.64
LA06	38 5.35	77 51.21	365.0	979971.35	5.76	-6.69
LA07	38 4.92	77 51.30	376.0	979970.27	6.34	-6.48
LA08	38 4.84	77 52.24	389.0	979967.53	4.94	-8.33
LA09	38 4.15	77 50.33	295.0	979976.82	6.40	-3.66
LA10	38 3.18	77 49.34	358.0	979970.96	7.89	-4.32
LA11	38 3.58	77 47.26	250.0	979978.88	5.06	-3 46
LA12	38 3.03	77 47.00	247.0	979978.05	4.75	-3.67
LA13	38 2.46	77 48.02	315.5	979973.68	7.66	-3.10
LA14	38 0.75	77 46.32	316.5	979974.62	11.20	0.40
LA15	38 1.16	77 46.48	251.0	979978.76	8.58	0.01
LA16	38 2.40	77 47.38	305.0	979974.46	7.54	-2.86
LA17	38 2.68	77 49.91	393.0	979968.56	9.51	-3.90
LA18	38 1.53	77 50.79	404.0	979966.81	10.48	-3.30
LA19	38 1.24	77 51.61	433.0	979967.15	13.97	-0.80
LA20	38 0.04	77 51.18	387.0	979968.06	12.30	-0.89
LA21	38 0.10	77 48.91	341.0	979972.29	12.12	0.49
LA22	38 0.44	77 48.57	338.0	979972.17	11.22	-0.31
LA23	38 0.82	77 48.05	328.0	979972.94	10.50	-0.69
LA24	38 1.32	77 47.59	299.0	979974.75	8.85	-1.35
LA25	38 2.82	77 52.38	390.0	979967.44	7.90	-5.40
LA26	38 2.87	77 51.68	379.0	979969.50	8.85	-4.07
LA27	38 2.59	77 51.26	288.0	979975.83	7.03	-2.79
LA28	38 6.97	77 48.26	251.0	979982.83	4.15	-4.42
LA29	38 5.32	77 47.24	251.0	979982.16	5.89	-2.67
LA30	38 6.35	77 46.58	384.0	979976.36	11.09	-2.00
LA31	38 6.79	77 46.19	387.7	979975.44	9.88	-3.35
LA32	38 6.91	77 45.18	314.0	979978.64	5.97	-4.74
LA33	38 5.91	77 45.01	335.0	979977.34	8.11	-3.32
LA34	38 5.18	77 45.79	348.0	979974.46	7.52	-4.35
LA35	38 4.63	77 46.47	324.0	979975.59	7.20	-3.85
LA36	38 4.75	77 46.98	252.0	979980.52	5.18	-3.42
LA37	38 4.70	77 45.14	332.0	979975.38	7.64	-3.69
LA38	38 3.23	77 45.60	255.2	979979.72	6.90	-1.80
LA39	38 3.47	77 45.29	302.0	979976.65	7.88	-2.42
LA40	38 6.78	77 51.40	331.0	979974.12	3.24	-8.05
LA41	38 6.33	77 51.35	250.0	979978.42	0.58	-7.95

