DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

RESULTS OF A GRAVITY SURVEY OF McCARTHY'S MARSH, SEWARD PENINSULA, ALASKA

by

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ABSTRACT

A gravity survey of McCarthy's Marsh (sometimes referred to as the Fish River Flats) was completed during August 1977 and included 80 measurements. The resulting contoured data indicate a small sedimentary basin localized in the northeastern corner of the topographic depression which forms the marsh. Faults probably border both the northern and eastern edges of the structural basin, which was probably filled by sediments eroded from the adjacent mountains. These mountains include plutons rich in radioactive minerals, which may have been locally concentrated in the sedimentary rocks within the basin; and a potentially commercial uranium deposit has now been discovered in another valley on the opposite side of the Darby Mountains. Geophysical modeling suggests a minimal sedimentary thickness of about 1 km and possibly up to 2 or even 3 km depending on the density of the sediments filling the basin. Geomorphic evidence indicates recent or active faulting at one basin boundary and might thus suggest a young age, low sediment density, and small total thickness. However, coal specimens collected near the edge of the basin may be Tertiary in age and thus suggest an older basin age, probably higher sediment density, and higher total thickness.

INTRODUCTION

McCarthy's Marsh is a tundra and lake covered topographic depression bounded by the Bendeleben Mountains on the north, the Darby Mountains on the east, and a chain of hills dominated by Mt. Wick (450 m elevation) on the southwest. The topographic relief within the depression is small and ranges from about 100 m at the northwest corner to less than 30 m. The depression is drained to the southwest by the Fish River. The abundant lakes and marshlands geomorphically suggest a continuing process of gradual subsidence combined with sedimentation from the surrounding mountain ranges. Geomorphic studies of the Bendeleben fault (Hopkins, 1963) along the northern edge of the topographic basin suggest recent or active subsidence of the lowland. In a 1967 and 1968 gravity reconnaissance of the Seward Peninsula (Barnes, 1971), a single measurement near the north-central part of the McCarthy's Marsh showed a Bouguer anomaly more than 30 mGal lower than the anomalies measured in the adjacent hills and mountains. The anomaly was interpreted as a small structural basin filled with Cenozoic sediments or sedimentary rocks. In the initial contouring and in later contouring for the reconnaissance gravity map of Alaska (Barnes, 1977), the structural basin was assumed to have the approximate area and shape of the present topographic basin, although variation of the gravity and probable basin depth within the area was recognized. The basin was considered too small to produce significant petroleum resources, and thus received little study.

Recently, Miller and Bunker (1976) studied the uranium and thorium contents of some of the plutons in the nearby mountains and found concentrations that ranged up to 58.6 ppm in the Darby pluton. The probability that some of the sediments underlying McCarthy's Marsh had been derived from the weathering of these plutons, and the possibility of local concentration of radioactive minerals suggested the desirability of drilling some exploratory holes. A gravity survey was thus planned as an initial step towards determining the configuration of the basin and locating a drilling site. Most of this report was prepared as a Technical Letter in 1977 as preparation for the proposed drilling.

Following the gravity survey, a potentially commercial uranium deposit of at least 1 million pounds U_3O_8 (Dickinson and others, 1987) was found south of Death Valley on the opposite, or eastern side, of the Darby Mountains. This deposit occurs in early Tertiary sedimentary rocks, in which coal or other carbonaceous material produced a reducing environment for uranium-bearing ground water moving downslope from the mountains. The coal contains anomalously high amounts of tungsten (Stricker and others, in press, 1988) and the Tertiary rocks are also rich in siderite (Dickinson, 1988). Coal has also been found on the flanks of McCarthy's Marsh (T.M. Miller, oral communication, 1977) where its presence suggests both a Tertiary age and possible reducing environment for some of the rocks underlying that marsh.

GRAVITY MEASUREMENTS

More than 80 gravity measurements (including two outside the mapped area) were obtained during August 1977 using a LaCoste and Romberg geodetic gravimeter. A large jet helicopter provided transportation from the operating base established at the settlement of Council a few miles west of the mapped area. The gravity base station at Council was located on the ground approximately 1 m northwest of the northwest corner of the Trading Post, where the established gravity is 982,272.49 mGal on the U.S. Geological Survey Alaskan gravity base network (Barnes, 1968) converted to the International Gravity Standardization net 1971, IGSN-71 (Morelli and others, 1974). The data were reduced using the ellipsoid of the 1967 Geodetic Reference System (International Association of Geodesy, 1971) and include the second order terms in the free-air correction. Gravity anomalies released on the original reconnaissance map of the Seward Peninsula (Barnes, 1971) were calculated with the older datum and 1931 ellipsoid, but the more recent Seward Peninsula map (Barnes and Hudson, 1977) used the newer datum and included the data in this report.

