

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.

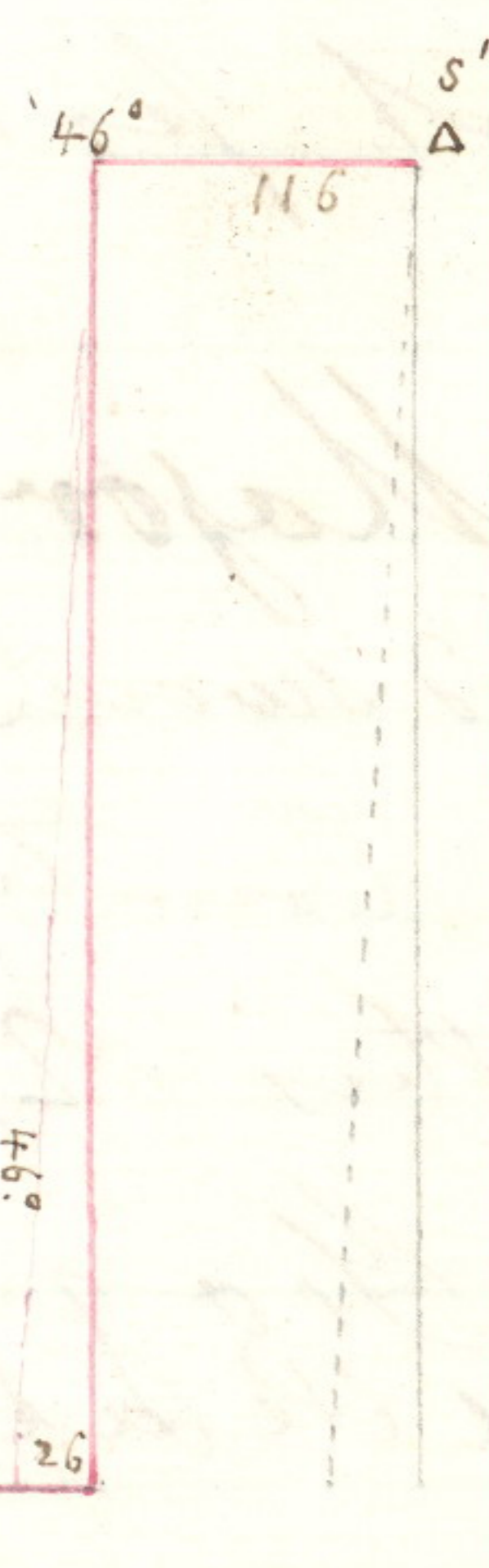
Daniel G. Major. Astronomer & Surveyor

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 21.

1/2 M

Center of projecting rocks S 46° 12' E. distant about 15 chains
Erected an 8 foot tamarack post 12 inches square. Trimmis
and finally marked. It was very difficult to erect mind
as the place is rocky with thin covering of soil.
Ascending along slope, cross head of ravine and through
scattered timber blazed & marked some pine trees near
the boundary. 12 chains small dump on top mountain
thence through pine & tamarack - 36 chains cross wood road
on top ridge of mountain course N 45. Thence through
dense undergrowth and woods to 40 chains. Cut top off tamarack
tree, left stump 3 feet high. Properly marked, also
blazed & marked "O" two trees, within a few feet of Post and also
one north with the letter "W". Thence the line passes
through wooded tops of mountain, the dividing ridge
between Mill & Russell Creeks. Blazed many trees
along the line. 60 chains edge of descent to Mill Creek.
Descending about 78 chains line crosses small ledge of
rock abutting from hill side. 79.50 to large pine 15 links
diameter. Blazed and marked "W". Thence to 80 chs. built stone
mound. marked stone slab on top 40 M. 1864
46° E. Bearing to large ^{Pine} blazed & marked "W" N 86° E dist
2 chains Bearing to one of two dried firs S 77° 30' E dist 60
links, blazed & marked "O". 2 feet diameter. To pine
tree S 22° W dist 3 chains. To pine 2 feet diam. N 48° W.
dist 65 links. Boundary descends steep Mt side
to ravine, bearing N. E. blazed two pines, ^{10 inches diam} 50 links from
line, one north with mark "W" the other south, "O". cross
ravine and ascend through very dense woods, of pine, fir
and tamarack, blazing and marking two more large fir trees
3 feet diam. planted post & erected ^{1/2 m} mound in dense
undergrowth amid fallen timber. Blazed many trees close to
the Boundary in this vicinity. The Boundary leaving timber
descends and crosses ravine, course E. S. E. Ascending along
the side of steep rocky mountain ridge, blazed & marked "O". three
pines just south of line. and also 3 near top of ridge & N of line
"W". Mile terminates at a lone Pine, on ridge; the tree
is 24 inches diameter and marked on East "46° E 1864"
on west "41 M". Bearings - To N. E. Rock N 36° 50' E.
distance 90 links. Middle point between 2 blazed pines

