

47 th Congress  
1<sup>st</sup> Session

Ex. Doc No. 70

In response the Senate  
resolution of January 6, 1882  
the report of the Commissioner  
of the General Office upon the  
survey of the United States  
Texas Boundary Commission

50  
40-C-2

47<sup>th</sup> CONGRESS  
1<sup>ST</sup> Session

Ex. Doc No. 70

In response to Senate resolution of January 6, 1882 the report of the Commissioner of the General Land Office upon the survey of the United States and Texas Boundary Commission.

Complete Report of  
John H. Clarke's Survey of Texas - U.S.  
boundary - 1859 through 1862, including maps.

8-15-2012  
djh Clarke's 1859-1860 plats - See drw. 93. N. 1 and 2  
Most plats cover 103<sup>rd</sup> & 100<sup>th</sup> meridian tracements.  
One plat covers most eastern 40 miles of 32<sup>nd</sup> parallel  
(in 93. N. 1)



L E T T E R

FROM THE

SECRETARY OF THE INTERIOR,  
TRANSMITTING,

*In response to Senate resolution of January 6, 1882, the report of the Commissioner of the General Land Office upon the survey of the United States and Texas Boundary Commission.*

JANUARY 24, 1882.—Referred to the Committee on Territories and ordered to be printed.

DEPARTMENT OF THE INTERIOR,  
Washington, January 19, 1882.

SIR: In answer to Senate resolution of the 6th instant, instructing me to furnish the Senate with the report, if any, of the survey of the United States and Texas Boundary Commission, made under the provisions of the act of Congress approved June 5, 1858; and if no final report of said Commission was made, to report that fact, together with the maps, surveys, and report of work so far as it was prosecuted, I have the honor to transmit herewith the report of the Commissioner of the General Land Office, under date of the 11th instant, on the subject, together with the maps and papers accompanying his report.

Very respectfully,

S. J. KIRKWOOD,  
Secretary.

The PRESIDENT *pro tempore* of the Senate.

DEPARTMENT OF THE INTERIOR,  
GENERAL LAND OFFICE,  
Washington, D. C., January 11, 1882.

SIR: I have the honor to acknowledge the receipt, by reference from the department for report, of a resolution of the United States Senate, dated January 6, 1882, calling on the Secretary of the Interior to "furnish the Senate with the report, if any, of the survey of the United States and Texas Boundary Commission, made under the provisions of the act of Congress approved June 5, 1858"; and if no final report of said Commission was made, that fact is required to be reported, together with the maps, surveys, and report of the work so far as it was prosecuted.

In reply, I have the honor to state that no report of said survey on the part of the commissioner for the State of Texas was ever made.

Several partial reports were made by John H. Clark, United States



commissioner, and his report of September 30, 1861, covers briefly the whole field of operations by both commissioners in establishing said boundary.

I transmit herewith, in separate packages, the maps and notes of field-work of the survey returned by the United States commissioner; also, the correspondence in the case, including copy of the instructions by the department to said commissioner for said survey, and letters to the governor of Texas.

Of the 16 maps returned by the commissioner, Nos. 3 and 16 are missing, the latter being a general map of the whole survey, noted on the records as "missing" as early as May 7, 1862; the former, No. 3, being a map of that part of the thirty-second parallel from Crow Spring to the Pecos River.

All the maps are in more or less of an unfinished condition as to topography, lettering, &c., some of them being nearly completed. The bound volume, No. 9, contains manuscript notes of all the field-work of triangulation and topography. None of the maps or records are authenticated or approved.

From an examination of the papers and reports, which will be found in the bundle marked "Correspondence," the following is prepared as showing, in brief, what was accomplished under said act of Congress approved June 5, 1858. (Stat. at Large, Vol. II, p. 310.)

The Joint Commission on the part of the United States and the State of Texas commenced work together on the Rio Grande, but the Texas commissioner did not remain long in the field on account of personal differences between himself and the United States commissioner. A new Texas commissioner came and assisted in the survey of a part of the west boundary, or one hundred and third meridian, west longitude.

In the next year, viz, 1860, when the United States commissioner surveyed the north and east boundaries, it does not appear from the records and papers that the Texas commissioner took any part in the work, and the language used by the United States commissioner indicates that he did the work without any co-operation.

The east boundary, being that part of the line between Texas and Indian Territory, along the one hundredth meridian, west longitude, had been in part previously established by Messrs. Jones and Brown, surveyors, in 1859, under a contract for marking the boundary-line of certain Indian lands, which boundary, by treaty of January 22, 1855, was the one hundredth meridian, or the line between the State of Texas and the Indian country.

Said surveyors had marked the one hundredth meridian from the north bank of Red River, or what is designated on the United States maps as Red River, north to the Canadian River, and about 19 miles farther north, and under the instructions issued to the United States commissioner by the Secretary of the Interior, for the survey of the United States and Texas boundary, he was only required to *retrace* so much of said meridian as had been thus previously established by said surveyor, Jones and Brown.

The copy of letter from the department to the governor of Texas, dated August 17, 1858, with the correspondence in the package accompanying this letter, sets forth the reasons why the government proposed to adopt the survey made by said surveyors as a part of the line between the United States and State of Texas.

As stated in my letter dated January 5, 1882, to Hon. S. B. Maxey, the work of Commissioner Clark was terminated in January, 1862, by the direction of the department in letter dated the 16th of that month,



and the office-work was therefore never completed, the field-work having been executed, as required by the Secretary of the Interior, except a part of the west boundary, which was not run, viz, from 33° north latitude to 33° 45' north latitude.

No part of said boundary survey has ever been officially agreed upon or accepted by the two governments as contemplated in the act of Congress authorizing the survey.

In explanation of the condition of some of the maps, I have the honor to state that they were damaged by water at the time of the Patent Office fire in 1877.

The Senate resolution is herewith returned.

I am, very respectfully, your obedient servant,

N. C. McFARLAND,  
*Commissioner.*

Hon. S. J. KIRKWOOD,  
*Secretary of the Interior.*

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SCHEDULE OF PAPERS, BOOKS, AND MAPS HEREWITH TRANSMITTED.

1st. Fourteen maps of portions of the boundary between the United States and the State of Texas.

2d. Book numbered 9; complete copy of field-work.

3d. Book numbered 17; complete record of astronomical work.

4th. Letters and reports of surveys numbered from 1 to 20, inclusive, as follows:

No. 1.—Letter from department to governor of Texas, dated July 1, 1858.

No. 2.—Letter from department to United States commissioner, dated July 9, 1858.

No. 3.—Letter of governor of Texas to Secretary of the Interior, dated July 12, 1858.

No. 4.—Letter of governor of Texas to Secretary of the Interior, dated July 28, 1858.

No. 5.—Letter of Secretary of the Interior to governor of Texas, dated August 17, 1858.

No. 6.—J. H. Clark to department, dated September 8, 1858.

No. 7.—J. H. Clark to department, dated May 12, 1859.

No. 8.—J. H. Clark's report to department, dated June 3, 1859.

No. 9.—J. H. Clark's report to department, dated October 27, 1859.

No. 10.—Secretary of the Interior to governor of Texas, dated March 19, 1860.

No. 11.—Governor of Texas to department, dated April 16, 1860.

No. 12.—Report of J. H. Clark to department, dated July 16, 1860.

No. 13.—Report of J. H. Clark to department, dated November 14, 1860.

No. 14.—Department to General Land Office, dated July 27, 1861.

No. 15.—Department to General Land Office, dated August 2, 1861.

No. 16.—Report of J. H. Clark to department, dated September 30, 1861.

No. 17.—Letter of J. H. Clark to department, dated October 14, 1861.

No. 18.—Letter of J. H. Clark to General Land Office, dated January 19, 1862.

No. 19.—Department to J. H. Clark, dated January 16, 1862.

No. 20.—J. H. Clark's letter to General Land Office, dated January 21, 1862.

# BOOK No. 9.

## COMPLETE COPY OF FIELD-WORK.

SUNDAY, *January 9th*, 1859.—Locate base line and begin to clear the ground; 1,150 yds.

*January 10th*.—Prolong the base line about 320 yds.; work on it.

*January 11th*.—Work in preparing the ground. Rain in afternoon.

*January 12th*.—Work on the base line; prepare the ground.

*January 14th*.—Put pegs on base line.

*January 15th*.—Measure base line 750 rods, in 8 hours.

*January 16th & 17th*.—Second measurement—whole base line 950 rods & 5 ft. per rod = 4,750 ft. There being no error.

*January 18th*.—Recon'g on Mts. (East). *19th*. Go to Fronteroo.



*January 20th*, 1859.—Azimuth variation of needle,  $12^{\circ} 25' 00''$ .

### Station Frontera.

ex.....	1. Vernier.	2. Vernier.
	o ' "	o ' "
N.....	18 52 10	198 52 05
M.....	31 05 30	211 05 30
P.....	47 38 50	227 38 25
S.....	75 28 00	255 28 00
High. pt. Mud.....	158 50 35	338 50 35
1.....	181 05 30	
+ 2.....	189 36 00	
3.....	194 26 00	
Monument.....	216 01 35	36 01 35

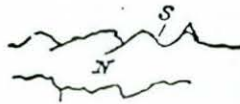
	o	'	"	o	'	"
< Mon. from b. ....	102	22	35	292	22	40
< Mon. A. 1 on m. ....	143	57	35	323	57	35
< b. A. 1 " " ....	31	34	25	211	34	25

Station 1 on meridian.

To—						
< b. 1 on meridian, c. ....	127	03	00	307	03	05
< c. 1 " " 2 on m. ....	35	25	10	215	24	50
< Mon. 1 " " 2 " ....	152	20	00	332	20	00
< b. 1 " " 2 " ....	162	27	10	342	29	30
{ N. ....	200	18	30			
{ M. ....	340	34	40			
{ P. ....	540	28	35			
{ S. ....	860	43	20			
High. pt. Mulera. ....	164	54	50			
1 El Paso Mt. ....	182	50	00			
+ 2 " " " ....	188	44	10			
3 " " " ....	192	54	15			
Monument. ....	207	40	20			

Station B.

< c. b. 1 on meridian ....	21	32	50	201	32	40
< c. b. A. frontera ....	152	24	50	332	24	45
< 1 on mer. b. A. ....	131	52	40	311	52	40
< c. b. 1 on meridian ....	21	22	10	201	22	05



Station C.

< 1 on meridian c. A. ....	24	05	05	204	05	00
< 2 " " c. 1 on m. ....	108	45	00	288	45	00
< d. c. 2 on mer. ....	43	43	55	223	43	55

Station 2 on meridian, Jan'y 21st, 1859.

< c. 2 on meridian 3 on m. ....	144	10	00	324	10	00
< d. 2 " " c. ....	121	45	50	301	45	50
< d. 2 " " 3 on mer. ....	22	45	10	202	45	05

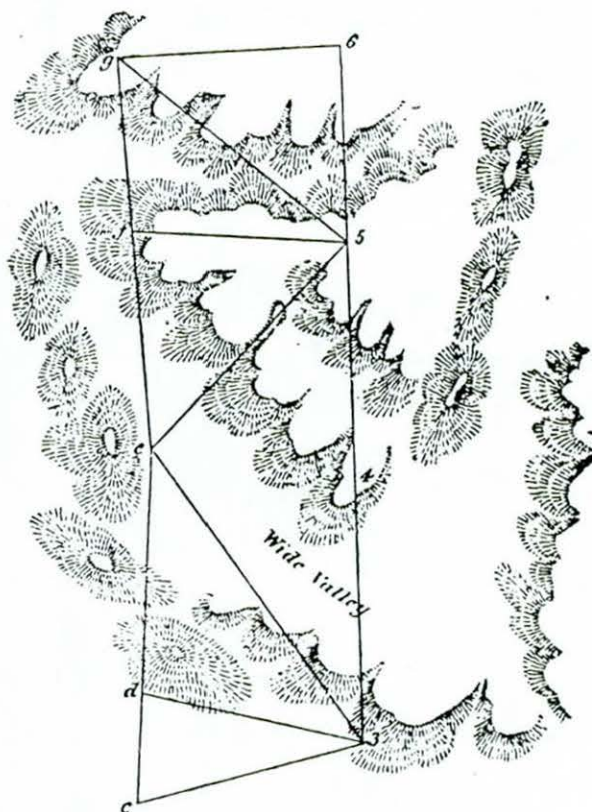
Station 3 on meridian.

< 2 on meridian, 3 on mer. d. ....	42	05	30	222	05	30
< e. 3 " " 4 " " ....	24	15	20	204	15	00

Flag mount. ....	16	50	00	1	El Paso Mts. ....	182	12	00
{ N. ....	25	04	20	+ 2	" " ....	186	40	30
{ M. ....	47	02	00	3	" " ....	190	02	00
{ S. ....	113	34	00	1	Lake Goose Mts. ....	203	28	00
High pt. Mulera. ....	171	17	30	2	" " " " ....	205	25	00
Monument. ....	196	40	25	S. P.	Pedrilla Mts. ....	267	38	00
Road on river. ....	184	02	00	N. P.	" " " " ....	278	56	00







Station 4, Jan'y 22nd.

	o	'	"	o	'	"	
<d. 4. e.....	71	16	50	251	16	45	
Flag mt.....	18	01	00				
N.....	27	25	00				
M.....	53	38	00				
P.....	88	21	00				
S.....	121	58	00				
High pt. Mulera.....	172	31	00				
<e. 4. y.....	33	30	00				
<e. 4. x.....	55	58	00	<of dev.	1	35	00
<e. 4. f.....	83	35	20		263	35	25
<e. 4. 5.....	108	44	00		288	44	00
<f. 4. 5.....	25	09	00		205	08	30.3

Three hills from St. 5.

Station 5.

<4. 5. e.....	17	21	20	197	21	10
<4. 5. f.....	50	02	30	230	02	30
<e. 5. f.....	32	43	25	212	43	10
<e. 5. y.....	13	32	00			
<e. 5. x.....	40	26	00			
<f. 5. 5.....	108	28	10	288	28	00
<f. 5. 6.....	129	55	10	309	55	10
<g. 5. 6.....	21	26	30	201	26	35

Station G.

<6. 5. 5.....	147	52	00	327	52	05
<5. 5. f.....	26	55	05	206	55	00
<5. 5. 5.....	24	43	20	204	43	15
<5. 5. 4.....	11	56	00			
<5. 5. 3.....	20	07	00			



Station F.

	° ' "	° ' "
g. f. 5 .....	44 35 00	224 34 55
c. f. 4 .....	26 00 05	206 00 00
g. f. 4 .....	149 22 50	329 23 00
g. f. e .....	175 22 00	355 22 05
e. f. 5 .....	130 47 30	310 47 30

Station E.

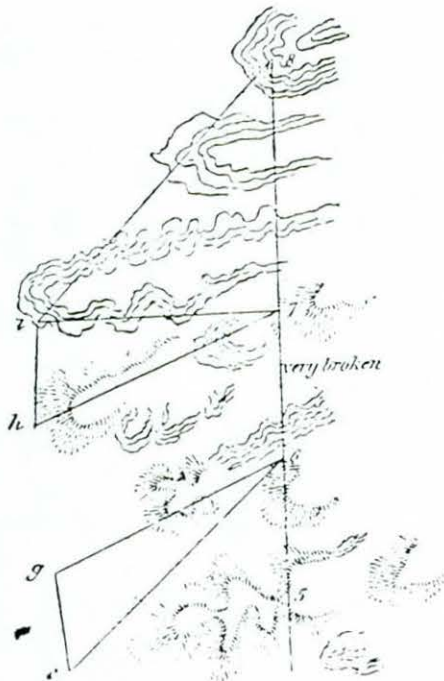
f. e. 5 .....	16 31 00	196 30 55
5. e. 4 .....	53 54 40	233 54 35
4. e. d .....	114 11 30	294 11 40
3. e. 4 .....	84 30 00	264 30 00
3. e. d .....	29 42 10	209 41 55

Station 6, Jan'y 23rd, needle 11° 45' 00".

5. 6. g .....	12 48 50	192 48 45
e. 6. 5 .....	6 28 25	186 28 15
h. 6. 7 .....	34 36 25	214 36 30
g. 6. h .....	136 13 25	316 14 00
B. ....	19 43 00	
Flag mt. ....	24 36 20	
N. ....	37 07 00	
M. ....	84 41 30	
P. ....	119 43 00	
S. ....	139 56 30	
H. pt. Mul. ....	174 50 20	

Station 7.

h. 7. 6 .....	51 06 40	231 06 25
e. 7. 6 .....	45 45 00	225 44 50
h. 7. 8 .....	128 54 35	308 54 30
i. 7. 8 .....	15 50 40	195 50 35
h. 7. i .....	128 01 30?	



Station H.

6. h. 7 .....	265 40 50	85 40 55
i. h. 7 .....	33 48 10	213 48 05

Station J.

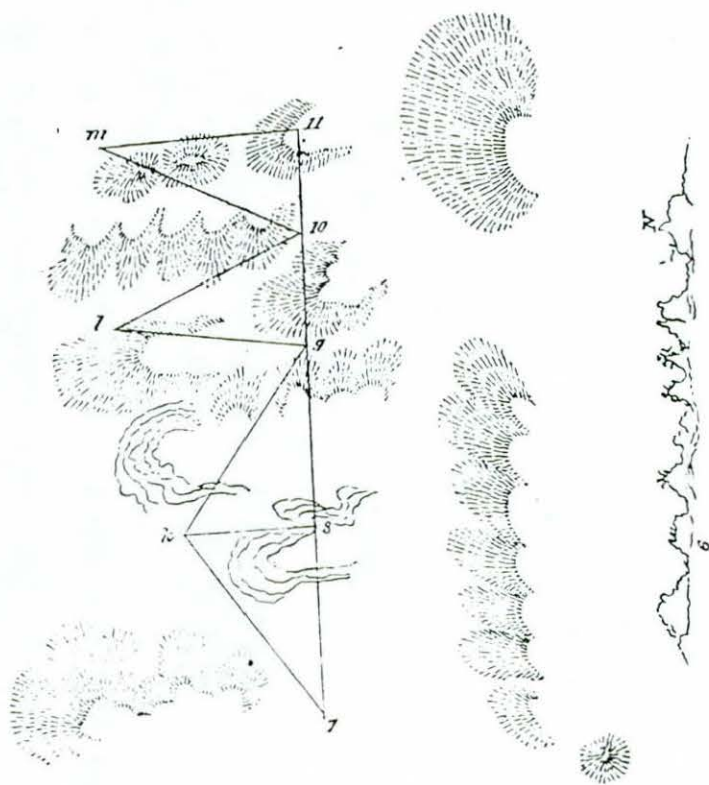
	°	'	"	°	'	"
<h. i. 7 .....	33	03	10	113	08	05
<8. i. 7 .....	159	07	30	339	07	40

Station 8.

<i. 8. 7 .....	5	01	00	185	00	55
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Station 9, January 24th.

<j. 9. 8 .....	52	46	30	232	46	30
<i. 9. 8 .....	3	41	55	183	41	40
<j. 9. K .....	84	21	00	264	20	55
<j. 9. 10 .....	127	53	00	317	33	00
Flag mount .....	28	04	20	Staff seen.		
B .....	25	04	30			
N .....	59	50	10			
M .....	116	42	00			
P .....	139	17	25			
S .....	150	54	30			



Station J.

<k. j. 9 .....	63	39	05	243	39	10
<k. j. 8 .....	142	48	20	322	48	20
<k. j. i .....	184	59	10	4	59	15

Station 10.

<l. 10. 11 .....	41	15	25	221	15	20
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Station K.

<l. k. 9 .....	153	25	30	333	25	40
<l. k. j .....	185	28	40	5	28	35

Station 11.

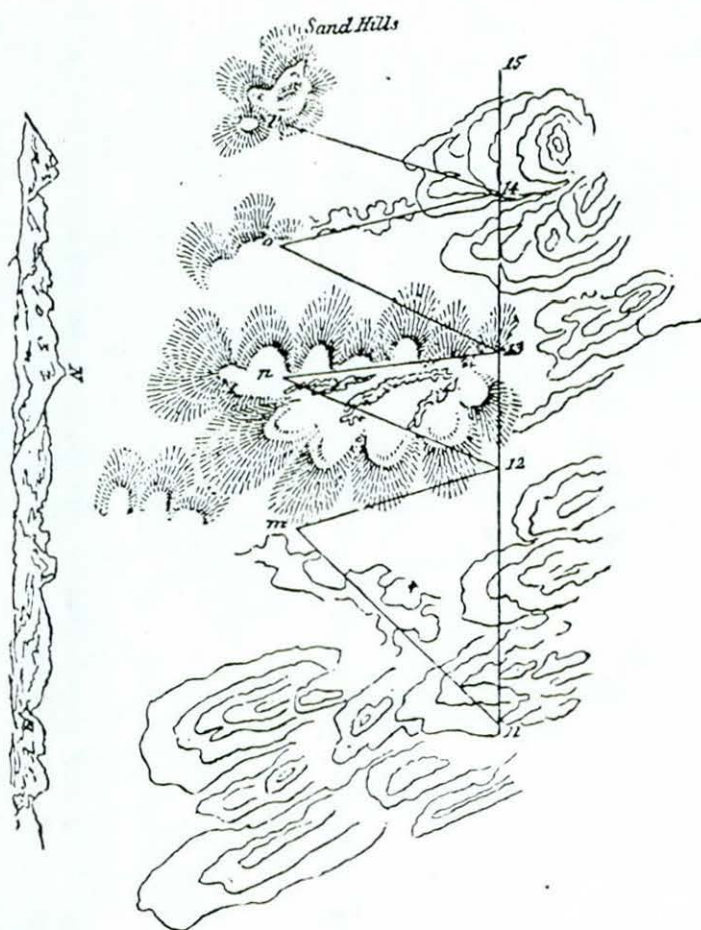
<10. 11. l .....	82	48	50	262	48	45
<10. 11. m .....	130	17	00	310	17	00
<10. 11. m .....	+00	00	10	00	00	00

## Station L.

	o	'	"	o	'	"
<m. l. 12.....	16	26	30	196	26	25
<m. i. 11.....	48	54	40	228	54	30
<m. l. 10.....	104	51	25	284	51	20
<m. l. k.....	129	28	00	309	28	10
M. l. k.....	-00	00	05	-00	00	00

## Station 12, Jan'y 25th.

<11. 12. l.....	50	48	30	230	48	35
<11. 12. m.....	71	34	40	251	34	50
<11. 12. n.....	146	02	35	326	02	45
Camp. 13 m.....	00	00	20	-00	00	16
B.....	31	58	10			
Flag mount.....	35	45	50			
N.....	76	47	20			
M.....	129	28	20			
P.....	145	44	00			
S.....	154	42	00			



## Station M.

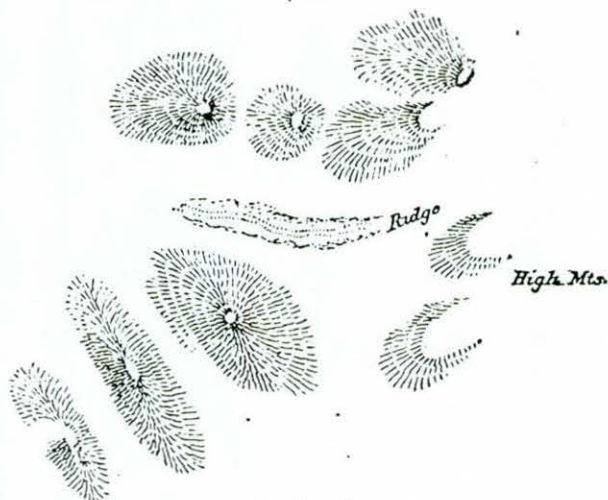
<n. m. 13.....	15	02	10	195	02	00
<n. m. 12.....	69	44	40	249	44	45
<n. m. 11.....	128	26	50	308	27	00
<n. m. l.....	212	07	20	32	07	25
<n. m. e.....	178	20	00			
<n. m. s.....	181	39	00			
Camp mer.....	-00	00	05	-00	00	15

## Station 13, on meridian.

<12. 13. m.....	16	46	00	196	46	00
<12. 13. n.....	30	59	00	210	58	55
<o. 13. 14.....	30	35	55	210	39	00



	°	'	"		°	'	"
N. N .....	59	02	00	B .....	38	55	20
N .....	90	02	00	Flag Mt. (Staff) .....	43	24	45
M .....	136	07	00	N. < of elev. ....	8	24	00
P .....	149	05	40	Observatory .....	127	07	00
S .....	156	45	00				
< Observatory. 13. flag mt. ....				96	15	00	276 14 55
< Observatory 13. 14 .....				52	53	55	232 53 50



Station 6.

5 on parallel .....	00	00	00
Mt. A .....	29	35	00
West Peak of Or. Mts. ....	60	12	50
Highest Peak " " .....	76	12	00
East " " " .....	84	13	20
East Peak 2, of Black Mts .....	125	51	00
Sierra Alto .....	187	30	00
High. Peak Huico Tanks .....	194	05	00
N. (Franklin Mts.) .....	312	32	00
Error 00° 00' 00" .....	180	00	00

February 3rd.—Plotting in camp.

February 4th.—Work in camp.

Section 7, February 5th, 1859.

St. 6, 00° 00' 00" .....			
Mount A .....	27	30	35
West Peak of Organ Mts. ....	57	27	50?
West Peak of Black Mts. ....	121	28	50?
East Peak 2, " " .....	124	36	20?
< N. St. 7. 6. ....	39	09	30
< M. St. 7. 6. ....	64	29	35
< P. St. 7. 6. ....	72	00	25

Station 8, on E. side of Salt Lake Road.

St. 7. = 00° 00' 00" .....			
< P. 8. 7 .....	70	32	25?
< M. 8. 7 .....	62	40	25?
< N. 8. 7 .....	37	05	20?
Mount A .....	24	27	45

Station 9.

St. 9. = 00° 00' 00" .....			
< P. 8. 9 .....	64	23	30
< M. 8. 9 .....	55	19	20?
< N. 8. 9 .....	29	53	30
< St. 9. d. (Evans) .....	10	06	20?
< St. 9. Mt. A .....	29	43	53

From Station 9 to 10..... *Station 10.* = 68 chains 11.5 feet.

From Station 10 to 11..... *Station 11.* = 33 chains 40.2 feet.  
 " " 11 " 12..... = 30 " 37.2 "  
 " " 12 " 13..... = 54 " 00. "  
 " " 13 " 14..... = 67 " 21. "  
 " " 14 " 15..... = 64 " 45. "  
 " " 15 " 16..... = 65 " 19. "  
 " " 16 " 17..... = 84 " 44. "

< *Station 17.*  
 Franklin Mount P. St. 17, 16..... 46 24 15  
 " " " N. " "..... 16 51 00  
 16. = 00° 00' 00".  
 d (Evans)..... 6 08 30  
 Mount A..... 13 01 45  
 West Peak of Organ Mts..... 40 00 00  
 Highest pt " "..... 59 32 30  
 Eastern Gap " "..... 68 21 30  
 St. 17 to 18..... = 87 chains 49.5 feet.  
 " 18 to 19..... = 69 " 0.6 "



*Sierra Alta*

*Station 19, February 6th, 1859.*

St. 18 = 00° 00' 00".  
 d (Evans)..... 5 26 00  
 Mount A..... 11 34 50  
 West Peak of Organ Mts..... 37 27 20  
 Highest Peak " "..... 58 37 15  
 Eastern Gap " "..... 65 13 20  
 North Peak Huico Mts..... 161 35 20  
 Highest Peak " "..... 174 52 40  
 1st Peak south of line..... 180 04 15  
 2nd " " "..... 181 45 00  
 Highest pt. Sierra Alto..... 190 29 35  
 Mt. in front of " "..... 190 39 10 N. Peak.  
 " highest pt "..... 191 53 00  
 5 = ..... 210 10 10  
 Peak of Franklin Mts..... 317 58 00  
 M. " "..... 327 30 00  
 N. " "..... 345 19 20  
 St. 19 to 20..... = 124 chains 35.5 feet.  
 " 20 " 21..... = 40 " 43 "  
 " 21 " 22..... = 22 " 36 "  
 " 22 " 23..... = 56 " 09 "



*Mts. South of Huico Tanks = y*



*Franklin Mts.*



*Organ Mts.*



Station 23.

22 = 00° 00' 00".			
Mt. A .....	9	51	30
West Peak of Organ Mts .....	34	00	10
Highest pt " " .....	54	32	55
Eastern Gap " " .....	60	48	50
North Peak Huico Mts .....	158	22	35
Highest Peak " " .....	174	05	35
Highest pt. Sierra Alto .....	191	50	00
Mount in front of Sierra Alto .....	192	38	00
" " " " .....	194	18	00
" " " " .....	197	25	30
Huico Tanks .....	202	07	00
Peak of Franklin Mts .....	323	35	20
M .....	332	20	40
N .....	347	49	40
Station 23 to 24 .....	= 100	chains	03 feet.
" 24 " 25 .....	= 107	"	02 "
No error.			

Station 25.

Mount A .....	8	44	20
West Peak of Organ Mts .....	31	28	50
High pt " " .....	51	33	50
East Gap " " .....	57	03	10
North Peak of Huico Mts .....	154	42	40
Highest Peak " " .....	173	11	40
Highest pt. on Sierra Alto .....	193	07	10
Gap in " " .....	193	13	15
{ Mt. in front of " "			
{ North point .....			
{ 1. highest .....	195	38	30
{ 2. " .....	197	15	00
{ South point .....	200	54	00
Mount range south of Sierra Alto high pt .....	223	25	30
{ Franklin Mt .....	327	24	15
{ P .....	335	30	10
{ M .....	349	20	30
{ N .....			

February 7th.—Moved camp to initial point.

February 8th.—Go to Cañonita.

February 8th to 17th.—Plotting in camp and preparing a copy of the field notes for the department.

February 18th.—Move camp below Frontera.

February 19th.—Go to Hart's Mill on Rio Grande.

February 20th.—Pass through Franklin and go in camp two miles below Fort Bliss.

February 21st.—Prepare for starting on line.

February 22nd.—Start about 12 a. m. for Huico Tanks.

February 23rd.—Arrived at Huico Tanks in evening.

February 24th.—Take up line in Huico Tanks Valley—reached (the above-mentioned place) about 11 o'clock a. m., having to ride twelve miles from camp at Huico Tanks.

February 24th, 1859.

25 to 26 .....	= 93	chains	03 feet.
26 " 27 .....	= 83	"	36 "
27 " 28 .....	= 89	"	47 "

Station 28.

East = 0° 60' 00".			
To Sierra Alto .....	16	05	15
South peak of mount in front of Sierra Alto .....	27	52	10
Highest point Huico Tanks .....	33	58	30



	o	'	"
P. of Franklin Mts .....	151	23	20
N. " " " .....	170	50	40
West peak of Or. Mts .....	208	42	00
Station 28 to 29 .....	101 chains, 46 feet; monument in road.		

February 25th.—Start from camp 8 a. m.; ar., 10½.

From station 29 to 30 .....	= 53 chains 19 feet.
" " 30 " 31 .....	= 58 " 25 "

Station 31.

	o	'	"
East = 00° 00' 00".			
Sierra Alto .....	18	11	30
Mount in front of Sierra Alto No. 1 .....	30	29	10
" " " 2 .....	32	20	10
South Peak .....	39	32	00
Highest point Huico Tanks .....	41	10	50
{ P. of Franklin Mts .....	154	00	00
{ N. " " " .....	191	48	20
Mount A .....	186	57	25
West peak of Or. Mts .....	206	48	50
Highest point " " .....	225	03	30
Gap of " " .....	229	46	40
From 31 to 32 .....	= 100 chains 31 feet.		

Station 31, east 00.

	o	'	"
Sierra Alto .....	19	43	30
Mount in front of Sierra Alto No. 1 .....	37	20	00 good.
" " " 2 .....	39	01	20
South Peak .....	44	13	50
Highest point Huico Tanks .....	45	26	00



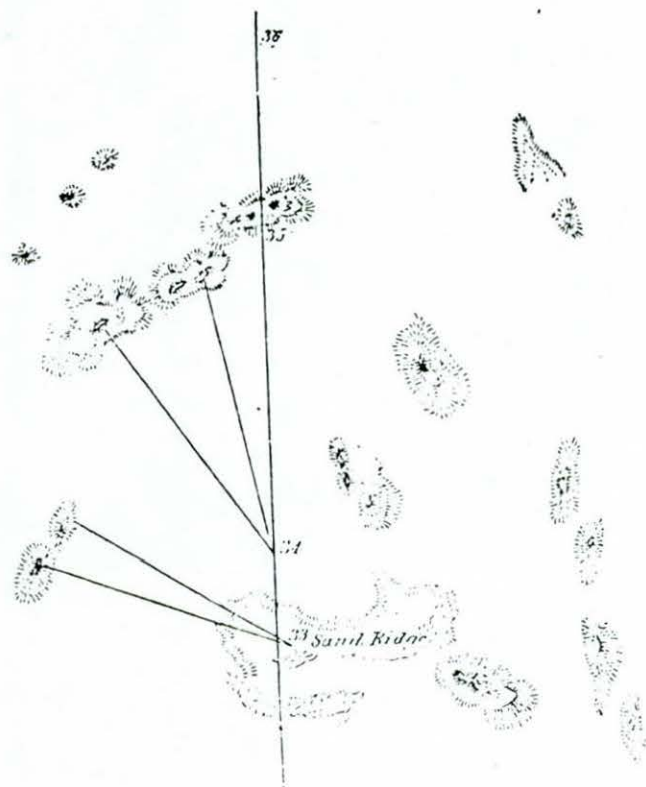
Station 32 to 33 = 113 chains 21 feet—50.

Station 33.

	o	'	"
Sierra Alto .....	21	47	50
Mts. in front of Sierra Alto:			
{ 1 .....	48	58	10
{ 2 .....	49	54	50
{ South Peak .....	54	23	10
33 to 34 .....	= 103 chains 25 feet—50		
34 " 35 .....	= 91	"	31 "
34 " beginning of hill .....	= 88	"	

Station 35.

East = 00.	o	'	"
Highest point of Huico Tanks .....	61	45	30 good.
Peak behind Huico Tanks .....	61	10	40
Mt. in front of Sierra Alto N. 1 .....	83	54	40
P. of Franklin Mts .....	157	56	00
M. " " " .....	163	51	40
N. " " " .....	173	08	50
West peak of Organ Mts .....	203	42	40 good.



Station 35 to 36 .....	= 132 chains 46 feet.
35 " base of Mt .....	= 35 "

February 26th, from camp on Huico Tanks.

36 to 37 .....	= 32 chains 37 feet.
37 " 38 .....	= 33 " 33 "

Station 37.

< a. 37, b .....	6	37	25
< a. 37, c .....	19	31	00
< a. 37, flag d (Catro) .....	29	36	40
Peak behind tanks .....	62	36	00
< 36, 37, peak .....	75	24	00
Highest point of Huico Tanks .....	76	58	00?

Station 38.

< a. 38, b .....	7	57	55
< a. 38, c .....	23	30	05
< a. 38, flag .....	39	24	50
East = peak behind tanks .....	77	02	13
Highest pt. of tanks .....	79	51	00
Peak front of tanks .....	110	17	40?
2 .....	116	40	30
1 .....	123	44	00

<c. 38, flag d .....	15 51 15	good.
North peak front of tanks .....	130 52 00	
P. of Franklin Mts .....	159 27 30	
N. " " " .....	173 38 50	
35 to 39 .....	= 78 chains	39 feet.

Station N.

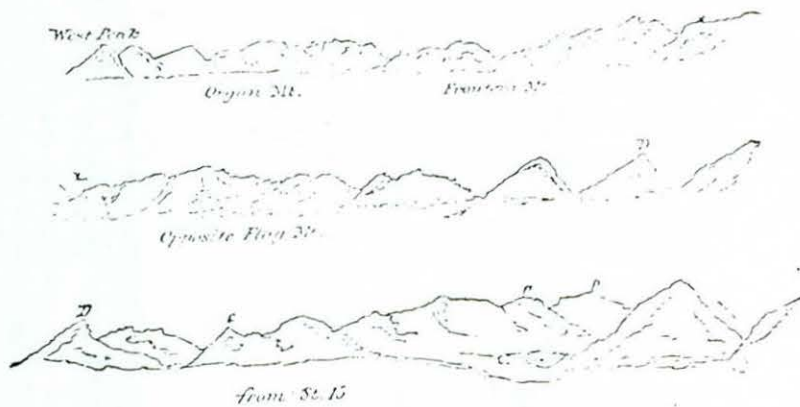
<13 n. 12 .....	114 56 40	294 56 55
<13 n. m .....	150 43 30	330 43 45
<Observ. n. 13 .....	282 36 00	102 36 10
<Camp mer. n .....	00 00 +15	0 00 +05

Station 14.

<13 14 o .....	21 31 05	201 31 00
<13 14 ob .....	86 28 20	266 28 25
<13 14 n .....	86 18 50	266 18 50
January 29:		
<2 on parallel st., 14 on meridian 15 .....	89 10 35	269 10 40
<2 " " 14 " " st., 3 on par .....	356 10 30	176 10 30
<St. O. (Evans) 14 m., st., 2 on parallel .....	69 20 10	149 20 05?
<St. 2 on par. 14 m. c. (Evans) .....	21 00 00	201 00 05
<St. 15 on mer. 14 m., st. 3 on parallel .....	87 00 15	267 00 00

Station 15 on meridian.

<14 m. 15 2 on parallel .....	49 16 35	229 16 35
<14 m. 15 c. (Evans) .....	62 25 50	242 25 45
<St. 15 on meridian .....	00 00 00	180 00 00
<St. d. 15, st. 4 on parallel .....	27 39 05	207 39 05 good.
<St. d. 15 flag mount .....	30 47 10	210 47 15
St. d .....	00 00 00	
N. N .....	42 16 40	
N .....	49 48 00	
<St. d. 15 14 on meridian .....	93 01 55	270 01 50
St. 2 .....	00 00 00	
West p. Organ Mts .....	117 31 50	
High p. " " .....	129 51 10	
Long Mt., in front of Organ Mts .....	133 11 55	
P. east of " " .....	137 09 30?	
Mt. opposite flag mt .....	174 21 30	



SURVEY ON PARALLEL 32° 00' 00".

January 26th.

Angles read from E. by S.

Station 1.

From mon. to st. 1 measured (2) 55 ch. 33 ft.: n.	
base line .....	00 00 00
To flag mt .....	2 34 00



	°	'	"	
N. N .....	12	18	30	
N .....	24	04	00	
Flag O. (Evans) .....	37	20	30	
M .....	45	24	30	
P .....	54	05	10	
S .....	60	10	25	
S. of base line .....	103	45	00	
N. " " " .....	109	26	00	
W. p. of O. Mts .....	270	38	00	
High " " " .....	276	15	30	
East end " " .....	284	38	50	
L.mt. in ft " " .....	297	25	30	No error of instrument.
' "				
<N. end base line st. 1 flag ob .....	47	34	05	34 10
<N. " " " st. 1 monument .....	70	33	45	33 50
<b. (Evans) st. 1 n. base .....	238	16	45	16 45
<S. base line st. 1 n. " .....	5	39	30	39 30 (red) 39 40

Station N, end of base line, January 27th, 1859.

	°	'	"	°	'	"
<St. 1, n. 2 .....	55	05	55	235	05	55
<St. 1, n. A .....	133	22	10	313	22	50
<St. 1, n. S .....	171	15	20	351	16	45
St. 1, 00° 00' 00", Long Mt. in front of Or. Mts., 7° 27' 20".						
Mt. opposite flag mt .....	35	33	00			
P. E .....	50	58	20			
B .....	59	12	10			
F. staff on Mount .....	68	20	30			
N. N .....	78	10	00			
N .....	90	38	50			
M .....	113	16	30			
P .....	122	37	10			
S .....	129	06	35			
Hill East .....	143	40	00			
X .....	144	30	30			
High pt. Mulera .....	145	53	00			
To S. end of base line .....	171	16	20			
" " " " .....	00	00	20			
West P. Organ Mts .....	341	51	45			
High " " " .....	345	03	00	E. end	355	19 10

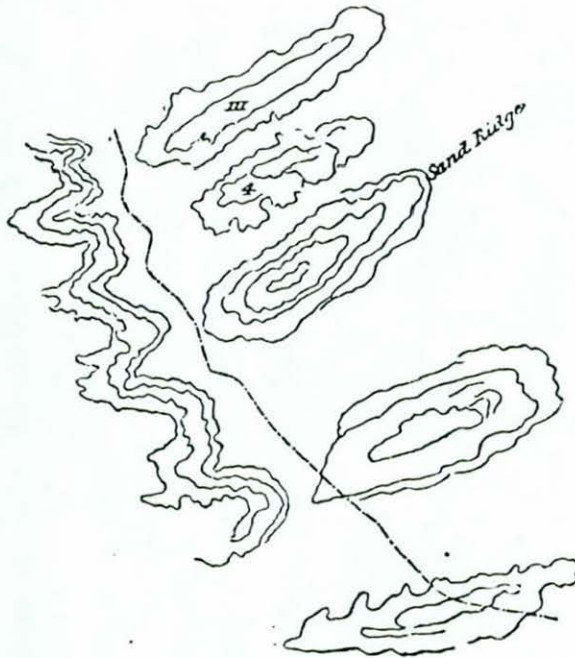
Station S, end of base line.

<N. S. St. 1, on Par .....	3	01	30	183	01	70
<N. S. S. " " .....	42	47	05	232	47	05
<S. S. flag a (Evans) .....	23	28	25	203	28	20
L. end of Or. Mts .....	3	50	00			
Mt. in front of Or. Mts .....	11	24	10			
Mt. opposite of flag mt .....	38	23	10			
P. east .....	41	07	10			
B .....	55	10	50			
Flag Mt .....	68	20	25			
N. N .....	78	08	35			
N .....	91	55	00			
M .....	117	01	15			
P .....	127	43	40			
S .....	135	10	00			
West end of Or. Mts .....	171	03	40			
High P. " " .....	175	53	00			
Camp Mer .....	00	00	10			

Station A (Evans).

<S. base line, a, N. base .....	118	16	10	298	16	15
<S. " " a, St. 1, Par .....	143	28	25	323	28	10
<S. " " a, St. 2, " .....	206	00	00	25	19	10
<S. " " a, flag mt .....	229	14	55	40	15	00

S, 00° 00' 00"	o	'	"
West end of Organ Mts.....	145	56	50
East " " " ".....	169	50	50
Mt. opposite flag mt.....	196	14	35



SURVEY ON PARALLEL 32° 00' 00".

Station 2, January 28th.

St. 1 on Par. 00° 00' 00"		
b. (Evans) 23° 01' 50"	203	01 55
West P. Organ Mts.....	84	11 25
High P. " ".....	92	42 05
C (Evans).....	96	06 55
Long Mt. in front Or. Mts.....	105	27 15
Mt. opposite flag mt.....	136	35 40
P. E.....	157	43 00
B.....	169	59 40
St. 3 on Par. 00° 00' 00"	180	00 60
Flag mt.....	184	33 05
N. N.....	196	34 30
N.....	210	12 50
S end of base line 00—		
a (Evans).....	150	32 00
N. end of base line.....	164	32 35
	330	31 50
		32 30

Station C (Evans).

St. 1 = 00° 00' 00"		
West P. of Organ Mts.....	102	06 45
Long Mt. in front ".....	124	36 40
Mt. opposite flag mt.....	160	31 05
St. 15 on meridian.....	171	01 50
Flag mt.....	209	50 00
St. 3.....	214	35 05
St. 14 on meridian.....	220	25 50
St. O (Evans).....	271	27 20
St. 2 on meridian.....	295	36 50
St. a (Evans).....	337	11 50
N. end of base line.....	348	53 40
St. b (Evans).....	350	24 20
St. 1 on par.....	00	00 -15
	-00	10

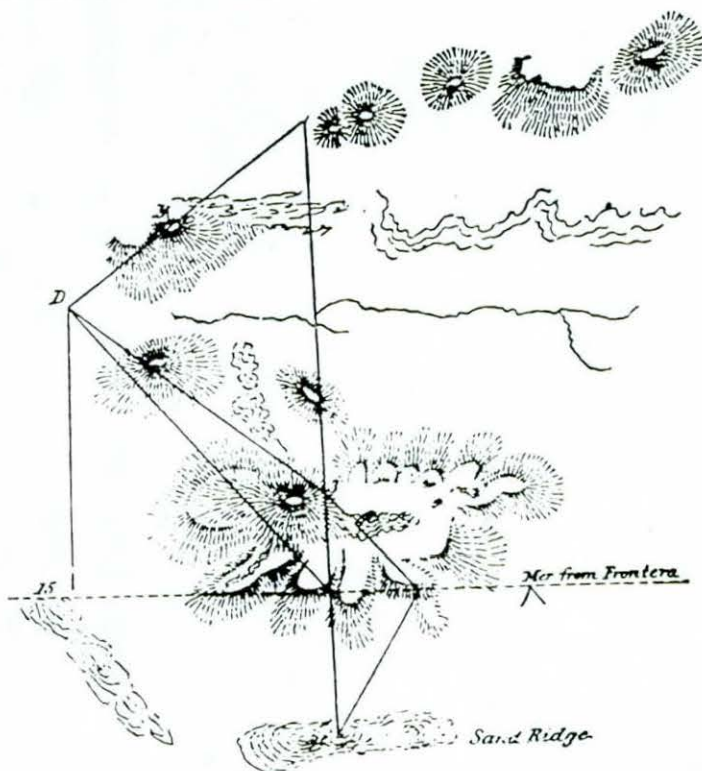


Station b (Evans).

	o	'	"	
St. 1 = 0° 00' 00".				
West P. Organ Mts.....	98	34	50	
Long Mt. in front of Organ Mts.....	122	39	10	
Mt. opposite of flag mt.....	155	51	05	
St. C (Evans).....	164	12	10	
St. 3 on parallel.....	197	23	40	
Flag mt.....	198	11	50	' "
St. 14 on meridian.....	199	16	10	16 15
St. 2 on par.....	215	18	35	18 35
St. O (Evans).....	249	02	30	02 35
S. end of base line.....	322	23	55	24 00
St. a (Evans).....	324	53	25	53 30
N. end of base line.....	341	56	05	56 10
First and second readings.....	00	00	00	

Station 3, Monument, Jan'y 29th.

St. 2 = 0° 00' 0".			
< St. 14 on m. 3, 2.....	2	53	15
< St. 14 " " 3, c. (Evans).....	18	58	40
< d. 3 on par. 4 on P.....	48	00	10
P. E.....	131	58	15?
B.....	171	53	50?
Flag mt.....	186	52	45
N. N.....	208	44	55?
N.....	203	30	40
M.....	244	04	10
P.....	249	53	25
S.....	253	51	40
High pt. Mulera.....	269	11	10



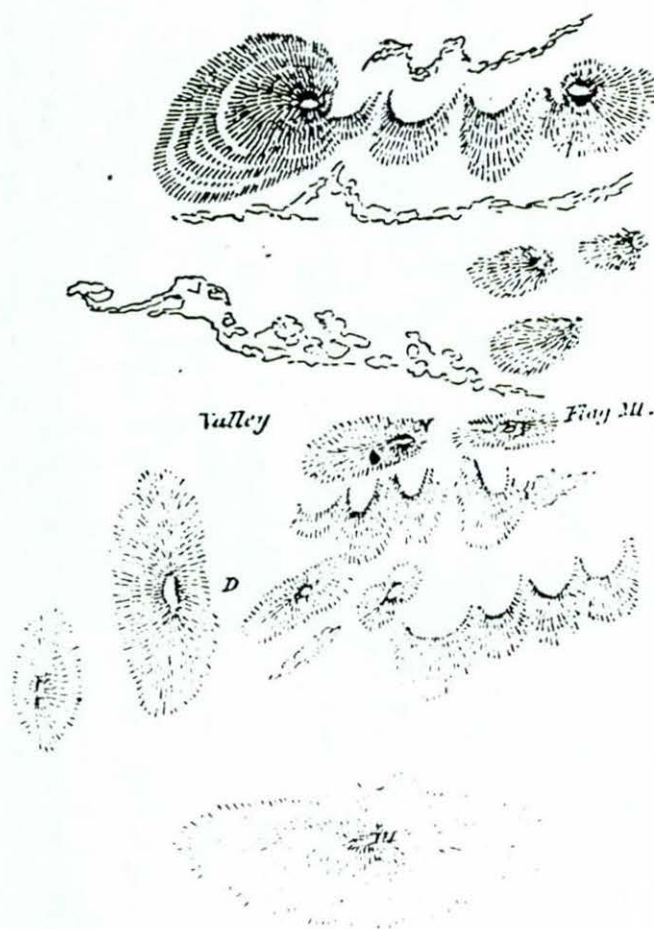
January 30th, Sunday.—Plotting in camp.  
 January 31st.—Plotting in camp; rain.

February 1st, Station 4.

	o	'	"	o	"
= 00° 00' 00".					
< 4. 3. D. (Evans).....	61	35	50	241	35 45
Mt. A.....	72	32	25		
Mt. opposite Organ Mts.....	84	45	00??		



	S	I	"	
Highest pt " "	85	37	10	
East Peak " "	93	46	00	
Peak 1.....	115	13	20	
Peak 2.....	115	36	30	
West Peak Black Mts	127	35	10	
Highest Peak " "	127	58	10	
East Peak 1 " "	128	43	20	
" " 2 " "	130	44	30	" "
To O (Evans).....	149	21	20	21 20
<3. 4. 15 on meridian.....	28	57	30	57 30



Station 5, February 2nd, 1853.

St. 4 = 00° 00' 00"		
Flag a (Evans).....	27	16 00
Mt. A.....	43	57 50
Mt. opposite Or. mts.....	49	32 50
West peak " ".....	63	11 50
Highest " ".....	80	04 50
Peak 1.....	113	35 50
" 2.....	114	10 50
West peak Black Mts.....	125	57 40
Highest peak " ".....	125	49 40
East peak 1 " ".....	125	45 00
" " 2 " ".....	128	43 50
Hill struck by line.....	180	02 35
Sierra Alto.....	186	57 10
High peak Hucco tanks.....	192	45 15
Flag Mount.....	350	14 15
Error, (90 - 0° - 15°).....	00	00 05

Station 39.

East = 00° 00' 00".		o ' "
to C .....		7 28 05
West 00° 00' 00".		
Mount A .....		5 24 15
West Peak of Or. Mts.....		22 00 35
Highest point " " .....		37 54 10
East Gap of " " .....		40 04 40 <sup>ff</sup>
to C .....		187 27 50
to D .....		284 45 00
Highest pt. Hueco tanks .....		283 40 00
{ South Peak front S. Alto .....		300 22 00
{ 1 .....		307 38 50
{ 2 .....		314 14 20
North Peak front S. Alto .....		320 52 10
P. of Franklin Mts .....		340 03 00
N. of " " .....		353 52 30
Error 00° 00' + 20".		

Station 40.

West 00° 00' 00".		
Mount B .....	28 47 20 <sup>†</sup>	
To C .....	207 31 00 <sup>†</sup>	
{ Sierra Alto .....	224 22 30	very good.
{ 2 .....	260 21 00	
{ 3 .....	328 39 00	
North Peak of Mt. in front S. Alto .....	329 24 50	good.
P. of Franklin Mts .....	340 43 05	
M of " " .....	345 59 20	
N of " " .....	354 06 10	
Mount A .....	5 15 35	
d (Evans) .....	1 17 40 <sup>†</sup>	
<39. 40. flag .....	345 48 20	

February 27th.—Plotting in camp on the Hueco tanks.

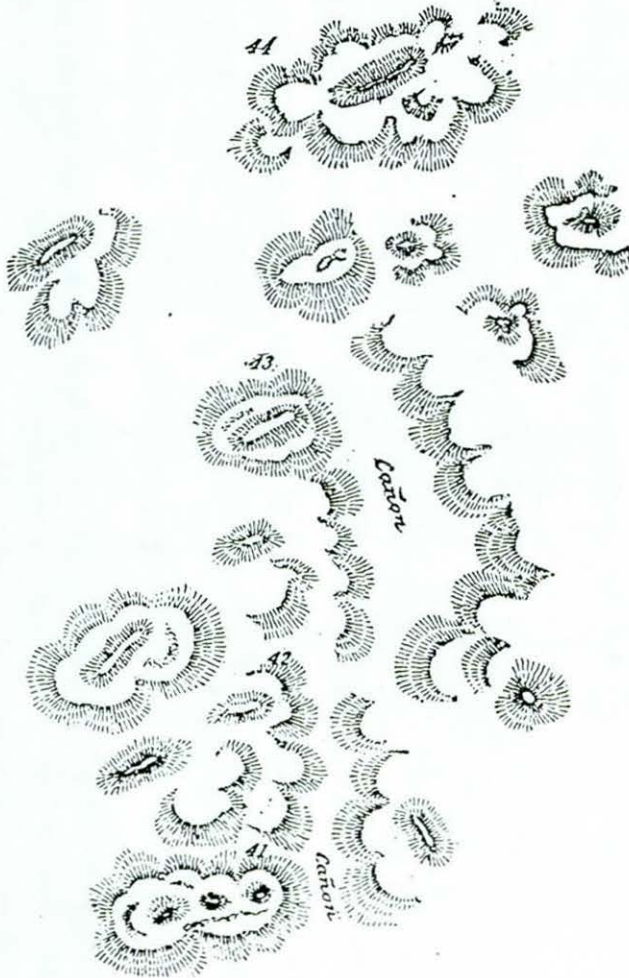


Station 41, February 28th, from camp in front S. Alto.

West = 00° 00' 00".		
Mount A .....	5 01 05	185 01 10
X = .....	18 18 30	
West Peak of Organ Mts .....	20 51 20	200 51 30
Pendleton's flag .....	49 56 25	



	o	'	"
Nertheast of Alamo Mt .....	174	50	20
North Peak of Cornudos Mts.....	176	07	30
South " " " " .....	180	13	30
Z .....	192	15	30
Hill a.....	184	42	00
" b.....	211	50	10
" c.....	219	07	00
Highest point of S. Alto .....	232	19	05
P. of Franklin Mts .....	341	14	55
M " " " .....	346	21	15
N " " " .....	354	13	15
Flag Mount .....	359	30	30
Error 00° 00' 00" .....	180	00	00



Station 42.

	o	'	"
West = 00° 00' 00".			
North Peak Cornudos tanks .....	167	07	40
South " " " .....	167	55	00
North End of Alamo Mt .....	173	45	00
" Peak of Cornudos Mts .....	176	04	55
South " " " " .....	180	12	40
Hill a.....	185	26	35
" b.....	216	52	00
" c.....	220	51	45
Sierra Alto.....	235	55	10
d .....	267	18	20
Error 00° 00' 00" .....	180	00	00

Station 43.

West = 00° 00' 00".			
Pendleton's flag.....	3	45	00

	°	'	"
Hueco Mountains:			
{ No. 1 .....	23	49	20
{ " 2 .....	38	18	50
{ " 3 .....	106	26	00
North pt. Alamo Mt .....	173	17	45
" Peak of Cornudos Mts .....	175	53	55
South " " " " .....	180	14	40
Hill d .....	323	38	15
N. of Franklin Mts .....	354	36	50
Mount Maxey (stick) .....	194	13	20

West = 00° 00' 00". Station 44.  
 Pendleton's flag ..... 2 36 40

Hueco Mountains:			
{ No. 1 .....	17	41	50
{ " 2 .....	30	14	25
{ " 3 .....	80	10	00
{ 4 (tree on summit) .....	146	13	50
North end of Alamo Mt .....	173	04	15
" Peak of Cornudos Mts .....	175	47	25
South " " " " .....	185	10	40
Hill a .....	348	22	15

West = 00° 00' 00". Station 45.  
 Pendleton's flag ..... 2 20 05

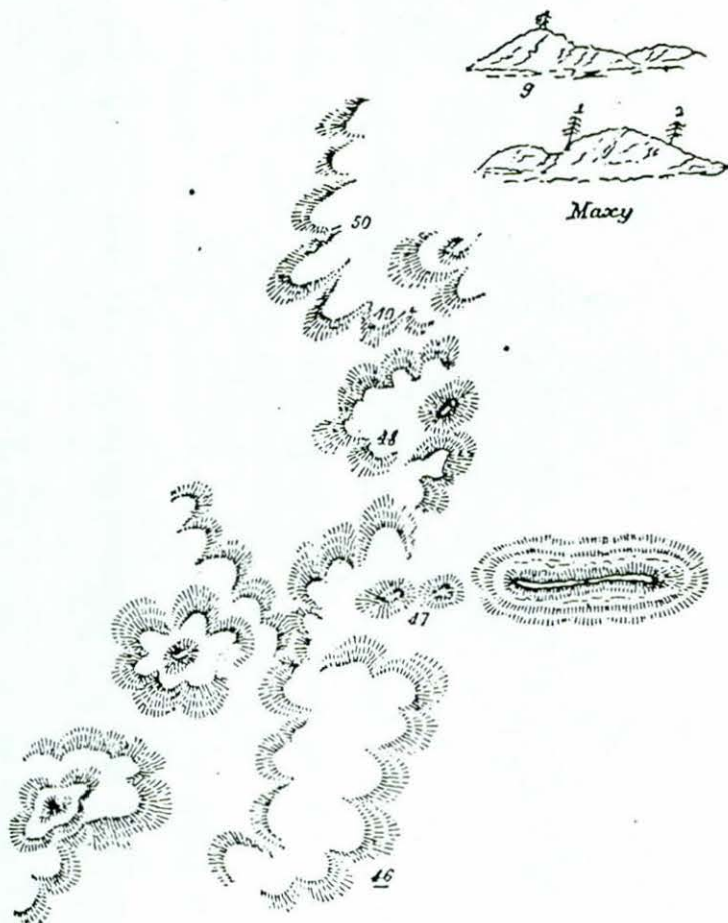
Hueco Mts.:			
{ 1 .....	16	03	05
{ 2 .....	27	48	25
Highest peak Organ Mts .....	34	24	05
Hueco Mts. No. 3 .....	82	17	20
4 (tree) .....	101	03	40
North peak Cornudos tanks .....	166	00	00
South " " " " .....	166	52	05
North end Alamo Mt .....	172	58	40
South point " " .....	174	41	00
North peak Cornudos Mts .....	175	45	20
South " " " " .....	180	17	35
Hill a .....	351	46	20





Station 46, March 1st.

West = 00° 00' 00"	0	1	"
Pendleton's flag .....	1	45	55
Hueco mts. No. 1 .....	13	28	45
4 (tree) .....	22	06	10
Hill h. (bush near top) .....	69	57	10
" f. (bush on top) .....	114	13	40
North end of Alamo Mt .....	172	46	30
South pt.           "   " .....	174	32	10
North peak of Cornudos Mts .....	175	40	25
South   "   "   "   " .....	180	16	50
Hill g (bush near top) .....	198	03	50
Sierra Alto .....	278	14	50
Mount Maxy (2.) .....	342	09	35
"   "   (1.) .....	342	08	25
No error.			



Station 47.

From 46 to 47 = 172 chains 30 feet - 10.

West = 00° 00' 00"	0	1	"
Pendleton's flag .....	00	48	10
Cornudos tanks, N. peak .....	164	47	25
"   "   S.   " .....	165	45	10
Alamo Mt., N. end .....	172	06	05
"   "   S.   " .....	174	01	50
Cornudos Mt., north .....	175	22	35
"   "   south .....	180	17	40
Sierra Alto, highest point .....	300	15	30
Mount Maxy (top) .....	354	29	30
No. 4 (tree) .....	5	33	00

Station 48.

47 to 48 .....	72 chains 15 feet 15 —	
From " to base 1st hill 15 "	" "	
" " " 2nd " 55 "	" "	
West = 00°.		0 ' "
Mount No. 1 .....		6 29 30
" " 2 .....		14 52 00
Cornudos tanks, N. peak .....		164 23 10
" " S. " .....		165 22 30
Alamo Mt., N. end .....		171 47 10
" " S. " .....		173 48 10
Cornudos Mt., N. peak .....		175 15 30
" " S. " .....		180 20 50
Z { 1 .....		193 00 00
2 .....		195 15 40
Mount Maxy (top) .....		355 44 20
Station 48 to 49 .....	31 chains 02 feet — 25	
" 49 " 50 .....	17 " 12 " 20	

Station 50.

West = 00° 00' 00".		c ' "
Hueco Mts. No. 3 .....		23 40 00
N. peak of Cornudos tanks .....		164 05 10
S. " " " " .....		165 05 35
N. point of Alamo Mt .....		171 33 00
S. " " " " .....		173 37 20
North peak of Cornudos Mts. ....		175 08 40
South " " " " .....		180 21 10
Z { 1 .....		193 10 30
2 .....		195 32 05
Station 50 to 51 .....	= 81 chains 11 feet — 5	
" 51 " 52 .....	100 " 00 " 2	

March 2d.—Moved camp to Alamo Spring, 20 miles 200 feet. Very cold day. Norther.

March 3rd.—Plotting in camp. Cold day.

March 4th.—Go from Alamo Spring to line; arrive at 11½ a. m.

Station 53.

From 52 to 53, 39 chains 07 feet — 2.

East high P. Hueco Mts. ....		36 16 50
S. of 1st Sierra .....		295 50 10
Sierra Alto { a .....		321 04 50
b .....		325 16 45
c .....		330 40 10
Station 53 to 54 .....	102 chains 19 feet — 5	

Station 54.

West = 00° 00' 00".		0 ' "
Highest P. Huico Mts .....		30 05 25
Alamo Mount .....		169 40 50
South end of Alamo Mt. ....		172 14 05
North peak Cornudos Mt .....		179 27 55
South " " " " .....		180 25 35
Z { 1 .....		194 39 10
2 .....		197 51 15
S .....		304 24 20
S. Alto { a .....		325 51 15
b .....		329 35 20
c .....		334 16 40



## Station 55.

Station 54 to 55.....	69 chains 28 feet — 8
West = 00° 00' 00".	o ' "
Highest p. Hueco Mts .....	26 54 10
S .....	309 24 00
Sierra Alto { a .....	328 35 25
{ b .....	332 01 00
{ c .....	336 18 20
No error.	
Station 55 to 56 .....	89 chains 31 feet.
“ 56 “ 57 .....	146 “ 14 “ 10
“ 57 “ 58 .....	131 “ 30 “ 15
“ 58 “ 59 .....	64 “ 34 “ 10
Station 59 to 60 .....	34 chains 68 feet 5

The road is 20 chains east of Station 60.

## March 5th, Camp on Road.

From Station 60 to 61 .....	20 chains 02 feet.
-----------------------------	--------------------

## Station 61.

West = 00° 00' 00".	o ' "
South peak Cornudos tanks .....	155 50 20
North end Alamo Mt .....	162 23 00
South point “ “ .....	166 56 40
North peak Cornudos Mts .....	172 25 45
South “ “ “ .....	180 41 00
Z { 1 .....	198 22 00
{ 2 .....	204 26 35
S. of Hueco Mts. ....	301 32 50
{ a .....	340 39 20
{ b .....	342 38 00
{ c .....	345 16 50
From Station 61 to 62 .....	58 chains 45 feet — 1
“ “ 62 “ 63 .....	87 “ 21 “ 2
“ “ 63 “ 64 .....	48 “ 43 “ 2
“ “ 64 “ 65 .....	81 “ 18 “ — 8
“ “ 65 “ 67 (mistake in recording) .....	= 59 “ 12 “ — 5
“ “ 67 “ 68 .....	58 “ 41 “ — 5

## Station 68.

North end Alamo Mt .....	147 41 10
South point “ “ .....	156 16 40
North p. Cornudos Mts .....	169 54 10
South p. “ “ .....	180 59 00
Z { 1 .....	202 00 00
{ 2 .....	211 58 40
S. of Hueco Mts. ....	339 07 30
Station 68 to 69 .....	= 55 chains 42 feet — 2
“ 69 “ 70 .....	= 33 “ 33 “
“ 70 “ 71 .....	= 91 “ 04 “ — 4
“ 71 “ 72 .....	= 20 “ 14 “ — 5

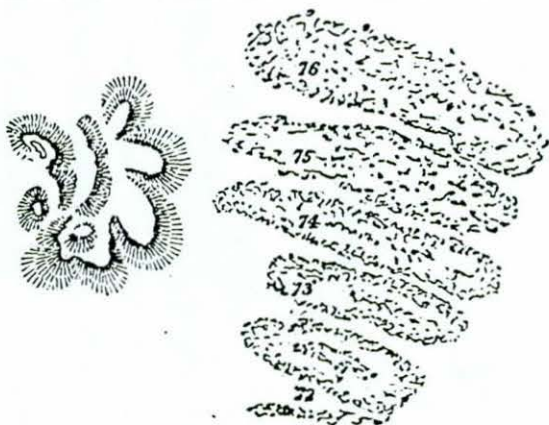
March 6th.—Go back on road and build stone monument.

March 7th.—From Station 72 to 73, 20 chains 14 feet — 4.

## Station 73.

West = 00° 00' 00".	o ' "
North end of Alamo Mt .....	123 37 40
South “ “ “ .....	137 55 10
Mesa (Cornudos) .....	155 32 10
N. peak of Cornudos Mts .....	167 29 15
S. “ “ “ .....	180 50 30

Z { 1	.....							204 47 10
Z { 2	.....							218 32 40
Eagle Spring Mt	.....							254 49 00
S. of Hueco Mts	.....							341 58 40†
Highest point S. Alto	.....							348 12 00†
From Station 73 to 74	.....	= 37	chains	43	feet	—	3	
“ “ 74 “ 75	.....	= 89	“	40	“		8	
“ “ 75 “ 76	.....	37	“	05	“		4	
“ “ 76 “ 77	.....	38	“	31	“		4	

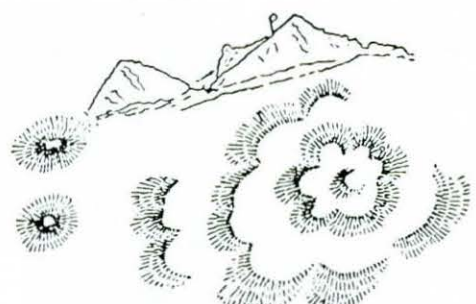


Station 77, 2nd Tangent.

East = 00° 00' 00"								0 15 40
S. peak of Cornudos Mts	.....							29 12 45
Z { 1	.....							48 17 30
Z { 2	.....							255 59 00
N. end of Alamo Mt	.....							279 06 00
East “ “ “ “	.....							327 24 00
Mesa (Cornudos)	.....							347 19 40
N. peak of Cornudos Mts	.....							18 chains 10 feet — 2
From Station 77 to 78	.....	48	“	34	“		3	
“ “ 78 “ 79	.....	125	“	31	“		10	
“ “ 79 “ 80	.....							

Station 80.

West 00. N. point of Alamo Mt	.....							36 02 00
East end “ “ “	.....							49 25 00
Mesa (Cornudos)	.....							132 23 10
North peak of Cornudos Mts	.....							162 59 10
South “ “ “ “	.....							189 48 00
Z (2)	.....							238 23 15
S. of Hueco Mts	.....							344 16 00



Station 77, 1st tangent.

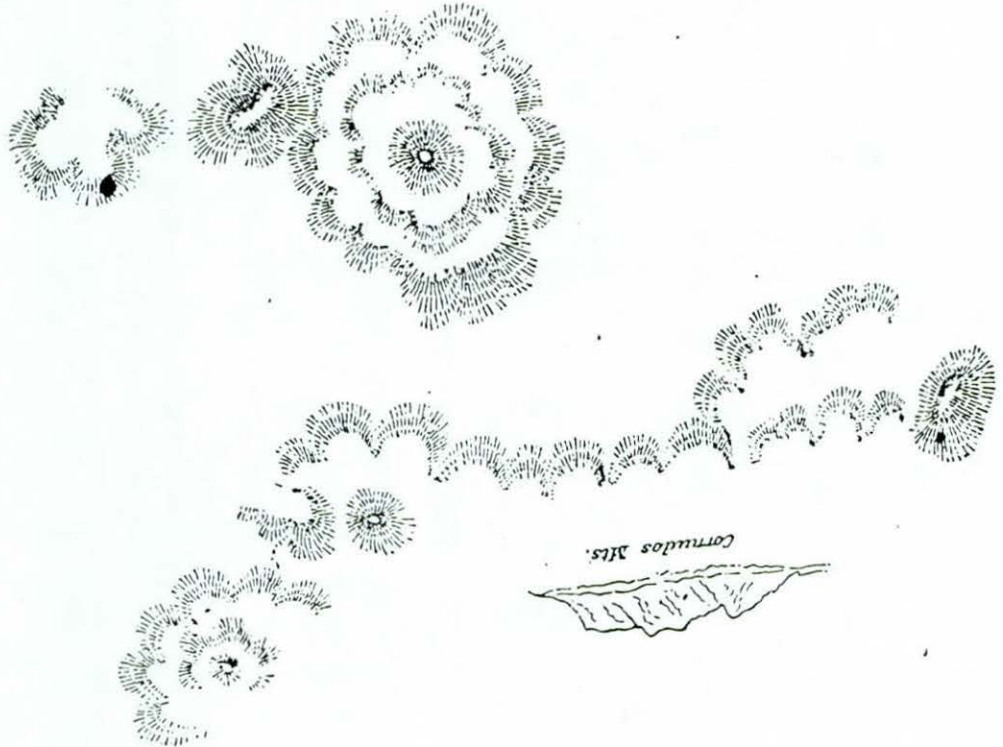
West = 00° 00' 00"								0 16 35
North end of Alamo Mt	.....							97 29 25
East “ “ “ “	.....							145 38 35
Mesa (Cornudos)	.....							164 05 20
N. peak of Cornudos Mts	.....							181 20 00
S. “ “ “ “	.....							207 51 30
Z { 1	.....							226 30 30†
Z { 2	.....							



Highest point of Sierra Alto.....		349	21	30
From Station 80 to 81.....	35 chains	10	feet	— 4
Perpendicular.....	= 48 "	23	"	— 3

Station 81.

West = 00. N. end of Alamo Mt .....		32	17	10
East end of " " .....		43	22	00
Mesa (Cornudos) .....		127	21	00
N. peak of Cornudos Mts .....		161	51	40
S. " " " " .....		190	50	00
Z (2) .....		240	30	00



Station 81, on Perpen. No. 2.

East = 00° 00' 00''.				
S. peak of Cornudos Mts .....		19	57	00
Z (2) .....		62	06	30
S. of Hueco Mts. ....		163	14	50
East end of Alamo Mt .....		215	18	40
Mesa (Cornudos) .....		313	53	10
N. peak of Cornudos Mts .....		347	04	25

From Station = 81 to 82 .....	11 chains	15	feet.
" " 82 " 83 .....	10 "	19	"
" " 83 " 84 .....	61 "	13	" 5
" " 84 " 85 .....	116 "	04	" 10
" " 85 " 86 .....	140 "	49	" 15

Station 84.

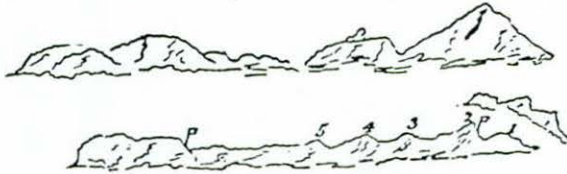
West = 00° 00' 00''.				
N. end of Alamo Mt .....		19	26	00
East " " " " .....		26	34	00
Mesa (Cornudos) .....		117	45	00
N. peak of Cornudos Mts .....		164	36	50 good.
Trees on top of mesa .....		187	21	00
S. peak of Cornudos Mts .....		207	12	00
Z (2) .....		247	13	50

March 8th.—From spring on Cornudos Mt.

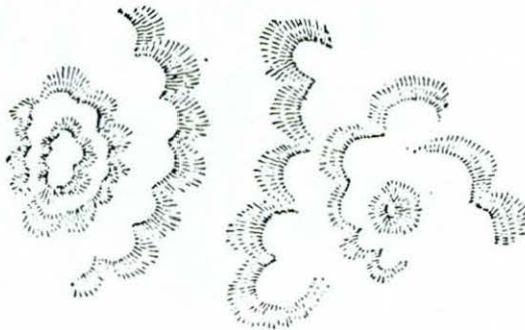
From station 86 to 87 .....	18 chains 36½ feet ½
“ “ 87 “ 88 .....	113 “ 40 —15

Station 88.

West = 00° 00' 00" .....	0 “
North end of Alamo Mt. ....	8 51 30
East point “ “ “ .....	11 59 10
South “ “ “ “ .....	8 21 35
N. peak of Cornudos Mt .....	94 51 20
S. peak of Gaudalupe Mts. ....	191 21 50
S. peak of Cornudos Mt .....	327 56 30 ??
Highest p. of S. Alto, .....	350 10 00



Caudalupe Mts. St. 29.



March 9th, 1859.—Work in camp at Alamo Springs.

March 10th.—Start from Crow Springs. Go in camp ten miles below Cornudos tanks.

March 11th.—Arrived at Crow Springs.

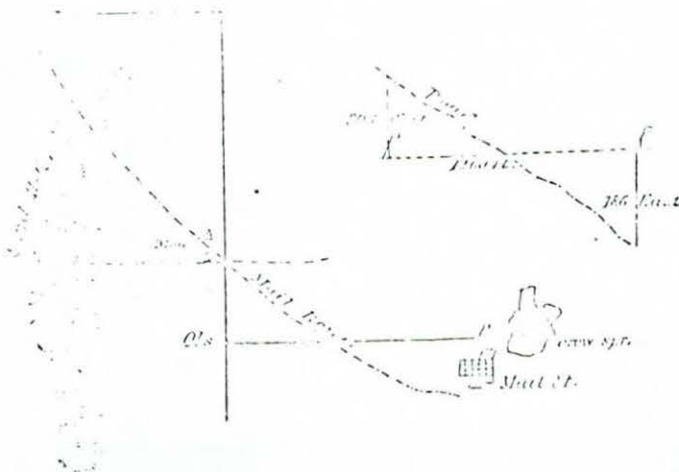
March 12th.—Go on line from camp on Salt Lake.

Meridian from observatory to 32° 00' 00" = 2,677.5 feet.

Instrument = 32 feet N. of observatory.

From observatory to station 1, 2,524 feet.

Tangent is 153 feet south of 32° 00' 00"; afterwards changed to 17½ feet S. of parallel.



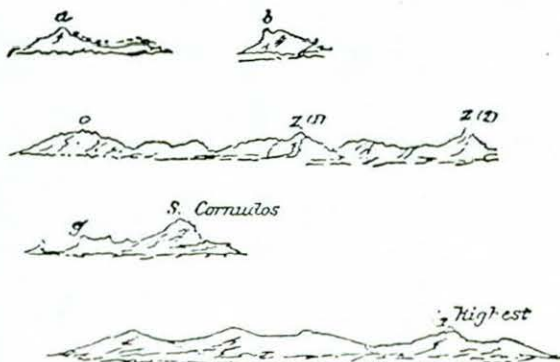


## Station at observatory.

North = 00° 00' 00".	o	'	"	
North end of Gaudalupe Mts .....	11	21	20	
Middle gap of " " .....	90	22	20	
South peak of " " .....	120	27	35	good
Highest peak S. of " " .....	145	58	40	
S. peak of Cornudos Mts .....	270	21	30	
N. " " " " .....	274	55	70	
Point N. of Gaudalupe Mts .....	354	10	50	
<St. 1, obs. flag on house .....	91	05	50	

## Station 1.

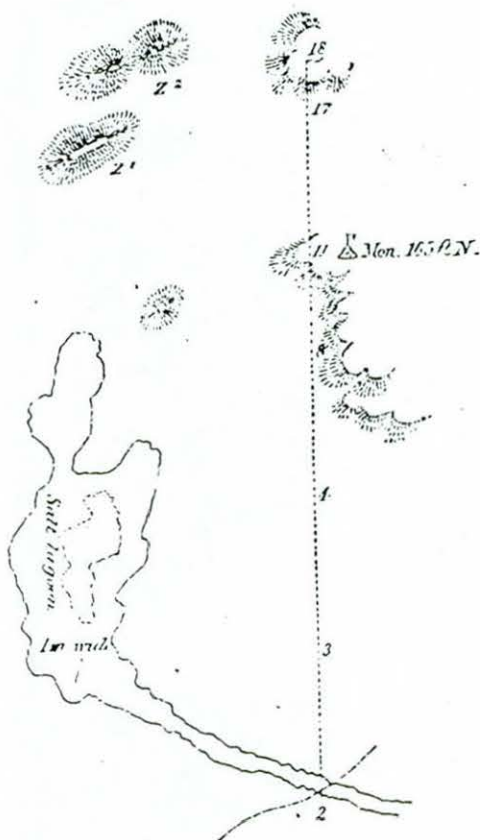
West = 00—	o	'	"	o	'	"
North Peak of Cornudos Mts .....	3	55	40			
Cornudos tanks (a) .....	13	46	00			
" " (b) .....	14	29	10			
North Point, Gaudalupe Mts .....	84	07	30	106	03	20 good.
Gap of " " .....	183	32	40			
South point of " " .....	212	07	55	good.		
Highest pt. south of " " .....	236	55	00			
a .....	255	45	50			
b .....	273	54	10			
c .....	334	09	50	very good.		
z (1) .....	340	25	40			
d .....	343	38	50			
z (2) .....	346	57	50			
End of tableland .....	356	55	30			
South Peak of Cornudos Mts .....	359	23	40			
No error.						



From Station 1 to 2 .....	45	chan.	9	feet,	5.	2274
" " 2 " 3 .....	41	"	5	"	5.	2160
" " 3 " 4 .....	20	"	06.5	"	2.	1004

## Station 4.

West = 00—	o	'	"	
North Peak of Cornudos Mts .....	4	05	30	
Cornudos tanks (a) .....	14	19	10	
" " (b) .....	15	03	50	
Point north of Gaudalupe Mts .....	85	56	00	
Gap of " " .....	184	10	10	
South point of " " .....	210	01	40	good.
Highest point S. of " " .....	234	00	30	
a of 1st Sierra .....	254	18	00	
b .....	276	57	10	
c .....	333	01	50	
z (1) .....	330	27	55	
d .....	345	15	10	
z (2) .....	346	28	00	
End of table land (g) .....	356	42	40	
South Peak of Cornudos Mts .....	359	22	50	



March 13th.—From Station 4 to 5..... = 48 chains 37 feet.

2437

Station 5.

East 00—			
South pt. of Gaudalupe Mts.....		29	10 05
a of 1st Sierra.....		73	39 10
z (1).....		15	00 50
z (2).....		16	14 40

From Station	5 to	6	.....	=	31	chains	12	feet,	1.	1562
"	"	6	" 7	.....	=	47	"	46	" 1.	2395
"	"	7	" 8	.....	=	57	"	44	" 2.	2892
"	"	8	" 9	.....	=	75	"	10	" 2.	3760
"	"	9	" 10	.....	=	67	"	39	" 3.	3386
"	"	10	" 11	.....	=	79	"	25	" 4.	3970
"	"	11	" 12	.....	=	50	"	30	" 2.	2530
"	"	12	" 13	.....	=	63	"	06	" 4.	3150
"	"	13	" 14	.....	=	63	"	04	" 4.	3150
"	"	14	" 15	.....	=	38	"	33	" 6.	4430
"	"	15	" 16	.....	=	110	"	40	" 10.	5530
"	"	16	" 17	.....	=	128	"	07	" 20.	} 8730
"	"	17	" 18	.....	=	47	"	00	" 10.	



Gaudalupe Mts.

Station 7.

East 00—			
South Peak of Gaudalupe Mts.....		27	52 00
z { 1.....		158	14 20
z { 2.....		165	52 25
N. Peak of Cornudos Mts.....		184	17 35
(b) Cornudos tanks.....		195	46 25



Station 10.

	C	I	"
S. Peak of Gaudalupe Mts.....	24	59	50
z { 1.....	155	58	40
z { 2.....	164	48	00
N. Peak of Cornudos Mts.....	184	40	10
(b) Cornudos tanks.....	197	05	00

Station 12.

East = 00—			
South Peak of Gaudalupe Mts.....	23	23	15
z { 1.....	154	13	40
z { 2.....	163	59	10
N. Peak of Cornudos Mts.....	184	56	30
No error.			

Station 13.

East 00.			
South Peak of Gaudalupe Mts.....	22	41	35
z { 1.....	153	18	10
z { 2.....	163	33	45
North Peak of Cornudos Mts.....	185	04	10
Cornudos tanks (b).....	198	31	00

Station 15.

East 00.			
South Peak of Gaudalupe Mts.....	21	09	30
z { 1.....	150	47	15
z { 2.....	162	28	40
North Peak of Cornudos Mts.....	185	28	40
Highest Point of Cornudos tanks.....	198	51	00

Station 15.

East 00.			
South Peak of Gaudalupe Mts.....	20	19	00
z { 1.....	148	41	30
z { 2.....	151	35	15
N. Peak of Cornudos Mts.....	185	48	00

Station 18. Monument.

East 00.			
South Peak of Gaudalupe Mts.....	18	45	50
z { 1.....	144	43	40
z { 2.....	152	18	35
N. end of mesa.....	175	12	00
N. Peak of Cornudos Mts.....	185	23	40

Station 2, March 14th, survey east, 2067.

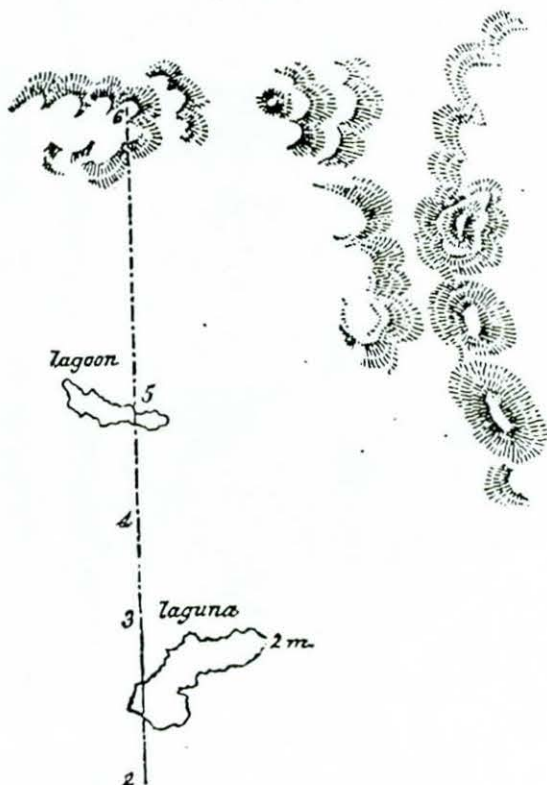
From Station 1 to 2.....	41 chains 19 feet.
West 00.	
North Peak of Cornudos Mts.....	3 51 55
Cornudos tanks (a).....	13 04 15
" " (b).....	11 16 35 good.
Point North of Gaudalupe Mts.....	84 04 50
North point " " ".....	105 05 00
South " " ".....	213 00 40
Highest pt. of Sierra S of ".....	258 05 00
".....	275 21 20
".....	334 34 40
z { 1.....	340 47 10
z { 2.....	347 08 45
E.....	345 18 25

Station 3.

< 2. 3. Flag on Mail Station.....	33 42 25
From Station 2 to 3.....	38 chains 30 feet—4
" " 3 to 4.....	68 " 11 "

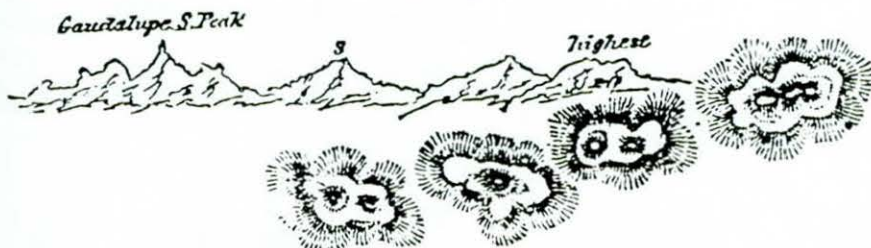
Station 4.

West 00.	°	'	"	
South Peak of Cornudos tanks (a) .....	13	06	05	
North " " " " (b) .....	13	16	10	good.
Point north of Gaudalupe Mts .....	31	40	15	
South Peak " " " " .....	215	28	20	
S. of Sierra .....	228	32	25	
Highest pt. S. of Gaudalupe Mts .....	241	13	00	
a .....	257	48	30	
z { 1 .....	341	36	40	
{ 2 .....	347	34	50	
No error.				
From Station 4 to 5 .....				= 110 chains 39 feet 20—



Station 5.

West 00.	°	'	"	
North Peak of Cornudos Mts .....	3	34	40	
" end of tanks .....	13	26	55	
" point of Gaudalupe Mts .....	79	50	20	
South Peak " " " " .....	218	23	30	
S. of Sierra .....	232	16	10	
Highest point S. of Gaudalupe Mts .....	244	39	10*	
a .....	259	21	25	
b .....	283	29	30	
z { 1 .....	342	24	20	
{ 2 .....	347	59	40	
From Station 5 to 6 .....				= 98 chains 06 feet 6.
" " 6 " 7 .....				= 95 " 06 " 10.





## Station 7.

West 00.	0	1	2	3	4	5	6	7	8	9	00	
Cornudos tanks north.....	12	30	45	good.								
S. of Sierra.....	239	48	30									
Highest pt. S. of Gaudalupe Mts.....	251	08	00									
z { 1.....	343	39	10									
z { 2.....	348	40	10									
From Station 7 to 8.....	15 chains 10 feet.											
" " 8 " 9.....	54	"	37									

## Station 9.

West 00.	0	1	2	3	4	5	6	7	8	9	00	
Cornudos tanks (b).....	12	16	00									
Highest pt. S. of Gaudalupe Mts.....	253	40	00									
z { 1.....	344	03	25									
z { 2.....	348	54	15									
<N. 9. P.....	24	15	35									
<N. 9. S.....	29	02	40									
From Station 9 to 10.....	= 53 chains 05 feet 5.											



## Station 10.

West 00.	0	1	2	3	4	5	6	7	8	9	00	
North Peak of Cornudos tanks (1).....	12	04	40									
Highest pt. S. of Gaudalupe Mts.....	255	35	20									
z { 1.....	344	22	15									
z { 2.....	349	04	20									
No error.												
<N. 10. P.....	28	44	15	208	43	40						
<N. 10. S.....	34	20	10	214	20	00						
From Station 10 to 11.....	70 chains 21 feet 20.											

March 15th.—Moved camp foot of Gaudalupe Mountains.

March 16th.—Go to top of Gaudalupe Mountains and put flag on tangent.

## March 17th, station 11.

	0	1	2	3	4	5	6	7	8	9	00	
<N. 11 P.....	37	32	15	217	31	55						
<N. 11 S.....	44	45	55	224	45	30						
of elevation to S. from 11.....	13	43	00	13	43	00						
" " " P. " ".....	13	13	00	13	13	00						
" " " N. " ".....	12	28	00									
From station 11 to 12 = 63 chains 46 feet —25.												

## Station 12.

<N. 12 P.....	50	25	00	230	24	50						
<N. 12 S.....	60	09	25	240	09	05						
Elevation to S.....	18	04	00									
" " P.....	16	15	00									
" " N.....	14	07	00									

Addition to station 10, east of Salt Lake meridian.

	C	I	"	C	I	"
<N. 10 P .....	28	44	15	208	43	40
<N. 10 S .....	34	20	10	214	20	09

Addition to station 9, east of Salt Lake meridian.

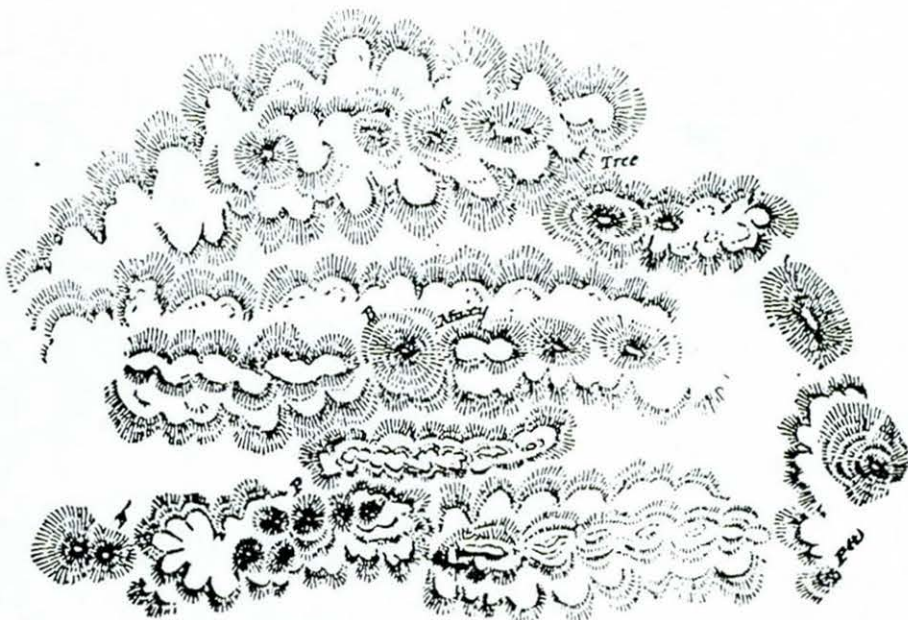
<N. 9 P .....	24	15	35	204	15	15
<N. 9 S .....	29	02	40	209	02	00



Gaudalupe Mts. S. end.

March 18th, station 13, on top of 1st ridge.

	C	I	"	
<12, 13 n .....	62	58	20	242 50 15
West 00.				
To mound a .....	139	37	00	
Tree on " .....	139	22	40	
To mound c .....	171	10	00	
" S. peak of Gaudalupe Mts .....	248	52	10	
" S. ....	272	30	30	
z (2) .....	349	58	35	
S. peak of Cornudos tanks (a) .....	10	33	20	
N. " " " (b) .....	11	05	30	
To Peak b .....	146	11	10	
Point n. of Gaudalupe Mts .....	70	08	00	
Tree on mount b .....	142	43	50	
<N. P. P .....	107	10	35	





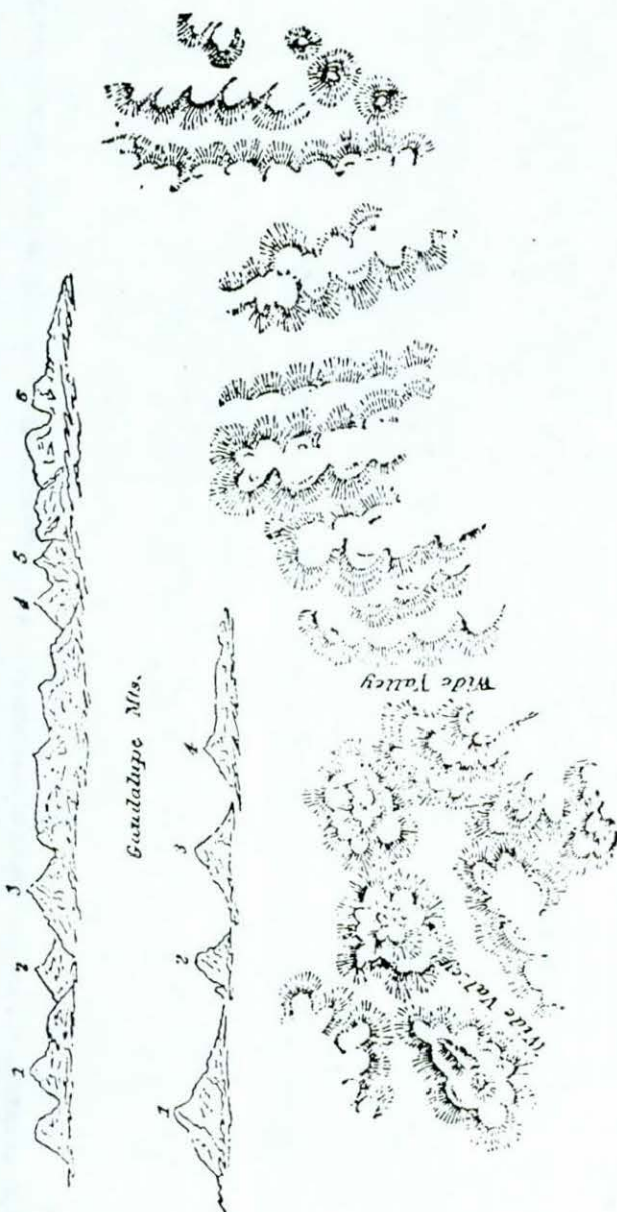
## Station N, flag on top of mount.

On this station every angle reads 10° less than noted.		o	'	"
<9 n. 13.....	.....	81	12	10
St. 13—00.....	.....			
z (2).....	.....	104	50	00
North peak of Cornudos tanks.....	.....	126	13	55
Point N. of Gaudalupe Mts.....	.....	187	24	30
To mound a.....	.....	266	14	00
Tree on mound a.....	.....	266	01	00
To mound c (tree).....	.....	300	35	10
Tree near a.....	.....	3	32	00
<P. N. P. ....	.....	570	28	30 +10—10

March 19th.—Plotting in camp.

March 20th.—Moved camp back to Crow Springs.

March 21st.—Traveled from Crow Springs towards Pinery; encamped after passing Sand Hills.



March 22nd.—Traveled to Pinery—arrived about sunset.

March 23rd.—Moved camp to Independence Springs.

March 24th.—Stay in camp—copy field-notes.

March 25th.—Copy field-notes—& plots for the department.

March 26th.—Prolonged the meridian from camp on Independence Springs.

Dist. from observ. to parallel  $32^{\circ} 00' 00'' = 42,916, 74$  feet = 8 miles' 676 feet.

Signal east of N. — $00^{\circ} 19' 08''$ .

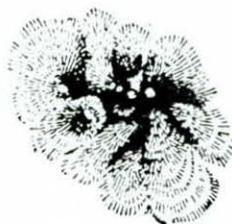
From Station 1 to 2	=	11 chains 40 feet 5.
" " 2 " 3	=	3 " 42 "
" " 3 " 4	=	43 " 42 " 5.
" " 4 " 5	=	48 " 39 " 10.
" " 5 " 6	=	75 " 03 " 25.
" " 6 " 7	=	156 " 48 " 48.
" " 7 " 8	=	191 " 47 " 47.
" " 8 " 9	=	148 " 04 " 30.
" " 9 " 10	=	65 " 47 " 47.
" " 10 " 11	=	41 " 17 " 15.

Station at observatory.

North $00^{\circ} 00' 00''$ .	c	'	"
{ 1	274	38	00
{ 3. Gaudalupe Mts	291	04	15
{ 4	338	15	00
Bearing to spring	64	00	00
" of road toward east	95	00	00
Variation of needle	12	20	00
Dist. from obser. to spring, 250 feet.			

Station 3, S. 00.

Gaudalupe Mountain.	{ South end of Gaudalupe Mts	85	41	20
	{ 1. (tree near top)	93	30	30
	{ 2	101	09	20
	{ 3. (tree near top)	109	30	25
	{ 4. (arroyo near top)	157	38	35
	{ 5	159	55	55
East peak	{ 6. (arroyo near top)	196	37	20
	{ Point near N. end of Gaud'e Mts	211	56	10
South range	{	300	00	45
	{ 1	7	50	50
	{ 2	16	43	40
	{ 3	41	49	35
	{ 5	55	25	50



Station 4.

South = $00^{\circ} 00' 00''$ .	c	'	"	
" end of Gaudalupe Mts	82	26	40	
Gaudalupe Mountains.	{ 1 (tree near top)	90	18	50
	{ 2	98	19	00
	{ 3 (tree near top)	105	40	50 good
	{ 4 (arroyo near top)	156	07	40
	{ 5	158	36	40
	{ 6 (arroyo near top)	197	09	25
East Peak	{ Point near N. end of Gaud'e Mts	212	34	40
	{	301	02	00



		C ' "
South Range.	1 .....	7 27 00
	2 .....	15 45 25
	3 .....	39 11 20
	4 .....	51 17 40 <sup>!</sup>
Sugarloaf Mt. in front of Gaud'e Mts.	.....	79 30 15

Station 5.

			C ' "
South 00° 00' 00".			
Sugarloaf Mt. in front of Gaud'e Mts.	.....		75 08 10
South end of Gaudelupe Mts	.....		78 55 30
Gaudalupe Mountains.	1 (tree near top) .....		86 45 20
	2 .....		95 06 00
	3 (tree near top) .....		101 14 50
	4 (arroyo near top) .....		154 11 40
	5 .....		156 58 00
	6 (arroyo near top) .....		197 50 00
Point near N. end of Gaud'e Mts	.....		212 34 40
	East Peak .....	301 02 00	297 16 40
South Range.	1 .....	7 27 00	7 03 50
	2 .....	15 45 25	14 48 00
	3 .....	39 11 20	36 34 40
	4 .....	51 17 40 <sup>!</sup>	47 11 00

Station 6.

South 00° 00' 00".			
" end of Gaudalupe Mts.	.....		73 42 00
Gaudalupe Mountains.	1 (tree near top) .....		81 23 00
	3 " " " .....		94 14 00
	4 (arroyo near top) .....		150 37 00
	5 .....		153 23 30
	East Peak N .....		298 45 40
" " S .....		303 48 40	
South Range.	1 .....		6 32 00
	2 .....		13 32 40
	3 .....		33 08 00
	4 .....		41 48 20

Station 7.

South 00° 00' 00".			
South end of Gaudalupe Mts.	.....		63 35 00
Gaudalupe Mountains.	1 (tree near top) .....		70 43 10
	3 (tree near top) .....		79 17 50
	4 (arroyo near top) .....		139 19 10
	5 .....		144 18 30
	6 (arroyo near top) .....		201 34 30
	Point near N. end of Gaud'e Mts.	.....	
{ East Peak N .....		301 46 00	
{ " " S .....		307 07 20	
South Range.	1 .....		5 38 40
	2 .....		11 28 20
	3 .....		27 29 35
	4 .....		33 18 40

Station 8.

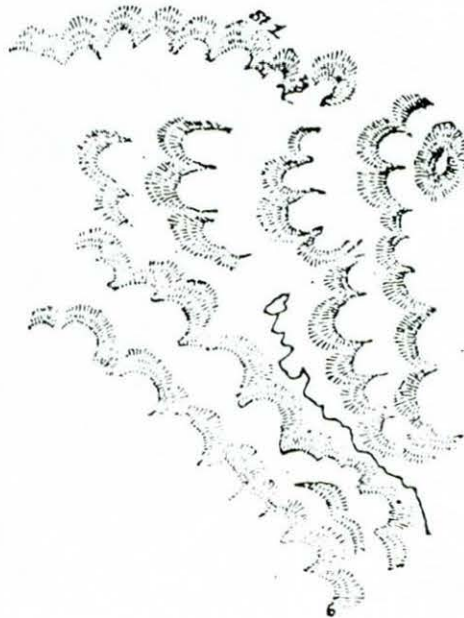
South 00° 00' 00".			
South end of Gaudalupe Mts.	.....		53 33 00
Gaudalupe Mts.	1 .....		57 13 20 <sup>!</sup>
	3 .....		63 06 30 <sup>!</sup>
	4 } good { .....		112 50 10
	5 } .....		121 17 00
	6 .....		206 17 00
	Point near N. end of Gaud'e Mts.	.....	
" on N. " " " .....			224 00 50
{ East Peak 1 .....		305 09 50	
{ " " 2 .....		310 45 50	
{ South " .....		326 53 50	

	°	'	"
East Sierra .....	328	22	30
1st of South Range .....	4	51	50



Station at Observatory, March 27th.

	°	'	"
North 00° 00' 00''			
Gaud'e Mts. { 1 .....	274	38	00
{ 3 .....	291	04	15
{ 4 .....	338	15	00
Bearing to spring .....	64	00	00
"    of road towards east .....	95	00	00
"    " stream .....	119	30	00
Variation of needle .....	12	20	00



Distance from Observatory to spring = 90 yards - 20 = 350 feet.

Heavy storm; impossible to work.

March 28th.—Continued storm; tents blown down and torn to pieces. Moved camp a quarter of a mile in a ravine.

March 29th.—Heavy norther; working an impossibility.



March 30th, Station 9.

Calm day; start for the mountains with pack-mules.

		o / "
Gaualupe	{ 4 .....	81 09 30
Mts.	{ 5 .....	89 51 10
Point near N. end of Gaud. Mts.	.....	225 00 30



{ East Peak 1 .....	287 03 50
{ " " 2 .....	307 37 40
{ " " 3 .....	313 21 25
Gallihan's flag 00° 00' 00".	
To flag on Station 2 .....	26 29 00
" " " " 11 .....	78 44 35

Station 10.

	c	'	"
South = $00^{\circ} 00' 00''$ .			
5 of Gaudalupe Mountains.....	74	46	50
North = $00^{\circ} 00' 00''$ .			
{ East Peak 1.....	288	16	00
{ " " 2.....	308	40	15
{ " " 3.....	314	26	10
South Peak.....	327	05	30
East Sierra.....	329	10	25
Peak on parallel.....	274	40	00
Gallihan's flag $00^{\circ} 00' 00''$ .			
To Station 3.....	13	59	25
" old tangent.....	17	22	00
" flag on Station 2.....	25	28	30
" " " " 11.....	98	50	15

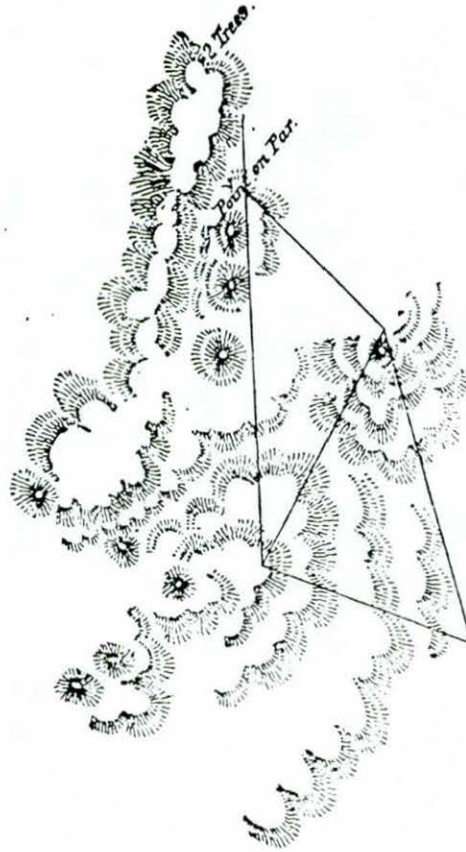


March 31st.—Survey on parallel  $32^{\circ} 00' 00''$  west, from meridian on Independence Springs. Tangent is south of parallel 3,385 feet+.



## Station 11.

	o	'	"
East, 00° 00' 00".			
East Peak No. 1 .....	17	31	50
“ “ “ 2 .....	18	14	10
“ “ “ 3 .....	37	41	10
“ “ “ 4 .....	43	02	25
“ “ “ 5 .....	51	30	00
“ “ “ 6 (one in front Sierra) .....	57	22	00
Mt. south of S. range .....	93	30	00
Flag of Gallihan .....	123	51	25
Point on parallel .....	179	22	05 good.
< Top point of Par. to 2 trees (N. tree) .....	11	16	10
< “ “ brush next to grove of pines .....	11	51	30
< Of elevation to Station 3 .....	4	27	00



## Station at Gallihan's flag.

	o	'	"
< Top Gallihan's flag, Station 2 .....	110	13	19
< “ front of Par. Gallihan's flag, 2 trees (N. tree) .....	16	58	50
Stewart's flag .....	162	03	00

## Addition to Station 11, S. 00°.

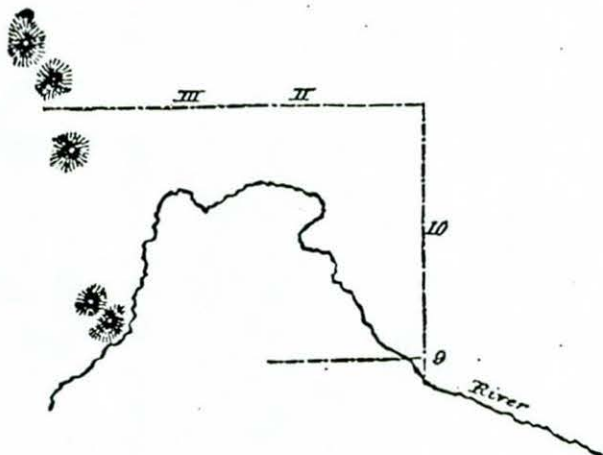
	o	'	"
Gallihan's flag .....	69	14	30
To flag on Station 2 .....	89	59	10
East Peak 1 .....	289	01	40
“ “ 2 .....	298	04	00
“ “ 3 .....	302	47	00
“ “ 4 .....	303	02	30
Sierra .....	297	22	00
S. Peak .....	298	02	40

April 2d.—Start back from the mountains to camp on Independence Springs.

April 3d.—Start for the Pecos; camp at head of Delaware Creek.

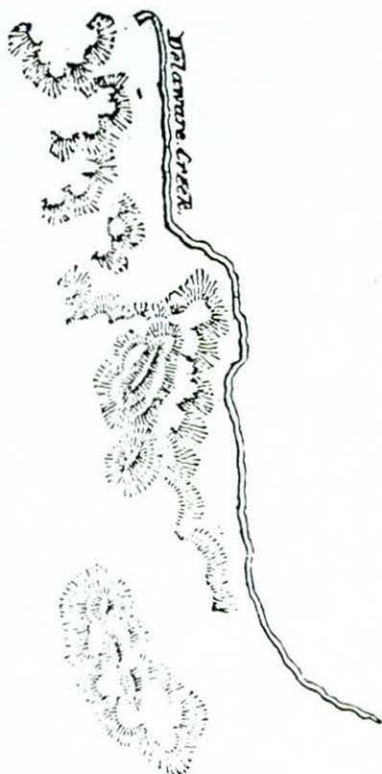
April 4th.—Continue march; camp one mile above crossing.

April 5th.—Leave road for mouth of Delaware Creek; follow the trail made by ast. party and find them three miles south on Pecos.



April 6th.—Prepare for running meridian and plot in camp.

March 7th.—Signal E. of N.,  $00^{\circ} 07' 00''$ . Par.  $32^{\circ}$  is 6,526 feet south of observatory. Tangent is 1,250 feet S. of  $32^{\circ} 00' 00''$ .



Going east on parallel.

