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UNITED STATES DEPARTMENT OF THE INTERIOR U.S. Geological Survey

GEOLOGICAL SURVEY

Reports-Open file Series



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PRINCIPAL FACTS FOR GRAVITY STATIONS OF PART OF THE SELWAY-BITTERROOT  
WILDERNESS, IDAHO AND MONTANA

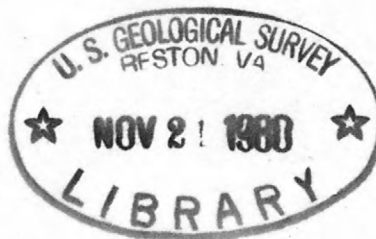
by

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Open-File Report No. 80-1241

1980

This report is preliminary and has not been  
edited or reviewed for conformity with the  
U.S. Geological Survey standards.



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## Introduction

During the summers of 1978 and 1979, 211 gravity stations were established in the Selway-Bitterroot Wilderness area (Fig. 1). The data were obtained as part of the U.S. Geological Survey's (USGS) program to evaluate the mineral-resource potential of wilderness areas. This gravity survey complements a gravity study of the proposed Blue Joint, Magruder and Meadow Creek wilderness study areas (Bankey and others, 1980).

## Data Collection

Gravity observations were made using LaCoste-Romberg meter G-235 and Worden meter E-134<sup>1</sup>. The stations were referenced to local USGS bases described in Appendix A. The USGS bases were tied to the U.S. Department of Defense base 3936-2 in Grangeville, Idaho and base 0442-0 in Missoula, Mont. Both base are part of the International Gravity Standardization Net, IGSN-71 (Defense Mapping Agency Aerospace Center, 1974). Complete base descriptions are included at the end of this report.

## Elevation Control

Station elevations were obtained from surveyed bench marks, spot elevations, and contour interpolations on USGS topographic maps at a scale of 1:24,000. Elevation accuracy is estimated to vary from 0.2 meters for bench marks to 6 meters for contour interpolations. The maximum resultant error of the Bouguer anomaly is estimated to be less than 2 mgal (milligals) for an assumed density of 2.67 g/cm<sup>3</sup>.

<sup>1</sup>Use of brand names in this report is for descriptive purposes only, and in no way constitutes endorsement by the U.S. Geological Survey.

## Data Reduction

Programs existing on the USGS Honeywell<sup>1</sup> computer system were used to reduce the gravity data. An unpublished program by D. A. Dansereau and R. R. Wahl (U.S. Geological Survey, 1975) was used to calculate earth-tide and linear meter-drift corrections. The theoretical gravity value was calculated using the 1967 formula of the Geodetic Reference System (International Association of Geodesy, 1967). An unpublished program by R. H. Godson (U.S. Geological Survey, 1978) was used to compute terrain corrections for the area from each station out to 166.7 km using the method of Plouff (1977). The program uses mean elevation data on a 15 second grid for corrections from 0 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. This program also calculates earth curvature corrections and complete (terrain-corrected) Bouguer anomaly values. Corrections for terrain ranged from 0.95 mgal to 30.98 mgal. Two complete Bouguer anomaly values per station were obtained assuming average rock densities of  $2.67 \text{ g/cm}^3$  and  $2.45 \text{ g/cm}^3$ . The corrections and anomaly values are listed in Appendix B.

## BOUGUER GRAVITY DATA

page 1

Selway-Bitterroot Gravity Corrections  
 Addendum to Open-File #0-1241  
 Meter ID: g-235 Date: 1-28-82

STATION IDENTIFICATION proj sta-id	L O C A T I O N S				E L E S T (in ft)	G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S		
	LATITUDE deg min	LONGITUDE deg min				OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE_BOUGUER d1=2.67 d2=2.45	SPEC FIELDS
North : s22	46 9.27	115 27.36			6930.0 Mt	980138.77	980723.52	24.33	-236.36	1.52	0.00	66.65	-146.90	-138.90
North : s46	46 32.61	114 40.48			3593.0 Mt	980363.81	980758.70	11.25	-122.55	1.18	0.00	-57.08	-169.55	-165.34
North : s84	46 18.71	114 30.43			5285.0 Mt	980230.76	980737.75	9.85	-180.26	1.44	0.00	-10.16	-182.01	-175.58
North : s85	46 17.98	114 25.27			6548.0 Mt	980160.47	980736.66	7.27	-223.33	1.51	0.00	39.32	-178.25	-170.11
North : s91	46 7.20	114 32.23			7774.0 Mt	980055.63	980720.40	25.92	-265.15	1.49	0.00	65.92	-174.79	-165.78
North : s159	45 50.06	115 35.87			4195.0 Mt	980282.21	980694.55	3.15	-143.08	1.29	0.00	-17.95	-159.17	-153.88
North : bj41	45 49.50	114 45.24			3224.0 Mt	980313.22	980693.71	16.11	-109.96	1.10	0.00	-77.36	-172.31	-168.76
North : hj110	45 46.01	114 27.85			7045.0 Mt	980078.21	980688.45	11.56	-240.28	1.51	0.00	51.97	-178.27	-169.64

## REFERENCES

- Bankey, Viki, Brickey, Mike, and Kleinkopf, M. Dean, 1980, Principal facts for gravity stations, Blue Joint, Magruder, and Meadow Creek Wilderness areas, Montana, Idaho: U.S. Geological Survey Open-File Report 80-915, p.
- Defense Mapping Agency Aerospace Center, 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, 1635 p.
- International Association of Geodesy, 1967, Geodetic Reference System. International Association of Geodesy Special Publication 3, 74 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.

