

Serial No. 205

DEPARTMENT OF COMMERCE  
U. S. COAST AND GEODETIC SURVEY  
E. LESTER JONES, Director

TERRESTRIAL MAGNETISM

RESULTS OF MAGNETIC OBSERVATIONS  
MADE BY THE UNITED STATES COAST  
AND GEODETIC SURVEY  
IN 1921

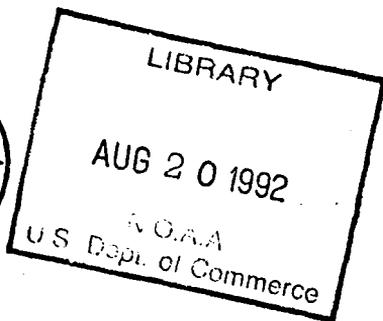
By

DANIEL L. HAZARD

Assistant Chief, Division of Terrestrial Magnetism

QB  
275  
435  
no. 87  
(1922)

Special Publication No. 87



PRICE, 5 CENTS

Sold only by the Superintendent of Documents, Government Printing Office,  
Washington, D. C.

WASHINGTON  
GOVERNMENT PRINTING OFFICE  
1922

# National Oceanic and Atmospheric Administration

## ERRATA NOTICE

One or more conditions of the original document may affect the quality of the image, such as:

Discolored pages

Faded or light ink

Binding intrudes into the text

This has been a co-operative project between the NOAA Central Library and the Climate Database Modernization Program, National Climate Data Center (NCDC). To view the original document, please contact the NOAA Central Library in Silver Spring, MD at (301) 713-2607 x124 or [www.reference@nodc.noaa.gov](mailto:www.reference@nodc.noaa.gov).

LASON  
Imaging Contractor  
12200 Kiln Court  
Beltsville, MD 20704-1387  
January 1, 2006

## CONTENTS.

---

	Page.
Introduction.....	1
Distribution of stations.....	1
Secular change of the magnetic declination.....	2
Instrumental corrections.....	4
Diurnal variation correction.....	4
Arrangement of table.....	4
Magnetic observations on land.....	5
Descriptions of stations:	
Alabama.....	10
Alaska.....	10
Arkansas.....	12
Idaho.....	13
Illinois.....	13
Indiana.....	14
Iowa.....	14
Kansas.....	15
Kentucky.....	15
Minnesota.....	15
Mississippi.....	16
Missouri.....	16
Montana.....	17
Nebraska.....	18
North Carolina.....	18
North Dakota.....	20
Ohio.....	21
Oklahoma.....	21
Oregon.....	21
Tennessee.....	22
Virginia.....	22
Washington.....	23
Wisconsin.....	23
Wyoming.....	24
Siberia.....	25

# RESULTS OF MAGNETIC OBSERVATIONS MADE BY THE U. S. COAST AND GEODETIC SURVEY IN 1921.

By DANIEL L. HAZARD, *Assistant Chief, Division of Terrestrial Magnetism.*

## INTRODUCTION.

In 1882 the results of magnetic observations made by this Bureau prior to 1881, together with descriptions of stations, were published as Appendix 9, Report for 1881. From that time to 1902 the results were published only in connection with a discussion of the distribution or the secular change of one or more of the three magnetic elements. In Magnetic Declination Tables and Isogonic Charts for 1902 the declination results were given for all the stations occupied up to that time, and descriptions were given of the stations occupied subsequent to 1881. From 1903 to 1911 there was published annually an appendix to the Superintendent's report giving the results of magnetic observations made during the fiscal year (July to June) covered by the report.

When in 1912 it was decided to confine the annual report of the Superintendent to administrative matters and to publish separately the scientific results which had formerly appeared as appendixes to the report, the time was deemed opportune to change from the *fiscal* year to the *calendar* year in the publication of the results of the magnetic observations in the field. Accordingly Special Publication No. 15 contained the results of observations made between July 1, 1911, and December 31, 1912, and the results for subsequent calendar years have appeared in Special Publications Nos. 20, 25, 36, 42, 51, 55, 64, and 72.

Five magnetic observatories have continued in operation throughout the year: At Cheltenham, Md.; Sitka, Alaska; near Honolulu, Hawaii; on Vieques Island, P. R.; near Tucson, Ariz. Their records have furnished the means for reducing to mean of day the values of declination obtained from field observations. There will be found in the tables the mean values of the magnetic elements for each of the observatories for the year 1921.

## DISTRIBUTION OF STATIONS.

The distribution of stations is shown in the following table, from which it will be seen that all of the observations in the continental part of the United States were made at repeat stations for the determination of secular change.

Declination observations were made at a large number of stations in southeastern Alaska in connection with the triangulation. A special investigation was made of the area of local disturbance in

the vicinity of Sentinel Point, Port Snettisham. In addition to the observations on shore, the results of which are given, numerous observations were made on board the steamer *Explorer*, extending from the entrance to Port Snettisham to beyond Sentinel Point. The maximum disturbance was found to be just west of Sentinel Point, the ship's compass changing its direction  $55^\circ$  in a very short distance when passing close inshore and a change of  $130^\circ$  being noted in the shore observations between two stations less than half a mile apart. The disturbance extended entirely across the channel, a departure from normal of  $20^\circ$  being noted at one place in mid-channel.

*Summary of results.*

State.	Localities.	Stations.	Old localities reoccupied.	Declination results.	Dip results.	Intensity results.
Alabama.....	1	1	1	1	1	1
Alaska.....	88	93	2	04	10	9
Arizona.....	1	1	1	1	1	1
Arkansas.....	1	1	1	1	1	1
California.....	1	1	1	1	1	1
Idaho.....	3	3	3	3	3	3
Illinois.....	2	2	2	2	2	2
Indiana.....	1	1	1	1	1	1
Iowa.....	2	2	2	2	2	2
Kansas.....	2	2	2	2	2	2
Kentucky.....	2	2	2	2	2	2
Maryland.....	1	1	1	1	1	1
Minnesota.....	3	3	3	3	3	3
Mississippi.....	1	2	1	2	1	1
Missouri.....	2	2	2	2	2	2
Montana.....	5	5	5	5	5	5
Nebraska.....	3	3	3	3	3	3
North Carolina.....	7	15	7	15	8	8
North Dakota.....	2	3	2	3	2	2
Ohio.....	1	1	1	1	1	1
Oklahoma.....	2	2	2	2	2	2
Oregon.....	1	1	1	1	1	1
Porto Rico.....	1	1	1	1	1	1
Tennessee.....	3	4	3	4	3	3
Virginia.....	8	3	3	3	3	3
Virgin Islands.....	4	4	0	4	0	0
Washington.....	2	2	2	3	3	3
Wisconsin.....	2	2	2	2	2	2
Wyoming.....	3	3	3	3	3	3
Siberia.....	2	2	0	2	2	1
Total.....	152	168	60	172	72	72

SECLAR CHANGE OF THE MAGNETIC DECLINATION.

A comparison of the declination results at repeat stations occupied during the year with the results of earlier observations in the same localities is presented in the following table. The letter after the name of a station indicates (a) that the old station was reoccupied exactly, (b) that the new station was very near the old one, and (c) that the new station was some distance (a quarter of a mile or more) from the old one. A tabular value of the annual change refers approximately to the middle of the period from which it was derived. A plus sign indicates increasing east declination or decreasing west declination; a minus sign, the reverse.

The results indicate that in the past few years there has been little change of declination in the southwestern part of the country and a decrease in the northwestern part. On the Atlantic coast there has been little change in the position of the lines of equal annual change.

## Comparison of declination results at repeat stations.

State and station.	Former observations.		Last observations.		Average annual change.
	Date.	Declination.	Date.	Declination.	
Maryland: Choptenham observatory (a) ..	1919, year..	6 15.0 W..	1921, year..	6 22.4 W..	-3.7
Virginia:					
Richmond (a) .....	1916, Ap. . .	4 48.7 W.	1921, Jy. . .	5 00.4 W.	-2.2
Lynchburg (a) .....	1915, Je. . .	3 25.3 W.	1921, Oc. . .	3 41.2 W.	-2.5
Bristol (a) .....	1915, No. . .	0 47.8 W.	1921, Oc. . .	0 57.0 W.	-1.6
North Carolina:					
Halifax (a) .....	1916, Ap. . .	3 34.7 W.	1921, Jy. . .	3 48.9 W.	-2.7
Goldsboro (a) .....	1917, Jy. . .	2 44.8 W.	1921, Jy. . .	2 52.1 W.	-1.8
Wilmington (b) .....	1898, Jy. . .	1 50.2 W.	1921, Jy. . .	2 56.9 W.	(-2.9)
Whiteville (a) .....	1911, Mh. . .	2 01.8 W.	1921, Jy. . .	2 26.9 W.	-2.4
Troy (b) .....	1899, Oc. . .	1 26.3 W.	1921, Jy. . .	2 24.3 W.	(-2.7)
Salisbury (a) .....	1916, My. . .	1 53.4 W.	1921, Au. . .	2 01.4 W.	-1.5
Morgantown (a) .....	1916, My. . .	1 03.6 W.	1921, Au. . .	1 08.8 W.	-1.0
Alabama: Huntsville (a) .....	1917, Mh. . .	4 01.6 E.	1921, Oc. . .	4 07.2 E.	+1.2
Mississippi: Corinth (b) .....	1917, Mh. . .	4 51.4 E.	1921, Oc. . .	5 00.0 E.	+1.9
Tennessee:					
Knoxville (a) .....	1917, Mh. . .	0 25.8 W.	1921, Au. . .	0 30.0 W.	-1.0
Athens (a) .....	1917, Mh. . .	0 32.1 E.	1921, Oc. . .	0 28.0 E.	-0.9
Memphis (a) .....	1917, Ap. . .	5 34.0 E.	1921, Oc. . .	5 31.8 E.	-0.5
Kentucky:					
Winchester (a) .....	1912, Oc. . .	0 06.2 W.	1921, Au. . .	0 22.2 W.	-1.8
Louisville (a) .....	1915, Oc. . .	1 03.2 E.	1921, Au. . .	0 48.2 E.	-2.6
Ohio: Cleveland (a) .....	1910, Au. . .	3 39.9 W.	1921, Je. . .	4 25.0 W.	-4.2
Indiana: Vincennes (a) .....	1915, Je. . .	2 59.4 E.	1921, Au. . .	2 57.0 E.	-0.4
Illinois:					
Urbana (a) .....	1910, Jo. . .	3 14.6 E.	1921, Je. . .	3 10.0 E.	-2.3
Jol't (c) .....	1914, Oc. . .	2 37.8 E.	1921, Se. . .	2 25.0 E.	-1.8
Wisconsin:					
Madison (a) .....	1915, Jy. . .	4 35.6 E.	1921, Je. . .	4 21.7 E.	-2.4
La Crosse (a) .....	1914, Se. . .	5 24.9 E.	1921, Jy. . .	5 08.5 E.	-2.4
Minnesota:					
St. Paul (a) .....	1915, Jy. . .	8 42.2 E.	1921, Jy. . .	8 27.3 E.	-2.5
Willmar (a) .....	1915, Je. . .	8 37.0 E.	1921, Jy. . .	8 20.3 E.	-2.7
Brockenridge (a) .....	1914, Au. . .	12 10.2 E.	1921, Jy. . .	11 50.7 E.	-2.8
Iowa:					
Des Moines (a) .....	1918, Jy. . .	7 54.4 F.	1921, Se. . .	7 47.5 E.	-2.2
Davenport (a) .....	1918, Jy. . .	5 01.8 E.	1921, Se. . .	4 56.1 E.	-1.8
Missouri:					
University City (a) .....	1916, Au. . .	5 02.2 E.	1921, Au. . .	4 58.7 E.	-0.7
Kansas City (a) .....	1916, Oc. . .	9 14.6 E.	1921, Se. . .	9 14.6 E.	0.0
Arkansas: Little Rock (a) .....	1916, Jy. . .	7 02.5 E.	1921, Se. . .	7 06.0 E.	+0.7
Oklahoma:					
Guthrie (a) .....	1911, Jy. . .	9 49.6 E.	1921, Se. . .	10 01.3 E.	+1.2
McAlester (a) .....	1914, Oc. . .	8 55.2 E.	1921, Se. . .	9 01.1 E.	+0.9
Kansas:					
Salina (a) .....	1917, Je. . .	11 25.8 E.	1921, Se. . .	11 21.2 E.	-1.1
Winfield (a) .....	1916, My. . .	9 50.7 E.	1921, Se. . .	9 48.2 E.	-0.5
Nebraska:					
Newport (a) .....	1915, Au. . .	12 31.1 E.	1921, Se. . .	12 17.2 E.	-2.3
Chadron (a) .....	1915, Au. . .	14 39.1 E.	1921, Se. . .	14 27.2 E.	-2.0
North Dakota:					
Jamestown (a) .....	1914, Au. . .	12 32.4 E.	1921, Jy. . .	12 20.3 E.	-1.8
Bismarck (a) .....	1914, Au. . .	15 07.6 E.	1921, Jy. . .	14 51.2 E.	-2.4
Montana:					
Glendive (a) .....	1916, Se. . .	17 20.1 E.	1921, Jy. . .	17 02.0 E.	-3.7
Billings (b) .....	1910, Jy. . .	18 18.4 E.	1921, Jy. . .	18 07.3 E.	-1.0
Livingston (b) .....	1916, Se. . .	19 45.4 E.	1921, Jy. . .	19 31.0 E.	-3.0
Helena (a) .....	1913, Se. . .	20 09.4 E.	1921, Au. . .	19 59.9 E.	-1.2
Missoula (a) .....	1906, Se. . .	21 22.0 E.	1921, Au. . .	21 32.2 E.	+0.7
Wyoming:					
Cheyenne (b) .....	1918, Jy. . .	15 18.4 E.	1921, Se. . .	15 13.0 E.	-1.7
Rawlins (a) .....	1915, Se. . .	16 15.1 E.	1921, Se. . .	16 08.0 E.	-1.2
Green River (a) .....	1918, Je. . .	17 17.6 E.	1921, Au. . .	17 12.2 E.	-1.7
Idaho:					
Pocatello (a) .....	1916, Se. . .	18 34.3 E.	1921, Au. . .	18 33.5 E.	-0.2
Shoshone (a) .....	1910, Jy. . .	19 46.8 E.	1921, Au. . .	19 59.5 E.	+1.2
Wells (a) .....	1910, Jy. . .	21 03.4 E.	1921, Au. . .	21 10.1 E.	+0.6
Oregon: Pendleton (a) .....	1917, Je. . .	21 58.4 E.	1921, Au. . .	21 58.2 E.	0.0
Washington:					
Spokane (a) .....	1917, Je. . .	23 43.0 E.	1921, Au. . .	23 35.3 E.	-1.8
Seattle (a) .....	1917, Mh. . .	23 47.0 E.	1921, My-No	23 45.3 E.	-0.3
Arizona: Tucson observatory (a) .....	1919, year..	13 47.8 E.	1921, year..	13 47.8 E.	0.0
Hawaii: Honolulu observatory (a) .....	1919, year..	9 50.7 E.	1921, year..	9 55.2 E.	+2.2
Porto Rico: Vieques observatory (a) .....	1919, year..	3 40.0 W.	1921, year..	3 53.8 W.	-6.6
Alaska: Sitka observatory (a) .....	1919, year..	30 28.9 E.	1921, year..	30 28.7 E.	+0.9