From Station 1 to 2 .....	25 chains 48 ft. — 2
“ “ 2 “ 3 .....	18 “ 07 “ — 1
“ “ 3 to west bank of Pecos .....	10 “ 25 “ — 1
	o / “ o / “
< Monument 3. 4 .....	89 14 05      269 14 10
< “ flag 3. 4 .....	73 43 25      253 43 20
From St. 3. to monument flag = 1,250 feet.	



April 8th.—Survey on parallel 32° west.

From	To	Chains	Feet	Seconds
1	2	42	35	5
2	3	28	20	2
3	4	51	00	5
4	5	72	14	4
5	6	49	06	3
6	7	61	27	5
7	8	60	34	4
8	9	50	39	5
9	10	109	26	5
10	11	45	00	—
11	12	21	20	3
12	13	55	44	4
13	14	43	09	—
14	15	59	24	5
15	16	87	12	5
16	17	50	06	2
17	18	90	27	7
18	19	129	26	20
19	20	23	23	8
20	21	72	04	4
21	22	31	22	2
22	23	149	11	—
23	24	69	10	—

Station 3, going west.

	°	'	"
South end of Gaudalupe Mts.	00	00	00
1. " "	1	07	00
3. " "	9	09	00

Station 5.

<1 gradú, St. 5. St. 6	8	11	40
------------------------	---	----	----

Station 10.

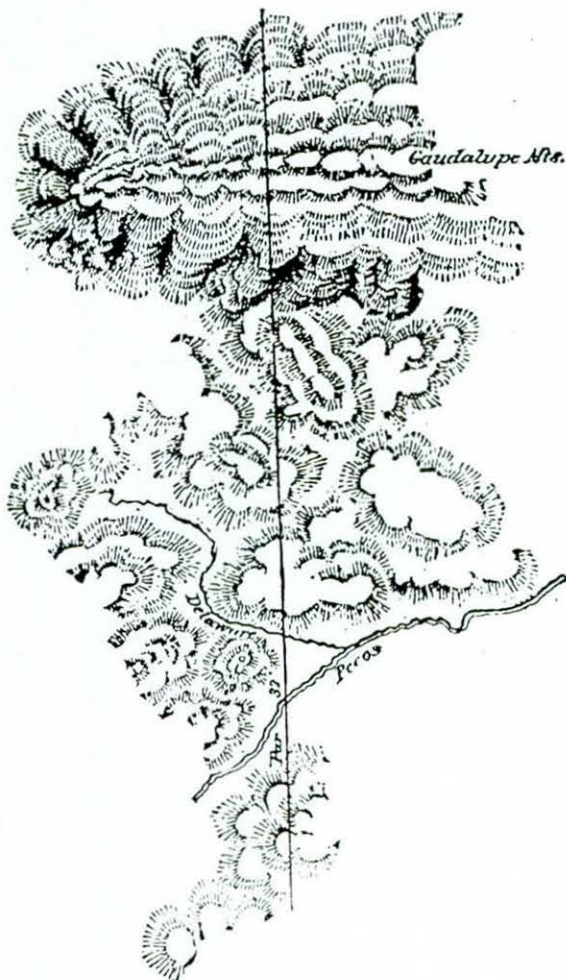
South end of Gaudalupe Mts.	00	00	00
Peak 1	1	13	45
" 2 (a)	2	42	20
" " (b)	2	45	20
Mound south of line	9	22	30
Station 11	10	01	00
Mound north of line (1)	18	06	20
" " " " (2)	20	17	00
" " " " (3)	34	28	40

Station 11.

South end of Gaudalupe Mts.	00	00	00
Peak 1 " "	1	15	15
" 2 (a) " "	2	44	30
" " (b) " "	2	50	05

Station 12.

Most southern peak = 00° 00' 00".	0 0 00
South peak 2 } .....	3 49 30
"    "    3 } .....	8 18 35
South end of Gaudalupe Mts. ....	35 35 10
Peak 1 of " " .....	36 20 25
" (a) " " .....	37 20 15
" (b) " " .....	38 25 20



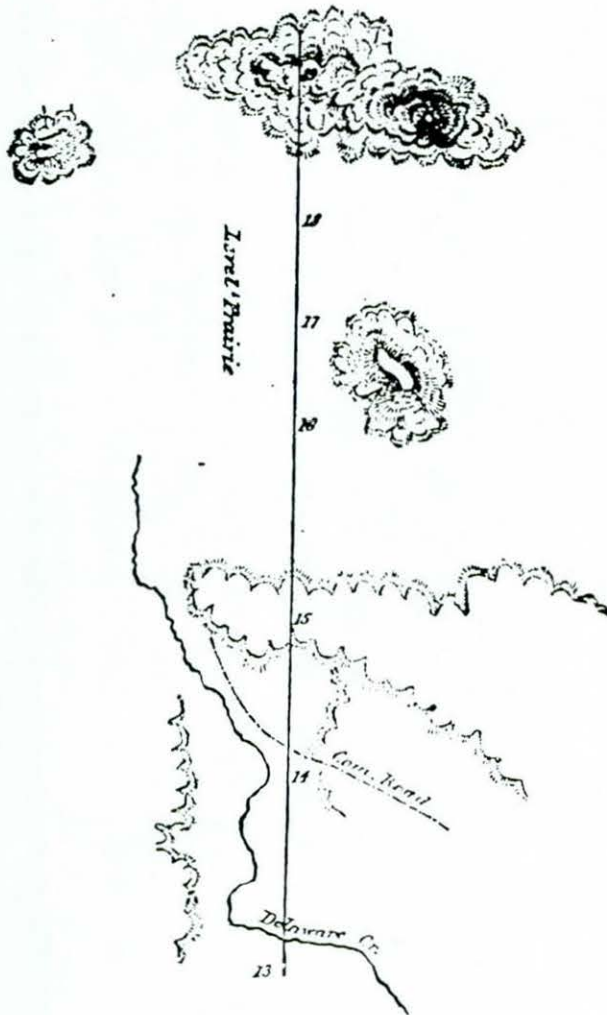
South mound .....	45 01 20
Station 13. ....	45 44 10
North mound (1) .....	55 08 10
"    "    (2) .....	57 27 01
"    "    (3) .....	72 14 00



Station 15, April 9th.

East = 00° 00' 00".

		0	"	"
Peak S. of line	{ 1 ..... { 2 ..... { 3 ..... { 4 .....	129	20	40
		133	12	50
		135	17	35
		137	54	45
South end of Gaudalupe Mts.....		169	28	35
Peak 1.....		170	46	45
" 2 (a).....		172	19	50
" " (b).....		172	24	25
Mound N. of line 1.....		194	55	50
" " " " 3.....		212	43	30



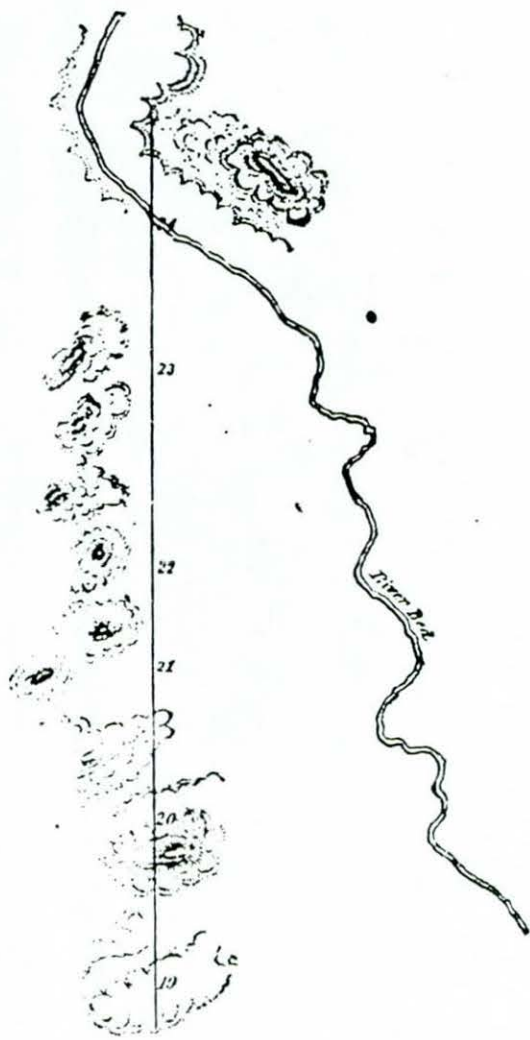
Station 17.

East 00° 00' 00".

Peak 1	.....	124	27	40
" 2	{ S. of line ..... { ..... { ..... { .....	128	16	20
		131	14	30
		133	04	40
		169	10	35
South end of Gaudalupe Mts.....		170	30	40
Peak 1.....		172	06	40
" 2 (a).....		172	10	50
" " (b).....		195	05	40
Mound N. of line 1.....		209	57	10
" " " " 2.....				

Station 19.

Station 20 = 180° 00' 00"	° ' "
Peak 2 (b) of Gaudalupe Mts. ....	171 47 00
" 1 " " " " .....	170 03 10
South end of Gaudalupe Mts. ....	168 38 50



April 10th.—Gale.—no possibility to work—move camp 5 miles up the creek

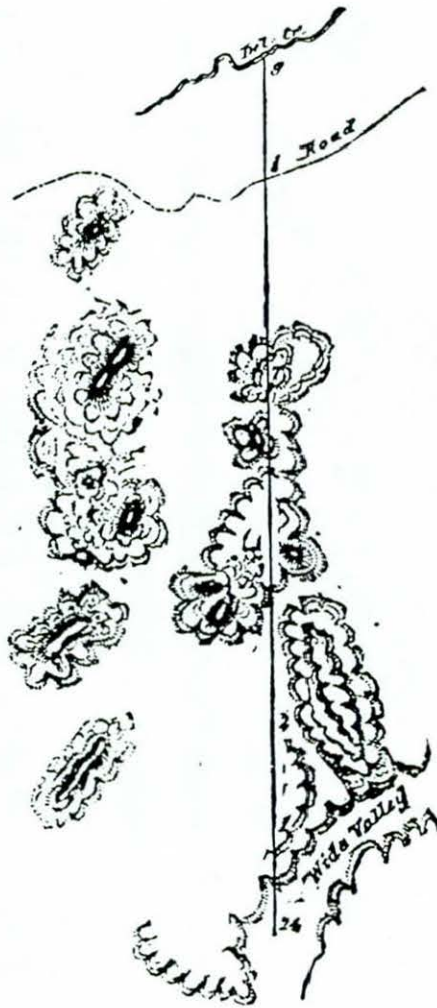
April 11.—Go on line, Station 23.

South end of Gaudalupe = 00° 00' 00"	° ' "
Peak 1 } Gaudalupe Mts. { .....	1 29 10
" 2 } " " " " { .....	3 17 45
Station 24 .....	12 04 35
Mound 1 N. of line .....	16 37 50
" 2 " " " " .....	175 20 40
" 3 " " " " .....	194 25 00
" 5 S. " " " " .....	228 50 00



Station 24.

South = 00° 00' 00".	0 0 0
South end of Gaudalupe Mts. ....	73 42 50
Peak 1. ....	79 13 40
" 2 (a) . ....	81 04 10



Survey south on base line.

From Station 24 to 1. ....	=	41 chains 03 feet.	3
" " 1 " 2. ....	=	85 " 02 "	4
" " 2 " 3. ....	=	116 " 28 "	50
" " 3 " 4. ....	=	33 " 37 "	20
" " 4 " 5. ....	=	76 " 46 "	40
" " 5 " 6. ....	=	47 " 17 "	2
" " 6 " 7. ....	=	69 " 07 "	7
" " 7 " 8. ....	=	33 " 60 "	
" " 8 " 9. ....	=	60 " 00 "	

Station 3.

South = 00° 00' 00".	0 0 0
South end of Gaudalupe Mts. ....	81 08 20
Peak 1. ....	82 40 20
" 2 (a) . ....	84 28 35
" 2 (b) . ....	84 43 00

Station 5.

South 00° 00' 00".	0	0	0
South end of Gaudalupe Mts.....	82	43	50
Peak 1.....	84	15	50
" 2 (a).....	86	02	30
" 2 (b).....	86	23	45
1. Peaks south of line.....	15	22	10
2. " " " ".....	22	06	00
3. " " " ".....	26	36	20
Road south of Station 5 = 6 chains.			

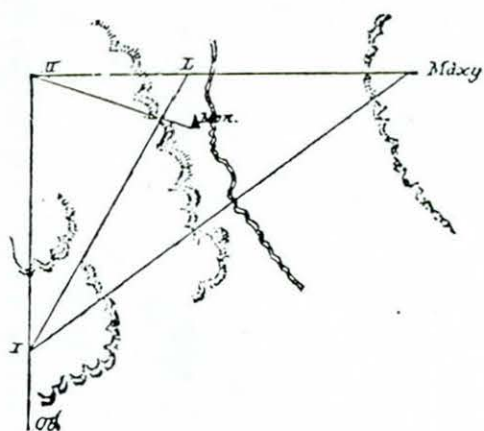
Station 7.

South 00° 00' 00".			
1 } S. peaks { .....	19	36	40
2 } .....	29	38	30
South end of Gaudalupe Mts.....	84	32	40
Peak 1.....	86	05	00
" 2 (a).....	87	50	00
" 2 (b).....	88	19	25

April 12th.—Heavy gale. Build monument 13 miles from Pecos.  
 April 13th.—Return to camp on Pecos.  
 April 14th.—Build monument on Pope's trail. Begin to compute the recent field-work.  
 April 15th, 16th, and 17th.—Plotting in camp.

Station I.

< A.....	7	11	10
Flag II.....	00	00	00
Station L.....	27	36	30
Flag (Maxy).....	41	42	30



April 18th.—Prolong the meridian.

< I, L, II.....	62	24	35
Reading to monument.....	340	38	00
Tangent is 121 feet N. of parallel.....	32	00	00
Observatory to I.....	593	feet.	
I to II.....	1,827	"	

April 19th.—Moved camp over Pecos—encamped near crossing.  
 April 20th.—Survey on line E. of Pecos.

From Station 2 to 3.....	=	76	feet,
" " 3 " 4.....	=	70	chains 18 feet — 10
" " 4 " 5.....	=	81	" 41 " 8
" " 5 " 6.....	=	119	" 41 " 11

From Station	6 to 7	.....	=	66 chains	07 feet	
" "	7 " 8	.....	=	81 "	00 "	5
" "	8 " 9	.....	=	88 "	08 "	8
" "	9 " 10	.....	=	58 "	07 "	7
" "	10 " 11	.....	=	72 "	10 "	8
" "	11 " 12	.....	=	110 "	29 "	9
" "	12 " 13	.....	=	71 "	21 "	6



From Station	13 to 14 (mon.)	at wells	.....	18 chains	32 feet	2
" "	14 " 15	.....	70 "	14 "		
" "	15 " 16	.....	38 "	39 "		
" "	16 " 17	.....	122 "	38 "		5
" "	17 " 18	.....	41 "	24 "		
" "	18 " 19	.....	112 "	03 "		
" "	19 " 20	.....	120 "	31 "		10
" "	20 " 21	.....	77 "	02 "		
" "	21 " 22	.....	76 "	43 "		
" "	22 " 23	.....	87 "	12 "		
" "	23 " 24	.....	73 "	20 "		
" "	24 " 25	.....	53 "	07 "		
" "	25 " 26	.....	102 "	18 "		
" "	26 " 27	.....	93 "	43 "		
" "	27 " 28	water depot	29 "	19 "		
" "	28 " 29	.....	11 "	43 "		
" "	29 " 30	.....	21 "	19 "		
" "	30 " 31	.....	119 "	22 "		
" "	31 " 32	.....	81 "	18 "		
" "	32 " 33	.....	159 "	47 "		
" "	33 " 34	.....	130 "	08 "		
" "	34 " 35	.....	121 "	20 "		
" "	35 " 36	.....	115 "	42 "		
" "	36 " 37	.....	95 "	13 "		
" "	37 " 38	(last flag)	48 "	00 "		



April 21st.—Plott in camp.

April 22nd.—Move camp to Pope's Wells and build monument.

April 23rd.—Go on line from line.

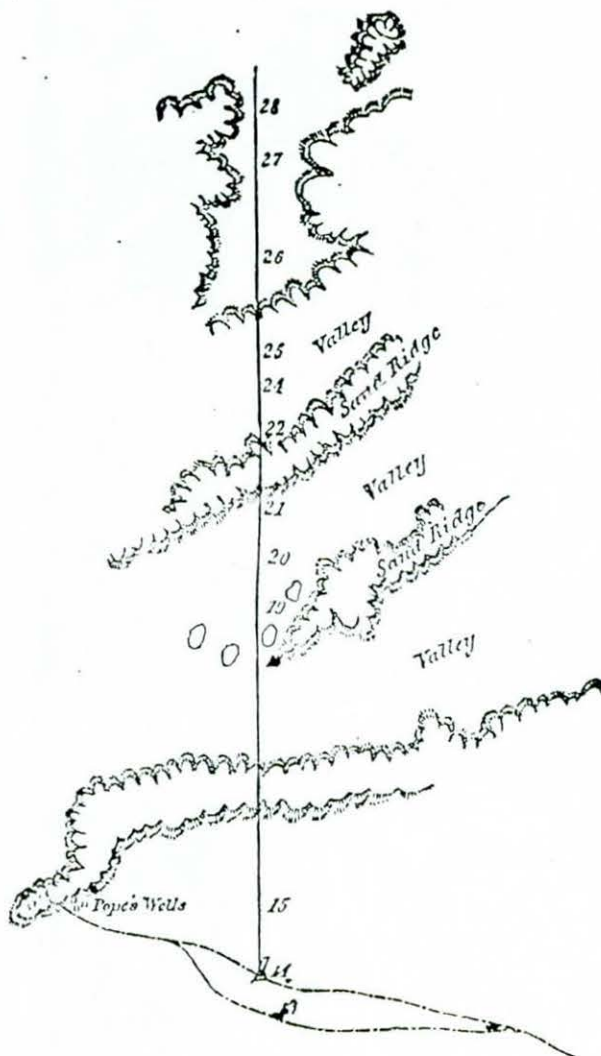
From Station 15 to Chimney, N. W.....	0	'	"
" " 16 " " " " .....	4	18	30
	20	25	00

April 24th.—Prolong line to last flag.

From initial point to St. 4 east of Pecos.....	154	miles,	3,015
To Pope's Wells (monument), St. 14 .....	8	"	441
St. 14 to 27 (depot camp monument) .....	10	"	1,355
St. 27 to 37 (east flag monument) .....	8	"	4,464

Station 37.

< a 37 ( $\frac{E}{xiii}$ ) .....	103	32	25	} Addition made May 5th.
< a 37 ( b ) .....	182	17	55	
< x 37 ( $\frac{E}{xiii}$ ) .....	99	30	25	
+ S. 30 m .....	150	feet.		

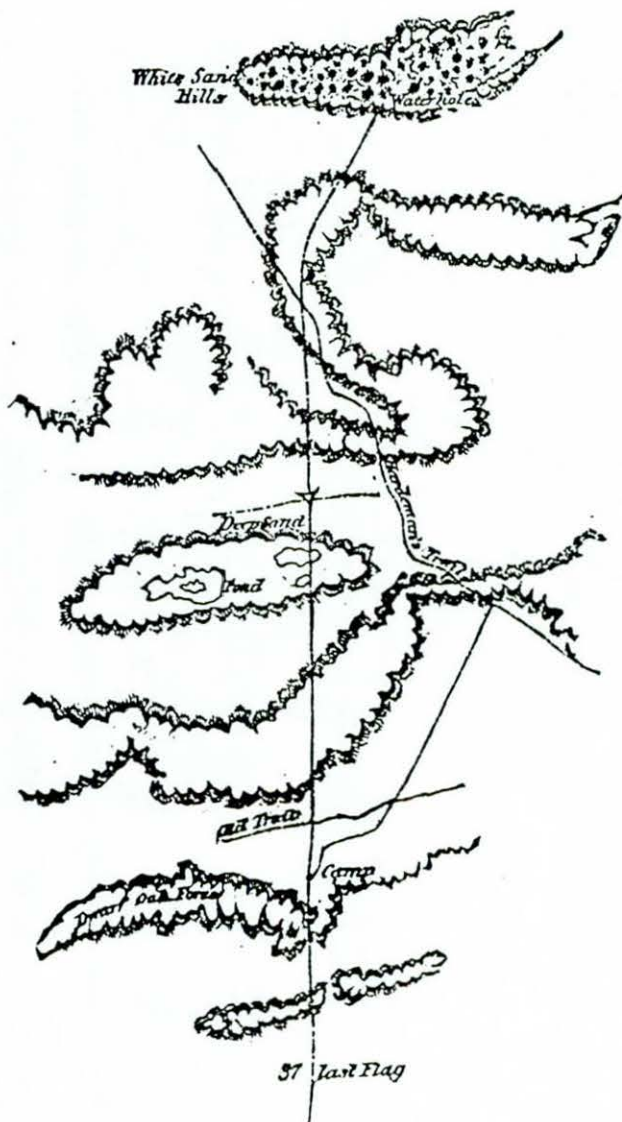


April 25th.—Start on recon. for corner 103° meridian. Run parallel by compass—last flag 123. Dist. 10 miles.





May 20th.—Running of mer. & par. from ast. camp on sand hills.  
 Diff. of observ. from Par.  $32^{\circ} = 1m\ 2532.5$  feet.  
 Signal E. of M. 2.97 feet.  
 To west corner of tent,  $174^{\circ}\ 00'\ 00''$ .



On mer. going North.

From Obs. to St. 1.....	= 50 chains, 21 feet.
" 1 " " 2.....	= 38 " 19 "
" 2 " " 3.....	= 44 " 17 "
" 3 " " 4.....	= 23 " 05 "

Station II.

To flag on sand hills.....	0 1 "
North end " ".....	354 19 35
.....	253 40 10

Station III.

To flag on sand hills.....	356 08 30
North end " " bush.....	284 27 15

Station IV.

North end of sand hills.....	36 13 25
Flag on " ".....	86 41 15



## Station I (Par. 32° going west).

From Station	IV— I	.....	=	26—13
" "	I— II	.....	=	53—32
" "	II— III	.....	=	57—48
" "	III— IV	.....	=	96—29
" "	IV— V	.....	=	75—38
" "	V— VI	.....	=	2—45
" "	VI— VII	.....	=	55—00
" "	VII— VIII	.....	=	31—14
" "	VIII— IX	.....	=	34—43
" "	IX— X	.....	=	63—40
" "	X— XI	.....	=	75—40
" "	XI— XII	.....	=	35—16
" "	XII— XIII	.....	=	148—30
" "	XIII— Catro's flag (base line)	.....	=	8442 feet.

## Station I.

N. end of sand hills	.....	o / "	4 23 50
Flag on " "	.....		77 30 00

## Station II.

I to road, 42 chains 25.			
N end of bluffs	.....		4 31 40
S " " "	.....		8 18 40
Flag on sand hills	.....		60 55 15



## Station III.

N. end of bluffs (1)	.....	o / "	00 24 30
" " (2)	.....		4 04 20
S " " "	.....		7 21 30
Flag on sand hills	.....		33 22 20

Station VI.

Mound N. of line (bush) .....	4 07 20
N. end of table land .....	184 41 45
S " " " " .....	186 54 20
N " " sand hills .....	185 18 00
S " " " " .....	224 36 00

Station VII.

Road is next of VI—45 chains.  
 " IX to Road—10 "

Station X.

Mound N of line .....	107 22 25
" S " " .....	333 07 50

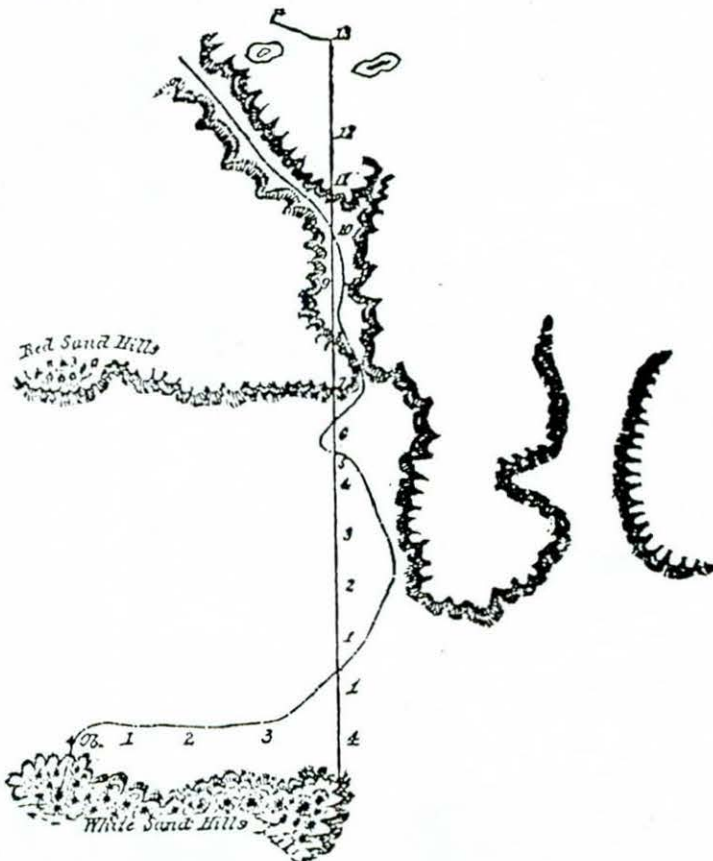
Station XIII.

< n } XIII. Catro flag .....	1 06 20
< a } .....	
< w } .....	
< a. XIII. b. ....	1 25 35
< 14 } XIII. & Catro flag .....	102 01 00
< p } .....	
< s } .....	
< c } XIII & Catro .....	99 10 25
< p } .....	
< n } XIII. { n } .....	3 00 20
< x } .....	
< p } .....	

St. Catro's flag—

< s } Catro. XIII .....	77 58 10
< c } .....	
< p } .....	
< b } .....	74 45 43
< u } .....	
< a } Catro XIII .....	73 22 21
< p } .....	

Dist. Obs. to flag on sand hills, 510 feet—



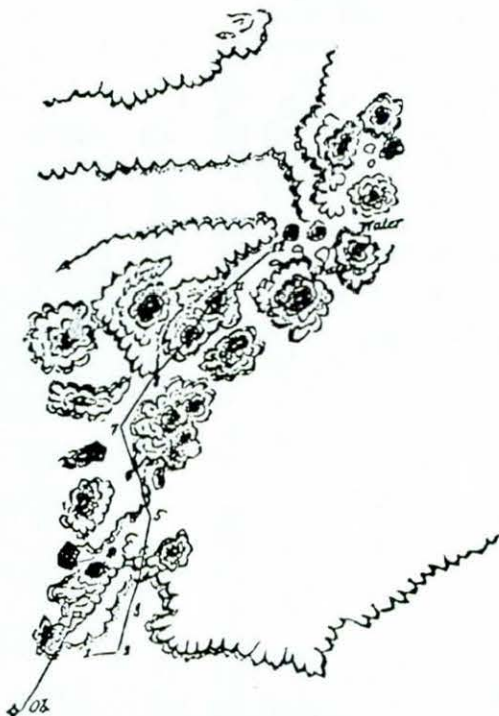
*Distances Computed.*

Last flag to M. of Obs. (103°)	32m-588
Obs is east of 103° mer	2" 337
M. East of St. IV	820
Road (valley) West of obs. M	17,900 ft.
Obs. East of 103° mer	10,897
103 east of road	7,003
Last flag to St XIII	24.4945
Obs. to St. XIII	7.923
Base XIII to Catro's flag	8442
Initial point to St. IV E. Pecos	= 154.3015
Popes Wells	8.441
" " to Depot Camp	10.1355
Last flag	8.4464
Obs. on sand hills	32.588
	<hr/>
	212.9863
Initial to 103 mer	211.4246
Obs. East of 103 mer	2.339

*May 21st, 22nd, & 23rd.—Work in camp.*

*May 27th.—Survey of Waterholes.*

Station.	Bearing.	Dist.	< + d.	Diff.
1.....	11 0	172		
2.....	91 15	110		
3.....	89 00	250	} + 2 00	+6.20
4.....	117 45	125	} -00 30	-4.30
5.....	111 30	233	- 2 15	-2.23
6.....	132 15	75	- 4 45	-0.70
7.....	105 00	226	- 3 30	-2.84
8.....	98 30	258	- 2 00	-3.03
9.....	101 30	172	- 4 15	-6.64
10.....	75 30	181	- 0 00	+5.23
11.....	49 00	304	- 2 15	-5.71
12.....	69 15	48	-14 00	-5.52





May 24th.—Survey the 103 mer. North.

Start 3.25 p. m. from corner, camp 7.55 p. m., bluff bearing 56° 45' 00".

St. mon. to Road mon st. 1.....	2 miles
1 to 2.....	4 " 5
2 to 3.....	6 "
3 to 4.....	2 "

May 25th.—Start 7 a. m. Camp 12.40 p. m.

Station 4 — 5.....	= 4.5	Sand ridge.
" 5 — 6.....	= 5	land mostly level.
" 6 — 7.....	= 3	heavy sand hills.
" 7 — 8.....	= 4	level.
" 8 — 9.....	= 4	very deep sand.

Ridge X is about 25.30 miles north, country open sandy plain—no indication or possibility of existing water along that stretch.

Return from Sand hills to main camp on Pecos.

May 28th.—Start at 10.30 a. m.; travel till after sunset; encamp 2 miles E. of old camp in red sand. 24.1824.

May 29th.—Start at sunrise. Reach sand in 2 m. travel, and Pecos at 2 p. m.

22 — 600 ft.  
through sand, 7 — 2098 "

May 30th.—Reach 2nd camp on Pecos at 2 p. m. 16.504 ft

May 31st.—Reach Main camp on Pecos—Dist: 10.5235 feet.

SURVEY ON THE PECOS RIVER.

(Commenced June 13th, 1859.)

V 11° 40' 00".

1 From camp on crossing to divide of road.....	13947
2 " Divide of road to monument on 32°.....	9461
3 " 32° to south bank of Delaware Creek.....	16224
4 " S. B. to camp at mouth " ".....	539

7. 3211

2 Viam camp—

Camp to camp = 7. 2283.

Station 1 to 2.....	W 2 30 N. 2
" 2 " 3.....	N 30 30 W. } 3
" 3 " 4.....	N 15 00 W. }
" 3 " 5.....	N 45 W. 4
4.....	N 60 E. 5 In camp on Delaware Creek.

South 00° 00' 00".

South end of Gauda. Mts.....	77 39 35
Peak No. 1 " ".....	78 51 20
2 " on line of Gauda. Mts.....	85 47 00
T. Peak 3 " ".....	161 24 10
Ast. St. on Delaware Creek.....	277 56 20

Dist. inst. to obser. 500 feet.

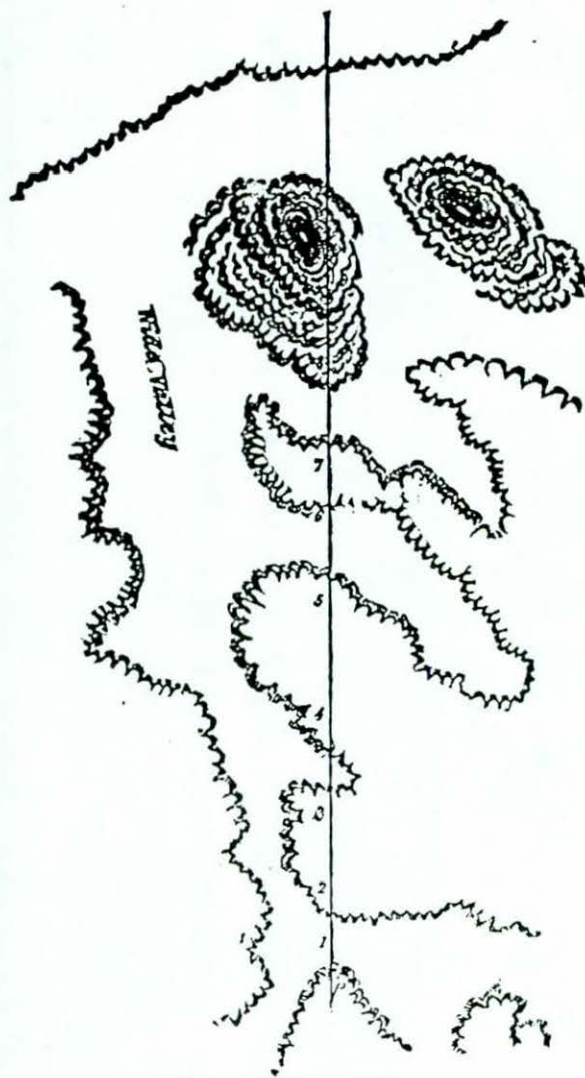
June 14th.—From camp on Del. Creek, 1 to camp 2.

Var. N. 00' 1—2 camp to old obs. N.....	289 feet.
2—3 N. 4. E.....	5080
3—4 N. 10. E.....	1320
4—5 N. 23. E.....	2550
5—6 N. 20. E. 1 road.....	1300
6—7 N. 23. W.....	1452
7—8 N. 40. W. camp.....	2803

14894—

Viam W° n = 16525.

South = 00° 00' 00".



	S	T	R
South end of Gandalupe Mts.....	74	51	10
Peak No. (1).....	75	59	20
“ (3) on line.....	83	43	15
“ (4).....	102	28	10
Starting point.....	206	02	15
Dist. inst. to Ast., p., 420 feet.			



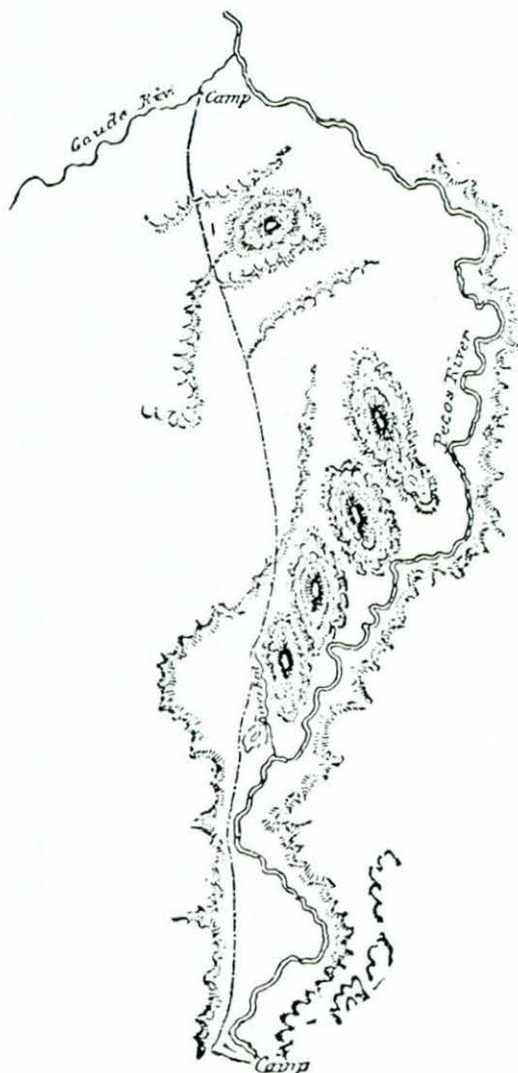
June 15th.—From 2nd camp on Pecos to Gaud. River, Camp 3.

Var 00°.

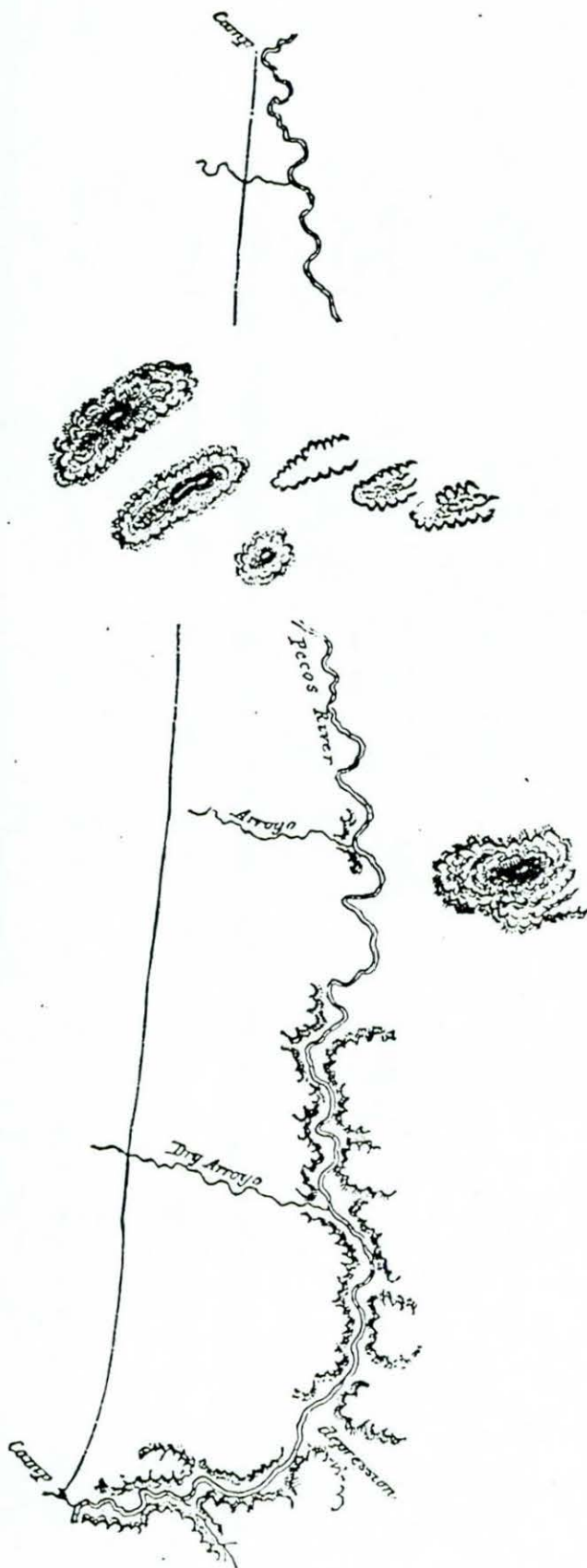
St.	Bearing.	Distance.	R.		
1	N. 43 30 W.	1210	.....	South = 00° 00' 00".	0 1 "
2	N. 3 45 W.	1100	.....	South end of Gaud:.....	61 45 35
3	N. 12 E.	2200	.....	Peak No. 1 ".....	62 47 40
4	N. 4 30 E.	2140	.....	" on line (3).....	68 59 00
5	N. 27 45 E.	1320	.....	" (4).....	90 24 40
6	N. 12 15 E.	2640	.....	Ast. St.....	224 38 00
7	N. 10 E.	1456	R.		
8	N. 4 30 E.	2640	.....	Inst. to obs—420 feet.	
9	N. 3 45 W.	4062			
10	N. 2 30 E.	10560	R.	Ast. obs. on Gaud. River.....	32 14 20
11	N. 3 45 W.	5280			
12	N. 6 30 W.	5322			
13	N. 2 E.	2640			
14	N. 8 W.	3960			
15	N. 48 30 W.	2640	R.		
16	N. 33 W.	} 6526	R.		
17	N. — W.				
18	N. 12 30 E.				
19	N. 32 E.				
20	N. 48 15 E.				
21	N. 57 30 E.	.....	R.	Camp.	

Via I. = 12. 2629.

" II. = 12. 2840.





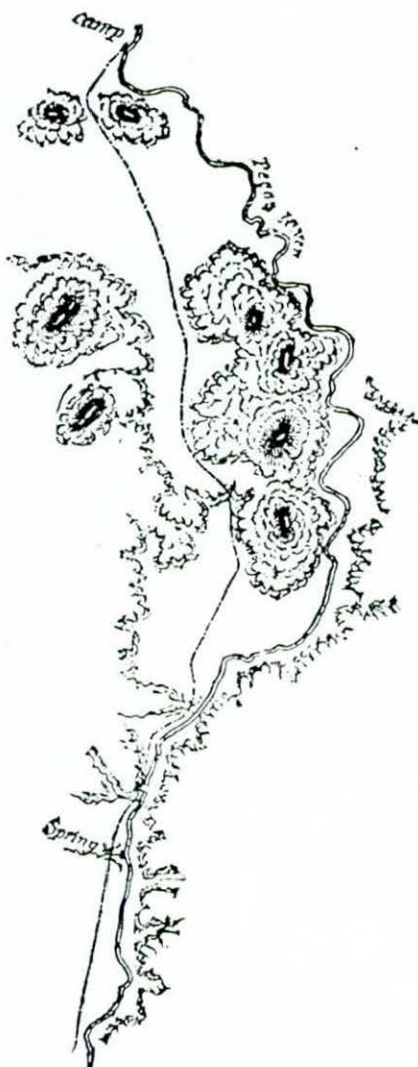


June 16th.—From Gaud. River, Camp 3 to Camp 4.

To Station 1 from camp is: to river crossing E., 41° —to bearing 1 N., 500 feet.  
 V 00°.

St.	Bearing.	Dist.	R.
1	N. 28 15 W.	5100	
2	N. 37 30 W.	955	R.
3	N. 12 45 W.	2757	
4	N. 58 15 W.	5280	R.
5	N. 32 30 W.	9590	
6	N. 45 15 W.	14062	R.
7	N. 35 45 W.	27400	
8	N. 38 30 W.	13115	R.
9	N. 00 45 W.	1000	R.

Camp ast. ob., 32° 24' 20".  
 14 m., 339.  
 15 " 4559.



June 17th.—From Camp 4 to 5.

St.	Bearing.	Dist.	R.	
1	N. 48 ° W.	10697	R.	
2	" 56 30 "	3180		
3	" 23 45 "	2310		
4	" 42 15 "	2247	R.	
5	" 32 45 "	1340		
6	" 75 00 "	1460		
7	" 17 45 "	5660		
8	" 22 30 "	5620		
9	" 49 45 "	1500		
10	" 472 15 "	1423	R.	
11	" 43 30 "	2690		
12	" 68 45 "	1450	.....	To Peak cañ., 100°.
13	" 85 15 "	4100		
14	" 50 30 "	1320		
15	" 26 45 "	1042		
16	" 39 15 "	2700		
17	" 51 45 "	2760		
18	" 51 30 "	5280		
19	" 32 45 "	1350	R.	To cañon N. 122° W. = 8 m.
20	" 98 30 "	563		
21	" 51 30 "	610		
22	" 47 15 "	600		
23	" 123 15 "	591		
24	" 20 "	700		
25	N. 2 30 E.	1590	R.	Camp, 11 m., 2986.





June 18th.—Camp 5 to 6.

St.	Bearing.	Dist.	R.	
1	N. 43° W.	1550		
2	" 12 30 E.	1560		
3	" 42 30 W.	5450	R.	Spring.
4	" 32 45 W.	4240		
5	" 12 30 E.	4319	R.	
6	" 16 E.	1819		
7	" 36 30 E.	2140		
8	" 12 30 E.	700		
9	" 27 45 W.	4415	R.	Crossing.
10	" 22 E.	1220		
11	" 12 45 W.	1804		
12	" 62 30 W.	1160	R.	Crossing.
13	" 29 15 E.	2780		
14	" 23 30 E.	24997	R.	Camp.

Ast. obs. 32° 40' 00".  
11 m., 145.

*Open Level Prairie  
Containing a luxuriant growth of Grass  
dotted with Springs.*



June 19th.—Camp 6 to 7.

St.	Bearing.	Dist.	R.	
1	N. 22 30 W.	7920		
2	" 2 45 E.	5280		
3	" 00 30 E.	6600		
4	" 3 00 E.	9240		
5	" 00 30 E.	9240		
6	" 60 2 E.	6292	R.	
7	" 122 W.	4012	R.	Wagon 1 ft behind.
8	" 42 45 W.	1420		
9	" 12 30 E.	2640		
10	" 22 45 W.	2990		
11	" 32 30 W.	1540		
12	" 2 30 E.	1503	R.	
13	" 32 35 E.	4960		
14	" 65 30 E.	5041	R.	Camp.

13 m. 42. Ast. obs. 32° 47' 40".

June 20th.—Camp 7 to 8.

St.	Bearing.	Dist.	R.	
1	N. 47 30 "	1550	.....	
2	" 00 30 "	1450	.....	
3	" 27 45 "	5280	.....	
4	" 17 30 "	18373	R.	Trail.
5	" 0 "	7920	.....	
6	" 27 30 "	2640	.....	
7	" 30 30 "	1320	.....	
8	" N "	5280	.....	
9	" 33 30 W.	3119	.....	
10	" 88 "	1330	.....	
11	" 27 45 "	2610	.....	
12	" 32 "	2670	.....	
13	" 17 30 "	1310	R.	
14	" 2 30 "	5996	.....	
15	" 12 30 E.	1870	.....	
16	" 18 W.	600	.....	
17	" 24 30 E.	610	.....	Lat. Ast. obs.: 32° 58' 10".
18	" 32 30 "	11744	R.	Camp. 13 m. 1592 feet.



June 20th.—Camp 8—Bearings on mountains west, south 00° 00' 00".

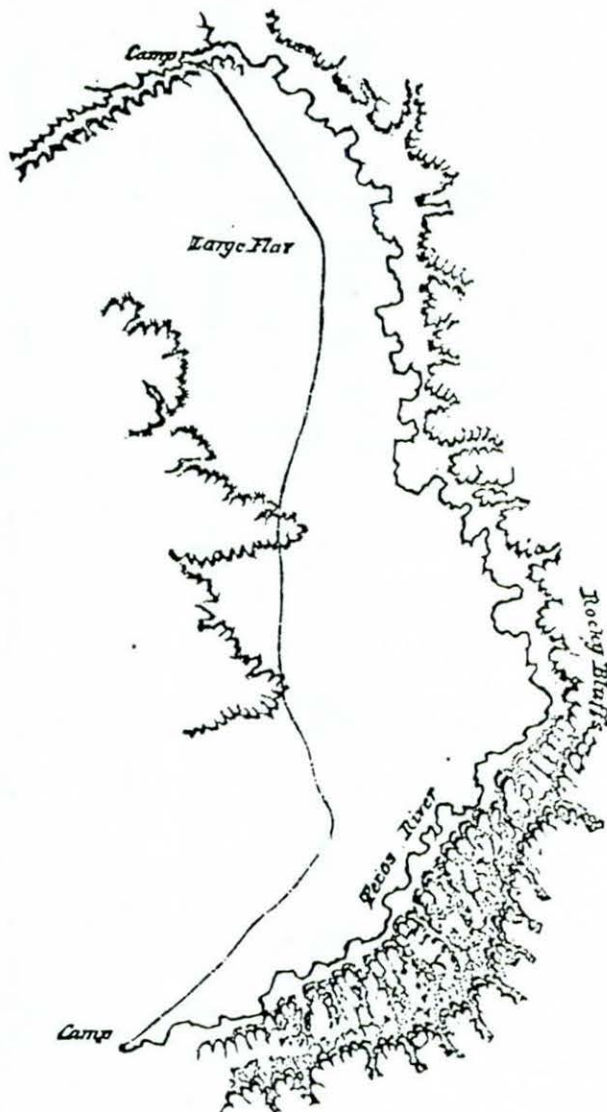
Peak No.	Range	Bearing	Distance
1	Gaudoalpe mountains	20 26 30	
2	"	12 15 10	
3	"	23 03 40	
4	"	61 07 10	
5	"	63 38 30	
6	"	66 40 50	
7	"	67 14 30	
8	"	69 33 20	
a 10	2d range	105 45 00	
11	"	107 52 40	
12	"	109 32 30	
13	3d range	126 44 40	
14	"	128 30 10	
15	"	129 11 50	
To ambulance		228 09 00	
Distance		420 feet.	
N. 3, No. 9		74° 13' 00"	





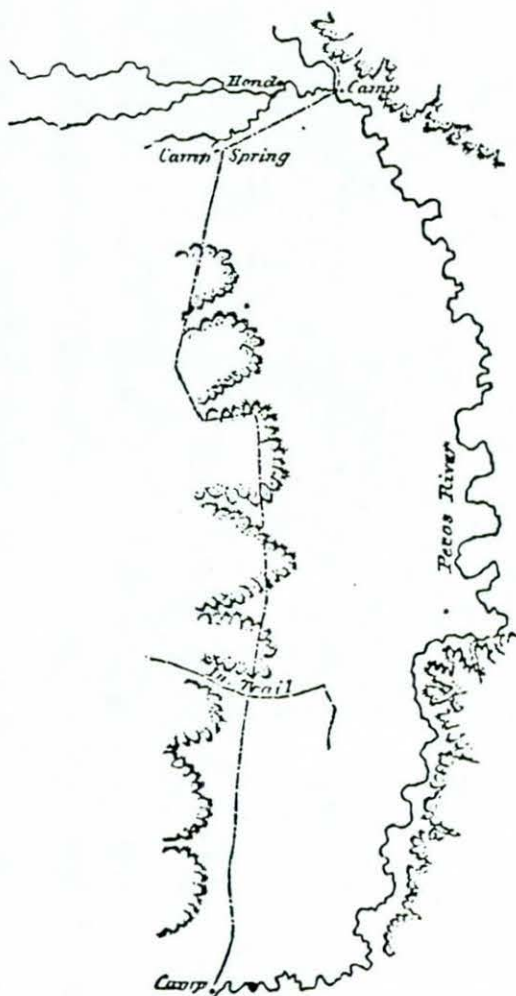
June 21st.—Camp 8 to 9.

St.	Bearing.	Dist.	R.	
	° /			
1	N. 52 15 E.	1120	.....	
2	" 12 45 E.	4000	.....	
3	" 47 30 E.	7600	.....	
4	" 70     E.	7480	.....	
5	" 47 30 E.	4030	.....	
6	" 62 15 E.	3101	.....	
7	" 56 45 E.	3030	.....	
8	" 12 45 E.	1020	R.	
9	" 33 30 W.	2640	.....	
10	" 22 45 W.	5300	.....	
11	" 28 30 W.	5290	.....	
12	" 1 30 E.	7920	.....	
13	" 9 45 W.	10560	.....	
14	" 33 30 W.	2740	.....	
15	" 2 15 E.	2956	R.	13 miles 248 feet. Camp on river.



June 22d.—Camp 9 to 10.

St.	Bearing.	Dist.	R.	
1	N. 15 30 W.	22686	R.	Camp to crossing; $\frac{1}{4}$ mile S. W. 45°
2	" 2 45 "	16590	R.	Trail $\frac{1}{4}$ mile N.
3	" 88 00 "	3960	.....	
4	" 21 45 "	4120	.....	
5	" 00 30 "	5640	R.	
6	" 29 45 "	5675	R.	Camp X to IX.
7	" 23 30 "	5360	.....	3,318 f.
8	" 15 00 "	6319	R.	
9	" 3 00 "	2700	.....	
10	" 2 30 E.	2690	.....	
11	" 11 15 "	4080	.....	
12	" 12 45 "	8107	R.	
13	" 23 15 W.	2632	.....	
14	" 12 30 E.	1331	R.	Camp on Benito River. 17 miles 2130 feet.



June 24th.—Moved camp to Pecos River.

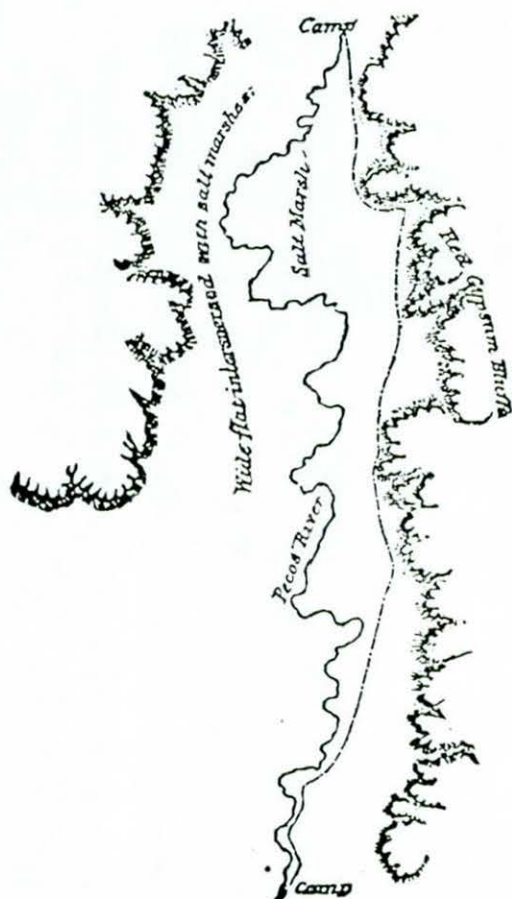
June 25th.—Crossed Pecos with train.

June 26th.—Camp XI, east bank of Pecos, to Camp XII, to mount  
85° 30'.

St.	Bearing.	Dist.	R.			
1	N. 17 00 W.	2800				
2	" 33 30 E.	1610				
3	" 14 15 W.	1550				
4	" 65 15 E.	810				
5	" 45 30 E.	2610		1.....	73	22 15
6	" 27 45 E.	4247	R.	2.....	84	30 55
7	" 12 30 E.	4000		3.....	87	16 20
8	" 16 45 W.	2020		4.....	95	42 10
9	" 22 15 E.	2022		5.....	97	39 55
10	" 12 30 E.	8087	R.	6.....	99	36 05
11	" 22 45 W.	2042		7.....	100	27 30
12	" 12 45 E.	1020				
12	" 17 30 W.	6260	R.			
13	" 17 45 W.	1777	R.	Camp.		
14	" 19 45 W.	7503				
15	" 12 15 E.	1520				
16	" 00 15 W.	2050	R.	Camp XII.		

9 m. 4409.

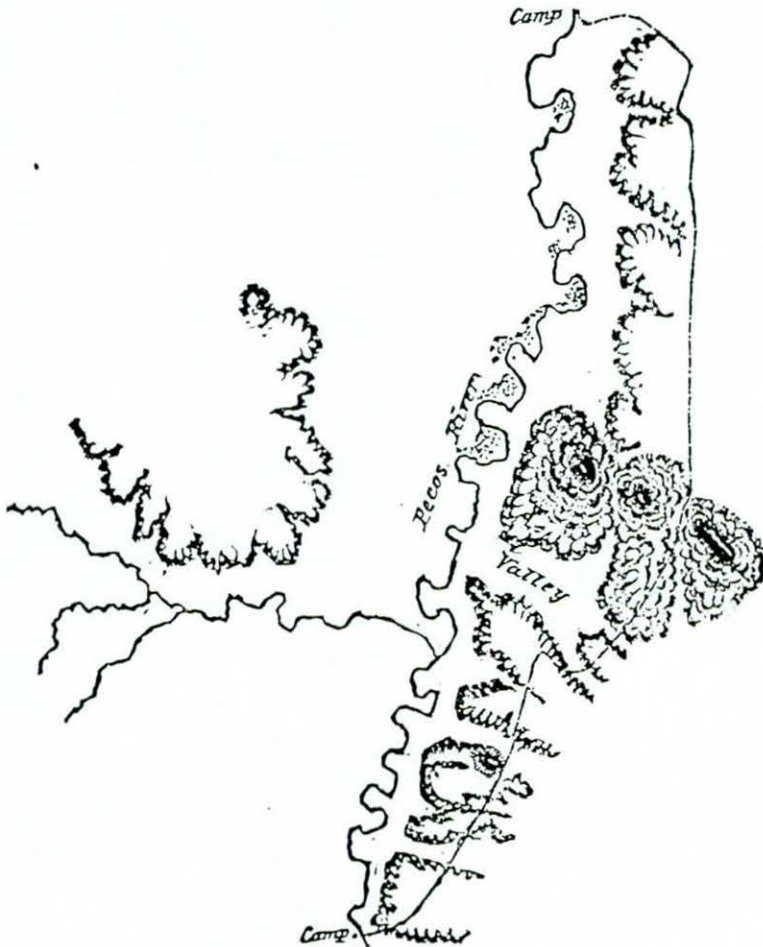
Ast. obs. lat. 33° 29' 10".





June 27th.—Camp XII—XIII.

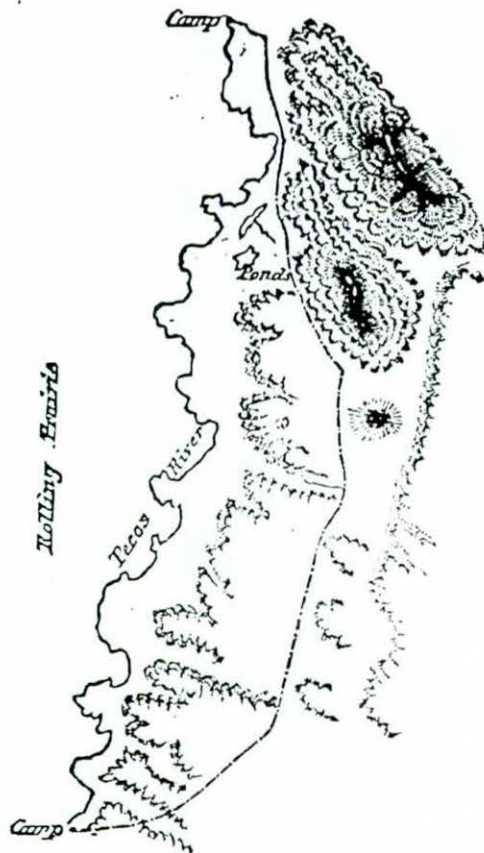
St.	Bearing.	Dist.	R.
1	° / N. 56 30 E.	621	
2	" 12 30 "	752	
3	" 72 16 "	1320	R.
4	" 46 45 "	1240	
5	" 26 15 "	1410	
6	" 46 45 "	2529	
7	" 22 15 "	660	..... Valley 8 to 9.
8	" 47 " "	1184	R.
9	" 20 15 "	343	
10	" 47 15 "	1650	
11	" 22 30 "	522	R.
12	" 26 30 "	4260	
13	" 6 30 "	1873	
14	" 17 15 "	4150	R.
15	" 10 00 "	1420	
16	" 104 15 "	5071	R.
17	" 36 30 "	14233	R.
18	" 1 45 W.	1420	
19	" 9 45 "	5410	
20	" 19 15 "	3960	
21	" 6 15 "	5602	R.
22	" 12 15 "	3739	R.
23	" 56 45 E.	2150	..... Lat. 33° 38' 30".
24	" 10 45 "	1230	
25	" 68 45 W.	7680	..... Dist. 14 miles 577 feet.



June 28th.—XIII-XIV. Camp at Bosco Grande.

St.	Bearing.	Dist.	R.	
	° /			
1	N. 86 30 E.	4120		
2	" 63 45 "	5004	R.	Star 7 due N., 3 miles east single peak. The bluffs east are 3 miles of the road, par. to the river, and extend from St. 1 to 9. X is prob. Mound Extampeda on the map.
3	" 33 30 "	9137	R.	
4	" 21 15 "	2040		
5	" 22 15 "	730		
6	" 46 15 "	1522	R.	
7	" 13 15 "	3940		
8	" 1 30 W.	5752	R.	
9	" 77 15 "	2780		
10	" 40 15 "	1210		
11	" 21 30 "	1263	R.	
12	" 1 15 "	2680		
13	" 12 15 E.	2600		
14	" 31 45 "	1330		
15	" 12 30 W.	1320		
16	" 10 15 E.	1513	R.	
17	" 4 30 W.	5294		
18	" 63 15 "	2272	.....	Camp.

10 m. 1644.

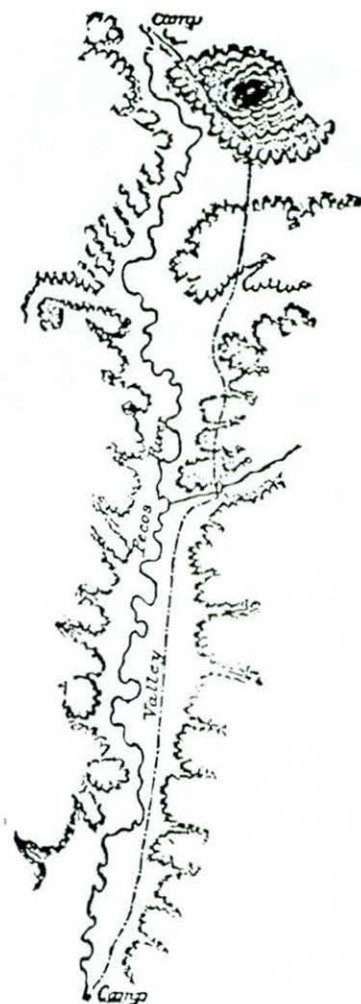


June 29th.—Rest at Camp 14, Bosco Grande.

June 30th.—Camp XIV to XV.

St.	Bearing.	Dist.	R.
1	N. 47 30 E.	1450	.....
2	" 12 15 "	1490	.....
3	" 56 45 "	680	.....
4	" 11 45 "	3898	R.
5	" 56 45 "	1110	
6	" 10 30 "	23433	R.
7	" 53 45 "	1300	
8	" 16 15 "	1250	
9	" 27 30 W.	1450	
10	" 51 45 E.	510	
11	" 12 30 "	3786	
12	" 57 30 "	450	
13	" 11 45 "	1340	R.
14	" 3 15 W.	2740	
15	" 11 45 E.	15272	R.
16	" 60 30 W.	4080	
17	" 1 45 "	1822	R.
18	" 28 15 "	1238	R. Camp XV.

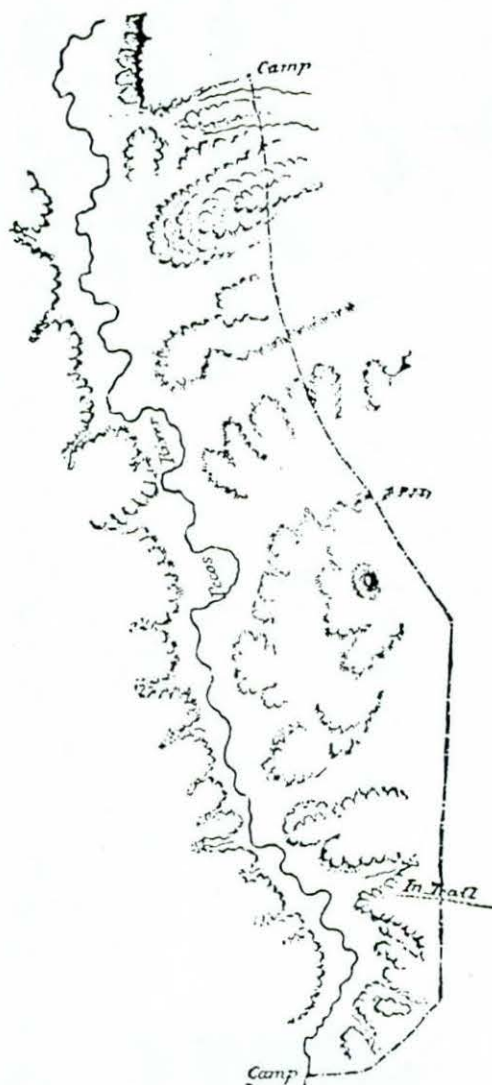
12 m. 3948.





July 1st.—Camp XV to XVI.

St.	Bearing.	Dist.	R.	
1	S. 12 15 W.	1540	.....	Lat. ast. obs. = 34° 06' 40".
2	" 3 30 E.	1255	.....	Camp 16.
3	N. 74 15 "	4592	R.	Peak 1 = 317° 30'
4	" 74 45 "	2850	.....	" 2 = 315° 15'
5	" 15 45 "	17211	R.	" 3 = 312° 30' } Small compass.
				" 4 = 309° 30'
				Camp ... 74° 30'
				3,110 feet east.
6	" 26 15 W.	15827	R.	To Peak N. 9 S W., dist. 4 m.
7	" 25 30 "	3850	.....	
8	" 11 45 "	13004	R.	
9	" 27 30 E.	1450	.....	
10	" 13 15 W.	810	.....	
11	" 34 00 E.	1354	.....	
12	" 29 45 W.	1851	R.	Ridge.
13	" 12 15 "	4080	.....	
14	" 01 45 "	750	.....	
15	" 20 45 E.	610	.....	
16	" 37 15 "	1934	R.	Valley.
17	" 17 30 "	710	.....	
18	" 2 15 "	800	.....	
19	" 33 45 W.	882	.....	
20	" 112 30 "	640	.....	
21	" 32 30 "	630	.....	
22	" 110 15 "	631	R.	Camp XVI. 14 m. 3236.



July 2nd.—From Camp XVI to XVII.

St.	Bearing.	Dist.	R.
1	N. 12 15 E.	9731	R.
2	" 26 30 "	3841	.....
3	" 1 15 W.	2032	R.
4	" 57 15 E.	3898	.....
5	" 2 15 "	2120	R.
6	" 15 45 W.	5846	R. Valley bayo 5 W.
7	" 17 30 E.	5917	R. Main valley.
8	" 26 15 "	2110	.....
9	" 12 20 "	610	.....
10	" 56 45 "	2540	.....
11	" 43 30 "	8957	.....



11	°			8957		
12	N.	43	30	E.	601	R. — 200 —
13	"	47	15	"	7255	R.
14	"	18	30	W.	2000	.....
15	"	92	15	"	1742	R.
16	"	1	45	E.	2420	.....
17	"	11	45	"	3334	R.
18	"	15	30	"	1310	.....
19	"	77	15	"	720	.....
20	"	6	15	W.	2600	..... — 600
21	"	18	45	"	2650	.....
22	"	1	00	E.	1180	.....
23	"	5	30	W.	3110	.....
24	"	21	15	E.	2716	..... Camp XVII; 14 m. 4720; lat. 34° 17' 20".







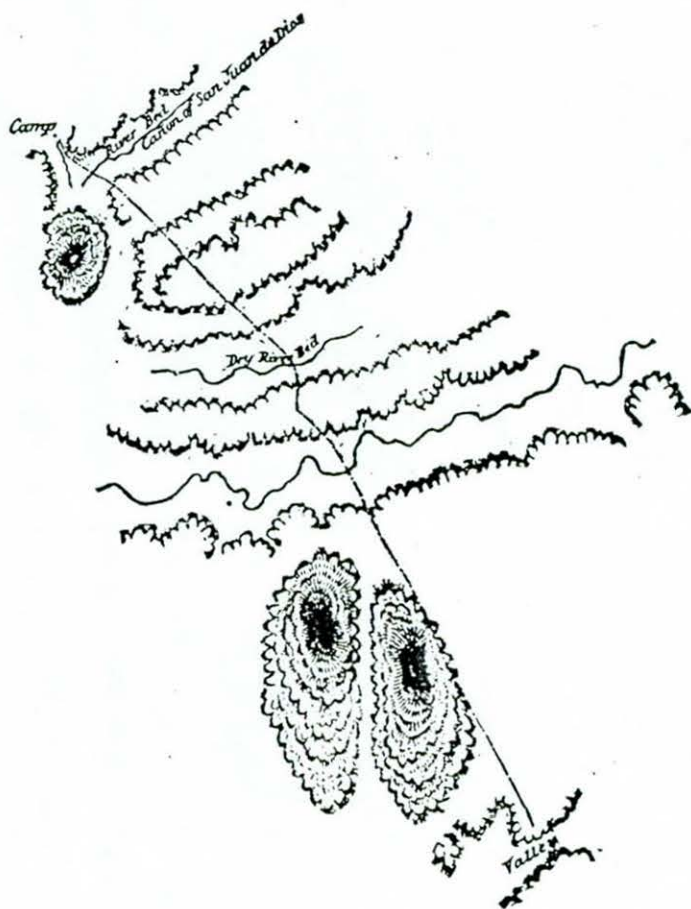
July 4th.—Camp XVIII to XIX.

St.	Bearing.	Dist.	R.
	° /		
1	N. 31 45 E.	2755	.....
2	" 18 30 W.	710	.....
3	" 26 45 E.	2854	.....
4	" 10 45 "	3732	R.
5	" 43 15 "	2242	.....
6	" 12 30 "	3683	R.
7	" 1 45 "	13417	R.
8	" 16 30 W.	2397	R.



9	N. 45	45	W.	19869	R.	Valleys well timbered at Camp XIX; spring; river bed dry;
10	" 69	15	"	1830	R.	water in ponds; Pecos 4 miles east (report).
11	" 44	15	"	2410	.....	
12	" 53	45	"	4654	.....	Valley.
13	" 33	15	"	2841	.....	
14	" 13	30	"	2822	R.	
15	" 33	45	"	6518	R.	River bed.
16	" 48	30	"	8282	.....	Camp XIX.

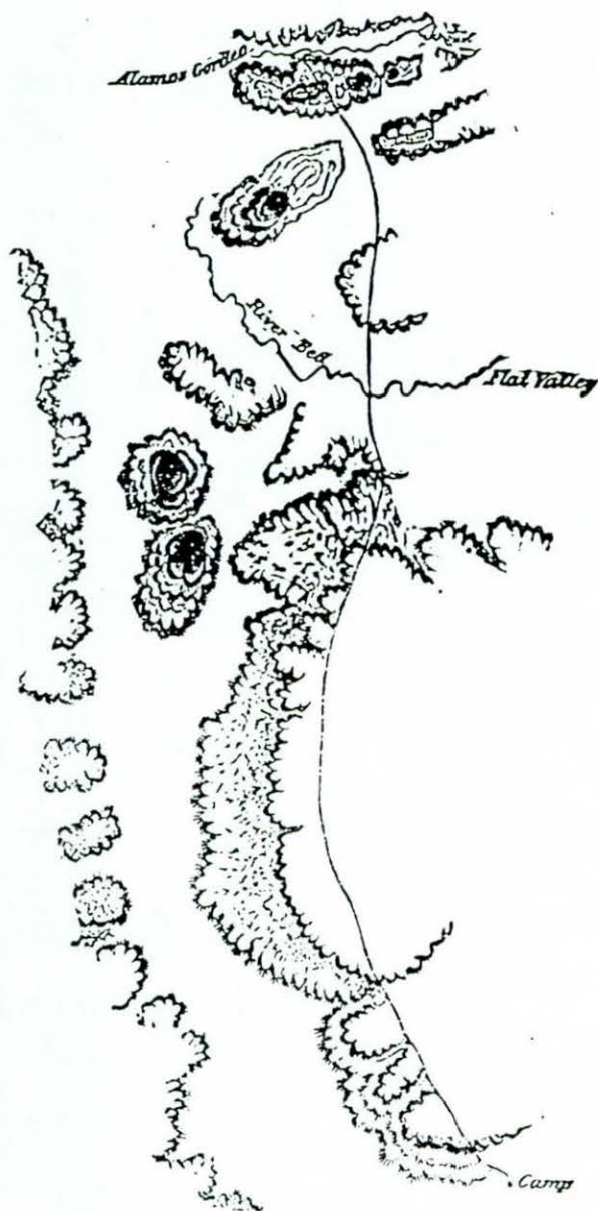
15 m. 7314. Lat. 34° 39' 20".





July 5th.—Camp XIX to XX.

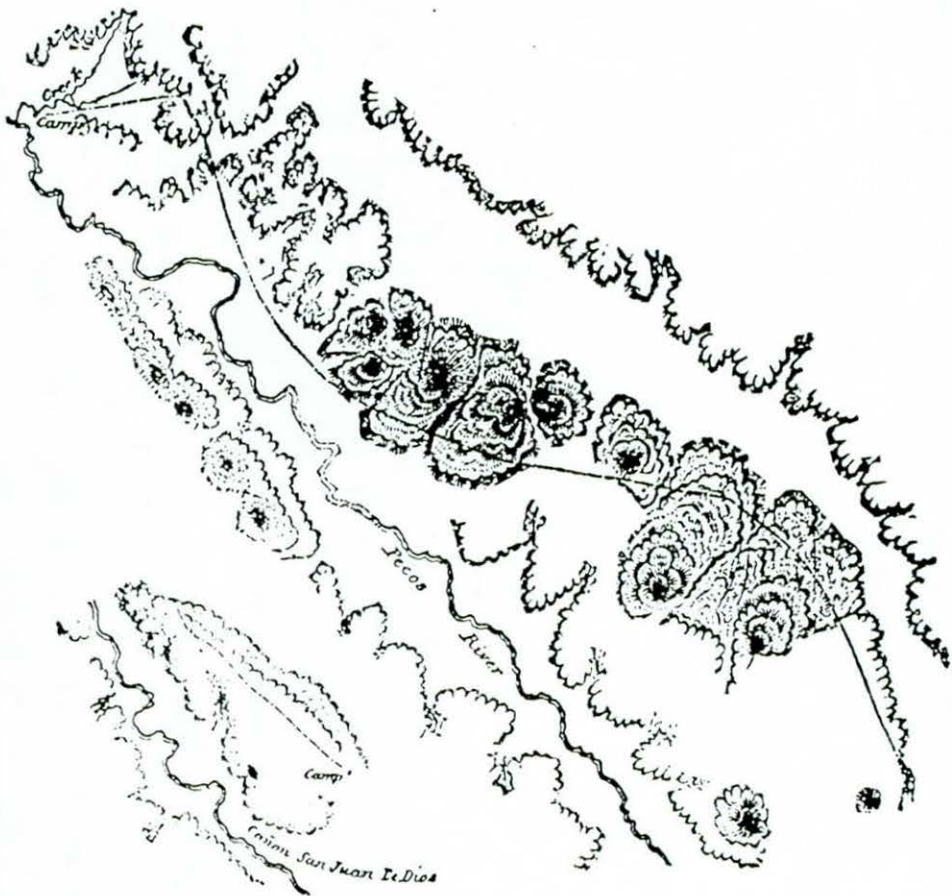
1	N.	38	30	W.	1840	.....	Cañon, St. 9, 5 miles west.
2	"	62	45	"	1044	R.	Either S. Juan de Dios or probably junction of Pecos with it.
3	"	33	15	"	12377	R.	
4	"	50	00	"	610	.....	
5	"	43	15	"	645	.....	
6	"	33	30	"	4420	R.	
7	"	8	45	"	16077	.....	
8	"	16	30	"	10231	R.	
9	"	11	45	"	11630	R.	
10	"	42	45	"	1452	R.	
11	"	56	15	E.	581	.....	
12	"	33	15	W.	1162	.....	
13	"	55	30	"	2322	.....	12 m. 1000 feet. Lat. 34° 47' 00".



July 6th.—Camp XX, of Pecos to XXI, strike Pecos again.

St.	Bearing.	Dist.	R.
1	N. 48 30 W.	1380	.....
2	" 26 15 "	2640	.....
3	" 36 30 "	11473	R.
4	" 48 15 "	8993	R.
5	" 48 30 "	8996	R.
6	" 50 30 "	8363	.....
7	" 50 15 "	2640	.....
8	" 48 30 "	610	R.
9	" 18 15 "	9625	R.
10	" 52 30 "	1324	R.
11	" 78 45 "	2314	R.
12	" 8 30 "	1340	R.
13	" 90 15 "	5889	R.
14	" 86 15 "	9428	R.

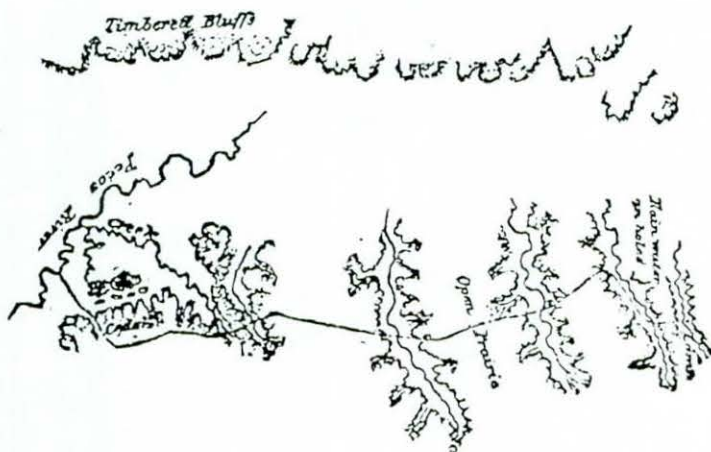
Fourteen m. 1564 feet. Lat. 34° 55' 00".



July 7th.—XXI to XXII.

St.	Bearing.	Dist.	R.	
1	N. 72 15 E.	4569	R.	Ranch on Pecos 5½ miles from Camp XXI. Bear east 35° 15' S.
2	" 111 45 "	552	.....	
3	" 73 30 "	1281	.....	
4	" 12 30 "	3879	.....	
5	" 51 15 "	1346	R.	
6	" 41 45 "	680	.....	
7	" 12 30 "	698	.....	
8	" 27 30 W.	684	.....	
9	" 12 15 E.	681	.....	
10	" 2 30 W.	597	.....	
11	" 52 45 "	1492	R.	
12	" 68 15 "	1325	.....	
13	" 1 45 "	4981	.....	
14	" 12 30 E.	4952	R.	
15	" 18 45 W.	5649	R.	
16	" 23 30 "	11126	R.	
17	" 43 15 E.	1421	.....	
18	" 37 30 "	1805	.....	
19	" 12 30 "	801	.....	
20	" 26 15 W.	1201	.....	

Nine m. 2197 feet.





July 7th.—Afternoon drive.

St.	Bearing.	Dist.	R.	
	° ' "			
1	N. 57 30 E.	4833	R.	
2	" 18 15 W.	1225	.....	
3	" 1 45 "	2640	.....	
4	" 15 15 "	5280	.....	
5	" 12 45 E.	5905	R.	
6	" 13 45 W.	755	.....	
7	" 43 15 "	6592	.....	Strike Capt. Whipple's road.
8	" 52 45 "	6123	.....	

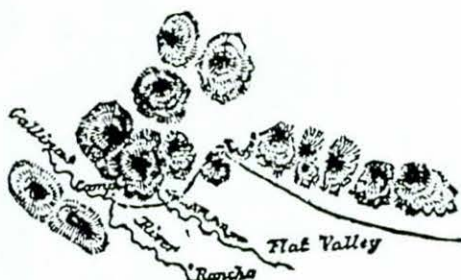
Six miles, 1671 feet. Lat. 35° 07' 10".



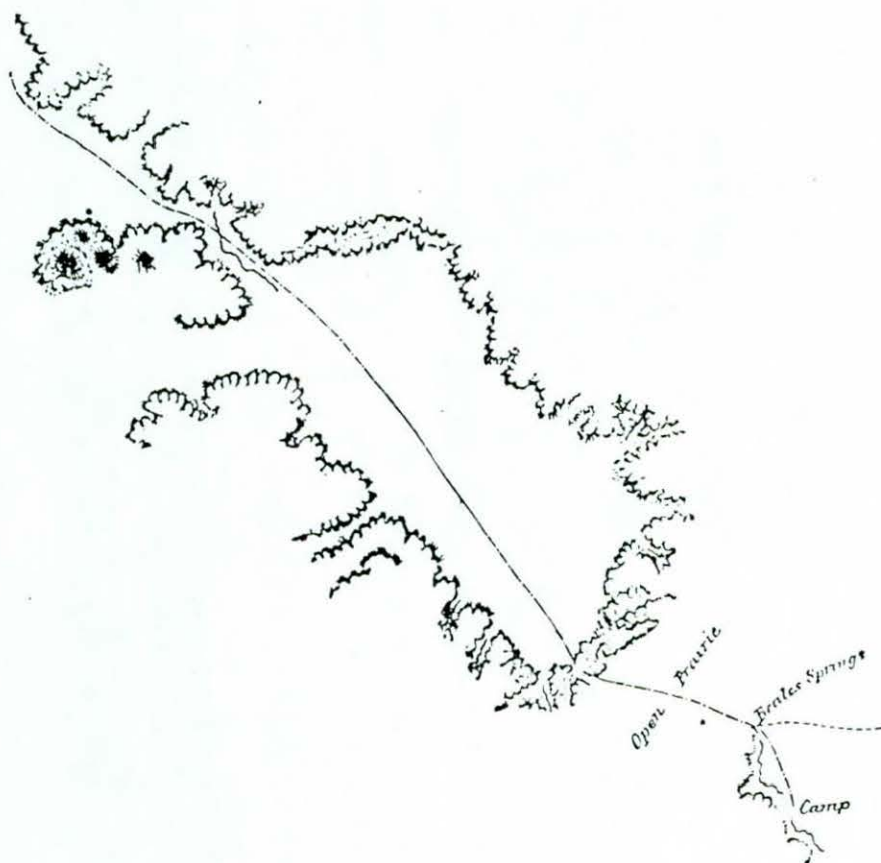
S. Ex. 70—6

July 8th.—Camp XXII to XXIII on the Rio Galleno.

St.	Bearing.	Dist.	R.	
1	N. 12 30 E.	1450	.....	
2	" 32 45 W	2395	R.	
3	" 48 30 "	9046	R.	Bluffs.
4	" 42 45 "	20049	.....	
5	" 16 15 "	5281	.....	
6	" 63 15 "	4152	R.	
7	" 56 00 "	4082	.....	
8	" 43 15 "	2652	.....	
9	" 32 45 "	2746	R.	
10	" 90 15 "	3437	R.	
11	" 52 15 "	2652	.....	
12	" 46 30 "	12569	R.	
13	" 57 00 "	14476	.....	
14	" 40 00 "	640	R.	
15	" 120 15 "	6098	.....	
16	" 88 45 "	523	.....	
17	" 84 45 "	2701	R.	Camp XXII.



17 m. 5189 feet.



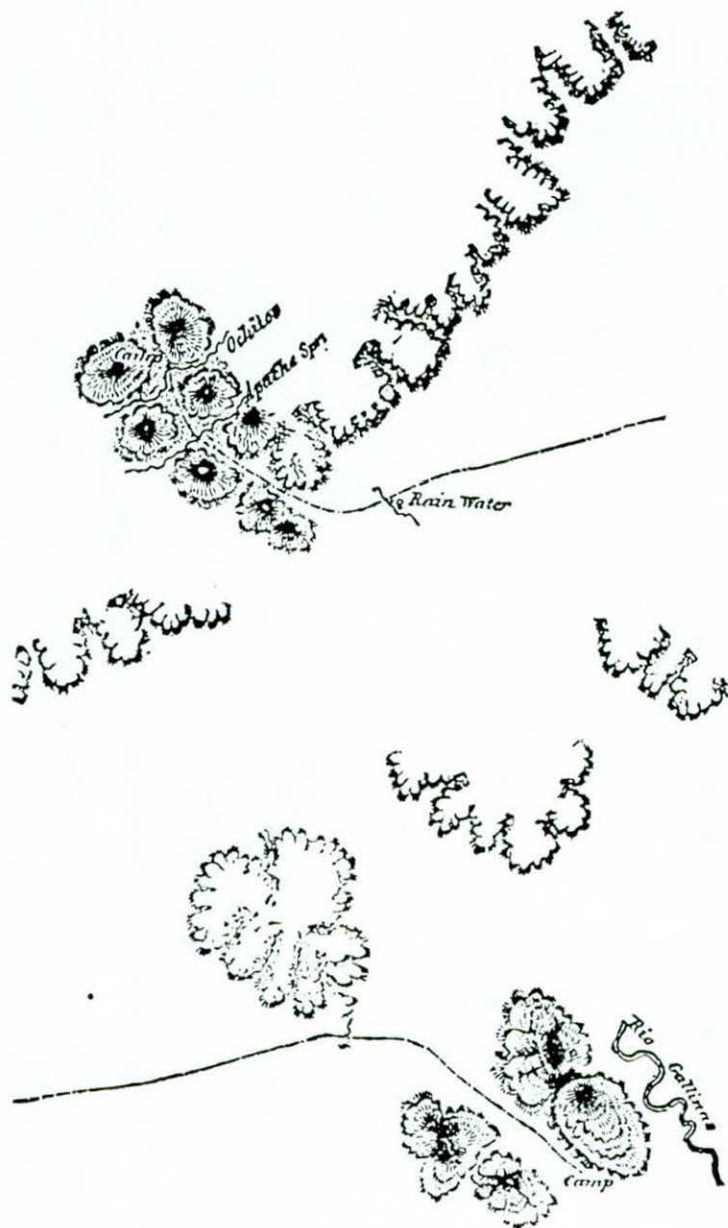
July 9th.—Move camp over the River Galleno. 10th.—In camp.

July 11th.

St.	Bearing.	Dist.	R.	
1	N. 22 45 W	3800	.....	
2	" 33 30 "	3784	R.	7 m. 4760 feet.
3	" 98 15 "	11416	R.	
4	" 113 30 "	22621	R.	

July 12th.

St.	Bearing.	Dist.	R.
1	N. 128 15 W	14220	R. to At Chigo N. 172 W. Dist. 2 miles.
2	" 122 45 "	3910	
3	" 42 30 "	2450	
4	" 12 30 "	20987	
5	" 117 45 "	601	
6	" 52 30 "	31118	17 m. 3526 feet.



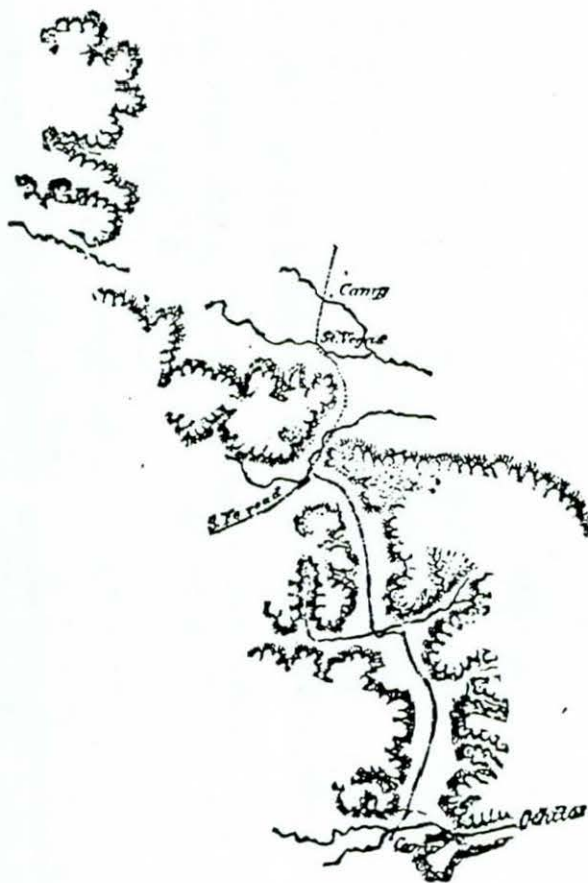
July 13th.—Camp near Vegas.

St.	Bearing.	Dist.	R.
1	N. 12 30 W		Vegas to camp, 14 miles.
2	" 1 45 "		15 m. 1376 feet.





July 14th.

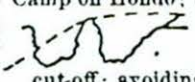
St.	Bearing.	Dist.	R.
1	N. 34° 15' E .....	5270 .....	



Recog. from Fort Stanton along the Hondo to the Pecos, up that river to Natch's rancho.

Date.	Dist.	Course.	Remarks.
	<i>Miles.</i>		
June 15th	13	S. E. & S. b. E. . . .	From fort to camp on Benito.
" 16th	14½	S. of E. & E. . . . .	The point of the Capitan due N., peak Blanca d. W.; the Cariso 20° N. of White Mount. The Buidoso & Benito unite and form the Hondo 3 m. west of camp; camp on Hondo.
" 17th	1½	E. . . . .	The river bends to E. N. E. for 2 m.  & runs around the point of the mount. in about 3½ m.; a cut-off is made by an Indian trail; about 3 m. lead to the river bottom again; camp on Hondo; bottom, narrow; hills, 8-900 feet high.
" 18th	1½	E. S. E. . . . .	The roads run 1½ m. along the river  , and then
	1	E. S. E. . . . .	the river runs for 1 m. N. E.; turning the point of the mount. runs S. for 1½ m., across which the trail cuts off 1 m.; the trail runs d. S. to the summit of a hill; then S. E., then E., then N. E. and E. N. E. in about 3½ m.; on coming to the river again some 7-8 m. by its course from where it leaves it the river runs first N., N. E., E. S. E., N. E., N., N. W., then N. E. & E. S. E.; bearing from this point Blanca W.; the Capitan N. W.; about 25 miles.
	3½	(S., S. E., E. . . . . (N. E., E. N. E. . . . .	

Recog. for Fort Stanton along the Hondo to the Pecos, up that river to Natch's rancho.

Date.	Dist.	Course.	Remarks.
19th	4	E. S. E	Camp on Hondo; remain in camp.
20th	7½	E. S. E	 Down the Hondo to where it turns to E. N. E.; the river again turns to E. S. E. and to E. N. S., avoid the long bend by a cut-off; avoiding another bend we came to the river again; camp on Hondo; Capitan W. N. W. 35-40 m.
	3	N. N. E	
	3½	E. N. E	
	3½	E	
21st	3½	N. E	Struck the <i>Atascoso</i> , a branch of the Hondo; struck the head of a stream running to E.; 2-300 yards further came to a stream running from the N. N. W.; passed it up and crossed its source; seemed to be N. N. W.; traveled ¾ m. N., and saw from a hill our last camp, due south 8-10 m. dist.
	2½	N. E	
	3	N. N. W., N. W.	
22nd	8	N. E	Came to Pecos; Capitan W. 10° N.
	3	N	Came to a vast lagoon of salt water, great canes & rushes up the lagoon, & crossed with great labor; came to river; last camp 4½ miles in dist. S.
	2	N	
23rd	2	N. E	
	7½	N	Along the edge of the mesa, came to the lower end of the Bosque Grande; came to a bed of gypsum, vein 10 feet thick; the river all along winds from side to side through a valley 1½-2 m. wide, decked with mottes of cottonwood trees at short intervals. The mesa Rita del Grabriel chaors comes in two-thirds of the distance of the Bosque—from the lower end on the east bank.
	7	N	
24th	1½	N	Along the river bottom: the river makes a big bend here to the right about 3 miles.
	9	W. of N	Came to the river again; Espia N. E.
	1	"	Made a detour to descend to river bottom, and came to camp on Pecos; Estampedio is 6-7 m. E. S. E. of Espia, both small hills. The mesa San Juan is seen to the right on this day's march; a ravine with fine cottonwood trees is called by the guide "Vescera."
25th	2	N	
	3	Northerly	The river comes from the N. N. E. through fine bottoms; came to it opposite a hill called <i>Penas Negras</i> ; the river bottom narrows here, but just above widens again.
	3	N	In 3 m. again we struck the river at a white mound of bluffs on the Rio del Toro.
	2½	N	This river comes from N. N. E.; struck across & came to it again at a rocky point of sandstone; the river again bends off, & in 3 miles we came to it at a dry arroyo, with cottonwood trees. This river comes from N. N. W.
26th	2½	N	
	2½	N	Saw trees on the other side of Pecos through a gap in the hills called Latiar.
	3½	"	Struck the lower end of Bosque redando; river bottom quite narrow, but expands for 4-5 miles till it is 1½-2 m. wide.
	1½	"	The river in ½ m. leaves the west, & for 3 m. runs along the east side of the valley.
	1½	"	Left the lower bottom and came on the mesa 1,200 yds., covered with mesquite grass, with sand-hill 25-30 f. high all along the western border.
	2	"	River most crooked & the groupes of cottonwood become denser.
	2	W	Valley narrower. The Paisar comes in opposite the upper half of the mesa just mentioned.
27th	2	N. W.	Traveled over the river bottom, composed of fine drift sand, to the upper end of the Bosque redando, and again left the river from a hill at the foot of the <i>Bosque</i> , the double head; the last point of "Capitan bore" S. 30° W., and a double mound 6-7 m. N. E. of our camp bore N.
	1½	N. W.	The course here changed to N. W., and we came to camp, to our left a small white bluff called El ese.
28th	10	N. N. W.	3 miles below camp the route was considerable to the west, the river at times 1½-2 miles east; camped in a small valley surrounded by bluffs; bottom narrow & enclosed by bluffs.
	½	N	Along the river; ascended the bluffs; followed a deep trail, thinking to avoid a bend in the river, course W. N. W.; after 3 m. on that trail came to a rocky precipice, which we descended, & in 1½ m. reached a slough called the "Salado."
	4½	N. N. W.	
	6	N. N. W.	Struck the river; 1 m. up a gentle & 5 m. on a fine plain, when we came to deep barrunoas, with difficulty descended into it, and came upon a much broken plain of rocks, beyond which was a deep arroyo of salt water; the river over broken ledges of rock to camp; river very crooked; think it no more than 8-9 m. to Bosque red. in a straight line.
29th	2	N. N. W.	
	14	N. W.	Follow the river, which winds very much, but preserves its general direction from the N. W.; camped at Beete's rancho.
July 30th 1st	14	N. W.	Remained in camp.
	1	Nor	Along the Anton Chigo road to N.
	3	N	Narrow sandy prairie
	11½	N. N. W.	Over first a stony bluff, then another still higher, and finally over a level prairie.
	1½	W. N. W.	Decended two rocky precipice, 6-700 feet h.



*Recog. for Fort Stanton along the Hondo to the Pecos, &c.—Continued.*

Date.	Dist.	Course.	Remarks.
	1	E.....	Came to camp on Pecos; saw three cone-shaped hills to the right, the most north of which is "La Corazon" S. Fe mount N. W.
2nd	1	N. W.....	Along the Pecos, which we crossed at Taylor's coral.
	3	N. E.....	Along a cañon.
	3	N. W.....	To the Rio Gallinas.
	2½	N. & N. W.....	Along the Gallinas, and, crossing it, camped at "Ojo Gallinas."
3rd	5	N.....	To Natches rancho.

*Triangulation from Kansas Boundary Obs. to Rabbit Ear Observatory, i. e., connection of Kansas corner & obs. with Rabbit Ear Mountain (East Peak) last prominent tree on top. August 8th, 1859.*

Meridian on Kansas Boundary Obs., V. 12° 31' road from S.

	* tree.		
East Peak No. 1	} Rabbit Ear Mountain.....	4 50 30	} + V.
" " " 2		4 48 35	
West " " 1	6 35 40		
" " " 2	6 40 00		
Mount West 3	11 39 20		
Round Mound 1	56 54 40		
" " 2	57 09 30		
Monument	152 54 00		
	" " 5		
	" " 10		
	" " 00		

Meridian transfer by needle from Rabbit Ear Observatory, V. 13° 14'. N. B.—Very hot day.

Mount east of Rabbit Ear Mt.....	1 20 40—V.
East Peak 1.....	4 50 35
West " 1.....	6 35 45
" " 2.....	6 40 10
" " 3.....	11 39 15
Round Mound 1.....	56 54 30
" " 2.....	57 09 25
Monument.....	152 54 05

*Triangulation on Rabbit Ear Creek Observatory, August 12th, 1859, i. e., connection of observ. with corner of Kansas Boundary, Rabbit Ear Mount, & N. W. corner of Texas Boundary.*

Station flag a.

< read from S. by W.

East mounds.....	11 19 45
East Peak tree.....	47 42 35
West " 1.....	53 15 30 ! good.
" " 2 bush.....	53 44 25 good.
To flag d (Maxy).....	72 30 05
" round mound.....	80 18 30
" flag b (Taylor).....	120 52 25
Error — 10	

Obs. to a 49.1 feet (measure of 6 measurements.)

Lat. of obs. is 36° 34' 16" . 36 = 25921.8 = 4 miles 4801 feet north of Lat. 36° 30' 10" of M = 101,115 feet.

Station flag d

Observ. to flag e (Catro).....	5 28 45
" east mound.....	21 24 00
East Peak tree.....	59 12 25
West " 1.....	65 02 35 !
" " 2 (bush).....	65 33 10



Flag <i>e</i> (Maxy).....	139 33 15
" <i>b</i> (Taylor).....	215 08 20
" a. m.   meridian .....	264 56 25

No error; all very good.

*Station flag c.*

From flag <i>d</i> (Maxy) to—	
Flag <i>e</i> (Catro).....	24 52 45
East mound.....	48 06 20
East Peak (tree).....	84 30 55
West 1.....	92 05 20 †
" 2 (bush).....	92 53 55 good.
Flag <i>b</i> (Taylor).....	352 30 45
E = -15.	

*Station at flag b.*

From flag at Obser. to—	
Flag <i>e</i> (Catro).....	2 44 45
East Peak (tree).....	52 49 05
West " 2 (bush).....	59 06 05
Flag <i>d</i> (Maxy).....	29 31 45
" <i>e</i> ".....	126 23 15
" <i>a</i> (on meridian).....	315 51 10

No error.

*Station at flag e—Catro on bluffs.*

From flag <i>a</i> on M to—	
East Peak (tree).....	243 37 20
West " (bush).....	248 37 40
Flag <i>e</i> (Maxey).....	332 01 10
To flag <i>b</i> (Taylor).....	355 50 05
" <i>d</i> (Maxey).....	353 02 55
E = 10°.	

*Station at Observatory.*

From flag <i>d</i> (Maxy) to—	
Flag <i>b</i> (Taylor).....	5 37 10
Flag <i>a</i> (on M).....	12 24 30

August 17th.—Survey on Azimuth line from obser. to corner, 36° 30' 00".

*Station I on bluffs.*

From flag on Ob.—by N. to east:	
To flag <i>a</i> on meridian.....	25 04 55
East Peak (tree) Rabbit Ear Mt.....	298 41 50
Dist. 13 chains 6 feet.	

*Station II.*

To Peak (tree) Rabbit Ear Mt.....	299 53 55
Dist. 10 chains 45 feet.	

*Station III.*

To (tree) Rabbit Ear Mt.....	300 52 05
Bush on near Ridge 1.....	115 45 05
" far " 2.....	134 46 05

*Station IV.*

Bush 1.....	98 25 25
" 2.....	128 59 15
(Tree) Rabbit Ear Mt.....	311 49 30

Obs: to XI, 6 m. 702.

XI to C, 1 m. 4550.

*Station V.*

Bush 1.....	91 56 20
" 2.....	126 46 10
(Tree) Rabbit Ear Mt.....	314 45 15 †

*Station VI.*

Tree on Rabbit Ear Mt.....	317 58 30
Ears Mound (h. point).....	304 40 55
To tree on end of bluff.....	278 24 45

## Station VII.

	c	'	"
Tree on bluff.....	285	54	35
Ears Mound.....	311	02	25†
Tree on Rabbit Ear M.....	320	50	00 Good.

Dist. 7--8 43 chains 23 feet.

## Station VIII.

Tree on bluff.....	291	05	30
Ears Mound.....	315	02	10 †
Tree on Rabbit Mt.....	322	57	00 Good

## Station IX.

Tree on bluff.....	302	42	15
Ears Mound.....	323	10	05
Tree on Rabbit Ear Mt. (very good).....	327	16	45

-8-9-111 chains 19 feet.

9-10-39 " 11 "

## Station X.

Tree on bluff.....	306	19	20
= 2d =.....	306	11	40
Tree on Rabbit Ear Mt.....	328	35	20

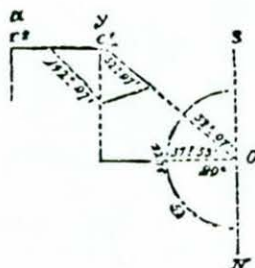
10-11=19 chains 09 feet.

## Station XI.

Tree on bluff.....	307	57	35
Tree on Rabbit Ear Mt.....	329	13	55

## Station on end of Az. line (XVI).

Tree on end of bluff.....	318	44	35
" " Rabbit Ear Mt.....	334	25	40



Az. =  $127^{\circ} 53' 00''$

y - x = 2109  
2

O + C' = 42212

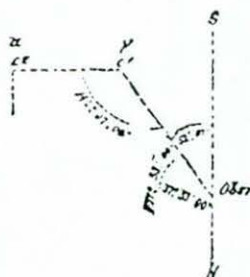
D = 7. 5252.7

C' - C = 4.642438  
4.625445

E.  $10.016995 = \text{tang}^{\circ} E. - 45^{\circ} = 1^{\circ} 07' 14''$

Log. tan. E - 45 = 8.291358  
Log. tang  $\frac{A+B}{2} = 11.830780$  } =  $A+B + (B-A) = 142^{\circ} 06' 24'' 5$

Log. tang  $\frac{B-\wedge}{2} = 10.122138$  } =  $A+B - (B-\wedge) = 36^{\circ} 12' 06'' 5$

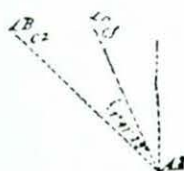


Az. =  $37^{\circ} 53' 00''$

Dist.: y - x = 2109  
1054+

Dist.: o - c = 42212.7 =

7 m. 5252 ft.



Az. is =  $127^{\circ} 53' 00''$  fro. N b E.

" "  $37^{\circ} 53' 00''$  " E.

Survey on 103 meridian—going south—August 24th, 1859.

<Flag a, camp ..... × 342 56 20 ± 56' 25'  
 Dist. camp to flag (Maxey), 50 chains 14 feet.

Station I on M., going south.

<Tree, corner Mon. St. I ..... × 74 24 45  
 To tree end of bluff ..... 315 40 40

Station II.

To a ..... 31 12 25 ± 12' 25'  
 Rabbit Ear Mt ..... × 107 23 20  
 Flag B ..... 112 31 55 ± 32' 45'  
 To h ..... 112 32 45

Station III.

No readings.

Station IV.

<Tree N. Mon ..... × 68 29 35  
 Flag a ..... 41 32 20  
 South end of long mount ..... 351 27 00

Station V.

South pt. long Mt ..... × 108 16 50  
 Tree on Rabbit Ear Mt ..... 118 09 00

Station VI.

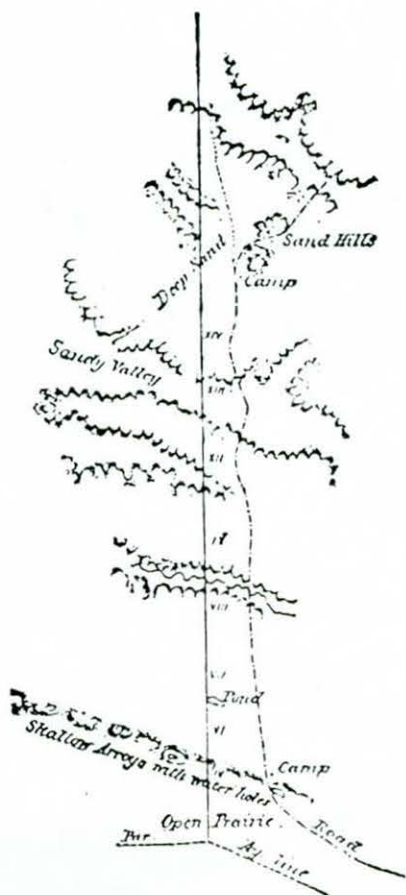
South Peak ..... 101 24 36  
 South pt. long Mt ..... 110 13 25  
 Tree Rabbit Ear Mt ..... × 120 28 40

Station VII.

South pt. long Mt ..... 114 03 00  
 Tree on Rabbit Ear Mt ..... × 125 05 25

Station VIII.

Tree Rabbit Ear Mt ..... × 128 00 20





## Station IX, August 25th, 1859.

Var. Theod. No. 76, 12° 00' 45" east.

N. O.		5	1	"
From Station 8	.....	×	1	20
Tree on Rabbit Ear Mt.	.....		310	37 10
S. pt. long Mt.	.....		299	15 25
S. peak	.....		286	05 35

## Station X.

Tree Rabbit Ear Mt.	.....		312	56 15
S. pt. long Mt.	.....		301	27 20
Peak of South Range	.....		189	38 55

## Station XI.

Tree on Rabbit Ear Mt.	.....		314	55 10
S. pt. long Mt.	.....		303	23 00
S. peak	.....		288	26 00
Peak of South Range	.....		190	25 50

## Station XII.

Tree on Rabbit Ear Mt.	.....		216	22 15
S. pt. long Mt.	.....		304	50 15
Peak South Range	.....		191	06 10

## Station XIII, Monument.

Tree on Rabbit Ear Mt.	.....	×	322	26 05
S. pt. Long Mt.	.....		311	10 10
S. Peak	.....		293	18 40
Peak South Range	.....		193	11 00

## Station XIV.

Tree on Rabbit Ear Mt.	.....	×	323	44 00
S. pt. Long Mt.	.....		312	35 50
Peak, South Range	.....		193	22 30
Sand hill near bluff	.....		160	47 30
Sand hill 1.	.....		146	19 00
"    "    2.	.....		145	50 40
"    "    3.	.....		145	27 00

## Station XV.

Tree on Rabbit Ear Mt.	.....	×	326	40 00
High pt. Rabbit Ear	.....		324	01 00

## Station XVI.

Tree on Rabbit Ear Mt.	.....	×	327	38 30
High pt. " " "	.....		325	07 00
S. pt. Long Mt.	.....		317	01 45
S. Peak	.....		307	32 00

## Station XVII (Camp).

Tree on Rabbit Ear Mt.	.....	×	329	11 10
High pt. " " "	.....		326	42 25
S. pt. of Long Mt.	.....		318	47 00

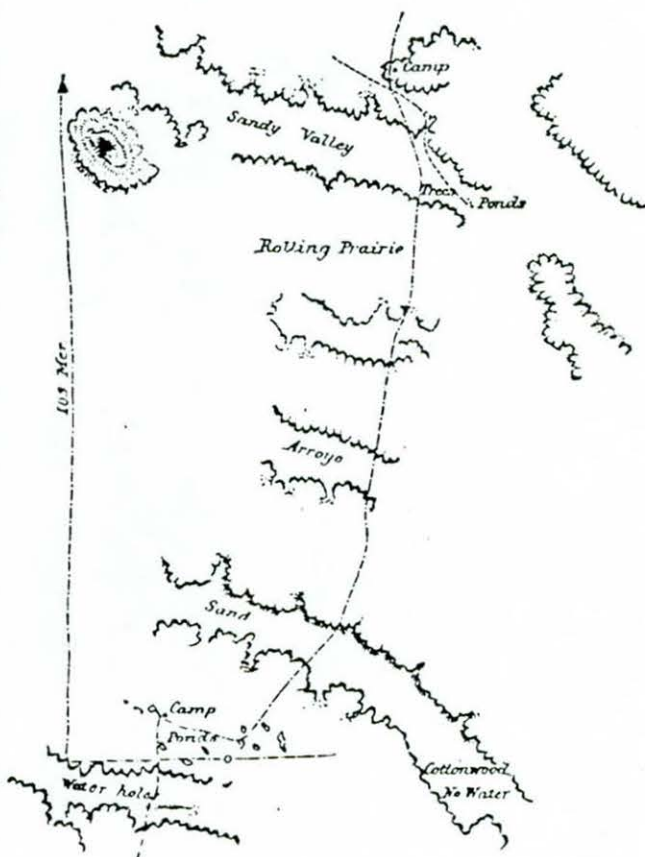
## Station XVIII.

