

Received 12th April 1866

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First Page of Book)

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Oakland Alameda Co Cal.
December 29th 1865

To the

Hon James M. Edmunds.
Commissioner of General Land Office

Sir;

I have the honor to transmit to your Office this book (Copy N^o: 2.) of Observations Reductions Discussion of Final Results and Field Notes: being an authentic Report of the proceedings attending the location, survey & demarkation of the Oregon & Washington Boundary, between the Columbia & Snake Rivers

Very Respectfully Submitted
Daniel G. Major.
Astronomer & Surveyor.

A list of the names of persons assisting in the location, survey, and marking of the Oregon and Washington Boundary, between the Columbia and Snake Rivers.

Daniel G. Major. Astronomer & Surveyor.
Frederick G. Hesse Observer at First-Station
P. C. Harnway Recorder " " "
John Major. Superintendent of Monuments
George Perin Chairman
Henry Boyer " "
W. Manning " "
William Henry Axman
William Hawk & W. Wood Flagmen.

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Affidavits

I, Frederick G. Hesse, Astronomer, do solemnly swear that I have made and reduced the principal series of ^{observations} taken on Cottonwood Creek, Oregon during the months of November and December 1863. and that every care and diligence was used in the field, for the correct determination of the 46th parallel of North latitude. I further certify to the best of my knowledge & belief that the requirements of the contract entered into between The Honorable Commissioner of the General Land Office and D. G. Major dated Washington D. C. April 25th 1863. have, with regard to the number & character of the astronomical observations, been more than complied with.

F. G. Hesse.

Subscribed by said Frederick G. Hesse Astronomer, and sworn to, before me a Justice of the Peace for the County of Alameda in the State of California this 29th day of December 1865.

Geo. H. Gogg
Justice of the Peace

I John Major do hereby certify that I have assisted D. G. Major, Astronomer & Surveyor to determine run & mark the 46th parallel of latitude between the Columbia & Snake Rivers; and to the best of my knowledge & belief, the boundary has been well deter-

mined & surveyed, and good substantial monuments have been built at the termination of each mile and half mile from the Columbia River to Mill Creek in the Blue Mountains. I do further certify that it was impracticable to chain and establish mile monuments through the Blue Mountains, but the Boundary Line has been faithfully marked through, by cutting through timber, blazing & marking trees and building durable stone monuments on the prominent ridges and important points through to Snake River.

John Major

Subscribed by said John Major, and sworn to before me a Justice of the Peace for the County of Alameda in the State of California this 29th day of December 1865.

Geo. F. Gogg }
Justice of the Peace }

I, Daniel G. Major, Astronomer & Surveyor do solemnly swear that I have truly, faithfully and impartially executed to the best of my skill & ability the observations, calculations & surveys mentioned in the Contract entered into on the 25th of April 1863. between James M. Edmunds Commissioner of the General Land Office & myself, so far as it was possible to carry out spirit and letter of Instructions forming portion of said contract. And I further swear that I have made and caused to be made more than double the number of observations agreed upon, in order to get the most reliable results for Latitude: That the measurements & chainings were carefully made and in all cases of doubt repeated.

Deeply marked, durable posts were erected in every instance where they were to be had, without regard to expense incurred or labor expended. The monuments were all of larger size than required by the terms of contract. After putting in the 42 mile monument it was not possible to ^{continue} make accurate measurements with chain or to erect monuments at the end of each mile but they were erected as the field notes show on all prominent ridges: &c. I hereby certify that this is a correct report of observations, calculations & Field notes.

