

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.

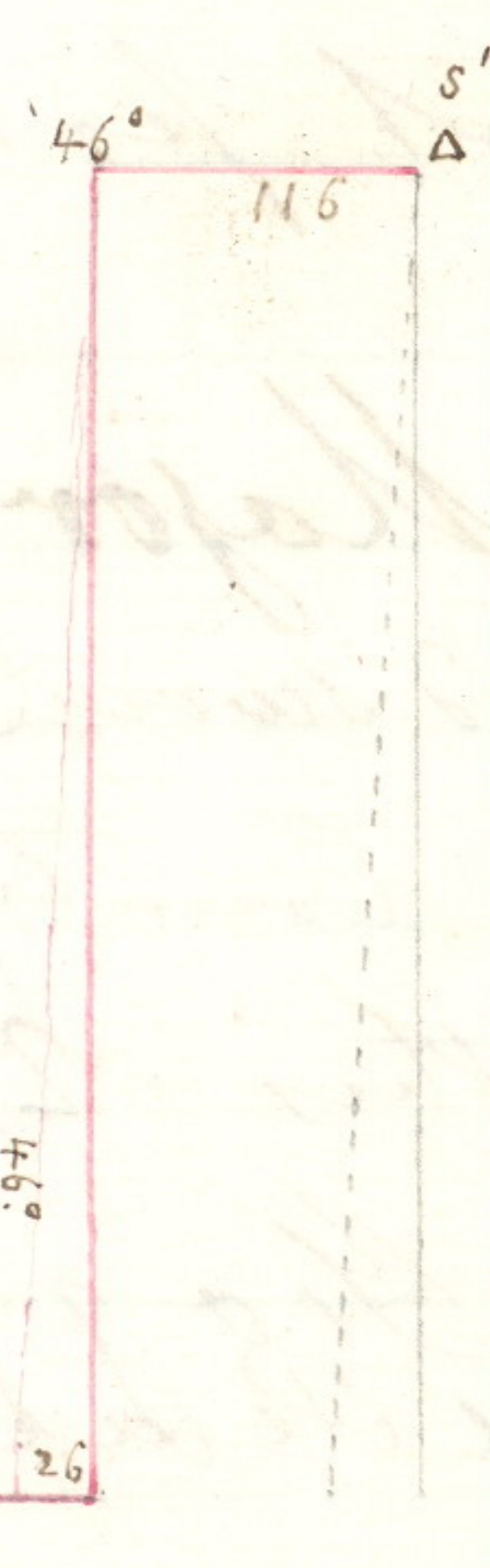
Daniel G. Major. Astronomer & Surveyor

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 17
 34 M.
 sides trimmed and ground end charred. Marked
 in deeply cut characters, on north side "V." on south
 "O" on the east "46° I. 1864" and on west "34 M."
 Mound 7 feet square & 5 feet high, Taping to post.
 earth well packed & sodded. Dug deep rectangular ditch
 2 feet wide & 18 inches deep. Also pits corresponding to
 the cardinal points. Thence east ascend hill 6 chains
 to top. Cross fence and enter Preen's claim, descend, 39 chains
 edge of bluff. 40 chains side of steep bluff, bearing N.W.
 and S.E. Could not set instrument for bearings. Made excavation
 deposited charred wood & bones. Planted an Alder
 post 5 1/2 feet long & 5 inches square. marked on N.W. side
 "1/2 M". Erected mound of earth, 4 feet square and 3 feet
 high. Dug trench for 3 sides of mound, none for the
 lower or north side, because the ground was too steep
 also 3 pits. 30 links to foot of bluff. leaving
 this mound, the boundary passing east 50 links
 reaches foot of bluff and bottom land, thence 42.50
 chains to an Alder tree, blazed and marked "W". 42.80 chs
 south edge of Cottonwood Creek. A mountain stream
 20 links wide but shallow, coursing N.W. and at
 this place has some few Cottonwood & Alder trees on
 its banks. cross road being S.E. & N.W. enter cul-
 tivated fields. 80 chains terminate in Mr Swasey's
 field, at intersections of line north & south between
 Ranges 36 and 37 east. Section line 13-18.
 Bearing to Chimney of Mr Foster's house N 21° 19' E. dist 85 chs
 Ridge of Catholic Seminary N 48° 21' W. distance 7 miles.
 35 M. Ridge of Frank Sheldon's house distance 60 chains S 61° 03' E
 upper or S.W. corner of ditch on bluff. S 47° 42' W. distance 50 chs
 Made excavation 4 feet deep. deposited cows head, a quantity
 of bones, some charred stakes and a glass bottle. Planted a
 heavy, seasoned cottonwood post 9 1/2 feet long and 15 inches
 in diameter. Top bevelled, sides trimmed & ground end charred
 marked in deeply cut characters on north face "W" on the
 south "O" on the east, "46° I. 1864" and on the west "35 M."
 Mound 8 feet square and 4 1/2 feet high; earth well
 packed and planted with seed. Soil of the 1st quality
 and under cultivation. This monument has been rendered

1864

June 18.

 $\frac{1}{2}$ M.

