

Received 12th April 1866

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(Film Front Cover For
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.

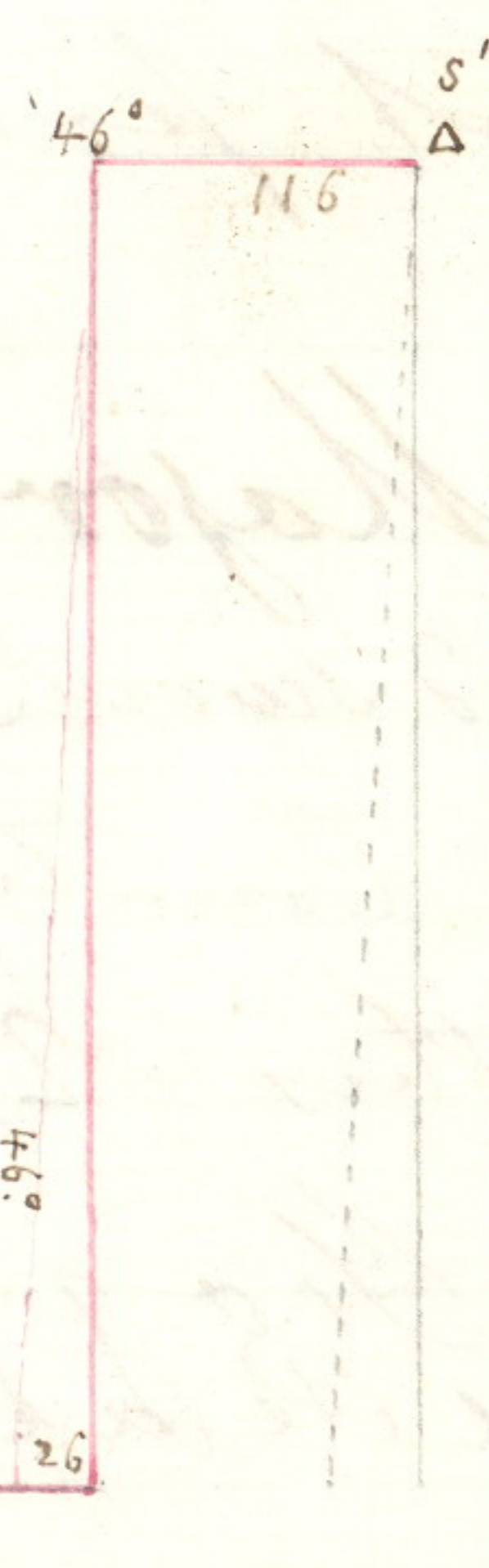
Daniel G. Major. Astronomer & Surveyor

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
May 28
S 14-15

Known the Oregon & Washington boundary in this vicinity and is about 6 miles from mouth of Canon.

Proceeding thence east, ascend and cross top of ridge and descend abrupt rocky side to ravine. 10 chains from 9th mile post intersect north & south line between sections 14-15. set post on rocky side of hill, built mound, erected post, dug pits, &c. thence descending over rocky side, end of 40 chains on side of ridge near the top. Marked parallel. Made excavation, deposited charred cherry stakes. Planted a willow post 6 feet long and 5 inches square, upper end trimmed, top bevelled, ground end charred. Placed two large stones near the post. threw up a small mound (the inclination of the hill being too great for a large one). Dug deep rectangular trench and 3 pits the lower or east one being omitted. Post marked on west face $\frac{1}{2}$ M. bearings to ledge of rock on ridge N $29^{\circ} 26' E$. distance say 50 chains; about 10 chains S. this ridge descends and makes a gap ^{then rises} in continuation of the ridge to the S.S.E.

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

Descending the steep sides of this ridge, cross a small valley between high ridges and which valley is $\frac{1}{4}$ mile wide; on west side of a small stoney hill part in the 10th mile post. Made excavation 3 feet deep; soil stoney. deposited 2 charred white thorn stakes, planted post 8 feet long and 9 inches square, when trimmed, top bevelled, ground end charred. Marked on north face, "V." on the South "O." on the East, "46° I 1864." on the west, "10 M." Built mound 8 feet square at base and rising to post $3\frac{1}{4}$ feet, composed partly of stone, and covered with soil. Dug trench and pits of the usual size. Bearings, to ledge of rock projecting from ridge top, N $82^{\circ} 09' W$. Distance 50 chs. To a similar object, S $0^{\circ} 01' 30'' W$ dist $1\frac{1}{3}$ miles. Point at which horizon is intercepted by ridge S $48^{\circ} 02' E$ dist 1 mile.