Altimetry was used for the elevation control, and the 100-ft elevation of the Council base was established by an average of ties to spot elevations in the survey area. There has been no leveling and minimal vertical angle-control within the survey area, but the base elevation is consistent with elevations estimated by the Federal Aviation Agency for the Council airstrip. Estimates of altimetry accuracy for similar surveys have been close to ±5 meters, and this limitation suggests that the Bouguer anomalies have an accuracy of about ±1 mGal. River gradients were also used as supplementary elevation control. The reduction density is a standard 2.67 g/cm^3, which is fairly typical of the Paleozoic metamorphic rocks and younger plutons that crop out in the adjacent mountains. Tabulated data for the gravity measurements are given in the appendix, the format and source codes of which were discussed by Barnes (1972). The data were not corrected for effects of nearby terrain, which except on the margin of the basin are small in comparison with the possible errors caused by altimetry.

Results

The gravity data are summarized in the contour map of plate 1, which shows a triangular shaped low in the northeast corner of the topographic basin. This low probably represents the deepest part of the structural basin. The closely-spaced linear contours on the north and east sides of the gravity low are interpreted to be caused by high-angle faults. The gradient on the north side is approximately centered on the scarp trace of the Bendeleben fault. Geologic mapping (Miller and others, 1972, and Till and others, 1986) south of the gravity survey suggested another fault on trend with the belt of parallel contours on the east side of the basin, although the fault trace was not actually located.

Plate 2 shows aeromagnetic contours from the same area which are taken from surveys at 1000 ft elevation and with 1 mile flight line separation flown by Lockwood, Kessler, and Bartlett, Incorporated for the Department of Natural Resources, Alaska Division of Geological Survey (1971). Closely spaced magnetic contours on the edge of the gravity low are interpreted as resulting from volcanic flows within the sedimentary section. Such flows crop out on the south side of the Bendeleben fault. The remaining magnetic contours are consistent with a thick sedimentary section.

The calculated depth of the basin depends on the density of the material within it, which is probably controlled in part by the sedimentary history of the structure. Figure 1 is a computer plot of profile AB (located on plate 1), and of one possible basin cross section calculated by a simple two-dimensional iterative computer program using the method of Bott (1960) on a profile from which a regional gradient of 15 mGal in 40 km has been subtracted. The vertical scale is enlarged eight times, exaggerating the V-like result of the calculation, which is only a preliminary approximation for a profile so close to the corner of the basin. The sediment density used in the model was 1.67 g/cm^3 (a density contrast of 1.00 g/cm^3), which is close to a minimum for uncompacted water-saturated sediments, so the calculated depth of more than 1 km might be considered a minimum depth. However, if the basin was formed and filled primarily in Quaternary time by clay and silt sediments the thickness of permafrost and ice lenses could be large, and the depth might be much smaller. However, the presence of volcanics within the section tends to diminish the possibility of a thick ice section. Figure 2 is another model of the same profile using a sediment density of 2.17 g/cc (density contrast 0.50 g/cc). Such a density would be more typical of mid-Tertiary sedimentary rocks, and the depth (2.5 km) might be considered more reasonable for a structure this large. Allowance for the inaccuracy of the two-dimensional model would also tend to increase the calculated depth.

Figure 5 is another profile which is located closer to the center of the basin, but which is supported by fewer gravity measurements. Along this line the two-dimensional gravity model is probably more valid, and the 2.00 g/cc (0.67 g/cc density contrast) sediment density of the model may be a more probable average. This profile suggests that the most probable depth is slightly less than 1.4 km, which would be increased if older sediments were assumed or if allowance were made for inaccuracies in the modeling technique.

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USGS GRAVITY DATA FROM: SEWARD PEN ALASKA, TRAVERSE: FISH-RIV-1 PROJ CHIEF: BARNES DATUM: BARNES 1975 DATA SET: AY61