To XIX	.....		114	chains 15 feet.
Go back to Station VIII.	.....			

August 26th.

Station IX, survey west.

South Peak .....	16 03 20	} Very good.
Point on Long Mt. ....	22 24 05	
"    " Square Top Mt .....	29 12 10	
High point Rabbit Ear Mt .....	37 34 30	
Tree " " " .....	× 40 34 30	+ 01' 20"



E.—Station 1. Going west.

S. Peak .....	× 196 10 35	
Peak Long Mt. 1 .....	202 46 10	
"    " 2 .....	204 21 00	
Pt. Square Top Mt .....	× 209 55 10	
High pt. Rabbit Ear Mt .....	× 218 52 25	
Tree " " " .....	× 221 47 05	41 47 05

Station 2.

S. Peak .....	× 196 54 10	
Pt. Square Top Mt .....	212 24 55	
High pt. Rabbit Ear Mt .....	222 58 55	
Tree " " " .....	× 225 50 50	45 50 50

Station 3, August 27th, 1859.

S. Peak .....	195 50 35
Tree on Rabbit Ear Mt .....	22 53 40

Station 4.

S. Peak .....	× 198 19 00	
Peak Long Mt .....	206 42 30	
Pt. Square Top Mt .....	× 218 12 05	
South end of mesa .....	× 226 01 35	
High pt. Rabbit Ear Mt .....	× 230 57 45	
Tree " " " .....	× 235 20 25	55 20 25
North end of mesa .....	249 55 00	

## Station 5.

S. Peak (2) .....	×	190	14	25			
" " (1) .....		198	52	00			
Peak Square Top Mt .....	×	220	42	00			
S. end of mesa .....	×	229	21	30			
High pt. Rabbit Ear Mt .....	×	234	35	40	0	1	"
Tree " " " .....		239	22	45	59	22	45

## Station 6.

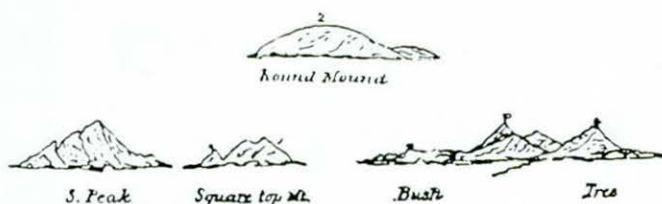
Peak Square Top Mt .....		223	29	00			
Tree Rabbit Ear Mt .....		243	46	00			

## Station 7.

S. Peak .....		200	39	45			
Round Mount .....		208	18	00			
Peak on Long Mt .....		211	30	25			
" " Square Top Mt .....	×	229	43	35			
S. end of mesa .....	×	241	17	10			
High pt. Rabbit Ear Mt .....	×	247	14	35			
Tree " " " .....	×	253	10	20	73	10	20

## Station 1. Going south.

N.							
Tree on Rabbit Ear Mt .....	×	343	39	15			
High pt. " " " .....	×	337	51	25			
Bush on mesa .....		332	03	15			
Pt. on Square Mt .....	×	320	38	30			
Round Mt .....		298	34	35			
S. Peak .....		291	12	45			



## Station 2.

Tree on Rabbit Ear .....	×	343	26	55			
High point " " .....	×	338	14	15			
Pt. Square Top Mt .....	×	321	14	35			

August 28th.—Moved meridian 30'' east.

Station 3.—Peak Square Top Mt., ?? × 323° 02' 10''.

## Station 4.

Tree on Rabbit Ear .....	×	345	15	35			
P. Square Top Mt .....	×	323	53	45			

## Station 5.

Tree on Rabbit Ear .....	×	345	54	45			
P. Square Top Mt .....	×	325	16	25			
S. end of mesa (bush) .....	×	335	44	55			
High pt. Rabbit Ear .....	×	340	48	05			

## Station 6.

Tree on Rabbit Ear .....		346	27	25			
S. end of mesa (bush) .....		336	39	55	Good.		
Peak Square-top Mt .....		326	28	38			



Station 7.

Tree on Rabbit Ear.....	×	} very good. {	347 07 25
High pt. " ".....	×		342 26 15
S. end of mesa (bush).....	×		337 46 25
P. Square-top Mt.....	×		327 56 05
S. peak.....			308 31 50
Peak sand-hills near 103 m.....			138 54 00

Station 8.

Tree Rabbit Ear Mt.....	×	} Very good. {	348 23 15
High pt. " " ".....	×		344 07 35
S. end mesa (bush).....	×		339 54 45
Peak Square-top Mt.....	×		330 46 55
" sand-hills near 103 m.....			132 56 00

Station 9.

Tree on Rabbit Ear Mt.....		} good. {	349 09 05
High pt. " " ".....			345 08 25
S. end of mesa (bush).....			341 11 50
Peak Square-top Mt.....			322 32 00
" Long Mt.....			313 14 30

Station 10.

Tree on Rabbit Ear.....	×	} excellent. {	350 04 05
High pt. " ".....			346 22 05
P. Square-top Mt.....	×		334 41 30
South peak.....			315 42 45
Bush on mesa (R. Ear).....			302 37 35
			342 45 15

Station 11.

Tree Rabbit Ear.....	×	} Good. {	350 41 10
High pt. " ".....			347 12 35
S. end mesa (bush).....			343 49 25
P. Square-top Mt.....	×		326 10 35
Tree on west sand-hills.....	×		275 04 50

Station 12.

Tree Rabbit Ear Mt.....		}	350 56 05
Highest pt. " " ".....			347 33 35
S. end of mesa (bush).....			344 15 25
P. Square-top Mt.....			336 46 55

Station 13.

Tree on Rabbit Ear Mt.....	×	}	351 34 40
High pt. " " ".....			348 25 30
S. end of mesa (bush).....			345 22 40
Peak Square-top Mt.....	×		338 22 20
" Long Mt.....			320 19 45
S. peak.....			307 03 50
Tree on west sand-hills.....	×		292 34 35
Bush on middle bluff.....			208 14 25

Station 14. ×

Tree on Rabbit Ear Mt.....	×	}	350 50 35
High pt. " " ".....			348 47 15
S. end of mesa (bush).....			345 49 40
P. Square-top Mt.....	×		339 01 05
S. peak.....			307 55 30
Tree on west sand-hills.....	×		297 36 20
Bush middle bluff.....			209 47 15

Station 15.

S. peak.....		308 51 20
Tree on west sand-hills.....	×	302 40 00

## Station 16.

		C	I	I
Tree on Rabbit Ear Mt	.....	×	{	352 36 35
High pt. " " "	.....		}	349 50 10
S. end of mesa (bush)	.....		}	347 10 00
P. Square-top Mt	.....	×	} Very good..	340 56 55
P. Long Mt	.....	×		323 51 55
Tree west sand-hills	.....	×		311 37 25
Bush long table lands	.....			217 24 45
To camp	.....			309 00 00

August 29th.—Rained all day; no work.

## Station 17th, August 30th.

P. Square-top Mt. g	.....	} Bad. {	341 08 35
Tree west sand-hills g	.....		313 49 05
Two western trees?	.....		257 44 30

## Station 18.

Tree on Rabbit Ear Mt	.....	352 48 55
High pt. " " "	.....	350 06 45
S. end mesa (bush)	.....	347 31 05
P. Square-top Mt	.....	241 27 10
Tree west sand-hills	.....	314 51 05
2 west trees	.....	259 31 35

## Station 19.

West Peak	.....	276 00 25
2 west trees	.....	265 42 10
Tree on west sand-hills	.....	326 47 05
Peak Square-top Mt	.....	342 27 10

## Station 20.

Tree Rabbit Ear Mt	.....	} 353 34 00 ×	×	
High pt. " " "	.....			351 08 55 ×
S. end mesa (bush)	.....			348 50 25
P. Square-top Mt	.....	343 22 15 ×	×	
Tree west sand-hill	.....	325 36 45 ×	×	
S. Peak (2)	.....	314 39 45		
Blue {	Tree long bluff (1)	.....	233 25 25	
	" " " (2)	.....	228 51 25	
	End " "	.....	225 33 35	

## Station 21.

Mound near camp	.....	245 09 35
Tree long bluff (1)	.....	235 56 10
" " " (2)	.....	232 42 55
End of bluff	.....	232 19 00
Cottonwood tree bottom	.....	196 37 25

## Station 22.

High pt. Rabbit Ear Mt	.....	×	351 56 45
Mound near camp	.....	×	254 02 35
Tree long bluff (1)	.....		241 09 40
" " " (2)	.....	×	237 46 35
End bluff	.....	×	237 22 15
Cottonwood bottom	.....		198 54 20

## Station 23.

Mound near camp	.....	×	259 01 40
Tree long bluff (1)	.....		244 06 10
" " " (2)	.....	×	240 39 35
End of bluff	.....		240 14 40
Double mound	.....		236 10 35



Station 24.

		o / "
Mound near camp.....	×	270 20 55
Tree long bluff (1).....		251 01 30
“ “ “ (2).....	×	247 30 10
End of bluff.....		247 05 25
Double mound.....	×	243 01 10

Station 25.

Highest pt. Rabbit Ear Mt.....	×	352 45 25
Mound near camp.....	×	287 24 00
Tree long bluff (1).....		262 47 15
“ “ “ (2).....	×	259 24 45
End “ “.....		259 03 00
Double mound.....	×	255 54 30

Station 26.

Mound east of Rabbit Ear Mt.....		354 53 30
Highest pt. “ “ “.....	×	352 58 00
Tree west sand-hills.....	×	312 41 35
Mound near camp.....		295 38 10
Tree long bluff (1).....		269 30 50
“ “ “ (2).....	×	266 22 10
End “ “.....		266 02 00
Double mound.....		262 49 00
Mound S. of long bluff.....		254 23 00

Station 27. August 31st.

Highest pt. Rabbit Ear Mt.....	Bad.	*354 03 30
Mound near camp.....		299 25 15
Tree long bluff (1).....		272 54 50
“ “ “ (2).....	×	269 55 25
End “ “.....		269 35 35
Rock on double mound.....	×	266 41 50
Mound S. of long bluff.....		256 03 45

Station 28.

Tree long bluff (1).....		274 28 20
“ “ “ (2).....		271 33 40
Mound S. long bluff.....		256 40 40

Station 29.

Tree long bluff (1).....		287 07 15
“ “ “ (2).....	×	284 58 50
Rock double mound.....	×	283 16 25

\* Erased in original.



On Station XXIX laid of perpendicular to the east 40303 feet, and go with survey again on 103rd meridian.

Camp. Dist. from corner to St. XXIX = 29 miles 4199.8.

Station 1 = 62 chains 28 feet.

" 2 = 39 " 7 "

" 3 = 78 " 38 "

" 4 = 131 " 33 "

" 5 = 36 " 01 "

" 6 = 65 " 01 "

End of bluffs ..... 9 27 10

Tree long bluff (1) ..... 9 38 05

" " " (2) ..... 11 15 00

High Rabb. Ear Mt. .... 76 40 00

" 7 = 26 " 00

" 8 = 28 " "

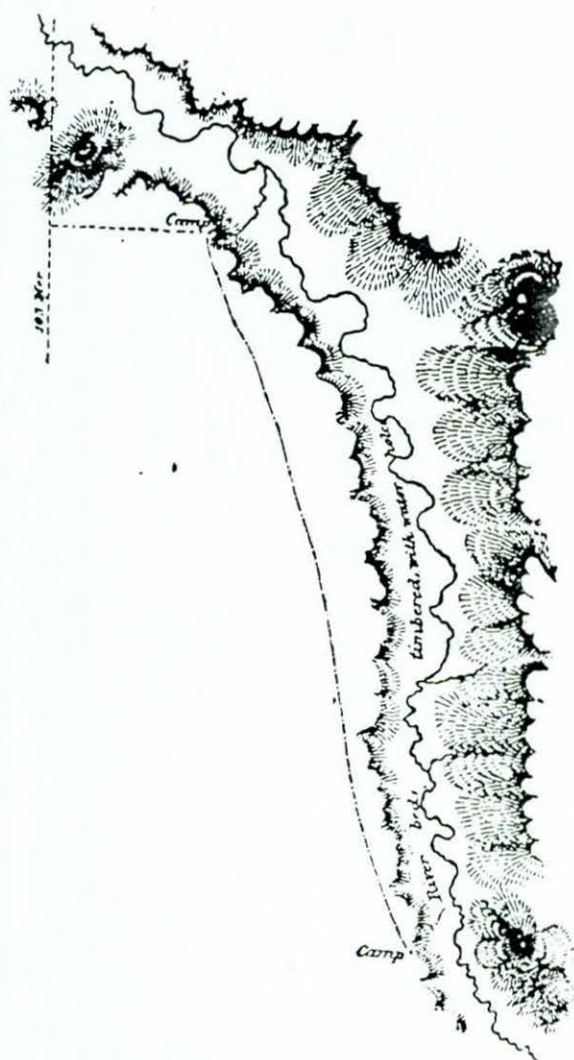
" 9 = 74 " "

" 10 = 41 " "

" 11 = 142 " "

" 12 = 47 " "

" 13 = 45 " 34  $\Delta$



September 1st.—Heavy norther; rained all day; compute the work done, gives survey south to station 29 = 29 miles 4199 feet.

September 2nd, Station 8.

	°	'	"
West :			
End of bluff .....	×	8	32 00
Tree on long bluff (2) .....		8	42 15
“ “ “ “ (1) .....	×	10	11 35
Mound near camp .....		24	48 45
Peak on long mound .....		45	12 55
Highest pt. Rabbit Ear Mt .....		74	41 40
Tree on “ “ “ “ .....		76	24 45

Station 9.

Mound end of bluff .....	342	48	15
(Near point station, 10 feet.)			

From monument on 103rd meridian the survey M. is 1029 feet east.

Survey on M. going south.

	°	'	"
High pt. Rabbit Ear Mt .....	340	12	10
End of bluff .....	277	25	00
Mound end of bluff .....	254	41	20
Tree on bluff .....	254	33	35
North end of long blue sier .....	243	04	30
St. at turn and to St. I .....		13 chains	92 feet.
St. I to II .....	67	"	34.5 "

Station II.

	°	'	"
Tree on Rabbit Ear Mt .....	342	09	50
Highest pt. “ “ “ .....	340	33	35
Tree on long bluff (1) .....	281	09	15
“ “ “ “ (2) .....	279	58	50
End of “ “ .....	279	51	00
Mound end of bluff .....	257	23	55
Tree on “ “ .....	257	14	25
From St. 2 to 3 .....		47 chains	27 feet.
“ “ 3 “ 4 .....	154	"	00 "
“ “ 4 “ 5 .....	51	"	25 "

Station 5.

	°	'	"
Highest pt. Rabbit .....	341	46	55
Peak on long mt .....	315	25	15
Mound near camp .....	301	11	45
Tree on long bluff (1) .....	289	36	00
“ “ “ “ (2) .....	288	41	05
End of bluff (good) .....	288	33	45
Double mound .....	288	05	05
Mound end of bluff .....	268	01	45
North end of blue sier .....	250	51	35
V to VI .....		= 86 chains	21 feet.
Tree on same bluff .....	267	53	40

Station VI.

Tree on Rabbit Ear Mt .....	343	39	40
High pt. “ “ “ .....	343	10	25
Peak on long mt .....	315	56	10
Fast end of blue mesa .....	5	23	30

September 3rd, Station 7.

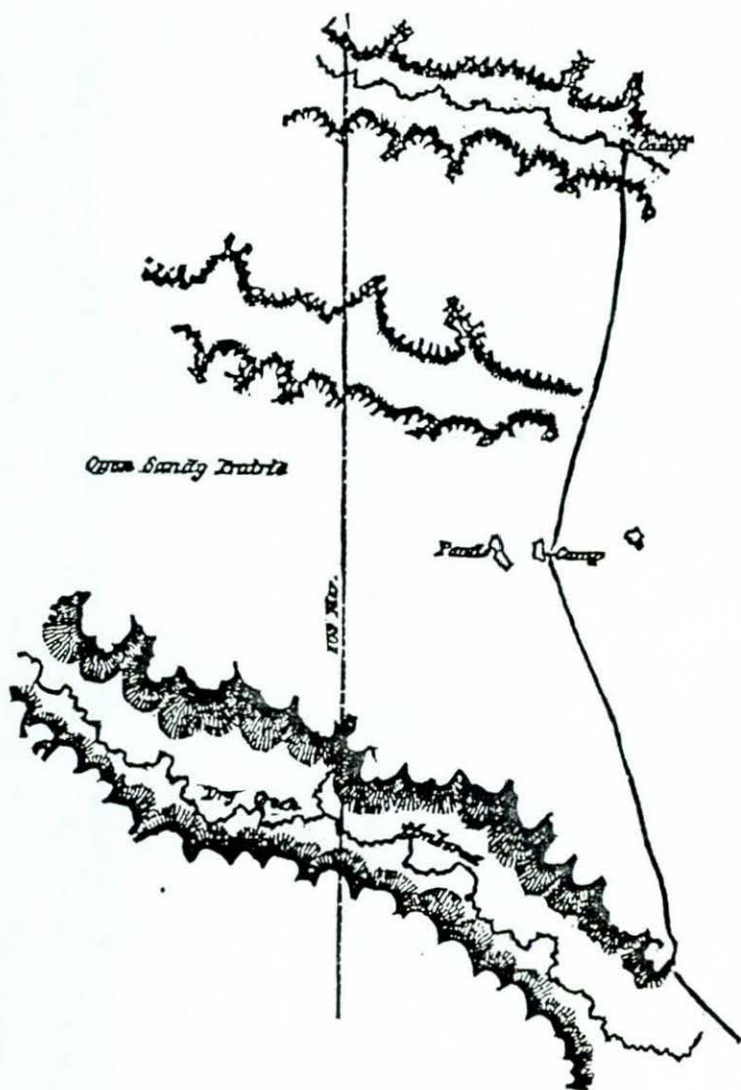
East end of blue mesa .....	5	42	55
G to 7 .....		109 chains	49 feet.

## Station 8.

East end blue mesa??			
7 to 8 .....	34	chains	04 feet.
8 — .....	71	“	15 “
9 — .....	167	“	15 “
10 — .....	35	“	05 “
11 — .....	23	“	20 “
12 — .....	30	“	47 “
13—14 .....	74	“	05 “

## Station 14.

East end blue mesa .....			
14—15 .....	68	chains	30 feet.
15—16 .....	79	“	01 “



## Station 16.

East end of blue bluff (good?) .....	8	04	25
--------------------------------------	---	----	----

## September 4th, Station 16.

East end of blue bluff (g?) .....	7	27	30 ×
16—17 .....	26	chains	32 feet.



Station 17.

East end of blue bluff .....	7 41 00	×
------------------------------	---------	---

Station 18.

East end blue bluff .....	7 59 35	×
17—18 .....	48 chains 2 feet.	
Peak west .....	122 07 20	×
18—19 .....	99 chains 17 feet.	

Station 19.

East end of blue bluff .....	8 41 45	
West Peak .....	125 05 00	×
19—20 .....	66 chains 10 feet.	

Camp dist. XXIX to station 20 is 12 miles 4171 feet.

East end of blue bluff .....	90 12 25	
West peak .....	306 54 10	
XX—XXI .....	104 chains 31 feet.	
XXI—XXII .....	66 " 16 "	
XXII—XXIII .....	174 " 00 "	

September 5th.—Heavy norther and rain all day, ther. 39° Fahr.

September 6th, Station 24.

East end of blue bluffs .....	13 46 10	
Tree on " " .....	14 17 35	
XXIII—XXIV .....	15 chains 13 feet.	

Station 25.

East end of blue bluff .....	15 36 35	
Tree on " " .....	16 13 55	
XXIV—XXV .....	86 chains 39 feet.	
XXV—XXVI .....	94 " 35 "	

XX to Station 26, 17084 feet.

East end blue bluff .....	18 17 15	×
Tree on " " .....	19 00 55	

Station 27 (Mon.)

East end blue bluff .....	23 37 35	×
Tree on " " .....	34 36 10	

Station 28.

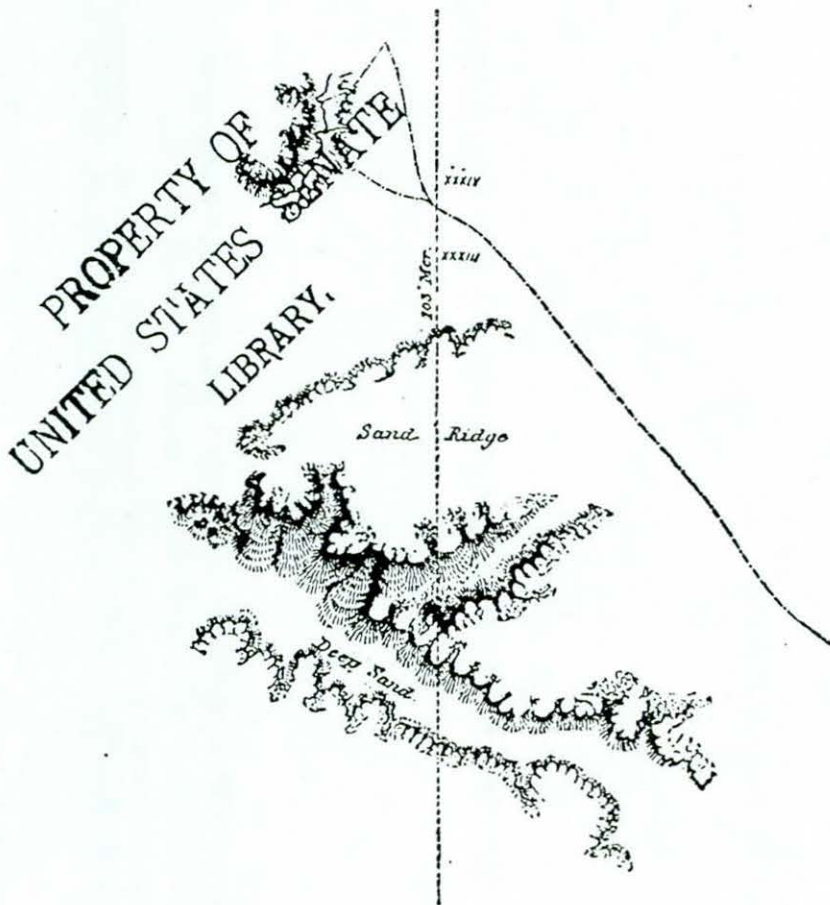
West peak .....	322 51 40	×
Peak in the west .....	81 41 35	×

Station 29.

East end of blue bluff (1) .....	42 25 25	×
" " " (2) .....	43 12 35	
Tree on " " .....	45 00 50	

Station 30.

East end of blue bluff (1) .....	52 08 10	×
" " " (2) .....	55 25 00	
Tree on " " .....	57 33 35	×
Corner 36° 30' to St. 29 is .....	29 miles 4199 feet.	=
St. 29 to St. 26 .....	16 " 135 "	=



Station 31.

	88	48	35
East end of blue bluff (1) .....	88	48	35
Tree on " " .....	103	20	55

St. XXVI to Station 32, 37234 ft.

South end of bluff (1) .....	×	37	55	00
(2) .....		40	46	30
Double bush on eastern bluff .....		105	56	25
Tree .....	×	125	26	05
Peak in the east .....		295	59	10
Tree at camp .....	×	331	44	10
To end of tree near camp .....		334	47	00
Eastern mound .....		351	17	10
Peak on Llano Estacado .....	×	356	35	20
East end high Mesa Llano .....		359	18	50

XXXII to XXXIII = 6576.

Station 33.

South end of bluff (1) .....		56	06	40
(2) .....		61	12	15
Bush " (2) .....		63	45	10
Tree on blue bluff .....	×	145	15	00?
End of blue bluff .....	×	147	25	45
" " " .....		154	24	35
Tree at camp .....	×	311	37	15
To middle tree near camp .....		315	26	20
" end of tree .....		318	36	00
Eastern mound .....		352	42	00
Peak on Llano .....	×	356	54	00
East end mesa on Llano .....		359	17	10

XXXIII to XXXIV, 12100.

Station 34.

	o	'	"
South end of bluff (1) .....	64	02	00
"    "    (2) .....	69	35	10
Bush on    "    (2) .....	72	06	40
Peak on Llano .....	Bad.	351	20 00 †
End of high mesa on Llano .....	Bad.	356	16 00 †
XXXIV to XXXY = 2664.			

Station 35.

South end of bluff (1).  
 "    "    (2).  
 Bush on    "    (2).  
 Tree on blue bluff.  
 Trees at camp.  
 XXXV-XXXVI = 3864 (creek).

Station 36, September 7th.

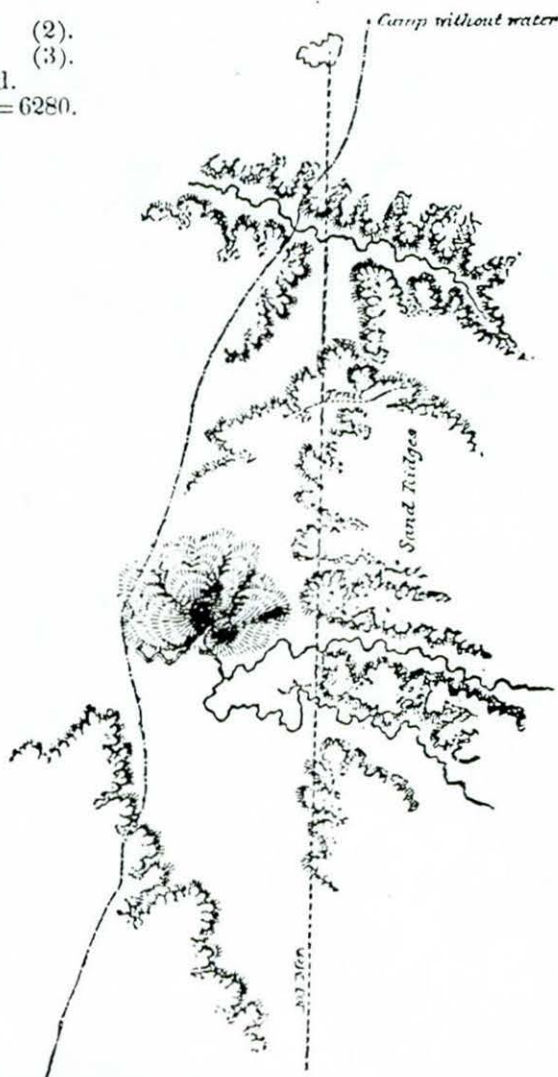
End of mesa on Llano.  
 Peak    "    "  
 End of mesa 2.  
 Mesa in the west.  
 XXXVI-XXXVII = 6610.

Station 37 (monument).

End of masa (2).  
 Bush on east mound.

Station 37.

End of mesa on Llano (1).  
 Peak    "    "  
 Mesa    "    "    (2).  
           "    "    (3).  
 Bush on east mound.  
 XXXVIII-XXXIX = 6280.





## Station 39.

	C	'	"
End of mesa on Llano (1).....	359	10	20
Peak " " ".....	355	43	20
Mesa " " " (2).....	351	58	05
" " " " (3).....	329	19	55
XXXIX-XL = 2533.			

## Station 40.

End of mesa on Llano (1).....	359	10	10
Beak on ".....	355	56	40
End of mesa.....	351	44	15
End ".....	328	11	25
XL-XLI = 2570.			

## Station 41.

End of mesa on Llano (1).
Peak " " ".....
End " " " (2).
" " " " (3).
Peak west end of mesa.
Mt. Colorado.
XLI = XLII <sup>2</sup> = 5642.
XL <sup>1</sup> = XLII - 4160.

## Station 42.

Peak on Llano.....	354	57	25
End of mesa (2).....	350	26	10
" " " (3).....	322	10	55
42 to 43 = 4254.			

## Station 43.

End of mesa Llano (3).....	321	18	10
43 to 44 = 5313.			

## Station 44.

Peak on Llano.....	354	38	45
End of mesa ".....	349	47	25
" " " ".....	319	09	40
Mt. Colorado.....	57	18	00
44 to 45 = 11492.			

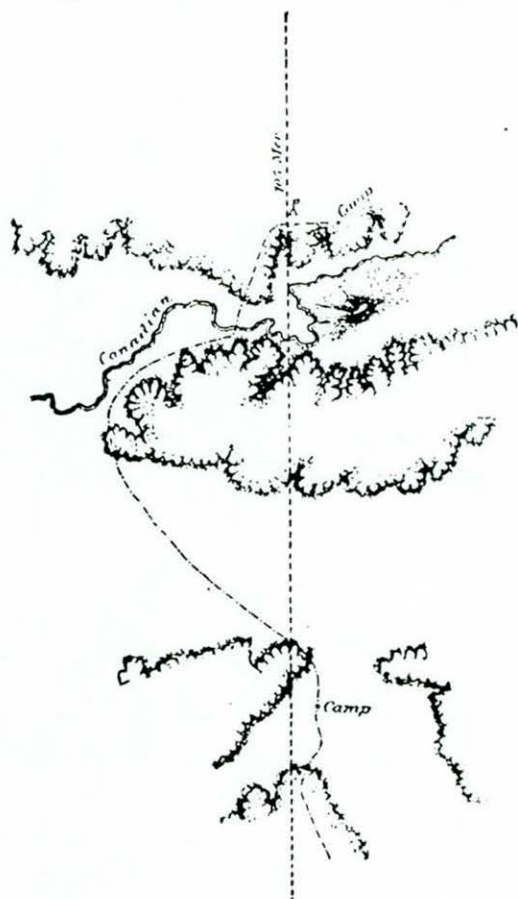
Station 45, Sept. 8th, light rain during the day.

End of mesa on Llano.....	342	10	15
" " " ".....	314	15	45
45 to 46 = 4650.			

## Station 47 (mon.).

{ End of mesa on Llano (3).....	312	15	25
{ Tree on " (1).....	312	13	50
" " " (2).....	312	09	25
" " " (1).....	308	56	45
" " " (1).....	308	55	35
" " " (1).....	308	48	35
" " " (2).....	61	20	40†
Tree in the west (1).....	61	34	15
" " (2).....	93	chains	00 feet
From XLV to XLVI.....	142	"	03 "
" XLVI " XLVII.....	36	"	10 "
" XLVII " XLVIII (River).....			

At station XLVI there were no angles measured, hence the distances chained, a clamped together are included in one.

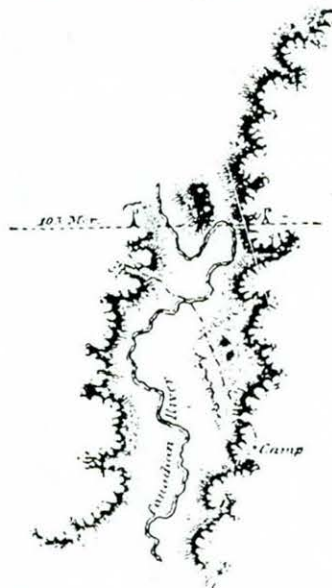


*September 9th.*—Build meridian monument & put flag over the river. Escort has left us. Rain in the evening.

*September 10th.*—Cross the river with the train and go in camp on the line. Heavy rain in the afternoon.

*September 11th.*—Heavy norther. Rain all day & night.

*September 12th.*—Rain in the morning—cloudy—little rain in the afternoon.



*September 12th.*—l. ed during the work.

*Station b (flag).*

	°	'	"
Flag a to M.....	97	50	35
" " " monument .....	101	48	40
" " " flag c .....	128	24	45

*Station flag C.*

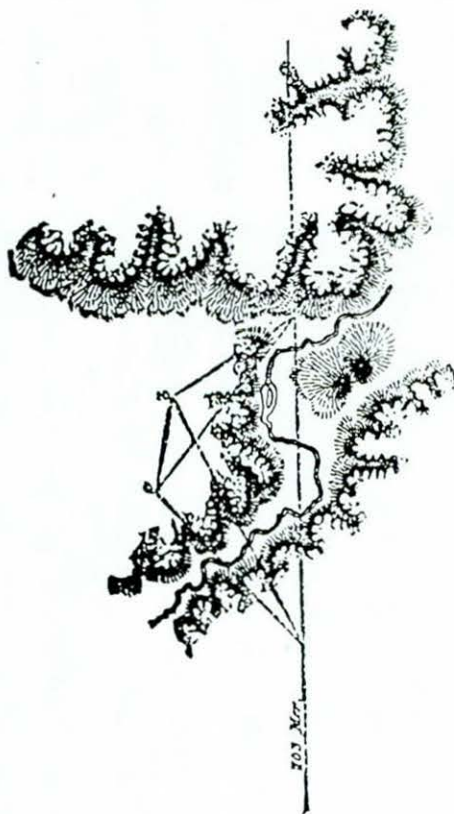
From flag b to flag a .....	32	20	50
" " " " M.....	141	11	15
Monument.....	147	48	35
Distance b + c .....	31 chains	24.5	(1)
	31	"	25 (2)
	"	"	(3)
	"	"	24.5 (4)
	"	"	24.5 (5)

to P. 8775.

P. to I. 450.

*Station flag a.*

From flag b to c .....	19	14	25
------------------------	----	----	----

*Station I, on meridian S. of Canadian, Sept. 12th.*

	°	'	"
Flag a to I, 9 chains 00 feet.			
South tree .....	14	04	10
Bush on western mound .....	39	42	15
Tree in the west (1) .....	71	10	25
Double tree western ridge .....	84	04	25
End of mesa on llano (3) .....	287	23	30

*Station II.*

S. tree .....	15	12	45
Bush on western mound .....	42	38	05
Tree in the west (1) .....	72	36	10
Double tree on far western ridge .....	85	22	30
End of mesa on llano .....	289	02	35

*Station III.*

End of rocky bluff .....	20	05	05
--------------------------	----	----	----

*Station IV.*

End of rocky bluff .....	23	53	20
--------------------------	----	----	----



Station V.

End of rocky bluff .....	92 43 20
Bush on rocky mound.....	104 45 10
End of bluff N. W .....	175 49 35
St. 4 to 6 = 6088.	

September 13th.—Rain & wind all day; bad weather.

Station VII.

End of mesa on llano (1) .....	359 23 00
Peak " " " .....	350 35 40
End mesa " " (2) .....	341 24 10
" " " (3) .....	323 49 40
1 tree on mesa (3) .....	323 46 40
2 " " " (3) .....	323 33 35
Tree on Sierra in west.....	75 23 40
Dist. 5 to 6 .....	= 121 chains 38 feet.
" 6 to 7 .....	= 89 " 21 "

Station VIII.

End of mesa on llano (1) .....	358 18 20
Tree on mesa (1) .....	357 55 55
End of " (2) .....	349 08 20
" " " (3) .....	321 24 10
Peak in the east.....	292 21 40
Dist. 7 to 8 .....	= 99 chains 07 feet.
" 8 " 9 .....	= 189 " 38 "
" 9 " 10 .....	= 24 " 00 "



September 14th.—Cloudy, misty day; some rain.

Station X.

End of mesa on llano (1) .....	358 04 25
Tree " " " (1) .....	357 39 05
Peak " " " .....	348 23 30
End of mesa " " (2) .....	347 23 50
" " " (3) .....	315 05 50

	C	I	"
Tree on " (3) .....	314	49	10
Peak with tree in east .....	311	15	10
" west end of mesa .....	49	31	15
10 — 11. 386444 + 43530.			

*Station XI.*

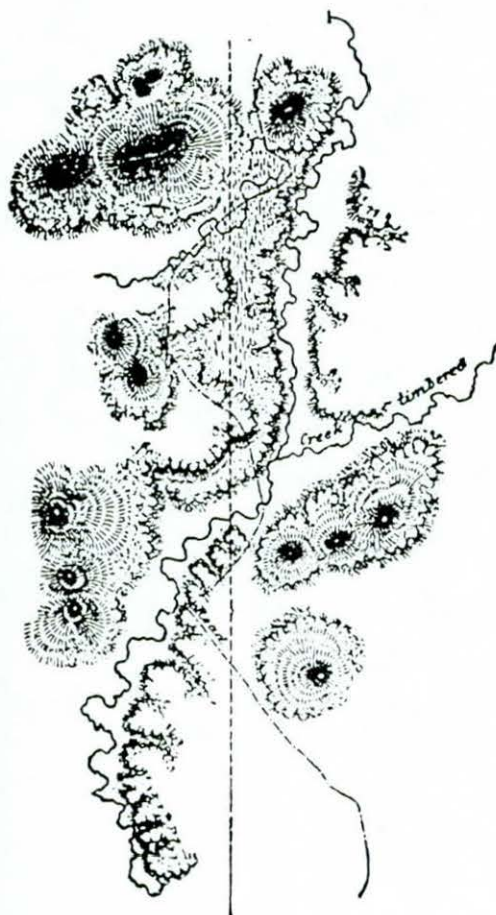
Tree on mesa llano (1) .....	357	34	50
Peak " " .....	347	33	40
End of mesa " (2) .....	346	28	15
Tree on " (3) .....	311	40	00
Peak with tree in east .....	308	57	30
" west end of mesa .....	50	50	25

*Station XII (mon).*

Peak on llano .....	346	48	05
End of mesa (2) .....	345	37	50

*Station XIII, no reading.*

11 to 12 = 38644	13 — 14 = 21570.
12 " 13 = 27184	14 — 15 = 16260.

*Station XIV, monument.*

Peak on west end of mesa .....	55	34	15
--------------------------------	----	----	----

*Station XV.*

Peak with tree east .....	291	21	45
" west end of mesa .....	56	54	00

*Station XVI.*

End of mesa on llano (1) .....	356	39	10
Tree " " (1) .....	355	54	50
Peak " " .....	336	02	45
End of " " (2) .....	333	54	00
Peak on west end of mesa .....	61	05	45
End of mesa in the south (N) .....	33	15	00

Station XVII.

End of mesa on llano (1).....	356 22 10
Tree " " (1).....	355 33 55
Peak " " .....	333 18 25
End of mesa in the south (N).....	35 13 00
Peak west end of mesa.....	62 32 00
15 to 17 = 4171.	
Obs. lat. 35° 08' 58" 99.	

Station XVIII, September 15th, fine day.

End of mesa on llano (1).....	356 08 10
Tree " " (1).....	355 16 00
Peak " " .....	330 42 50
Obs. at camp.....	156 53 20
17 - 18 = 1959.	

Station XIX.

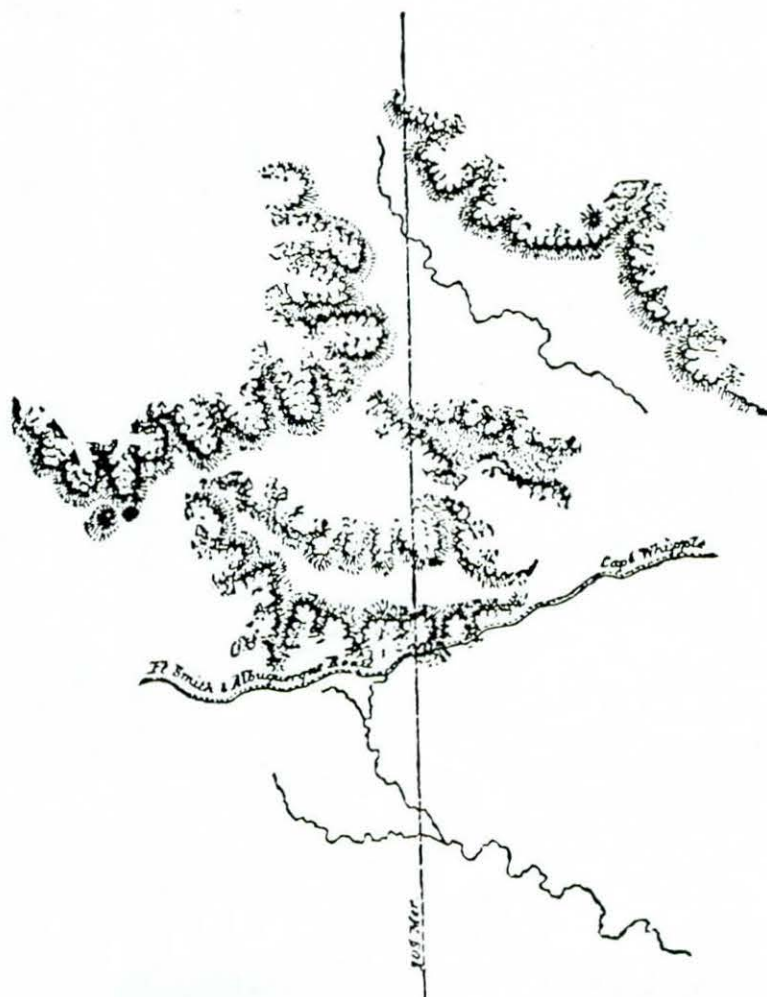
End of mesa on llano (1).....	355 45 45
Tree " " (1).....	354 49 00
Peak " " .....	326 41 00
Obs. at camp.....	172 04 10
18 - 19 2688.	

Station XX & XXI.

No readings.

Station XXII (on Capt. Whipple's road).

End of mesa on llano (1).....	35 46 50
Tree " " (1).....	353 36 30
Peak " " .....	314 59 00
Lost bluff in the west.....	278 01 10
19 - 22 = 5233.	





Station XXIII.

	o	r	"
End of mesa on llano (1).....	354	18	30
Tree on " " (1).....	353	01	40
Peak " " ".....	309	07	35
End of mesa in the south (N).....	42	41	30
" " " " " (S).....	36	03	10
22 - 23 = 1875.			
23 - 24 = 7294.			

Station XXIV.

End of mesa on llano.....	351	13	35
Tree " " ".....	349	13	50
Peak " " ".....	275	16	00
End of mesa in south (N).....	48	41	45
" " " " (S).....	41	33	40
Double peak (1) S.....	91	06	40
" " (2) N.....	91	14	20
Mt. Colorado.....	94	47	20

Station XXV.

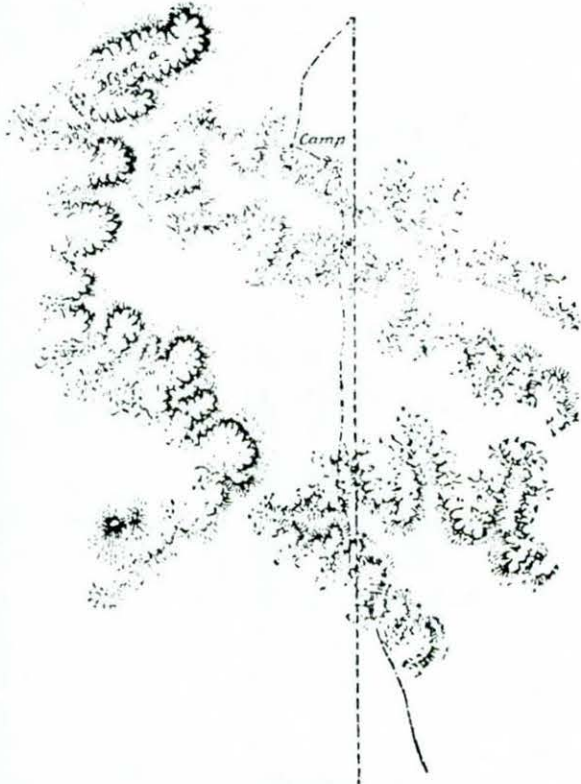
To mesa a.....	353	45	50
End of mesa on llano (tree).....	344	55	55
Peak " " " ".....	253	43	30
End of mesa South (n).....	52	23	00
" " " " (s).....	45	02	35
Double peak (1) n.....	92	43	40
Mt. Colorado (S. end).....	96	16	50
" " n. ".....	96	35	00



Mt. Colorado



Double Mountain



Station XXVI.

Mesa a.....	351 59 30
End of mesa on llano (1).....	336 07 25
Tree " " " (1).....	390 43 20
End of mesa in south (N).....	57 34 40
" " " " " (S).....	50 06 00
Double peak N.....	94 35 10
Mt. Colorado, S. end.....	98 06 45
" " N. ".....	98 27 00
24 - 26 = 11165.	
26 - 27 = 2184.	

Station XXVII.

Mesa a.....	349 00 15
End of mesa on llano (1).....	268 37 10
" " " south (n).....	63 10 40
" " " " (s).....	55 44 20
Double peak N.....	96 21 25
Mt. Colorado N. end.....	100 12 50
To mesa b.....	7 54 10

Station XXVIII.

To mesa a.....	335 20 25
" camp (ast. obs.).....	301 23 20
Tree on mesa on Llano (1).....	205 37 40†
End of " " (1).....	196 26 10
Mesa b.....	12 27 50
End of mesa s (n).....	72 44 10
" " " n (s).....	62 54 35
Mound Colorado (N. end).....	102 49 50
28-29=8091.	
29-30=2237.	

Ast. obs. in camp on Sept. 14th between St. 17-18.

o / o / "	h. m. s.
35 30=1 46 03.....	7 50 01
35 00=1 45 24.....	7 30 21
1 45 44.....	7 40 50
1 45 24.....	7 30 21千

September 16th.—Fine day.

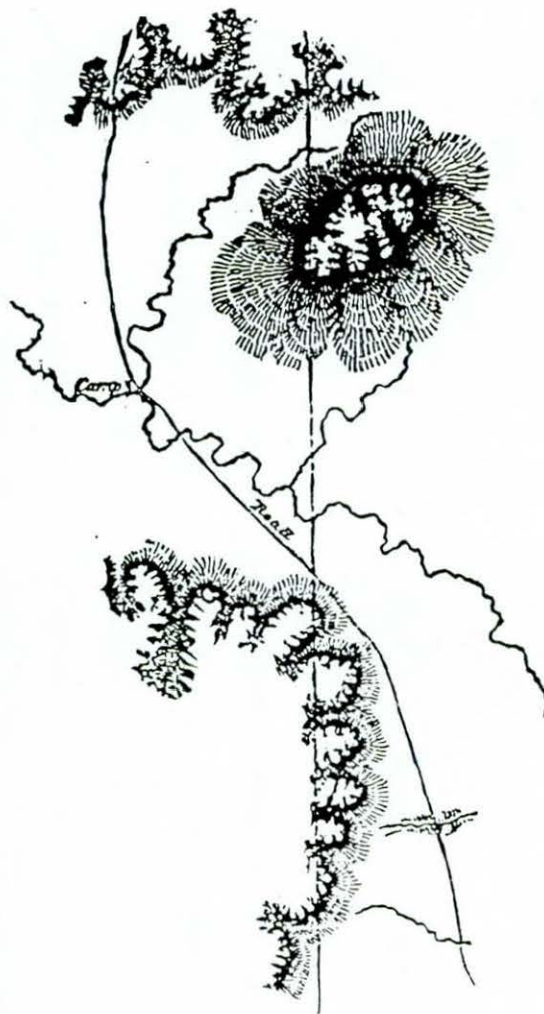
Station XXIX.

To mesa a.....	329 27 10
End of mesa on Llano (1).....	194 09 35
Tree " " " (1).....	202 12 10
Spur of bluff near line.....	09 10
Mesa b.....	13 44 10
End of mesa in south (N).....	74 26 20
" " " " " (S).....	67 46 10
Mt. Colorado N. end.....	103 14 05

Station XXX.

Mesa a.....	304 55 00
End of mesa on Llano (1).....	191 05 10
Tree " " " (1)?.....	197 37 40
Mesa b.....	17 27 00

	o' "
End of mesa in S. (N) .....	78 00 00
" " " " (S) .....	71 46 10
Mt. Colorado (N. end) .....	104 06 20



Station XXXI.

To mesa a .....	265 37 30
End of mesa Llano .....	189 30 55
Tree " " .....	195 00 10
Mesa b .....	21 53 10
End of mesa south (N) .....	80 47 50
" " " " (S) .....	74 57 00
Mt. Colorado .....	104 47 00

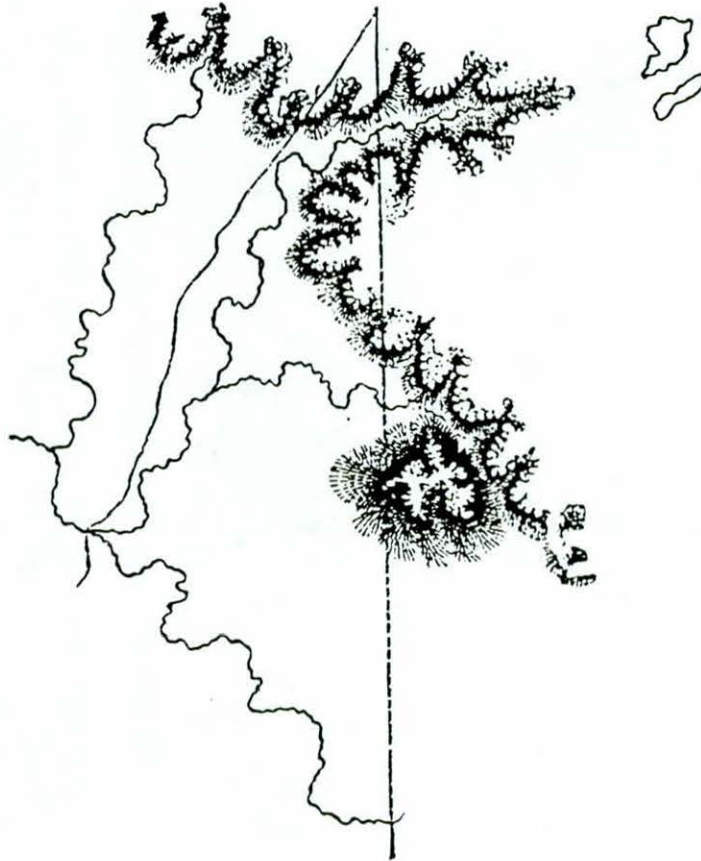
Station XXXII.

To x .....	332 38 35
" 7 .....	393 49 40
Mesa a .....	208 21 40
Spur bluff near line .....	31 40
Mesa b .....	41 56 20



Station XXXIII.

	o	'	"
To camp (ast. tent).....	262	38	20
Mesa <i>a</i> .....	195	40	00
End of mesa Llano (1).....	185	43	45
31-33=8213.			
Ast. station is $\frac{1}{4}$ mile east of Station XXXIII.			
35° 00' 09" 00.			



Station XXXIV, on mesa of Llano Estacado.

Mesa <i>a</i> .....	194	15	40
End of mesa on Llano (1).....	185	31	55
Tree " " (1).....	186	39	35
" " " (2).....	187	04	55
To camp (ast. tent).....	242	59	45
33-34=734 (bluff).			

Station XXXV.

Mesa <i>a</i> .....	190	29	10
End of mesa on Llano.....	187	07	30
Dist. 34-35= 91 chains 00 ft. 4550 ft.			
" 35-45=155 " 25 " =7775 "			

September 17th.—Fine day.

Station XXXVII.—Monument.

	o	'	"
N. to bluff 1.....	3	10	16
Mesa <i>a</i> .....	6	42	05
36 to 37 = 39 chains 00 feet.			

## Station XXXVIII.—(Mon.)

End of bluff on Llano	.....	3	31	00
Mesa a	.....	6	15	15
37 to 38 = 1242.				

## Station XXXIX.

Mesa a	.....	5	20	50
Bush west of line	.....	290	55	10

## Station XL.

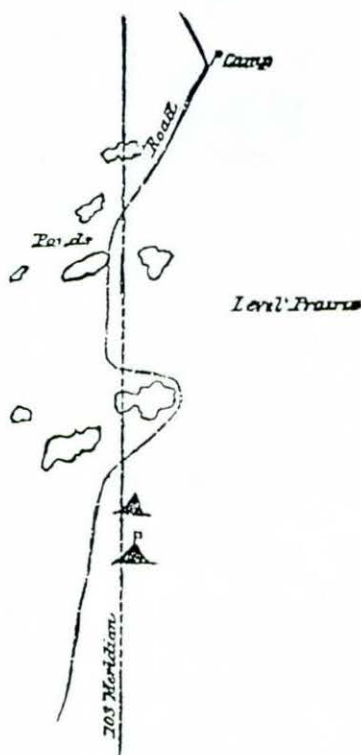
Mesa a	.....	4	43	40
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## Station XLI.

Mesa a	.....	2	53	00
41 to 42	..... 75 chains 10 feet.			3760
42 " 43	..... 142 " 21 "			7121
43 " 44	..... 83 " 00 "			4150
44 " 45	..... 115 " 25 "			5775
45 " 46	..... 120 " 41 "			6041
46 " 47	..... 164 " 21 "			8921

N. B.—Viameter on road from bluff to camp = 11 miles.

Station 46 to camp	.....	312	05	40
To tree	.....	131	05	45



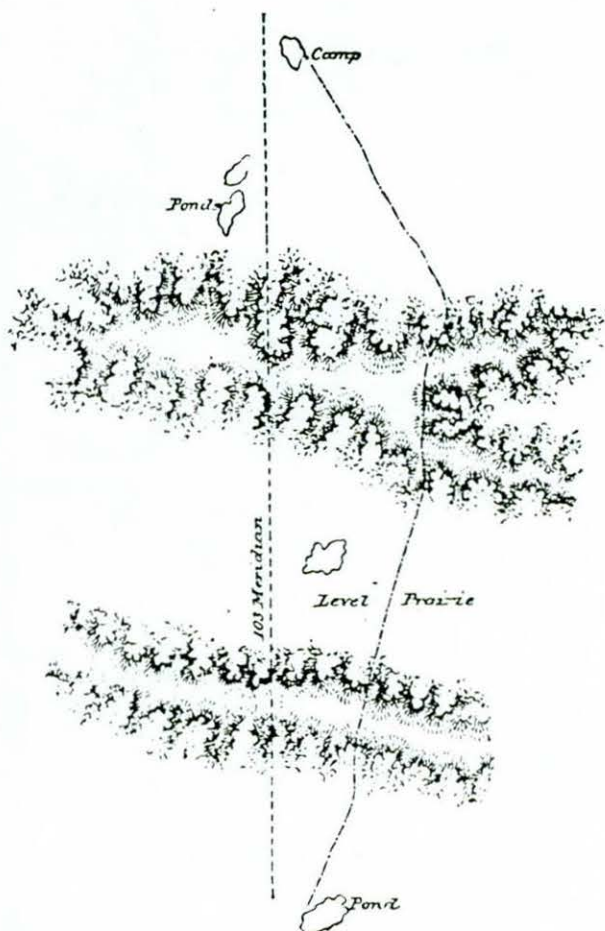
September 18th.—Clear, very cold day, heavy wind.

T. C. × M. L. e. I. o. é.

Station 46 to 47	.....	9060
" 47 " 48	.....	3870

Station 48 to 49 .....	8035
" 49 " 50 .....	17380
" 50 " 51 .....	3265
" 51 " 52 .....	13530
" 52 " 53 .....	3525
" 53 " 54 .....	1773
" 54 " 55 .....	3370
" 55 " 56 .....	5130
" 56 " 57 .....	4291
" 57 " 58 .....	3131
" 58 " 59 .....	8046
" 59 " 60 .....	7820

Viameter on road camp to camp = 15 miles 1646 feet.

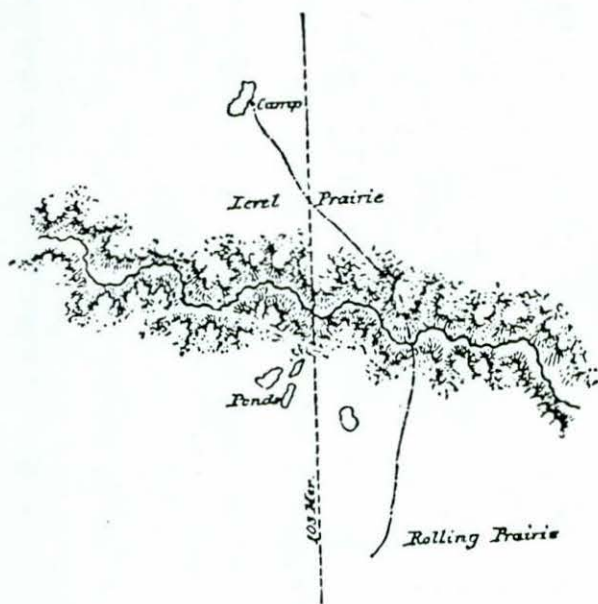


September 19th.—Very hot.

Station 61 to 62 .....	3735
" 62 " 63 .....	5127
" 63 " 64 .....	5017
" 64 " 65 .....	4295
" 65 " 66 .....	2280
" 66 " 67 .....	3043
" 67 " 68 .....	2632
" 68 " 69 .....	6282
" 69 " 70 .....	11590

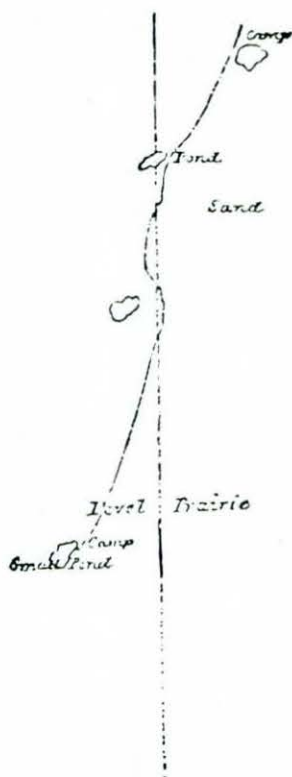
NOTE.—The valley is very shallow where we crossed by the line, with a sandy, dry creek-bed, but seems to become very deep and bluffly about 5 miles east of 103rd meridian.





September 20th.—Very fine day. After reaching with survey the camp, go with the commissioner 8 miles ahead and come in sight of sand hills.

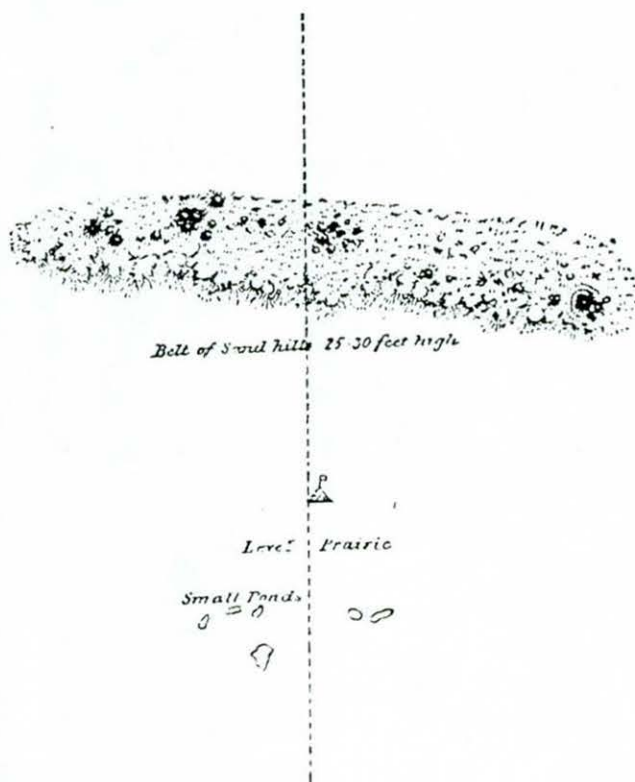
Station 70 to 71	.....	904
" 71 " 72	.....	5802
" 72 " 73	.....	2396
" 73 " 74	.....	4491
" 74 " 75	.....	5750



September 21st.—Hot day.

Station 75 to 76 .....	7121
" 76 " 77 .....	5540
" 77 " 78 .....	4265
" 78 " West .....	30° 41' 40"
" " " East .....	338° 36' 10"
" " " 79 .....	8490
" 79 " West .....	46° 40' 20"
" 79 " 80 .....	4114
" 80 " 81 .....	2260
" 81 " 82 .....	3601
" 82 " 83 .....	3412
" 83 " 84 .....	
" 78 to West .....	33° 24' 20"
" " " East .....	337° 36' 10"

End of survey.



May 11th, 1860.—Survey of road from the crossing of Washita River by Fort Arbuckle to Fort Cobb.

Distance from crossing of Washita River to Camp on Whisky branch..	3 miles 416	a
" " " to Fort .....	2 " 1303	b
" Fort Arbuckle to camp on Wild Horse Cr.....	3 " 1054	c
Fort Arbuckle:		
Latitude .....	34° 31' 10"	
Longitude .....	97° 15' 34"	

May 13th.—In Camp.

May 14th.

Wild Horse Creek to Rock Creek .....	8 m. 1105
Rock Creek to Ox Creek .....	1 " 1382
Ox " " Bush " .....	7 " 3356
Lat. of camp on Wild Horse Creek:—	

May —.

Rock Creek to Ox Creek.  
Ox " " Bush "

Bearings.

210	1320
325	3960
285	1382
340	5280
325	2640
360	2640
325	2640
300	1320
270	1320
285	1320
310	2640
320	1320
280	1320
260	3960
350	3356

May 15th.

Camp to I	.....	= 1 m.	3146	
I " II	.....	= 4 "	2302	beginning of flatt.
II " III	.....	= 4 "	—	end " "
III " IV	.....	= 1 "	2609	
IV " V	.....	= 1 "	3779	
V " Camp C	.....	= 0 "	4213	

May 16th.

Camp on Sandy Creek, 2 to I	.....	1 m.	3239	
I to II	.....	3 "	4818	
II " III	.....	3 "	3502	
III " IV	.....	4 "	1474	
IV " Camp	.....	4 "	802	
Lat. of camp in Mud Valley = 34° 58' 20".				

May 17th.

a, 284, camp to R I	.....	2 m.	1698	
b, 290, I " II	.....	2 "	3225	
c, 280, II " III	.....	1 "	5326	
d, 290, flatt, III " IV	.....	1 "	3765	
e, 300, x, IV " V	.....	2 "	3778	
V " camp	.....	7 "	4133	
Lat., 35° 06' 20".				

May 18th.

R I, on bluff, camp to I	.....	= 3 m.	4298	
II, Delaware settle, I " II	.....	= 1 "	251	
III, beginning of flatt, II " III	.....	= 1 "	4213	
IV, crossing rapid, III " IV	.....	= 3 "	408	
IV " V	.....	= 1 "	5135	
V " VI	.....	= 3 "	408	
VI " camp	.....	= 2 "	3028	

May 19th.

Camp to I	= 2 m.	1435	252	5998
I " II	= 1 "	3936	310	5997
II " III	= 1 "	4661	240	3192
III " Camp	= 1 m.	579	310	1222
			288	1872
			300	1872
			270	4971
			240	4971
			360	3219
			40	1320
			100	1320

May 28th.

May 30th. Fort Cobb to 100 meridian.

Camp to R. I	.....	= 5 m.	3626	Break head of creek.
I " II	.....	= 5 "	7197	Swampy crossing open prairie.
II " camp	.....	= 4 "	2370	Head of creek.

} Sandy road.



Sandy road; all the way rolling prairie; camp; tolerable water in ponds; wood  $\frac{1}{2}$  mile south.

May 31st.

Camp to I .....	6 m.,	2829.	Leave Emory's trail.
I " II .....	2 "	4555.	Head of break.
II " III .....	3 "	4595.	On road.
III " Camp .....	6 "	2066.	

Follow Emery's trail; leave at R. I. Open prairie; very sandy; very broken to S.; broken hills N. Go around head of break. Strike Whipple's trail at R. II. Camp  $\frac{1}{2}$  mile north of road, near Dome Rock. Traders' train comes up in evening.

325	13389
40	21120
310	15115
320	15145
260	5624
220	5624
260	22496

June 1st. Dist. 14 m. 2144.

Camp of 31, end of flatt. All day rolling prairie. Canadian Valley N. in sight. Buffalo hunt; horse runs away. At 7 make one of our old camps,  $\frac{1}{3}$  creek 3rd, crossing at 11 $\frac{1}{2}$ . Heavy wind all day. Evening camp, valley of Washita, about 4 miles due south.

June 2nd.

R. I. Old camp. Bridge .....	4 m.	5253
R. II. Deep crossing. No bridge .....	2 "	52
R. III. Crossing of Oak Creek .....	4 "	2580
III to camp.		

Rolling prairie; all day course west. At reading I our old camp of Oct. 10th, 59. The creeks all running water. The main valley about 10-12 miles south. Commissioner kills two buffalos on large flatt. Rising country to north. Road very good; tolerable grass; gypsum water; ?? probably Washita River.

June 3rd.—Temperature at 2 $\frac{1}{2}$  p. m. 101°. Road all the way open; rolling prairie mainly on S. of divide, very near it. Passed old camp at Red Creek at 1, and make camp on Gooseberry Creek; very hot.

Camp to head of Arroyo I.....	2 m.	4647
I to II.....	4 "	2145
II " III.....	2 "	2751
III " Camp.....	9 "	3645

19 m. 2600.

Sat :

June 4th.

Camp to I .....	3 m.	960
II .....	1 "	4121
III .....	0 "	4068
IV .....	2 "	1698 Turkey Creek crossing.
IV to Camp.....	2 "	2896

Rolling prairie. Ridge N.

Camp on Wild Turkey Creek, 2 m. above crossing. Grass and water very bad; plenty wood.

June 5th.

III. Canadian in sight.  
+ 280 to Antelope hills.

Camp to I.....	= 6 m.	0216
I " II.....	= 4 "	0196
II " III.....	= 4 "	2606
III " Camp.....	= 1 "	5108

Very rolling prairie. Dug a well at Camp Water. Grass good, plenty wood, very hot.

June 6th.

Camp to R. I.....	= 4 m.	3250	bottom of Canadian,
I " II.....	= 2 "	4266	leave bottom.
II " III.....	= 5 "	0548	on Dry Creek.
III " Camp.....	= 1 "	4253	Sand "

Road leads through a ravine to the bottom of the Canadian River I; were all day along the river; no water in it; found water in ponds in "Sand Creek"; very good water by digging; bad grass; Cand R.; small bluffs on Sand Creek.

June 7th.

I Canadian to East bears  $98^{\circ}$ . Canadian N. is 4 m.

Camp to I.....	2 m.	3512	first mound of Antelope hills.
I " II.....	5 "	0881	at frog creek.
II " Camp.....	3 "	2159	soldiers' camp creek.

Camp creek, good water and grass. At reading I pass to 2 mounds.

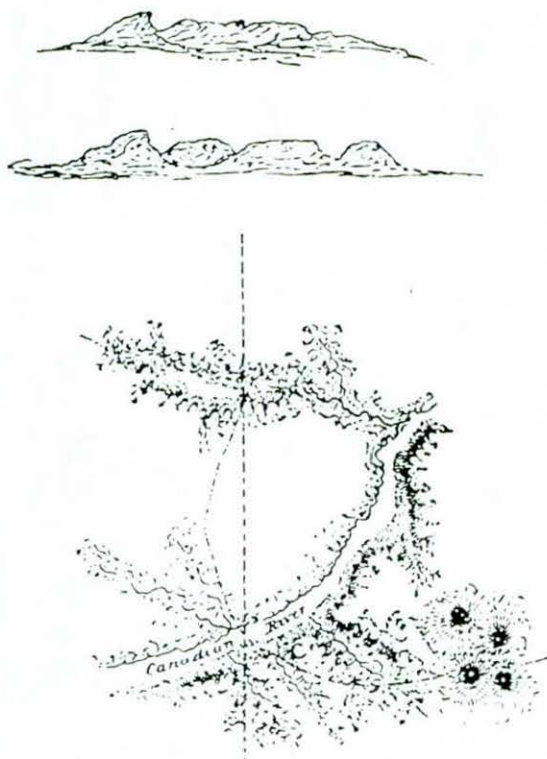
June 8th.—Go on reconnoitre over the Canadian.

June 9th.—Survey on 100th meridian north.

1. Monument S. of road to monument N. of road, 1 mile.			
Monument to Antelope hills.....		66	13 55
3. " II. N. of river to A. hills.....		81	51 15
4. $\Delta$ .....			
5. $\Delta$ .....			
6. /.....			
8. To A. hills.....		100	53 15
9. 50 feet S. of $\Delta$ 4 m. { a.....		105	28 10
{ b.....		112	36 40
11. ....			
12. $\Delta$ . 8 m.....			

Camp, Lat.  $35^{\circ} 55' \pm$ .

" on Soldier Creek to camp on Carrall Creek across Canadian  
= 4 m. 4795.



June 10th.—Lay over.

June 11th.

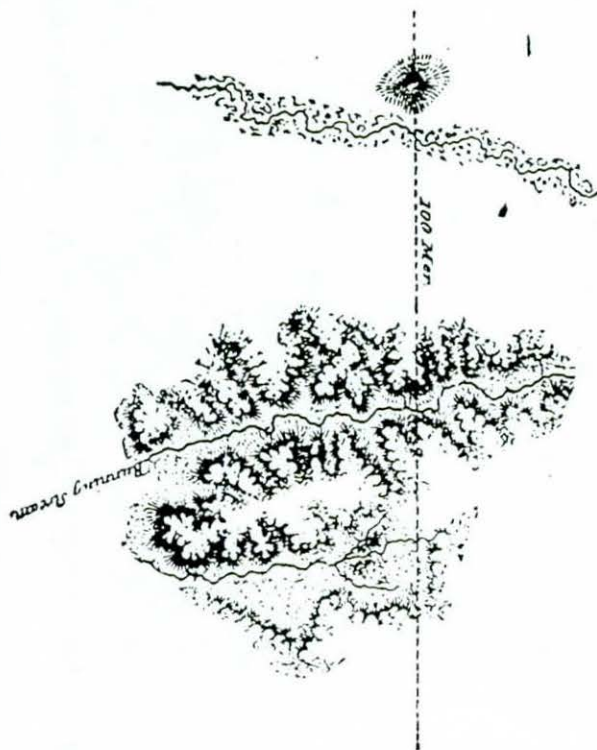
- 13.
14. 10 m.
15. Monument  $\frac{1}{4}$  m. N.
16. R.
17. In S. bluff of river valley  $\frac{1}{4}$  m. N. of mon., 12 miles.
18. Monument 280 yards, 14 m. south.
19. " 15 m. 341 yards south.

Camp is  $\frac{3}{4}$  m. N. of mon., 12 miles.

The camp on Commission Creek is due east of mon., 13 miles.

Lat.  $36^{\circ} 04' \pm$  camp.

Corall Creek camp to Commis. Creek camp, 11 m. 4809.





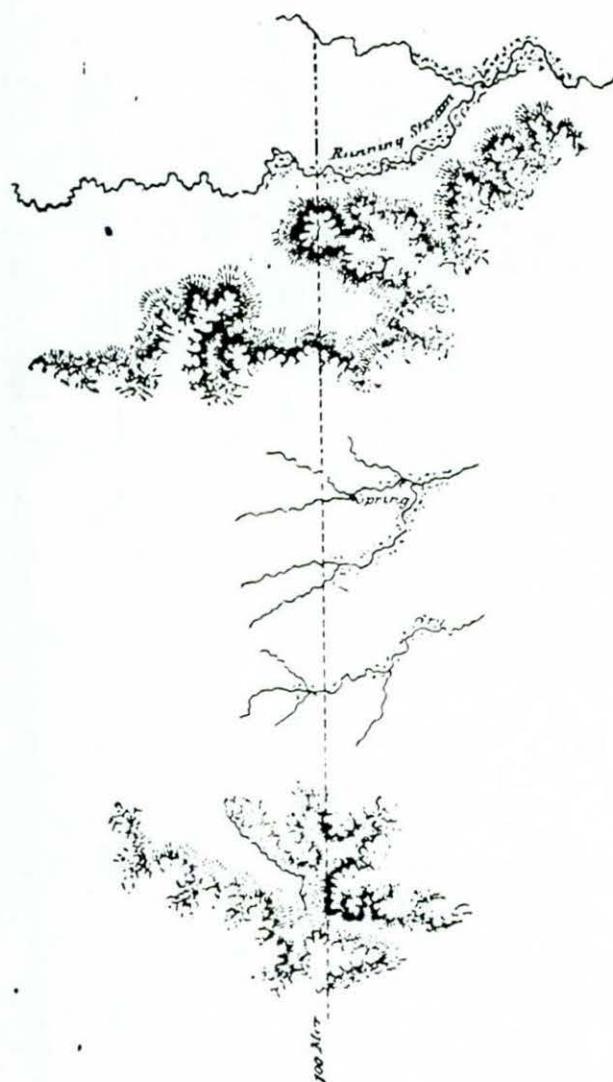
June 12th.

20.			
21.	△ m. 17.		
22.			
23.	△ m. 19.		
24.	△ 20 <sup>?</sup> $\frac{1}{2}$ .		
24-25	= 3 m.	.....	15918
25-26	= 1 "	.....	5359
26-27	= $\frac{3}{4}$ "	.....	4040
28	$\frac{1}{2}$ " }	.....	2718
29	$\frac{1}{2}$ " }	.....	2751
30	$\frac{3}{4}$ to camp, W., 22° 10' 15" N.	.....	4040
31	1 $\frac{1}{2}$ river is $\frac{1}{2}$ m. from St. 30.	.....	6678
32	$\frac{1}{2}$ deep sand from river	.....	1398

Monument on road, 30 &amp; 31.

Lat. 36° 16'.

Commission Creek to Middle River, 18 m. 431.

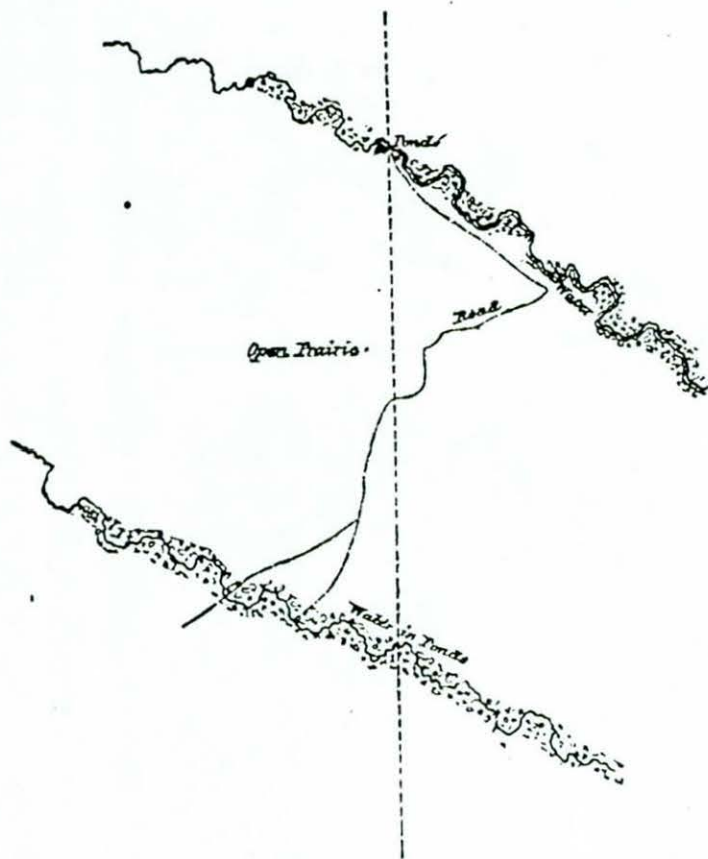


June 13th.—Build monument on Major Sedgwick's trail. Survey begins at 12 a. m.

32 to 33 =	$\frac{1}{4}$ m.;	33 to branch, $\frac{1}{4}$ m.;	to camp at 8 p. m.;	put mon. 16.5 east...	2718
33—34 =	3 "	.....	.....	.....	15918
35 =	$\frac{3}{4}$ "	.....	.....	.....	4040
36 =	$\frac{3}{4}$ "	.....	.....	.....	4040
37 =	$\frac{1}{2}$ "	.....	.....	.....	2720
38 =	$\frac{3}{4}$ "	.....	.....	.....	4034
39 =	$1\frac{1}{2}$ "	.....	.....	.....	8475

Lat.  $36^{\circ} 21'$ —camp.

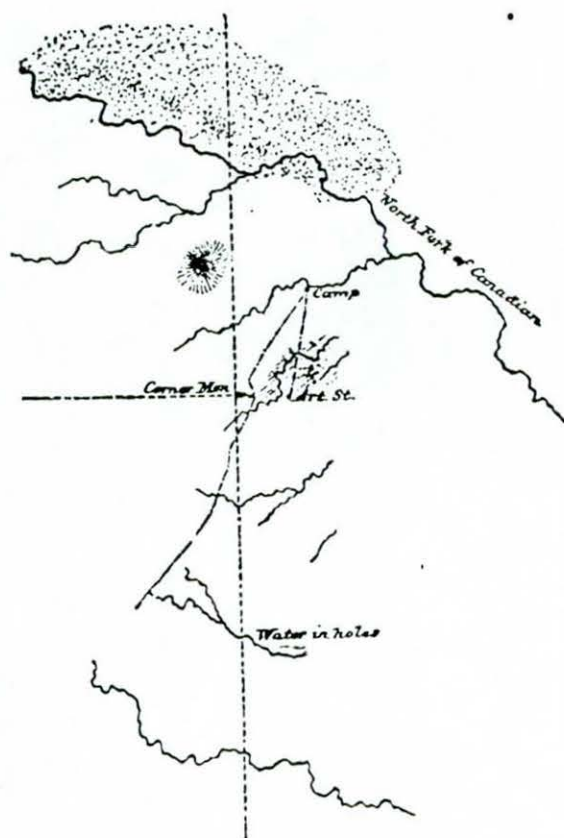
Middle River to Com. Creek, 12 m. 1425.



June 14th.

39—40 =	$\frac{1}{2}$ m.	.....	3190
41 =	$1\frac{1}{2}$ "	monument. ....	8464
42 =	$\frac{1}{2}$ "	.....	3188
43 =	$\frac{1}{4}$ "	944 water holes in arroyo .....	1875
44 =	$\frac{3}{4}$ "	.....	4515
45 =	$\frac{1}{4}$ "	.....	1864
46 =	$1\frac{1}{2}$ "	.....	7150
47 =	$\frac{3}{4}$ "	.....	4480
48 =	$\frac{1}{4}$ "	.....	2020
49 =	1	.....	5084
50 =	$1\frac{1}{2}$	.....	7263
51 Maxey's flag.			

Com. Creek to Adilene Creek, 15 m. 2866.



June 15th.—Prepare to start for Kansas boundary.

June 16th.—Start for

St.  $\frac{1}{4}$  to 10 $\frac{1}{4}$  " 12., divide $\frac{1}{4}$  " 11 "  $1\frac{1}{2}$ Start again  $5\frac{3}{4}$ 

Heite River

Camp

Start  $9\frac{3}{4}$  a. m. $11\frac{3}{4}$  " on divide. $12\frac{3}{4}$  p. m. opposite to branch. $1\frac{1}{2}$  " strike N. J. Fork. $3\frac{3}{4}$ .

7.

 $8\frac{1}{2}$  p. m.

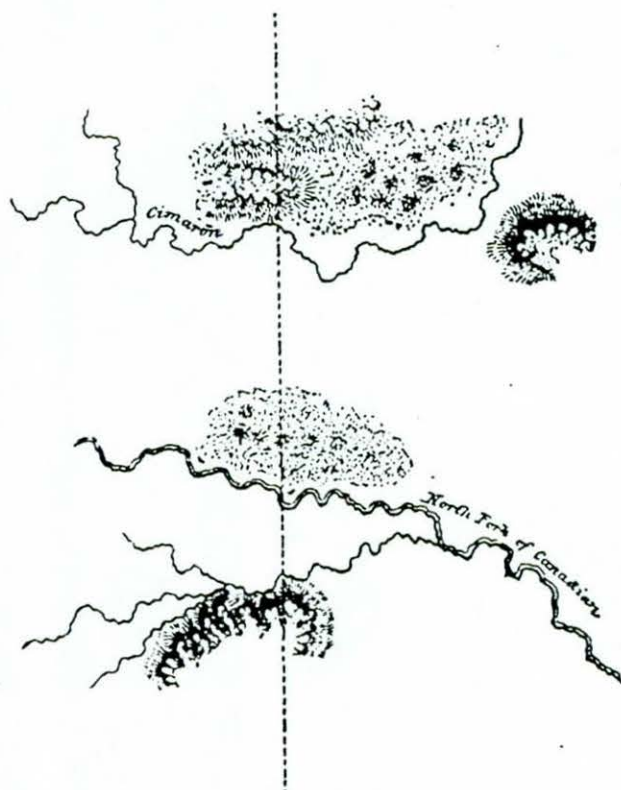


June 17th.—Start 6 a. m.

Strike Canadon at 9.

Start 9½.

Mr. Major's 100th meridian strikes Kansas boundary 52 feet east of Station 98. Difference of two meridians 1200—1500 feet. Major's meridian is east.



June 17th.—Come to Cimaron, go on line Station 98, connect it with 100 meridian. Start for Station 107; found the monument, but the stake removed. Start to return. Cross Cimaron at 12½ m. Make camp on north fork of Canadian at 6 p. m.

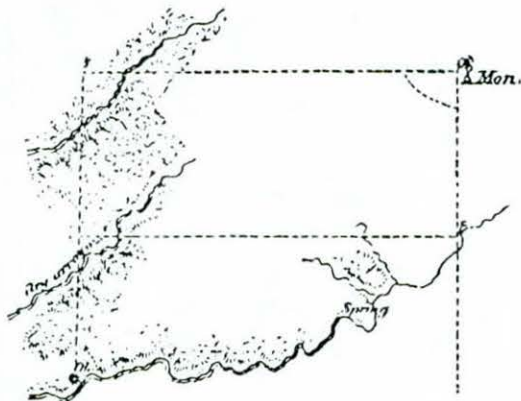
June 18th.—Start at sunrise, go 1 mile up and near river. Strike for camp, which I reached at 11½ p. m. all right.

June 19th.—Connection of 100th meridian with observatory.

Observatory is north of 36° 30'	.....	17116 ft. 7 inches
" to meridian flag 1	.....	4730 ft.
Flag is to move east	.....	14 ft.



Station 51 to square mound	.....	} a—342 41 05 b—340 43 10
51—1 = 16 chains 00 feet.		
2 = 50 "	45 "	
3 = 38 "	13 "	
4 = 42 "	10 "	
5 = 73 "	49 "	
6 = 28 "	5 "	
7 = 45 "	15 "	
x = 39 "	33 "	
From observatory	.....	} a 26 23 30 b 63 36 25 x 90 00 00 b 63 35 55



*Survey South.*

12336 feet from meridian flag = 247 ch. 36 feet.

Mond fl .....	1 = 9
	2 = 50
	3 = 30
	4 = 83
	5 = 118
	<hr/>
	2.90

*Survey West, tangt. 50 ch. south of 37.*

5-1 .....	= 44	ch. 06 ft.
-2 .....	= 44	"
-3 .....	= 54	"
-4 .....	= 14	" } 45
-5 .....	= 31	"
-6 .....	= 30	" } 56
-7 .....	= 26.24	
	<hr/>	
	243.24	

*June 20th.*—To survey 90 ch. 30 ft.  
West, 50 " N.

7-8=33.  
57, 30

Tang is 26 ch. N. 36° 30''.

*Survey west, Dist. 120.00.*

St. 0 .....	a. 169 29 30	
0-1=17 ch. 47 "	b. 168 28 05	
1-2=97 " 37 "	b. 89 13 15	W. 0
	a. 90 09 10	}
2-3=1½ .....	a. 284 05 00	
	b. 282 58 25	very good.
3-4=2 .....	a. 308 03 20	} east, 0
4-5=2 .....	b. 307 22 55	

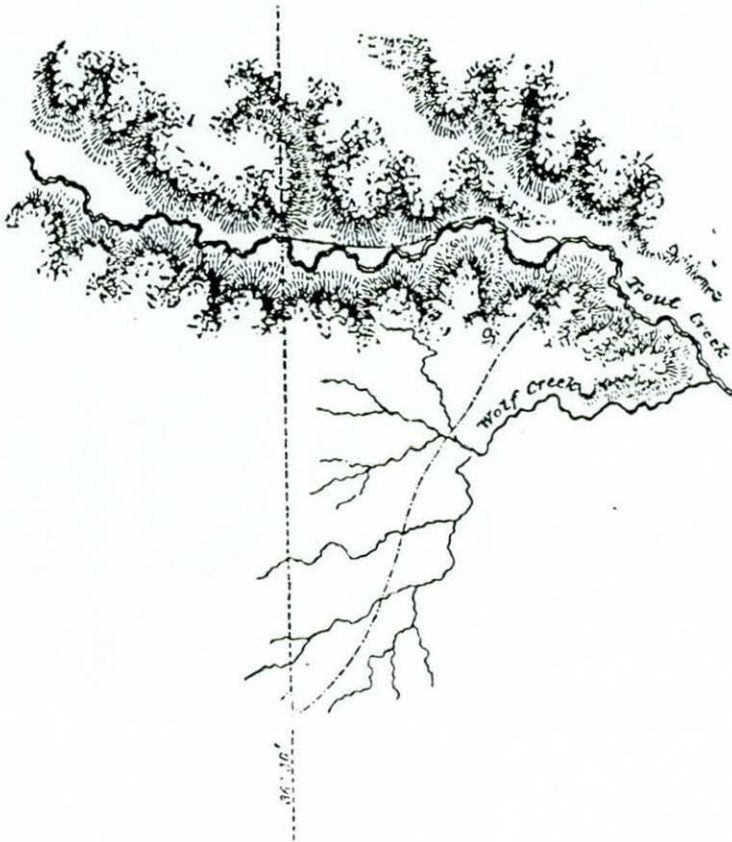
Adeline Creek to Dead Wolf Creek, 20 m.

June 21st.—Survey west on Par. 36° 30'.

5—	6=	$\frac{1}{2}$	.....	=	51.11
—	7=	1	.....	=	97.26
—	8=	1	.....	=	109.14
—	9=	$1\frac{1}{2}$	.....	=	142.20
—	10=	$2\frac{1}{4}$	.....	=	211.49
—	11=	1	.....	=	101.17
—	12=	$\frac{3}{4}$	.....	=	72.32
—	13=	$\frac{1}{4}$	.....	=	33.15

816.183

Wolf Creek to Trout Creek, 4 m. 2888.





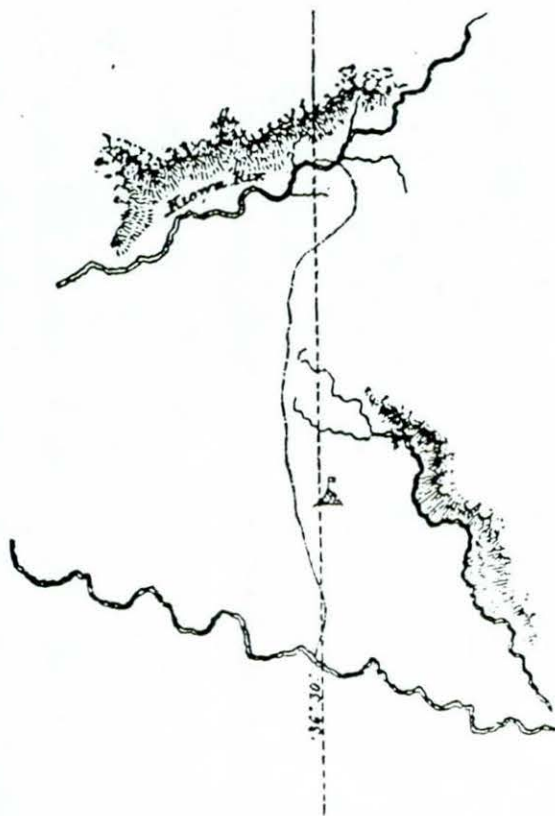
June 22nd.

13—14 = $\frac{1}{4}$ .....	32.17	
15 = $\frac{1}{4}$ .....	22.9	
16 = $\frac{1}{4}$ .....	60.36	— 5762
17 = $\frac{1}{4}$ .....	56.25	
18 = $\frac{1}{4}$ .....	59.17	
19 = $\frac{1}{4}$ .....	76.43	
20 = 1 .....	109.33	
21 = $1\frac{1}{4}$ peg .....	167.17	

Kiowa camp.

Trout Creek camp to noon camp (on Par.) 5 m. 5115 on parallel to  
 Kiowa camp 6 m. 236.

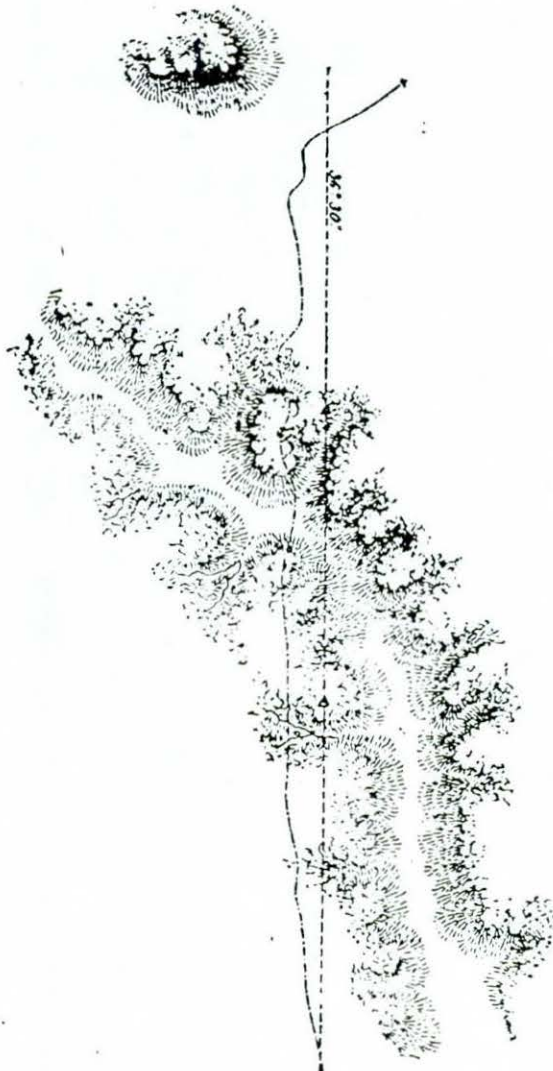
A single tree on ridge.



Survey 16 miles, and follow trail to river 17 miles.

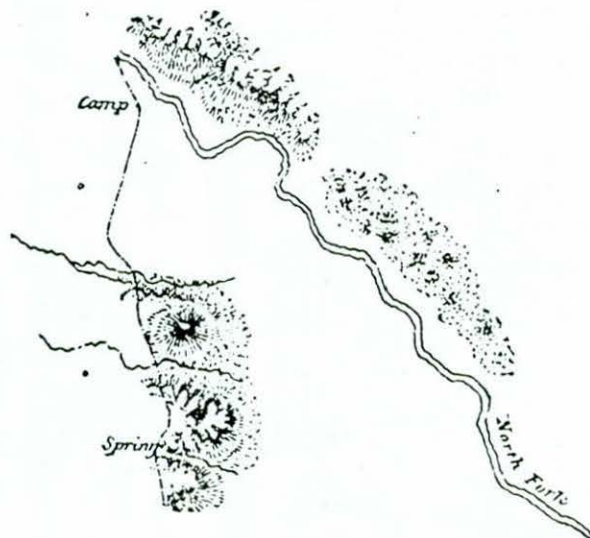
June 23rd.

21-22 .....	2279		
23 .....	2253	<i>Viameter measure.</i>	
24 .....	2126	Camp to Van Dorn's trail..	11. 3145
25 .....	2360	Western end of flatt (lake)	2.
26 .....	3549	Change of course pegs ....	17. 1867
27 .....	6529	To camp .....	17. 1498
28 .....	6151		
29 .....	2283		
30 .....	6172		
31 .....	6772		
32 .....	6132		
33 .....	6689		
34 .....	4846	Trail 10 $\frac{1}{2}$ .....	58000
35 .....	5610		
36 .....	3871		
37 peg .....	1324		
38 " .....	2550		
To turn of road .....			23462



June 24th.—Start off, follow river, travel 13 miles and camp on North Fork.

*June 25th.*—Follow river 10 miles and camp on Skull Creek, coming in due S. W., due S. high table land.  
Camp of 23 to camp on N. Fork 13 m. 314.



*June 25th.*—N. Fork camp to mouth of Skull Creek 9 m. 3475.

*June 26th.*—To Par. 12 m. 1625 feet.

*June 27th.*—Observatory put up. Observing in night; heavy wind.

*June 28th.*—Obs. Heavy thunder-storm.

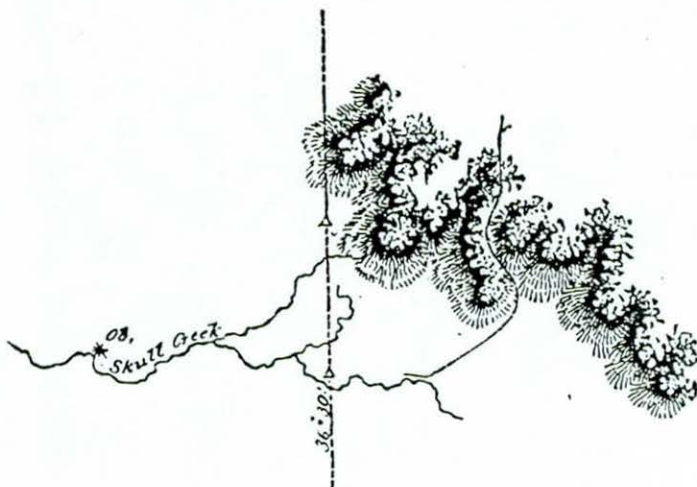




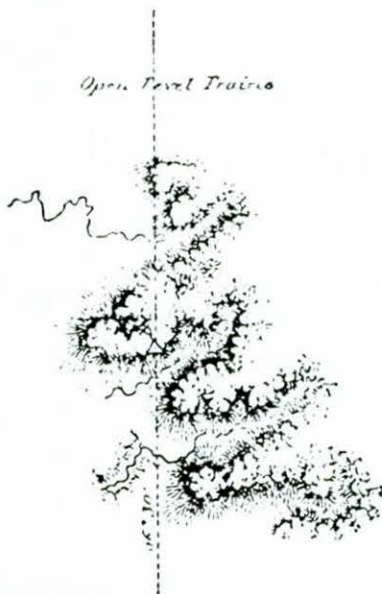
June 29th.—Survey east.

Observe to Par.  $36^{\circ} 50' = 4805$  feet. Obs. N.  
 To Tang. 3433 tgs. is N.  
 Signal from cb. 3433. Sig. goes east 34 inches.

		c	l	"
St. M, flag N, a	.....	108	42	30
b	.....	119	27	30
c	.....	150	17	40
6600 ft. .... d	.....	228	28	45
Ft. 1.0 E = .. a	.....	35	40	35
b	.....	52	35	50
c	.....	77	04	15
d	.....	150	28	55
St. 2, = $\frac{1}{2}$ .... a	..... $45^{\circ} 10'$ S. W. break of creek 10 miles.			
St. 3, $1\frac{1}{2}$ .				



St. 3, South bluff	..... =	345	57	05	is 21 yds.
South of head of bluff N. mound.	{ a, S	30	42	50	
	{ b, N	22	"	"	
	a	316	15	1	
4. = 1. 105 ch. 36 ft.					
5— $\frac{1}{2}$ . S. of end of bluff 15 yds. x $\frac{1}{2}$ m. N. 79 ch. 10 ft.					
6, 2—x a	.....	334	04	25	
W. 1, x a	.....	11	19	10	
N. mound. { a	.....	23	27	55	
	{ b	24	"	10	
210 ch. 10 ft.					
7. 225 ch. 41 ft.					



To flag, 23 ch.  $46\frac{1}{2}$ .  
 S. Ex. 70—9

June 30th, survey west. E=0.

St. 0-1.....	32 ch. 00 tang. is 74 feet south.		
2.....	72 " 10.		
St. 2 to a.....		9	28 10
b.....		17	33 55
c.....		48	38 20
x.....		356	19 25
" 3-2½ to a.....		5	14 35
b.....		9	
c.....			
d.....		50	
x.....		357	
N. ½ a.....		80	15 20
b.....		16	27 10
d.....		35	17 05
s.....		309	25 10
.....		358	03 10

Station 4.

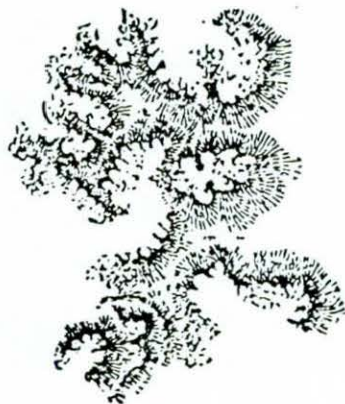
Texas trail is 150 yards south.



4-5, 79 ch. 10 feet.

VI.—1½ to E. o., north bluff N.....		338	17 30
107:30 a.....		6	59 05
b.....		15	29 05
c.....			
Bluff No.....		325	17 25
VII.—1 Nn.....		343	46 40
105. 25. N.....		351	46 10
VIII. 1. { Nn.....		347	56 45
8) { N.....		358	41 00
a.....		4	36 55
b.....		9	30 50
m.....		330	36 45
104. 42.....			
IX. ½ Nn.....		349	21 0
a.....		4	01 30
b.....		10	19 50
48. 15 M.....		4	42 0
X.....	132	00	ft.
XI.....	158	20	"
XII. ¾.....			

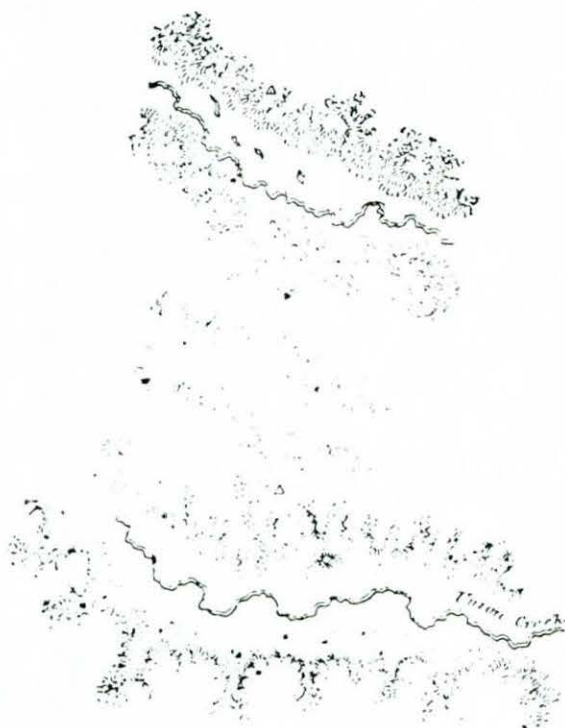
*Obser. monument to Union Creek, 18 m. 3450.*



July 1st.

R on Sta. XIV. See Texas party ahead; they are waiting.

XIII.	½	.....	1240	; on flag up, which bears 19° 15' 20'' north.
XIV.	1	.....	5042	; ambulance bears 19° 31' 30'' north.
XV.	½	.....	2319	; dist. about 3 m.
XVI.	½	.....	2640	; 15½ m. at 10½ a.m.; they are moving south.
XVII.	½	.....	3876	; Texas men; is 1½ m. N.
XVIII.	½	.....	4801	
XIX.	½	.....	3438	; camp to camp 18 m. 3814.
XIX.	W. o.			
XX P.	½	.....	3017	
XXI.	1	.....	6383	
XXII.	½	.....	5017	
XXIII.	½	.....	3820	
XXIV.		.....	6583	
XXV.	½	.....	2370	
XXVI.	½	.....	1880	; see bluffs to S.W., 6 m.
XXVII.	1	.....	6338	; to N. E., 10.
XXVIII.	½	.....	4736	

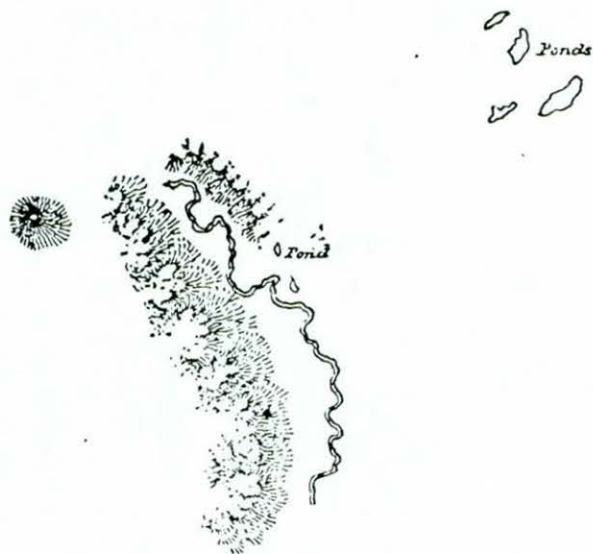


XXVIII.—	XXIX	.....	4639	
	XXX	.....	7326	
	XXXI	.....		peg on road 8. 217.



July 2nd.

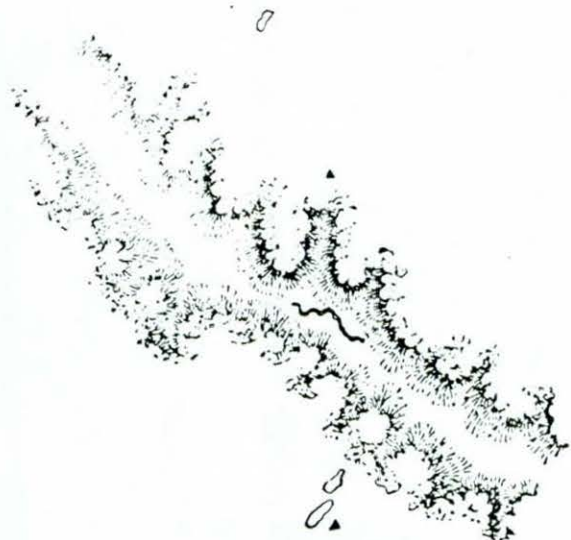
XXXII.	$\frac{3}{8}$ .....	650	
XXXIII.	1.....	5098	
XXXIV.	$1\frac{1}{2}$ .....	7820	camp to water-hole 1, 3265 f.
XXXV.	1.....	5192	to next camp x 2, 776.
XXXVI.	$1\frac{1}{2}$ .....	7740	
XXXVII.	$1\frac{1}{2}$ .....	7810	
XXXVIII.	$\frac{1}{2}$ .....	2421	



July 3rd.

38—39 =  $\frac{1}{4}$ , 1272 s. bluffs of N. F.,  $97^{\circ} 36' 10''$ .  
6 m. No.

40 .....	$\frac{1}{2}$	2012	$102^{\circ} 34' 20''$
41 .....	$1\frac{1}{2}$	7091	
42 .....	$1\frac{1}{2}$	7414	
43 .....	$1\frac{1}{2}$	7431	
44 .....	2 N. F $\Delta$	crossing = 10071.	
45 .....		5236	
46 .....		3645	
47 .....		5159	
48 .....		2547	
Camp to trail .....	2 m.	1672.	
July 2d .....	18 "	2480.	

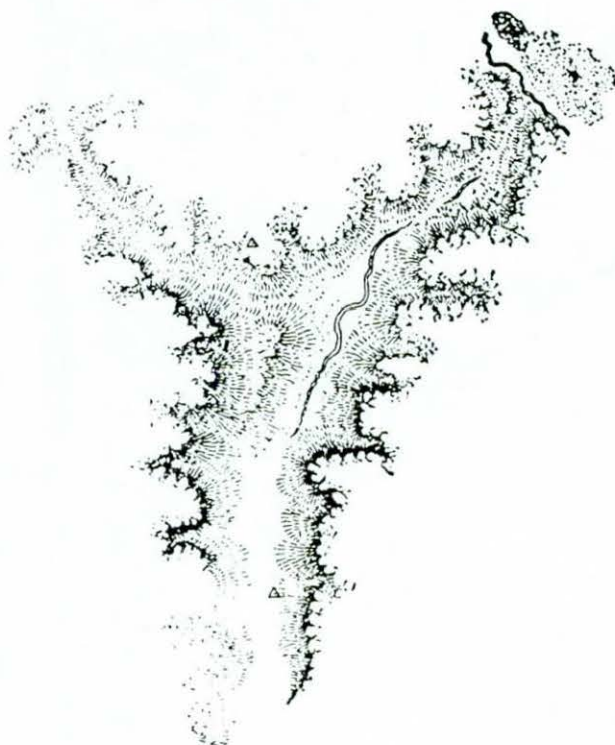


July 4th.

48—49 .....	1154
50 .....	7749
51 .....	5205
52 .....	7916
53 .....	6035
54 .....	13268
55 .....	2600
56 .....	2716
57 .....	8275
58 .....	2656
59 .....	5383
61 .....	10744
62 .....	+21286

July 4th.

Camp July 3rd to crossing of valley I .....	2. 4648
Change of course, II .....	2. 52
Course to dry camp, III. ....	11. 4397
Whole distance from camp to camp, IV .....	4728



July 4th.—Survey till sunset; build monument; is to right; start at 8 o'clock for water-holes on North Fork, where we arrived at daylight.

July 5th.—Stay at water-holes.

July 6th.—Cross over to Cottonwood camp.

“ 7th.—Proceed on to 103rd meridian, camp.

“ 8th.—Stay there; little rain afternoon.

9th.—Letters from T. C.

From Dry Camp to water-hole on N. Fork .....	13. 616
“ N. Fork to Cottonwood camp .....	18. 1261
“ Cottonwood to Ob. on Rabbit Ear .....	23. 247
Ob. to Spring camp .....	13. 4780
Cottonwood camp to S. F. Road, due N .....	13. 4420
On S. F. Road to Cedar Creek .....	5. 4468
S. F. Road to Cottonwood Hollow, 1½ m. S. of road .....	21. 2385
Santa Fé Road to Rabbit Ear camp .....	7. 1922

July 10th.—Take up line on old Ob. meridian on Rabbit Ear Creek.

0—1¼ W. O. to tree on R. Mt .....	330 56 15
“ highest point .....	334 54 25
“ meridian flag??	