S-13-14

Gradually ascending over poor stoney soil 9.75 chains intersected North & South line between sections 13-14. at back-bone of elevated, flat topped ridge, which leans S.E. Deposited charred stake, built mound around post properly marked. Dug trench, pits, &c. as prescribed in "Manual of Surveying Instructions."

1864
May 30
Descending from ridge, pass over several small foot-hills, 40 chains, ^{terminates} situated on flat surrounded by high ridges which bear of in all directions.

$\frac{1}{2}$ M
Bearings. To rocks projecting from ridge $N 75^{\circ} 20' E$. distance $1\frac{1}{2}$ miles. To large rock on ridge $S 72^{\circ} 45' W$ distance 2 miles. Made excavation $2\frac{1}{2}$ feet deep; deposited charred stake 16 inches long. Planted post $6\frac{1}{2}$ feet long and 5 inches square, top bevelled, ground and charred marked on west side " $\frac{1}{2}$ M". Erected a large and very durable mound with trench, pits, &c. Thence over broken country cut up by ridges & ravines having no general direction; 77 chains cross gully with first trail, ascend hill to end of 80 chains. Bearings.

To edge of rocky bluff $N 27^{\circ} 43' W$. distance $\frac{1}{2}$ mile. To a large Boulder on hill side, distant 15 chains $S 81^{\circ} 50' 30" E$. Made excavation 3 feet deep; deposited charred stakes. Planted a charred willow post 8 feet long and 9 inches square when trimmed, top bevelled.

11 M

marked on north face "W", on the south "O", on the east " $46^{\circ} I, 1864$ " and on the west "11 M" all in deeply cut characters. Built a very durable mound of stone 6 feet ^{square} at base and tapering up $4\frac{1}{2}$ feet to post in center. Dug trench ^{of usual size & position} & pits. Ascend steep side of ridge which becomes rocky near the top, cross end of ridge

S 13-18
10.39 intersected north and south line, between Ranges 32 and 33. Set post for sections 13-18 situated on south face of stoney mountain. built mound of stones about post, properly marked. No trench nor pits on account of rocky nature of location.

Descending, cross ravine, proceed up and along flat tops of ridge and thence over N.E. decline of ridge top, 40 chs terminate in a hollow, bearing N.E. & S.W.

$\frac{1}{2}$ M.
Bearings; to large boulder, on hill side. $N 48^{\circ} 05' E$. distance about 25 chains. To S.W. bank of Kalla Kalla River $N 19^{\circ} 42' E$. distance 2 miles. Made excavation $2\frac{1}{2}$ feet deep; deposited charred stakes. Built mound 6 feet square and 3 feet high. Dug trench and pits of the usual size. Post 6 feet long & 4 inches square, trimmed marked on the west face, deeply cut, " $\frac{1}{2}$ M".

- 1864
May 31
12 M.
S. 17-18.
 $\frac{1}{2}$ M.
- ascend - 42 cross top of ridge - descend, cross rocky ravine, ascend to smaller ridge, cross and descend to bed of rocky ravine and end of 80 chains, course of ravine N.N.E. Could get no bearings. Made excavation 3 feet deep. Deposited bones planted a heavy post of prescribed size & marking. Erected a monument of large stones about post. a most durable monument. Ascending in 5 chains cross small ridge and descend, 10 chs intersected north and south line between sections 17-18. Set post in mound, with trench, pits, &c: as prescribed. ascend foot ridge to top and descend 20.50 to bottom of ravine: thence over gradual decline to north, enter circular flat fronting N.E. below hill and towards small ravine. ^{and} 40 chains. Bearing, To lone tree on Walla Walla River N. $54^{\circ} 31' E$. Distance 3 miles. Center of bend in Walla Walla River N $5^{\circ} 04' W$. distance 2 m. Made excavation 2 feet deep: deposited a white cobble stone of quartz. Planted a post 6 feet long & 4 inches square, trimmed, top levelled, ground end charred; marked on west side " $\frac{1}{2}$ M". Built mound of earth 6 feet square at base and 3 feet high tapering to post, earth packed & sodded. Dug as usual rectangular trench, 2 spades wide & 18 inches deep. also 4 pits at cardinal points of mound.
- Crossing foot spur of ridge, descend to small ravine ascend, cross low ridge, bearing down N.N.E. (descend to flat rocky bed ravine course N.N.E.) 75 links wide termination of 80 chains. Bearing to out cropping rock on side of hill, a few links from bottom, N $62^{\circ} 45' E$ dist 48 links. To large "holder" in bed of ravine S $7^{\circ} 46' W$. dist 3 chs. Made excavation, deposited a quantity of bones. Set a Cottonwood post 8 feet long and 7 inches square, trimmed, top levelled, and ground end charred. Built a monument of large rocks, 8 feet square and 4 feet high. one of the most lasting monuments on Boundary. Could make no trench. placed 4 large holders in place of pits. Marked post as all the others, except on west side, "13 M".
- passing along foot hill of mountain ridge, 9.90 intersected north and south line between sections 16-17 in laps of descending ridge. Bearings - To rock on side of mountain S $46^{\circ} 14' E$. distance 60 chs.
- S. 16-17.

