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CANADA

DEPARTMENT OF MINES AND RESOURCES

MINES AND GEOLOGY BRANCH

GEOLOGICAL SURVEY BULLETIN

No. 6

GRAVIMETRIC SURVEYS OF 1944 IN NEW BRUNSWICK

BY

A. H. Miller

DOMINION OBSERVATORY

OTTAWA
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,
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PREFACE

Geophysical surveys in New Brunswick are proving a valuable guide to the nature of structures concealed beneath flat-lying Pennsylvanian strata that blanket nearly half of the southeastern part of the province. Outcrops at the edges of the Pennsylvanian blanket, and the records of oil and gas wells, indicate that ridges of pre-Carboniferous crystalline rocks occur along the axes of some folds involving Carboniferous strata. The outlining of such ridges beneath the Pennsylvanian blanket will provide information on the structure of the Carboniferous rocks, and this information may be of economic value because the Carboniferous includes the salt-bearing Windsor strata as well as the petroliferous Albert formation.

Previous geophysical surveys, jointly by the Geological Survey and the Dominion Observatory in 1932, 1935, and 1943, with torsion balance and magnetometer, showed that definite gravity and magnetic anomalies were associated with known ridges of pre-Carboniferous rocks. Surveys described in this report were made on the Pennsylvanian cover by A. H. Miller of the Dominion Observatory. They suggest the presence of several pre-Carboniferous ridges.

GEORGE HANSON,
Chief Geologist, Geological Survey

OTTAWA, February 5, 1946

63178—2½

GRAVIMETRIC SURVEYS OF 1944 IN NEW BRUNSWICK

INTRODUCTION

The gravimetric surveys with which this report is concerned were carried on by the Dominion Observatory, in collaboration with the Geological Survey, at the request of the Department of Lands and Mines of New Brunswick. Their object was threefold.

(1) To trace across the Shediac basin the presumed easterly continuation of the structure between Pollett River and Bridgedale, indicated by the gravity "high" determined with the torsion balance in 1943, and to outline other possible structures in this basin.

(2) To complete a network of stations around the Weldon salt deposit, and thereby help to define its extent and structural significance.

(3) To outline, so far as might be possible, the subsurface structure of the Carboniferous basin (*See* Figure 4) of eastern New Brunswick between Moncton and Bathurst. This basin is believed to be underlain by a series of buried ridges of pre-Carboniferous rocks, with intermediate synclinal basins generally oriented southwest-northeast, corresponding structurally to the petroliferous Hillsborough basin. This interpretation is based partly on the results of previous drilling and partly on general geological studies.

Previous work in 1935[1] and 1943 indicated that such ridges and basins could be detected with the torsion balance. It was, therefore, proposed to run a series of traverses in the following order of priority.

(1) Along the eastern coastal road from Cocagne to Caraquet, approximately 120 miles.

(2) Along the Moncton-Rogersville-Newcastle-Bathurst highway, approximately 100 miles.

(3) Along the Sussex-Chipman highway and thence along the Canadian National Railway to McGivney, approximately 80 miles.

A gravimeter (*See* Plate I A) became available for the work through the courtesy of the Humble Oil and Refining Company of Houston, Texas, who own the instrument, and of the American Geophysical Union, at whose disposal it has been placed by the company for the past several years. The writer is indebted to Dr. George P. Woollard for training in operation of the instrument. As a preliminary to about 3 months' field work the writer spent a pleasant and profitable 10 days under his supervision at the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts. Later, at the conclusion of the work in New Brunswick in September, Dr. Woollard came to Canada and observed, in company with the writer, some ninety stations (424-511, Table I) on regional traverses (stations about 10 miles apart) in Nova Scotia, New Brunswick, and Quebec. Except for about 30 miles along the railway between Chipman and McGivney all the proposed work mentioned above was completed, in addition to a considerable amount of other work with the gravimeter and a traverse between Port Elgin and Bathurst with the magnetometer.

The gravimeter is ordinarily transported in a motor truck, and observations are taken along the road on a tripod let down through a well in the rear of the chassis. As no highway follows the railway between Chipman and McGivney, the change to transportation by rail and observation on the railroad bed would have taken time and been somewhat of an experiment. Instead, the observations were carried from Chipman by the highway through Minto, Sheffield, Fredericton, and Covered Bridge to McGivney, and on from there to close with the traverses through Newcastle.

[1] Pub. Dom. Obs. XI, 6, App. III, 1940.

The program (*See* Figure 1) was carried out after consultation in the field with F. J. Alcock of the Geological Survey, and in continued close co-operation with Dr. F. J. Wright, Provincial Geologist of New Brunswick. The writer was ably assisted by Mr. L. P. Wood, Barbados scholar and undergraduate of McGill University.

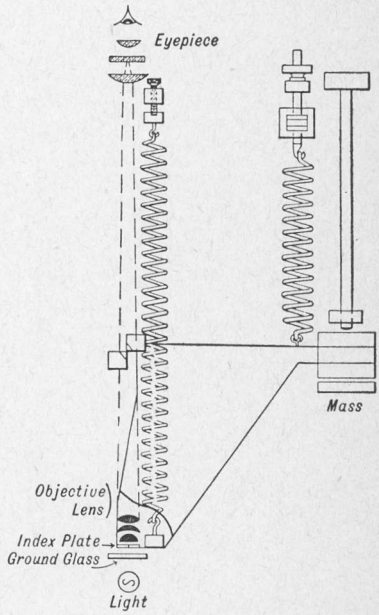
FIELD WORK AND COMPUTATIONS

The Gravimeter

Gravimeters are, in principle, exceedingly sensitive weighing devices for making rapid determination of minute differences of gravity. They have been much employed in the exploration for oil. The essential part of most of the several existing types is a mass supported by a spring or a system of springs. Variations in gravity produce corresponding changes in the weight of the mass, which in turn affects the spring. In some instruments the resulting elastic deformation of the spring serves to determine the gravity variations; in others the tension or force required to maintain the original dimension of the spring determines the gravity differences.

Plate I

A. The gravimeter in use.



B. Diagram of Truman gravimeter.

Rotation accompanying the elongation of a spring, and the torsion in a quartz fibre are effects that are employed in two well-known types of gravimeter to determine the gravity variations. In another type the mass, supported by a delicate spring, is represented by the inner plate of an electrical condenser. The instrument used in the present investigation (*See* Plate I A) is described as a compound Truman type gravimeter, in which gravity is balanced to a zero (null) position by varying the tension in a fine spring.

Observational Routine and Accuracy of Observed Values

Twenty-seven base stations were established by the usual method[1] of looping. All other stations in New Brunswick are referred to the values

[1]Nettleton, L .L.: Geophysical Prospecting for Oil; McGraw Hill Book Co., Inc. (1940), 1st edition, p. 38.

obtained for one or other of these bases. Several pendulum stations were available, along the route followed, for control of the long regional traverses in Nova Scotia, New Brunswick, and Quebec. The first loop, begun at the pendulum station at Amherst, followed Route 2 to Aulac, thence through Port Elgin and Shediac by Routes 16, 15, and 11 to Moncton, and thence by Route 2 back to Amherst, a distance of 120 miles. Ten bases were established along this loop at intervals considerably shorter than those subsequently adopted. This loop closed within two milligals, and the error was distributed around the loop. All other loops closed within one milligal, and no further adjustments were made. The value of gravity carried over with the gravimeter, through the network, from the pendulum station at Amherst to the pendulum station at Fredericton, agreed with the pendulum result within nine-tenths of a milligal. The pendulum value 980·690 is larger than the gravimeter value, but is retained in Table I because it agrees better with the results for the regional traverse between Rivière du Loup and Saint John, and because the loop carried from Amherst through Moncton, Sussex, Fredericton, and Doaktown without adjustment closed within half a milligal at Newcastle with the line from Amherst along the coast, through Port Elgin and Shediac.

Most of the observed results, if not all of them, are probably correct to a milligal, that is to one unit in the third place of decimals in the quantities entered in the last column but two of Table I. This is concluded from the results of repeated observations, and in particular from eleven stations purposely repeated on returning from Newcastle to Moncton on September 1. Three of these repeats gave a difference of zero, one gave two-tenths of a milligal, three stations gave three-tenths of a milligal, two four-tenths, one six-tenths, and one eight-tenths, the average being three-tenths of a milligal. Stations 443 to 460 or even to 466 are probably in error by more than a milligal, due to a correction that had to be made for a shift of the equivalent of 4 milligals in the reading of the instrument, and thought to be caused by travel over rough roads between Whitehead, Goldboro, and Melrose, in Nova Scotia.

The scale value of the gravimeter was determined at Woods Hole, at the beginning of the season, by the application of the gold weights installed in the instrument for the purpose. The value 0·352 milligal per scale division was obtained. The instrument had been calibrated by Woollard[1] by comparison with numerous pendulum stations in the United States.

With the exception of Bathurst (difference, 5 milligals) and Truro (difference, 3½ milligals) the gravimeter agreed within a milligal with the pendulum at the remaining eleven pendulum stations previously established in the Maritimes and Quebec.

Principal Facts for Gravity Stations

Principal facts for all the gravity stations are listed in Table I. In column 1 the station numbers are arranged in chronological order; the names of the stations are given in column 2. The name in brackets identifies the place on the map nearest to the point of observation. Longitudes and latitudes (columns 3 and 4) were obtained from maps varying in scale from 1 to 8 miles to an inch. Those taken from the 1- and 2-mile maps (listed to one-hundredth of a minute) are perhaps correct to one-tenth of a minute, whereas those taken from the smaller scale maps may be as much as 0·5 minute in error for some stations. Elevations appearing in column 5 were, in many instances, known either from rail elevations published by the Geodetic Survey of Canada or from elevations shown on the 1- and 2-mile maps. Where the required elevations were not known they were obtained with an altimeter (aneroid barometer, Paulin system), which

[1] Woollard, George Prior: Transcontinental Gravitational and Magnetic Profile of North America and its Relation to Geologic Structures; Bull. Geol. Soc. Am., pp. 747–790 (1943).

was checked against known elevations several times a day, and most of them are believed to be correct to within 5 feet.

Theoretical gravity (γ_0, in centimetres per second) at sea-level for each station in column 6 is obtained by substitution of the latitude (Φ) of the station for gravity at sea-level in the formula $\gamma_0 = 978{\cdot}049\ (1 + 0{\cdot}0052884 \sin^2\Phi - 0{\cdot}0000059 \sin^2 2\Phi)$, adopted by the International Union of Geodesy and Geophysics[1]. In this formula the quantity 978·049 is the most probable value of gravity at the equator, as deduced from numerous gravity observations at many places over the earth. The coefficients of $\sin^2\Phi$ and $\sin^2 2\Phi$ are deduced from theoretical expressions for gravity on the adopted spheroid. In column 7 are corrections for elevation, or the decrease in gravity due to increased distance from the centre of the earth. It amounts to –0·09406 milligal per foot. In the next column is the Bouguer correction, the combined correction due to elevation (negative) and the correction (positive) for the attraction, at the station, of material above sea-level. This second part of the correction is taken to be equivalent to the attraction of an infinite horizontal disk of thickness equal to the elevation of the station. It is practically equivalent to one-half the effect of a curved disk of the same density and thickness extending all the way around the earth. For a rock density of 2·67 the combined or Bouguer correction amounts to –0·06 milligal per foot. It is always negative, because the elevation correction exceeds that due to land above sea-level. Irregularities in the terrain may necessitate a further correction, appropriately termed the 'terrain correction.' No corrections have been made for this, but observation of the topography in the immediate vicinity of the stations, and comparison with the results of topographical reductions for pendulum stations in the area, suggest that the terrain correction (carried to a distance of even 100 miles from the station) is not likely to amount to as much as one milligal for any of the stations.

In columns 9 and 10 are the free-air and Bouguer theoretical values of gravity for each station. They are obtained by substracting the respective corrections from the theoretical value of gravity γ_0 at sea-level. In the next column is the value of observed gravity for each station, deduced from the observations with the gravimeter. The gravity anomalies (observed value minus computed value) are listed in the last two columns.

The free-air anomalies, which take no account of the attraction of matter above sea-level, have been included in the list because of their application to the determination of the geoid[2].

After correction has been made for the attraction of topography there still remain in the Bouguer anomalies the effects of invisible excesses and deficiencies of matter in the earth's crust. Anomalies of density nearest to and directly beneath the station will be those most effective in producing gravity anomalies, and they are the very anomalies that are of particular interest to the geophysical prospector. More distant anomalies in the crust also may and do produce quite large gravity anomalies. They may be distinguished from the local effects by their persistence for greater distances over the earth's surface. A positive anomaly, one for which the observed value is greater than the computed value, represents, of course, an excess of gravity at the station, and is an indication of rocks heavier than normal. A negative anomaly represents a deficiency of gravity, and suggests lighter rock formations.

It is thought that the anomalies are usually correct to a milligal, but as they are affected by errors in both the observed and computed values it is apparent that they may be from 1 to 2 milligals in error in many cases.

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[1] Lambert, Walter D., and Darling, F. W.: Tables for Theoretical Gravity According to the New International Formula; Bull. Geod. 32, Oct.-Nov.-Dec., 1931.
Gulatee, B. L.: Prof. Paper No. 30, Survey of India, Gravity Anomalies and the Figure of the Earth, 1940.

[2] Jeffreys, Harold: Earthquakes and Mountains, Chap. III, 1935.
Hirvonen, R. A.: The Continental Undulations of the Geoid; Finnish Geol. Inst. 19, 1934.
Lambert, W. D.: Tables for Determining the Form of the Geoid and Its Indirect Effect on Gravity; Sp. Pub. 199 U.S.C. and G.S., p. 103.
Gulatee, B. L.: Gravity Anomalies and the Figure of the Earth; Prof. Paper 30, Survey of India, 1940.

