

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. Harnsey 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.

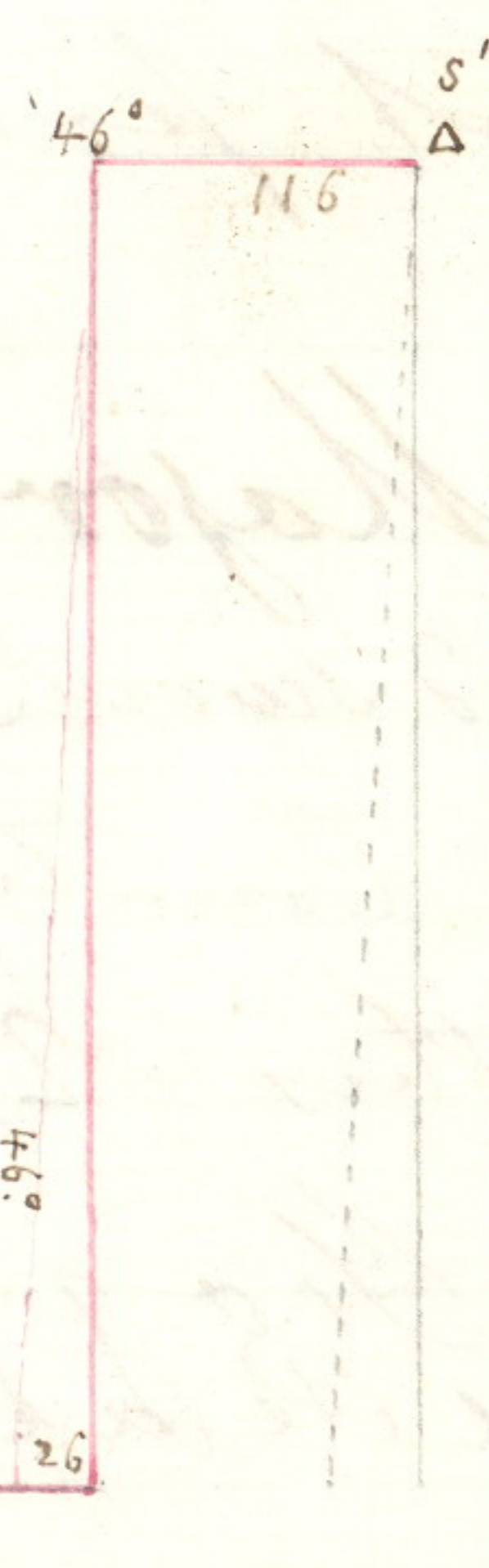
Daniel G. Major. Astronomer & Surveyor

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 25.

Continuing east the Boundary passes over an elevated country, diversified by several small ill defined spur ridges and ravines. 40 chains terminate on side of a small ravine which heads in main ridge south. This point is in low ground again and I could get no bearings.

1/2 M.

Made excavation 2 1/2 feet deep. Deposited a piece of volcanic stone (scoria) 4 inches square. Post a willow 6 feet long and 4 inches square when trimmed top levelled and ground end charred. Marked on west side in deep characters "1/2 M." Threw up an earthen mound 6 feet square at base and 3 feet high tapering to post. Earth packed & sodded. Enclosed with deep ditch and 4 pits of usual size & location. 45 chains bottom of ravine coursing north and putting down to big canon, thence over small ridges bearing south, 72 chains cross ravine 2 chains wide and bearing down to S.W. 80 chains intersect section line 13-14 near foot of west spur ridge, descending from main ridge coursing S.S.W. Marked parallel. Could get no bearings positions being low. Made excavation

4 M.

3 feet deep: deposited charred stakes; erected willow post 7 1/2 feet long and 6 1/2 inches square when trimmed top end levelled, ground end charred. Marked on north side in deep characters "W." on the south "O." on the east side "46° I. 1864." and on the west "4 M." Threw up a mound 8 feet square at base and 4 feet high tapering to post in center. Earth packed & sodded. Dug trench 12 inches from exterior base line of mound, 18 inches wide and 2 spades deep. Also dug 4 pits of usual size and location. Sand rolling and broken. Soil 2nd rate. No water, timber nor stone. Excellent lunch grass.

1/2 M.

Thence over small ridge ascend to circular flat the end of 40 chains. Made excavation 2 1/2 feet deep deposited ^{cherry} stakes. Planted post 6 feet long and 6 inches square, top levelled ground end charred; marked west side "1/2 M." Erected earthen mound 6 feet square and 3 feet high tapering to post in center. Earth packed & sodded. Dug trench and pits of usual size and location.

1864
May 26.

Bearing to Yakama bluff N $51^{\circ} 26'$ W. dist 30 miles.
Peak on ridge N $59^{\circ} 16'$ W. dist. $10\frac{3}{4}$ miles. The only bearings
that could be had.