DATE: 08/09/77, METER: G192, OBSERVERS: MORIN * MAIN BASE: COUN, VALUE: 982272.47, DRIFT: 0.10, OTHER BASES: BL31, NOMF

STAT. NOS. MAIN	AUX.	LATITUDE	LONGITUDE	LOC. TYPE	HT-REF	ELEV FEET	ELEV TYPE	OBSV TIME	OBSV GRAV MILLIGALS	GRAV TYPE	FAA MGALS	SBA 2.20	ANOM ACC.	SBA 2.67	STAT NUMB	OTHER ELEV.	ELEV TYPE	SBA 2.67
BL31		61 10.54	149 58.87	A	0	88	A	540	981906.77	A	-93.2	-95.6	6	-96.2	BL31	*****	R	******
NOMF		64 30.55	165 26.12	A	0	16	A	755	982260.06	A	7.8	7.4	6	7.3	NOMF	*****	R	******
NOMF		64 30.55	165 26.12	A	0	16	A	755	982259.82	A	7.6	7.1	6	7.0	NOMF	*****	R	******
NOMF		64 30.55	165 26.12	A	0	16	C	1317	982259.82	A	7.6	7.1	6	7.0	NOMF	*****	R	******
COUN		64 53.60	163 39.92	A	0	100	R	1529	982272.47	B	1.2	-1.6	7	-2.2	COUN	100	R	-2.2
COUN		64 53.60	163 39.92	A	0	100	R	1529	982272.44	B	1.2	-1.7	7	-2.3	COUN	100	R	-2.3
MM01		64 56.04	163 28.25	A	0	1501	T	1555	982188.33	C	46.0	3.8	7	-5.2	MM01	1640	G	-9.8
MM02		64 59.02	163 26.80	A	0	869	T	1605	982229.79	C	24.5	0.1	7	-5.1	MM02	848	M	-6.9
MM03		65 3.70	163 29.15	A	0	473	T	1615	982247.77	C	-0.1	-13.6	7	-16.3	MM03	455	M	-17.6
MM04		65 5.98	163 28.85	A	0	333	T	1625	982246.56	C	-17.1	-26.5	7	-28.5	MM04	309	J	-30.0
MM05		65 4.35	163 20.52	A	0	344	T	1634	982239.12	C	-21.6	-31.3	7	-33.4	MM05	319	M	-34.9
MM06		65 8.21	163 15.42	A	0	224	T	1643	982235.45	C	-41.1	-47.6	7	-48.7	MM06	225	J	-48.7
MM07		65 11.01	163 11.62	A	0	446	T	1654	982244.07	C	-17.2	-29.7	7	-32.4	MM07	470	M	-30.9
MM08		65 10.52	163 7.72	A	0	361	T	1705	982248.92	C	-17.4	-27.5	7	-29.7	MM08	320	M	-32.2
MM09		65 7.68	163 6.15	A	1	182	T	1712	982228.61	C	-51.3	-56.4	7	-57.5	MM09	174	M	-58.0
MM10		65 9.30	162 56.62	A	20	380	T	1722	982232.82	C	-30.3	-41.0	7	-43.3	MM10	355	M	-44.8
MM11		65 10.28	162 43.00	A	-3	1192	T	1735	982196.42	C	8.5	-25.0	7	-32.2	MM11	1172	G	-33.6
MM12		65 7.40	162 48.60	A	0	210	T	1744	982249.11	C	-27.8	-33.7	7	-35.8	MM12	204	J	-35.4
MM13		65 4.82	162 53.45	A	2	110	T	1753	982231.77	C	-51.6	-54.7	7	-55.3	MM13	105	J	-55.6
MM14		65 3.68	162 58.15	A	1	88	T	1801	982229.10	C	-55.0	-57.5	7	-58.0	MM14	84	J	-58.3
MM15		65 3.25	163 5.95	A	0	106	T	1810	982239.96	C	-41.9	-44.9	7	-45.5	MM15	115	J	-45.8
MM16		64 59.50	163 5.92	A	0	71	T	1819	982267.76	C	-13.1	-15.1	7	-15.5	MM16	58	J	-1 1
MM17		64 56.08	163 9.25	A	0	56	T	1830	982273.04	C	-5.2	-6.8	7	-7.2	MM17	46	J	-7.8
MM18		64 53.90	163 13.65	A	0	62	T	1838	982273.13	C	-3.9	-5.1	7	-5.3	MM18	38	J	-5.6
COUN		64 53.60	163 39.92	A	0	100	R	1856	982272.47	B	1.2	-1.6	6	-2.2	COUN			

DATA SUMMARY

NUMBER OF STATIONS: 25

RANGES OF:	LATITUDE	LONGITUDE	ELEVATION	OBSV GRAV	FAA	SBA-2.67
MINIMUM:	61 10.54	149 58.87	16	981906.77	-93.2	-96.2
MAXIMUM:	65 13.01	165 26.12	1581	982273.13	46.8	7.3