Table I. Principal Facts for Gravity Stations

Station No.	Station Name	Longitude	Latitude	Elevation	Theoretical gravity	Corrections: Elevation	Corrections: Bouguer	Computed gravity: Free air	Computed gravity: Bouguer	Observed gravity	Gravity anomalies: Free air	Gravity anomalies: Bouguer
		° ′	° ′	Feet	γ_0							
1	St. George	66 49·19	45 08·03	89	980·6415	−0·0084	−0·0053	980·6331	980·6362	980·6404	0·0073	0·0042
2	Saint John	66 05·00	45 16·10	113	·6536	·0106	·0068	·6430	·6468	·6668	·0238	·0200
3	Fredericton	66 38·60	45 56·90	128	·7150	·0120	·0077	·7030	·7073	·6900	− ·0130	− ·0173
4	Anagance Corner	65 14·80	45 51·87	218	·7074	·0205	·0131	·6869	·6943	·6988	·0119	·0045
5	Moncton	64 47·20	46 05·10	50	·7273	·0047	·0030	·7226	·7243	·7320	·0094	·0077
6	Gilberts Corner	64 34·17	46 13·88	55	·7405	·0052	·0033	·7353	·7372	·7494	·0141	·0122
7	Shediac	64 32·48	46 13·25	47	·7396	·0044	·0028	·7352	·7368	·7510	·0158	·0142
8	Chapmans Corner	64 33·96	46 13·07	32	·7393	·0030	·0019	·7363	·7374	·7510	·0147	·0136
9	(Gilberts Corner)	64 34·17	46 14·74	15	·7418	·0014	·0009	·7404	·7409	·7529	·0125	·0120
10	" "	64 35·10	46 13·50	80	·7400	·0075	·0048	·7325	·7352	·7464	·0139	·0112
11	(Shediac)	64 30·88	46 13·48	46	980·7399	−0·0043	−0·0028	980·7356	980·7371	980·7515	0·0159	0·0144
12	Point du Chêne	64 31·40	46 14·33	3	·7412	·0003	·0002	·7409	·7410	·7545	·0136	·0135
13	Barachois	64 25·45	46 13·40	35	·7398	·0033	·0021	·7365	·7377	·7524	·0159	·0147
14	Amherst	64 12·80	45 50·00	70	·7046	·0066	·0042	·6980	·7004	·6930	− ·0050	− ·0074
15	Port Elgin	64 05·35	46 03·09	6	·7243	·0006	·0004	·7237	·7239	·7150	− ·0087	− ·0089
16	Bayfield	63 49·00	46 08·33	12	·7322	·0011	·0007	·7311	·7315	·7273	− ·0038	− ·0042
17	Shemogue	64 11·05	46 09·34	50	·7337	·0047	·0030	·7290	·7307	·7345	·0055	·0038
18	Cape Bald	64 16·27	46 12·90	59	·7391	·0055	·0035	·7336	·7356	·7470	·0134	·0114
19	Cocagne (P.O.)	64 37·25	46 20·50	9	·7505	·0008	·0005	·7497	·7500	·7593	·0096	·0093
20	(Buctouche)	64 43·51	46 29·07	38	·7634	·0036	·0023	·7598	·7611	·7639	·0041	·0028
21	Rexton	64 52·90	46 39·32	25	980·7788	−0·0024	−0·0015	980·7764	980·7773	980·7630	−0·0134	− ·0143
22	Shediac Road	64 40·44	46 08·86	205	·7330	·0193	·0123	·7137	·7207	·7292	·0155	·0085
23	St. Anselme	64 43·29	46 04·25	58	·7260	·0055	·0035	·7205	·7225	·7299	·0094	·0074
24	Memramcook W.	64 34·32	45 59·90	29	·7195	·0027	·0017	·7168	·7178	·7228	·0060	·0050
25	(Dorchester)	64 30·00	45 53·14	125	·7093	·0118	·0075	·6975	·7018	·6896	− ·0079	− ·0122
26	Sackville	64 22·15	45 53·87	43	·7104	·0040	·0026	·7064	·7078	·6919	− ·0145	− ·0159
27	Jolicure	64 13·04	45 56·67	45	·7146	·0042	·0027	·7104	·7119	·6845	− ·0259	− ·0274
28	(Cape Bald)	64 17·90	46 12·77	26	·7389	·0024	·0016	·7365	·7373	·7507	·0142	·0134
29	Dupuis Corner	64 19·37	46 13·28	42	·7396	·0040	·0025	·7356	·7371	·7509	·0153	·0138
30	Robichaud	64 22·78	46 13·09	23	·7393	·0022	·0014	·7371	·7379	·7523	·0152	·0144
31	(Barachois)	64 26·96	46 13·65	29	980·7402	−0·0027	−0·0017	980·7375	980·7385	980·7537	0·0162	0·0152
32	Boudreau	64 29·02	46 13·60	49	·7401	·0046	·0029	·7355	·7372	·7523	·0168	·0151
33	Shediac Bridge	64 34·83	46 16·90	9	·7451	·0008	·0005	·7443	·7446	·7542	·0099	·0096
34	Scoudouc Station	64 33·72	46 10·00	101	·7347	·0095	·0061	·7252	·7286	·7458	·0206	·0172
35	Scoudouc	64 34·25	46 08·17	95	·7319	·0089	·0057	·7230	·7262	·7393	·0163	·0131
36	Meadowbrook	64 35·33	46 05·85	83	·7285	·0078	·0050	·7207	·7235	·7340	·0133	·0105
37	(Calhoun)	64 35·17	46 03·87	210	·7255	·0198	·0126	·7057	·7129	·7211	·0154	·0082

TABLE I. PRINCIPAL FACTS FOR GRAVITY STATIONS—*Continued*

Station		Longitude	Latitude	Elevation	Theoretical gravity	Corrections		Computed gravity		Observed gravity	Gravity anomalies	
No.	Name					Elevation	Bouguer	Free air	Bouguer		Free air	Bouguer
		° ′	° ′	Feet	γ_0							
38	(Gayton)	64 34·88	46 02·88	210	·7240	·0198	·0126	·7042	·7114	·7199	·0157	·0085
39	"	64 34·62	46 01·64	111	·7221	·0104	·0067	·7117	·7154	·7236	·0119	·0082
40	Botsford Portage	64 14·90	46 11·63	103	·7371	·0097	·0062	·7274	·7309	·7393	·0119	·0084
41	(Shemogue)	64 12·97	46 10·50	95	980·7354	−0·0089	−0·0057	980·7265	980·7297	980·7352	0·0087	0·0055
42	"	64 08·03	46 08·18	22	·7320	·0021	·0013	·7299	·7307	·7334	·0035	·0027
43	Woodside	64 07·15	46 05·47	44	·7279	·0041	·0026	·7238	·7253	·7217	− ·0021	− ·0036
44	Hardy	64 01·78	46 04·50	50	·7264	·0047	·0030	·7217	·7234	·7178	− ·0039	− ·0056
45	Melrose	63 56·60	46 05·68	93	·7282	·0087	·0056	·7195	·7226	·7229	·0034	·0003
46	Malden	63 52·86	46 06·59	90	·7296	·0085	·0054	·7211	·7242	·7234	·0023	− ·0008
47	(Baie Verte)	64 08·35	45 59·57	80	·7190	·0075	·0048	·7115	·7142	·6986	− ·0129	− ·0156
48	Pointe de Butte	64 14·64	45 54·00	72	·7106	·0068	·0043	·7038	·7063	·6817	− ·0221	− ·0246
49	Aulac	64 16·88	45 52·30	74	·7081	·0070	·0044	·7011	·7037	·6777	− ·0234	− ·0260
50	(Frosty Hollow L.)	64 25·85	45 52·26	202	·7080	·0190	·0121	·6890	·6959	·6801	− ·0089	− ·0158
51	(Chapman)	64 04·26	46 08·30	61	980·7321	−0·0057	−0·0037	980·7264	980·7284	980·7303	0·0039	0·0019
52	Grant	64 01·57	46 10·79	15	·7359	·0014	·0009	·7345	·7350	·7401	·0056	·0051
53	Murray Corner	63 57·60	46 10·34	15	·7352	·0014	·0009	·7338	·7343	·7400	·0062	·0057
54	(Murray Corner)	63 55·24	46 09·47	14	·7339	·0013	·0008	·7326	·7331	·7387	·0061	·0056
55	Spencer	63 52·78	46 08·65	15	·7327	·0014	·0009	·7313	·7318	·7343	·0030	·0025
56	(St. André de Shediac)	64 18·70	46 11·84	100	·7375	·0094	·0060	·7281	·7315	·7421	·0140	·0106
57	St. André de Shediac	64 18·03	46 10·67	115	·7357	·0108	·0069	·7249	·7288	·7378	·0129	·0090
58	Cormier Village	64 21·12	46 10·29	63	·7351	·0059	·0038	·7292	·7313	·7412	·0120	·0099
59	Upper Aboushagau	64 24·22	46 09·33	131	·7337	·0123	·0079	·7214	·7258	·7370	·0156	·0112
60	Drisdelle	64 23·41	46 07·65	88	·7312	·0083	·0053	·7229	·7259	·7327	·0098	·0068
61	Glaude	64 25·41	46 11·48	57	980·7369	−0·0054	−0·0034	980·7315	980·7335	980·7468	0·0153	0·0133
62	(Scoudouc Station)	64 33·79	46 11·48	90	·7369	·0085	·0054	·7284	·7315	·7463	·0179	·0148
63	" "	64 33·82	46 09·10	85	·7333	·0080	·0051	·7253	·7282	·7421	·0168	·0139
64	(Moncton Road)	64 36·60	46 12·13	145	·7379	·0136	·0087	·7243	·7292	·7410	·0167	·0118
65	(Shediac Road)	64 39·00	46 10·20	189	·7350	·0178	·0113	·7172	·7237	·7334	·0162	·0097
66	(Harrisville)	64 43·05	46 07·12	183	·7304	·0172	·0110	·7132	·7194	·7269	·0137	·0075
67	Chartersville	64 44·03	46 05·10	29	·7273	·0027	·0017	·7246	·7256	·7345	·0099	·0089
68	Painsec	64 38·53	46 06·24	218	·7290	·0205	·0131	·7085	·7159	·7248	·0163	·0089
69	Lakeburn	64 41·00	46 06·20	209	·7290	·0197	·0125	·7093	·7165	·7244	·0151	·0079
70	(Upper Dover)	64 40·97	46 03·30	174	·7246	·0164	·0104	·7082	·7142	·7220	·0138	·0078
71	Smith lake	64 38·52	46 02·14	275	980·7229	−0·0259	−0·0165	980·6970	980·7064	980·7144	0·0174	0·0080
72	(Memramcook W.)	64 37·50	46 00·42	386	·7203	·0363	·0232	·6840	·6971	·7035	·0195	·0064
73	Memramcook	64 33·10	46 00·28	73	·7201	·0069	·0044	·7132	·7157	·7195	·0063	·0038
74	(Upper Dorchester)	64 32·26	45 57·40	19	·7157	·0018	·0011	·7139	·7146	·7129	− ·0010	− ·0017

75	(Dorchester)	64 30·98	45 55·33	62	·7126	·0058	·0037	·7068	·7089	·6971	− ·0097	− ·0118
76	Gayton	64 33·60	46 02·07	37	·7228	·0035	·0022	·7193	·7206	·7286	·0093	·0080
77	Calhoun	64 34·15	46 04·20	50	·7260	·0047	·0030	·7213	·7230	·7314	·0101	·0084
78	Hillsborough	64 38·95	45 55·50	90	·7129	·0085	·0054	·7044	·7075	·7086	·0042	·0011
79	(Hillsborough)	64 39·70	45 56·22	113	·7140	·0106	·0068	·7034	·7072	·7042	·0008	− ·0030
80	Weldon	64 40·43	45 56·84	28	·7149	·0026	·0017	·7123	·7132	·7128	·0005	− ·0004
81	(Weldon)	64 40·97	45 57·44	103	980·7158	−0·0097	−0·0062	980·7061	980·7096	980·7125	0·0064	0·0029
82	"	64 41·40	45 58·20	210	·7169	·0198	·0126	·6971	·7043	·7068	·0097	·0025
83	(Stony Creek)	64 41·80	45 58·95	165	·7181	·0155	·0099	·7026	·7082	·7119	·0093	·0037
84	Stony Creek	64 42·48	45 59·64	66	·7191	·0062	·0040	·7129	·7151	·7204	·0075	·0053
85	(Stony Creek)	64 42·52	46 00·37	195	·7202	·0183	·0117	·7019	·7085	·7146	·0127	·0061
86	(Lower Coverdale)	64 42·69	46 01·31	145	·7216	·0136	·0087	·7080	·7129	·7202	·0122	·0073
87	(Lower Coverdale)	64 43·10	46 02·02	180	·7227	·0169	·0108	·7058	·7119	·7207	·0149	·0088
88	(Lower Coverdale)	64 43·53	46 02·71	95	·7237	·0089	·0057	·7148	·7180	·7269	·0121	·0089
89	(Lower Coverdale)	64 43·87	46 03·38	75	·7247	·0071	·0045	·7176	·7202	·7280	·0104	·0078
90	(Bridgedale)	64 44·72	46 03·97	75	·7256	·0071	·0045	·7185	·7211	·7317	·0132	·0106
91	Bridgedale	64 45·45	46 04·50	80	980·7264	−0·0075	−0·0048	980·7189	980·7216	980·7302	0·0113	0·0086
92	Surrey	64 38·43	45 54·84	66	·7119	·0062	·0040	·7057	·7079	·7105	·0048	·0026
93	(Edgett's Landing)	64 37·80	45 54·20	70	·7109	·0066	·0042	·7043	·7067	·7098	·0055	·0031
94	" "	64 37·70	45 53·54	140	·7099	·0132	·0084	·6967	·7015	·7060	·0093	·0045
95	" "	64 36·94	45 52·95	75	·7091	·0071	·0045	·7020	·7046	·7144	·0124	·0098
96	(Hopewell Cape)	64 36·03	45 52·31	70	·7081	·0066	·0042	·7015	·7039	·7146	·0131	·0107
97	" "	64 34·80	45 51·58	76	·7070	·0071	·0046	·6999	·7024	·7074	·0075	·0050
98	Hopewell Cape	64 34·63	45 50·67	100	·7056	·0094	·0060	·6962	·6996	·7035	·0073	·0039
99	(The Rocks)	64 35·00	45 49·76	125	·7043	·0118	·0075	·6925	·6968	·6991	·0066	·0023
100	(Cape Station)	64 36·32	45 48·66	70	·7026	·0066	·0042	·6960	·6984	·6970	·0010	− ·0014
101	Daniel	64 38·20	45 46·74	58	980·6997	−0·0055	−0·0035	980·6942	980·6962	980·6827	−0·0115	− ·0135
102	(Hillsborough)	64 39·35	45 56·04	26	·7137	·0024	·0016	·7113	·7121	·7105	− ·0008	− ·0016
103	Gray 'Island'	64 38·72	45 56·28	53	·7141	·0050	·0032	·7091	·7109	·7067	− ·0024	− ·0042
104	(Hillsborough)	64 40·31	45 55·60	190	·7130	·0179	·0114	·6951	·7016	·7023	·0072	·0007
105	"	64 41·54	45 55·27	180	·7125	·0169	·0108	·6956	·7017	·7051	·0095	·0034
106	Salem Station	64 42·21	45 56·12	112	·7138	·0105	·0067	·7033	·7071	·7109	·0076	·0038
107	(Weldon)	64 41·86	45 56·62	72	·7146	·0068	·0043	·7078	·7103	·7141	·0063	·0038
108	"	64 40·00	45 56·50	113	·7144	·0106	·0068	·7038	·7076	·7047	·0009	− ·0029
109	"	64 40·52	45 57·29	118	·7156	·0111	·0071	·7045	·7085	·7084	·0039	− ·0001
110	Leger Corner	64 44·90	46 05·67	43	·7282	·0040	·0026	·7242	·7256	·7322	·0080	·0066
111	(Shediac Bridge)	64 34·21	46 15·78	38	980·7434	−0·0036	−0·0023	980·7398	980·7411	980·7522	0·0124	0·0111
112	(Cocagne)	64 35·83	46 18·40	86	·7473	·0081	·0052	·7392	·7421	·7543	·0151	·0122
113	Breau Village	64 37·98	46 22·30	88	·7532	·0083	·0053	·7449	·7479	·7559	·0110	·0080
114	Despres Village	64 39·64	46 24·00	92	·7557	·0087	·0055	·7470	·7502	·7580	·0110	·0078
115	Ward Corner	64 40·72	46 25·20	86	·7575	·0081	·0052	·7494	·7523	·7637	·0143	·0114
116	St. François de Kent	64 41·15	46 26·67	67	·7598	·0063	·0040	·7535	·7558	·7709	·0174	·0151
117	(Buctouche)	64 42·33	46 27·67	33	·7613	·0031	·0020	·7582	·7593	·7705	·0123	·0112
118	"	64 44·19	46 29·80	94	·7645	·0088	·0056	·7557	·7589	·7589	·0032	·0000
119	St. Pierre	64 45·30	46 31·19	99	·7665	·0093	·0059	·7572	·7606	·7573	·0001	− ·0033
120	Ste. Anne de Kent	64 46·32	46 32·80	82	·7690	·0077	·0049	·7613	·7641	·7556	− ·0057	− ·0085