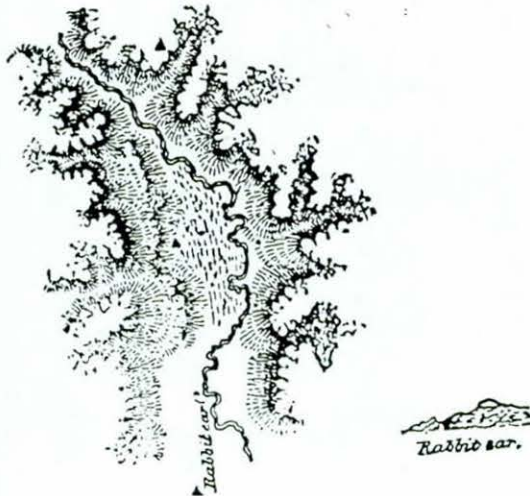
	o	'	"
1-2=1 m. to tree.....	337	06	35
highest pt.....	339	37	25
meridian flag.....	18	45	50
mound.....	12	20	40
2-3=1½ to tree.....	340	45	15
highest pt.....	342	32	35
table land.....	323	45	10
mound N.....	12	02	25
3-4=2½ to tree.....	344	39	45
highest pt.....	345	47	15
table land.....	333	20	05
mound.....	11	31	25

*Survey east.*

	o	'	"
a+6			
5-6-3 m-6 to tree.....	349	37	25
high pt.....	350	05	55
table land.....	343	49	35
mound N.....	10	28	10

7-1½.  
8-¼

Par. 36° 30' is 25921.3-88 feet south of tangent.



*July 11th.—Survey south.*

St. 8-1.....	= 13 ch. 05 ft.
" 2.....	
St. 2 to tree.....	
St. 1-2.....	50 ch. 43 ft.
S.=O.	
Tree on Rabbit Ear.....	83 17 15
Highest point.....	83 33 00
Wagon mound.....	100 31 15
Col. Russell's flag ??.....	63 52 45

*Station 3.*

South O, highest point, Rabbit Ear.....	86 07 35
St. 2-3.....	88 ch. 19 ft.

*Station 4.*

Highest point Rabbit Ear.....	91 35 55
Wagon Mt.....	103 12 35
3-4.....	188 ch. 06 ft.

There is an error in numbering the stations on the op. side.

St. 5-6.....	85 ch. 40 ft.
Highest pt. Rabbit Ear.....	94 23 05
Wagon mound.....	104 10 00
St. 7.....	=74 ch. 46 ft.
St. 8.....	21 ch. 06 ft.



Highest pt. Rabbit Ear.....	97 05 05
Tree " " .....	97 44 05
Wagon mound .....	105 02 10

July 12th.—Survey east on Par. 36° 30' tangent is 282 feet south.

0-1— $\frac{1}{4}$ to 1248 ft.	
Highest pt. Rabbit Ear Mt.....	7 04 50
To mon .....	12 05 10
" Wagon Mt.....	14 59 20
1-2—.....	7828
3—.....	6884
Highest pt. Rabbit Ear.....	6 08 15
4—.....	3868
5—.....	15846
Highest pt.....	5 03 10
6—.....	1462
7—.....	3842
8 $\frac{1}{2}$ —.....	4012
	105 46 10
	100 19 50=0=4° 26' 20"
8-9—.....	16421

From monument on corner 103° meridian to mon. on head of Mustang Creek, 73530 ft.



To Kiowa Camp .....	19.
" turn of road.....	17.
" up Canadian to Skull Creek.....	20. $\frac{1}{2}$ 56
" monument Union Creek.....	15. $\frac{1}{2}$
" cross of creek (dry, no name).....	7. $\frac{1}{2}$
" road pegs.....	3. $\frac{1}{2}$ 27 $\frac{1}{2}$
" cross of N. Fork $\Delta$ .....	13.
" camp.....	3. $\frac{1}{2}$
	100 $\pm$
Camp 3rd July to next cross.....	4. $\frac{1}{2}$
Cross to mon.....	12. $\frac{1}{2}$ 117
Survey east.	
Obs. to Spring camp $\Delta$ .....	12.
Mon. to mon.....	7.
End of line.....	3. 139
R. 25.	
To M. Meigs' Cr.....	7-7
Cottonwood.....	7-8
Ponds.....	18-8
July 30th.....	30

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August 26th, 1860.—Retrace the 100th meridian south.  
 Inscription on the monument near the Canadian River:  
 N. 100 m. W. L.  
 E. C. & C.  
 S. 1859, 89 miles.  
 W. Texas.  
 Beale's Road 50 chains S. of monument.

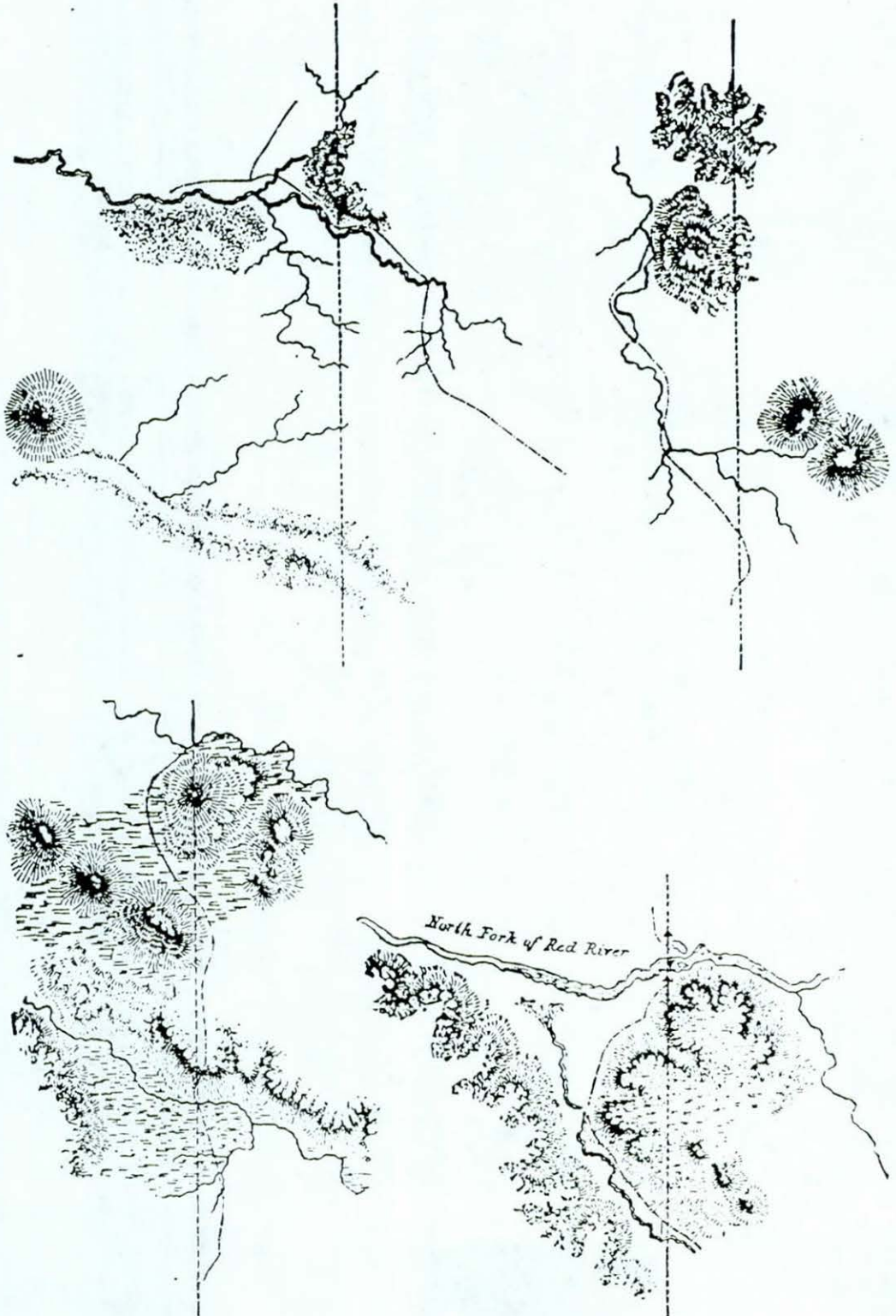
Dist. to next monument 94 ch. 1 ft.

St. 88 to  $\frac{a}{b}$  Var.  $11^{\circ} 45' 00''$  east.

a. 129 30.

b. 128 00.

N. B.—From 89 to 74 all the monuments have been torn down by the Buffalo, and can only be found by tracing the line.



August 29th, 1860.

From north bank to old mt.....	5 ch. 11 ft.
Direct across channel.....	25 " 44 "
Old mon. (50) to S. edge valley.....	53 " 45 "
From line to Ast. Station.....	6 " 23 "

No water on the surface (*i. e.*) river bed, but is found by digging 2 feet 3 inches below the surface.

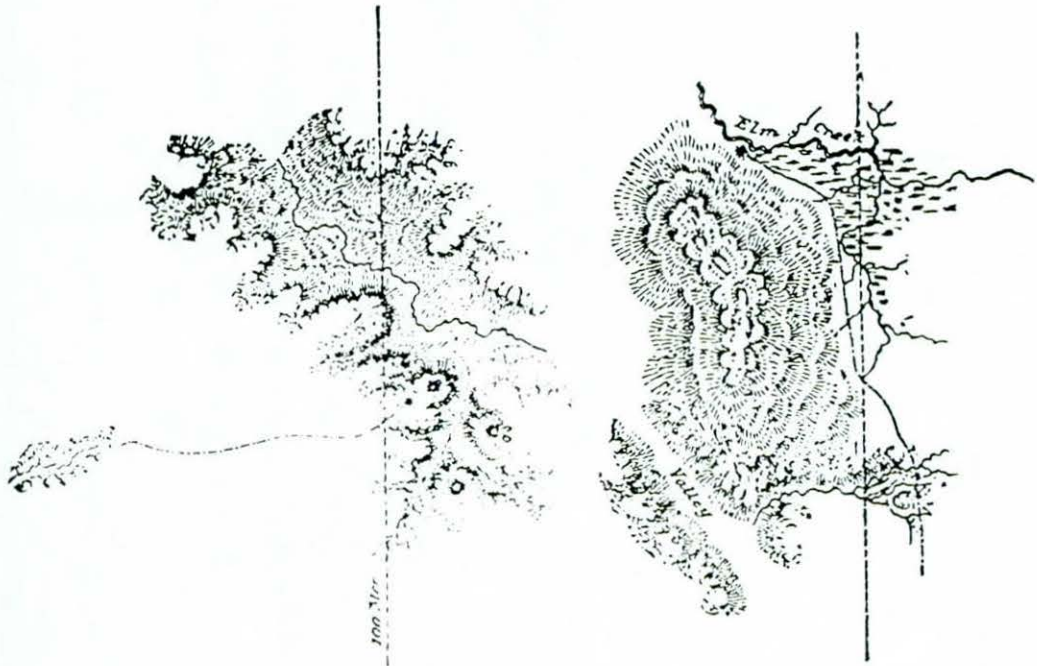
August 30th, 1860.—Start on scout for the main Red River.

Start at 7 a. m.	} Country very broken all day.
Noon 1.30 p. m.	
Start again at 4 p. m.	
Camp at 7.50 p. m.	

September 2nd, 1860.

Camp in cañon to Road I.....	2 m. 2369 ft. 130 <sup>D</sup>
I to II.....	7 " 2816 " E.
II " camp (evening).....	3 " 5121 " E.

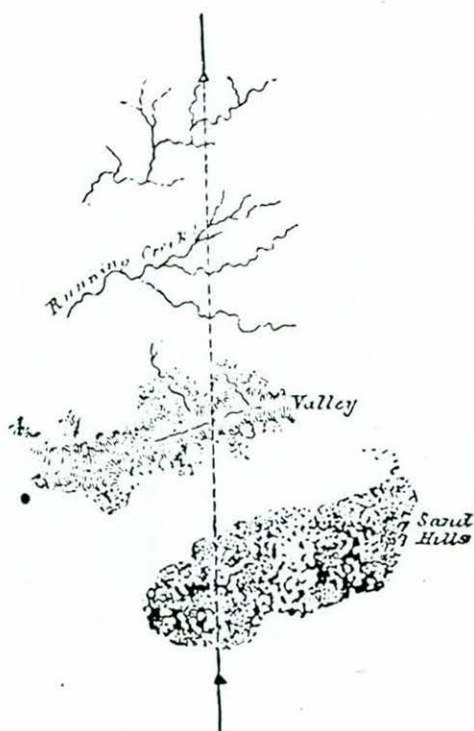
Open.



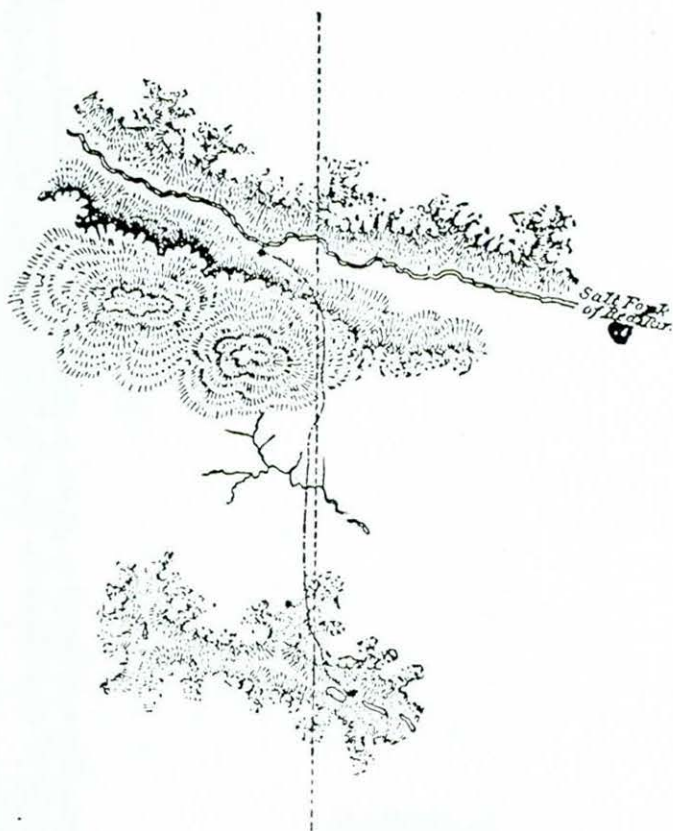
St. 27 to—

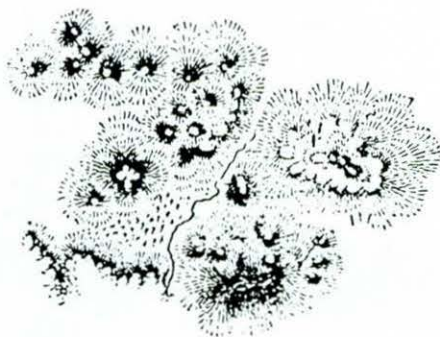
	○ /
S.	87 45.
N.	101 35.
N n.	102 40.
N n n.	104 20.





August 31st.—Salt Fork of Red River where we crossed by line is 6 ch. 20 ft., well def. banks, bluffs 25–30 ft. high, red clay, N. banks, S. banks, sand hills covered with vines. Water in several large ponds on the surface, and good found by digging 6 inches under the surface.



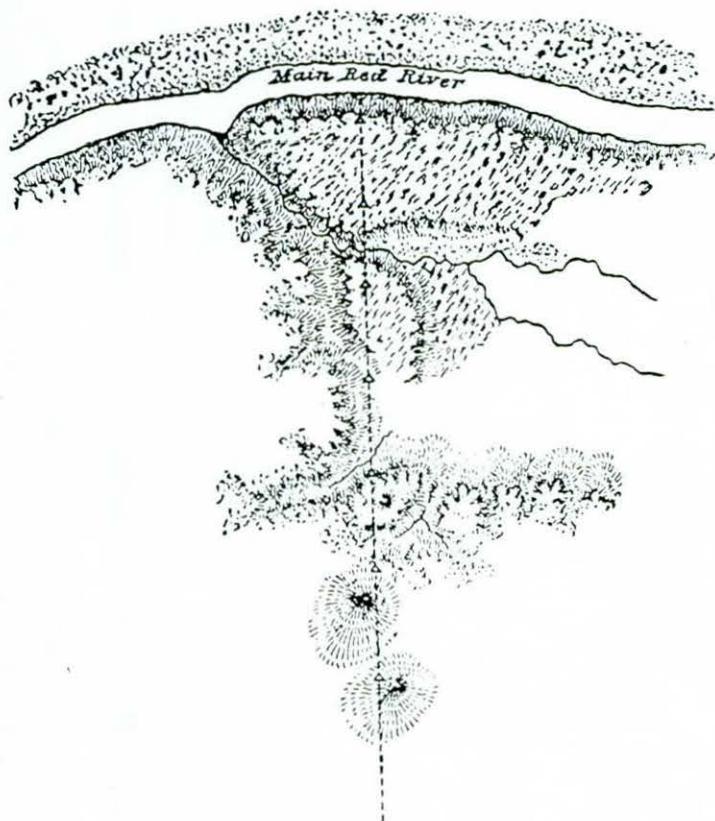


Strike main Red River at 3.30 P. M.

Main Red River where crossed is .....	65 ch .38 ft.
Channel of running water .....	" 22 "
" 6 inches deep.	

Plenty of long, large lagunes of water in the bed besides the running channel.

The banks are red clay 25-40 ft. high. Water unfit for use.



*September 1st.*—Little rain at 3 a. m. Start before daylight; travel till 10.30 a. m., when we reached the Salt Fork, where we breakfasted. Start again at 1 p. m. & travel till sunset, camp on running creek (3 p. m.).

*September 2nd.*—Start at daybreak, & reach camp 9 a. m. all right, rest till 12 m., when we start again East for good; travel till sunset, encamp in open prairie on gully; fine night.

September 3rd.

At R. I. to Wichita Mt.	
To S.....	59° 45'
N.....	60° 30'

North Fork where crossed is 7 ch. 10 ft. wide, sandy bed, no water on the surface, west side gentle sloping prairie, east side bluff 20 feet high.

X to S. Wichita Mt.....	40 45
N.....	42 25
To battlements a.....	75 10
Course of river.....	203 35
	353 10
The road is 1 mile N of camp to I.....	7 m 183
Head of spring brook.....	3 " 1724
Dist. x.....	0 " 1320
To North Fork of Red River (cross).....	2 " 2919
X on bluff.....	1 " 1422
Camp on arroyo (night camp).....	2 " 2040

Reading III to Wichita Mt.:

	○	/
	Nr.	24 35.
	N.	357 09.
	S.	360 10.
Bluff {	W.	365 25.
	E.	7 15.

Camp to R. I.....	0.4003
" II.....	2.3660
Road M.....	2.13
" N.....	0.2264
" III.....	3.3673
Arroyo.....	2.1092
IV.....	3.3910
To camp.....	2.1579
Camp to I.....	2 m. 3238
Divide II to Wichita B.....	3 " 3252
{ III.....	3 " 1140
{ Noon camp.	
IV.....	5 " 262
V.....	0 " 3608
Camp VI.....	1 " 1316

Reading to Wichita Mt., on R. II., of Sept. 5th.

N.....	309 00
S.....	310 10
West bluff.....	319 10
East ".....	324 30
R. Mound.....	327 45
Peak.....	343 30
Long bluff.....	355 35
Clus. of mounds.....	10 35
Long Mt.....	28 40
Peak.....	37 40
Three mounds.....	46 30

September 6th.

Camp near Red II, large Ris., 6-8 chain, wide bluff on banks 10-15 feet high.

1.....	61 30
2.....	55
3.....	25 45



UNITED STATES AND TEXAS BOUNDARY.

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4 .....		7 40
5 .....		359 10
6 .....		359 20
7 .....		346 40
8 .....		330 00
9 .....		322 20
x .....		312 35
Camp to R I .....	3 m.	503
Noon camp, II .....	8 "	51
Night " III .....	3 "	2699 $\frac{1}{2}$

*September 7th.*

R. I. = 9 .....		310 00
7 .....		319 30
5 .....		346 30
1' .....		35 30
To bluff east 20 N.		
Camp to Road I .....		5, 1803
Camp noon.		
" at Fort Cobb .....		13, 2709

# BOOK No. 17.

## COMPLETE RECORD OF ASTRONOMICAL WORK.

*Latitude and longitude of astronomical stations on Texas boundary line.*

Station.	Latitude.	Page.
<i>A.—Determinations, 32d parallel.</i>		
1. Initial Point .....	31 59 48.2	4-58
2. Crow Spring .....	31 59 35.8	59-84
3. Independence Spring .....	31 52 55.3	85-104
4. Pecos River: .....	32 01 04.9	*105-132
1st. Camp on road to Sand Hills .....	31 43 04.0	133-138
2d. Camp .....	31 49 03.3	139-144
5. Sand Hills (near) .....	31 58 42.4	145-166
<i>B.—Determinations along Rio Pecos.</i>		
1. Junction Delaware Creek & Rio Pecos .....	32 02 06.5	167-168
2. Guadalupe Creek .....	32 14 23.2	169-174
3. (Camp No. 4.) Rio Pecos .....	32 24 41.8	175-179
4. (Camp No. 6.) " " .....	32 38 26.6	180-185
5. (Camp No. 7.) " " .....	32 48 35.9	186-191
6. (Camp No. 8.) " " .....	32 58 24.2	192-197
7. (Camp No. 12.) " " .....	33 29 27.7	198-203
8. (Camp No. 13.) " " .....	33 38 28.1	204-209
9. (Camp No. 16.) " " .....	34 06 50.7	210-215
10. (Camp No. 17.) " " .....	34 18 00.3	216-221
11. (Camp No. 18.) " " .....	34 29 10.5	222-227
12. Cañada de San Juan de Dios .....	34 39 24.0	228-233
13. Alamo Gordo .....	34 47 44.3	234-239
14. Agua Negra .....	34 55 20.2	240-245
15. Camp on Whipple's road .....	35 06 33.9	246-251
16. Camp between Parker's & Stateche's Rancho .....	35 17 02.2	252-257
<i>C.—Determinations along 103d merid n.</i>		
1st. station .....	32 07 51.9	258-263
2d. " .....	32 20 44.7	264-269
3d. " .....	34 21 40.5	270-275
4th. " .....	34 27 27.7	276-281
5th. " (pond south of bluff) .....	34 46 59.0	282-287
6th. " (bluffs S. of Whipple road) .....	35 00 09.0	288-293
7th. " (trib'y south of Canadian River) .....	35 08 58.9	294-299
<i>D.—Determinations, parallel 36° 30'.</i>		
1st. Rabbitear Creek .....	36 34 16.0	300-323
2d. Skull Creek .....	36 30 47.6	324-339
2. Skull Creek, near junction with N. Fork .....	36 31 03.6	340-345
3d. Merid par. 36° 30' & 100th meridian (near) .....	36 32 49.2	346-367
<i>E.—Determinations along 100th merid n.</i>		
1. Mt. N. fork Red River, by 100th meridian .....	35 17 33.3	368-373
2. Springs near 100th meridian .....	35 30 51.8	374-379
3. Mt. main branch Washita by 100th mer'd n .....	35 45 12.9	380-385
4. Corral Creek .....	35 54 57.5	386-391
5. Commission Creek .....	36 04 08.3	392-403
6. Pond Creek .....	36 21 48.7	404-408
<i>F.—Determinations on survey to and from Fort Cobb.</i>		
1. Muddy Valley .....	34 57 22.6	404-408
2. Bend of Big Washita .....	35 05 36.0	409-414
3. Fort Cobb .....	35 06 26.9	415-422
4. Gooseberry Creek .....	35 39 57.0	427-430
5. Camp on tributary of False Washita .....	35 09 18.4	431-436
6. Camp on Main Washita .....	35 06 45.1	447-442

(A. 4.) Near this point there was one lunation for longitude observed, marked A. 4, 443 to 486.

(D. 1.) Rabbitear Creek, one lunation for longitude was observed at this point, marked as above, 487 to 514.



## Determination of the latitude.

## A.—1ST. INITIAL POINT (RIO GRANDE), 32D PARALLEL.

[Station: Initial point, 32<sup>d</sup> parallel, on the Rio Grande. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by Parkinson & Frodsham.]

Date: JANUARY 7TH, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.		Level, sums of.	Approximate latitude.			Z. difference by micrometer.			Corrections for level.			Latitude.		
		°	'	"	D.	N.		S.	°	'	"	'	"	'	"	°	'	"	
B. A. C. 441	N.	43	42	57.27	2132.0	71	64												
446	S.	72	22	12.97	1698.0	67	69	31	57	24.88	+	2	23.55	+	0	00.52	31	59	48.95
441	N.	43	42	57.27	2132.0	71	64												
469	S.	72	15	27.09	2213.0	67	69	32	00	47.82				+	00.52			Rejected.	
540	N.	44	28	11.52	1389.0	73	66.5												
572	S.	71	23	45.60	2165.5	73	66.5	32	04	01.44	-	4	16.83	+	1.35			59	45.96
540	N.	44	28	11.52	1389.0	73	66.5												
573	S.	71	23	38.90	2179.0	73	66.5	32	04	00.79	-	4	21.29	+	1.35			59	39.50
G. C. 173	S.	72	52	09.70	1510.5	77	65												
194	N.	43	10	16.08	1688.0	77	65	31	58	45.61	+	0	58.71	+	2.44			59	46.78
188	S.	72	38	28.89	2749.5	77	65												
194	N.	43	10	16.08	1688.0	77	65	32	05	37.51	-	5	51.09	+	2.44			59	48.88
B. A. C. 749	N.	40	03	27.51	932.0	78	70												
780	S.	75	35	21.82	2895.0	78	70	32	10	35.33	-	10	49.26	+	0.83			59	46.90
821	N.	50	23	58.49	1481.0	73	69												
866	S.	65	23	57.92	2613.0	73	69	32	06	01.79	-	6	14.41	+	0.83			59	48.21

JANUARY 8TH, 1859.

B. A. C. 404	N.	45	12	24.81	429.0	86	88													
430	S.	70	39	33.05	1196.0	85	88	32	04	01.07	-	4	13.69	-	0.52			31	59	46.86
441	N.	43	42	57.27	1979.5	89	85													
446	S.	72	22	13.03	1542.0	88	88	31	57	24.84	+	2	24.70	+	0.41			59	49.95	
441	N.	43	42	57.27	1979.5	89	85													
469	S.	72	15	27.14	2158.0	88	88	32	00	47.79	-	0	59.04	+	0.41			59	49.16	
540	N.	44	28	11.52	1219.5	91	85.5													
Mean } 573	S.	71	23	41.06	1996.5	89	89	32	04	03.71	-	4	17.65	-	0.57			59	46.63	
P. D. } 572	S.																			
G. C. 194	N.	43	10	16.06	1638.0	86.5	90													
G. C. 188	S.	72	38	28.92	2698.0	89	89	32	05	37.51	-	5	50.60	-	0.46			59	46.50	
B. A. C. 749	N.	40	03	27.46	911.0	90	90													
780	S.	75	35	21.86	2873.0	90	91	32	10	35.34	-	10	48.93		0.00			59	46.41	
735	N.	40	21	26.08	2540.4	91	90													
780	S.	75	35	21.86	2873.0	90	91	32	01	36.03	-	1	50.14		0.00			59	45.89	
821	N.	50	23	58.46	740.5	90	89													
866	S.	65	23	57.92	1879.0	92.5	87	32	06	01.81	-	6	16.56	+	0.68			59	45.93	
953	N.	51	42	15.03	1509.0	98	83													
941	S.	64	05	40.29	2646.5	98	83	32	06	02.33	-	6	16.23		0.00			59	46.10	
981	N.	50	55	20.60	2721.0	94	88													
957	S.	65	17	35.15	1596.0	96	86	31	53	32.42	-	6	12.09	+	0.83			59	45.34	
99	S.	69	28	38.24	1957.0	104	89													
1006	N.	46	29	28.62	1748.5	104	89	32	00	56.57	-	1	08.96	+	3.12			59	50.73	

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B. A. C. 540	N.	44	28	11.56	1444.0	86	85													
572, 573	S.	71	23	41.39	2218.0	86	85	32	04	03.55	-	4	16.00	+	0.21			31	59	47.76
G. C. 173	S.	72	52	09.84	1747.5	87	86.5													
194	N.	43	10	15.81	1933.0	87	86.5	31	58	47.17	+	1	01.35	+	0.10			59	48.62	
183	S.	72	38	29.02	2790.5	87	86.5													
194	N.	43	10	15.81	1933.0	87	86.5	32	05	37.58	-	5	49.77	+	0.10			59	47.91	
735	N.	40	21	26.01	2657.0	88	88													
780	S.	75	35	21.97	2990.0	88	88	32	01	36.01	-	1	50.14		0.00			59	45.87	
821	N.	50	23	58.42	1382.0	87	89													
866	S.	65	23	57.95	2519.5	87	89	32	06	01.81	-	6	16.23	-	0.42			59	45.16	
B. A. C. 941	S.	64	05	40.07	2733.5	97	84													
955	S.	51	42	13.08	1591.5	97	84	32	00	03.42	-	6	17.72	+	2.70			59	48.40	
999	S.	69	28	38.57	2079.0	85	97													
1006	N.	46	29	28.42	1889.0	81	102	32	00	56.50	-	1	02.84	-	3.43			59	50.23	



Determination of the latitude—Continued.

P. of star in B. A. C. or G.	N. or S.	Polar distances.			Micrometer readings.		Level, sums of.	Approximate latitude.			Z. difference by mi- crometer.	Corrections for level.	Latitude.		
		°	'	"	D.	N.		S.	°	'			"	'	"
B. A. C. 1064...	S.	71	44	11.02	1431.0	95	88								
1083...	N.	44	25	10.60	2242.0	96	88	31	55	19.85	+4	28.24	+	1.56	31 59 48.99
1099...	N.	42	16	29.47	2607.0	88	97								
1119...	S.	73	55	19.52	1562.0	89	96	31	54	05.50	+5	45.63	-	1.66	59 49.47
1175...	M.	57	20	24.08	1465.0	79	106								
1207...	S.	58	32	02.78	2177.5	91	95	32	03	46.57	-3	55.66	-	3.23	59 47.68
1240...	S.	72	12	12.88	2792.5	88	98								
1252...	N.	43	27	21.59	926.0	88	98	32	10	12.76	-10	17.34	-	2.08	59 53.34
1289...	N.	52	19	44.22	2324.0	81	107								
1279...	S.	63	53	10.47	1176.5	80	108	31	53	32.65	+6	19.54	-	5.41	59 43.78
1289...	S.	67	56	52.75	1302.5	94	94								
1305...	N.	48	12	18.29	2107.5	94	94	31	55	24.48	+4	26.25		0.00	59 50.73
1339...	N.	47	54	05.65	1662.0	92	93								
1362...	S.	88	01	44.19	2065.0	92	96	32	02	05.08	-2	13.29	-	0.83	59 50.96
1339...	N.	47	54	05.65	1662.0	92	96								
1363...	S.	68	07	19.44	1552.5	92	96	31	59	17.45	+0	36.22	-	0.83	59 52.84
1436...	S.	74	28	46.03	1512.5	92	98								
1477...	N.	41	30	08.12	1378.0	94	96	32	00	32.92	-0	44.49	-	0.83	59 47.60
1437...	S.	74	21	45.36	2143.0	92	98								
1477...	N.	41	30	08.12	1378.0	94	96	32	04	03.26	-4	13.02	-	0.83	59 49.41
1477...	N.	41	30	08.12	1378.0	92	98								
1485...	S.	74	20	37.87	2251.5	94	96	32	04	37.0	-4	48.91	-	0.83	59 47.26
1528...	S.	65	10	08.23	2190.0	100	90								
1534...	N.	50	49	11.29	2096.5	91	98.5	32	00	20.24	-0	30.93	+	0.73	59 50.04
1568...	S.	71	32	43.11	2643.0	91	99								
1613...	N.	44	08	47.43	939.0	95	97	32	09	14.73	-9	23.60	-	1.04	55 50.09
1689...	S.	73	25	27.57	2894.0	94	97								
1736...	N.	42	22	44.93	1807.0	96	99	32	05	53.75	-5	59.53	-	1.04	59 53.18

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G. C. 173...	S.	72	52	10.00	1699.5	99.5	79.5								
194...	N.	43	10	16.00	1867.5	101	81	31	58	47.00	+0	55.57	+	4.17	31 59 46.74
188...	S.	72	38	29.16	2933.0	99.5	79.5								
194...	N.	43	10	16.00	1867.5	101	81	32	05	37.42	-5	52.41	+	4.17	59 49.18
735...	N.	40	21	25.93	2920.0	96.5	85.5								
780...	S.	75	35	22.10	3261.0	97	85.5	32	01	35.98	-1	52.79	+	2.29	59 45.48
749...	N.	40	03	27.30	1297.0	96.5	85.5								
780...	S.	75	35	22.10	3261.0	97	85.5	32	10	35.29	-10	49.49	+	2.29	59 48.09
821...	N.	50	23	58.38	1301.0	96	89.5								
866...	S.	65	23	58.02	2442.5	96	93	32	06	01.80	-6	17.55	+	0.99	59 45.24
941...	S.	64	35	40.34	2712.0	108	82								
953...	N.	51	42	13.75	1572.5	108	82	32	06	02.95	-6	16.89	+	5.41	59 51.47
957...	S.	65	17	55.21	1435.0	100	90								
981...	N.	50	55	19.77	2556.0	101	89	31	53	32.51	+6	10.77	+	2.29	59 45.57
999...	S.	69	28	38.64	1914.0	98	91.5								
1006...	N.	46	29	28.34	1706.0	99	91	32	00	56.51	-1	08.80	+	1.51	59 49.22
B. A. C. 1064...	S.	71	44	11.09	1293.0	97	97								
1083...	N.	44	25	10.39	2111.0	97	97	31	55	19.26	+4	30.55	+	0.42	59 50.23
1099...	N.	42	16	29.53	2190.5	103	87.5								
1119...	S.	73	55	19.62	1165.5	102	88.5	31	54	05.42	+5	39.02	+	3.23	59 47.67
1135...	S.	70	45	03.45	1259.0	103	87								
1172...	N.	45	27	40.59	2364.0	97	88	31	53	37.98	+6	05.48	+	2.60	59 46.06
1140...	S.	70	46	48.96	1100.0	103	87								
1172...	N.	45	27	40.59	2364.0	97	88	31	52	45.22	+6	58.07	+	2.60	59 45.89
1269...	N.	52	19	44.13	2576.0	97.5	93								
1279...	S.	63	53	10.42	1444.5	98.5	93	31	53	32.72	+6	14.24	+	0.94	59 47.90
1289...	S.	67	56	52.76	1606.5	97	94								
1305...	N.	48	12	18.04	2406.0	97	94	31	55	24.60	+4	24.43	+	0.62	59 49.65
1339...	N.	47	54	05.39	1735.0	97	94								
1362...	S.	68	01	44.21	2146.0	97	94	32	02	05.20	-2	15.94	+	0.62	59 49.88
1339...	N.	47	54	05.39	1785.0	97	94								
1363...	S.	68	07	19.45	1639.0	97	94	31	59	17.58	0	32.08	+	0.62	59 50.28
1436...	S.	74	28	47.12	1574.0	96	96								
1477...	N.	41	30	07.73	1434.5	99.5	94.5	32	00	32.57	0	46.14	+	0.52	59 46.95
1437...	S.	74	21	45.46	2209.0	96	96								
1477...	N.	41	30	07.73	1434.5	99.5	94.5	32	04	03.40	4	16.17	+	0.52	59 47.75

## Determination of the latitude—Continued.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.			Level sums of.	Approximate lati- tude.	Z. difference by mi- cronometer.	Corrections for level.	Latitude.
		°	'	"	D.	N.	S.					
B. A. C. 1477..	N.	41	30	07.73	1434.5	96	96					
1485..	S.	74	20	37.96	2312.5	99.5	94.5		32 04 37.15	4 50.40	+ 0.52	31 59 47.27
999..	S.	69	28	38.37	1930.0	95	91					
1006..	N.	46	29	29.06	1743.0	99.5	87		32 00 56.28	- 1 01.85	+ 2.60	59 57.03
1064..	S.	71	44	11.22	1375.0	94	93					
1083..	N.	44	25	10.33	2179.0	95	91		31 55 19.22	+ 4 25.92	+ 0.52	59 45.66
1099..	N.	42	16	29.16	2231.0	101	86					
1119..	S.	73	55	19.65	1206.0	100.5	86		31 54 05.59	+ 5 39.02	+ 3.12	59 47.73
1135..	S.	70	45	03.46	1049.0	98.5	88					
1172..	N.	45	27	42.24	2161.5	94	94		31 53 37.15	+ 6 07.96	+ 1.09	59 46.20
1140..	S.	70	46	48.98	887.0	98.5	88					
1172..	N.	45	27	42.24	2161.5	94	94		31 52 44.39	+ 7 01.54	+ 1.09	59 47.02
1240..	S.	72	12	12.98	2864.0	97	94					
1252..	N.	43	27	21.22	1001.0	97	94		32 10 12.90	-10 16.90	+ 0.62	59 56.62
1436..	S.	74	28	46.15	2007.0	98.5	98					
1477..	N.	41	30	07.61	1866.0	102.0	96		32 00 33.12	- 0 46.63	+ 0.67	59 47.08
1437..	S.	74	21	45.49	2640.0	98.5	98					
1477..	N.	41	30	07.61	1966.0	102.0	96		32 04 03.45	- 4 16.00	+ 0.67	59 48.12
1528..	S.	65	10	08.17	2047.5	103	95					
1534..	N.	50	49	10.94	1940.0	103	95		32 00 20.44	- 0 35.56	+ 0.67	59 46.54
1568..	S.	71	32	43.18	2976.0	98	100					
1613..	N.	44	08	46.82	1261.0	103.5	96.5		32 09 15.00	- 9 27.24	+ 0.52	59 48.28
1703..	S.	73	40	39.70	1675.0	101.5	98.5					
1736..	N.	42	22	44.38	1966.0	101.5	98		31 58 17.96	+ 1 36.25	+ 0.62	59 54.83

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B. A. C. 441..	N.	43	42	57.52	2526.0	100	81.7					
469..	S.	72	15	27.56	2713.0	102	80		32 00 47.46	- 1 01.85	+ 4.17	31 59 49.78
540..	N.	44	28	11.65	1938.0	94	90					
572 & 3	S.	71	23	41.65	2713.0	93	92		32 04 03.35	- 4 16.33	+ 0.52	59 47.54
G. C. 188..	S.	72	38	20.26	2718.0	93	95					
194..	N.	43	10	16.00	1669.0	93	95		32 05 37.37	- 5 46.96	- 0.42	59 49.99
B. A. C. 735..	N.	40	21	25.90	2191.0	95	96					
780..	S.	75	35	22.19	2519.0	95	96		32 01 35.95	- 1 48.49	- 0.21	59 47.25
821..	S.	50	23	58.36	1439.5	95.5	95					
866..	S.	65	23	58.07	2570.0	91	101		32 06 01.78	- 6 13.41	- 0.93	59 47.44
249..	S.	72	32	19.25	2244.0	95	98					
252..	S.	43	20	30.34	1557.0	95	98		32 03 35.20	- 3 47.23	- 0.62	59 47.35
941..	S.	64	05	40.37	2657.0	97	97					
953..	N.	51	42	13.71	1528.5	97	96.5		32 06 02.96	- 6 13.91	+ 0.05	59 49.10
275..	S.	69	28	35.86	1967.5	97	98.5					
G. C. 277..	N.	46	29	29.02	1762.0	97	98.5		32 00 57.56	- 1 07.97	- 0.31	59 49.28
1064..	N.	71	44	11.15	1725.0	96	100					
1083..	S.	44	25	10.27	2539.5	96	100		31 55 19.29	+ 4 29.40	- 0.83	59 47.86
1099..	N.	42	16	29.09	2596.0	97.5	98					
1119..	S.	73	55	18.10	1558.0	96	99		31 54 06.40	+ 5 43.32	- 0.36	59 49.36
1135..	S.	70	45	03.49	1010.0	96	100.5					
1172..	N.	45	27	40.49	2136.5	96	100.5		31 53 38.01	+ 6 12.59	- 0.93	59 49.67
1140..	S.	70	46	49.37	845.0	96	100.5					
1172..	N.	45	27	40.45	2136.5	96	100.5		31 52 45.06	+ 7 07.16	- 0.93	59 51.29
1269..	N.	52	19	44.02	2716.0	97.5	102					
1279..	S.	63	53	10.40	1578.0	97.5	102		31 53 32.79	+ 6 17.06	- 0.94	59 48.91
1289..	S.	67	56	52.77	1606.0	98	102					
1305..	S.	48	12	17.89	2412.5	98	102		31 55 24.67	+ 4 26.75	- 0.83	59 50.59
1339..	N.	47	54	05.23	2035.5	100	99					
1362..	S.	68	01	44.21	2445.5	100	99		32 02 05.28	- 2 15.61	+ 0.21	59 49.88
1436..	S.	74	28	46.18	1794.5	101	104					
1477..	N.	41	30	07.49	1662.0	101	104		32 00 33.16	- 0 43.82	- 0.62	59 48.72
1437..	S.	74	21	45.52	2430.0	101	104					
1477..	N.	41	30	07.09	1662.0	101	104		32 04 03.49	- 4 14.02	- 0.62	59 48.85
1528..	S.	65	10	08.15	2027.0	102	103					
1534..	S.	50	49	10.86	1922.0	102	102		32 00 20.49	- 0 34.73	± 0.00	59 45.76
1568..	S.	71	32	43.19	2880.0	101	104					
1613..	N.	44	08	46.70	1169.5	101.5	103		32 09 15.05	- 9 25.75	- 0.46	59 48.84

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540..	N.	44	28	11.69	1814.5	92	85					
572 & 3	S.	71	23	41.71	2593.0	93	85		32 04 03.30	- 4 17.49	+ 1.56	59 47.37



Determination of the latitude—Continued.

No. of star in B. A. C. or G. C.	N. or S.	Polar dista			Micrometer readings.			Level, sums of.			Approximate lati- tude.			Z. difference by mi- crometer.		Corrections for level.		Latitude.		
		°	'	"	D.	N.	S.	°	'	"	'	"	"	"	"	°	'	"		
G. C. 173..	S.	72	52	10.17	1593.0	93	87													
194..	N.	43	10	16.01	1775.0	97	85				31	58	46.91	+ 1 00.20	+ 1.87			31	59	48.98
188..	N.	72	38	29.32	2838.0	93	87													
194..	N.	43	10	16.01	1775.0	97	85				32	05	37.33	- 5 51.59	+ 1.87				59	47.61
735..	N.	40	21	25.89	2011.0	92.5	92													
780..	S.	75	35	22.24	2343.0	92	92				32	01	35.93	- 1 49.81	+ 0.05				59	46.17
821..	N.	50	23	58.36	1580.0	94	90.5													
866..	S.	65	23	58.10	2710.5	94	90.5				32	06	01.77	- 6 13.91	+ 0.73				59	48.59
G. C. 249..	S.	72	32	19.30	2394.0	92	91													
252..	N.	43	20	29.31	1704.0	92	91				32	03	35.69	- 3 48.22	+ 0.21				59	47.68
941..	N.	64	05	40.39	2522.5	94	87													
953..	S.	51	42	13.69	1388.0	97	84				32	06	02.96	- 6 15.24	+ 2.08				59	49.80
275..	S.	69	28	35.89	2134.0	96	84.5													
277..	N.	46	29	28.98	1916.0	90	90				32	00	57.56	- 1 12.10	+ 0.78				59	46.24
1064..	S.	71	44	11.18	1616.5	89	91.5													
1083..	N.	44	25	10.22	2431.5	89	91.5				31	55	19.30	+ 4 29.56	- 0.41				59	48.45
1099..	N.	42	16	29.02	2674.0	94	86													
1119..	N.	73	55	19.51	1641.5	91	88				31	54	05.73	+ 5 41.50	+ 1.24				59	48.47
1175..	N.	57	20	24.03	1901.5	91	89													
1207..	S.	58	32	02.62	2619.0	89	90				32	03	46.67	- 3 57.15	+ 0.21				59	49.73
1269..	S.	52	19	43.96	2573.5	90	92													
1279..	S.	63	53	10.39	1437.0	90	92				31	53	32.82	+ 6 15.90	- 0.41				59	48.31
1289..	S.	67	56	52.77	1818.0	90	92													
1305..	N.	48	12	17.81	2623.5	90	92				31	55	24.71	+ 4 26.42	- 0.41				59	50.72
1339..	N.	47	54	05.15	1833.0	90	92													
1362..	S.	68	01	44.21	2238.0	90	92				32	02	05.32	- 2 13.95	- 0.41				50	50.94
1436..	S.	74	28	46.21	1843.5	90	94													
1477..	N.	41	30	07.37	1711.0	91	93				32	00	33.21	- 0 43.82	- 0.62				59	48.77
1437..	N.	74	21	45.55	2477.0	90	94													
1477..	N.	41	30	07.37	1711.0	91	93				32	04	03.54	- 4 13.35	- 0.62				59	49.57
1477..	N.	41	30	07.37	1711.0	91	94													
1485..	S.	74	29	38.04	2582.0	91	93				32	04	37.29	- 4 48.08	- 0.62				59	48.59
1528..	S.	65	10	08.14	2178.0	89	95													
1534..	S.	50	49	10.78	2077.0	89	95				32	00	20.54	- 0 33.41	- 1.25				59	45.88
B. A. C. 1568..	S.	71	32	43.21	2890.0	90	94													
G. C. 428..	N.	44	08	46.58	1175.0	93	93				32	09	15.10	- 9 27.24	- 0.42				59	47.44
B. A. C. 1689..	N.	75	25	34.51	2852.5	92	96.5													
1736..	N.	42	22	44.10	1765.0	93	96.5				32	05	50.69	- 5 59.69	- 0.83				59	50.17
1703..	N.	73	40	39.75	1478.5	92	96.5													
1736..	N.	42	22	44.10	1765.0	93	96.5				31	58	18.07	- 1 34.76	- 0.83				59	52.00
1804..	S.	40	14	16.78	1690.0	95	96													
1827..	S.	75	33	59.32	2797.0	95	96				32	05	51.94	- 6 06.14	- 0.21				59	45.59
1804..	N.	40	14	16.78	1690.0	95	96													
1852..	S.	75	44	15.95	1863.0	95	96				32	00	43.63	- 57.21	- 0.21				59	46.21
1880..	S.	70	16	46.33	3165.5	93	99													
1899..	N.	45	25	10.66	1439.0	93	99				32	09	01.50	- 9 11.19	- 1.25				59	49.06
G. C. 527..	S.	75	13	00.55	3290.5	93.5	98													
549..	N.	40	38	32.79	2492.5	95	96.5				32	04	13.33	- 4 23.94	- 0.63				59	48.66
556..	S.	59	25	20.90	1598.5	96	98.5													
570..	N.	66	52	27.70	3174.0	97	98				31	51	05.70	+ 8 41.10	- 0.35				59	46.45
581..	S.	67	50	51.43	2667.0	97	96													
596..	N.	48	03	18.63	2108.0	97	96				32	02	54.94	- 3 04.89	+ 0.21				59	50.26

JANUARY 17TH, 1859.

G. C. 173..	S.	72	52	10.22	1608.0	73.5	83														
194..	N.	43	10	16.03	1805.0	73.5	83				31	58	41.97	+ 1 05.15	- 1.97				31	59	45.15
188..	N.	72	38	29.64	2850.0	73.5	83														
194..	N.	43	10	16.03	1805.0	73.5	83				32	05	37.16	- 5 45.63	- 1.97				59	49.56	
735..	N.	40	21	25.94	1893.5	80	78														
780..	S.	75	35	22.88	3222.0	77	82				32	01	35.59	- 1 48.61	- 0.31				59	46.67	

JANUARY 18TH, 1859.

G. C. 540..	N.	44	28	11.77	1606.5	91	80														
572, 573..	S.	71	23	41.83	2381.5	93	89				32	04	03.20	- 4 16.33	+ 0.83				31	59	47.70
173..	S.	72	52	10.58	1512.5	93	93														
194..	N.	43	10	16.05	1698.0	97	91				31	58	46.83	+ 1 01.35	+ 0.62				59	48.80	



## Determination of the latitude—Continued.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.		Level, sums of.	Approximate latitude.			Z. difference by micrometer.	Corrections for level.	Latitude.					
		o	'	"	D.	N.		S.	o	'			"	o	'	"		
G. C.	188.	S.	72	38	29.43	2757.5	93	93										
	194.	N.	43	10	16.05	1698.0	97	91	32	05	37.26	- 5	50.43	+	00.62	31	59	47.45
B. A. C.	735.	N.	40	21	25.89	2013.5	99	92										
	780.	S.	75	35	22.34	2350.0	99	93	32	01	35.88	- 1	51.30	+	1.35		59	45.93
	798.	S.	78	09	46.54	2235.0	98	93										
	806.	N.	37	48	10.73	1968.5	98	93	32	01	01.36	- 1	18.22	+	1.04		59	44.18
	821.	N.	50	23	58.37	1337.0	98.5	93										
	866.	S.	65	23	58.16	2471.0	98	95	32	06	01.73	- 6	15.07	+	0.88		59	47.54
G. C.	249.	S.	72	32	19.38	2195.0	99	96										
	252.	N.	43	20	30.25	1501.0	99	96	32	03	35.18	- 3	49.54	+	0.62		59	46.26
	941.	S.	64	05	40.21	2306.0	99.5	95										
	953.	N.	51	42	13.69	1169.0	99.5	95	32	06	03.05	- 6	16.06	+	0.93		59	47.02
	957.	S.	65	17	35.30	1347.0	99.5	95										
	981.	N.	50	55	19.72	2471.5	100.5	95.5	31	53	32.49	+ 6	11.93	+	0.98		59	45.40
	275.	S.	69	28	35.95	1951.0	99	97.5										
	277.	N.	46	29	28.91	1742.0	100	96.5	32	00	57.57	- 1	09.13	+	0.52		59	48.96
	1064.	S.	71	44	11.24	1750.0	101.5	98										
	1083.	N.	44	25	10.12	2560.0	101.5	98	31	55	19.32	+ 4	27.91	+	0.73		59	47.96
	1099.	N.	42	16	28.59	2583.5	103.5	96										
	1119.	S.	73	55	19.79	1552.0	102	98	31	54	05.81	+ 5	41.17	+	1.18		59	48.16
	1175.	N.	57	20	24.09	1716.0	104.5	98										
	1207.	S.	58	32	02.58	2438.0	103.0	99	32	03	46.66	- 3	58.80	+	1.08		59	48.94
	1269.	N.	52	19	43.87	2614.0	105	98										
	1279.	S.	63	53	10.38	1482.0	105	99	31	53	32.87	+ 6	14.41	+	1.34		59	48.62
	1289.	S.	67	56	52.80	1547.0	104.5	99										
	1305.	N.	48	12	17.67	2342.0	105.5	99	31	55	24.76	+ 4	22.95	+	1.24		59	48.95
	1436.	S.	74	28	46.27	1806.0	104.5	99.5										
	1477.	N.	41	30	07.14	1665.5	103.5	104	32	00	33.29	- 0	46.47	+	0.46		59	47.28
	1437.	S.	74	21	45.61	2437.5	104.5	99.5										
	1477.	N.	41	30	07.14	1665.5	103.5	104	32	04	03.62	- 4	15.34	+	0.46		59	48.74
	1477.	N.	41	30	07.14	1665.5	103.5	104										
	1485.	S.	74	20	38.10	2534.0	103.5	104	32	04	37.38	- 4	47.26	+	0.46		59	50.58
B. A. C.	1528.	S.	65	10	08.11	2032.5	104.5	103.5										
	1534.	N.	50	49	10.62	1924.0	110	98.5	32	00	20.63	-	35.89	+	1.29		59	46.03
	1568.	S.	71	32	43.24	2870.0	105	105										
G. C.	428.	N.	44	08	46.34	1156.0	103	106.5	32	09	15.21	- 9	26.91	-	0.35		59	47.95
B. A. C.	1703.	S.	73	40	39.81	1585.5	108	96.5										
	1736.	N.	42	22	43.84	1864.0	109	101.5	31	58	18.17	+ 1	32.11	+	2.11		59	52.39
	1804.	N.	40	14	16.49	1792.0	109.5	102										
	1827.	S.	75	33	59.40	2817.0	109	103	32	05	52.05	- 6	08.79	-	1.39		59	44.65
	1804.	N.	40	14	16.49	1792.0	109.5	102										
	1852.	S.	75	44	16.02	1885.5	109	103	32	00	43.74	- 1	00.69	+	1.39		59	44.44
	1880.	S.	70	16	46.34	3041.0	106.5	105.5										
	1899.	N.	45	25	10.41	1372.0	109	103	32	09	01.62	- 9	12.02	-	0.73		59	50.33
	527.	S.	75	13	00.62	3362.5	109	110										
	549.	N.	40	38	32.48	2559.0	110.5	104	32	04	13.45	+ 4	25.76	-	0.57		59	48.26
	556.	S.	59	25	20.79	1298.0	109.5	104.5										
	570.	N.	56	52	27.56	2868.0	110.5	103	31	51	05.82	+ 8	39.28	-	1.30		59	46.40
	581.	S.	67	50	51.42	2358.0	101.5	100										
	596.	N.	48	03	18.44	1792.5	111.0	102.5	32	02	55.07	+ 3	07.04	-	2.18		59	50.21

Tabulation of results for latitude of astronomical station on Rio Grande, derived from observations made with zenith telescope by Würdeman on thirty-eight pairs of stars.

By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assist. Astronomer.

Date.		1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
		B. A. C. 404 N. 430 S.	B. A. C. 441 N. 446 S.	B. A. C. 441 N. 469 S.	B. A. C. 540 N. 572 & 3 S.	G. C. 173 S. 194 N.	G. C. 188 S. 194 N.	B. A. C. 735 N. 780 S.	B. A. C. 749 N. 780 S.	B. A. C. 798 S. 806 N.
1858.										
January	7th		31 59 48.95		59 42.73	59 46.76	59 48.86		59 46.90	
"	8th	31 59 46.86	59 49.95	59 49.16	59 46.63		59 46.50	59 45.89	59 46.41	
"	10th				59 47.76	59 48.62	59 47.91	59 45.87		
"	13th					59 46.74	59 49.18	59 45.48	59 48.09	
"	14th									
"	15th			59 49.78	59 47.54		59 49.99	59 47.25		
"	16th				59 47.37	59 48.98	59 47.61	59 46.17		
"	17th					59 49.56		59 46.67		
"	18th				59 47.70	59 48.80	59 47.45	59 45.93		59 44.18
Latitude by a mean of each pair		31 59 46.86	31 59 49.45	31 59 49.47	31 59 46.62	31 59 48.24	31 59 48.21	31 59 46.18	31 59 47.13	31 59 44.18
Date.		10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
		B. A. C. 821 N. 866 S.	B. A. C. 249 S. 252 N.	B. A. C. 941 S. 953 N.	B. A. C. 981 N. 957 S.	G. C. 275 S. 277 N.	B. A. C. 999 S. 1006 N.	B. A. C. 1064 S. 1083 N.	B. A. C. 1099 N. 1119 S.	B. A. C. 1135 S. 1172 N.
1859.										
January	7th	31 59 48.21								
"	8th	59 45.93		59 46.10	59 45.34		59 50.73			
"	10th	59 45.16		59 48.40			59 50.23	59 48.99	59 49.47	
"	13th	59 45.24		59 51.47	59 45.57		59 49.22	59 50.23	59 47.67	59 46.06
"	14th						59 51.03	59 45.66	59 47.73	59 46.20
"	15th	59 47.44	59 47.35	59 49.10		59 49.28		59 47.86	59 49.36	59 49.67
"	16th	59 48.59	59 47.68	59 49.80		59 46.24		59 48.85	59 48.87	
"	17th									
"	18th	59 47.54	59 46.26	59 47.92	59 45.40	59 48.96		59 47.96	59 48.16	
Latitude by a mean of each pair		31 59 46.87	31 59 47.09	31 59 48.79	31 59 45.43	31 59 48.16	31 59 50.30	31 59 48.25	31 59 48.47	31 59 47.31



Tabulation of results for latitude of astronomical station on Rio Grande, &c.—Continued.

Date.	19th pair.	20th pair.	21st pair.	22nd pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
	B. A. C. 1140 S. 1172 N.	B. A. C. 1175 N. 1207 S.	B. A. C. 1240 S. 1252 N.	B. A. C. 1269 N. 1279 S.	B. A. C. 1289 S. 1305 N.	B. A. C. 1339 N. 1362 S.	B. A. C. 1339 N. 1363 S.	B. A. C. 1436 S. 1477 N.	B. A. C. 1437 S. 1477 N.
1859.	o i "	o i "	i "	i "	i "	i "	i "	i "	i "
January 7th									
8th									
10th		59 47.68	59 53.34	59 46.78	59 50.73	59 50.96	59 52.84	59 47.00	59 49.41
13th	31 59 45.89			59 47.90	59 49.65	59 49.88	59 50.28	59 46.95	59 47.75
14th	59 47.02		59 56.62					59 47.08	59 48.12
15th	59 51.29			59 48.91	59 50.59	59 49.88		59 48.72	59 48.85
16th		59 49.73		59 48.31	59 50.72	59 50.94		59 48.77	59 49.57
17th									
18th		59 48.94		59 48.62	59 48.95			59 47.28	59 48.74
Latitude by a mean of each pair	31 59 48.06	31 59 48.75	31 59 54.98	31 59 48.10	31 59 50.12	31 59 50.40	31 59 51.56	31 59 47.73	31 59 48.74
Date.	28th pair.	29th pair.	30th pair.	31st pair.	32d pair.	33d pair.	34th pair.	35th pair.	36th pair.
	B. A. C. 1477 N. 1485 S.	B. A. C. 1528 S. 1534 N.	B. A. C. 1568 S. 1613 N.	B. A. C. 1689 S. 1736 N.	B. A. C. 1703 S. 1736 N.	B. A. C. 1804 N. 1827 S.	B. A. C. 1804 N. 1852 S.	B. A. C. 1880 S. 1899 N.	B. A. C. 527 S. 549 N.
1859.	i "	i "	i "	i "	i "	i "	i "	i "	i "
January 7th									
8th									
10th	31 59 47.26	59 50.04	59 50.09	59 53.18					
13th	59 47.27								
14th		59 46.64	59 48.28		59 54.83				
15th		59 45.76	59 48.84						
16th	59 48.59	59 45.88	59 47.74	59 50.17	59 52.00	59 45.59	59 46.21	59 49.06	59 48.66
17th									
18th	59 50.58	59 46.03	59 47.95		59 52.39	59 44.65	59 44.44	59 50.33	59 48.26
Latitude by a mean of each pair	31 59 48.42	31 59 46.87	31 59 48.52	31 59 51.67	31 59 53.07	31 59 45.12	31 59 45.32	31 59 49.69	31 59 48.46



Tabulation of results for latitude of astronomical station on Rio Grande, &c.—Continued.

Date.	37th pair.		38th pair.		Results for latitude by a mean of each night's observations.	1st result.—Latitude by a mean of each pair.	2d result.—Latitude by a mean of all the observations.	3d result.—Latitude by a mean of results for each night.	Final result.—Mean of 1st, 2d, and 3d results.
	G. C. 570 N. 556 S.	G. C. 581 S. 596 N.							
1859.	o / "	o / "	o / "	o / "	o / "				
January 7th	.....	.....	.....	.....	31 59 46.45	} 31 59 48.40	} 31 59 48.26	} 31 59 48.04	} 31 59 48.23
8th	.....	.....	.....	.....	59 47.22				
10th	.....	.....	.....	.....	59 49.15				
13th	.....	.....	.....	.....	59 47.92				
14th	.....	.....	.....	.....	59 49.55				
15th	.....	.....	.....	.....	59 48.81				
16th	31 59 46.45	50 50.26	.....	.....	59 48.40				
17th	.....	.....	.....	.....	59 47.12				
18th	59 46.40	59 50.21	.....	.....	59 47.77				
Lat. by a mean of each pair.	31 59 46.42	31 59 50.23							

Latitude of astronomical station No. 1, initial point, 32d parallel on Rio Grande, 31° 59' 48".23.

Determination of the latitude.

A.—2D. CROW SPRING, 32D PARALLEL.

[Station 2, Crow Spring. Zenith telescope, by Würdeman. Chronometer No. 2419, sidereal, by P. and F.

Date: MARCH 8TH, 1859.

No. of star.	N. or S.	Polar distances.	Micrometer readings.			Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.
			D.	N.	S.					
B. A. C. 1804.	N.	40 14 11.28	1823.0	83	71					
1827.	S.	75 34 00.48	2990.0	83	71	32 05 54.12	6 25.98	+ 2.50	31 59 30.64	
1804.	N.	40 14 11.28	1823.0	83	71					
1852.	S.	75 44 17.04	2058.0	83	71	32 00 45.84	1 17.73	+ 2.50	30.61	
1880.	S.	70 10 46.54	3021.5	81	75					
1899.	N.	45 25 06.46	1294.5	81	75	32 09 03.50	9 31.21	+ 1.25	33.54	
G. C. 527.	S.	75 13 01.57	2691.0	101	67					
549.	N.	40 38 26.98	1803.0	93	67	32 04 15.77			Rejected.	
556.	S.	59 25 18.60	1392.5	86	75					
570.	N.	56 52 24.80	2908.0	92	68	31 51 08.30	8 21.25	+ 3.64	33.19	
581.	S.	67 50 50.81	2328.5	100	60					
596.	N.	48 03 13.59	1678.5	96	67	32 02 57.80	3 34.99	+ 7.18	30.62	
B. A. C. 2 01.	S.	60 25 38.47	2743.5	77	89					
2314.	N.	55 18 53.07	1268.0	78	88	32 07 44.23	8 08.02	- 2.29	34.02	
2338.	N.	50 27 04.36	2200.0	80.5	86.5					
2350.	S.	65 38 14.82	1790.5	80.5	86.5	31 57 20.41	2 15.44	- 1.04	34.81	
2504.	N.	54 38 21.33	2782.0	81.5	93					
2555.	S.	61 38 07.98	1371.0	83	91	31 51 45.34	+ 7 46.69	- 2.03	30.00	
G. C. 704.	N.	42 15 02.82	2405.0	86	88					
709.	S.	73 50 10.85	2009.0	86	88	31 57 23.16	+ 2 10.98	- 0.42	33.72	
B. A. C. 2609.	N.	42 04 17.96	1426.5	86	88					
G. C. 709.	S.	73 50 10.85	2009.0	86	88	32 02 45.59	- 3 12.66	- 0.42	32.51	
754.	S.	62 36 28.71	3340.0	33	40					
760.	N.	53 05 15.04	1609.5	16	09.5	32 09 13.80	- 9 32.36	- 2.55	33.21	
754.	S.	62 36 28.71	3340.0	33	40					
764.	N.	53 05 56.28	1672.5	16	09.5	32 08 53.18	- 9 11.53	- 2.55	33.42	
793.	S.	73 52 50.67	1736.0	17	36					
797.	N.	42 17 17.29	2569.0	25	69	31 54 57.73	+ 4 35.51	- 0.00	31.53	
B. A. C. 3162.	N.	52 36 09.41	2356.0	23	56					
3204.	S.	63 12 47.91	3428.0	34	28	32 05 31.34	- 5 54.56	+ 1.56	38.34	
3278.	S.	72 55 54.74	1483.0	14	83					
3341.	N.	43 19 27.66	2804.5	28	04.5	31 52 18.80	+ 7 17.08	+ 0.94	36.82	

## Determination of the latitude—Continued.

MARCH 9TH, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.			Level sums.			Approximate lati- tude.			Z. difference by mi- crometer.			Corrections for level.			Latitude.		
		°	'	"	D.	N.	S.	°	'	"	'	"	"	"	"	"	°	'	"			
1880..	S.	70	16	46.55	3393.0	85	79															
1899..	N.	45	25	06.42	1671.5	87	77	32	09	03.51	-	9	29.39	+	1.67				31	59	35.79	
527..	S.	75	13	01.57	2534.5	82	84															
549..	N.	40	38	26.94	1678.0	92	76.5	32	04	15.74	-	4	43.29	+	1.41							33.86
556..	S.	59	25	18.59	1440.5	89	80.5															
570..	N.	56	52	24.56	2950.0	83.5	88	32	51	08.42	+	8	19.27	+	0.42							28.11
581..	S.	67	50	50.79	2351.5	90	82.5															
596..	N.	48	03	13.54	1727.5	91	82	32	02	57.83	-	3	26.39	+	1.72							33.16
2239..	N.	51	23	11.27	1748.5	93	83															
2254..	S.	64	27	00.82	2722.0	93.5	82	32	04	53.95	-	5	21.99	+	2.24							34.20
2241..	N.	51	19	24.06	1398.5	93	83															
2254..	S.	64	27	00.82	2722.0	93.5	82	32	06	47.56	-	7	17.75	+	2.24							32.05
2301..	S.	60	25	38.43	2942.5	94.5	82.5															
2314..	N.	55	18	53.77	1449.5	94.5	82.5	32	07	43.90	-	8	13.81	+	2.50							32.59
2338..	N.	50	27	04.19	2184.0	96.5	80.5															
2350..	S.	65	38	14.78	1792.5	96.5	80	31	57	20.51	+	2	09.49	+	3.33							33.33
2383..	S.	63	03	27.73	2068.5	95	83															
2416..	N.	52	58	31.18	2167.0	95	83	31	59	00.54	+	0	32.58	+	2.50							35.62
2429..	N.	49	03	26.64	1730.0	97	81															
2434..	S.	66	47	08.32	2673.5	95	83	32	04	42.52	-	5	12.06	+	2.92							33.38
2504..	N.	54	38	21.25	2926.5	98	82															
2555..	S.	61	38	07.92	1536.0	97	82	31	51	45.41	+	7	39.91	+	3.23							28.55
704..	N.	42	15	02.70	2568.0	99	81															
709..	S.	73	50	10.83	2187.0	99	81	31	57	23.23	+	2	06.02	+	3.75							33.00
2609..	N.	42	04	17.84	1589.0	99	81															
709..	S.	73	50	10.83	2187.0	99	81	32	02	45.66	-	3	17.79	+	3.75							31.62
2715..	N.	47	09	26.05	2115.0	94	90.5															
2788..	S.	68	48	32.73	2365.0	96	92	32	01	00.61	-	1	26.69	+	0.78							34.70
793..	S.	73	52	50.65	1754.0	85	93															
797..	N.	42	17	17.13	2602.0	85.5	93	31	54	56.11	+	4	40.48	-	1.61							34.97
3162..	N.	52	36	09.28	2460.5	85	94.5															
3201..	S.	63	28	43.08	2076.0	85	94.5	31	57	33.82	+	2	05.17	-	1.98							39.01
3204..	S.	63	12	47.83	2172.0	84.5	93.5															
3252..	N.	52	53	26.91	2671.5	84.5	93	31	56	52.63	+	2	45.21	-	1.82							36.02
3204..	S.	63	12	47.83	2172.0	84.5	93.5															
3261..	N.	52	58	43.35	3149.0	84.5	93	31	54	14.38	+	5	22.94	-	1.82							35.53
3278..	S.	72	55	54.76	1551.0	83	93															
3341..	N.	41	19	57.48	2886.0	81.5	96	31	52	18.89	-	7	21.55	-	2.55							37.89
3423..	S.	67	22	25.99	2160.0	79	98															
3466..	N.	48	38	51.52	2219.0	81	98	31	59	21.24	-	19.51	-	3.75								37.00
3485..	S.	68	07	58.52	2507.0	78	100															
3533..	N.	47	47	39.26	2052.0	80.5	99	32	02	11.11	-	2	30.49	-	4.22							36.40
3610..	N.	54	17	18.54	2138.0	83	97															
3650..	S.	61	44	36.68	2032.0	83	97	31	59	02.39	+	35.06	-	2.92								34.53
3661..	N.	57	34	04.72	2321.0	80	98.5															
3685..	S.	58	34	40.50	1584.0	80	98.5	31	55	37.39	+	4	03.76	-	3.85							37.30

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1880..	S.	70	16	46.55	3282.0	87	79															
1899..	N.	45	25	06.38	1555.0	89	78.5	32	09	03.53	-	9	31.21	+	1.93							31 59 34.25
527..	S.	75	13	01.69	2433.0	85	83															
549..	N.	40	38	26.89	1573.5	88.5	82	32	04	15.71	-	4	44.28	+	0.99							32.42
556..	S.	59	25	18.57	1109.0	86	86															
570..	N.	56	52	24.74	2635.0	90	84	31	51	08.34	+	8	24.72	+	0.62							33.68
581..	S.	67	50	50.78	2282.0	91.5	82.5															
596..	N.	48	03	13.42	1656.0	94	80	32	02	57.90	-	3	27.05	+	1.83							32.68
2239..	N.	51	23	11.22	1568	92	82															
2254..	S.	64	27	00.80	2343.5	92.5	81	32	04	53.99	+	5	22.64	+	2.24							33.59
2241..	N.	51	19	24.02	1218.0	92	82															
2254..	S.	64	27	00.80	2543.5	92.5	81	32	06	47.59	-	7	18.41	+	2.24							31.42
2301..	S.	60	25	38.39	2779.0	96.5	79															
2314..	N.	55	18	53.72	1278.0	96.5	79	32	07	43.94	-	8	16.46	+	2.84							30.32
2338..	N.	50	27	04.13	1971.0	96.5	80															
2350..	S.	65	38	14.85	1582.0	96.5	84	31	57	20.51	+	2	08.66	+	3.43							32.60
2383..	S.	63	03	27.69	1849.5	95	82.5															
2416..	N.	52	58	31.12	1944.0	95	82.5	31	59	00.59	+	0	31.26	+	2.60							33.85
2504..	N.	54	38	21.18	2776.0	98	82															
2555..	S.	61	38	07.87	1385.0	100	81	31	51	45.47	+	7	40.07	+	2.84							28.38
G. C. 704..	N.	42	15	02.57	2479.5	89.5	91.5															
709..	S.	73	50	10.80	2083.5	88.5	93	31	57	23.31	+	2	10.98	-	0.67							33.62



Determination of the latitude.—Continued.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.			Level sums.			Approximate latitude.			Z. difference by micrometer.			Corrections for level.			Latitude.		
		°	'	"	D.	N.	S.	°	'	"	°	'	"	"	"	"	"	"	°	'	"	
B. A. C. 2609..	N.	42	04	17.72	1502.0	89.5	91.5				32	02	45.74	-	3	12.33	-	0.67	31	59	32.74	
G. C. 709..	S.	73	50	10.80	2083.5	88.5	93															
2715..	N.	47	09	25.94	1804.0	91	93															
2788..	S.	68	48	32.71	2052.0	93.5	92				32	01	00.67	-	1	22.03	-	0.10			38.54	
754..	S.	62	36	28.57	2787.5	94	91.5															
760..	N.	53	05	14.73	1042.5	91	94				32	09	08.35	-	9	37.16	+	0.00			31.19	
754..	S.	62	36	28.57	2787.5	94	91.5															
764..	N.	53	05	55.95	1106.0	91	94				32	08	47.74	-	9	16.16	+	0.00			31.58	
B. A. C. 2952..	S.	58	47	36.37	3079.0	97	89															
2999..	N.	57	00	00.70	1881.0	95	91				32	06	11.96	-	6	36.24	+	1.04			36.26	
2999..	N.	57	00	00.70	1881.0	95	91															
3016..	S.	58	53	18.47	2566.5	97	89				32	03	20.41	-	3	46.73	+	1.04			34.72	
G. C. 793..	S.	73	52	50.62	2113.0	95.5	89															
797..	N.	42	17	16.96	2944.5	95.5	89				31	54	56.21	+	4	35.02	+	1.35			32.58	
B. A. C. 3162..	N.	52	36	09.14	1796.5	96.5	91															
3204..	S.	63	12	47.75	2871.5	96.5	91				32	05	31.55	-	5	55.56	+	1.13			37.12	
3278..	S.	72	55	54.71	1421.0	95	92															
3341..	N.	43	19	27.30	2746.0	99	90.5				31	52	18.99	+	7	18.22	+	1.19			38.42	
3423..	S.	67	22	25.97	2155.5	100.5	89															
3466..	N.	48	38	51.36	2189.5	101	90.5				31	59	21.33	+	11	25	+	2.18			34.76	
3485..	S.	68	07	58.45	2478.0	102	91															
3533..	N.	47	47	39.09	2002.5	102	91				32	02	11.23	-	2	37.27	+	2.28			36.24	

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B. A. C. 1880..	S.	70	16	46.55	2997.0	80	80				32	09	03.52	-	9	31.87	+	1.40			33.05
1899..	N.	45	25	06.40	1268.0	86.5	73														
G. C. 527..	S.	75	13	01.57	2464.5	85	76				32	04	15.79	-	4	45.77	+	2.39			32.41
549..	N.	40	38	26.85	1600.5	88	74														
556..	N.	59	25	18.54	1352.5	88.5	73														
570..	S.	56	52	24.70	2866.0	88	74				31	51	08.38	+	8	20.59	+	3.06			82.03
581..	S.	67	50	50.77	2475.0	85	76														
596..	N.	48	03	13.42	1846.0	87	76				32	02	57.90	-	3	28.04	+	2.08			31.94
B. A. C. 2239..	N.	51	23	11.17	1466.0	89.5	76														
2254..	S.	61	27	00.77	2444.0	89.5	76				32	04	54.03	-	5	23.47	+	2.81			33.37
2254..	S.	64	27	00.77	2444.0	89.5	76														
2241..	N.	51	19	24.07	1124.0	89.5	76				32	06	47.58	-	7	16.59	+	2.81			33.60
G. C. 754..	S.	62	36	28.51	2775.5	103	82														
760..	N.	53	05	14.72	1016.0	105	81				32	09	08.38	-	9	41.95	+	4.69			31.12
754..	S.	62	36	28.51	2775.5	103	82														
764..	N.	53	05	54.63	1078.0	105	81				32	08	48.43	-	9	21.45	+	4.69			31.67

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G. C. 550..	S.	59	25	18.38	1610.5	93	87				31	51	08.57	+	8	21.00	-	0.15			29.42
570..	N.	56	52	24.48	3124.0	86.5	94														
581..	S.	67	50	50.14	2620.0	87.5	92.5				32	02	58.36	-	3	23.08	+	0.78			34.06
596..	N.	48	03	13.14	2006.0	90	92.5														
B. A. C. 2239..	N.	51	23	11.07	1757.5	88	94														
2254..	S.	64	27	00.75	2718.0	88	94.5				32	04	54.09	-	5	17.68	-	1.30			35.11
2254..	S.	64	27	00.75	2718.0	88	94.5														
2241..	N.	51	19	23.87	1408.0	88	94				32	06	47.69	-	7	13.28	-	1.30			33.11
2301..	S.	60	25	38.32	2745.5	88	94														
2314..	N.	55	18	53.57	1262.0	88	92				32	07	44.05	-	8	10.65	-	1.04			34.43
2338..	N.	50	27	03.93	2197.0	90.5	90														
2350..	S.	65	58	14.07	1792.5	90.5	91.5				31	57	21.00	+	2	14.12	-	0.10			35.02
2383..	S.	63	03	27.58	1914.0	89	91.5														
2416..	N.	52	58	30.93	2026.0	89	91.5				31	59	00.74	+	37.04	-	0.52				37.26
G. C. 704..	N.	42	15	02.01	2451.0	93	91.5														
709..	S.	73	50	10.43	2059.5	91	94				31	57	23.78	+	2	29.48	-	0.15			33.11
B. A. C. 2609..	N.	42	04	17.37	1472.0	91	94														
G. C. 709..	S.	73	50	10.43	2059.5	93	91.5				32	02	46.10	-	3	14.31	-	0.15			31.94
B. A. C. 2715..	N.	47	09	25.60	2006.0	93.5	94.5														
2788..	S.	68	48	32.66	2253.0	94	95.5				32	01	00.87	-	1	25.00	-	0.26			35.61
G. C. 754..	S.	62	36	28.12	2751.5	98.5	93														
760..	N.	53	05	14.52	1004.5	100.5	92.5				32	09	08.18	-	9	37.82	+	1.30			32.16
754..	S.	62	36	28.12	2751.5	98.5	93														
764..	N.	53	05	55.73	1068.0	100.5	92.5				32	08	48.07	-	9	16.82	+	1.30			33.46
B. A. C. 2952..	S.	58	47	36.07	2986.0	104	91														
2999..	N.	57	00	00.40	1778.0	104.5	91				32	06	11.76	-	6	39.54	+	2.89			35.11
2999..	N.	57	00	00.40	1778.0	105.5	91														
3016..	S.	58	53	18.20	2471.0	105.5	91				32	03	20.70	-	3	49.21	+	2.89			34.30
G. C. 793..	S.	73	52	50.44	1970.0	115	101														
797..	N.	42	17	16.48	2798.0	105	101.5				30	54	56.59	+	4	33.86	+	3.02			33.47



Tabulation of results for latitude of astronomical station No. 2, Crow Spring, derived from observations made with zenith telescope by Wurdeman on thirty pairs of stars.

By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.

		1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
Date.		B. A. C. 1804 N. 1827 S.	B. A. C. 1804 N. 1852 S.	B. A. C. 1880 S. 1899 N.	G. C. 527 S. 549 N.	G. C. 550 S. 570 N.	G. C. 556 S. 570 N.	G. C. 581 S. 596 N.	B. A. C. 2239 N. 2254 S.	B. A. C. 2241 N. 2254 S.
1859.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
March 8th	.....	31 59 30.64	31 59 30.61	31 59 33.54	.....	.....	31 59 33.19	31 59 30.62	.....	.....
9th	.....	.....	.....	59 35.79	31 59 33.80	.....	59 28.11	59 33.16	31 59 34.20	31 59 32.05
10th	.....	.....	.....	59 34.25	59 32.42	.....	59 33.68	59 32.68	59 33.59	59 31.42
11th	.....	.....	.....	59 33.05	59 32.41	.....	59 32.03	59 31.94	59 33.37	59 33.80
13th	.....	.....	.....	.....	.....	31 59 29.42	.....	59 34.06	59 35.11	59 33.11
Latitude by a mean of each pair		31 59 30.64	31 59 30.61	31 59 34.15	31 59 32.89	31 59 29.42	31 59 31.75	31 59 32.49	31 59 34.06	31 59 32.59
		10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
Date.		B. A. C. 2301 S. 2314 N.	B. A. C. 2338 N. 2350 S.	B. A. C. 2383 S. 2416 N.	B. A. C. 2429 N. 2434 S.	B. A. C. 2504 N. 2555 S.	G. C. 704 N. 709 S.	B. A. C & G. C. 2609 N. 709 S.	B. A. C. 2715 N. 2788 S.	G. C. 754 S. 760 N.
1859.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
March 8th	.....	31 59 34.02	31 59 34.81	.....	.....	31 59 30.00	31 59 33.70	31 59 32.51	.....	31 59 33.21
9th	.....	59 32.59	59 33.33	31 59 35.62	31 59 33.38	59 28.55	59 33.00	59 31.62	31 59 34.70	.....
10th	.....	59 30.32	59 32.60	59 33.85	.....	59 28.38	59 33.62	59 32.74	59 38.54	59 31.19
11th	.....	.....	.....	.....	.....	.....	.....	.....	.....	59 31.12
13th	.....	59 34.43	59 35.02	59 37.26	.....	.....	59 33.11	59 31.94	59 35.61	59 32.16
Latitude by a mean of each pair		31 59 32.84	31 59 33.94	31 59 35.57	31 59 33.38	31 59 28.97	31 59 33.35	31 59 32.20	31 59 36.28	31 59 31.92

Tabulation of results for latitude of astronomical station No. 2, Crow Spring, &c.—Continued.

		19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
Date.		G. C. 754 S. 764 N.	B. A. C. 2952. 2999.	B. A. C. 2999. 3016.	G. C. 793 S. 797 N.	B. A. C. 3162 N. 3204 S.	B. A. C. 3204 S. 3252 N.	B. A. C. 3204 S. 3261 N.	B. A. C. 3278 S. 3341 N.	B. A. C. 3423 S. 3466 N.
1859.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
March 8th	.....	31 59 33.42			31 59 31.53	31 59 38.34			31 59 36.82	
9th	.....				59 34.97	59 39.01	31 59 36.02	31 59 35.53	59 37.89	31 59 37.00
10th	.....	59 31.58	31 59 36.26	31 59 34.72	59 32.58	50 37.12			59 38.42	59 34.76
11th	.....	59 31.47								
13th	.....	59 33.46	59 35.11	59 34.30	59 33.47					
Latitude by a mean of each pair		31 59 32.53	31 59 35.68	31 59 34.51	31 59 33.13	31 59 38.15	31 59 36.02	31 59 35.53	31 59 37.71	31 59 35.88
			28th pair.	29th pair.	30th pair.	Results for lati- tude by a mean of each night's observations.	1st result.	2d result.	3d result.	Final result.
Date.			B. A. C. 3455 S. 3533 N.	B. A. C. 3610 N. 3650 S.	B. A. C. 3661 N. 3685 S.		Latitude by a mean of each pair.	Latitude by a mean of all the ob- servations.	Latitude by a mean of the results of each night.	Mean of 1st, 2d, and 3d results.
1859.			o i "	o i "	o i "					
March 8th	.....					31 59 33.13	} 31 59 34.49	} 31 59 33.62	} 31 59 33.46	} 31 59 33.85
9th	.....		31 59 36.40	31 59 34.53	31 59 37.30	31 59 34.28				
10th	.....		59 36.24			31 59 33.68				
11th	.....					31 59 32.41				
13th	.....					31 59 33.83				
Latitude by a mean of each pair			31 59 36.32	31 59 34.53	31 59 37.30					

Latitude Sta. 2, Crow Spring, 31° 59' 33".85.



## Determination of the latitude.

## A.—3D. INDEPENDENCE SPRING, 32D PARALLEL.

[Station 3, Independence Spring. Zenith telescope by Würdeman. Chronometer No. 2419, siderea by P. &amp; F.]

Date: MARCH 22D, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.		Level sums.		Approximate latitude.	Z. difference by chronometer.	Corrections for level.	Latitude.		
		°	'	"	D.	N.	S.	°				'	"	
2254..	S.	64	27	00.55	2400.5	71.5	77.5							
2270..	N.	51	45	17.43	2233.0	71	78	31 53 51.01	-0 55.40	1.35		31 52 54.26		
2292..	S.	79	10	47.73	2033.0	70	81							
2300..	N.	37	01	52.10	1899.0	70	81	31 53 40.08	0 44.32	2.28		53.48		
2338..	N.	50	27	03.49	1670.0	73	79							
2350..	S.	65	38	14.43	2477.5	73	79	31 57 21.04	4 25.10	1.25		5.69		
2383..	S.	63	03	27.29	2685.0	73	81							
2416..	N.	52	58	30.44	1589.5	73.5	80.5	31 59 01.13	6 02.34	1.55		54.24		
2504..	N.	54	38	20.41	2255.0	74	83.5							
2555..	S.	61	38	07.36	2048.0	71.5	86.5	31 51 46.11	1 08.47	2.54		52.04		
704..	N.	42	15	01.35	2247.5	73.5	86							
709..	S.	73	50	10.58	3049.0	73.5	85	31 57 24.03	4 25.10	2.50		56.43		
2609..	N.	42	04	16.48	1268.0	73.5	85							
709..	S.	73	50	10.58	3049.0	73.5	86	32 02 46.47	9 49.07	2.50		54.90		
2715..	N.	47	09	24.70	1345.0	80.5	79.5							
2788..	S.	68	48	32.18	2809.5	81	79.5	32.01 01 56	8 04.38	0.26		50.92		
2899..	S.	70	14	42.39	2718.0	82.5	79.5							
2889..	N.	45	45	02.61	1396.5	83	80.5	32 00 07.50	-7 17.07	+ 0.57		50.98		
3162..	N.	52	37	07.63	1890.5	80.5	82							
3201..	S.	63	28	41.99	2732.5	78	82.5	31 57 35.19	-4 38.49	- 0.62		56.08		
3278..	S.	72	55	54.21	2298.0	79	80							
3341..	N.	43	19	25.18	2411.5	80	80	31 52 20.30	+0 37.54	- 0.10		57.74		
3485..	S.	68	07	57.59	3285.0	78.5	33.5							
3533..	N.	47	47	37.02	1589.0	78	85	32 03 12.69	-9 14.34	- 1.24		57.11		
3610..	N.	54	17	16.64	1657.0	77.5	85							
3650..	S.	71	44	35.26	2773.0	78	85	31 59 04.05	-6 09.12	- 1.50		53.43		
3661..	N.	57	34	02.99	1676.0	79	84							
3685..	S.	58	34	38.85	2163.5	79	84	31 55 39.08	-2 41.24	- 0.62		57.22		
3765..	N.	50	02	01.25	1580.0	78.5	84.5							
3801..	S.	65	54	53.99	3129.0	77.5	84.5	32 01 32.38	-8 32.33	- 1.35		58.71		

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2594..	N.	54	38	20.36	2176.5	72	78							
2555..	S.	61	38	07.21	1979.0	71	79	31 51 46.21	-1 05.32	- 1.45		31 52 50.08		
704..	N.	42	15	01.26	2474.5	72	78.5							
709..	S.	73	50	10.55	3283.5	72	79	31 57 24.09	-4 27.57	- 1.39		55.13		
2609..	N.	62	04	16.39	1497.0	72	78.5							
709..	S.	73	50	10.55	3283.5	72	79	32 02 46.53	-9 50.80	- 1.39		54.25		
2715..	N.	47	09	24.61	1351.0	72.5	79							
2788..	S.	68	48	32.14	3805.5	72.5	80.5	32 01 01.62	-8 01.08	- 1.50		59.09		
2899..	S.	70	14	32.34	2874.5	77	77.5							
2989..	N.	45	45	02.49	1555.0	76	79.5	32 00 07.58	-7 16.42	- 0.41		50.75		
793..	S.	73	52	50.22	2312.5	73	83							
797..	N.	42	17	14.98	1942.0	74.5	82	31 54 57.40	-2 02.54	- 1.81		53.05		
3162..	N.	52	33	07.51	1822.5	75	83.5							
3201..	S.	63	28	41.99	2663.0	75	84.5	31 57 35.29	-4 37.96	- 1.86		55.47		
3278..	S.	72	55	34.16	2018.0	77.5	83.5							
3341..	N.	43	19	25.01	2138.0	77	85	31 52 20.41	-0 39.69	- 1.45		57.65		
B. A. C. 3423..	S.	67	22	24.95	2628.0	77	85							
3466..	N.	48	38	49.21	1463.0	77.5	85	31 59 22.02	-6 25.31	- 1.60		56.09		
3485..	S.	68	07	57.51	2947.0	76.5	85.5							
3533..	N.	47	47	36.84	2701.5	77	85.5	32 02 12.82	.....	- 1.81		Rejected.		
3610..	N.	54	17	16.49	1356.5	77	85							
3650..	S.	61	44	35.14	2472.0	77	85	31 59 04.18	-6 08.95	- 1.66		53.57		
3661..	N.	57	34	02.85	1044.5	77	85.5							
3685..	S.	58	34	38.71	2130.0	75	86	31 55 39.22	-2 40.57	- 2.01		56.64		
3765..	N.	50	02	01.07	1602.0	77	83							
3801..	S.	65	54	53.99	3149.0	77	82	32 01 32.51	-8 31.67	- 1.24		59.60		



Determination of the latitude—Continued.

MARCH 24TH, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.		Level sums.		Approximate latitude.			Z. difference by micrometer.		Corrections for level.		Latitude.		
		°	'	"	D.	N.	S.	°	'	"	'	"	"	"	°	'	"	
B. A. C. 2504..	N.	54	38	20.31	2189.0	65	63											
2555..	S.	61	38	07.18	1995.0	64	65.5	31	51	46.25	+1	04.16	+ 1.04	31	52	50.46		
G. C. 704..	N.	42	15	01.19	2532.5	64	66											
709..	S.	73	50	10.53	3341.0	63	67.5	31	57	24.14	-4	27.38	- 0.67			56.09		
2609..	N.	42	04	16.31	1554.5	64	66											
709..	S.	73	50	10.53	3341.0	63	67.5	32	02	46.58	-9	50.88	- 0.67			55.03		
2715..	N.	47	09	24.53	1374.5	64.5	67.5											
2788..	S.	68	48	32.11	2834.5	66	68	32	01	01.68	-8	02.89	- 0.52			58.27		
2899..	S.	70	14	42.31	2792.0	65	69											
2989..	N.	45	45	02.36	1478.0	65	71	32	00	07.66	-7	14.60	- 1.03			52.03		
G. C. 793..	S.	73	52	50.18	2428.0	63	73											
797..	N.	42	17	14.88	2057.5	68	68.5	31	54	57.47	-2	02.54	- 1.09			53.84		
3162..	N.	52	36	07.39	1768.0	65	71.5											
3201..	S.	63	28	41.82	2608.0	67	70	51	55	35.39	-4	37.83	- 0.98			56.58		
3278..	S.	72	55	54.11	1970.0	65.5	71.5											
3341..	N.	43	19	24.81	2087.5	67.5	69.5	31	52	20.52	+0	38.86	- 0.83			58.55		
3423..	S.	67	22	24.87	2706.0	67	67											
3466..	N.	48	38	49.39	1535.5	67	68	31	59	22.87	-6	27.14	- 0.10			55.63		
3485..	S.	68	07	57.43	3148.5	63.5	71											
3533..	N.	47	47	36.67	1469.0	64	71.5	32	02	12.95	-9	15.49	- 1.45			56.01		
3610..	N.	57	17	66.35	1716.0	65.5	70.5											
3650..	S.	61	44	35.03	2836.0	67.5	68.0	31	59	04.31	-6	10.44	- 0.57			53.30		
3661..	N.	57	34	07.72	1934.0	64	69.5											
3685..	S.	58	34	38.58	2422.0	64	69.5	31	55	39.35	-2	41.40	- 1.14			56.81		

MARCH 25TH, 1859.

2338..	N.	50	27	03.38	1581.0	81.5	79.5											
2350..	S.	65	38	14.06	2390.0	81.5	79.5	31	57	21.28	-4	27.57	+ 0.41	31	52	54.12		
2383..	S.	63	03	27.21	2638.5	82	79											
2416..	N.	52	58	30.31	1536.0	81.5	79.5	31	59	01.24	-6	04.65	+ 0.52			57.11		
2504..	N.	54	38	18.65	2238.0	80.5	85.5											
2555..	S.	61	38	07.13	2039.5	82	86	31	51	47.11	+1	05.65	- 0.96			51.80		
704..	N.	42	14	59.10	2519.0	82	87											
709..	S.	73	50	11.28	3331.5	84	85	31	57	24.81	-4	28.73	- 0.62			54.46		
2609..	N.	42	04	16.23	1543.0	87	87											
709..	S.	73	50	11.28	3331.5	84	85	32	02	46.24	-9	51.34	- 0.62	31	52	54.08		
2715..	N.	47	09	24.44	1386.0	83	87											
2788..	N.	68	48	32.07	2845.0	84.5	86.5	32	01	01.79	-8	02.56	- 0.62			58.61		
2899..	S.	70	14	42.25	3246.5	85	86											
2989..	N.	45	45	02.16	1746.0	85	85	32	00	07.87	-8	16.29	- 0.12			Rejected.		
793..	S.	73	52	50.14	2550.0	84.5	87											
797..	N.	42	17	14.74	2177.5	86	86	31	54	57.56	-2	03.20	- 0.25			54.11		
3162..	N.	52	36	07.19	2146.0	85.5	85.5											
3201..	S.	63	28	41.75	2987.5	86	86	31	57	35.53	-4	38.32	0.00			57.21		
3278..	S.	72	55	54.08	2363.0	86.5	85											
3341..	N.	43	19	24.68	2474.5	87	87	31	52	20.62	+0	36.88	- 0.15			57.35		
3423..	S.	67	22	24.76	1898.0	91	86											
3466..	N.	48	38	48.33	1 2.5	90	87	31	59	23.44	-6	34.41	+ 0.83			50.86		
3485..	S.	68	07	57.35	3150.0	90.5	88											
3533..	N.	47	47	36.51	1512.5	91	89	32	02	13.07	-4	16.81	+ 0.46			56.72		
3610..	N.	54	17	16.21	1716.0	65.5	70.5											
3650..	S.	61	44	34.92	2836.0	67.5	68	31	59	04.43	-6	09.94	- 0.20			54.29		
3661..	N.	57	34	02.60	1934.0	64	69.5											
3685..	S.	58	34	38.46	2422.0	64	69.5	31	55	39.47	-2	42.56	- 0.56			57.47		

Tabulation of results for latitude of astronomical station No. 3, Independence Spring, derived from observations made with a zenith telescope by Wurdeman on seventeen pairs of stars.

By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assist. Astronomer.

Date.	1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
	B. A. C. 2254 S. 2270 N.	B. A. C. 2292 S. 2300 N.	B. A. C. 2338 N. 2350 S.	B. A. C. 2383 S. 2416 N.	B. A. C. 2504 N. 2555 S.	B. A. C. 704 N. 709 S.	B. A. C. & G. C. 2609 N. 709 S.	B. A. C. 2715 N. 2788 S.	B. A. C. 2899 S. 2889 N.
1859.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
March 22d.....	31 52 54.26	31 52 53.48	31 52 54.69	31 52 57.24	31 52 52.04	31 52 56.43	31 52 54.90	31 52 56.92	31 52 50.98
23d.....					52 50.08	52 55.13	52 54.25	52 59.09	52 50.75
24th.....					52 50.46	52 56.09	52 55.03	52 58.27	52 52.03
25th.....			52 54.12	52 57.11	52 51.80	52 54.46	52 54.08	52 58.61	
Latitude by a mean of each pair.....	31 52 54.26	31 52 53.48	31 52 54.40	31 52 57.17	31 52 52.19	31 52 55.52	31 52 54.25	31 52 58.22	31 52 51.25
	10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	Results for latitude by a mean of each night.
Date.	G. C. 797 S. 797 N.	B. A. C. 3162 N. 3201 S.	B. A. C. 3278 S. 3211 N.	B. A. C. 3423 S. 3466 N.	B. A. C. 3485 S. 3533 N.	B. A. C. 3610 N. 3650 S.	B. A. C. 3661 N. 3685 S.	B. A. C. 3765 N. 3801 S.	
1859.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
March 22d.....		31 52 56.08	31 52 57.74		31 52 57.11	31 52 53.43	31 52 57.22	31 52 58.71	31 52 55.41
23d.....	31 52 53.05	52 55.47	52 57.65	31 52 56.00		52 53.57	52 56.64	52 59.60	31 52 55.10
24th.....	52 53.84	52 56.58	52 58.55	52 55.63	52 56.01	52 53.30	52 56.81		31 52 55.21
25th.....	52 54.11	52 57.21	52 57.35	52 50.86	52 56.72	52 54.29	52 57.47		31 52 55.24
Latitude by a mean of each pair.....	31 52 53.66	31 52 56.33	31 52 57.82	31 52 54.16	31 52 56.61	31 52 53.64	31 52 57.03	31 52 59.15	
1st result.	2d result.	3d result.	Final result.						
Latitude by a mean of all the pairs.	Latitude by a mean of all the observations.	Latitude by a mean of results for each night.	Being a mean of 1st, 2d, and 3d results.						
o i "	o i "	o i "	o i "	Latitude of astronomical station No. 3, Independence Spring, 31° 52' 55".26.					
31 52 55.30	31 52 55.25	31 52 55.24	31 52 55.26						



Determination of the latitude.

[Station 4, Pecos River. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal. by P. & F.]

Date: APRIL 2D, 1859.

Date, 1859.	N. or S.	Polar distances.		Micrometer readings.			Level sums.	Approximate lati- tude.			Z. difference by mi- croneter.	Corrections for level.	Latitude.				
		°	"	D.	N.	S.		°	'	"			'	"	°	'	"
3162..	N.	52	36 06.37	2024.5	85.5	77.5											
3201..	S.	63	28 41.05	2828.0	85.5	77.5		31	57 36.29	+ 4	25.76	1.67		32	01 03.72		
3278..	N.	72	55 53.65	1415.5	85.5	80											
848..	N.	43	19 24.98	3004.5	85.5	79		31	52 20.68	+ 8	45.56	+ 1.24			07.48		
3423..	S.	67	22 24.14	1798.5	87	80.5											
3466..	N.	48	38 47.63	2101.0	87	81		31	59 24.11	+ 1	40.05	+ 1.29			05.45		
3485..	S.	68	07 56.70	2318.5	87	81											
880..	N.	47	47 35.88	2109.0	92	78		32	02 13.71	- 1	09.29	+ 2.07			06.49		
3610..	N.	54	17 15.01	2309.5	91	81											
3650..	S.	61	44 33.96	1659.0	91	81		31	59 05.51	+ 1	55.93	+ 2.07			03.51		
3661..	N.	57	34 01.47	2539.0	91	83											
3685..	S.	58	34 37.37	1558.5	91.5	82.5		31	55 40.58	+ 5	24.30	+ 1.76			06.64		
3765..	N.	50	01 59.31	2123.5	94	82											
3801..	S.	65	55 03.57	2207.5	93	82.5		32	01 28.51	- 0	27.78	+ 2.23			02.96		
3910..	S.	73	48 37.33	1529.5	88	90											
3953..	N.	42	23 11.42	2802.0	87	93		31	54 05.62	+ 7	00.88	- 0.83			05.69		
G. C. ... 969..	N.	41	26 27.90	2303.5	86	92											
N.A.B. Leonis	S.	74	38 37.43	1645.5	86.5	92		31	57 27.33	+ 3	37.63	- 1.18			03.78		
B. A. C. 4066..	S.	67	45 30.66	984.5	88	89.5											
G. C. ... 999..	N.	48	33 28.77	2905.0	86	91		31	50 30.34	+10	35.20	- 0.67			04.92		
B. A. C. 4242..	S.	70	51 03.04	2306.0	85	91.5											
G. C. ... 1023..	N.	45	07 42.49	2392.0	84	92		32	10 37.23	- 0	28.44	- 1.50			04.17		
B. A. C. 4362..	S.	72	07 11.53	1762.0	87	91											
" 4389..	N.	43	58 53.33	2512.0	87	91		31	56 57.57	+ 4	08.06	+ 0.83			06.46		
G. C. ... 1046..	S.	61	37 21.01	2837.5	88	90.5											
B. A. C. 4467..	N.	54	08 08.27	1716.5	87	92		32	07 15.36	- 6	10.77	- 0.77			03.87		
B. A. C. 4467..	N.	49	06 45.87	1826.0	88.5	92											
" 4566..	S.	66	47 32.81	2135.0	89.5	91		32	02 50.66	- 1	42.20	- 0.51			07.95		
4393..	S.	61	41 33.17	2458.0	80	95.5											
4457..	N.	54	98 08.27	1716.5	87	92		32	05 09.28	+ 4	05.25	- 0.77			03.26		
4575..	S.	66	35 32.12	3226.0	89.5	91											
4467..	N.	49	06 45.87	1826.0	88.5	92		32	08 51.00	- 7	43.05	- 0.51			07.44		
B. A. C. 4592..	S.	58	23 47.45	2949.0	90.5	89											
" 4652..	N.	57	17 02.91	1404.0	90.5	89		32	09 34.82	- 8	31.00	+ 0.31			03.51		
" 4699..	N.	45	28 49.81	2199.0	89	91.5											
" 4731..	S.	70	26 10.71	2465.0	88.5	92.5		32	02 29.74	- 1	21.97	- 0.67			07.10		
" 4797..	N.	53	10 32.67	2107.5	91.5	91.5											
" 4809..	S.	62	42 05.62	2566.0	90	92.5		32	03 40.85	- 2	31.64	- 0.25			08.96		
" 4917..	N.	42	56 51.55	2327.0	87.5	93											
" 4933..	S.	73	02 46.80	2146.5	87.5	93		32	10 10.82	+ 0	59.70	- 0.93			09.59		
" 5036..	N.	56	09 47.89	1976.0	87	95.5											
" 5061..	S.	59	52 37.85	1550.0	87	95.5		31	58 47.13	+ 2	20.89	- 1.76			06.26		
" 5072..	N.	56	33 57.80	1458.0	88	94											
" 5075..	S.	59	12 25.49	2487.5	88	94		32	06 48.35	- 5	40.50	- 1.24			06.61		
" 5085..	S.	74	04 40.89	2197.0	88	94											
" 5113..	N.	41	48 28.53	1780.5	88	94		32	03 25.33	- 2	17.75	- 1.24			06.34		
" 5178..	N.	52	54 41.86	2655.0	89	95											
" 5192..	S.	63	15 40.80	1514.0	88	96		31	54 48.67	+ 6	17.38	- 1.45			04.60		
B. A. C. 5252..	S.	68	36 04.94	2652.5	90.5	94											
" 5271..	N.	47	09 35.99	1549.0	90.5	94		32	07 09.53	- 6	05.31	- 0.72			03.50		

APRIL 3D, 1859.

B. A. C. 2504..	N.	54	38 19 90	3009 0	82	84											
2555..	S.	61	38 06 80	1336 0	83	84		31	51 46 65	+ 9	13 34	- 0 31		32	00 59 68		
704..	N.	42	15 00 53	2739 5	83	85											
709..	S.	73	50 10 30	2077 0	83	86		31	57 24 58	+ 3	39 12	- 0 52		32	01 03 18		
2609..	N.	42	04 15 65	1765 0	83	85											
709..	S.	73	50 10 30	2077 0	83	86		32	02 47 02	- 1	43 19	- 0 52			03 31		
2715..	N.	47	09 23 79	2198 0	84	87 5											
2788..	S.	68	48 31 68	2176 0	87	87		32	01 02 26	+ 0	07 27	- 0 35			09 18		
754..	S.	62	36 27 08	2593 5	87	87											
760..	N.	53	05 12 62	1118 0	87	87		32	09 10 15	- 8	08 02	0 00			02 13		
754..	S.	62	36 27 08	2593 5	87	87											
764..	N.	53	05 53 82	1184 0	87	87		32	08 49 55	- 7	46 19	0 00			03 36		



Determination of the latitude—Continued.

Date, 1859.	N. or S.	Polar distance.			Micrometer readings.			Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.		
		°	'	"	D.	N.	S.					°	'	"
B. A. C. 2952.	S.	58	47	34.36	2935.0	86	90							
" 2999.	N.	56	59	58.49	2009.0	87	90	32 06 13.57	- 5 06.27	- 0.72		32 01 06.58		
" 2999.	N.	56	59	58.49	2009.0	87	90							
" 3016.	S.	58	53	16.39	2418.5	87	90	32 03 22.56	- 2 15.44	- 0.72		06.40		
G. C. 793.	S.	73	52	40.79	1705.0	84.5	91.5							
" 797.	N.	42	17	13.56	2810.5	84.5	92	31 54 58.32	+ 6 05.64	- 1.50		02.46		
B. A. C. 3162.	N.	52	36	06.26	1794.5	85	93							
" 3204.	S.	63	12	45.79	2596.0	86	92	32 05 34.00	- 4 25.09	- 1.45		97.46		
" 3204.	S.	63	12	45.73	2596.0	86	92							
" 3252.	N.	52	53	23.72	3352.5	87	93	31 56 55.07	+ 4 10.21	- 1.45		03.83		
B. A. C. 3278.	S.	72	55	53.60	1537.0	85.5	94.5							
G. C. 848.	N.	43	19	24.83	3132.5	88	92	31 52 20.78	+ 8 47.71	- 1.34		07.15		
B. A. C. 3423.	S.	67	22	24.06	1955.0	83	86							
" 3466.	N.	48	38	47.48	2253.5	83	85.5	31 59 24.23	+ 1 38.73	- 2.70		00.26		
B. A. C. 3485.	S.	68	07	56.61	2541.0	81.5	84.5							
G. C. 880.	N.	47	47	36.22	2333.0	83	85	32 02 13.58	- 1 08.80	- 0.52		04.26		
B. A. C. 3661.	N.	57	34	01.34	2430.0	80	85.5							
" 3685.	S.	58	34	37.24	1447.0	79.5	84.0	31 55 40.71	+ 5 25.13	- 1.03		04.81		
" 3765.	N.	50	01	59.13	2329.5	83.5	86							
" 3801.	S.	65	55	03.56	2414.5	83.5	86	32 01 28.65	- 28.11	- 0.52		00.0		
" 3910.	S.	73	48	37.26	1790.0	80.5	87.5							
" 3953.	N.	42	23	11.21	3057.0	81.5	87	31 54 05.76	+ 6 59.06	- 1.30		03.52		
G. C. 969.	N.	41	26	27.68	2523.0	82.5	87.5							
N. A. B. Leonis	S.	74	38	37.34	1673.0	82.5	87.5	31 57 27.49	+ 3 34.99	- 1.04		01.44		
B. A. C. 4242.	N.	70	50	52.89	2291.0	66	67							
G. C. 1023.	S.	45	07	42.18	2361.0	66	67	32 00 42.46	+ 0 23.15	- 0.20		05.41		
" 1025.	N.	43	47	30.46	2531.0	62.5	70							
B. A. C. 4318.	S.	72	09	43.98	2578.5	61	70	32 01 22.78	- 0 15.71	- 1.71		04.76		
B. A. C. 4362.	S.	72	07	11.43	1984.0	65.5	63.5							
" 4389.	N.	43	58	53.10	2719.0	66	63.5	31 56 57.72	+ 4 03.10	+ 0.36		01.18		
G. C. 1046.	S.	61	37	20.85	3016.0	64.5	63.5							
B. A. C. 4457.	N.	54	08	08.10	1887.0	63	65.5	32 07 15.52	- 6 13.41	- 0.15		01.96		
" 4393.	N.	61	41	33.02	2638.5	64.5	63.5							
" 4457.	N.	64	08	08.08	1887.0	63	65.5	32 05 09.45	- 4 08.55	- 0.10		00.90		
" 4592.	S.	58	23	47.28	3204.0	63	61							
" 4652.	N.	57	17	02.72	1655.0	64	71	32 09 35.0	- 8 32.33	- 0.51		02.67		
" 4678.	N.	57	39	57.02	2571.0	61.5	64.5							
" 4694.	S.	58	28	41.28	1588.0	61.5	64.5	31 53 40.85	+ 5 25.12	- 0.62		06.35		
" 4699.	N.	45	28	49.58	2278.0	62.5	64							
" 4731.	S.	70	26	10.58	2543.0	61	64	32 02 29.92	- 1 27.64	- 0.46		01.82		
" 4797.	N.	53	10	32.53	2258.0	62	66							
" 4809.	S.	62	42	05.48	2715.0	62	66	32 03 40.99	2 31.15	- 0.83		09.4		
" 4873.	S.	72	26	30.62	3083.5	61	66.5							
" 4903.	N.	43	17	32.93	1893.0	61	67	32 07 58.22				Rejected.		
R. A. C. 4917.	N.	42	56	51.34	2377.5	61.5	67.5							
" 4933.	N.	73	02	46.66	2201.0	60.5	67.5	32 10 11.9	- 0 58.37	- 1.34		08.03		
" 5036.	S.	56	09	47.73	2285.0	61	71							
" 5061.	S.	59	52	37.70	1867.0	60	71.5	31 58 52.28	- 2 18.25	- 1.77		08.76		
" 5072.	N.	56	38	57.64	1672.0	59.5	71							
" 5075.	S.	59	12	25.34	2707.0	59.5	71	32 06 48.51	- 5 42.32	- 1.19		05.00		
" 5085.	N.	74	04	40.71	2731.0	61	69							
" 5113.	S.	41	48	28.30	2322.0	61	69	32 03 25.44	- 2 15.27	- 1.66		98.51		
" 5178.	N.	52	54	41.70	2651.5	60	72							
" 5192.	S.	63	15	40.68	1509.0	59.5	72.5	31 54 48.86	+ 6 17.88	- 2.59		04.1		
" 5252.	N.	68	36	04.86	2735.0	61.5	70.5							
" 5271.	N.	47	09	35.91	1632.0	61.5	70.5	32 07 08.61	- 6 04.81	- 1.86		01.94		

APRIL 4TH, 1859.