36 M

 $\frac{1}{2}$ M.

as permanent as possible: because of proximity to the 1st Astronomical Station and also the intersection of the Range line 36-37 E. Thence east through Swaseys field, & 40 chains terminate in cultivated field of Frank Sheldon. Bearing to Swasey Jr.'s house N 14° 03' E, dist 10 chains. Baptist Church N 50° 30' W dist 7 $\frac{1}{4}$ miles Swaseys barn S 46° 42' W, dist $\frac{1}{3}$ mile. F. Sheldons door (of house) S 2° 08' E dist $\frac{1}{3}$ m. Post 6 feet long & 4 in square Cottonwood. Deposited quantity of glass, put up small mound. Marked as usual on west side " $\frac{1}{2}$ M." Land excellent. Thence through cultivated fields, the best land in the valley, ^{begin} ascent foot hills of Mt. to end of 80 chains - Bearings - To Sumus Flour Mill N 69° 15' W, distance 6 $\frac{1}{2}$ miles. To ridge of Catholic Seminary N 53° 30' W, distance 7 $\frac{1}{4}$ miles. To "Lones Pine" tree S 73° 37' W dist 2 $\frac{1}{4}$ m. Chimney to Mr Wards fire house S 44° 48' W dist 1 $\frac{1}{5}$ m. Made excavation 4 feet deep; deposited charred wood & quantity of bones. Planted a heavy ^{scarred} Cottonwood post 9 feet long & 15 inches diameter, ^{top levelled, sides trimmed, ground end charred} doubly marked, ^{on N face "W" on south "O" W} - Mound 8 feet ^{off} & 4 $\frac{1}{2}$ feet high, sodded. Deep trench & pits. This mound intended for middle monument ^{of Boundary line} is eligibly situated on hill and almost north of ^{1st Astronomical Station} Obsequy Camp on Cottonwood. From the 14th to this mile the Boundary passes up the Walla Walla Valley. The land for the most part being level and the soil along the line averaging the 2nd rate; and being an extensive cattle range I was obliged to rebuild some of the mounds which were scarcely finished before being destroyed by the animals. In such districts, a post 5 feet long with 4 feet in the ground and enclosed by deep trench & pits, without mound would be more lasting marks. Ascending foot spurs of Blue Mtns. which trend N.E. & S.S.W. in 40 links cross fence and up cultivated hill bearing down to N & N.W. 17 chains to top then descend steep decline to ravine ^{21 chs} bearing down to N.W. ^{around .29 top of ridge & descend} 39 cross ravine. 40 chains. Erected post & mound of the usual size and form. Bearings To house on Russell Creek N 20° 18' W dist 3 $\frac{1}{2}$ m. Ridge of log house N 14° 48' W, dist $\frac{1}{2}$ m. Too low for other bearings. Dug trench & pits; post marked on west side " $\frac{1}{2}$ M." Thence East,

1864. June 20. 37 M. ascending steep hill ^{50 chs to top} and along decline of a mountain spur coursing E & W. to end of 80 chains, on decline of ridge to N.W. Bearing to Lone Pine N 70° 36' E dist 55 chains. Catholic Seminary N 57° 49' W. distance 8 miles. The "Lone Pine" tree S 79° 05' W dist 3 1/2. Excavation 3 feet deep. Deposited 2 large stakes. Planted, heavy, seasoned tamarack post 9 feet long & 15 inches diam. properly trimmed & doubly marked. Mound ^{as usual, by upper or west side as follows 37 M.} 7 feet square & 4 1/2 feet high. sodded, deep trench & pits of usual size. The Boundary passing east along side of mountain crosses in 26 chains. The head of small ravine and then ascends crossing wood road to mountains descends slope with brush, to tamarack 6 foot 1/2 mile post in mound with trench & pits. deposited bones. A pine bears S.W. dist 50, the northern two that have been prominent landmarks, for the Boundary line, all the way up from dividing ridge bet. Columbia & Walla Walla Rivers. Blazed tree and marked "O": diameter 15 inches, also blazed & marked the Pine 7 chains N.W. with a "W": the mound is among brush, marked two of the largest trees with "O" and "W". Thence up steep hill 74 chs to wood road on ridge into mountain's course N by W. 75 chs ridge of steep decline. 80 chains on steep inclination - Bearing to single tamarack tree on bench of ridge N 54° 48' E. dist 60 chs. The southern of two tamaracks S 51° 14' E. dist 2 m. Erected heavy tamarack post 9 feet long & 16 inches diam properly marked. Mound ^{of earth} with deep trench & pits except on the lower or east side. Deposited shined stakes. descending rapidly the line crosses small ravine N.E. ascending passes along N. slope of hill with sparse timber, blazed and marked with "O" or "W." two tamaracks on opposite sides of line, thence passes through small clump of tamaracks & crossing ridge, blazed & marked two more trees, crossed foot of ridge N.E. and 29 chains to road up Russell Creek 29.50 creek, Wet stream 10 links wide with little brush. course north. ascend steep, stoney side of Mt ^{end of} 40 chains set post 4 1/2 feet long & 4 1/2 inches square marked "N.W." in mound of stone: heavy thunder storm prevented me getting bearings. ascending, cross ridge bearing down to N.W. descending along slope, to ravine, ascend side of ridge, 79 chains back base of spur ridge. 80 chains to north side of ridge. Bearing to Flag Staff Fort Walla Walla N 69° 47' W. dist. 10 1/2 miles. Point in which distant & near range of Mts intersect. S 69° 40' E. Center of little group of rock projecting from side of Mt N 36° 30' E. dist 25 chs.

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, 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 stone 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.

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