Table I. Principal Facts for Gravity Stations—*Continued*

Station No.	Station Name	Longitude	Latitude	Elevation	Theoretical gravity	Corrections: Elevation	Corrections: Bouguer	Computed gravity: Free air	Computed gravity: Bouguer	Observed gravity	Gravity anomalies: Free air	Gravity anomalies: Bouguer
		° ′	° °	Feet	γ_0							
121	(Ste. Anne)	64 47·60	46 34·67	36	980·7718	−0·0034	−0·0022	980·7684	980·7696	980·7555	−0·0129	−0·0141
122	(E. Galloway)	64 48·90	46 36·62	108	·7747	·0102	·0065	·7645	·7682	·7479	− ·0166	− ·0203
123	(Rexton)	64 51·04	46 38·33	26	·7773	·0024	·0016	·7749	·7757	·7593	− ·0156	− ·0164
124	Richibucto	64 52·30	46 40·31	17	·7802	·0016	·0010	·7786	·7792	·7660	− ·0126	− ·0132
125	(Richibucto)	64 52·54	46 41·88	11	·7826	·0010	·0007	·7816	·7819	·7697	− ·0119	− ·0122
126	"	64 54·89	46 42·53	25	·7836	·0024	·0015	·7812	·7821	·7739	− ·0073	− ·0082
127	(St. Louis de Kent)	64 56·99	46 43·33	42	·7848	·0040	·0025	·7808	·7823	·7789	− ·0019	− ·0034
128	Upper Baie du Viu	65 11·90	46 54·36	179	·8014	·0168	·0107	·7846	·7907	·7834	− ·0012	− ·0073
129	(St. Louis de Kent)	64 59·28	46 44·80	74	·7870	·0070	·0044	·7800	·7826	·7824	·0024	− ·0002
130	(Kouchibouguac)	65 01·10	46 45·98	134	·7888	·0126	·0080	·7762	·7808	·7801	·0039	− ·0007
131	Kouchibouguac	65 03·20	46 47·31	75	980·7908	− ·0071	−0·0045	980·7837	980·7863	980·7854	0·0017	−0·0009
132	(Kouchibouguac)	65 04·30	46 48·64	85	·7928	·0080	·0051	·7848	·7877	·7854	·0006	− ·0023
133	(Laketon)	65 05·89	46 49·95	130	·7947	·0122	·0078	·7825	·7869	·7825	·0000	− ·0044
134	Laketon	65 07·60	46 51·23	190	·7967	·0179	·0114	·7788	·7853	·7767	− ·0021	− ·0086
135	(Laketon)	65 09·17	46 52·59	183	·7987	·0172	·0110	·7815	·7877	·7771	− ·0044	− ·0106
136	(Upper Baie du Viu)	65 10·20	46 53·33	116	·7998	·0109	·0070	·7889	·7928	·7829	− ·0060	− ·0099
137	" "	65 13·30	46 55·02	160	·8023	·0150	·0096	·7873	·7927	·7882	·0009	− ·0045
138	Redmondville	65 14·60	46 55·64	141	·8033	·0133	·0085	·7900	·7948	·7943	·0043	− ·0005
139	(Redmondville)	65 16·88	46 56·78	105	·8050	·0099	·0063	·7951	·7987	·8038	·0087	·0051
140	(Black River)	65 19·28	46 57·90	84	·8067	·0079	·0050	·7988	·8017	·8102	·0114	·0085
141	(Ferry Road Corner)	65 28·1	47 03·0	55	980·8143	− ·0052	−0·0033	980·8091	980·8110	980·8144	0·0053	0·0034
142	(Newcastle Bridge)	65 32·77	47 00·01	45	·8098	·0042	·0027	·8056	·8071	·8098	·0042	·0027
143	(Black River)	65 19·49	46 58·00	77	·8068	·0072	·0046	·7996	·8022	·8108	·0112	·0086
144	" "	65 21·12	46 58·50	119	·8076	·0112	·0071	·7964	·8005	·8093	·0129	·0088
145	" "	65 23·10	46 59·13	115	·8085	·0108	·0069	·7977	·8016	·8128	·0151	·0112
146	(Chatham)	65 25·25	47 00·43	55	·8105	·0052	·0033	·8053	·8072	·8204	·0151	·0132
147	"	65 26·3	47·01·1	100	·8115	·0094	·0060	·8021	·8055	·8153	·0132	·0098
148	South Nelson Road	65 33·40	46 57·90	51	·8067	·0048	·0031	·8019	·8036	·8130	·0111	·0094
149	(Ferry Road Corner)	65 29·3	47 03·6	260	·8152	·0245	·0156	·7907	·7996	·8010	·0103	·0014
150	(Little Bartibog)	65 28·2	47 05·4	305	·8179	·0287	·0183	·7892	·7996	·8008	·0116	·0012
151	(Little Bartibog)	65 27·2	47 06·8	120	980·8200	−0·0113	−0·0072	980·8087	980·8128	980·8155	0·0068	0·0027
152	" "	65 26·0	47 08·4	260	·8224	·0245	·0156	·7979	·8068	·8084	·0105	·0016
153	(Tabusintac River)	65 25·8	47 20·4	268	·8404	·0252	·0161	·8152	·8243	·8088	− ·0064	− ·0155
154	Bathurst	65 39·00	47 37·20	20	·8656	·0019	·0012	·8637	·8644	·8352	− ·0285	− ·0292
155	East Bathurst	65 37·2	47 36·3	71	·8643	·0067	·0043	·8576	·8600	·8301	− ·0275	− ·0299
156	(East Bathurst)	65 36·0	47 35·2	172	·8627	·0162	·0103	·8465	·8524	·8220	− ·0245	− ·0304
157	" "	65 34·5	47 34·2	140	·8611	·0132	·0084	·8479	·8527	·8222	− ·0257	− ·0305

158	Bass River	65 33·1	47 33·0	125	·8593	·0118	·0075	·8475	·8518	·8273	− ·0202	− ·0245
159	(Bass River)	65 32·0	47 32·3	235	·8583	·0221	·0141	·8362	·8442	·8241	− ·0121	− ·0201
160	"	65 30·5	47 30·9	400	·8562	·0376	·0240	·8186	·8322	·8148	− ·0038	− ·0174
161	(Foy Brook)	65 29·8	47 29·4	480	980·8539	−0·0451	−0·0288	980·8088	980·8251	980·8065	−0·0023	−0·0186
162	" "	65 29·5	47 28·5	520	·8526	·0489	·0312	·8037	·8214	·8016	− ·0021	− ·0198
163	Foy Brook	65 28·9	47 27·0	507	·8503	·0477	·0304	·8026	·8199	·7952	− ·0074	− ·0247
164	Middle Brook	65 28·0	47 25·4	510	·8479	·0480	·0306	·7999	·8173	·7863	− ·0136	− ·0310
165	Pisiquit Brook	65 27·1	47 23·7	500	·8454	·0470	·0300	·7984	·8154	·7882	− ·0102	− ·0272
166	(Pisiquit Brook)	65 26·5	47 22·2	450	·8431	·0423	·0270	·8008	·8161	·7921	− ·0087	− ·0240
167	(Tabusintac River)	65 25·3	47 18·8	341	·8380	·0321	·0205	·8059	·8175	·8072	·0013	− ·0103
168	Eskedelloc Brook	65 24·5	47 17·2	285	·8356	·0268	·0171	·8088	·8185	·8134	·0046	− ·0051
169	(Eskedelloc Brook)	65 24·3	47 15·6	310	·8332	·0292	·0186	·8040	·8146	·8127	·0087	− ·0019
170	(Bartibog)	65 24·3	47 14·0	230	·8308	·0216	·0138	·8092	·8170	·8139	·0047	− ·0031
171	(Bartibog)	65 24·3	47 12·4	285	980·8284	−0·0268	−0·0171	980·8016	980·8113	980·8092	0·0076	−0·0021
172	Bartibog	65 24·4	47 11·2	123	·8266	·0116	·0074	·8150	·8192	·8194	·0044	·0002
173	(Bartibog)	65 25·1	47 09·6	225	·8242	·0212	·0135	·8030	·8107	·8121	·0091	·0014
174	Neguac	65 04·0	47 15·6	18	·8332	·0017	·0011	·8315	·8321	·8412	·0097	·0091
175	Tracadie	64 54·77	47 30·80	38	·8560	·0036	·0023	·8524	·8537	·8612	·0088	·0075
176	(Ferry Road Corner)	65 26·3	47 03·8	92	·8155	·0087	·0055	·8068	·8100	·8144	·0076	·0044
177	(Bartibog Bridge)	65 23·9	47 04·6	50	·8167	·0047	·0030	·8120	·8137	·8186	·0066	·0049
178	" "	65 21·6	47 05·5	60	·8181	·0056	·0036	·8125	·8145	·8197	·0072	·0052
179	" "	65 19·7	47 06·2	50	·8191	·0047	·0030	·8144	·8161	·8218	·0074	·0057
180	The Willows	65 17·3	47 07·0	37	·8203	·0035	·0022	·8168	·8181	·8246	·0078	·0065
181	(The Willows)	65 15·6	47 07·9	40	980·8217	−0·0038	−0·0024	980·8179	980·8193	980·8267	0·0088	·0074
182	Barryville	65 14·2	47 09·6	40	·8242	·0038	·0024	·8204	·8218	·8278	·0074	·0060
183	(New Jersey)	65 13·0	47 11·4	63	·8269	·0059	·0038	·8210	·8231	·8281	·0071	·0050
184	New Jersey	65 11·3	47 12·4	73	8284	·0069	·0044	·8215	·8240	·8308	·0093	·0068
185	(New Jersey)	65 09·7	47 13·4	78	·8299	·0073	·0047	·8226	·8252	·8338	·0112	·0086
186	(Rivière des Caches)	65 07·1	47 14·1	27	·8310	·0025	·0016	·8285	·8294	·8394	·0109	·0100
187	(Neguac)	65 02·9	47 16·5	27	·8346	·0025	·0016	·8321	·8330	·8431	·0110	·0101
188	(Covedell)	65 01·0	47 17·7	50	·8364	·0047	·0030	·8317	·8334	·8429	·0112	·0095
189	Covedell P.O.	65 00·4	47 19·2	23	·8386	·0022	·0014	·8364	·8372	·8479	·0115	·0107
190	(Tabusintac)	65 00·0	47 20·9	20	·8412	·0019	·0012	·8393	·8400	·8512	·0119	·0112
191	(Brantville)	64 58·1	47 22·2	48	980·8431	−0·0045	−0·0029	980·8386	980·8402	980·8470	0·0084	0·0068
192	"	64 56·8	47 23·5	35	·8451	·0033	·0021	·8418	·8430	·8456	·0038	·0026
193	(Legere)	64 56·39	47 24·75	45	·8470	·0042	·0027	·8428	·8443	·8465	·0037	·0022
194	(County Boundary)	64 55·40	47 26·30	28	·8493	·0026	·0017	·8467	·8476	·8498	·0031	·0022
195	(Sheila bridge)	64 54·59	47 27·90	12	·8517	·0011	·0007	·8506	·8510	·8532	·0026	·0022
196	(Sheila)	64 55·22	47 29·24	14	·8537	·0013	·0008	·8524	·8529	·8570	·0046	·0041
197	(Tracadie)	64 54·95	47 32·17	13	·8581	·0012	·0008	·8569	·8573	·8696	·0127	·0123
198	Lozier settlement	64 56·02	47 33·77	40	·8605	·0038	·0024	·8567	·8581	·8709	·0142	·0128
199	(Lozier settlement)	64 55·04	47 35·26	70	·8627	·0066	·0042	·8561	·8585	·8709	·0148	·0124
200	Caraquet	64 57·97	47 47·35	88	·8808	·0083	·0053	·8725	·8755	·8735	·0010	− ·0020
201	(Six Roads)	64 53·19	47 36·30	63	980·8643	−0·0059	−0·0038	980·8584	980·8605	980·8735	0·0151	0·0130
202	"	64 52·18	47 37·96	8	·8668	·0008	·0005	·8660	·8663	·8792	·0132	·0129

TABLE I. PRINCIPAL FACTS FOR GRAVITY STATIONS—*Continued*

Station		Longitude	Latitude	Elevation	Theoretical gravity	Corrections		Computed gravity		Observed gravity	Gravity anomalies	
No.	Name					Elevation	Bouguer	Free air	Bouguer		Free air	Bouguer
		° ′	° ′	Feet	γ_0							
203	(Pokemouche)	64 52·55	47 39·78	18	·8695	·0017	·0011	·8678	·8684	·8784	·0106	·0100
204	Upper Pokemouche	64 52·71	47 41·18	50	·8716	·0047	·0030	·8669	·8686	·8756	·0087	·0070
205	(Blanchard settlement)	64 53·45	47 42·57	50	·8737	·0047	·0030	·8690	·8707	·8765	·0075	·0058
206	" "	64 54·58	47 44·29	35	·8763	·0033	·0021	·8730	·8742	·8790	·0060	·0048
207	(Caraquet)	64 55·33	47 45·65	50	·8783	·0047	·0030	·8736	·8753	·8779	·0043	·0026
208	Bertrand	65 04·02	47 45·41	70	·8779	·0066	·0042	·8713	·8737	·8758	·0045	·0021
209	(Dugas)	65 07·78	47 49·43	30	·8840	·0028	·0018	·8812	·8822	·8753	−·0059	−·0069
210	Grand Anse	65 12·63	47 48·12	80	·8820	·0075	·0048	·8745	·8772	·8714	−·0031	−·0058
211	New Bandon	65 17·5	47 46·0	146	980·8788	−0·0137	−0·0088	980·8651	980·8700	980·8672	0·0021	−0·0028
212	Clifton	65 22·5	47 43·7	119	·8754	·0112	·0071	·8642	·8683	·8663	·0021	−·0020
213	Janeville	65 26·4	47 41·3	65	·8718	·0061	·0039	·8657	·8679	·8702	·0045	·0023
214	Salmon Beach	65 32·1	47 39·8	30	·8695	·0028	·0018	·8667	·8677	·8577	−·0090	−·0100
215	Reynolds	65 32·0	46 56·75	120	·8049	·0113	·0072	·7936	·7977	·8045	·0109	·0068
216	(Reynolds)	65 31·10	46 55·11	165	·8025	·0115	·0099	·7910	·7926	·7957	·0047	·0031
217	Barnaby River	65 30·79	46 53·30	80	·7998	·0075	·0048	·7923	·7950	·7924	·0001	−·0026
218	(Wiseman Brook)	65 28·35	46 52·30	80	·7983	·0075	·0048	·7908	·7935	·7920	·0012	−·0015
219	Wiseman Brook	65 26·44	46 51·70	80	·7974	·0075	·0048	·7899	·7926	·7913	·0014	−·0013
220	(Wiseman Brook)	65 26·88	46 49·96	120	·7947	·0113	·0072	·7834	·7875	·7832	−·0002	−·0043
221	(Collette)	65 27·22	46 48·24	125	·7922	·0118	·0075	·7804	·7847	·7769	−0·0035	−0·0078
222	Collette	65 27·71	46 46·80	170	·7900	·0160	·0102	·7740	·7798	·7704	−·0036	−·0094
223	(North Rogersville)	65 26·80	46 45·20	270	·7876	·0254	·0162	·7622	·7714	·7618	−·0004	−·0096
224	Rogersville	65 25·70	46 43·94	315	·7857	·0296	·0189	·7561	·7668	·7574	·0013	−·0094
225	(Rogersville)	65 24·80	46 42·80	280	·7840	·0263	·0168	·7577	·7672	·7572	−·0005	−·0100
226	(Mortimer)	65 15·29	46 29·34	155	·7638	·0146	·0093	·7492	·7545	·7445	−·0047	−·0100
227	Acadieville	65 23·70	46 41·52	310	·7821	·0292	·0186	·7529	·7635	·7526	−·0003	−·0109
228	Belliveau	65 22·70	46 39·99	273	·7798	·0257	·0164	·7541	·7634	·7514	−·0027	−·0120
229	(Belliveau)	65 21·90	46 38·33	275	·7773	·0259	·0165	·7514	·7608	·7500	−·0014	−·0108
230	(Kent Junction)	65 21·25	46 36·65	260	·7748	·0245	·0156	·7503	·7592	·7498	−·0005	−·0094
231	Kent Junction	65 20·25	46 34·91	265	980·7721	−0·0249	−0·0159	980·7472	980·7562	980·7473	0·0001	−0·0089
232	(Kent Junction)	65 19·36	46 33·39	227	·7699	·0214	·0136	·7485	·7563	·7470	−·0015	−·0093
233	(Mortimer)	65 18·00	46 32·00	228	·7678	·0214	·0137	·7464	·7541	·7445	−·0019	−·0096
234	"	65 16·90	46 30·71	205	·7658	·0193	·0123	·7465	·7535	·7443	−·0022	−·0092
235	(Harcourt)	65 14·40	46 27·77	167	·7614	·0157	·0100	·7457	·7514	·7389	−·0068	−·0125
236	(Grangeville)	65 13·37	46 26·53	173	·7595	·0163	·0104	·7432	·7491	·7343	−·0089	−·0148
237	Grangeville	65 12·32	46 25·25	215	·7576	·0202	·0129	·7374	·7447	·7267	−·0107	−·0180
238	Adamsville	65 11·15	46 23·88	297	·7556	·0279	·0178	·7277	·7378	·7213	−·0064	−·0165
239	(Coal Branch station)	65 10·10	46 22·58	235	·7536	·0221	·0141	·7315	·7395	·7325	·0010	−·0070
240	Coal Branch station	65 09·00	46 21·43	208	·7519	·0196	·0125	·7323	·7394	·7396	·0073	·0002