5 M.

Running east on parallel 42 chains begin to descend;
cross ravine and ascend to high ridge crossing
N.E. and S.W. passing over it, descend the east slope and
in 80 chains intersected Township line between Ranges 31
32 E. 2 chains south of $\frac{1}{4}$ section post. and $2\frac{1}{2}$ ^{miles} south of
Township line between T. 6 & 7 north. Marked parallel and took
bearings as follows; viz: To point of high ridge N. $59^{\circ} 46'$ W.
distance 11 miles. Point in which distant horizon is intercepted
by near ridge S. $89^{\circ} 54'$ W. only objects available. Made excava-
tion 3 feet deep; deposited cherry stakes charred. Planted
a post 8 feet long and 6 inches square when trimmed; top
bevelled, ground end charred; marked in deeply cut char-
acters on north face "W." on the south "O." on the east "46"
I. 1864". on the west "5 M". Built a mound of earth
8 feet square and 4 feet high tapering to post. Soil
well packed and sodded. Dug trench 12 inches from
exterior base line 18 inches deep and 2 spades wide. Dug 4
pits corresponding to the Cardinal points.

Land high rolling ridges. Soil 2nd rate; no timber,
water nor stonks. Excellent bunch grass.

Running east the line ascends and in 20 chains crosses
high ridge bearing N. E. This is the most elevated ridge
on the Boundary between the Columbia River and the
Blue Mountains: descend north east slope to ravine.

1/2 M

set post for end of 40 chain on tongue of land between descen-
ding ridges, and near the bottom. Too low to get any bearings.
Made excavation $2\frac{1}{2}$ feet deep; deposited charred wild
cherry stakes also some bones. Planted a willow post 6 feet
long and 4 inches square, trimmed, top bevelled and ground end
charred; marked on west face in deeply cut characters "1/2 M."

Erected earth mound 6 feet square at base and 3 feet high,
tapering to post. earth packed and sodded. Dug deep trench and
pits of the usual size. Ascend, 50 chains intersection of $\frac{1}{4}$
section line, then descend, 65 chains bottom of ravine bearing S.S.W.
then ascend and 80 chains end on ^{N.} slope of hill near
top. Marked the parallel and took the following bearings

1864 May 26. To north west end of ledge of rocks N $19^{\circ} 30' E$. dist 6 m.
6 M. Gap in Blue Mountains N $88^{\circ} 37' E$ dist. 45 miles.

Most S. Easterly visible point of Blue Mountains S $44^{\circ} 36' E$
distance 50 miles. Center of the Town of Walla Walla
N $79^{\circ} 46' E$. distance 25 1/2 miles.

Made excavation 3 feet deep. Deposited charred
stake 30 inches long. Planted a charred willow
post 8 feet long and 6 inches square at bevelled
top. Marked in deep characters on N. face "W." on the
south "O." on the east. "46° I. 1864." and on the west "6 M"
Erected mound of earth 8 feet square at base and 4
feet high, tapering to post. Dug trench 2 spades
wide and 18 inches deep; also 4 pits of usual
size & location. Mound packed & sodded,
descending gentle slope to north and east in 10 chains
intersected line between sections 17-18. T. 6. N. R. 32. E.

S. 17-18.

Erected a section mound with charred post
properly marked as prescribed in "Manual of
Surveying instructions". Dug trench pits &c. from
here the line descends and crosses a ravine, coursing
N. E., ascending steep hill - 40 chains on flat top -
marked parallel and made the following bearings
To rock N $67^{\circ} 24' W$. distance 7 miles. Point of tri-
ber on Walla Walla River S $78^{\circ} 32' E$. distance 16 miles

Most ~~South~~^{point} Easterly visible of Blue Mountains S $44^{\circ} 08' E$ dist.
40 miles. Point of rocky ledge N $5^{\circ} 28' W$. dist 1 m.

Made excavation 2 1/2 feet deep; deposited charred
wild cherry stake; planted willow post 6 feet
long and 4 inches square, top bevelled, upper part trim-
med, ground end charred. Given on west side "1/2 M."

1/2 M.

Erected a mound of earth, 6 feet square, and 3 feet
high tapering to post. earth well packed & sodded.
Dug rectangular trench 12 inches outside exterior line
of base, 2 spades wide and 18 inches deep. Dug 4 pits
corresponding to Cardinal points. Descend long hill
bearing down to E. N. E. 75 chains cross steep ravine,
ascend and cross a high narrow tongue between two
ravines. 80 chains west of ravine 50 links. Could get
no bearings. Made excavation 3 feet deep and