USGS GRAVITY DATA FROM: SEWARD PEN ALASKA, TRAVERSE: FISH-RIV-2 PROJ CHIEF: BARNES DATUM: BARNES 1975 DATA SET: AY62

DATE: 08/18/77, METER: G192, OBSERVERS: MORIN * MAIN BASE: COUN, VALUE: 982272.47, DRIFT: -.20, OTHER BASES: COUN,

STAT. NOS. MAIN	AUX.	LATITUDE	LONGITUDE	LOC. TYPE	HT-REF	ELEV FEET	ELEV TYPE	OBSV TIME	OBSV GRAV MILLIGALS	GRAV TYPE	FAA MGALS	SBA 2.20	ANOM ACC.	SBA 2.67	STAT NUMB	OTHER ELEV.	ELEV TYPE	SBA 2.67
COUN		64 53.60	163 39.92	A	0	100	R	849	982272.47	B	1.2	-1.6	6	-2.2	COUN	100	R	-2.2
MM19		64 54.76	163 11.88	A	0	53	T	941	982273.36	C	-3.7	-5.2	7	-5.5	MM19	42	J	-6.2
MM20		64 56.72	163 8.70	A	0	62	T	949	982272.76	C	-5.7	-7.4	7	-7.8	MM20	48	J	-8.7
MM21		64 58.08	163 6.50	A	0	71	T	956	982272.13	C	-6.9	-8.9	7	-9.3	MM21	52	J	-10.4
MM22		64 58.68	163 0.80	A	0	131	T	1004	982263.96	C	-10.3	-14.0	7	-14.8	MM22	130	M	-14.9
MM23		64 59.03	162 57.80	A	0	120	T	1011	982259.08	C	-16.6	-20.0	7	-20.7	MM23	126	M	-20.4
MM24		64 57.17	162 52.15	A	0	171	T	1028	982250.32	C	-18.4	-23.2	7	-24.3	MM24	155	M	-25.2
MM25		64 54.73	162 47.53	A	0	256	T	1029	982256.22	C	-3.8	-11.0	7	-12.5	MM25	235	M	-13.7
MM26		64 55.08	162 41.35	A	0	525	T	1040	982231.85	C	-1.9	-16.6	7	-19.8	MM26	500	M	-21.3
MM27		64 58.69	162 42.80	A	0	313	T	1048	982227.80	C	-29.4	-38.2	7	-40.0	MM27	295	M	-41.1
MM28		65 0.30	162 39.40	A	0	578	T	1057	982234.86	C	0.8	-15.5	7	-18.9	MM28	550	M	-20.7
MM29		65 2.15	162 41.20	A	0	494	T	1104	982239.85	C	-4.2	-18.2	7	-21.1	MM29	520	M	-19.6
MM30		65 2.26	162 49.30	A	0	154	T	1145	982228.95	C	-47.1	-51.6	7	-52.5	MM30	185	M	-50.7
MM31		65 2.74	162 58.25	A	0	98	T	1155	982232.53	C	-50.2	-52.8	7	-53.3	MM31	80	J	-54.0
MM32		65 1.65	163 1.75	A	0	65	T	1201	982247.46	C	-34.5	-36.9	7	-37.4	MM32	72	J	-38.3
MM33		65 2.52	163 3.55	A	0	96	T	1207	982241.57	C	-40.4	-43.1	7	-43.7	MM33	99	J	-43.5
MM34		65 3.66	163 9.05	A	0	125	T	1214	982241.92	C	-38.7	-42.2	7	-42.9	MM34	125	J	-42.9
MM35		65 5.29	163 10.70	A	0	156	T	1220	982236.65	C	-42.9	-47.3	7	-48.2	MM35	156	J	-48.2
MM36		65 6.40	163 8.65	A	0	243	T	1227	982221.80	C	-50.8	-57.7	7	-59.1	MM36	235	M	-59.7
MM37		65 7.28	163 11.60	A	0	196	T	1234	982226.24	C	-51.8	-57.3	7	-58.5	MM37	198	J	-58.6
MM38		65 6.08	163 19.88	A	0	271	T	1242	982243.42	C	-26.3	-33.9	7	-35.5	MM38	270	M	[illegible]
MM39		65 4.47	163 24.80	A	0	297	T	1249	982247.79	C	-17.5	-25.9	7	-27.7	MM39	266	J	[illegible]