241	(Birch siding)	65 08·10	46 20·18	273	980·7500	−0·0257	−0·0164	980·7243	980·7336	980·7350	0·0107	0·0014
242	Birch siding	65 07·00	46 18·98	300	·7482	·0282	·0180	·7200	·7302	·7308	·0108	·0006
243	(Hebert siding)	65 06·00	46 17·77	268	·7464	·0252	·0161	·7212	·7303	·7309	·0097	·0006
244	Hebert siding	65 05·03	46 16·54	282	·7445	·0265	·0169	·7180	·7276	·7283	·0103	·0007
245	Canaan Station	65 03·70	46 14·94	258	·7421	·0243	·0155	·7178	·7266	·7220	·0042	− ·0046
246	(Gallagher)	65 01·00	46 13·95	278	·7406	·0261	·0167	·7145	·7239	·7162	·0017	− ·0077
247	Gallagher	64 59·80	46 12·65	315	·7387	·0296	·0189	·7091	·7198	·7151	·0060	− ·0047
248	(Gallagher)	64 58·34	46 11·38	280	·7368	·0263	·0168	·7105	·7200	·7156	·0051	− ·0044
249	(Indian Mountain)	64 56·89	46 10·52	330	·7355	·0310	·0198	·7045	·7157	·7132	·0087	− ·0025
250	Indian Mountain	64 56·17	46 09·69	472	·7342	·0444	·0283	·6898	·7059	·7068	·0170	·0009
251	(Lutz Mountain)	64 55·32	46 08·73	410	·7328	·0386	·0246	·6942	·7082	·7114	·0172	·0032
252	Lutz Mountain	64 54·07	46 08·22	410	·7320	·0386	·0246	·6934	·7074	·7105	·0171	·0031
253	(Stiles Village)	64 52·76	46 09·84	585	·7345	·0550	·0351	·6795	·6994	·7035	·0240	·0041
254	(Magnetic Hill)	64 53·00	46 07·85	190	·7315	·0179	·0114	·7136	·7201	·7243	·0107	·0042
255	Hildegard	64 51·34	46 07·36	150	·7307	·0141	·0090	·7166	·7217	·7276	·0110	·0059
256	(Hildegard)	64 50·14	46 06·66	110	·7297	·0103	·0066	·7194	·7231	·7296	·0102	·0065
257	(Moncton)	64 48·72	46 06·05	115	·7288	·0108	·0069	·7180	·7219	·7285	·0105	·0066
258	(Cocagne)	64 37·78	46 21·10	56	·7514	·0053	·0034	·7461	·7480	·7561	·0100	·0081
259	Cocagne	64 36·80	46 19·87	42	·7495	·0040	·0025	·7455	·7470	·7577	·0122	·0107
260	St. Marcel	64 34·98	46 19·48	55	·7489	·0052	·0033	·7437	·7456	·7577	·0140	·0121
261	(St. Marcel)	64 34·29	46 18·78	81	980·7479	·0076	0·0049	980·7403	980·7430	980·7554	0·0151	0·0124
262	Grandigue	64 33·76	46 18·00	51	·7467	·0048	·0031	·7419	·7436	·7553	·0134	·0117
263	(Gilberts Corner)	64 34·20	46 14·40	19	·7413	·0018	·0011	·7395	·7402	·7524	·0129	·0122
264	Fox Creek	64 42·31	46 03·77	26	·7253	·0024	·0016	·7229	·7237	·7313	·0084	·0076
265	Upper Dover	64 41·48	46 02·34	113	·7232	·0106	·0068	·7126	·7164	·7244	·0118	·0080
266	(Upper Dover)	64 41·20	46 01·25	47	·7215	·0044	·0028	·7171	·7187	·7262	·0091	·0075
267	Dover	64 41·47	46 00·19	44	·7199	·0041	·0026	·7158	·7173	·7237	·0079	·0064
268	(Dover)	64 41·19	45 59·58	30	·7190	·0028	·0018	·7162	·7172	·7232	·0070	·0060
269	(Gautreau Village)	64 40·11	45 59·24	34	·7185	·0032	·0020	·7153	·7165	·7218	·0065	·0053
270	Gautreau Village	64 39·02	45 58·30	138	·7171	·0130	·0083	·7041	·7088	·7107	·0066	·0019
271	(Pré d'en haut)	64 38·55	45 57·87	27	980·7165	−0·0025	−0·0016	980·7140	980·7149	980·7156	0·0016	0·0007
272	Pré d'en haut	64 38·02	45 57·70	129	·7162	·0121	·0077	·7041	·7085	·7083	·0042	− ·0002
273	(Pré d'en haut)	64 37·88	45 57·28	30	·7156	·0028	·0018	·7128	·7138	·7114	− ·0014	− ·0024
274	" "	64 37·70	45 56·89	107	·7150	·0101	·0064	·7049	·7086	·7056	·0007	− ·0030
275	" "	64 37·25	45 56·52	82	·7144	·0077	·0049	·7067	·7095	·7084	·0017	− ·0011
276	(Boudreau Village)	64 36·66	45 55·95	40	·7136	·0038	·0024	·7098	·7112	·7119	·0021	·0007
277	Boudreau Village	64 36·33	45 55·05	98	·7122	·0092	·0059	·7030	·7063	·7067	·0037	·0004
278	(Beaumont)	64 35·55	45 54·07	24	·7107	·0023	·0014	·7084	·7093	·7121	·0037	·0028
279	Beaumont	64 35·21	45 53·31	30	·7096	·0028	·0018	·7068	·7078	·7158	·0090	·0080
280	Salisbury	65 02·32	46 01·66	77	·7222	·0072	·0046	·7150	·7176	·7227	·0077	·0051
281	(Sussex Corner)	65 27·48	45 43·43	133	980·6947	−0·0125	−0·0080	980·6822	980·6867	980·6923	0·0101	0·0056
282	(Penobsquis)	65 25·57	45 44·96	135	·6970	·0127	·0081	·6843	·6889	·6928	·0085	·0039
283	"	65 23·80	45 46·04	147	·6987	·0138	·0088	·6849	·6899	·6921	·0072	·0022
284	(Sussex Corner)	65 26·80	45 44·35	80	·6961	·0075	·0048	·6886	·6913	·6946	·0060	·0033
285	Penobsquis	65 22·42	45 46·58	100	·6995	·0094	·0060	·6901	·6935	·6953	·0052	·0018
286	(Penobsquis)	65 20·58	45 47·15	185	·7003	·0174	·0111	·6829	·6892	·6927	·0098	·0035
287	(Five Points)	65 19·17	45 47·79	171	·7013	·0161	·0103	·6852	·6910	·6955	·0103	·0045

TABLE I. PRINCIPAL FACTS FOR GRAVITY STATIONS—*Continued*

Station No.	Station Name	Longitude	Latitude	Elevation	Theoretical gravity	Corrections: Elevation	Corrections: Bouguer	Computed gravity: Free air	Computed gravity: Bouguer	Observed gravity	Gravity anomalies: Free air	Gravity anomalies: Bouguer
		° ′	° ′	Feet	γ_0							
288	Five Points	65 17·80	45 49·18	195	·7034	·0183	·0117	·6851	·6917	·6965	·0114	·0048
289	McKinnon	64 49·98	46 04·27	63	·7261	·0059	·0038	·7202	·7223	·7304	·0102	·0081
290	(Jones)	64 52·41	46 03·37	67	·7247	·0063	·0040	·7184	·7207	·7267	·0083	·0060
291	Jones	64 54·80	46 03·82	105	980·7254	−0·0099	−0·0063	980·7155	980·7191	980·7239	0·0084	0·0048
292	(Boundary Creek)	64 57·45	46 03·40	65	·7248	·0061	·0039	·7187	·7209	·7253	·0066	·0044
293	" "	65 00·09	46 03·11	96	·7243	·0090	·0058	·7153	·7185	·7227	·0074	·0042
294	(Salisbury)	65 04·45	46 00·45	54	·7203	·0051	·0032	·7152	·7171	·7218	·0066	·0047
295	River Glade	65 07·08	45 59·26	89	·7185	·0084	·0053	·7101	·7132	·7179	·0078	·0047
296	(River Glade)	65 09·11	45 57·89	107	·7165	·0101	·0064	·7064	·7101	·7153	·0089	·0052
297	(Petitcodiac)	65 12·00	45 54·79	97	·7118	·0091	·0058	·7027	·7060	·7109	·0082	·0049
298	"	65 10·82	45 56·24	83	·7140	·0078	·0050	·7062	·7090	·7141	·0079	·0051
299	(Anagance Corner)	65 13·52	45 53·36	132	·7097	·0124	·0079	·6973	·7018	·7058	·0085	·0040
300	(Five Points)	65 16·72	45 50·61	150	·7055	·0141	·0090	·6914	·6965	·7011	·0097	·0046
301	(Springdale)	65 20·22	45 46·97	167	980·7001	−0·0157	−0·0100	980·6844	980·6901	980·6935	0·0091	0·0034
302	"	65 19·73	45 46·76	210	·6997	·0198	·0126	·6799	·6871	·6944	·0145	·0073
303	Springdale	65 19·34	45 46·37	223	·6992	·0210	·0134	·6782	·6858	·6972	·0190	·0114
304	(Springdale)	65 18·72	45 45·72	267	·6982	·0251	·0160	·6731	·6822	·6974	·0243	·0152
305	(South Branch)	65 18·00	45 44·98	310	·6971	·0292	·0186	·6679	·6785	·6995	·0316	·0210
306	(Mechanics settlement)	65 14·10	45 43·87	950	·6954	·0894	·0570	·6060	·6384	·6662	·0602	·0278
307	" "	65 11·70	45 43·75	1,000	·6952	·0941	·0600	·6011	·6352	·6599	·0588	·0247
308	(Penobsquis)	65 20·90	45 47·56	170	·7009	·0160	·0102	·6849	·6907	·6962	·0113	·0055
309	Portage Vale	65 13·61	45 50·46	255	·7053	·0240	·0153	·6813	·6900	·6937	·0124	·0037
310	Sussex	65 30·08	45 43·22	70	·6944	·0066	·0042	·6878	·6902	·6939	·0061	·0037
311	(Sussex)	65 32·27	45 43·73	67	980·6952	−0·0063	−0·0040	980·6889	980·6912	980·6976	0·0087	0·0064
312	"	65 34·10	45 44·67	225	·6966	·0212	·0135	·6754	·6831	·6898	·0144	·0067
313	(Millstream)	65 34·6	45 45·6	252	·6980	·0237	·0151	·6743	·6829	·6872	·0129	·0043
314	Millstream	54 35·8	45 46·7	122	·6997	·0115	·0073	·6882	·6924	·6963	·0081	·0039
315	(Millstream)	65 38·2	45 48·2	233	·7019	·0219	·0140	·6800	·6879	·6890	·0090	·0011
316	(Fenwick)	65 40·0	45 48·9	600	·7030	·0564	·0360	·6466	·6670	·6731	·0265	·0061
317	Cole's Island	65 48·6	45 55·5	97	·7129	·0091	·0058	·7038	·7071	·7006	− ·0032	− ·0065
318	Sussex	65 31·1	45 43·48	68	·6948	·0064	·0041	·6884	·6907	·6955	·0071	·0048
319	(Fenwick)	65 42·2	45 49·9	492	·7045	·0463	·0295	·6582	·6750	·6812	·0230	·0062
320	"	65 44·0	45 51·0	375	·7061	·0353	·0225	·6708	·6836	·6853	·0145	·0017
321	(Long Creek)	65 45·6	45 52·3	125	980·7081	−0·0118	−0·0075	980·6963	980·7006	980·7004	0·0041	−0·0002
322	Long Creek	65 46·4	45 52·6	25	·7085	·0024	·0015	·7061	·7070	·7055	− ·0006	−0·0015
323	(Long Creek)	54 47·3	45 53·8	105	·7103	·0099	·0063	·7004	·7040	·7004	·0000	− ·0036
324	Young Cove Road	65 51·5	45 56·7	199	·7147	·0187	·0119	·6960	·7028	·6941	− ·0019	− ·0087

325	(Young Cove Road)	65 52·8	45 56·5	202	·7143	·0190	·0121	·6953	·7022	·6944	— ·0009	— ·0078
326	(Young Cove)	65 54·5	45 56·6	153	·7145	·0144	·0092	·7001	·7053	·6981	— ·0020	— ·0072
327	Young Cove	65 56·0	45 56·9	57	·7150	·0054	·0034	·7096	·7116	·7048	— ·0048	— ·0068
328	(Young Cove)	65 55·3	45 58·4	145	·7173	·0136	·0087	·7037	·7086	·7031	— ·0006	— ·0055
329	(Granville)	65 54·40	46 00·10	61	·7198	·0057	·0037	·7141	·7161	·7106	— ·0035	— ·0055
330	Granville	65 52·90	46 01·82	53	·7224	·0050	·0032	·7174	·7192	·7136	— ·0038	— ·0056
331	(Chipman)	65 53·50	46 10·90	45	980·7360	—0·0042	—0·0027	980·7318	980·7333	980·7133	—0·0185	—0·0200
332	Cumberland Bay	65 52·50	46 02·38	36	·7232	·0034	·0022	·7198	·7210	·7156	— ·0042	— ·0054
333	The Range	65 54·06	46 04·00	47	·7257	·0044	·0028	·7213	·7229	·7140	— ·0073	— ·0089
334	Coal Creek	65 53·00	46 05·95	64	·7286	·0060	·0038	·7226	·7248	·7122	— ·0104	— ·0126
335	Wilson Brook	65 53·37	46 07·67	62	·7312	·0058	·0037	·7254	·7275	·7085	— ·0169	— ·0190
336	(Chipman)	65 53·62	46 09·34	70	·7337	·0066	·0042	·7271	·7295	·7076	— ·0195	— ·0219
337	"	65 56·30	46 11·98	123	·7377	·0116	·0074	·7261	·7303	·7117	— ·0144	— ·0186
338	"	65 59·31	46 11 16	214	·7364	·0201	·0128	·7163	·7236	·7041	— ·0122	— ·0195
339	(Hardwood Ridge)	66 01·61	46 10·97	319	·7362	·0300	·0191	·7062	·7171	·6967	— ·0095	— ·0204
340	(Albright)	66 11·42	46 01·34	206	·7217	·0194	·0124	·7023	·7093	·6964	— ·0059	— ·0129
341	(Hardwood Ridge)	66 02·30	46 09·28	313	980·7336	—0·0294	—0·0188	980·7042	980·7148	980·6982	— ·0060	—0·0166
342	(Minto)	66 03·00	46 06·50	244	·7294	·0230	·0146	·7064	·7148	·7034	— ·0030	— ·0114
343	"	66 03·40	46 04·45	102	·7263	·0096	·0061	·7167	·7202	·7117	— ·0050	— ·0085
344	New Zion	66 05·70	46 03·55	201	·7250	·0189	·0121	·7061	·7129	·7045	— ·0016	— ·0084
345	Howard Brook	66 08·05	46 02·60	223	·7236	·0210	·0134	·7026	·7102	·6985	— ·0041	— ·0117
346	(Ripples)	66 12·10	45 59·29	210	·7186	·0198	·0126	·6988	·7060	·6931	— ·0057	— ·0129
347	Maugerville	66 26·72	45 52·32	23	·7081	·0022	·0014	·7059	·7067	·6940	— ·0119	— ·0127
348	(Lakeville)	66 15·52	45 55·31	95	·7126	·0089	·0057	·7037	·7069	·6964	— ·0073	— ·0105
349	(Ripples)	66 13·76	45 57·40	85	·7157	·0080	·0051	·7077	·7106	·6989	— ·0088	— ·0117
350	Sheffield	66 17·90	45 53·36	20	·7097	·0019	·0012	·7078	·7085	·6980	— ·0098	— ·0105
351	Sheffield Ch. Monument	66 21·22	45 53·17	20	980·7094	—0·0019	—0·0012	980·7075	980·7082	980·6980	—0·0095	—0·0102
352	(Maugerville)	66 24·19	45 53·10	25	·7093	·0024	·0015	·7069	·7078	·6959	— ·0110	— ·0119
353	"	66 29·16	45 52·65	20	·7086	·0019	·0012	·7067	·7074	·6922	— ·0145	— ·0152
354	Upper Maugerville	66 31·80	45 53·44	30	·7098	·0028	·0018	·7070	·7080	·6924	— ·0146	— ·0156
355	(South Devon)	66 35·85	45 55·61	27	·7131	·0025	·0016	·7106	·7115	·6939	— ·0167	— ·0176
356	(Barker)	66 33·70	45 54·68	30	·7117	·0028	·0018	·7089	·7099	·6937	— ·0152	— ·0162
357	(South Devon)	66 36·38	45 57·97	50	·7166	·0047	·0030	·7119	·7136	·6949	— ·0170	— ·0187
358	Penniac bridge	66 34·7	46 00·6	43	·7206	·0040	·0026	·7166	·7180	·7011	— ·0155	— ·0169
359	Marysville	66 35·55	45 58·73	50	·7177	·0047	·0030	·7130	·7147	·6972	— ·0158	— ·0175
360	Covered Bridge	66 37·0	46 14·3	136	·7412	·0128	·0082	·7284	·7330	·7173	— ·0111	— ·0157
361	Taymouth	66 36·2	46 11·8	142	980·7374	—0·0134	—0·0085	980·7240	980·7289	980·7134	—0·0106	—0·0155
362	Durham	66 36·6	46 08·2	78	·7320	·0073	·0047	·7247	·7273	·7141	— ·0106	— ·0132
363	(Peniac)	66 35·4	46 04·0	73	·7257	·0069	·0044	·7188	·7213	·7093	— ·0095	— ·0120
364	Peniac	66 34·5	46 02·0	60	·7227	·0056	·0036	·7171	·7191	·7051	— ·0120	— ·0140
365	(Nashwaak)	66 36·8	46 04·6	65	·7266	·0061	·0039	·7205	·7227	·7106	— ·0099	— ·0121
366	"	66 37·1	46 06·6	72	·7296	·0068	·0043	·7228	·7253	·7132	— ·0096	— ·0121
367	Boiestown	66 24·8	46 27·5	236	·7610	·0222	·0142	·7388	·7468	·7375	— ·0013	— ·0093
368	(Clearwater)	66 30·8	46 22·8	502	·7539	·0472	·0301	·7067	·7238	·7139	·0072	— ·0099
369	Cross creek	66 35·1	46 18·7	333	·7478	·0313	·0200	·7165	·7278	·7092	— ·0073	— ·0186