B. A. C. 2504.	N.	54	38	19.87	3056.0	73	78						
" 2555.	N.	61	38	06.76	1374.0	73	79.5	31 51 46.68	+ 9 16.32	- 1.19		32 01 01 81	
G. C. 704.	N.	42	15	00.48	2774.5	79	75						
" 709.	S.	73	50	10.27	2114.5	78	76	31 57 24.62	+ 3 38.30	+ 0.62		03.54	
B. A. C. 2609.	N.	42	04	15.60	1794.0	79	75						
G. C. 709.	S.	73	50	10.27	2114.5	78	76	32 02 47.06	- 1 46.01	+ 0.62		91.67	
B. A. C. 2715.	N.	47	09	23.73	2121.5	78	78						
" 2788.	S.	68	48	31.64	2101.0	82	78	32 01 02.31	+ 6 78	+ 0.41		09.50	
G. C. 754.	S.	62	36	27.03	2867.0	82.5	76						
" 760.	N.	53	05	12.55	1394.5	81	78.5	32 09 10.21	- 8 07.03	+ 0.93		04 11	

Determination of the latitude—Continued.

Date, 1859.	N. or S.	Polar distances.	Micrometer readings.		Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.
			D.	N. S.					
B. A. C. 2952.	S.	58 47 34.29	2898.0	81.5 79					
" 2999.	N.	56 59 58.42	1967.0	81 79	32 06 13.64	- 5 07.93	+ 0.46	32 01 06.17	
" 3016.	S.	58 53 16.31	2382.5	81.5 79					
" 2999.	N.	56 59 58.42	1967.0	81 79	32 03 22.63	- 2 17.43	+ 0.46	05.66	
G. C. 793.	S.	73 52 49.76	1632.5	81.5 79					
" 797.	N.	42 17 13.50	2733.5	83 79	31 54 58.37	+ 6 04.16	+ 0.67	03.20	
" 3162.	N.	52 36 06.16	2097.5	83.5 80					
G. C. 3201.	S.	63 28 40.92	1459.0	82.5 80	31 57 36.46	+ 3 31.18	+ 0.62	08.26	
" 3204.	S.	63 12 45.64	2905.0	82.5 80					
" 3162.	N.	52 36 06.16	2097.5	83.5 80	32 05 34.10	- 4 27.08	+ 0.62	07.64	
" 3423.	S.	67 22 23.97	1897.0	85 81					
" 3466.	N.	48 38 47.33	2202.0	84.5 82	31 59 24.35	+ 1 40.88	+ 0.67	05.90	
" 3485.	S.	64 07 56.53	2405.5	84.5 82.5					
" 880.	N.	47 47 35.64	2197.0	85 82.5	32 02 13.91	- 1 03.96	+ 0.46	05.41	
" 3610.	N.	54 17 14.78	2425.0	84.5 83.5					
" 3650.	S.	61 44 33.72	2059.0	84 84	31 59 05.75	+ 2 01.05	+ 0.21	07.01	
" 3661.	N.	57 34 01.77	2627.0	84.5 83.5					
" 3685.	N.	58 34 37.10	1640.0	85 82.5	31 55 40.56	5 26.45	+ 0.36	07.37	
" 3765.	N.	50 01 58.96	2215.5	86.5 81.5					
" 3801.	S.	65 55 03.45	2291.5	83 85	32 01 28.79	25.14	+ 0.41	04.06	

Tabulation of results for latitude of astronomical station No. 4, Pecos River, derived from observations made with a zenith telescope by Würdeman on thirty-seven pairs of stars.

[By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.]

	1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
Date.	B. A. C. 2504 N. 2555 S.	G. C. 704 N. 709 S.	B. A. C. & G. C. 2699 N. 709 S.	B. A. C. 2715 N. 2788 S.	G. C. 754 S. 760 N.	G. C. 754 S. 764 N.	B. A. C. 2952 S. 2909 N.	B. A. C. 2999 N. 3016 S.	G. C. 793 S. 797 N.
1859.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
April 2d.....	32 00 59.6	32 01 05.3	32 01 04.5	32 01 08.7	32 01 03.4	32 01 04.1	32 01 03.3	32 01 04.6	32 01 02.4
" 3d.....	01 01.8	01 03.2	01 03.3	01 09.2	01 02.1	01 03.3	01 06.5	01 06.4	01 02.4
" 4th.....	01 01.8	01 03.5	01 01.7	01 09.5	01 04.1	-----	01 06.2	01 05.7	01 03.2
Latitude by a mean of each pair.....	32 01 00.7	32 01 04.9	32 01 03.1	32 01 09.1	32 01 03.2	32 01 03.7	32 01 05.3	32 01 05.5	32 01 02.6
	10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
	B. A. C. 3162 N. 3261 S.	B. A. C. 3162 N. 3204 S.	B. A. C. 3204 S. 3252 N.	B. A. C. & G. C. 3278 S. 848 N.	B. A. C. 3423 S. 3466 N.	B. A. C. & G. C. 3485 S. 880 N.	B. A. C. 3610 N. 3650 S.	B. A. C. 3661 N. 3685 S.	B. A. C. 3765 N. 3801 S.
	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
April 2d.....	32 01 03.7	32 01 07.4	32 01 03.8	32 01 07.4	32 01 05.4	32 01 06.4	32 01 03.5	32 01 06.6	32 01 02.9
" 3d.....	01 08.3	01 07.4	01 03.8	01 07.2	01 00.3	01 04.3	01 04.8	01 04.8	01 00.0
" 4th.....	01 08.3	01 07.6	01 03.8	01 07.2	01 05.9	01 05.4	01 07.0	01 07.4	01 04.1
Latitude by a mean of each pair.....	32 01 06.0	32 01 07.5	32 01 03.8	32 01 07.3	32 01 03.8	32 01 05.3	32 01 05.2	32 01 06.2	32 01 0.23



Tabulation of results for latitude of astronomical station No. 4, Pecos River, &c.—Continued.

Date.	19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
	B. A. C. 3910 S. 3953 N.	G. C. & N. A. 969 N. β Leonis S.	B. A. C. & G. C. 4066 S. 999 N.	B. A. C. & G. C. 4242 S. 1023 N.	B. A. C. & G. C. 1025 N. 4318 S.	B. A. C. 4362 S. 4389 N.	B. A. C. 1046 S. 4457 N.	B. A. C. 4393 S. 4457 N.	B. A. C. 4575 S. 4467 N.
1859.	" " "	" " "	" " "	" " "	" " "	" " "	" " "	" " "	" " "
April 2d .....	32 01 05.7	32 01 03.7	32 01 04.9	32 01 04.1	32 01 04.8	32 01 06.4	32 01 03.8	32 01 03.2	32 08 07.4
" 3d .....	01 03.5	01 01.4		01 05.4	32 01 04.8	01 01.2	01 02.0	01 00.9	
" 4th .....									
Latitude by a mean of each pair .....	32 01 04.6	32 01 02.5	32 01 04.9	32 01 04.7	32 01 04.8	32 01 03.8	32 01 02.9	32 01 02.0	32 01 07.4
	28th pair.	29th pair.	30th pair.	31st pair.	32d pair.	33d pair.	34th pair.	35th pair.	36th pair.
	B. A. C. 4592 S. 4652 N.	B. A. C. 4678 N. 4694 S.	B. A. C. 4699 N. 4731 S.	B. A. C. 4797 N. 4809 S.	B. A. C. 4917 N. 4933 S.	B. A. C. 5036 N. 5061 S.	B. A. C. 5072 N. 5075 S.	B. A. C. 5085 S. 5113 N.	B. A. C. 5178 N. 5192 S.
April 2d .....	32 01 03.5		32 01 07.10	32 01 08.9	32 01 09.6	32 01 06.2	32 01 06.6	32 01 06.2	32 01 04.6
" 3d .....	01 09.7	32 01 05.4	01 01.8	01 09.4	01 08.0	01 08.8	01 05.0	01 08.5	01 04.1
" 4th .....									
Latitude by a mean of each pair .....	32 01 03.1	32 01 05.4	32 01 04.4	32 01 09.2	32 01 08.7	32 01 07.5	32 01 05.8	32 01 07.3	32 01 04.3

Tabulation of results for latitude of astronomical station No. 4, Pecos River—Continued

	37th pair.	Results for latitude by a mean of each night.	1st result.	2d result.	3d result.	Final result.
	R. A. C. 5252 S. 5271 N.		Latitude by a mean of all the pairs.	Latitude by a mean of all the observations.	Latitude by a mean of results for each night.	Being a mean of 1st, 2d, & 3d results.
	o i "	o i "	o i "	o i "	o i "	o i "
April 2d .....	32 01 03.5	32 01 05.2	} 32 01 04.9	32 01 04.8	32 01 05.0	32 01 04.9
" 3d .....	01 01.9	32 01 04.2				
" 4th .....		32 01 05.4				
Latitude by a mean of each pair .....	32 01 02.7					

Latitude of astronomical station No. 4, on Pecos River, 32° 01' 04".9.

A.—SUBSTATIONS 1 AND 2, 32D PARALLEL.

Determination of the time.

[Station: Point where road to sand hills leaves the river. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: MAY 13TH, 1859.

Ther., Fahr't, 65°; bar., 26.6 in.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from meridian, in time.			Sid'l time of observation deduced.			Time of observ'n noted by chron'r.			Error of chro'r. slow of sidereal time.		Mean error of chron'r.	
	o	i	"	o	i	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	s.
♁ Bootis (east).	91	57	25	45	57	54.0	3	10	10.4	10	59	06.3	10	45	54.5	13	11.	80	} 13 14.58.5 { Only one star observed for time.
	92	16	45	46	07	34.3	3	09	24.9	10	59	51.8	10	46	37.5	13	14.	30	
	92	50	45	46	24	34.8	3	08	04.6	11	01	12.1	10	47	57.4	13	14.	70	
	93	19	25	46	38	55.3	3	06	57.0	11	02	19.7	10	49	04.5	13	15.	20	
	93	39	50	46	49	08.0	3	06	09.2	11	03	07.5	10	49	52.6	13	14.	90	
	94	11	35	47	05	00.9	3	04	53.9	11	04	22.8	10	51	08	13	14.	80	
	94	31	45	47	15	06.1	3	04	06.3	11	05	10.4	10	51	54	13	16.	40	

*Determination of the latitude by Polaris.*

[Station: Point where road leaves Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: MAY 13TH, 1859.

Th'r, Fahr't, 65°; bar., —.

	Times of observation noted by chron'r.			True sidereal time of observation.		Meridian distances—		Observed double altitudes of Polaris out of the merid.	True altitudes.	Latitude deduced from each observ'n.
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	In sid'l time.	In arc.	<i>° ' "</i>	<i>° ' "</i>			
1.....	11 20 18.5	11 33 12.5	1 33 41.4	23 25 21.0	60 53 45	30 25 27.3	31 44 44.0			
2.....	11 23 30.0	11 36 24.9	1 30 29.0	22 37 15.0	60 52 50	30 24 59.8	44 57.9			
3.....	11 41 25.5	11 34 19.5	1 12 34.4	18 08 36.0	60 47 10	30 22 09.8	44 27.2			
4.....	11 43 10.0	11 56 04.1	1 10 49.9	17 42 28.5	60 47 55	30 22 32.3	44 61.7			
5.....	11 44 52.0	11 57 46.0	1 09 07.9	17 16 58.5	60 46 20	30 21 44.8	44 25.6			
6.....	11 47 44.0	12 00 38.0	1 06 15.9	16 33 58.5	60 46 35	30 21 52.3	44 51.8			
7.....	11 49 16.5	12 02 10.5	1 04 43.4	16 10 51.0	60 45 25	30 21 17.3	44 26.2			

Latitude by a mean of 7 results on Polaris ..... *° ' "* 31 44 44.0  
 Result by Spica (south)..... 31 41 24.1  
 Latitude point where road leaves Pecos River ..... 31 43 04.0

*Determination of the latitude, Spica (south).*

[Station: Point where road leaves Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: MAY 13TH, 1859.

Th'r, Fahr't, 65°; bar., —.

No. for ref.	Times of obs'n noted by chron.	Meridian distances in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian alt's of star.	True meridian altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
	12 55 13	9 41.76	3 49.7	95 39 30	47 52 49.3	31 41 24.1

Latitude by Spica (south)..... *° ' "* 31 41 24.1





Determination of the latitude Spica (south.)

[Station: 1st camp between sand hills and river. Sextant by Würdeman. Chronometer No. 2419, sid'l by P. & F.]

Date: MAY 14TH, 1859.

Th'r, Fahr't, 68°; bar., —.

N. for ref.	Times of observation noted by chron.			Meridian distances in sidereal time.			Reduction to meridian in arc.			Obs'd double circum-meridian alt's of star.			True meridian altitudes.			Latitude deduced from each observation.		
	h.	m.	s.	m.	s.	"	"	"	°	'	"	°	'	"	°	'	"	
1.....	12	53	35.5	10	15.4	4	16.8	95	27	00	47	47	01.6	31	47	11.8		
2.....	12	55	44.6	8	06.3	2	40.3	95	30	15	47	47	07.6	47	10.8			
3.....	12	58	34.5	5	16.4	1	07.8	95	32	45	47	46	45.1	47	28.3			
4.....	13	00	05.5	3	45.4	0	34.4	95	33	30	47	46	34.2	47	39.2			
5.....	13	01	48.5	2	02.4	0	10.0	95	34	35	47	56	42.5	47	30.9			
6.....	13	03	00	0	50.9	0	01.7	95	35	15	47	46	54.0	47	19.4			
7.....	13	04	35.5	0	44.6	0	01.4	95	34	20	47	46	26.2	47	47.2			
8.....	13	06	02.5	2	11.6	0	11.8	95	35	10	47	47	01.6	47	11.8			
9.....	13	07	28.6	3	37.7	0	32.0	95	34	35	47	47	04.3	47	09.1			
10.....	13	08	59.5	5	08.6	1	04.5	95	32	50	47	46	44.2	47	29.2			
11.....	13	10	18.8	6	27.9	1	41.8	95	31	45	47	46	49.0	47	24.4			
12.....	13	11	38.0	7	47.1	2	27.8	95	29	55	47	46	40.0	47	33.4			
13.....	13	13	11	9	20.1	3	32.5	95	27	35	47	46	34.7	47	38.7			

Latitude by a mean of 13 results on a Virginis (Spica) ..... 31 47 25.

A.—5TH. SAND HILLS, 32D PARALLEL.

Determination of the latitude.

[Station 5: Ast. station, intersection of 32d par. & 103d merid. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: MAY 17TH, 1859.

Date.	N. or S.	Polar distances.			Micrometer readings.			Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.		
		°	'	"	D.	N.	S.							
1859.														
B. A. C. 3910..	S.	73	48	33.5	1975.0	65.5	79							
3953..	N.	42	23	03.2	2811.5	70	76	31	54	11.64	+4	36.67		
G. C. 969..	N.	41	26	19.37	1755.5	57	91						31 58 46.29	
N. N. B. Leonis	S.	74	38	33.56	1517.5	65	83	31	57	33.53	+1	18.72	46.85	
B. A. C. 4066..	S.	67	45	25.0	1628.0	77.5	73							
G. C. 999..	N.	48	33	20.0	3092.0	78	76	31	50	37.46	8	04.22	+ 0.67	42.35
B. A. C. 4212..	S.	68	19	26.2	1921.0	74.5	81							
G. C. 1015..	S.	47	52	36.8	2789.5	80.5	75	31	53	58.49	4	47.26	- 0.10	45.65
G. C. 1025..	N.	43	47	20.8	2240.5	68.5	89.5							
B. A. C. 4318..	S.	72	09	39.8	2720.0	76	82	32	01	29.69	2	38.59	- 2.79	48.31
B. A. C. 4362..	S.	72	07	06.1	2014.5	73	83							
4389..	N.	43	58	42.9	2314.5	73	83	31	57	05.50	1	39.23	- 2.07	42.66
4467..	N.	49	06	35.8	1732.0	70	84							
4566..	S.	66	47	25.8	2488.5	66	87	32	02	59.15	4	10.21	- 3.62	45.32
B. A. C. 4699..	S.	45	28	38.6	2159.0	65	91							
4731..	S.	70	26	04.0	2863.0	65	91	32	02	38.66	-3	52.85	- 5.39	40.42
4797..	N.	53	10	22.5	1627.5	76	80							
4809..	S.	62	41	57.2	2506.0	77	81	32	03	50.15				Rejected.
4873..	S.	72	26	24.3	3186.0	74	84							
G. C. 1195..	N.	43	17	52.6	1534.5	75.5	83.5	32	07	51.55	9	06.23	- 1.86	43.46
B. A. C. 5000..	N.	56	23	16.5	3010.5	76	88							
5061..	S.	59	52	28.0	1818.0	76	88	31	52	07.40	6	34.42	- 2.50	Rejected.



## Determination of the latitude—Continued.

Date.	N. or S.	Polar distance.	Micrometer readings.			Level suns.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.
			D.	N.	S.					
" 5030..	N.	56 09 38.0	1785.0	76	88					
" 5061..	S.	59 52 28.6	1818.0	76	88	31 58 56.65	-0 10.91	- 2.50	31 58 43.24	
" 5072..	N.	56 33 48.0	1452.5	85	79					
" 5075..	S.	59 12 16.2	2947.0	76	87	32 06 57.91	-8 14.31	- 0.51	43.09	
" 5252..	S.	68 35 57.4	3180.0	74	90.5					
" 5271..	N.	47 09 24.9	1626.0	74	90.5	32 07 18.82	-8 33.99	- 3.37	41.46	
" 5338..	N.	43 34 26.9	2495.0	73	91.0					
" 5367..	S.	72 34 42.8	1883.0	71	94	31 55 25.16	+3 22.42	- 4.25	43.33	
B. A. C. 5338..	N.	43 34 26.89	2495.0	73	91					
" 5376..	S.	72 25 16.94	2740.0	71	94	32 00 08.08	-1 21.03	- 4.25	42.80	
B. A. C. 5432..	N.	55 47 08.66	2678.0	71	93.5					
" 5440..	S.	60 30 18.84	1323.0	71	93.5	31 51 18.75	+7 28.17	- 4.66	42.46	

MAY 18TH, 1859.

B. A. C. 3910..	S.	73 48 33.43	2212.0	77	93				
" 3938..	N.	42 23 03.09	3046.5	67.5	105.5	31 54 11.74	+4 36.01	- 5.60	31 58 42.15
G. C. 969..	N.	41 26 18.25	2513.5	106	68				
N. A. B. Leonis	S.	74 38 33.47	2334.5	106	68	31 57 34.14	+0 59.20	- 7.88	41.22
B. A. C. 4066..	S.	67 45 24.91	1542.5	90	88				
G. C. 999..	N.	48 33 19.90	3006.5	89	91	31 50 37.59	+8 04.22	- 0.00	41.81
B. A. C. 4212..	S.	68 19 26.07	2054.0	91	93				
G. C. 1015..	N.	47 52 37.29	2918.0	101	85	31 53 58.32	+ 15.77	+ 2.90	46.99
G. C. 1025..	N.	43 47 20.62	2372.0	95	91				
B. A. C. 4318..	S.	72 09 39.69	2874.5	94	92	32 01 29.84	-2 46.20	+ 0.62	44.26
B. A. C. 4362..	S.	72 07 05.97	2129.5	94	92				
" 4389..	N.	43 58 42.69	2417.0	94	92	31 57 05.67	+1 35.09	+ 0.41	41.17
" 4393..	S.	61 41 25.36	3055.5	94	91				
" 4457..	N.	54 07 58.91	1850.5	94	91	32 05 17.86	-6 38.55	+ 0.62	39.93
" 4676..	N.	57 45 17.26	2838.0	101.5	81				
" 4694..	S.	58 28 32.30	1841.0	101.5	81	31 53 05.22	+5 29.76	+ 4.46	39.44
" 4699..	N.	45 28 38.43	2168.5	109.5	74				
" 4731..	S.	70 26 03.97	2922.5	110	74	32 02 08.80	-4 09.39	+ 7.31	36.72
" 4917..	N.	42 56 39.52	2134.5	102	84				
" 1205..	S.	72 55 54.18	2431.0	101	85	32 03 43.15	1 38.07	(*)	Rejected.
" 5000..	N.	56 23 16.31	3671.0	101.5	86.5				
" 5061..	S.	59 52 28.43	1895.5	101.5	86.5	31 52 07.63	+6 28.80	+ 3.11	39.54
" 1234..	N.	56 09 38.92	1836.0	101.5	86.5				
" 5061..	S.	59 52 28.43	1895.0	101.5	86.5	31 58 56.32	-0 19.68	+ 3.11	39.75
B. A. C. 5072..	N.	56 33 47.77	1501.5	104	83				
G. C. 1245..	S.	59 12 18.29	3013.5	104	83	32 06 56.97	8 20.09	- 4.36	41.24
" 5085..	S.	74 04 34.31	2651.0	103	85				
" 5113..	N.	41 48 17.30	1753.0	103.5	82	32 03 34.19	4 57.01	+ 3.94	41.12
" 5178..	N.	52 54 31.23	2654.5	106	82				
" 5192..	S.	63 15 32.00	2062.5	106	82	31 54 58.38	3 35.65	+ 5.00	39.03
" 5252..	S.	68 35 57.19	3137.0	90	98				
" 5271..	N.	47 09 24.47	1579.5	92	96	32 07 19.17	8 35.14	- 1.25	42.78
" 1322..	N.	43 34 27.51	2541.0	96.5	92				
" 5367..	S.	72 34 41.56	1946.0	97	92	31 55 25.46	3 16.80	- 0.98	41.28
" 1322..	N.	43 34 27.51	2541.5	96.5	92				
" 5376..	S.	72 25 16.72	2900.0	97	92	32 00 07.88	1 25.66	- 0.98	41.24
" 5432..	N.	55 47 10.22	2883.5	98	91				
" 5440..	S.	60 30 13.59	1554.0	98	91	31 51 18.08	7 19.73	+ 1.45	39.27
B. A. C. 5473..	S.	58 46 55.84	2080.5	104	84				
" 5484..	N.	57 20 25.62	2503.0	104	84	31 56 19.27	2 19.74	+ 4.16	43.17
" 5515..	N.	56 59 17.45	2630.5	103	86				
" 5541..	S.	59 12 25.85	1813.5	106	84	31 54 08.35	4 30.22	+ 3.00	41.57
" 5602..	S.	62 48 45.13	3141.5	96.5	93				
" 5615..	N.	53 13 19.63	3127.5	96	93	31 58 57.62			Rejected.
" 5652..	S.	59 47 48.45	2407.0	98	91				
" 5747..	N.	56 13 46.30	2300.0	102	88	31 59 12.62	35.39	+ 2.38	39.61
" 5666..	S.	59 57 18.73	1539.0	98	91				
" 5457..	N.	56 13 46.30	2300.0	102	88	31 54 27.48	4 11.90	+ 2.38	41.76

\* Very high wind.



Determination of the latitude—Continued.

MAY 20TH, 1859.

Date.	N. or S.	Polar distances.		Micrometer readings.			Level sums.			Approximate latitude.			Z. difference by micrometer.		Corrections for level.	Latitude.			
		°	'	D.	N.	S.	°	'	"	'	"	"	"	°	'	"			
1859.																			
B. A. C. 3910...	S.	73	48	33.27	2007.5	77	83												
3953...	N.	42	23	02.86	2833.5	77	83	31	54	11.93	4	33.20	-	1.25		31	58	43.88	
G. C. 969 .....	S.	41	26	19.00	3029.0	77	82												
β Leonis .....	S.	74	38	33.29	2814.5	77	83	31	57	33.85	1	10.95	-	1.04			43.76		
4212...	S.	68	19	25.83	1638.0	81	89.5												
1015...	N.	47	52	36.34	2511.5	82	89.5	31	53	58.91	4	48.91	-	1.67			46.14		
1025...	N.	43	47	20.27	1627.5	83.5	90												
4318...	S.	72	09	39.45	2124.5	83	91	32	01	30.14	2	44.38	-	1.50			44.26		
4362...	N.	72	07	05.74	1675.0	83	93.5												
4389...	N.	43	58	42.30	1971.0	83	93	31	57	05.98	1	37.90	-	1.98			41.90		
4467...	N.	49	06	35.27	1609.0	83	92												
4566...	S.	68	47	25.35	2374.0	85	91	32	02	59.69	4	13.02	-	1.55			45.12		
4701...	N.	39	52	41.36	2826.0	85	87												
4721...	N.	76	22	53.71	1657.5	86.5	85.5	31	52	12.46	6	26.48	-	0.10			38.88		
4797...	N.	53	10	21.80	1314.5	85	87												
4809...	S.	62	41	56.60	2238.0	85	87	32	03	50.80	5	05.45	-	0.42			44.93		
4873...	S.	72	26	23.80	2727.5	88	86.5												
1195...	S.	43	17	51.80	1061.0	88	86	32	07	52.20	9	11.19	+	0.31			41.32		
4917...	N.	42	56	38.97	1784.5	90	86												
1205...	N.	73	00	46.63	2076.5	89.5	86	32	01	17.20	1	36.58	+	0.77			41.39		
B. A. C. 5072...	N.	56	33	47.28	1150.0	93.5	84.5												
G. C. 1245 .....	S.	59	12	17.82	2660.0	93.5	84.5	32	06	57.45	-8	19.43	+	1.87			39.89		
B. A. C. 5085...	S.	74	04	33.97	2263.0	91.5	85.5												
5113...	N.	41	48	16.72	1379.0	92.5	85	32	03	34.65	-4	52.38	+	1.39			43.66		
5178...	N.	52	54	30.70	1964.5	94.5	88.5												
5192...	N.	63	15	31.55	1298.0	94.5	88.5	31	54	58.87	+3	40.44	+	1.24			40.55		
5252...	N.	68	35	56.78	2776.0	93.5	85												
5271...	N.	47	09	23.90	1200.5	93.5	85	32	07	19.66	-8	41.10	+	1.76			40.32		
5338...	N.	43	34	26.91	2168.0	96	83.5												
5367...	N.	72	34	42.17	1577.0	95	84.5	31	57	25.96	+3	15.47	+	2.38			43.81		
5338...	N.	43	34	26.91	2168.0	96	83.5												
5376...	N.	72	25	16.33	2441.0	95	84.5	32	00	08.38	-1	30.29	+	2.38			40.47		

MAY 21ST, 1859.

G. C. 969 .....	N.	41	26	18.99	1802.5	90	77											
N. A. β Leonis	S.	74	38	33.27	1605.0	90	77	31	57	33.87	+1	05.32	+	2.69		31	58	41.88
B. A. C. 4066...	S.	67	45	24.59	855.0	85	81											
G. C. 999 .....	N.	48	33	19.52	2332.0	89	86	31	50	37.94	+8	08.57	-	0.20			46.31	
B. A. C. 4212...	S.	68	19	25.72	1288.5	79	87											
G. C. 1015 .....	N.	47	52	36.18	2160.0	82	85	31	53	59.05	+4	48.24	-	0.93			46.35	
G. C. 1025 .....	N.	43	47	20.10	1474.5	82	85.5											
B. A. C. 4318...	S.	72	09	30.55	1975.5	81	87	32	01	34.67	-2	45.70	-	0.98			47.99	
4362...	N.	72	07	05.61	2210.0	81	87											
4389...	N.	43	58	42.10	2505.0	82	85.5	31	57	06.14	+1	37.57	-	0.98			42.73	
4393...	N.	61	41	17.64	2325.0	81	87											
4457...	N.	51	07	58.34	1141.0	78	88.5	32	05	22.11	-6	34.91	-	1.71			44.30	
4699...	N.	45	28	37.62	1557.5	78	92											
4731...	N.	70	26	03.40	2272.5	78	92	32	02	39.49	-3	56.48	-	2.90			40.11	
4797...	N.	53	10	21.55	1395.5	86	86											
4809...	S.	62	41	56.38	2319.5	86	86	32	03	51.03	-5	05.61	-	0.00			45.42	
4873...	N.	72	26	23.62	2693.0	82	88											
1195...	N.	43	17	51.51	937.5	86	86	32	07	52.43	-9	10.86	-	0.62			40.95	

Tabulation of results for latitude of astronomical station No. 5, intersection of 32d parallel and 103d meridian, with zenith telescope by Würdeman, on twenty-eight pairs of stars.

[By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.]

		1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
Date.		B. A. C. 3910 S. 3953 N.	G. C. & N. 969 N. β Leonis S.	B. A. C. & G. C. 4066 S. 999 N.	B. A. C. & G. C. 4212 S. 1015 N.	B. A. C. & G. C. 1025 N. 4318 S.	B. A. C. 4362 S. 4389 N.	B. A. C. 4393 S. 4457 N.	B. A. C. 4467 N. 4566 S.	B. A. C. 4670 N. 4694 S.
1859.		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
May 17th	.....	31 58 46.3	31 58 46.8	31 58 42.3	31 58 45.6	31 58 48.3	31 58 42.7	31 58 42.7	31 58 45.3	31 58 39.4
" 18th	.....	58 42.2	58 41.2	58 41.8	58 47.0	58 44.3	58 41.2	31 58 40.0		
" 20th	.....	58 43.9	58 43.8		58 46.1	58 44.3	58 41.9		58 45.1	
" 21st	.....		58 41.9	58 46.3	58 46.4	58 48.0	58 42.7	58 44.3		
Latitude by a mean of each pair		31 58 41.1	31 58 43.4	31 58 43.4	31 58 46.2	31 58 46.2	31 58 42.1	31 58 42.1	31 58 45.2	31 58 39.4
		10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
Date.		B. A. C. 4699 N. 4731 S.	B. A. C. 4791 N. 4721 S.	B. A. C. 4797 N. 4809 S.	B. A. C. & G. C. 4873 S. 1195 N.	B. A. C. & G. C. 4917 N. 1205 S.	B. A. C. 5000 N. 5061 S.	B. A. C. 5036 N. 5061 S.	B. A. C. & G. C. 5072 N. 1245 S.	B. A. C. 5085 S. 5113 N.
1859.		° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
May 17th	.....	31 58 40.4			31 58 43.5			31 58 45.2	31 58 43.1	
" 18th	.....	58 36.7					31 58 39.5	58 39.8	58 41.2	31 58 41.1
" 20th	.....		31 58 38.9	31 58 44.9	58 41.3	31 58 41.4			58 39.9	58 43.7
" 21st	.....	58 40.1		58 45.4	58 41.0					
Latitude by a mean of each pair		31 58 39.0	31 58 38.9	31 58 45.1	31 58 41.9	31 58 41.4	31 58 39.7	31 58 41.5	31 58 41.4	31 58 42.4

Tabulation of results for latitude of astronomical station No. 5, &c.—Continued.

		19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
Date.		B. A. C. 5178 N. 5192 S.	B. A. C. 5252 S. 5271 N.	B. A. C. 1322 N. 5567 S.	B. A. C. & G. C. 1322 N. 5367 S.	B. A. C. & G. C. 1322 N. 5376 S.	B. A. C. 5432 N. 5440 S.	B. A. C. 5473 S. 5484 N.	B. A. C. 5515 N. 5541 S.	B. A. C. 5652 S. 5747 N.
1859.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
May 17th			31 58 41.5		31 58 43.3	31 58 42.8	31 58 42.3			
" 18th		31 58 39.0	58 42.8	31 58 41.3	58 41.3	58 41.2	58 39.3	31 58 43.2	31 58 41.6	31 58 39.6
" 20th		58 40.6	58 40.3		58 43.8	58 40.5				
" 21st										
Latitude by a mean of each pair		31 58 39.8	31 58 41.5	31 58 41.3	31 58 42.8	31 58 41.5	31 58 40.8	31 58 43.2	31 58 41.6	31 58 39.6
		28th pair.	Results for latitude by a mean of each night.		1st result.	2d result.	3d result.	Final result.		
Date.		B. A. C. 5666 S. 5747 N.			Latitude by a mean of all the pairs.	Latitude by a mean of all the observa- tions.	Latitude by a mean of results for each night.	Mean of 1st, 2d, and 3d results.		
1859.		o i "	o i "		o i "	o i "	o i "	o i "		
May 17th			31 58 44.3		} 31 58 42.0	} 31 58 42.4	} 31 58 42.9	} 31 58 42.4		
" 18th		31 58 41.8	31 58 41.1							
" 20th			31 58 42.5							
" 21st			31 58 44.0							
Latitude by a mean of each pair		31 58 41.8								



## B.—1ST. JUNCTION DELAWARE CREEK &amp; PECOS. PECOS RIVER SURVEY.

*Determination of the latitude.*

[Station: Junction of Delaware Creek and Pecos River. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: MARCH 31ST, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.	Micrometer readings.	Level sums.		Approximate latitude.	Z. difference by micrometer.	Corrections for latitude.	Latitude.
				E.	W.				
B. A. C. 2609.	N.	42 04 15.80	1836	100	62				
G. C. 709.	S.	73 50 10.35	1994	101	61	32 02 46.92	— 52.25	+ 8.09	32 01 62.76
B. A. C. 2715.	N.	47 09 24.01	2195	88	76				
" 2788.	S.	68 48 31.82	2000	90	77	32 01 02.08	+ 1 04.49	+ 2.59	69.16
" 2952.	N.	58 47 34.59	2712	87	85.5				
" 2999.	S.	56 59 58.75	1969	88	82	32 06 13.33	— 4 05.74	+ 0.46	68.05
" 2999.	N.	56 59 58.75	1969	88	82				
" 3016.	S.	58 53 16.63	2199.8	88	82	32 03 22.31	— 1 16.37	+ 0.46	66.40
" 3162.	N.	52 36 06.53	1982	90	82				
" 3204.	S.	63 12 45.87	2609	90	82	32 05 33.80	— 3 27.38	+ 1.66	68.08
" 3423.	S.	67 22 24.28	1751.5	96	81				
" 3466.	N.	48 38 47.94	2236.5	97	81	31 59 23.89	+ 2 40.41	+ 3.21	67.51
" 3485.	N.	68 07 56.86	2290.5	97	81				
G. C. 880.	N.	47 47 36.23	2258.0	98.5	80	32 02 13.40	— 0 10.74	+ 3.58	66.24
B. A. C. 3610.	N.	54 17 15.31	2445.0	100	79				
" 3650.	S.	61 44 34.19	1917.0	100.5	78.5	31 59 05.25	+ 2 54.63	+ 4.45	64.33

Latitude of the above station, 32° 02' 06".5.

## B.—3D. CAMP NO. 4. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 4; survey of Pecos River. Sextant by Würdeman. Chron. No. 2419, sidereal.]

Date: JUNE 16TH, 1859.

Th't. Earth, 84 ; bar., 26.6 in.

Name of star.	Double alt's observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of observation noted by chron.	Error of chron. slow of sid'l time.	Mean error of chron. r.	Remarks.
α Lyrae (east.)	0 1 11	0 1 11	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>	Only one stat ob- served for time.
	104 13 15	52 05 59.9	3 05 45.5	15 27 27.29	15 15 27	10 60.29	10 60.17	
	105 58 25	52 58 36.1	3 01 15.1	15 30 57.69	15 20 02	10 55.69		
	106 43 20	53 21 04.1	2 59 19.7	15 32 53.09	15 21 51.5	10 61.59		
107 25 25	53 42 07.0	2 57 31.2	15 34 41.59	15 23 37.5	10 63.99			
	108 50 20	54 24 35.4	2 53 53.6	15 38 19.49	15 27 19.9	10 59.29		

*Determination of the latitude by Polaris.*

[Station: Camp No. 4, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal by P. & F.]

Date: JUNE 16TH, 1859.

Th'r, Fahr't 84°; bar., 26.6 in.

No. for ref.	Times of observation by chronometer.	True sid'l times of observation.	Meridian distances—		Observed double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	13 57 19	14 08 19.2	1 00 59.85	15 14 57.75	62 04 30	31 00 54.9	32 24 28.2
2	14 00 09	14 11 09.2	1 03 49.85	15 57 27.75	62 05 20	31 01 19.9	24 35.9
3	14 02 45	14 13 45.2	1 06 25.85	16 36 27.75	62 04 35	31 00 57.4	23 56.9
4	14 06 00	14 17 00.2	1 09 40.85	17 25 12.75	62 05 45	31 01 32.4	24 10.4
5	14 08 37.5	14 19 37.7	1 12 18.35	18 04 35.25	62 06 15	31 01 47.4	24 07.2
6	14 11 50	14 22 50.2	1 15 30.85	18 52 42.75	62 07 25	31 02 22.4	24 19.2
7	14 14 07	14 25 07.2	1 18 47.85	19 41 57.75	62 06 30	31 01 54.9	23 26.0
8	14 17 26	14 28 36.2	1 21 16.85	20 19 07.75	62 07 15	31 02 17.4	23 30.0

Latitude by a mean of 8 results on Polaris	<table border="0"> <tr> <td>32 24 04.2</td> <td rowspan="2">}</td> </tr> <tr> <td>+3.78</td> </tr> <tr> <td>32 24 07.98</td> <td></td> </tr> </table>	32 24 04.2	}	+3.78	32 24 07.98	
32 24 04.2	}					
+3.78						
32 24 07.98						
7 results on $\beta$ Libræ (south)	32 25 15.67					
Latitude camp 4	32° 24' 41".82					

*Determination of the latitude.  $\beta$  Libræ (south).*

[Station: camp No. 4, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l by P. & F.]

Date: JUNE 16TH, 1859.

Th'r, Fahr't, 84°; bar., 26.6 in.

N. for ref.	Times of observ'n noted by chron't.	Merid'n dist. in sid'l real time.	Reduction to meridian in arc.	Observ'd double circum. merid. altitudes of star.	True meridian altitudes of star.	Latitude deduced from each observ'n.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	14 50 30.5	7 57.83	2 37.4	97 22 15	48 43 02.4	32 25 05.3
2	14 53 13.0	5 15.33	1 08.4	97 24 45	48 22 48.4	25 19.3
3	14 56 17.5	2 10.83	11.8	97 26 40	48 42 49.3	25 18.4
4	14 59 50.5	1 32.17	5.8	97 27 10	48 42 58.3	25 09.4
5	15 04 21.5	5 53.17	1 25.9	97 23 45	48 42 35.9	25 31.8
6	15 06 34.5	8 06.17	4 42.8	97 21 45	48 42 52.8	25 14.9
7	15 09 31.0	11 02.67	5 02.1	97 17 15	48 42 57.1	25 10.6

Latitude by a mean of 7 results on  $\beta$  Libræ (south) ..... 32° 25' 15".67

## B.—4TH. CAMP NO. 6, SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 6, survey of Pecos River. Sextant by Würdeman. Chron'r No. 2419, sidereal, by Parkinson &amp; Frodsham.]

Date: JUNE 18TH, 1859.

Th'r, Farh't 93°; bar., 26.6 in.

Name of star.	Double alt's observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observation deduced.			Time of observation noted by chronom'r.			Error of chron'r, slow of sid'l time.		Mean error of chron'r.	
	°	'	"	°	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	s.
α Lyrae (cast.)	79	05	25	39	31	44.7	4	11	36.9	14	20	35.81	14	10	00.9	10	34.91	} 10 40.01	} Only one star ob'd for time.
	79	37	15	39	47	40.2	4	10	13.6	14	21	59.11	14	11	17.8	41.93			
	80	00	10	39	59	08.2	4	09	10.5	14	23	02.21	14	12	18.0	44.21			
	80	17	15	40	07	40.9	4	08	27.6	14	23	45.11	14	13	05.9	39.21			
	80	39	55	40	19	01.3	4	07	28	14	24	44.71	14	14	01.6	43.11			
	81	39	45	40	48	57.3	4	04	50.6	14	27	22.11	14	16	46.0	36.11			
	82	02	00	41	00	05.1	4	03	52.2	14	28	20.46	14	17	39.8	40.60			

*Determination of the latitude by Polaris.*

[Station: Camp No. 6, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal by P. &amp; F.]

Date: JUNE 18TH, 1859.

Th'r Farh't, 93°; bar., 26.6 in.

No. for reference.	Times of observation by chronometer, &c.			True sidereal times of observation.			Meridian distances—						Latitude deduced from each observation.								
	h.	m.	s.	h.	m.	s.	In sec'l time.	In arc.		Observed double alt's of Polaris out of the meridian.		True altitudes of star.									
1	13	38	34.5	13	49	14.5	0	11	53.44	10	28	21.6	62	29	20	31	13	22.0	32	38	31.7
2	13	40	14.5	13	50	54.5	0	43	33.44	10	53	21.6	62	30	00	31	13	42.0	38	44	7
3	12	42	30.9	13	53	10.9	0	45	49.84	11	27	27.6	62	30	45	31	14	04.5	38	57	5
4	13	45	56.5	13	56	30.5	0	49	15.44	12	18	51.6	62	30	00	31	13	42.0	38	19	2
5	13	47	58.0	13	58	38.0	0	51	16.94	12	49	14.6	62	31	45	31	14	34.5	38	61	8
6	13	50	56	14	01	36.0	0	54	14.94	13	33	44.1	62	31	50	31	14	37.0	38	49	2
7	13	58	47	14	09	27.0	1	02	05.94	15	31	29.1	62	32	50	31	15	07.0	38	35	1
8	14	02	46.5	14	13	26.5	1	06	05.44	16	31	21.6	62	33	35	31	15	29.5	38	33	1
9	14	03	53.5	14	14	33.5	1	07	12.44	16	48	06.6	62	35	15	31	16	19.5	38	75	6
10	14	06	52.5	14	17	32.5	1	10	17.44	17	22	51.6	62	34	55	31	16	09.5	38	46	2

Latitude by a mean of 9 results on Polaris ..... 32 38 42.05  
 8 " α<sup>2</sup> Librae (south) ..... 32 38 11.20  
 Latitude camp No. 5 ..... 32 38 26.62



*Determination of the latitude  $\alpha^2$  Libræ (south).*

[Station: Camp No. 6. Survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JUNE 18TH, 1859.

Th'r, Farh't, 93°; bar., 26.6 in.

No. for ref.	Times of observ'n noted by chron'r.	Merid'n distances in sid'l times.	Reduction to meridian in arc.	Obs'd double circum-meridian alt's of star.	True meridian altitudes of star.	Latitude deduced from each observ'n.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	14 22 05	10 23.0	3 50.8	83 42 45	41 54 10.4	32 37 78.8
2	14 26 22.5	6 05.5	1 19.5	83 48 20	41 54 36.6	37 52.6
3	14 29 15.0	3 13.0	0 22.0	83 50 25	41 54 41.6	37 47.6
4	14 31 00.0	1 28.0	0 04.5	83 49 25	41 53 54.6	37 95.1
5	14 33 04.0	0 36.0	0 00.7	83 50 55	41 54 35.3	37 53.9
6	14 35 12.0	2 45.0	0 16.0	83 50 10	41 54 28.1	37 61.1
7	14 36 44.0	4 16.0	0 38.9	83 49 00	41 54 16.0	37 73.2
8	14 38 33.9	6 05.9	1 19.7	83 46 30	41 53 41.8	38 47.4

Latitude by a mean of 8 results on  $\alpha^2$  Libræ (south) ..... 32° 38' 11".2

B.—5TH. CAMP NO. 7. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 7. Salt Lagoon, north of spring. Sextant by Würdeman. Chron'r 2419, sidereal, by Parkinson & Frodsham.]

Date: JUNE 19TH, 1859.

Th'r, Farh't, 87°; bar., 26.6 in.

Name of star.	Double alt's observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of observation noted by chron'r.	Error of chron'r. slow of sid'l time.	Mean error of chron'r.
	<i>° ' "</i>	<i>° ' "</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>
$\beta$ Leonis (west) ...	99 37 50	49 48 14.4	2 40 13.9	14 22 07.85	14 11 34	10 33.85	} 10 32.00
	99 06 55	49 32 46.6	2 41 30.4	14 23 24.35	14 12 53.5	30.85	
	98 34 35	49 16 36.2	2 42 51.2	14 24 45.15	14 14 13	32.15	
	97 31 35	48 45 05.4	2 45 25.7	14 27 19.65	14 16 48.5	31.15	
$\alpha$ Lyra (east) ...	97 03 15	48 30 55.0	2 46 35.5	14 28 29.40	14 17 58.6	Rejected.	} 10 42.06
	83 25 45	41 41 58.7	4 00 33.2	14 31 39.64	14 20 57	10 42.64	
	83 52 15	41 55 14.1	3 59 23.6	14 32 49.24	14 22 00.9	-----	
	84 16 40	42 07 26.9	3 58 19.6	14 33 53.24	14 23 09.6	10 43.64	
	84 32 05	42 15 09.7	3 57 39.2	14 34 33.64	14 23 53.5	40.14	
	84 53 55	42 26 05.0	3 56 42	14 35 30.84	14 24 49	41.84	

Mean error by 4 obs on  $\beta$  Leonis (west) ..... *m. s.* 10 32.00  
 " " " 4 obs on  $\alpha$  Lyra (east) ..... 10 42.06  
 Chronometer 2419, sid'l, is slow of sid'l time, June 19th, 1859. .... 10 37.03

*Determination of the latitude by Polaris.*

[Station: Camp No. 7, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JUNE 19TH, 1859.

Th'r, Fahr't, 87°; bar., 26.6.

No. for ref.	Times of obser- vation by chro- nometer.	True sidereal times of ob- servation.	Meridian distances—		Observed double alt's of Polaris out of mer'n.	True altitudes of star.	Latitude de- duced from each observ'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	° ' "	° ' "	° ' "	° ' "
1.....	13 47 31	13 58 08.03	0 50 46.10	12 41 31.50	62 51 15	31 24 19.1	32 48 50.42
2.....	13 49 41	14 00 18.03	0 52 56.10	13 14 01.50	62 51 45	31 24 34.1	48 50.50
3.....	13 51 28.5	14 02 05.53	0 54 43.60	13 40 54.00	62 52 00	31 24 41.6	48 52.80
4.....	13 54 08.6	14 04 45.63	0 57 23.70	14 20 55.50	62 52 35	31 24 59.1	48 55.80
5.....	13 56 49.0	14 07 26.03	1 00 04.10	15 01 01.50	62 52 40	31 25 01.6	48 43.10
6.....	13 59 29.0	14 10 06.03	1 02 44.37	15 41 05.55	62 53 30	31 25 26.6	48 52.40
7.....	14 01 46.5	14 12 23.53	1 05 01.60	16 15 24.00	62 54 05	31 25 44.1	48 55.80
8.....	14 04 11.4	14 14 48.43	1 07 26.50	16 51 37.80	62 54 15	31 25 49.1	48 45.40
	14 05 50.0	14 16 27.03	1 09 05.10	17 16 16.80	62 54 55		

Latitude by a mean of 8 results on Polaris ..... 32° 48' 50.77"  
 32° 48' 23.10"

Latitude, camp No. 7. .... 32° 48' 36.93"

*Determination of the latitude on  $\alpha^2$  Libræ (south.)*

[Station: Camp No. 7, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JUNE 18TH, 1859.

Th'r, Fahr't, 87°; bar., 26.6 in.

N. for ref.	Times of obser- vation noted by chron'r.	Merid'n dist's in sidereal time.	Reduction to meridian in arc.	Obs'd double cir- cum-meridian alt's of star.	True meridian al- titudes of star.	Latitude de- duced from each observa- tion.
1.....	14 35 57	3 25 99	0 23.2	83 29 35	41 44 16.9	32 48 12.2
2.....	14 41 20.9	8 49.89	2 34.0	83 24 30	41 43 55	48 34.1

Latitude by a mean of 2 results on  $\alpha^2$  Libræ ..... 32° 48' 23'.10"

B.—6TH. CAMP NO. 8. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 8, survey of Pecos River. Sextant by Würdeman. Chron'r No. 2419, sid'l, by Parkinson & Frodsham.]

Date: JUNE 20TH, 1859.

Th'r, Fahr't, 85°; bar., 26.6 in.

Name of star.	Double alt's observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of observation noted by chron'r.	Error of chron'r. slow of sid'l time.	Mean error of chron'r.
	° ' "	° ' "	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>
Leonis (west)...	98 42 35	49 20 36.1	2 42 17.1	14 24 11.06	14 13 39.50	10 31.56	} 10 33.135
	98 04 05	49 01 20.6	2 43 52.4	14 25 46.36	14 15 13.50	32.86	
	97 19 00	48 38 47.6	2 45 43.8	14 27 37.76	14 17 03.90	33.86	
	95 58 15	47 58 24.0	2 49 02.9	14 30 56.86	14 20 22.60	34.26	
Lyrae (east).....	90 59 10	45 28 47.6	3 41 09.6	14 51 03.25	14 40 26.00	10 37.25	} 10 38.616
	91 19 50	45 39 07.9	3 40 15.8	14 51 57.05	14 41 17.90	39.15	
	91 55 00	45 56 48.4	3 88 43.8	14 53 29.05	14 42 49.60	39.45	

Mean error by 4 ob's on  $\beta$  Leonis (west)..... *m. s.* 10 33.135  
 " " 3 ob's on  $\alpha$  Lyrae (east)..... 10 38.616  
 Chronometer 2419, sidereal, is slow of sidereal time June 20th ..... 10 35.875

*Determination of the latitude by Polaris.*

Station: No. 8 camp, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 20TH, 1859.

Th'r, Fahr't, 85°; bar., 26.6 in.

No.	Times of ob- for servation by ref. chronometer.	True sidereal times of ob- servation.	Meridian distances—		Observed double alti- tudes of Po- laris out of the meridian.	True altitudes of star.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	° ' "	° ' "	° ' "	° ' "
1	13 48 17.5	13 58 53.3	0 51 30.5	12 52 37.5	63 11 20	31 34 21.8	32 58 49.4
2	13 51 02.0	14 01 37.8	0 54 15.0	13 33 45.0	63 12 15	31 34 49.3	58 62.9
3	13 53 38.0	14 04 13.8	0 56 51.0	14 12 45.0	63 12 25	31 34 54.3	58 54.0
4	13 55 38.0	14 06 13.8	0 58 51.0	14 42 45.0	63 13 05	31 35 14.3	58 62.9
5	13 57 54	14 08 29.8	1 01 07.0	15 16 45.0	63 13 00	31 35 14.8	58 47.3
6	14 05 36	14 16 11.8	1 08 49.0	17 12 15.0	63 14 35	31 35 59.5	58 46.8

Latitude by mean of 6 results on Polaris..... *° ' "* 32 58 53.88  
 " " " "  $\alpha^2$  Librae, south..... 32 57 54.50  
 Latitude, camp No. 3..... 32 58 24.19



*Determination of the latitude of  $\alpha^2$  Lyrae (south).*

[Station: Camp No. 8, survey of Pecos River. Sextant by Würdemann. Chronometer No. 2419, sid'l by P. & F.]

Date: JUNE 20TH, 1859.

Th'r, Fahr't, 85°; bar., 26.6 in.

No. for ref.	Times of observ'n noted by chron'r.			Merid'n dist. in sidereal time.		Reduction to meridian in arc.		Observed double circum-meridian altitudes of star.			True meridian altitudes of star.			Latitude deduced from each observ'n.		
	h.	m.	s.	m.	s.	'	"	o	'	"	o	'	"	o	'	"
1.....	14	27	40	4	52.24		50.20	83	11	10	41	35	30.9	32	56	58
2.....	14	29	25.5	3	06.74		20.50	83	10	45	41	34	48.8			57 40.3
3.....	14	31	28.0	1	04.24		2.30	83	11	50	41	35	03.0			57 26.1
4.....	14	33	14.0		41.76		0.90	83	10	40	41	34	26.6			57 62.5
5.....	14	37	58.5	5	26.26	1	02.70	83	05	50	41	33	03.3			59 25.8

Latitude by a mean 5 results on  $\alpha^2$  Lyrae ..... 32° 57' 54".5.

## B.—7. CAMP No. 12. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 12 (east bank near salt marsh). Sextant by Würdemann. Chron'r No. 2419, sidereal, by P. & F.]

Date: JUNE 26TH, 1859.

Th'r, Fahr't 70°; bar., 26.5 in.

Name of star.	Double alt's observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observation deduced.			Time of observation noted by chron'r.			Error of chron'r slow of sid'l time.			Mean error of chron'r.			
	o	'	"	o	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	s.	m.	s.	
$\alpha$ Lyrae (east.)	76	58	20	38	28	08.6	4	19	12.1	14	13	00.81	14	02	28.50	10	32.31					
	77	28	55	38	43	26.6	4	17	50.9	14	14	22.01	14	03	47.50		34.51					
	77	44	05	38	51	01.9	4	17	10.6	14	15	02.31	14	04	26.00		36.31					
	77	59	15	38	58	37.2	4	16	30.2	14	15	42.71	14	05	07.60		35.11					
	78	14	55	39	06	29.0	4	15	48.6	14	16	24.31	14	05	46.50		37.81					
	78	37	45	39	17	52.9	4	14	48.1	14	17	24.81	14	06	49.60		35.21					
	78	54	00	39	26	00.6	4	14	05.3	14	18	07.61	14	07	32.60		35.01					
	79	08	50	39	33	25.9	4	13	25.6	14	18	47.31	14	08	11.00		36.31					

10 42.58 } Only 1 star obs'd for time.

*Determination of the latitude by Polaris.*

[Station: Camp No. 12, east bank near salt marsh. Sextant by Würdeman. Chronometer 2419, sidereal, by P. & F.]

Date: JUNE 26TH, 1859.

Th'r, Farh't, 70°; bar., —.

No. for ref.	Times of observ'n by chronometer.	True sidereal times of observation.	Meridian distances.		Observed double altitudes of Polaris out of the meridian.	True altitudes of star.	Latitude deduced from each observation.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	14 12 11.5	14 22 46.8	1 14 52.44	18 43 06.60	64 17 15	32 07 19.8	33 29 12.9
2	14 13 36.6	14 24 11.9	1 16 17.54	19 04 23.20	64 17 05	32 07 14.8	29 07.5
3	14 15 32.0	14 26 07.3	1 18 12.94	19 33 14.10	64 17 45	32 07 34.8	29 14.1
4	14 17 10	14 27 45.3	1 19 50.94	19 57 44.10	64 17 45	32 07 34.8	29 01.0
5	15 13 40.5	15 24 15.8	2 16 21.44	34 05 21.60	64 38 20	32 17 52.9	29 47.2
6	15 15 43.0	15 26 18.3	2 18 23.94	34 55 59.10	64 38 15	32 17 50.4	29 18.8
7	15 17 48.0	15 28 23.3	2 20 28.84	35 07 14.10	64 40 40	32 19 02.9	29 64.7
8	15 20 29.0	15 31 04.3	2 23 09.94	35 47 29.10	64 41 35	32 19 30.4	29 57.2
9	15 22 03.6	15 32 38.9	2 24 44.54	36 11 08.10	64 42 20	32 19 52.9	29 59.7
10	15 27 20.6	15 37 35.9	2 30 01.54	37 30 23.10	64 42 55	32 20 10.5	29 05.8

Latitude by a mean of 10 results on Polaris ..... 33 29 28.89  
 9 results on a<sup>2</sup> Librae (south) ..... 33 29 26.60  
 Latitude of Camp No. 12 ..... 33 29 27.74

*Determination of the latitude a<sup>2</sup> Librae (south).*

[Station: Camp 12, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JUNE 26TH, 1859.

Th'r, Farh't, 70°; bar., 26.6 in.

No. for ref.	Times of observation noted by chronometer.	Merid'n dist. in sidereal time.	Reduction to meridian in arc.	Observed double circum-meridian altitudes of star.	True meridian altitudes of star.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	14 22 59.5	9 33.22	3 10 94	82 00 55	41 02 42.34	33 29 46.9
2	14 23 57.0	8 35.72	2 34.50	82 02 55	41 03 05.90	29 23.3
3	14 25 21.0	7 11.22	1 48.10	82 04 25	41 03 04.50	29 24.7
4	14 28 36.0	3 59.72	0 32.50	82 07 00	41 03 06.40	29 22.8
5	14 29 56.5	2 36.22	0 14.20	82 07 25	41 02 59.30	29 29.9
6	14 31 23.9	1 08.82	0 02.60	82 07 45	41 02 57.70	29 31.5
7	14 32 26.0	0 06.72	0 00.00	82 08 15	41 03 10.11	29 19.1
8	14 33 49.5	1 16.78	3 38	82 08 15	41 03 13.48	29 15.7
9	14 35 31.6	2 58.88	0 18.60	82 07 25	41 03 03.79	29 25.5

Latitude by a mean of 9 results on a<sup>2</sup> Librae ..... 33 29 26.6

## B.—S. CAMP NO. 13. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp 13, survey of Pecos River. Sextant by Würdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 27TH, 1859.

Th'r, Fahr't, 68°; bar., 26.4 in.

Name of star.	Double alt's observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observation deduced.			Time of observation noted by chron'r.			Error of chron'r slow of sid'l time.		Mean error of chron'r.	
	o	i	''	c	i	''	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	s.
α Lyræ (east).....	90	29	20	45	13	52.8	3	43	49.9	14	48	23.02	14	37	28.8	10	54.22	} 10 52.677	
	90	53	50	45	26	08.1	3	42	45.8	14	49	27.12	14	38	31.6		55.52		
	91	14	30	45	36	28.5	3	41	51.8	14	50	21.12	14	39	29.5		51.62		
	91	34	40	45	46	33.7	3	40	59.5	14	51	13.42	14	40	20.6		52.82		
	92	03	35	46	01	01.6	3	39	43.5	14	52	29.42	14	41	36		53.42		
	92	32	35	46	15	32.0	3	38	27.9	14	53	45.02	14	42	52		53.02		
α Bootis (west)....	93	01	45	46	30	07.4	3	37	11.8	14	55	01.12	14	44	13		48.12	} 10 47.053	
	119	00	45	59	29	54.5	2	02	52.9	16	12	09.45	16	01	26.6	10	42.85		
	118	31	50	59	15	26.7	2	04	06.3	16	13	22.85	16	02	38.0		44.85		
	118	03	25	59	01	13.9	2	05	18.2	16	14	34.75	16	03	44.8		49.95		
	117	38	35	58	48	48.7	2	06	21.6	16	15	38.15	16	04	48.8		49.35		
	116	53	40	58	26	20.8	2	08	13.8	16	17	30.35	16	06	41.8		48.55		
	116	25	45	58	12	23.0	2	09	24.7	16	18	41.25	16	07	54.6		46.65		

Mean error by 7 ob's on α Lyræ (east).....	m.	s.
" " " 6 ob. on α Bootis (west).....	10	52.677
Chron'r 2419, sid'l, is slow of sid'l time June 27th, 1859.....	10	47.033
	10	49.855

*Determination of the latitude of Polaris.*

[Station: Camp No. 13, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 27TH, 1859.

Th'r, Fahr't, 68°; bar., —.

No. for ref.	Times of observation by chronometer.			True sidereal times of observation.			Meridian distances.		Observed double alt's of Polaris out of the meridian.	True altitudes of star.	Latitude deduced from each obs'n.										
	h.	m.	s.	h.	m.	s.	h.	m.				s.	o	i	''						
1	14	22	07	14	32	56.8	1	25	27.84	21	21	57.60	64	38	15	32	17	52.5	33	38	34.4
2	14	23	47.5	14	34	37.3	1	27	08.24	21	47	05.10	64	39	55	32	18	42.5			38 70.7
3	14	25	50.0	14	36	39.8	1	29	10.84	22	17	42.60	64	39	00	32	18	15.0			38 26.0
4	14	26	54.5	14	37	44.3	1	30	15.34	22	33	50.10	64	39	05	32	18	17.5			38 19.3
5	14	28	20	14	39	09.8	1	31	40.84	22	55	12.60	64	39	25	32	18	27.5			38 17.2
6	14	29	40.6	14	40	30.4	1	33	01.44	23	15	21.60	64	39	40	32	18	35.0			38 12.8
7	14	31	28.5	14	42	18.3	1	34	49.34	23	42	20.10	64	40	15	32	18	52.5			38 14.6

Latitude by a mean of 7 results on Polaris.....	33	38	29.85
" " " " β Libræ (south).....	33	38	26.38
Latitude, camp No. 13.....	33	38	28.11



*Determination of the latitude  $\beta$  Libræ (south).*

[Station: Camp No. 13. Survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JUNE 27th, 1859.

Th'r, Fahr't, 68°; bar., —.

No. fr ref.	Times of observ'n noted by chron'r.			Merid'n dist. in side- real time.		Reduction to merid- ian in arc.		Observed double cir- cum-meridian alt's of star.			True meridian alti- tudes of star.			Latitude deduced from each observ'.		
	h.	m.	s.	m.	s.	'	"	o	'	"	o	'	"	o	'	"
1.....	14	47	39	10	59.67	4	48.7	94	51	55	47	30	02.60	33	38	04.05
2.....	14	49	35	9	03.67	3	16.1	94	53	45	47	29	25.00			38 42.55
3.....	14	51	13	7	25.67	2	11.8	94	55	35	47	29	15.70			38 51.75
4.....	14	53	00.6	5	38.07	1	15.8	94	56	25	47	28	44.70			39 22.85
5.....	14	55	22.5	3	16.17	0	25.4	95	01	10	47	30	16.80			37 50.75
6.....	14	58	44	0	05.33	0	25.4	95	01	45	47	30	08.90			37 58.65
7.....	15	01	04.5	2	25.83	0	14.1	05	00	50	47	29	55.50			38 12.05
8.....	15	02	38.5	3	59.83	0	38.2	94	58	20	47	29	04.60			39 02.95
9.....	15	06	11.6	7	32.93	2	16.2	94	56	55	47	30	00.10			38 07.45
10.....	15	08	09.6	9	30.93	3	36.3	94	54	10	47	29	57.70			38 09.85

Latitude by a mean of 10 results on  $\beta$  Libræ..... 33° 38' 26".38

B.—9. CAMP NO 16. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp No. 16, survey of Pecos River. Sextant by Würdeman. Chron'r 2419, sidereal, by P. & F.]

Date: JULY 1st, 1859.

Th'r, Fahr't, 70; bar., 26.4 in.

Name of star.	Double alt's ob- served.			True altitudes.			Hour angle from me- ridian in time.			Sidereal time of ob- servation deducted.			Time of obs'n noted by chr' F.			Error of chronom. slow of sid'l time.			Mean error of chron'r.		
	o	'	"	o	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	o	'	"	
a Lyra (east).	86	43	45	43	21	01.1	3	54	40	14	37	32.95	14	26	23.6	11	09.35	} 10 06.12			
	87	04	25	43	31	21.4	3	53	45.5	14	38	27.45	14	27	20	11	07.45				
	87	21	55	43	40	06.6	3	52	59.4	14	39	13.55	14	28	13.6	10	59.95				
	87	58	30	43	58	24.7	3	51	23.2	14	40	49.75	14	29	42	11	07.75				
a Bootis (west)	125	58	35	62	58	52.8	1	43	54.4	15	53	10.92	15	42	13.5	10	57.42	} 10 56.095			
	125	11	40	62	35	24.5	1	45	59.1	15	55	15.62	15	44	23	10	52.62				
	124	44	20	62	21	44.6	1	47	11.5	15	56	28.02	15	45	33.4	10	54.62				
	124	20	00	62	09	34.4	1	48	21.7	15	57	38.22	15	46	38.5	10	59.72				
	123	56	55	61	58	01.6							15	47	39.8						

Mean error by 4 ob's on a Lyra (east)..... m. s. 11 06.120  
 " " by 4 ob's on a Bootis (west)..... 10 56.095  
 Chron'r 2419, sid'l, is slow of sid'l. time July 1st, 1859..... 11 01.107

Determination of the latitude by *Polaris*

[Station: Camp No. 16, survey of Pecos River. Sextant, —; chronometer, —.]

Date: JULY 1ST, 1859.

Th'r, Fahr't, 73°; bar., —.

No. of ref.	Times of observation by chronometer.	True sidereal times of observation.	Meridian distances—		Observed double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sidereal time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	15 12 43.5	15 23 44.60	2 16 12.19	34 03 01.5	65 51 55	32 54 42.7	34 06 41.3
2	15 14 04.0	15 25 05.10	2 17 32.60	34 23 09.0	65 52 40	32 55 05.2	06 46.5
3	15 16 05	15 27 06.10	2 19 33.60	34 53 24.0	65 54 05	32 55 47.7	07 03.8
4	15 17 19.6	15 28 20.79	2 20 48.20	35 12 03.0	65 55 40	32 56 35.2	07 35.3
5	15 19 23.5	15 30 24.60	2 22 52.10	35 43 01.5	65 55 30	32 56 30.2	07 03.6
6	15 20 59	15 32 00.10	2 24 27.60	36 06 54.0	65 56 35	32 57 02.7	07 14.4
7	15 22 27	15 33 28.10	2 25 55.60	36 28 54.0	65 57 45	32 57 22.7	07 15.7
8	15 24 57	15 35 58.10	2 28 25.60	37 06 24.0	65 58 00	32 57 45.2	07 04.7
9	15 25 18.6	15 36 19.70	2 28 47.20	37 11 48.0	65 58 35	32 58 02.7	07 17.4

Latitude by a mean of 9 results on *Polaris* ..... *C. I. V.*  
 10 " "  $\beta$  *Librae* (south) ..... 34 07 06.9  
 Lat. Camp No. 16 ..... 34 06 34.58  
 ..... 34 06 50.74

Determination of the latitude,  $\beta$  *Librae* (south).

[Station: Camp No. 16, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidl, by P. &amp; F.]

Date: JULY 1ST, 1859.

Th'r, Fahr't, 73°; bar., —.

No. for ref.	Times of observ'n noted by chron'r.	Merid'n dist. in sidereal time.	Reduction to meridian in arc.	Observed double circummeridian alt's of star.	True meridian altitudes of star.	Latitude deduced from each observation.
1	14 49 28	8 59.3	3 10.29	93 58 10	47 01 30.09	31 06 34.36
2	14 51 05	7 22.3	2 08.00	94 00 05	47 01 25.30	06 43.15
3	14 53 33	4 54.3	0 56.60	94 01 40	47 01 01.40	06 67.05
4	14 59 06.6	0 39.3	0 00 90	94 04 15	47 01 23.29	06 45.25
5	15 00 27.5	2 00.2	0 01 40	94 05 00	47 01 54.26	06 14.25
6	15 02 02.5	3 35.2	0 30.30	94 03 25	47 01 27.60	06 40.85
7	15 03 12.5	4 45.2	0 53.20	94 03 30	47 01 53.00	06 15.45
8	15 04 27.6	6 00.3	1 24.50	94 02 20	47 01 49.70	06 18.75
9	15 05 47.0	7 19.7	2 06.50	94 00 15	47 01 28.80	06 39.65
10	15 07 01.6	8 34.3	2 53.10	93 59 15	47 01 45.40	06 23.05

Latitude by a mean of 10 results on  $\beta$  *Librae* (south) ..... 31 06 34.53







*Determination of the latitude by Polaris.*

[Station: Camp No. 18, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: JULY 30, 1859.

Th'r. Fahr't, 69°; bar., 26.3 in.

No. for ref.	Times of observation by chronometer, etc.			True sidereal times of observation.			Meridian distances—						Obs'd double altitudes of Polaris out of the meridian.	True altitudes.			Latitude deduced from each obs'n.					
	h.	m.	s.	h.	m.	s.	In sid'l time.			in arc.				°	'	"	°	'	"	°	'	"
1	15	10	17	15	21	21.7	2	13	47.41	33	26	51.15	66	36	45	33	17	07.8	34	29	36.4	
2	15	11	29	15	22	33.7	2	14	59.41	33	44	51.15	66	36	55	33	17	12.8			29	26.6
3	15	12	53.5	15	23	58.2	2	16	23.91	34	05	58.65	66	28	35	33	18	02.8			29	59.0
4	15	14	35	15	25	32.7	2	18	05.41	34	31	21.15	66	38	15	33	17	52.8			29	27.8
5	15	15	59.5	15	27	04.2	2	19	29.91	34	52	28.65	66	39	40	33	18	35.3			29	52.2
6	15	17	33.0	15	28	37.7	2	21	03.41	35	15	51.15	66	38	40	33	18	05.3			29	02.3
7	15	19	27.0	15	30	31.7	2	22	57.41	35	44	21.15	66	40	00	33	18	45.3			29	17.6
Latitude by a mean of 7 results on Polaris																			34	29	31.7	
9 " " $\beta$ Libræ (south)																			34	28	49.43	
Latitude, camp No. 18																			34	29	10.56	

*Determination of the latitude,  $\beta$  Libræ (south).*

[Station: Camp No. 18, survey of Pecos River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JULY 30, 1859.

Th'r. Fahr't, 72°; bar., 26.3 in.

No. for ref.	Times of observation by chronometer.			Merid'n dist's in sidereal time.			Reduction to meridian in arc.			Obs'd double circum-merid'n altitudes of star.			True meridian altitudes of star.			Latitude deduced from each observation.					
	h.	m.	s.	m.	s.	'	'	"	'	'	"	'	'	"	°	'	"	°	'	"	
1	14	54	30	5	53.75	0	35.30	93	19	10	46	39	23.9	34	28	44.65					
2	14	55	24.5	2	59.25	0	20.80	93	19	40	46	39	24.4			28	44.10				
3	14	56	33.6	1	50.15	0	07.80	93	19	05	46	38	53.9			28	74.60				
4	14	57	39.0	0	44.75	0	01.30	93	19	45	46	39	07.4			28	61.15				
5	14	58	46.5	0	22.75	0	00.30	93	20	05	46	39	16.4			28	52.10				
6	15	00	23.4	1	59.65	0	09.20	93	20	00	4	39	22.8			28	45.76				
7	15	02	35.8	4	12.05	0	41.00	93	18	35	46	39	12.1			28	50.47				
8	15	04	20.0	5	56.25	1	22.00	93	17	40	46	39	25.6			28	42.97				
9	15	05	33.5	7	09.75	1	59.40	93	15	05	46	38	45.5			28	83.07				
Latitude by a mean of 9 results on $\beta$ Libræ (south)																			34	28	49.43

## B.—12. CAÑADA DE SAN JUAN DE DIOS. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Cañada de San Juan de Dios. Sextant by Würdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Date: JULY 4TH, 1859.

Th'r, Fahr't, 70°; bar., 26.3 in.

Name of star.	Double alt's observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observation deduced.			Time of observation noted by chron'r.			Error of chron'r, slow of sid'l time.		Mean err. of chron'r.
	°	'	"	°	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	
α Lyrae (east) ...	103	26	55	51	42	48.8	3	12	03.1	15	20	09.86	15	09	18.6	10	51.26	} 10 51.96
	103	51	00	51	54	51.5	3	11	09.6	15	21	12.36	15	10	20.5		51.86	
	104	08	45	52	03	44.2	3	10	14.0	15	21	58.96	15	11	07		51.96	
	104	28	45	52	13	44.5	3	09	22.7	15	22	50.26	15	12	00		50.26	
	104	48	05	52	23	24.7	3	08	32.5	15	23	40.46	15	12	46		54.46	
α Bootis (west) ...	119	41	15	59	50	09.0	1	59	20	16	08	36.48	15	58	10.60	10	25.88	} 10 26.63
	119	25	45	59	42	23.8	2	00	00.5	16	09	16.98	15	58	50.00		26.98	
	119	02	50	59	30	56.1	2	01	00.2	16	10	16.68	15	59	52.50		24.18	
	118	43	10	59	21	05.9	2	01	51.4	16	11	07.88	16	00	39.80		28.08	
	118	28	05	59	13	33.2	2	02	30.6	16	11	47.08	16	01	18.70		28.28	

Mean error of chron'm by 5 results on α Lyrae (east) .....	m.	s.	10	51.96
" " " by 5 results on α Bootis (west) .....			10	26.63
Chron'r 2419, sid'l, is slow of sid'l time July 4th, 1859 .....			10	39.32

*Determination of the latitude by Polaris.*

[Station: Cañada de San Juan de Dios. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. &amp; F.]

Date: JULY 4TH, 1859.

Th'r, Fahr't, 70; bar., 26.3 in.

No. for ref.	Time of observ'n by chronometer.			True sidereal time of observation.			Meridian distances—			Observed double altitudes of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.										
	h.	m.	s.	h.	m.	s.	In sid'l time.	In arc.														
1	15	15	29	15	26	08.3	2	18	33.12	34	38	16.8	66	59	20	33	28	26.0	34	39	55.1	
2	15	17	50	15	28	29.3	2	20	54.12	35	13	31.8	67	00	55	33	29	13.5			40	12.6
3	15	19	48	15	30	27.3	2	22	52.12	35	43	01.8	67	02	10	33	29	51.0			40	24.6
4	15	21	15.5	15	31	54.8	2	24	19.62	36	04	54.3	67	02	20	33	29	56.0			40	10.4
5	15	22	49.6	15	32	28.9	2	25	53.72	36	28	25.8	67	02	50	33	30	11.0			40	04.7
6	15	24	20	15	35	19.3	2	27	44.12	36	56	01.8	67	03	50	33	30	41.0			40	10.2
7	15	27	30.5	15	38	09.8	2	30	34.62	37	38	39.3	67	04	15	33	30	53.5			39	44.1
8	15	28	46.9	15	39	26.2	2	31	51.02	37	57	45.3	67	06	20	33	31	56.0			40	29.1
9	15	30	42.5	15	41	21.8	2	33	46.62	38	26	39.3	67	07	25	33	32	28.5			40	35.0

Latitude by a mean of 9 results on Polaris .....	°	'	34	40	11.75
12 " " β Librae (south) .....			34	38	36.25
Latitude, camp in the Cañada de San Juan de Dios .....			34	39	24



*Determination of the latitude  $\beta$  Libræ (south.)*

[Station: Cañada de San Juan de Dios. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: JULY 4TH, 1859.

Th'r, Fahr't, 70; bar. —.

No. for ref.	Times of observation noted by chron'r.	Merid'n dist's in sidereal time.	Reduction to meridian in arc.	Obs'd double-circum-merid'n altitudes of star.	True meridian altitudes of star.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	14 49 25	9 24.14	3 24.8	92 53 55	46 29 35.7	34 38 33.0
2	14 50 40	8 09.14	2 33.0	92 55 15	46 29 24.8	38 43.9
3	14 52 18.6	6 30.54	1 37.9	92 57 40	46 29 41.3	38 27.4
4	14 53 54.0	4 55.14	0 56.0	92 58 25	46 29 21.9	38 46.8
5	14 55 44	3 05.14	0 22.0	92 59 40	46 29 25.4	38 43.3
6	14 57 14.6	1 34.54	0 05.7	93 00 25	46 29 31.6	38 37.1
7	14 59 00	0 10.86	0 00.0	93 00 40	46 29 33.4	38 35.3
8	15 01 04	2 14.86	0 16.6	93 00 40	46 29 50.0	38 18.7
9	15 03 15.6	4 26.46	0 45.6	92 59 35	46 29 46.5	38 22.2
10	15 04 37.0	5 47.86	1 17.8	92 58 05	46 29 33.7	38 35.0
11	15 05 58.5	7 09.26	1 58.6	92 56 30	46 29 27.0	38 41.7
12	15 07 26.5	8 37.36	2 52.2	92 54 25	46 29 18.1	38 50.6

Latitude by a mean of 12 results on  $\beta$  Libræ (south) ..... 34° 38' 36". 2

B.—13. ALAMO GORDO. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Alamo Gordo. Sextant by Würdeman. Chron'r No. 2419, sidereal, by P. & F.]

Date: JULY 5TH, 1859.

Th'r, Fahr't, 79; bar., 26.3 in.

Name of star.	Double alt's observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of obs'n noted by chron'r.	Error of chron'r, slow of sid'l time.	Mean error of chron'r.
	<i>° ' "</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>
a Lyrae (east).....	102 54 35	51 26 40.4	3 13 41.7	15 18 31.27	15 08 06	10 25.27	10 25.07
	103 15 00	51 36 53.2	3 12 48.7	15 19 24.27	15 09 01.5	22.77	
	103 50 25	51 54 36.1	3 11 46.7	15 20 26.27	15 10 30	26.27	
	104 09 20	52 04 03.8	3 10 27.5	15 21 45.47	15 11 21	24.47	
	104 28 50	52 13 49.9	3 09 36.9	15 22 36.07	15 12 09.5	26.57	
a Bootis (west).....	123 29 35	61 14 22.3	1 51 39.5	.....	15 50 59.5	10 05.47	10 06.07
	122 03 35	.....	.....	.....	.....	.....	
	121 33 10	60 46 09.9	1 54 09.2	.....	15 51 18.6	07.07	
	120 46 30	60 22 48.5	1 56 12.6	.....	15 55 22	07.07	
	120 24 15	60 11 40.9	1 57 11.2	.....	15 56 23	04.67	

Mean error of chron'r by 5 results on a Lyrae (east)..... 10 25.07  
 " " 4 results on a Bootis (west)..... 10 06.07  
 Chron'r No. 2419, sidereal, is slow of sid'l time July 5th, 1859..... 10 15.75



B.—14. AGUA NEGRA. SURVEY OF PECOS RIVER.

*Determination of the time.*

Station: Agua Negra. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.

Date: JULY 6TH, 1859.

Th'r, Fahr't 80°; bar., 25 in.

Name of star.	Double alt's observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of obs'n noted by chron'r.	Error of chron'r slow of sid'l time.	Mean error of chron'r.
						<i>m. s.</i>	<i>m. s.</i>
α Lyrae (east)...	103 05 10	51 31 58.1	3 13 28.4	15 18 44.57	15 09 02.60	9 41.97	9 43.53
	103 19 25	51 39 05.8	3 12 51.4	15 19 21.57	15 09 37.50	44.07	
	103 32 10	51 45 28.4	3 12 18.2	15 19 54.77	15 10 09.00	45.77	
	103 44 25	51 51 36.1	3 11 46.3	15 20 26.67	15 10 43.50	43.17	
	103 59 40	51 59 13.7	3 11 06.7	15 21 06.27	15 11 23.60	42.67	
α Bootis (west)	121 13 25	60 36 16.3	1 54 45.3	16 04 01.74	15 54 37	9 24.74	9 24.06
	120 50 30	60 24 48.7	1 55 46.0	16 05 02.44	15 55 37.80	24.64	
	120 28 25	60 13 46.0	1 56 44.9	16 06 00.44	15 56 37.60	22.84	
	120 03 35	60 01 20.7	1 57 49.3	16 07 05.74	15 57 41.00	24.74	
	119 44 25	59 51 45.6	1 58 40.5	16 07 56.94	15 58 33.60	23.34	
Mean error of chron'r by 5 results on α Lyrae (east)							<i>m. s.</i>
5 results on α Bootis (west)							9 43.53
Chron'r 2419, sidereal, is slow of sid'l time July 6th, 1859.							9 24.06
							9 33.795

*Determination of the latitude by Polaris.*

Station: Agua Negra. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.

Date: JULY 6TH, 1859.

Th'r, Fahr't, 80°; bar., 25.0 in.

No. for ref.	Times of observ'n noted by chron'r.	True sid'l time of observation.	Meridian distances—		Observed, double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.	
			In sid'l time.	In arc.				
1	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>		<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	
1	15 18 12	15 27 45.8	2 20 08.83	35 02 12.45	67 32 05	33 44 53.2	34 55 62.1	
2	15 19 01	15 28 34.8	2 20 57.83	35 14 27.45	67 32 05	33 44 53.2	55 51.5	
3	15 20 36	15 30 09.8	2 22 32.83	35 38 12.20	67 32 45	33 45 13.2	55 51.0	
4	15 22 24.5	15 31 58.7	2 24 21.23	36 05 19.95	67 33 35	33 45 38.2	55 52.2	
5	15 24 57.6	15 34 11.4	2 26 34.43	36 38 56.45	67 34 30	33 46 05.7	55 50.4	
6	15 27 00.	15 36 34.4	2 28 57.43	37 14 21.45	67 35 45	33 46 43.2	55 55.9	
7	15 28 29.0	15 38 02.8	2 30 25.83	37 36 27.45	67 36 35	33 47 08.2	55 60.9	
Latitude by a mean of 7 results on Polaris								34 55 54.8
11 " β Libræ (south)								34 54 45.77
Latitude, comp at Agua Negra								34 55 20.28





*Determination of the latitude by Polaris.*

[Station: 1st camp on Whipple's road. Sextant by Würdeman. Chronometer No. 2419, sidereal.]

Date: JULY 7TH, 1859.

Th'r, Farh't, 81°; bar., 25.00 in.

No. for ref.	Time of observation noted by chron'r.			True sid'l time of observation.			Meridian distances—				Observed double altitudes of Polaris out of the meridian.			True altitudes.			Latitude deduced from each observation.				
	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	°	'	"	°	'	"	°	'	"	°	'	"
1	15	19	42	15	29	12.6	2	21	34.74	35	23	41.10	67	54	15	33	55	56.6	35	06	46.9
2	15	21	49.5	15	31	20.1	2	23	42.24	35	55	33.60	67	55	35	33	56	36.6			06 59.2
3	15	23	06.5	15	32	37.1	2	24	59.24	36	14	48.60	67	55	35	33	56	36.6			06 42.5
4	15	24	35	15	34	05.6	2	26	27.74	36	36	56.10	67	56	50	33	57	14.1			06 60.3
5	15	26	02	15	35	32.6	2	27	54.74	36	58	41.10	67	57	15	33	57	26.6			06 53.4
6	15	27	19	15	36	49.6	2	29	11.74	37	17	56.10	67	57	45	33	57	41.6			06 51.2
7	15	29	22.5	15	38	33.1	2	31	15.24	37	48	48.60	67	58	50	33	58	14.1			06 55.6

Latitude by a mean of 7 results on Polaris	°	'	"	35	06	52.72
7 " " $\beta$ Libra (south)	°	'	"	35	06	15.17
Latitude, 1st camp on Whipple's road	°	'	"	35	06	33.94

*Determination of the latitude,  $\beta$  Libra (south).*

[Station: 1st camp on Whipple's road. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JULY 7TH, 1859.

Th'r, Farh't, 81°; bar., —

No. for ref.	Times of observation noted by chron'r.			Merid'n dist's in sidereal time.		Reduction to meridian in arc.		Obs'd double circum-merid'n altitudes of star.			True meridian altitudes of star.			Latitude deduced from each observation.			Remarks.
	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>m.</i>	<i>s.</i>	'	"	°	'	"	°	'	"	°	'	"	
1	14	58	01.5	1	56.33	0	02.0	92	04	35	46	01	33.7	35	06	35.1	
2	14	59	43.9	0	13.93	0	00.0	92	04	45	46	01	36.7			06 32.1	
3	15	01	31.0	1	33.17	0	00.6	92	05	45	46	02	07.3			06 01.5	
4	15	02	39.8	2	41.17	0	16.4	92	05	10	46	02	05.6			06 03.2	
5	15	04	19.5	4	11.67	0	40.2	92	03	40	46	01	44.4			06 24.4	
6	15	05	42.7	5	44.87	1	44.0	92	02	50	46	02	23.2			05 45.6	Rejected.
7	15	07	05.0	7	07.17	1	55.7	92	01	55	46	02	07.4			06 01.4	
8	15	07	53.5	7	55.67	2	23.6	92	00	45	46	0	00.3			06 08.5	

Latitude by a mean of 7 results on $\beta$ Libra (south)	°	'	"	35	06	15.17
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## B.—16. CAMP BETWEEN PARKER'S &amp; HATCHE'S. SURVEY OF PECOS RIVER.

*Determination of the time.*

[Station: Camp between Parker's &amp; Hatche's Ranchos. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JULY 9TH, 1859.

Th'r, Fahr't, 65°; bar., —.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observations deduced.			Time of observ'n noted by chron'r.		Error of chron'r, slow of sid'l time.		Mean error of chronom'r.	
	o	i	"	o	i	"	o	i	"	h.	m.	s.	h.	m.	s.	m.		s.
α Lyrae (east) . . . . .	110	43	55	55	21	17.8	2	54	16.0	15	37	56.99	15	29	14.80	8	42.19	8 42.46
	111	05	25	55	32	08.1	2	53	20	5	38	52.99	15	30	10.60		42.39	
	111	21	30	55	40	10.7	2	52	38.3	15	39	34.69	15	30	52.90		41.79	
	111	39	50	55	49	21.0	2	51	50.9	15	40	22.09	15	31	38.00		44.09	
	111	59	05	55	58	58.7	2	51	01.1	15	41	11.87	15	32	30.00		41.87	
α Bootis (west) . . . . .	108	05	45	54	02	16.1	2	28	08.8	16	37	25.22	16	29	01.60	8	23.62	8 23.76
	107	48	35	53	53	40.9	2	28	52.4	16	38	08.80	16	29	48.80		20.00	
	107	32	20	53	45	33.2	2	29	35.6	15	38	52.00	16	30	27.50		24.50	
	107	08	45	53	33	45.5	2	30	33.5	16	39	49.90	16	31	26.60		23.30	
	106	50	25	53	24	35.3	2	31	20.0	16	40	36.40	16	32	09.00		27.40	
Mean error of chronometer by 5 results on α Lyrae (east) . . . . .																		8 42.46
" " " " " 5 results on α Bootis (west) . . . . .																		8 23.76
Chron'r 2419, sidereal, is slow of sid'l time July 9th, 1859 . . . . .																		8 33.110

*Determination of the latitude of Polaris.*

[Station: Between Parker's and Hatche's Rancho near near the Gallienas River. Sextant by Würdeman. Chronometer No. 2419, sidereal, by Parkinson &amp; Frodsham.]

Date: JULY 9TH, 1859.

Th'r, Fahr't, 65 ; bar., 25 in.

No. Tr ref.	Time of observation noted by chron'r.			True sid'l time of observation.			Meridian distances—				Observed double altitudes of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.								
	h.	m.	s.	h.	m.	s.	In arc.	In arc.	In arc.	In arc.											
1 . . . . .	15	48	59.5	15	57	32.6	2	49	52.97	42	38	14.55	68	24	25	34	12	59.0	35	17	11.10
2 . . . . .	16	51	30	16	00	03.1	2	52	23.40	43	05	51.00	68	29	00	34	13	16.5			16 51.00
3 . . . . .	15	53	03.6	16	01	36.7	2	53	57.10	43	29	16.50	68	29	50	34	13	41.5			16 53.00
4 . . . . .	15	54	54.5	16	03	27.6	2	55	47.90	43	56	58.50	68	31	25	34	14	29.1			17 11.60
5 . . . . .	15	56	00.0	16	04	33.1	2	56	53.47	44	13	22.05	68	32	05	34	14	49.1			17 14.50
6 . . . . .	16	24	26.8	16	32	59.9	3	25	20.30	51	20	04.50	68	47	20	34	2	31.6			17 53.20
7 . . . . .	16	25	56.5	16	34	29.6	3	26	50.00	51	42	30.00	68	48	08	34	22	50.7			16 57.90
Latitude by a mean of 7 results on Polaris . . . . .																		35 17 10.30			
" " " " " a Scorpii (south) . . . . .																		35 16 54.05			
Latitude, camp between Parker's and Hatche's ranchos . . . . .																		35 17 02.17			



*Determination of the latitude, a Scorpii (south).*

[Station: Camp between Hache's & Parker's ranchoes near the Gallienas River. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: JULY 9TH, 1850.

Th'r, Fahr't. 65°; bar., 25.0 in.

No. for ref.	Times of observation noted by chron'r.			Merid'n dist'n in sidereal time.		Reduction to meridian in arc.		Obs'd double circum-merid'n altitudes of star.		True meridian altitudes of star.			Latitude deduced from each observation.			
	h.	m.	s.	m.	s.	"	"	o	'	"	o	'	"	o	'	"
1	16	00	10	12	06.68	4	00.2	57	06	45	28	35	50.9	35	16	57.9
2	16	01	33	10	43.68	3	08.5	57	08	55	28	36	04.2			16 44.6
3	16	03	12.6	9	04.08	2	14.7	57	09	55	28	35	40.4			16 68.4
4	16	05	44.0	6	32.68	1	10.0	57	12	15	28	35	45.7			16 63.1
5	16	07	35.5	4	41.18	0	35.9	57	14	00	28	36	04.2			16 44.6
6	16	09	19.0	2	57.68	0	14.3	57	14	20	28	35	52.0			16 56.2
7	16	10	38.5	1	38.18	0	04.3	57	14	30	28	35	47.6			16 01.2
8	16	12	29.5	0	12.82	0	00.8	57	14	45	28	35	51.6			16 57.2
9	16	14	31.6	2	14.92	0	08.2	57	14	35	28	35	54.0			16 54.8
10	16	16	01.5	3	44.22	0	22.8	57	14	05	28	35	53.6			16 55.2
11	16	17	26.0	5	09.32	0	43.5	57	13	35	28	35	59.3			16 49.5
12	16	19	04.0	6	47.32	1	15.5	57	12	15	28	35	51.2			16 57.6
13	16	20	54.0	8	37.32	2	01.7	57	10	15	28	35	54.9			16 53.9

Rejected.  
Rejected.

Latitude by a mean of 11 results on a Scorpii (south)..... 35° 16' 54".05

C.—1ST. STATION. DETERMINATIONS ALONG 103D MERIDIAN.

*Determination of the line.*

Station: 1, prolongation 103d merid'n north. Sextant by Würdeman. Mean solar watch, Tobias & Co., Liverpool.]

Date: MAY 24TH, 1850.

Th'r, Fahr't. 70°; bar., —.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from meridian in time.			Sid'l time of observation deduced.			Time of observation noted by watch mean.			Error of chron'r on sid'l time, fast.			Mean error of chron'r.			
	o	'	"	o	'	"	h.	m.	s.	o	'	"	h.	m.	s.	m.	s.	m.	s.			
(East: a Corona Borealis...	99	13	45.49	36	10.33	05	58.2	12	22	47.93												
	99	59	35.49	59	05.83	04	09.7	12	24	36.63												
	100	37	35.50	18	06.33	02	39.4	12	26	06.73	12	29	17.270	2	24.5604	2	24.5604					
	101	58	15.50	58	27.32	59	28.1	12	29	18.03												
	102	55	45.51	27	12.92	57	11.9	12	31	34.23												
(West: a Leonis.....	99	44	15.49	51	25.62	33	27.7	12	34	21.04												
	98	49	00.49	23	47.42	35	46.4	12	36	39.74												
	98	17	25.49	07	59.62	37	05.5	12	37	58.84	12	38	20.680	2	15.970	2	15.970					
	97	50	20.48	54	26.72	38	13.2	12	39	06.54												
	107	00	50.48	19	11.22	43	28.9	12	44	22.24												

Results by east star ..... m. s. 12 24.5604  
 " west star ..... " " 12 15.9700  
 Error of watch on sid'l time, fast ..... " " 2 20.2652

## Determination of the latitude by Polaris.

[Station: 1, prolongation 103d meridian north. Sextant by Würdeman. Mean solar watch by Tobias &amp; Co., Liverpool.]

Date: MAY 24TH, 1859.

Th'r. Fahr't. —; bar., —.

No. for ref.	Times of observation noted by watch in sid'l time.	True sidereal time of observat'n.	Meridian distances—			Observed double altitudes of Polaris out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sidereal time.	In arc.				
1	12 09 09.87	12 06 49.61	1 00 11.48	5	02 52.20	61 34 05	30 45 39.3	32 09 17.7
2	12 10 19.06	12 07 58.80	0 59 02.29	14	45 34.35	61 34 15	30 45 44.3	09 29.3
3	12 11 57.33	12 09 37.07	0 57 24.02	14	21 00.30	61 34 25	30 45 49.3	09 43.5
4	12 13 23.56	12 11 03.30	0 55 57.79	13	59 26.85	61 33 50	30 45 31.8	09 33.8
5	12 15 19.88	12 12 59.62	0 54 01.47	13	30 22.05	61 33 10	30 45 11.8	09 24.2
6	12 17 02.16	12 14 41.90	0 52 19.19	13	04 47.35	61 32 45	30 44 59.3	09 29.3
7	12 18 33.41	12 16 13.15	0 50 47.94	12	41 59.10	61 32 30	30 44 51.8	09 20.4

Latitude by a mean of 7 results on Polaris ..... 32 09 27.0  
 Result by south star ..... 32 06 16.92  
 Latitude of 1st station, prolongation of 103d merid'n north ..... 32 07 51.96

## Determination of the latitude, α Virginis (south).

[Station: 1, prolongation 102d meridian north. Sextant by Würdeman. Mean solar watch, Tobias &amp; Co., Liverpool.]

Date: MAY 24TH, 1859.

Th'r. Fahr't. 50°; bar., —.

No. for ref.	Times of obs'n noted by watch in sid'l time.	Meridian distances in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian alt's of star.	True meridian altitudes of star.	Latitude deduced from each observ'n.
.....	h. m. s.	m. s.				
.....	13 14 03.50	6 09.81	1 31.8	94 53 25	47 27 28.70	32 06 40.81
.....	13 16 28.90	3 44.41	0 33.8	94 57 15	47 28 25.72	05 47.84
.....	13 18 23.21	1 50.10	0 08.1	94 56 05	47 27 25.03	06 48.54
.....	13 19 55.40	0 17.91	0 00.2	94 57 05	47 27 47.14	06 26.42
.....	13 27 42.70	7 29.39	2 15.6	94 53 35	47 28 17.59	05 50.06
.....	13 29 39.05	9 25.74	1 34.8	94 50 45	47 28 11.70	06 01.84
.....	13 30 55.26	10 41.95	4 36.7	94 49 00	.....	.....

Latitude by a mean of 6 results on α Virginis (south) ..... 32 06 16.92

C.—2D. STATION. DETERMINATIONS ALONG 103D MERIDIAN.

*Determination of the time.*

[Station: 2, prolongation 103d meridian north. Sextant by Würdeman. Mean solar watch, Tobias & Co., Liverpool.]

Date: MAY 25TH, 1859.

Th'r, Fahr't, 80°; bar., —.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from meridian in time.	Sid'l time of observation deduced.	Time of observ'n noted by chron'r.	Error of chron'r on sid'l time, East.	Mean error of chronometer.																																																																								
(East.) α Coronæ Bo- realis.	<table border="0"> <tr> <td>°</td><td>'</td><td>"</td> <td>°</td><td>'</td><td>"</td> </tr> <tr> <td>101</td><td>50</td><td>15</td> <td>50</td><td>54</td><td>28.0</td> </tr> <tr> <td>102</td><td>11</td><td>15</td> <td>51</td><td>04</td><td>58.2</td> </tr> <tr> <td>102</td><td>38</td><td>25</td> <td>51</td><td>18</td><td>33.6</td> </tr> <tr> <td>173</td><td>41</td><td>55</td> <td>51</td><td>50</td><td>19.1</td> </tr> </table>	°	'	"	°	'	"	101	50	15	50	54	28.0	102	11	15	51	04	58.2	102	38	25	51	18	33.6	173	41	55	51	50	19.1	<table border="0"> <tr> <td><i>h.</i></td><td><i>m.</i></td><td><i>s.</i></td> <td><i>h.</i></td><td><i>m.</i></td><td><i>s.</i></td> </tr> <tr> <td>2</td><td>59</td><td>53.1</td> <td>12</td><td>28</td><td>53.03</td> </tr> <tr> <td>2</td><td>59</td><td>03.8</td> <td>12</td><td>29</td><td>42.77</td> </tr> <tr> <td>2</td><td>58</td><td>04.9</td> <td>12</td><td>30</td><td>41.23</td> </tr> <tr> <td>2</td><td>55</td><td>27.0</td> <td>12</td><td>33</td><td>19.13</td> </tr> </table>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	2	59	53.1	12	28	53.03	2	59	03.8	12	29	42.77	2	58	04.9	12	30	41.23	2	55	27.0	12	33	19.13	<table border="0"> <tr> <td><i>h.</i></td><td><i>m.</i></td><td><i>s.</i></td> </tr> <tr> <td>12</td><td>34</td><td>43.22</td> </tr> </table>	<i>h.</i>	<i>m.</i>	<i>s.</i>	12	34	43.22	<table border="0"> <tr> <td><i>m.</i></td><td><i>s.</i></td> </tr> <tr> <td>4</td><td>04.290</td> </tr> </table>	<i>m.</i>	<i>s.</i>	4	04.290	<table border="0"> <tr> <td><i>m.</i></td><td><i>s.</i></td> </tr> <tr> <td>4</td><td>04.290</td> </tr> </table>	<i>m.</i>	<i>s.</i>	4	04.290
°	'	"	°	'	"																																																																										
101	50	15	50	54	28.0																																																																										
102	11	15	51	04	58.2																																																																										
102	38	25	51	18	33.6																																																																										
173	41	55	51	50	19.1																																																																										
<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>																																																																										
2	59	53.1	12	28	53.03																																																																										
2	59	03.8	12	29	42.77																																																																										
2	58	04.9	12	30	41.23																																																																										
2	55	27.0	12	33	19.13																																																																										
<i>h.</i>	<i>m.</i>	<i>s.</i>																																																																													
12	34	43.22																																																																													
<i>m.</i>	<i>s.</i>																																																																														
4	04.290																																																																														
<i>m.</i>	<i>s.</i>																																																																														
4	04.290																																																																														

*Determination by the latitude of Polaris.*

[Station: 2, prolongation 103d meridian north. Sextant by Würdeman. Mean solar watch by Tobias & Co.]

Date: MAY 25TH, 1859.

Th'r, Fahr't, 80°; bar., —.

No. for ref.	Times of observation noted by chron'r.	True sidereal time of observation.	Meridian distances—		Observed double altitudes of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
1.....	<i>h. m. s.</i> 12 14 19.63	<i>h. m. s.</i> 12 10 15.34	<i>h. m. s.</i> 0 56 46.47	<i>° ' "</i> 14 11 37.05	<i>° ' "</i> 61 58 00	<i>° ' "</i> 30 57 39.1	<i>° ' "</i> 32 21 36.9
2.....	12 15 56.39	12 11 52.10	0 55 09.71	13 47 25.65	61 58 30	30 57 54.1	21 60.7
3.....	12 18 12.77	12 14 08.48	0 52 53.33	13 19 95	61 58 25	30 57 51.6	21 70.0
4.....	12 20 01.56	12 15 57.27	0 51 04.54	46 08.10	61 57 40	30 57 29.1	21 56.6
5.....	12 21 42.34	12 17 38.05	0 49 23.76	20 56.40	61 57 15	30 57 16.6	21 52.2
6.....	12 24 47.45	12 20 43.16	0 46 18.65	34 39.75	61 57 25	30 57 21.6	21 71.5
7.....	12 27 08.76	12 23 04.47	0 43 57.34	59 20.10	61 57 15	30 57 16.6	21 76.8

Latitude by a mean of 7 results on Polaris..... 32 21 00.67  
 result by α Virginis (south)..... 32 19 28.79  
 Latitude, station 2, prolongation 103d meridian (north)..... 32 20 44.68







C.—4TH. STATION. DETERMINATION ALONG 103D MERIDIAN.

*Determination of the time.*

[Station: 4th astr'l station Llaño Estacado. Sextant by Würdeman. Chron'r 2419, sidereal, by P. & F.]

Date: SEPTEMBER 19TH, 1859.

Th'r, Fahr't, 56°; bar., 26.6.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from merid. in time.			Sidereal time of observation deduced.			Time of obs'n noted by chronometer.			Error of chron'r. slow of sid'l time.		Mean error of chron'r.
	o	i	"	o	i	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	
α Andromedæ (east).	84	08	40	42	03	23.4	3	45	40.7	20	15	29.65	20	00	13.5	15	16.15	15 17.35
	84	35	45	42	16	56.4	3	44	33.4	20	16	37.05	20	01	18.6		19.45	
	85	07	30	42	32	49.4	3	43	16.3	20	17	54.05	20	02	39.8		14.25	
	86	11	00	43	04	35.4	3	40	40.5	20	20	29.85	20	05	11.5		18.35	
	86	28	15	43	13	13.2	3	39	58.2	20	21	12.15	20	05	53.6		18.55	
α Lyrae (west) . . . . .	105	20	20										21	23	48.6			15 07.93
	105	04	25	52	31	33.3	3	07	27.9	21	39	39.91	21	24	30.8	15	09.11	
	104	48	40	52	23	40.6	3	08	08.7	21	40	20.78	21	25	14.6		06.11	
	104	30	55	52	14	42.9	3	08	55.1	21	41	07.11	21	25	39		08.11	
	104	12	35	52	05	37.7	3	09	42.2	21	41	54.21	21	26	41.5		09.71	
	103	59	15	51	58	57.6	3	10	16.8	21	42	28.81	21	27	22.8		06.61	

Mean error of chron'r by 5 results on α Andromedæ (east) . . . . .	m.	s.	15	17.350
" " " " " 5 results on α Lyrae (west) . . . . .	"	"	15	07.930
Chron'r 2419, sidereal, is slow of sid'l time Sept. 19th, 1859. . . . .	"	"	15	12.640

*Determination of the latitude by Polaris.*

[Station: 4th astronomical station, 103d meridian. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: SEPT. 19TH, 1859.

Th'r, Fahr't, 56°; bar. —.

No. for ref.	Time of obs'n noted by chron'r.	True sid'l time of observation.	Meridian distances—		Observed double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sid'l time.	In arc.			
1	19 47 52.5	20 03 05.14	5 05 24.1	76 21 01.7	69 37 30	34 47 31.7	34 28 11.6
2	19 48 53.6	20 04 06.24	5 04 23.0	76 05 45.2	69 33 35	34 48 04.2	28 01.8
3	19 49 49.0	20 05 01.64	5 03 27.6	75 51 54.0	69 39 45	34 48 39.2	28 16.5
4	19 50 35.9	20 05 48.54	5 02 40.7	75 40 10.5	69 40 25	34 48 59.2	28 19.2
5	19 52 23	20 07 35.64	5 00 53.6	75 13 04.0	69 42 10	34 49 51.7	28 22.4
6	19 53 22	20 08 34.64	4 59 54.6	74 58 39.0	69 43 30	34 50 31.7	27 51.0
7	19 54 33.5	20 09 46.14	4 58 43.1	74 49 46.5	69 43 45	34 50 39.2	28 32.4
8	19 55 42.5	20 10 55.14	4 57 34.1	74 33 31.5	69 44 10	34 50 31.7	28 19.7

Latitude by a mean of 8 results on Polaris . . . . .	m.	s.	34	28 11.6
" " " " " 8 " " " β Aquarii (south) . . . . .	"	"	34	26 41.29
Latitude, 4th astron'l station (Llaño Estacado) . . . . .	"	"	34	27 27.76





*Determination of the latitude by Polaris.*

[Station: Camp at Pond, 11 miles from Bluffs, 103d. Sextant by Wüirdeman. Chronometer No. 2419 sid'l, by Parkinson & Frodsham.]

Date: SEPTEMBER 17TH, 1859.

Th'r, Fahr't, 69°: bar., —.

No. for ref.	Times of observation noted by chron'r.	True sid'l time of observation.	Meridian distances—		Observed double alt's of Polaris out of the meridian.	True altitude.	Latitude deduced from each observation.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	19 49 22	20 04 36.7	5 03 56.8	75 59 12.0	70 18 15	35 07 57.0	34 47 45.8
2.....	19 50 45.5	20 06 00.2	5 02 33.3	75 38 19.5	70 19 35	35 08 37.0	" 47 55.2
3.....	19 51 59.0	20 07 14.2	5 01 19.8	75 19 57.0	70 20 45	35 09 12.0	" 47 63.3
4.....	19 52 56.6	20 08 11.3	5 00 22.2	75 05 33.0	70 21 45	35 09 42.0	" 47 72.2
5.....	19 54 16.5	20 09 31.2	4 59 02.3	74 45 34.5	70 23 05	35 10 22.0	" 47 83.0
6.....	19 55 38.5	20 10 53.2	4 57 40.3	74 25 04.5	70 23 40	35 10 39.5	" 47 70.6
7.....	19 57 10.6	20 12 25.3	4 56 08.2	74 02 03.0	70 24 20	35 10 59.5	" 47 57.2
8.....	19 59 14.0	20 14 28.7	4 54 04.8	73 31 12.0	70 25 25	35 11 32.0	" 47 44.7

Latitude by a mean of 8 results on Polaris ..... 34 48 01.5  
 (11 results). Result by  $\beta$  Aquarii (south) ..... 34 45 56.59  
 Latitude of camp at Pond, 11 miles from Bluffs ..... 34 46 59.04

*Determination of the latitude,  $\beta$  Aquarii (south).*

[Station: camp at Pond (staked plain). Sextant by Wüirdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: SEPTEMBER 17TH, 1859.

Th'r, Fahr't, 60°: bar., —.