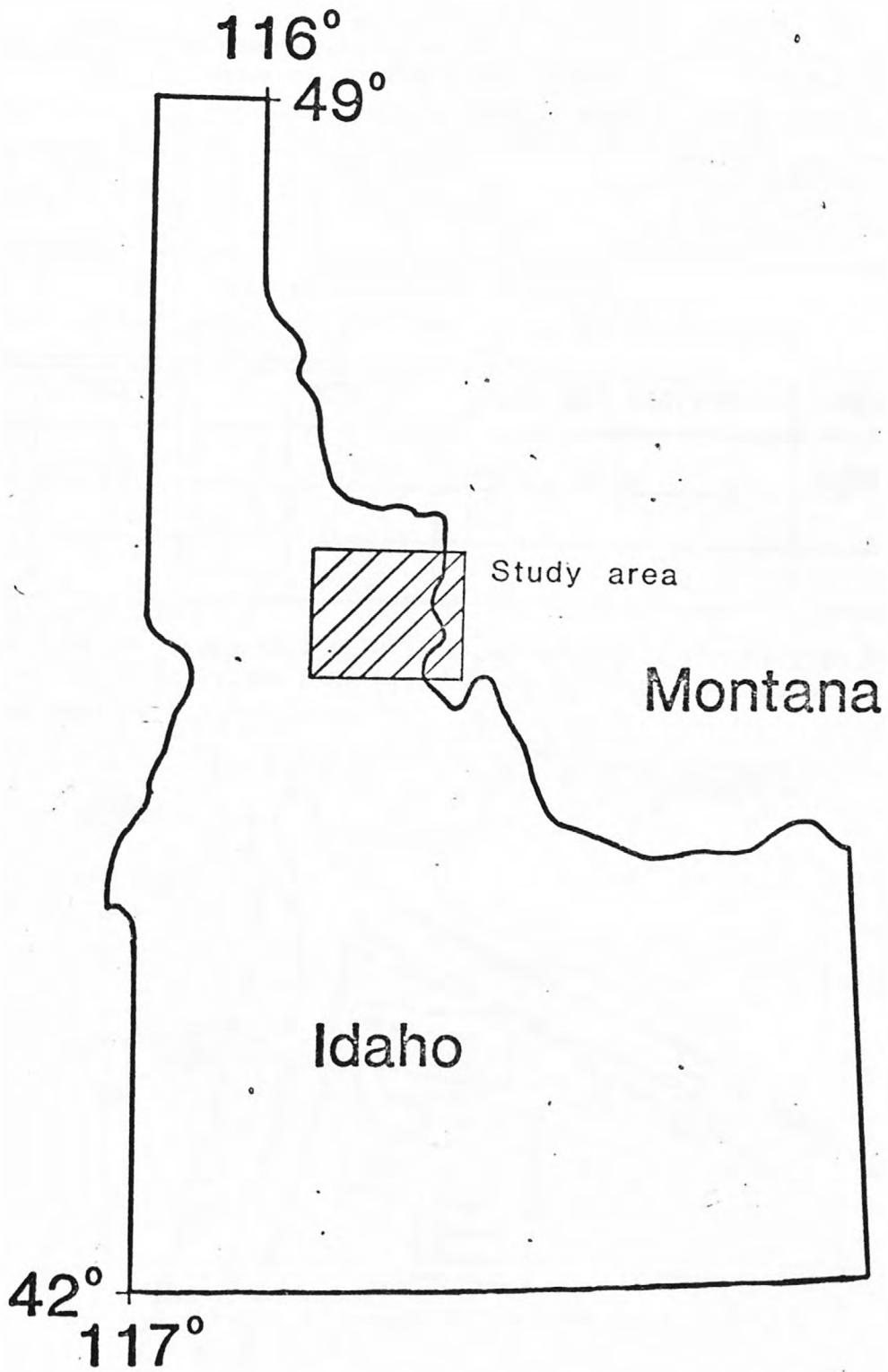


Figure 1.--Location map of the gravity survey covering the Selway-Bitterroot Wilderness.

Appendix A  
Gravity Base Descriptions

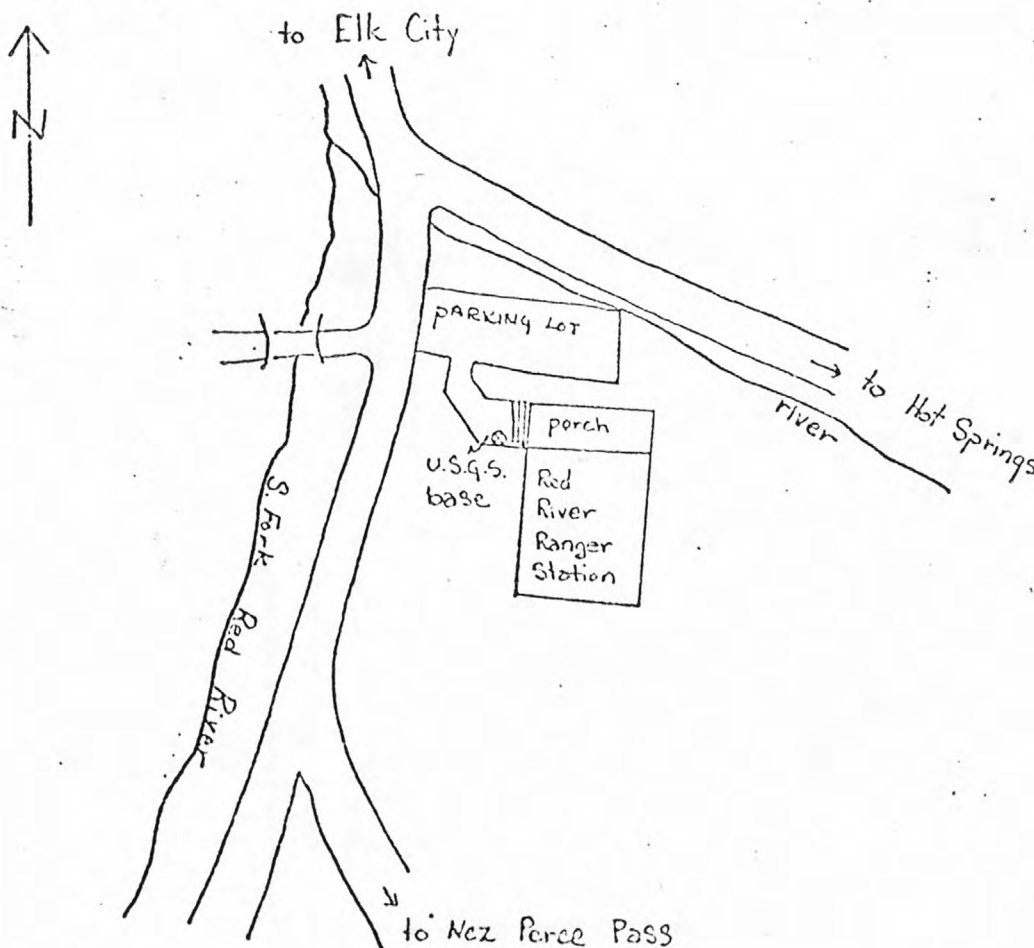
A-1

U.S. GEOLOGICAL SURVEY  
GRAVITY BASE STATION

STATE/COUNTRY Idaho		STATION DESIGNATION Red River Ranger Station		OBSERVED GRAVITY 980241.02 mgal
NEAREST TOWN Elk City		LONGITUDE 115° 20.50'		LATITUDE 45° 42.60'
ELEVATION 1620 m (5400' est.)		TOPOGRAPHIC MAP(S) Elk City 2°, no smaller map yet		
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/10/79	Brickey	G-235	Lowell, Idaho	980489.73

DESCRIPTION/SKETCH

Ranger Station is approximately 16 km. southwest of Elk City on Red River Road. Base is on concrete sidewalk at base of wooden steps, on southern end of sidewalk at Ranger Station.



