

In west longitudes, during the last decade, the Aleutian cyclone also was productive of strong wintry gales, the greatest violence of which occurred on the same days as to the westward of the 180th meridian.

On the 19th and 20th the American S. S. *Carriso*, Manila toward San Francisco, near 43° 40' N., 146° 30' W., encountered whole westerly gales, lowest pressure 28.69, late on the 19th. On the 20th the British S. S. *Tyndareus*, in 50° 06' N., 141° 46' W., experienced its lowest pressure, 28.71 inches, in the same storm. Quoting from the observer:

3 a. m., wind veered to ESE. 7. 4 a. m. SE. 8, lowest barometer. 5 a. m., veered to SSE. 8. 6 a. m., veered to S. 8. 8 a. m., wind increased to force 10. Noon, wind veered to SSW. 8. 8 p. m., wind and sea decreasing.

On the 24th and 25th, the storm center was very near Dutch Harbor, but the cyclone was of great dimensions. The Canadian S. S. *Canadian Scottish*, in 53° 57' N., 139° 44' W., experienced the highest wind force, 11 from the

southwest. The American S. S. *President Jackson*, in 50° 55' N., 156° 30' W., encountered a south to southwest gale, force 11, lowest pressure 28.12 inches.

On the last two days of the month, with the cyclone central over the northern Gulf of Alaska, the American S. S. *Eldridge* experienced whole gales to storm winds from westerly directions, the lowest pressure noted being 28.68, in 49° 42' N., 153° 20' W., on the 28th.

Fog occurred along the northern and middle steamship routes on several days, but was not so frequent as during January, except along the American coast between 25° and 50° N. Here it was particularly frequent between 30° and 40° N., where it was observed on 30 or more per cent of the days.

From the standpoint of the seaman the rough weather of February resulted principally in delays between ports, many vessels being compelled to slow engines for hours at a time in the face of enormous or greatly confused seas.

## 551.516 (73) DETAILS OF THE WEATHER IN THE UNITED STATES GENERAL CONDITIONS

By ALFRED J. HENRY

A dry month everywhere, except locally in the State of Washington, in the Missouri Valley, the Gulf States and the Lake region. Dry weather continued in Oregon and California.

Temperature was above the normal in the Northwest and below in the Southeast, the dividing line between the two areas running northeast-southwest from west Texas to the Lake region. The usual details follow.

### CYCLONES AND ANTICYCLONES

By W. P. DAY

Low-pressure areas were about normal in number, but included a large proportion of secondary developments over the South and Southwest. There were an unusual number of large and sluggish high-pressure areas. These highs occupied the northern interior districts for days at a time and probably prevented the normal eastward drift of the lows and favored the development of secondaries over southern districts. These southern lows were also affected and showed numerous abnormal movements. In other words, there was a more or less continuous outflow of cold air from the northern interior with somewhat abortive attempts on the part of the warm air to pierce this front, at least over the continental areas.

### FREE-AIR SUMMARY

By L. T. SAMUELS, Meteorologist

There are shown in Table 1, the monthly mean temperatures, relative humidities and vapor pressures together with the departures from normal and in Table 2, the resultant wind directions and velocities and the normals. The large positive temperature departures at all levels at Ellendale are conspicuous while practically the opposite condition is found at Due West. The very excellent agreement between the temperature departures found for the various kite stations and those shown in Climatological Chart III is of particular interest in that it indicates the close approximation to the true average monthly temperatures as determined from the daily

maxima and minima of surface observations and those found at the average time of kite flights.

The resultant wind directions at Drexel and Ellendale showed the largest deviation from the normals, there being a very pronounced north component in the monthly means. This, it may appear, is somewhat in conflict with the fact that these two stations showed the largest positive temperature departures, but it will be observed that the resultant velocities for the month at these stations were considerably less than normal. It is further probable that in a number of cases the northerly winds at these stations were not necessarily relatively cold winds but as was indicated in the free-air summary for January, 1924, may have followed a curved path and originated over a relatively warm region.

