

DEPARTMENT OF THE INTERIOR

BULLETIN

OF THE

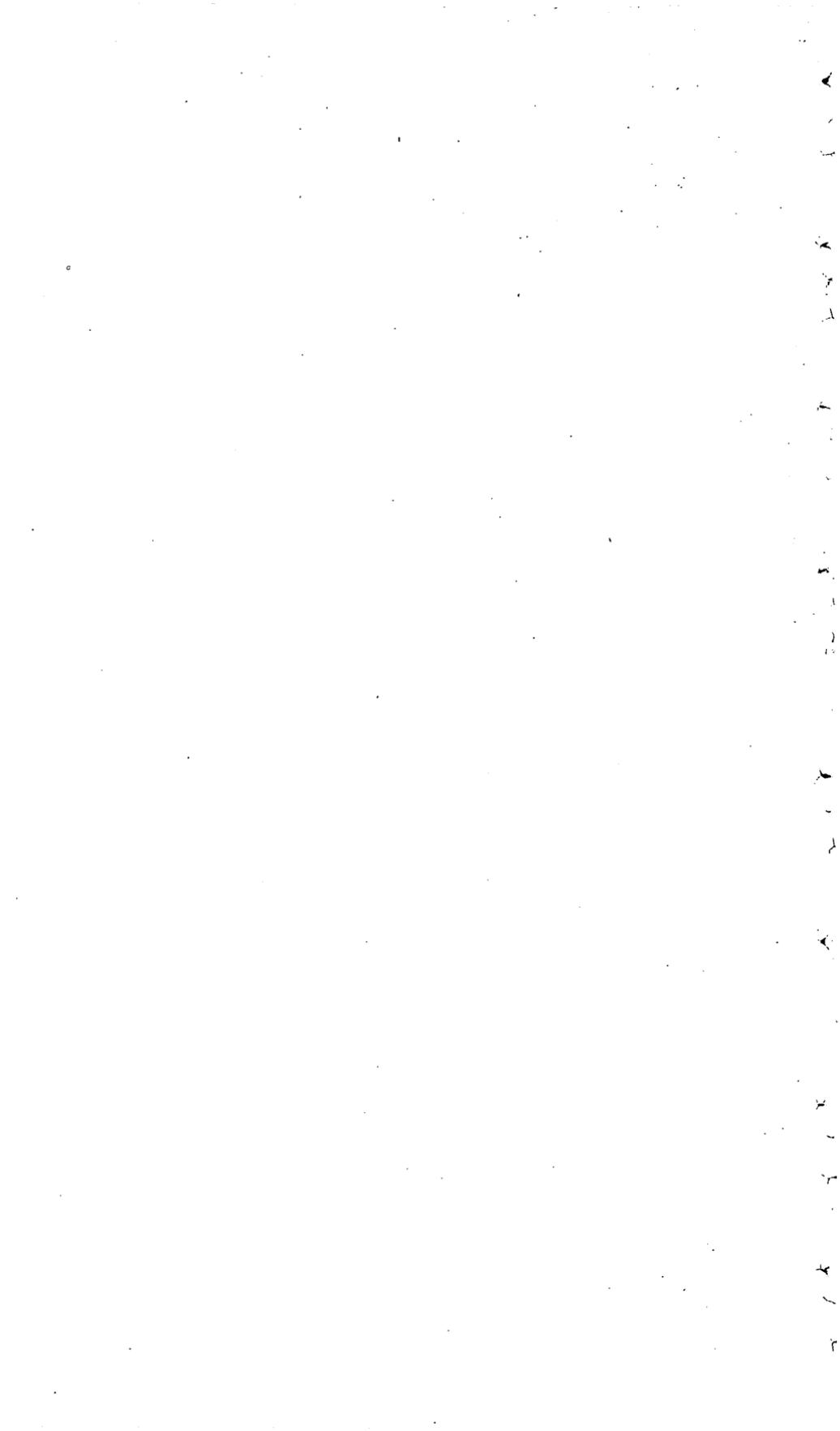
UNITED STATES

GEOLOGICAL SURVEY.

No. 174



WASHINGTON
GOVERNMENT PRINTING OFFICE
1900



UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

SURVEY

OF THE

NORTHWESTERN BOUNDARY OF THE UNITED STATES

1857-1861

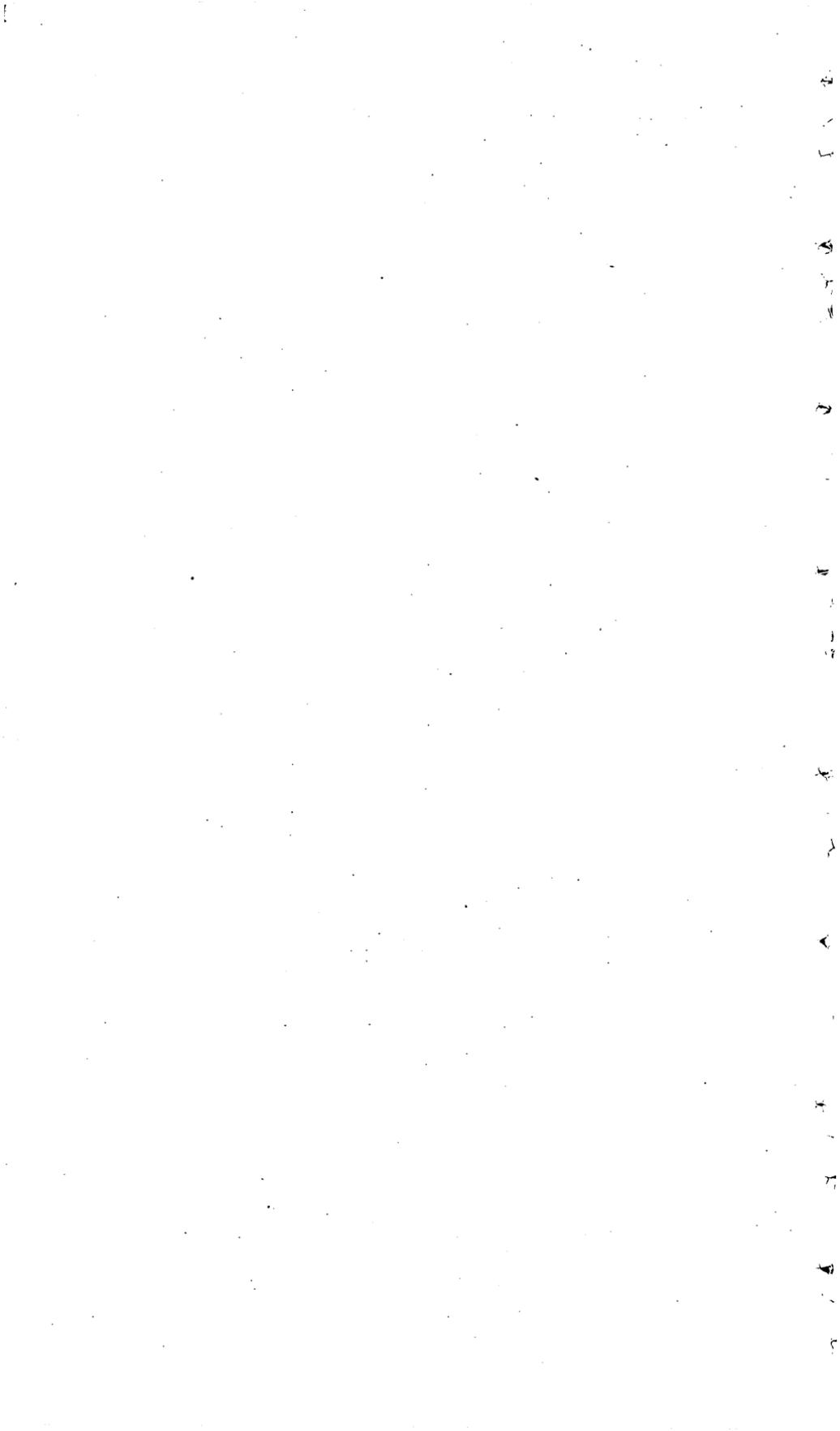
BY

MARCUS BAKER



WASHINGTON
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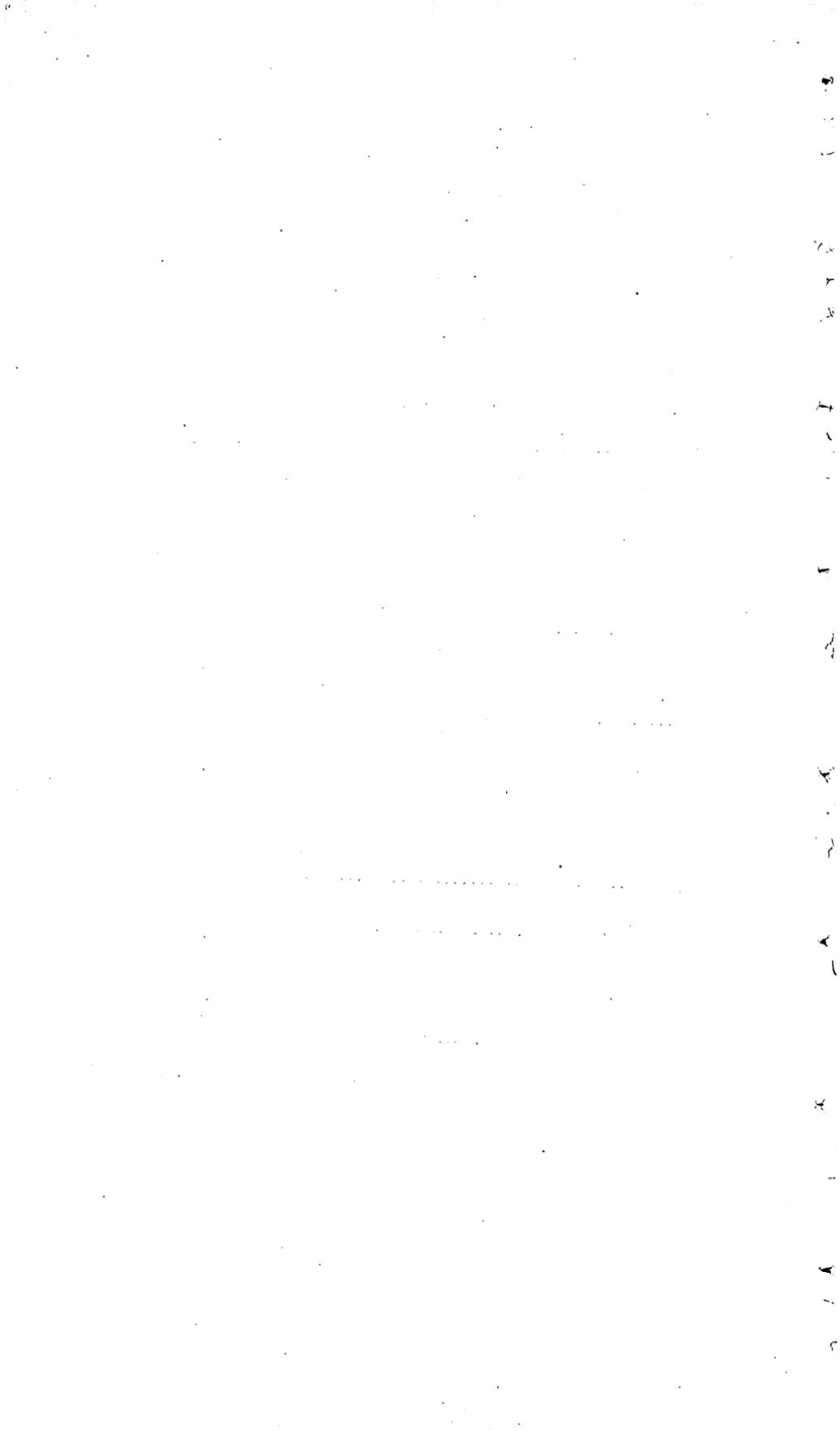


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LETTER OF TRANSMITTAL.

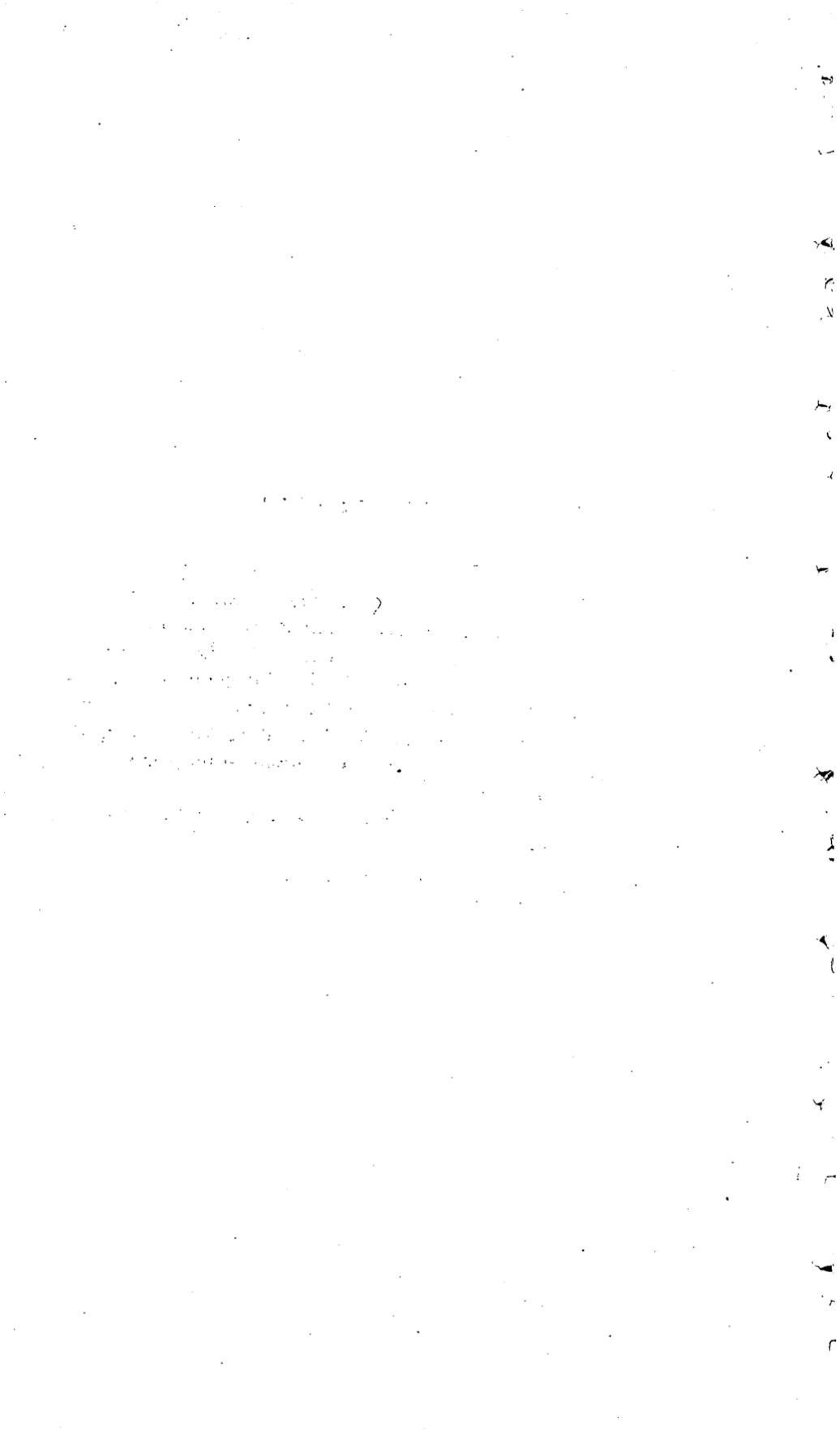
DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., June 9, 1900.

SIR: I have the honor to transmit herewith, for publication as a bulletin, an account of the establishment of and survey of the boundary line between the United States and Canada, along the forty-ninth parallel, from the summit of the Rocky Mountains to the Pacific.

Very respectfully,

MARCUS BAKER, *Cartographer.*

Hon. CHARLES D. WALCOTT,
Director United States Geological Survey.



SURVEY OF THE NORTHWESTERN BOUNDARY OF THE UNITED STATES, 1857-1861.

By **MARCUS BAKER.**

INTRODUCTION.

By the Northwestern Boundary, as here used, is meant that part of the boundary line between the United States and Canada which extends from the summit of the Rocky Mountains westward along the forty-ninth parallel to the seacoast at Point Roberts and thence through the waters of Georgia, Haro, and Juan de Fuca straits to the Pacific. This line naturally divides itself into two parts, the land boundary and the water boundary. This paper treats only of the land boundary. As to the water boundary, the joint commission charged with the survey disagreed, and its location was finally determined by arbitration in 1871, the arbiter, Emperor William I, of Germany, deciding in favor of the American claim. The prominence given this part of the line, growing out of the arbitration, has made its history well known. In regard to it there is an abundance of printed material. The history of the land boundary, however, is very imperfectly known. Little has been published respecting it, and its story is to be gathered largely from manuscript memoranda, notes, sketches, pictures, correspondence, and the memories of men still living.

From time to time information respecting this line is needed by the Executive Departments. In 1897 the Geological Survey was directed by Congress to survey and mark the boundary between Montana and Idaho. In performing this duty it became necessary to connect with the survey of the forty-ninth parallel. The search then made of the records in the State Department showed the desirability of preparing a concise history of the northwestern boundary, its establishment, survey, and marking, with a summary of results. To exhibit such a history and summary is the object of this bulletin.

SOURCES OF INFORMATION.

The sources of information from which this account is prepared are three, viz:

(a) Government publications, consisting of the Statutes at Large, executive documents, official reports, etc.

(b) Manuscript records in the State Department, consisting of the original notebooks, observations, computations, plattings, sketches, maps, correspondence, etc.

(c) The memories of some of the surviving participants in the survey. These will be discussed in the order indicated above.

(a) In the Statutes at Large are contained all laws enacted by Congress touching the boundary, including also all the treaties. For the original treaty of June 15, 1846, see vol. 9, pages 869-870; for the act creating the commission to survey and mark the boundary, vol. 11, page, 42; for various appropriation acts, vol. 11, pages 42, 159, 312, 403, and vol. 12, page 20.

On November 12, 1859, Lieut. (now Gen.) John G. Parke, chief astronomer and surveyor, made a short report of progress. This is a document of 7 pages and is printed as Senate Ex. Doc. No. 16, Thirty-sixth Congress, first session. It is here reprinted as Appendix B.

Nothing further, in official documents, appears for nine years. The civil war turned attention to more urgent matters and this subject was dropped. In February, 1868, however, President Johnson sent to the Senate a long communication on the San Juan boundary question. This document (Senate Ex. Doc. No. 29, Fortieth Congress, second session) of 280 pages, though dealing chiefly with the water boundary, nevertheless throws considerable light on the history of the land boundary.

On January 13, 1869, the House of Representatives, by a resolution, requested information as to expenditures by the Northwestern Boundary Commission. In response, a message from President Johnson was laid before the House of Representatives on February 13, 1869. (House Ex. Doc. No. 86, Fortieth Congress, third session.) This document of 102 pages is almost wholly given to a detailed tabular exhibit of expenditures. There is, however, a letter of 4 pages from the commissioner, Hon. Archibald Campbell, summarizing the entire history of the survey. This is apparently the nearest approach to a report on this subject that has ever appeared in print.

Finally, in 1889, Capt. George M. Wheeler, U. S. A., published in his report upon geographical surveys west of the one hundredth meridian (vol. 1, pp. 614-619) a short account of the Survey of the Northwestern Boundary of the United States 1857-1861.