TABLE I. PRINCIPAL FACTS FOR GRAVITY STATIONS—*Continued*

Station No.	Station Name	Longitude	Latitude	Elevation	Theoretical gravity	Corrections: Elevation	Corrections: Bouguer	Computed gravity: Free air	Computed gravity: Bouguer	Observed gravity	Gravity anomalies: Free air	Gravity anomalies: Bouguer
		° ′	° ′	Feet	γ_0							
370	(McGivney)	66 33·4	46 21·4	552	·7518	·0519	·0331	·699$_6$	·7187	·7060	·0061	− ·0127
371	(Astle)	66 28·8	46 25·1	512	980·7574	−0·0482	−0·0307	980·7092	980·7267	980·7162	0·0070	−0·0105
372	Doaktown	66 07·4	46 33·5	124	·7700	·0117	·0074	·7583	·7626	·7435	− ·0148	− ·0191
373	Ludlow	66 20·5	46 29·6	190	·7642	·0179	·0114	·7463	·7528	·7435	− ·0028	− ·0093
374	McNamee	66 16·7	46 30·6	140	·7657	·0132	·0084	·7525	·7573	·7493	− ·0032	− ·0080
375	Carroll	66 13·9	46 31·4	165	·7669	·0155	·0099	·7514	·7570	·7528	·0014	− ·0042
376	Blissfield	66 04·2	46 34·8	251	·7720	·0236	·0151	·7484	·7569	·7435	− ·0049	− ·0134
377	Blackville	65 49·51	46 43·69	90	·7853	·0085	·0054	·7768	·7799	·7873	·0105	·0074
378	Upper Blackville	65 51·90	46 38·91	232	·7781	·0218	·0139	·7563	·7642	·7824	·0261	·0182
379	Weaver	65 58·01	46 37·04	344	·7753	·0324	·0206	·7429	·7547	·7534	·0105	− ·0013
380	Renous	65 47·60	46 48·92	71	·7932	·0067	·0043	·7865	·7889	·7901	·0036	·0012
381	Park	65 43·55	46 51·03	87	980·7964	−0·0082	−0·0052	980·7882	980·7912	980·7907	0·0025	−0·0005
382	Parker	65 39·20	46 53·32	55	·7998	·0052	·0033	·7946	·7965	·7933	− ·0013	− ·0032
383	Lower Derby	65 37·17	46 55·90	68	·8037	·0064	·0041	·7973	·7996	·8025	·0052	·0029
384	(Pré d'en haut)	64 37·50	45 57·75	205	·7163	·0193	·0123	·6970	·7040	·7039	·0069	− ·0001
385	(Belliveau Village)	64 36·00	45 58·03	180	·7167	·0169	·0108	·6998	·7059	·7075	·0077	·0016
386	" "	64 36·07	45 57·32	215	·7156	·0202	·0129	·6954	·7027	·7028	·0074	·0001
387	Belliveau Village	64 36·25	45 56·91	117	·7150	·0110	·0070	·7040	·7080	·7075	·0035	− ·0005
388	St. Joseph	64 34·00	45 58·60	72	·7176	·0068	·0043	·7108	·7133	·7148	·0040	·0015
389	(Salisbury)	65 10·91	46 00·84	273	·7209	·0257	·0164	·6952	·7045	·7084	·0132	·0039
390	"	65 11·30	46 01·52	296	·7219	·0278	·0178	·6941	·7041	·7056	·0115	·0015
391	(Salisbury)	65 11·49	46 02·33	350	980·7232	−0·0329	−0·0210	980·6903	980·7022	980·7009	0·0106	−0·0013
392	"	65 12·23	46 02·85	357	·7239	·0336	·0214	·6903	·7025	·7012	·0109	− ·0013
393	"	65 12·18	46 04·04	296	·7257	·0278	·0178	·6979	·7079	·7076	·0097	− ·0003
394	"	65 10·28	46 04·06	425	·7258	·0400	·0255	·6858	·7003	·7002	·0144	− ·0001
395	"	65 10·27	46 03·27	365	·7246	·0343	·0219	·6903	·7027	·7018	·0115	− ·0009
396	"	65 09·58	46 02·70	327	·7237	·0308	·0196	·6929	·7041	·7039	·0110	− ·0002
397	"	65 04·10	46 03·40	225	·7248	·0212	·0135	·7036	·7113	·7143	·0107	·0030
398	"	65 05·83	46 03·84	177	·7254	·0166	·0106	·7088	·7148	·7143	·0055	− ·0005
399	"	65 06·06	46 05·00	272	·7272	·0256	·0163	·7016	·7109	·7128	·0112	·0019
400	"	65 06·40	46 05·84	355	·7284	·0334	·0213	·6950	·7071	·7069	·0119	− ·0002
401	(Salisbury)	65 07·00	46 06·95	230	980·7301	−0·0216	−0·0138	980·7085	980·7163	890·7141	0·0056	−0·0022
402	"	65 08·93	46 03·97	320	·7256	·0301	·0192	·6955	·7064	·7060	·0105	− ·0004
403	"	65 06·50	46 01·68	194	·7222	·0182	·0116	·7040	·7106	·7128	·0088	·0022
404	(Anagance)	65 16·23	45 52·75	180	·7088	·0169	·0108	·6919	·6980	·7025	·0106	·0045
405	(Corn Hill East)	65 17·15	45 53·64	447	·7101	·0420	·0268	·6681	·6833	·6875	·0194	·0042
406	"	65 17·37	45 54·11	255	·7108	·0240	·0153	·6868	·6955	·7003	·0135	·0048
407	"	65 17·60	45 54·67	210	·7116	·0198	·0126	·6918	·6990	·7018	·0100	·0028

408	"	65 17·80	45 55·06	373	·7122	·0351	·0224	·6771	·6898	·6926	·0155	·0028
409	"	65 18·20	45 55·48	432	·7129	·0406	·0259	·6723	·6870	·6898	·0175	·0028
410	"	65 18·49	45 56·21	278	·7140	·0261	·0167	·6879	·6973	·7007	·0128	·0034
411	Havelock	65 19·05	45 59·88	295	980·7195	−0·0277	−0·0177	980·6918	980·7018	980·6999	0·0081	−0·0019
412	(Corn Hill East)	65 18·76	45 56·96	470	·7151	·0442	·0282	·6709	·6869	·6882	·0173	·0013
413	" "	65 19·38	45 54·11	413	·7108	·0388	·0248	·6720	·6860	·6888	·0168	·0028
414	(Portage Vale)	65 13·84	45 51·20	543	·7064	·0511	·0326	·6553	·6738	·6770	·0217	·0032
415	(Corn Hill East)	65 19·04	45 53·36	540	·7097	·0508	·0324	·6589	·6773	·6817	·0228	·0044
416	" "	65 19·61	45 54·75	480	·7118	·0451	·0288	·6667	·6830	·6856	·0189	·0026
417	(Portage Vale)	65 13·50	45 50·60	280	·7055	·0263	·0168	·6792	·6887	·6926	·0134	·0039
418	Hammondvale	65 30·20	45 34·42	513	·6812	·0483	·0308	·6329	·6504	·6721	·0392	·0217
419	(Jeffry)	65 30·53	45 36·59	461	·6844	·0434	·0277	·6410	·6567	·6708	·0298	·0141
420	Jeffry	65 29·60	45 37·78	404	·6862	·0380	·0242	·6482	·6620	·6743	·0261	·0123
421	(Jeffry)	65 30·91	45 39·38	247	980·6886	−0·0232	−0·0148	980·6654	980·6738	980·6816	0·0162	0·0078
422	(Sussex)	65 30·80	45 41·31	175	·6915	·0165	·0105	·6750	·6810	·6860	·0110	·0050
423	(Sussex Corner), N.B.	65 28·80	45 42·32	108	·6931	·0102	·0065	·6829	·6866	·6914	·0085	·0048
424	Northport, N.S.	63 52·17	45 56·05	6	·7137	·0006	·0004	·7131	·7133	·7058	− ·0073	− ·0075
425	Pugwash	63 39·70	45 50·98	19	·7061	·0018	·0011	·7043	·7050	·7041	− ·0002	− ·0009
426	Wallace	63 28·44	45 48·86	11	·7029	·0010	·0007	·7019	·7022	·6930	− ·0089	− ·0092
427	Tatamagouche	63 17·08	45 42·53	16	·6934	·0015	·0010	·6919	·6924	·6983	·0064	·0059
428	River John	63 03·40	45 45·10	18	·6972	·0017	·0011	·6955	·6961	·6970	·0015	·0009
429	Caribou River	62 49·09	45 44·84	25	·6969	·0024	·0015	·6945	·6954	·7036	·0091	·0082
430	New Glasgow	62 38·83	45 35·10	31	·6822	·0029	·0019	·6793	·6803	·6886	·0093	·0083
431	French River	62 25·5	45 34·4	137	980·6811	−0·0129	−0·0082	980·6682	980·6729	980·6814	0·0132	0·0085
432	Barney River	62 15·3	45 36·3	205	·6840	·0193	·0123	·6647	·6717	·6877	·0230	·0160
433	James River	62 07·0	45 34·9	252	·6819	·0237	·0151	·6582	·6668	·6782	·0200	·0114
434	Antigonish	61 58·2	45 37·9	15	·6864	·0014	·0009	·6850	·6855	·6956	·0106	·0101
435	Heatherton	61 47·0	45 35·9	76	·6834	·0071	·0046	·6763	·6788	·6772	·0009	− ·0016
436	Tracadie	61 38·4	45 37·9	41	·6864	·0039	·0025	·6825	·6839	·6911	·0086	·0072
437	(Fivemile Lake)	61 32·9	45 31·7	469	·6771	·0441	·0281	·6330	·6490	·6516	·0186	·0026
438	Guysborough	61 30·0	45 23·9	7	·6654	·0007	·0004	·6647	·6650	·6629	− ·0018	− ·0021
439	Halfway Cove	61 22·4	45 20·8	6	·6607	·0006	·0004	·6601	·6603	·6559	− ·0042	− ·0044
440	Half Island Cove	61 11·3	45 21·1	96	·6611	·0090	·0058	·6521	·6553	·6515	− ·0006	− ·0038
441	Canso	60 59·9	45 20·5	6	980·6602	−0·0006	−0·0004	980·6596	980·6598	980·6590	−0·0006	−0·0008
442	Whitehead	61 11·3	45 14·7	8	·6515	·0008	·0005	·6507	·6510	·6497	− ·0010	− ·0013
443	Goldboro'	61 39·2	45 11·1	28	·6461	·0026	·0017	·6435	·6444	·6416	− ·0019	− ·0028
444	Melrose	62 02·4	45 15·8	186	·6532	·0175	·0112	·6357	·6420	·6476	·0119	·0056
445	Sherbrooke	61 58·5	45 09·0	33	·6429	·0031	·0020	·6398	·6409	·6414	·0016	·0005
446	Liscomb	61 59·5	45 01·9	13	·6323	·0012	·0008	·6311	·6315	·6335	·0024	·0020
447	Moose River	62 15·2	44 58·4	13	·6270	·0012	·0008	·6258	·6262	·6314	·0056	·0052
448	Sheet Harbour	62 32·7	44 55·4	8	·6225	·0008	·0005	·6217	·6220	·6243	·0026	·0023
449	Tangier	62 42·5	44 48·3	13	·6118	·0012	·0008	·6106	·6110	·6027	− ·0079	− ·0083
450	Ship Harbour	62 53·1	44 49·1	23	·6130	·0022	·0014	·6108	·6116	·5893	− ·0215	− ·0223
451	Musquodoboit Harbour	63 09·05	44 47·20	56	980·6101	−0·0053	−0·0034	980·6048	980·6067	980·5840	−0·0208	−0·0227
452	Porter's Lake	63 18·51	44 44·30	13	·6058	·0012	·0008	·6046	·6050	·5837	− ·0209	− ·0213
453	Dartmouth	63 34·26	44 39·90	13	·5992	·0012	·0008	·5980	·5984	·5861	− ·0119	− ·0123