As a rule a well-developed low is accompanied, not only by considerable cloudiness, but at least in certain quadrants by more or less widespread precipitation as well, thereby making it impracticable to secure within its confines good kite or pilot-balloon observations. On the morning of the 3d, however, there appeared a deep low central over the lower Missouri Valley which in the second respect differed from the average. For this reason it seems advisable to relate in some detail the characteristics of the upper atmosphere as shown by aerological observations during the eastward advance of this storm. Its movement across the country was conspicuously slow, the center being over the lower Lakes three days later. The precipitation area increased rapidly, however, after the 3d, but fortunately good kite observations were obtained during the most of this period, some of these being made during snow flurries. The times of these observations were approximately the same as indicated by the morning weather charts so that reference to the latter is suggested in order to locate the position of any particular station relative to the storm center.

Attention is first invited to the "flat map" of the 2d with respect to both pressure and temperature gradients (not reproduced). The free-air temperatures on this day exhibited the same characteristics, there being practically no temperature difference between Drexel and Groesbeck from 1,000 to 4,000 m. It seems probable that this fact played a part in the rapid development of the low as found the next morning. On the next day (3d) all of the kite stations except Due West were within the boundaries of this storm and fortunately all stations

except Broken Arrow obtained morning kite observations. All altitudes referred to are above sea level, unless otherwise stated.

February 3, 1924, altitude (meters above sea-level)

Station	Surface	1,000	2,000	3,000	4,000	5,000
Ellendale, N. Dak.:						
Wind direction.....	N.	NNE.	NNE.	NNE.		
Temperature (°C.).....	-7	-10	-6	-10		
Relative humidity (per cent).....	92	94	48	38		
Drexel, Nebr.:						
Wind direction.....	NE.	ENE.	E.			
Temperature (°C.).....	1	7	7			
Relative humidity (per cent).....	98	70	37			
Groesbeck, Tex.:						
Wind direction.....	S.	WSW.	WSW.			
Temperature (°C.).....	13	16	10			
Relative humidity (per cent).....	83	52	33			
Royal Center, Ind.:						
Wind direction.....	E.	SSW.	WSW.	SW.	SW.	
Temperature (°C.).....	1	10	4	-4	-11	
Relative humidity (per cent).....	92	53	58	74	88	
Due West, S. C.:						
Wind direction.....	SW.	W.	W.	WSW.	WSW.	WSW.
Temperature (°C.).....	3	8	4	0	-7	-14
Relative humidity (per cent).....	88	68	69	58	50	48

Ellendale, situated in the NW. quadrant; wind NNE. to at least 3,000 m.; adiabatic rate for dry air from surface to 870 m., sharp inversion to 1,460 m., isothermal to 2,100 m., above which the average winter lapse rate for that elevation prevailed to 3,000 m.; surface relative humidity high, altitude of St base about 850 m., upper limit of clouds at base of inversion; light snow during flight.

Drexel, situated just north of the region of lowest pressure; wind NE., veering gradually, becoming SW. at 4,500 m.; general temperature inversion from surface to 1,650 m., then a decrease to 2,700 m. at slightly less than the adiabatic rate for dry air; light fog at surface, deepening by end of flight as the temperature decreased with altitude and the inversion became elevated, the fog then reaching to the base of the inversion.

Groesbeck, situated in the extreme S. portion of the low; surface wind S., WSW. at 500 to 2,500 m.; vertical temperature gradient very similar to that at Drexel with inversion extending to 1,200 m.; during the flight the WSW. wind changed to SW., coincident with a drop in temperature. This resulted in a nearly adiabatic rate from the surface to 520 m. and in a thin St cloud with its top at the base of the inversion.