## INSTRUMENTAL CORRECTIONS.

Beginning with 1913 the results of horizontal intensity observations made by the Coast and Geodetic Survey have been reduced to the international standard of the Carnegie Institution of Washington. The published results of horizontal intensity determinations made before that year must be diminished by 0.001 H to reduce them to that standard.

The field instruments were compared with the standard instruments at Cheltenham at the beginning or end of the season. The adopted corrections are given below:

*Corrections to magnetometers.*

Number.	Pattern.	Correction to east declination.	Correction to H in parts of H.
19	Coast and Geodetic Survey.....	0.0	-0.0005
29	do.....	-.6	.0000
26	Wild-Edelmann.....	.0	-.0010
30	India Survey.....	.0	+ .0009
31	do.....	.0	-.0007
36	do.....	-1.1	.0000
27	do.....	0.0	+ .0016
28	Carnegie Institution.....	.0	-.0016

*Corrections to dip circles.*

Number.	Pattern.	Needles.	Correction.
31	Kew-Dover.....	1	-1.1
		2	+1.1
36	Kew-Dover.....	3 (deflected)	0.0
		1	-1.6
56	Kew-Casella.....	2	-0.4
		1	+1.2
.5678	Kew-Casella.....	3 of 18	-2.6
		1	+1.2
		2	-1.1
		5	-2.6
		6	-1.4

## DIURNAL VARIATION CORRECTION.

Each value of the magnetic declination has been corrected for diurnal variation with the aid of the continuous observations at the nearest magnetic observatory, allowance being made for the change in diurnal range with change in magnetic latitude. In the case of the stations in the northwestern part of the country, use was made of the observations at three observatories, Cheltenham, Md., Tucson, Ariz., and Sitka, Alaska. No attempt has been made to correct the dip and intensity results for diurnal variation.

## ARRANGEMENT OF TABLE.

The results presented are arranged by States alphabetically, and the results for each State are given in the order of increasing latitudes. The latitudes and longitudes are in most cases the results of solar observations made with the small theodolite which forms a part of the magnetometer. Where declination was determined with a com-

pass declinometer the azimuth and geographic position were obtained from the triangulation. The horizontal intensity is expressed in terms of the one-hundred thousandth part of a C. G. S. unit of intensity of magnetic force, termed a gamma and designated by the Greek letter  $\gamma$ .

In order to include the desired amount of information in the available space, the months have been abbreviated as follows:

January.....Ja.	May.....My.	September.....Se.
February.....Fe.	June.....Je.	October.....Oc.
March.....Mh.	July.....Jy.	November.....No.
April.....Ap.	August.....Au.	December.....De.

The numbers shown as a decimal in the column headed "D. C." give the needles used. Dip circle No. 5678 is designated 78 in the table. Where the number in the magnetometer column is in italics, the declination observations were made with a compass declinometer.

The observer is indicated by the initials of his name. The names of the observers are as follows:

W. H. Cullum.	A. J. Hoskinson.	A. P. Ratti.
E. R. Hand.	H. E. McComb.	B. H. Rigg.
George Hartnell.	W. N. McFarland.	F. P. Ulrich.
N. H. Heck.	W. W. Merrymon.	J. T. Watkins.
W. M. Hill.	F. L. Peacock.	L. C. Wilder.

*Magnetic observations on land.*

ALABAMA.

Station.	Latitude.	Longitude.	Date, 1921.	Declination.	Dip.	Horizontal Intensity.	Instruments.		Observer.
							M.	D. C.	
Huntsville.....	34 44.1	86 34.7	Oct. 11, 12	<i>East,</i> 4 07.2	69 58.6	22295	38	78.56	W. N. M.

ALASKA.

Clarence Strait:									
Seal (a).....	54 55.9	131 35.6	Jy. 17	36 42.0	.....	.....	5	.....	F. L. P.
Seal (b).....	54 55.9	131 35.6	Jy. 18	47 11.2	.....	.....	5	.....	F. L. P.
Duncan.....	55 00.7	131 38.5	Au. 5, 10	30 28.3	.....	.....	5	.....	F. L. P.
Wedge.....	55 09.2	131 57.6	Au. 17, 21	27 45.4	.....	.....	5	.....	F. L. P.
Chasina S.....	55 15.4	131 59.6	Je. 2, 6	29 21.6	.....	.....	5	.....	F. L. P.
Skin.....	55 18.1	132 04.4	Se. 12	28 47.6	.....	.....	5	.....	F. L. P.
Gravina.....	55 18.6	131 52.1	Je. 10, 12	29 20.5	.....	.....	5	.....	F. L. P.
S. Vallenar (a).....	55 22.7	131 52.8	Se. 1	30 26.1	.....	.....	5	.....	F. L. P.
S. Vallenar (b).....	55 22.7	131 52.8	Se. 7	29 69.9	.....	.....	5	.....	F. L. P.
High Island.....	55 23.7	132 09.6	Se. 14, 15	29 07.0	.....	.....	5	.....	F. L. P.
Guard Island.....	55 26.7	131 52.9	Se. 8, 9	29 50.2	.....	.....	5	.....	F. L. P.
Approach (a).....	55 26.8	132 06.9	Oct. 10	31 16.8	.....	.....	5	.....	F. L. P.
Approach (b).....	55 26.8	132 06.9	Oct. 14	35 12.0	.....	.....	5	.....	F. L. P.
Caamano.....	55 29.8	131 59.0	So. 16	29 16.3	.....	.....	5	.....	F. L. P.
Noyes Island:									
Camp.....	55 33.2	133 37.3	Oct. 20	29 34.9	.....	.....	8	.....	L. C. W.
Shine.....	55 33.4	133 39.7	Oct. 20	29 31.8	.....	.....	8	.....	L. C. W.
Sitka Observatory.....	57 03.0	135 20.1	Year	30 28.7	74 22.8	15566	37	2 EI	F. P. U.
Stephens Passage:									
Wind.....	57 37.6	133 40.4	My. 12	31 32.1	.....	.....	7	.....	N. H. H.
League.....	57 37.6	133 40.4	My. 12	31 32.2	.....	.....	7	.....	N. H. H.
Lookout.....	57 38.9	133 40.5	My. 12	31 02.6	.....	.....	7	.....	N. H. H.
Port Snettisham:									
Anmer.....	57 55.9	133 51.0	Ap. 29	31 32	.....	.....	7	.....	B. H. R.
Kris.....	57 57.1	133 51.2	Ap. 29	31 41	.....	.....	7	.....	B. H. R.
Sned.....	57 58.0	133 53.3	Ap. 29	32 01	.....	.....	7	.....	B. H. R.
Tish.....	57 58.0	133 50.0	Ap. 16	33 50	.....	.....	7	.....	N. H. H.
Go.....	57 58.4	133 49.1	Ap. 16	36 39	.....	.....	7	.....	N. H. H.
Long.....	57 58.6	133 48.6	Ap. 16	41 52	.....	.....	7	.....	N. H. H.
Z.....	57 58.7	133 47.9	Ap. 16	71 31	.....	.....	7	.....	N. H. H.

## Magnetic observations on land—Continued.

ALASKA—Continued.