(b) The manuscript records of the survey are nearly all contained in two blue chests stored in the division of manuscripts in the library of the State Department. Some of the maps being too large to go into these chests are kept elsewhere in the library. The memoranda, notes, correspondence, maps, etc., in this collection are the chief source of information from which this account has been prepared. But unfortunately the most important document of all was not found there, and a diligent search has failed to bring it to light. This paper is the final report, written on foolscap paper and consisting of four parts, one by

Archibald Campbell, the commissioner; one by Gen. J. G. Parke, chief astronomer and surveyor; one by G. Clinton Gardner, assistant astronomer and surveyor, and one by J. S. Harris, general assistant. For this description of the missing manuscript I am indebted to Mr. William J. Warren, Bureau of Engineers, War Department. When Captain Wheeler was preparing his account of this survey he made an unsuccessful search for this missing report. He says:¹

I have been unable to trace the manuscript of the final report, including that of the chief astronomer and the specialists, which it is believed was made. According to the Journal of the Senate of February 9, 1871, this report was called for by the Senate, but a search of the Senate records and also those of the State Department, made at my request by Mr. Dwight, librarian of the State Department, remained unavailing on June 15, 1887. Mr. William J. Warren, secretary of the commissioner [and] now chief clerk [in the office] of the [Chief of] Engineer[s] [War] Department, recollects to have seen the manuscript of this report at the office of the Northern Boundary [Survey], established in 1873, as does also Maj. J. F. Gregory, Corps of Engineers, a member of that commission, but it could not be found by Mr. Dwight in the records transmitted at the close of the latter survey to the State Department.

The search above mentioned I have now repeated and with like result. The manuscript has not been found.

The existence of the manuscript is attested by Mr. Warren, who gave me the description above written. The call for it made by the Senate in 1871 is set forth in the following extract from the Senate Journal of February 9, 1871, page 254:

Mr. Howard [Jacob M., of Michigan] submitted the following resolution, which was considered by unanimous consent, and agreed to:

“Resolved, That the President be respectfully requested, if not incompatible with the public interests, to transmit to the Senate copies of the final report, and the accompanying documents, of the commissioner on the part of the United States to carry into effect the first article of the treaty with Great Britain of June 15, 1846.”

An examination of the records in the office of the Secretary of the Senate reveals no other entry concerning it, from which it is concluded that it was never sent. Similarly an examination of the records in the Index Bureau of the State Department shows the call, but no action is indorsed thereon, thus corroborating the belief that it was not sent.

When the *Northern* Boundary Commission was created, in 1872, Mr. Archibald Campbell was appointed United States commissioner of *that* survey also. He found at the outset that it was desirable to have for reference the records of the *Northwestern* Boundary Survey, and accordingly wrote to the State Department asking permission to withdraw those records for temporary use.

The following is a copy of his letter, which is now on file in the Index Bureau of the State Department:

U. S. NORTHERN BOUNDARY COMMISSION,
Washington, D. C., June 27, 1872.

SIR: In preparing for the duties of the boundary commission it would be of the greatest assistance to have the use of the records, notebooks, and other papers of

¹G. M. Wheeler, U. S. Geog. Surv. W. One Hundredth Mer. 4°. Washington, 1889, vol. 1, p. 617.

the Northwest Boundary Commission, deposited by me in the Department at the close of the work in October, 1869.

I have therefore the honor to request that you allow me to withdraw these records and papers temporarily. Before leaving for the field they will be returned to the Department.

I have the honor to be, very respectfully, your obedient servant,

ARCHIBALD CAMPBELL,
Commissioner, Northern Boundary Survey.

Hon. CHAS. HALE,
Acting Secretary of State.

Upon that letter is indorsed: "Papers, etc., herein referred to sent to Mr. Campbell 27th June."

A search of the records of the Index Bureau of the State Department fails to reveal any other entry touching these papers. If they were returned no record was made of such return. It is certain that these papers were in the possession of the Northern Boundary Commission in 1872. Beyond that there is no trace. It would therefore be natural to look for them among the papers of the Northern Boundary Commission, which were sent to the State Department on June 30, 1876. But a search among these papers made by me in March, 1900, was unsuccessful. The missing manuscript was not found.

Prof. C. L. Doolittle, now at the Flower Observatory at Upper Darby, Pennsylvania, was connected with the Northern Boundary Survey. In response to an inquiry as to whether he had any information touching the report desired, he writes, among other things, under date of March 12, 1900:

My connection with the northern boundary began after active operations had been going on for a year. We then had our office at Detroit. After field operations were completed we removed to Washington. It is not a great exaggeration to say that I saw every scrap of paper to be found in the Detroit office. At all events, this report was not to be found there. I remember hearing such a report spoken of, but it was then said to be stored away with other Government archives at Washington.

(c) Archibald Campbell, the commissioner, died in the city of Washington July 27, 1887. To his son, Charles Campbell, now an employee in the Department of State, I am indebted for information as to the survey. I have also conferred with Gen. J. G. Parke, Corps of Engineers, U. S. A. (retired), who was chief astronomer and surveyor of the Northwestern Boundary Survey Commission, and with Mr. William J. Warren, chief clerk in the office of the Chief of Engineers, U. S. A., who was secretary of the commission. To both of these gentlemen, and especially to the latter, I am indebted for information used in preparing this account. Mr. G. Clinton Gardner, the assistant astronomer and surveyor from 1857 to 1868, is now a civil engineer in Peru, South America, while Mr. Joseph S. Harris, general assistant Northwest Boundary Survey from 1857 to 1864, is now president of the Philadelphia and Reading Railroad. To both of these gentlemen I am indebted for letters relating to the boundary and its survey. I have

also talked on this subject with Mr. J. V. Wurdemann, now employed in the Library of Congress, who participated in the survey and with Dr. Theodore Gill, who prepared a report on the fishes collected by the survey. To the courtesy of these gentlemen as also to that of Prof. C. L. Doolittle, to the Smithsonian Institution, to the Coast Survey, and to the General Land Office I am indebted for bits of information used in preparing this report.

ESTABLISHMENT OF THE LINE.

The present boundary line between British Columbia on the north and Washington, Idaho, and Montana on the south was established in 1846. Prior to that date the boundary was in dispute between the United States and Great Britain and the Oregon question was a burning one. Great Britain claimed as far south as forty-two degrees north latitude, the northern limit of California to-day. The United States claimed as far north as $54^{\circ} 40'$, the present southern boundary of Alaska. The slogan of the day was "Fifty-four forty or fight." But there was no fight and no fifty-four forty. A treaty was arranged by which the disputed tract was divided between the claimants. The boundary line adopted was the present line along the forty-ninth parallel from the summit of the Rocky Mountains to the middle of the channel between Vancouver Island and the continent and thence southward along the main channel and Juan de Fuca Strait to the Pacific.

The diplomatic agents who drew this treaty were, on the part of the United States, James Buchanan, then Secretary of State, and on the part of Great Britain, the then British minister, Richard Pakenham. The treaty was signed at Washington June 15, 1846, ratifications exchanged at London July 17, and proclaimed August 5, 1846.¹

The first article of the treaty describes the boundary in the following words:

From the point on the 49th parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, the line of boundary between the Territories of the United States and those of Her Britannic Majesty shall be continued westward along the said 49th parallel of north latitude, to the middle of the channel which separates the continent from Vancouver's Island and thence southerly through the middle of the said channel, and of Fuca's [Juan de Fuca] Straits, to the Pacific Ocean.

HISTORY OF THE SURVEY.

On August 11, 1856, almost exactly ten years after the proclaiming of the treaty of limits, which for brevity may be called the Buchanan-Pakenham treaty, Congress passed an act to carry its first article into effect. This act provided for the appointment of a commissioner and a chief astronomer and surveyor on the part of the United States to unite

¹ Stat. L., vol. 9, pp. 869-870; vol. 11, p. 42.

with similar officers to be appointed by Great Britain to survey the boundary and mark it with monuments. It also provided for the appointment of an assistant astronomer and surveyor, a secretary, and a clerk; it appropriated \$11,000 for the annual salary of these five officers, and \$60,000 for provisions, transportation, and contingencies; it restricted the work to the northern boundary of Washington, which then extended from the Rocky Mountains to the Pacific; and finally it authorized the President to direct the employment of such officers, assistants, and vessels of the Coast Survey as he might deem necessary or useful.

Under this law Mr. Archibald Campbell was appointed commissioner on February 14, 1857, and on the same day Lieut. (now Gen.) John G. Parke, Corps of Engineers, U. S. A., was appointed chief astronomer and surveyor,¹ each at a salary of \$3,000 per annum. Two weeks later, viz, February 28, 1857, Mr. G. Clinton Gardner was appointed assistant astronomer and surveyor, and on April 5 entered upon his duties. On April 9 Mr. William J. Warren (now chief clerk Office of Chief of Engineers, U. S. A.) was appointed secretary, and on March 6 Mr. John J. Major was appointed clerk to the commissioner. Mr. Campbell remained commissioner to the end in 1869. On the outbreak of the civil war, in the spring of 1861, General Parke left the work and never returned to it. Messrs. Gardner and Warren served with the commission until December 31, 1868, and perhaps a little later.² Mr. Major resigned December 9, 1864.

Of the other principal employees, Mr. Joseph S. Harris, now president of the Philadelphia and Reading Railroad, is recorded as assistant surgeon and naturalist March 27, 1857, to March 31, 1864, when he left the survey to engage in private business. Francis Herbst and Henry Custer served as topographers, the former about two years from April 16, 1857, till March 31, 1859, the latter about seven years from April 16, 1857, till June 30, 1864. Mr. J. Nevine King served as quartermaster and commissary from May 21, 1857, to January 15, 1861; Mr. George Gibbs as geologist and interpreter from June 22, 1857, till May 31, 1862, and Mr. R. V. Peabody as guide from August 1, 1857, to January 15, 1861. Dr. C. B. R. Kennerly served as surgeon and naturalist from March 22, 1857, till his death in 1861.

On February 28, 1857, Mr. Campbell received his instructions from the Secretary of State, dated February 25, whereupon, he says, "I proceeded at once to collect all such information within my reach which might contribute to a proper understanding of the meaning of the language of the treaty, and in the execution of the work intrusted to me."³ Having arranged with Professor Bache, Superintendent of the Coast Survey, for the use of the surveying steamer *Active* and the brig

¹ House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 100.

² House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 23.

³ Senate Ex. Doc., No. 29, Fortieth Congress, second session, p. 8.

Fauntleroy, with the officers and assistants attached,¹ Mr. Campbell sailed from New York April 20 and reached San Francisco via the Isthmus of Panama on May 15. On June 17 the party sailed on the *Active* for Victoria, where they arrived five days later and learned that the first British commissioner, Capt. James Charles Prevost, R. N., commanding H. B. M. S. *Satellite*, had arrived at Esquimalt ten days before. The second British commissioner was Capt. George Henry Richards, R. N., whose ordinary duties were those of chief astronomer and surveyor, he being empowered to act as commissioner only in the event of the death of Captain Prevost. Captain Richards, commanding the British steamer *Plumper*, left England at the close of March, 1857, for Victoria. By an accident to the *Plumper's* machinery he was delayed at Rio de Janeiro for some time and did not reach Victoria till November, 1857. The powers of these first and second British commissioners did not extend to the whole line, but only to the water boundary. "So much of the boundary between her Majesty's possessions in North America and the territories of the United States as is comprised between the continent of America and Vancouver's Island." Such is the language of the instructions to Captain Prevost.

The British and American commissioners held their first meeting on Saturday, June 27, 1857, on board the *Satellite* in Esquimalt harbor. The respective commissions of themselves and assistants were exhibited, read, and found in due form. A second meeting was held three weeks later in Nanaimo harbor on board the *Satellite*. Captain Richards not yet having arrived, it was decided that nothing further could be done with the water-boundary question.

Accordingly the American party proceeded to the vicinity of the forty-ninth parallel at Point Roberts on the mainland and began operations on the land boundary. It was not till the summer of the next year, 1858, that the British commissioner for surveying the land boundary, Col. J. S. Hawkins, Royal Engineers, arrived from England. The American parties worked, therefore, alone during the fall and winter of 1857 and spring of 1858. "Before the spring [of 1858] four astronomical points on the 49th parallel were determined, and the country thoroughly reconnoitered in the vicinity of the parallel, for a considerable distance eastward."²

After the arrival of Colonel Hawkins a joint meeting of the commission was held to arrange a plan of field operations for surveying and marking the line. The outcome of that meeting is set forth in the following agreement:³

After discussing plans for determining and marking the line as far eastward as the Cascade Mountains, it was concluded to be inexpedient at the present time, in con-

¹From Coast Survey Report for 1857, p. 116, we learn that, "At request of State Department," steamer *Active* and party, in charge of Lieut. Commander Richard M. Cuyler, U. S. N., were placed at disposal of Archibald Campbell, esq., commissioner of the Northwestern Boundary Survey.

²House Ex. Doc. No. 86, Fortieth Congress, Third session, p. 95.

sequence of the great expense, consumption of time, and the impracticable nature of the country, to mark the whole boundary by cutting a track through the dense forest.

It was therefore agreed to ascertain points on the line by the determination of astronomical points at convenient intervals on or near the boundary, and to mark such astronomical stations or points fixed on the parallel forming the boundary by cutting a track of not less than 20 feet in width on each side for the distance of half a mile or more, according to circumstances. Further, that the boundary be determined and similarly marked where it crosses streams of any size, permanent trails, or any striking natural feature of the country.

In the vicinity of settlements on or near the line it is deemed advisable to cut the track for a greater distance and to mark it in a manner to be determined hereafter.

This arrangement for the part west of the Cascades appears to have been subsequently applied to the whole line; and thus it resulted that of the entire boundary, 409.5 miles long, from the boundary station on the crest of the Rocky Mountains westward to the obelisk on the western side of Point Roberts, 190 miles were cleared and marked and 220 miles were not traced out, cleared, surveyed, or marked. These figures are obtained by scaling off from the final maps.

At the end of the season of 1858 the line had been reconnoitered eastward as far as the valley of the Skagit, near the one hundred and twenty-first meridian, a distance of about 90 miles, and the astronomical observations necessary for determining three points on the parallel in the valley of the Chiloweyuck completed.

In the season of 1859 the work of surveying and marking the boundary was carried eastward from the valley of the Skagit to the Columbia River, a distance of about 150 miles. General Parke, writing November 12, 1859, thus summarizes the work done during the season:

A completion of the determination and marking of the parallel from three points astronomically fixed at the close of the last season.

A complete set of observations for latitude at four stations, from which the parallel has been determined and marked at the crossings of the following streams: The Skagit, Pasayten, Similkameen, Okinakane (Lake Osoyoos), and Nehoiapitkwu; and before the astronomical parties leave the field the necessary observations will be completed for determining two other points of the parallel, the third crossing of the Nehoiapitkwu and the Columbia River.

A chronometer trip for difference of longitude between Camp Simiahmoo and Chiloweyuck depot.

Observations of the transit of the moon and moon-culminating stars at two of the latitude stations for absolute longitude.

A triangulation covering an area of about 50 square miles.

A survey of the nearest practical lines to the parallel, connecting the astronomical stations, making a total distance chained of about 370 miles.

Reconnoissances for developing the topography along and adjacent to the boundary line, and for locating routes of communication. These reconnoissances have extended over an area of about 6,000 square miles.

A full set of magnetic observations were made at one station, and throughout the work all the necessary observations for time, azimuth, micrometer value, and instrumental corrections were carefully made.

In the season of 1860 the surveying and marking of the entire land boundary was nearly or quite completed. I have not found any statement as to just when the field work ended. The Auditor's accounts indicate that a considerable number of laborers, axmen, packers, etc., were employed during 1861, of whom 22 were discharged on March 31 and 14 on June 30. Others received their final pay at various dates in 1861, the latest being in September. General Parke, who came out with the last party, tells me that on reaching the Columbia Plains he heard of the first battle of Bull Run. It seems to me likely, therefore, that the field work closed late in 1860 or early in 1861. During this season, then, the surveying and marking of the line was carried on over a distance of 170 miles—between the summit of the Rocky Mountains and the Columbia River.

As to the disbanding of the field parties and their return to Washington we gather some facts from the Auditor's accounts, so often cited here. It appears that all returned via the Isthmus of Panama, the fare being \$258 from San Francisco to New York and \$7.50 from New York to Washington. Commissioner Campbell, Secretary Warren, Geologist Gibbs, and Artist Alden left the field November 25, 1860, and reached Washington January 10, 1861, the journey taking forty-six days. Henry Custer, Charles T. Gardner, T. Hudson, and James Nooney left the field April 30, 1861, and G. Clinton Gardner on May 10, 1861. All these came direct to Washington. Finally, in the last quarter of 1861 (exact date not given), General Parke, J. S. Harris, J. V. Wurdemann, and John J. Major returned to Washington. With these returning parties came instruments, records, collections, baggage, etc. There is a charge for freight on "41 packages instruments and baggage" and "24 boxes natural-history specimens."

Arrived in Washington, the commission rented rooms and established an office over a store at the SE. corner of Pennsylvania avenue and Twentieth street NW., and there proceeded with the plattings, computations, drawing of maps, and preparation of the final report. The scientific reports appear to have been completed in 1862 and the drawing of the final maps, at least of the land boundary, late in 1865 or early in 1866. The work upon the report, however, continued, and there began to be some good-natured raillery as to when it would be completed. Finally, on January 13, 1869, the House of Representatives, by a resolution, requested information as to expenditures on account of the Northwestern Boundary Survey. The reply to that request has furnished the chief source of information for this history.¹ In October, 1869, the work was brought to a close and the results deposited in the State Department. But the report, unfortunately, was not published, and the manuscript has for many years

¹ House Ex. Doc. No. 86, Fortieth Congress, third session.

been lost to view. Its whereabouts are still unknown. The reason it was not published, I am informed, is that Mr. Fish, Secretary of State at that time, deemed its publication too expensive. The war had brought a mountain of debt, and under these conditions he refused to sanction so costly a publication.

COST.

The total cost of surveying and marking the line, including all expenses, was about \$600,000, or \$1,463 per mile. The first appropriation for the work, made August 11, 1856, was \$71,000. This and the subsequent appropriations are as follows:

Appropriations for surveying and marking the boundary along the forty-ninth parallel, between the United States and the British Possessions, from the Rocky Mountains to the Pacific Ocean.

| Date. | Fixed salaries. | Other expenses. | Total. | Authority. |
|------------------------|-----------------|-----------------|-----------|---------------------------------|
| August 11, 1856 | \$11, 000 | \$60, 000 | \$71, 000 | Stat. L., vol. 11, p. 42. |
| February 7, 1857 | 11, 000 | 60, 000 | 71, 000 | Stat. L., vol. 11, pp. 159-160. |
| June 5, 1858 | 11, 000 | 60, 000 | 71, 000 | Stat. L., vol. 11, p. 312. |
| March 3, 1859 | 11, 000 | 139, 000 | 150, 000 | Stat. L., vol. 11, pp. 403-404. |
| May 26, 1860 | 11, 000 | 139, 000 | 150, 000 | Stat. L., vol. 12, pp. 20-21. |
| Total | 55, 000 | 458, 000 | 513, 000 | |

The amount actually expended somewhat exceeded this sum, aggregating nearly \$600,000.