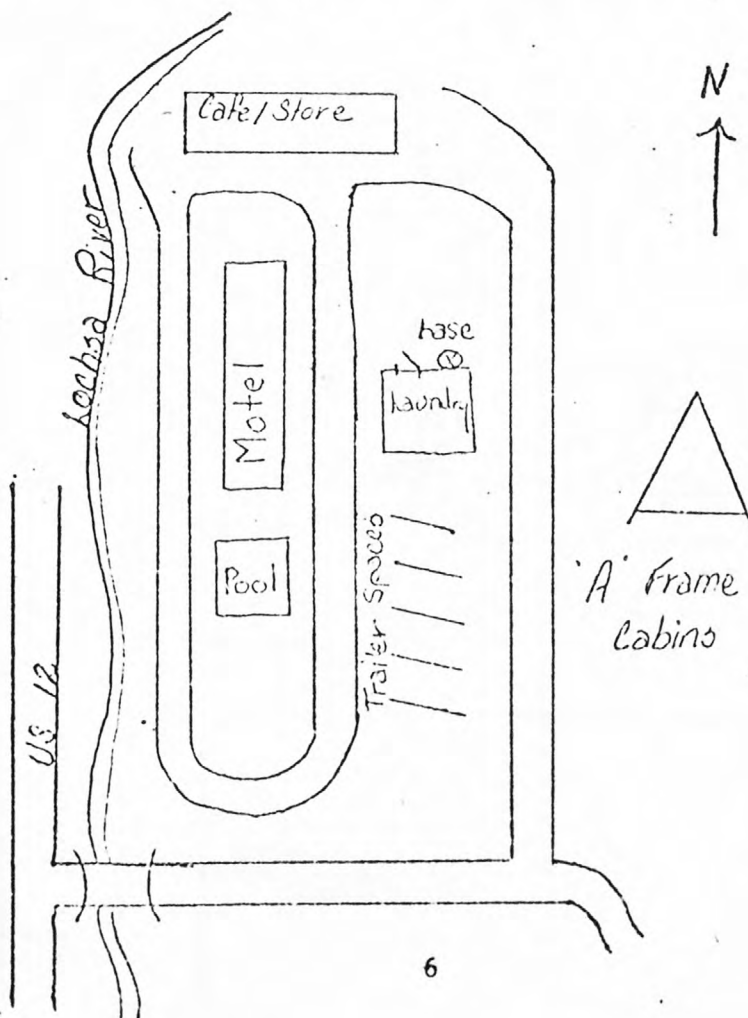


U.S. GEOLOGICAL SURVEY  
GRAVITY BASE STATION

STATE/COUNTRY		STATION DESIGNATION		OBSERVED GRAVITY
Idaho		Three Rivers Motel (S-1)		980489.73
NEAREST TOWN		LONGITUDE		LATITUDE
Lowell		115° 35.69'		46° 08.67'
ELEVATION		TOPOGRAPHIC MAP(S)		
446.6 m (1465')		Lowell 1/24,000		
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/2/78	Kleinkopf/Brickey	G-235	Grangeville	980382.52 mgals

## DESCRIPTION/SKETCH

Meter read on cement slab, one meter east of door at north end of laundry building.  
Base is beneath electrical outlet, about 0.15 meters out from wall.

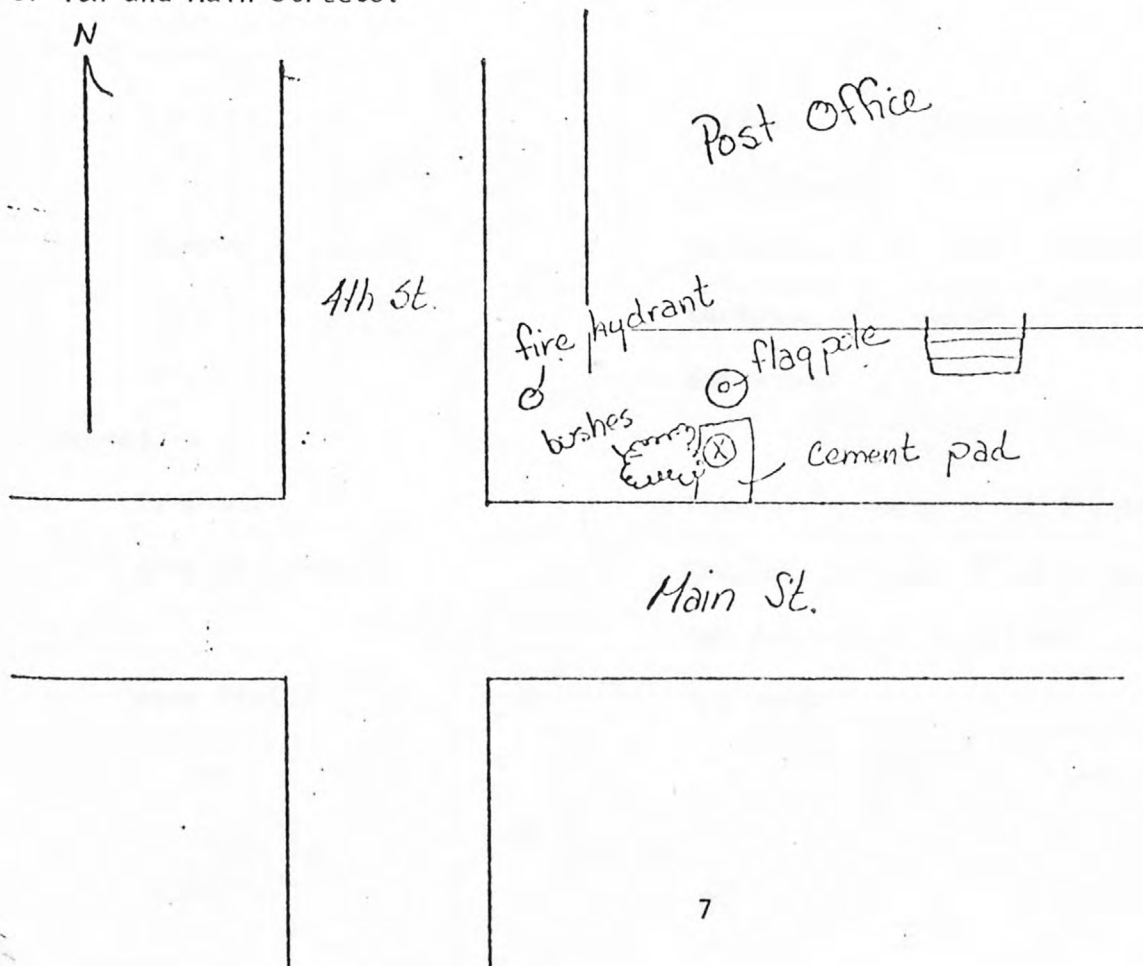


U.S. GEOLOGICAL SURVEY  
 GRAVITY BASE STATION

STATE/COUNTRY		STATION DESIGNATION		OBSERVED GRAVITY
Montana		Hamilton Post Office		980318.74 mgals
NEAREST TOWN		LONGITUDE		LATITUDE
Hamilton		114° 09.54'		46° 14.83'
ELEVATION		TOPOGRAPHIC MAP(S)		
1088.3 m (3570')		Hamilton 1/250,000		
DATE	OBSERVER	METER	REFERENCE STATION	REFERENCE VALUE
8/29/78	Kleinkopf	G-235	Missoula Airport	980429.45 mgals

## DESCRIPTION/SKETCH

Location at south base of flag pole, at east edge of bushes on a concrete pad near the southwest corner of Post Office. Post Office is at the northeast corner of 4th and Main Streets.



## Appendix B: Principal Facts of Gravity Data

### Explanation of headings

#### Identification

proj	Project name.
sta id	Gravity identification.

#### Location

latitude	North latitude in degrees, minutes, and hundredths of minutes.
longitude	West longitude in degrees, minutes, and hundredths of minutes.
elev (in feet)	Station elevation in feet.
st	State where station is located.

#### Gravity

observed	Observed gravity in milligals.
theoretical	Theoretical gravity.

#### Corrections

terrain	Terrain correction out to 166.7km in milligals.
Bouguer	Elevation correction in milligals.
curv	Curvature correction in milligals.
special	Not used.

#### Anomalies

free-air	Free-air anomaly in milligals.
complete-Bouguer	Complete Bouguer anomaly in milligals for designated densities.
spec fields	Not used.