Station.	Latitude.	Longitude.	Date, 1921.	Declination.	Dip.	Horizontal Intensity.	Instruments.		Observer.
							M.	D. C.	
Z'.....	57 58.7	133 48.1	Ap. 18	52 54	.....	γ	7	.....	N. H. H.
Y'.....	57 58.8	133 47.7	Ap. 18	57 27	.....	.....	7	.....	N. H. H.
South.....	57 58.8	133 45.0	Ap. 20	21 15	.....	.....	7	.....	N. H. H.
A.....	57 58.9	133 52.3	Ap. 20	32 25	.....	.....	7	.....	B. H. R.
X.....	57 58.9	133 47.4	Ap. 18	50 39	.....	.....	7	.....	N. H. H.
X'.....	57 59.0	133 47.2	Ap. 18	71 43	.....	.....	7	.....	N. H. H.
Mist.....	57 59.1	133 50.8	Ap. 20	33 10	.....	.....	7	.....	B. H. R.
X.....	57 59.1	133 47.0	Ap. 18	88 46	.....	.....	7	.....	N. H. H.
Wit.....	57 59.2	133 45.3	Ap. 20	10 10	.....	.....	7	.....	N. H. H.
W.....	57 59.2	133 46.8	Ap. 18	70 08	.....	.....	7	.....	N. H. H.
Red.....	57 59.3	133 46.6	Ap. 18	94 28	.....	.....	7	.....	N. H. H.
Ben.....	57 59.3	133 45.3	Ap. 20	14 39	.....	.....	7	.....	N. H. H.
Not.....	57 59.4	133 45.6	Ap. 20	8 40	.....	.....	7	.....	N. H. H.
Not.....	57 59.4	133 46.3	Ap. 18	109 52	.....	.....	7	.....	N. H. H.
Not.....	57 59.5	133 46.1	Ap. 20	76 58	.....	.....	7	.....	N. H. H.
Edge.....	57 59.5	133 45.6	Ap. 20	9 31	.....	.....	7	.....	N. H. H.
B.....	57 59.5	133 50.0	Ap. 20	33 55	.....	.....	7	.....	B. H. R.
Sent'.....	57 59.6	133 45.9	Ap. 20	West. 20 42	.....	.....	7	.....	N. H. H.
Sent.....	57 59.0	133 45.7	Ap. 20	East. 7 36	.....	.....	7	.....	N. H. H.
Not.....	57 59.6	133 45.6	Ap. 20	11 22	.....	.....	7	.....	N. H. H.
C.....	57 59.7	133 49.7	Ap. 20	35 32	.....	.....	7	.....	B. H. R.
D.....	57 59.7	133 49.4	Ap. 20	36 05	.....	.....	7	.....	B. H. R.
E.....	57 59.8	133 48.9	Ap. 20	40 58	.....	.....	7	.....	B. H. R.
F.....	58 00.0	133 48.3	Ap. 20, 20	35 33	.....	.....	7	.....	B. H. R.
Fit.....	58 00.1	133 47.9	Ap. 20	39 06	.....	.....	7	.....	B. H. R.
Port.....	58 00.5	133 47.1	Ap. 20	35 21	.....	.....	7	.....	B. H. R.
Stephens Passage: Corner.....	58 09.9	134 12.4	Ap. 6	31 37.2	.....	.....	7	.....	A. P. R.
Gastineau Channel: Marmon.....	58 11.7	134 15.3	Oc. 5	31 18.9	.....	.....	7	.....	A. P. R.
Entrance.....	58 12.5	134 13.9	Oc. 5	31 37.7	.....	.....	7	.....	A. P. R.
Don.....	58 13.9	134 18.5	Oc. 5	31 22.9	.....	.....	7	.....	A. P. R.
Little.....	58 15.1	134 18.7	Oc. 5	29 55.4	.....	.....	7	.....	A. P. R.
Bay.....	58 16.2	134 21.0	Oc. 5	33 28.2	.....	.....	7	.....	A. P. R.
Jun.....	58 16.5	134 23.0	Oc. 5	33 16.5	.....	.....	7	.....	A. P. R.
Lynn Canal: Boat.....	58 38.9	135 09.6	Jy. 15	30 50.9	.....	.....	7	.....	B. H. R.
Lost.....	58 41.0	135 11.7	Jy. 15	31 24.1	.....	.....	7	.....	B. H. R.
Henry.....	58 44.1	135 14.0	Jy. 15	30 15.4	.....	.....	7	.....	B. H. R.
Mary.....	58 43.8	135 01.0	Jy. 16	31 58.9	.....	.....	7	.....	B. H. R.
Rivor.....	58 45.8	135 13.8	Jy. 15	31 29.7	.....	.....	7	.....	B. H. R.
Slate.....	58 45.9	135 04.1	Jy. 16	31 50.8	.....	.....	7	.....	B. H. R.
Pale.....	58 47.1	135 04.9	Jy. 30	31 40.4	.....	.....	7	.....	B. H. R.
Slo.....	58 48.5	135 06.3	Jy. 30	31 53.6	.....	.....	7	.....	B. H. R.
Cot.....	58 47.7	135 15.4	Se. 22	31 49.0	.....	.....	7	.....	A. J. H.
Cross.....	58 48.7	135 16.2	Se. 22	31 58.0	.....	.....	7	.....	A. J. H.
Man.....	58 49.7	135 08.1	Au. 15	31 47.1	.....	.....	7	.....	B. H. R.
Cove.....	58 50.7	135 18.1	Se. 22	31 55.4	.....	.....	7	.....	A. J. H.
Sher.....	58 51.1	135 09.0	Se. 22	32 06.1	.....	.....	7	.....	A. J. H.
Brown.....	58 53.6	135 08.9	Se. 22	32 53.5	.....	.....	7	.....	A. J. H.
Cow.....	58 54.4	135 09.2	Se. 22	33 21.0	.....	.....	7	.....	A. J. H.
Van.....	58 55.3	135 17.9	Se. 20	31 45.0	.....	.....	7	.....	A. P. R.
Island.....	58 57.4	135 17.8	Se. 28	31 46.1	.....	.....	7	.....	A. P. R.
Quartz.....	58 59.1	135 18.8	Se. 20	31 30.8	.....	.....	7	.....	A. P. R.
Sed.....	59 00.2	135 14.9	Se. 11	25 38.4	.....	.....	7	.....	A. P. R.
Web.....	59 00.5	135 19.7	Se. 29	31 30.1	.....	.....	7	.....	A. P. R.
Tan.....	59 00.9	135 14.6	Se. 11	32 58.2	.....	.....	7	.....	A. P. R.
Kabe.....	59 01.0	135 20.5	Se. 9	31 56.5	.....	.....	7	.....	A. P. R.
Slide.....	59 01.7	135 12.2	Se. 11	30 32.0	.....	.....	7	.....	A. P. R.
Bac.....	59 04.6	135 16.4	Se. 21	30 09.0	.....	.....	7	.....	A. J. H.
Seduction.....	59 04.8	135 18.4	Se. 21	32 36.7	.....	.....	7	.....	A. J. H.
St. Michael, old.....	63 20.0	162 00.7	Oc. 7, 12	20 41.0	74 14.7	15106	20	31.123	J. T. W.
St. Michael, new.....	63 29.2	162 00.2	Se. 4, 11	21 01.2	74 26.4	16065	20	31.123	J. T. W.
Nome (City).....	64 30.1	165 21.0	Se. 19, 21	19 09.4	74 40.3	14053	20	31.123	J. T. W.
Nome.....	64 30.2	165 24.0	Je. 21, 24	18 32.0	74 43.2	.....	20	31.12	J. T. W.
Do.....	64 30.2	165 24.0	Se. 22, 25	18 31.4	74 42.5	14088	20	31.123	J. T. W.
Teller City.....	65 16.0	166 21.4	Jy. 19, 21	18 54.9	75 20.4	14180	20	31.123	J. T. W.
Point Hope.....	68 21.7	166 46.8	Au. 23	20 09.8	77 38.8	12188	20	31.123	J. T. W.
Demarcation Pt.....	69 38.8	141 00.0	Au. 15, 16	40 23.4	81 23.8	8751	20	31.123	J. T. W.
Ooglaamle.....	71 18.7	156 50.7	Jy.-Au.	29 45.6	80 33.7	6433	20	31.123	J. T. W.

## Magnetic observations on land—Continued.

## ARIZONA.

Station.	Latitude.	Longitude.	Date, 1921.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
Tucson Observatory.	32 14.8	110 50.1	Year	<i>East</i> , 13 47.8	59 27.9	20868	30	3 EI	W. H. C.

## ARKANSAS.

Little Rock.....	34 47.0	92 17.9	Se. 28	7 06.0	65 35.0	23464	38	36.12	W. N. M.
Do.....	34 47.0	92 17.9	Se. 28	.....	65 33.4	.....	..	78.56	W. N. M.

## HAWAII.

Honolulu Obs'y.....	21 19.2	158 03.8	Year	9 55.2	39 24.8	28818	36	4 EI	H. E. M.
---------------------	---------	----------	------	--------	---------	-------	----	------	----------

## IDAHO.

Pocatello.....	42 51.5	112 26.4	Au. 25	18 33.5	68 56.0	20822	19	56.13	W. W. M.
Shoshone.....	42 55.9	114 24.8	Au. 23	19 59.5	69 32.7	20026	19	56.13	W. W. M.
Weiser.....	44 15.7	116 57.9	Au. 20	21 10.1	69 01.4	20768	19	56.13	W. W. M.

## ILLINOIS.

Urbana.....	40 05.9	88 13.9	Je. 23	3 10.0	71 09.8	19258	19	56.13	W. W. M.
Joliet.....	41 28.5	88 11.5	Se. 26	2 25.0	72 33.6	18045	19	56.13	W. W. M.

## INDIANA.

Vincennes.....	38 40.4	87 32.5	Au. 22, 23	2 57.0	70 12.8	20015	38	36.12	W. N. M.
----------------	---------	---------	------------	--------	---------	-------	----	-------	----------

## IOWA.

Davenport.....	41 32.1	90 36.4	Se. 22	4 56.1	72 10.0	18529	19	56.13	W. W. M.
Des Moines.....	41 35.6	93 33.7	Se. 20	7 47.5	71 45.4	18759	19	56.13	W. W. M.

## KANSAS.

Winfield.....	37 14.7	96 59.0	Se. 17, 19	9 48.2	67 33.5	22230	38	36.12	W. N. M.
Salina.....	38 49.0	97 37.2	Se. 10, 14	11 21.2	68 30.8	21479	38	36.12	W. N. M.

## KENTUCKY.

Winchester.....	38 00.3	84 11.1	Au. 17, 18	<i>West</i> 0 22.2	69 51.2	19808	38	36.12	W. N. M.
Louisville.....	38 14.2	85 42.9	Au. 19, 20	<i>East</i> 0 48.2	70 03.2	20055	38	36.12	W. N. M.

## MARYLAND.

Cheltenham Obs'y..	38 44.0	76 50.5	Year	<i>West</i> 6 22.4	70 56.8	19064	26	26 EI	G. H.
Do.....	38 44.0	76 50.5	Ap. 6, 11	6 22.0	.....	19074	38	.....	G. H.
Do.....	38 44.0	76 50.5	Oct. 14, 15	6 23.6	.....	19043	19	.....	G. H.

## U. S. COAST AND GEODETIC SURVEY.

## Magnetic observations on land—Continued.

## MINNESOTA.

Station.	Latitude.	Longitude.	Date, 1921.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
St. Paul.....	44 58.0	93 06.2	Jy. 9	<i>East.</i> 8 27.3	74 52.0	16110	19	56.13	W. W. M.
Willmar.....	45 09.6	95 03.7	Jy. 12	8 20.3	74 53.8	16013	19	56.13	W. W. M.
Brecknridge.....	48 15.5	96 35.5	Jy. 14	11 50.7	75 37.6	15271	19	56.13	W. W. M.

## MISSISSIPPI.

Corinth.....	34 55.3	88 31.2	Oc. 5, 6	4 40.7	66 45.9	22457	38	78.56	W. N. M.
Corinth, Aux. A.....	34 55.3	88 31.2	Oc. 6	5 00.0	.....	.....	38	.....	W. N. M.

## MISSOURI.

University City.....	38 38.6	90 17.8	Au. 25, 26	4 58.7	69 59.0	20238	38	36.12	W. N. M.
Kansas City.....	39 03.0	94 31.0	Se. 6-8	9 14.6	69 20.3	20986	38	36.12	W. N. M.

## MONTANA.

Livingston.....	45 39.7	110 36.2	Jy. 28	19 31.0	71 44.4	18086	19	56.13	W. W. M.
Billings.....	45 46.3	108 32.4	Jy. 26	18 07.3	72 20.8	18323	19	56.13	W. W. M.
Helena.....	46 37.1	112 00.8	Au. 9	19 59.9	72 03.6	18162	19	56.13	W. W. M.
Missoula.....	46 52.3	113 59.7	Au 11	21 32.2	71 56.7	18441	19	56.13	W. W. M.
Glendive.....	47 06.8	104 41.6	Jy. 22	17 02.0	74 19.8	16475	19	56.13	W. W. M.

## NEBRASKA.

Lincoln.....	40 49.5	96 40.8	Se 15	10 03.7	70 51.0	19520	19	56.13	W. W. M.
Newport.....	42 36.2	99 20.2	Se 12	12 17.2	71 31.6	19004	19	56.13	W. W. M.
Chadron.....	42 49.1	103 06.2	Se 10	14 27.2	71 19.0	19221	19	56.13	W. W. M.

## NORTH CAROLINA.

Station.	Latitude.	Longitude.	Date.	Declination.	Dip.	Horizontal intensity.	Instruments.	Observer.	
									M.
Wilmington, new....	34 12.8	77 53.0	Jy. 19, 20	<i>West.</i> 2 48.2	66 50.0	22122	38	36.12	W. N. M.
Wilmington, old....	34 14.2	77 57.6	Jy. 16-18	2 56.9	67 21.8	21092	38	36.12	W. N. M.
Wilmington, aux. A.	34 14.2	77 57.6	Jy. 18	2 50.9	.....	.....	38	.....	W. N. M.
Whiteville.....	34 21.3	78 42.0	Jy. 22-25	2 28.9	66 39.3	22324	38	36.12	W. N. M.
Whiteville, S. M.....	34 21.3	78 42.0	Jy. 25	2 06.0	.....	.....	38	.....	W. N. M.
Troy, aux. C.....	35 21.5	79 53.8	Jy. 28	2 15.8	.....	.....	38	.....	W. N. M.
Troy, aux. B.....	35 21.5	79 54.0	Jy. 28	2 22.7	.....	.....	38	.....	W. N. M.
Troy, aux. A.....	35 21.6	79 54.0	Jy. 28	2 12.9	.....	.....	38	.....	W. N. M.
Troy, old.....	35 21.6	79 54.0	Jy. 28	2 03.5	.....	.....	38	.....	W. N. M.
Troy, new.....	35 21.7	79 54.0	Jy. 20	2 24.3	67 29.2	21774	38	36.12	W. N. M.
Goldsboro.....	35 22.0	77 58.3	Jy. 12, 13	2 52.1	67 54.5	21207	38	36.12	W. N. M.
Sallsbury.....	35 41.8	80 30.6	Au. 8	2 01.4	67 51.3	21379	38	36.12	W. N. M.
Morgantown.....	35 43.0	81 42.6	Au. 9, 10	1 08.8	67 50.8	21584	38	36.12	W. N. M.
Halifax.....	36 19.3	77 34.4	Jy. 8, 9	3 48.9	68 49.8	20520	38	36.12	W. N. M.
Halifax, aux. A.....	36 19.3	77 34.4	Jy. 8	3 48.8	.....	.....	.....	.....	W. N. M.

## NORTH DAKOTA.

Bismarck, 1914.....	46 48.4	100 47.2	Jy. 19	<i>East.</i> 14 51.2	74 51.0	16160	19	56.13	W. W. M.
Bismarck, 1907.....	46 48.4	100 47.2	Jy. 20	14 30.5	.....	.....	19	.....	W. W. M.
Jamestown.....	46 53.0	98 42.	Jy. 16	12 20.3	75 25.2	15579	19	56.13	W. W. M.

## OHIO.

Cleveland.....	41 28.8	81 36.5	Je. 17	<i>West.</i> 4 25.0	72 46.2	17677	19	56.13	W. W. M.
----------------	---------	---------	--------	------------------------	---------	-------	----	-------	----------

## Magnetic observations on land—Continued.

## OKLAHOMA.

Station.	Latitude.	Longitude.	Date, 1921.	Declination.	Dip.	Horizontal intensity.	Instruments.		Observer.
							M.	D. C.	
McAlester.....	34 58.2	95 48.8	Se. 23-25	<i>East.</i> 9 01.1	65 24.2	23840	38	36.12	W. N. M.
Guthrie.....	35 53.0	97 24.8	Se. 21	10 01.3	66 04.3	23243	38	36.12	W. N. M.