- 1864 May 27 deposited charred white thorn stake 20 inches
 7 M. long. Erected a heavy willow post 4 feet long, and 8 in.
 square, top bevelled, upper end trimmed. Marked as usual, on
 north face "W" on the south "O" on the East "46° E 1864" on the
 west "7 M.". The side of the ridge was too precipitous to
 build mound. Dug the usual rectangular ditch 2 feet
 deep and 18 inches wide. Also 4 large sized and deep
 pits. Owing to the exceeding abruptness of the country, it
 was not possible to transport a longer post to this point.
 This ravine bearing north, is met in about 15 chains by
 another, both of which rise in a ridge bearing S by E and
 1/2 of mile south. 1 chain across ravine and began steep ascent.
 10.12 Intersect north & south line between sections
 S 16-17 16-17. T. 6 N. R. 32 E. Bearing to the 3rd & largest "Bolder" on
 elevated Plateau N 23° 09' E. Distance 3 1/2 miles. Point
 at which ridge intercepts distant horizon N 9° 43' W.
 Stony place on side of ridge S 44° 47' W. dist. 1/3 m
 Erected an Alder section post properly marked also built
 mound with pits, &c. 40 chains terminated on East side of
 steep ridge 70 links from bed of ravine. Could find no ob-
 jects from which to take bearings. Made excavation 2 feet
 deep, planted an Alder post 5 feet long & 6 in square, top bevel-
 led. ^{marked on west face 1/2 M.} deposited a white thorn stake 15 inches long. Moved 2
 large stones to post. Erected mound 6 feet square at base and
 3 feet high tapering to top of post. Earth packed & sodded.
 1/2 M. Dug deep trench & pits, as usual. 40 links S. and S.E. from
 post a ledge of rock "puts out", continue ascent of steep
 stoney side of hill, cross flat-top, and descend to ravine
 bearing N.E. The mile ends at East-side of ravine near its
 head and 1 chain above its bed. Bearing to 3rd & largest bolder
 on elevated Plateau. N. 7° 54' E. distance 3 miles. Conical Mound
 N 1° 36' W. Mouth of ravine leading to Canon with trail to Wild
 Home N 36° 09' E. Made excavation 2 feet deep. Deposited
 2 charred stakes (white thorn). Planted a heavy willow post
 4 1/2 feet long, and 8 inches square, top bevelled and trimmed.
 Marked in deeply cut characters on north face "W," on south, "O"
 8 M. on the East "46° E 1864" and on the West "8 M.". The charred
 stakes were 2 feet long & 1 inch diameter. Threw up mound of
 earth 8 feet square at base and 2 1/2 feet high, tapering

1864
May 27th

to post in center. Sodded & earth packed. Dug deep trench around mound 12 inches from exterior base, 2 spades wide and 18 inches deep. Dug 4 pits in usual position.

S. 15 - 16

Ascending, cross flat top of ridge bearing N.N.E. and descend steep decline - 9 chains to bottom of ravine - at 9.9000 intersect North & South line between section 15-16. set post properly marked. Dug trench & pits; erected mound east-side of ravine. Could get no bearings.

Ascend, cross level top of ridge and descend to steep ravine with several small tributaries, heading in main ridge and descending in a northerly direction. This ravine is a principal branch of the main Canon 40 chains. gives out on West-side of ridge $\frac{3}{4}$ distance up. There is a large rock abutting from hill side just north of the Boundary and about 3 chains west of this mound. Bearing to ledge of rock abutting from ridge N $42^{\circ} 34' E$. distance $\frac{3}{4}$ mile.

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

Made excavation 3 feet deep. Deposited charred stake, planted 6 foot willow post 4 inches diam - top levelled and marked on west side $\frac{1}{2}$ M. Erected mound 6 feet square and 3 feet high. Dug the usual trench, pits, &c. Thence facing up to top of ridge, descend steep Mountain side, cross small ravine, ascend steep open ridge and descend 78 chains to Canon. 79.66 to trail or road to Wild horse Creek and Unatilla Reserve. Course S.S.E. 80 chains marked parallel. Bearings. To small abutting rock $\frac{1}{2}$ distance from top of ridge. N $77^{\circ} 15' E$. distance 20 chs. Edge of large rock N $80^{\circ} 13' W$. distance 5 chains. Center of top of projecting rocks. S $73^{\circ} 04' E$. distant about 25 chs. Rock abutting from ridge S $68^{\circ} 34' W$. distant 12 chs.

9 M.

Made excavation 3 feet deep. Deposited charred stakes and bones. Planted a charred willow post - 8 feet long and 8 inches square. trimmed at upper end. Top bevelled marked on north face "N" on the south "O." on the east "46 I. 1864" and on the west "9 M." Built a durable mound about post, principally of stone and covered with soil and then sodded. ^{the trench & pits as usual.} This mound is well located for marking

- 1864
May 28
S 14-15
1/2 M
10 M.
S-13-14
- 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 1/2 M. bearings to ledge of rock on ridge N 29° 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.
- Descending the steep sides of this ridge, cross a small valley between high ridges and which valley is 1/4 mile wide; on west side of a small stoney hill just 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 1/2 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° 09' W. Distance 50 chs. To a similar object, S 0° 01' 30" W dist 1 1/3 miles. Point at which horizon is intercepted by ridge S 48° 02' E dist 1 mile.
- 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".

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