Royal Center, situated in the E. portion; surface wind E., rapidly veering to S. at 500 m. and SW. from 1,500 to 4,000 m.; temperature inversion from surface to 1,000 m., then decreased at nearly the adiabatic rate for dry air to 4,000 m.; surface relative humidity high but decreased rapidly with altitude to 50 per cent until just below level of A. Cu. base at 4,000 m.

February 4, 1924, altitude (meters above sea level)

Station	Surface	1,000	2,000	3,000	4,000
Ellendale, N. Dak.:					
Wind direction.....	N.	NNE.	NNE.	NNE.	
Temperature (°C.).....	-21	-21	-16	-18	
Relative humidity (per cent).....	84	77	35	26	
Drexel, Nebr.:					
Wind direction.....	N.	N.	N.		
Temperature (°C.).....	-9	-11	-11		
Relative humidity (per cent).....	97	91	92		
Groesbeck, Tex.:					
Wind direction.....	NW.	NW.			
Temperature (°C.).....	2	-5			
Relative humidity (per cent).....	63	69			
Due West, S. C.:					
Wind direction.....	SSE.	SSW.	SSW.	SW.	SW.
Temperature (°C.).....	6	6	3	-3	-9
Relative humidity (per cent).....	90	91	64	60	62

On the 4th the storm center was over southern Missouri, snow having fallen throughout the NW. quadrant with thunderstorms general around the center and a portion of the south quadrant. On this morning all kite stations except Ellendale were within its influence and morning kite flights were obtained at all of these except Broken Arrow. Following are some characteristics shown by these observations:

Drexel, situated in the NW. quadrant; wind N., surface to 1,900 m., the limit of the observation; temperature decreased at practically adiabatic rate for dry air from surface to 870 m., then practically isothermal to 1,900 m.; light snow during flight; surface relative humidity above 90 per cent increasing to 100 per cent at all upper levels; St base about 800 m.

Groesbeck, situated in the SW. quadrant; wind NW. surface and aloft; temperature decreased at practically adiabatic rate for dry air from surface to 1,500 m., then sharp inversion to 1,800 m., the upper limit of the observation; surface relative humidity 60 per cent and slightly higher aloft; kites did not reach St. Cu.

Due West, situated in the E. quadrant; surface wind SSE., veering aloft to SW. from 3,000 to 4,000 m.; sharp temperature inversion from surface to 570 m., then nearly adiabatic rate for dry air to 1,420 m., followed by a small inversion, above which, the average winter lapse rate for those levels occurred; surface relative humidity from 90 per cent to 80 per cent, decreasing to 60 per cent at highest level (4,000 m.).

February 5, 1924, altitude (meters above sea level)

Station	Surface	1,000	2,000	3,000	4,000
Ellendale, N. Dak.:					
Wind direction.....	NNW.	NE.	NE.	NNE.	N.
Temperature (°C.).....	-24	-16	-13	-16	-20
Relative humidity (per cent).....	80	55	34	30	28
Drexel, Nebr.:					
Wind direction.....	N.	NNE.	NNE.	NNE.	
Temperature (°C.).....	-19	-14	-12	-17	
Relative humidity (per cent).....	100	73	40	66	
Broken Arrow, Okla.:					
Wind direction.....	NNW.	NNW.	NNW.		
Temperature (°C.).....	-11	-15	-14		
Relative humidity (per cent).....	79	85	99		
Groesbeck, Tex.:					
Wind direction.....	NW.	WNW.	WNW.		
Temperature (°C.).....	-2	-10	-12		
Relative humidity (per cent).....	56	69	49		
Royal Center, Ind.:					
Wind direction.....	ESE.	SW.	SW.		
Temperature (°C.).....	0	0	-7		
Relative humidity (per cent).....	98	78	92		
Due West, S. C.:					
Wind direction.....	SW.	SW.	SSW.		
Temperature (°C.).....	11	4	1		
Relative humidity (per cent).....	87	82	61		

On the 5th the storm center was over Indiana and all kite stations except Ellendale were again within its immediate limits. On this day it was found that practically no difference existed between the free-air temperatures from Ellendale to Groesbeck, from 1,500 m. to 3,000 m., the upper limit of the observations. Following are the characteristics shown at the individual stations on the morning of this date.