## OREGON.

Pendleton.....	45 40.3	118 47.4	Au. 18	<i>East.</i> 21 53.2	69 22.2	20376	19	56.13	W. W. M.
----------------	---------	----------	--------	-------------------------	---------	-------	----	-------	----------

## PORTO RICO.

Porto Rico Obs'y....	18 08.8	65 28.9	Year	<i>West.</i> 3 53.3	51 28.7	27754	31	1EI	W. M. H.
----------------------	---------	---------	------	------------------------	---------	-------	----	-----	----------

## TENNESSEE.

Memphis.....	35 08.3	90 00.7	Oc. 3, 4	<i>East.</i> 5 31.8	66 31.2	22950	38	78.56	W. N. M.
Athens.....	35 27.0	84 35.7	Oc. 14, 15	0 28.0	67 01.8	21480	38	78.12	W. N. M.
Knoxville.....	35 56.0	83 57.0	Au. 12-15	<i>West.</i> 0 30.0	67 31.2	21989	38	36.12	W. N. M.
Knoxville, aux. A....	35 56.0	83 57.0	Au. 13	0 29.1	.....	.....	38	.....	W. N. M.

## VIRGINIA.

Bristol.....	36 36.2	82 10.5	Oc. 17, 18	<i>West.</i> 0 57.0	68 35.8	20910	38	78.56	W. N. M.
Lynchburg.....	37 24	79 08	Oc. 20, 21	3 41.2	69 52.8	19913	38	78.56	W. N. M.
Richmond.....	37 32.7	77 28.8	Jy. 4, 5	5 00.4	69 45.9	19896	38	36.12	W. N. M.

## VIRGIN ISLANDS.

Sight.....	17 44.5	64 40.1	Je. 8	4 38.5	.....	.....	6	.....	E. R. H.
Kid.....	17 45.5	64 34.0	Je. 2	4 37.8	.....	.....	6	.....	E. R. H.
Goat.....	17 45.3	64 34.7	Je.	4 38.8	.....	.....	6	.....	E. R. H.
Bird.....	17 47.3	64 37.2	Je. 6	4 44.8	.....	.....	6	.....	E. R. H.

## WASHINGTON.

Seattle.....	47 33.1	122 15.2	Oc.-No.	<i>East.</i> 23 46.0	70 40.5	19143	20	31.123	J. T. W.
Do.....	47 33.1	122 15.2	My. 30-Je. 4	23 44.6	70 41.8	19163	20	31.12	J. T. W.
Spokane.....	47 43.1	117 31.2	Au. 10	23 33.3	71 45.9	18508	19	56.13	W. W. M.

## WISCONSIN.

Madison.....	43 04.5	89 25.3	Je. 28	4 21.7	74 01.2	17101	19	56.13	W. W. M.
La Crosse.....	43 50.1	91 13.5	Jy. 2	5 08.5	74 12.0	16649	19	56.13	W. W. M.

## WYOMING.

Cheyenne.....	41 09.2	104 51.2	Se. 5	15 13.0	69 19.0	20780	19	56.13	W. W. M.
Green River.....	41 31.6	109 27.9	Au. 30	17 12.2	68 32.4	21237	19	56.13	W. W. M.
Rawlins.....	41 48.0	107 12.7	Se. 1	16 08.0	69 10.8	20811	19	56.13	W. W. M.

## SIBERIA.

Emma Harbor.....	64 25.2	173 15.4	Je.-Jy.	13 51.6	74 08.5	15138	20	31.123	J. T. W.
Whalon.....	66 10.2	169 48.4	Jy. 12	17 10.0	75 48.8	.....	20	31.12	J. T. W.

## DESCRIPTIONS OF STATIONS.

Magnetic observers are instructed to mark each station (except auxiliary stations for development of local disturbance) in as permanent a manner as possible, either with a stone, a draintile filled with cement, or a post of some durable wood, so that it may be available for future occupation. They are also required to furnish a sufficiently detailed description to locate the station, even if the marking should be destroyed, and to determine the bearings of two or three prominent objects in addition to the one used as a reference mark in the azimuth and declination observations. The information is given in abridged form on the following pages. Further details can usually be obtained upon application to the Superintendent of the Coast and Geodetic Survey.

The usual method of marking a station is by a stone post about 30 inches long and 6 inches square, set so as to project 2 or 3 inches above the ground. In the center of the top is set a circular bronze plate  $3\frac{1}{2}$  inches in diameter, with a stem 3 inches long.

When the local authorities desire it, and are willing to bear the expense, a second stone is set to mark the true meridian.

The descriptions of stations are arranged alphabetically by States and by names of stations.

## ALABAMA.

*Huntsville, Madison County.*—The station of 1917 was reoccupied. It is in the southwestern part of the public-school grounds, about one-half mile northeast of the courthouse square. The station is 75.5 feet from the southwest corner of the school-house, 18.4 feet south and east from a large oak tree 4 or 5 feet in diameter, and 50.9 feet from the center of the brick sidewalk on Calhoun Street. It is marked by a limestone post 5 by 5 by 24 inches, lettered U. S. 1910, projecting 1 inch above ground. The following true bearings were determined in 1910 and 1921:

Spire of Episcopal Church.....	30	51.5	W. of S.
Upper vent pipe, roof of house (203 Calhoun Street).....	33	18.4	W. of S.
I in "Huntsville" cut in corner stone of school building.....	52	09.8	E. of N.
Joint of northwest gable of veranda at (no number) East Clinton St. ....	50	03.2	E. of S.

## ALASKA.

*Demarcation Point.*—The station is 51 feet south of the Alaska-Canada Boundary Monument No. 1 and 22 feet west of the boundary line, on the featureless coastal plane which extends several miles inland from the bluff shore (15-20 feet) of the Arctic Ocean. The station is about 250 feet inland from the edge of the bluff, but the edge of the plain along the bluff is disintegrating and eroding, and the shore line is apparently undergoing progressive recession. It is marked by a concrete pier 10 by 10 by 24 inches, with a bronze disk, set flush with the surface of the tundra. The following true bearings were determined:

Triangulation station Polar (old tripod in place, not visited).....	56	56.4	W. of N.
Monument No. 1, center of top, distant 55.6 feet.....	23	52.8	E. of N.
Rocky nubble or cairn on sky line.....	16	24.9	E. of S.

*Nome.*—The City of Nome owns lots 1, 2, 3, and 4 of block 94, at the southeast corner of Fifth Avenue and C Street. The lots are 50 by 140 feet, fronting on Fifth Avenue. The station is about 25 feet northeast of the center of lot 2 and about 180 feet south of the edge of the bluff bank of Dry Creek. The station is marked by a concrete pier 10 by 10 by 24 inches, with bronze disk, set flush with surface of tundra. Gravel to a depth of 6 inches was spread over the surface of the tundra round the station. From the station the southwest corner of lot No. 1 (stake 2 by 2 by 18) bears  $68^{\circ} 37'$  true, distant 128 feet; the northwest corner of lot No. 1 bears  $144^{\circ} 35'$ , distant 98.6

feet; the northeast corner of lot No. 4 bears  $271^{\circ} 38'$ , distant 124.3 feet. The following true bearings were determined:

Finial on steeple of Pilgrim Church.....	28	57.0	W. of S.
West tangent to rock on summit of Anvil Peak.....	8	23.2	E. of N.
City triangulation station.....	84	53.4	E. of S.
Ames building flagstaff.....	29	15.2	E. of S.
East tangent of rock on summit of Anvil Peak.....	8	28.4	E. of N.
Top of cross on St. Mary's spire.....	44	07.4	E. of S.
Vertical post in rail at south side of top of wireless tower.....	72	55.1	E. of S.

Observations were also made at triangulation station City. It is on the summit of Gold Hill, the first eminence about  $1\frac{1}{2}$  miles east of Nome and about 1,000 yards from the beach. The station is marked by a concrete-filled 8-inch terra-cotta pipe, with bronze disk, set flush with the surface of the tundra. The surface of tundra at station was graded and covered with 6 inches of gravel. From the station the northwest corner of Dan Kelley's shack bears  $330^{\circ} 27'$  true, distant 48.1 feet; southwest corner of shack,  $347^{\circ} 03'$ , distant 49.5 feet; southwest corner of shed,  $352^{\circ} 09'$ , distant 60.5 feet; center of shaft in old dump,  $10^{\circ} 36'$ , distant 26.4 feet. A cairn of rocks was built over the station. The following true bearings were determined:

Triangulation station Anvil, highest (?) point of rock on top of Anvil Peak.....	11	31.7	W. of N.
Magnetic station (Fifth Avenue and C Street).....	84	50.7	W. of N.
Ames building flagstaff.....	79	21.5	W. of S.
West tangent to rock on top Anvil Peak.....	11	33.5	W. of N.
Mark, west edge of shack on beach.....	18	38.6	W. of S.
Finial on spire of Pilgrim Church.....	88	32.4	W. of S.
South vertical post in rail at top of wireless tower.....	89	34.0	W. of N.
Top of cross on St. Mary's spire.....	85	40.6	W. of S.

*Ooglaamie.*—The station is at Barrow Trading Post, on the crest of the flat ridge of the spit between the lagoon and the ocean; about 150 yards southwest of the trading post store, or old house of refuge. The mark is a concrete pier 10 by 10 by 24 inches, with bronze disk, set flush with the surface of the ground. From the station the west post of a meat rack, west of a sod house and an ice house, bears  $5^{\circ} 38'$  true, distant 36.7 feet; the northwest post of a boat rack bears  $97^{\circ} 12'$  true; the northeast corner of a frame shack (under eaves) bears  $193^{\circ} 37'$  true, 62 feet; the northwest corner of a frame shack (under eaves) bears  $264^{\circ} 00'$  true, 85.7 feet; east corner of Brower's residence (under eaves)  $228^{\circ} 48'$ . The following true bearings were determined:

Taller steeple on church at Mission.....	26	40.3	W. of S.
Flagstaff, base, at Government school.....	35	14.6	W. of S.
Flagstaff, base, at Anton Betz on beach southwest of Mission.....	41	18.4	W. of S.
Canoe rack on cemetery hill, center of base of south post.....	51	55.1	E. of S.
Lower steeple on church at Mission.....	25	58.8	W. of S.
Base of flagstaff over south entrance to trading post store (Liebes')..	30	20.8	E. of N.

*Point Hope.*—The station is on the gravel spit which terminates in Point Hope. It is near the new cemetery, about one-third mile from the beach, inshore from the Mission, and about  $2\frac{1}{2}$  miles eastward from the point. The mark is a concrete pier 12 by 12 by 24 inches, with bronze disk, set flush with the surface of the gravel. It is near the crest of the first east-west ridge south of the cemetery, separated from the cemetery by a wet depression between the ridges. It is on range of the east fence (whale bones) of the cemetery and 153 feet south of the southeast corner of the cemetery. The following true bearings were determined:

Vent on east gable of store.....	63	27.2	W. of S.
West edge of chimney on residence at Mission.....	15	54.8	W. of N.
West gable of chapel.....	9	21.0	E. of N.
Right tangent to Cape Lisburne (approximate).....	21	07.8	E. of N.
Bottom of notch in sky line north of cone.....	70	54.8	E. of N.
Vertical face of headland over Cape Thompson.....	55	05.9	E. of S.
Right tangent to Cape Thompson (approximate).....	54	57.8	E. of S.

*St. Michael.*—The station Hill Top of 1908 was reoccupied approximately. It is on the summit near the school and west of the native village of Tatchek. It is marked by a concrete pier 10 by 10 by 24 inches, terminating at the surface with a 6-inch terra-cotta pipe and bronze disk, flush with the surface of tundra. The surface of tundra

round the station was graded and covered with a 4-inch layer of gravel. From the station the south edge of the school vestibule bears  $73^{\circ} 31'$  west of true south; the south-east corner of school lighting plant bears  $74^{\circ} 26'$  west of south, distant 44.5 feet; north-east corner of school lighting plant bears  $87^{\circ} 22'$  west of north, distant 46 feet; triangulation station Tatchek upper base,  $38^{\circ} 11'$  east of north, distant 7 feet; north corner of old store building,  $31^{\circ} 58'$  east of south, distant 55 feet. The following true bearings were determined:

Magnetic station on hill near radio station.....	45 09.8 E. of N.
Greek cross on spire of Russian Church.....	45 27.8 W. of S.
Base of flagstaff, parade ground, Army post.....	71 11.6 W. of S.
East wireless pole.....	38 28.3 E. of N.
East Peak.....	76 32.2 E. of S.
Stephen Hill.....	63 53.0 W. of N.
Cross on dome of Russian Church.....	44 44.8 W. of S.