COUN		64 53.60	163 39.92	A	0	100	R	1304	982272.47	B	1.2	-1.6	6	-2.2	COUN	100	R	-2.2
COUN		64 53.60	163 39.92	A	0	100	R	1401	982272.47	B	1.2	-1.6	6	-2.2	COUN	101	R	-2.2
COUN		64 53.60	163 39.92	A	0	100	R	1401	982272.47	B	1.2	-1.6	6	-2.2	COUN	108	R	-2.2
MM40		64 55.32	163 10.95	A	0	52	T	1431	982273.13	C	-4.6	-6.1	7	-6.4	MM40	44	J	-6.9
MM41		64 57.32	163 7.22	A	0	61	T	1448	982272.68	C	-6.5	-8.3	7	-8.6	MM41	58	J	-9.3
MM42		64 56.38	162 57.50	A	0	146	T	1450	982264.62	C	-5.5	-9.7	7	-10.5	MM42	147	M	-10.5
MM43		64 57.83	162 53.20	A	0	152	T	1457	982251.43	C	-19.9	-24.2	7	-25.1	MM43	145	M	-25.5
MM44		64 56.33	162 51.35	A	0	183	T	1503	982250.47	C	-16.1	-21.3	7	-22.4	MM44	180	M	-22.6
MM45		64 55.44	162 49.75	A	0	215	T	1510	982255.26	C	-7.3	-13.4	7	-14.7	MM45	208	M	-15.1
MM46		64 58.19	162 54.98	A	0	129	T	1518	982256.44	C	-17.4	-21.1	7	-21.8	MM46	137	M	-21.4
MM47		64 56.52	162 56.52	A	0	119	T	1524	982256.92	C	-15.9	-19.3	7	-20.0	MM47	138	M	-19.4
MM48		64 59.78	163 0.35	A	0	94	T	1530	982259.62	C	-19.3	-22.0	7	-22.6	MM48	108	M	-21.8
MM49		65 0.85	163 2.00	A	0	80	T	1536	982253.63	C	-27.9	-30.2	7	-30.7	MM49	68	J	-31.4
MM50		65 1.67	163 1.10	A	0	87	T	1542	982245.42	C	-36.4	-38.9	7	-39.4	MM50	73	J	-40.3
MM51		65 2.24	163 0.20	A	0	86	T	1547	982238.38	C	-44.2	-46.6	7	-47.2	MM51	76	J	-47.8
MM52		65 6.48	162 50.95	A	0	142	T	1556	982237.16	C	-45.1	-49.1	7	-49.9	MM52	123	J	-51.1
MM53		65 8.24	162 48.35	A	0	280	T	1604	982245.17	C	-26.2	-34.0	7	-35.7	MM53	279	J	-35.8
MM54		65 9.08	162 46.90	A	0	354	T	1610	982247.99	C	-17.3	-27.3	7	-29.4	MM54	360	J	-29.1
MM55		65 8.12	162 59.88	A	0	176	T	1620	982233.02	C	-47.9	-52.9	7	-53.9	MM55	185	M	-53.4
MM56		65 7.10	163 2.10	A	0	218	T	1629	982223.18	C	-52.7	-58.8	7	-60.1	MM56	202	M	-61.1
MM57		65 5.43	163 1.10	A	0	107	T	1636	982226.91	C	-57.4	-60.4	7	-61.1	MM57	98	J	-61.6
MM58		65 6.12	163 11.55	A	0	168	T	1645	982231.81	C	-47.5	-52.3	7	-53.3	MM58	170	J	-53.2
MM59		65 8.00	163 2.70	A	0	204	T	1652	982230.84	C	-48.1	-53.8	7	-55.1	MM59	209	J	-54.8
MM60		65 4.32	163 10.30	A	0	157	T	1708	982239.65	C	-39.2	-43.6	7	-44.4	MM60	143	J	-44.9
MM61		65 0.32	163 13.75	A	0	119	T	1709	982272.22	C	-5.1	-8.4	7	-9.1	MM61	133	J	[illegible]
MM62		64 58.53	163 5.58	A	0	67	T	1716	982270.60	C	-9.5	-11.4	7	-11.8	MM62	54	J	[illegible]
COUN		64 53.60	163 39.92	A	0	100	R	1746	982272.47	B	1.2	-1.6	6	-2.2	COUN	100	R	-2.2