## BOUGUER GRAVITY DATA

sellay-bitterroot wilderness area  
 brickey & bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION		L O C A T I O N S				G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S			SPEC FIELDS	
IDENTIFICATION	LATITUDE	LONGITUDE	ELE	ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE-BOUGUER d1=2.67 d2=2.45				
proj	sta-id	deg	min	deg	min	(in ft)										
:	s2	46	19.61	-114	38.82	5736.0	id	980215.40	980739.11	3.13	-195.64	-1.48	0.00	15.50	-178.49	-162.50
:	s3	46	16.38	-114	27.84	8647.0	id	980004.97	980734.24	30.98	-294.92	-1.41	0.00	83.42	-181.93	-165.40
:	s4	45	37.25	-114	50.27	8944.0	id	979925.37	980675.23	20.10	-305.05	-1.37	0.00	90.73	-195.59	-167.14
:	s5	46	3.21	-114	57.24	7017.0	id	980105.39	980714.36	14.54	-259.33	-1.52	0.00	50.58	-175.73	-157.03
:	s6	46	7.38	-114	55.62	2393.0	id	980391.25	980720.67	11.33	-81.62	-0.88	0.00	-104.41	-175.58	-169.72
:	s6	46	7.38	-114	55.62	2393.0	id	980391.31	980720.67	11.33	-81.62	-0.88	0.00	-104.35	-175.52	-169.66
:	s7	45	58.95	-114	57.90	7799.0	id	980035.14	980707.96	17.45	-266.00	-1.48	0.00	60.22	-189.22	-166.65
:	s8	45	54.72	-114	50.21	2969.0	id	980342.05	980701.59	15.39	-101.26	-1.04	0.00	-80.38	-167.29	-160.13
:	s9	45	58.18	-114	49.79	4102.0	id	980267.14	980706.80	14.18	-140.11	-1.28	0.00	-53.44	-180.65	-170.17
:	s10	45	58.20	-114	45.94	6957.0	id	980119.37	980706.84	20.65	-237.28	-1.52	0.00	66.47	-151.68	-126.30
:	s11	45	56.55	-115	2.68	7610.0	id	980047.61	980704.34	19.25	-259.56	-1.50	0.00	58.55	-183.25	-163.32
:	s12	46	9.82	-115	30.14	6027.0	id	980202.25	980724.35	19.35	-205.56	-1.50	0.00	44.45	-143.26	-107.79
:	s13	46	10.88	-115	27.56	5564.0	id	980224.13	980725.95	15.75	-189.77	-1.47	0.00	21.23	-154.26	-137.31
:	s14	46	11.24	-115	25.67	5676.0	id	980219.46	980726.49	18.75	-193.59	-1.48	0.00	26.54	-149.78	-135.25
:	s15	46	8.84	-115	31.21	3820.0	id	980343.88	980722.88	11.24	-130.29	-1.23	0.00	-19.84	-140.12	-122.43
:	s16	46	12.42	-115	23.46	5141.0	id	980250.28	980728.27	19.35	-175.35	-1.43	0.00	5.31	-152.11	-138.22
:	s17	46	12.44	-115	18.62	6269.0	id	980152.69	980728.30	13.13	-230.87	-1.52	0.00	60.66	-158.60	-140.53
:	s18	46	13.81	-115	16.50	4228.0	id	980307.15	980730.37	10.62	-144.20	-1.30	0.00	-25.72	-160.61	-151.18
:	s19	46	17.77	-114	37.02	7461.0	id	980091.46	980736.34	24.35	-254.47	-1.50	0.00	56.41	-175.22	-158.79
:	s20	46	18.40	-114	34.70	5900.0	id	980201.61	980737.29	5.08	-201.23	-1.49	0.00	18.94	-178.70	-162.41
:	s21	46	20.59	-114	30.73	5806.0	id	980207.17	980740.59	8.32	-198.03	-1.48	0.00	12.37	-178.82	-163.06
:	s22	46	9.27	-115	23.46	6930.0	id	980138.77	980723.52	23.58	-236.36	-1.52	0.00	66.65	-147.65	-110.37
:	s23	46	8.38	-115	24.76	6503.0	id	980170.90	980722.18	12.69	-221.80	-1.51	0.00	60.00	-150.62	-133.27
:	s24	46	7.73	-115	22.85	6807.0	id	980142.77	980721.20	20.97	-232.17	-1.52	0.00	61.42	-151.30	-135.14
:	s25	46	8.26	-115	31.17	5241.0	id	980251.59	980722.00	13.97	-173.76	-1.44	0.00	22.29	-143.93	-130.23
:	s25a	46	11.20	-115	33.79	1525.0	id	980474.76	980726.43	13.79	-52.01	-0.60	0.00	-108.27	-147.10	-143.90
:	s26	46	12.93	-115	32.15	1603.0	id	980467.54	980729.04	11.40	-54.67	-0.63	0.00	-110.77	-154.67	-151.05
:	s27	46	13.92	-115	29.36	1647.0	id	980459.99	980730.53	13.43	-56.17	-0.65	0.00	-115.67	-159.06	-155.48
:	s28	46	13.69	-115	25.40	1732.0	id	980452.83	980730.19	18.49	-59.07	-0.67	0.00	-114.50	-155.75	-153.50
:	s29	46	15.78	-115	23.64	1812.0	id	980440.50	980733.34	25.47	-61.80	-0.70	0.00	-122.45	-152.48	-158.48
:	s30	46	17.20	-115	24.67	1874.0	id	980438.32	980735.48	24.67	-63.92	-0.72	0.00	-120.94	-160.91	-159.14
:	s31	46	20.02	-115	20.64	2007.0	id	980446.77	980739.73	13.82	-68.45	-0.76	0.00	-104.24	-159.63	-155.07
:	s32	46	20.38	-115	18.70	2101.0	id	980440.98	980740.27	12.91	-71.66	-0.79	0.00	-101.73	-161.27	-156.37
:	s33	46	22.20	-115	14.45	2228.0	id	980436.56	980743.02	19.38	-75.99	-0.83	0.00	-96.96	-154.40	-159.59
:	s34	46	23.62	-115	12.84	2362.0	id	980430.41	980745.16	17.71	-80.56	-0.87	0.00	-92.65	-156.37	-151.12
:	s35	46	25.34	-115	8.90	2560.0	id	980412.53	980747.74	16.59	-87.31	-0.93	0.00	-94.51	-166.16	-161.71
:	s36	46	25.75	-115	6.82	2651.0	id	980406.52	980748.36	16.72	-90.42	-0.95	0.00	-92.58	-167.23	-162.55
:	s37	46	14.71	-115	23.97	1777.0	id	980446.80	980731.73	21.25	-60.61	-0.69	0.00	-117.83	-157.88	-154.58
:	s38	46	13.76	-115	27.40	1693.0	id	980459.71	980730.29	15.25	-57.74	-0.66	0.00	-111.38	-154.54	-150.98
:	s39	46	9.94	-115	35.27	1495.0	id	980485.90	980724.53	10.88	-50.99	-0.59	0.00	-98.05	-138.76	-135.40