In response to the House resolution of January 13, 1869, above referred to, Mr. Seward, then Secretary of State, transmitted, on February 9, 1869, a detailed reply, consisting, in the main, of a statement by Mr. C. M. Walker, then Fifth Auditor of the Treasury Department, of "disbursements on account of Northwest Boundary Survey from February 14, 1857, to December 31, 1868."¹ The total expenditures in that period were for—

| | |
|---------------------------|----------------|
| Salaries | \$385, 508. 78 |
| Contingent expenses | 209, 724. 25 |
| Total | 595, 233. 03 |

Most of these were made in the five years 1857 to 1861, inclusive. After the latter year a small office was maintained in Washington at an annual rental of \$250, which, with various minor items, entailed an annual expense of from \$1,200 to \$1,400. The work was finally closed up and the records deposited in the State Department in October, 1869.²

¹ House Ex. Doc. No. 86, Fortieth Congress, third session, 102 pp.

² Letter from Archibald Campbell to Acting Secretary of State, June 27, 1872.

For the preparation of scientific reports on magnetics, mammals, birds, fishes, plants, insects, fossils, etc., including the making of drawings, there was expended about \$3,500¹ and for the drawing of the final maps about \$9,400.

For building the initial monument at Point Roberts was paid \$7,590.38, one-half of which was paid by the United States and one-half by Great Britain.²

The cost to the British Government of running and marking the boundary line I have not found. A single item bearing on the matter is contained in Parliamentary Papers, 1863, volume 37, page 287 (55-v), where there is "An estimate of the sum required to be voted in the year ending March 31, 1864, to complete the expenses of surveying the line of boundary between the British and United States territory in the western part of North America, 4,300 pounds."

While the boundary survey was going forward there was another independent exploration by the British in progress in the region, under the direction of Capt. John Palliser. Early in 1857 the president of the Royal Geographical Society recommended to the British foreign office that a grant of £5,000 be voted to cover the expense of two years' exploration along the forty-ninth and fifty-third parallels and between the one hundredth and one hundred and fifteenth meridians.³ This sum was voted and later on £1,500 additional, to continue the work one year more, making three years in all. Among the estimates for the year ending March 31, 1861, is an item of £6,300 for completing Palliser's explorations. The results of Palliser's work, his route of travel, etc., are set forth in the Journal of the Royal Geographical Society of London, 1859, volume 29, pages xcvi-c; and 1860, volume 30, pages 267-314.

MAPS.

ORIGINAL MANUSCRIPT MAPS.

Two large blue chests in the manuscript room at the State Department contain the original observations, computations, sketches, notes, etc., relating to the Northwestern Boundary Survey. They do not contain the final maps, these being kept among the treaty maps. They do, however, contain the following manuscript map material, which may be classified as preliminary and final:

Preliminary.—First. Several rolls of rough sketches of reconnoissances, triangulation, trails, office plattings, field sketches, etc., on rough paper, drawing paper, tracing linen, and tracing paper. Some of this is original field material identified by title, date, and signature. Much of it, however, is of the nature of office studies, plattings, etc., which served a temporary purpose and is no longer of value.

¹ House Ex. Doc. No. 86, Fortieth Congress, third session, p. 101.

² Same, p. 97.

³ Parliamentary Papers, 1857, vol. 26, p. 29 (38-vii-sess. 2).

Second. There is a series of 19 sheets on tracing linen covering the entire line from the sea coast eastward to the Rocky Mountains. These sheets are numbered from west to east, 1 to 19. Each sheet except the first embraces 30' of longitude and from 15' to 25' of latitude. Sheet 2, for example, includes from 123° to $122^{\circ} 30'$; sheet 3, longitude $122^{\circ} 30'$ to 122° , while sheet 19, the easternmost of the series, includes longitude $114^{\circ} 30'$ to 114° . The relief is shown by broken horizontal curves. The scale is not stated, but the parallels and meridians enable us to infer that it is 1:64000, or about 1 mile to 1 inch. These sheets bear no title, no legend, no date, and no names.

Third. There is a series of five manuscript maps (not numbered) on a scale of 1:120000, showing the entire line from the sea coast to the Rocky Mountains. They appear to be unfinished drafts. Relief is shown by contours in green, trails in red, and there are a few names. They are drawn on backed drawing paper. None of them have legends or titles, or names of draftsmen or any authority. They contain no dates. They appear to be compilations from original sketches, notes, and surveys. They are not numbered. Beginning at the west end of the line, the sheets cover the following areas: The first sheet covers from latitude $48^{\circ} 40'$ to $49^{\circ} 25'$, and from longitude $123^{\circ} 20'$ to $120^{\circ} 50'$, being 30 inches high and 61 inches wide. The second sheet covers from latitude $48^{\circ} 33'$ to $49^{\circ} 35'$, and from longitude $121^{\circ} 15'$ to $119^{\circ} 12'$, being 38 inches high and 50 inches wide. The third sheet covers from latitude $48^{\circ} 30'$ to $49^{\circ} 18'$, and from longitude $119^{\circ} 35'$ to $117^{\circ} 40'$, being 29 inches high and 50 inches wide. The fourth sheet covers from latitude $47^{\circ} 35'$ to $49^{\circ} 10'$, and from longitude $117^{\circ} 50'$ to $114^{\circ} 40'$, being 59 inches high and 55 inches wide. Owing to its inconvenient size this sheet has been cut into two pieces along the parallel of $48^{\circ} 21'$. The meridians are erroneously numbered. The fifth sheet covers from latitude $48^{\circ} 15'$ to $49^{\circ} 35'$, and from longitude $116^{\circ} 08'$ to $113^{\circ} 13'$, being 50 inches high and 71 inches wide. This map also has been cut into two pieces along the meridian of $114^{\circ} 55'$. Like the preceding, the meridians are erroneously numbered. Owing to its size, this roll of maps is not kept with the other material in the chests above mentioned.

Fourth. There is an unfinished manuscript map, in two sheets, on unmounted drawing paper, covering the entire line from the sea coast to the Rocky Mountains. It includes latitude 47° to 50° and longitude $113^{\circ} 30'$ to 125° , is on the conic projection, and is projected on the one hundred and nineteenth as the central meridian. The eastern part includes longitude $113^{\circ} 30'$ to 119° , the western 119° to 125° . The scale is not stated, but appears to be 1:601000. There is no title, no date, no signature. It is an outline map, no relief being shown. The camps are shown, but the boundary monuments are not.

Fifth. The foregoing four groups I have called preliminary maps. There is, however, a fifth group, a set of seven tracings, which have an official character which places them in a different category. These seven tracings, on tracing linen, are on a scale of 1 : 120000, are numbered from west eastward, and each sheet includes $1^{\circ} 20'$ of longitude and $30'$ of latitude, being $15'$ on each side of the forty-ninth parallel. Sheet 1, the westernmost, includes longitude $123^{\circ} 10'$ to $121^{\circ} 50'$; sheet 2, $121^{\circ} 50'$ to $120^{\circ} 30'$, and so on; and sheet 7, the easternmost, $115^{\circ} 10'$ to $113^{\circ} 50'$. On these maps are shown trails, camps, caches, monuments, and names; the relief also is shown by red contour lines.

Sheet 1 has the following legend:

Tracings numbering from 1 to 7, showing the topography, names, and scales adopted by the British and United States Boundary Commissions for their final maps. By order of the commissioners.

R. W. HAIG,
Capt'n R'l Art'y, Astr. British Commis'n.
 G. CLINTON GARDNER,
Ass't Astr. and Surv., U. S. B. C.

WASHINGTON CITY, *May 30, 1863.*

Final drawings.—The final original manuscript maps resulting from the survey are thirteen in number. To this should be added the title page, making fourteen drawings. They are beautifully drawn on "smooth antiquarian" drawing paper, backed with muslin, and bound with blue braid. The sheets are of uniform size, being 30 inches high and 42 inches wide. They are kept among the treaty maps in the library of the Department of State. They are drawn wholly in black and show trails, timber, camps, monuments, etc. Topography is shown by hachures. The scale of the ten detailed maps is 1 : 120000, or 1.89 miles to 1 inch; of the two general maps 1 : 720000, or 11.37 miles to 1 inch, and of the index map 1 : 1200000, or 18.94 miles to 1 inch. This series of drawings was obviously planned to form an atlas. Of this the contents would be:

1. Title.
2. Index map showing location of ten detailed sheets.¹
3. General map, eastern section.
4. General map, western section.
5. Detailed sheets numbered 1 to 7 (from east to west), showing land boundary.
6. Detailed sheets numbered 8 to 10, showing water boundary.

The title is as follows:

Maps of the Boundary between the United States and the British Possessions as established by the treaty of Washington, June 15, 1846. Surveyed under the direction of the Joint Commission appointed to carry into effect the First Article of the Treaty.

The index map is entitled:

Index Map showing the limits of the detailed sheets of the U. S. North Western Boundary Survey.

¹The plate which accompanies this bulletin is a copy, on a reduced scale, of this map.

The general map (western section) has outside the border the legend "U. S. North West Boundary Survey, Archibald Campbell, U. S. Commissioner; John G. Parke, U. S. Eng., Chief Astr. and Surveyor." The title is as follows:

Map of Western Section. From notes by John G. Parke, U. S. Engineers, Chief Astr. and Surveyor, G. Clinton Gardner, Ass't Astr. and Surveyor, and Jas. S. Harris, Henry Custer, Chas. T. Gardner, George Gibbs, Francis Hudson and R. V. Peabody, Ass'ts U. S. Boundary Survey.

Compiled and drawn by Lemuel D. Williams, Theodor Kolecki, and Edward Freyhold. By order of U. S. Commissioner. (Signed) G. Clinton Gardner, Ass't Astr. and Surveyor, U. S. Boundary Survey, Office Washington D. C. 1866. Scale 1:720000 or 11.37 miles to one inch.

This map includes from longitude 118° to 125° and the eastern section, bearing a similar title, includes from longitude 110° to 118° .¹

The detailed sheets showing the land boundary, numbered 1 to 7, are signed "Jno. G. Parke, Major of Engrs., Brevet Major General, U. S. A., Chief Astr. and Surv. Archibald Campbell, U. S. Commissioner, etc. etc. etc. and J. S. Hawkins, Colonel R'l Eng'rs., H. B. M. Commissioner." The date of signing is recorded as May 7, 1869.

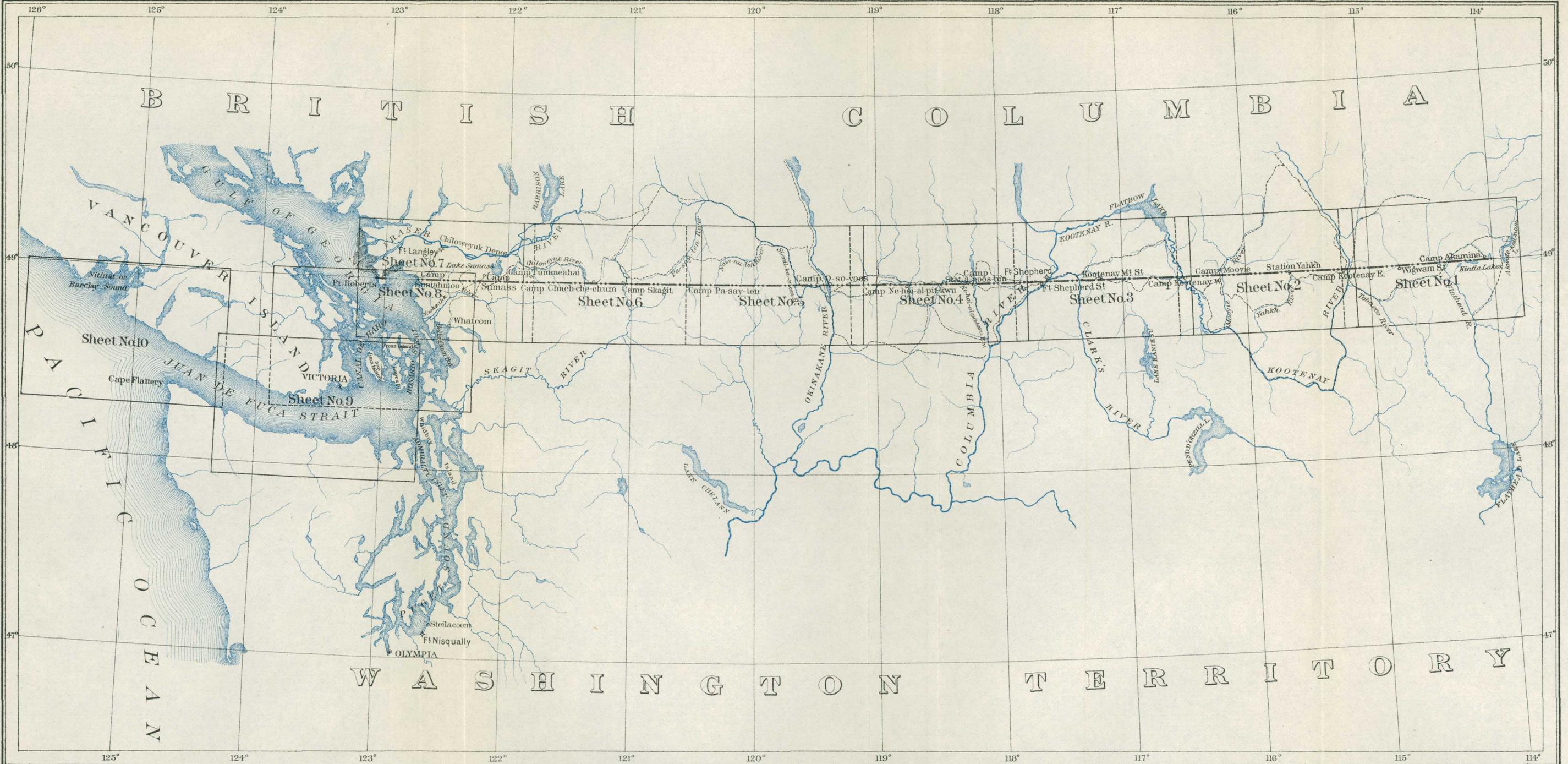
The detailed sheets showing the water boundary, numbered 8 to 10, have no titles, but each has the following written upon it: "That part of the boundary line described in the treaty of June 15, 1846, between the continent and Vancouver Island not agreed upon by the Joint Commission." These are signed by John G. Parke and Archibald Campbell. They do not bear the signature of any member of H. B. M. Commission. The date of signing is November 3, 1869.

Of these final maps, the seven detailed sheets showing the land boundary have been photolithographed and a small edition printed. Just when they were printed or how large the edition I have not learned. These photolithographs are on double the scale of the original (i. e., 1:60000). They were printed by the New York Lithographing, Engraving, and Printing Company, Julius Bien, superintendent. The sheets are numbered from east to west, and the seventh or westernmost bears the following title:

Photo-lithographic Copy of the detailed maps of the North West Boundary from Point Roberts to the Rocky Mountains between the United States and the British Possessions under the Treaty of June 15th, 1846, showing Monuments, Cuts, and other Marks. Archibald Campbell, U. S. Comr. N. W. Boundary Survey. Scale 1:60000 (enlarged to twice the scale of original drawings). Photo-lith. by New York Litho'g Engrav'g and Print'g Co., Julius Bien, Sup't.

The sheets are printed wholly in black, are 28 inches high by 71 inches wide and printed in two pieces. Relief is shown by hachures and timber by the usual convention. Boundary marks are shown by

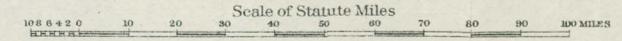
¹In the library of the Coast and Geodetic Survey I have seen a photograph of this western sheet. It is a pale and faded copy, 18 by 24 inches, was made by Alexander Gardner, and is on a scale of 1:1070000, or about 17 miles to 1 inch.



Reduced from Original Manuscript in State Department

INDEX MAP SHOWING THE LIMITS OF THE DETAILED SHEETS OF THE U. S. NORTH WESTERN BOUNDARY SURVEY

JULIUS BIEN & CO. LITH. N. Y.



black circles unaccompanied by names or any designations. Of these maps I have seen copies in the Library of Congress, in the Geological Survey, in the General Land Office, in the Office of the Chief of Engineers, and in the State Department. Some of these are numbered and others not. Could there have been two editions? These sheets cover less territory than the originals. They show the belt of topography, but omit the signatures and legends, if indeed there were any on the copy furnished the lithographer. The copy in the State Department has a clear, strong red line along portions of the boundary and under the title (sheet 7) has the following in the draftsman's hand:

NOTE.—The red lines indicate the portions of the boundary actually surveyed and marked by vistas cut through the forest and monuments of stone.

In the General Land Office there is a photographic copy of the detailed sheets dated 1866, on which are lines similar to the red ones above mentioned. As to this photographic copy we have the following statement made by Mr. Campbell in a letter to the Secretary of State, dated February 3, 1869:¹

In collating the results of the survey * * * complete maps on a large scale [were] made of the entire boundary and the adjacent country. A general map has also been made, showing the extent of the country traversed. And to facilitate the survey of the public lands, photographic duplicates of the detailed sheets showing each monument on the boundary line, with its geographical position, were furnished to the General Land Office.

I have examined these photographs in the General Land Office. There are four of them, each 20 by 70 inches in size, and each composed of several separate photographs, which have been joined together, mounted on cloth, and bound with blue braid. A special title was prepared and photographed for each of these four maps. The title of the easternmost sheet is as follows:

Photographic Sketch of the detailed Maps of the Boundary between the United States and the British Possessions, showing the Monuments *from Mooyie and Yah'k Divide to Rocky Mountain Divide*. Mapped under the direction of the United States North West Boundary Commission. From Surveys by the Joint Commission to carry into effect the 1st Article of the Treaty between the United States and Great Britain and authorized on the part of the United States by Act of Congress of August 11th 1856.

Archibald Campbell, U. S. Commissioner.

John G. Parke, U. S. Eng., Chief Astr. and Surveyor.

G. Clinton Gardner, Ass't Astr. and Surveyor.

William J. Warren, Secretary.

John J. Major, Clerk.

Scale 1: 120000. 1866.

The titles of the others are identical with this, except as to the country covered. This easternmost sheet embraces longitude $113^{\circ} 45'$ to 116° , *from Mooyie and Yah'k Divide to Rocky Mountain Divide*;

¹House Ex. Doc. No. 86, Fortieth Congress, third session, p. 96.

the next, longitudes 116° to $118\frac{1}{2}^{\circ}$, from *Inchuintum River to Mooyie and Yahk Divide*; the next longitudes, $118\frac{1}{2}^{\circ}$ to 121° , from *Divide of Cascade Mountains to Inchuintum*; and the last, longitudes 121° to $123\frac{1}{4}^{\circ}$, from *Point Roberts to Divide of Cascade Mountains*.

The geographic positions of the various camps, stations, etc., are given on these maps, as are also the longitudes of the boundary monuments, accompanied by brief descriptions of the locations. These positions, classified in two groups and arranged in order of longitude, are printed on pages 28-39 of this bulletin.

The preparation of the 13 final original drawings was apparently begun in 1863. There is an autograph memorandum by Mr. G. Clinton Gardner, dated June 30, 1863, containing an estimate of the time required to make these drawings. He estimates that the drawing of seven sheets of 1:120000 scale will take eighty-two weeks' work, and that two sheets of the general map of 1:720000 scale thirty-five weeks' work. After discussing methods and costs he adds:

The scale spoken of by the English commissioner for the general map was 1:600000, but that scale would require larger sheets than those used for the detailed maps. I have therefore proposed to use for the general maps $\frac{1}{6}$ instead of $\frac{1}{5}$ of that of the detailed maps in order that all the sheets shall be of uniform size.