No. for ref.	Times of observation noted by chron'r.	Merid'n dist'n in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-merid'n alt's of star.	True merid'n alt's.	Latitude deduced from each observ'n.
1.....	21 00 41.5	2 15.8	2 46.9	98 03 15	49 03 41.1	34 45 14.1
2.....	21 02 09.6	6 47.7	1 52.4	98 04 10	49 03 14.1	45 41.1
3.....	21 03 11.4	5 45.9	1 21.3	98 04 40	49 02 58.0	45 57.2
4.....	21 05 01.5	3 55.8	0 21.0	98 05 25	49 02 20.2	45 95.0
5.....	21 07 11.0	1 46.3	0 07.6	98 07 45	49 03 16.8	45 38.4
6.....	21 09 53.6	0 36.3	0 00.8	98 07 35	49 03 05.0	45 51.2
7.....	21 10 45.0	1 47.7	0 08.1	98 07 45	49 03 17.3	45 37.1
8.....	21 13 13.5	4 16.2	0 44.6	98 05 00	49 02 31.3	45 83.9
9.....	21 14 28.0	5 30.7	1 14.4	98 04 30	49 02 46.1	45 69.1
10.....	21 16 06.5	7 09.3	2 05.3	98 02 40	49 02 42.0	45 73.2
11.....	21 17 51.5	8 54.2	3 13.8	98 00 45	49 02 53.0	45 62.2

Latitude by a mean of 11 results on  $\beta$  Aquarii ..... 34° 45' 56" 59





## Determination of the latitude.

Station: Camp near bluffs south of road. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 15TH, 1859.

Th'r. Fahr't, 74°; bar., —.

No. for ret.	Times of observation noted by chron'r.			Merid'n dist's in sidereal time.		Reduction to meridian in arc.		Obs'd double circum-merid'n alt's of star.			True meridian altitudes.			Latitude deduced from each observation.		
	h.	m.	s.	m.	s.	"	"	°	'	"	°	'	"	°	'	"
1.....	20	58	36.5	10	17.92	4	17.6	97	33	25	48	50	17.0	34	58	38.3
2.....	21	00	49.6	8	04.82	2	38.6	97	36	14	48	50	03.0			58 52.3
3.....	21	02	49.5	6	04.92	1	29.9	97	38	15	48	49	54.3			58 61.0
4.....	21	05	20.0	3	34.42	0	31.0	97	40	35	48	50	05.4			58 49.9
5.....	21	08	09.5	0	44.92	0	01.4	97	41	35	48	50	05.8			58 49.5
6.....	21	10	03.6	1	09.18	0	03.3	97	41	45	48	50	12.7			58 42.6
7.....	21	11	27.0	2	32.58	0	15.7	97	41	55	48	50	30.1			58 25.2
8.....	21	14	24.0	5	29.60	1	13.2	97	40	00	48	50	30.1			58 25.2
9.....	21	16	00.6	7	06.18	2	02.5	97	38	00	48	50	19.4			58 35.9
10.....	21	17	50.7	8	56.28	3	13.9	97	35	25	48	50	13.3			58 41.9

Latitude by a mean of 10 results on  $\beta$  Aquarii (south) ..... 34 58 42.18

## C.—7TH. STATION. DETERMINATIONS ALONG THE 103D MERIDIAN.

## Determination of the time.

Station: Camp on 1st creek south of Canadian, 103d meridian. Sextant by Würdeman. Chron'r No. 2419, sidereal, by P. & F.]

Date: SEPT. 14TH, 1859.

Fahr't, 65°; bar., —.

Name of star.	Double alt's observed.			True altitudes.			Hour angle from meridian in time.			Sidereal time of observation deduced.			Time of obs'n noted by chron'r.			Error of chron'r. slow of sid'l time.			Mean error of chron'r.
	°	'	"	°	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	
$\alpha$ Andromeda (east)	90	51	45	45	25	03.1	3	29	37.0	20	31	33.31	20	16	07.60	15	25	71	15 26.04
	91	14	15	45	36	18.4	3	28	41.6	20	32	28.71	20	17	01.60	15	27	11	
	91	34	45	45	46	33.7	3	27	51.2	20	33	19.11	20	17	53.50	15	25	61	
	91	58	20	45	58	21.5	3	26	53.1	20	34	17.21	20	18	51.00	15	26	61	
	92	24	15	46	11	19.4	3	25	49.3	20	35	21.01	20	19	54.00	15	27	01	
	92	45	50	46	22	07.2	3	24	56.2	20	36	7.11	20	20	49.50	15	24	61	
$\alpha$ Lyrae (west)	112	05	35	56	02	13.7	2	50	31.2	21	22	43.84	21	07	36.00	15	07	34	15 06.96
	111	42	20	55	50	36.0	2	51	29.9	21	23	42.04	21	08	35.60	15	06	44	
	111	24	25	55	41	38.3	2	52	17.6	21	24	29.74	21	09	22.00	15	07	74	
	111	06	55	55	32	53.1	2	53	02.9	21	25	15.04	21	10	08.80	15	06	24	
	110	45	25	55	22	07.8	2	53	58.5	21	26	10.64	21	11	03.60	15	07	04	

Mean error of chron'r by 6 obs. on  $\alpha$  Andromeda (east) ..... 15 26.04  
 " " " " " 5 obs. on  $\alpha$  Lyrae (west) ..... 15 06.96  
 Chron'r 2419, sid'l, is slow of sid'l. time Sept. 14th, 1859 ..... 15 16.50

*Determination of the latitude, α Aquarii (south).*

[Station: 1st creek south of the Canadian. Sextant by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: SEPT. 14TH, 1859.

Th'r, Fahr't, 65°; bar., 26.6 in.

No. for ref.	Times of observ'n noted by chron'f.			Merid'n dis. in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-merid'n altitudes of star.	True meridian altitudes of star.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>					
1.....	21 23 25.5	9 54.42	4 16.89	107 36 35	53 51 57.60	35 08 10.51		
2.....	21 35 47.0	7 32.92	2 34.98	107 39 15	53 51 35.78	08 32.42		

Latitude by a mean of 2 results on α Aquarii (south) ..... 35° 08' 58" .99

*Determination of the latitude by Polaris.*

[Station: Camp on tribut'y of 1st creek south of Canadian 103 m'd. Sextant by Würdeman. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 14TH, 1859.

Th'r, Fahr't, 65°; bar., —.

No. for ref.	Time of observation noted by chronom'f.	True sid'l time of observation.	Meridian distances—		Observed double altitudes of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observation.
			In sid'l time.	In arc.			
.....	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	" "	" "	" "	" "
.....	19 40 29	19 55 45.50	5 12 41.84	78 10 27.60	70 54 35	35 26 07.2	35 09 09.79
.....	19 41 54.5	19 57 11.00	5 11 16.34	77 49 05.10	70 55 45	35 26 42.2	09 13.18
.....	19 43 08.6	19 58 25.10	5 10 02.24	77 30 33.60	70 57 20	35 27 29.7	09 33.43
.....	19 44 09.5	19 59 26.00	5 09 01.34	77 15 20.10	70 58 05	35 27 52.2	09 33.44
.....	19 45 46.6	20 01 03.10	5 07 24.24	76 51 03.60	70 59 45	35 28 42.2	09 46.63
.....	19 47 21.0	20 02 37.50	5 05 49.84	76 27 27.60	71 01 10	35 29 24.7	09 55.38
.....	19 48 39.5	20 03 56.00	5 04 31.34	76 07 50.10	71 02 15	35 29 57.2	09 59.07
.....	19 49 58.0	20 05 14.50	5 03 12.84	75 48 12.60	71 02 50	35 30 14.7	09 47.75
.....	19 51 40.6	20 06 57.10	5 01 30.24	75 22 33.60	71 03 50	35 30 44.7	09 40.15

Latitude by a mean of 9 results on Polaris ..... 35 09 36.53  
 Result by α Aquarii (south) ..... 35 08 58.99  
 Latitude of camp on trib. of 1st creek south of Canadian River ..... 35 09 17.76

D.—1ST. RABBIT EAR CREEK. DETERMINATIONS, PARALLEL 36-30'.

Determination of the latitude.

[Station 6, Rabbit Ear Creek. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: AUGUST 4TH, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.	Micrometer readings.		Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.
			D.	N.					
B. A. C. 7164.	N.	58 11 20.27	1777.0	86	80	36 30 48.50	+ 3 26.65	+ 1.24	36 34 16.39
" 7174.	N.	48 47 02.72	2401.5	86	80				
" 7198.	N.	43 12 39.85	1259.5	86	81				
" 7246.	S.	63 25 29.04	2472.5	85	81	35 40 55.55	- 6 41.20	+ 1.03	15.38
" 7333.	N.	46 37 49.30	1931.0	87	81				
" 7368.	S.	60 20 47.21	1287.0	89	80.5	36 30 41.74	+ 3 33.60	+ 1.45	10.19
" 7368.	S.	60 20 47.21	1287.0	89	80.5				
" 7402.	N.	46 38 35.52	1999.0	89	81	36 30 18.63	+ 3 55.49	+ 1.45	15.57
" 7503.	N.	45 01 36.43	2037.5	91	81.5				
" 7568.	S.	61 53 20.42	1726.0	91	81	36 32 31.57	+ 1 43.03	+ 2.63	16.63
" 7503.	N.	45 01 36.43	2037.5	91	81.5				
" 7623.	S.	61 51 40.39	1875.0	91	81.0	36 33 21.09	+ 0 53.75	+ 2.03	16.87

AUGUST 5TH, 1859.

B. A. C. 5788.	S.	53 52 41.82	1696.0	93	81				
" 5834.	N.	53 01 41.00	1958.5	93	82	36 32 48.59	+ 1 26.82	+ 2.50	36 34 17.91
γ Draconis	N.	38 29 29.02	1943.0	87	91				
" 6106.	N.	68 23 57.75	1759.0	86	90.5	36 33 16.61	+ 1 00.86	- 0.83	16.59
B. A. C. 6178.	S.	58 37 30.14	2676.5	86	92.0				
" 6202	S.	47 53 06.61	790.0	86	92.0	36 44 41.62	- 10 23.96	- 1.24	16.42
" 6231.	S.	68 05 35.96	2422.0	85.5	90				
" 6246.	N.	38 42 39.00	2148.0	85.5	90	36 35 52.52	- 1 30.63	- 1.63	20.56
" 6246.	N.	38 42 39.00	2148.0	85.5	90				
" 6251.	N.	68 17 23.58	1353.5	85	91	36 29 58.71	+ 4 22.78	- 1.09	20.40
" 6335.	N.	37 59 14.80	1593.5	85	91				
" 6438.	S.	68 44 18.91	2299.0	83	92.5	36 38 13.14	- 3 53.34	- 1.60	18.20
" 6530.	N.	37 56 24.50	2223.0	91	86				
" 6582.	N.	69 00 33.79	1726.0	91.5	86.5	36 31 30.55	+ 2 44.38	+ 0.93	15.66
" 6372.	N.	37 55 59.54	1301.5	85	91				
" 6438.	S.	68 44 18.91	2299.0	83	92.5	36 39 50.77	+ 5 29.92	+ 1.60	19.25
" 6648.	N.	60 38 59.42	1351.5	95	83				
" 6720.	N.	46 21 34.87	2179.0	94	84.5	36 29 42.85	+ 4 33.70	+ 2.22	18.77
" 6765.	N.	51 39 37.04	2154.0	94	85.5				
" 6777.	S.	55 19 42.52	1450.0	94	85.5	36 30 20.22	+ 3 49.71	+ 1.76	11.69
" 6777.	S.	55 19 42.52	1450.0	94	85.5				
" 6806.	N.	51 38 29.28	2048.0	93	87	35 30 54.10	+ 3 13.98	+ 1.50	09.58
" 6777.	N.	55 19 42.55	1450.0	94	85.5				
" 6813.	N.	51 38 11.08	2023.0	93	87	36 31 03.20	+ 3 05.88	+ 1.50	10.58
" 6765.	N.	51 39 37.04	2154.0	94	85.5				
" 6851.	N.	55 17 15.01	1667.0	93	87	36 31 33.97	+ 2 38.43	+ 1.50	13.99
" 6806.	N.	51 38 29.28	2048.0	93	87				
" 6851.	S.	55 17 15.01	1667.0	93	87	36 32 07.85	+ 2 02.71	+ 1.50	12.06
" 6813.	N.	51 38 11.08	2023.0	93	87				
" 6851.	S.	55 17 15.01	1667.0	93	87	36 2 16.95	+ 1 54.60	+ 1.50	13.05
" 6895.	N.	40 17 04.88	2486.0	93	88				
" 6912.	S.	66 47 12.81	1321.5	93	88	36 27 51.15	+ 6 22.02	+ 1.03	14.20
" 1806.	N.	63 30 30.42	1287.0	93.5	87.5				
" 6962.	N.	43 36 23.16	2693.5	93.5	87.5	36 26 33.21	+ 7 42.88	- 1.24	17.33
" 7029.	N.	58 15 34.45	1707.5	91.5	90				
" 7119.	N.	48 35 37.99	1682.0	94	87.5	36 34 23.75	- 08.43	- 0.83	16.18
" 7029.	S.	58 15 34.45	1707.5	91.5	90				
" 7174.	N.	48 47 02.40	2728.5	87	95	36 28 41.57	+ 5 37.70	- 0.15	19.12
" 7119.	N.	48 35 37.99	1682.0	94	87.5				
" 7164.	S.	58 11 19.99	2093.5	91.5	90.0	36 36 31.01	- 2 16.10	- 0.15	14.76
" 7164.	S.	58 11 19.99	2093.5	91.5	90.0				
" 7174.	N.	48 47 02.40	2728.5	87	95	36 30 48.80	+ 3 30.03	- 0.15	18.68
" 7198.	N.	43 12 39.52	1394.0	97	85				
" 7246.	S.	63 25 28.77	2411.0	100	81	36 40 55.85	- 6 42.52	+ 3.21	16.54
" 7333.	N.	46 37 48.97	2095.0	85	95				
" 7368.	S.	60 20 46.93	1433.0	85	96	36 30 42.05	+ 3 38.96	- 2.38	18.63
" 7368.	S.	60 20 46.93	1433.0	85	96				
" 7402.	N.	46 38 35.17	2164.0	84	97.5	36 30 18.95	- 4 01.88	- 2.38	18.45
" 7503.	N.	45 01 36.09	1839.0	82	99				
" 7568.	N.	61 53 29.13	1501.5	81	101	36 32 31.89	+ 1 51.63	- 3.73	19.79



Determination of the latitude—Continued.

AUGUST 6TH, 1859.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.			Level sums.	Approximate latitude.			Z. difference by micrometer.			Corrections for level.			Latitude.		
		°	'	"	D.	N.	S.		°	'	"	'	"	"	"	"	"	"	"	
B. A. C. 5788	N.	53	32	41.67	1606.5	77	92													
" 5834	N.	53	01	41.84	1888.0	80	90		36	32	48.24	1	33.11	-	2.50		36	34	18.85	
" 5911	N.	41	37	06.58	2647.0	87.5	83													
" 5988	N.	65	24	47.84	1701.0	85	85		36	29	02.79	5	12.89	+	0.46				16.14	
N. A. y Draconis	N.	38	29	28.79	2197.0	86	86													
B. A. C. 6106	N.	68	23	57.56	2012.0	86	86		36	33	16.82	1	01.19		0.00				18.01	
" 6178	N.	58	37	29.95	2851.5	85	85													
" 6203	N.	47	53	06.38	962.5	85	85		36	44	41.83	10	24.79		0.00				17.04	
" 6231	N.	68	05	35.78	2496.0	85	86.5													
" 6246	N.	38	42	38.77	2211.0	85	86.5		36	35	52.72	1	34.26	-	0.31				26.67	
" 6246	N.	38	42	38.77	2211.0	85	86.5													
" 6251	N.	68	17	23.41	1430.5	85	86.5		36	29	58.91	4	18.15	-	0.31				16.75	
" 6335	N.	37	59	15.61	1650.0	87	85.5													
" 6438	N.	68	44	18.72	2358.0	85.5	87		36	38	12.83	3	54.17		0.00				18.66	
" 6372	N.	37	55	59.29	1358.5	85.5	87													
" 6438	N.	68	44	18.72	2358.0	87	85.5		36	39	50.99	5	30.58		0.00				20.41	
" 6530	N.	37	56	24.28	2216.5	88	86													
" 6582	N.	69	00	33.59	1713.0	87	88		36	31	31.06	2	46.53	+	0.10				17.69	
" 6728	N.	46	36	20.77	1796.0	85.5	90													
" 6740	N.	60	10	02.12	2258.5	85.5	90		36	36	48.55	2	32.97	-	0.93				14.65	
" 6765	N.	51	39	37.00	2154.0	88	88													
" 6777	N.	55	19	42.25	1450.0	88	88		36	30	29.37	3	52.85		0.00				13.22	
" 6765	N.	51	39	37.00	2154.0	88	88													
" 6851	N.	55	17	14.74	1667.0	88	88		36	31	34.13	2	41.07		0.00				15.29	
" 6777	N.	55	19	42.25	1450.0	88	88													
" 6806	N.	51	38	29.00	2048.0	88	88		36	30	54.37	3	17.79						12.16	
" 6777	N.	55	19	42.25	1450.0	88	88													
" 6813	N.	51	38	19.80	2023.0	88	88		36	31	03.47	3	09.52						12.99	
" 6806	N.	51	38	29.00	2048.0	88	88													
" 6851	N.	55	17	14.74	1667.0	88	88		36	32	08.13	2	06.02						14.15	
" 6813	N.	51	38	19.80	2023.0	88	88													
" 6851	N.	55	17	14.74	1667.0	88	88		36	32	17.23	1	57.75						14.98	
" 6806	N.	40	17	04.98	2486.0	86	90													
" 6912	N.	66	47	12.57	1321.5	86	90		36	27	51.22	6	25.16	-	0.83				15.55	
" 7855	N.	63	30	30.18	1287.0	80	96													
" 6912	N.	43	36	22.85	2693.5	87	89		36	26	33.48	7	45.20	-	1.86				16.82	
" 7855	N.	63	36	24.05	753.0	80	96													
" 6912	N.	43	36	22.85	2693.5	87	89		36	23	37.05	10	41.82	-	1.86				17.01	
" 6955	N.	35	40	53.91	3191.0	87	89													
" 7855	N.	63	36	30.18	1287.0	80	96		36	24	17.95	9	59.98	-	1.86				16.07	
" 6955	N.	43	40	53.91	3191.0	87	89													
" 7855	N.	63	36	23.05	753.0	80	96		36	21	21.52	12	56.60	-	1.86				16.26	
AUGUST 21ST, 1859.																				
B. A. C. 5911	N.	41	37	12.01	2461.0	95	95													
" 5888	N.	65	24	45.91	1521.0	97	93		36	29	01.04	5	10.73	+	0.41				36 34 12.18	
y Draconis	N.	38	29	26.02	2099.0	100.5	92.5													
" 6196	N.	68	23	48.39	1929.5	100.5	92.5		36	33	22.79	+	0.56	+	0.83				19.68	
B. A. C. 6178	N.	58	37	27.42	2881.0	101	92													
" 6201	N.	47	53	03.48	978.0	100	93		36	44	44.55	-10	29.41	+	1.66				16.70	
" 6335	N.	37	59	11.12	1818.0	102.2	92.5													
" 6438	N.	68	44	16.21	2545.0	103	92.5		36	38	16.33	-4	00.62	+	2.12				17.83	
" 6372	N.	37	55	55.74	1325.0	102.5	92.5													
" 6438	N.	68	44	16.21	2545.5	103	92.5		36	39	49.02	-5	37.53	+	2.12				13.61	
" 6519	N.	37	56	29.34	2232.0	99	97													
" 6582	N.	69	00	59.89	1747.5	100	95.5		36	31	34.33	+	2 49.24	+	0.67				15.24	

## Determination of the latitude—Continued.

AUGUST 22D, 1859.

No. of star in B. A. C. or G. C.	No. or S.	Polar distances.			Micrometer readings*			Level stuns.			Approximate latitude.			Z. difference by micrometer.		Corrections for level.		Latitude.		
		°	'	"	D.	N.	S.	°	'	"	'	"	"	"	"	°	'	"		
B. A. C. 6231	S.	68	05	33.42	2391.0	90.5	91.5													
6246	S.	38	42	35.38	2097.5	90.5	91.5	36	35	55.60	-	1	37.07	-	0.27	36	34	18.26		
6335	N.	37	59	10.93	1687.0	92	91.5													
6438	S.	68	44	16.06	2408.5	95	89	36	38	16.50	-	3	58.63		0.00			17.87		
6372	N.	37	55	55.54	1395.0	94	91.5													
6438	S.	68	44	16.06	2408.5	96	90	36	39	54.20	-	5	35.21		0.00			18.99		
6530	M.	37	56	20.11	2222.0	94	91.5													
6582	S.	69	00	30.59	1738.0	96	90	36	31	34.65	+	2	40.41	+	0.10			15.16		
6728	N.	46	36	16.53	1571.0	96	92													
6740	S.	60	09	58.40	2053.5	96	92	36	36	52.53	-	2	39.58	+	0.83			13.72		
6765	N.	51	39	05.89	2215.0	99	88													
6777	S.	55	19	38.49	1530.5	97	89.5	36	30	37.81	+	3	46.39	+	1.55			Rejected.		
6806	N.	51	38	24.83	2106.5	97	89.5													
6851	S.	55	17	10.69	1748.0	97	89.5	36	32	12.25	+	1	58.57	+	1.70			12.52		
6813	N.	51	38	06.61	2081.5	97	89.5													
6851	S.	55	17	10.67	1748.0	97	89.5	36	32	21.36	+	1	50.36	+	1.70			13.36		
6895	N.	40	16	59.82	2467.0	96	91													
6912	S.	66	47	09.31	1327.0	96	91	36	27	55.43	+	6	17.05	+	1.03			13.51		
1806	S.	63	30	26.50	1289.5	98	88													
6962	S.	43	36	18.04	2656.0	98	88	36	26	37.73	+	7	31.96	+	2.07			11.76		
7029	S.	58	15	30.06	1490.5	99	90													
7119	N.	48	35	32.92	1445.5	98.5	90.5	36	34	28.51	-	14.88	+	1.76			15.39			
7164	S.	58	11	14.46	1877.0	100	90													
7174	N.	48	46	57.29	2481.0	100	90	36	30	54.12	+	3	19.77	+	2.07			15.96		
7198	N.	43	12	34.08	1204.0	101	88													
7246	S.	63	25	24.54	2433.0	103	85.5	36	41	00.69	-	6	46.49	+	3.16			17.36		
7333	N.	46	37	43.58	1956.0	102.5	88.5													
7368	S.	60	20	42.36	1344.0	102	88.5	36	30	47.03	+	3	22.41	+	2.84			12.28		
7368	S.	60	20	42.36	1344.0	102	88.5													
7462	N.	46	38	29.69	7.5	102.5	88.5	36	30	23.97	+	3	46.06	+	2.84			12.87		

Tabulation of results for latitude of astronomical station No. 6, Rabbit Ear Creek, derived from observations made with zenith telescope by Würdeman on thirty-one pairs of stars.

[By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.]

Date,	1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
	B. A. C. 5788 S. 5834 N.	B. A. C. 5911 N. 5988 S.	B. A. C. & G. C. $\gamma$ Draconis. 6106 S.	B. A. C. 6178 S. 6203 N.	B. A. C. 6231 S. 6246 N.	B. A. C. 6246 N. 6251 S.	B. A. C. 6335 N. 6438 S.	B. A. C. 6372 N. 6438 S.	6530 N. 6582 S.
1859,	<i>l</i> <i>u</i>	<i>l</i> <i>u</i>	<i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i>
Aug. 4th									
5th	36 34 17.9		36 34 16.6	36 34 16.4	36 34 20.5	36 34 20.4	36 34 18.2	36 34 19.2	36 34 15.6
6th	34 18.8	36 34 16.1	34 18.0	34 17.0	34 26.7	34 16.8	34 18.7	34 20.4	34 17.7
21st		34 12.2	34 19.7	34 16.7			34 17.8	34 13.6	34 15.2
22d					34 18.3		34 17.9	34 19.0	34 15.2
Latitude by a mean of each pair	36 34 18.3	36 34 14.1	36 34 18.1	36 34 16.7	36 34 21.8	36 34 18.6	36 34 18.1	36 34 18.0	36 34 15.9
Date,	10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
	B. A. C. 6648 S. 6729 N.	B. A. C. 6728 6740	B. A. C. 6765 N. 6777 S.	B. A. C. 6777 S. 6806 N.	B. A. C. 6777 S. 6813 N.	B. A. C. 6765 N. 6851 S.	B. A. C. 6806 N. 6851 S.	B. A. C. 6813 N. 6851 S.	B. A. C. 6895 N. 6912 S.
1859,	<i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i> <i>l</i> <i>u</i>	<i>l</i> <i>u</i>
Aug. 4th									
5th	36 34 18.8		36 34 11.7	36 34 09.6	36 34 10.6	36 34 13.9	36 34 12.0	36 34 13.0	36 34 14.2
6th		36 34 14.7	34 13.2	34 12.2	34 13.0	34 15.2	34 14.2	34 15.0	34 15.6
21st									
22d		34 13.8					34 12.5	34 13.4	34 13.5
Latitude by a mean of each pair	36 34 18.8	36 34 14.2	36 34 14.9	36 34 10.9	36 34 11.8	36 34 14.5	36 34 12.9	36 34 13.8	36 34 14.4



Tabulation of results for latitude of astronomical station No. 6, Rabbit Ear Creek—Continued.

Date.	19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
	B. A. C. & G. C. 6965 N. 1896 S.	B. A. C. & G. C. 1896 S. 6962 N.	B. A. C. & G. C. 1897 S. 6962 N.	B. A. C. & G. C. 1807 S. 6965 N.	B. A. C. 7029 S. 7119 N.	B. A. C. 7029 S. 7174 N.	B. A. C. 7119 N. 7164 S.	B. A. C. 7164 S. 7174 N.	B. A. C. 7164 S. 7174 N.
1859.									
August 4th								36 34 16.4	36 34 15.4
" 5th		36 34 17.3				36 34 16.2	36 34 19.1	36 34 14.7	34 18.6
" 6th	36 34 16.4	34 16.8	36 34 17.0	36 34 16.3					34 16.5
" 21st									
" 22d		34 11.8				34 15.4			34 17.4
Latitude by a mean of each pair	36 34 16.4	36 34 15.3	36 34 17.0	36 34 16.3	36 34 15.8	36 34 19.1	36 34 14.7	36 34 17.0	36 34 16.4
Date.	28th pair.	29th pair.	30th pair.	31st pair.	Results for latitude by a mean of each night's observations.	1st result.	2d result.	3d result.	Final result.
	B. A. C. 7363 N. 7368 S.	B. A. C. 7368 S. 7402 N.	B. A. C. 7503 N. 7568 S.	B. A. C. 7503 N. 7623 S.		Latitude by a mean of all the pairs.	Latitude by a mean of all the observations.	Latitude by a mean of results for each night.	Being a mean of 1st, 2d, & 3d results.
1859.									
August 4th	36 34 16.2	36 34 15.6	36 34 16.6	36 34 16.8	36 34 16.1				
" 5th	34 18.6	34 18.4	34 19.8		36 34 16.3				
" 6th					36 34 16.6	36 34 16.1	36 34 16.1	36 34 15.9	36 34 16.0
" 21st					36 34 15.8				
" 22d	34 12.3	34 12.9			36 34 14.9				
Latitude by a mean of each pair	36 34 15.7	36 34 15.6	36 34 18.2	36 34 16.8					

Latitude of astronomical station No. 6, Rabbit Ear Creek ..... 36° 34' 16".0

D.—2. SKULL CREEK. DETERMINATIONS, PARALLEL 39° 30'.

Determination of the latitude.

[Station 7, Skull Creek. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 27TH, 1860.

No. of star in B. A. C. or G. C.	N. or S.	Polar distance.	Micrometer readings.		Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for level.	Latitude.
			D.	N. S.					
B. A. C. 4747..	S.	53 50 37.76	16 98.5	84.5 89					
" 4797..	N.	53 10 30.73	1953.5	88 88	36 29 25.75	1 24.34	0.46	36 30 49.53	
" 4810..	S.	67 07 24.24	1452.0	87 87					
" 4830..	N.	40 01 07.51	2375.0	88 88	36 25 44.12	5 05.28	0.00	49.40	
G. C. 1172..	N.	44 59 24.34	2763.0	87 87					
" 1184..	S.	62 20 08.05	849.5	87 87	36 20 13.80	10 32.89	0.00	46.69	
B. A. C. 5552..	N.	47 16 23.49	2451.5	75 84					
" 5652..	S.	59 47 43.08	1937.0	75 85	38 27 56.71	2 50.17	1.88	45.02	
" 5552..	N.	47 16 23.49	2451.5	75 84					
" 5666..	S.	59 57 13.56	1068.5	75 85	38 23 11.47	7 37.43	1.86	47.64	
" 5788..	S.	53 52 53.10	1981.5	74 79.5					
" 5834..	N.	53 01 51.90	1661.0	74 86	36 32 37.50	1 46.01	1.13	50.36	
" 5911..	N.	41 37 18.89	2101.0	74 86					
" 5983..	S.	65 24 55.88	1745.0	74 86	36 28 52.61	1 57.75	2	47.86	
B. A. C. 6005..	S.	65 36 32.13	1431.0	75 86					
" 6056..	N.	41 34 02.28	2544.0	73 88.5	36 24 42.79	6 08.12	- 2.75	48.16	
" 6231..	S.	65 05 40.70	2809.0	85 79					
" 6246..	N.	38 42 46.63	1906.5	84 79	36 35 40.33	4 53.50	+ 1.43	49.17	
" 6246..	N.	38 42 46.63	1906.5	84 79					
" 6251..	S.	68 17 28.28	1746.0	85 79	36 29 52.54	0 53.0	.34	46.96	
B. A. C. 6357..	N.	50 27 18.95	2525.5	83 80					
B Lyrae .....	S.	56 47 53.50	1012.5	82 82	39 22 23.77	8 20.	.31	44.50	
B. A. C. 6648..	S.	60 39 00.51	2368.0	84 82					
" 6720..	N.	46 21 40.78	2570.5	84 82	36 29 39.35	1 06.96	+ 0.41	46.74	
" 6673..	S.	60 49 59.88	1373.0	84 82					
" 6720..	N.	46 21 40.78	2570.5	84 82	36 24 09.77	6 36.07	+ 0.41	46.25	
" 6714..	S.	60 50 35.99	1319.0	84 82					
" 6720..	N.	46 21 40.78	2570.5	84 82	36 23 51.61	6 53.93	+ 0.41	45.95	
" 6765..	N.	51 39 38.19	2014.0	84 84					
" 6777..	S.	55 19 42.96	1943.0	84 84	36 30 19.42	0 23.48	0.00	42.90	
B. A. C. 6777..	S.	55 19 42.96	1943.0	84 84					
" 6806..	N.	51 38 29.87	1904.5	84 84	36 30 53.58	0 12.73	0.00	40.85	
" 6777..	S.	55 19 42.96	1943.0	84 84					
" 6813..	N.	51 38 00.19	1880.5	84 84	36 31 08.42	0 00.67	0.00	47.75	
" 6765..	N.	51 39 38.19	2014.0	84 84					
" 6851..	S.	55 17 14.63	2161.0	84 84	36 31 33.59	0 48.62	0.00	40.97	
" 6806..	N.	51 38 29.87	1904.5	84 84					
" 6851..	S.	55 17 14.63	2161.0	84 84	36 32 07.75	1 04.84	0.00	42.91	
" 6813..	N.	51 38 00.19	1880.5	84 84					
" 6851..	S.	55 17 14.63	2161.0	84 84	36 32 22.59	1 32.78	0.00	49.81	
" 6940..	S.	63 30 24.08	1803.0	87 81					
" 6962..	N.	43 36 22.74	2575.0	87 81	36 26 36.59	4 15.34	1.25	53.18	
" 6940..	S.	63 30 24.08	1803.0	87 81					
" 6965..	N.	43 40 53.73	2983.0	87 81	36 24 21.09	6 30.29	1.25	52.63	
" 6943..	S.	63 36 16.12	1271.5	87 81					
" 6962..	N.	43 40 53.73	2575.0	87 81	36 23 40.57	7 11.13	1.25	52.95	
B. A. C. 6943	S.	63 36 16.12	1271.5	87 81					
" 6965..	N.	43 40 53.73	2983.0	87 81	36 21 25.07	9 28.08	+ 1.25	52.40	

JUNE 28TH, 1860.

" 4747..	S.	58 50 37.64	2171.0	84 90				
" 4797..	N.	53 10 30.60	2429.0	80 94	36 29 25.88	1 25.33	- 2.08	36 30 49.13
" 4810..	S.	67 07 24.11	1595.5	83 93				
" 4830..	N.	40 01 07.36	2498.6	83 92	36 25 44.26	5 08.42	- 1.87	50.81
G. C. 1172..	N.	44 59 24.19	2846.0	82 92				
" 1184..	S.	62 20 07.91	926.0	83 91	36 20 13.95	10 35.04	- 1.87	47.12
B. A. C. 5033..	N.	47 18 21.35	2617.5	85 89				
" 5061..	S.	59 52 32.41	1481.0	86 88	36 24 33.12	6 15.90	- 0.62	48.40
" 6231..	S.	68 05 40.46	2755.5	92 94				
" 6246..	N.	38 42 46.30	1858.0	92 94	36 35 46.62	4 56.85	- 0.41	43.06
" 6246..	N.	38 42 46.30	1558.0	92 94				
" 6251..	S.	68 17 28.04	1690.5	92 94	36 29 52.83	0 53.40	- 0.41	47.82

## Determination of the latitude—Continued.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.			Micrometer readings.		Level sums.		Approximate latitudes.			Z. difference by micrometers.	Correction for level.	Latitude.			
		°	'	"	D.	N.	S.	°	'	"	'			"	°	'	"
B. A. C. 6251..	S.	68	17	28.04	1690.5	92	94										
" 6258..	N.	38	45	57.60	2150.5	92	94	36	28	17.18	2	32.15	0.41	36	30	48.92	
" 6357..	N.	50	27	18.68	2683.0	92	96										
N. A. $\beta$ Lyrae.	S.	56	47	53.20	1166.5	91	77	36	22	24.06	8	23.57	- 1.03			46.60	
P. A. C. 6390..	N.	50	28	29.48	2800.0	92	96										
N. A. $\beta$ Lyrae.	S.	56	47	53.20	1166.5	91	97	36	21	48.66	9	00.28	- 1.03			47.91	
B. A. C. 6530..	N.	37	56	28.98	1913.0	92	97										
" 6582..	S.	69	00	34.03	2028.5	92	97	36	31	28.49	0	38.20	- 1.03			49.26	
" 6530..	N.	37	56	28.98	1913.0	92	97										
" 6589..	S.	68	51	11.20	2876.0	92	97	36	36	09.91	5	18.51	- 1.03			50.37	
" 6648..	S.	60	39	00.22	5509.0	99	91										
" 6720..	N.	46	21	40.45	2712.0	99	91	36	29	39.66	1	07.14	+ 1.87			48.67	
" 6673..	S.	60	49	59.39	1514.5	99	91										
" 6720..	N.	46	21	40.45	2712.0	90	91	36	24	10.08	6	36.07	+ 1.87			48.02	
" 6714..	S.	60	50	35.69	1460.5	99	91										
" 6720..	N.	46	21	40.45	2712.0	99	91	36	23	51.93	6	53.93	+ 1.87			47.73	
B. A. C. 6765..	N.	51	39	37.86	1948.0	90	99										
" 6777..	S.	55	19	46.86	1870.0	89	100	36	30	17.64	0	25.80	- 2.98			41.36	
" 6765..	N.	51	39	37.86	1948.0	90	99										
" 6851..	S.	55	17	13.52	2091.5	89	100	36		34.31	0	47.46	- 2.08			44.77	
" 6777..	N.	55	19	46.86	1870.0	90	99										
" 6813..	S.	51	37	59.88	1819.0	89	100	36	31	06.63	0	16.87	- 2.08			47.68	
" 6806..	N.	51	38	29.55	1843.0	90	98										
" 6851..	S.	55	17	13.52	2091.5	89	100	36	32	08.46	1	22.19	- 2.08			44.19	
" 6813..	N.	51	37	59.88	1819.0	90	99										
" 6851..	S.	55	17	13.52	2091.5	89	100	36	32	23.30	1	30.13	- 2.08			51.09	
" 6895..	N.	40	17	05.17	2321.0	98	90										
" 6912..	S.	66	47	13.17	1901.5	98	90	36	27	50.83	2	51.82	+ 1.67			44.32	



Tabulation of results for the latitude of astronomical station No. 7 (Skull Creek), derived from observations made with zenith telescope by Würdeman, on thirty pairs of stars.

[By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.]

		1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
Date.		B. A. C. 4747 S. 4797 N.	B. A. C. 4810 S. 4830 N.	G. C. 1172 N. 1194 S.	B. A. C. 5033 N. 5061 S.	B. A. C. 5552 N. 5652 S.	B. A. C. 5552 N. 5666 S.	B. A. C. 5788 S. 5831 N.	B. A. C. 5911 N. 5988 S.	B. A. C. 6005 S. 6056 N.
1860.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 27th	.....	36 30 49.5	36 30 49.4	36 30 46.7	36 30 48.4	36 30 45.0	36 30 47.0	36 30 50.4	36 30 47.8	36 30 48.2
28th	.....	30 49.1	30 50.8	30 47.1						
Latitude by a mean of each pair.....		36 30 49.3	36 30 50.4	36 30 46.9	36 30 48.4	36 30 45.0	36 30 47.0	36 30 50.4	36 30 47.8	36 30 48.2
		10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
Date.		B. A. C. 6231 N. 6246 S.	B. A. C. 6246 N. 6251 S.	B. A. C. 6251 S. 6258 N.	B. A. C. 6357 N. β Lyrae S.	B. A. C. 6390 N. β Lyrae S.	B. A. C. 6530 N. 6582 S.	B. A. C. 6530 N. 6589 S.	B. A. C. 6648 S. 6720 N.	B. A. C. 6773 S. 6720 N.
1860.		o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 27th	.....	36 30 49.2	36 30 46.9	36 30 48.9	36 30 44.5	36 30 47.9	36 30 49.3	36 30 50.4	36 30 46.7	36 30 46.2
28th	.....	30 43.0	30 47.8	30 48.9	30 46.6	30 47.9	30 49.3	30 50.4	30 48.7	30 48.0
Latitude by a mean of each pair.....		36 30 46.1	36 30 47.3	36 30 48.9	36 30 45.5	36 30 47.9	36 30 49.3	36 30 50.4	36 30 47.7	36 30 47.1

Tabulation of results for the latitude of astronomical station No. 7.—Continued.

Date.	19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
	B. A. C. 6714 S. 6720 N.	B. A. C. 6765 N. 6777 S.	B. A. C. 6777 S. 6806 N.	B. A. C. 6777 S. 6813 N.	B. A. C. 6765 N. 6851 S.	B. A. C. 6806 N. 6851 S.	B. A. C. 6813 N. 6851 S.	B. A. C. 6895 N. 6912 S.	B. A. C. 6940 S. 6962 N.
1860.	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "	° ' "
June 27th.....	36 30 45.9	36 30 42.9	36 30 40.8	36 30 47.7	36 30 44.9	36 30 42.9	36 30 49.8	.....	36 30 53.2
28th.....	30 47.7	30 41.4	.....	30 47.7	30 44.8	30 44.2	30 51.1	36 30 44.3	.....
Latitude by a mean of each pair.....	36 30 46.8	36 30 42.1	36 30 40.8	36 30 47.7	36 30 44.8	36 30 43.5	36 30 50.4	36 30 44.3	36 30 53.2
Date.	28th pair.	29th pair.	30th pair.	Latitude by a mean of each night.	1st result.	2d result.	3d result.	Final result.	
	B. A. C. 6940 S. 6965 N.	B. A. C. 6943 S. 6962 N.	B. A. C. 6943 S. 6965 N.		Latitude by a mean of all the pairs.	Latitude by a mean of all the observations.	Latitude by a mean of results for each night.	Being a mean of 1st, 2d, & 3d results.	
1860.	° ' "	° ' "	° ' "	} 36 30 47.8	° ' "	° ' "	° ' "	° ' "	
June 27th.....	36 30 52.6	36 30 52.9	36 30 52.4		36 30 47.6	36 30 47.5	36 30 47.5	36 30 47.6	
28th.....	.....	.....	.....		36 30 47.4				
Latitude by a mean of each pair.....	36 30 52.6	36 30 52.9	36 30 52.4	.....	.....	.....	.....		
Latitude, ast. station No. 7, Skull Creek.....									36° 30' 47".6

D.—2. SKULL CREEK, NEAR JUNCTION WITH NORTH FORK OF THE CANADIAN. DETERMINATIONS, PARALLEL 36° 30'.

*Determination of the time.*

[Station: Skull Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 26TH, 1860.

Th., Fahr't., 68°; bar., 25 in.

Name of star.	Double altitudes observed.	True altitudes.	Four angle from merid. in time.		Sidereal time of obs'n deduced.		Time of obs'n noted by ch'r.		Error of chron'r.	Mean error of chronometer.
			h. m. s.	h. m. s.	h. m. s.	m. s.	m. s.			
α Lyræ (east).	83 44 00	41 51 08 60	4 07 40.9	14 24 34.22	14 37 05.80	12 31.58	} 12 30.990			
	84 15 50	42 07 04.1	4 06 15.5	14 25 59.62	14 38 31.9	12 32.28				
	84 35 50	42 17 04.4	4 05 21.5	14 26 53.62	14 39 25.0	12 31.38				
	84 57 15	42 27 47.2	4 04 23.9	14 27 51.22	14 40 22.0	12 30.78				
	85 17 25	42 37 52.5	4 03 29.7	14 28 45.42	14 41 15.6	12 30.18				
	85 58 35	42 58 28.1	4 01 39.2	14 30 35.92	14 43 06.6	12 30.68				
	86 15 55	43 07 08.3	4 00 52.7	14 31 22.42	14 43 52.5	12 30.08				
α Bootis (west).	119 43 35	59 51 20.7	1 55 11.0	17 04 30.41	16 16 47.50	12 17.09	} 12 16.410			
	119 20 45	59 39 55.6	1 56 14.0	17 05 33.41	16 17 49.5	12 16.09				
	119 06 05	59 32 35.4	1 56 54.1	17 06 13.51	16 18 29.6	12 16.09				
	118 51 35	59 25 20.3	1 57 34.2	17 06 53.61	16 19 11.0	12 17.39				
	118 33 20	59 16 12.6	1 58 24.2	17 07 43.61	16 19 59.0	12 15.39				

Mean error of chron'r by 7 obs. on α Lyræ (east) ..... m. s. 12 30.990  
 " " " by 5 obs. on α Bootis (west) ..... 12 16.410  
 Chron'r No. 2419, sidereal, is fast of sid'l time June 26th, 1860. .... 12 23.700

*Determination of the latitude by Polaris.*

[Station: Skull Creek. Sextant by Gambey, of Paris. Chronometer No. 2419, by P. & F.]

Date: JUNE 26TH, 1860.

Th'r, Fahr't., 68°; bar., —.

No. for ref.	Times of observation noted by chro'r.	True sid'l time of observation.	Meridian distances—		Obs'd double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
1...	h. m. s. 14 49 39.5	h. m. s. 14 37 15.8	h. m. s. 1 29 21.33	° ' " 22 20 19.95	° ' " 70 22 15	° ' " 35 10 02.2	° ' " 36 29 56.7
2...	14 50 53.0	14 38 29.3	1 30 34.83	22 38 42.45	70 22 45	35 10 17.2	29 61.2
3...	14 52 04.8	14 39 41.1	1 31 46.63	22 56 39.45	70 23 00	35 10 24.7	29 58.5
4...	15 31 51.5	15 19 27.8	2 11 33.33	32 53 19.95	70 37 10	35 17 30.1	29 70.0

Latitude by a mean of 4 results on Polaris ..... 36 29 61.6  
 " " " β Libræ (south) ..... 36 32 05.61  
 Skull Creek, latitude ..... 36 31 03.60



Determination of the latitude,  $\beta$  Libræ (south).

[Station: Skull Creek. Sextant by Gambey. Chronometer No. 2319, sid'l. by P. &amp; F.]

Date: JUNE 26TH, 1860.

Th'r, Fahr't, 68°; bar., —.

No. for ref.	Time of observ'n noted by chro'r.	Meridian dis. in sidereal time.	Reduction to meridian in arc.	Obs'd doub' circum-meridian alt's of star.	True meridian altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	15 15 37	6 18.64	1 27.4	80 10 35	44 35 58.2	36 31 57.3
2.....	15 17 20.6	6 35.04	0 45.9	89 11 50	44 35 54.2	31 61.3
3.....	15 18 40.0	3 15.64	0 23.2	89 12 45	44 35 59.0	31 56.5
4.....	15 20 02.0	1 53.64	0 07.9	89 12 45	44 35 43.7	31 71.8
5.....	15 24 29.0	2 33.36	0 14.3	89 12 25	44 35 43.1	31 72.4
6.....	15 26 11.0	4 16.36	0 39.8	89 11 35	44 35 40.6	31 74.4

Latitude by a mean of 6 results on  $\beta$  Libræ..... 36° 32' 05".61

## D.—3D. INTERSECTION 36° 30' AND 100TH MERIDIAN.

## Determination of the latitude.

[Station: (8) Near N. E. corner Mt. of 100 meridian &amp; parallel 36° 30'. Zenith telescope by Würdeman. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 15TH, 1860.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.	Microm'r readings.	Level sums.	Approximate latitude.	Z. difference by micrometer.	Corrections for latitude.	Latitude.
		<i>° ' "</i>	<i>D. N. S.</i>	<i>N. S.</i>	<i>° ' "</i>	<i>" "</i>	<i>" "</i>	<i>° ' "</i>
G. C. 1172..	N.	44 59 26.44	2682.0	72.5 63				
1184..	S.	62 20 09.93	397.0	72 64	36 20 11.81	12 35.76	+ 1.71	36 32 49.28
B. A. C. 4952..	N.	62 10 09.91	1534.0	75 62				
4981..	S.	64 35 07.60	2369.0	75 62	36 37 21.24	4 36.18	+ 2.70	47.76
5033..	N.	47 18 24.01	2473.0	77 61				
5061..	S.	59 52 34.84	973.5	76 62	36 24 30.57	8 15.96	+ 3.11	49.64
5122..	N.	48 41 19.86	1867.0	78.5 60				
5131..	S.	58 10 04.24	2146.0	78.5 60	36 34 17.95	1 32.28	+ 3.83	49.40
5187..	S.	69 52 43.07	1525.0	71.5 70				
5210..	N.	37 11 51.98	2447.0	73 76	36 27 42.47	5 04.95	+ 0.77	48.19
5259..	S.	53 54 26.61	2009.0	74 67				
5310..	N.	52 57 29.90	1787.5	75.5 66.5	36 34 01.74	1 13.26	+ 1.66	50.14
5259..	S.	53 54 26.61	2009.0	74 67				
5336..	N.	52 58 54.02	1913.5	75.5 66.5	36 33 19.68	0 31.58	+ 1.66	49.76
5399..	S.	66 08 33.86	2177.0	78 65				
5461..	N.	40 37 38.17	1427.0	79 74	36 36 53.98	4 08.06	+ 2.70	48.82
B. A. C. 5523..	N.	47 48 32.85	2193.0	78 67				
5541..	S.	59 12 25.01	1599.0	78 68	36 29 31.07	3 16.37	+ 2.17	49.61
5552..	N.	47 16 26.74	2400.0	79 65.5				
5652..	S.	59 47 46.00	1527.0	79 66.5	36 27 53.63	4 48.74	+ 2.70	45.07
5552..	N.	47 16 26.74	2400.0	79 65.5				
5666..	S.	59 57 16.20	652.0	79 66.5	36 23 08.53	9 38.15	+ 2.70	49.38
5703..	S.	64 02 34.17	986.0	71 73				
5706..	N.	43 14 03.48	3012.0	71 73	36 21 41.17	11 10.10	- 0.42	50.85
5788..	S.	53 52 56.43	1774.0	74 74				
5834..	N.	53 01 56.09	1823.5	74 74	36 32 33.74	16.37	0.00	50.10

Determination of the latitude—Continued.

JUNE 17TH, 1860.

No. of star in B. A. C. or G. C.	N. or S.	Polar distance.			Microm' readings.			Level sums.	Approximate latitude.			Z. difference by micrometer.	Correction for level.	Latitude.		
		°	'	"	D.	N.	S.		°	'	"			°	'	"
G. C. 1077..	N.	40	16	03.39	2531.0	85	83									
B. A. C. 4566..	S.	66	47	40.21	1676.5	85	83	36 28 08.20	4 42.63	+ 0.41		36 32 51.24				
*4656..	S.	61	49	19.23	735.5	86	84									
*4699..	N.	45	28	49.75	2884.5	86	86	33 20 55.51	11 17.71	+ 0.21		Rejected.				
B. A. C. 4747..	S.	53	50	39.20	1601.5	88	85									
4797..	N.	53	10	32.29	2226.5	86	85.5	36 29 24.25	3 26.72	+ 0.26		51.23				
4810..	S.	67	07	25.61	1275.0	85.5	86.5									
4830..	N.	40	01	09.20	2575.5	85.5	86.5	36 25 42.59	7 10.14	- 0.21		52.52				
1172..	N.	44	59	27.07	2846.0	84	88									
1184..	S.	62	20	09.34	0555.5	84	88	36 20 11.79	12 37.58	- 0.83		48.54				
4952..	N.	42	10	09.48	1545.0	85	89									
4081..	S.	64	35	07.24	2366.5	85	89	36 37 21.64	4 31.71	- 0.83		49.10				
5033..	N.	47	18	23.56	2821.0	84.5	89.5									
5066..	S.	50	52	34.44	1311.0	85	89	36 24 31.00	8 19.43	- 0.83		49.60				
5187..	S.	69	52	42.70	1416.5	86.5	91.5									
5210..	N.	37	11	51.46	2345.0	86.5	91.5	36 27 42.92	5 07.10	- 1.04		48.98				
5259..	S.	53	34	26.13	2361.0	87	91									
5310..	N.	52	57	29.41	2151.0	87.5	92	36 34 02.23	1 10.45	- 0.93		50.85				
B. A. C. 5399..	S.	66	08	33.44	2417.5	87	92									
5461..	N.	40	37	37.60	1677.0	89	93	36 36 54.48	4 04.92	- 0.93		48.63				
5523..	N.	47	48	32.30	2554.5	88	94									
5541..	S.	59	12	24.49	1946.5	88	94	36 29 31.69	3 21.10	- 0.83		51.87				
5259..	S.	53	54	26.13	2364.0	87	91									
5336..	N.	52	58	53.53	2276.5	87.5	92	36 33 20.17	0 28.94	- 0.93		50.30				
5788..	S.	53	52	55.87	1789.0	91	94.5									
5834..	N.	53	01	54.63	1840.0	91	95	36 32 34.72	0 16.87	- 0.67		50.92				
5911..	N.	41	37	20.81	2486.0	90	96									
5988..	S.	65	24	58.37	1760.0	90	97	36 28 59.41	4 00.12	- 1.35		49.18				
6005..	N.	65	36	34.62	1105.0	91	95									
6056..	N.	41	34	14.91	2583.0	92	95	36 24 35.23	8 08.85	- 0.83		43.25				
N. A. γ Dra conis.	N.	38	29	41.46	1864.0	91.5	97									
B. A. C. 6106..	S.	68	24	06.23	1908.0	91	97	36 33 06.15	0 14.55	- 1.13		50.47				
6231..	S.	68	05	43.22	2326.0	93	96									
6246..	N.	58	42	50.03	1887.3	94	99	36 35 43.37	2 51.66	- 0.51		51.20				
6231..	S.	68	05	43.22	2326.0	93	96									
6258..	N.	38	46	01.33	2098.0	94	99	36 34 07.72	1 15.41	- 0.51		51.80				
6246..	N.	38	42	50.03	1807.0	94	99									
6251..	S.	68	17	30.80	1259.0	93	96	36 29 49.58	3 01.25	- 0.51		50.32				
6258..	N.	38	46	01.33	2098.0	94	99									
6251..	N.	68	17	30.80	1259.0	93	96	35 28 13.93	4 37.50	- 0.51		50.92				
6357..	N.	59	27	30.94	2767.0	92	98									
β Lyra	N.	56	47	56.50	869.0	93	95.5	36 22 16.28	10 27.76	- 0.88		43.16				
6390..	N.	50	28	32.99	2880.0	92	98									
β Lyra	N.	56	47	56.50	869.0	93	95.5	36 21 45.25	11 05.14	- 0.88		49.51				
6530..	N.	37	56	32.82	1798.5	93	97									
6582..	S.	69	00	36.91	1537.0	95	97	36 31 25.13	1 26.49	- 0.83		50.79				
6540..	N.	37	56	32.82	1798.5	93	97									
6589..	S.	68	51	14.09	2386.0	93	97	36 36 06.54	3 14.32	- 0.83		51.39				
B. A. C. 6648..	S.	60	39	03.45	1932.0	91	99									
6720..	N.	46	21	44.12	2514.0	91	99	36 29 36.21	3 12.50	- 1.67		47.04				
6673..	S.	60	50	02.62	941.0	91	99									
6720..	N.	46	21	44.12	2514.0	91	99	36 24 06.63	8 43.58	- 1.67		48.54				
6714..	S.	60	59	38.93	880.5	91	99									
6720..	N.	46	21	44.12	2514.0	91	99	36 23 48.47	9 00.28	- 1.67		47.08				
6765..	N.	51	39	41.40	2035.0	94	96									
6777..	S.	55	19	46.07	1581.0	95	95	36 30 16.26	2 30.16	- 0.21		46.21				
6765..	N.	51	39	41.40	2035.0	94	96									
6851..	S.	55	17	17.75	1800.0	95	95	36 31 30.42	1 17.73	- 0.21		47.94				
6777..	S.	55	19	46.07	1581.0	95	95									
6896..	N.	51	38	32.38	1925.0	94	96	36 30 59.77	1 53.78	- 0.21		44.34				
6777..	S.	55	19	46.07	1581.0	95	95									
6813..	N.	51	38	17.62	1901.0	94	96	36 30 58.15	1 45.84	- 0.21		43.78				
6806..	N.	51	38	32.38	1925.0	94	96									
6851..	S.	55	17	17.75	1800.0	95	95	36 32 04.93	0 41.34	- 0.21		46.06				
B. A. C. 6813..	N.	51	38	27.62	1901.0	94	96									
6851..	S.	55	17	17.75	1800.0	95	95	36 32 12.31	0 33.41	- 0.21		45.51				
6895..	N.	40	17	08.92	2247.5	95	96									
6912..	S.	66	47	12.80	1343.5	95	96	36 27 49.14	4 59.00	- 0.21		47.93				

(\* Across the face.) Rejected.

## Determination of the latitude—Continued.

JUNE 19TH, 1860.

No. of star in B. A. C. or G. C.	N. or S.	Polar distances.	Microm' readings.		Level sums.	Approximate lati- tude.	Z. difference by mi- crometer.	Corrections for level.	Latitude.		
			D.	N. S.					°	'	"
B. A. C. 4747..	S.	53 50 38.8	1535.5	78.5 81.5							
" 4787..	N.	53 10 31.9	2167.5	79 83	36 29 24.6	3 29.0	- 0.72	36 32 52.8			
" 4810..	S.	67 07 19.8	1339.0	77 86							
" 4830..	N.	40 01 18.7	2644.0	80.5 84	36 25 40.7	7 11.6	- 1.29	51.0			
" 4952..	N.	42 10 09.0	1681.5	81 83.5							
" 4981..	S.	64 35 06.8	2504.0	80 83.5	36 37 22.1	4 32.0	- 0.62	49.5			
" 5033..	N.	47 18 23.1	2733.5	78 84							
" 5061..	S.	59 52 35.0	1223.5	77 83.5	36 24 30.9	8 19.4	- 1.29	49.0			
" 5187..	S.	69 52 42.3	1345.0	75 85							
" 5210..	N.	37 11 50.9	2275.5	75 85	36 27 43.4	5 07.7	- 2.07	49.0			
" 5259..	S.	53 54 25.6	2271.0	78 82							
" 5310..	N.	52 57 28.9	2062.0	79 83	36 34 02.7	1 09.1	0.08	53.5			
" 5399..	S.	66 08 33.0	2293.0	77 86							
" 5461..	N.	40 37 37.0	1554.5	78 84.5	36 36 55.0	4 04.2	- 1.60	49.2			
" 5523..	N.	47 48 31.7	2351.5	78.5 82							
" 5541..	S.	59 12 24.0	1744.5	78.5 82	36 29 32.1	3 20.7	- 0.70	52.1			



Tabulation of results for the latitude of astronomical station No. 8, northeast corner (intersection of 100th meridian and parallel of 36° 30' north lat.), derived from observations made with zenith telescope by Würdeman on thirty-eight pairs of stars.

[By JOHN H. CLARK, Commissioner, &c., &c., and HUGH CAMPBELL, Principal Assistant Astronomer.]

Date.	1st pair.	2d pair.	3d pair.	4th pair.	5th pair.	6th pair.	7th pair.	8th pair.	9th pair.
	B. A. C. & G. C. 1077 N. 4566 S.	B. A. C. 4747 S. 4797 N.	B. A. C. 4810 S. 4830 N.	G. C. 1172 N. 1184 S.	B. A. C. 4952 N. 4981 S.	B. A. C. 5033 N. 5061 S.	B. A. C. 5033 N. 5066 S.	B. A. C. 5122 N. 5131 S.	B. A. C. 5187 S. 5210 N.
1860.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 15th				36 32 49.3	36 32 47.8	36 32 49.6		36 32 49.4	36 32 48.2
" 17th	36 32 51.2	36 32 51.2	36 32 52.5	32 48.5	32 49.1		36 32 49.6		32 49.0
" 19th		32 52.8	32 51.0		32 49.5	32 49.0			32 49.0
Latitude by a mean of each pair	36 32 51.2	36 32 52.0	36 32 51.7	36 32 48.9	36 32 48.8	36 32 49.3	36 32 49.6	36 32 49.4	36 32 48.7
Date.	10th pair.	11th pair.	12th pair.	13th pair.	14th pair.	15th pair.	16th pair.	17th pair.	18th pair.
	B. A. C. 5259 S. 5310 N.	B. A. C. 5259 S. 5336 N.	B. A. C. 5399 S. 5461 N.	B. A. C. 5323 N. 5541 S.	B. A. C. 5552 N. 5652 S.	B. A. C. 5552 N. 5666 S.	B. A. C. 5703 S. 5706 N.	B. A. C. 5788 S. 5834 N.	B. A. C. 5011 N. 5988 S.
1860.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 15th	36 32 50.1	36 32 49.8	36 32 48.6	36 32 49.6	36 32 45.1	36 32 49.4	36 32 50.9	36 32 50.0	
" 17th	32 50.9	50.3	32 48.6	32 51.9				50.9	36 32 49.2
" 19th	32 53.5		32 49.2	32 52.1					
Latitude by a mean of each pair	36 32 51.5	36 32 50.0	36 32 48.8	36 32 51.2	36 32 45.1	36 32 49.4	36 32 50.9	36 32 50.4	36 32 49.2

Tabulation of results for the latitude of astronomical station No. 8, northeast corner (intersection of 100th meridian and parallel of 36° 30' north lat.)—Cont'd.

	19th pair.	20th pair.	21st pair.	22d pair.	23d pair.	24th pair.	25th pair.	26th pair.	27th pair.
Date.	B. A. C. 6005 S. 6056 N.	B. A. C. & G. C. γ Draconis N. 6606 S.	B. A. C. 6231 S. 6246 N.	B. A. C. 6231 S. 6258 N.	B. A. C. 6246 N. 6251 S.	B. A. C. 6258 N. 6251 S.	B. A. C. & N. A. 6357 N. β Lyrae S.	B. A. C. 6390 N. β Lyrae S.	B. A. C. 6530 N. 6582 S.
1860.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 15th									
" 17th	36 32 43.2	36 32 50.5	36 32 51.2	36 32 51.8	36 32 50.3	36 32 50.9	36 32 43.2	36 32 49.5	36 32 50.8
" 19th									
Latitude by a mean of each pair	36 32 43.2	36 32 50.5	36 32 51.2	36 32 51.8	36 32 50.3	36 32 50.9	36 32 43.2	36 32 49.5	36 32 50.8
	28th pair.	29th pair.	30th pair.	31st pair.	32d pair.	33d pair.	34th pair.	35th pair.	36th pair.
Date.	B. A. C. 6530 N. 6589 S.	B. A. C. 6648 S. 6720 N.	B. A. C. 6673 S. 6720 N.	B. A. C. 6714 S. 6720 N.	B. A. C. 6765 N. 6777 S.	B. A. C. 6765 N. 6851 S.	B. A. C. 6777 S. 6806 N.	B. A. C. 6777 S. 6813 N.	B. A. C. 6806 N. 6851 S.
1860.	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "	o i "
June 15th									
" 17th	36 32 51.4	36 32 47.0	36 32 48.5	36 32 47.1	36 32 46.2	36 32 47.9	36 32 44.3	36 32 43.8	36 32 46.1
" 19th									
Latitude by a mean of each pair	36 32 51.4	36 32 47.0	36 32 48.5	36 32 47.1	36 32 46.2	36 32 47.9	36 32 44.3	36 32 43.8	36 32 46.1





Determination of the latitude by *Polaris*.

[Station: Intersection of N. Red River by 100th meridian. Sextant by Gambey, of Paris. Chronometer No. 2419, sid'l, by P. & F.]

Date: AUGUST 28TH, 1860.

Th'r, Farh't, 65°; bar., —.

No. for ref.	Times of observation noted by chron'r.	True sid'l time of observation.	Meridian distances—		Observed double alt's of <i>Polaris</i> out of the meridian.	True altitudes.	Latitude deduced from each observation.
			In sid'l time.	In arc.			
1	19 09 05	19 01 22.8	5 52 37.61	88 09 24.15	70 30 10	35 13 59.6	35 17 31.3
2	19 09 47.5	19 02 05.3	5 53 20.11	88 20 61.00	70 30 40	35 14 14.6	17 30.3
3	19 10 58.5	19 03 16.3	5 54 31.11	88 37 46.65	70 31 30	35 14 39.6	17 28.7
4	19 11 45.6	19 04 03.4	5 55 18.21	88 49 33.15	70 32 10	35 14 59.6	17 31.0
5	19 12 32.0	19 04 49.8	5 56 04.61	89 01 39.15	70 32 45	35 15 17.1	17 30.4
6	19 13 43	19 06 00.8	5 57 15.61	89 18 54.15	70 33 20	35 15 34.6	17 22.0
7	19 14 48.8	19 07 06.6	5 58 21.41	89 35 21.15	70 33 50	35 15 49.6	17 12.3
8	19 15 32.6	19 07 50.4	5 59 05.21	89 46 18.15	70 34 15	35 16 02.1	17 08.4
9	19 16 22.5	19 08 40.3	5 59 55.11	89 58 46.65	70 34 50	35 16 19.6	17 07.1
10	19 17 54.5	19 10 12.3	6 01 27.11	90 21 46.65	70 35 45	35 16 47.1	17 00.1
11	19 18 26.0	19 10 43.8	6 01 58.61	90 29 39.15	70 36 20	35 17 04.6	17 05.7

Latitude by a mean of 11 results on *Polaris*..... 35 17 18.84  
 Latitude of camp at intersection of North Fork of Red River by 100th merid..... 35 17 47.86  
 35 17 33.35

Determination of the latitude, *Mars* (south).

[Station: Ints'n of N. F. of Red River by 100th meridian. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: AUGUST 28TH, 1860.

Th'r, Farh't, 65°.

No. for ref.	Times of observation noted by chronom'r.	Merid'n dist. in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-merid'n alt's of star.	True meridian altitudes.	Latitude deduced from each observation.
1	19 29 50	8 16.3	1 49.7	54 52 50	27 28 45.8	35 17 45.52
2	19 30 50	7 15.3	1 24.4	54 53 25	27 28 38.0	17 53.32
3	19 33 39.8	4 26.3	0 31.6	54 55 15	27 26 40.2	17 51.12
4	19 34 28.0	3 38.1	0 21.1	54 55 40	27 26 42.2	17 49.12
5	19 35 14.5	2 51.6	0 13.1	54 55 45	27 26 36.7	17 54.62
6	19 36 01.0	2 05.1	0 06.9	54 56 05	27 26 40.5	17 50.82
7	19 37 38.5	0 27.6	0 00.3	54 56 10	27 26 36.4	17 54.92
8	19 38 28.5	0 22.3	0 00.2	54 56 10	27 26 36.3	17 55.02
9	19 40 00.5	1 54.3	0 01.3	54 56 10	27 26 37.4	17 53.92
10	19 41 14.0	3 07.8	0 15.7	54 55 50	27 26 41.8	17 49.52
11	19 42 15.4	4 09.3	0 27.7	54 55 40	27 26 48.8	17 42.52
12	19 44 28.0	6 21.8	1 05.0	54 54 15	27 26 43.3	17 48.02
13	19 45 14.6	7 08.4	1 21.8	54 53 40	27 26 42.6	17 48.72
14	19 46 07.5	8 01.3	1 43.3	54 53 20	27 26 59.1	17 32.22
15	19 47 27.5	9 21.3	2 20.5	54 52 15	27 26 58.8	17 32.52
16	19 48 03.6	9 57.4	2 39.1	54 51 15	27 26 47.4	17 43.92

Latitude by a mean of 16 results on *Mars* (south)..... 35 17 47.86









*Determination of the latitude by Polaris.*

[Station: Camp near int. of Washita by 100th merid'n. Sextant by Gambey, of Paris. Chronometer No. 2419, sid'l, by P. & F.]

Date: AUGUST 26TH, 1860.

Th'r, Farh't, 80°; bar., 25 in.

No. for ref.	Times of observation noted by chron'r.	True sid'l time of observation.	Meridian distances—		Obs'd double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	18 09 37	18 01 59.6	4 52 15.62	73 18 54.30	70 41 50	35 19 49.7	35 45 15.0
2.....	18 10 44.5	18 03 07.1	4 54 23.12	73 35 46.80	70 42 40	35 20 14.7	45 15.7
3.....	18 11 58	18 04 20.6	4 55 36.62	73 54 09.30	70 43 35	35 20 42.2	45 17.0
4.....	18 13 06.5	18 05 29.1	4 56 45.12	74 11 16.80	70 44 20	35 21 04.7	45 14.6
5.....	18 15 22.5	18 07 45.1	4 59 01.12	74 45 16.80	70 46 20	35 22 04.7	45 25.8
6.....	18 16 55	18 09 17.6	5 00 33.62	75 08 24.30	70 46 50	35 22 19.7	45 07.4
7.....	18 18 28.5	18 10 51.1	5 02 08.12	75 31 31.80	70 48 10	35 22 59.7	45 13.9
8.....	18 20 50.6	18 13 13.2	5 04 29.22	76 07 18.30	70 49 30	35 23 39.7	45 02.1

Latitude by a mean of 8 results on Polaris.....	35 45 13.9
4 " " Mars (south).....	35 45 11.95
Latitude of camp near int. of Washita by the 100th meridian.....	35 45 12.92

*Determination of the latitude, Mars (south).*

[Station: Intersection of main branch of Washita by 100th merid'n. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: AUGUST 26TH, 1860.

Th'r, Farh't, — bar., —.

No. for ref.	Times of observation noted by chron'r.	Meridian dist. in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian altitudes of star.	True meridian altitudes of star.	Latitude deduced from each observation.
1.....	19 35 46.5	1 09.4	0 02.1	53 44 55	26 50 58.3	35 45 10.6
2.....	19 39 13.6	2 17.4	0 08.3	53 44 35	26 50 54.5	45 14.4
3.....	19 41 10.5	4 14.5	0 28.5	53 44 15	26 51 04.7	45 04.2
4.....	19 42 54.6	5 58.6	0 56.6	53 42 50	26 50 50.3	45 18.6

Latitude by 4 results on Mars (south).....	35° 45' 11".95
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## E.—4. CORRAL CREEK. DETERMINATIONS ALONG 100TH MERIDIAN.

*Determination of the time.*

[Station: Corral Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 10TH, 1860.

Th'r, Farh't, 74°; bar., 25.0 in.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from merid'n in time.	Sidereal time of observation deduced.	Time of observ'n noted by chronom'r.	Error of chron'r.	Mean error of chronom'r.	
	° ' "	° ' "	h. m. s.	h. m. s.	h. m. s.	m. s.	m. s.	
α Lyræ (east).	76 43 05	38 20 33.5	4 25 21.1	14 06 53.82	14 15 11.5	8 17.68	} 8 16.440	} Only one star for time.
	77 04 45	38 31 23.9	4 24 22.4	14 07 52.52	14 16 10	17.48		
	77 26 40	38 42 21.8	4 23 23.0	14 08 51.92	14 17 07.6	15.68		
	77 54 20	38 56 12.2	4 22 07.7	14 10 07.21	14 18 21.5	14.29		
	78 16 25	39 07 14.9	4 21 08.4	14 11 06.52	14 19 23.6	17.08		

*Determination of the latitude by Polaris.*

[Station: Corral Creek. Sextant by Gambey, of Paris. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 10TH, 1860.

Th'r, Farh't, 74°; bar., 26.6 in.

No. for ref.	Times of observation noted by chron'r.	True sidereal times of observation.	Meridian distances—		Observed double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sidereal time.	In arc.			
	h. m. s.	h. m. s.	h. m. s.	° ' "	° ' "	° ' "	° ' "
1	13 42 28	13 34 11.6	0 26 31.08	6 57 46.20	68 59 20	34 28 32.10	35 54 13.50
2	13 43 39.6	13 35 23.2	0 27 42.68	6 55 40.20	68 59 20	34 28 32.10	54 10.50
3	13 44 41.5	13 36 25.1	0 28 44.58	7 13 05.70	68 59 35	34 28 39.60	54 14.80
4	13 45 34.8	13 37 18.4	0 29 37.90	7 24 28.50	68 59 40	34 28 42.10	54 15.20
5	13 46 34.6	13 38 18.2	0 30 37.68	7 39 25.20	69 00 00	34 28 52.10	54 22.30
6	13 47 58.0	13 39 41.6	0 32 01.08	8 00 16.20	69 00 25	34 29 04.60	54 30.50
7	13 49 19.9	13 41 03.5	0 33 22.98	8 20 44.70	69 00 50	34 29 17.10	54 38.80

Latitude by a mean of 7 results on Polaris	35 54 20.80
9 " " α <sup>2</sup> Libræ (south)	35 55 33.30
Latitude of camp on Corral Creek	35 54 57.05

*Determination of the latitude, α<sup>2</sup> Libræ (south).*

[Station: Corral Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 10TH, 1860.

Th'r, Farh't, 74°; bar., 25 in.

No. for ref.	Times of observ'n noted by chron'r.	Meridian distances in sidereal time.	Reduct'n to meridian in arc.	Obs'd double cir-cum-meridian alt's of star.	True meridian altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>o ' "</i>	<i>o ' "</i>	<i>o ' "</i>
1....	14 46 25	5 03.0	0 50.0	77 13 55	38 36 49.1	35 55 24.8
2....	14 47 23.5	4 04.5	0 32.5	77 14 25	38 36 46.6	55 27.3
3....	14 48 37.0	2 51.0	0 15.9	77 14 35	38 36 35.0	55 38.9
4....	14 49 50.8	1 37.2	0 05.1	77 15 25	38 36 49.2	55 24.7
5....	14 50 54.5	0 33.5	0 00.6	77 15 15	38 36 39.7	55 34.2
6....	14 52 09.0	0 41.0	0 06.8	77 15 05	38 36 34.9	55 39.0
7....	14 52 52.4	1 24.4	0 03.8	77 14 55	38 36 32.9	55 41.0
8....	14 53 56.0	2 28.0	0 11.9	77 14 50	28 36 38.5	55 35.4
9....	14 54 55.5	3 27.	0 23.4	77 14 30	38 36 39.1	55 34.8

Latitude by a mean of 9 results on α<sup>2</sup> Libræ (south), ..... 35° 55' 33".3

E.—5. COMMISSION CREEK. DETERMINATION ALONG THE 100TH MERIDIAN.

*Determination of the time.*

[Station: Camp on Commission Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 11TH, 1860.

Th'r, Farh't, 76°; bar., 25 —.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of obs'n deduced.	Time of observ'n noted by chron'r.	Error of chron'r fast of sid'l time.	Mean error of chronom'r.
	<i>o ' "</i>	<i>o ' "</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>m. s.</i>	<i>m. s.</i>
α Lyræ (east) ..	74 11 30	37 04 43.5	4 32 31.1	13 59 43.83	14 07 51.9	8 08.07	} 8 08.780
	74 39 00	37 18 29.1	4 31 16.1	14 00 58.83	14 09 06.8	07.97	
	75 06 30	37 32 14.5	4 30 01.3	14 02 13.63	14 10 23.6	09.97	
	75 21 40	37 39 49.8	4 29 20.4	14 02 54.93	14 11 03.1	08.67	
	75 37 55	37 47 47.6	4 28 36.7	14 03 38.23	14 11 47.5	09.27	
	76 00 00	37 59 00.5	4 27 35.7	14 04 39.23	14 12 48.0	08.77	



## Determination of the latitude by Polaris.

[Station: Camp on Commission Creek. Sextant by Gambey, of Paris. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 11TH, 1860.

Th'r, Farh't, 76°; bar., —.

No. for ref.	Times of observ'n noted by chron r.	True sidereal times of observ'n.	Meridian distances—		Observed double alt's of Polaris out of the meridia	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>o / "</i>	<i>o / "</i>	<i>o / "</i>	<i>o / "</i>
1	13 57 46	13 49 37.82	0 41 55.80	10 28 57.0	69 19 01	34 38 23.3	36 03 14.3
2	13 59 20	13 51 11.22	0 43 29.80	10 52 27.0	69 19 50	34 38 47.8	03 32.4
3	14 00 33.6	13 52 24.82	0 44 43.40	11 10 51.0	69 20 15	34 39 00.3	03 39.7
4	14 01 57.0	13 53 48.22	0 46 06.86	11 31 42.9	69 20 40	34 39 12.8	03 46.2
5	14 03 00.9	13 54 52.12	0 47 10.76	11 47 41.4	69 20 59	34 39 17.8	03 46.3
6	14 04 00.6	13 55 51.82	0 48 10.46	12 22 36.9	69 21 15	34 39 30.3	03 48.0
7	14 05 14.5	13 57 05.72	0 49 24.36	12 21 05.4	69 21 20	34 39 32.8	03 51.0
8	14 06 08.0	13 57 59.22	0 50 17.86	12 34 27.9	69 21 35	34 39 40.3	03 54.2
Latitude by a mean of 8 results on Polaris							36 03 41.51
9 " " a <sup>2</sup> Libræ							36 04 35.25
Latitude of camp on Commission Creek							36 04 08.36

Determination of the latitude, a<sup>2</sup> Libræ (south.)

[Station: Camp on Commission Creek. Sextant by Gambey. Chronometer No. 2413, sid'l, by P. & F.]

Date: JUNE 11TH, 1860.

Th'r, Farh't, 76°; bar., —.

	Times of observation noted by chron r.	Merid'n dist. in sidereal time.	Reduc't'n to meridian in arc.	Obs'd double circum-merid'n alt's of star.	True merid'n altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>o / "</i>	<i>o / "</i>	<i>o / "</i>
1	14 48 19.9	3 00.53	0 17.7	76 56 20	38 27 29.2	36 04 44.7
2	14 49 19.8	2 00.63	0 07.8	76 57 15	38 27 46.8	04 27.1
3	14 50 42.5	0 37.93	0 00.7	76 57 10	38 27 37.2	04 36.7
4	14 51 38.5	0 18.07	0 00.2	76 57 15	38 27 39.2	04 34.7
5	14 52 35.0	1 14.37	0 03.0	76 57 15	38 27 42.0	04 31.9
6	14 54 10.0	2 49.57	0 15.6	76 57 05	38 27 49.6	04 24.3
7	14 55 08.5	3 48.07	0 28.1	76 56 15	38 27 37.1	04 36.8
8	14 55 51.5	4 31.07	0 39.9	76 55 50	38 27 36.4	04 37.5
9	14 56 59.0	5 38.57	1 02.1	76 54 45	38 27 26.1	04 43.8
Latitude by a mean of 9 results on a <sup>2</sup> Libræ						36° 04' 35".2

E.—6. POND CREEK. DETERMINATIONS ALONG THE 100TH MERIDIAN.

*Determination of the time.*

[Station: Pond Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. F.]

Date: JUNE 13TH, 1860.

The'r, Farh't, 80°; barom'r, 25 in.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from merid'n in time.	Sidereal time of observation deduced.	Time of obs'n noted by chronometer.	Error of ch'r, fast of sid'l time.	Mean error of chronom'r.
	° ' "	° ' "	h. m. s.	h. m. s.	h. m. s.	m. s.	m. s.
α Lyrae (east) .....	76 17 10	38 07 37.8	4 27 28.9	14 04 46.06	14 12 54.6	8 08.54	} 8 07.720
	76 35 45	38 16 55.6	4 28 38.4	14 05 36.56	14 13 44.0	07.44	
	76 53 15	38 25 40.9	4 25 50.8	14 06 24.16	14 14 32.0	07.84	
	77 07 40	38 32 53.6	4 25 11.5	14 07 03.46	14 15 10.4	06.94	
	77 25 45	38 41 56.4	4 24 22.4	14 07 52.56	14 16 00	07.44	
	77 49 40	38 53 54.3	4 23 17.5	14 08 57.46	14 17 05.60	08.14	

*Determination of the latitude by Polaris.*

[Station: Camp on Pond Creek. Sextant by Gambey, of Paris. Chronometer No. 2419 sid'l, by P. & F.]

Date: JUNE 13TH, 1860.

The'r, Farh't, 80°; bar., —.

No. for ref.	Times of observation noted by chronom'r.	True sid'l time of observation.	Meridian distances—		Obsrv'd double alt's of Polaris, out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sid'l time.	In arc.			
	h. m. s.	h. m. s.	h. m. s.	° ' "	° ' "	° ' "	° ' "
1 .....	14 01 29	13 53 21.2	0 45 38.14	11 24 32.10	69 55 55	34 56 53.3	36 21 28.9
2 .....	14 02 33.6	13 54 25.8	0 46 42.74	11 40 41.10	69 55 55	34 56 53.3	21 24.1
3 .....	14 03 50.8	13 55 43.0	0 47 59.94	11 59 59.10	69 56 00	34 56 55.8	21 20.8
4 .....	14 05 09.6	13 57 01.8	0 49 18.74	12 19 41.10	69 56 25	34 57 08.3	21 27.1
5 .....	14 06 04.8	13 57 57.0	0 50 13.94	12 33 29.10	69 56 40	34 57 15.8	21 30.2

Latitude by a mean of 5 results on Polaris .....	36 21 26.22
7 " " " α <sup>2</sup> Librae (south) .....	36 21 71.20
Latitude of camp on Pond Creek .....	36 21 48.71

*Determination of the latitude  $\alpha^2$  Libræ (south).*

[Station: Camp on Pond Creek. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: JUNE 13TH, 1860,

Th'r, Fahr't, 80°; bar., —.

No. for ref.	Times of observations noted by chronometer.	Meridian distances in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian altitudes of star.	True meridian altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>" "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	14 45 36.5	5 42.89	1 20.6	76 19 25.0	38 10 05.9	36 21 67.9
2.....	15 46 45.6	4 33.79	0 51.2	76 20 45.0	38 10 16.5	21 57.3
3.....	14 48 13.0	3 06.39	0 23.7	76 21 00.0	38 09 55.5	21 78.3
4.....	14 50 15.5	1 03.89	0 02.7	76 21 45.0	38 09 58.0	21 75.8
5.....	14 51 53.6	0 35.21	0 00.8	76 21 35.0	38 09 51.1	21 82.7
6.....	14 53 31.5	2 12.11	0 11.9	76 21 40.0	38 10 04.7	21 69.1
7.....	14 54 34.8	3 15.41	6 26.1	76 21 15.0	38 10 06.4	21 67.4

Latitude by a mean of 7 results on  $\alpha^2$  Libræ (south)..... 36° 21' 71".2

## F.—1. MUDDY VALLEY. DETERMINATIONS ON SURVEY TO AND FROM FORT COBB.

*Determination of the time.*

[Station: Camp in Muddy Valley, Choctaw Nation. Sextant by Gambey. Chron'r No. 2419, sidereal.]

Date: MAY 16TH, 1860.

Th'r, Fahr't, 72°; bar., 29.3 in.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observation deduced.	Time of observation noted by chron'r.	Error of chron'r.	Mean error of chron'r.	
$\alpha$ Coronæ Borealis (east).	92 57 05	46 27 40.8	3 22 14.7	12 06 34.09	12 05 54.0	s. ..... 28.59 27.59 24.29	s. ..... 26.823	} Only one star observed for time.
	93 09 25	45 33 50.9	3 21 44.4	12 07 04.39	12 06 35.8			
	93 46 25	46 52 21.5	3 20 13.7	12 08 35.09	12 08 07.5			
	94 35 45	47 17 02.2	3 18 13.0	12 10 35.79	12 10 11.5			



*Determination of the latitude by Polaris.*

[Station: Muddy Valley (Indian Nation). Sextant by Gambey, of Paris. Chronometer No. 2419, sidereal, by P. & F.]

Date: MAY 16TH, 1860.

Th'r, Farh't, 72°; bar., 29.3 in.

No. for ref.	Times of observation noted by chron'r.	True sidereal time of observation.	Meridian distances—		Obs'd double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	11 43 45	11 44 11.82	1 23 09.85	20 47 27.75	67 13 30	33 35 23.1	34 56 04.1
2.....	11 44 55.8	11 45 22.62	1 21 59.05	20 29 45.75	67 14 35	33 35 55.6	56 45.9
3.....	11 47 17.5	11 47 44.32	1 19 37.35	19 54 20.25	67 12 55	33 35 05.6	56 13.9
4.....	11 49 30	11 49 56.82	1 17 24.85	19 21 12.75	67 12 45	33 35 00.6	56 25.5
5.....	11 52 50.9	11 53 17.72	1 14 03.95	18 30 59.25	67 12 00	33 34 38.1	56 27.1
6.....	11 54 35.0	11 55 01.82	1 12 19.85	18 04 57.75	67 11 50	33 34 33.1	56 34.2
7.....	11 57 30.0	11 57 56.82	1 09 24.85	17 21 12.75	67 11 45	33 34 30.6	56 51.4

Latitude by a mean of 7 results on Polaris..... *° ' "* 34 56 28.8  
 8 " " a Virginia (south)..... 34 58 16.5  
 Latitude of camp in Muddy Valley (Indian Nation)..... 34 57 22.6

*Determination of the latitude a Virginia (south).*

[Station: Camp in Muddy Valley. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. & F.]

Date: MAY 16TH, 1860.

Th'r, Farh't, 72°; bar., 26.8 in.

No for ref.	Times of observation noted by chron'r.	Merid'n dis. in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian altitudes of star.	True meridian altitudes.	Latitude deduced from each observ'n.
1.....	13 12 41	4 44.4	0 49.9	89 11 40	44 25 44.7	34 58 09.0
2.....	13 13 33.7	3 51.7	0 33.1	89 13 00	44 36 07.9	57 45.8
3.....	13 14 48.0	2 37.4	0 15.2	89 12 45	44 35 42.5	58 11.2
4.....	13 16 06.5	1 18.9	0 03.8	89 12 55	44 35 36.1	58 17.6
5.....	13 17 20.0	0 05.4	0 00.0	89 12 55	44 35 32.3	58 21.4
6.....	13 18 56.5	1 31.1	0 05.1	89 12 45	44 35 32.4	58 21.3
7.....	13 20 40.9	3 15.5	0 23.5	89 11 45	44 35 20.8	58 32.9
8.....	13 21 50.0	4 24.2	0 43.2	89 11 05	44 35 20.5	58 32.2

Latitude by a mean of 8 results on a Virginia (south)..... *° ' "* 34 58 19.5

## F.—2. BEND OF BIG WASHITA. DETERMINATIONS ON SURVEY TO AND FROM FORT COBB.

*Determination of the time.*

[Station: Bend of Big Washita. Sextant by Gambey. Chronometer No. 2419, sidereal.]

Date: MAY 17TH, 1860.

Th'r., Fahr't, 66°; bar., 29.3 in.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from merid. in time.			Sidereal time of obs deduced.			Times of obs'n noted by chron'r.			Error of chronometer, fast of sid'l time.	Mean error of chronom'r.	
	°	'	"	°	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.			
α Leonis (west.)	104	40	00	52	20	47.5	2	13	55.4	12	14	52.26	12	15	10.9	18.65	} 20.52	} Only one star observed for time.
	104	05	26	52	01	57.0	2	15	39.7	12	16	56.56	12	16	57.5	20.94		
	103	41	50	51	50	11.7	2	16	14.5	12	17	41.36	12	18	03.0	21.64		
	103	24	35	51	41	34.0	2	17	32.1	12	18	28.96	12	18	49.5	20.54		
	103	00	15	51	29	23.9	2	18	38.9	12	19	35.76	12	19	56.6	20.84		

*Determination of the latitude by Polaris.*

[Station: Bend of Big Washita. Sextant by Gambey, of Paris. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: MAY 17TH, 1860.

Th'r., Fahr't, 66°; bar., 29.3 in.

No. for ref.	Times of observation noted by chronom'r.			True sidereal times of observation.			Meridian distances—		Observed double altitudes of Polaris out of the merid'n.	True altitudes.	Latitude deduced from each observ'n.
	h.	m.	s.	h.	m.	s.	In sidereal time.	In arc.			
1	12	39	37	12	39	16.5	0 28 05.8	7 01 27.0	67 20 50	33 39 02.4	35 04 36.0
2	12	41	18	12	40	57.5	0 26 24.8	6 36 12.0	67 20 45	33 38 59.9	04 38.8
3	12	42	39.5	12	42	19.0	0 25 03.3	6 15 49.8	67 21 10	33 39 12.4	04 54.7
4	12	44	21.8	12	44	01.3	0 23 21.0	5 50 15.0	67 21 00	33 39 07.4	04 53.6
5	12	45	55.4	12	45	34.9	0 21 47.4	5 26 51.3	67 20 55	33 39 04.9	04 54.6
6	12	49	25.0	12	49	04.5	0 18 17.8	4 34 27.3	67 20 35	33 38 54.9	04 51.5

Latitude by a mean of 6 results on Polaris..... 35 04 48.2  
 10 results on a Virginis (south)..... 35 06 23.8  
 Latitude camp at bend of Big Washita..... 35 05 36.0





*Determination of the latitude by Polaris.*

[Station: Fort Cobb. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. &amp; Frodsham.]

Date: MAY 19TH, 1860.

Th'r, Farh't, 71; bar., 29.3 in.

No. for ref.	Times of observation noted by chronom'r.	True sidereal time of observation.	Meridian distances—		Obs'd double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each obs'n.
			In sid'l time.	In arc.			
1	h. m. s. 12 23 59	h. m. s. 12 22 13.92	h. m. s. 0 45 09.73	° ' " 11 17 25.95	° ' " 67 25 45	° ' " 33 41 30.8	° ' " 35 05 65.4
2	12 25 37.5	12 23 52.42	0 43 31.23	10 52 48.45	67 25 25	33 41 20.8	05 62.4
3	12 26 45.4	12 25 00.32	0 42 23.33	10 35 49.95	67 25 15	33 41 15.8	05 62.0
4	12 28 37	12 26 51.92	0 40 31.73	10 07 55.95	67 24 35	33 40 55.8	05 49.5
5	12 29 53.5	12 28 08.42	0 39 15.23	9 48 48.45	67 24 25	33 40 50.8	05 49.4
6	12 30 52.0	12 29 06.92	0 38 16.73	9 34 10.95	67 23 55	33 40 35.8	05 38.1
7	12 32 40	12 30 54.92	0 36 28.73	0 07 10.95	67 23 20	33 40 18.3	05 27.0

Latitude by a mean of 7 results on Polaris ..... 35 05 50.54  
 16 results on a Virginis (south) ..... 35 07 07.30  
 Result of May 19th, lat., Fort Cobb ..... 35 06 28.94

*Determination of the latitude, a Virginis (south).*

[Station: Fort Cobb. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: MAY 19TH, 1860.

Th'r, Farh't, 71°; bar., 29.3 in.

No. for ref.	Times of observ'n noted by chron'r.	Meridian distances in sidereal times.	Reduction to meridian in arc.	Obs'd doublecircum-meridian altitudes of star.	True meridian altitudes.	Latitude deduced from each observ'n.
1	13 07 30	12 07.19	5 24.9	88 45 15	44 27 06.6	35 06 47.1
2	13 09 59.5	9 37.69	3 25.1	88 47 15	44 26 06.9	06 55.9
3	13 10 27.0	9 10.19	3 06.0	88 49 35	44 26 57.8	06 86.6
4	13 12 14.8	7 22.39	2 00.3	88 50 45	44 26 27.1	06 95.4
5	13 13 27.6	6 09.59	1 24.0	88 51 40	44 26 18.3	06 70.6
6	13 14 15.0	5 22.19	1 03.7	88 53 10	44 26 43.1	06 74.5
7	13 15 14.6	4 22.59	0 42.3	88 53 45	44 26 39.2	06 66.7
8	13 16 05	3 32.19	0 27.3	88 54 30	44 26 47.0	06 64.5
9	13 17 15.6	2 21.59	0 12.3	88 55 05	44 26 49.2	06 54.6
10	13 18 08.5	1 28.69	0 04.7	88 55 40	44 26 59.1	06 66.5
11	13 19 12.6	0 24.59	0 00.3	88 55 25	44 26 47.2	06 61.2
12	13 20 10	0 32.81	0 00.6	38 55 35	44 26 52.5	06 72.3
13	13 21 41.8	2 04.61	0 09.5	88 54 55	44 26 41.4	06 62.3
14	13 23 07.0	3 29.81	0 27.0	88 54 40	44 26 51.4	06 59.8
15	13 24 21.0	4 43.81	0 49.5	88 54 00	44 26 53.9	06 58.9
16	13 25 27.6	.....	1 15.4	88 53 10	44 26 54.8	06 81.6

Latitude by a mean of 16 results on a Virginis (south) ..... 35° 7' 07".3





*Determination of the latitude.*

[Station: Fort Cobb. Sextant by Gambey. Chronometer No. 2419, sidereal, by P. &amp; F.]

Date: MAY 25TH, 1860.

Th'r, Farh't, 80°; bar., 29.3 in.

	Times of observ'n noted by chron'r.	Meridian distances in sidereal time.	Reduction to meridian in arc.	Obs'd double cir- cum-meridian altitudes of star.	True meridian altitudes.	Latitude deduced from each obser- vation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1	13 14 02.6	5 31.69	1 08.9	88 52 30	44 26 29.2	35 06 84.5
2	13 14 57.0	4 37.29	0 48.1	88 53 35	44 26 40.9	06 72.8
3	13 15 58.0	3 38.29	0 29.1	88 54 45	44 26 56.9	06 56.8
4	13 16 47.0	2 47.29	0 17.5	88 55 15	44 27 00.3	06 53.4
5	13 17 49.5	1 44.79	0 06.8	88 55 10	44 26 47.1	06 66.6
6	13 18 46.0	0 48.29	0 01.5	88 55 10	44 26 41.8	06 71.9
7	13 20 46.0	1 11.72	0 03.2	88 54 45	44 26 31.0	06 82.7
8	13 22 51.5	3 17.21	0 24.4	88 54 35	44 26 47.2	06 66.5
9	13 23 44.5	4 10.21	0 39.2	88 54 05	44 26 47.0	06 66.7
10	13 25 00	5 25.71	1 06.5	88 52 15	44 26 19.3	06 94.4

Latitude by a mean of 10 results on a Virginis ..... 35° 07' 11".6

## F.—4. GOOSEBERRY CREEK. DETERMINATIONS ON SURVEY TO AND FROM FORT COBB.

*Determination of the latitude by Polaris.*

[Station: Goosberry Creek. Sextant by Gambey, of Paris. Chronometer No. 2419, sid'l, by P. &amp; F.]

Date: JUNE 3D, 1860.

Th'r, Farh't, —; bar., —.

No. for ref.	Times of observation noted by chron'r.	True sidereal times of ob- servation.	Meridian distances—		Obs'd double altitudes of Polaris out of the meridian.	True alti- tudes.	Latitude deduced from each obs'n.
			In sid'l time.	In arc.			
	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1 ...	13 41 50	13 36 42.3	0 29 07.54	7 16 53.10	68 31 15	34 14 19.0	35 39 53.2
2 ...	13 42 54	13 37 46.3	0 30 11.54	7 32 53.10	68 31 10	34 14 16.5	39 47.6
3 ...	13 44 35.5	13 39 27.8	0 31 53.04	7 58 15.60	68 31 35	34 14 29.0	39 55.1
4 ...	13 46 12.6	13 41 04.9	0 33 30.14	8 22 32.10	68 32 10	34 14 46.5	39 67.5
5 ...	13 48 03	13 42 55.3	0 35 20.54	8 50 08.10	68 32 15	34 14 49.0	39 63.8
6 ...	13 49 21.6	13 44 13.9	0 36 39.14	9 09 47.10	68 32 20	34 14 51.5	39 61.9
7 ...	13 51 58.0	13 46 50.3	0 39 15.54	9 48 53.10	68 32 15	34 14 49.0	39 49.9
8 ...	13 53 25.0	13 48 17.3	0 40 42.54	10 10 38.10	68 32 50	34 15 06.5	39 61.6

Latitude by a mean of 8 results on Polaris ..... 35° 39' 57".57



*Determination of the time.*

Station: Goosberry Creek Sextant by Gambey. Chronometer No. 2419, sidereal, by P. & F.]

Date: JUNE 3D, 1861.

The'r, Farh't, 81°; bar., 29.3.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from merid'n in time.	Sidereal time of observations deduced.	Times of observ'n noted by chron'r.	Error of chron'r.	Mean error of chron'r.	
	° ' "	° ' "	h. m. s.	h. m. s.	h. m. s.	m. s.	m. s.	
α Lyrae (east).....	71 39 10	35 48	27. 84 38 30.	2 13 53	44. 61 13 58	52. 65 07. 99	} 5 07. 750	} Only one star obs'd for time.
	71 56 25	35 57	05. 64 37 43.	2 13 54	31. 61 13 59	39. 5 07. 89		
	72 20 35	36 09	11. 14 36 37.	0 13 55	37. 81 14 00	43. 6 05. 79		
	72 36 40	36 17	13. 94 35 53.	5 13 56	21. 39 14 01	30 08. 69		
	72 58 40	36 28	14. 54 34 53.	6 13 57	21. 21 14 02	29. 6 08. 39		

F.—5. CAMP ON TRIBUTARY OF FALSE WASHITA. DETERMINATIONS ON SURVEY TO AND FROM FORT COBB.

*Determination of the time.*

[Station: Camp on tributary to False Washita. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 4TH, 1860.

The'r, Farh't, 70°; bar., 28.6 in.

Name of star.	Double altitudes observed.	True altitudes.	Hour angle from meridian in time.	Sidereal time of observations deduced.	Time of observation noted by chron'r.	Error of chr'r, fast of sid'l time.	Mean error of chron'r.
	° ' "	° ' "	h. m. s.	h. m. s.	h. m. s.	m. s.	m. s.
α Lyrae (west).....	125 50 25	62 54 47.1	2 15 06.8	20 47 21.34	20 51 58.0	4 36.60	} 4 35. 820
	125 27 10	62 43 09.4	2 16 06.0	20 48 20.54	20 52 56.6	4 36.06	
	125 10 05	62 34 36.7	2 16 49.9	20 49 54.44	20 53 41.5	4 37.06	
	124 50 10	62 24 39.0	2 17 41.0	20 49 55.54	20 54 29.8	4 34.26	
	124 31 20	62 15 13.9	2 18 29.3	20 50 43.84	20 55 18.9	4 35.06	
α Andromedæ (east).	100 16 05	50 07 21.0	3 06 30.8	20 54 42.81	20 59 26.50	4 43.69	} 4 43. 790
	100 36 20	50 17 28.8	3 05 41.2	20 55 32.41	21 00 16.80	4 44.39	
	101 23 29	50 40 59.3	3 03 46.0	20 57 27.61	21 02 09.00	4 41.39	
	102 16 40	51 07 40.0	3 01 35.3	20 59 38.31	21 04 24.00	4 45.69	

Mean error of chron'r's by 5 results on α Lyrae (west) ..... m. s. 4 35. 820  
 " " " 4 results on α Andromedæ (east) ..... 4 43. 790  
 Chron'r No 2419, sid'l, is fast of sid'l time Sept. 4th, 1860 ..... 4 39. 805

*Determination of the latitude by Polaris.*

Station: Camp on tributary to False Washita. Sextant by Gambey, of Paris. Chronometer No. 2419, sid'l, by P & F.]

Date: SEPT. 4TH, 1860.

Th'r, Fahr't, 70°; bar., 26.6 in.

No for ref.	Times of observation noted by chron'r.	True sid'l time of observation.	Meridian distances—		Obs'd double altit's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.
			In sid'l time.	In arc.			
1	h. m. s. 18 37 20.6	h. m. s. 18 32 40.8	h. m. s. 5 23 51.65	° ' " 80 57 54.75	° ' " 69 52 00	° ' " 34 54 49.1	° ' " 35 08 63.7
2	18 38 11.0	18 33 31.2	5 24 42.05	81 10 30.75	69 52 45	34 55 11.6	08 67.7
3	18 39 11.0	18 34 31.2	5 25 42.05	81 25 30.75	69 53 50	34 55 44.1	08 78.0
4	18 40 09.6	18 35 29.8	5 26 40.65	81 40 09.75	69 54 35	34 56 06.6	08 78.8
5	18 41 30.0	18 36 50.2	5 28 01.05	82 00 15.75	69 55 00	34 56 19.1	08 61.4
6	18 42 40.0	18 38 00.2	5 29 11.05	82 17 45.75	69 55 45	34 56 41.6	08 58.0
7	18 43 55.0	18 39 15.2	5 30 28.05	82 36 30.75	69 56 45	34 57 11.6	08 60.2

Latitude by a mean of 7 results on Polaris..... 35 09 06.80  
 9 " " Mars (south)..... 35 09 29.96  
 Latitude of camp on tributary to False Washita..... 35 09 18.38

*Determination of the latitude, Mars (south).*

Station: Camp on tributary to False Washita. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 4TH, 1860.

Th'r, Fahr't, 70; bar., —.

No. for ref.	Times of observation noted by chron'r.	Meridian dis's in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian altitudes of star.	True meridian altitudes.	Latitude deduced from each observation.
1	h. m. s. 19 39 27.8	m. s. 1 05.7	' " 0 01.9	' " 56 20 50	' " 28 08 54.4	' " 35 09 39.9
2	19 40 29.0	0 04.3	0 00.0	56 21 00	28 08 59.0	09 35.3
3	19 41 32.0	0 58.7	0 01.5	56 20 50	28 08 57.9	09 36.4
4	19 42 23.5	1 50.2	0 05.4	56 21 00	28 09 02.9	09 31.2
5	19 43 38.6	3 05.3	0 15.5	56 21 00	28 09 13.0	09 21.3
6	19 44 40.0	2 06.7	0 27.5	56 20 35	28 09 12.5	09 21.8
7	19 46 05.5	5 32.2	0 49.8	56 20 00	28 09 17.3	09 17.0
8	19 47 18.8	6 45.5	1 14.3	56 18 40	28 09 01.9	09 32.4
9	19 48 19.6	7 46.3	1 38.3	56 17 50	28 09 00.9	09 34.4

Latitude by a mean of 9 results on Mars (south)..... 35 09 29.96



F.—G. CAMP ON MAIN WASHITA. DETERMINATIONS ON SURVEY TO AND FROM FORT COBB.

Determination of the time.

[Station: 1st camp on main Washita. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 6TH, 1860.

Th'r, Farh't, 72°; bar., 26.6 in.

Name of star.	Double altitudes observed.			True altitudes.			Hour angle from merid'n in time.			Sidereal time of obs'n deduced.			Time of obs'n noted by chronometer.			Error of chronometer, fast of sid'l time.		Mean error of chronom'r.	
	o	'	"	o	'	"	h.	m.	s.	h.	m.	s.	h.	m.	s.	m.	s.	m.	s.
α Coronæ Borealis (west).	96	10	20	48	04	25.6	3	14	23.8	18	43	11.52	18	45	44.60	2	33.08	} 2 32.20	
	95	49	05	47	53	47.8	3	15	16.1	18	44	03.82	18	46	36.80	2	32.98		
	95	22	45	47	40	37.5	3	16	20.3	18	45	08.02	18	47	38.70	2	30.68		
	95	02	50	47	30	39.7	3	17	09.1	18	45	56.82	18	48	29.00	2	32.18		
	94	41	20	47	19	54.4	3	18	01.8	18	46	49.52	18	49	22.60	2	32.98		
	94	23	10	47	10	49.2	3	18	46.3	18	47	34.02	18	50	06.50	2	32.48		
	94	04	35	47	01	31.4	3	19	31.8	18	48	19.52	18	50	50.90	2	31.28		
	93	44	35	46	51	31.2	3	20	20.9	18	49	08.62	18	51	41.50	2	32.88		
	93	14	05	46	36	15.8	3	21	36.6	18	50	23.52	18	52	54.50	2	31.18		

Determination of the latitude by Polaris.

[Station: 1st camp on main Washita. Sextant by Gambey, of Paris. Chronometer No. 2419, by P. & F.]

Date: SEPT. 6TH, 1860.

Th'r, Farh't, 72°; bar., —.

No. for ref.	Times of observation noted by chron'r.	True sid'l time of observation.	Meridian distances—		Obs'r'd double alt's of Polaris out of the meridian.	True altitudes.	Latitude deduced from each observ'n.								
			In sid'l time.	In arc.											
	h.	m.	s.	o	'	"	o	'	"	o	'	"	o	'	"
1	18 55 49.6	18 53 17.4	5 44 27.2	86	06	48.0	70	02	55	35	00	17.0	35	06	51.9
2	18 56 37.5	18 54 05.3	5 45 15.1	86	18	46.5	70	03	20	35	00	29.5	06	46.4	
3	18 57 38.6	18 55 06.4	5 46 16.2	86	34	03.0	70	03	55	35	00	47.0	06	41.4	
4	18 58 30	18 55 57.8	5 47 07.6	86	46	54.0	70	04	50	35	01	14.5	06	49.4	
5	18 59 37.5	18 57 05.3	5 48 15.1	87	03	46.5	70	05	25	35	01	32.0	06	41.6	
6	19 00 54.8	18 58 22.6	5 49 32.4	87	23	06.0	70	06	40	35	02	09.5	06	50.2	
7	19 01 47.5	18 59 15.3	5 50 25.1	87	36	18.5	70	07	25	35	02	32.1	06	53.0	
8	19 02 48.6	19 00 16.4	5 51 26.2	87	51	33.0	70	07	55	35	02	47.1	06	45.1	
9	19 04 04	19 01 31.8	5 52 41.6	88	10	24.0	70	08	45	35	03	12.1	06	41.8	

Latitude by a mean of 9 results on Polaris ..... 35 06 48.7  
 10 " " Mars (south) ..... 35 06 43.59  
 Latitude of 1st camp on main Washita ..... 35 06 45.14



*Determination of the latitude, Mars (south).*

Station: 1st camp on main Washita. Sextant by Gambey. Chronometer No. 2419, sid'l, by P. & F.]

Date: SEPT. 6TH, 1860.

Th'r, Fahr't, 72; bar., —.

No. for ref.	Times of observation noted by chron'r.	Merid'n dist's in sidereal time.	Reduction to meridian in arc.	Obs'd double circum-meridian alt's of star.	True meridian altitudes.	Latitude deduced from each observation.
	<i>h. m. s.</i>	<i>m. s.</i>	<i>' "</i>	<i>° ' "</i>	<i>° ' "</i>	<i>° ' "</i>
1.....	19 29 59.5	10 27.8	2 58.8	56 43 20	28 23 07.5	35 06 28.5
2.....	19 31 58.6	8 28.7	1 57.4	56 44 50	28 22 51.1	06 42.9
3.....	19 33 04.0	7 23.3	1 29.1	56 45 30	28 22 42.8	06 50.2
4.....	19 34 31.9	5 55.4	0 57.3	56 46 55	28 22 53.5	06 40.5
5.....	19 35 42.6	4 44.7	0 36.7	56 47 10	28 22 40.4	06 53.6
6.....	19 37 08.0	3 19.3	0 17.5	56 47 45	28 22 38.7	06 55.2
7.....	19 38 16.5	2 10.8	0 07.8	56 48 10	28 22 41.6	06 52.4
8.....	19 39 36.8	0 50.5	0 01.1	56 48 50	28 22 54.9	06 39.1
9.....	19 40 40	0 12.9	0 00.8	56 49 00	28 22 59.6	06 34.4
10.....	19 44 10	3 42.7	0 22.4	56 48 20	28 23 01.2	06 32.1

Latitude by a mean of 10 results on Mars (south)..... 35° 06' 43". 59

LONGITUDES—(PECOS RIVER).

*Transit observations for longitude made near the intersection of Pecos River by the 32d parallel of north latitude, in connection with the establishment of the 103d meridian by the commission for running and marking the Texas boundary.*

Date: APRIL 11TH, 1859.

[Transit by Wardeman. Chron'r 2419, sidereal, by Parkinson & Frodsham.]

Reading of level, —.

Illumination.	West.	West.	West.
Object.	$\eta$ Cancri.	$\delta$ Cancri.	$\rho^1$ Cancri.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	8 12 54	8 25 17.4	8 34 35.4
2	8 13 17.5	8 25 40.0	8 35 00.0
3	8 13 40.7	8 26 03.4	8 35 25.4
4	8 14 03.9	8 26 26.2	8 35 49.5
5	8 14 28.1	8 26 50.0	8 36 15.5
6	8 14 51.2	8 27 12.8	8 36 39.9
7	8 15 15.4	8 27 36.5	8 37 05.6

Inst'g changed in azimuth.

Transit observations for longitude, &c.—Continued.

Date: APRIL 11TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... } E. W.  
 { 41 41  
 { 41 41

Illumination.	West.	West.	West.
Object.	Moon's 1st limb.	83 Cancr.	α Hydræ.
Wire.	<i>h m. s.</i>	<i>h m. s.</i>	<i>h m. s.</i>
No. 1	8 51 47	8 59 13.4	9 10 35.4
" 2	8 51 47	8 59 36.0	
" 3	8 52 10.2	8 59 59.5	9 11 19.5
" 4	8 52 34.0	9 00 22.3	9 11 40.9
" 5	8 52 58.0	9 00 45.7	9 12 04.2
" 6	8 53 21.5	9 01 08.6	9 12 25.9
" 7	8 53 46.0	9 01 32.5	9 12 48.5

Date: APRIL 11TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level, ———.