DATA SUMMARY

	RANGES OF:	LATITUDE	LONGITUDE	ELEVATION	OBSV GRAV	FAA	SBA-2.67
NUMBER OF STATIONS: 49	MINIMUM:	64 53.60	162 39.40	52	982221.80	-57.4	-61.1
	MAXIMUM:	65 9.08	163 39.92	578	982273.36	1.2	-2.2

USGS GRAVITY DATA FROM: SEWARD PEN ALASKA, TRAVERSE: FISH-RIV-3 PROJ CHIEF: BARNES DATUM: BARNES 1975 DATA SET: AY61

DATE: 08/11/77, METER: G192, OBSERVERS: MORIN * MAIN BASE: COUN, VALUE: 982272.47, DRIFT:0.07, OTHER BASES: NOMF,

STAT. MAIN	NOS. AVG.	LATITUDE	LONGITUDE	LOC. TYPE	HT-REF	ELEV FEET	ELEV TYPE	OBSV TIME	OBSV GRAV MILLIGALS	GRAV TYPE	FAA MGALS	SBA 2.20	ANOM ACC.	SBA 2.67	STAT NUMB	OTHER ELEV.	ELEV TYPE	SBA 2.67
COUN		64 53.60	163 39.92	A	0	100	H	850	982272.47	B	1.2	-1.6	6	-2.2	COUN	100	R	-2.2
MM63		64 58.60	163 38.75	A	0	172	F	923	982270.85	C	0.6	-4.3	7	-5.3	MM63	185	M	-4.6
MM64		65 6.88	163 33.42	A	0	341	T	942	982247.38	C	-16.4	-26.0	7	-28.0	MM64	352	J	-27.4
MM65		65 7.38	163 26.12	A	0	431	T	950	982233.36	C	-22.7	-34.9	7	-37.4	MM65	425	M	-37.8
MM66		65 12.18	163 28.48	A	0	646	T	1000	982232.39	C	-9.0	-27.2	7	-31.1	MM66	650	M	-30.9
MM67		65 11.28	163 26.75	A	0	554	T	1007	982238.11	C	-11.0	-26.5	7	-29.9	MM67	560	M	-29.5
MM68		65 10.65	163 26.30	A	0	504	T	1012	982241.81	C	-12.0	-26.2	7	-29.2	MM68	490	M	-30.1
MM69		65 9.34	163 24.57	A	8	372	T	1019	982247.48	C	-16.4	-26.9	7	-29.1	MM69	358	M	-30.8
MM70		65 8.72	163 22.91	A	0	307	T	1025	982242.25	C	-27.1	-35.7	7	-37.5	MM70	315	M	-37.1
MM71		65 8.72	163 20.68	A	0	242	T	1032	982242.28	C	-33.2	-40.0	7	-41.4	MM71	258	M	-40.5
MM72		65 8.13	163 18.85	A	0	221	T	1039	982239.65	C	-37.0	-43.3	7	-44.6	MM72	235	M	-43.8
MM73		65 4.55	163 16.55	A	5	242	T	1047	982240.40	C	-30.2	-37.0	7	-38.5	MM73	253	M	-37.8
MM74		65 1.88	163 19.08	A	0	140	T	1055	982271.74	C	-5.2	-9.2	7	-10.0	MM74	158	J	-9.8
MM75		65 1.45	163 13.48	B	8	131	T	1105	982262.86	C	-14.6	-18.3	7	-19.1	MM75	160	P	-17.4
MM76		65 1.82	163 7.40	A	5	122	T	1115	982251.58	C	-27.1	-30.6	7	-31.3	MM76	141	M	-30.2
MM77		64 59.25	163 4.02	A	0	60	T	1123	982265.29	C	-16.2	-17.9	7	-18.3	MM77	75	M	-17.5
MM78		65 0.35	163 3.15	A	0	62	T	1130	982256.94	C	-25.7	-27.5	7	-27.8	MM78	66	J	-27.6
MM79		65 1.20	162 54.48	A	0	125	T	1141	982231.18	C	-46.6	-50.2	7	-50.9	MM79	168	P	-50.8
MM80		65 3.82	162 56.92	A	5	86	T	1152	982226.79	C	-57.6	-60.0	7	-60.6	MM80	120	M	-58.6
MM81		65 4.58	162 55.60	A	0	85	T	1200	982226.04	C	-57.3	-59.7	7	-60.2	MM81	120	M	-58.1
MM82		65 5.49	163 5.70	A	0	139	T	1211	982225.31	C	-56.0	-59.9	7	-60.8	MM82	150	M	-6[illegible] 2
COUN		64 53.60	163 39.92	A	0	100	R	1249	982272.47	B	1.2	-1.6	6	-2.2	COUN	100	R	-[illegible] 2
COUN		64 53.60	163 39.92	A	0	100	R	1249	982272.51	B	1.2	-1.6	6	-2.2	COUN	100	R	-2.2
NOMF		64 30.55	165 26.12	A	0	16	A	1508	982259.74	A	7.5	7.0	6	7.0	NOMF	100	R	-2.2
NOMF		64 30.55	165 26.12	A	0	16	A	1508	982259.82	A	7.6	7.1	6	7.0	NOMF	100	R	-2.2