PROFILE- LAHORE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
PROF00	38 12.76	77 59.27	417.2	979986.40	14.87	0.64
PROF01	38 12.72	77 59.23	414.9	979987.07	15.38	1.23
PROF02	38 12.68	77 59.19	403.8	979987.26	14.59	0.81
PROF03	38 12.64	77 59.16	389.7	979988.37	14.43	1.14
PROF04	38 12.60	77 59.13	386.3	979988.69	14.49	1.31
PROF05	38 12.56	77 59.10	390.9	979988.44	14.73	1.40
PROF06	38 12.52	77 59.06	396.7	979988.21	15.10	1.57
PROF07	38 12.48	77 59.03	385.7	979989.21	15.13	1.97
PROF08	38 12.44	77 59.00	373.5	979990.13	14.96	2.22
PROF09	38 12.39	77 58.98	373.0	979990.18	15.03	2.31
PROF10	38 12.37	77 58.93	368.0	979990.81	15.22	2.67
PROF11	38 12.36	77 58.88	362.2	979991.48	15.36	3.01
PROF12	38 12.33	77 58.84	359.1	979992.08	15.71	3.47
PROF13	38 12.29	77 58.80	362.4	979992.08	16.08	3.72
PROF14	38 12.25	77 58.77	367.7	979991.64	16.20	3.66
PROF15	38 12.22	77 58.75	369.4	979991.66	16.42	3.83
PROF16	38 12.18	77 58.72	351.8	979992.82	15.99	3.99
PROF17	38 12.14	77 58.72	332.0	979994.20	15.56	4.24
PROF18	38 12.10	77 58.68	330.0	979994.37	15.60	4.35
PROF19	38 12.07	77 58.64	315.4	979995.60	15.51	4.75
PROF20	38 12.05	77 58.58	307.4	979996.24	15.42	4.94
PROF21	38 12.03	77 58.53	307.8	979996.22	15.47	4.97
PROF22	38 12.01	77 58.47	312.3	979996.32	16.02	5.37
PROF23	38 11.99	77 58.42	328.8	979995.58	16.86	5.65
PROF24	38 11.97	77 58.36	346.8	979994.43	17.44	5.61
PROF25	38 11.95	77 58.29	365.7	979993.47	18.28	5.81
PROF26	38 11.93	77 58.22	370.6	979993.55	18.85	6.21
PROF27	38 11.93	77 58.19	367.4	979994.00	19.00	6.47
PROF28	38 11.94	77 58.16	373.9	979993.60	19.20	6.45
PROF29	38 11.94	77 58.10	368.9	979994.60	19.73	7.15
PROF30	38 11.94	77 58.04	364.2	979994.74	19.43	7.00
PROF31	38 11.94	77 57.99	355.2	979995.34	19.18	7.06
PROF32	38 11.94	77 57.92	346.9	979996.07	19.13	7.30
PROF33	38 11.95	77 57.86	341.2	979996.52	19.03	7.39
PROF34	38 11.95	77 57.79	351.6	979996.15	19.64	7.64
PROF35	38 11.95	77 57.74	366.6	979995.30	20.20	7.69
PROF36	38 11.95	77 57.68	379.9	979994.82	20.97	8.01
PROF37	38 11.95	77 57.61	380.5	979994.93	21.13	8.16
PROF38	38 11.94	77 57.55	374.1	979995.60	21.22	8.46
PROF39	38 11.94	77 57.49	364.5	979996.25	20.96	8.53
PROF40	38 11.92	77 57.43	360.9	979996.42	20.82	8.52
PROF41	38 11.90	77 57.37	353.1	979996.98	20.68	8.64
PROF42	38 11.87	77 57.32	347.7	979997.31	20.55	8.69
PROF43	38 11.84	77 57.27	343.6	979997.64	20.53	8.82
PROF44	38 11.81	77 57.21	355.9	979996.97	21.07	8.93
PROF45	38 11.79	77 57.16	362.3	979996.72	21.45	9.09
PROF46	38 11.76	77 57.12	355 8	979997.57	21.73	9.59
PROF47	38 11.74	77 57.07	361.9	979997.40	22.16	9.82
PROF48	38 11.71	77 57.02	371.0	979997.12	22.78	10.13
PROF49	38 11.69	77 56.99	376.7	979996.74	22.97	10.12
PROF50	38 11.67	77 56.94	381.1	979996.67	23.34	10.34

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
PROF51	38 11.64	77 56.89	378.4	979997.08	23.54	10.63
PROF52	38 11.61	77 56.84	376.7	979997.48	23.83	10.98
PROF53	38 11.59	77 56.79	376.8	979997.86	24.24	11.39
PROF54	38 11.57	77 56.74	373.9	979998.23	24.37	11.62
PROF55	38 11.54	77 56.69	374.4	979997.99	24.22	11.45
PROF56	38 11.52	77 56.64	381.3	979997.21	24.12	11.11
PROF57	38 11.48	77 56.57	392.0	979995.91	23.88	10.51
PROF58	38 11.46	77 56.52	384.6	979996.14	23.45	10.33
PROF59	38 11.44	77 56.49	383.1	979995.90	23.10	10.03
PROF60	38 11.44	77 56.45	381.2	979996.80	23.82	10.82

UNIONVILLE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
UN BASE1	38 21.27	77 57.35	301.0	980025.93	31.00	20.73
UN01	38 20.80	77 59.04	259.0	980027.57	29.38	20.54
UN02	38 19.57	77 58.78	495.0	980009.38	35.19	18.30
UN03	38 17.12	77 58.10	436.0	979994.11	17.96	3.09
UN04	38 15.03	77 58.12	484.0	979987.04	18.47	1.96
UN05	38 16.40	77 55.71	500.0	979992.52	23.44	6.39
UN06	38 15.15	77 53.32	427.0	979996.21	22.10	7.54
UN07	38 21.77	77 53.60	331.0	980012.53	19.69	8.40
UN08	38 20.65	77 55.01	324.0	980009.80	17.94	6.89
UN09	38 20.35	77 56.07	347.0	980008.56	19.30	7.47
UN10	38 19.93	77 55.54	280.0	980010.43	15.49	5.94

MINE RUN QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
MR01	38 16.71	77 51.76	412.0	979996.67	18.86	4.81
MR02	38 16.25	77 50.35	434.0	979989.38	14.32	-0.49
MR03	38 16.61	77 49.70	408.0	979992.06	14.02	0.11
MR04	38 16.04	77 48.36	486.0	979984.87	15.00	-1.57
MR05	38 16.19	77 47.92	454.0	979987.31	14.22	-1.27
MR06	38 16.20	77 47.21	416.0	979989.15	12.47	-1.72
MR07	38 16.32	77 46.18	434.0	979987.31	12.14	-2.66
MR08	38 16.51	77 45.46	426.0	979987.75	11.55	-2.98
MR09	38 15.99	77 45.59	416.0	979986.58	10.20	-3.98
MR10	38 18.08	77 48.49	454.0	979994.75	18.89	3.40
MR11	38 17.75	77 48.74	444.0	979993.52	17.20	2.05
MR12	38 17.82	77 48.00	464.0	979992.94	18.40	2.57
MR13	38 17.55	77 47.64	463.0	979991.83	17.59	1.80
MR14	38 17.55	77 47.36	482.0	979989.71	17.26	0.82
MR15	38 17.25	77 46.66	452.0	979989.12	14.28	-1.13
MR16	38 16.77	77 46.26	434.0	979988.09	12.26	-2.54
MR17	38 20.04	77 48.47	406.0	980007.26	24.01	10.16
MR18	38 19.78	77 47.79	428.0	980007.56	26.76	12.16
MR19	38 21.86	77 45.96	359.0	980015.68	25.34	13.09
MR20	38 22.07	77 45.59	333.0	980017.48	24.38	13.03
MR21	38 22.47	77 46.48	262.0	980023.30	22.94	14.00