As to the drawing of these sheets and their cost, there are three memorandums in the handwriting of Mr. Gardner. The first, undated, is as follows:

| | |
|--|----------|
| Seven detail sheets from Point Roberts to Rocky Mountains, at \$600..... | \$4, 200 |
| The water-boundary sheet..... | 1, 800 |
| The two general sheets, one from Columbia River west..... | 1, 500 |
| And the other from Columbia east to Fort Benton..... | 1, 000 |
| | 8, 500 |

The second memorandum, dated October 31, 1864, is as follows:

| | |
|---|----------|
| The seven detail sheets have cost \$4,085, [and] when completed [will cost] \$115 [more]..... | \$4, 200 |
| The general sheets have cost \$1,867, [and] when completed [will cost] \$813 [more]..... | 2, 500 |
| The water-boundary sheet has cost \$750, [and] when completed [will cost] \$925 [more]..... | 1, 675 |
| Total..... | 8, 375 |

The third memorandum, dated January 1, 1865, is as follows:

| | |
|---|----------|
| Water-boundary sheet..... | \$2, 000 |
| Detail sheets, 7 at \$600..... | 4, 200 |
| General maps, No. 1, \$1,800; No. 2, \$1,400..... | 3, 200 |
| Total cost of the drawing of maps..... | 9, 400 |

Thus it appears that the drawing of these maps was completed late in 1864 or early in 1865. The photographic copy of them in the General Land Office is dated 1866.

The drawing was done by Edward Freyhold, of No. 44 Sharp street, Baltimore, by L. D. Williams, and by Theodor Kolecki. Freyhold did the "hill work"—i. e., the hachures—and the others the outline, lettering, etc. Prior to February, 1864; Freyhold had drawn the hill work on detail sheets 3 and 7.

Among the papers is an unexecuted contract (apparently the original draft) between the United States Northwestern Boundary Commission and Edward Freyhold, whereby Freyhold agrees to draw the hill work on sheets 1, 2, 4, 5, and 6 "similar and not inferior to certain other work executed by him on sheets 3 and 7" for \$1.75 per square inch, and to complete the work "before the 31st day of August, 1864."

Sheet 4 was finished March 5, 1864, and contained $214\frac{1}{2}$ square inches of hill work; sheet 6 was finished April 26, 1864, and contained $249\frac{1}{2}$ square inches of hill work; sheet 5 was finished June 6, 1864, and contained $137\frac{5}{8}$ square inches of hill work; sheet 2 was finished August 13, 1864, and contained $225\frac{1}{4}$ square inches of hill work. There is no record as to No. 1, but it is probable that it was finished on March 5, so that the hill work was all completed by August 13 and the drawing of the final maps completed about the beginning of the year 1865.

BRITISH MAPS.

On June 23, 1871, Sir Edward Thornton, then British minister in Washington, sent to the Department of State an atlas comprising maps, views, and tables of geographic positions of the northwest boundary. This atlas is entitled:

Maps of the land boundary between the British possessions in North America and the United States as established by the treaty of Washington, 15th June, 1846, and surveyed and marked under the direction of the Joint Commission appointed to carry into effect the 1st article of the treaty. Scale 1:120000, or 1.8939 statute miles to one inch. Photo-zincographed at the ordnance survey office, Southampton, under the superintendence of Cap't. Parsons, R. E., F. R. A. S.; Col. Sir Henry James, R. E., F. R. S., etc., director, 1869.

Then follows:

(a) An index map composed of two double-page sheets on a scale of 1:600000.

(b) Seven detailed sheets, scale 1:120000, numbered 1 to 7 from west to east. All are dated May 7, 1869, and signed by J. S. Hawkins, H. B. M. Comm'r, Archibald Campbell, U. S. Comm'r, Samuel Anderson, Lt. R. Eng'rs Secretary for Captain Haig, R. A., Chief Astronomer. Sheets 1 and 7 were drawn by J. Carroll, 2 by H. Walthouse, and 3, 4, 5 and 6 by F. B. Grose.

(c) A title page for another series of six sheets on the mile scale is as follows:

Maps of the land boundary between the British possessions in North America and the United States as established by the treaty of Washington 15th June, 1846, and

GEOGRAPHIC COORDINATES.

The geographic positions of various camps and stations in the vicinity of the parallel were determined astronomically. Latitudes were determined with the zenith telescope; azimuth and time with the transit. Longitudes were determined by chronometer, by moon-culminating stars, and at one station, Camp Mooyie, by the solar eclipse of July 7, 1860.

It would seem that 28 fundamental or base stations were established near the boundary. For these stations measurements were made to the parallel. Thereupon other stations, with monuments, were established on the parallel.¹ Of these stations on the parallel there are 161. The description of these fundamental or base stations and of the 161 stations on the parallel, their location, longitude, etc., are given in Tables I to IV herewith. Tables I and III are made up from data on the photographic copies of the final map which were deposited in the General Land Office in 1866. Tables II and IV are copied from the British atlas in the State Department, which was presented by the British minister, Sir Edward Thornton, in 1871. The results from the two sources are almost identical, but as they are not absolutely so, and as the originals are not conveniently accessible, it was deemed best to print, side by side, the results from these two sources.

¹ For method employed see Appendix A, pp. 64-65.

TABLE I.—*Geographical coordinates of camps, stations, etc.*

FROM AMERICAN SOURCES.

| No. | Station. | Latitude. | | | Longitude. | | |
|-----|---|-----------|----|-------|------------|----|------|
| | | ° | ' | " | ° | ' | " |
| 1 | Camp Akamina | 49 | 00 | 52.2 | 114 | 03 | 34 |
| 2 | Camp Kishenehn | 49 | 00 | 02.6 | | 21 | 09 |
| 3 | Ford of Flathead River | 48 | 57 | 01.1 | | 24 | 26.6 |
| 4 | Junction of trail to Wigwam Station | 48 | 55 | 31.4 | | 43 | 33.7 |
| 5 | Wigwam Station | 48 | 59 | 42.8 | | 45 | 02 |
| 6 | Camp Kootenay East | 48 | 59 | 44.4 | 115 | 11 | 19.2 |
| 7 | Yahk'h Station | 48 | 59 | 55.4 | | 38 | 51 |
| 8 | Camp Mooyie | 49 | 01 | 25.6 | 116 | 12 | 40.5 |
| 9 | Mooyie trail monument | 49 | 00 | 01.3 | | 14 | 59.2 |
| 10 | Acklew Cache, junction of trails | 48 | 54 | 21.4 | | 22 | 02.1 |
| 11 | Camp Kootenay West | 48 | 59 | 54.9 | | 31 | 16.2 |
| 12 | Kootenay Mountain Station | 49 | 00 | 12.8 | 117 | 10 | 48.4 |
| 13 | Pend d'Oreille Station | 49 | 00 | 03.5 | | 21 | 52.9 |
| 14 | Fort Shepherd Station | 49 | 00 | 00 | | 37 | 19.4 |
| 15 | Camp Columbia | 48 | 59 | 49.1 | | 37 | 41.8 |
| 16 | Camp Statapoostin | 49 | 00 | 13.96 | 118 | 16 | 15.6 |
| 17 | Inchuintum Station | 48 | 59 | 58.5 | | 28 | 12.3 |
| 18 | Camp Nehoialpitkun | 48 | 59 | 02.9 | | 44 | 28.5 |
| 19 | Camp Osoyoos or Osoyoos Station | 48 | 59 | 56.4 | 119 | 24 | 12 |
| 20 | Camp Similkameen | 48 | 59 | 12.0 | | 34 | 53.2 |
| 21 | Nais-nu-loh Station | 48 | 59 | 52.9 | 120 | 00 | 18.8 |
| 22 | Junction of trails, Naisnuluh | 49 | 07 | 54.8 | | 00 | 59.9 |
| 23 | Camp Pa-say-ten | 48 | 59 | 42.2 | | 32 | 12.8 |
| 24 | Junction of trails, Pa-say-ten Valley | 49 | 09 | 38.8 | | 33 | 38.9 |
| 25 | Roche Station | 48 | 59 | 49.8 | | 39 | 14.8 |
| 26 | Camp Skagit | 49 | 00 | 01.8 | 121 | 02 | 45.2 |
| 27 | Crossing of Skagit River on trail | 49 | 07 | 42.7 | | 08 | 29.2 |
| 28 | Camp Chuch-che-hum | 49 | 00 | 03.5 | | 16 | 41.4 |
| 29 | Camp Chiloweyuck | 49 | 00 | 21.9 | | 23 | 41.8 |
| 30 | En-saw-kwatch Station | 49 | 00 | 30 | | 30 | 41.8 |
| 31 | Sen-eh-say Station | 49 | 00 | 34.3 | | 36 | 15.4 |
| 32 | Camp Tummeahai | 49 | 02 | 04.9 | | 47 | 34.4 |
| 33 | Intersection of Whateom and Lake trails | 48 | 06 | 05.4 | | 54 | 56.8 |
| 34 | Chiloweyuck Depot | 49 | 09 | 28.2 | | 57 | 59 |
| 35 | Camp Sumass | 49 | 01 | 25.8 | 122 | 11 | 52.8 |
| 36 | British Station | 49 | | | | 37 | 01.6 |
| 37 | Camp Simlahmoo | 49 | 00 | 43.1 | | 45 | 30 |
| 38 | ..... |  |  |  |  |  |  |

TABLE II.—*Geographical coordinates of camps, stations, etc.*

FROM BRITISH SOURCES.

| No. | Station. | Latitude. | | | Longitude. | | |
|-----|--|-----------|----|------|------------|----|------|
| | | ° | ' | " | ° | ' | " |
| 1 | Camp Akamina and Station | 49 | 00 | 52.0 | 114 | 03 | 34.0 |
| 2 | Camp Kish-e-nehn | 49 | 00 | 02.8 | 114 | 21 | 09.0 |
| 3 | ..... |  |  |  |  |  |  |
| 4 | ..... |  |  |  |  |  |  |
| 5 | Wigwam Station | 48 | 59 | 42.8 | 114 | 45 | 02.0 |
| 6 | Camp Kootenay East | 48 | 59 | 44.6 | 115 | 11 | 19.2 |
| 7 | Yahk'h Station | 48 | 59 | 55.4 | 115 | 38 | 57.0 |
| 8 | Camp Mooyie | 49 | 01 | 26.0 | 116 | 12 | 40.5 |
| 9 | ..... |  |  |  |  |  |  |
| 10 | ..... |  |  |  |  |  |  |
| 11 | Camp Kootenay West | 48 | 59 | 55.1 | 116 | 31 | 16.2 |
| 12 | Kootenay Mountain Station | 49 | 00 | 12.8 | 117 | 10 | 48.4 |
| 13 | Pend d'Oreille Station | 49 | 00 | 03.5 | 117 | 21 | 52.9 |
| 14 | Fort Shepherd Station | 49 | 00 | 00.0 | 117 | 37 | 19.4 |
| 15 | Camp Columbia | 48 | 59 | 50.4 | 117 | 37 | 41.8 |
| 16 | Camp Stat-a-poos-tin | 49 | 00 | 10.8 | 118 | 16 | 15.6 |
| 17 | In-chu-in-tum Station | 48 | 59 | 58.5 | 118 | 28 | 12.3 |
| 18 | Camp Ne-hoi-al-pit-kwu | 48 | 59 | 04.3 | 118 | 44 | 28.5 |
| 19 | Camp O-so-yoos & O-so-yoos Station | 49 | 00 | 00.9 | 119 | 24 | 12.0 |
| 20 | Camp Simil-ka-mcen | 48 | 59 | 12.1 | 119 | 34 | 53.2 |
| 21 | Nais-nu-loh Station | 48 | 59 | 53.9 | 120 | 07 | 18.8 |
| 22 | ..... |  |  |  |  |  |  |
| 23 | Camp Pa-say-ten | 48 | 59 | 42.6 | 120 | 32 | 12.8 |
| 24 | ..... |  |  |  |  |  |  |
| 25 | Roche Station | 48 | 59 | 49.8 | 120 | 39 | 14.8 |
| 26 | Camp Skagit | 49 | 00 | 02.3 | 121 | 02 | 45.2 |
| 27 | ..... |  |  |  |  |  |  |
| 28 | Camp Chuck-che-hum | 49 | 00 | 03.7 | 121 | 16 | 41.4 |
| 29 | Camp Chiloweyuck | 49 | 00 | 22.2 | 121 | 23 | 41.8 |
| 30 | En-saw-kwatch Station | 49 | 00 | 30.0 | 121 | 30 | 41.8 |
| 31 | Sen-eh-say Station | 49 | 00 | 34.3 | 121 | 36 | 15.4 |
| 32 | Camp Tummeahai | 49 | 02 | 04.9 | 121 | 47 | 34.4 |
| 33 | ..... |  |  |  |  |  |  |
| 34 | ..... |  |  |  |  |  |  |
| 35 | Camp Sumass and Station | 49 | 01 | 25.8 | 122 | 11 | 52.8 |
| 36 | British Station | 49 | 00 | 00.0 | 122 | 43 | 59.9 |
| 37 | Camp Simiahmoo Observatory | 49 | 00 | 43.1 | 122 | 45 | 30.0 |
| 38 | Obelisk at Initial Point | 49 | 00 | 00.0 | 123 | 03 | 53.0 |

TABLE III.—Locations and longitudes of the boundary monuments.

FROM AMERICAN SOURCES.

| No. | Location of monument. | Longitude. |
|-----|--|-------------|
| | | o " " |
| 1 | Divide of Rocky Mountains..... | 114 03 28.4 |
| 2 | Left bank of Kishenehn Creek | 20 53.9 |
| 3 | Near trail entering Boundary Pass | 21 17.3 |
| 4 | Second terrace, left bank of Flathead River | 27 09.4 |
| 5 | First bench, right bank of Flathead River | 28 02.5 |
| 6 | West bank of river | 45 16.1 |
| 7 | Hillside, west of river | 45 42 |
| 8 | Small creek, foot of mountain..... | 115 03 28.7 |
| 9 | Second plateau, left bank of river | 10 11.6 |
| 10 | Right bank of river | 11 11.2 |
| 11 | Brink of ravine, base of mountain | 16 01.4 |
| 12 | Side of hill | 38 02.8 |
| 13 | Ridge of hill | 38 29.1 |
| 14 | Flat, east side of river..... | 39 10.5 |
| 15 | Flat, west side of river | 39 24.5 |
| 16 | Flat, west of river | 39 46.5 |
| 17 | High bluff, left bank of creek..... | a 116 11 24 |
| 18 | Left bank of creek, water's edge | 11 25.6 |
| 19 | Plateau above creek | a 11 54 |
| 20 | Side of mountain, west side of valley | 12 22.3 |
| 21 | ..... |  |
| 22 | Brow of first hill, right bank of river..... | 81 05.9 |
| 23 | Mountain slope, west side of valley | 35 44.9 |
| 24 | Bench, west side of river | 117 08 55.9 |
| 25 | Mark on face of rock on hillside..... | 09 56.5 |
| 26 | Right bank of river, meridian of Pend d'Oreille Station..... | 21 52.9 |
| 27 | Bench, west side of river | 22 03 |
| 28 | Sharp ridge, west side of river..... | 22 54.8 |
| 29 | Near east bank of river | 36 59.4 |
| 30 | ..... |  |
| 31 | On brink of hill, west bank of river..... | 37 36.2 |
| 32 | On hilltop, west of Camp Columbia | 38 49.1 |
| 33 | On ridge..... | 41 17.7 |
| 34 |do | 45 49.5 |
| 35 | On ridge between streams..... | 53 08.1 |
| 36 |do | 59 00.9 |
| 37 | On slope of hill between streams..... | 118 01 52.2 |
| 38 | On slope of hill east..... | 03 17.1 |
| 39 | On hill between streams..... | 05 15.8 |
| 40 | On hill west side of stream..... | 09 26 |

a Approximate.

TABLE IV.—Locations, longitudes, and descriptions of the boundary monuments.

FROM BRITISH SOURCES.

| No. | Location of monument. | Longitude. | Description. | From what station determined. | No. in British Atlas. |
|-----|---|--------------|-----------------|-------------------------------|-----------------------|
| | | ° / " | | | |
| 1 | On the divide of the Rocky Mountains. | 114 03 28.41 | Pile of stones. | Camp Akamina and Station. | 161 |
| 2 | On left bank of Kishenehn Creek.. | 20 53.9 | do | Camp Kishenehn. | 160 |
| 3 | Near trail entering Boundary Pass. | 21 17.3 | do | do | 159 |
| 4 | On first bench, right bank Flathead River. | 27 09.4 | do | do | 158 |
| 5 | On second terrace, left bank Flathead River. | 28 02.5 | do | do | 157 |
| 6 | Near west bank of river..... | 45 16.1 | do | Wigwan Station | 156 |
| 7 | On hill west of river..... | 45 42.0 | do | do | 155 |
| 8 | At foot of mountains, left bank small creek. | 115 03 28.7 | do | Camp Kootenay East. | 154 |
| 9 | On second plateau, left bank river. | 10 11.6 | do | do | 153 |
| 10 | On right bank Kootenay River.... | 11 11.2 | do | do | 152 |
| 11 | On east brink ravine beyond which the mountains rise. | 16 01.4 | do | do | 151 |
| 12 | On hillside east of river..... | 38 02.8 | do | Yahk'h Station... | 150 |
| 13 | do..... | 38 29.1 | do | do | 149 |
| 14 | Near east bank of river..... | 39 10.5 | do | do | 148 |
| 15 | On west side of river..... | 39 24.5 | do | do | 147 |
| 16 | do..... | 39 46.5 | do | do | 146 |
| 17 | On high bluff, left bank..... | a116 11 24 | do | Camp Mooyic.... | 145 |
| 18 | On left bank of creek close to water. | 11 25.6 | do | do | 144 |
| 19 | On plateau above creek..... | a11 54 | do | do | 143 |
| 20 | On side of mountain, west side of valley. | 12 22.3 | do | do | 142 |
| 21 | On trail leading from the north to Cholemta. | 14 59.2 | do | do | 141 |
| 22 | On brow of first hill, right bank river. | 31 05.9 | do | Camp Kootenay West. | 140 |
| 23 | On side of mountain, west side of valley. | 35 44.9 | do | do | 139 |
| 24 | On bench, west side, South Fork Salmon River. | 117 08 55.9 | do | Kootenay Mt. Station. | 138 |
| 25 | On face of rock on ridge east..... | 09 56.5 | Bench mark ↑ | do | 137 |
| 26 | Latitude mark, Pend d'Oreille Station. | 21 52.9 | Pile of stones. | Pend d'Oreille Station. | 136 |
| 27 | On bench, west side of river..... | 22 03 | do | do | 135 |
| 28 | On high ridge west..... | 22 54.8 | do | do | 134 |
| 29 | Near east bank of Columbia River. | 36 59.4 | do | Fort Shepherd Station. | 133 |
| 30 | Near east bank of river..... | 37 05.2 | do | Camp Stat-a-poos-tin. | 132 |
| 31 | On brink of hill, west bank Columbia River. | 37 36.2 | do | do | 131 |
| 32 | On hilltop, west of Camp Columbia. | 38 49.1 | do | do | 130 |
| 33 | On side of hill between streams.... | 41 17.7 | do | do | 129 |
| 34 | do..... | 45 49.5 | do | do | 128 |
| 35 | do..... | 53 08.1 | do | do | 127 |
| 36 | do..... | 59 00.9 | do | do | 126 |
| 37 | On slope between streams..... | 118 01 52.2 | do | do | 125 |
| 38 | do..... | 03 17.1 | do | do | 124 |
| 39 | On hill between streams..... | 05 15.8 | do | do | 123 |
| 40 | On hill west side of stream..... | 09 26.0 | do | do | 122 |

a Approximate.