TABLE I. PRINCIPAL FACTS FOR GRAVITY STATIONS—*Continued*

Station No.	Station Name	Longitude	Latitude	Elevation	Theoretical gravity	Corrections: Elevation	Corrections: Bouguer	Computed gravity: Free air	Computed gravity: Bouguer	Observed gravity	Gravity anomalies: Free air	Gravity anomalies: Bouguer
		° ′	° ′	Feet	γ_0							
454	Waverley	63 36·22	44 46·83	74	·6096	·0070	·0044	·6026	·6052	·5863	− ·0163	− ·0189
455	Grand Lake	63 35·71	44 53·50	60	·6196	·0056	·0036	·6140	·6160	·6006	− ·0134	− ·0154
456	Elmsdale	63 30·33	44 58·00	51	·6264	·0048	·0031	·6216	·6233	·6150	− ·0066	− ·0083
457	Milford	63 26·2	45 02·3	55	·6329	·0052	·0033	·6277	·6296	·6245	− ·0032	− ·0051
458	Stewiacke	63 20·9	45 08·3	82	·6419	·0077	·0049	·6342	·6370	·6315	− ·0027	− ·0055
459	Brookfield	63 16·83	45 15·23	98	·6523	·0092	·0059	·6431	·6464	·6454	·0023	− ·0010
460	Truro	63 16·65	45 21·76	62	·6621	·0058	·0037	·6563	·6584	·6696	·0133	·0112
461	Glenholme	63 32·0	45 23·8	50	980·6652	−0·0047	−0·0030	980·6605	980·6622	980·6618	−0·0013	−0·0004
462	Upper Economy	63 50·3	45 23·2	50	·6643	·0047	·0030	·6596	·6613	·6622	·0026	·0009
463	Five Islands	64 04·4	45 24·5	50	·6663	·0047	·0030	·6616	·6633	·6694	·0078	·0061
464	Parrsboro	64 19·7	45 24·2	25	·6658	·0024	·0015	·6634	·6643	·6810	·0176	·0167
465	West Brook	64 18·1	45 33·0	108	·6790	·0102	·0065	·6688	·6725	·6887	·0199	·0162
466	Springhill, N.S.	64 04·2	45 39·0	435	·6881	·0409	·0261	·6472	·6620	·6645	·0173	·0025
467	Nigadoo, N.B.	65 43·14	47 44·31	51	·8763	·0048	·0031	·8715	·8732	·8702	− ·0013	− ·0030
468	Belledune	65 48·76	47 53·13	40	·8895	·0038	·0024	·8857	·8871	·8712	− ·0145	− ·0159
469	Nash Creek	66 04·64	47 55·39	21	·8929	·0020	·0013	·8909	·8916	·8739	− ·0170	− ·0177
470	Charlo Station	66 18·37	47 59·62	53	·8992	·0050	·0032	·8942	·8960	·8843	− ·0099	− ·0117
471	Dalhousie Jct.	66 30·47	48 02·50	78	980·9035	−0·0073	−0·0047	980·8962	980·8988	980·8721	−0·0241	−0·0267
472	Campbellton, N.B.	66 40·77	48 00·28	42	·9002	·0040	·0025	·8962	·8977	·8658	− ·0304	− ·0319
473	Matapedia, Que.	66 56·42	47 58·48	54	·8975	·0051	·0032	·8924	·8943	·8621	− ·0303	− ·0322
474	Millstream	67 04·0	48 02·8	230	·9040	·0216	·0138	·8824	·8902	·8551	− ·0273	− ·0351
475	Routhierville	67 09·12	48 10·99	278	·9162	·0261	·0167	·8901	·8995	·8639	− ·0262	− ·0356
476	Causapscal	67 13·65	48 20·98	451	·9312	·0424	·0271	·8888	·9041	·8755	− ·0133	− ·0286
477	Amqui	67 26·21	48 28·01	525	·9417	·0494	·0315	·8923	·9102	·8901	− ·0022	− ·0201
478	Val Brillant	67 33·6	48 32·3	538	·9481	·0506	·0323	·8975	·9158	·9121	·0146	− ·0037
479	St. Moise	67 51·9	48 33·3	800	·9496	·0752	·0480	·8744	·9016	·8649	− ·0095	− ·0367
480	Mont Joli	68 12·2	48 35·3	263	·9526	·0247	·0158	·9279	·9368	·9042	− ·0237	− ·0326
481	Rimouski, Que.	68 30·9	48 27·3	76	980·9406	−0·0071	−0·0046	980·9335	980·9360	980·8897	−0·0438	−0·0463
482	St. Simon	69 02·0	48 12·4	298	·9183	·0280	·0179	·8903	·9004	·8563	− ·0340	− ·0441
483	St. Eloi	69 15·7	48 04·2	139	·9061	·0131	·0083	·8930	·8978	·8517	− ·0413	− ·0461
484	Rivière du Loup	69 31·7	47 49·6	290	·8842	·0273	·0174	·8569	·8668	·8215	− ·0354	− ·0453
485	Rivière Verte	69 26·8	47 47·2	440	·8806	·0414	·0264	·8392	·8542	·8039	− ·0353	− ·0503
486	Whitworth	69 19·2	47 43·0	895	·8743	·0842	·0537	·7901	·8206	·7732	− ·0169	− ·0474
487	St. Honoré	69 07·5	47 42·4	1,301	·8734	·1224	·0781	·7510	·7953	·7556	·0046	− ·0397
488	Vauban	69 03·7	47 40·1	1,060	·8700	·0997	·0636	·7703	·8064	·7731	·0028	− ·0333
489	Cabano	68 53·8	47 40·8	564	·8710	·0530	·0338	·8180	·8372	·7930	− ·0250	− ·0442
490	Notre Dame du Lac	68 47·4	47 36·5	605	·8646	·0569	·0363	·8077	·8283	·7856	− ·0221	− ·0427

491	Ste. Rose du Dégelé	68 38·9	47 33·6	506	980·8602	−0·0476	−0·0304	980·8126	980·8298	980·7857	−0·0269	−0·0441
492	Interprovincial Bdy	68 28·6	47 29·3	510	·8538	·0480	·0306	·8058	·8232	·7849	− ·0209	− ·0383
493	Edmundston, N.B.	68 19·6	47 21·7	489	·8424	·0460	·0293	·7964	·8131	·7806	− ·0158	− ·0325
494	Green River	68 09·6	47 19·3	477	·8388	·0449	·0286	·7939	·8102	·7782	− ·0157	− ·0320
495	St. Leonard	67 55·7	47 10·0	467	·8248	·0439	·0280	·7809	·7968	·7699	− ·0110	− ·0269
496	Grand Falls	67 44·8	47 02·9	502	·8142	·0472	·0301	·7670	·7841	·7576	− ·0094	− ·0265
497	Cliffordvale	67 42·8	46 55·3	595	·8028	·0560	·0357	·7468	·7671	·7407	− ·0061	− ·0264
498	Perth	67 42·1	46 44·1	263	·7859	·0247	·0158	·7612	·7701	·7477	− ·0135	− ·0224
499	Upper Kent	67 42·1	46 34·3	276	·7712	·0260	·0166	·7452	·7546	·7273	− ·0179	− ·0273
500	Florenceville	67 36·7	46 26·4	190	·7593	·0179	·0114	·7414	·7479	·7270	− ·0144	− ·0209
501	Hartland	67 31·7	46 18·3	168	980·7472	−0·0158	−0·0101	980·7314	980·7371	980·7199	−0·0115	−0·0172
502	Woodstock	67 34·5	46 09·0	194	·7332	·0182	·0116	·7150	·7216	·7036	− ·0114	− ·0180
503	Meductic	67 29·1	45 58·6	147	·7176	·0138	·0088	·7038	·7088	·6858	− ·0180	− ·0230
504	Hawkshaw	67 15·0	45 57·7	130	·7162	·0122	·0078	·7040	·7084	·6636	− ·0404	− ·0448
505	Long Creek	66 55·67	45 52·33	45	·7081	·0042	·0027	·7039	·7054	·6925	− ·0114	− ·0129
506	Oromocto	66 28·54	45 51·20	24	·7064	·0023	·0014	·7041	·7050	·6933	− ·0108	− ·0117
507	Upper Gagetown	66 14·65	45 50·72	41	·7057	·0039	·0025	·7018	·7032	·6919	− ·0099	− ·0113
508	Queenstown	66 06·1	45 40·7	27	·6906	·0025	·0016	·6981	·6890	·7009	·0028	·0119
509	Evandale	66 02·9	45 35·6	22	·6830	·0021	·0013	·6809	·6817	·6939	·0130	·0122
510	Glenwood	66 07·07	45 29·44	44	·6737	·0041	·0026	·6696	·6711	·6865	·0169	·0154
511	Woodman's Point	66 14·06	45 22·22	30	980·6628	−0·0028	−0·0018	980·6600	980·6610	980·6659	0·0059	0·0049
512	Hampton Station	65 49·72	45 31·55	27	·6769	·0025	·0016	·6744	·6753	·6867	·0123	·0114
513	Norton	65 41·86	45 38·25	52	·6869	·0049	·0031	·6820	·6838	·6916	·0096	·0078

DISCUSSION OF RESULTS

The mileage of the stations in the profiles of Figures 2, 5, 6, and 7 have been obtained by projection on a line joining Moncton and Newcastle, about 32 degrees west of north, approximately perpendicular to the shore of the Bay of Fundy and

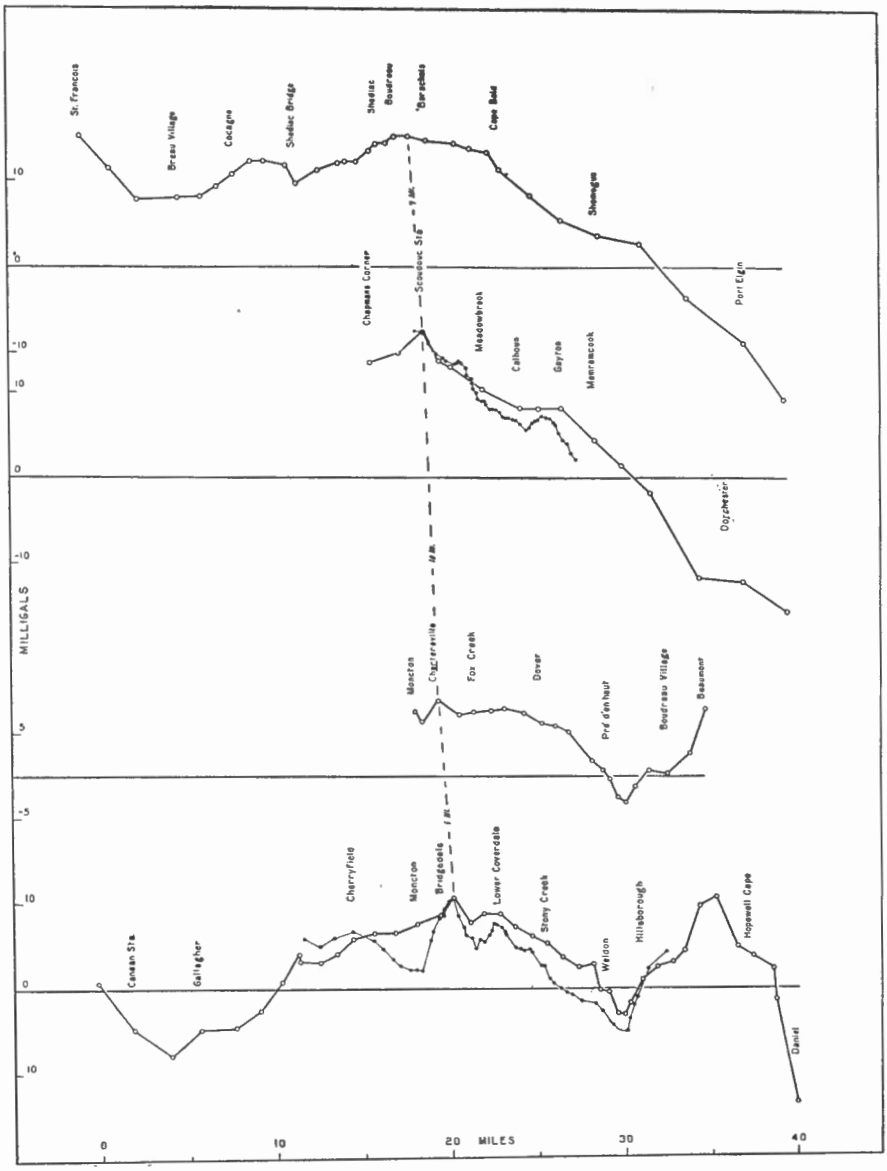

Figure 2. Showing extension of the Pollett River-Bridgedale high across Shediac basin, as suggested by four gravity profiles between Bridgedale and Barachois. Results of observations with the torsion balance are indicated by the graphs with the small circles and thin lines; those with the gravimeter by the larger circles and thick lines.

also to the strike of the Pollett River-Bridgedale anomaly (34 degrees north of east). The gravity anomalies that are plotted in each of these figures and in Figure 3 are the Bouguer anomalies listed in Table I.

Extension of the Pollett River-Bridgedale High

The easterly extension of the Pollett River-Bridgedale high is indicated by the four profiles of Figure 2. From Bridgedale it apparently continues for 20 miles through Chartersville and Scoudouc Station to a point about midway between Barachois and Boudreau, Route 15, on the shore of Northumberland Strait.

For comparison there are plotted in this figure the anomalies obtained with the gravimeter in 1944 and those derived from the gravity gradients in the survey of 1935. In the upper profile the form of the gravimeter and torsion balance curves is generally the same between Hillsborough and Bridgedale; highs and lows occur at the same points. The torsion balance profile is, however, generally from 2 to 4 milligals lower between those two places, and the difference is probably due to error in the torsion balance results. True average gradients are probably not obtained for the intervals between successive stations at places where the gradients are large and variable.

North of Bridgedale the observations with the respective instruments were over quite different ground. The torsion balance traverse, from Bridgedale, was directed towards the lighthouse. It cut across the marsh lands to Lewisville, and thence along the McLoughlin road through Cherryfield to the road intersection at the foot of Lutz Mountain, near Irishtown station. The gravimeter traverse, on the other hand, followed the Magnetic Hill road to Indian Mountain.

The magnitude of the respective anomalies along the Calhoun traverse is, in general, in fair agreement. There is a high between Gayton and Calhoun, but not more than a suggestion of it in the gravimeter results. Another high is shown by the torsion balance about 2 miles north of Meadowbrook. Greater detail is to be expected in the torsion balance results, as the stations were usually only a quarter of a mile apart as compared with 1 to 2 miles with the gravimeter. A fault, or its gravitated equivalent—an abrupt rise in rock formation of higher density—is indicated by the gradients and curvatures obtained with the torsion balance at a depth of somewhat more than 1,000 feet about a mile south of Scoudouc station.

Similar effects were observed with the torsion balance at about ½ mile and also 1 mile north of Meadowbrook. As the pre-Carboniferous rocks are probably not far below the surface at any of these points these anomalies may be due to variations of density within the pre-Carboniferous formations themselves. The large magnetic and gravity anomalies at Bridgedale are also, most probably, due to the presence of some heavy, magnetic, pre-Carboniferous formation within the pre-Carboniferous and not to a transition from Carboniferous to pre-Carboniferous rocks, for it is concluded from drill holes and confirmed by the anomalies that pre-Carboniferous rocks lie within a few hundred feet[1] of the surface at Lower Coverdale, about 3 miles south of Bridgedale.

Other Anomalies in the Shediac Basin

The Shediac basin comprises that part of New Brunswick east of Petitcodiac River, and covers about 600 square miles. East of Memramcook River the existing observations indicate a gradual decrease in gravity from the Bridgedale-Barachois high to the pronounced low between Cumberland Basin and Baie Verte. Between the Memramcook and Petitcodiac the low in the vicinity of Pré d'en Haut is related to the salt deposit, and an apparent high near Beaumont is probably due to a buried easterly extension of the pre-Carboniferous rocks of Caledonia Mountain. No further indication of this gravity high can be observed along the strike until Cape Bruin (station 57) is reached. A positive anomaly of a few milligals was observed at that station. Possibly associated with this is the magnetic anomaly between Shemogue and Port Elgin (*See* Figure 5).

[1] Cf. Geological section by G. W. H. Norman, Fig. 36, Pub. Dominion Observatory, XI, 6, p. 244. Lower Coverdale is near sta. 20, mileage 10, and Bridgedale at sta. 31, mileage 12·7.