## BOUGUER GRAVITY DATA

selway-bitterroot wilderness area  
 brickey 3 bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION IDENTIFICATION		L O C A T I O N S				E L E S T		G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S		
proj	sta-id	deg	min	deg	min	(in ft)	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE-BOUGUER d1=2.67 d2=2.45	SPEC FIELDS	
:	s40	46	27.20	-115	4.64	2750.0	id	980404.14	980750.55	11.96	-93.79	-0.98	0.00	-87.84	-170.65	-163.83
:	s41	46	27.70	-115	1.05	2833.0	id	980398.58	980751.30	11.50	-96.63	-1.00	0.00	-86.35	-172.48	-165.38
:	s42	46	28.47	-114	52.99	3050.0	id	980381.68	980752.46	10.52	-104.03	-1.06	0.00	-84.01	-178.58	-170.78
:	s43	46	30.34	-114	49.41	3205.0	id	980375.41	980755.28	10.91	-109.31	-1.09	0.00	-78.53	-178.02	-168.32
:	s44	46	30.57	-114	46.69	3286.0	id	980375.74	980755.63	9.89	-112.08	-1.11	0.00	-70.93	-174.23	-165.72
:	s45	46	30.93	-114	42.88	3542.0	id	980365.27	980756.16	6.56	-120.81	-1.17	0.00	-57.88	-173.30	-163.79
:	s46	46	34.78	-114	40.45	3593.0	id	980363.81	980761.97	17.15	-122.55	-1.18	0.00	-60.35	-156.92	-132.02
:	s47	46	33.91	-114	38.59	3751.0	id	980353.41	980760.66	10.95	-127.94	-1.21	0.00	-54.59	-172.78	-163.04
:	s48	46	35.50	-114	36.17	4306.0	id	980331.89	980763.05	3.91	-146.87	-1.31	0.00	-26.34	-170.61	-158.72
:	s49	46	38.10	-114	34.73	5233.0	id	980279.14	980766.97	2.22	-178.48	-1.44	0.00	4.11	-173.59	-158.95
:	s50	46	42.35	-114	32.21	4213.0	id	980348.42	980773.38	5.13	-143.69	-1.30	0.00	-28.87	-168.73	-157.21
:	s51	46	43.84	-114	31.64	4122.0	id	980358.31	980775.62	5.91	-140.59	-1.28	0.00	-29.77	-165.74	-154.53
:	s52	46	46.49	-114	26.05	3851.0	id	980382.98	980779.61	5.93	-131.35	-1.23	0.00	-34.57	-161.22	-150.76
:	s53	46	46.96	-114	23.93	3788.0	id	980390.39	980780.31	3.83	-129.20	-1.22	0.00	-33.79	-160.38	-149.95
:	s54	46	45.50	-114	19.09	3620.0	id	980395.20	980778.12	7.20	-123.47	-1.19	0.00	-42.57	-160.02	-150.34
:	s55	46	45.90	-114	16.11	3542.0	id	980402.55	980778.72	6.66	-120.81	-1.17	0.00	-43.16	-158.48	-148.97
:	s56	46	45.23	-114	13.70	3457.0	id	980405.25	980777.78	8.89	-117.91	-1.15	0.00	-47.51	-157.68	-147.49
:	s57	46	44.69	-114	10.82	3356.0	id	980408.23	980776.90	10.97	-114.46	-1.13	0.00	-53.13	-157.75	-147.23
:	s58	46	44.85	-114	8.38	3280.0	id	980416.53	980777.14	6.96	-111.87	-1.11	0.00	-52.22	-158.24	-149.51
:	s59	46	45.42	-114	4.90	3189.0	id	980423.14	980777.99	2.45	-108.77	-1.09	0.00	-55.02	-162.43	-153.58
:	s60	46	46.33	-114	21.34	3715.0	id	980392.42	980779.37	6.04	-126.71	-1.20	0.00	-37.67	-159.54	-149.50
:	s61	46	45.77	-114	29.06	3979.0	id	980371.58	980778.52	7.47	-135.71	-1.26	0.00	-32.86	-162.36	-150.76
:	s62	46	40.55	-114	34.15	4452.0	id	980324.44	980770.66	7.33	-151.84	-1.34	0.00	-27.68	-173.53	-161.51
:	s63	46	14.87	-115	12.58	7362.0	id	980109.02	980731.96	19.52	-251.10	-1.51	0.00	69.04	-164.04	-144.83
:	s64	46	16.62	-115	11.12	6875.0	id	980146.90	980734.60	11.69	-234.49	-1.52	0.00	58.53	-165.79	-143.66
:	s66	46	19.06	-115	3.66	6300.0	id	980184.27	980738.28	3.20	-214.87	-1.51	0.00	38.20	-174.98	-157.42
:	s67	46	18.14	-115	1.42	6975.0	id	980142.63	980736.89	8.08	-237.90	-1.52	0.00	61.56	-169.77	-150.71
:	s68	46	18.52	-114	45.03	6929.0	id	980138.89	980737.47	6.07	-236.33	-1.52	0.00	52.73	-179.05	-159.95
:	s69	46	8.91	-115	6.96	6092.0	id	980194.97	980722.98	17.38	-207.78	-1.50	0.00	44.65	-147.25	-98.56
:	s70	46	17.37	-114	59.25	7229.0	id	980111.27	980735.73	15.59	-246.56	-1.51	0.00	55.03	-177.45	-158.30
:	s71	46	17.49	-114	56.40	6380.0	id	980164.51	980735.91	13.13	-217.60	-1.51	0.00	28.32	-177.67	-159.04
:	s72	46	17.97	-114	53.13	4115.0	id	980303.29	980736.64	9.04	-140.35	-1.28	0.00	-46.47	-179.07	-168.14
:	s73	46	18.97	-114	49.49	6978.0	id	980130.35	980738.14	11.77	-238.00	-1.52	0.00	48.11	-179.63	-160.87
:	s74	46	17.68	-114	47.39	7279.0	id	980105.68	980736.20	15.20	-248.27	-1.51	0.00	53.67	-180.91	-159.90
:	s75	46	7.56	-115	3.08	5259.0	id	980217.00	980720.95	20.42	-179.37	-1.44	0.00	-9.56	-169.94	-158.60
:	s76	46	7.73	-115	10.76	7122.0	id	980119.12	980721.20	18.24	-242.91	-1.51	0.00	67.36	-158.83	-140.19
:	s77	46	9.01	-115	15.49	7380.0	id	980104.78	980723.13	23.92	-251.71	-1.51	0.00	75.33	-153.97	-138.33
:	s78	46	9.45	-115	20.78	6861.0	id	980144.41	980723.80	19.52	-234.01	-1.52	0.00	65.54	-150.47	-134.75
:	s79	46	10.69	-115	18.51	7020.0	id	980136.70	980725.66	15.14	-239.43	-1.52	0.00	70.90	-154.91	-136.31
:	s80	46	9.10	-115	13.14	7596.0	id	980092.50	980723.27	22.16	-259.08	-1.50	0.00	83.20	-155.31	-137.73