To rock on side of mountain. S $69^{\circ} 50' W$. Set post
 in mound. Dug trench, pits, &c. post a charred white
 1864
 June 2 thorn. Thence along foot hills of mountains, enter
 Walla Walla Valley - 40 chains ^{end} foot of ridge ascending
 to South. Bearings: To top end of bluff ridge N $56^{\circ} 42' W$.
 1/2 M. distant 1 1/2 miles. To largest holder on top of ridge S 45°
 28' 30" E dist 1 1/2 m. The day being very hazy could get no
 other bearings. Made excavation, deposited bones and
 charred sticks and pieces of scoria of irregular form
 about 15 inches cube. Erected post and built du-
 rable mound, with trench, pits, &c. similar to
 other half mile mounds. 6 chains north of this mound
 are old Indian trails leading to mouth of Walla Walla
 and Columbia River. On either side of these trails
 are two piles of stones dist about 7 chains and
 bearing N $15^{\circ} E$. Proceeding east crossing foot
 ridges and old Indian trails coming W by N.
 enter valley of Walla Walla. Bearings to holder on
 top of ridge S $16^{\circ} 12' E$ distance 1 mile. Rock projecting from
 side of ridge S $82^{\circ} 17' W$. distance 1 1/2 mile. Conical Mound
 N $36^{\circ} 26' W$. distance 6 miles. Made excavation 3 feet
 deep. Deposited horse head & bones. Built mound of earth
 8 feet square and 4 feet high, tapering to a cotton
 wood post 8 feet long, 6 inches square, trimmed, top bevelled.
 14 M. marked on N. face "W" on the South "O." on the east "46° I 1864"
 on the west "14 M." mound well packed & sodded, deep rectan-
 gular trench & pits.
 Thus far, from Columbia River, the Oregon & Washington
 Boundary traverses a country diversified by low
 mountain ridges cut by deep ravines and the last
 6 miles has been much more uneven than the
 preceding: the soil is of the 2nd & 3rd rate,
 no timber nor water, but excellent bunch grass.
 Thence east ^{the boundary} in Walla Walla valley pass over level
 prairie to 9.50 chains, the intersection of the north-
 and south line between sections 15-16. T. 6 N. R. 33 E.
 Bearing to rock on east side of bluff distance 60 chs S $3^{\circ} 11' E$
 Conical Mound N $39^{\circ} 03' W$ dist 6 miles.
 Erected post with "prescribed inscription". Built