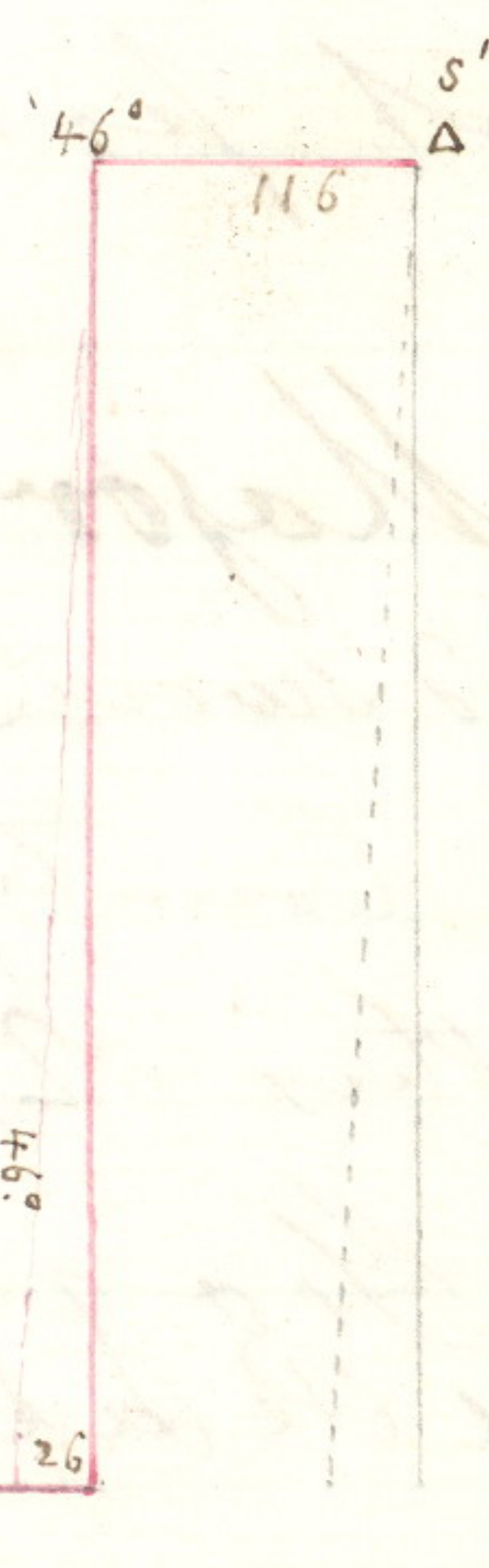
Daniel G. Major. Astronomer & Surveyor

Subscribed and sworn to by said Daniel G. Major
Astronomer and Surveyor, before me a Justice of the
Peace for the County of Alameda State of California
this 29th day of December 1865.
Geo. F. Gogg, Justice of the Peace

Discussion of observations made at First Astro-
nomical Station Cottonwood Creek Oregon
and Second Astronomical Station Columbia
River Washington Territory; for the determination
of the eccentricity of the Sextant; —

the corrections to be applied to the results
deduced from the various altitudes of the
objects observed:—and

The most probable results for the position
of the Stations.



Measured North from ^{First astronomical station on} Cottonwood Creek
116 chains of 33 feet. Then ran West on tangent 35
miles to Columbia River; thence north 131 chains of
33 feet to second astronomical station. Difference
of tangent from Parallel 46° in 35 miles = 26 chs of 33 feet

Difference of Latitude between S¹ and S² = 221 chs of 33 feet

$$221 \times 33 = 7293 \text{ feet} \quad \log \quad 3.8629060$$

$$3600 \quad 3.5563025$$

$$364635 \text{ ar. comp} \quad 4.4381416$$

$$\text{The measured distance betⁿ stations} = 1' 12'' .0 = 72'' .00 \quad 1.8573501$$

$$\text{Correction for Eccentricity} = e \sin A (1 - \cos B) + e \cos A \sin B.$$