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
MR22	38 20.67	77 45.71	318.0	980013.48	21.03	10.18
MR23	38 20.07	77 46.43	318.0	980012.46	20.89	10.04
MR24	38 19.35	77 46.50	318.0	980008.22	17.70	6.86
MR25	38 18.42	77 46.56	438.0	979995.31	17.44	2.50
MR26	38 21.27	77 51.26	257.0	980020.07	21.00	12.23

CHANCELLORSVILLE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
CH01	38 16.23	77 44.85	417.0	979986.99	10.36	-3.87
CH02	38 15.94	77 44.47	402.0	979986.14	8.52	-5.19
CH03	38 16.62	77 44.97	399.0	979989.35	10.45	-3.16
CH04	38 17.02	77 43.88	436.0	979988.34	12.34	-2.53
CH05	38 18.22	77 41.82	408.0	979991.88	11.48	-2.43
CH06	38 18.49	77 40.52	305.0	979999.77	9.29	-1.11
CH07	38 18.07	77 40.59	372.0	979995.71	12.15	-0.54
CH08	38 17.42	77 41.04	371.0	979995.06	12.36	-0.30
CH09	38 17.04	77 41.17	362.0	979994.72	11.73	-0.62
CH10	38 16.31	77 41.24	344.0	979994.54	10.92	-0.81
CH11	38 15.78	77 40.53	363.0	979990.70	9.65	-2.73
CH12	38 16.16	77 40.07	360.0	979991.37	9.48	-2.80
CH13	38 15.17	77 39.26	329.0	979993.59	10.23	-0.99
CH14	38 15.57	77 38.20	300.0	979993.72	7.05	-3.18
CH15	38 15.79	77 37.87	252.0	979996.39	4.88	-3.71
CH16	38 17.34	77 38.78	262.0	979998.83	5.99	-2.95
CH17	38 18.09	77 38.83	314.0	979996.28	7.23	-3.48
CH18	38 18.88	77 38.11	366.0	979994.49	9.18	-3.31
CH19	38 20.55	77 37.84	312.0	979999.94	7.10	-3.54
CH20	38 20.98	77 37.56	300.0	980004.45	9.85	-0.38
CH21	38 21.50	77 39.07	309.0	980002.83	8.31	-2.23
CH22	38 20.93	77 39.49	331.0	980000.41	8.80	-2.49
CH23	38 20.21	77 39.67	266.0	980003.71	7.04	-2.03
CH24	38 19.47	77 38.90	300.0	979998.83	6.44	-3.79
CH25	38 20.22	77 43.93	347.0	980007.97	18.90	7.07
CH26	38 21.24	77 43.58	252.0	980018.63	19.13	10.54
CH27	38 19.34	77 42.53	369.0	979999.44	13.73	1.15
CH28	38 17.76	77 44.68	360.0	979997.35	13.11	0.83
CH29	38 19.04	77 41.36	393.0	979994.28	11.27	-2.13
CH30	38 21.21	77 40.59	354.0	980001.97	12.11	0.04
CH31	38 21.51	77 40.25	331.0	980004.13	11.67	0.38
CH32	38 22.07	77 39.60	295.0	980006.38	9.71	-0.35
CH33	38 21.53	77 41.13	181.0	980016.71	10.11	3.94
CH34	38 19.28	77 44.26	325.0	980006.08	16.32	5.24
CH35	38 20.03	77 42.43	340.0	980003.67	14.22	2.63
CH36	38 20.41	77 42.70	284.0	980008.24	12.97	3.28

GERMANNA BRIDGE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
GB BASE1	38 25.84	77 51.30	297.0	980023.17	21.16	11.03
GB01	38 22.71	77 45.42	286.0	980021.54	23.08	13.33
GB02	38 22.87	77 46.38	301.0	980021.66	24.38	14.11
GB03	38 24.85	77 47.43	370.0	980019.69	25.99	13.38

RICHARDSVILLE QUADRANGLE

STATION	LATITUDE	LONGITUDE	ELEV	OBS GRAV	FREE AIR	BOUGUER
RV01	38 25.47	77 39.18	293.0	980017.07	15.22	5.23
RV02	38 23.34	77 39.27	334.0	980007.86	12.99	1.60
RV03	38 22.79	77 38.85	178.0	980016.36	7.63	1.56