TABLE III.—Locations and longitudes of the boundary monuments—Continued.

FROM AMERICAN SOURCES—Continued.

| No. | Location of monument. | Longitude. |
|-----|--|-------------|
| 41 | Side of mountain east of river..... | 118 09 58.4 |
| 42 | Gravel bench west of river..... | 11 56.1 |
| 43 | Near the trail to Colville..... | 13 19.1 |
| 44 | Point of ridge at bend of valley..... | 14 21.0 |
| 45 | North slope of mountain south of river..... | 16 36. |
| 46 | High ridge south of river..... | 18 45.4 |
| 47 | High ridge south of Nehoialpitkwu River..... | 21 36.8 |
| 48 |do..... | 22 18.6 |
| 49 | In valley at base of mountain, south..... | 24 07.2 |
| 50 |do..... | 25 38.2 |
| 51 | In valley south of Nehoialpitkwu River..... | 26 32.6 |
| 52 | In valley east of Colville trail..... | 27 40.8 |
| 53 | Near edge of first plateau..... | 28 40.8 |
| 54 | First plateau west of river..... | 29 48.7 |
| 55 | First bench west of small creek..... | 31 28.4 |
| 56 | Summit between creeks..... | 33 43 |
| 57 | Divide in bend of the Nehoialpitkwu River..... | 36 43.4 |
| 58 | Sharp ridge between creeks..... | 38 24.9 |
| 59 | Northern slope of mountain..... | 39 51.5 |
| 60 |do..... | 40 57.2 |
| 61 | Open country east of Rock Creek..... | 41 49.6 |
| 62 |do..... | 42 38.4 |
| 63 |do..... | 43 24.5 |
| 64 | East of Colville trail..... | 44 13.8 |
| 65 | Foot of mountain, right bank of Nehoialpitkwu River..... | 45 12.6 |
| 66 | Point of ridge in bend of river..... | 45 48.9 |
| 67 |do..... | 46 45.6 |
| 68 | Foot of mountains south side of valley..... | 48 27.3 |
| 69 | Point of hill south of creek..... | 51 14.9 |
| 70 | Ridge between two creeks..... | 52 26.6 |
| 71 |do..... | 53 06.6 |
| 72 |do..... | 55 05 |
| 73 |do..... | 55 58.2 |
| 74 | Summit east of wagon road..... | 56 58.9 |
| 75 | In valley east of wagon road..... | 59 33.6 |
| 76 | High plateau south of Rock Creek..... | 119 01 23 |
| 77 |do..... | 02 54.9 |

TABLE IV.—Locations, longitudes, and descriptions of the boundary monuments—Cont'd.

FROM BRITISH SOURCES—Continued.

| No. | Location of monument. | Longitude. | Description. | From what station determined. | No. in British Atlas. |
|-----|--|-------------|-----------------|--|-----------------------|
| | | ° ' " | | | |
| 41 | On side of mountain east of Nehoialpitkwu River. | 118 09 58.2 | Pile of stones. | Camp Stat-a-poos-tin. | 121 |
| 42 | On a gravel ridge west of river..... | 11 56.1 |do..... |do..... | 120 |
| 43 | In valley near trail to Colville..... | 13 19.1 |do..... |do..... | 119 |
| 44 | On point ridge right side of valley. | 14 21.0 |do..... |do..... | 118 |
| 45 | On north slope of mountains south of river. | 16 36.7 |do..... | In-chu-in-tum Station and Camp Stat-a-poos-tin. | 117 |
| 46 | On high ridge south of river..... | 18 45.4 |do..... |do..... | 116 |
| 47 |do..... | 21 36.3 |do..... |do..... | 115 |
| 48 |do..... | 22 18.6 |do..... |do..... | 114 |
| 49 | In valley of Nehoialpitkwu south of river. | 24 17.2 |do..... |do..... | 113 |
| 50 |do..... | 25 38.2 |do..... |do..... | 112 |
| 51 |do..... | 26 32.6 |do..... |do..... | 111 |
| 52 | In valley near and east of Colville trail. | 27 40.8 |do..... |do..... | 110 |
| 53 | On first plateau west of river..... | 28 40.8 |do..... | Camp Ne-hoi-alpit-kwu and In-chu-in-tum Station. | 109 |
| 54 |do..... | 29 48.7 |do..... |do..... | 108 |
| 55 | On first bench west of small creek.. | 31 28.4 |do..... |do..... | 107 |
| 56 | On summit between two creeks..... | 33 43.0 |do..... |do..... | 106 |
| 57 | On divide between Rock Creek and Nehoialpitkwu. | 36 43.4 |do..... |do..... | 105 |
| 58 | On sharp ridge between heads of tributary of Rock Creek. | 38 24.9 |do..... |do..... | 104 |
| 59 | On southern slope of mountain.... | 39 51.5 |do..... |do..... | 103 |
| 60 |do..... | 40 57.2 |do..... |do..... | 102 |
| 61 | In open country east of Rock Creek. | 41 49.6 |do..... |do..... | 101 |
| 62 |do..... | 42 38.4 |do..... |do..... | 100 |
| 63 |do..... | 43 24.5 |do..... |do..... | 99 |
| 64 | East of and near Colville trail..... | 44 13.8 |do..... |do..... | 98 |
| 65 | At foot of mountain, right bank of Nehoialpitkwu River. | 45 12.6 | Mound of earth. | Camp Osoyoos and Camp Ne-hoi-alpit-kwu. | 97 |
| 66 | On point of ridge in bend of Nehoialpitkwu River. | 45 48.9 | Pile of stones. |do..... | 96 |
| 67 | On point of ridge in bend of Nehoialpitkwu. | 46 45.6 |do..... |do..... | 95 |
| 68 | In valley of Nehoialpitkwu..... | 48 27.3 |do..... |do..... | 94 |
| 69 | On point of ridge south and east of creek. | 51 14.9 |do..... |do..... | 93 |
| 70 | On ridge between two creeks..... | 52 26.6 |do..... |do..... | 92 |
| 71 | On same ridge..... | 53 06.6 |do..... |do..... | 91 |
| 72 |do..... | 55 05.0 |do..... |do..... | 90 |
| 73 |do..... | 55 58.2 |do..... |do..... | 89 |
| 74 | On summit east of wagon road to Rock Creek. | 56 58.9 |do..... |do..... | 88 |
| 75 | In valley east of wagon road to Rock Creek. | 59 33.6 |do..... |do..... | 87 |
| 76 | On high plateau south of Rock Creek. | 119 01 23.0 |do..... |do..... | 86 |
| 77 |do..... | 2 54.9 |do..... |do..... | 84 |

TABLE III.—Locations and longitudes of the boundary monuments—Continued.

FROM AMERICAN SOURCES—Continued.

| No. | Location of monument. | Longitude. |
|-----|---|-------------|
| 78 | High plateau south of Rock Creek | 119 04 36 |
| 79 | Rocky ledge east of small lake | 06 15 |
| 80 | Summit east of creek | 08 02.8 |
| 81 | West bank of creek | 09 32.8 |
| 82 | First bench west of creek | 10 18.4 |
| 83 | Slope of hill north of small lake | 11 56.5 |
| 84 | South and east of Colville trail | 14 27.2 |
| 85 | North and west of small creek | 17 10.4 |
| 86 | Spur from mountain to the north | 18 58.1 |
| 87 |do | 21 26.4 |
| 88 | Summit of first ridge east of the valley | 22 37.6 |
| 89 | East side of Osoyoos Valley | 24 08.9 |
| 90 | West side of Osoyoos Valley | 26 04.5 |
| 91 | Plateau north of Similkameen River | 28 48 |
| 92 |do | 29 52.6 |
| 93 | Southern slope of rocky knoll | 33 24 |
| 94 | Ridge east of trail | 36 14.6 |
| 95 | Near trail | 37 45.9 |
| 96 | Isolated mountain east of Similkameen River | 39 56.6 |
| 97 | Left bank of Similkameen River | 40 32.7 |
| 98 | Foot of mountains west side of Similkameen Valley | 42 20.9 |
| 99 | Flat east side of swamp | 58 38.7 |
| 100 | Near small stream | 59 57.9 |
| 101 | Sharp ridge west side of stream | 120 00 46.1 |
| 102 | Bench east side Pa-say-ten Valley | 32 00.9 |
| 103 | Slope west side Pa-say-ten Valley | 32 29.3 |
| 104 | Hillside east of Chuchuwantén River | 38 51.9 |
| 105 | Hillside west of Chuchuwantén River | 39 47.2 |
| 106 | Bench of hill east side of Skagit Valley | 121 02 26.6 |
| 107 | Slope of mountain west side of Skagit Valley | 04 22.2 |
| 108 | Base of mountain south of camp | 16 41.4 |
| 109 | West of and near trail to Skagit | 16 56.3 |
| 110 | East of and near trail to Skagit | 18 57.3 |
| 111 | East side of Klahaihu Valley | 23 11 |
| 112 | West side of Klahaihu Valley | 23 48.5 |
| 113 | East of river | 30 08.4 |
| 114 | On rock west of river | 30 21.2 |

TABLE IV.—Locations, longitudes, and descriptions of the boundary monuments—Cont'd.

FROM BRITISH SOURCES—Continued.

| No. | Location of monument. | Longitude. | Description. | From what station determined. | No. in British Atlas. |
|-----|---|-------------|-----------------|--|-----------------------|
| | | ° ' " | | | |
| 78 | On high plateau south of Rock Creek. | 119 4 36.0 | Pile of stones. | Camp Osoyoos and Camp Ne-hoi-al-pit-kwu. | 85 |
| 79 | On rocky ridge east of small lake .. | 6 15.0 |do..... |do..... | 83 |
| 80 | On summit east of fork of Rock Creek. | 8 02.8 |do..... |do..... | 82 |
| 81 | On valley of fork of Rock Creek, west bank. | 9 32.8 |do..... |do..... | 81 |
| 82 | On first bench west of fork of Rock Creek. | 10 18.4 |do..... |do..... | 80 |
| 83 | North of small lake..... | 11 56.5 |do..... |do..... | 79 |
| 84 | Southeast of Colville trail | 14 27.2 |do..... |do..... | 78 |
| 85 | North and west of small creek | 17 10.4 |do..... |do..... | 77 |
| 86 | On spur from mountain to the north. | 18 58.1 |do..... |do..... | 76 |
| 87 |do..... | 21 26.4 |do..... |do..... | 75 |
| 88 | Summit of first ridge east of Lake Osoyoos. | 22 37.6 |do..... |do..... | 74 |
| 89 | East of trail up east bank of Lake Osoyoos. | 24 08.0 |do..... |do..... | 73 |
| 90 | West of trail up west bank of Lake Osoyoos. | 26 04.5 |do..... | Camp Similkameen and Camp Osoyoos. | 72 |
| 91 | Near divide between Osoyoos and Similkameen and near junction of trail. | 28 48.0 |do..... |do..... | 71 |
| 92 | On plateau north of Similkameen.. | 29 52.6 |do..... |do..... | 70 |
| 93 | On southern slope of a rocky knoll. | 33 24.0 |do..... |do..... | 69 |
| 94 | On summit of ridge east of trail up Similkameen. | 36 14.6 |do..... |do..... | 68 |
| 95 | East of and near trail up Similkameen. | 37 45.9 |do..... |do..... | 67 |
| 96 | On summit of isolated mountain of Similkameen. | 39 56.6 |do..... |do..... | 66 |
| 97 | On left bank of Similkameen | 40 32.7 |do..... |do..... | 65 |
| 98 | At foot mountains west side Similkameen Valley. | 42 20.9 |do..... |do..... | 64 |
| 99 | On flat east side of stream..... | 58 38.7 |do..... | Nais-nu-loh Station. | 63 |
| 100 | East and near to stream..... | 59 57.9 |do..... | Nais-nu-loh Station. | 62 |
| 101 | On sharp ridge west side of stream. | 120 00 46.1 |do..... |do..... | 61 |
| 102 | On bench, east side of Pasayten Valley. | 32 00.9 |do..... | Camp Pa-say-ten. | 60 |
| 103 | On slope westside of Pasayten Valley | 32 29.3 |do..... |do..... | 59 |
| 104 | On hillside east of river | 38 51.9 |do..... | Roche Station.... | 58 |
| 105 | On hillside west of station | 39 47.2 |do..... |do..... | 57 |
| 106 | On side of hill east of Skagit Valley. | 121 02 26.6 |do..... | Camp Skagit | 56 |
| 107 | On side of mountain west side of Skagit Valley. | 04 22.2 |do..... |do..... | 55 |
| 108 | At foot of mountain south of camp. | 16 41.4 |do..... | Camp Chuch-che-hum. | 54 |
| 109 | West of and near trail to Skagit ... | 16 56.2 |do..... |do..... | 53 |
| 110 | East of and near trail to Skagit ... | 18 57.3 |do..... |do..... | 52 |
| 111 | On east side of Klahaihu Valley ... | 23 11.0 |do..... | Camp Chiloweyuck. | 51 |
| 112 | On west side of Klahaihu Valley... | 23 48 5 |do..... |do..... | 50 |
| 113 | On east side of Ensaw-kwatch River. | 30 08.4 |do..... | En-saw-kwatch Station. | 49 |
| 114 | On west side of Ensaw-kwatch River. | 30 21.2 | Bench mark ↑ |do..... | 48 |

TABLE III.—Locations and longitudes of the boundary monuments—Continued.

FROM AMERICAN SOURCES—Continued.

| No. | Location of monument. | Longitude. |
|-----|---|-------------|
| 115 | East side of Sen-eh-say River | 121 35 28.4 |
| 116 | Side of mountain south of creek | 42 56.3 |
| 117 |do | 43 31.6 |
| 118 | Side of mountain west of falls of creek | 43 58.1 |
| 119 | Whatcom trail (last iron pillar) a..... | 122 04 45.2 |
| 120 | Small bench east base of hill | 05.26.6 |
| 121 | Summit of hill east of Sumass Prairie..... | 06 31.9 |
| 122 | Bench above rocky precipice | 07 21.7 |
| 123 | Face of hill | 07 50.4 |
| 124 | Small bench west of stream | 08 38.4 |
| 125 | Flat east of stream | 10 02.7 |
| 126 | Rising ground | 11 00.8 |
| 127 | Meridian of Camp Sumass | 11 52.8 |
| 128 | East side of Sumass River..... | 12 46.3 |
| 129 | Trail west of Sumass River..... | 12 55.2 |
| 130 | Trail-crossing boundary | 14 01 |
| 131 | Trail on sharp ridge west of swamp..... | 15 04.1 |
| 132 | Flat north of trail..... | 16 29.1 |
| 133 | Hill east of trail | 18 00.6 |
| 134 | East bank of small lake | 19 08.9 |
| 135 | Trail crossing boundary | 19 55.1 |
| 136 | West of swamp and north of trail..... | 20 29.4 |
| 137 | Flat north of trail..... | 21 47.6 |
| 138 | Trail crossing boundary | 22 20.7 |
| 139 | Trail east side of Cullam Creek | 23 05.9 |
| 140 | Flat south of trail | 24 22.7 |
| 141 |do | 25 04.1 |
| 142 | Rising ground between swamp and creek..... | 27 19.3 |
| 143 | Belt of timber between swamps..... | 28 32.9 |
| 144 | Edge of slope west of swamp..... | 29 37.2 |
| 145 | Trail west bank of Sehkomehkl Creek..... | 30 07.9 |
| 146 | Ridge west of Sehkomehkl Creek | 31 05.1 |
| 147 | Flat north of trail | 32 13.7 |
| 148 | Small ridge south of trail | 33 27.7 |
| 149 | Flat south of trail | 34 46.7 |
| 150 | Flat near stream, south of trail..... | 36 08.5 |
| 151 | Latitude mark, British station..... | 37 01.6 |
| 152 | First bench and south of trail..... | 37 26.9 |

a A pencil note here says: "All iron pillars from western end to Whatcom trail—43 in all—36 given here."

TABLE IV.—Locations, longitudes, and descriptions of the boundary monuments—Cont'd.

FROM BRITISH SOURCES—Continued.

| No. | Location of monument. | Longitude. | Description. | From what station determined. | No. in British Atlas. |
|-----|--|-------------|--------------------|-------------------------------|-----------------------|
| | | o ' " | | | |
| 115 | On east side of Sen-eh-say, or Selacee, River. | 121 35 28.4 | Pile of stones. | Sen-eh-say Station | 47 |
| 116 | On side of mountain south of creek. | 42 56.3 | Pyramid of stones. | Camp Tummeahal. | 46 |
| 117 |do..... | 43 31.6 |do..... |do..... | 45 |
| 118 | On side of mountain west of falls of creek. | 43.58.1 |do..... |do..... | 44 |
| 119 | On De Lacy's trail, Whatcom to Fort Hope, crossing line. | 122 4 45.2 | Iron pillar.... | Sumass Station and Camp. | 43 |
| 120 | On bench at base of hill..... | 5 26.6 |do..... |do..... | 42 |
| 121 | On top of mountain east side of Sumass Prairie. | 6 81.9 |do..... |do..... | 41 |
| 122 | On bench above rocky precipice east of trail. | 7 21.7 |do..... |do..... | 40 |
| 123 | On face of hill 5 chains from base and near trail. | 7 50.4 |do..... |do..... | 39 |
| 124 | On bench west of stream..... | 8 38.4 |do..... |do..... | 38 |
| 125 | On flat east of stream..... | 10 02.7 |do..... |do..... | 37 |
| 126 | On mound east of latitude mark.... | 11 00.8 |do..... |do..... | 36 |
| 127 | Latitude mark Sumass..... | 11 52.8 |do..... | British Station..... | 35 |
| 128 | On east side of Sumass River..... | 12 46.3 |do..... |do..... | 34 |
| 129 | On Whatcom trail west side Sumass River. | 12 55.2 |do..... |do..... | 33 |
| 130 | On trail crossing boundary line.... | 14 01.0 |do..... |do..... | 32 |
| 131 | On top of hill west of swamp and on trail crossing line. | 15 04.1 |do..... |do..... | 31 |
| 132 | On flat north of trail and west of swamp. | 16 29.1 |do..... |do..... | 30 |
| 133 | On hill 20 chains east of trail crossing line. | 18 00.6 |do..... |do..... | 29 |
| 134 | On east side small lake..... | 19 08.9 |do..... |do..... | 28 |
| 135 | On trail crossing boundary line.... | 19 55.1 |do..... |do..... | 27 |
| 136 | On west side of swamp and north of trail. | 20 29.4 |do..... |do..... | 26 |
| 137 | On flat north of trail..... | 21 47.6 |do..... |do..... | 25 |
| 138 | On trail crossing boundary line.... | 22 20.7 |do..... |do..... | 24 |
| 139 | On trail crossing boundary line east side of creek. | 23 05.9 |do..... |do..... | 23 |
| 140 | On flat south of trail..... | 24 22.7 |do..... |do..... | 22 |
| 141 |do..... | 25 04.1 |do..... |do..... | 21 |
| 142 | On slightly elevated ground west of creek. | 27 19.3 |do..... |do..... | 20 |
| 143 | On belt of timber between swamps. | 28 32.9 |do..... |do..... | 19 |
| 144 | On edge of slope west of stream and south of trail. | 29 37.2 |do..... |do..... | 18 |
| 145 | On trail crossing line west side of Seh-ko-mehl Creek, | 30 07.9 |do..... |do..... | 17 |
| 146 | On ridge west of Seh-ko-mehl Creek. | 31 05.1 |do..... |do..... | 16 |
| 147 | On flat north of trail..... | 32 13.7 |do..... |do..... | 15 |
| 148 | On ridge south of trail and stream. | 33 27.7 |do..... |do..... | 14 |
| 149 | On flat south of trail..... | 34 46.7 |do..... |do..... | 13 |
| 150 | On flat near stream south of trail... | 36 08.5 |do..... |do..... | 12 |
| 151 | Latitude mark, British station..... | 37 01.6 |do..... |do..... | 11 |
| 152 | On first bench south of trail..... | 37 26.9 |do..... |do..... | 10 |

TABLE III.—*Locations and longitudes of the boundary monuments—Continued.*

FROM AMERICAN SOURCES—Continued.

| No. | Location of monument. | Longitude. |
|-----|--------------------------------------|-------------|
| | | ° ' " |
| 153 | Slope south of trail..... | 122 28 45.5 |
| 154 | Flat west of ravine..... | 40 04.1 |
| 155 |do..... | 41 22.7 |
| 156 | Small ridge between swamps..... | 42 20.5 |
| 157 | Parallel station..... | 43 59.9 |
| 158 | East side of Point Roberts..... | 123 00 42.9 |
| 159 | Ridge on Point Roberts..... | 02 12.7 |
| 160 | Flat east of Obelisk..... | 03 02.9 |
| 161 | Initial Point, Obelisk of stone..... | 03 53 |

TABLE IV.—Locations, longitudes, and descriptions of the boundary monuments—Cont'd.