| Object | Weight | Latitude | | 1 - Cos B | | sin B | |
|----------------------|--------|---------------|---|-------------|---|-------------|--------------|
| * Polaris | 86 | 45° 59' 48".8 | + | e sin A 322 | + | e cos A 735 | = l' |
| * Polaris | 76 | 46 01 03.5 | + | " 289 | + | " 703 | = l' = l + 2 |
| Sun | 90 | 45 59 17.9 | - | " 084 | - | " 401 | = l |
| Sun | 139 | 46 00 05.1 | - | " 537 | - | " 886 | = l' |
| α Virginis | 68 | 46 00 15.1 | - | " 166 | - | " 552 | = l' |
| Saturn | 35 | 46 00 05.6 | - | " 253 | - | " 665 | = l' |
| α Bootis | 34 | 45 59 46.0 | - | " 560 | - | " 898 | = l' |
| α Tauri | 16 | 45 58 58.6 | - | " 503 | - | " 867 | = l' |
| α Pegasi | 13 | 45 58 51.8 | - | " 477 | - | " 852 | = l' |
| α Urse Majoris SP 12 | 12 | 45 59 25.5 | + | " 052 | + | " 318 | = l' |
| β Ceti | 11 | 45 59 23.8 | - | " 096 | - | " 427 | = l' |

* vide pages 73 and 108.

1864
 June 30 proceeding E. a chain, the line passes 50 links south of ledge of rock. this ridge is covered with loose stone and is very precipitous ^{down} to creek; line in 16 chains enters timber, blazed pine 18 inches diam "W" also one 2 1/2 feet diam "O". thence through timbered bottom, blazing & marking many trees close to Boundary, in 21 chains Mill Creek 50 links wide a rapidly flowing Mountain stream of excellent water. bottom narrow and densely covered with large timber & undergrowth. Course of Creek W.S.W. ~~from~~ E.N.E. ascend bluff bank and timbered Mt side in the distance of 55 chains, cross a succession of three steep ridges cut by deep ravines, with flowing water from S. & S.S.E, blazed & marked trees enroute. At 46 miles erected a Monument of stone on back bone of ridge descending to W. of N. Post a fir 9 inches diam properly trimmed & marked. Blazed & marked a fir with "O". dist. 40 links south of mound; also the nearest tree (a fir) 75 links north, "W". Thence line traverses north side of main ridge, crossing several lateral ^{spurs &} ravines and the whole covered with sparse pine & fir timber. Almost perpendicular descent to a main branch of Mill Creek putting in from south 20 links wide, distance 30 chains. Passing through much dead timber in this ravine, ascend rocky side to steep ridge, Boundary crosses ^{main branch} about 1/3 mile from Mill Creek, passing into pine & fir timber. 56 chains thence north of steep rocky bluffs, and up north side of ridge through timber, blazing & marking many trees adjacent to line. 47.60 erected a stone monument on prominent back-bone of ridge, planted a heavy pine post properly marked in deeply cut char-
 Could make pits ^{thence} ~~we~~ pits because of rocky formation. ^{deposite charcoal} acters. blazed and marked 2 trees below post, "W". also two "O". Bearing to Cone of Mt. top N 55° 14' W. dist 60 miles. Conical Mound S 33° 17' W. dist 5 m. Sharp point of high ridge N 7° 44' E. dist 8 m. Rocky mound on ridge dist 55 Chs. S 81° 13' E. Thence Boundary crosses ridge and traversing steep side of mountain enters timber and

46 M

46 3/4 M

47 3/4 M?

1864
 July 2 ascends bluff with timber thence up to ridge top. and large
 monument of stone with a heavy resinous post
 durably marked on N, "W." on S, "O." on E, "46" I 1864
 next the same. This point was established from position
 of instrument at monument 44^m.50 ch. so also were
 all the posts between the two. Distance by careful
 measurements of angular distances = 3^m.70 chains.

48 1/2 M. The position of this monument is perhaps the most
 prominent on the Boundary. It is situated on a
 very narrow ridge bearing ^{5600 feet high} N & S. the "divide" between
 Mill Creek and a north east branch of Walla Walla River
 The former Creek is formed from a large basin with numer-
 ous tributaries in the ravines leading down from all directions,
 There is a faint trail along this ridge: but rather dangerous
 for man or beast. 1/4 mile south of monument passing through
 some timber, the ridge is more elevated and wider.