Observations were also made at a new station on the eastern end of St. Michael Island, on the same ridge as the radio station and about 410 feet southeast of the radio office building. It is marked by a concrete pier 10 by 10 by 24 inches with bronze disk in top, about 6 inches above the surface of the tundra. From the station the south corner of the military cemetery, 109 feet distant, bears  $66^{\circ} 53'$  west of south; the east corner (in range with west corner),  $83^{\circ} 29'$  west of north, 65 feet; the north corner,  $64^{\circ} 46'$  west of north; east wireless pole,  $85^{\circ} 59'$  west of north; middle wireless pole,  $65^{\circ} 26'$  west of north; west wireless pole,  $62^{\circ} 11'$  west of north; east corner of radio office building,  $56^{\circ} 49'$  west of north, distant 410 feet. The following true bearings were determined:

Greek cross on spire of Russian Church.....	45 19.3 W. of S.
Cross on dome of Russian Church.....	44 57.7 W. of S.
Whale Island light, mantle.....	48 32.2 E. of N.
Cross on belfry, Catholic Church.....	51 22.6 W. of S.
Base of flagstaff, parade ground, Army post.....	60 53.6 W. of S.
East Peak.....	75 39.5 E. of S.
Hill Top magnetic station.....	45 10.3 W. of S.

*Teller City, Port Clarence.*—The station is on the west side of the street on which the school is located and is on the range of north end of lagoon in line with the first point of the shore line northeast of Cape Riley. It is about 200 feet from the Port Clarence shore and about 325 feet from the Grantley Harbor shore. The nearest point on the shore of the lagoon is distant about 100 feet. The station is marked by a concrete pier 10 by 10 by 24 inches, with bronze disk, set flush with the surface of the gravel spit. The following true bearings were determined:

Base of inclined leg of tripod signal.....	48 50.4 W. of S.
Right tangent to point northeast of Cape Riley.....	52 01.6 W. of S.
Southwest corner of small gray building at Teller reindeer station... 36	52.4 W. of N.
Left tangent to first conspicuous bluff point on south side of Grantley Harbor.....	84 49.4 E. of S.
Base of flagstaff on schoolhouse.....	20 56.7 E. of S.
Summit of small cone.....	43 57.1 E. of N.

#### ARKANSAS.

*Little Rock, Pulaski County.*—The station of 1916 was reoccupied. It is on the parade grounds of Fort Logan H. Roots, about 3 miles northwest of Little Rock. It is about 125 feet due east of the drive in front of the small brick building now used as headquarters by the Public Health Service. It is marked by a gray limestone post 7 by 7 by 36 inches, sunk flush with the surface of the ground and lettered U. S. C. & G. S. This stone marks the north end of a meridian line established in 1901. The south end is marked by a similar stone set 444.5 feet distant. This stone could not be found in 1921. The following true bearings were determined in 1905 and 1921:

Water tank on grounds.....	47 20.7 E. of N.
Tip west cupola on barracks building.....	58 49.2 E. of N.
Tip east cupola on another barracks building.....	64 09.2 E. of S.
Water tank across river.....	3 31.8 W. of S.

## IDAHO.

*Pocatello, Bannock County.*—The station of 1916 was reoccupied. It is on the grounds of the Idaho Technical Institute,  $1\frac{1}{2}$  miles northeast of the town's center. It is 108 feet southeast of the iron fence on the northwest side of the grounds, 28.5 feet southwest of a row of trees (in line with the southwest side of the main building), and 185.7 feet northwest of the southwest corner of the main building. It is marked by a lava post 6 by 6 by 30 inches, with a cross in the center and set flush with the surface. The following true bearings were determined in 1910 and 1916:

Near edge of chimney at public school building.....	16	00.5	W. of S.
Center of high brick smokestack.....	69	41.6	W. of S.
Right edge of brick residence near northwest entrance to campus...	7	00.2	E. of N.
Roof gable above front entrance to girls' dormitory.....	23	34.4	E. of S.
Right edge of girls' dormitory, on bricks.....	15	51.9	E. of S.

*Shoshone, Lincoln County.*—Observations were made over a lava block about 10 inches square on top and showing about 8 inches above ground. This stone is set firmly in a slanting position and marks the southeast corner of the township. It is placed where a dry irrigation ditch running along the eastern side of the township turns and runs along the southern side, about half a mile from the town's center. The land to the east belongs to the Oregon Short Line Railroad Co. The following true bearings were determined in 1910 and 1921:

Southern gable on cupola on ice house one-quarter mile away.....	35	32.0	E. of N.
Northwest corner of large brick smoke stack at top.....	63	31.1	E. of N.
Southern gable of easternmost railroad shop's building.....	73	24.9	E. of N.
Southeast corner (low down) of railroad shop building, next stack..	65	07.3	E. of N.
Center of fireplace chimney on house one-half mile away.....	87	31.0	W. of S.

*Weiser, Washington County.*—The station of 1910 was reoccupied. It is about  $1\frac{1}{2}$  miles north of the center of the town, about 1,000 feet north of the north city reservoir, on the grounds where the Congregational Academy formerly stood. The shell of the westernmost one of the former academy buildings still stands and the station is 147.3 feet southeast of the southeast corner of this building. It is also 180.8 feet southwest of the southwest corner of the remnants of the foundation of the middle building and 195 feet south of the fence on the north side of the field. The station is marked by a rough white sandstone 7 by 10 by 27 inches, with a bronze disk set in the top, projecting about 3 inches above ground. The following true bearings were determined in 1910 and 1921:

Spire of Congregational Church, $1\frac{1}{2}$ miles away (mark).....	3	46.0	E. of S.
Tip top of brick front of Wheaton theater building.....	5	50.9	W. of S.
Center of window in small house on elevator.....	20	35.0	W. of S.
Near edge of base of chimney on large central building at college...	80	04.9	W. of N.
Center of chimney at high school, $1\frac{1}{2}$ miles away.....	9	43.4	E. of S.

## ILLINOIS.

*Joliet, Will County.*—The station of 1914 being no longer suitable for magnetic observations a new station was established in the southwestern part of Rock Run Park, about one-fourth mile southwest of the old station and 6 miles southwest of town. The new station is about 275 feet from the end of the peninsula, 53 feet from the bank of the bayou on the west and 115 feet northwest of the canal. It is 23.7 feet north-northeast of a small double oak tree, 33.7 feet south of an oak tree, 55.5 feet south-southwest of a hickory tree, and 24.8 feet southwest of a lynn tree. The station is marked by a rough white stone 4 by 6 by 20 inches, projecting about 4 inches above ground with the letters U. S. and a cross cut on the top. The following true bearings were determined:

Left edge of red silo at farm one-quarter mile away (mark).....	25	36.7	W. of N.
Center of base of telephone pole one-quarter mile away, seen between two trees.....	22	26.4	E. of N.
Center of two telephone poles three-eighths of a mile away, seen double between two trees.....	44	22.6	E. of N.
Left edge at base of telephone pole 350 feet away.....	5	53.0	E. of S.

*Urbana, Champaign County.*—The station of 1919 in the Roselawn Cemetery was reoccupied. It is 130.1 feet southwest from the southwest corner of the base of the John E. Strong monument and 30.8 feet from a small birch tree west of the station, next to the driveway. It is in an alley on block E, between lots 19, 20, 21, and 22, near the center of the cemetery. It is marked by a bronze disk set in a limestone post flush with the ground. The disk is marked 1917. The following true bearings were determined in 1917 and 1921:

Letter L in Lawhead monument, 250 feet away (mark).....	39	52.1	W. of S.
Tip of silo at old Haines homestead, 1½ miles away.....	75	14.7	W. of N.
Near gable point on J. W. Curtis monument, 225 feet away.....	78	57.5	E. of N.
Right-hand-most edge of cement block vault in Mt. Hope Cemetery, 600 feet away.....	75	12.7	E. of S.
Letter I in Harris monument, 200 feet away.....	59	05.8	E. of S.

## INDIANA.

*Vincennes, Knox County.*—The station of 1915 was reoccupied. It is in the Catholic Cemetery which is about three-fourths of a mile southwest of the courthouse. It is about 20 feet west of the central driveway, 10.1 feet from the southeast corner of the Murphy monument, 12.4 feet from the northwest corner of the tombstone of Toussaint Chappard, 38.4 feet from the southeast corner of the foundation of the Berry monument, and 38.8 feet from the northeast corner of the foundation of the Caney monument. It is marked by a Bedford limestone post, 6 by 6 by 36 inches, set with the top about 6 inches below the surface and lettered U. S. C. & G. S. 1905. The following true bearings were determined in 1905 and 1921:

Tall steeple on Catholic Church.....	64	50.0	E. of N.
Short steeple on Catholic Church.....	65	33.6	E. of N.
Tip of the Huslage stone monument.....	50	04.7	W. of S.
South gable on the straw-board plant.....	12	30.8	W. of N.

## IOWA.

*Davenport, Scott County.*—The station of 1918 was reoccupied. It is in the Fe Juárez Park, about 1½ miles west and one-half mile north of the county courthouse. The station is in the northwest part of the park, near the center of the oval just east of the buffalo pens. It is 88.8 feet southeast of the northeast corner post around the buffalo pens, 49.7 feet south of the inner edge of the driveway, 41.0 feet east of the same, and 55.4 feet west of the same. The station is marked by a limestone post 6 by 8 by 26 inches, set flush with the surface of the ground and lettered U. S. C. & G. S. on the top. The following true bearings were determined in 1918 and 1921:

Edge of brick border at northwest corner of base of building, 400 feet away (mark).....	24	16.6	W. of S.
Near edge of chimney on house on hill.....	74	10.0	W. of S.
Windmill tower near house on hill.....	76	04.0	W. of S.
Center of chimney on house one-fourth mile away.....	25	55.1	W. of N.
Center of iron corner fence post of elk pen.....	1	33.4	W. of S.
East gable on frame house 800 feet away.....	80	27.1	W. of S.

*Des Moines, Polk County.*—The station of 1918 was reoccupied. It is in the State Fair Grounds on the slope of the hill below and about 275 feet northwest of the poultry building, about on the line Grand Avenue would run if extended east through the grounds. It is 63 feet northwest of a hickory tree which stands between the station and the Polk County headquarters building, 74.5 feet southwest of another hickory tree near a small building, 72 feet west of a large elm tree, and 50 feet north of the center of the driveway that now goes up the hill to the poultry building. The station is marked by a large rough stone lettered U. S. C. & G. S. The following true bearings were determined in 1910 and 1918:

Lower cupola on Drake Sanitarium, nearly hidden by tree (mark). ..	17	35.2	W. of N.
Higher cupola on Drake Sanitarium.....	16	34.1	W. of N.
Center of base of rod on poultry building.....	39	15.1	E. of S.
Northwest corner of foundation of building just north of Polk County headquarters.....	72	15.5	E. of N.
North gable of exposition building.....	43	22.3	W. of S.

## KANSAS.

*Salina, Saline County.*—The station of 1917 was reoccupied. It is on the grounds of the Kansas Wesleyan University, 209.2 feet south and a little east of the southeast corner of the dwelling across the street, and 300 feet (about) west of the tracks of the McPherson branch, Union Pacific Railroad. It is marked by a limestone post 6 by 6 by 30 inches, set flush with the ground, and lettered U. S. C. & G. S., 1904. The following true bearings were determined in 1917 and 1921:

Top of clock cupola.....	10 31.1	W. of S.
Tip of fire plug, front of main building.....	76 36.0	W. of S.
Vertical iron pipe in center of fountain.....	88 13.5	W. of N.
Gable under the scroll ornament on house across the street.....	18 19.8	E. of N.
I, in "Science Hall" cut in stone over door.....	71 29.7	E. of S.

*Winfield, Cowley County.*—The station of 1916 was reoccupied. It is in the northwest corner of the campus of Southwest Kansas College, 330.5 feet from the northwest corner of the college building, 117 feet from the porch of the house on the north side of the road, and 23.4 feet from a pine tree to the southwest. The station is marked by a limestone post 7 by 8 by 36 inches, set flush with the ground, and lettered on top U. S. C. & G. S., 1902. The following true bearings were determined in 1911:

Southwest corner of old college building (mark).....	33 46.8	E. of S.
Northeast corner of a house (near ground).....	66 49.8	W. of S.
West gable of house on hill.....	78 24.0	E. of N.

## KENTUCKY.

*Louisville, Jefferson County.*—The station of 1915 was reoccupied. It is in Cherokee Park, about 625 feet southwest of the first pavilion. It is 21 feet north of the north side of the footpath leading to the pavilion, between the footpath just mentioned and the main driveway, the south side of which is 33 feet distant. It is 68 feet from a tree to the southwest, 53 feet from a laurel on the north side of the driveway, and 43 feet from a maple southeast on the south side of the footpath. The exact spot is marked by a limestone post 8 by 8 by 30 inches, set with a bronze disk, and projecting 2 inches above the surface of the ground. The following true bearings were determined in 1915 and 1921:

Apex of water tank.....	45 29.2	E. of N.
Middle of smokestack at filtration plant.....	46 13.5	E. of N.
Southwest corner of the foundation of pavilion.....	78 33.3	E. of S.
Northwest corner of the foundation of pavilion.....	84 50.8	E. of S.