FROM BRITISH SOURCES—Continued.

| No. | Location of monument. | Longitude. | Description. | From what station determined. | No. in British Atlas. |
|-----|---|-------------|-----------------|-------------------------------|-----------------------|
| | | ° ' " | | | |
| 153 | On slope south of trail..... | 122 38 45.6 | Iron pillar.... | British Station ... | 9 |
| 154 | On flat west of ravine | 40 04.1 |do..... |do..... | 8 |
| 155 |do..... | 41 22.7 |do..... |do..... | 7 |
| 156 | On small ridge between swamps ... | 42 20.5 |do..... |do..... | 6 |
| 157 | Near high-water mark, Simiahmoo Bay. | 43 59.9 |do..... |do..... | 5 |
| 158 | On east side of Point Roberts..... | 123 00 42.9 |do..... | Camp Simiahmoo observatory. | 4 |
| 159 | On ridge..... | 02 12.7 |do..... |do..... | 3 |
| 160 | On flat east of Obelisk, Point Roberts. | 03 02.9 |do..... |do..... | 2 |
| 161 | On west face of Point Roberts..... | 03 53.0 | Obelisk..... |do..... | 1 |

MAGNETICS.

Both the British and the American surveyors were equipped with an outfit of instruments for determining the magnetic declination, dip, and force. The British instruments were standardized at Greenwich, and the resulting elements at 23 stations, as obtained by Captain Haig, were discussed by General Sabine and published in the Philosophical Transactions. An abstract of these results is printed on page 42 of this bulletin.

As to the results by the American parties, much, unfortunately, must be left to inference, their results being, supposedly, in the "lost report." Mr. Campbell, writing in 1869,¹ says: "A magnetic survey extending over a range of $3^{\circ} 20'$ in latitude and 4° in longitude, with the necessary observations of the magnetic elements of the astronomical stations, was also made." The work appears to have been done by Mr. J. S. Harris, whose results were secured by the United States Coast Survey. From these it appears that the observations covered a considerably larger extent of territory than that above indicated by Mr. Campbell. The character of the instrumental outfit and its fate in the field can be inferred, in part, from the two following passages from General Parke's report of progress, written November 12, 1859: "A full set of magnetic observations were made at one station" (in 1858).² Also, "I am happy to report that we have got thus far through the season's work without any damage to our astronomical instruments. I regret, however, that we have been less fortunate with the magnetic instruments. The mule carrying these missed his footing and rolled down a precipitous bank. The magnetic theodolite will have to be replaced, and the other instruments will require repairing."³

The Coast and Geodetic Survey has furnished from its manuscript registers the following table of results for declination, dip, and intensity.

¹ House Ex. Doc. No. 86, Fortieth Congress, third session, p. 95.

² Senate Ex. Doc. No. 16, Thirty-sixth Congress, first session, p. 6.

³ Same, pp. 6-7

Declination, dip, and force for the mean epoch 1860.

[Results from observations by Joseph S. Harris, United States Northwestern Boundary Commission, 1858 to 1861. From manuscript furnished by the United States Coast and Geodetic Survey.]

| Station. | Latitude. | Longitude. | East declination. | Dip. | Horizontal force. | | Total force. |
|------------------------------|-----------|------------|-------------------|-------|-------------------|-----------------|-----------------|
| | | | | | Br. units. | C. G. S. units. | C. G. S. units. |
| Magnetic station | 49 00 | 114 21 | 22 58 | | | | |
| Do..... | 48 59 | 115 10 | 22 58 | | | | |
| Camp No. 11 | 49 07 | 115 16 | | 73 37 | | | |
| Camp No. 14, Joseph Prairie. | 49 31 | 115 35 | 23 34 | 73 49 | 3.757 | 0.1732 | 0.6217 |
| Magnetic station | 49 00 | 116 33 | 22 37 | | | | |
| Do..... | 48 42 | 116 19 | 22 16 | | | | |
| Do..... | 48 10 | 116 45 | 21 49 | | | | |
| Peon Prairie..... | 47 44 | 117 14 | 21 53 | 72 05 | 4.099 | 0.1890 | 0.6146 |
| Spokane Ferry | 47 49 | 117 49 | 22 07 | 71 52 | 4.132 | 0.1905 | 0.6123 |
| Colville Depot..... | 48 34 | 117 52 | 22 31 | 72 31 | 3.976 | 0.1833 | 0.6100 |
| Tukannon River..... | 46 32 | 118 00 | 20 55 | 70 22 | 4.380 | 0.2020 | 0.6009 |
| Lugenbeel Creek..... | 47 09 | 118 06 | 20 55 | 71 19 | 4.229 | 0.1950 | 0.6085 |
| Cow Creek | 46 53 | 118 10 | 21 01 | 71 01 | 4.301 | 0.1983 | 0.6097 |
| Dry Creek | 46 09 | 118 18 | 20 13 | 70 47 | 4.289 | 0.1978 | 0.6007 |
| Magnetic station | 46 03 | 118 25 | 20 00 | | | | |
| Do..... | 49 00 | 118 44 | 22 07 | | | | |
| Near Wallula..... | 46 02 | 119 00 | 19 46 | | | | |
| Camp Osoyoos..... | 49 00 | 119 24 | | 72 33 | | | |
| Magnetic station | 49 00 | 119 35 | 23 34 | | | | |
| Do..... | 49 03 | 120 55 | 24 19 | | | | |
| Skagit..... | 49 00 | 121 03 | | 72 40 | 3.933 | 0.1812 | 0.6084 |
| Magnetic station | 49 05 | 121 07 | 22 23 | | | | |
| Camp Chiloweyuck | 49 01 | 121 23 | 22 09 | 72 25 | 4.025 | 0.1856 | 0.6141 |
| Magnetic station | 48 59 | 121 42 | 22 47 | | | | |
| Do..... | 49 01 | 121 45 | 22 55 | | | | |
| Do..... | 48 59 | 121 57 | 22 39 | | | | |
| Semiahmoo | 49 01 | 122 46 | 22 55 | 72 01 | 4.094 | 0.1888 | 0.6115 |
| Point Roberts..... | 48 59 | 122 58 | 22 39 | 71 46 | 4.111 | 0.1896 | 0.6056 |

Declination, dip, and force for the mean epoch 1860.

[Abstract of results obtained by Capt. R. W. Haig, R. A., with standard instruments, between August, 1858, and August, 1861, in connection with the survey of the northwest boundary. From Philosophical Transactions of the Royal Society, 1864, vol. 154, pp. 161-166.]

| Station. | Latitude. | Longitude. | East declination. | Dip. | Total force. | |
|----------------------------------|-----------|------------|-------------------|-------|--------------|-----------------|
| | | | | | Br. units. | C. G. S. units. |
| Akamina station | 49 01 | 114 04 | 22 56 | 73 38 | 13,522 | 0.6235 |
| Wigwam station..... | 49 00 | 114 45 | 22 50 | 73 30 | .496 | 0.6223 |
| Tobacco Plains (Kootenay) .. | 48 57 | 115 08 | ..... | 73 24 | .481 | 0.6216 |
| On Kootenai River | 48 40 | 115 17 | 22 36 | 73 09 | .460 | 0.6206 |
| South Crossing (Kootenay) .. | 48 22 | 115 21 | 22 28 | 72 55 | .443 | 0.6198 |
| Chelemta..... | 48 41 | 116 19 | 22 27 | 72 59 | .423 | 0.6189 |
| Pack River | 48 22 | 116 28 | 22 19 | 72 43 | .401 | 0.6179 |
| Sinyakwateen | 48 09 | 116 44 | 22 10 | 72 30 | .238 | 0.6104 |
| Chemikane River | 48 00 | 117 45 | 21 57 | 72 12 | .334 | 0.6148 |
| Colville B. B. C. Barracks | 48 40 | 118 05 | 22 11 | 72 39 | .357 | 0.6159 |
| Inshwointum..... | 49 00 | 118 28 | 22 15 | 72 50 | .361 | 0.6161 |
| Osoyoos station..... | 49 00 | 119 24 | 22 07 | ..... | ..... | ..... |
| Ashtnolou station | 49 00 | 120 00 | 22 12 | 72 34 | .306 | 0.6135 |
| On Ashtnolou River..... | 49 07 | 120 00 | 22 04 | ..... | ..... | ..... |
| Do | 49 10 | 120 00 | 22 06 | 72 42 | .315 | 0.6139 |
| Dalles, 8-mile camp | 45 40 | 120 49 | ..... | 69 49 | .091 | 0.6036 |
| Dalles, 3-mile camp..... | 45 35 | 120 49 | 20 27 | 69 45 | .087 | 0.6034 |
| Chiluweyuk | 49 02 | 121 23 | ..... | 72 21 | .257 | 0.6113 |
| Schweltza Lake | 49 02 | 122 00 | 21 44 | 72 14 | .234 | 0.6102 |
| Sumass Prairie | 49 01 | 122 12 | 21 42 | 72 11 | .226 | 0.6098 |
| Nisqually..... | 47 07 | 122 25 | 20 51 | 70 39 | .111 | 0.6045 |
| Fort Vancouver..... | 45 38 | 122 28 | 20 13 | 69 28 | .026 | 0.6006 |
| Esquimalt..... | 48 26 | 123 27 | 21 20 | 71 30 | .148 | 0.6062 |

ELEVATIONS.

Elevations were determined along and near the boundary by both the American and British parties throughout the progress of the survey. Most of them were measured barometrically; a few were determined by triangulation.

Among the State Department papers is a short summary or table of heights determined by the British, and a longer and incomplete list of elevations determined by the United States parties.

The British list, contained on two leaves of blue foolscap paper, is entitled: "Abstract of the principal heights determined by barometrical measurements on the line of the North American boundary in the years 1859, 60-61."

The table contains eight columns. The first gives the year; the second, name of station; third, latitude; fourth, longitude; fifth, barometer (always marked A or M, meaning probably aneroid or mercurial); sixth, number; seventh, elevation above sea level; eighth, how determined. The paper is not dated or signed. Columns 2, 3, 4, and 7 of that table are here printed on pages 43 and 44.

The American list is entitled: "Data concerning the determination of altitudes by the U. S. N. W. Boundary Commission in the years 1857, 58, 59, and 60."

This data is contained in two cahiers, of six double sheets each, designated Vol. I and Vol. II. The first one has been revised throughout; the second one is apparently revised in part only and is incomplete. The data is in nine columns. The first gives the date "when occupied;" the second, the name of station; third, barometer (designated by number, 790, 1224, 1219, 1226); fourth, number; fifth, latitude; sixth, longitude; seventh, observer; eighth, altitude; ninth, remarks. We here print columns 2 and 9 (consolidated), 5, 6, and 8.

Elevations along the forty-ninth parallel from the Pacific Ocean to the Rocky Mountains, determined barometrically, in the years 1857-1860, by the British Northwestern Boundary Commission.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 1 | River about 2 miles below lower end of Chief Mountain Lake..... | | | 5,028 |
| 2 | Watershed in South Kootenai Pass..... | | | 6,970 |
| 3 | Mountain near following station..... | | | 8,454 |
| 4 | End of boundary line, watershed in latitude 49°..... | 49 0 00 | 114 3 25 | 7,524 |
| 5 | Terminal latitude station..... | 49 0 52 | 3 34 | 6,548 |
| 6 | Watershed on trail below Summit Station..... | 49 1 26 | 3 54 | 5,859 |
| 7 | Mule Camp..... | 49 3 38 | 7 30 | 5,191 |
| 8 | Junction of trails south of Kootenai Pass..... | 49 5 39 | 11 42 | 4,753 |
| 9 | Flathead latitude station..... | 49 0 00 | 21 06 | 4,136 |
| 10 | Ford of Flathead River..... | 48 57 01 | 24 24 | 4,073 |
| 11 | Flathead Valley, upper terrace..... | 48 56 18 | 28 40 | 4,267 |
| 12 | Wigwam River Station..... | 48 59 43 | 45 02 | 4,694 |
| 13 | Watershed, Tobacco and Wigwam..... | 48 57 23 | 45 02 | 5,332 |
| 14 | Camp [near head of Tobacco River, homeward]..... | 48 53 06 | 45 43 | 4,350 |
| 15 | Camp near head of Tobacco River [outward]..... | | | 4,358 |
| 16 | { Camp on Tobacco River—homeward..... | 48 49 04 | 53 52 | 2,998 |
| | { Camp on Tobacco River—outward..... | | | 3,103 |
| 17 | Mooyie cutting..... | 49 00 00 | 116 11 40 | 2,252 |
| 18 | Crossing of Mooyie River..... | 48 54 08 | 11 38 | 2,142 |
| 19 | Second ridge west of Yakh River..... | 48 54 17 | 8 30 | 4,466 |
| 20 | First ridge west of Yakh River..... | 48 33 55 | 4 00 | 5,791 |
| 21 | High peak above following station..... | | | 8,531 |
| 22 | Watershed, Kootanie and Yakh rivers..... | 48 58 13 | 115 25 00 | 7,664 |
| 23 | Watershed at head of Mooyie River..... | 49 27 00 | 115 46 00 | 2,920 |
| 24 | Yakh River Station..... | 48 59 55 | 38 48 | 2,927 |
| | | | | 2,998 |
| 25 | Third crossing, Kootanie River on Tobacco plains near trading post..... | 48 37 30 | 10 00 | 2,228 |
| | | | | 2,296 |
| | | | | 2,300 |
| 26 | Second crossing, Kootanie River..... | 48 22 01 | 26 30 | 2,136 |
| 27 | Chelempta Kootanie River..... | 48 41 15 | 116 34 24 | 1,712 |
| 28 | Sinyakwateen Ferry..... | 48 09 16 | 50 20 | 1,996 |
| 29 | Lake 9 miles south of Sinyakwateen..... | 48 00 03 | 52 00 | 2,192 |
| 30 | Edge of wood, Spokane plains..... | 48 48 35 | 117 00 45 | 2,143 |

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | | | Longitude. | | | Elevation. |
|-----|---|-----------|----|----|------------|----|--------------|-------------------|
| | | ° | ' | " | ° | ' | " | |
| | | | | | | | <i>Fect.</i> | |
| 31 | Plants house | 48 | 42 | 50 | 117 | 17 | 00 | 2,018 |
| 32 | Little Spokane Springs | 48 | 46 | 10 | | 29 | 00 | 1,641 |
| 33 | Spokane River—west bend | 47 | 53 | 20 | | 40 | 30 | 1,423 |
| 34 | Chém-a-kane bridge..... | 48 | 0 | 14 | 116 | 46 | 24 | 1,890 |
| 35 | N. A. B. C. Barracks, at Colville, Columbia River.... | 48 | 39 | 58 | 118 | 05 | 10 | 1,268 1,336 |
| 36 | Fort Shepherd..... | 49 | 01 | 05 | 117 | 36 | 58 | 1,405 |
| 37 | Third boundary crossing of Colville River..... | 48 | 58 | 26 | 118 | 13 | 28 | 1,534 |
| 38 | Statapoostin Station..... | 49 | 00 | 13 | | 17 | 09 | 1,515 |
| 39 | Camp 8¼ miles below In-chú-in-tum Station | 49 | 00 | 23 | | 25 | 00 | 1,871 |
| 40 | In-chú-in-tum Station..... | 49 | 00 | 01 | | 30 | 13 | 1,991 |
| 41 | Camp on line near Rock Creek..... | 48 | 59 | 30 | 119 | 02 | 10 | 2,351 |
| 42 | Haigs Pond..... | 49 | 00 | 00 | | 8 | 40 | 3,784 |
| 43 | Camp Archer, near Osoyoos | 48 | 59 | 50 | | 19 | 05 | 2,880 |
| 44 | Larchtree Hill..... | 49 | 00 | 00 | | 13 | 00 | 3,964 |
| 45 | Similkameen River, near Vermilion Forks | | | | | | | 1,597 |
| 46 | Camp above Similkameen..... | | | | | | | 3,031 |
| 47 | Camp near Moodys Flat..... | | | | | | | 4,119 |
| 48 | Camp 21 miles out on road | | | | | | | 1,652 |
| 49 | Fort Hope | | | | | | | α 140 |
| 50 | Osoyoos Lake..... | 49 | 00 | 00 | 119 | 26 | 40 | 757 928 949 |
| 51 | Similkameen River | | | | | | | 1,180 |
| 52 | Haynes house | 49 | 02 | 00 | 119 | 43 | 00 | 1,130 |
| 53 | Similkameen—lower ford | 49 | 12 | 05 | | 53 | 10 | 1,244 |
| 54 | Highest Ashtnolon Mountain | 48 | 58 | 40 | 120 | 01 | 30 | b 7,500 |
| 55 | Ashtnolon Station..... | 48 | 59 | 54 | | 02 | 44 | 5,558 |
| 56 | Upper Ashtnolon Ford | 49 | 08 | 00 | | 03 | 15 | 2,431 |
| 57 | Ashtnolon Cache..... | 49 | 07 | 20 | | 19 | 20 | 3,556 |
| 58 | Ptarmigan Hill..... | 49 | 08 | 40 | | 26 | 00 | 6,331 |
| 59 | Mouth of Pasayten River | 49 | 09 | 55 | | 35 | 55 | 3,060 |
| 60 | Roche River Station..... | 48 | 59 | 50 | | 41 | 20 | 4,300 |
| 61 | Mouth of Roche River | 49 | 03 | 30 | | 44 | 40 | 3,774 3,459 |
| 62 | Camp about 600 feet below summit on east side of Hozomeen } outward..... | 49 | 02 | 05 | | 59 | 30 | 5,538 5,527 |
| | Hozomeen } returning | | | | | | | |
| 63 | Summit of Hozomeen Pass..... | 49 | 02 | 40 | 121 | 00 | 45 | 6,277 |
| 64 | Skagit Ford | 49 | 08 | 00 | | 11 | 05 | 1,640 1,634 |
| 65 | Chuchehum Pass | | 00 | 20 | | 17 | 40 | 4,719 |
| 66 | Chiloweyuck Lake | | 01 | 30 | | 25 | 10 | 2,052 |

α Assumed.

b Approximate.