## BOUGUER GRAVITY DATA

selway-bitterroot wilderness area  
 brickey & bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION IDENTIFICATION		L O C A T I O N S				GRAVITY		C O R R E C T I O N S				A N O M A L I E S			
proj	sta-id	LATITUDE deg min	LONGITUDE deg min	ELE (in ft)	ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE- d1=2.67	BOUGUER d2=2.45	SPEC FIELDS
:	s81	46 8.25	-115 5.38	2840.0	id	980370.04	980721.98	15.08	-96.86	-1.00	0.00	-84.92	-167.70	-160.88	
:	s82	46 8.33	-114 57.93	5288.0	id	980211.72	980722.11	20.65	-180.36	-1.44	0.00	-13.27	-174.42	-161.14	
:	s83	46 17.42	-114 33.84	7483.0	id	980091.11	980735.80	14.92	-255.39	-1.50	0.00	59.12	-182.86	-162.92	
:	s84	46 18.73	-114 22.91	5285.0	id	980230.76	980737.78	17.86	-180.26	-1.44	0.00	-10.19	-174.03	-147.35	
:	s85	46 17.97	-114 19.73	6548.0	id	980160.47	980736.64	8.94	-223.33	-1.51	0.00	39.34	-176.57	-148.97	
:	s86	46 15.40	-114 21.68	7388.0	id	980112.34	980732.77	7.82	-251.98	-1.51	0.00	74.01	-171.66	-150.19	
:	s87	46 17.80	-114 19.33	7305.0	id	980117.40	980736.38	10.72	-249.15	-1.51	0.00	67.64	-172.30	-152.53	
:	s88	46 17.70	-114 16.03	7210.0	id	980118.06	980736.23	16.12	-245.91	-1.51	0.00	59.54	-171.77	-152.71	
:	s89	46 15.17	-114 7.59	3609.0	id	980312.70	980732.41	1.91	-123.09	-1.18	0.00	-80.40	-202.76	-192.58	
:	s90	46 4.07	-114 14.27	4245.0	id	980269.92	980715.68	3.98	-144.79	-1.30	0.00	-46.67	-188.77	-177.06	
:	s91	46 7.19	-114 32.11	7774.0	id	980055.63	980720.39	25.59	-265.15	-1.49	0.00	65.94	-175.11	-154.12	
:	s92	46 15.32	-114 10.82	3662.0	id	980319.72	980732.64	3.01	-124.90	-1.19	0.00	-68.63	-191.71	-181.57	
:	s93	46 15.72	-114 13.05	4105.0	id	980301.87	980733.24	5.19	-140.01	-1.28	0.00	-45.45	-181.54	-170.33	
:	s94	46 11.83	-114 9.27	3636.0	id	980314.46	980727.38	2.87	-124.01	-1.19	0.00	-71.07	-193.40	-183.32	
:	s95	46 11.83	-114 6.74	3767.0	id	980305.27	980727.38	1.90	-128.48	-1.22	0.00	-67.94	-195.74	-185.21	
:	s96	46 10.85	-114 4.55	3930.0	id	980291.51	980725.91	3.02	-134.04	-1.25	0.00	-64.91	-197.18	-186.28	
:	s97	46 9.82	-114 1.04	4179.0	id	980267.62	980724.35	6.88	-142.53	-1.29	0.00	-63.84	-200.79	-189.51	
:	s98	46 9.57	-113 58.93	4289.0	id	980255.09	980723.98	10.09	-146.29	-1.31	0.00	-65.65	-203.16	-191.83	
:	s99	46 10.24	-113 54.51	4660.0	id	980233.12	980724.98	11.65	-158.94	-1.37	0.00	-53.77	-202.43	-192.05	
:	s100	46 12.35	-113 51.61	5264.0	id	980205.33	980728.16	9.80	-179.54	-1.44	0.00	-27.98	-199.16	-185.05	
:	s101	46 14.27	-113 50.51	5820.0	id	980175.90	980731.06	7.55	-198.50	-1.49	0.00	-8.06	-200.49	-184.64	
:	s102	46 15.27	-113 48.01	6632.0	id	980132.77	980732.57	6.47	-226.20	-1.52	0.00	23.61	-197.64	-181.06	
:	s103	46 13.96	-113 44.55	6913.0	id	980117.13	980730.59	2.64	-235.78	-1.52	0.00	36.34	-198.32	-178.98	
:	s104	46 13.23	-113 42.86	6584.0	id	980135.61	980729.57	2.14	-224.56	-1.52	0.00	24.93	-199.01	-180.55	
:	s105	46 14.12	-113 40.53	6030.0	id	980173.84	980730.84	7.93	-205.67	-1.50	0.00	9.85	-189.39	-172.97	
:	s106	46 14.77	-113 37.84	5772.0	id	980186.37	980731.81	3.51	-196.87	-1.48	0.00	-2.85	-197.69	-181.64	
:	s107	46 14.14	-113 34.56	5445.0	id	980202.43	980730.87	2.81	-185.71	-1.46	0.00	-16.57	-200.93	-185.74	
:	s108	46 13.61	-113 31.92	5300.0	id	980211.91	980730.06	3.06	-180.77	-1.44	0.00	-19.91	-199.06	-184.30	
:	s109	46 12.43	-113 30.26	5353.0	id	980205.88	980728.29	3.43	-182.57	-1.45	0.00	-19.18	-199.78	-184.90	
:	s110	46 11.63	-113 29.05	5455.0	id	980200.91	980727.08	1.98	-186.05	-1.46	0.00	-13.36	-198.89	-183.60	
:	s111	46 11.27	-113 26.58	5760.0	id	980179.54	980726.54	1.35	-196.46	-1.48	0.00	-5.53	-202.12	-185.92	
:	s112	46 12.25	-113 23.97	5725.0	id	980178.82	980728.02	1.09	-195.26	-1.48	0.00	-11.02	-206.67	-190.55	
:	s113	46 14.03	-113 21.24	5458.0	id	980195.57	980730.70	1.35	-186.16	-1.46	0.00	-22.04	-208.30	-192.96	
:	s114	46 14.50	-113 18.73	5507.0	id	980199.22	980731.41	2.52	-187.83	-1.46	0.00	-14.50	-201.27	-185.88	
:	s115	46 9.95	-113 56.02	4545.0	id	980238.03	980724.55	13.26	-155.02	-1.35	0.00	-59.23	-202.33	-192.93	
:	s116	46 7.24	-114 12.36	3923.0	id	980292.49	980720.46	3.63	-133.80	-1.25	0.00	-59.14	-190.56	-179.73	
:	s117	46 6.35	-114 14.49	4152.0	id	980285.40	980719.12	6.21	-141.61	-1.29	0.00	-43.37	-180.06	-168.80	
:	s118	46 6.93	-114 17.63	4353.0	id	980270.06	980719.99	17.51	-148.47	-1.32	0.00	-40.69	-172.97	-159.31	
:	s119	46 7.40	-114 19.90	4680.0	id	980254.58	980720.70	19.04	-159.62	-1.37	0.00	-26.15	-168.10	-156.40	
:	s120	46 8.03	-114 23.06	4980.0	id	980241.19	980721.66	16.63	-169.85	-1.41	0.00	-12.30	-166.93	-152.49	