40 M

1/2 M.

1864
 June 24
 41 M. 10 inches in diameter $N 26^{\circ} 20' W$. distance $1\frac{1}{2}$ chains. To large rock projecting from back bone of ridge bearing down to Mill Creek from the N.E. $S 64^{\circ} 58' E$ distance 2 miles. To a pine blazed & marked "O." $S 64^{\circ} 24' W$. Distance $2\frac{1}{2}$ chains. Boundary descends north side of very steep rocky ridge, 9.50 crosses a rock 3 feet long, 2 feet wide. 10.00 descend steep hill, blazed & marked a pine 18 inches diameter, "W" and a fir 2 feet diameter "O". Thence through timber bordering Mill Creek, blazed & marked many trees on both sides of line. 13.60 Mill Creek 75 links wide, water shallow and flowing with rapid current north. The line crosses the creek and enters cottonwood grove. the trees are large and the only ones of that kind in the vicinity. There is some good timber in creek "bottom" pine, fir, & tamarack. Leaving creek, through timbered bottom 15.50 old trail up creek. also a road being built. 16.70 leave bottom and ascend precipitous and rocky bluff. Blazed & marked a pine "W." north of line, thence continued ascent over rocky and mountainous country, blazed a ^{line} pine for Oregon $1\frac{1}{2}$ ch south of line. size 2 feet diameter. also a pine for "W" near rocky bluff. The Boundary here passes over small rocky mound, a larger one north 20 links also a larger one S. 36 links. Built mound of stone on edge of ledge; erected cottonwood post, marked on N. face "W" on the south "O" on the east "46" J. 1864" on west "42 M." owing to the exceedingly abrupt nature of the country through which the line is passing it is impossible to chain with much hope of accuracy, thence forward the monument will be found at unequal distances but on the most prominent points of ridges &c. ascend steep hill and cross ridge bearing E.S.E. descending slope of ridge to north, covered with small brush. then ascend & cross ridge N by W. Blazed a prominent lone Pine tree 120 links S. from line marked it "O". descending near head of deep ravine, line passes along for about 15 chains, steep side of Mt. then up very abrupt rocky ridge to monument of stone on top of ^{spur} ridge bearing down S. to Mill Creek. about $\frac{3}{4}$ of a mile south of the crossing of Boundary Mill Creek comes from the east. so that the

42 $\frac{3}{4}$ M.

1864

June 27.

line is nearly parallel here for some distance with the creek. Bearing from monument to center of rock projecting from N hill side $N 60^{\circ} 35' E$ distance 15 chs
 Top of bald hill in Blue Mts. $S 26^{\circ} 08' E$. dist 10 m
 Peak in Yakama Range Mts dist 65 m $N 74^{\circ} 26' W$.
 Pine tree on point of descending ridge $S 0^{\circ} 34' W$. dist about 15 chains. Built a large stone monument around a 7 foot pine post 18 inches diameter marked on N, "W." on S, "O." on E, "46 E 1864." on W. "46" E ^{deposite} ^{chancel} "1864." The position of this post is very prominent. June 27th 1864 Observed Polaris at greatest eastern elongation. Azimuth angle $2^{\circ} 02'$. Observed double altitudes for time. & Lyra