Bearing to Mount St. Helens ^{distance 200 miles} N 84° 08' W. To rocky cap of con-
 ical mound N 57° 11' E. dist 6 m. To conical top of mountain
 S 70° 35' E. dist. 1 m. Small Island in Columbia River N 74° 27' W.
 dist 45 m. To timbered peak of Blue Mts. S 50° 22' W.
 dist. 35 miles. The view from this point is very extensive
 the Walla Walla valley, Columbia River, Yakama Mountains
 and in the far distant Western horizon, rise up the
 Mountain Peaks, ^{Hood} Adams St. Helens & Rainier
 due South & S. W. the country is ^{covered with snow clad.} mountains.

and snow clad

July 5 N. N. E. & E. near & higher mountains. Leaving this
 monument descend rapidly ^{through snow banks} into a large deep basin
 much similar to the Mill Creek basin. Line passing
 down through timber, in 20 chains crosses rocky top
 of abrupt projecting mound, thence down steep side of
 rocky ridge to bottom with small creek along
^{dist 7 1/2 chs} S. a tributary of the Walla Walla, ascend steep rocky
 side of mountain for 1 1/4 miles to monument of stone

50.52^{ch} M Erected heavy 7 foot ^{long} 12 in. square fir post. properly marked.
 Blazed & marked a stunted fir tree 2 feet diam. "W"
 distance 4.5 links, direction E. N. E. also marked "O." on
 fir 18 in. diam. dist. 55 links. direction E. S. E. Top of high
 peak N 25° 50' W. dist. 1 1/2 m. Projecting rock near top conical
 mound N 16° 26' E dist. 1 1/2 m. Highest peak S 10° 51' E. dist. 28 m.

1864

July 8.

51.48^m chs

Elevation of this ridge by barometric measurement 5900 feet above mean sea level. The same ridge further south is higher. in 1 1/2 chains line enters woods and through patches of dead timber and crossing ridge in 30 chains elevation close to 6300 feet continues through fir & tamarack ^{cutting} blazing and marking many trees, descend to small ravine with water flowing S & SE tributary of Walla Walla. thence up steep mountain side covered with dead & fallen timber to top of ridge near the W.S.W. highest point. Erected a large fir post, trimmed and durably marked as usual. Deposited at its foot a quantity of charcoal. Built a most durable stone, circular, monument marked a lone fir tree 3 feet in diam. and 15 links south "O." "1864". This is the dividing ridge between the waters of the Walla Walla & Columbia River and the waters of Grande Ronde River & Snake R. Bearings to high Cone N 66° 18' E dist 10 miles. To sharp peak of double headed Mt S 51° 09' E. dist 40 m. Small Mt. peak S 7° 40' W. dist 40 m. From high mound on preceding ridge the line is seen to traverse a heavily timbered country running east crossing a large stream from S.W. thence over bare mountains ^{country} to the Snake River. Proceeding east on Boundary line descend along steep south side of rocky ridge, through sparse timber. about 12 chains cross small stream ^{later} in same course E by N. then ascend ascent N.E. decline of E & W. rocky ridge, cross it through timber and 2 1/2 chains E & below bold peak. blazed & marked many pine & fir trees, with "W" or "O" thence steep descent, cross point of ridge & down to N.W. branch of Grande Ronde River. a rapid mountain stream, hemmed in by high bluff ridges: 60 links wide and about 3 feet ^{course S.} deep. It is impassable either up or down having shelving Mt bluffs on either side and much huge fallen timber & rocks in the stream; about 2 miles south it turns abruptly to the East. It is not possible to follow the line up the mountain side East, it being exceedingly precipitous and being a succession of rocky perpendicular palisades from last monument established point of next forward station on