*Winchester, Clark County.*—The station of 1912 in the northeast corner of the campus of the Kentucky Wesleyan College was reoccupied. It is 196 feet east by north of the east corner of the main building, 69.8 feet north by east of the main walk, and it is between trees Nos. 7 and 8 counted from the main entrance to the campus, 15.3 feet from No. 7 and 10 feet from No. 8. The station is marked by a Bedford limestone post 5 by 7 by 30 inches projecting 2 inches above the ground, and lettered U. S. C. & G. S., 1912. The following true bearings were determined in 1912 and 1921:

I in "Library" cut in stone on Carnegie Library.....	27 42.3	W. of S.
Southwest corner of main building (above foundation).....	67 07.2	W. of S.
Fire plug in front of main building (nut on top).....	53 00.1	W. of S.

A second post, 261 feet to the south, marks the true meridian.

## MINNESOTA.

*Breckenridge, Wilkin County.*—The station of 1914 was reoccupied. It is in the south side of the county courthouse yard, 22.6 feet from the tree row on the south and 78.5 feet from the cement walk on the west side of the yard. It is marked by a limestone post 6 by 6 by 24 inches, set flush with the ground, and lettered U. S. C. & G. S., 1909. The following true bearings were determined in 1909 and 1914:

Northwest corner of St. Francis Hospital, above water table (mark)...	61 22.4	W. of S.
Cross on cupola of St. Francis Hospital.....	43 56.5	W. of S.
Northwest corner of school building east of courthouse.....	76 05.2	E. of N.
Southeast corner of school building.....	86 42.6	E. of N.
Southeast corner of St. Francis Hospital.....	37 24.5	W. of S.

*St. Paul, Ramsey County.*—The station of 1915 was reoccupied. It is in the southwest part of Oakland Cemetery, among the cottonwood trees west of the center of what was once a lake. It is 185.8 feet from the south fence of the cemetery, about 440 feet from the west fence and 148.8 feet from the Elliot monument. It is marked by a dressed marble post 4 inches square set flush with the ground and lettered U. S. C. S., 1891, on top. The following true bearings were determined in 1915 and 1921:

Southwest corner of second foundation of Lindeke monument (mark).....	47	37.3	W. of N.
Southwest corner edge of Morris monument.....	81	30.1	W. of N.
Tip of water tank 900 feet away.....	1	29.6	E. of S.
Center of keystone in arch over entrance to old office building.....	77	55.8	E. of S.
Spire of cemetery chapel.....	8	20.2	E. of N.

*Willmar, Kandiyohi County.*—The station of 1915 was reoccupied. It is in the northwest part of town, in the western part of the yard of the Lafayette School. It is 126.8 feet northwest of the northwest corner of the school building, 102.7 feet south of the inner row of trees on the north side of the grounds, 62.1 feet east of the outer row of trees on the west side of the grounds, 46.2 feet east of the inner row and 15.7 feet west of the north basket ball goal post. The station is marked by a cement post 8 by 10 by 24 inches, projecting 2 inches above the ground with a drill hole in the top and faintly lettered U. S. C. & G. S., 1907. The following true bearings were determined in 1915 and 1921:

Right edge of school building, on bricks.....	31	17.5	E. of S.
Northwest corner of frame house 450 feet away.....	3	51.9	E. of S.
Southeast corner of frame house 450 feet away.....	37	56.8	W. of N.
Tip on large street water plug 400 feet away.....	52	42.4	E. of N.
Left edge of school building, on bricks.....	61	05.8	E. of S.

## MISSISSIPPI.

*Corinth, Alcorn County.*—The station of 1917 was reoccupied. It is in the grounds of the public school, 76.3 feet from the southeast corner of the building and 86.6 feet from the northeast corner. It is 30.7 feet from the fence to the south. The station is marked by a blue limestone post, set flush with the ground and lettered U. S. C. & G. S., 1905. The following true bearings were determined:

Smaller, most northerly vent pipe on roof of house.....	74	10.4	W. of S.
North gable of corner house on Waldron Street.....	82	40.8	W. of N.
Southeast corner of east wing of high school building (at ground)...	56	46.0	W. of N.
Auxiliary A, about 500 feet away.....	82	40.1	E. of N.

Declination observations were made at an auxiliary station about 500 feet to the east, indicating some local disturbance.

## MISSOURI.

*Kansas City, Jackson County.*—The station of 1913 was reoccupied. It is on a low hill in the northern part of Swope Park, about 5 miles southeast from the town's center. It is about 350 feet north from the Missouri Pacific Railroad tracks, 358.5 feet east from the southeast corner of the stone wall above the bear cages, and 98 feet southwest from the center of the trunk of an oak tree. The station is marked by a marble post 6 by 6 by 33 inches, projecting about 6 inches above the ground, and lettered U. S. C. & G. S., with a small hole in the center to indicate the exact spot. The following true bearings were determined in 1913 and 1921:

Flagstaff on tower of golf club.....	80	37.5	W. of N.
West edge of chimney on lion house.....	75	59.2	W. of N.
Tip of marble memorial.....	77	15.9	E. of S.

*University City, St. Louis County.*—The station of 1916 was reoccupied. It is in the southern part of the campus of the Washington University, about one-half mile southwest from the town's center. It is about 500 feet southeast from the southeast corner of the Graham Memorial Chapel, about 450 feet southwest from the southwest corner of the Ridgeley Library and Law School, and about 160 feet north from the north curb of Forsythe Avenue. It is marked by a limestone post 5 by 7 by 28 inches, with a bronze disk set in the top, projecting about 5 inches above the ground. The following true bearings were determined in 1916 and 1921:

Top of southwest tower of Graham Memorial Chapel (not sharp).....	45	16.0	W. of N.
Top of southwest tower of Library and Law School.....	58	00.8	E. of N.
Top of southeast tower of Library and Law School.....	61	05.3	E. of N.
Flagstaff at parapet, of southeast tower of administration building..	69	10.5	E. of N.
Frame of window in apartment house, piece dividing panes.....	5	51.8	W. of S.

## MONTANA.

*Billings, Yellowstone County.*—The station of 1910 could not be reoccupied and a new station was therefore established, about 125 feet west-southwest from the old one. It is in the eastern part of the cemetery, about  $2\frac{1}{2}$  miles west of town. It is in the intersection of the first alley west of the east fence with an alley running east and west, between lots 342 and 343 of the north half of the cemetery and lots 1 and 2 of the south half. It is 38.7 feet from the east fence, 62.0 feet south-southeast of the southeast corner of the base of the Erickson monument, 54.1 feet northeast of the northeast corner of the base of the Power monument and 44.2 feet north-northeast of the northeast corner of the base of the Trinkle monument. The station is marked by a granite post 6 by 8 by 17 inches, with a bronze disk in the top, set 7 inches below the surface of the ground. The following true bearings were determined:

Courthouse spire, $2\frac{1}{2}$ miles away (mark).....	65	28.3	E. of N.
Catholic Church spire south of courthouse.....	66	09.5	E. of N.
Church spire north of courthouse.....	64	21.8	E. of N.
Center of tall cement stack north of courthouse.....	61	32.1	E. of N.
Center of large brick stack at sugar factory.....	89	35.7	E. of N.

*Glendive, Dawson County.*—The station of 1916 was reoccupied. It is on the east side of the Northern Pacific hospital grounds,  $\frac{3}{4}$ -mile northeast of the town's center. It is 105.2 feet east of the east corner of the hospital, 125.2 feet southeast of the southeast side of the pumping station, 42 feet west of the fence on the east side of the hedge, and 23.4 feet north of the road leading into the grounds from the east. The station is marked by a round cement post 12 inches in diameter and 30 inches long, projecting a little above the ground and having a bronze disk countersunk in the top. The following true bearings were determined in 1916 and 1921:

Spire on cupola of Dawson High School (mark).....	24	54.0	W. of S.
Flagpole on courthouse cupola.....	33	36.1	W. of S.
Right edge of south cement gate post at cemetery.....	23	00.8	E. of S.
Extreme south edge of portico of hospital, second floor.....	64	00.3	W. of S.
Pole on tower of brick school $1\frac{1}{2}$ miles away.....	13	25.6	W. of S.

*Helena, Lewis and Clark County.*—The station of 1913 was reoccupied. It is in the barn lot of St. Joseph Catholic Orphan Asylum, about 1 mile north of the city limits. It is 453 feet east of Montana Avenue extended, 78 feet from the south fence of the lot, 55 feet from the north fence, about 125 feet northeast of the south east corner of the cow barn, and about 90 feet southeast of the northeast corner of the horse barn. The station is marked by a granite slab 6 by 6 by 24 inches, projecting 3 inches above ground, with a drill hole in the top. The following true bearings were determined in 1913 and 1921:

Right edge (about middle) of brick smoke stack at sewer crematory..	83	30.1	E. of N.
Middle of central one of three upper small windows in domed mausoleum.....	2	16.4	W. of N.
Right edge of elevated water tank.....	6	07.6	W. of N.
Center (near bottom) of tall stack at East Helena smelter.....	60	52.5	E. of S.

*Livingston, Park County.*—The station of 1916 was found to be no longer suitable for magnetic observations and a new station was therefore established 14.8 feet magnetic north of the old station. It is in the grounds of the Protestant Cemetery about 2 miles northwest of town, 45.9 feet south-southeast from the southwest corner of the west cement gate post at the front entrance to the cemetery, and 44.3 feet south-southwest from the southeast corner of the east gate post. The station was not marked. The following true bearings were determined:

Tip on Kenney obelisk monument 400 feet away (mark).....	7	34.7	E. of S.
Center of windmill (leaning) 400 feet away.....	24	13.9	W. of S.
South gable of small building.....	16	19.8	W. of N.
Center of chimney on house $1\frac{1}{2}$ miles away.....	29	24.3	E. of S.

*Missoula, Missoula County.*—The station of 1906 was reoccupied. It is on the grounds of the State University, north of the eastern part, and about 1 mile southeast of the town. It is in the southeast corner of the running track and athletic field and east of University Hall. It is 67.7 feet west of the fence bounding the athletic field on the east and 143.5 feet north of the fence bounding the athletic field on the south. The station is marked by a granite post 6 by 6 by 24 inches, projecting 1 inch above ground and lettered U. S. C. & G. S., 1905. The following true bearings were determined in 1906 and 1921:

Tower on University Hall.....	83	10.8	W. of S.
Northeast corner of Natural Science Hall, on brick.....	44	13.6	W. of N.
Steeple of Christian Church.....	29	16.9	W. of N.
South gable of old library building.....	74	26.6	W. of N.
Square cupola on brick house, 625 East Front Street.....	25	01.4	W. of N.

## NEBRASKA.

*Chadron, Dawes County.*—The station of 1915 was reoccupied. It is on a bench of the steep hill on the grounds of the normal school about 1 mile due south of town. The curbing on the east side of Main Street, east of the courthouse, is in line with the station, and the walk on the east side of this street would pass 25 feet to the east of the station if produced. It is 278 feet north from the highest point of the hill, 54 feet northeast from a pine tree. It is marked by a cement post 16 by 16 by 30 inches with a bronze disk in the top, which projects about 2 inches above the ground. The following true bearings were determined in 1915 and 1921:

Spire at apex of high school cupola (mark).....	30	53.6	E. of N.
East gable of Mr. Brown's house.....	81	49.8	W. of S.
Left edge of west ward school.....	17	36.4	W. of N.
Southwest corner of brick on courthouse cupola.....	3	53.6	E. of N.
Left edge of tiptop of large brick stack at normal school.....	13	15.0	E. of N.

*Lincoln, Lancaster County.*—The station of 1915 was reoccupied. It is on the campus of the State University Agricultural School, about 2 miles northeast of the town's center. It is between the roads, about 100 feet northeast of the Home Economics Building. It is marked by a Bedford limestone post 8 by 8 by 36 inches, with a brass plate in the top. The stone projects about 6 inches above the ground. The laying of additional water pipes and the paving of the driveways since 1915 probably had some effect on the magnetic conditions of the station. The following true bearings were determined from the meridian line:

Northwest corner of base stone on northwest corner of Home Economics Building.....	75	41.3	W. of S.
Northeast corner of Plant Industry Building, level with third floor..	76	17.8	E. of S.
Southwest corner of Plant Industry Building, level with third floor..	29	00.3	E. of S.
Lower tip on stone shield over door to Agricultural Engineer Building	2	46.0	W. of N.

A similar stone, 494 feet to the south, marks the true meridian.

*Newport, Rock County.*—The station of 1915 was reoccupied. It is near the southeast corner of the school grounds, one-fourth mile northwest of the town's center. It is 142.4 feet southeast of the southeast corner of the high school, 79.8 feet east of the cement walk leading to the school, 98.4 feet east of the east side of the annex, 43.1 feet north of the cement walk south of the school grounds, and 21.8 feet from the fence on the east. The station is marked by a cement post 12 by 12 by 24 inches, with a bronze disk in the top, which sets flush with the ground. The following true bearings were determined in 1915 and 1921:

Apex of railroad water tank one-quarter mile away (mark).....	49	50.0	E. of S.
East gable of high school frame annex building.....	83	34.4	W. of N.
Right-hand edge of stone base to school building.....	18	49.3	W. of N.
West low gable on house on hill one-quarter mile away.....	52	20.3	E. of N.
Left edge of bungalow 300 feet away.....	82	00.6	E. of N.