## BOUGUER GRAVITY DATA

selway-bitterroot wilderness area  
 brickey & bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION		L O C A T I O N S				G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S			SPEC FIELDS	
IDENTIFICATION		LATITUDE	LONGITUDE	ELE	ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE AIR	COMPLETE-BOUGUER d1=2.67 d2=2.45			
proj	sta-id	deg	min	deg	min	(in ft)										
:	s121	46	8.31	-114	24.45	5130.0	id	980233.10	980722.08	14.15	-174.97	-1.43	0.00	-6.71	-168.95	-153.87
:	s122	46	8.59	-114	27.10	5554.0	id	980210.63	980722.50	9.53	-189.43	-1.47	0.00	10.25	-171.12	-156.18
:	s123	46	7.84	-114	29.55	6000.0	id	980182.12	980721.37	5.17	-204.64	-1.50	0.00	24.77	-176.20	-159.64
:	s130	46	6.90	-115	34.17	1497.0	id	980480.08	980719.95	13.01	-51.06	-0.59	0.00	-99.10	-137.74	-134.56
:	s131	46	5.74	-115	32.33	1522.0	id	980473.12	980718.20	13.35	-51.91	-0.60	0.00	-101.96	-141.13	-137.90
:	s132	46	5.21	-115	30.74	1536.0	id	980467.57	980717.40	13.12	-52.39	-0.61	0.00	-105.40	-145.27	-141.99
:	s133	46	4.93	-115	25.36	1620.0	id	980447.90	980716.98	19.08	-55.25	-0.64	0.00	-116.75	-153.56	-150.52
:	s134	46	3.44	-115	18.88	1698.0	id	980436.69	980714.73	21.76	-57.91	-0.66	0.00	-118.38	-155.20	-150.27
:	s135	46	2.76	-115	17.54	1734.0	id	980432.13	980713.71	21.93	-59.14	-0.68	0.00	-118.52	-156.41	-150.82
:	s136	46	2.34	-115	15.97	2890.0	id	980368.03	980713.08	14.67	-98.57	-1.02	0.00	-73.31	-158.23	-149.97
:	s137	46	1.44	-115	14.96	4892.0	id	980247.54	980711.72	13.15	-166.85	-1.40	0.00	-4.28	-159.38	-146.60
:	s138	46	0.02	-115	14.63	6810.0	id	980118.24	980709.58	22.22	-232.27	-1.52	0.00	48.79	-162.77	-145.84
:	s139	46	1.90	-115	17.44	1785.0	id	980424.35	980712.41	25.90	-60.88	-0.69	0.00	-120.21	-155.89	-152.95
:	s140	46	5.23	-115	27.81	1585.0	id	980454.29	980717.43	17.30	-54.06	-0.62	0.00	-114.10	-151.48	-148.40
:	s141	46	3.86	-115	20.88	1685.0	id	980439.49	980715.37	22.37	-57.47	-0.66	0.00	-117.43	-153.19	-150.24
:	s142	46	4.08	-115	17.91	3816.0	id	980322.47	980715.70	10.25	-130.15	-1.22	0.00	-34.45	-155.58	-145.60
:	s143	46	4.89	-115	16.11	5260.0	id	980234.34	980716.92	16.11	-179.40	-1.44	0.00	11.91	-152.82	-139.25
:	s144	46	5.44	-115	13.91	6535.0	id	980150.09	980717.75	19.12	-222.89	-1.51	0.00	46.63	-158.65	-141.74
:	s145	46	6.83	-115	12.38	5935.0	id	980201.77	980719.84	6.95	-202.43	-1.49	0.00	39.84	-157.13	-140.90
:	s146	46	4.49	-115	23.23	1648.0	id	980444.00	980716.31	20.88	-56.21	-0.65	0.00	-117.35	-153.32	-150.36
:	s147	46	7.58	-114	33.57	7488.0	id	980078.85	980720.98	18.33	-255.39	-1.50	0.00	61.70	-176.87	-157.21
:	s148	46	8.78	-114	42.21	6311.0	id	980171.44	980722.78	3.04	-215.25	-1.51	0.00	41.89	-171.82	-154.21
:	s149	46	7.72	-114	44.84	6255.0	id	980159.18	980721.19	6.35	-213.34	-1.51	0.00	25.97	-182.52	-165.34
:	s150	46	8.20	-114	46.90	6562.0	id	980142.13	980721.91	6.48	-223.81	-1.52	0.00	37.05	-181.80	-163.77
:	s151	46	7.52	-114	48.62	7053.0	id	980101.39	980720.88	16.11	-240.56	-1.51	0.00	43.46	-182.50	-163.88
:	s152	46	7.36	-115	11.39	6925.0	id	980149.84	980720.64	17.88	-236.19	-1.52	0.00	80.13	-139.70	-121.58
:	s153	46	12.13	-114	43.52	3035.0	id	980346.72	980727.84	21.41	-103.52	-1.05	0.00	-95.76	-178.91	-172.06
:	s154	46	12.50	-114	39.98	5360.0	id	980206.61	980728.39	9.38	-182.81	-1.45	0.00	-17.90	-192.79	-180.15
:	s155	45	49.67	-115	26.67	3982.0	id	980291.53	980693.97	1.30	-135.81	-1.26	0.00	-28.06	-163.83	-152.64
:	s156	45	48.49	-115	28.57	3895.0	id	980295.95	980692.19	2.97	-132.85	-1.24	0.00	-30.03	-161.15	-150.35
:	s157	45	49.65	-115	30.06	3847.0	id	980301.38	980693.94	5.22	-131.21	-1.23	0.00	-30.87	-158.09	-147.60
:	s158	45	49.78	-115	33.36	3767.0	id	980304.97	980694.13	7.25	-128.48	-1.22	0.00	-35.00	-157.44	-147.35
:	s159	45	50.06	-115	34.03	4195.0	id	980282.21	980694.55	3.20	-143.08	-1.29	0.00	-17.95	-159.12	-147.49
:	s160	45	48.67	-115	37.91	3604.0	id	980307.81	980692.46	5.70	-122.92	-1.18	0.00	-45.80	-164.20	-154.45
:	s161	45	48.73	-115	40.83	3463.0	id	980309.86	980692.55	10.31	-118.11	-1.15	0.00	-57.10	-166.05	-157.07
:	s162	45	47.95	-115	42.78	3359.0	id	980310.59	980691.38	14.85	-114.57	-1.13	0.00	-64.96	-165.81	-157.50
:	s163	45	47.84	-115	46.13	2978.0	id	980331.17	980691.21	15.23	-101.57	-1.04	0.00	-80.03	-167.41	-160.21
:	s164	45	48.60	-115	48.18	2747.0	id	980348.27	980692.36	15.02	-93.69	-0.98	0.00	-85.79	-165.44	-158.88
:	s165	45	49.20	-115	49.57	2675.0	id	980355.44	980693.26	13.91	-91.24	-0.96	0.00	-86.30	-164.59	-158.14
:	s166	45	49.39	-115	51.59	2478.0	id	980372.91	980693.55	13.05	-84.52	-0.90	0.00	-87.63	-160.01	-154.04