Drexel, situated in the W. portion; surface wind N. shifting rapidly aloft to NNE., remaining so to top level; temperature decreased at the adiabatic rate for dry air from surface to 800 m., then a sharp inversion to 1,000 m., followed by a practically isothermal layer to at least 3,000 m.; surface relative humidity nearly 100 per cent, decreasing to 40 per cent at 2,000 m., increasing again to 65 per cent at the top.

Broken Arrow, situated in the SW. quadrant, wind NNW. at surface, NW. at highest level (2,600 m.); temperature decreased at the adiabatic rate for dry air

from surface to 640 m., then practically isothermal to the highest level as at Drexel; surface relative humidity 80 per cent, increasing aloft to St Cu base at 1,100 m. and remaining 100 per cent to top level; light snow during flight.

Groesbeck, situated in the SW. quadrant; surface wind NW., WNW. at all levels above to top of observation (2,600 m.); temperature decreased at the adiabatic rate for dry air from surface to 650 m., then at a lesser rate to 1,700 m., followed by a practically isothermal layer as at the former stations, to the highest level; surface relative humidity 50 per cent, with little change to the highest altitude.

Royal Center, situated just north of the storm center; wind ESE. to SE. at surface, rapidly veering aloft to SW. from 870 m. to the highest level (2,200 m.); temperature practically isothermal from surface to 870 m., then nearly the adiabatic rate for dry air; relative humidity 100 per cent at surface and all levels; base of St Cu about 600 m.; light snow during flight.

Due West, situated in the SE. quadrant, wind SW. at surface and SSW. aloft; temperature decreased at the adiabatic rate for dry air from surface to 1,500 m., then a shallow inversion, above which a small lapse rate was found; relative humidity at surface from 87 per cent to 64 per cent, increasing aloft to St base at 1,000 m., top limit of St at base of inversion at 1,500 m.; light rain just preceding flight.

February 6, 1924, altitude (meters above sea-level)

Station	Surface	1,000	2,000
Royal Center, Ind.:			
Wind direction	SW.	SSW.	WNW.
Temperature (°C.)	-10	-14	-15
Relative humidity (per cent)	100	100	100
Due West, S. C.:			
Wind direction	W.	WSW.	SW.
Temperature (°C.)	-1	-8	-10
Relative humidity (per cent)	58		

On the 6th the storm was centered over Lake Huron while Royal Center and Due West remained within its boundaries, and kite flights from these two stations showed the following characteristics.

Royal Center, situated in the SW. quadrant; surface wind SW., veering to WNW. at 2,200 m., the highest level reached; temperature lapse rate nearly adiabatic for dry air from surface to 1,150 m., then a sharp inversion of 100 m. depth, then practically isothermal to the top level; relative humidity practically 100 per cent surface and aloft; Nb. base about 1,000 m. and extending in depth at least to highest level. During flight when temperature lapse rate off surface had increased the cloud base lowered to 650 m.; snowing during flight.

Due West, situated in the S. quadrant; wind W. at surface and WSW. to SW. aloft to highest level (2,800 m.); temperature decreased at nearly the adiabatic rate for dry air from surface to 1,870 m., above which was found a sharp inversion to 2,100 m.; then the normal lapse rate; surface relative humidity 50 per cent; St. base about 1,600 m., depth of clouds unknown as no free-air humidity record was obtained; light snow during flight.