The Weldon Salt Deposit

"Four wells[1], two near Gautreau on the east side and two near the mouth of Weldon Creek on the west side of Petitcodiac River show that, there at least, a thick bed of salt occurs 150 to 500 feet beneath the top of the Albert formation in the centre of the basin north of Caledonia Mountains. The top of the salt in

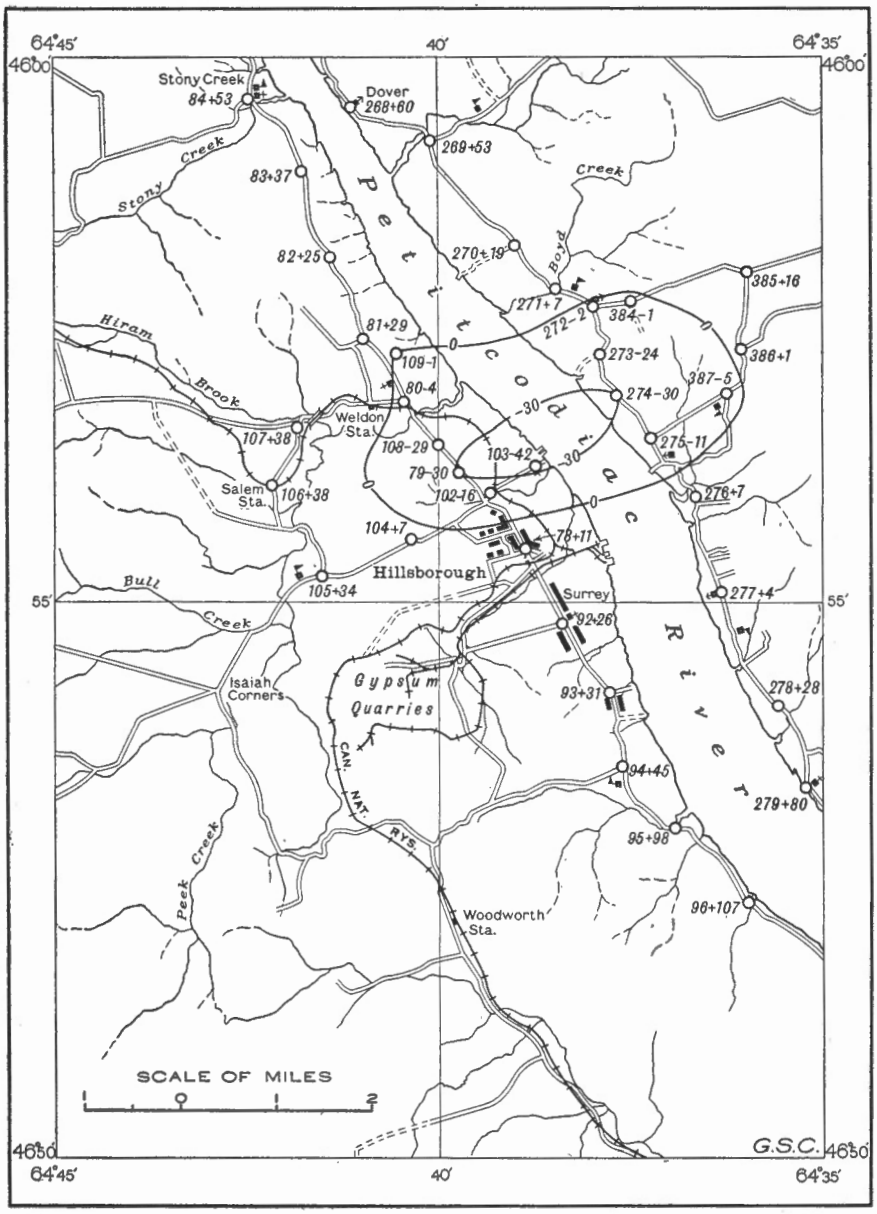

Figure 3. Map of part of New Brunswick showing gravity anomalies in the vicinity of Hillsborough, and contours of gravity over Weldon salt deposit. Locations of gravimeter stations are indicated by small circles. The station numbers are followed by the sign and the number representing the Bouguer anomaly in units of one-tenth of a milligal; thus 272-2.

[1] Geol. Surv., Canada; Descriptive Notes, Map 647A, Hillsborough Sheet.

the wells east of the river is 1,225 feet below sea-level, and in the western wells slightly more. The greatest drilling thickness of salt, though perhaps not the true thickness, is 1,512 feet in a well at the mouth of Weldon Creek. The salt contains a little shale and in some layers a little glauberite. Most of the glauberite occurs in a bed 100 feet thick at the top of the salt and in parts of this bed it is the chief constituent".

Salt, with a density of only 2·2, would produce a negative anomaly or gravity low in contact with the average rock. A low of 3 milligals is outlined by the closed contours south of Hillsborough (*See* Figure 3).

For a density contrast of 0·2 that anomaly would correspond to a thickness of 1,200 feet of salt. On this interpretation, also, the greatest thickness of salt occurs from 1 to 2 miles south of the drill holes at Weldon and Gautreau. There are, however, other light rocks in the Mississippian, notably the Albert shales, some of which are even lighter than salt, but in the absence of knowledge regarding the extent of such rocks it is, of course, impossible to estimate their contribution to the observed anomaly. In any event the area of lighter rocks is definitely outlined by the anomaly contours of Figure 3.

Rock Densities and Magnetic Susceptibilities

Measurement of the density of 200 rock specimens (mostly by J. A. L. Henderson) shows large ranges within the individual formations of Pennsylvanian, Mississippian, and pre-Carboniferous age. Thirty-four Pennsylvanian specimens ranged from 2·11 to 2·72, 136 Mississippian specimens from 1·59 to 2·73, and 43 pre-Carboniferous specimens from 2·57 to 2·97. Fifty specimens were tested for magnetic susceptibility, ten of these from Carboniferous (Mississippian and Pennsylvanian) formations. The latter were only slightly magnetic, but the pre-Carboniferous specimens varied from only slightly to highly magnetic. The density measurements suggest that gravity anomalies may be caused by, and may occur over, areas underlain by formations of any of these ages irrespective of the others, depending on the extent and location of the constituent rocks. As the pre-Carboniferous rocks are on the average heavier, and as they include the heaviest rocks, a positive gravity anomaly is an indication favourable to their occurrence, but by no means proof of it. On the other hand magnetic susceptibility determinations suggest that a magnetic anomaly is decidedly suggestive of the presence of pre-Carboniferous rocks, but that the non-existence of an appreciable magnetic anomaly is no proof of their absence.

Pre-Carboniferous rocks comprise a great variety of formations from Precambrian to Devonian age, and, consequently, represent a much longer time than does the succeeding Carboniferous period. It is possible that further study of the physical properties of different rock types, in relation to their relative importance in the make-up of the existing geological formations, might lead to better understanding of the observed geophysical anomalies, and to more definite interpretation of them.

Anomalies Over a Pre-Carboniferous Ridge

A logical approach to the investigation, by geophysical methods, of buried pre-Carboniferous ridges would certainly appear to be the observation of anomalies caused by an exposed ridge, where the pre-Carboniferous rocks reach the surface. Fortunately just such a ridge is known in southern New Brunswick; it is Caledonia Mountain, along the upper reaches of the Bay of Fundy. This mountain, like most of the upland region[1] along the Bay of Fundy between

[1] Alcock, F. J. New Brunswick, Past and Present; Can. Geog. Jour., XXVII, 2, pp. 64-83.

Hillsborough and Saint John, is composed of hard volcanic rocks and granites. Observations on it with the magnetometer, by G. W. H. Norman[1] and Dr. Wright, show large magnetic anomalies, and observations with the torsion balance, in 1935, indicate a large gravity anomaly over the probable buried extension of the mountain, south of Hillsborough. In 1944 the gravimeter revealed large positive gravity anomalies (*See* Figure 5) over the pre-Carboniferous formations at Hammondvale, at Mechanicsville, a few miles south of South Branch, and over the probable easterly extension of Caledonia Mountain, at station 96, between Surrey and Hopewell Cape. All these observations indicate that a buried, pre-Carboniferous ridge, at a moderate depth and of the same composition as the Caledonia Mountain ridge, could hardly escape detection with either the magnetometer or the gravimeter.

The Carboniferous Basin of New Brunswick

The Carboniferous basin of New Brunswick (*See* Figure 4) covers most of the southeastern half of the province, and is occupied mainly by flat-lying sedimentary rocks of Pennsylvanian age. As already indicated, the object of the observations within this basin was to outline the positions of sub-surface features beneath the mantle of late Carboniferous rocks.

If such features, presumed to be ridges of pre-Carboniferous rocks, do exist, it would be expected that gravity would be greater above them, where the heavier pre-Carboniferous rocks come nearer to the surface, than over the intervening pre-Carboniferous valleys, where the thickness of lighter Carboniferous rocks is greater. On this ideal assumption, a gravity profile across the basin would be a series of alternating highs and lows corresponding to an elevation profile of the pre-Carboniferous surface itself. By plotting the results of parallel traverses on the same base (as in Figure 5) the trends of the anomalies in a direction at right angles to the traverses are obtained, and may correspond to the trends or axes of the ridges themselves.

Gravity Anomalies Observed Over the Carboniferous Basin

The anomalies over the main part of the Carboniferous basin are shown in Figure 5. The results tend to confirm the presumed existence of buried ridges, and are in as reasonable agreement with that presumption as could be expected. They are, however, no proof of the existence of such ridges, and, as other possible explanations could be given for the anomalies, they can be regarded only as favourable indications. Whatever the cause, it is certain that the definite persistence of the anomalies has an important significance, and represents something that is intimately bound up with sub-surface geological structure.

The most pronounced feature is the low of 20 milligals extending for 60 miles from East Galloway through Grangeville to Chipman and possibly on to Fredericton. Other trends are indicated by the dotted lines between the profiles of Figure 5.

Although the structure and position of a sub-surface geological formation do determine the form of the gravity profile, it does not follow, conversely, that the form of the gravity profile determines unequivocally the features of the sub-surface geology. However, much useful information may be had from mere inspection of the gravity profile and the application of quite simple rules. A sharp rise and corresponding fall in the profile is probably caused by a deposit at no great depth. On the other hand, a broad anomaly does not necessarily indicate a deeply buried deposit. For example, except for the minor undulations in the top of the curve, the profile between Port Elgin (Figure 5) and East

[1] Pub. D.O. XI, 6, 1940, App. II and III.

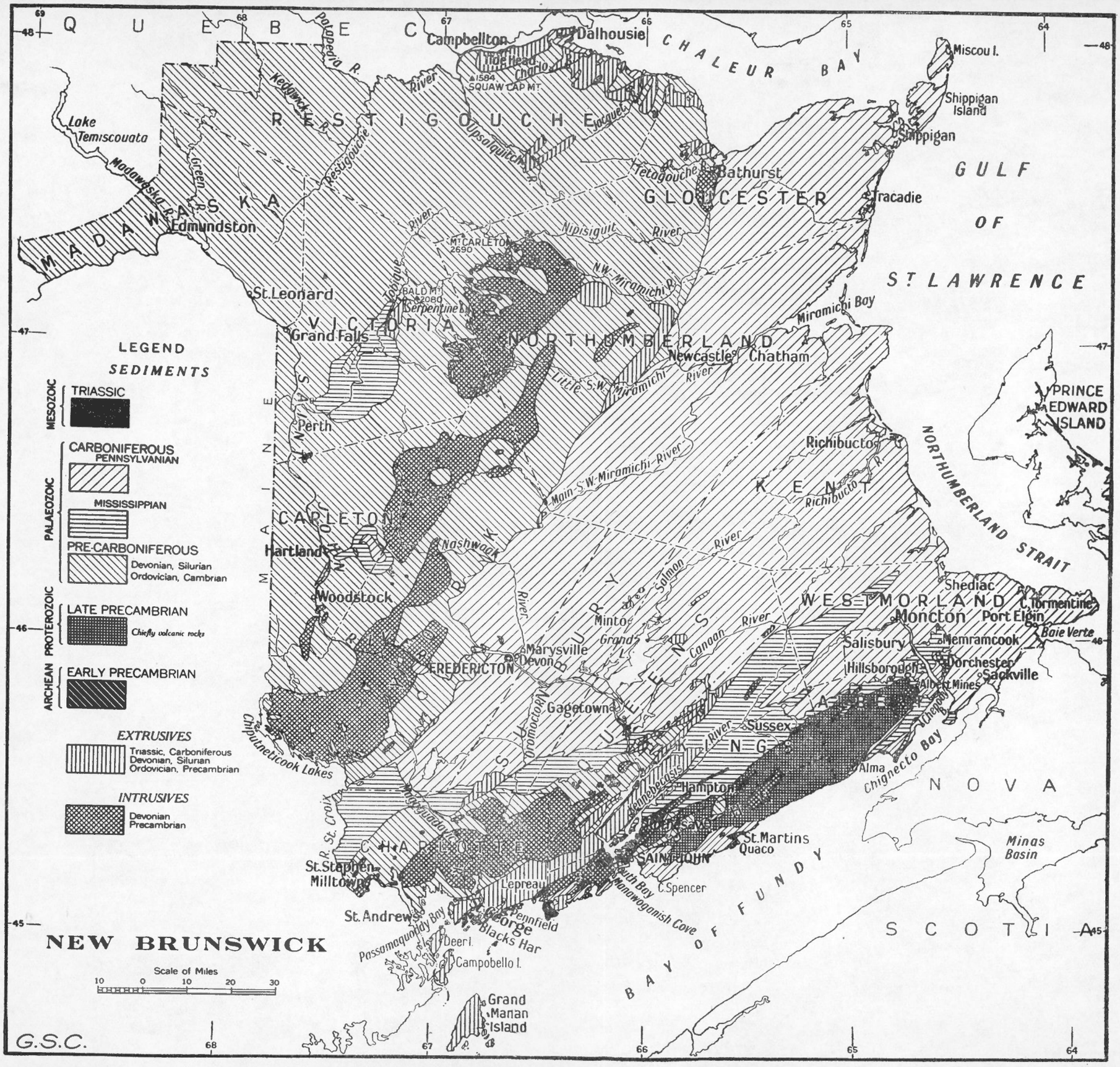

Figure 4. Geological map of New Brunswick, compiled by F. J. Alcock, Geological Survey, 1943.

Galloway has the appearance of a truncated wedge or prism cut off at the top, and may be due to just such a configuration of the buried pre-Carboniferous surface.

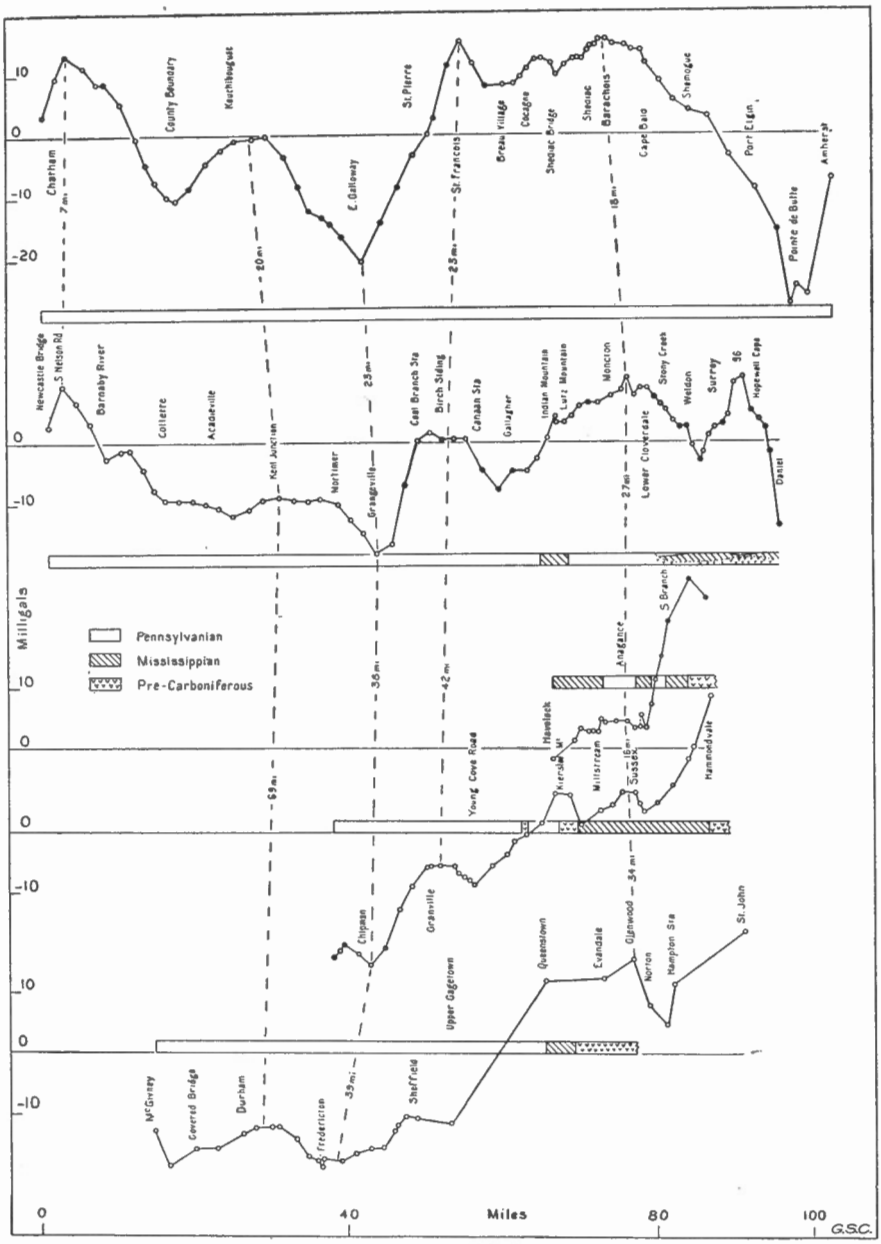

Figure 5. Gravity profiles across part of Carboniferous basin, in New Brunswick, south of Miramichi River.