## BOUGUER GRAVITY DATA

selway-bitterroot Wilderness area  
 brickey & bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION		L O C A T I O N S				G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S		
IDENTIFICATION	LATITUDE	LONGITUDE	ELE	ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE	COMPLETE-BOUGUER	SPEC	
proj	sta-id	deg min	deg min	(in ft)							AIR	d1=2.67 d2=2.45	FIELDS	
:	s167	45 49.72	-115 55.66	2331.0	id	980392.18	980694.05	11.49	-79.50	-0.86	0.00	-82.68	-151.56	-145.88
:	s168	46 8.17	-115 38.61	1470.0	id	980488.66	980721.87	13.12	-50.14	-0.59	0.00	-94.97	-132.57	-129.47
:	s169	46 8.89	-115 43.97	1401.0	id	980499.33	980722.95	12.54	-47.78	-0.56	0.00	-91.88	-127.69	-124.74
:	se146	46 2.13	-115 20.06	5069.0	id	980239.83	980712.76	15.08	-172.89	-1.42	0.00	3.61	-155.62	-142.50
:	se147	46 0.65	-115 21.12	5555.0	id	980219.31	980710.52	6.96	-189.46	-1.47	0.00	30.99	-152.98	-137.82
:	se148	46 0.08	-115 22.75	5355.0	id	980236.44	980709.66	3.63	-182.64	-1.45	0.00	30.18	-150.28	-135.41
:	se149	46 0.10	-115 24.84	5484.0	id	980231.34	980709.70	3.18	-187.04	-1.46	0.00	37.18	-148.14	-132.87
:	se150	46 0.45	-115 26.99	5910.0	id	980203.71	980710.23	8.76	-201.57	-1.49	0.00	49.05	-145.25	-129.24
:	se151	45 59.54	-115 27.94	5525.0	id	980229.40	980708.85	4.43	-188.44	-1.46	0.00	39.93	-145.54	-130.26
:	se152	45 58.03	-115 29.63	5297.0	id	980240.77	980706.58	3.27	-180.67	-1.44	0.00	32.16	-146.68	-131.94
:	se153	45 56.23	-115 30.80	4860.0	id	980262.40	980703.86	2.65	-165.76	-1.39	0.00	15.43	-149.07	-135.52
:	se154	45 55.07	-115 29.54	4897.0	id	980254.91	980702.11	1.27	-167.02	-1.40	0.00	13.18	-153.98	-140.20
:	se155	45 54.41	-115 28.55	4818.0	id	980258.59	980701.12	1.49	-164.33	-1.39	0.00	10.43	-153.80	-140.27
:	se156	45 53.36	-115 27.35	4477.0	id	980274.26	980699.53	0.95	-152.70	-1.34	0.00	-4.37	-157.46	-144.65
:	se157	45 51.86	-115 26.19	4301.0	id	980278.61	980697.27	1.45	-146.69	-1.31	0.00	-14.30	-160.86	-148.78
:	se158	45 50.61	-115 25.05	4155.0	id	980284.36	980695.39	1.36	-141.71	-1.29	0.00	-20.39	-162.03	-150.36
:	se159	45 49.01	-115 26.12	4172.0	id	980279.44	980692.98	1.06	-142.30	-1.29	0.00	-21.30	-163.82	-152.08
:	se160	45 48.36	-115 24.66	4410.0	id	980263.30	980691.99	1.06	-150.41	-1.33	0.00	-14.09	-164.77	-152.36
:	se161	45 46.82	-115 23.23	4192.0	id	980268.71	980689.67	2.24	-142.98	-1.29	0.00	-26.84	-168.88	-157.17
:	se162	45 45.38	-115 23.37	4244.0	id	980261.41	980687.50	3.52	-144.75	-1.30	0.00	-27.08	-169.62	-157.87
:	se163	45 46.83	-115 12.32	4818.0	id	980220.91	980689.69	3.00	-164.33	-1.39	0.00	-15.82	-178.54	-165.13
:	se164	45 42.15	-115 14.64	6515.0	id	980102.33	980682.63	2.64	-222.21	-1.51	0.00	32.11	-188.97	-170.75
:	se165	45 41.20	-115 13.07	6478.0	id	980101.22	980681.20	2.08	-220.95	-1.51	0.00	28.96	-191.42	-173.26
:	se166	45 41.74	-115 11.04	6918.0	id	980074.79	980682.01	3.27	-235.95	-1.52	0.00	43.06	-191.14	-171.84
:	se167	45 42.10	-115 8.85	7018.0	id	980068.76	980682.55	4.19	-239.36	-1.52	0.00	45.88	-190.81	-171.31
:	se168	45 43.51	-115 7.69	6654.0	id	980095.33	980684.68	2.69	-226.95	-1.52	0.00	36.12	-189.65	-171.05
:	se169	45 43.87	-115 5.83	6764.0	id	980087.90	980685.22	3.61	-230.70	-1.52	0.00	38.49	-190.12	-171.28
:	se170	45 43.35	-115 2.04	4973.0	id	980194.85	980684.44	4.46	-169.61	-1.41	0.00	-22.07	-182.63	-174.91
:	se171	45 42.32	-115 1.74	5759.0	id	980147.67	980682.88	4.30	-196.42	-1.48	0.00	6.17	-187.44	-171.48
:	se172	45 42.49	-115 0.05	6817.0	id	980087.69	980683.14	6.09	-232.51	-1.52	0.00	45.34	-182.60	-163.82
:	se173	45 41.58	-114 59.87	7163.0	id	980066.36	980681.77	4.84	-244.31	-1.51	0.00	57.89	-183.09	-163.24
:	se174	45 40.98	-114 56.83	6740.0	id	980089.84	980680.87	3.06	-229.88	-1.52	0.00	42.54	-185.80	-166.99
:	se175	45 39.16	-114 56.85	7466.0	id	980034.48	980678.12	12.45	-254.64	-1.50	0.00	58.13	-185.57	-165.49
:	se176	45 38.07	-114 55.71	7538.0	id	980028.85	980676.48	10.81	-257.10	-1.50	0.00	60.90	-186.88	-166.47
:	se177	45 37.82	-114 53.75	7325.0	id	980043.62	980676.09	4.25	-249.83	-1.51	0.00	56.04	-191.05	-170.69
:	se178	45 37.54	-114 51.82	7560.0	id	980027.85	980675.67	5.22	-257.85	-1.50	0.00	62.77	-191.36	-170.42
:	se179	45 40.37	-114 57.88	7210.0	id	980061.58	980679.95	5.08	-245.91	-1.51	0.00	59.35	-183.00	-163.03
:	se180	45 43.28	-114 3.87	6010.0	id	980139.09	980684.34	8.09	-204.98	-1.50	0.00	19.73	-178.66	-140.17
:	se181	45 44.52	-115 4.87	6692.0	id	980093.42	980686.20	3.95	-228.24	-1.52	0.00	36.26	-189.55	-170.94
:	se182	45 46.26	-115 4.52	7227.0	id	980062.20	980688.83	11.21	-246.49	-1.51	0.00	52.69	-184.11	-164.60



## BOUGUER GRAVITY DATA

selway-bitterroot wilderness area  
 brickey & bankey 1979  
 Meter ID: e-134 Date: 01/21/80

STATION		L O C A T I O N S				G R A V I T Y		C O R R E C T I O N S				A N O M A L I E S				
IDENTIFICATION	LATITUDE	LONGITUDE		ELE	ST	OBSERVED	THEORETICAL	TERRAIN	BOUGUER	CURV	SPECIAL	FREE	COMPLETE-BOUGUER	SPEC		
proj	sta-id	deg	min	deg	min	(in ft)						AIR	d1=2.67 d2=2.45	FIELDS		
:	se183	45	46.35	-115	2.70	6640.0	id	980099.84	980688.96	4.52	-226.47	-1.52	0.00	35.04	-188.43	-170.01
:	se184	45	47.70	-115	1.79	6805.0	id	980090.70	980691.00	5.16	-232.10	-1.52	0.00	39.36	-189.09	-170.27
:	se185	45	49.27	-115	1.81	6850.0	id	980092.13	980693.37	6.19	-233.63	-1.52	0.00	42.66	-186.30	-167.44
:	se186	45	49.50	-114	58.85	5990.0	id	980146.02	980693.71	5.02	-204.30	-1.50	0.00	15.39	-185.38	-168.84
:	se187	45	49.99	-114	57.03	4710.0	id	980223.05	980694.45	4.26	-160.64	-1.37	0.00	-28.60	-186.36	-173.36
:	se188	45	50.68	-114	55.90	4040.0	id	980261.51	980695.49	8.97	-137.79	-1.27	0.00	-54.16	-184.25	-173.53
:	se189	45	51.41	-114	55.13	3840.0	id	980279.43	980696.59	10.57	-130.97	-1.23	0.00	-56.13	-177.76	-167.74
:	se190	45	50.49	-115	1.16	6660.0	id	980107.11	980695.20	4.93	-227.15	-1.52	0.00	37.94	-185.80	-167.36
:	se191	45	52.11	-115	1.74	6420.0	id	980123.66	980697.65	4.02	-218.97	-1.51	0.00	29.50	-186.96	-169.12
:	se192	45	53.17	-115	3.32	6810.0	id	980098.72	980699.25	8.74	-232.27	-1.52	0.00	39.60	-185.45	-166.90
:	se193	45	53.95	-115	3.90	6934.0	id	980093.92	980700.42	8.18	-236.50	-1.52	0.00	45.28	-184.56	-165.62

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