## NORTH CAROLINA.

*Goldboro, Wayne County.*—The station of 1917 was reoccupied. It is in the southern part of Herman Park, about 1 mile east by north from the center of the town and about 255 feet a little south of east of the park shelter house. It is 50.3 feet from the edge of the north brick border of the road to the south which runs east from the main gate.

The station is marked by a limestone post 6 by 6 by 30 inches, projecting 4 inches above the ground and lettered U. S. C. & G. S., 1908. The following true bearings were determined in 1921:

Vertical joint of west gable framing of house of Herbert Lauterbach..	69	52.8	E. of S.
Southeast corner at base of gatepost at entrance to park (south one of two larger ones).....	78	30.2	W. of N.
Northwest corner (at base) of gatepost (south one of two larger ones)...	78	08.8	W. of N.
Southwest corner of shelter house of park.....	61	35.0	W. of N.
Northeast corner of shelter house of park (above foundation).....	53	51.2	W. of N.

*Halifax, Halifax County.*—The station of 1916 was reoccupied. It is about half a mile southwest of the center of town in the southeastern part of the lot known as the grounds of the old Jones house, across the railroad from the house of R. H. Daniels. It is 176 feet from the west track of the Atlantic Coast Line Railroad, 37.3 feet from the boundary line to the south, 76 feet northwest from the center of the trunk of a large oak tree, and 33 feet southwest of the larger and more southerly of two cedar trees. The station is marked by a slab of marble 1 by 8 by 15 inches, which rests on a marble base and projects about 1 inch above the ground. A cross in the top indicates the exact spot. The following true bearings were determined in 1916:

Southwest corner of R. H. Daniels's house under eaves.....	77	52.6	E. of N.
Top of warning sign post at the railroad crossing.....	58	07.8	E. of N.

Declination observations were also made at auxiliary station about 500 feet north by west from the primary.

*Morganton, Burke County.*—The station of 1916 was reoccupied. It is in the southeastern part of the grounds of the North Carolina School for the Deaf, north of the superintendent's house, and about 1 mile southwest from the town's center. It is 214.4 feet northwest from the northeast corner of the front piazza of the superintendent's house and 226.8 feet northeast from the northwest corner of the piazza. It is marked by a cement monument 12 by 12 by 30 inches, projecting 6 inches above the ground, with a bronze disk set in the rounded top. The following true bearings were determined in 1916 and 1921.

Top of fourth cupola east of water tank.....	81	01.1	E. of S.
Central west gable of Goodwin Hall.....	68	00.2	E. of N.
Top of Methodist Episcopal South Church steeple.....	1	24.0	W. of N.
Third cupola (more distant of two now visible).....	80	48.3	E. of S.

An iron rod set 600 feet distant marks the north end of a meridian line.

*Salisbury, Rowan County.*—The station of 1916 was reoccupied. It is in the county fair grounds, about  $1\frac{1}{2}$  miles northwest of the town's center. It is in the southern part of the infield within the race track, 131 feet north from the fence surrounding the infield and 309 feet southeast of the nearest point of the judge's stand. It is marked by a marble post 6 by 4 by 26 inches, with a bronze disk set in the top, projecting 2 inches above the ground. The following true bearings were determined in 1916 and 1921:

Top of belfry of public school.....	18	00.1	E. of S.
Upper southeast corner of tower of the new school for girls.....	28	59.7	E. of N.
Top of south cupola of the main exhibition building.....	14	15.2	W. of N.
Flagstaff on hotel.....	42	47.2	E. of S.
Pointed top of water tank in lumber yard.....	26	47.5	E. of S.
Top of water tank 2 miles distant.....	0	55.7	E. of S.

*Troy, Montgomery County.*—The station of 1899 being no longer suitable for magnetic observations, a new station was established in the southeastern part of the courthouse grounds, 26.6 feet west of the southwest corner, and 32.9 feet southwest of the northwest corner of the small wooden dwelling in the corner of the courthouse grounds. It is marked by the old south meridian stone, a granite post, about 4 feet long and 8 inches square and lettered N. C. G. S., U. S. C. S., 1898. It is set projecting about 20 inches above ground to provide for future filling.

The following true bearings were determined:

Gable of house (deserted).....	77	30.1	W. of S.
Tip of lightning rod on house of Squire Lisk (mark).....	4	41.1	W. of N.
East gable of house about three-fourths mile away.....	1	45.6	E. of S.

A similar stone was set 334.1 feet to the north to mark the true meridian. It is in the southeast corner of the lot of the house occupied by Squire Lisk, about on the sidewalk line.

Declination observations were also made at the station of 1899 and at three auxiliary stations, one (A) in the northwest corner of the field across the alley east of the courthouse grounds, another (B) 10 feet south of the primary, and a third (C) about a quarter of a mile to the east.

*Whiteville, Columbus County.*—The station of 1911, in the northwest corner of the courthouse grounds, was reoccupied. It is marked by a granite post about 6 inches square, set flush with the ground, and lettered N. C. G. S. U. S. C. S., 1898, on top. It formed the north end of the old meridian. The following true bearings were determined:

X in name of J. R. Maxwell on stone.....	17 52.4 W. of S.
I in name Ziron on a sign.....	27 40.3 W. of S.

A new meridian line 212.4 feet long was established on the east side of the courthouse grounds. The south end is marked by the old south meridian stone lettered as above and the north end is marked by a marble post 6 by 6 by 24 inches, with a cross cut in the top, set flush with the ground. Declination observations were made over the south stone.

*Wilmington, New Hanover County.*—The station of 1898 being no longer suitable for magnetic observations, a new station was established on private property owned by a company of which Dr. B. R. Graham is one of the stockholders. It is about half a mile north of the electric car line in the subdivision called Greenfield Park in the eastern part of the city. Along the brow of the hill above the Spring Branch is a rampart four or five feet high, serpentine in form with its general direction from southwest to northeast. The magnetic station is 148 feet northeast of the northeast end of the rampart, between two pine trees, which were blazed about 5 feet above the ground. One tree bears N 21° W. distance 37.7 feet, and the other bears S. 19° E. distance 27.5 feet. The station is marked by a limestone post 6 by 6 by 30 inches projecting about 2 inches above ground with a bronze disk set in the top.

Observations were also made at a point on the southeast corner of the grounds of the Walker Memorial Hospital, about 275 feet east of the old station, and the declination was determined at an auxiliary station several hundred feet to the south. The following true bearings were determined at the new station:

Church spire.....	19 47.7 W. of N.
Church spire with small ball on top and larger one below (mark)...	17 03.3 W. of N.
Tip of cupola.....	0 20.9 W. of N.
Tip of cupola.....	10 48.6 E. of N.
Base of flagstaff on building.....	13 24.6 E. of N.

#### NORTH DAKOTA.

*Bismarck, Burleigh County.*—The station of 1914 was reoccupied. It is on the south side of the grounds of the county courthouse, in line with the south side of the Methodist Episcopal Church, 14 feet north of the south walk and 93 feet east of the west walk. It is marked by a sandstone post 6 by 6 by 18 inches, with cross and drill hole in the top, set flush with the ground. The following true bearings were determined in 1914:

Southeast corner of courthouse (mark).....	36 04.6 E. of N.
Northeast corner of city hall.....	48 31.5 E. of S.
Left edge of granite pillar at southeast corner of M. E. Church.....	87 45.2 W. of N.
Northeast corner of school building.....	44 03.4 W. of N.
Left edge of entrance to school building, on brick.....	49 36.0 W. of N.

Declination observations were also made at the station of 1907 as near as could be determined from the description.

*Jamestown, Stutsman County.*—The station of 1914 was reoccupied. It is on the grounds of the north side public school, near the northeast corner. It is in line with the east side of the school building and 83.5 feet north of the northeast corner, 109 feet northeast of the northwest corner, 11 feet south of the row of trees on the north edge of the grounds, 28 feet west of the row of trees on the east side of the grounds, and 105 feet east of the row of willows on the west side. The station is marked by a cement post 8 by 8 by 24 inches, projecting 2 inches above the ground, with a bronze disk in the top. The following true bearings were determined in 1914 and 1921:

Left edge of old Presbyterian College, main building (mark) .....	82	20.3	E. of S.
Right-hand-most edge of large red brick opera house .....	41	51.8	W. of S.
South (left-hand) corner edge of B. P. O. E. building one-half mile away .....	46	13.0	W. of S.
Left edge of stand pipe 800 feet away .....	11	12.7	E. of N.
Point of south gable on north college building .....	84	54.7	E. of N.

## OHIO.

*Cleveland, Cuyahoga County.*—The station of 1910 in Woodland Hills Park was reoccupied, and the marking stone was reset in a large base of cement, and now stands about 12 inches above the level of the ground. The stone is 8 inches square and lettered U. S. C. & G. S., 1907, on top. The station is about 300 feet west-southwest from the old house used as headquarters for the park foreman and police, and also as a store house for tools, etc., and about 108 feet east from the center of the East Boulevard which is to come through the park. It is 65 feet from the center of the driveway to the south and about 35 feet south of the bank of the ravine through the park.

The following true bearings were determined:

Gable on house with large chimney 600 feet away (mark) .....	22	39.4	E. of N.
Center of chimney at school 1 mile away .....	79	18.1	E. of S.
Sharp church spire with cross, 1 mile away .....	72	13.4	W. of S.
Northern and tallest of 3 church steeples close together .....	77	27.2	W. of S.
Center of smoke stack at Cleveland Forge Co. ....	64	38.0	W. of N.

## OKLAHOMA.

*Guthrie, Logan County.*—The station of 1911 was reoccupied. It is in the north-western part of Highland Park, about 1 mile northeast of the business portion of the town, near the tip of the egg-shaped block of residences which projects north from Warner Avenue into the park just west of the main entrance. This piece of land is bounded by a drive with a curb on one side. The magnetic station is about 100 feet north of this curb at the tip, and 67.3 feet south of a drive inside of the park. In the bend of this second drive are three small oak trees distant from the station 43.8, 55.8, and 64.8 feet, respectively. The station is marked by a limestone post 6 by 6 by 24 inches, about flush with the ground, lettered U. S. C. & G. S., 1905. The following true bearings were determined in 1906 and 1921:

Cross on Catholic Church .....	52	28.3	W. of S.
Flagpole Logan County High School .....	72	45.6	W. of N.
East edge of standpipe .....	19	10.1	E. of S.
West edge of standpipe .....	18	49.6	E. of S.
East gable of house one-third mile away .....	71	28.4	W. of N.

*McAlester, Pittsburg County.*—The station of 1914 was reoccupied. It is about 3 miles north of the center of the town and one-fourth mile west of Sky-line Drive, on ground owned by the city and fenced in to protect the watershed and pumping station. About half a mile north of the east-west road which passes the convict cemetery the Sky-line Drive crosses a conspicuous outcrop of igneous rock (dyke) running in a general northeast-southwest direction. About one-fourth mile from the drive this dyke crosses the city property near the southeast corner and with its east and south fences forms a triangle in which the magnetic station is located. The station is 142 feet from the south fence and 153 feet from the east fence. It is marked by a limestone post 5½ by 5½ by 30 inches, projecting about 6 inches above ground and lettered U. S. C. & G. S., 1905. The following true bearings were determined in 1905 and 1921:

Flagstaff on schoolhouse .....	42	29.8	E. of S.
East edge of standpipe .....	19	11.7	E. of S.
Cross on church .....	18	38.6	E. of S.
Cupola of house .....	3	29.0	E. of S.
Dome on the penitentiary .....	22	59.7	W. of S.

## OREGON.

*Pendleton, Umatilla County.*—The station of 1917 was reoccupied. It is one-half mile southeast of the center of the town, on the hill north of the city reservoir. It is 260 feet north of the northwest corner of the reservoir; 240.2 feet northwest of the north-

east corner; 106.1 feet east of the row of trees on the west side of the grounds, and 124.2 feet west of the row of trees on the east side. It is marked by a bronze disk set in the top of a concrete post 18 by 18 by 40 inches, projecting 12 inches above ground. The following true bearings were determined in 1917:

Center of clock on courthouse.....	36 04.4	W. of N.
South gable of public-school building.....	19 48.2	E. of N.
Block on point of roof of east reservoir.....	19 35.0	E. of S.
Smoke stack at asylum.....	84 15.4	W. of N.

## TENNESSEE.

*Athens, Mc Minn County.*—The station of 1917 was reoccupied. It is on a hill north of the town about 600 feet northeast of the railroad station and about 800 feet south of the standpipe; 118 feet southeast of the lower road from Athens to Sweetwater, and 55.3 feet and 50.6 feet, respectively, from the northeast and southeast corners of the building formerly the Athens Collegiate and Industrial Institute, a colored institution. The station is marked by a stone 3 by 8 by 16 inches, lettered U. S. C. & G. S., 1903, on top in the center of which there is a drill hole. The following true bearings were determined:

East corner of square brick building (just above foundation).....	16 56.3	E. of N.
Left edge of standpipe (below rim).....	24 53.8	E. of N.
Right edge of standpipe (below rim).....	25 50.4	E. of N.
North gable of small frame building $\frac{1}{2}$ miles distant.....	79 58.3	E. of N.