Figure Captions

Figure 1. Gravity profile AB and cross section computed with a density contrast of 1.00 gm/cm^3 representing a porous-sediment density of 1.67 gm/cm^3. Horizontal and vertical scale units in kilometers (vertical exaggeration: 8X). Small circles represent observed Bouguer gravity values in milligals; small crosses represent data calculated by the iterative program of Bott (1960).

Figure 2. Gravity profile AB and cross section computed with a density contrast of 0.50 gm/cm^3 representing a sedimentary rock density of 2.17 gm/cm^3 and basement rock density of 2.67 gm/cm^3. Horizontal and vertical scale units in kilometers (vertical exaggeration: 8X). Small circles represent observed Bouguer gravity values in milligals; small crosses represent data calculated by the iterative program of Bott (1960).

Figure 3. Gravity profile CD and cross section computed with a density contrast of 0.67 gm/cm^3 representing primarily a sedimentary density of 2.00 and basement rock density of 2.67 gm/cm^3. Horizontal and vertical scale units in kilometers (vertical exaggeration: 8X). Small circles represent observed Bouguer gravity values in milligals; small crosses represent data calculated by the iterative program of Bott (1960).

MCCARTHY'S MARSH - PROFILE AB - DENSITY CONTRAST = 1.00 G/CC

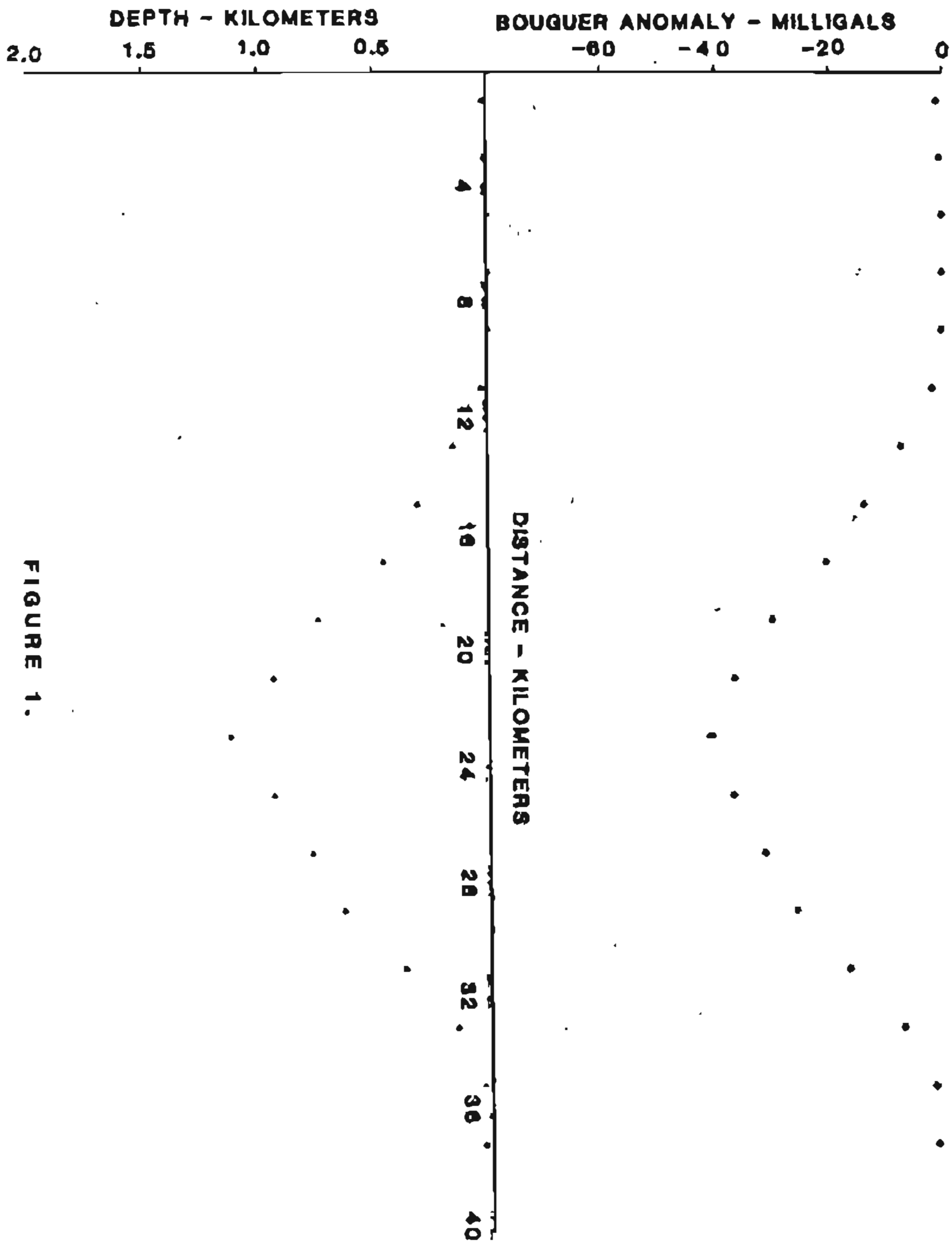

FIGURE 1.