Elevations along the forty-ninth parallel from the Pacific Ocean to the Rocky Mountains, determined barometrically in the years 1857-1860 by the United States Northwestern Boundary Commission.

| No. | Station. | Latitude. | | Longitude. | | Elevation. |
|-----|---|-----------|------|------------|------|------------|
| | | ° | ' | ° | ' | Feet. |
| 1 | Camp Simiahmoo | 49 | 00.7 | 122 | 45.5 | 11 |
| 2 | Camp Sumass..... | | 01.4 | | 11.9 | 14 |
| 3 | Sumass Creek, mouth of; by the creek and lake about 15 miles below Camp Sumass, about 57 miles from the sea; ordinary tides rise here about 1 foot..... | | 08.7 | | 04.3 | 7 |
| 4 | Mountains east of Pekosie Lake..... | 48 | 58.5 | | 01.0 | 4,991 |
| 5 | Harrison Lake..... | 49 | 19.1 | 121 | 43.4 | 30 |
| 6 | Harrison or Shook-o-meh River, mouth of..... | | | | | 20 |
| 7 | Chiloweyuck River, near Hudson Bay Company fishery..... | | | | | 15 |
| 8 | Hach-teha village, about 77 miles above mouth of Fraser River..... | | | | | 29 |
| 9 | Skow-aal-hu village, about 90 miles above mouth of Fraser River..... | | | | | 70 |
| 10 | Fort Hope, altitude of Fraser River..... | | | | | 120 |
| 11 | Indian village on Chiloweyuck River, 5 miles above Chiloweyuck Depot..... | 49 | 07.8 | 121 | 55.0 | 77 |
| 12 | Foot of first high ridge after leaving Chiloweyuck Depot..... | | 06.9 | | 56.2 | 179 |
| 13 | Chiloweyuck River, north bank, 14 miles above Chiloweyuck Depot, in flat below mouth of Tummeahai Creek, at foot of first mountain over which trail passes..... | | 05.0 | | 51.9 | 419 |
| 14 | Chiloweyuck River; Frenchmans Camp, 21 miles above Chiloweyuck Depot..... | | 05.1 | | 42.3 | 723 |
| 15 | Chiloweyuck River; mouth of Utzetza (second large tributary from the north), 26 miles above Chiloweyuck Depot..... | | 06.6 | | 36.8 | 1,071 |
| 16 | Chiloweyuck River; Samana village, 24 miles above Chiloweyuck Depot and 2 miles above mouth of Senehsay Creek..... | | 05.8 | | 39.3 | 913 |
| 17 | Chiloweyuck River; 33 miles above Chiloweyuck Depot and 3 miles below Chiloweyuck Lake..... | | 06.0 | | 30.7 | 1,550 |
| 18 | Chiloweyuck River, 10 miles above Chiloweyuck Depot..... | | 06.0 | | 57.3 | 157 |
| 19 | Trail, Chiloweyuck Depot to Chiloweyuck Lake; spring west of summit of first high ridge..... | | 05.7 | | 54.4 | 1,027 |
| 20 | Trail, Chiloweyuck Depot to Chiloweyuck Lake, summit first ridge..... | | 05.5 | | 54.2 | 1,268 |
| 21 | Tummeahai Creek, mouth of (25 feet above water), 15 miles above Chiloweyuck Depot..... | | 04.4 | | 49.3 | 400 |
| 22 | Chiloweyuck Depot (15 feet above mean water), 63 miles from the sea..... | | 09.5 | | 58.0 | 39 |
| 23 | Camp Tummeahai, 3 miles above mouth of Tummeahai Creek..... | | 02.1 | | 47.6 | 1,146 |
| 24 | Forks of Tummeahai, 7 miles above mouth of Tummeahai Creek..... | | 00.2 | | 43.8 | 2,056 |
| 25 | Put-lush-go-hap Lake, on Main Fork Tummeahai Creek, 10 miles above its mouth..... | 48 | 58.5 | | 41.0 | 2,639 |
| 26 | Foot of rapids in Tummeahai Creek, below lake, 9½ miles from creek's mouth..... | | 59.2 | | 41.3 | 2,915 |
| 27 | Divide between Tummeahai Creek (Main Fork) and Sen-eh-say and Nooksahk, 12 miles above mouth of Tummeahai Creek, 11 miles from mouth of Sen-eh-say Creek, and 5 miles from Nuquoichum, tributary of the Nooksahk..... | | 57.4 | | 39.4 | 6,117 |
| 28 | Tummeahai Creek (head of South Fork), 11 miles above mouth of Tummeahai Creek..... | | 57.8 | | 44.9 | 3,745 |
| 29 | Divide between Nooksahk and Tummeahai (South Fork), 11½ miles above mouth of Tummeahai Creek and 14 miles above Cowap, tributary of the Nooksahk..... | | 57.4 | | 44.8 | 5,893 |

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|----------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 30 | La-yome-sin Creek, crossing about $\frac{1}{2}$ mile above mouth, 11 miles above Chiloweyuck Depot | 49 04.3 | 121 54.0 | 572 |
| 31 | La-yome-sin Creek, 4 miles above mouth | 02.8 | 52.9 | 1,026 |
| 32 | Summit, east head of La-yome-sin and Nooksahk, 8 miles above mouth of La-yome-sin | 00.0 | 49.4 | 5,212 |
| 33 | Summit of mountain in divide between La-yome-sin and Tummeahai, near junction of this ridge with the Chiloweyuck-Nooksahk divide | 00.4 | 49.6 | 4,930 |
| 34 | Chiloweyuck-Nooksahk divide, highest point in this immediate vicinity | 48 59.2 | 53.0 | 5,200 |
| 35 | Summit Kaisootst Mountain | 57.8 | 57.0 | 5,289 |
| 36 | Summit Signal peak | 59.2 | 122 00.1 | 4,991 |
| 37 | Summit Tummeahai | 49 01.9 | 121 45.1 | 6,633 |
| 38 | Divide between Nooksahk and Tummeahai | 48 57.3 | 43.5 | 5,893 |
| 39 | Summit La-yome-sin Mountain | 49 01.9 | 50.5 | 5,884 |
| 40 | Summit Klehtlakeh Mountain | 11.0 | 40.0 | 6,840 |
| 41 | Near summit Put-lush-go-hap Mountain | 48 59.7 | 38.8 | α 7,195 |
| 42 | Summit Put-lush-go-hap Mountain | 59.7 | 38.8 | 7,687 |
| 43 | Sen-eh-say Creek, mouth of, 22 miles above Chiloweyuck Depot | 49 04.0 | 40.8 | 823 |
| 44 | Sen-eh-say Creek, 5 miles from mouth, at mouth of Chuchum Creek | 02.0 | 38.0 | 1,621 |
| 45 | Sen-eh-say Creek, 8 miles from mouth, at forks | 48 59.8 | 36.7 | 2,394 |
| 46 | Sen-eh-say Creek, 11 miles from mouth, at head of West Fork | 57.7 | 39.4 | 3,302 |
| 47 | En-saaw-kwatch Creek, mouth of, 29 miles above Chiloweyuck Depot | 49 05.5 | 34.7 | 1,296 |
| 48 | En-saaw-kwatch Creek, 4 miles above its mouth | 02.2 | 32.7 | 2,900 |
| 49 | En-saaw-kwatch Creek, heads of, 10 miles above its mouth | 48 58.5 | 29.4 | 5,073 |
| 50 | Divide between two western tributaries of Klab-neh Creek, $4\frac{1}{2}$ miles from mouth of tributaries | 57.4 | 28.3 | 5,617 |
| 51 | High point on same divide; En-saaw-kwatch and Klab-neh | 57.0 | 28.4 | 6,856 |
| 52 | First western tributary of Klab-neh Creek, 4 miles above its mouth | 58.2 | 27.3 | 4,317 |
| 53 | First western tributary of Klab-neh Creek, mouth of, 2 miles above mouth of Klab-neh and $42\frac{1}{2}$ miles above Chiloweyuck Depot | 59.6 | 23.5 | 2,076 |
| 54 | Camp Chiloweyuck on Klab-neh Creek, 1 mile above Lake Depot | 49 00.4 | 23.7 | 2,002 |
| 55 | Lake Depot on Chiloweyuck Lake (6 feet above lake level, approximately) | 01.8 | 23.0 | 1,997 |
| 56 | Peak west of Chiloweyuck Lake | 02.2 | 26.6 | 7,244 |
| 57 | Pekosie Lake, 4 miles above mouth of Pekosie Creek | 48 58.9 | 122 02.8 | 790 |
| 58 | Nooksahk River, 46 miles above mouth, and 4 miles above mouth of Pekosie Creek | 55.6 | 02.5 | 685 |
| 59 | Nooksahk River, 50 miles above mouth, at mouth of Cowap Creek | 53.7 | 121 57.0 | 701 |
| 60 | Nooksahk River, 53 miles above mouth, near mouth of Noochsakatsu, South Branch | 53.3 | 55.1 | b 936 |
| 61 | Nooksahk River, 56 miles above mouth, near mouth of Tchahko, South Branch | 53.2 | 52.0 | 1,299 |
| 62 | Nooksahk River, 62 miles above mouth, right bank | 53.9 | 44.7 | 1,307 |
| 63 | Nooksahk River, 66 miles above mouth, right bank, at mouth of Nuquoichum | 54.1 | 40.3 | 2,044 |
| 64 | Head of Nuquoichum, $4\frac{1}{2}$ miles from mouth | 57.8 | 38.0 | 5,461 |

^a "Summit perhaps 300 feet higher." H. Custer, 1863.^b Observations taken on the trail and "should not perhaps be taken as the height of the river."

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 65 | Limit of growth of timber, Put-lush-go-hap Mountain | 49 00.0 | 121 39.0 | 6,593 |
| 66 | do | 48 57.5 | 37.5 | 6,117 |
| 67 | Kockolum Creek, half mile above mouth (mouth is half mile below Chiloweyuck) | 49 05.7 | 26.2 | 1,973 |
| 68 | Kockolum Creek, 3 miles above mouth, outlet of first lake (Kehkawalum) | 07.2 | 25.6 | 2,652 |
| 69 | Kockolum Creek, 4½ miles above mouth, between two lakes | 08.8 | 24.8 | 2,843 |
| 70 | Kockolum Creek, 5½ miles above mouth, divide from Klehkwunnum; near head of Indian Lake and 4 miles from mouth of this tributary of Klehkwunnum | 09.5 | 24.3 | 3,259 |
| 71 | Water of second lake, 16 miles from mouth of Klehkwunnum a | 09.6 | 24.4 | 3,132 |
| 72 | Klehkwunnum Creek, mouth of Pips Creek | 12.3 | 21.4 | 1,917 |
| 73 | Klehkwunnum Creek, 19 miles from mouth, marsh lakes near head of | 10.0 | 18.0 | 1,927 |
| 74 | Divide between Skagit and Fraser rivers, head of Kle-sil-kwu Creek b | 09.3 | 16.8 | 1,948 |
| 75 | Junction of Man-sel-pan-ik and Kle-sil-kwu creeks | 07.8 | 13.6 | 1,820 |
| 76 | Junction of Man-sel-pan-ik and Kle-sil-kwu creeks, 4½ miles above mouth of Kle-sil-kwu | 08.0 | 13.0 | 1,860 |
| 77 | High mountain, northeast side of Klehkwunnum | 10.6 | 14.5 | 6,480 |
| 78 | Skagit Ford, 110 miles from mouth of Skagit River | 07.7 | 08.5 | 1,752 |
| 79 | Man-sel-pan-ik Creek, 4 miles from junction with Kle-sil-kwu Creek | 04.6 | 14.5 | 3,027 |
| 80 | Man-sel-pan-ik Creek, 7 miles from junction with Kle-sil-kwu Creek | 02.4 | 14.3 | 3,491 |
| 81 | Man-sel-pan-ik Creek, 7¼ miles from junction with Kle-sil-kwu Creek, first western tributary | 01.6 | 14.4 | 3,550 |
| 82 | Man-sel-pan-ik Creek, 8 miles from junction with Kle-sil-kwu Creek, where Whatcom trail strikes it | 01.2 | 14.4 | 4,080 |
| 83 | Man-sel-pan-ik and Skagit divide, second summit on Whatcom trail | 01.9 | 13.4 | 5,718 |
| 84 | Summit on trail, Chuch-che-hum to Skagit, 9 miles from mouth of Man-sel-pan-ik; 7 miles from mouth of Chuch-che-hum | 00.6 | 15.3 | 4,505 |
| 85 | Lowest point of same divide | 00.5 | 15.3 | 4,445 |
| 86 | Head of gorge 150 yards west of divide | 00.4 | 15.1 | 4,143 |
| 87 | Summit of old Whatcom trail | 00.9 | 16.3 | 5,664 |
| 88 | Blue Lake, 6 miles from mouth of Chuch-che-hum Creek | 00.4 | 15.6 | 3,725 |
| 89 | Divide, Chiloweyuck-Skagit-Fraser | 02.3 | 16.3 | 6,837 |
| 90 | Camp Chuch-che-hum, 5½ miles from mouth of Chuch-che-hum Creek | 00.1 | 16.7 | 3,420 |
| 91 | Nef Prairie, 3 miles southeast of Lake Depot | 00.2 | 20.2 | 2,592 |
| 92 | Klab-neh Creek, 4 miles from mouth | 48 58.0 | 22.6 | 2,078 |
| 93 | Klab-neh Creek, 5 miles from mouth, first tributary from the east | 57.2 | 23.1 | 2,090 |
| 94 | Klab-neh Creek, 7 miles from mouth, near second large tributary from the east | 55.8 | 23.3 | 2,243 |
| 95 | Klab-neh Creek, 9½ miles from mouth, near third large tributary from the east | 54.3 | 25.2 | 2,414 |
| 96 | Klab-neh Creek, 10 miles from mouth | 54.0 | 25.6 | 2,538 |
| 97 | Near summit of ridge west of Klab-neh | 54.0 | 26.9 | 4,410 |

a This is supposed to be the lowest of all the divides between these two streams, 20 miles from mouth of Klehkwunnum Creek and 7 miles from mouth of Kle-sil-kwu Creek.

b This stream is supposed to fall gently till near its entrance into Fraser River, 2 miles below Fort Hope, where it becomes rapid.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 98 | Summit of Goat Mountain; divide between Klab-neh and Zakeno (tributary of the Skagit), 30 miles above mouth of Zakeno, 50 miles above mouth of Skagit, and 16 miles from mouth of Klab-neh..... | 48 51.7 | 121 24.0 | 5,862 |
| 99 | On divide Klahch Creek, a branch of Red Mountain Creek, 4 miles above mouth of latter..... | 52.0 | 24.2 | 5,106 |
| 100 | Red Mountain Creek..... | 52.6 | 23.1 | 2,932 |
| 101 | Red Mountain Creek, 4½ miles above mouth, near head of southern branch..... | 50.9 | 21.4 | 3,754 |
| 102 | Divide Klab-neh and Glacier creeks, 8½ miles above mouth of Red Mountain Creek, 15 miles above mouth of Glacier Creek..... | 52.0 | 17.6 | 5,107 |
| 103 | Glacier Creek (Sko-mel-pua-nook), head or first forks of, 13¼ miles above its mouth..... | 52.0 | 15.4 | 2,891 |
| 104 | Glacier Creek, 11 miles above its mouth..... | 52.9 | 13.4 | 2,550 |
| 105 | Glacier Creek, 9 miles above its mouth..... | 53.3 | 11.2 | 2,292 |
| 106 | Glacier Creek, 5 miles above its mouth..... | 54.4 | 08.0 | 2,075 |
| 107 | Glacier Creek, 2½ miles above its mouth..... | 54.4 | 04.7 | 1,940 |
| 108 | Glacier Creek, mouth of, junction with Skagit, 84 miles from mouth of Skagit..... | 55.0 | 02.4 | 1,525 |
| 109 | Skagit River, 87 miles above its mouth..... | 57.2 | 03.4 | 1,531 |
| 110 | Skagit River, 82 miles above its mouth..... | 53.5 | 01.2 | 1,468 |
| 111 | Skagit River, 71 miles above its mouth..... | 48.6 | 01.6 | 1,405 |
| 112 | Skagit River, 64 miles above its mouth..... | 44.2 | 02.0 | 1,298 |
| 113 | Camp Skagit, 96 miles above mouth of Skagit (15 feet above river)..... | 49 00.0 | 02.8 | 1,573 |
| 114 | Skagit Cache, in Skagit Valley, 2 miles east of river..... | 02.2 | 01.2 | 1,748 |
| 115 | Camp on tributary of Skagit, ¼ mile above mouth; its mouth 97 miles above Skagit's mouth..... | 01.5 | 02.0 | 1,586 |
| 116 | Camp on tributary of Skagit (Ne-pó-pe-ch-kum), 1 mile above mouth; its mouth 99 miles above Skagit's mouth..... | 02.6 | 03.1 | 1,611 |
| 117 | Camp on Skagit (15 feet above water), 100 miles above Skagit's mouth..... | 02.9 | 04.0 | 1,624 |
| 118 | Camp on Skagit (25 feet above water), 101 miles above Skagit's mouth..... | 03.6 | 04.3 | 1,637 |
| 119 | Camp on slough of Skagit, 104 miles above Skagit's mouth..... | 04.7 | 05.0 | 1,675 |
| 120 | Camp on Skagit (20 feet above water), 108 miles above Skagit's mouth..... | 06.7 | 07.2 | 1,727 |
| 121 | Skagit River, 115 miles above its mouth..... | 11.0 | 02.6 | 1,812 |
| 122 | Skagit River, 120 miles above its mouth, above mouth of Kullas Creek..... | 14.1 | 03.0 | 1,947 |
| 123 | High point on divide, Skagit-Similkameen..... | 18.3 | 120 56.8 | 6,871 |
| 124 | Camp near Skagit-Similkameen divide, 126 miles from mouth of the Skagit..... | 17.8 | 58.1 | 5,254 |
| 125 | Near head of large tributary to the Skagit, 9 miles from its entrance into the Skagit, at which point the elevation is about 1,980 feet, the point being 122 miles above its mouth..... | 16.3 | 52.1 | 2,969 |
| 126 | Summit of pass between Skagit and Similkameen, 126 miles from mouth of Skagit..... | 17.9 | 59.0 | 5,668 |
| 127 | Lake, head of Similkameen, 125 miles from mouth of Similkameen..... | 18.3 | 57.5 | 5,307 |
| 128 | Camp, first forks, a 122 miles from mouth of Similkameen..... | 21.6 | 53.7 | 4,163 |
| 129 | On divide, crossing a great bend of the Similkameen..... | 23.2 | 52.0 | 5,074 |
| 130 | Fort Hope trail, 1 mile east of junction with Whatcom, near two small lakes..... | 25.3 | 52.5 | 5,947 |
| 131 | High point on trail..... | 25.0 | 51.9 | 5,490 |