TABLE 1.—Free-air temperatures, relative humidities and vapor pressures during February, 1924

Altitude, m. s. l. (m.)	TEMPERATURE (° C.)											
	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De-parture from 6-yr. mean	Mean	De-parture from 9-yr. mean	Mean	De-parture from 3-yr. mean	Mean	De-parture from 7-yr. mean	Mean	De-parture from 6-yr. mean	Mean	De-parture from 6-yr. mean
Surface	4.8	-0.2	-1.9	+2.2	5.9	-2.5	-6.9	+3.6	8.0	-1.8	-2.6	-0.3
250	4.8	-0.1	-1.9	+2.6	5.6	-2.6	-6.8	+3.7	7.9	-1.6	-2.8	-0.3
500	4.4	+0.9	-1.9	+2.6	4.4	-2.5	-6.8	+3.7	7.1	-1.4	-4.7	-0.3
750	3.6	+1.1	-1.9	+3.0	3.4	-2.5	-6.4	+3.7	6.5	-1.6	-5.1	0.0
1,000	3.0	+0.9	-1.5	+2.9	2.9	-2.3	-5.4	+3.8	6.0	-1.2	-6.5	+0.5
1,250	2.5	+0.7	-1.1	+2.7	1.8	-2.5	-5.1	+3.8	6.0	-1.2	-6.5	+0.5
1,500	2.0	+0.9	-1.4	+2.5	0.6	-2.8	-5.2	+3.5	5.2	-1.3	-6.0	+0.4
2,000	0.8	+1.0	-2.8	+2.2	-0.1	-2.0	-6.9	+3.0	3.2	-1.9	-7.0	+0.5
2,500	-1.2	+1.2	-4.8	+2.3	-2.5	-1.9	-9.0	+2.9	0.0	-1.9	-9.4	+0.8
3,000	-3.7	+1.2	-7.2	+2.4	-5.4	-2.5	-11.1	+3.4	-1.2	-1.4	-13.0	-1.7
3,500	-6.2	+1.1	-9.8	+2.6	-8.4	-2.8	-13.3	+3.8	-3.8	-1.7	-16.8	-2.9
4,000	-8.7	+1.2	-12.8	+2.3	-11.8	-2.9	-15.5	+4.1	-6.3	-1.7	-20.9	-4.0
4,500	-11.7	+1.2	-16.0	+2.3	-15.2	-2.8	-17.5	+4.8	-9.5	-2.5		
5,000	-14.9	+1.2	-19.3	+2.7	-18.2	-2.8	-20.3	+4.9	-12.9	-2.7		

  

Altitude, m. s. l. (m.)	RELATIVE HUMIDITY (PER CENT.)											
	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De-parture from 6-yr. mean	Mean	De-parture from 9-yr. mean	Mean	De-parture from 3-yr. mean	Mean	De-parture from 7-yr. mean	Mean	De-parture from 6-yr. mean	Mean	De-parture from 6-yr. mean
Surface	71	+4	78	+1	63	-5	75	-6	75	0	84	+6
250	70	+3	78	+1	63	-5	75	-6	72	-1	84	+6
500	64	-1	74	-1	61	-5	73	-7	70	0	81	+3
750	62	0	68	-3	61	-4	67	-7	66	0	78	-2
1,000	59	+1	63	-3	60	-4	63	-7	61	-1	65	-6
1,250	57	+2	60	-2	59	-4	60	-6	58	-1	63	-5
1,500	54	+1	57	-2	57	-4	55	-7	55	0	60	-4
2,000	46	-3	54	-1	53	-4	50	-9	54	+5	59	+1
2,500	44	-4	53	0	51	-5	48	-11	50	+5	58	+2
3,000	41	-4	51	-2	51	-2	48	-10	48	+5	64	+8
3,500	40	-3	51	-2	49	-2	47	-9	46	+5	73	+17
4,000	40	-3	51	0	49	-2	46	-9	43	+6	82	+26
4,500	39	-3	52	+1	48	-2	60	+6	39	+10		
5,000	39	-3	52	+1	48	-2	74	+16	34	+9		

  