*Knoxville, Knox County.*—The station of 1917 was reoccupied. It is on the University of Tennessee Experiment Farm, about  $\frac{1}{2}$  miles from the courthouse in a southwesterly direction. It is on the southwest edge of an Indian mound; about 1,000 feet a little west of south from a dwelling house, and 84 feet west from the center of the road through the center of the farm. It is marked by a marble post 6 by 6 by 28 inches, lettered U. S. C. S., projecting about 2 inches above the ground. The following true bearings were determined in 1917 and 1921:

Southeast gable of house (Jones) 1 mile away.....	87 01.2	W. of N.
Northeast corner of roof of piazza of house (Cox) 1 mile away.....	75 48.5	W. of N.
South gable of cattle barn.....	44 00.9	W. of N.
East gable of house 1 mile away.....	77 31.6	W. of N.
Cupola.....	72 54.3	E. of N.
South gable of horse barn.....	76 37.2	W. of N.

*Memphis, Shelby County.*—The station of 1917 was reoccupied. It is in the southeastern part of Overton Park, about 185 feet north of a line between the seventh and eighth golf holes, and about  $\frac{1}{2}$  miles northeast of the town's center. It is 155.3 feet northeast from the northeast corner of the nearest rustic bridge and 203.5 feet northeast from the northeast corner of a rustic bridge constructed from a single log. The station is marked by a limestone post 6 by 6 by 30 inches, projecting about 6 inches above the ground. The following true bearings were determined:

East pinnacle of truncated steeple of Baptist Church.....	8 20.6	E. of S.
West pinnacle of truncated steeple of Baptist Church.....	8 06.8	E. of S.
North gable of house.....	2 07.0	E. of S.

## VIRGINIA.

*Bristol, Washington County.*—The station of 1915 was reoccupied. It is on the grounds of the Virginia Interment College, 107 feet from the front line of the grounds and 60 feet to the right from the center of the walk leading to the main entrance of the building. It is marked by a limestone post projecting 3 or 4 inches and lettered U. S. C. & G. S., 1898. A similar but unlettered stone 120.5 feet to the south determines a meridian line. A drill hole in the granite step of the college 126 feet to the north is also in the meridian. The following true bearings were determined in 1906 and 1921:

Spire on Mary Street church.....	2 27.0	W. of S.
Spire of building $\frac{1}{2}$ miles distant.....	8 23.5	W. of S.
Flagstaff on public school.....	34 40.3	W. of S.
High-school flagstaff.....	22 21.9	E. of S.
Southeast side of large stack of Columbian Paper Co. (top).....	60 01.0	E. of S.

*Lynchburg, Campbell County.*—The station of 1915 was reoccupied. It is in the southeastern corner of the county fair grounds, about  $1\frac{1}{2}$  miles southeast of the town's center. It is 111.7 feet northwest from the fence bounding the grounds on the southeast and 141 feet northeast from the fence on the southwest. The station is marked by a granite post 5 by 10 by 24 inches, projecting 2 inches above the ground, and lettered U. S. C. & G. S., 1910. The following true bearings were determined in 1910 and 1915:

Flagpole on Odd Fellows' Home (mark).....	2 17.2 W. of S.
Southwest corner of grandstand (lower).....	53 21.3 W. of N.
Northeast corner of exhibition hall.....	30 36.2 W. of N.
South gable of stable.....	9 27.4 W. of N.

*Richmond, Henrico County.*—The station of 1916 was reoccupied. It is in the southeastern part of the new reservoir park, about  $2\frac{1}{2}$  miles northwest from the town's center. It is 211.7 feet southeast from the curb next to the reservoir of the road on the southeast side of the reservoir and 200 feet northwest from the inside edge of the road along the southeast side of the park. It is in a grove of trees south of the reservoir. It is marked by a blue limestone post 5 by 6 by 33 inches, with a bronze disk set in the top, projecting  $3\frac{1}{2}$  inches above the ground. This part of the park is thickly wooded and a fire plug about 217 feet to the east was the only suitable mark. Its true bearing is  $78^{\circ} 54.2'$  E. of S.

Declination observations were also made at an auxiliary station about 230 feet to the southwest, the resulting declination being very nearly the same as at the primary station.

## WASHINGTON.

*Seattle, King County.*—This station is near the west shore of Bailey Peninsula (Seward Park) and at the head of Andrews Bay. It is marked by a concrete post, with bronze disk, set in the path along the top of the bluff. The marker is flush with the surface and about 7 feet from the edge of the bluff. From the station a large spruce, scarred by fire on the north side, bears N.  $75^{\circ}$  E., distant about 20 yards; the crest of roof of bathhouse bears S.  $52^{\circ}$  W., distant about 60 yards. The following true bearings were determined:

Grace Methodist Episcopal Church steeple.....	23 26.3 W. of N.
Dome on horizon.....	23 23.1 W. of N.
North dome on Church of Immaculate Conception.....	31 03.9 W. of N.
South dome on Church of Immaculate Conception.....	31 08.4 W. of N.
South gable of house on top of hill across bay.....	58 48.0 W. of N.

*Spokane, Spokane County.*—The station of 1917 was reoccupied. It is on an unused portion of ground in the northwest part of Fairmount Cemetery and 315.6 feet from the board fence bounding the cemetery on the north. The station is marked by a sandstone post 4 by 6 by 26 inches, projecting about a foot above the surface of the ground. (Rocks prevented post being planted deeper.) The post is lettered on top U. S. C. & G. S., 1906, and has a hole in the center to mark the exact spot. The following true bearings were determined in 1906 and 1917:

Tip on water tank.....	6 15.3 W. of S.
Right edge of water tank.....	6 49.1 W. of S.
South edge of top of brick smoke stack at old smelter.....	45 38.9 W. of N.
North edge of top of brick smoke stack at old smelter.....	45 13.2 W. of N.

## WISCONSIN.

*La Crosse, La Crosse County.*—The station of 1914 was reoccupied. It is in the northeast corner of Myrick Park, about 500 feet north of the small greenhouse and 275 feet east-northeast from a large granite boulder which bears a bronze plate; 10 feet from the edge of the bank overlooking the marsh and 57.7 feet from a large oak tree on the bank of the marsh. The station is marked by a stone 8 by 8 by 36 inches set nearly flush with the ground and lettered U. S. C. & G. S. The following true bearings were determined in 1914 and 1921:

Cross on church spire at North La Crosse, $1\frac{1}{2}$ miles away (mark)....	46 58.8 W. of N.
Center of tall cement stack, 1 mile away.....	34 34.4 W. of N.
East edge of chimney at greenhouse, 500 feet away.....	10 26.3 W. of S.
Point of first electric power line tower.....	81 37.3 W. of N.
Near edge of brick house, three-fourths mile away.....	43 42.3 E. of N.

*Madison, Dane County.*—The station of 1907 was reoccupied. It is on the State agricultural farm in a pasture, about 750 feet north-northwest of the beef cattle barn. It is 277.5 feet from the wire fence on the east side of the pasture, 97.6 feet from the wire fence on the south side, and about 175 feet from the fence on the north side. The station is marked by a Bedford limestone post 8 inches square, set 6 inches below the surface. The following true bearings were determined:

Cupola on dairy barn (mark) . . . . .	18 39.9 W. of S.
Near edge of brick stack at Reutchler greenhouse . . . . .	45 33.3 W. of S.
Middle rib marking on large brick stack, three-eighths mile away . . . . .	71 23.2 E. of S.
Cupola on beef cattle barn . . . . .	16 57.0 E. of S.
Tower on C. E. Buell's residence, one-half mile away . . . . .	7 27.2 W. of S.

## WYOMING.

*Cheyenne, Laramie County.*—The station of 1918, at Fort D. A. Russel, was reoccupied as nearly as could be determined from the changed surroundings (within 10 feet). It is in the field northwest from the hospital about 1,500 feet; 164 feet north-east of a fence, 242 feet south of the west gatepost of the gate leading from this field to the rifle range, and 96 feet southwest of the center of the road leading from a gate just west of the isolation hospital to the above gate. The station is marked by a rough white sandstone 5 by 8 by 20 inches, projecting about 2 inches above ground and having a rude cross cut on the top. A large red granite rock was buried flush with the ground and in contact with the south face of the sandstone. The following true bearings were determined:

High single north gable on large brick house, 1,000 feet away (mark) . . . . .	4 27.5 W. of S.
Tip of Fort Russel watertank, one-fourth mile away . . . . .	32 27.8 W. of S.
Right edge of main wide portion of upper concrete house at reservoir . . . . .	35 26.0 W. of N.
Left edge main chimney on hospital (at roof) . . . . .	46 02.6 E. of S.
Tip of main ventilator on isolation hospital building . . . . .	38 33.5 E. of S.

*Green River, Sweetwater County.*—The station of 1918 was reoccupied. It is on Government Island, about a quarter of a mile north of the center of the town, in a V-shaped piece of land between two hills and east of a peculiar rock formation of nearly cylindrical form on which stands a flagpole. It is about 60 feet from a hill to the west, 120 feet from a hill to the east, and 350 feet from hills to the north. It is 434.5 feet north of the northwest corner of the fence surrounding the old cemetery and almost in line with this corner and the chimney of the second house east on the south side of the cemetery. It is marked by a red sandstone about 5 by 7 inches on top, projecting about 4 inches above the ground and having a cross and drill hole on the top. The following true bearings were determined in 1918 and 1921:

Large stack at potash plant on mountain slope south of town . . . . .	10 43.9 W. of S.
Flagpole on school building (mark) . . . . .	24 12.7 W. of S.
Cross on Catholic Church . . . . .	48 34.8 W. of S.
Flagpole at courthouse . . . . .	52 02.8 W. of S.
Large stack at power plant in low land southeast of town . . . . .	0 08.9 E. of S.

*Rawlins, Carbon County.*—The station of 1915 was reoccupied. It is near the north-west corner of the fair grounds, three-quarters of a mile northeast of the center of town. It is 250 feet west-southwest from the southwest corner of the covered grandstand, 116 feet east-northeast of the north gatepost at the entrance to the grounds, 123 feet from the fence around the race track, and 58.7 feet south of a board fence. The station is marked by a cement block, 12 by 12 by 18 inches, projecting 1 inch above ground and having a bronze disk set in the top. The following true bearings were determined in 1915 and 1921:

Tip on railroad water tank (mark) . . . . .	14 24.7 W. of S.
Cupola on ward school on hill . . . . .	31 37.9 W. of S.
Cross on Catholic Church . . . . .	49 43.0 W. of S.
Cupola on southeast corner of penitentiary . . . . .	73 13.8 W. of S.
Tip on water tank at penitentiary . . . . .	77 47.2 W. of S.

## SIBERIA.

*Emma Harbor, Providence Bay.*—The station is on Cape Puzino, on the south side of the entrance to Emma Harbor from Providence Bay. It is marked by a concrete pier about 10 by 10 by 24 inches, with bronze disk set in the top, flush with the surface of the tundra. A wooden post (said to mark a Russian magnetic station) 6 inches in diameter and projecting about 6 feet above the tundra, surrounded by a cairn of angular stone fragments, bears about  $131^{\circ}$  true, distant 10.3 feet. A small cairn of rocks was built over the station mark. The following true bearings were determined:

Vertical face of sky line of a small nubble on ridge on west side of Providence Bay.....	85	55.0	W. of S.
Small nubble on sky line of ridge on west side of Providence Bay..	86	06.2	W. of S.
Cape Likachef, left tangent at high water mark.....	3	32.4	E. of N.
North edge of chimney on large red roof, in village.....	79	42.4	E. of S.
Sharp gap in sky line.....	87	34.6	E. of S.
Gable, gray building in village.....	80	43.1	E. of S.
Gable, gray building in village.....	81	20.4	E. of S.
Sharp gap, in sky line.....	27	33.3	W. of S.

*Whalen.*—The station is in the village of Whalen at the east end of the gravel spit extending to the westward from the west end of the bluff headland on the north side of East Cape. At the village the spit is about 500 feet wide and 15 feet high at its crest. The lagoon inclosed by the spit is reported to extend to the westward about 7 miles along the spit, with a width of about  $1\frac{1}{4}$  miles. There is said to be an opening into the lagoon at its west end about 150 feet wide and 6 feet deep. The station is marked by a concrete pier 10 by 10 by 24 inches, and bronze disk; a small cairn of 12-inch stones was built over the marker. It is just south of the crest of the spit, about 270 feet from the bluff edge of the north shore of the spit, about 230 feet from the shore of the lagoon on the south, and 321 feet from the northwest corner of the schoolhouse. The main path through the village westward from the schoolhouse passes south of the station. The following true bearings were determined:

Ball on flagstaff at lookout.....	71	59.1	W. of N.
Vertical edge of notch on sky line of far western promontory.....	53	29.4	W. of N.
Center of top of the outer of two priest rocks.....	82	05.8	E. of S.
Southwest corner of school, just below eaves.....	62	19.8	E. of S.
East nubble of a group on sky line.....	2	15.2	E. of S.
Vertical edge of distant sky line.....	42	27.9	W. of S.