There is reason to suppose that the pre-Carboniferous rocks are not far below the surface at Barachois. Assuming that the anomaly there (*See* Figure 5) is due to a single contact or single density contrast, then it would be estimated

that at Port Elgin the pre-Carboniferous surface is at a depth of about 2 miles, and at East Galloway about 3 miles.

These results are obtained by a simple rule first used by Eötvös. For moderate slopes (up to 15 degrees) the gravity anomaly between two points on the ground above a sloping contact is directly proportional to the density contrast, at the contact, and to the depth through which the contact has plunged in the interval. Consequently, if the anomaly is measured and the density contrast is known, the plunge of the contact may be computed. For density difference unity, the depression is 80 feet per milligal. For density contrast 0·2, the value employed in the estimates of the preceding paragraph, the computed depression is 80/0·2, or 400 feet, per milligal.

There are other simple relations[1] between the gravity profile and structure in its various geometric forms, and these may often have useful application. Over the Carboniferous basin, where the dimensions of the structures along the strike are usually large as compared with the other dimensions, the half-width rule, described by Nettleton[2], may be usefully employed in estimating depths.

At many points along the profiles of Figure 5, it is apparent to the eye that the resultant anomaly curve is a combination of a regional effect of more deep-seated origin and a local effect caused by something nearer the surface.

In the second profile from the bottom of Figure 5, it is apparent that a local anomaly between Hopewell Cape and Surrey is superimposed on a more regional anomaly between Daniel and Weldon. The two anomalies could be distinguished[3] from each other graphically by connecting with a smooth, slightly curved line the two small circles at the base of the local anomaly. Similarly, in the lower profile, the anomalies at Cocagne and St. François are comparatively local effects superimposed upon the general trend of the profile.

Application of the simple rules, described or referred to above, indicates that most of the anomalies in Figure 5 could be accounted for by structures at moderate depths. To illustrate, the St. François anomaly could be accounted for by a structure with centre of gravity at a depth of 1½ miles and crest at about ½ mile. The corresponding figures for the Chatham anomaly are 6 and 3 miles respectively. These anomalies approach the form of that due to a buried cylinder, and have been estimated on that basis for a density contrast of 0·2.

Magnetic Anomalies

Results of a traverse with the vertical magnetometer between Port Elgin and Bathurst are shown in Figure 6. The observed magnetic values have not been corrected for normal variation with latitude and longitude. The profile, therefore, shows a continual rise in value on proceeding northwest towards Bathurst. Assuming the normal variations with latitude and longitude to be constant, then the observations when referred to the inclined abscissa (indicated by the broken straight line) would represent the true anomalies, provided the traverse retained the same course or direction throughout. This is roughly true of the road from Port Elgin to Bathurst, along which the traverse was made. The point on the traverse farthest from the line joining Port Elgin and Bathurst is Chatham, which is about 15 miles west. The error there, though larger than for any of the other stations, amounts to only 20 gammas, and is comparatively negligible.

At a number of places the magnetic and gravity anomalies coincide, or nearly coincide. Where the magnetic and gravity highs agree, and especially where the two curves are sufficiently similar to suggest a common origin, it would be reasonable to suppose heavy magnetic rock, probably pre-Carboniferous, to be the cause of the anomaly.

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[1] Nettleton, L. L.: Geophysical Prospecting for Oil (1940), 1st edition, Chap. VI.
[2] Ibid., p. 123.
[3] Cf. several profiles by Woollard under reference p. 5.

Attention has already been directed to the magnetic anomaly south of Shemogue as evidence of a possible subterranean easterly extension of Caledonia Mountain. The magnetic anomaly at Cocagne, and the relatively small gravity anomaly a little farther south (*See* Figure 6), are evidence of the buried continuation of Indian Mountain, which was traced for several miles with the magnetometer in 1943. The large gravity low at East Galloway is also a magnetic low.

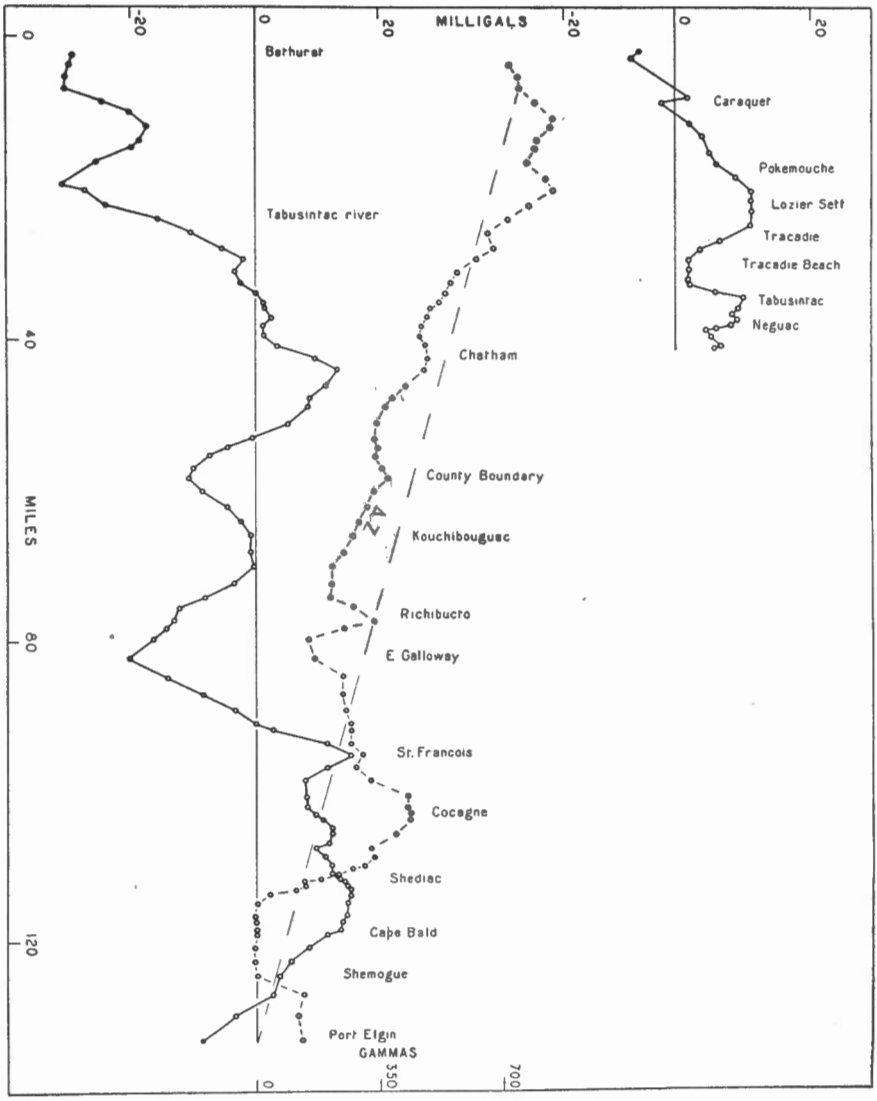

Figure 6. Gravity and magnetic profiles Port Elgin to Bathurst, and gravity profile Ferry Road (Chatham) to Caraquet. The magnetic profile is indicated by the broken line.

Neguac-Tracadie-Caraquet Gravity Profile

A gravimeter traverse begun at Ferry Road corner was carried on around the peninsula, through Neguac and Tracadie beyond Caraquet. The gravity anomalies are shown by the lower profile of Figure 6. Although not entirely

lacking, there is no marked correspondence between this profile and the Chatham-Bathurst gravity profile.

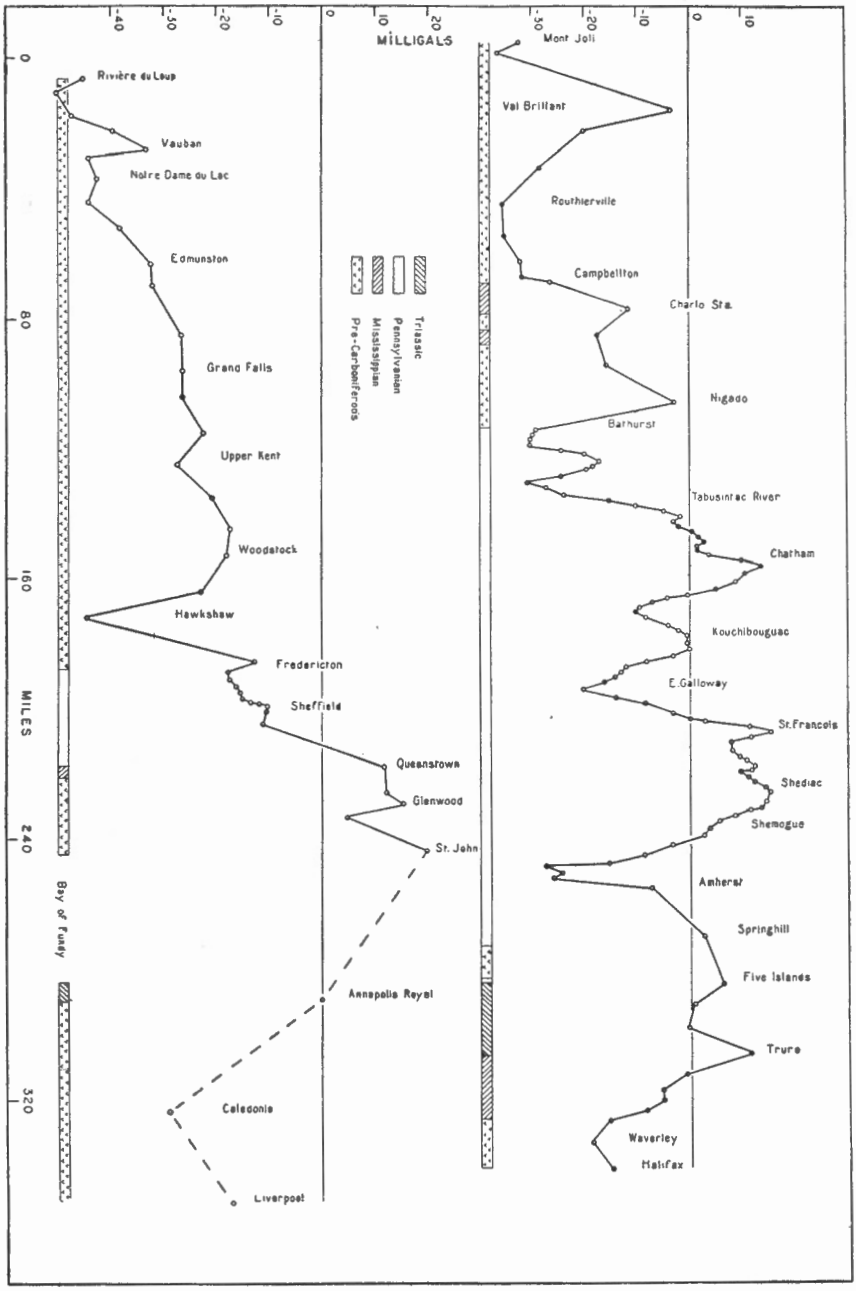

Figure 7. Gravity profiles Halifax to Mont Joli, and Liverpool to Rivière du Loup.

Regional Traverses With the Gravimeter

Towards the close of the field season, about the middle of September, traverses with stations 8 to 10 miles apart were made across Nova Scotia from

Northport (near Port Elgin) along the coast through Tatamagouche to Pictou; thence through Antigonish to Canso; thence along the Atlantic coast to Dartmouth; and thence through Truro, Parrsboro, and Springhill to Amherst. Observations were resumed at Bathurst, linking the previously established Amherst-Port Elgin-Bathurst traverse with one through Campbellton and Matapedia, across Gaspe, to Mont Joli. From there the traverse was carried along the St. Lawrence through Rimouski to Rivière du Loup, and finally back along Route 2 through New Brunswick to Saint John.

The location of these traverses is shown on Figure 1, and the main results appear on Figure 7, where the Bouguer anomalies are plotted along two approximately parallel traverses across Gaspe, New Brunswick, and Nova Scotia, between the St. Lawrence River and the Atlantic Ocean.

Stations at Annapolis Royal, Caledonia, and Liverpool were established with a pendulum apparatus in 1937. A low is suggested through the area of Precambrian and pre-Carboniferous rocks from Caledonia to Waverley (*See* Figure 7). Much of the large, negative, Bouguer anomaly across Gaspe is due to isostatic compensation. The large anomaly at Val Brillant is reflected in the results along the more westerly traverse at Vauban (*See* Figure 7).

The anomaly at Val Brillant is of special interest and significance in connection with large landward "deflections of the vertical" observed by the Geodetic Survey along the northern coast of Gaspe[1]. At Mont Joli the deflection amounts to about 10 seconds of arc. In an investigation of these deflections by F. J. Alcock and the writer[2], it was found that, on the average, about half the deflection could be accounted for by isostatic compensation. That would leave about 5 seconds unaccounted for at Mont Joli, one of the stations not covered in the above mentioned investigation. It is estimated, however, that the heavy rock formation that causes the gravity anomaly at Val Brillant would deflect the plumb line another 3 seconds, thus leaving only 2 of the 10 seconds unaccounted for.

A remarkably large gravity anomaly was observed at Hawkshaw, on Devonian intrusive granite. It seems hardly likely that the granite would cause the anomaly, and that it is more probably due to some lighter material associated with the intruded mass.

It is important to note, in connection with the present investigation, that both profiles of Figure 7 show large anomalies over exposed pre-Carboniferous formations. This is probably due to variation of density within the formations, and is in agreement with conclusions based on the known variation in rock densities.

SUMMARY AND CONCLUSIONS

(a) The gravity high outlined between Pollett River and Bridgedale, in 1943, was traced (*See* Figure 2) for another 20 miles along its apparent continuation from Bridgedale, on Petitcodiac River, to the vicinity of Barachois on Northumberland Strait. Except for a small gravity anomaly at Cape Bruin, on Northumberland Strait, and a small magnetic anomaly south of Shemogue, no other significant anomalies were observed in the Shediac basin apart from those on the immediate east bank of Petitcodiac River.

(b) An area of about 8 square miles of low gravity was outlined by anomaly contours (*See* Figure 3) from the results of numerous observations on both banks of Petitcodiac River in the vicinity of Hillsborough. This area includes the site of the drill holes at the mouth of Weldon Creek, but lies about a mile south of the drill holes near Gautreau, in which more than 1,000 feet of salt was dis-

[1] McDiarmid, F. A.: Deflection of the Plumb Line in Canada; Geod. Surv., Canada, Pub. No. 36, 1931.
[2] Alcock, F. J., and Miller, A. H.: Plumb-line Deflections and Gravity Anomalies in Gaspe Peninsula and Their Significance; Trans. Roy. Soc., Canada, vol. XXVI, pp. 321-333 (1932).

covered. The cause of the gravity anomaly is probably salt and other light or even lighter Mississippian rocks associated with it. The gravity observations suggest the possibility of even greater thicknesses of salt to the south of the drill holes.

(c) Several traverses with the gravimeter and one with the magnetometer across the Carboniferous basin of New Brunswick lend support to the presumed existence of buried pre-Carboniferous ridges in the part of the basin south of Miramichi River. They also give definite indication of their location. It is possible, however, that the geophysical results could be interpreted in a number of other ways. In view of the fact that the existence of the ridges appears probable from results of drilling and from consideration of the geology, there is a reasonable prospect that some of them may be indicated by the anomalies.

A series of highs and lows was observed on the traverse between Chatham and Bathurst, but no very close relations were observed with the results of that traverse and those of the traverse along the coast from Chatham through Tracadie to Caraquet.

(d) Regional traverses, with stations spaced at 8- to 10-mile intervals, across Nova Scotia, New Brunswick, and Gaspe show large gravity anomalies over pre-Carboniferous formations. A very large negative anomaly was observed over a Devonian granite intrusion at Hawkshaw. These results have a direct bearing on the investigation of buried ridges by geophysical methods, and at the same time indicate that caution must be exercised in the interpretation of the results of such surveys.

A large gravity anomaly observed at Val Brillant a few miles south of Mont Joli offers a partial explanation for the large "deflexion of the vertical" at the latter place.