Altitude, m. s. l. (m.)	VAPOR PRESSURE (mb.)											
	Broken Arrow, Okla. (233 m.)		Drexel, Nebr. (396 m.)		Due West, S. C. (217 m.)		Ellendale, N. Dak. (444 m.)		Groesbeck, Tex. (141 m.)		Royal Center, Ind. (225 m.)	
	Mean	De-parture from 6-yr. mean	Mean	De-parture from 9-yr. mean	Mean	De-parture from 3-yr. mean	Mean	De-parture from 7-yr. mean	Mean	De-parture from 6-yr. mean	Mean	De-parture from 6-yr. mean
Surface	6.18	+0.11	4.28	+0.54	5.89	-2.18	2.96	+0.48	8.39	-1.26	4.05	-0.14
250	6.14	+0.12	4.28	+0.54	5.79	-2.17	2.96	+0.48	7.98	-1.21	3.98	-0.10
500	5.40	+0.07	4.06	+0.51	5.27	-1.93	2.88	+0.44	7.28	-0.91	3.28	-0.32
750	4.80	+0.09	3.70	+0.48	4.96	-1.79	2.69	+0.40	6.68	-0.88	2.84	-0.41
1,000	4.44	+0.20	3.55	+0.50	4.97	-1.47	2.67	+0.43	6.22	-0.65	2.48	-0.51
1,250	4.19	+0.32	3.42	+0.50	4.60	-1.39	2.56	+0.39	5.72	-0.49	2.24	-0.43
1,500	3.80	+0.29	3.20	+0.49	4.14	-1.34	2.34	+0.32	5.17	-0.25	2.05	-0.34
2,000	2.99	+0.15	2.70	+0.42	3.60	-0.80	1.81	+0.10	4.23	+0.08	1.92	-0.02
2,500	2.49	+0.11	2.22	+0.33	3.17	-0.41	1.47	+0.08	3.21	-0.09	1.54	-0.11
3,000	1.99	+0.11	1.77	+0.22	2.55	-0.28	1.31	+0.18	2.72	-0.05	0.80	-0.55
3,500	1.60	+0.11	1.41	+0.17	2.05	-0.38	1.12	+0.25	2.28	+0.02	0.22	-0.81
4,000	1.28	+0.12	1.17	+0.23	1.48	-0.38	0.96	+0.25	1.80	+0.04		
4,500	0.98	+0.12	1.09	+0.31	1.05	-0.38	1.03	+0.45	1.34	+0.22		
5,000	0.80	+0.12	1.09	+0.37	0.77	-0.38	0.95	+0.53	0.96	+0.17		