52 1/2 Miles

1864
 July 11
 54 1/4 M. Top of ridge 54 miles 21 chains. Erected a fir properly marked. Deposited charcoal. Built a very substantial circular, stone monument 5 feet high. Bearing to conical ridge top dist. 2 1/4 m. S 77° 12' W. To top of Mt. dist. 4 1/2 m. N 48° 26' W. To top of Mt. S 30° 50' E dist. 1 m. To ledge of projecting rock dist. 3/4 m. N 38° 32' E. This ridge is very narrow at top and leans down S. to creek. Descend steep side of ridge covered with fine stone, enter fir & pine timber with undergrowth 25 chains to rocky ravine with water running south. then ascend steep stoney hill, line passing through edge of thickest timber, blazed & marked several fir, spruce & pine thence through break in timber and through small skirt of timber near top of ridge, in 55. 15 ch reached back-lane of ^{narrow} ridge near its sudden decline to S. Erected spruce post 7 feet long & 11 inches diam. Marked as usual. Erected a large & substantial stone mound. ^{circle & tapering to post in center.} Top of sugar log Mt. N 60° 12' E dist 15. m. Top of bald conical peak N 17° 38' W. dist 2 m. Projecting rock S. 64° 55' E. dist 3 1/2 m. To two small trees on bare side of Mt. S 37° 33' W dist 4 1/2 m. Thence line passes down steep ravine with timber, crossing steep side of rocky bluff and in 18 chains reach creek flowing S. 16 links wide good volume of water. coming from two branches N.E. & N.W. ascending steep rocky Mt side, through sparse timber, to ridge bearing south, with sparse stunted firs and also grass wood. ridge narrow & generally bare. ^{to 56. miles 60 ch} Planted a fir post of usual size & marking. Built circular stone mound about it. A stunted fir tree 2 feet diam. dist. 15 links N. by W. marked "W". Similar tree 50 links S.W. blazed & marked "O". Bearing - Center of rock on side of ridge 1/3 distance down. N 39° 27' W. dist 80 chs. Highest point of conical top of ridge S 29° 27' W. dist 5 m. Small bare spot on heavy timbered range S 39° 32' E. dist. 5 m. Descend 4 chains & enter timber, blazed fir 3 1/2 feet diam & marked "W" also fir 20 inches diam. marked "O". then ^{continue down} descend through timber 10 chains, cross small creek in ravine, bearing S. over fallen & dead timber ascend steep rocky side of mountain through skirt of timber and undergrowth to station on side of ridge and edge of narrow line of timber thence 5 ch to bald top of ridge, line begins to descend to steep

to be 25 chains wide. The channel is on the Idaho side about $3\frac{1}{2}$ chains from the shore. The current is very rapid and the river is hemmed in by high rocky mountains which descend very abruptly. Continuing the line across the river to the Idaho side, passing up from beach in a few chains would divide a mining camp cropping about the center of the sluice boxes & dams. There are many men washing gold from the river bar and making excellent wages. Thence up beach the line would divide several small spots on the side of ridge that the Indians use pieces have enclosed & cultivated. The pine post in terminating monument was obtained from a group of 12 dozen pines situated in a narrow bottom to river on Oregon side about 20 chains south of Boundary. Marked on the most westerly of the number, the letter "O" with blaze above and below it. The Boundary is about 30 miles south of Lewiston by very difficult trail along the river bluffs. The mouth of Grand Ronde River is by trail 6 1/2 miles north. The distance from the channel of Columbia River to the channel of Snake River along the 46th degree of Latitude is 97 miles & 35 chs.

August 30. 1864.

Daniel G. Major
Astronomer & Surveyor.
Oregon & Washington Boundary

Department of the Interior
General Land Office
February 6th 1866.

The foregoing field notes of the survey of the Oregon & Washington Boundary on the 46th parallel of North latitude from the Columbia to Snake Rivers, together with astronomical observations, reductions and discussions of final results, executed by Daniel G. Major, Astronomer & Surveyor under his contract of April 25th 1863, having been examined, they are hereby approved.

J. McDermott
Commissioner