MCCARTHY'S MARSH - PROFILE AB - DENSITY CONTRAST = 0.50 G/CC

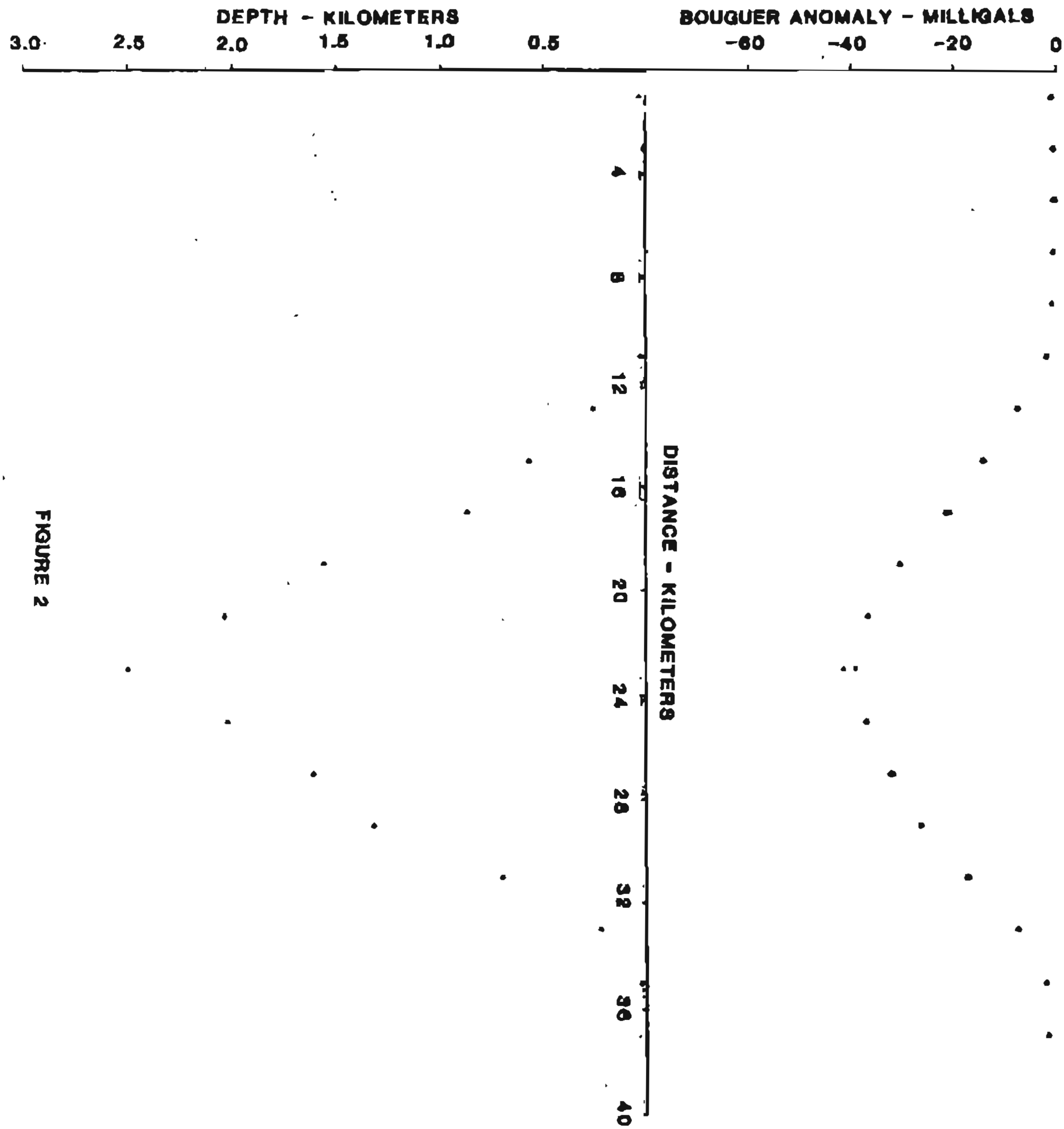

FIGURE 2

MCCARTHY'S MARSH - PROFILE CD - DENSITY CONTRAST = 0.67 G/CC

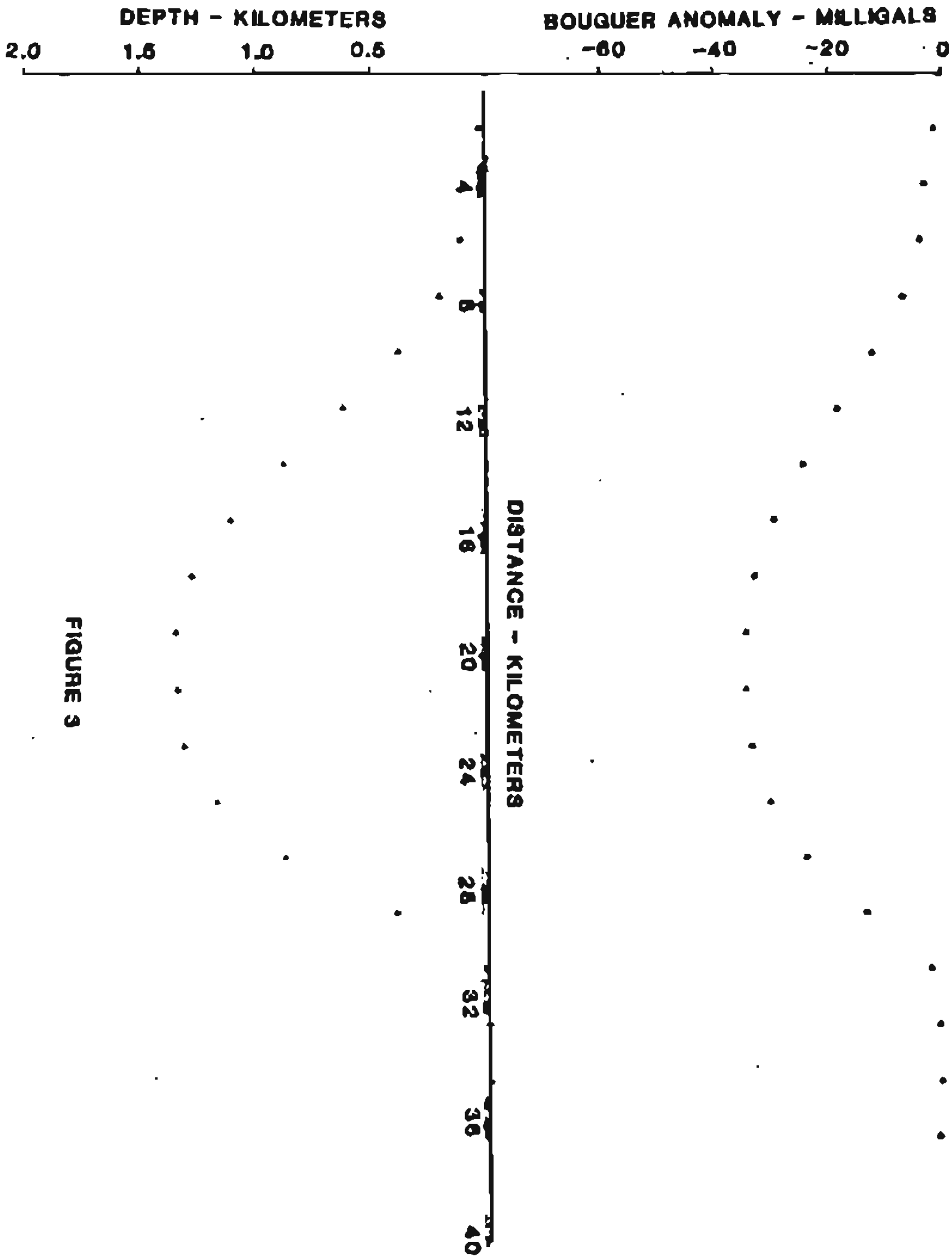

FIGURE 3