TABLE 2.—Free-air resultant winds (m. p. s.) during February, 1924

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233 meters)				Drexel, Nebr. (396 meters)				Due West, S. C. (217 meters)				Ellendale, N. Dak. (444 meters)				Groesbeck, Tex. (141 meters)				Royal Center, Ind. (225 meters)				
	Mean		6-year mean		Mean		9-year mean		Mean		3-year mean		Mean		7-year mean		Mean		6-year mean		Mean		6-year mean		
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	
Surface	N. 45° W.	2.1	N. 29° W.	0.9	S. 62° E.	0.2	N. 66° W.	1.4	N. 66° W.	1.8	W.	1.6	N. 20° W.	3.2	N. 44° W.	3.6	N. 7° W.	1.5	N. 22° W.	0.5	N. 70° W.	1.9	S. 85° W.	2.1	
250	N. 45° W.	2.1	N. 34° W.	0.7		N. 65° W.	1.9	N. 88° W.	4.4			N. 11° W.	1.6	N. 36° W.	0.4	N. 76° W.	2.0	S. 82° W.	2.0	S. 82° W.	2.0	S. 82° W.	2.0	S. 82° W.	2.3
500	N. 58° W.	2.0	N. 71° W.	0.6	N. 76° W.	0.4	N. 71° W.	2.0	N. 72° W.	2.5	W.	3.1	N. 21° W.	3.0	N. 48° W.	3.8	N. 16° W.	1.1	S. 42° W.	0.8	N. 84° W.	3.5	S. 71° W.	3.6	
750	N. 48° W.	2.6	S. 70° W.	1.5	N. 54° W.	1.7	N. 69° W.	4.1	S. 84° W.	3.6	S. 81° W.	4.6	N. 4° W.	1.7	N. 53° W.	4.8	N. 36° W.	1.2	S. 48° W.	1.6	S. 78° W.	4.2	S. 71° W.	5.2	
1,000	N. 57° W.	2.5	S. 70° W.	2.5	N. 34° W.	2.5	N. 65° W.	5.3	S. 81° W.	4.3	S. 79° W.	5.7	N. 23° W.	2.0	N. 23° W.	5.3	N. 72° W.	2.1	S. 63° W.	2.9	S. 82° W.	5.2	S. 76° W.	6.5	
1,250	N. 63° W.	3.5	N. 88° W.	3.5	N. 40° W.	3.8	N. 65° W.	6.5	S. 81° W.	5.5	S. 81° W.	7.2	N. 32° W.	3.2	N. 53° W.	6.4	N. 82° W.	3.3	S. 73° W.	4.1	N. 73° W.	5.8	S. 85° W.	7.7	
1,500	N. 58° W.	4.6	N. 82° W.	4.4	N. 45° W.	4.7	N. 65° W.	8.4	N. 82° W.	7.9	S. 84° W.	9.1	N. 24° W.	3.6	N. 57° W.	7.5	S. 85° W.	5.5	S. 79° W.	5.6	N. 60° W.	6.6	S. 88° W.	9.1	
2,000	N. 60° W.	5.7	N. 76° W.	6.5	N. 49° W.	6.9	N. 67° W.	10.3	N. 80° W.	11.1	S. 87° W.	12.6	N. 26° W.	5.4	N. 61° W.	9.4	N. 86° W.	7.0	S. 84° W.	7.6	N. 60° W.	11.3	N. 87° W.	11.0	
2,500	N. 68° W.	6.5	N. 74° W.	7.4	N. 53° W.	11.2	N. 68° W.	12.7	N. 88° W.	13.1	S. 85° W.	14.7	N. 24° W.	7.1	N. 64° W.	11.5	N. 81° W.	7.7	W.	8.6	N. 72° W.	14.8	N. 83° W.	13.6	
3,000	N. 70° W.	7.7	N. 79° W.	10.6	N. 56° W.	10.1	N. 73° W.	14.4	N. 88° W.	13.4	S. 86° W.	15.9	N. 21° W.	10.3	N. 65° W.	12.8	N. 69° W.	7.7	W.	10.7	S. 81° W.	18.1	N. 86° W.	14.6	
3,500	N. 66° W.	6.4	N. 65° W.	10.9	N. 65° W.	11.5	N. 73° W.	15.7	N. 74° W.	14.0	N. 83° W.	17.1	N. 37° W.	8.4	N. 69° W.	12.2	N. 58° W.	9.0	N. 86° W.	11.4	S. 45° W.	13.0	N. 83° W.	17.6	
4,000	N. 59° W.	9.0	N. 62° W.	10.3	N. 60° W.	14.6	N. 78° W.	16.9	S. 83° W.	12.0	S. 83° W.	12.0	N. 30° W.	11.9	N. 65° W.	13.4	N. 64° W.	8.7	N. 83° W.	12.1	S. 45° W.	11.6	N. 82° W.	17.5	
4,500	N. 44° W.	9.9	N. 51° W.	12.6	W.	12.4	N. 83° W.	17.0	S. 68° W.	15.0	S. 68° W.	15.0	N. 30° W.	12.8	N. 63° W.	14.1	N. 57° W.	7.9	N. 74° W.	12.5					
5,000	S. 45° W.	11.5	S. 45° W.	11.5	N. 70° W.	11.8	N. 81° W.	16.3	S. 68° W.	16.6	S. 68° W.	16.6	N. 68° W.	16.4	S. 84° W.	18.6	N. 51° W.	8.2	N. 49° W.	10.1					