Illumination.	West.	West.
Object.	λ Leonis.	ε Leonis.
Wire.	<i>h m. s.</i>	<i>h m. s.</i>
No. 1	9 13 57.5	9 25 28.9
" 2	9 13 57.5	9 25 50.6
" 3	9 14 21.8	9 26 14.7
" 4	9 14 45.5	9 26 38.5
" 5	9 15 10.2	
" 6	9 15 33.5	9 27 27.0
" 7	9 15 58.5	9 27 51.9

Date: APRIL 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... } E. W. E. W.  
 { 50 37.5 44 43  
 { 40 38.0 44 43

Illumination.	West.	West.	West.
Object.	ε Urs. Majoris.	83 Cancr.	λ Leonis.
Wire.	<i>h m. s.</i>	<i>h m. s.</i>	<i>h m. s.</i>
No. 1	8 36 03	8 58 07.6	9 10 39.0
" 2	8 36 35.8	8 58 31.0	9 11 02.8
" 3	8 37 09	8 58 34.6	9 11 27.2
" 4	8 37 41.9	8 59 16.8	9 11 50.5
" 5	8 38 16.5	8 59 40.7	9 12 15.0
" 6	8 38 49.0	9 00 03.8	9 12 38.9
" 7	8 39 22.8	9 00 27.8	9 13 03.5

Transit observations for longitude, &c.—Continued.

Date: APRIL 11TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
48 42.5 47 44  
46 44 47 44

Illumina- tion.	West.			West.			West.		
Object.	ν Leonis.			Moon's 1st limb.			γ <sup>1</sup> Leonis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	9	31	41.8	9	46	14.5	9	59	12.4
2	9	38	03.9	9	46	37.4	9	59	35.8
3	9	38	26.5	9	47	00.0	9	59	59.9
4	9	38	46	9	47	22.5	10	00	22.5
5	9	39	12	9	47	46.5	10	00	47.0
6	9	39	34.6	9	48	09.5	10	01	09.5
7	9	39	57.7	9	48	33.2	10	01	33.5

Date: APRIL 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
48 45  
47 46

Illumina- tion.	West.			West.			West.		
Object.	45 Leonis.			ρ Leonis.			37 Sextantis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	10	07	16.5	10	12	27.5	10	25	50.5
2	10	07	38.8	10	12	49.9	10	26	12.6
3	10	08	01.1	10	13	12.4	10	26	34.5
4	10	08	23.5	10	13	34.2	10	26	56.5
5	10	08	46.4	10	13	57.3	10	27	19.5
6	10	09	08.4	10	14	18.8	10	27	41.0
7	10	09	31.2	10	14	42.4	10	28	03.5

Date: APRIL 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
48.5 48  
48.5 48

Illumina- tion.	West.			West.			West.		
Object.	α Urs. Majoris.			δ Leonis.			δ Hydræ et Crat.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	10	40	47.4	10	53	36.9	10	59	22.3
2	10	41	34.6	10	54	24.0	10	59	44.7
2	10	42	22.4	10	54	24.0	11	00	07.7
4	10	43	09.0	10	54	47.0	11	00	29.8
5	10	43	58.4	10	55	11.6	11	00	53.2
6	10	44	44.6	10	55	34.7	11	01	15.5
7	10	45	34.0	10	55	58.8	11	01	38.8



Transit observations for longitude, &c.—Continued.

Date: APRIL 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 53 58  
55 54

Illumina- tion.	West.	West.	West.
Object.	α Hydræ.	ε Leonis.	ν Leonis.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	9 07 46	9 24 49	9 37 41.9
" 2	9 08 07	9 25 12.5	9 38 04.5
" 3	9 08 29	9 25 36.9	9 38 26.9
" 4	9 08 51.2	9 26 00.8	9 38 49.4
" 5	9 09 14.4	9 26 25.6	9 39 12.4
" 6	9 09 36.0	9 26 49.5	9 39 34.6
" 7	9 09 58.8	9 27 14.0	9 39 57.8

Date: APRIL 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 57 57  
56 58

Illumina- tion.	West.	West.	West.
Object.	α Leonis.	γ <sup>1</sup> Leonis.	45 Leonis.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	9 48 18	9 59 12.5	10 07 16.9
" 2	9 48 18	9 59 35.5	10 08 01.6
" 3	9 48 40.5	9 59 59.5	10 08 23.4
" 4	9 49 02.9	10 00 22.6	10 08 46.5
" 5	9 49 26.0	10 00 46.5	10 09 08.5
" 6	9 49 27.8	10 01 09.7	10 09 31.2
" 7	9 50 10.9	10 01 33.7	

Date: APRIL 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 56 60  
59 58

Illumin- ation.	West.	West.	West.
Object.	ρ Leonis.	37 Sextantis.	Leonis.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	10 12 27.8	10 25 50.8	10 28 55.5
" 2	10 12 50.0	10 26 12.8	10 29 17.5
" 3	10 13 12.5	10 26 35.2	10 29 40.0
" 4	10 13 34.5	10 26 56.9	10 30 01.8
" 5	10 13 57.5	10 27 19.7	10 30 25.5
" 6	10 14 19.5	10 27 41.5	10 30 47.3
" 7	10 14 42.5	10 28 04.2	10 31 10.4

## Transit observations for longitude, &amp;c.—Continued.

Date: APRIL 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W. E. W.  
 { 60 57 59 57  
 { 58 59 59 57

Illumina- tion.	West.			West.			West.		
Object.	Moon's 1st limb.			$\chi$ Leonis.			$\sigma$ Leonis.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	10	39	27.2	10	44	50	11	00	58
2	10	39	48.9	10	45	12.4	11	01	20.1
3	10	40	11.2	10	45	34.5	11	01	41.9
4	10	40	33.5	10	45	56.5	11	02	03.6
5	10	40	57.2	10	46	19.2	11	02	26.8
6	10	41	19.5	10	46	40.7	11	02	48.5
7	10	41	42.5	10	47	03.8	11	03	10.8

Date: APRIL 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by Parkinson &amp; Frodsham.]

Reading of level..... { E. W. E. W.  
 { 58 59 56 61  
 { 56 61 55 62

Illumina- tion.	West.			West.			West.		
Object.	$\nu$ Leonis.			$\beta$ Leonis.			$\epsilon$ Corvi.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	11	16	50.8	11	28	55.5	11	49	56.4
2	11	17	12.9	11	29	17.8	11	50	19.7
3	11	17	34.8	11	29	40.9	11	50	43.5
4	11	17	56.5	11	30	03.5	11	51	07.5
5	11	18	19.0	11	30	26.5	11	51	30.9
6	11	18	40.5	11	30	49.5	11	51	54.5
7	11	19	02.8	11	31	12.5	11	52	18.5

Date: APRIL 14TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W. E. W.  
 { 43 43  
 { 46 40

Illumina- tion.	East.			East.			East.		
Object.	$\epsilon$ Leonis.			$\chi$ Leonis.			$\eta$ Leonis.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	10	40	29.5	10	44	47.9	10	55	31
2	10	40	52.5	10	45	10.8	10	55	54.2
3	10	41	14.5	10	45	32.5	10	56	16.5
4	10	41	37.1	10	45	55.5	10	56	39.9
5	10	41	59.4	10	46	17.4	10	57	01.8
6	10	42	21.4	10	46	39.5	10	57	25.0
7	10	42	43.5	10	47	01.8	10	57	47.5





## Transit observations for longitude, &amp;c.—Continued.

Date: APRIL 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P &amp; F.]

Reading of level..... { E. W.  
 { 41 39  
 { 38 42.5

Illumina- tion.	East.			East.			East.		
Object.	δ Leonis.			δ Hyd. et Crat.			B. A. C. 4006.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	10	53	34.8	10	59	20.5			
2	10	53	59.0	10	59	43.5	11	31	16.9
3	10	54	22.4	11	00	05.5	11	31	38.5
4	19	54	46.5	11	00	29.4	11	32	01.5
5	10	55	10.0	11	00	51.5	11	32	22.9
6	10	55	33.5	11	01	14.6	11	32	44.8
7	10	55	56.8	11	01	36.9	11	33	07.0

Date: APRIL 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W. E. W.  
 { 39 44 42 42  
 { 42 40 39 45

Illumina- tion.	East.			East.			East.		
Object.	π Virginis.			ε Corvi.			η Virginis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	11	40	42.5	11	49	53.0	11	59	46
2	11	41	05.4	11	50	17.4	12	00	08.5
3	11	41	27.0	11	50	40.5	12	00	30.0
4	11	41	50.0	11	51	04.8	12	00	53.0
5	11	42	11.5	11	51	28.5	12	01	14.5
6	11	42	33.9	11	51	52.2	12	01	36.8
7	11	42	55.6	11	52	15.6	12	01	58.3

Date: APRIL 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
 { 40 45  
 { 43 42

Illumina- tion.									
Object.	β Corvi.			Moon's 1st limb.			ψ Virginis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	12	13	59.5	12	22	03.8	12	34	05.8
2	12	14	23.9	12	22	27.4	12	34	28.5
3	12	14	47.0	12	22	49.5	12	34	50.5
4	12	15	11.9	12	23	13.1	12	35	13.5
5	12	15	34.4	12	23	35.3	12	35	35.4
6	12	15	59.0	12	23	57.9	12	35	57.5
7	12	16	22.0	12	24	20.5	12	36	19.8

*Transit observations for longitude, &c.—Continued.*

Date: APRIL 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W.  
 { 46 43  
 { 43 46

Illuminat'n.	East.			East.			East.		
Object.	ρ Virginis.			α Virginis.			ζ Virginis.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	12	47	34.7	13	04	50.5	13	14	35.5
" 2	12	47	58.0	13	05	13.0	13	14	58.0
" 3	12	48	20.0	13	05	35.4	13	15	19.8
" 4	12	48	43.1	13	05	58.5	13	15	42.5
" 5	12	49	04.9	13	06	20.6	13	16	04.2
" 6	13	49	27.5	13	06	42.8	13	16	26.2
" 7	12	49	49.5	13	07	05.4	13	16	48.0

Date: APRIL 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W.  
 { 44 48  
 { 47 43

Illumina-tion.	East.			East.			East.		
Object.	m Virginis.			η Urs. Majoris.			η Bootis.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	13	21	17.7	13	28	23.6	13	34	58.5
" 2	13	21	40.4	13	28	58.5	13	35	22.4
" 3	13	22	02.4	13	29	32.5	13	35	45.0
" 4	13	22	25.5	13	30	07.9	13	36	09.4
" 5	13	22	47.1	13	30	40.9	13	36	32.0
" 6	13	23	09.5	13	31	16.0	13	36	55.5
" 7	13	23	31.5	13	31	49.6	13	37	18.4

Date: APRIL 16TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
 { 43.5 43.5 44 52  
 { 46.5 40.5 48 48

Illumina-tion.	West.			West.			West.		
Object.	δ Leonis.			δ Hydræ et Crat.			ψ Virginis.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	10	53	35.5	10	59	20.9	12	34	06.5
" 2	10	53	39.0	10	59	43.8	12	34	28.9
" 3	10	54	22.9	11	00	06.5	12	34	51.0
" 4	10	54	45.8	11	00	28.5	12	35	13.0
" 5	10	55	10.5	11	00	51.9	12	35	36.0
" 6	10	55	33.5	11	01	14.5	12	35	58.0
" 7	10	55	57.5	11	01	37.5	12	36	20.6

## UNITED STATES AND TEXAS BOUNDARY.

*Transit of observations for longitude, &c.*—Continued.

Date: APRIL 16TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
48.5 49  
46 51

Illumina- tion.	West.			West.			West.		
Object.	<i>g</i> Virginia.			69 Virginia.			Moon's 1st limb.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	12	47	36.0	13	07	00.5	13	13	52.8
" 2	12	47	58.0	13	07	23.4	13	14	15.5
" 3	12	48	20.5	13	07	46.0	13	14	40.0
" 4	12	48	42.5	13	08	08.1	13	15	02.5
" 5	12	49	05.6	13	08	31.9	13	15	26.5
" 6	12	49	27.5	13	08	54.4	13	15	49.0
" 7	12	49	50.5	13	09	17.5	13	16	12.8

Date: APRIL 16TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
47 51  
50 48.5

Illumina- tion.	West.			West.			West.		
Object.	Moon's 2d limb.			<i>m</i> Virginia.			89 Virginia.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	13	16	31.0	13	21	18.5	13	29	16.5
" 2	13	16	31.0	13	21	40.4	13	29	39.5
" 3	13	16	55.2	13	22	02.8	13	30	02.6
" 4	13	17	18.0	13	22	24.5	13	30	24.9
" 5	13	17	42.0	13	22	47.5	13	30	49.4
" 6	13	18	04.5	13	23	09.5	13	31	11.5
" 7	13	18	28.0	13	23	32.2	13	31	35.4

Date: APRIL 16TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
50 50  
47

Illumina- tion.	West.			West.			West.		
Object.	$\eta$ Bootis.			94 Virginia.			$\lambda$ Virginia.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	13	34	59.0	13	45	58.0	13	58	34
" 2	13	35	21.9	13	46	17.6	13	58	56.4
" 3	13	35	45.5	13	46	40.0	13	59	18.9
" 4	13	36	08.5	13	47	01.8	13	59	41.2
" 5	13	36	32.5	13	47	24.8	14	00	04.5
" 6	13	36	55.4	13	47	46.7	14	00	26.5
" 7	13	37	19.0	13	48	09.6	14	00	49.5





*Transit observations for longitude, &c.*—Continued.

Date: APRIL 17TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 48 46  
44 49

Illumination.	East.			East.			East.		
Object.	5 Libræ.			B. A. C. 4896.			B. A. C. 4923.		
Wire No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	14	25	14.6	.....	.....	.....	14	36	15.5
2	14	25	38.0	.....	.....	.....	14	36	39.8
3	14	26	00.5	14	31	31.0	14	37	02.9
4	14	26	23.9	14	31	54.5	14	37	27.2
5	14	26	46.4	14	32	17.5	14	37	50.5
6	14	27	09.0	14	32	40.5	14	38	13.9
7	14	27	31.5	14	33	03.5	14	38	37.0

Date: APRIL 17TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level, ———.

Illumination.	East.								
Object.	ψ Bootis.								
No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	14	45	18.9						
2	14	45	44.3						
3	14	46	02.6						
4	14	46	34.0						
5	14	46	58.5						
6	14	47	23.5						
7	14	47	47.9						

Date: APRIL 18TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 43.5 47  
45 47

Illuminat.	West.			West.			West.		
Object.	5 Libræ.			B. A. C. 4896.			B. A. C. 4923.		
Wire No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	14	25	17	14	30	48.9	.....	.....	.....
2	14	25	40.3	14	31	10.0	.....	.....	.....
3	14	26	03.0	14	31	33.5	14	37	05.4
4	14	26	25.3	14	31	56.0	14	37	28.5
5	14	26	48.5	14	32	19.8	14	37	52.8
6	14	27	10.9	14	32	42.3	14	38	16.0
7	14	27	34.5	14	33	06.0	14	38	39.9

Transit observations for longitude, &c.—Continued.

Date: APRIL 18TH, 1859.

[Transit by Wurdeman releveled. Chron'r No. 2419, sidereal by P. & F.]

Reading of level..... { E. W. 47 50  
 { 45 51 E. W. 48 50  
 { 49 49

Illumination.	West.			West.			West.		
Object.	γ Bootis.			β Libræ.			Moon's 2d limb.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	14	45	21.4	14	56	32.5	15	04	49.5
2	14	45	45.5	14	56	54.5	15	05	13.5
3	14	46	10.6	14	57	16.9	15	05	37.8
4	14	46	34.5	14	57	38.5	15	06	02.3
5	14	47	00.5	14	58	01.6	15	06	27.8
6	14	47	24.6	14	58	23.5	15	06	52.0
7	14	47	50.0	14	58	46.5	15	07	17.5

Date: APRIL 18TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level, ———.

Illumination.	West.								
Object.	α Coronæ Borealis.			χ Libræ.			δ Scorpion.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	15	40.5	15	20	54.5	15	29	32.5
2	15	16	04.5	15	21	17.5	15	29	56.6
3	15	16	29.6	15	21	40.5	15	30	21.3
4	15	16	53.9	15	22	03.8	15	30	44.9
5	15	17	19.5	15	22	28.0	15	31	10.0
6	15	17	43.5	15	22	50.8	15	31	33.8
7	15	18	09.4	15	23	14.5	15	31	59.0

Date: APRIL 18TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. 51 49  
 { 49 51

Illumination.	West.			West.					
Object.	ο Scorpion.			β <sup>1</sup> Scorpion.					
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	35	11	15	44	19.5			
2	15	35	36.3	15	44	42.5			
3	15	36	01.5	15	45	06.0			
4	15	36	26.0	15	45	28.8			
5	15	36	51.9	15	45	52.8			
6	15	37	16.8	15	46	15.5			
7	15	37	42.5	15	46	39.5			



## Transit observations for longitude, &amp;c.—Continued.

Date: APRIL 19TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level ..... { 48 49  
52 46

Illumination.	East.			East.			East.		
Object.	α Coronæ Boreal.			χ Libræ <sup>***</sup> .			δ Scorpil <sup>***</sup> .		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	15	39.5	15	20	50.9	15	29	28.8
" 2	15	16	04.8	15	21	15.0	15	29	53.5
" 3	15	16	29.4	15	21	38.0	15	30	17.5
" 4	15	16	54.5	15	23	01.9	15	30	42.8
" 5	15	17	18.9	15	23	24.8	15	31	08.5
" 6	15	17	43.8	-----	-----	-----	15	31	31.0
" 7	15	18	08.0	15	23	11.5	15	31	55.5

Date: APRIL 19TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level ..... { 53 47  
49 51

Illumination.	East.			East.			East.		
Object.	θ Scorpil.			β <sup>1</sup> Scorpil.			δ Ophiuchi.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	35	07.5	15	44	15.9	15	54	02.6
2	15	35	33.6	15	44	40.0	15	54	25.3
3	15	35	57.8	15	45	02.7	15	54	46.8
4	15	36	23.5	15	45	28.5	15	55	09.5
5	15	36	48.5	15	45	50.0	15	55	31.4
6	15	37	13.6	15	46	13.5	15	55	53.5
7	15	37	38.5	15	46	36.6	15	56	15.0

Date: APRIL 19TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level ..... { 50 52  
53 4

Illumination.	East.			East.			East.		
Object.	Moon's 2d limb.			α Scorpil <sup>***</sup> .			τ Scorpil.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	16	01	39.5	16	07	44	16	14	03.5
" 2	16	02	05.5	16	08	09.0	16	14	28.9
" 3	16	02	30.4	16	08	33.4	16	14	53.5
" 4	16	02	56.5	16	08	58.5	16	15	19.5
" 5	16	03	20.9	16	09	22.5	16	15	43.9
" 6	16	03	46.5	16	09	47.5	16	16	08.9
" 7	16	04	11.5	16	10	11.5	16	16	33.6

Transit observations for longitude—Continued.

Date: APRIL 19TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level .....

E. W.  
{ 54 50  
51 53

Illumina- tion.	East.			East.			East.		
Object.	ζ Herculis.			20 Ophiuchi.			κ Ophiuchi.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	16	22	50.8	16	29	06.5	16	38	03.5
" 2	16	23	17.2	16	29	29.0	16	38	26.4
" 3	16	23	42.8	16	29	50.9	16	38	48.5
" 4	16	24	09.5	16	30	14.5	16	39	11.5
" 5	16	24	34.9	16	30	36.0	16	39	83.3
" 6	16	25	01.0	16	30	58.9	16	39	55.5
" 7	16	25	26.5	16	31	21.0	16	40	17.5

Date: APRIL 20TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level .....

E. W.  
{ 52 55  
57 51

Illumina- tion.	West.			West.			West.		
Object.	σ Scorpii.			α Scorpii.			τ Scorpii.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	15	59	41.6	16	07	50	16	14	09.5
" 2	16	00	05.5	16	08	13.8	16	14	33.9
" 3	16	00	30.0	16	08	38.5	16	14	58.9
" 4	16	00	53.9	16	09	02.6	16	15	23.5
" 5	16	01	19.4	16	09	27.9	16	15	49.0
" 6	16	01	42.9	16	09	51.9	16	16	13.5
" 7	16	02	07.9	16	10	17.4	16	16	39.0

Date: APRIL 20TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level, ———.

Illumina- tion.	West.			West.			West.		
Object.	ζ Herculis.			20 Ophiuchi.			η Ophiuchi.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	16	22	54.5	16	29	11.5	16	49	25.5
" 2	16	23	19.8	16	29	32.6	16	49	48.5
" 3	16	23	46.0	16	29	55.9	16	50	10.9
" 4	16	24	11.4	16	30	18.0	16	50	33.5
" 5	16	24	38.0	16	30	40.5	16	50	56.9
" 6	16	25	03.5	16	31	02.5	16	51	19.5
" 7	16	25	30.0	16	31	25.9	16	51	42.8

## UNITED STATES AND TEXAS BOUNDARY.

Transit observations for longitude, &amp;c.—Continued.

Date: APRIL 20TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
55 60  
60 55

Illumina- tion.									
Object.	A Ophiuchi.			Moon's 2d limb.			δ Ophiuchi.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	16	53	44.5	16	59	23.9	17	05	22.8
" 2	16	54	08.9	16	59	50.0	17	05	47.9
" 3	16	54	33.5	17	00	15.5	17	06	13.5
" 4	16	54	57.9	17	00	40.7	17	06	38.5
" 5	16	55	23.0	17	01	07.4	17	07	04.5
" 6	16	55	47.0	17	01	32.4	17	07	29.6
" 7	16	56	12.5	17	01	59.0	17	07	55.5

Date: APRIL 20TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level, ———.

Illumina- tion.	West.			West.			West.		
Object.	c <sup>3</sup> Ophiuchi.			o Serpentis.			μ Herculis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	17	09	54	17	20	38	17	27	55.5
" 2	17	10	17.8	17	21	00.6	17	28	20.4
" 3	17	10	41.9	17	21	23.3	17	28	45.2
" 4	17	11	05.5	17	21	45.4	17	29	09.0
" 5	17	11	30.5	17	22	08.5	17	29	35.4
" 6	17	11	53.9	17	22	30.6	17	29	59.5
" 7	17	12	18.8	17	22	53.9	17	30	25.0

## LONGITUDES.—RABBIT EAR CREEK.

Transit observations for longitude made at camp on Rabbit Ear Creek, in connection with the establishment of the 103d meridian by the commission for running and marking the Texas boundary.

Date: AUGUST 19TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
45 51  
52 42

Illumina- tion.	West.			West.			West.		
Object.	α Scorpii.			τ Scorpii.			ζ Herculis.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	.....	.....	.....	16	10	32.5	16	19	24.6
" 2	.....	.....	.....	16	10	56.8	16	19	49.9
" 3	.....	.....	.....	16	11	21.9	16	20	16.0
" 4	16	05	25.8	16	11	46.6	16	20	41.5
" 5	16	05	50.9	16	12	11.9	16	21	07.9
" 6	16	06	14.7	16	12	36.6	16	21	33.6
" 7	16	06	39.8	16	13	01.8	Lost.		



Transit observations for longitude, &c.—Continued.

Date: AUGUST 7TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of the level ..... E. W. { 54 45  
48 51

Illumina- tion.	West.			West.			West.		
Object.	Moon's 1st limb.			α Herculis.			α Ophiuchi.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	16	29	06.4	16	51	48	16	56	49.7
2	16	29	31.6	16	52	10	16	57	13.8
3	16	29	57.5	16	52	33.6	16	57	37.9
4	16	30	22.0	16	52	55.6	16	58	01.8
5	16	30	48.8	16	53	17.5	16	58	26.6
6	16	31	13.9	16	53	41.0	16	58	50.5
7	16	31	40.0	16	54	04.4	16	59	15.2

Date: AUGUST 7TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level ..... E. W. { 49 52  
55 46

Illumina- tion.	West.		
Object.	δ Ophiuchi.		
Wire. No.	h.	m.	s.
1	17	01	46.6
2	17	02	11.6
3	17	02	36.8
4	17	03	01.6
5	17	03	27.8
6	17	03	52.6
7	17	04	18.6

Date: AUGUST 9TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level ..... E. W. { 51 57  
55 52

*Illumina- tion.	West.			West.			West.		
Object.	4 Sagittarii.			γ Sagittarii.			μ <sup>1</sup> Sagittarii.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	17	34	44.3	17	40	14	17	50	23.5
2	17	35	09.0	17	40	40	17	50	47.6
3	17	35	32.5	17	41	04.8	17	51	10.6
4	17	35	56.8	17	41	30.8	17	51	34.5
5	17	36	21.0	17	41	56.0	17	51	57.6
6	17	36	44.5	17	42	21.6	17	52	21.3
7	17	37	08.6	17	42	46.8	17	52	44.6

\* Instrument reversed and collimation is consequently the reverse of what it was August 7.

## Transit observations for longitude, &amp;c.—Continued.

Date: AUGUST 9TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level.....

E. W.  
{ 53 53  
52 56

Illumina- tion.	West.			West.			West.		
Object.	δ Sagittarii.			λ Sagittarii.			Bradley No. 2333.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	17	55	27.6	18	03	13.6	18	10	55.7
" 2	17	55	53.2	18	03	37.4	18	11	18.6
" 3	17	56	18.0	18	04	02.6	18	11	42.8
" 4	17	56	44.4	18	04	28.5	18	12	06.0
" 5	17	57	09.0	18	04	50.6	18	12	52.6
" 6	17	57	44.6	18	05	14.6			
" 7	17	57	09.5						

Date: AUGUST 9TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level.....

E. W. E. W.  
{ 52 58 57 57  
55 54 57 53

Illumina- tion.	West.								
Object.	Moon's 1st limb.			σ Sagittarii.			ζ Sagittarii.		
Wire. No.	h.	m.	s.	h.	m.	s.	h.	m.	s.
1	18	21	42.5	18	30	03.5	18	37	07.8
" 2	18	22	08.0	18	30	28.6	18	37	33.8
" 3	18	22	33.0	18	30	52.6	18	37	58.7
" 4	18	22	58.5	18	31	17.6	18	38	24.7
" 5	18	23	23.9	18	31	41.8	18	38	50.0
" 6	18	23	49.7	18	32	06.6	18	39	15.5
" 7	18	24	15.5	18	32	30.6	18	39	40.5

Date: AUGUST 9TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level.....

E. W.  
{ 55 55  
54 56

Illumina- tion.	West.			West.		
Object.	τ Sagittarii.			ω Aquilæ.		
Wire. No.	h.	m.	s.	h.	m.	s.
1	18	41	39.0	18	54	50.6
" 2	18	42	04.8	18	55	13.5
" 3	18	42	29.0	18	55	35.4
" 4	18	43	54.6	18	55	58.6
" 5	18	43	18.8	18	56	20.5
" 6	18	43	44.0	18	56	42.8
" 7	18	44	08.5	18	57	05.5

Transit observations for longitude, &c.—Continued.

Date: AUGUST 11TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. 56 55 } E. W. 59 53  
 { 58 53 } 57 55

Illumination.*	West.			West.			West.		
Object.	η Capricorni.			Moon's 1st limb.			ν Capricorni.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	20	02	53.5	20	06	26	20	15	40
" 2	20	03	16.6	20	06	50	20	16	02.8
" 3	20	03	39.8	20	07	13.8	20	16	25.9
" 4	20	04	02.6	20	07	37.9	20	16	48.9
" 5	20	04	26.4	20	08	02.8	20	17	12.6
" 6	20	04	49.6	20	08	25.8	20	17	35.5
" 7	.....			20	08	50.6	20	17	59.6

Date: AUGUST 11TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. 59 54 }  
 { 55 59 }

Illumination.									
Object.	4 Capricorni.			32 Vulpeculæ.			61 <sup>1</sup> Cygni.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	20	21	19.6	.....			20	44	00.9
" 2	20	21	43.7	20	32	31.8	20	44	28.0
" 3	20	22	08.0	20	32	56.8	20	44	56.3
" 4	20	22	32.5	20	33	20.9	20	45	23.5
" 5	20	22	57.6	20	33	46.8	20	45	52.6
" 6	20	23	21.0	20	34	10.9	20	46	19.9
" 7	20	23	45.9	20	34	36.6	20	46	48.0

Date: AUGUST 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. 56 60 }  
 { 58 58 }

Illumination.†	East.			East.			East.		
Object.	α Aquilæ.			β Aquilæ.			α <sup>2</sup> Capricorni.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	19	27	33.3	19	32	02.5	19	53	51.5
2	19	27	55.9	19	32	24.9	19	54	14.6
3	19	28	17.5	19	32	46.5	19	54	36.8
4	19	28	40.4	19	33	09.6	19	55	00.0
5	19	29	01.9	19	33	31.0	19	55	22.0
6	19	29	24.5	19	33	53.5	19	55	44.5
7	19	29	46.8	19	34	15.2	19	56	07.0

\* But ins't in same position as night of 7th (east).  
 † Ins't reversed from last night's observations.



*Transit observations for longitude, &c.—Continued.*

Date: AUGUST 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
61 8  
59 61

Illumina- tion.	East.	East.	East.
Object.	$\rho$ Capricornl.	$\tau^2$ Capricornl.	$\psi$ Capricornl.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	20 04 24.8	20 15 10	20 21 17
2	20 04 48.5	20 15 23.5	20 21 41.7
3	20 05 11.1	20 15 45.9	20 22 05.7
4	20 05 34.9	20 16 09.0	20 22 30.7
5	20 05 57.5	20 16 31.5	20 22 54.5
6	20 06 20.9	20 16 54.5	20 23 19.0
7	20 06 43.5	20 17 16.9	20 23 43.4

Date: AUGUST 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W. E. W.  
59 64 58 65  
61 61 62 61

Illumina- tion.	East.	East.	East.
Object.	32 Vulpeculæ.	$\nu$ Aquarii.	Moon's 1st limb.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	20 32 04.6	20 45 32.5	20 54 44.9
2	20 32 29.8	20 45 55.5	20 55 08.8
3	20 32 54.5	20 46 17.6	20 55 32.4
4	20 33 19.8	20 46 40.9	20 55 56.0
5	20 33 44.0	20 47 03.0	20 56 19.5
6	20 34 09	20 47 25.6	20 56 42.9
7	20 34 33.5	20 47 48.0	20 57 05.9

Date: AUGUST 12TH, 1859.

[Transit by Wurdeman. Chron'r 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
61 63  
58 66

Illumina- tion.	East.	East.	East.
Object.	Moon's 2d limb.	$\zeta$ Capricorni.	$\epsilon$ Capricorni.
Wire. No.	<i>h. m. s.</i>	<i>h. m. s.</i>	<i>h. m. s.</i>
1	20 57 15	21 02 10.5	21 12 46.0
2	20 57 39.5	21 02 35	21 13 09.8
3	20 58 03.7	21 02 58	21 13 32.9
4	20 58 26.8	21 03 22.9	21 13 56.9
5	20 58 50.0	21 03 46.5	21 14 20
6	20 59 13.4	21 04 10.2	21 14 43.6
7		21 04 33.6	21 15 06.7

Transit observations for longitude, &c.—Continued.

Date: AUGUST 12TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W.  
61 64  
62 63

Illumination.	East.			East.			East.		
Object.	γ Capricorni.			δ Capricorni.			16. Pegasi.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	.....			21	23	52.0	21	30	11.6
" 2	.....			21	23	15.6	21	30	36.5
" 3	21	16	38.8	21	23	88.0	21	31	00.6
" 4	21	17	02.6	21	24	01.6	21	31	35.0
" 5	21	17	25.4	21	24	23.9	21	31	49.6
" 6	21	17	48.6	21	24	46.8	21	32	13.5
" 7	21	18	10.9	21	25	09.9	21	32	37.9

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W.  
61 62  
63 60

Illumination.	West.			West.			West.		
Object.	α Capricorni.			β Cephei.			γ Capricorni.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	20	57	59.6	.....			21	17	29.6
" 2	20	58	21.9	.....			21	17	51.8
" 3	20	58	45.4	.....			21	18	14.6
" 4	20	59	07.5	21	11	39.6	21	18	37.0
" 5	20	59	31.5	21	12	45.5	21	19	00.6
" 6	20	59	53.5	21	13	48.5	21	19	22.5
" 7	21	00	17.6	21	14	53.6	21	19	45.5

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
59 66 62 63  
62 63 59 66

Illumination.	West.			West.			West.		
Object.	ε Pegasi.			δ Capricorni.			16. Pegasi.		
Wire.	h.	m.	s.	h.	m.	s.	h.	m.	s.
No. 1	21	20	53.9	.....			21	30	11.6
" 2	21	21	16.0	.....			21	30	35.7
" 3	21	21	37.9	.....			21	31	00.0
" 4	21	22	00.0	21	24	59	21	31	23.6
" 5	21	22	22.9	21	24	22.9	21	31	48.9
" 6	21	22	44.8	21	24	45.5	21	32	12.5
" 7	21	23	07.6	21	25	08.9	21	32	37.8

Transit observations for longitude, &amp;c.—Continued.

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
58 67  
62 63

Illumina- tion.	West.			West.			West.		
Object.	Moon's 1st limb.			Moon's 2d limb.			θ Aquarii.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	21	40	50.8	21	42	55.4	21	53	01.8
" 2	21	41	13.6	21	43	18.6	21	53	23.5
" 3	21	41	36.6	21	43	41.5	21	53	45.9
" 4	21	41	59.0	21	44	03.8	21	54	07.8
" 5	21	42	22.9	21	44	27.1	21	54	30.6
" 6	.....			21	44	49.8	21	54	52.4
" 7	.....			21	45	12.9	21	55	14.0

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
61 65  
64 62

Illumina- tion.	West.			West.			West.		
Object.	ρ Aquarii.			53 <sup>2</sup> Aquarii.			σ Aquarii.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	21	56	24.8	22	02	30.8	22	06	48.8
" 2	21	56	46.9	22	02	53.5	22	07	10.5
" 3	21	57	09.5	22	03	16.6	22	07	32.4
" 4	21	57	31.0	22	03	39.5	22	07	55.0
" 5	21	57	53.9	22	04	02.6	22	08	18.0
" 6	21	58	15.9	22	04	25.5	22	08	40.0
" 7	21	58	38.4	22	04	48.9	22	09	03.4

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level..... { E. W.  
62 64  
60 66

Illumina- tion.	West.			West.			West.		
Object.	η Aquarii.			ζ Pegasi.			τ <sup>2</sup> Aquarii.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	22	11	45.9	.....			22	25	43.9
" 2	22	12	07.3	22	18	25.9	22	26	06.6
" 3	22	12	29.6	22	18	48.8	22	26	29.5
" 4	22	12	50.9	22	19	10.6	22	26	51.5
" 5	22	13	13.6	22	19	33.6	22	27	14.6
" 6	22	13	34.9	22	19	55.5	22	27	38.9
" 7	22	13	57.9	22	20	17.9	22	28	00.6



*Transit observations for longitude, &c.—Continued.*

Date: AUGUST 13TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level, ———.

Illumina- tion.	West.		
Object.	Fomalhaut.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	22	33	19.0
" 2	22	33	44.4
" 3	22	34	09.9
" 4	22	34	34.8
" 5	22	35	01.0
" 6	22	35	25.7
" 7	22	35	51.9

Date: AUGUST 14TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W. E. W.  
60 54 56 58  
59 55 59 55

Illumina- tion.	East.			East.			East.		
Object.	$\theta$ Aquarii.			$\rho$ Aquarii.			$\sigma$ Aquarii.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	21	52	59.6	21	56	22.5	22	06	46.4
" 2	21	53	22.4	21	56	45.5	22	07	08.9
" 3	21	53	43.8	21	57	06.9	22	07	30.9
" 4	21	54	06.9	21	57	30.0	22	07	54.0
" 5	21	54	28.8	21	57	51.8	22	08	16.0
" 6	21	54	50.9	21	58	14.0	22	08	38.8
" 7	21	55	13.0	21	58	36.0	22	09	01

Date: AUGUST 14TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level..... { E. W.  
59 54  
55 58

Illumina- tion.	East.			East.			East.		
Object.	$\kappa$ Aquarii.			$\zeta$ Pegasi.			Moon's 2d limb.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	22	14	03.5	22	18	02.4	22	27	26.4
" 2	22	14	26.6	22	18	24.8	22	27	48.9
" 3	22	14	47.8				22	28	11.0
" 4	22	15	10.6	22	19	10	22	28	34.6
" 5	22	15	32.5	22	19	31.6	22	28	56.7
" 6	22	15	54.6	22	19	54.0	22	29	18.8
" 7	22	16	16.5	22	20	16.5	22	29	41.2

## UNITED STATES AND TEXAS BOUNDARY.

Transit observations for longitude, &amp;c.—Continued.

Date: AUGUST 14TH, 1850.

[Transit by Wurdeman.]

Reading of level.....

	E.	W.
}	54	59
	58	58

Illumina- tion.	East.			East.			East.		
Object.	Fomalhaut.			α Pegasi.			♄ Aquarii.		
Wire. No.	A.	m.	s.	A.	m.	s.	A.	m.	s.
1	22	33	16.2	22	41	19.9	22	50	37.4
" 2	22	33	42.5	22	41	43.3	22	51	00.0
" 3	22	34	07.6	22	42	04.8	22	51	21.6
" 4	22	34	33.6	22	42	28.6	22	51	44.5
" 5	22	34	58.5	22	42	50.9	22	52	06.0
" 6	22	35	24.0	22	43	13.5	22	52	28.4
" 7	22	35	49.4	22	43	36.0	22	52	50.4

Date: AUGUST 14TH, 1850.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level.....

	E.	W.
}	57	53
	54	61

Illumina- tion.	East.			East.			East.		
Object.	♄ Aquarii.			κ Piscium.			γ Cephei.		
Wire. No.	A.	m.	s.	A.	m.	s.	A.	m.	s.
1	22	55	12.9	23	03	19.2	23	13	39.8
" 2	22	55	36.0	23	03	41.6	23	15	18.0
" 3	22	55	57.8	23	04	03.0	23	16	53.2
" 4	22	56	20.6	23	04	25.5	23	18	32.5
" 5	22	56	42.5	23	04	47.5	23	20	07.6
" 6	22	57	04.8	23	05	09.6	23	21	43.6
" 7	22	57	27.4	23	05	31.2	23	23	19.9

\* Date: AUGUST 15TH, 1850.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. &amp; F.]

Reading of level.....

	E.	W.
}	56	53
	59	57

Illumina- tion.	West.			West.			West.		
Object.	κ Piscium.			Moon's 2d limb.			ι Piscium.		
Wire. No.	A.	m.	s.	A.	m.	s.	A.	m.	s.
1	23	11	23.9	23	11	23.9	23	16	20.8
" 2	23	03	42.9	23	11	45.5	23	16	42.5
" 3	23	04	05.0	23	12	06	23	17	04.6
" 4	23	04	26.6	23	12	29.9	23	17	26.0
" 5	23	04	49.0	23	12	53.0	23	17	48.8
" 6	23	05	11.0	23	13	14.9	23	18	10.6
" 7	23	05	33.6	23	13	37.6	23	18	33.6

Clouds prevented the beginning of observations earlier.

*Transit observations for longitude, &c.*—Continued.

Date: AUGUST 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 59 57  
58 58

Illumina- tion.	West.			West.			West.		
Object.	21. Piscium.			27. Piscium.			30. Piscium.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	23	25	54.0	23	35	05.9	23	38	22
" 2	23	26	14.9	23	35	27.6	23	38	43.8
" 3	23	26	36.0	23	35	49.5	23	39	05.9
" 4	23	26	58.5	23	36	11.4	23	39	27.6
" 5	23	27	21.0	23	36	33.9	23	39	50.6
" 6	23	27	42.9	23	36	55.5	23	40	12.4
" 7	23	28	04.8	23	37	18.0	23	40	34.8

Date: AUGUST 15TH, 1859.

[Transit by Wurdeman. Chron'r No. 2419, sidereal, by P. & F.]

Reading of level.....

E. W.  
{ 60 58  
57 62

Illumina- tion.	West.		
Object.	α Andromedæ.		
Wire. No.	<i>h.</i>	<i>m.</i>	<i>s.</i>
1	23	44	37.6
" 2	23	45	01.9
" 3	23	45	27.0
" 4	23	45	51.5
" 5	23	46	17.4
" 6	23	46	41.8
" 7	23	47	07.6



# LETTERS AND REPORTS OF SURVEYS.

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DEPARTMENT OF THE INTERIOR,  
*July 1, 1858.*

Hon. H. R. RUNNELLS,  
*Gov. of Texas, Austin, Texas :*

SIR: I have the honor to enclose herewith a copy of an act in relation to the running and marking the boundary lines between the Territories of the U. States and the State of Texas.

A commissioner will be shortly appointed on the part of the United States to carry out the provisions of the act; and for a speedy and effectual prosecution of the survey, it is desirable to commence operations at an early day. From information possessed by this department it has been thought advisable to commence the survey at the intersection of the 32d parallel with the Rio Grande, there having been determined, by a long course of astronomical observations by various parties connected with the U. S. & Mexican Boundary Survey, several points in the vicinity of El Paso del Norte, which may serve as a basis of observation and measurement, and besides a winter's campaign will be more agreeable and prolific of results near the 32nd parallel than on the prairies northern borders of Texas.

I trust that the plan of operations will meet your views, and would respectfully request to be informed at an early day if you are in readiness to co-operate with the United States in carrying out the purposes expressed in the act referred to.

The party on the part of the United States will consist of, exclusive of military escort, about 30 or 35 men, including a commissioner who will act in the capacity of astronomer and surveyor, an assistant astronomer, and an assistant surveyor, or, with their attendants, the necessary laborers, &c. These officers have had long experience on similar works and are familiar with a greater portion of the country adjacent to the boundary now to be run and marked.

The commissioner on the part of the United States will be in San Antonio ready to co-operate with such a person as you may select on the part of the State of Texas, about the 1st of September next, and a copy of his instructions, as soon as they are prepared, will be enclosed to you for your information and for that of the person you may select to co-operate with him.

I am, sir, respectfully, your ob't servant,

J. THOMPSON,  
*Secretary.*



## No. 2.

DEPARTMENT OF THE INTERIOR,  
Washington, D. C., July 9, 1858.

JOHN H. CLARK,

*Com'r, Astronomer, & Surveyor of Texas Boundary, Present:*

SIR: By an act of Congress approved June 5th, 1858, the sum of eighty thousand dollars was appropriated to run and mark the boundary line between the Territories of the United States and the State of Texas, viz: beginning at the point where the one hundredth degree of longitude west from Greenwich crosses Red River, and running thence north to the point where said one hundredth degree of longitude intersects the parallel of thirty-six degrees thirty minutes north latitude; and thence west with the said parallel of thirty-six degrees and thirty minutes north latitude to the point where it intersects the one hundred and third degree of longitude west from Greenwich; and thence south with the said one hundred and third degree of longitude to the thirty-second parallel of north latitude; and thence west with the said thirty-second degree of north latitude to the Rio Grande.

As this act seems to contemplate the completion of the field work, it is desirable that the organization and outfit be made upon the smallest scale consistent with a faithful and proper execution of the work, and for this purpose you will proceed with as little delay as possible to San Antonio or El Paso, Texas, as it may be most advisable, with your assistants and instruments, and there prepare to take the field.

You will proceed first to run and mark that portion of the boundary which is defined by the 32d parallel of north latitude, using the most accurate methods known to science in your determinations. You will check the surveyed line by astronomical determinations or by triangulation or by both methods, when practicable, as often as may be demanded by the nature of the country.

As it is impossible, both on account of the expense as well as from the desert character of the country to be traversed, for you to obtain more than one lunation (and that without corresponding observations) to establish the 103d meridian of west longitude, it will be most accurate as well as most expeditious for you to transfer the longitude from Frontera (a point well established by the United States & Mexican Boundary Commission) in fixing that meridian. You will not neglect, however, to observe for longitude as near the intersection of the 32d parallel and the 103d meridian and at other points as circumstances will permit, and keep a record of your observations for future use and reference.

You will erect, in accordance with the 2d section of the act authorizing this survey, monuments of earth, stone, or wood, as may be most accessible, at the point of beginning; when the line is crossed by roads, rivers, and trails; at the corners and as often at other points as necessary to identify the line, each monument to be marked with dates and characters designating the respective Territories which may be adjacent.

Should you find it impossible after careful reconnaissance to run and mark the 103d meridian from the south on account of the absence of water or other physical obstacles upon the Llana Estacado, you may cause a careful survey to be made from the intersection of the Pecos River with the 32d parallel northward up the valley of that river, thence eastward to a point on or near the Canadian River, with a view to determining this meridian, or to check such observations as you may deem necessary to make at this point. As a further check upon this portion



of your work you may, if deemed necessary, and the condition of your party and the resources at your command will admit of it, proceed to where the 103d meridian cuts the parallel of 37° north latitude, as determined on the survey of the Kansas boundary, and run it southward.

After surveying and marking that portion of the boundary defined by the parallel of 36° 30' north latitude, and which is known to you to present no obstacles to a rapid survey and demarcation, to prevent delay and expense you will take the 100th meridian of west longitude as laid down on the map of the southern boundary of Kansas, or as determined and marked upon the surface of the earth by Messrs. Jones & Brown, surveyors of the Chickasaw and Choctaw boundaries, from observations made by Daniel G. Major, astronomer on the part of the United States, at its intersection with the Northern Creek boundary about midway between the north fork of the Canadian and the Canadian River, or by independent observations, whichever in your judgment from comparison may be found to be the most correct method.

Having connected with or observed for the 100th meridian at its intersection with the Creek boundary as determined by the parties above mentioned, you will proceed as rapidly as possible over the remaining portion of this meridian to Red River, the termination of your field work, making such observations and measurements as you may deem sufficient to verify it.

A duplicate copy of these instructions will be sent to the executive of Texas for his information and concurrence. If, however, the person designated to co-operate with you on the part of the State of Texas should receive instructions from the proper authority conflicting materially with the plan of operations herein specified, or should he propose a different course to be pursued, you will confer freely with him, and adopt such plan as may be mutually agreed upon, provided it does not conflict, in your judgment, with the interests of the United States, and communicate the same to this department for its approval.

As it is indispensable that each government should be furnished with a full and accurate record of the joint proceedings of the commission, they will doubtless instruct their respective officers to keep such record in duplicate. You will therefore keep a faithful record of this character of all your proceedings.

As soon as the boundary shall have been ascertained and marked you will cause a true and accurate map to be made of the country through which it passes in its extent, embracing as much topography of the adjacent country as is possible to obtain, and a duplicate copy of said map certified by the respective commissioners, together with a copy of the field notes, will accompany the records of the proceedings.

Further instructions in regard to the economy and organization of your party will be shortly given you.

I am, sir, respectfully, your ob't servant,

J. THOMPSON,  
*Secretary.*

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No. 3.

EXECUTIVE OFFICE,  
*Austin, July 12th, 1853.*

SIR: The very great interest manifested by many of our citizens in regard to the establishment of the boundary between Texas and the Government of the United States induces me to call your attention to that subject, and to request, if compatible with the views of the Presi-



dent, that the survey be commenced at as early a period during the present year as possible.

Hoping to hear from you on the subject as soon as your convenience will permit, I have the honor to be, very respectfully, your ob't serv't,  
H. R. RUNNELS.

Hon. J. THOMPSON,  
*Sec. Interior.*

(Indorsed:) Rec'd 24 July, '58. Wm. Campbell.

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No. 4.

EXECUTIVE OFFICE,  
*Austin, 28th July, 1858.*

SIR: I have the honor to acknowledge the receipt of yours bearing date July 9th, containing copies of instructions to John H. Clark, commissioner, &c., to run and mark the boundary line between the territories of the United States and the State of Texas.

You are pleased to request to be informed at an early day of the concurrence or non-concurrence in the views expressed, and to solicit any suggestions I may deem proper to make, which I shall now proceed to offer. The place of beginning or initial point of the survey, as designated in your instructions, is not without serious grounds of objection to the State of Texas, because of the large interests of a portion of her citizens in that portion of our territory lying immediately north of Red River, along and adjacent to the supposed boundary line. The immediate, if not chief object of the State of Texas in urging an arrangement with the U. S. Gov't for the early definition of the boundary has been to remove the doubts and uncertainty from the minds of those of her citizens who have invested their rights in that portion of the territory, the title to whose lands must remain suspended in uncertainty until the line has been properly defined and marked by the two governments.

You will perceive from these facts the serious inconvenience, and perhaps loss, that will result from delay in defining that portion of the line north of Red River at the earliest possible time, and of establishing the initial point or place of beginning on the Rio Grande in accordance with your instructions to the U. S. commissioner.

It is plain that persistence in your instructions on this head would not only disappoint the wishes of those directly interested in the settlement of the question, but the just and reasonable expectation that the convenience of Texas would be consulted in taking the necessary steps preliminary to its final adjustment, as it can be of little importance to the gen'l government where operations shall commence, and of so much to Texas. I must, as her representative in the premises, be permitted to insist on such modification of the instructions, in regard to the point of beginning, as will conform to her known interest. I discover no other grounds of objection to the instructions, except as to the precise time of taking the field, which, however, I presume will be adjusted at the convenience of the commissions when fully organized. That of Texas will be organized in a few days, of which you will be notified, with such additional suggestions, if any, as may be deemed important in behalf of this State.

I am, sir, respectfully, your ob't serv't,

H. R. RUNNELS.

Hon. J. THOMPSON,  
*Sec. Interior.*

(Indorsed:) Rec'd 12 Aug., '58. Wm. Campbell.



## No. 5.

DEPARTMENT OF THE INTERIOR,  
Washington, August 17th, 1858.Hon. H. R. RUNNELS,  
*Governor of Texas :*

SIR: I have the honor to acknowledge the receipt of your communication of the 28th ultimo acknowledging the receipt of mine of the 9th ultimo, enclosing copies of instructions to John H. Clark, esq., commissioner, &c., on the part of the United States to run and mark the boundary lines between the territories of the United States and the State of Texas.

I regret that the proposition of this department in reference to the starting point does not meet with your approval, and I respectfully beg leave to present for your consideration some of the leading reasons which induced me to propose commencing on the Rio Grande in preference to the Red River. It was doubtless the intention of Congress in authorizing this survey to have the *entire* lines described in the act accurately determined and marked upon the face of the earth, and a specific appropriation was made to effect this object. In considering this subject with a view to devising a plan of operation which should best subserve the interests of the general government and that of the State of Texas, I was fully aware of the great interests of a portion of the citizens of that State in the establishment of the true boundary north of Red River.

The boundaries now to be run are astronomical lines, requiring for their establishment the most delicate and accurate observations of the heavenly bodies; and for the purpose of making these observations, several months of apparent inactivity will be required before the parties can commence the determination of the lines from the initial points. To insure an accurate determination of any given initial, it is usual to have corresponding observations taken at some one of the old established observatories in this country or Europe, the results computed and sent to parties in the field to enable them to apply the proper correction due to the difference between the true position of the object observed and its position as given in the nautical almanacks. To exchange observations of this character will require several months, and if no such corresponding observations are made, the probable error in a given line of longitude fixed by observations in the field alone will be about three miles.

By commencing on the Rio Grande, therefore, you will readily perceive that a saving of at least six months of time will be effected (which will be equivalent to at least \$20,000 to the United States, and doubtless as much to Texas.) The position of Frontera has been determined by the United States & Mexican Boundary Commission, by combined observations upon the moon at San Eleiario and Frontera, running through a period of seven months, and corrections deduced from corresponding observations made at Cambridge, Mass., and Greenwich, England, have been applied to these results, giving for Frontera, adjacent to the 32d parallel, the most accurate position in longitude yet determined in the interior of the continent. I therefore consider commencing at the Rio Grande paramount to every other consideration, in the view of the extent of the lines, and the importance to both governments of accuracy in their determination.

Another reason which induced me to propose commencing on the Rio Grande is the economy with which these operations can be carried on; 2



less number of wagons, mules, and men will be required, from the fact that supplies can readily be drawn from the Rio Grande from Fort Davis and Fort Chadbourne. The parties can be supplied from either of these sources while operating between the Rio Grande and the 103d meridian; and after the completion of this portion of their work can be reinforced from the same sources with sufficient provisions to enable them to reach the vicinity of the parallel of  $36^{\circ} 30'$ , and from this point they can easily draw supplies from Anton Chico, on the Pecos, or from Fort Union, to enable them to complete their operations in this region, and from thence along the parallel of  $36^{\circ} 30'$  and the 100th meridian to Red River.

There are several other reasons, no less cogent, why it is best, in my opinion, to commence on the Rio Grande, viz, the 32d parallel is more accessible than the 100th meridian, for the reason that the greater part of an outfit can be procured on the Rio Grande, and be put immediately on the line. The climate of winter is milder, forage and grazing for the animals are more accessible and certain.

The principal objections to commencing on Red River are, first, that it will involve a serious delay in fixing the initial point of the 100th meridian, requiring, as I have before stated, several months' careful astronomical observations and an exchange of observations with some fixed observatory. And, besides, by the time the commissions of the respective governments are prepared to commence their labors at that point, that line will probably have been determined and marked by the U. S. surveyors, Messrs. Jones and Brown, who are now engaged upon the surveys of certain boundaries in the Choctaw and Chickasaw country, under the provisions of the treaty of Jan'y 22, 1855. Of the purpose of the United States to cause the 100th meridian, as far north as about the parallel of  $36^{\circ} 20'$ , to be determined and marked, I informed you on the 11th of January last, requesting you to take such steps as you deemed proper for the interest of Texas. The above-named surveyors are provided with a competent astronomer and excellent instruments, and their line will probably require but simple verification on the part of the joint commission; and for all purposes appertaining to the interests of the citizens of Texas along and adjacent to the proposed boundary line north of Red River, Brown and Jones' survey must prove sufficient and satisfactory. If they vary from the true line at all, that variation must prove to be inconsiderable, and in no way detrimental to the interests of Texas, for, so far as fixedness and certainty are concerned, there can be no locations of land, no perfection of titles, until the surveys are officially agreed upon and accepted by both governments. There will, therefore, be no possibility of a "serious inconvenience" or loss arising from delay in defining this portion of the boundary. This line, being established in the manner described, will reduce the labors of the joint commission by more than 100 miles, with a saving of from \$8,000 to \$10,000.

Another objection to commencing on Red River is the large amount of transportation which will be required to transport provisions, &c., for several months' stay in camp, for making observations, and to subsist the parties in their progress as far as the intersection of the parallel of  $36^{\circ} 30'$  with the 103d meridian of longitude, a point accessible from Fort Union or Anton Chico. And, again, were the parties to commence on Red River by the 1st of October they would reach the vicinity of the parallel of  $36^{\circ} 30'$  in midwinter, and be subjected to the rigors of the climate in a region well known to be barren and desolate in the extreme, with little grass for the subsistence of their animals (for the



transportation of a sufficiency of corn would be almost impossible), with water of a gypseous and deleterious character, and with little fuel. In the opinion of this department, based on the opinions of some of its officers, who are well acquainted with the character of the country north of the Canadian River, a surveying campaign in that region in winter would be hazardous in the extreme, if not impossible.

I have briefly stated the principal reasons which prompted me to propose commencing operations on the Rio Grande in the coming autumn. It is of very little consequence to the United States, in itself, as to which portion of the boundaries be first run, and I conceive it to be of as little consequence to Texas in that respect, since the 100th meridian will doubtless have been run and marked before our parties take the field. But, in point of economy and accuracy, I conceive it to be of the greatest importance to both parties interested. By commencing at the Rio Grande the saving in transportation will be about \$20,000, and the saving in time, say six months, will be about \$20,000 more, making an aggregate of \$40,000 saving to the United States, and there will be, of course, a proportionate saving to the treasury of Texas.

In the above views I do not wish to be considered as persisting in the course proposed in the instructions sent you on the 9th ult. I am actuated by no other motive than a desire to accomplish the object authorized by the act of Congress in the most accurate, rapid, and economical manner; and I indulge the hope that upon a careful reconsideration of the case all its bearings you will be prepared to adopt my views in regard to the starting point.

The commissioner on the part of the United States will be provided with complete duplicate sets of surveying instruments, one of which your commissioner is at liberty to use, and a complete set of astronomical instruments, which may be used by both parties to advantage.

In order to economize time and to have a more perfect understanding, this communication I have entrusted to Mr. Clark, commissioner, &c., on the part of the U. S., to place in your hands. Mr. Clark will be able to elucidate more fully the views herein expressed.

I am, sir, respectfully, yr. obt. servant,

J. THOMPSON,  
*Secretary.*

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No. 6.

SAN ANTONIO, TEXAS, *Sept. 8th, 1858.*

Hon. JACOB THOMPSON,  
*Secretary of Interior:*

SIR: By letter of the 4th inst. from Austin I informed you of my purpose of coming to San Antonio to consult the com'r. I took the opportunity which presented itself of accompanying Governor Runnels, so as to have both him & the commissioner a party to any arrangement agreed upon. They have concluded to adopt our plan of operations throughout, and I have fixed on some time during the 1st week of Nov. for leaving San Antonio.

The mules and wagons are already bargained for, and I will have an ambulance and wagon at Indianola about the 15th October to transport the assistants & instruments to this point. This is ample time, if they leave Washington immediately on the receipt of this letter.

It will require about fifteen thousand (15,000) dollars to make the outfit, and I request that this amount, exclusive of what may be neces-



sary to pay for the instruments & the placing of the assistants in the field, be put to my credit at New Orleans.

I beg leave to call your attention to my letter of Aug. 5th to you, asking for an escort, an order to sell me arms & tents at this place, & subsistence at the various posts along our line of march & survey. The escort can be dispensed with till we commence work, though an attack & loss of mules is to be apprehended between here and El Paso. I shall have but little difficulty in securing an outfit of wagons and mules. The cost will, however, be rather heavy. The item of corn was not estimated for, which, in consequence of taking the field at this season, will be very considerable.

In addition to the appointments of Messrs. Weyss, Campbell, & Emory I request that Jas. McLeod, of Georgetown, D. C., be appointed asst. at a rate of pay not exceeding \$50 per month, & one ration per day. He is the only one of the three young you referred to me that I believe will be of service.

I have the honor to be, respectfully, yr. obt. ser<sup>nt</sup>,

JOHN H. CLARK,

*Com'r.*

(Indorsed:) Rec'd Sep. 22d, 1858.

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No. 7.

U. S. & Tex. Boundary.

John H. Clark, Camp on Pecos, Texas, May 12, 1859, reports the withdrawal of Mr. Scurry, Texas com'r, and his party from the field, and the difficulty between the U. S. & Texas surveyors, and encloses copies of their correspondence in relation to the same.

Rec'd 6 June, '59.

Wm. Campbell.

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[Envelope.]

(On the upper left-hand corner:) Official business.

(On the upper right-hand corner:) Fort Belknap, Tex., free, May 19, 1859.

(On the left margin:) Per Overland Mail Route.

(Address:) Hon. Jacob Thompson, Secretary of the Interior, Washington City, D. C.

CAMP ON THE PECOS, May 12, 1859.

Hon. JACOB THOMPSON,  
*Secretary of Interior :*

SIR: I have to report that we discovered water near the corner, the intersection of the 32d parallel & the 103d meridian, & will proceed at once to finish the 32d parallel & run the line to the northward more than half way through the centre of the Llano, which will easily enable us to connect it from the other side; if, then, no other available water be found, I shall carry out that part of my instructions which direct me up the Pecos, & take up the line on the Canadian or at the intersection of the 103d meridian & the parallel of 36° 30'.

The main body of the escort & of my camp remains on the Pecos; if the "overland mail route" is not changed along this portion of it, which



is contemplated, before my return, I will then send in a map & notes of the boundary not heretofore reported. It is impossible for me to indicate to the department any other point of communication with me hereafter than Fort Union; and I hope it will not be necessary for me to depart even that far from the line.

I have further to report that the Texas com'r informs me (a copy of his letter is inclosed marked A) of the withdrawal of his party from the field. As an answer for the reason of his course there assigned, I inclose copies of two letters, marked B, that passed between Mr. Mills, surveyor *pro tem.* on the part of Texas, & Mr. Weyss. After the difficulty between Mr. Mills & Mr. Weyss, Mr. Scurry, the Texas com'r, came out to this camp on a mail-coach, & put this question to me in writing: *Whether it was my intention to discontinue the survey as agreed upon?* The only agreement on this point will be found in the journal of proceedings Jan. 3d, '59, where we state that the survey shall be in "conjunction," & declare that separate surveys are unnecessary; now the surveying was actually done in this manner: Mr. Weyss did all the work, & Mr. Mills looked on, & took a copy of his notes. I answered the above question; but it being considered evasive, I replied the second time as follows: "It has not been & is not now my intention to discontinue the joint survey as agreed upon between us in any particular. I am free to say, however, that I regard it as impossible for Mr. Mills & Mr. Weyss to act together efficiently in the manner pursued heretofore, since the difficulty between them at the last monument which you have pleased to treat as partly official & partly personal. I will, if you wish, upon your requisition & receipt, turn over to you such instruments as may be necessary with the view of having each party do its own surveying, or I will receive & duly consider any propositions you may think proper to make." To this Mr. Scurry made no response except what is contained in the letter inclosed, marked A, & already referred to.

I deem it unnecessary to annoy the Secretary with a complete history of this affair, confining myself to the single point, or pretext as it really is, which Mr. Scurry has tried to make against me in order to cover his own negligence & indifference to the survey. If complaints are made, I hope the Secretary will do me the justice to give me a personal hearing before he makes a decision. I can show that Mr. Scurry was never near the works, except on two occasions, when he was forced out of El Paso by the disorganized state of his party; that he engaged in private business at El Paso to the neglect of business that it was his duty to perform with me; that I had to give his surveyor transportation at the expense of my work on the line; that our party has done almost the whole of the work; that his surveyor resigned because he (Mr. Scurry, the com'r) neglected to supply his party with rations; that he appointed a Mr. Mills *pro tem.* who ignored me as chief of the party & who was entirely deficient as to the duties of his position; & that when it was clear Mr. Mills & Mr. Weyss could not get along together to any purpose, he sought it as an excuse for withdrawing his party (as he had previously himself) from the commission, instead of responding to my offer to have each party do its own surveying, which was the proper course for a joint survey to pursue, or else what was the object of two parties being in the field?

The difficulty between Mr. Weyss and Mr. Mills was merely a personal quarrel, & it is simply a ridiculous view in Mr. Scurry to make it a pretext for withdrawing his party from the field. I believe the real reason for Mr. Scurry's abandonment of the field will be found in the fact that he came out with the view of locating land; but not being



able to make a fortune out of it, as he expected and frequently expressed, he has no longer any object to continue on the line.

I remain, respectfully, y'r ob't servant,

JOHN H. CLARK,  
U. S. Com'r, &c., Tex's Bdr. Survey.

A.

IN CAMP ON PECOS, *May 11th*, 1859.

SIR: Your declaration, made verbally to me on yesterday, that Mr. Weyss, the U. S. surveyor, *would not continue* the survey of the Texas boundary conjointly, as heretofore, with the Texas surveyor, renders a compliance with the terms of the agreement between us as the representatives of our respective governments impossible; that agreement is, therefore, terminated by the act of the U. S. surveyor in refusing to comply with the terms of an express agreement entered into by the U. S. commissioner. Without commenting upon the singularity of a subordinate officer of your commission assuming to violate an agreement made by his chief, I shall content myself with a protest against such violation, as that agreement was one of the conditions upon which Texas consented to commence on the Rio Grande.

It only remains for me to announce to you officially that, under the circumstances, the Texas commission will not proceed with the survey from this point.

I am, very respectfully, your ob't serv't,

WM. R. SCURVY,  
Texas Com'r.

JOHN H. CLARK, Esq.,  
Com'r, &c., &c., Tex. B'd'g Survey.

B.

CAMP ON THE PECOS, *May 8th*, 1859.

Mr. JOHN E. WEYSS:

SIR: I demand that you state to me in writing whether you did not make the following statement, in substance, to me at our last interview on the plains:

"I refuse to continue the survey any farther with you. My commissioner, John H. Clark, has instructed me to have nothing further to do with you; address yourself to him. The reason of my breaking my promise to see you and let you know my propositions for further operations on my arrival in Mr. Clark's camp was his direction to me not to cross the river to see you and his refusal on my request to do so himself."

Yours, &c.,

ANSON MILLS.

B.

CAMP ON THE PECOS, *May 9*, 1859.

SIR: To your note of yesterday I make the following reply: I would have taken little notice of your imperative "demand" at all, if not Mr.



U. S. Commissioner Clark's name appeared in the note, and, as he is closely connected with the index of it, I owe it, therefore, to him to give a full statement of what has happened between us.

You seem to be endowed with a great faculty to misconceive, misapprehend, and misunderstand everything. You take expressions which I have used in conversation at different times under different circumstances, garble them together, make one long speech out of it, and finally condense it to a thing which you are pleased to term the "*substance*" of a late interview, and then having the thing fitted to your purposes "demand" a written statement (you mean, perhaps, yes or no) to that prepared "*substance.*" That won't do.

As much as I can gather from your somewhat confused letter, it appears to me that it contains the charges that I 1st made a formal promise to you to come over the river and acquaint you with certain propositions concerning the survey.

2d. That to excuse my breach of promise I stated to you that by order of the Com'r Clark I failed to do it.

3d. That my final determination not to have longer any personal connection with you was also created by Mr. Clark's direction or order.

To this confusion of things you "demand" me to make a statement. It seems to me that in a very few days you have entirely forgotten in what connection the incidents happened by which that rupture between us was produced, the circumstances under which I used somewhat similar expressions, as you make me do in our "last interview," and which, brought in proper connection with time and incidents, will sound and appear quite different from those in your "*substance.*"

In the first place, I had never a really official connection with you. I informed you when you came first to see me for the purpose of making arrangements concerning the survey that I had neither power nor authority to enter into agreements of that kind with you, and that the U. S. commissioner, J. H. Clark, was the proper person with whom you had or could make such arrangements; my duty and occupation being only to assist Mr. Clark in the running of the boundary line, execute his orders, and act under his instructions. You refused positively to treat with Mr. Clark, declaring that you had nothing to do with him and would have nothing to do with him. At your request, as you declared not to be willing to speak to Mr. Clark, at your request, I went finally to him to ask in your name about his opinion and instructions for the further joint proceedings of the survey. Mr. Clark's answer was verbal, that he had no objection whatever to your going along with me, if I could agree with you, but that, as far as myself was concerned, he expected that, under all circumstances, *I had to carry on the survey according to his instructions and orders.* So we became connected, personally only, and for as long as we could agree, because Mr. Clark by consenting to your going along with me did not authorize me to make arrangements and treaties with you which might, perhaps, have been adversely to his views, and if you had anything to propose it was always necessary to subject it to Mr. Clark's approbation and consent before I could have agreed to it. In this way we only were connected. And now to your charges and assertions. When I had reached the last flag, 30 miles east of Pecos, I declared it time to make a reconnoissance to the east to inspect the corner and find out how possible it would be to carry out the survey to it. I proposed the scout; you wanted to accompany me, and I, of course, had no objections to it. I run the line with the compass as far as the corner, and then we began our search for water, in which we were unsuccessful. After having reconnoitered



the whole line and finding no water on or near the corner, I expressed my opinion that I considered it exceedingly difficult, if not impossible, at all to reach the corner by triangulation.

Then you asked me what I proposed to do. I told you my plan to run the remainder of the line by compass, sextant, &c., but declared at once to you that, so far, this only was a plan of my own; that my instructions from the U. S. commissioner required me to run the line out by triangulation, and that as I found that modus operandi impossible I could not on my own responsibility substitute anything else for it; that I only could report the state of things to the commissioner and submit a new plan; in fact, that I could not do anything before I had reported to the commissioner and received new instructions. You admitted all that as proper and true. In coming to our depot camp you prepared to start for the river, and I, having no animal to ride, began to make a report in writing to the commissioner, *of which you are well aware, because you not only saw me write, but I beg'd you, as I did not intend to go myself to the river, to take my letter along to the commissioner, which you consented to do.*

It appears clearly from these facts that I did not intend at all to go to the river; that you knew it (as you consented to carry my letter), and that therefore I never could have contemplated or made to you the "promise" to come over the river to see you, &c. It seems that your mistake concerning that "promise" arose from the following remark which I made in the course of our conversation after we arrived in camp. I remarked that "if I had a riding animal I would go myself to Mr. Clark's camp, as such sort of business is much easier settled by a verbal report than by long letters;" to which you answered me in these very words: "*I wish to God you would come in yourself; you know I don't want to speak to Mr. Clark and he does want to speak to me, and if you don't come in I will not know anything.*" &c. *To this I replied, Oh! well, you will hear it in some way or other.*

How out of these facts you can make a promise on my part to come over the river to see you, &c., I can scarcely see, and if you really believed so, then you have been laboring under a strange mistake. The first point I hope is settled.

2d. Not having quite finished my letter to Com'r Clark when you left, and having no other opportunity (the men, as you know, having all been sent away). I was obliged to wait until next morning, and then the only opportunity was the water wagon. Then I determined to go in myself, settle the business, and return with the next outgoing wagon to my camp. I reached Mr. Clark's camp at 1½ p. m. I reported to Mr. Clark what I had seen and what I proposed for the future continuation of the survey. Mr. Clark, after hearing my statement, concluded *to go out himself, see about the matter, &c., and reserved his final decision, on new instructions to me, till he would have examined the unfinished part of the line himself.*

These facts again show that even if I had given you a promise (which I have already proved I never did) to report or make known to you the further intended operations, I had at that time nothing to communicate to you, Mr. Clark reserving his opinion and further instructions till he had examined the line himself. The proposed trip of Mr. Clark to the corner was entirely a private concern of his own. I mentioned that you very likely expected to be invited to this trip. Nobody seemed inclined to invite you or request your company, and, seeing this feeling, I naturally dropped the matter, leaving it to the commissioner, who went out on the scout, to invite you or not, as he thought proper, and I had no



longer anything to do with it. He found it proper not to invite you. How can you attach blame to me for the neglect?

How, after having so often declared that you wanted to have nothing to do with Mr. Clark, how could you expect that he would invite you, or did you report or invite Mr. Clark or me when you went out on your scouts? Whatever may be the case, I had nothing to do with it. The excursion was the commissioner's and it rested with him to invite or not to invite the persons he saw proper, and no offence toward you was or could have been intended by me if you were left behind. I left Mr. Clark's camp after about half hour's stay, and returned to my own in the night. Before I left, Mr. Clark charged me to erect a monument opposite the depot camp, and as soon as it was done to send the men and animals to the river, as they were not longer wanted out there at present. I had early next morning, according to Mr. Clark's instructions, the monument erected and men and animals sent in. The monument was scarcely finished when you appeared, and the first I heard, you still sitting on your mule, were the following expressions:

*"God damn you, sir; you are a God damned liar; you are a damned Dutchman; you never was nor is a gentleman; you God damned foreigner,"* &c., and more such civil and courteous expressions; at the same time and with the same language ordering me to pull down at once the monument, it being erected without your permission (meaning the monument which I had erected in the morning by and under orders of the U. S. commissioner). Scarcely was I able to find out between your cursing what was the real reason of your strange behaviour, and learning finally that the only cause was your not having been invited to Mr. Clark's scout, I repudiated any intentional offence by declaring that I had charged the other gentlemen to invite you if they found you, and if they failed I had nothing to do with it. To this you asked, *"Well, then, why did they fail?"* and then by this time, under your continued blaspheming, necessarily excited, *then I answered you, "Because they don't want to have anything to do with you, neither will I have longer anything to do with you."* After having cooled down a little you came forward with a written agreement, asking my signature to it. Without entering into the merits of your proposed agreement now, I can only here again express my astonishment how, after such a scene, having abused and cursed me without any cause in the grossest manner possible; how, after all that, you can come forward and invoke my aid and assistance to help you to carry along the survey.

*Then I declared that after what had happened I could not have longer any personal connection with you, and that from that moment I refused all further connection with you, and told you that if you had to make any further communications concerning the survey you must address yourself in future to Mr. J. H. Clark, U. S. com'r, chief surveyor, &c.*

After that, you again asked me if I had not told you formerly that Mr. Clark had left the matter (our working together) to me. I repeated what I have already mentioned in the beginning of this statement concerning our connection.

Even after this reiterated declaration on my side, you insisted to have my signature to your proposal either consenting or stating my objections. I finally, to end the whole disagreeable scene, I put the following words, I believe, under it: *"Sir, I have to make with you no arrangements concerning the survey of the boundary line; if you have to make any communications of that kind, address yourself to the U. S. com'r, J. H. Clark."* This is not only the "substance" but the full statement of the whole disagreeable affair. You will find in it nearly all the same expressions



which you give in your "substance" of our last interview, only in quite different connection, not as you please to file them together, but as they really happened.

You have insulted me in the grossest possible manner without any cause whatever. This statement of the facts shows clearly that you had no reason to any complaint whatever against me, but you misunderstood or misconstrued everything which happened. That, coming out to camp, instead of asking an explanation if you felt yourself injured or wronged, you used at once such language toward me which you knew very well would any further a connected work between us make a matter of impossibility. Your behaviour was not of a man who feels himself badly treated or injured, but it was that of a man who wanted to raise a quarrel by all means. This is my impression. You had no reason to treat me as you did, if it was really you will to carry on the survey with me together. But I believe that you wanted to split the concern for some reason or other, and wanted some pretext for it. However, this is only my private opinion.

You know very well that the origin of the differences in the two commissions is not with me. I was far away when the first bad feeling was created. I have nothing to do with your quarrels, official correspondences, statements, &c. I want to have done with this, and in future nothing to do again, and now two questions to you and I have done: 1st. Why, after having so repeatedly informed you that not myself but Mr. J. H. Clark is the com'r, chief astron'r, & surveyor, that he is the only person with whom you can make treaties and arrangements, why do you all the time insist on only communicating with me and ignore him? 2d. Why, after insulting me in the manner you did, damning and cursing me, why do you still insist to survey with me together if you are able to do it alone? Why don't you take your instrument, run and fix the line, and finally compare the result with the work of the U. S. commission? This is the only proper way to do it; all that what you proposed to me did not amount to anything.

I hope that here our correspondence will end, I having neither time nor inclination to continue it. I have finally to inform you that as well in your letter as in mine the name of Mr. Com'r Clark so often appears, I found it proper to furnish to him a copy of your letter and my answer to it.

JOHN E. WEYSS.

ANSON MILLS, Esq.

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No. 8.

CAMP ON THE PECOS, *June 3, 1859.*

Hon. JACOB THOMPSON.

*Secretary of Interior:*

SIR: I avail myself of the opportunity presented by Lt. Lazelle, commanding escort, to make a brief report. I have just returned to the Pecos from the establishment of the corner & the tracing of the 103d meridian, about 40 miles. I inclose a copy of observations made near the corner, & a sketch, which, with those already sent in, show the determination and tracing of the line as far as completed, a distance of about 250 miles. As soon as the escort communicates with Fort Bliss.

which will take but a few days, I hope, I shall go on up the Pecos, carrying out offsets to the line occasionally.

I have the honor to be, respectfully, yr. obdt. svt.,

JOHN H. CLARK,  
Com'r, &c., Trs. Bdy. Surrey.

(Indorsed:) Rec'd 24 June, '59. Mr. Campbell.

(Copy.)

*Zenith telescope observations to determine latitude of monument at intersection of 103d meridian by 32d parallel of north lat., by John H. Clark, com'r, &c., assisted by Hugh Campbell, principal assist. astronomer, U. S. & Tex. Bound. S'r'y.*

MAY 17TH, 1859.

No. of star.	N. or S.	Mag.	Micr. readings.	Level readings.	No. of star.	N. or S.	Mag.	Micr. readings.	Level readings.
3910	N.	6	19 75	N. 65.5 S. 79	4797	N.	6	16 27.5	N. 76 S. 80
3953	N.	6	28 11.5	N. 70 S. 76	4809	N.	6	25 06	N. 77 S. 81
G. c. 969	N.	4	17 55.5	N. 57 S. 91	4873	N.	4 1/2	31 86	N. 74 S. 84
B. Leonis	N.	2 1/2	15 17.5	N. 65 S. 83	G. c. 1195	N.	6 1/2	15 34.5	N. 75.5 S. 83.5
4066	N.	6	16 28	N. 77.5 S. 73	5000	N.	6 1/2	30 10.5	N. 76 S. 88
G. c. 1699	N.	5	30 92	N. 78 S. 76	5056	N.	3 1/2	17 85	N. 76 S. 88
4212	N.	6 1/2	19 21	N. 74.5 S. 81	5061	N.	6	18 18	N. 76 S. 88
G. c. 1015	N.	4	27 89.5	N. 80.5 S. 75	5072	N.	5 1/2	14 52.5	N. 85 S. 79
G. c. 1025	N.	6	22 40.5	N. 68.5 S. 89.5	5075	N.	5 1/2	29 47	N. 76 S. 87
4318	N.	7	27 20	N. 68 S. 82	5252	N.	4 1/2	31 80	N. 74 S. 90.5
4362	N.	6	20 14.5	N. 73 S. 83	5271	N.	6	16 26	N. 74 S. 90.5
4389	N.	6	23 14.5	N. 73 S. 83	5338	N.	5	24 95	N. 73 S. 91
4467	N.	6 1/2	17 32	N. 70 S. 84	5367	N.	5 1/2	18 83	N. 71 S. 94
4566	N.	6	24 88.5	N. 66 S. 87	5376	N.	6 1/2	27 40	N. 71 S. 93.5
4699	N.	5 1/2	2 59	N. 65 S. 91	5432	N.	6	26 78	N. 71 S. 93.5
4731	N.	6	28 63	N. 65 S. 91	5440	N.	6 1/2	13 23	N. 71 S. 93.5
				Relevelled.					

MAY 18, 1859.

3910	N.	6	22 12	N. 77 S. 93	5061	N.	6	18 95.5	N. 101.5 S. 86.5
3953	N.	6	30 46.5	N. 67.5 S. 105.5	5072	N.	5 1/2	15 01.5	N. 104 S. 83
G. c. 969	N.	4	25 13.5	Relevelled.	G. c. 1245	N.	5 1/2	30 13.5	N. 104 S. 83
B. Leonis	N.	2 1/2	23 34.5	N. 106 S. 68	5085	N.	5 1/2	26 51	N. 103 S. 84
4066	N.	6	15 42.5	Relevelled.	5113	N.	6	17 53.5	N. 103.5 S. 82
G. c. 999	N.	5	30 06.5	N. 90 S. 88	5178	N.	5	26 54.5	N. 106 S. 82
4212	N.	6 1/2	20 54	N. 90 S. 88	5192	N.	5	20 02.5	N. 106 S. 82
G. c. 1015	N.	4	29 18	N. 91 S. 93	5252	N.	4 1/2	31 37	N. 98 S. 98
G. c. 1025	N.	6	23 72	N. 101 S. 85	5271	N.	6	15 79.5	N. 92 S. 96
4318	N.	7	28 74.5	N. 95 S. 91	G. c. 1322	N.	5	25 41	N. 96.5 S. 92
4362	N.	6	21 29.5	N. 94 S. 92	5367	N.	5 1/2	19 46	N. 97 S. 92
4389	N.	6	24 17	N. 94 S. 92	5376	N.	6 1/2	28 00	N. 98 S. 91
4393	N.	6	30 55.5	N. 94 S. 91	5432	N.	6	28 83.5	N. 98 S. 91
4457	N.	6 1/2	18 50.5	N. 94 S. 91	5440	N.	6 1/2	15 54	N. 98 S. 91
4676	N.	7	28 30	N. 101.5 S. 81	5473	N.	6	20 80.5	N. 104 S. 84
4694	N.	7	18 41	N. 102 S. 81	5484	N.	6	25 03	N. 104 S. 84
4699	N.	5 1/2	21 68.5	N. 109.5 S. 74	5515	N.	7 1/2	26 30.5	N. 103 S. 86
4731	N.	6	29 22.5	N. 109.5 S. 74	5541	N.	6	18 13.5	N. 106 S. 84
4917	N.	7	21 34.5	N. 102 S. 84					Relevelled.
G. c. 1205	N.	6	24 31	N. 101 S. 85	5602	N.	6 1/2	31 41.5	N. 96.5 S. 93
5000	N.	6 1/2	30 71	N. 101 S. 85	5615	N.	6	31 27.5	N. 96 S. 93
G. c. 1234	N.	3 1/2	18 36	N. 101.5 S. 86.5	5652	N.	6 1/2	24 07	N. 98 S. 91
					5686	N.	5	15 39	N. 98 S. 91
					5747	N.	5	23 00	N. 102 S. 86



## Zenith telescope observations—Continued.

MAY 20TH, 1859.

No. of star.	N. or S.	Mag.	Micr. readings.	Level readings.	No. of star.	N. or S.	Mag.	Micr. readings.	Level readings.
3910	N.	6	20 07.5	N. 77 S. 83	G. c. 1195	N.	6½	10 61	N. 88 S. 86.5
3953	N.	6	28 33.5	N. 77 S. 83	4017	N.	7	17 84.5	N. 90 S. 86.5
G. c. 969	N.	2½	30 29	N. 78 S. 82	G. c. 1205	N.	6	20 76.5	N. 86.5 S. 86
B. Leonis	N.	4	28 13.5	N. 77 S. 83	G. c. 1234	N.	3½	14 90.5	N. 93 S. 85.5
4212	N.	6½	16 28	N. 81 S. 89.5	5061	N.	6	15 43	N. 93 S. 85
G. c. 1015	N.	4	25 11.5	N. 82 S. 89.5	5072	N.	5½	11 50	N. 93.5 S. 84.5
1025	N.	6	16 27.5	N. 81.5 S. 90	G. c. 1245	N.	5½	26 60	N. 93.5 S. 84.5
4318	N.	7	21 24.5	N. 83 S. 91	5085	N.	5½	22 63	N. 91.5 S. 85.5
4362	N.	6	16 75	N. 83 S. 93.5	5113	N.	6	13 79	N. 92.5 S. 85.5
4389	N.	6	19 71	N. 83 S. 93	51178	N.	5	19 64	N. 94.5 S. 86.5
4467	N.	6½	16 09	N. 83 S. 92	5192	N.	5	12 98	N. 94.5 S. 86.5
4560	N.	6	23 74	N. 85 S. 91	5252	N.	4½	27 76	N. 93.5 S. 85.5
4701	N.	6	28 26	N. 85 S. 87	5271	N.	6	12 00.5	N. 93.5 S. 85
4721	N.	5½	16 57.5	N. 86.5 S. 85.5	5338	N.	5	21 68	N. 93 S. 85.5
4797	N.	6	13 14.5	N. 85 S. 87	5367	N.	5½	15 77	N. 95 S. 84.5
4809	N.	6	22 38	N. 85 S. 87	5376	N.	6½	24 41	N. 95 S. 84.5
4873	N.	4½	27 27.5	N. 88 S. 86.5					

MAY 21ST, 1859.

G. c. 969	N.	4½	18 02.5	N. 90 S. 77	4390	S.	4	27 13.5	N. 81 S. 87
B. Leonis	N.	2½	16 05	N. 90 S. 77	4393	S.	6	23 35	
				Reveled.	4457	N.	6½	11 41	N. 78 S. 86.5
4066	N.	6	8 55	N. 85 S. 81	4690	N.	5½	15 57.5	N. 78 S. 82
G. c. 999	N.	5	23 32	N. 80 S. 86	4731	S.	6	22 72.5	N. 78 S. 82
4212	N.	6½	12 88.5	N. 79 S. 87					Reveled.
G. c. 1015	N.	4	21 60	N. 82 S. 85	4797	N.	6	13 95.5	N. 86 S. 86
1025	N.	6	14 74.5	N. 82 S. 85.5	4809	N.	6	23 19.5	N. 86 S. 86
4318	N.	7	19 75.5	N. 81 S. 87	4873	N.	4½	26 03	N. 86 S. 86
4362	N.	6	22 10	N. 81 S. 87	G. c. 1195	N.	6½	09 37.5	N. 86 S. 86
4389	N.	6	25 05	N. 82 S. 85.5					

## No. 9.

## CAMP IN THE CREEK NATION,

Near North Fork Town, Oct. 27, 1859.

Hon. JACOB THOMPSON,

Secretary of Interior:

SIR: I arrived at Rabbit Ear Creek from Ft. Union the 3d of August, and proceeded at once to establish the northwest corner of the boundary, which was done by transfer from the Kansas line as to longitude, the result of independent observations being used for the latitude. A lunation was also observed with the view of serving as a check on the accuracy of the transfer.

After the establishment and marking of the corner, the 103d meridian was taken up and surveyed across the Canadian and to a point on the Llano Estacado south of the 34th parallel, a distance with the survey from the Kansas boundary of about 240 miles. Having thus traced the line as far out on the staked plain as I believe there is any practical necessity for in connection with what was done from the south, I was compelled from the lateness of the season to suspend further operations and come into winter quarters.

Had I not been forced to quit the line on the south from physical causes, come up the Pecos, and then travel 600 miles for winter quarters, I could easily have completed the survey of all that part of the boundary covered by my instructions this season, despite the many moral obstacles against which I had to contend at every step. This fact is made evident from the statement of the work done and inclosed herein, show-

ing more than 3,000 astronomical observations and the survey of about 850 miles, 450 of which is a triangulation on the line proper. The amount and quality of this work will compare most favorably with what is & has been done on similar surveys.

I shall, on arriving near Ft. Smith, reduce the commission, and thus cut off all unnecessary expenses; and then there will be enough of the appropriation left to run the small part of the boundary yet unfinished. As soon as this reduction is accomplished and the property safely disposed of I will go to Washington for the purpose of reporting in person the affairs of the commission.

I am, sir, respectfully, your ob'd't serv't,

JOHN H. CLARK,  
Com'r, &c., U. S. & T.x's B'd'y Survey.

(Indorsed :) Rec'd 9 Nov., '59.  
Mr. Campbell.

A SUMMARY OF THE WORK DONE IN SURVEYING THE TEXAS BOUNDARY DURING THE SEASON OF 1859, BY THE UNITED STATES COMMISSION.

*No. of stations astronomically determined during the season of 1859.*

No. of station.	Name of station.	Instruments used at station.	No. of observations.
1	Initial point on Rio Grande	Zenith tel. & sext	322
2	Crow Spring	" " "	155
3	Independence Spring	" " "	90
4 & 5	Camps on Pecos River & mouth of Delaware Creek.	" " "	191
6	Camp on Pecos River	Transit inst.	861
7	Intersect 32d parall. & 103d merid	Zenith tel. & sext	124
8	103d meridian	Sextant	36
9	103d meridian	"	28
10	Camp on Guadalupe Creek	"	40
11	4th camp on Pecos River	"	25
12	6th camp on Pecos River	"	25
13	7th camp on Pecos River	"	27
14	8th camp on Pecos River	"	20
15	12th camp on Pecos River	"	30
16	13th camp on " "	"	31
17	16th camp on " "	"	37
18	17th camp on " "	"	39
19	18th camp on " "	"	32
20	Cañada of San Juan	"	32
21	Alamo gordo	"	29
22	Agua Negra	"	28
23	Camp on Whipple's road	"	25
24	Camp between Parker's & Hache's ranches	"	33
25	Rabbit Ear Creek	Zenith telescope	114
26	"	Transit inst.	568
27	Camp on 103d meridian (going south)	Theodolite	8
28	" on 103d. Sept. 14th	Sextant	30
29	" " " 15th	"	39
30	" " " 17th	"	33
31	" " " 19th	"	37
32	" " " 20th	"	33
Total No. of astron'l obs			3,122
No. of astron'l stations			32

*Distances surveyed during the season of 1859, from January 15th to September 21st.*

	Miles.
Frontier to initial point of boundary (triangulation)	11
Initial point on 32d parallel to its intersection with 103d meridian (triang'n)	211
On 103d meridian north (triangulation)	70
survey north on Pecos River, triang'n sextant viameter, chain, and compass	317
Transfer of longitude from Kansas boundary to observatory on Rabbit Ear Creek (triang'n)	30



Azimuth line connecting observat'y & init. point 36° 30' (triangulation).....	8
On 103d meridian south (triangulation) .....	29
(Returned), survey on perpendicular, west (triangulation).....	8
On 103d meridian again south (triangulation) .....	9
On perpendicular east (triangulation).....	8
Continued survey on 103d merid. south (triangulation) .....	111
To sand hills on Llano Estacado 103d merid .....	35
Miles .....	847
Total No. of ast. obs .....	3, 122
Total No. of miles surveyed .....	847

JOHN H. CLARK,  
U. S. Com'r, &c., Tex. B'd'y Survey.

No. 10.

DEPARTMENT OF THE INTERIOR,  
Washington, D. C., March 19, 1860.

Hon. SAM HOUSTON,  
Governor of Texas, Austin, Texas:

SIR: I have the honor to inform you that the commissioner on the part of the United States, under the act of June 5, 1858, for running and marking the boundary lines between the Territories of the United States and the State of Texas, will resume operations this spring, and expects to leave Fort Arbuckle on or about the 10th of May next, and I would respectfully suggest that the commissioner on the part of Texas be directed to proceed to that place for co-operation at the time above specified.

I am, sir, respectfully, your ob'd't servant,

J. THOMPSON,  
Secretary.

No. 11.

EXECUTIVE DEPARTMENT,  
Austin, April 16, 1860.

Hon. JACOB THOMPSON,  
Secretary of Interior:

SIR: Your letter dated March 19 has just come to hand.

It having been delayed on the route from here to Washington, it will be impossible for the Texas commission to reach Fort Arbuckle by the time proposed. Every endeavor will be used to hasten its departure, and I trust no serious delay will occur.

I have the honor to be, very respectfully, yours,

SAM HOUSTON.

(Indorsed :) Rec'd 30 Ap'l, '60, W. W. Campbell.



No 12.

SANTA FE TRAIL, N. M., July 16, 1860.

Hon. JACOB THOMPSON,  
Secretary of the Interior :

SIR: I have finished the survey and demarkation of that part of the 100th meridian forming the boundary of Texas not covered by Messrs. Jones and Brown's survey, and of the parallel of 36° 30' N. from its intersection with the 100th meridian to that of the 103d. The character of the determination and the method of running and marking this portion of the boundary is reserved for a future report. This completes the field work of the boundary, except the small part of the 103d meridian lying in the center of the staked plain and heretofore reported. I purpose running out and marking the arc that remains (about 50') of this meridian on my return.

Inclosed are copies in part of the astronomical observations, the N. west corner being established last season, for determining the parallel of 36° 30' and a rough sketch of this part of the line; also observations with a sextant for determining the position in latitude of Fort Cobb.

I shall, unless otherwise instructed, dispose of all the public property as soon after my arrival at Fort Smith as I may deem best for the interests of the government, and disband the commission. To accomplish this object I shall want about \$5,000 (five thousand) in addition to what I have on hand, and what may come from the sale of the property.

I am, sir, respectfully yours, &c.,

JOHN H. CLARK,  
U. S. Com'r, &c., Tr's B'd'y Survey.

(Indorsed:) Rec'd 20 Aug., '60, W. W. Campbell.

A.

*Incidental expenses of Texas boundary commission from its organization in the year 1858 up to Sept. 1st, 1861.*

To whom paid.	Nature of expenditure.	Amount.	
		Dollars.	Cents.
J. W. Padgett & Co.....	Observing tent .....	82	15
C. Alexander.....	Printing, binding, &c.....	9	75
G. T. Howard.....	Wagons & other equipments.....	1,980	00
L. Maxey.....	One mule.....	65	00
Wake Bryarly.....	Medical attendance & med.....	10	00
H. B. Adams.....	One horse.....	80	00
Geo. T. Howard.....	Mules & bell mare.....	5,055	00
— Batnaz.....	Herding.....	10	00
R. H. K. Whitely.....	Arms and ammunition.....	394	94
Charles Hummel.....	Arms and ammunition.....	81	75
B. La Coste.....	Dissicated vegetables.....	84	00
A. P. Tibbits.....	Ambulance.....	350	00
W. P. Clark.....	Transportation.....	139	27
Hugh Campbell.....	Transportation.....	147	35
John E. Weiss.....	Transportation.....	139	27
Jas. M. McLeod.....	Transportation.....	137	12
L. W. Emory.....	Transportation inst's.....	78	27
E. E. McLean.....	Tents.....	67	20
L. W. Emory.....	Transportation.....	151	27

*Incidental expenses of Texas boundary commission, &c.—Continued.*

To whom paid.	Nature of expenditure.	Amount.	
		Dollars.	Cents.
Jno. Periti.....	Blacksmith work.....	110	75
Reed & Co.....	Medicines.....	91	50
Jno. H. Clark.....	Transportation & board.....	249	50
Rice & Childers.....	Harness, saddles, &c.....	832	40
Geor. T. Howard.....	Wagons & ambulance.....	559	00
F. Volkerath.....	Repairs.....	26	25
B. R. Sappington.....	Blacksmithing and stabling.....	267	00
Howard & Ogden.....	Payment of bills.....	396	25
Howard & Ogden.....	Provisions, camp equipage.....	2,876	21
Jno. Vance.....	Corn, beef, &c.....	36	50
Joseph Ney.....	Corn.....	22	00
A. Zimmerman.....	Corn & blacksmithing.....	101	00
D. E. Tessier.....	Corn, beef, & sacks.....	202	25
Lieut. Dye.....	Beef.....	53	46
J. G. Taylor.....	Corn.....	42	50
Lewis Dutton.....	Corn, &c.....	90	00
John Garry & Co.....	On account of inst's.....	2	60
Perea Y. Alert.....	Forage.....	70	00
W. H. Jackson.....	Provisions.....	49	72
Boca, St. Vrain & Co.....	Supplies.....	10	00
Hugh Campbell.....	Supplies & personal exp.....	16	33
Cristoval Sanches.....	Supplies.....	90	00
R. H. Cochrane.....	Forage.....	252	70
Geor. Pendleton.....	Buckskins.....	10	00
B. La Coste.....	Supplies.....	288	00
W. L. Diffenderfer & Co.....	Supplies.....	453	87
B. W. Gillock.....	Board and forage.....	23	00
S. Hart.....	Supplies.....	261	90
Samuel Schultz.....	On acc. of mules & equipment.....	170	00
Magoffin & Richardson.....	Supplies.....	1,187	70
John A. Roberts.....	Supplies.....	60	00
Will. H. Russel.....	Personal expenses.....	31	50
Thomas A. Deviney.....	Blacksmithing.....	37	90
Louis Mund.....	Saddle.....	25	00
Magoffin & Richardson.....	Subsistence.....	13	00
Edwin R. Anderson.....	Subsistence.....	18	55
J. W. Pyron.....	Subsistence.....	300	00
Howard & Ogden.....	Subsistence stores.....	1,990	40
Howard & Ogden.....	Transportation.....	1,195	76
Eugene L. Violand.....	Camp equipage.....	10	45
A. Hatch.....	Subsistence.....	86	50
Raymon Montyo.....	Subsistence.....	42	00
N. Webb.....	Subsistence.....	129	83
Alex. Aird.....	Subsistence.....	20	75
John H. Clark.....	Forage.....	98	12
Hugh Campbell.....	Subsistence.....	24	75
Fredrick Bass.....	Medical attendance.....	113	50
L. W. Emory.....	Transportation & board.....	98	00
John Titsworth.....	Beef.....	15	75
James M. McLeod.....	Transportation & board.....	97	50
Will. P. Clark.....	Transportation & board.....	7	50
Allen Ivy.....	Provisions.....	26	87
John E. Weyss.....	Transportation & board.....	65	00
John H. Clark.....	Transportation & board.....	65	00
Geo. H. Burns.....	Freightage.....	43	50
John H. Clark.....	Provisions & camp equip.....	388	14
Hugh Campbell.....	Transportation & board.....	17	50
Hugh Campbell.....	Provisions.....	33	33
Almion Titsworth.....	Horse and provisions.....	121	04
John Titsworth.....	Forage.....	865	50
John Titsworth.....	Provisions & blacksmithing.....	280	33
John H. Clark.....	Transportation & board.....	118	75
John E. Weyss.....	Transportation & board.....	224	50
J. R. Titsworth.....	Provisions.....	120	00
John Gardner.....	Outfit.....	289	25
Bostick, G. P. & Co.....	Supplies.....	2,161	63
J. R. Kannady.....	Blacksmithing.....	125	92
Hayden & Flournoy.....	Soap.....	15	00
José de Lucero.....	Provisions.....	17	50
H. M. Enos.....	Provisions.....	369	68
J. M. Campbell.....	Supplies.....	207	17
Cyrus Mehring.....	Saddle.....	15	00
H. Campbell.....	Provisions.....	12	97
L. Masecy.....	Personal expenses.....	10	25
G. D. May.....	Board.....	14	77
J. E. Weyss.....	Provisions.....	6	50
Charles McCarthy.....	Transportation.....	6	00
Louis Mund.....	Provisions.....	19	82



*Incidental expenses of Texas boundary commission, &c.—Continued.*

To whom paid.	Nature of expenditure.	Amount.	
		Dollars.	Cents.
Bostick, Griff & Co.....	Provisions.....	53	00
A. G. Myers.....	Advertising.....	11	50
W. W. Flemming.....	Board.....	60	25
Charles McCarthy.....	Transportation.....	77	50
Hugh Campbell.....	One house.....	75	00
John M. Campbell.....	Sundries.....	167	50
Will P. Clark.....	Personal expenses.....	17	00
Hugh Campbell.....	Transportation.....	79	50
Will'm P. Clark.....	Transportation.....	76	12
John M. Campbell.....	Transportation.....	76	50
John E. Weyss.....	Transportation.....	90	50
John H. Clark.....	Transportation & board.....	126	12
Will'm Hesselbach.....	Preparing maps.....	41	03
Isaac Clark.....	Moving office furnit.....	1	00
G. F. Gilbet.....	Transportation.....	31	62
Kurni Wiltenerner.....	Room rent.....	40	00
Will. Hesselbach.....	Lettering and draughting.....	254	83
John R. Key.....	Draughting.....	128	50
Kurni Wiltenerner.....	Office rent.....	60	00
John R. Key.....	Topography.....	66	75
Auguste Fliege.....	Blacksmithing.....	32	25
Kestler, John.....	Building monuments.....	9	00
A. Strausz.....	Making projection.....	12	00
P. Hogan.....	Attendance of offices.....	65	00
Will. Hesselbach.....	Draughting.....	150	00
Taylor & Maury.....	Stationery.....	69	75
Kurni Weltenerner.....	Office rent.....	35	00
Amount.....		29, 811	95

*List of officers and employes of Texas boundary, with amounts paid to each from its organization, August, 1858, to September 1st, 1880.*

Name.	Time of service.			Amount paid.	
	Years.	Months.	Days.	Dollars.	Cents.
OFFICERS.					
J. H. Clark.....	3	01	17	10, 950	18
Hugh Campbell.....	2	11	00	5, 250	00
John E. Weyss.....	2	11	00	5, 250	00
L. W. Emory.....	1	01	04	1, 429	54
W. P. Clark.....	2	11	00	2, 600	00
James M. McLeod.....	1	01	00	650	00
John M. Campbell.....	0	09	28	1, 241	75
Rich'd Brogden.....	0	08	00	400	00
Will. H. Russel.....	0	06	02	286	29
EMPLOYEES.					
Behr, Solomon.....	1	02	23	369	16
Barlow, George.....	0	05	03	127	50
Bell, Will. G.....	0	05	29	356	32
Campbell, J. G.....	1	00	20	380	00
Cathro, Thomas.....	0	08	17	258	21
Conoly, James.....	0	05	29	149	17
Egan, Cornelius.....	0	05	20	141	21
Evans, T. W.....	0	02	26	71	20
Filkins, R. L.....	0	04	28	148	00
Fitzmaurice, J. L.....	0	05	06	131	66
Fresques, Mariano.....	0	05	08	132	62
Furhman, August.....	1	01	02	363	70
Garcia, Juan.....	1	01	02	326	19
Gomes, Thomas.....	1	01	02	326	19
Graham, Geo. H.....	0	04	28	172	66
Gray, John.....	0	06	28	172	58
Hasky, Hiram L.....	0	04	25	145	00
Hughes, Geor. S.....	0	08	19	249	30
Hughes, Patrick.....	0	04	28	148	00
Jackson, Will'm.....	1	02	23	368	53
Johnson, Andrew.....	0	08	11	209	82
Keshler, Lewis.....	0	03	21	92	50



## List of officers and employes of Texas boundary, &amp;c.—Continued.

Name.	Time of service.			Amount paid.	
	Years.	Months.	Days.	Dollars.	Cents.
Kilgore, Charles	0	05	05	155	00
Kilgore, Charles C.	0	05	15	165	00
Krough, Patric	0	07	18	153	38
Lee, James	0	04	25	145	00
Leonard, Lawrence	0	01	02	326	19
Lips, Albert	1	04	27	112	83
Lockhart, L. B.	0	02	11	70	77
Lynch, Patrick	0	06	19	165	32
McCarthy, Chas. S.	0	07	00	245	00
McDonald, H. N.	0	06	25	174	45
Manhan, Daniel	0	05	08	158	00
Mattingly, J. R.	0	06	26	170	97
Mattingly, R. L.	0	06	23	202	16
Maxey, L.	1	11	19	917	24
Meely, J. M.	0	04	24	144	60
Mehring, C. H.	0	04	15	134	19
Mund, Lewis	2	00	17	723	70
Murphy, Martin	0	05	27	205	78
Myers, John	1	01	02	363	70
Patton, James H.	0	05	24	173	29
Patterson, William	0	05	05	155	00
Pendleton, George	1	01	22	905	07
Porter, J.	0	05	27	176	39
Poras, Felipe	0	05	08	132	62
Poras, Varnival	0	04	15	107	09
Rodriguez, Juan	1	01	02	326	19
Seabrano, D.	0	01	29	32	90
Saguro, Francisco	0	10	00	250	00
Schoenert, A.	1	00	19	315	71
Schumacher, L.	0	03	00	75	00
Schulte, J. A.	0	06	18	164	30
Stephens, Andrew	0	05	07	130	83
Staub, William	0	06	11	158	65
Swain, John	0	04	28	148	00
Taylor, Rob't.	0	11	27	347	49
Tompkins, W. J.	0	11	27	347	49
Tucker, J. N.	1	00	22	318	13
Uhl, Gustav	2	00	07	594	50
Perry, Levi	0	06	04	152	82
Pollock, J.	0	02	07	55	63
Watine August	0	01	21	41	93
Amount				42,739	09

## RECAPITULATION.

Amount paid on account of officers & employes	\$42,739 09
Amount paid on account of incidental expenses	29,811 95
Sum total	72,559 04

Observations by J. H. Clark and H. Campbell, with Sext., by Lillie & Co., N. O., and sidereal chron., 2419, by Parkinson and Frodsham, at Fort Cobb, opposite sutler's store.

MAY 19, 1860.

			Polaris.								
H.	M.	S.	°	'	"	12	53	33	90	50	55
12	23	59	67	25	45	12	54	22.8	90	32	20
12	25	37.5	67	25	25	12	55	15.5	90	11	55
12	26	45.4	67	25	15	12	56	38.9	89	39	30
12	28	37	67	24	35	α Virginis (south).					
12	29	53.5	67	24	25	H.	M.	S.	°	'	"
12	30	52	67	23	55	13	10	27	88	49	35
12	32	40	67	23	20	13	12	14.8	88	50	45
			α Coronæ Borealis (east).			13	13	27.6	88	51	40
H.	M.	S.	°	'	"	13	14	15	88	53	10
12	43	15	107	12	40	13	15	14.6	88	53	45
12	45	08	107	56	55	13	16	05	88	54	30
12	46	12.5	108	24	55	13	17	15.6	88	55	05
12	47	23.6	108	53	15	13	18	08.5	88	55	40
12	49	10	109	37	15	13	19	12.6	88	55	25
			α Leonis (regulus) west.			13	20	10	88	55	35
H.	M.	S.	°	'	"	13	21	41.8	88	54	55
12	52	30	91	15	00	13	23	07	88	54	50
						13	24	21	88	54	00
						13	25	27.6	88	53	10
						13	26	36	88	51	20

Th'r 71°.

OBSERVATIONS CONTINUED, MAY 25TH, 1860.

			α Coronæ Borealis.								
H.	M.	S.	°	'	"	12	57	18.6	67	21	55
12	35	28	104	02	20	12	58	14.8	67	21	45
12	36	36.5	104	31	00	12	59	25.9	67	21	40
12	37	28.8	104	51	50	13	00	50.8	67	21	30
12	38	42.7	105	22	45	13	02	29.6	67	21	15
12	40	45	106	11	35	13	04	26	67	21	10
12	41	44.6	106	35	55	13	06	16	67	21	25
			α Leonis.			13	07	32	67	21	30
H.	M.	S.	°	'	"	13	08	18.6	67	21	35
12	44	59.5	94	06	10	α Virginis.					
12	45	59.6	93	43	25	H.	M.	S.	°	'	"
12	48	58.5	92	35	45	13	14	02.6	88	52	30
12	49	53.8	92	14	30	13	14	57	88	53	35
12	50	53.6	91	51	45	13	15	58	88	54	45
12	51	46	91	32	25	13	16	47	88	55	15
			Polaris.			13	17	49.5	88	55	10
H.	M.	S.	°	'	"	13	18	46	88	55	10
12	56	15.5	67	22	10	13	20	46	88	54	45
						13	22	51.5	88	54	35
						13	23	44.5	88	54	05
						13	25	00.0	88	52	15

Th'r 80°.

For barometric height refer to Whipple's report; my barometer was broken.

JOHN H. CLARK.

Observations with zenith telescope to determine the latitude in tracing the parallel of 36° 30' N. lat. on Texas boundary, for the year 1860. By J. H. Clark & H. Campbell.