Leaving rocky ledge descend deep ravine bearing S.S.W. to creek; line crosses near head of two smaller ravines and ascends in 30 chains to timber on top edge of mountain. Marked many pine & fir trees with "O" or "W" according as they were south or north of boundary thence through belt of timber which covers top of Mt. and bears N & S. terminating ⁱⁿ ⁵ ^{span} ^{ridges} [&] ravines putting down to Mill Creek, on south. Line follows an old Indian trail for a short distance, descending in timber about 40 chains cross small ravine bearing S.E. to a larger one S. then ascend and crossing Indian trail crossing N.E. placed at the east edge of timber and decline to ravine. A heavy pine post ⁶ ^{feet} ^{long} ^x 12 inches in diameter. Pine stump from which this post was cut is N by W. 1 chain. Near it (6 links) small pine, south of post 30 links blazed & marked "O." a pine 3 feet diameter. Another W.S.W. 150 links, same size also blazed & marked with "W" two pines 2 and $2\frac{1}{2}$ chains W by N. the nearer one 15 inches diameter the other 2 feet. Deposited charred wood & erected mound of earth & stone dug trenches & pits. Post marked as preceding. The elevated mountain tops bear off to N.E. and leaving this mound, begin crossing a very broken country of steep ridges & deep ravines putting down to the creek. the former coming S.S.W. the latter coming from E by north.

43.61^{chs} Miles

1864

June 28.

descending from foot to small ravine, ascend and in 10 chains cross ridge bearing S. by E. descend over small ridge and descend for 40 chains to steep rocky decline & to deep ravine bearing S. ascend steep precipitous and rocky side to top of ridge putting down to creek south, and then south west; line crosses midway between rocky bluffs. This position being very prominent erected a heavy pine post $6\frac{1}{2}$ feet long & 10 inches square at top marked on the North side "W" on the South, "O" on the East. "46° E. 1864" on the west the same. Could make no excavation

44 $\frac{7}{8}$ Miles

on account of rock. Deposited a quantity of charcoal. Built a most substantial mound of large rocks, 6 feet high & 6 feet square at base. Distance of this mound by triangulation 44 miles & 50 chains. Bearings - To center of grove of timber in gorge of mountain near top N 55° 53' E. dist 8 miles. Conical mound on top Mt. ridge S 73° 17' E dist 5 m. Center of rocky ledge abutting from near top of hill. N 16° 40' W. dist 60 chs. large rock or bluff near foot of ridge S 40° 26' W. dist $\frac{2}{3}$ m. Descend in 3 chains over loose, stoney side of ridge, thence down deep ravine bearing S.S.W. then ascend S.W. spur of ridge, then descend through brush to deep ravine, bearing S by W. with pine & tamarack timber and thence up to main ridge course S.S.E. Erected a heavy pine post 7 feet long & 10 inches square. Made excavation & deposited charcoal & pine stake $1\frac{1}{2}$ feet long & 3 inches diameter.

Built large mound of earth well packed & sodded. Dug pits marked as preceding. Mound trench & pits similar in all respects to those heretofore so often described. deep rectangular trench & 4 pits. Blazed & marked "W" two large tamarack trees, 60 links & 70 links from post. diameters

45 $\frac{1}{3}$ M

3 feet and 20 inches. Bearing N 60° E. Blazed & marked a pine 3 feet diam. "O." distance $1\frac{1}{2}$ chains bearing S 65° E. Bearings to largest rock on ledge N 9° 53' E. dist 8 chs. To center of mound on Mt. ridge S 81° 25' E dist $3\frac{1}{2}$ m. To a large pine 5 feet diam dist 4 chains N 12° W. To highest point of ridge, dist $1\frac{2}{3}$ m S 21° 47' W. In 25 links began descent to steep ravine with dense brush and sparse timber; blazed and marked 3 pines & a tamarack south of line with "O." and 2 tamaracks north of line "W." 5 chains to ravine, ascend steep rocky side of ridge 11 chs to top. A few pines north of line on ridge. Blazed & marked a pine "O." 25 links S of line

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?

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 them 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