- 1864
June 3
1/2 M
- mound of earth of 3 feet square at base and 2 feet high tapping to post. Dug deep trench pits &c similar to the preceding section mounds. Thence over undulating prairie ^{at end of} 40 chains marked boundary. Bearing to largest and west projecting rock $S 12^{\circ} 28' W$ distance 60 chains. To rock on mountain side $S 35^{\circ} 15' E$ distance 3 miles. Conical Mound $N 40^{\circ} 30' W$ distance $6\frac{1}{2}$ miles. Erected post 6 feet long & 4 inches square. marked on west side "1/2 M". Built mound 6 feet square and 3 feet high; sodded, dug rectangular trench & 4 pits. This mound is situated on a slight decline to north. The Boundary then passes along the edge of a N.W. decline in the prairie to the 80 chains which terminates in level prairie about 60 chains north of foot spurs of mountains, the main chain being W.N.W. Bearing to Conical Mound $N 44^{\circ} 18' W$ distance 7 miles. To edge of rock projecting from near foot of ridge $S 21^{\circ} 52' E$ distance 1 mile. Center of west rock on lower part of ridge $S 56^{\circ} 21' W$ distance 70 chains. Made excavation 3 feet deep: deposited charred white thorn stake, 12 inches long & 4 inches diameter.
- 15 M.
- Planted a post 8 feet long & 6 inches square, trimmed, top bevel led and deeply marked on north face "W" on the south "O" on the east "46 T. 1864" on the west "15 M" built earthen mound 8 feet square at base and 4 feet high tapping to post. Earth well packed & sodded. Dug deep trench pits &c. Thence over level prairie at 9.50 chains intersected north and south line between sections 15-14 T. 6 N. R. 33. E.
- S 14-15
- Bearing to upper ledge of projecting rocks $S 19^{\circ} 09' E$ dist 1 mile. Lone rock in side of mountain $S 45^{\circ} 05' W$ dist $1\frac{1}{2}$ miles. south edge of small ridge $N 50^{\circ} 27' W$ distance $8\frac{1}{2}$ miles. Erected properly marked section post. Built mound, dug pits & trench. Thence over gradual rise in prairie rocks terminate on slight decline to N.E. and a few chains south of a well defined depression to the N.W. Bearings - To highest projecting rock from end of ridge, $S 28^{\circ} 37' W$ distant $1\frac{1}{2}$ m. To similar object $S 8^{\circ} 28' E$ distance 1 mile. Planted a poplar post 7 feet long & 5 inches square. marked on west side "1/2 M". Built mound of earth 6 feet square and $3\frac{1}{2}$ feet high tapping to post. Mound packed & sodded. Dug trench and pits of the usual size and location.
- 1/2 M.

1864
 June 4
 16 M.

Leaving this post, the boundary passes up the bed of a slight decline for a distance of 20 chains and thence an ill-defined ridge; 80 chains terminate on slope to south. Bearing to Conical Mound N $50^{\circ} 08' W$. Distance 8 miles. To edge of highest projecting ledge of rock on bluff ridge. S $44^{\circ} 23' W$. Dist $1\frac{1}{2}$ miles. To center of small grove of timber on Pine Creek? S $66^{\circ} 53' E$. Distance $5\frac{1}{4}$ miles. Planted a large Cottonwood post 9 feet long & 8 inches square, top levelled. Marked on north face "W" on south "O" on the East "46° I. 1864" and on the west "16 M." Built mound 8 feet square and 4 feet high, taping to post. Earth packed & sodded ^{deposite bones}. Dug rectangular trench also pits &c. Up slight rise land near its top

S 13-14. 9.50 intersection of north + south line between sections 13-14. T 6 N. R 33 E. Bearing to Conical Mound N $50^{\circ} 14' W$. Dist 8 m. To highest projecting rock east end of ridge. S $47^{\circ} 24' W$. Distance $1\frac{3}{4}$ miles. To a smaller object S $39^{\circ} 50' W$. Distance $3\frac{1}{2}$ miles. Erected poplar post properly marked: built mound of earth, dug pits, &c. as usual. Thence over gentle swell (descend gradually: 40 chs ^{ends} on east slope of small rise.) Bearing to highest rock abutting from east ridge S $39^{\circ} 25' W$. Distance $1\frac{3}{4}$ miles. Highest rock abutting from ridge S $45^{\circ} 47' E$. Distance 3 m. The only objects that could be taken: weather vane. Made excavation $2\frac{1}{2}$ feet deep. Deposited bones and some washed quartz, milk colored. Erected poplar post 6 feet long 5 inches square. Marked on west face "1/2 M." Built earth mound 6 feet square 3 feet high taping to post. soil well packed & sodded. Dug deep rectangular trench and 4 pits. The boundary line ^{thence east} passes over slightly rolling prairie into depression, 80 chs terminate in a hollow 10 links north of old trail crossing E. and W. Bearings to point of ridge S $37^{\circ} 58' E$, ^{dist} $2\frac{1}{2}$ miles. Center of small grove of timber S $63^{\circ} 02' E$. Distance $4\frac{1}{4}$ miles. Made excavation 3 feet deep, deposited bones and deer horns, also a stone 12 inches square. Planted a heavy Cottonwood post $7\frac{1}{2}$ feet long and 7 inches square, trimmed, top levelled and marked in deeply cut

1/2 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