No. of star.	N. or S.	Mag.	Micrometer measurements.		Readings of level.	Date.	Station.
			Rec.	dir.			
G. C.							
1172.....	N.	6	26	82	N. 32.5 S. 35 N. 40 S. 28 N. 39 S. 29 N. 33 S. 35	June 15th, 1860	
1184.....	S.	3	3	97			
B. A. C.							
4952.....	N.	6	15	34	N. 35 S. 34 N. 40 S. 28 N. 40 S. 28 N. 35 S. 34	..	..
4981.....	N.	5	23	69	N. 36 S. 33 N. 41 S. 28 N. 40 S. 29		
5033.....	N.	6	24	73	N. 38 S. 32 N. 41 S. 28 N. 40 S. 29	..	..
5061.....	S.	6	9	73.5	N. 36 S. 33 N. 35.5 S. 34		
5122.....	N.	5½	18	67	N. 43 S. 26 N. 43 S. 26 N. 35.5 S. 34	..	..
5131.....	S.	4½	21	46	N. 33 S. 36 N. 33 S. 36		
5187.....	S.	5	15	25	N. 38 S. 32 N. 38 S. 32	..	..
5210.....	N.	6	24	47	N. 35 S. 35 N. 33 S. 37		
5259.....	N.	5	26	99	N. 41 S. 29 N. 41 S. 29	..	..
5310.....	N.	5½	17	87.5	N. 42 S. 28 N. 42 S. 28		
5336.....	N.	6	19	13.5	N. 33 S. 37 N. 35 S. 35 N. 44 S. 37 N. 44 S. 37	..	..
5399.....	S.	6	21	77	N. 43 S. 36 N. 41 S. 31 N. 41 S. 31		
5461.....	N.	6	14	27	N. 37 S. 38 N. 35 S. 36 N. 37 S. 37	..	..
5523.....	N.	5	21	93	N. 41 S. 31 N. 41 S. 31		
5541.....	N.	6	15	39	N. 37 S. 36 N. 36 S. 36	..	..
5552.....	N.	4	24	99	N. 43 S. 30 N. 43 S. 30		
5652.....	N.	6½	15	27	N. 36 S. 35 N. 37 S. 35	June 15th, 1860	..
5666.....	N.	5	6	72	N. 34 S. 38 N. 34 S. 38		
5703.....	S.	6	99	86	N. 34 S. 38 N. 34 S. 38	..	..
5706.....	N.	4	30	127	N. 37 S. 35 N. 35 S. 35 N. 39 S. 35 N. 39 S. 35		
5788.....	N.	5	17	74	N. 39 S. 35 N. 39 S. 35	..	..
5834.....	N.	3½	18	23.5	N. 42 S. 32 N. 42 S. 32 N. 43 S. 31 N. 43 S. 31		
G. C. 1077.....	N.	5	25	31	N. 42 S. 32 N. 43 S. 31 N. 42 S. 32 N. 42 S. 32	June 17th, 1860	..
4566.....	N.	6	16	76.5	N. 45 S. 30 N. 41 S. 34 N. 41 S. 34		
4656.....	S.	5	67	65.5	N. 41 S. 34 N. 41 S. 34	..	..
4699.....	N.	5½	28	84.5	N. 41 S. 34 N. 43 S. 32 N. 43 S. 32		
4747.....	N.	6	16	91.5	N. 44 S. 32 N. 44 S. 32	..	..
4797.....	N.	6	22	26.5	N. 44 S. 32 N. 44 S. 32		
4810.....	N.	6	12	7.5	N. 41 S. 34 N. 41 S. 34	..	..
4870.....	N.	6	25	73.5	N. 44 S. 32 N. 44 S. 32		
.....	N.	6	18	16	N. 42 S. 32 N. 42 S. 32	..	..
.....	N.	6	65	33.5	N. 42 S. 32 N. 42 S. 32		
4962.....	N.	6	15	15	N. 43 S. 31 N. 43 S. 31	..	..
4981.....	N.	5	23	66.5	N. 42 S. 32 N. 42 S. 32		
5033.....	N.	6	28	21	N. 42 S. 32 N. 42 S. 32	..	..
5061.....	S.	6	13	11	N. 44 S. 32 N. 44 S. 32		
5187.....	N.	5	14	59.5	N. 42 S. 32 N. 42 S. 32	June 17th, 1860	..
5210.....	N.	6	23	15	N. 42 S. 32 N. 42 S. 32		

Camp near N. E. corner of Texas boundary.



Observations with zenith telescope, &c.—Continued.

No. of star.	N. or S.	Mag.	Micrometer measurements.		Readings of level.		Date.	Station.
			Rev.	dir.				
3229	S.	5	23	64	43	45	June 17th, 1860	
3310	N.	5½	21	51	44	45		
5376	N.	5	22	76.5	43	47		
5399	S.	6	24	17.5	44	45		
3461	N.	6	16	71.0	43	47		
5523	N.	5	25	54.5	44	47		
5541	S.	6	19	46.5	44	47		
5788	S.	5	17	89	43	45		
5834	N.	3½	18	40	43	49.5		
5911	N.	5½	24	76	46	47		
5958	S.	6½	17	60	44	49		
6005	S.	5½	11	95	46	50		
6056	N.	6	25	73	39	41		
γ Draconis	N.	2	18	94	45	41		
6106	S.	5½	19	92	46	48		
6231	S.	5½	23	26	45	49		
6246	N.	5½	18	97	45	46		
6251	N.	3½	12	39	44	50		
6258	N.	6	20	92	44	41		
6351	N.	6	27	63	47	48		
6390	N.	5	28	80	45	50		
8 Libra	S.	3	8	80.5	48	49.5		
6530	N.	6	17	98.5	46	46.0		
6582	S.	6	15	37	47	49		
6588	S.	5	23	76	47	48		
6648	S.	5½	19	32	46	49		
6671	S.	6½	9	31	45	49		
6714	S.	5½	8	80.5	45	50		
6726	N.	6	25	14	46	49		
6765	N.	6	20	35	48	47		
6777	N.	6	15	81	46	49		
6806	N.	6	19	25	46	49		
6813	N.	6	19	01	49	46		
6851	S.	5	18	00	46	49		
6895	N.	6	22	47.5	44	45		
6912	S.	5½	13	43.5	44	51		
6940	S.	6	18	47	49	47		
6943	N.	6	13	11.5	46	50		
6965	N.	4	29	91	49	47		
4656	S.	5	7	67	42	36	Thr. 86.	
4699	N.	5½	29	18.5	35	43	June 19th, 1860	
4747	S.	6	15	35.5	42	43		
4797	N.	6	21	67.5	39	37		
4810	S.	6	13	39	41	41		
4830	N.	6	26	44	41	40		
G. C.	N.	6	29	21	36	46		
1172	N.	6	29	21	43	45		
1184	S.	5	06	31	41	39		
1252	N.	6	16	81.5	41	42		
1281	S.	5	25	04	40	42.5		
					40	41.5		
					40	42.5		

Camp near N. E. corner of Texas boundary.

Observations with zenith telescope, &amp;c.—Continued.

No. of star.	N. or S.	Mag.	Micrometer measurements.	Readings of level.	Date.	Station.
			<i>Rev.</i>	<i>dir.</i>		
5033.....	N.	6	27	33.5	N. 41 S. 37 S. 37	S. 40 S. 44 S. 43.5
5061.....	S.	6	12	23.5	N. 40 S. 39 S. 36	S. 40 S. 41 S. 44
5122.....	N.	5½	18	87.5	N. 36 S. 36 S. 39	S. 44 S. 44 S. 41
5131.....	S.	4½	21	44.5	N. 39 S. 39 S. 36	S. 41 S. 41 S. 44
5187.....	S.	5	13	45	N. 36 S. 36 S. 39	S. 44 S. 44 S. 41
5210.....	N.	6	22	75.5	N. 39	S. 41
5259.....	S.	5	22	71	Relevelled. N. 39 S. 39	S. 41 S. 41
5310.....	N.	5½	20	62	N. 40 S. 39	S. 41 S. 42
5336.....	N.	6	21	88	N. 41	S. 40
5399.....	S.	6	22	93	N. 36 S. 36 S. 42	S. 46 S. 45.5 S. 39
5461.....	N.	6	15	54.5	Relevelled. N. 40.5 S. 38	S. 40 S. 42 S. 42
5523.....	N.	5	23	51.5	N. 38 S. 38 S. 40.5	S. 42 S. 42 S. 40
5541.....	S.	6	17	44.5	N. 39 S. 38 S. 36	S. 40 S. 41 S. 42
5552.....	N.	4	24	98.5	N. 39 S. 39 S. 46.5	S. 40 S. 40 S. 40
5652.....	S.	6½	16	16	N. 38 S. 38 S. 40	S. 42 S. 42 S. 40
5666.....	S.	5	07	41	N. 46.5	S. 40
4747.....	S.	6	16	98.5	N. 38 S. 40 S. 48	S. 49 S. 48 S. 40
4797.....	N.	6	19	53.5	N. 48 S. 43 S. 44	S. 40 S. 44 S. 44
4810.....	S.	6	14	52	N. 44 S. 44 S. 44	S. 44 S. 44 S. 44
4830.....	N.	6	23	75	N. 44	S. 44
G. C.					N. 43	S. 44
1172.....	N.	6	27	63	N. 44 S. 44 S. 43	S. 43 S. 43 S. 44
1184.....	S.	3	8	49.5	N. 40 S. 40 S. 35	S. 40 S. 40 S. 44
5552.....	N.	4	24	51.5	N. 35 S. 35 S. 40	S. 45 S. 40 S. 40
5652.....	S.	6½	19	37	N. 40 S. 39 S. 35	S. 40 S. 40.5 S. 39
5666.....	S.	5	10	68.5	N. 40 S. 39 S. 35	S. 40 S. 40.5 S. 39
5788.....	S.	5	19	81.5	N. 35 S. 35 S. 39	S. 39 S. 39 S. 40.5
5834.....	N.	3½	16	61	N. 40 S. 34 S. 34	S. 40 S. 40 S. 46
5911.....	N.	5½	21	01	N. 40 S. 34 S. 24	S. 40 S. 46 S. 57
5988.....	S.	6½	17	45	N. 51 S. 51 S. 42	S. 29 S. 29.5 S. 59
6005.....	S.	5½	14	31	N. 44 S. 44 S. 40	S. 40 S. 40 S. 40
6056.....	N.	6	25	44	N. 44 S. 44 S. 40	S. 37 S. 37 S. 40
γ Drac.....	N.	2	19	73	N. 44 S. 44 S. 40	S. 40 S. 37 S. 40
6106.....	S.	5½	23	05	N. 40 S. 40 S. 45	S. 42 S. 42 S. 37
6231.....	S.	5½	28	09	N. 40 S. 40 S. 44	S. 42 S. 41 S. 38
6246.....	S.	5½	19	06.5	N. 40 S. 40 S. 41	S. 42 S. 41 S. 40
6251.....	S.	5½	17	46	N. 44 S. 44 S. 41	S. 38 S. 40 S. 40
6258.....	N.	6			N. 41 S. 42	S. 40 S. 40
6357.....	N.	6	25	25.5	N. 39 S. 39 S. 40	S. 40 S. 40 S. 42
6390.....	N.	5	29	39	N. 42 S. 40 S. 42	S. 40 S. 42 S. 40
β Lyra.....	S.	3	10	12.5	N. 42 S. 41 S. 41	S. 42 S. 41 S. 41
6530.....	N.	6	26	82.5	N. 41 S. 41 S. 42	S. 41 S. 41 S. 42
6582.....	S.	6	19	02	N. 41 S. 41 S. 40	S. 42 S. 42 S. 42
6589.....	S.	5	27	17	N. 41 S. 40 S. 40	S. 42 S. 40 S. 40
6648.....	S.	5½	23	68	N. 40 S. 40 S. 44	S. 42 S. 40 S. 40
6673.....	S.	6½	13	73	N. 40 S. 40 S. 44	S. 40 S. 40 S. 40
6714.....	S.	5½	13	19	N. 44 S. 40	S. 40 S. 42
6720.....	N.	6	25	70.5	N. 40	S. 42

June 19th, 1860

Thur. 84.

June 27th, 1860

June 27th, 1860

Camp N. E. corner of Texas boundary.

Observations with zenith telescope, &c.—Continued.

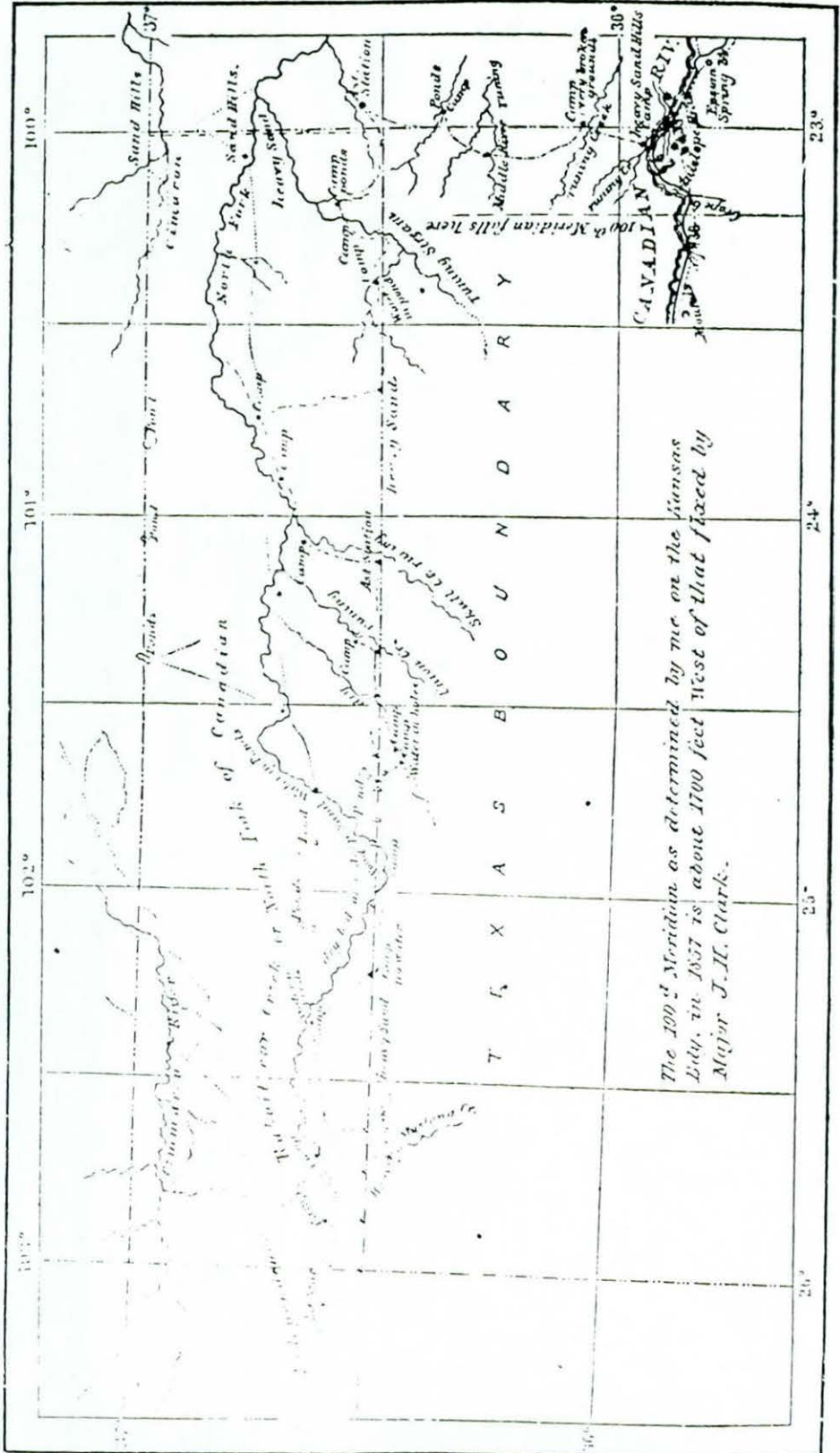
No. of star.	N. or S.	Mag.	Micrometer measurements.		Readings of level.		Date.	Station.
			Rev.	dir.				
6765	N.	6	20	14	N	S	June 27th, 1860	Astronomical station on Skull Creek.
6777	S.	6	19	43	N	S		
6806	N.	6	19	04.5	N	S		
6813	N.	6	18	80.5	N	S		
6851	N.	5	21	61	N	S		
6895	N.	6	22	01.5	N	S		
6912	S.	5½	17	73.5	N	S		
6940	S.	6	18	03	N	S		
6943	S.	6	12	71.5	N	S		
6962	N.	5½	25	75*	N	S		
6965	N.	4	29	83	N	S	Thr. 72° Farht.	
4747	S.	6	21	71	N	S	June 28th, 1860	Astronomical station on Skull Creek.
4797	N.	6	24	29	N	S		
4810	S.	6	15	65.5	N	S		
4830	N.	6	24	98	N	S		
G. C. 1172	N.	6	28	40	N	S		
1184	S.	3	9	26	N	S		
5033	N.	6	26	17.5	N	S		
5061	S.	6	14	81	N	S		
6331	S.	5½	27	55.5	N	S		
6246	N.	5½	18	58	N	S		
6251	N.	5½	16	80.5	N	S		
6258	N.	6	21	50.5	N	S		
6351	N.	6	26	89	N	S		
6390	N.	5	31	12.5	N	S	June 28th, 1860	Astronomical station on Skull Creek.
3 Lyra	N.	3	11	66.5	N	S		
6530	N.	6	19	13	N	S		
6582	S.	6	20	28.5	N	S		
6589	S.	5	28	76	N	S		
6648	N.	5½	25	09	N	S		
6672	N.	6½	15	14.5	N	S		
6714	N.	5½	14	60.5	N	S		
6720	N.	6	27	12	N	S		
6765	N.	6	19	48	N	S		
6777	N.	6	18	70	N	S		
6806	N.	6	18	43	N	S		
6813	N.	6	18	19	N	S		
51	S.	5	20	91.5	N	S		
6855	N.	6	23	21	N	S		
6912	S.	5½	19	01.5	N	S		
6940	S.	6	18	12	N	S		
6943	S.	6	12	77	N	S		
6962	N.	5½	25	70†	N	S		
6965	N.	4	29	75†	N	S		

\* Taken late.  
† Not satisfactory; clouds. Thr. 70 Farht.



No. 13.

U. S. & Texas b'd'y, J. H. Clarke, com'r, Nov. 14, 1860. Submits preliminary statements of last season's operations. Rec'd Nov. 16th, 1860.



WASHINGTON, D. C., *Nov. 14th, 1860.*

Hon. JACOB THOMPSON,  
*Secretary of the Interior:*

SIR: I herewith submit the following as a preliminary report of the operations of the Texas boundary survey during this season:

Having reorganized the commission and so increased its force as to be independent of an escort, I proceeded from Fort Smith April 28th, by Forts Arbuckle & Cobb, to the 100th meridian where it intersects the Canadian River. I arrived at this point June 8th, and commenced the survey by tracing the meridian northward to its intersection with the parallel  $36^{\circ} 30'$ , forming the northeast corner of the boundary.

While I was determining astronomically this corner, the surveying party was engaged in prolonging the 100th meridian up to the southern boundary of Kansas (37th parallel) with the view of connecting the longitudes of the two boundaries. The 100th meridian, determined & run as the eastern boundary of Texas, falls within 1,700 feet of the one fixed by me on the Kansas boundary in 1857.

The northeast corner being thus fixed, & the northwest corner having been established the previous season, there remained only the operation of tracing & marking the parallel of  $36^{\circ} 30'$  between these two points to complete the northern line of the boundary.

The tracing of the line westward was begun June 20th, and I had advanced but a short distance with the work, when great difficulty was experienced for the want of water. The rains which may sometimes be looked for in this country to form water holes did not occur, and it was only by straining men and animals to their utmost capacity that I was enabled to carry the survey through. As an instance of the hardship & risk to which the commission was subjected to in this part of the work, from Union to Mustang Creek, a distance of 87 miles, had to be overcome without water.

The parallel of  $36^{\circ} 30'$  was completed July 12th, when I set out for Fort Union to refit & reprovision the party with the object of going out on a staked plain and there complete the tracing and marking of the small arc of the 103d meridian remaining to be connected between the ends of this line, which had been run both from the south and the north last year.

I ascended the bluff of the "staked plain" Aug. 10th, but was forced to retrace my steps in two days for water. So completely destitute of water was this plain, that I could not get within 50 miles of the point I had reached last year. The customary rains had not fallen, and where last year I found large ponds or lakes, even of rain-water, were this year only dry beds cracked into deep fissures by the burning sun.

I returned along the bed of the Canadian, and came again to the 100th meridian Aug. 25th, and turning southward followed it to its intersection with the south or main branch of Red River. Thence I marched eastward to Ft. Cobb, traveling along the northern edge of the Wishita Mountains over an unexplored section of country.

Twenty thousand (\$20,000) dollars, one-fourth of the whole appropriation, which contemplated only the field-work, yet remains unexpended. This surplus will be ample to complete the office-work, that is, the computing & tabulating of the astronomical observations, and the plotting and drawing of the maps.

I have the honor to be, your ob't servant,

JOHN H. CLARK,  
*Com'r, &c., Tex's B'd'y Survey.*



## No. 14.

DEPARTMENT OF THE INTERIOR,

*July 27th, 1861.*

SIR: I have decided to transfer to your supervision and control the business connected with the U. S. and Texas boundary survey, and for your information transmit herewith a copy of a communication addressed to the department on the 24th instant by John H. Clarke, commissioner, &c., in charge of the work, showing the condition thereof at that date.

Mr. Clark has been this day informed of the purport of this letter, and instructed to report to you hereafter in relation to all matters pertaining to the work in his charge. See copy of a letter to him of this date, herewith enclosed.

You are requested to report your views to the dept. in relation to the expense necessary to be incurred in the completion of the office work, salaries, &c., incident to the survey.

A copy of the correspondence of the department upon the subject of this survey will be prepared and sent to you as early as practicable.

Very respectfully, your ob't servant,

CALEB B. SMITH,

*Secretary.*

JAMES M. EDMUNDS, Esq.,

*Commissioner of the General Land Office.*

DEPARTMENT OF THE INTERIOR,

*July 27th, 1861.*

SIR: I have this day informed the Commissioner of the General Land Office of my determination to transfer to his supervision and control all matters pertaining to the U. S. and Texas boundary survey. You will, therefore, report to that officer hereafter in relation to the work now in progress under your charge connected with said survey.

Referring to your letter of the 24th inst. I will remark that the item for office rent, included in your estimate of expenses necessary to be incurred in the completion of the work, can be omitted, as suitable accommodations for an office can be furnished you by the Com'r of the Gen'l Land Office.

Very respectfully, your ob't servant,

CALEB B. SMITH,

*Secretary.*

JOHN H. CLARK, Esq.,

*Com'r, &c., U. S. and Texas B'dy, Washington City.*

DEPARTMENT OF THE INTERIOR,

*Wash., July 24, 1861.*

Hon. C. B. SMITH,

*Secretary of the Interior :*

SIR: By verbal request of Mr. Moses Kelly, chief clerk, I make the subjoined statement, showing the condition of the office work of the U. S. and Texas boundary and survey at this date.

Of the astronomical work, all the latitude observations have been computed and tabulated, and the observations for longitude recorded in



form. As the results of the longitudinal determinations are not essential to the accuracy of the maps, except as checks, I do not propose to prosecute this branch of the work further, and it may therefore be closed. They can be computed hereafter, if desirable.

There are sixteen maps in all. One a general map, embracing all the boundary lines with much of the adjacent territory, and fifteen representing the line in detail. All of them are in an unfinished state, not complete as to topography and lettering, and without any titles. These drawings must be executed to make the maps intelligible and answer the purposes for which they are intended, a delineation and record of the boundary. The general map will be ready for the engraver in a few days; it will take two draughtsmen about three months to complete the rest.

The cost of finishing the work in the manner thus proposed will be about as follows:

Salaries of draughtsmen and self.....	\$2,000
Due Hesselberg for draughting.....	150
Stationery and room rent.....	100
Total.....	2,250

The engraving of the general map, if ordered, will cost from \$1,500 to \$3,500 according to the style and quality of the execution.

It is proper for me to state here, that, by agreement, I am under obligations to furnish the Texas commission with plots and copies of the notes of a part of the survey. These have not yet been made, and the communication, which ceased on leaving the field last November, being impossible, I think it is now unnecessary to incur that expense.

I am, sir, respectfully, yours,

JOHN H. CLARK,  
*Com'r &c., Tex's B'd'y Survey.*

DEPARTMENT OF THE INTERIOR,  
*Washington, August 2nd, 1861.*

SIR: Pursuant to the announcement in my letter to you of the 27th instant, I herewith transmit to you all the letters and papers and a transcript of the correspondence of the department relative to the survey of the boundary line between the territories of the United States and the State of Texas.

I am, sir, very respectfully, yr ob't servant,

CALEB B. SMITH,  
*Secretary of the Interior.*

Hon. J. M. EDMUNDS,

*Commissioner of the General Land Office.*

See letter to Com'r G. L. Office of 27 July, 1861.

*List of letters received by the Department of the Interior from John H. Clark, commissioner, and others in relation to the U. S. & Texas boundary survey.*

- July 1, 1858. John H. Clark.—Plan and estimate of organizing the Texas boundary commission.  
 " 12. " Hon. H. R. Runnels, gov. of Tex.—Calls attention to the subject of the survey of the Texas boundary.





- May 1 " John H. Clark.—Transmits his accounts for the 1st qr. 1859, and requests \$15,000 placed to his credit.
- " 12 " John H. Clark.—Reports the withdrawal from the field of the Texas commissioner with his party, &c.
- June 3 " John H. Clark.—Reports progress—the establishment of the corner at the 103d meridian, &c.
- " 25 " Wm. H. Russell.—Encloses duplicate voucher No. 25, accounts of John H. Clark for 1st qr., 1859.
- July 3 " Alex. Lewis Kesler.—In regard to pay he alleges to be due him for services on Tex. b'd'y. [Referred to Com'r Clark, Dec. 14, 1858.]
- July 18, 1859. John H. Clark.—Reports progress, &c., and requests that observations be made at Washington and Cambridge Observatories.
- Aug. 13, " Sec'y Navy.—States that Commander Maury has been directed to make the observations requested.
- Oct. 26, " Julius Harms.—Encloses claim of Louis Kesler for services on Tex. b'd'y. [Ref'd to Com'r Clark Dec. 14, 1859.]
- " 27, " John H. Clark.—Encloses a summary of work done in surveying Tex. b'd'y during the season of 1859.
- Nov. 7, " Sec'y Navy.—Encloses a report of observations made for moon culminations at the observatory by Prof. Yarnell.
- " 22, " L. W. Emory.—Respecting his accounts enclosed.
- Dec. 12, " John H. Clark.—Transmits his ac's for 2d & 3d qu'rs, 1859, &c.
- " 15, " John H. Clark.—In relation to the claims of Emory and Kesler for compensation, &c.
- Jan'y 4, 1860. Prof. G. P. Bond, Cambridge, Mass.—Transmits observations.
- Mar. 14, " John H. Clark.—Encloses report of operations and four maps, incomplete, &c.
- " 23, " John H. Clark.—Receipt for sextant & its fixtures. [This paper is not found among the files.]
- " 28, " H. L. Abbott.—Ack's return of protractor borrowed for use on the Tex. b'd'y survey.
- " 30, " Sec'y War.—States that the Gen'l-in-Chief has been desired to give the necessary instructions for a military escort.
- Mar. 30, 1860. Br'vt Lt. Gen'l Scott.—Special orders No. 36; escort for the Texas boundary commission.
- Apr 16, " Hon. Sam. Houston, Gov. of Tex.—Relative to the Texas commission reaching Fort Arbuckle.
- " 27, " John H. Clark.—Transmits his ac's for 4 q'r, 1859, and 1st q'r, 1860.
- May 9, " Br'vt Lt. Gen'l Scott.—Stating that paragraph I of special orders No. 36 has been revoked.
- " 10, " Fifth Auditor.—Requesting to be informed at what date the salary of John H. Clark, com'r, commenced.
- July 16, " John H. Clark.—Reports completion of survey of 100th meridian and parallel of 36° 30'.
- Aug. 27, " James Campbell.—Asks the whereabouts of his brother Hugh. [This paper does not appear on the files.]
- Nov. 14, " John H. Clark.—Submits a preliminary sketch of last season's operations.
- " 30, " John H. Clark.—Transmits his ac's for 2d & 3d q'rs, 1860.



- Dec. 11, " Capt. J. D. Sturgis.—Transmits receipt of T. N. Chapman for 2,000 cartridges, &c. [This paper was returned to Ordnance Bureau Dec. 26, 1860.]
- Feb. —, 1861. H. G. Bond.—Asking information for his map.
- " 23, " John H. Clark.—Transmits his ac'ts for 4th q'r, 1860.
- " 24, " H. G. Bond.—Thanks for information.
- Feb. 27, 1861. John H. Clark.—In reply to affidavit of L. Moxy, late an employé, regarding his claim.
- July 15, " John H. Clark.—Transmits his accounts for the 1st and 2d q'rs, 1861, and requests \$5,000 to his credit.
- " 24, " John H. Clark.—Submits a statement of the condition of the office work, &c.

*Unofficial papers.*

- Ap'l 24, 1859. John H. Clark.—Affidavits in regard to robbery.
- June 1, " Same.—In relation to the difficulty with the Texas commissioners, &c.
- Ap'l 7, 1860. Same.—Reports progress, &c.

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No. 16.

(In pencil.) Copy of this report sent to Hon. J. J. Groos, comm'r general land office of State of Texas, at Austin, March 10, 1877.

GENERAL LAND OFFICE,  
September 30th, 1861.

SIR: In answer to your communication of the 19th inst., I reply as follows:

1st. In execution of my instructions to survey and mark the boundary line between the Territories of the United States and the State of Texas, I proceeded, September, 1858, to San Antonio to confer with the Texas commissioner. It was there agreed between Mr. Scurry, the Texas commissioner, and myself to take the field as soon as the outfit could be made, and to begin the operations on the Rio Grande. My assistants, with the necessary instruments, having joined me, and the outfit being completed, I left San Antonio the 12th of November, accompanied by the Texas commission, for the initial point, which was reached January the 2d, 1859. The next day the work was commenced.

The performance of the astronomical work, upon which the boundary line is based, I undertook exclusively, the Texas commission taking a part in the tracing and demarcation of the line by furnishing half of the surveying force. The plan of survey adopted was to determine the line in latitude with a zenith telescope as often as it might be necessary to insure accuracy, and in longitude by triangulation and direct measurement from the initial point—the longitude of this point being found by transfer from Frontera, a well established station of the Mexican boundary Survey. From the meridian of each observatory a new tangent was turned, and being traced both east & west, the surveyor's line was seldom more than 30 miles without a check.

A base line on which the whole survey rests was selected near the initial point. It was 4,750 feet long, and was carefully and repeatedly measured with standard rods taken out for the purpose. The prepara-



tion of the ground for this base line and its measurement employed the surveying party for ten days. The surveying party was then sent to Frontera to connect it with the point of beginning, which was in the meantime fixed as to latitude by the astronomical party. To obtain this result a triangulation of the whole surrounding country was necessary, because of the meridian of Frontera being crossed by the many broken spurs of the Franklin Mountains.

The initial point being established and marked by a stone monument bearing the necessary inscriptions, I commenced, January 26th, the survey of the parallel or boundary line proper. After prolonging the line for 27 miles & putting up in that distance 6 monuments, I had to suspend operations from the Rio Grande Valley as a basis, it being too far to supply the parties with water. A reconnaissance showed that the next only available water, and that limited in supply, was to be had at the Hueco tanks. To this point the surveying party, accompanied by an escort detailed from Fort Bliss, moved on at once and took up the line. I remained near El Paso with the train till the 18th of February, waiting the arrival of the permanent escort.

When about leaving for the line I was notified by Mr. Scurry, the Texas comr., that he had resigned; and as the waiting for a successor would have been attended with an indefinite delay, I went on and joined the surveying party at Alamo Spring. I intended to redetermine the parallel at this place, but finding it unsuited for such purpose, I made the 2d astronomical station at Crow Spring. The prolongation of the tangent was discontinued at Alamo Spring, and taken up from the redetermination at Crow Spring, was traced back and connected with the line as brought over from the initial point. This part of the parallel was marked by the following monuments: one on the Hueco Mountains, two near the first crossing of the Overland mail route, two between the first & second crossing, and two at the second crossing of this route.

My observations at Crow Spring were completed by the 15th of March, when I left with the view of making my next station on the Pecos River; but in turning the Guadalupe Mountains I found that they presented so rugged and so extensive a system of ranges, that the surveying party could only, if at all, at the expense of much labor and time, trace the line entirely across them. I therefore made another astronomical determination immediately east of the mountains and near Independence Spring. The surveying party joined me the 23d of March, and, as I anticipated, had succeeded in working only up to the middle of the mountain ranges. Leaving this party to take up the line anew, and, after running it back, to continue its prolongation eastward, I moved from Independence Spring March 26 for the Pecos, where I again redetermined the parallel. A number of moon culminations were taken at this station in addition to the usual latitude observations. The monuments erected between Crow Spring and the Pecos are one at the west base of the Guadalupe Mountains, one on the meridian of Independence Spring, two near Delaware Creek, one on the road leading up the Pecos, and one on its west bank.

By the 1<sup>st</sup> of April the 32d parallel was run and marked from the Rio Grande to the Pecos, and in 3 days thereafter a flag was set on the "Llano Estacado" in the further prolongation of the line. By establishing a depot of water it was continued out on the plain for 35 miles, and marked by 4 monuments, when it had again to be broken in consequence of the entire absence of water, & the presence of deep sand. The nearest water, after leaving the Pecos, was in the White Sand Hills, distant in a direct line 65 miles, and its discovery cost no little time.



risk, and exposure. By making a considerable detour to the south, however, I managed to get sufficient supplies to these sand-hills, where I had the gratification to be able to redetermine the parallel for the 5th & last time, and the 22d of May erected the monument, marking its intersection with the 103d meridian.

Having completed the 32d parallel, I turned northward on the 103d meridian, using pack mules exclusively, as heavy sand precluded the possibility of taking wagons along. The meridian was traced up to the 33d parallel, although every drop of water used had to be transported from the White Sand Hills. Finding no indications of water to the northward, and meeting with nothing but sand, I was forced to suspend the operations of the survey in this direction, and return to the main camp on the Pecos. This was reached the 31st of May.

It is proper for me to state here that just before I left the Pecos for the White Sand Hills the Texas commission was withdrawn from the field by Mr. Scurry, the Texas com'r. The reasons which he assigned did not in my opinion justify an abandonment of the survey, and I therefore kept on with the work.

So much of the boundary line was thus run and marked during a severe winter over a country which, when not traversed by high and rugged mountains, presented only extended waterless stretches of sandy desert. The observations were often made in a temperature from 20 to 35° degrees below the freezing point, and the operations of the surveying party arrested by storms so violent as to turn over wagons, lift the instrument from the tripod, and fill the atmosphere with dust and gravel. To accomplish the survey of the 32d parallel, a distance of 211 miles, the note-books show that the party was compelled to travel 1,248 miles. This fact will give an idea of how much labor is necessary to effect a result in a country like that in which the Texas boundary line falls.

After finding it impossible to trace the line further up through the plain, I returned to the Pecos with the object of tracing a meridian near that river, and of carrying out offsets from it to the 103d meridian, and thus mark the boundary. I was ready to proceed the 1st of June, but was detained waiting for the escort till the 15th, when I went on and, reaching a point about midway between the 33d & 34th parallels, fitted out a pack train, & with it started for the 103d meridian. This examination showed that the river was much further from the 103d meridian than was anticipated, and that the intervening country, like the rest of the southern part of the staked plain, was formed almost entirely of sand and destitute of water. The plan of marking the 103d meridian by carrying out offsets had therefore to be abandoned as impracticable. I then marched as rapidly as the nature of the country would permit for the northwest corner of the boundary, continuing a survey of the river as it was erroneously placed on the maps.

The survey of the Pecos was made with sextant, compass, and viameter, and connected with Capt. Whipple's route along the Canadian. In addition to the results obtained from these instruments, the bearings of all the prominent topographical points were taken with a large theodolite at each latitude station. Many of these points had already been fixed from the 32d parallel, and the bearings being read on them daily, the surveyor is enabled to lay down a map of the Pecos & our route accurately, & in direct connection with the boundary line.

This route up the Pecos adds materially to the geographical knowledge of a region of country heretofore but little known, and demonstrates the practicability of a good wagon-road where it had been reported impossible to take a wagon. It could be advantageously adopted



as a line of communication between the frontier posts and settlements of Texas and New Mexico, for it is not only shorter, about 250 miles, than that by way of El Paso, but affords more wood, water, and grass. Such is the character and number of streams and springs putting into the Pecos from the west, that marches up from Delaware Creek could be so regulated as to enable the traveller to encamp every night near an abundance of wholesome water.

I arrived at the first settlement on the Rio de Gallinas the 8th of July, and travelled directly on to Fort Union, leaving my escort behind. It joined me at Fort Union the 18th, but was not prepared to leave till the 27th of July, again delaying me 10 days. I then marched from Fort Union for Rabbit Ear Creek, where I commenced work for the establishment of the northwest corner of the boundary.

An observatory was put up at Rabbit Ear Creek and observations made for both latitude & longitude. The corner (the intersection of the parallel  $36^{\circ} 30'$  and the 103d meridian) was fixed as to latitude from these observations; but the surveying party were sent over to the Kansas boundary, and taking up the 103d meridian as then established, transferred it to its intersection with the parallel for the longitude.

While at Rabbit Ear Creek a second Texas commission joined me, which, being unprepared to take any other part in the survey, threw up the mounds of earth marking the line; and I agreed to furnish the Texas commissioner with copies of field notes and plats. It was here that the only wild Indians met with during the whole expedition made their appearance. They marched up boldly in number, about 60, with the object, evidently, of inspiring fear by assuming a confident and defiant air, calling out in Spanish, as they approached, not to be afraid, as they would not hurt us. This tact failing them, they begged to be fed, saying they were Comanches and friends, and had come to eat and not to fight. When told that we could not feed such a band, they replied if you cannot feed our men feed our captains. The answer to such a reasonable proposition was that we had scarcely any provisions for ourselves; they retorted it was very strange that in so many wagons we carried nothing to eat, and with this growl they took themselves off, not having been allowed in this "pow-wow" to come nearer than within rifle-range of the camp and mules. That night and the next day they were hanging around camp, and twice attempted to stampede the cavallada.

The fixing and marking of the corner being accomplished, the prolongation of the 103d meridian was begun Aug. 23d. It was laid out from the meridian of the observatory, and checked as the line progressed by observing the elongations of Polaris. From the corner to the Canadian River the line passes over an undulating prairie, sandy and destitute of all forms of vegetation except grass; and although it was the rainy season there was a scarcity of water, and the hunting of it occupied much time.

The meridian was traced with a large theodolite, and the distances, besides the direct measurements, made out from angles on the peaks of the mountains, and both checked as often as practicable with latitude observations. Forging the Canadian, and overcoming the broken country about it, the Llano Estacado, marked by high and precipitous bluffs, was ascended near the 35th parallel, and the line continued and marked as far down as the 34th parallel. Here a belt of sand hills, traversing the plain nearly east and west, put a stop to the further progress of the train. The occurrence of this sand, together with the lateness of the season, compelled me to suspend further operations this year and go into



winter quarters, the Texas commission and the escort having already left the field.

Besides the monument marking the corner, 9 were erected before reaching the Canadian, 2 on the Canadian, 3 between it and Capt. Whipple's route, 2 on this road, one on the bluffs of the plain, and 6 on the plain. The 103d meridian being thus traced, and marked to the 34th parallel from the north and to the 33d parallel from the south, it may, for all practical purposes, be considered as completed.

I ascended the plain with the determination of carrying the line at least far enough to ascertain if it struck Red River. In latitude  $34^{\circ} 30'$  two dry arroyos occur draining eastward, which are without doubt the first breaks of Red River, and which prove its head to be east and not west of the 103d meridian, as was supposed. Had I not been forced to quit the line on the south from physical causes, go up the Pecos and double my track again back on the 103d meridian, and to start in time to travel 600 miles for winter quarters, I could in one year have completed all that part of the boundary covered by my instructions, in spite of the moral obstacles inseparable from an expedition governed by three heads, as this was.

Against all obstacles, however, physical & moral, the amount and quality of the work will compare favorably with what is & has been done in the same time, on similar surveys, as will be seen by reference to the field notes. They show more than 3,000 astronomical observations, & the survey of about 850 miles, 450 of which is triangulated on the boundary line proper. I took Capt. Whipple's road Oct. 1st, for Ft. Smith, where I arrived early in November, and cut off all unnecessary expenses by a reduction of the commission, retaining only such officers and men as could be profitably employed during winter. By this reduction I was able to resume the field work and complete the survey without an additional appropriation.

#### OPERATIONS IN 1860.

Having reorganized the commission and so increased its force as to be independent of an escort, I proceeded from Fort Smith, Ark., April 28, 1860, by Forts Arbuckle and Cobb, to where the 100th meridian crosses the Canadian River and there commenced work.

That part of the 100th meridian lying between the main branch of Red River & the southern boundary of the Cherokee country had been determined, run, and marked by Messrs. Jones & Brown in 1859 under the direction of the Indian Bureau, as constituting the boundary between Texas and a part of the Indian Territory. So much of the boundary line as was thus established, Hon. Jacob Thompson, then Secretary of the Interior, directed me to adopt, and in pursuance of this instruction I simply retraced the meridian up to where the work of Messrs. Jones & Brown ended. Thence I prolonged it up to its intersection with the parallel  $36^{\circ} 30'$ . While observing for the determination of this parallel in order to establish the northeast corner of the State of Texas, the surveying party continued the meridian up to the southern boundary of Kansas, the 37th<sup>o</sup> parallel, and connected it with the longitude of that boundary. The result shows that the 100th meridian as fixed by me on the survey of the southern boundary of Kansas in 1857, falls about 1,700 ft. west of that, forming the boundary line between Texas and the Indian Territory.

The northeast corner being thus established & marked, and the northwest corner having been fixed the previous season, there remained



only the operation of tracing & marking the parallel of  $36^{\circ} 30'$  between these two points to finish the northern line of Texas. The tracing of this line westward was begun June 20th, and I had advanced but a short distance when great difficulty was experienced for the want of water. The rains which may sometimes be looked for in this region to form water holes did not occur this season, and it was only by straining men and animals to their utmost capacity that I was able to carry the survey through. As an instance of the hardship and risk to which the commission was exposed to in this part of the work, from Union to Mustang Creek, a distance of 87 miles, had to be overcome without water. The parallel was redetermined at Skull Creek to check the prolongation of the tangent which was run out from the corner. A new tangent was taken from this redetermination and continued till it became necessary to leave it & strike to the north fork of the Canadian for water. It being impossible, in consequence of the absence of this indispensable element, to make another determination of the parallel of  $36^{\circ} 30'$ , I marched to the northwest corner, and thence run the line back to the last monument marking the boundary as brought over from the east.

The northern boundary being thus finished, I set out July 12 for Fort Union to refit & reprovise the party with the object of going out on the staked plain and there complete the tracing & marking of the small arc of the 103d meridian remaining to be connected between the ends of this line, which had been run from the south & from the north as heretofore reported. I reached & ascended the bluff of the staked plain Aug. 10th, but was forced to retrace my steps in two days for water. So entirely dried up was the plain that I could not get within 40 miles of the point I had attained the year before. The customary rains had not fallen, and where the season before I found large ponds of rain water were now only dry depressions of the prairie cracked into deep fissures by the burning sun. I returned along the bed of the Canadian and came again to the 100th meridian Aug. 25, and turning southward retraced it to its intersection with the main branch of Red River. Thence I marched eastward to Fort Cobb, along the northern edge of the Wishita Mountains, over a region of country for the most part unexplored.

I append here a list of the monument, with a brief description.

A. They were not put up at regular intervals, as will be seen by reference to the maps on which they are represented, but on prominent points, roads, and where there was a possibility of the location of land or other question of jurisdiction. They were made of stone or earth, and show the position in latitude or longitude by inscriptions, as also the initial letters of the territories separated thereby, in most cases the dates too were added. Their inscriptions were cut in on the stone or wood. B.

#### MONUMENTS ON 32D PARALLEL.

1. Initial point, a pyramid of stone 8 feet high, whitewashed, with inscriptions on all the sides. It stands 600 feet from the bank of the river, and between them lies the road from El Paso to Fort Fillmore.
2. On the first ridge of sand, built of stone around a stick of timber.
3. On the first plateau, of a stick of timber; a cotton-wood tree barked.
4. On the first spur of the Franklin Mountains cut by the line, is of stone, & whitewashed six feet high. All four of these monuments can be seen from the road along the valley.
5. Directly east of the Franklin Mountain, and on the road leading



from El Paso to the salt lakes. It is a large mound of earth, capped with a slab of stone bearing the inscriptions.

6. On the open prairie extending from the Franklin to Hueco Mountains. It is a mound of earth.

7. A mound of earth on the road leading from Hueco tanks to the Mesilla Valley.

8. Of earth on the ridge immediately north of the Hueco tanks.

9. Is built of stone in a cañon of the Hueco Mountain.

10. On the easternmost hill of the Hueco Mountain system; of stone.

11 & 12. One on each side of the mail route; one of earth, the other made of stone.

13. Is on a ridge of the Cornudas Mountains, and of stone.

14. Also of stone on the table land lying east of the mts.

15. This is on the same table land, & similar to the above.

16 & 17. These are near to and on each side of the mail route where the line crosses it the second time. They can be seen from Crow Spring; are pyramids of adobe built around stakes bearing the necessary inscriptions.

18. Is on a swell of ground just at the base of the first ridge, west of the Guadalupe Mountain system. It is of stone whitened, and is visible from the mail route or road about Crow Spring.

19. Is of stone on the top of Guadalupe Mt.

20. Is at the east base of the mountain and due north of Independence Spring. It is of stone.

21. At Soda Creek, where the parallel crosses it, and is of stone.

22 & 23. Are mounds of earth, within seeing distance of each other on opposite sides of Delaware Creek. These monuments in pairs were put up with the object of showing the direction of the boundary.

24. Of earth, capped with a block of stone having the inscriptions, on the east side of the road leading up the Pecos.

25. On the bluff near the west bank of the Pecos; made of stone and gravel.

26. Is on the Llano Estacado near Pope's well; of stone with a large stick of timber in the centre.

27. A mound of earth at supply camp on the plain. Has a large stick of timber in the centre.

28. Is of earth on the highest ridge of the plain between supply camp and the White Sand Hills. The soil here is formed almost entirely of sand. A flag-staff was left in this mound.

29. Is near some bluffs in sandy soil; of earth.

30. Near some natural mounds in a depression of the prairie; the soil of which this monument is made is rather firm.

31. Is on the trail of the commission to the White Sand Hills, where there is a depression of firm ground surrounded on all sides by hills of sand. It is a mound of earth which is firm enough, probably, to resist the action of the wind.

32. At the intersection of the 32d parallel and the 103d meridian. This is a mound of very sandy soil; it has a bottle buried in it which contains the latitude & longitude of the point, a list of the names of the members of the commission, and the date of its erection.

#### MONUMENTS ON 103D MERIDIAN.

1. This is a mound of tolerably firm soil on the road leading to & from the water in the White Sand Hills. It is thrown up around a stick of timber, on which is inscribed the markings necessary to indicate the line.



2. Is a mound of earth & near some slight bluffs.
3. This is similar to No. 2, except that a board, instead of a stake, contains the inscriptions.
4. Is a mound just on the northern edge of a great sand belt. It is built of firm soil around a flag-staff.
5. As all the monuments on the plain, with a single exception, No. 5 is also a mound of earth. It is on a slight roll or swell of the plain & near a large rain-water pond.
6. This mound is on a flat plain of the prairie and has nothing to mark it; it can, however, be seen at a great distance.
7. Is placed near the main break of Red River, on the northern side.
8. To the north of the north break of Red River stands No. 8. The plain here is as level as a table.
9. The only one of stone on the Llano; it is near the bluffs, and can be seen much better from the valley than from up on the plain. All the monuments on the plain north of the great sand belt will remain conspicuous for many years if not interfered with; the soil of which they are made is very close & tenacious.
- 10 and 11. These are earthen mounds, erected on each side of the Albuquerque & Fort Smith road, and are close enough to show the direction of the boundary across the roads.
12. This mound is a little less than a mile north of the road, from which it can be seen.
13. Is a mound, and south of the Cañada de Truxillo but a short distance.
14. Monument 14 is on a ridge directly north of this creek. The soil is a little sandy here.
15. A mound of earth, near the edge of a red sandstone bluff, which forms the southern bank of the Canadian.
16. This is of stone; in sight from No. 15 and on the north bank of the river. The angle at which the line crosses the river is shown by these two monuments.
17. Is on the first ridge, which is somewhat sandy, north of the river and made of earth.
18. On an Indian trail leading east & west; stone.
19. Earthen mound; on a ridge between two branches of Flag Creek.
20. A mound of rather loose soil in Sand Valley. There is much sand along the line marked by this & the following 4 mounds.
21. Stands on the south bank of the Maj. Long Creek and on a firm gravelly knoll.
22. Mound of light soil on a sandy flat.
23. Is north of some large sand-hills. The soil is loose and sandy & liable to drift.
24. Of light soil, but not sandy; will resist the action of the wind.
25. This mound is of firm & close soil, & is in sight from the corner monument.
26. The corner monument—the intersection of the 103d meridian with the parallel  $36^{\circ} 30'$ . It is an earthen mound, larger than most of the others; and there is in sight of it, besides monument No. 25, No. 1 on the parallel; so that there are three monuments in sight from the apex marking this angle of the boundary.

MONUMENTS ON PARALLEL  $36^{\circ} 30'$ .

1. This is near the corner monument, & earthen, as already stated. It will be lasting, as the soil is firm.



2. The prairie is smoother where No. 2 is put than it is about the corner. In all other respects No. 2 is similar to No. 1.
3. On a ridge near the head of Mustang Creek. A mound; the soil firm.
4. Also a mound, three miles eastward of the last mentioned; in sandy soil.
5. On meridian  $102^{\circ} 15'$ ; is in sand soil, too, but not of such character as to be swept away by the wind.
6. The boundary line crosses one bend of the North Fork of the Canadian, called here the Rabbit Ear Creek. At the west crossing of this bend a stone monument was erected, near a bluff of the river bed (which has no water here) southward.
7. At the east crossing of the bend on the west bluff is the 7th monument; of stone. This bend scarcely or never has any water.
8. A mound of firm soil on the level plain.
9. Is on the west bank of Union Creek; built of firm & hard earthen soil.
10. West bank of Skull Creek. Of material similar to the last, except that the stake is much larger than usual. There was an astr. station near here.
11. East bluff of Skull Creek. Similar and in sight from No. 10 on the other side.
12. On the open plain; of firm soil.
13. On the smooth open plain where the trail leads off to the north. It is a mound of earth.
14. Is on a flat ascending westward, and near Trout Creek. It is of firm soil. This point brings us fully into the buffalo region. The range of this animal has a very important bearing on the monuments, for wherever it occurs most of the mounds will in a season or two disappear.
15. The northeast corner monument at the intersection of the parallel  $36^{\circ} 30'$  & the 100th meridian. This is a mound of earth, and falls in a drain of a ridge, but not in a position that is likely to be washed away.

#### MONUMENTS ON THE 100TH MERIDIAN.

1. On the north bank of Pond Creek. It is built of firm soil, and the stake in the centre is a large barked cottonwood tree.
  2. Is on a trail made by Maj. Sedgwick and his command in 1860, very near the north bank of Middle River. The soil is just here somewhat sandy, but not light enough to drift.
  3. On Commission Creek, built of stone.
- Southward from this last monument, beginning at the southern b'd'y line of the Cherokee country, mounds of earth are thrown up for every mile to the main branch of Red River. In retracing this part of the boundary line I found that some of these monuments, falling in hollows, had been washed away, and many destroyed by the buffalo. The old bulls tear them up with their horns, and but few mounds or hillocks of any kind can be seen within their range that do not bear evidence of the wallowing of their shaggy heads and necks. All the creeks, bluffs, plains, & ridges, & mountains referred to in the foregoing descriptions of the monuments are laid down & named on the detail maps.

These artificial monuments may be put up with great care of the most lasting material, yet the chances are that all traces of many of them will be swept away in a few seasons; for besides their destruction within the buffalo range, the wild Indians will certainly tear down all they meet with, particularly those made of stone, which will not give them so



much trouble as the earthen mounds. The maps with the note-books are the only real and lasting record of the boundary. The line runs through a country full of striking and prominent topographical features, which can be easily identified; and being referred to in the note-books and laid down on the maps in latitude & longitude, they can be taken as starting points from which, with bearings & distances, the boundary line may be found & retraced at most any place in any time without reference to the monuments at all. Such features are named as follows: *32d parall.* Franklin Mountains, Organ Mountains, Hueco Cañon & Tanks, Sierra Alta, Alamo Spring & Mountains, Cornudas Tanks & Mountains, Crow Spring, Guadalupe Mountains (its southern peak particularly), Independence Spring, head of Delaware Creek, crossing of Pecos & its junction with Delaware Creek, Pope's Wells, small bluffs on Llano Estacado, white sand-hills near the corner (intersection of 32d parallel & 103d meridian). *103d meridian.* Small bluffs, sand belt, lines of rain-water ponds, breaks of Red River, bluffs of staked plain, crossing of Canadian, tips of *of* mountains on the west, chalky bluffs, sand ridge, Rabbit Ear Mountain, near northwest corner. *Parallel 36° 30'.* Head of Mustang Creek, crossings of a bend of the north fork of Canadian, head of Union Creek, crossing of Skull Creek, Kiowa camp ground, crossing of Trout Creek, square mound near northeast corner. *100th meridian.* Crossing of Pond & Commission Creek & of Middle River, head of arroyo, junction of Coral Creek & Canadian River, Antelope Hills, crossing of Washita River, bluffs near north fork of Red River, crossing of north fork, Camp Creek, Arroyos, crossing of Salt fork, bunch of 4 trees on the northern edge of a prairie-dog town flat, natural mounds near Red River (main branch).

2. The "platting" or projection was finished as long ago as the 1st of January, it being done before the drawing & lettering were commenced. The force engaged at present are J. H. Clark, at a salary of \$3,500 per an., without any allowances of any kind in the field or out of it; H. Campbell, \$1,800 per an.; J. E. Weyss, \$1,800 per an.; W. P. Clark, \$1,200 per an., and Wm. Hesselbach, \$100 per month. The last named is temporarily employed in the lettering. It is not possible for me to estimate to the day when I will be ready to turn over all the work of the commission. The astronomy is closed up, and the detail maps I will endeavor to have completed some time in November next.

3. I turn in herewith the general map which has been made of Texas and the adjoining country, and which it is presumed will fully supply all the purposes of a sketch plat and diagram.

4. The "tabular statement" required will be found in the paper herewith sent, marked "A." The aggregate may be slightly modified in consequence of the corrections made in my accounts by officers of the Treasury.

I am, sir, very respectfully, yours,

JOHN H. CLARK,  
Com'r, &c., Tr's B'd'y Survey.

To Mr. J. M. EDMONDS,  
Com'r Land Office, Dept. Interior.

(Indorsed): Ans'd October 3d, '61. Copy sent to G. G. Davis, dep'y collector, Brownsville, Texas, Feb'y 12, 1875. See report to dept. May 10, 1877, in ref. to the proper boundary bet. Texas & U. S. Copy sent Senator Maxey, Jan'y 5, '82. Chief Clerk, Oct 3, '61.



No. 17.

DEPARTMENT OF THE INTERIOR,  
*Genl. Land Office, Oct. 14th, 1861.*

SIR: You have entirely misconstrued what I said in reference to the permanency of the monuments. I could not have stated that I found on retracing the line that monuments built by me had been "obliterated by natural and other causes," for I never retraced any part of the line I had once determined, surveyed, and marked. I do not therefore know anything of the condition of the various monuments put up by me; but as they were of large dimensions and of the most substantial material possible, I believe they will endure the wear of time, wild animals, and wild Indians as well as any monuments ever constructed in the United States to mark boundary lines. What I stated on this point has reference only to that part of the 100th meridian surveyed and marked in 1859 under the direction of the Indian Bureau, and which I retraced in 1860 for the purpose of identifying it.

I repeat that under no circumstances could these landmarks be made more substantial or lasting. That some of them will not remain on the "earth's surface to a distant future" is quite probable; not from the fault of construction or material, however, but from the accident of their position and surroundings. To guard against this very contingency, their accidental or willful destruction, I had the boundary line constantly referred by triangulation to prominent physical objects which can be easily identified, and which will never in all human probability be "obliterated by natural and other causes."

What I endeavored to convey to you in my report bearing on the permanency of the monuments was that even in the event of their destruction, the line could be re-established by a common surveyor without a repetition of the scientific and expensive operations employed in determining the parallels and meridians constituting the boundary.

That the survey has been "long in progress" cannot be asserted with justice, if any regard be had for its great extent and character; and the imputation of unnecessarily protracting it cannot be sustained, nor would it be made by any one having a correct knowledge of the kind and amount of work I have accomplished both in the field and office.

This survey has been a work of the first magnitude. To fix the boundary line 800 miles in length, it was necessary, because of physical obstacles, to make more than 1,400 miles of survey checked by nearly 4,000 astronomical observations, besides many miles of reconnaissance surveys. The office work in addition to the computation of all the astronomical observations consists of the computation of the triangulation, the plotting and drawing of 15 details map delineating the topography along the boundary line in the highest style of the art, and a general map showing the boundary in connection with all the adjacent territories. This map contains besides the topography a list of many important points determined by me in latitude and longitude; and is the only correct representation of all that great stretch of country lying between the meridians 98 & 107 and the parallels 32 & 37, from the timbered regions of Texas and the Indian Territory across the plains to the Rocky Mountains, and from the southern limits of the great staked plain northward to the Arkansas.

It is true as you state that the sum of \$72,550<sup>34</sup>/<sub>100</sub> has been expended on the field and office work of this difficult & extensive survey; but by this statement I do not mean the fact shall be put out of view that I have completed the field work and nearly all the office work, and yet have unexpended about \$8,000 of the appropriation which was designed to



cover the expenses of the field work only. I make no reference to the \$10,000 which was taken by the department and expended for purposes foreign to the survey for which it was appropriated.

If you will compare the expenditure of money and time on this survey with the amount of work done and the geographical and other knowledge furnished—its cost with its results—you will find that, though executed in a scientific & artistic manner, it has been done at an expense to the government per mile that is usually paid for rough and primitive compass surveys.

I have discharged the duty that was entrusted to me on a scale of economy unprecedented in the history of similar expeditions; and I invite you to draw a parallel between the expedition which has been thus executed under my direction and any one similar in organization and object, not only as to number of persons employed, but as to amount of salaries, style of outfit, and every other outlay pertaining to both field and office work.

You state that you are anxious to close my work, and that having a large clerical force applicable to my assistance, you would be glad if they could be made to expedite the completion of my business by diminishing my force. To this I can only reply that I have no use whatever for any clerical force. There are only three persons now employed, and these as topographers. They were in the field as my assistants, and being familiar with the details of the survey, are alone competent to properly execute the topography that remains to be done.

In compliance with your wish that the work be closed by the middle of next month, it shall be prosecuted with that end in view, and be put in as complete a form as the time will permit, though I deeply regret that the results of a survey prosecuted with so much labor and care should be so hurriedly, and I fear so unprofitably, disposed of.

I remain, respectfully, yours,

JOHN H. CLARK,  
*Com'r, &c., Tex's B'd'y Survey.*

To Mr. J. M. EDMUNDS,  
*Land Com'r.*

No. 18.

DEPARTMENT OF THE INTERIOR,  
GEN'L. LAND OFFICE,  
Jan. 10, 1862.

SIR: In sending the invoice my only purpose was to inform you as to what constituted the archives of the commission. The astronomical work, as I reported, is finished and is ready to be turned over. The geodetic part of the survey is also all complete, except the maps.

I have so far progressed with the maps, however, as to be able to state that I can get them in a condition to show an intelligible delineation of the boundary line in about six weeks—say some day during the last week of February next, when they also will be ready for transfer.

Yours, respectfully,

JOHN H. CLARK,  
*Com'r, &c., Tex's B'd'y Survey.*

To Mr. J. M. EDMUNDS,  
*Com'r Land Office, Interior Department.*

(Indorsed :) See letter to Sec'y Int'r, of Jan'y 13th, 1862. File with Texas b'd'y papers. Rec'd Jan'y 11, '62.



No. 19.

DEPARTMENT OF THE INTERIOR,  
Washington, Jan'y 16th, 1862.

SIR: In answer to your communication of 13th instant, I have to state that in my judgment it will be best at once to terminate the Texas Boundary Commission, and require a transfer of all the papers & documents, and all property belonging to the U. S., and used in that service, to the General Land Office.

Very respectfully, your ob't serv't,

CALEB B. SMITH,  
*Secretary.*

The COMMISSIONER OF THE GENERAL LAND OFFICE.

(Indorsed:) See letter to John H. Clark, Texas boundary com'r, Jan'y 17, 1862

No. 20.

DEPARTMENT OF THE INTERIOR,  
Gen'l Land Office, Jan. 20th, 1861.HON. C. B. SMITH,  
*Secretary of the Interior:*

SIR: I have received a copy of your communication of Jan. 16th inst. to Mr. Edmunds, Land Comr., directing that the work of the Texas boundary survey be terminated at once without reference to its unfinished condition. It is not my purpose, in thus addressing you, to obtain a reversal of your decision, but simply, in justice to my feelings and my self-respect, to repel the accusation of Mr. Edmunds, upon which it appears your judgment is based.

Mr. Edmunds says that the balance on hand, Dec. 31st, 1861, is \$4,800, and that the time I have fixed to complete & transfer the work "will probably absorb the whole appropriation." This statement is as erroneous as the implication is unjust. The balance unexpended of the appropriation of \$80,000, Dec. 31, 1861, is \$7,017, and not \$4,800 as stated by Mr. Edmunds, and the time fixed by me would have absorbed only about \$1,000. Deducting this sum from the amount on hand Dec. 31, '61, I would have completed the office as well as the field work, and returned to the department a surplus of about \$6,000, besides the property on hand, out of the appropriation which was designed to cover the expenses of the field work only. This inaccuracy is in accord with the course of the Land Office towards my work, which it has never given itself the trouble to examine, and cannot therefore appreciate its scientific merit or practical bearing.

I was exceedingly anxious to finish a work I had prosecuted with so much labor and with such success; and in transferring it thus, must respectfully protest against being held responsible for its unfinished and unavailable condition.

I remain, respectfully, yours,

JOHN H. CLARK,  
*Comr., &c., Texas Bdy. Survey.*

DEPARTMENT OF INTERIOR,  
*Gen'l Land Office, Jan. 21st, 1862.*

SIR: In obedience to the direction of the Secretary, issued at your suggestion, I have to state that I am ready to transfer the archives and property of the Texas boundary survey. In consequence of that suggestion, upon which the Secretary's action is based, I am constrained to address him a letter, a copy of which is inclosed.

Respectfully, yours,

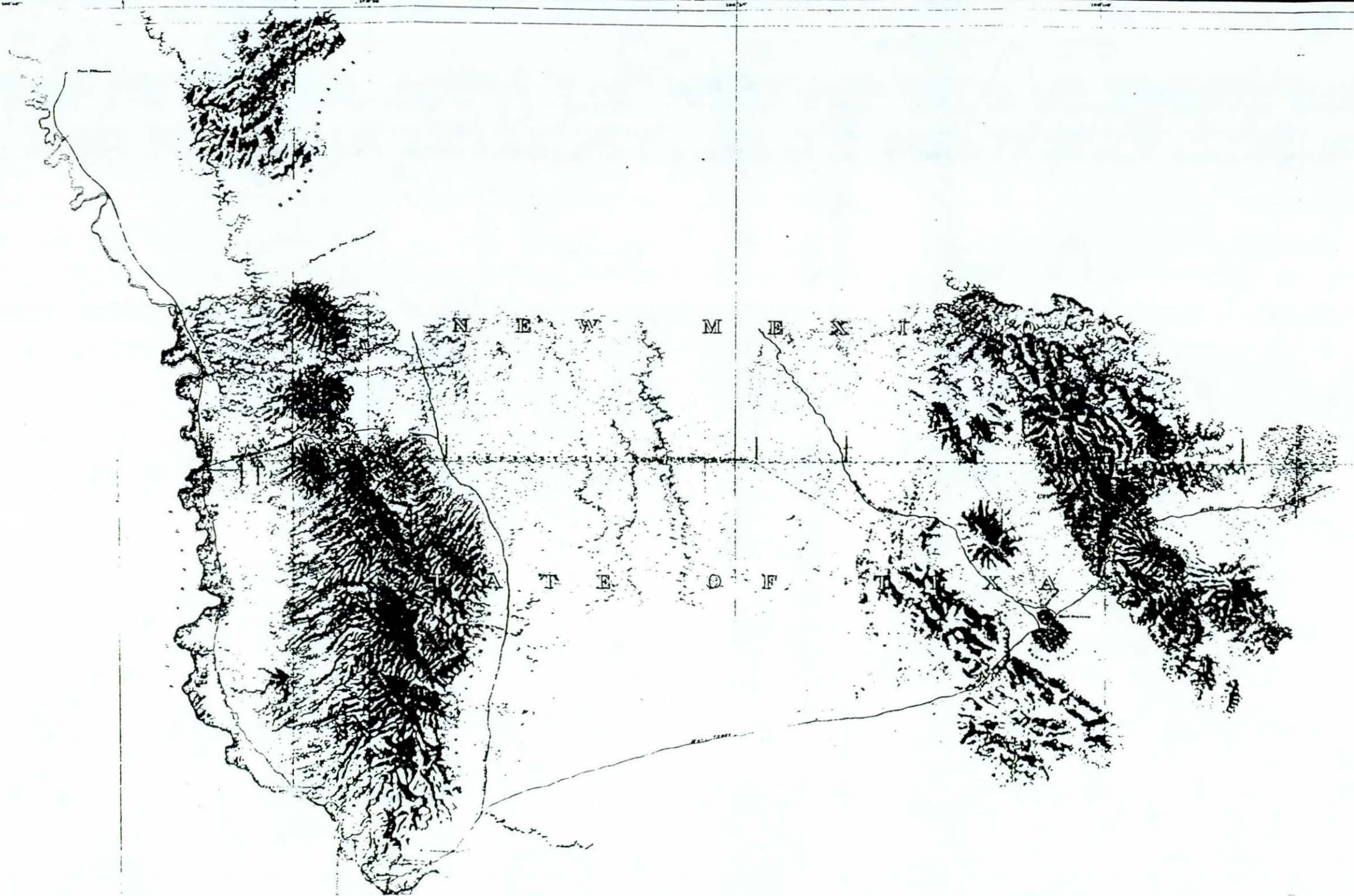
JOHN H. CLARK,  
*Comr., &c., Texas Bdy. Survey.*

To Mr. J. M. EDMUNDS,  
*Comr. Land Office, Dept. Interior.*

(Indorsed:) See letter to Mr. Clark, of Jan. 24th, 1862. Referred to Dr. Brown, Jan'y 30, '62. Rec'd Jan'y 24, '62. Bloss.

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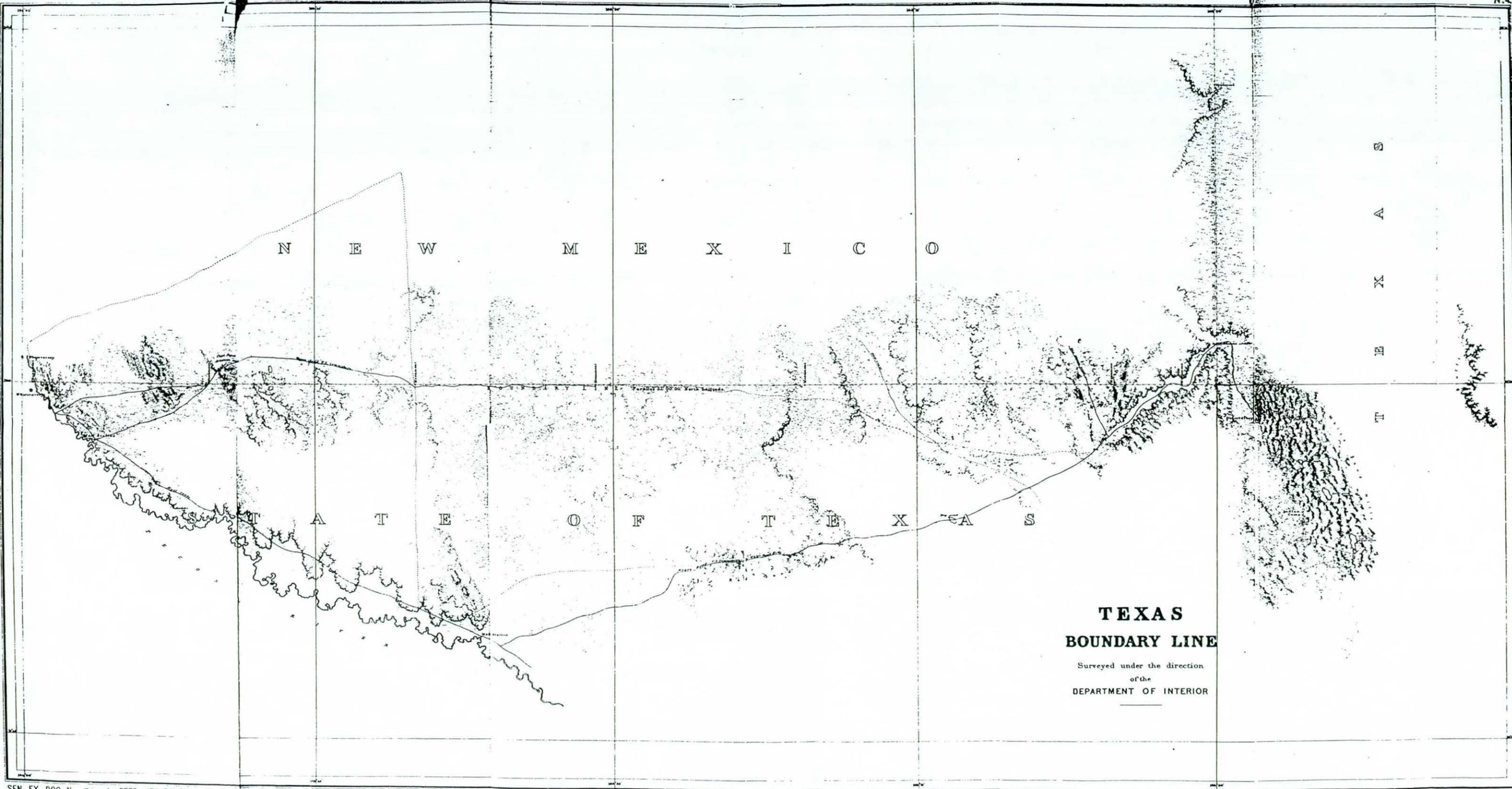




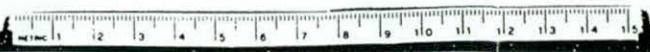
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**BOUNDARY LINE**  
Surveyed under the direction  
of the  
DEPARTMENT OF INTERIOR



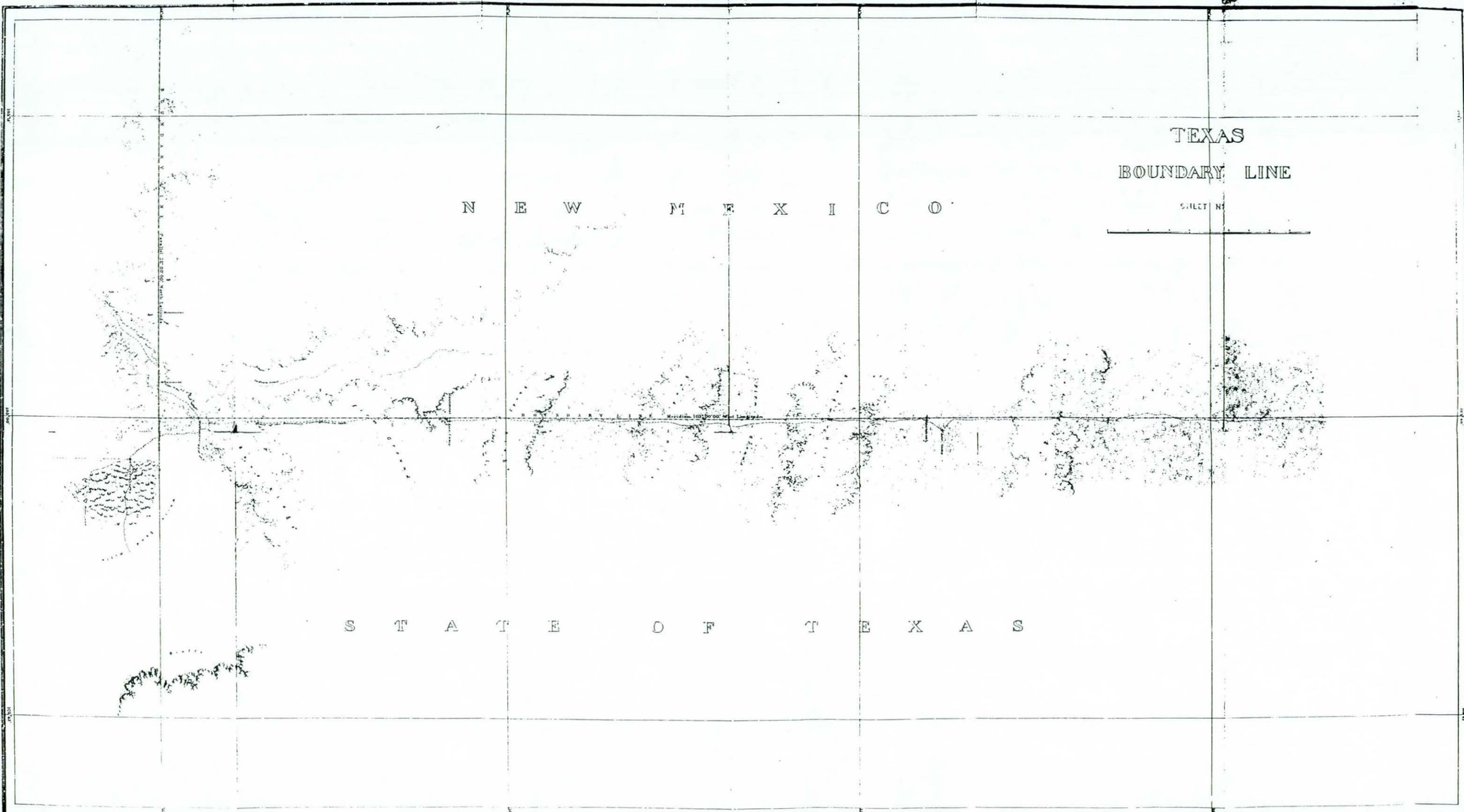




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 of the  
 DEPARTMENT OF INTERIOR

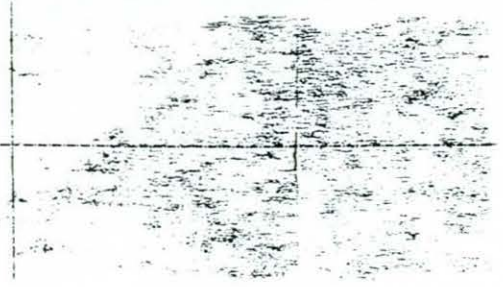
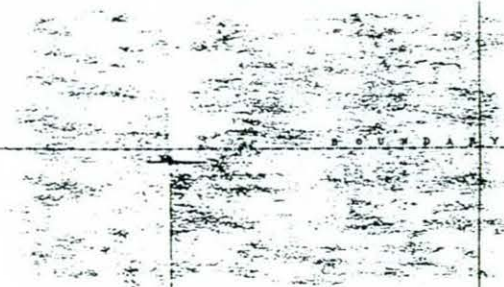








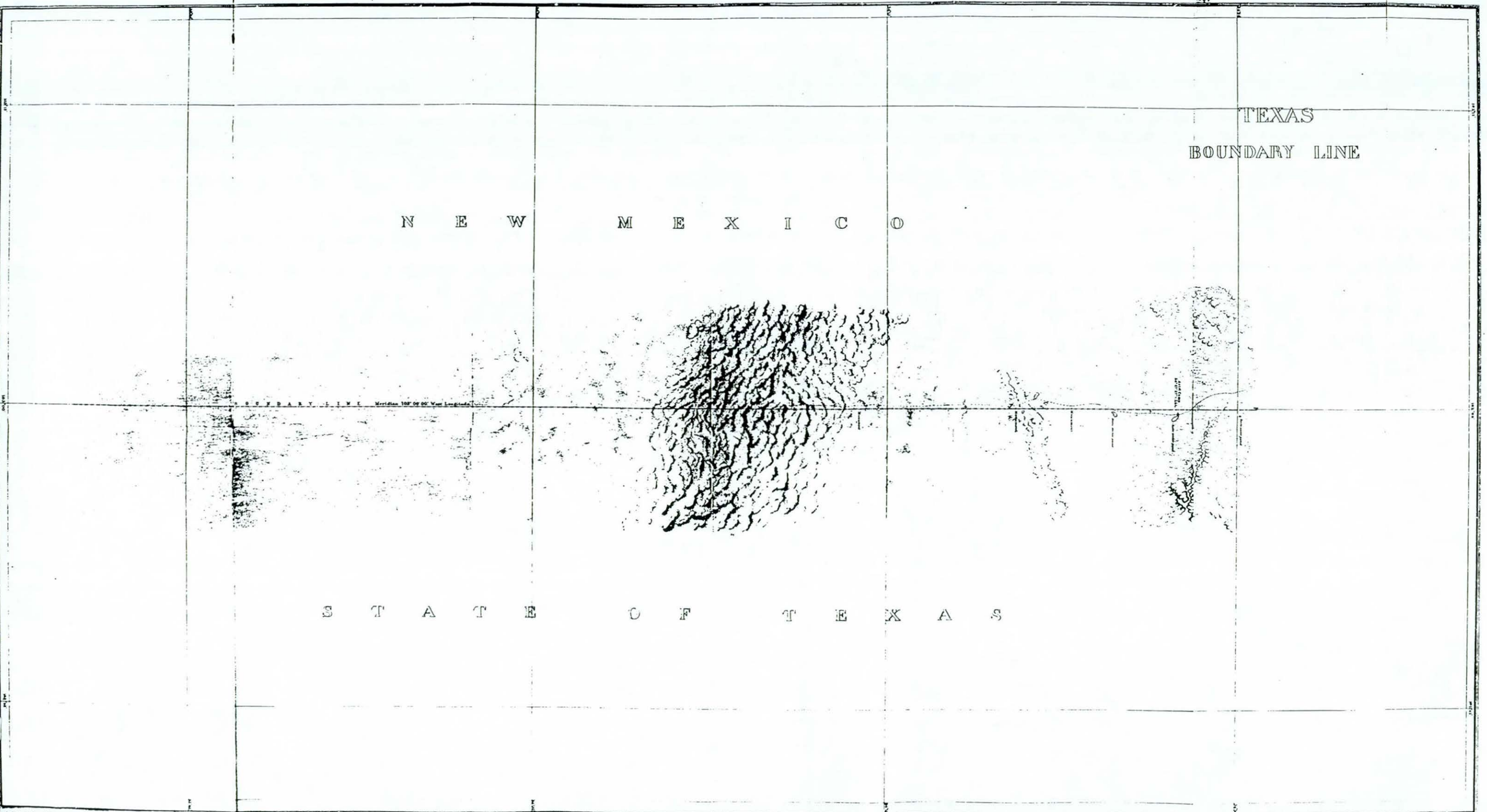
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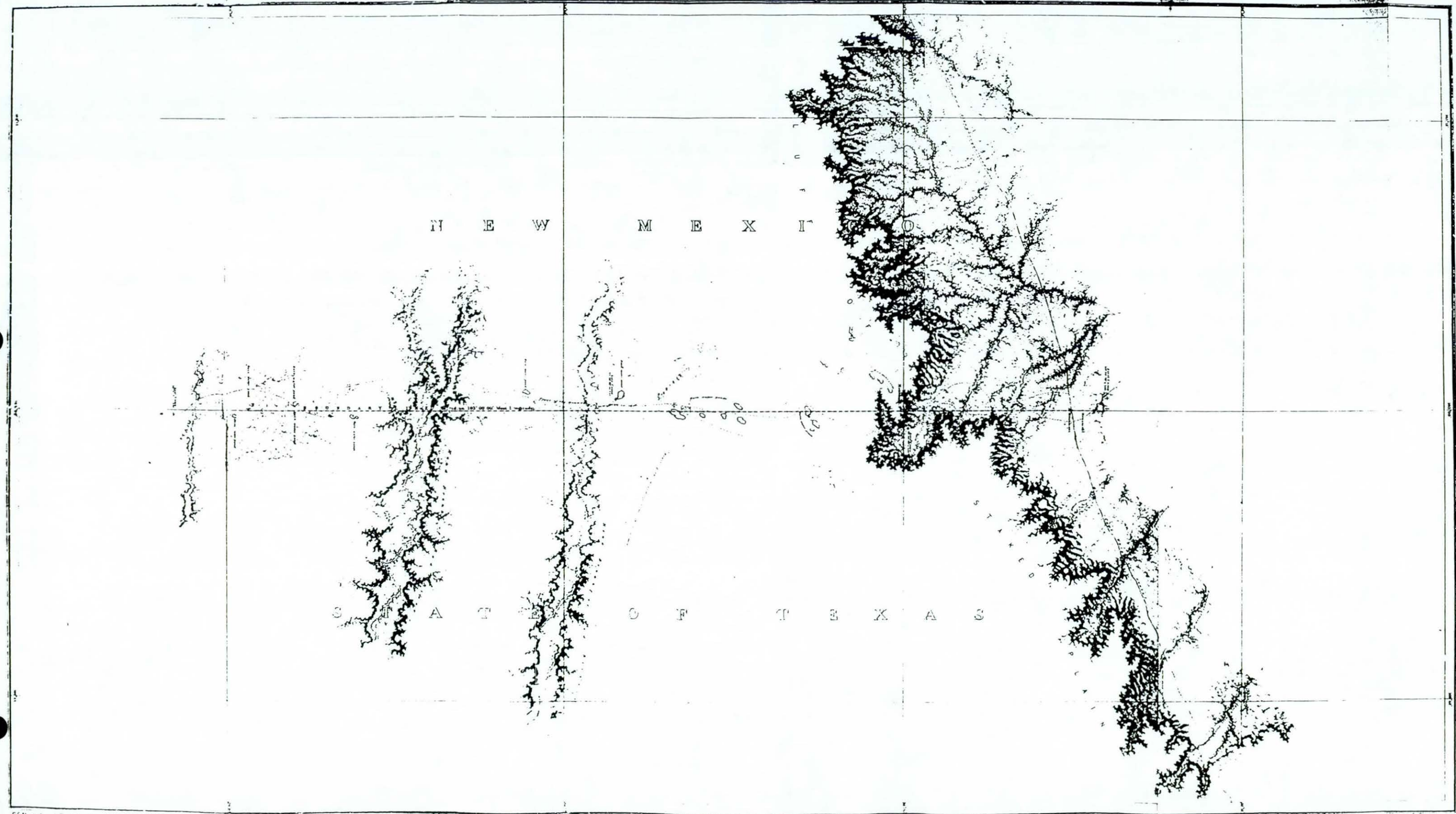
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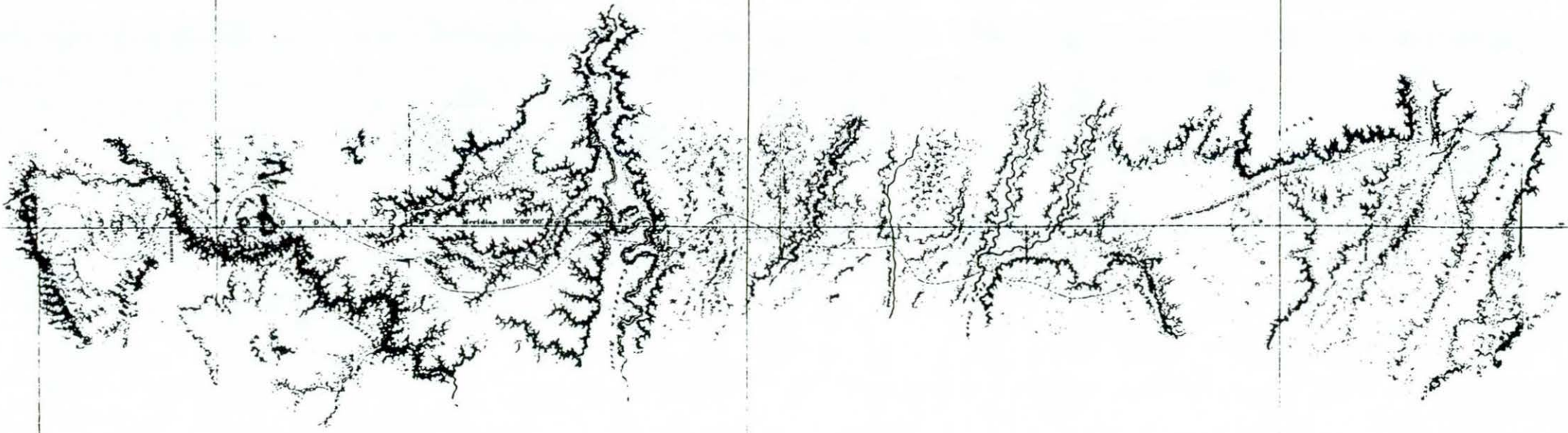
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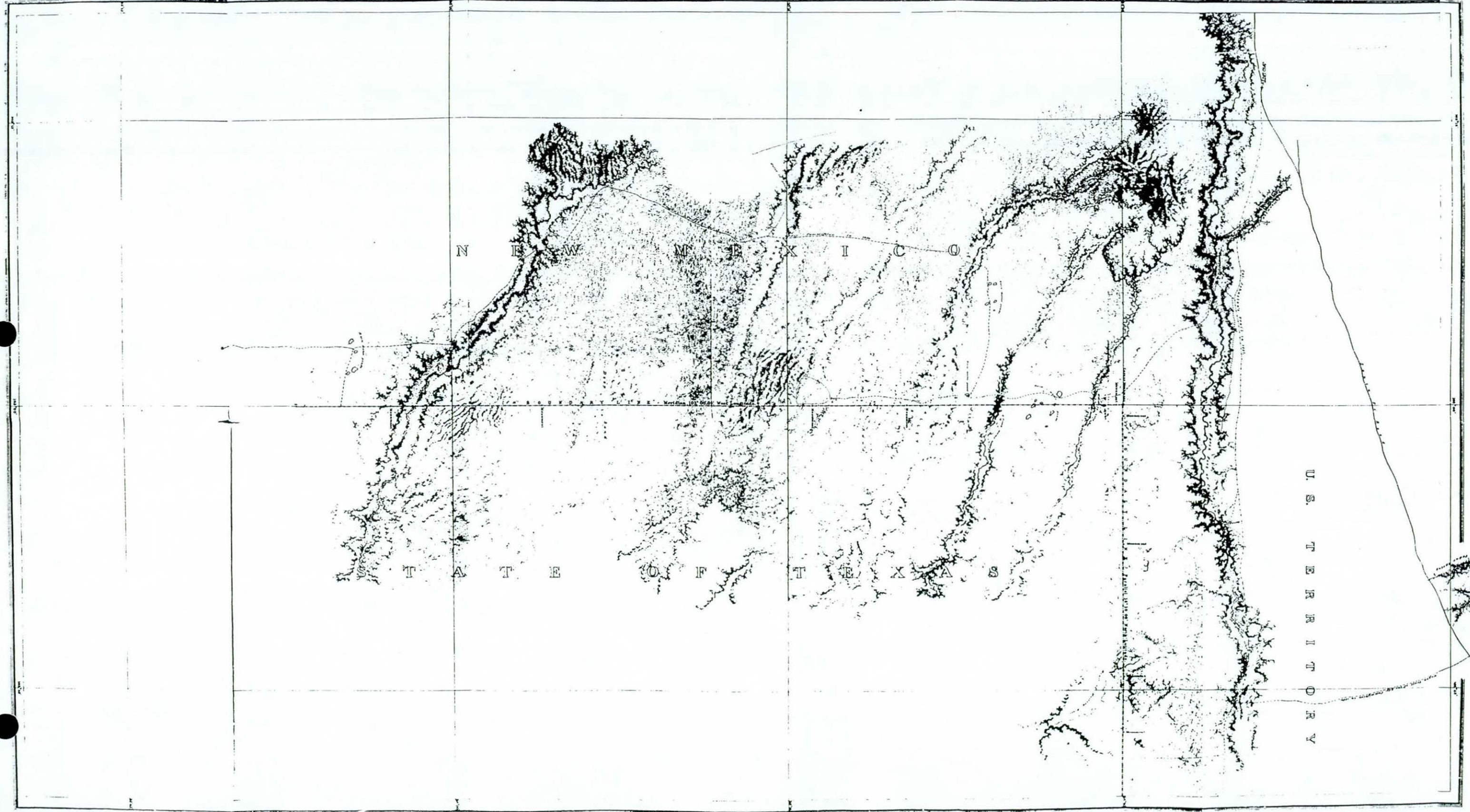


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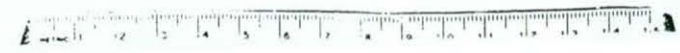
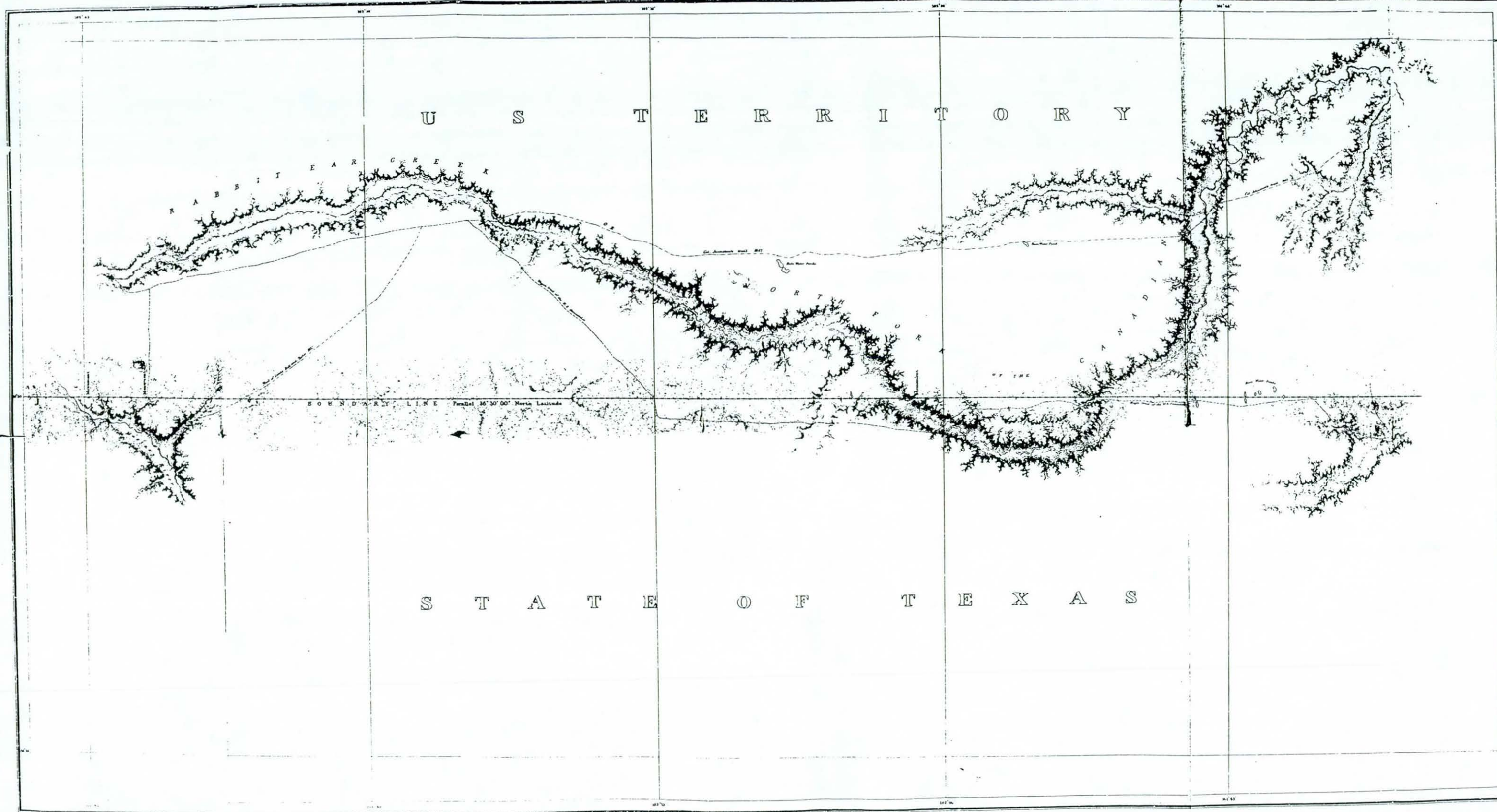


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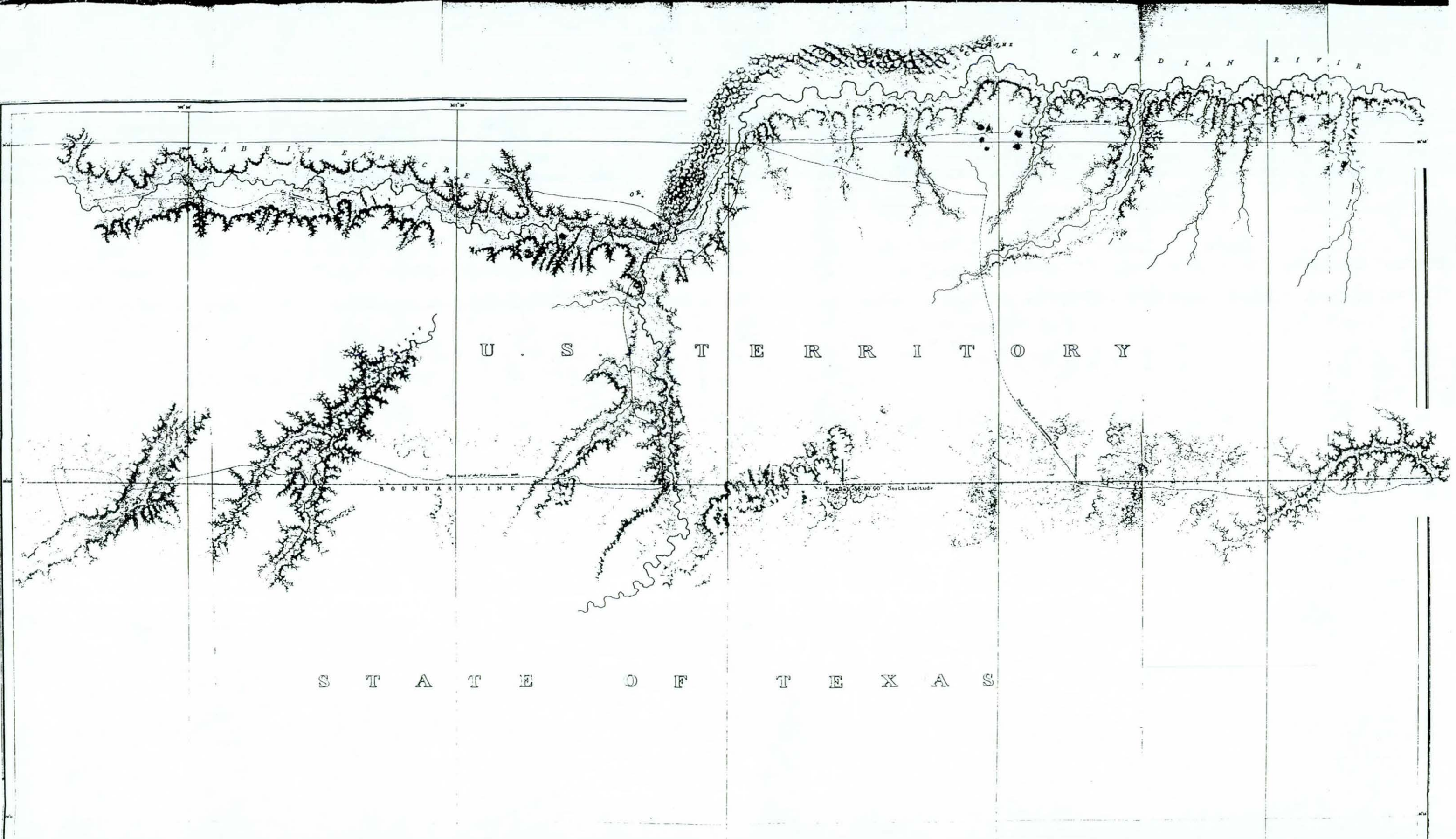




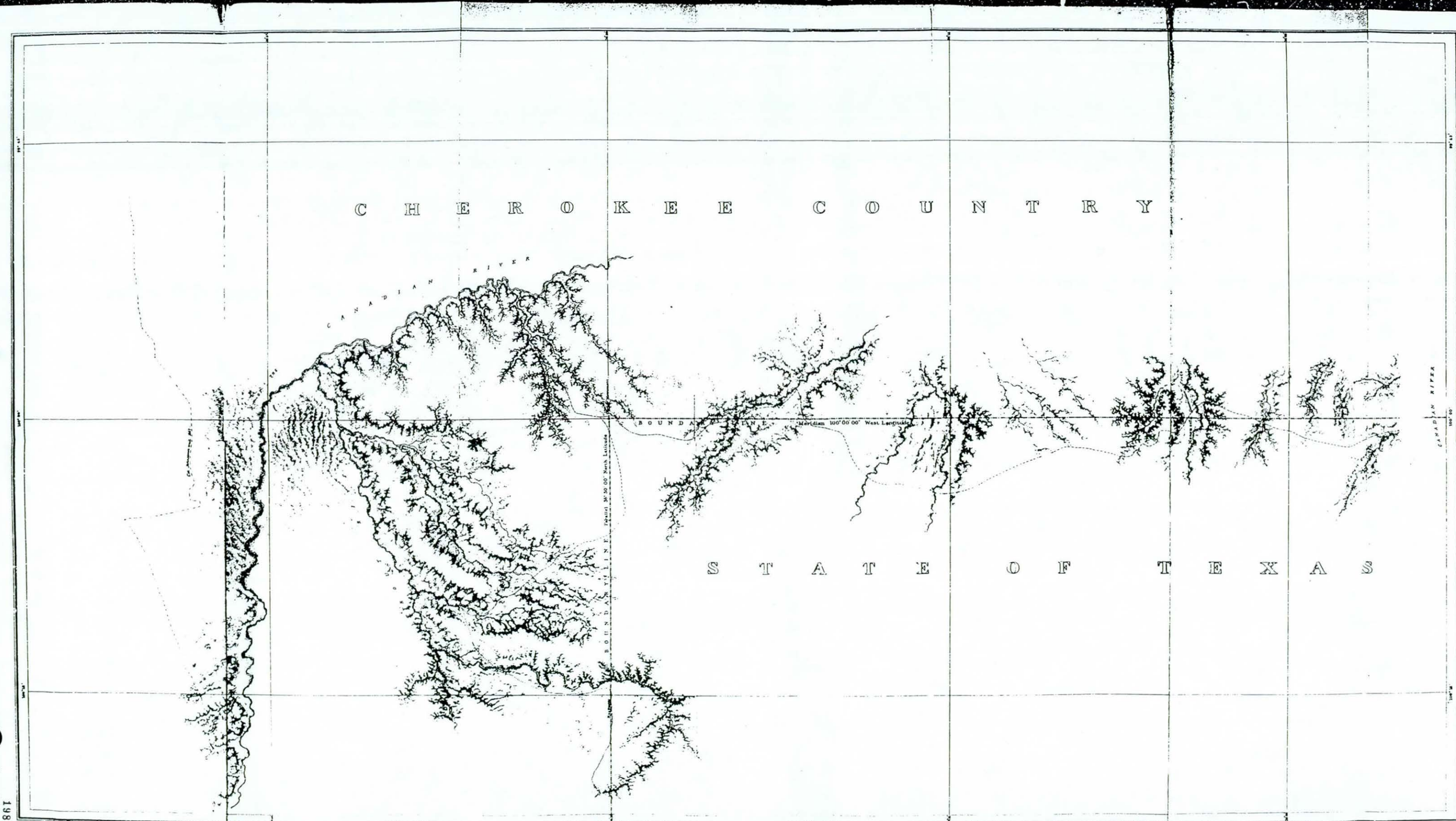










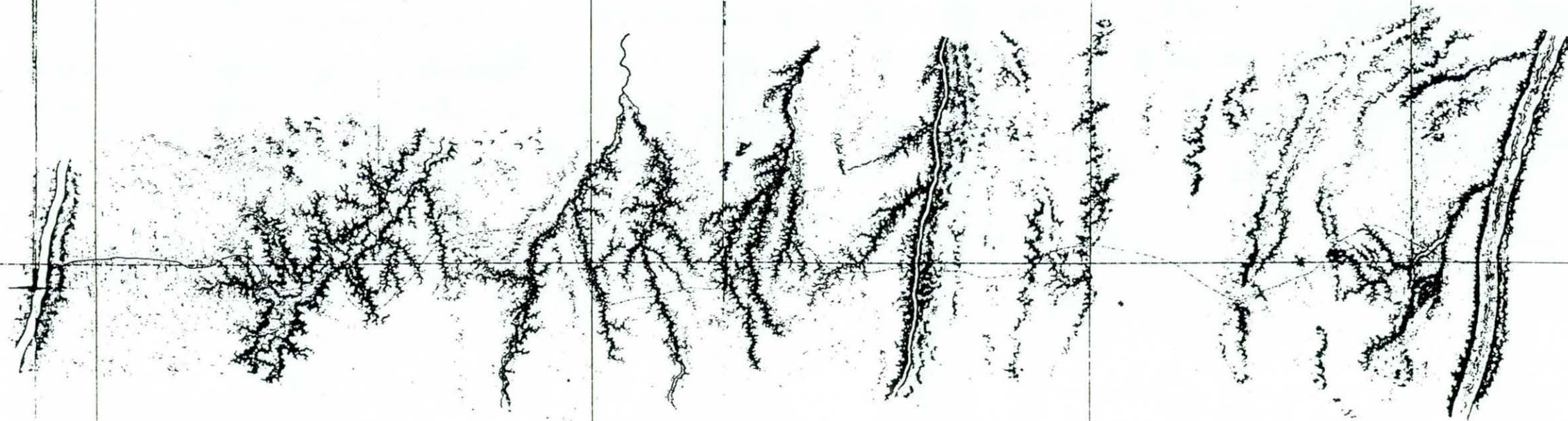




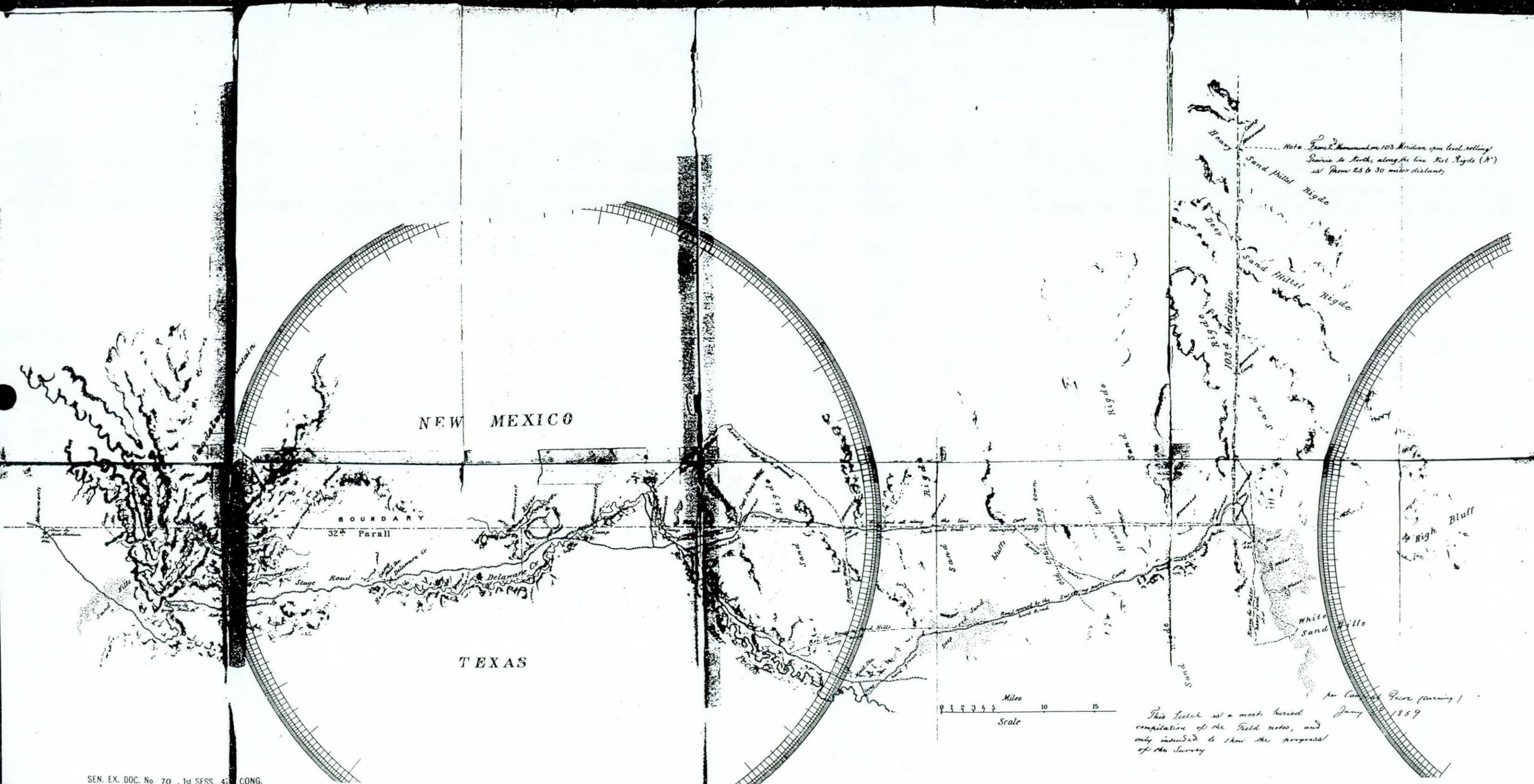
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