g Whatcom trail leaves river.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | | Longitude. | | Elevation. Feet. |
|-----|---|-----------|------|------------|------|---------------------|
| | | ° | ' | ° | ' | |
| 132 | Forks—trails to Whatcom and to Fort Hope | 49 | 25.8 | 120 | 51.1 | 5,722 |
| 133 | Fort Hope trail, upper crossing of Similkameen, 120 miles above its mouth | | 23.8 | | 54.5 | 4,028 |
| 134 | Fort Hope trail, 6 miles west of Similkameen crossing and 6 miles from mouth of creek up which the trail runs..... | | 21.2 | 121 | 00.8 | 4,436 |
| 135 | Summit of ridge, left bank of Similkameen, near upper crossing..... | | 23.7 | 120 | 55.3 | 4,750 |
| 136 | Fort Hope trail, summit between two crossings of Similkameen..... | | 25.3 | | 52.4 | 5,965 |
| 137 | Camp on Fort Hope trail..... | | 29.4 | | 47.5 | 4,906 |
| 138 | On ridge south of valley of Similkameen | | 30.4 | | 47.1 | 4,559 |
| 139 | Encampment des Femmes, junction of trails to Forts Hope and Kamloops, 104 miles above mouth of Similkameen | | 31.5 | | 45.2 | 2,506 |
| 140 | Summit of ridge north of Encampment des Femmes..... | | 34.5 | | 42.8 | 4,921 |
| 141 | Summit of ridge on trail | | 27.2 | | 35.5 | 4,085 |
| 142 | Camp on creek 1 mile east of last summit, 1½ miles above mouth of creek, which is 90 miles above mouth of Similkameen..... | | 27.3 | | 34.4 | 4,035 |
| 143 | Camp on Similkameen 82 miles above its mouth and one-half mile below mouth of Pa-say-ten Creek..... | | 27.0 | | 23.9 | 2,069 |
| 144 | Summit of ridge on south side of Similkameen | | 21.6 | | 24.5 | 4,041 |
| 145 | Base of same ridge, crossing of Yaki-keh-whel- lich-ler (?), 11 miles above its mouth, which is 72 miles above mouth of Similkameen | | 21.5 | | 23.9 | 2,580 |
| 146 | Yan-set-ah-skwa Creek, 5 miles above its mouth, which is 81 miles above mouth of Similkameen. | | 31.2 | | 24.9 | 2,379 |
| 147 | Camp on Similkameen 64 miles above its mouth and 6 miles below Skai-shin Creek..... | | 21.3 | | 05.2 | 1,919 |
| 148 | Camp on Similkameen 52 miles above its mouth and 3 miles above mouth of Nais-nu-loh | | 14.5 | 119 | 59.9 | 1,477 |
| 149 | Similkameen River, 49 miles above its mouth and just below mouth of Nais-nu-loh..... | | 13.1 | | 56.8 | 1,455 |
| 150 | Camp on Similkameen 36 miles above its mouth, in brushy bottom..... | | 09.5 | | 43.8 | 1,406 |
| 151 | Camp on northeast tributary of Similkameen 2 miles above mouth, the mouth 38 miles above mouth of Similkameen..... | | 11.7 | | 42.5 | 2,248 |
| 152 | Camp in flat near river, one-half mile above mouth of large creek coming from west, its mouth 31 miles above mouth of Similkameen.... | | 05.2 | | 43.0 | 1,356 |
| 153 | Camp on side of mountains, one-half mile north of creek coming from southwest, its mouth 26 miles from mouth of Similkameen..... | | 01.8 | | 41.1 | 1,652 |
| 154 | Summit of ridge bordering Similkameen River on west side | | 03.0 | | 43.0 | 5,068 |
| 155 | Camp Similkameen, 12 miles above mouth of Similkameen..... | 48 | 59.2 | | 34.9 | 1,164 |
| 156 | Camp on Similkameen 1½ miles above mouth of Similkameen..... | | 55.5 | | 25.0 | 904 |
| 157 | Camp on Okinakane 11 miles below forks, 61 miles above mouth of Okinakane; 567 miles above mouth of Columbia | | 46.0 | | 22.6 | 955 |
| 158 | Lake Osoyoos, foot of (4 feet above water), 76 miles above mouth of Okinakane..... | | 57.0 | | 24.2 | 957 |
| 159 | Lake Osoyoos, camp on east side, 82 miles above mouth of Okinakane..... | 49 | 02.4 | | 25.0 | 953 |
| 160 | Lake Osoyoos, north end of (inlet), 86 miles above mouth of Okinakane..... | | 04.5 | | 29.2 | 931 |
| 161 | Height of second plateau at foot of hills | | 13.1 | | 32.3 | 1,633 |
| 162 |do..... | | 05.9 | | 28.9 | 1,430 |

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|--------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 163 | Summit of ridge, 3 miles east of Okin-á-kane River. | 49 07.3 | 119 27.8 | 3,027 |
| 164 | Summit of trail, Similkameen to Okinakane..... | 11.4 | 39.0 | 4,251 |
| 165 | Lake Haipwil (2½ miles long by three-fourths mile wide)..... | 48 51.0 | 37.0 | 1,120 |
| 166 | Summit of mountain, north of lake..... | 55.6 | 36.8 | 4,565 |
| 167 | Camp on Haipwil Creek 3 miles above forks and 12 miles above its mouth..... | 47.0 | 37.9 | 1,376 |
| 168 | Camp on Haipwil Creek one-half mile above forks and 9 miles above its mouth..... | 48.9 | 38.0 | 1,366 |
| 169 | On Haipwil where it enters couléé, 20 miles above its mouth..... | 40.8 | 39.1 | 1,643 |
| 170 | Divide between Haipwil and Okinakane, near two lakes..... | 48.5 | 35.4 | 1,701 |
| 171 | Summit of hill, Okinakane Valley..... | 45.1 | 23.6 | 2,487 |
| 172 | Camp on Haipwil (West Fork) 8 miles above forks and 17 miles above mouth of Haipwil..... | 47.5 | 48.7 | 4,599 |
| 173 | Summit of trail between a tributary of Che-wach (branch of Haipwil) and [Lake?] Methow, 20 miles from mouth of Haipwil and 5 miles from mouth of Che-wach..... | 46.2 | 52.0 | 6,854 |
| 174 | West foot of ascent to summit..... | 45.9 | 52.6 | 6,220 |
| 175 | On Che-wach at forks, 67 miles above mouth of Methow and 559 miles above mouth of Columbia. | 47.8 | 57.5 | 3,296 |
| 176 | Near mouth of tributary of west fork of Haipwil, 9 miles from forks of Haipwil..... | 47.9 | 49.7 | 4,627 |
| 177 | Large lake southwest of mouth of Similkameen, south end, 8 miles from Okinakane River..... | 50.9 | 29.0 | 1,819 |
| 178 | Smaller lake southwest of mouth of Similkameen, east side, 2 miles from Okinakane River..... | 53.0 | 27.5 | 1,766 |
| 179 | Summit of trail, Skagit to Pasayten..... | 49 02.3 | 120 57.4 | 5,900 |
| 180 | Saddle Divide, waters Skagit and Pasayten, 10 miles from mouth of Ne-po-pe-eh-kum Creek, which is 100 miles above mouth of Skagit and 24 miles from mouth of N'-shiti-shuti River..... | 02.1 | 57.1 | 5,281 |
| 181 | Summit Cache..... | 01.9 | 56.5 | 5,594 |
| 182 | First depression east of Summit Cache..... | 02.0 | 55.3 | 5,570 |
| 183 | Third high point east of Summit Cache..... | 02.3 | 53.7 | 5,819 |
| 184 | Summit to north of trail <i>a</i> | 02.5 | 54.6 | 6,221 |
| 185 | Summit near end of ridge..... | 03.0 | 50.0 | 6,233 |
| 186 | First water below ridge on trail, 15 miles above mouth of N'-shiti-shuti, which is at Pasayten Cache..... | 03.2 | 48.6 | 3,860 |
| 187 | Camp on N'-shiti-shuti 10½ miles above its mouth, at mouth of Chu-chu-wun-ten..... | 03.5 | 42.9 | 3,431 |
| 188 | Pasayten Cache, at mouth of N'-shiti-shuti, 24 miles above mouth of Pasayten, which is 82 miles above mouth of Similkameen..... | 09.6 | 33.6 | 3,194 |
| 189 | Camp Pasayten, 36 miles from mouth of Pasayten. | 48 59.7 | 32.2 | 3,676 |
| 190 | First knoll on mountain east of Pasayten Cache... | 49 08.7 | 32.0 | 4,880 |
| 191 | Top of rocky slide near which trail passes on same mountain..... | 07.5 | 29.5 | 6,456 |
| 192 | Camp on west slope of mountain..... | 08.7 | 31.3 | 4,777 |
| 193 | Elevation east of hill..... | 08.6 | 30.8 | 5,157 |
| 194 | Camp..... | 07.5 | 28.3 | 4,701 |
| 195 | Western principal summit..... | 07.5 | 25.5 | 6,433 |
| 196 | Eastern principal summit..... | 07.8 | 23.5 | 6,455 |
| 197 | Camp east and above tributary of Nais-nu-loh..... | 08.2 | 22.2 | 6,494 |
| 198 | Elevation 1½ miles east of above..... | 08.3 | 21.6 | 6,170 |

a To the north of this trail, in latitude 49° 03.7', longitude 120° 53.5', is another divide, between Ne-po-pe-eh-kum and N'-shiti-shuti, which is about 4,500 feet high. It is 11 miles from mouth of N'-shiti-shuti.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|--------------|
| | | ° ' " | ° ' " | <i>Feet.</i> |
| 199 | Camp on Nais-nu-loh, 18 miles above its mouth.... | 49 08.8 | 120 15.1 | 3,568 |
| 200 | Camp Nais-nu-loh Cache, 21 miles above mouth of Nais-nu-loh..... | 07.2 | 17.3 | 3,678 |
| 201 | Saddle between two principal summits, 26 miles above mouth of Nais-nu-loh..... | 07.5 | 24.2 | 6,005 |
| 202 | Camp on Nais-nu-loh, 7 miles above its mouth, at bend, mouth of creek..... | 07.8 | 00.5 | 2,525 |
| 203 | Camp on Nais-nu-loh, 5½ miles above its mouth, at trail crossing..... | 09.1 | 00.2 | 2,171 |
| 204 | On Nais-nu-loh, ¼ mile above its mouth, where trail leaves it..... | 13.1 | 119 57.4 | 1,515 |
| 205 | Camp on southeastern tributary of Lake Osoyoos, 6 miles from its mouth, last trail crossing..... | 48 59.5 | 16.4 | 3,092 |
| 206 | Summit of trail, Lake Osoyoos to Ne-hoi-al-pit-kwu River..... | 49 00.6 | 11.8 | 4,068 |
| 207 | Highest terrace east of summit..... | 01.1 | 09.3 | 3,476 |
| 208 | Fourth terrace east of summit, just before descending to valley of Rock Creek..... | 02.6 | 05.4 | 3,032 |
| 209 | First crossing of Rock Creek, 6 miles above its mouth..... | 02.7 | 05.2 | 2,762 |
| 210 | Fourth terrace, just after ascending from valley of Rock Creek..... | 02.8 | 04.9 | 3,101 |
| 211 | Upper terrace above town [? Twai-yeep] on Rock Creek, just before descending to Ne-hoi-al-pit-kwu River..... | 03.2 | 118 59.0 | 2,366 |
| 212 | Upper camp on Ne-hoi-al-pit-kwu, 80 miles above its mouth, at mouth of Rock Creek..... | 03.2 | 58.7 | 2,153 |
| 213 | Camp Ne-hoi-al-pit-kwu, 66 miles above its mouth (20 feet above water)..... | 48 59.1 | 44.5 | 1,826 |
| 214 | On Ne-hoi-al-pit-kwu River, 44 miles above its mouth..... | 49 00.4 | 23.4 | 1,663 |
| 215 | Camp Statapoostin, 36 miles above its mouth..... | 00.2 | 16.3 | 1,636 |
| 216 | En-cháhm Lake, outlet of, 1½ miles from Ne-hoi-al-pit-kwu River, at a point 32 miles from its mouth..... | 02.1 | 12.7 | 1,531 |
| 217 | Camp on Ne-hoi-al-pit-kwu, 29 miles from its mouth..... | 48 59.4 | 12.5 | 1,468 |
| 218 | Camp on Ne-hoi-al-pit-kwu, 16 miles from its mouth..... | 50.5 | 10.4 | 1,466 |
| 219 | Camp on Ne-hoi-al-pit-kwu, 9 miles from its mouth..... | 46.3 | 06.8 | 1,226 |
| 220 | Camp on Ne-hoi-al-pit-kwu, 1 mile from its mouth..... | 40.9 | 06.5 | 1,271 |
| 221 | Camp on Ne-hoi-al-pit-kwu, at mouth, 746 miles from mouth of Columbia..... | 40.0 | 06.2 | 1,252 |
| 222 | Columbia River crossing, 1 mile below Kettle Falls (20 or 25 feet high), 782 a miles above its mouth..... | 36.8 | 07.5 | 1,202 |
| 223 | Columbia River camp (25 feet above river), 766 miles above its mouth..... | 51.6 | 117 53.9 | 1,341 |
| 224 | Camp Columbia (53 feet above water now nearly at lowest stage), 783 miles above its mouth..... | 59.8 | 37.7 | 1,317 |
| 225 | Camp Columbia (another measure)..... | | | 1,514 |
| 226 | Camp on summit on trail westward from Camp Columbia..... | 58.6 | 45.4 | 3,410 |
| 227 | Camp on tributary of Yóme-tsin, 4 miles from Yóme-tsin's mouth, which is 775 miles from mouth of Columbia..... | 58.1 | 48.1 | 2,166 |
| 228 | High point on trail..... | 58.9 | 49.5 | 4,650 |
| 229 | Camp..... | 58.0 | 58.7 | 2,684 |
| 230 | Summit on trail, divide between Yome-tsin and Ne-hoi-al-pit-kwu..... | 57.7 | 118 02.9 | 4,739 |
| 231 | Camp on tributary of Ne-hoi-al-pit-kwu, 5 miles above its mouth, which is 23 miles above mouth of Ne-hoi-al-pit-kwu..... | 57.2 | 07.0 | 3,363 |

a Apparently an error for 742.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|--------------|
| | | ° / | ° / | <i>Feet.</i> |
| 232 | High point on trail east of divide | 48 57.8 | 118 02.0 | 4,707 |
| 233 | Crossing Creek, 3 miles east of camp—first plateau, 2 miles above mouth of creek, which is 59 miles above mouth of Okinakane | 48.7 | 119 19.2 | 1,383 |
| 234 | Crossing Creek, 5 miles east of camp—second pla- teau, 6 miles above mouth of Kwahaloose Creek, which is 57 miles above mouth of Okinakane River | 42.1 | 15.2 | 2,158 |
| 235 | Divide between Kwahaloose Creek and large east- ern tributary [Lower Bonaparte of Arrowsmith's map] of Okinakane River | 40.6 | 13.7 | 3,350 |
| 236 | Camp on first large branch of Lower Bonaparte River, 3 miles above mouth of branch and 12 miles above mouth of river | 39.6 | 08.2 | 2,563 |
| 237 | Divide between 2 branches of Lower Bonaparte River and a southern tributary of the Ne-hoi-al- pit-kwu River; 11 miles above mouth of first branch, which is 12 miles above mouth of second branch, which is 33 miles above mouth of Lower Bonaparte River and 22 miles from mouth of southern tributary of Ne-hoi-al-pit-kwu River, which is 63 miles above mouth of that river | 41.3 | 118 58.3 | 4,312 |
| 238 | Camp on second branch of Lower Bonaparte River, 9 miles above its mouth | 40.7 | 54.7 | 3,531 |
| 239 | Camp on second branch of Lower Bonaparte River, 3 miles above its mouth | 38.7 | 47.8 | 2,459 |
| 240 | Summit of ridge north of No. 238=average height of mountains in vicinity | 41.0 | 56.6 | 5,220 |
| 241 | Crossing of Lower Bonaparte, 38 miles above its mouth | 38.7 | 39.9 | 2,746 |
| 242 | Divide between Okinakane and Columbia, 45 miles from mouth of Lower Bonaparte and 19 miles from the Columbia, at a point 739 miles from its mouth | 37.9 | 32.3 | 5,662 |
| 243 | High point north of trail on divide between Okinakane and Columbia | 39.2 | 33.1 | 7,035 |
| 244 | Camp No. 3, on Columbia River <i>a</i> | 48 37.0 | 118 06.9 | 1,207 |
| 245 | Camp No. 2, on Columbia River | | | 1,622 |
| 246 | Summit of ridge bordering Colville Valley to north. | | | 3,017 |
| 247 | Camp No. 1, on Peptashin Creek near mouth | | | 1,535 |
| 248 | Summit of ridge=average height of ridges in vicinity | | | 3,718 |
| 249 | Camp No. 15, Peptashin Creek near town | | | 1,957 |
| 250 | Colville depot, at observatory | | | 1,963 |
| 251 | Camp No. 1, Mill Creek near Colville depot | | | 1,653 |
| 252 | Lake 5 miles southeast of Colville depot | | | 2,153 |
| 253 | Summit of mountain west of Colville depot | | | 3,330 |
| 254 | Summit of mountain 6 miles east of Colville depot. | | | 5,697 |
| 255 | Camp No. 2 on Mill Creek near Stugar's farm | | | 1,629 |
| 256 | Mountain east of Camp No. 2 | | | 4,880 |
| 257 | Mountain south, on same ridge, and north of Fran- cois' house | | | 4,096 |
| 258 | Camp No. 3, near Francois' farm | | | 1,717 |
| 259 | Mountain southwest of Francois', near trail | | | 3,186 |
| 260 | On branch of Mill Creek, at crossing of trail, 5 miles south of Francois', An-i-ah-t-wa or Oit-chin Prairie | | | 1,765 |
| 261 | Crossing of first stream south of Hughes ranch on wagon road | | | 1,734 |
| 262 | On wagon road between Colville and Spokane at small ponds | | | 2,119 |
| 263 | On head of small lake, east end, near wagon road | | | 1,970 |

a Second cahier begins here.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° / | ° / | <i>Feet.</i> |
| 264 | Highest point on Colville wagon road | | | 4,033 |
| 265 | Chemakane bridge, junction of trail and wagon road | | | 1,922 |
| 266 | Summit of trail between Mill Creek and Little Spokane | | | 2,735 |
| 267 | Walker's Prairie, on small branch of Chemakane | | | 1,897 |
| 268 | Mouth of Chemakane—approximate | | | 1,366 |
| 269 | Summit of trail, short cut between Chemakane and Spokane | | | 2,809 |
| 270 | Trail at northernmost bend of Spokane River, 13 miles below mouth of Little Spokane a. | | | 1,500 |
| 271 | On plateau above Spokane River, 7 miles below mouth of Little Spokane | | | 1,854 |
| 272 | On edge of Spokane River, 7 miles below mouth of Little Spokane | | | 1,553 |
| 273 | Little Spokane, mouth of, at water's edge | | | 1,635 |
| 274 | Summit of hill, northeast of mouth of Little Spokane | | | 3,140 |
| 275 | On little Spokane, near crossing of trail | | | 1,609 |
| 276 | On plateau south of crossing | | | 1,760 |
| 277 | On plateau of Spokane River | | | 1,878 |
| 278 | Hill in bend of Little Spokane, about 5 miles from mouth | | | 2,355 |
| 279 | On edge of plateau south of trail | | | 2,266 |
| 280 | On Spokane River, water's edge, near Plant's | | | 1,901 |
| 281 | On plateau north of Plant's | | | 2,375 |
| 282 | Plant's house | | | 2,08 |
| 283 | Trail to Sinyakwateen, 11 miles from Plant's | | | 2,228 |
| 284 | Trail on Spokane, 3¼ miles below lake [Cœur d'Alene] | | | 2,135 |
| 285 | Cœur d'Alene Lake | | | 2,151 |
| 286 | Hill near lake, south of trail | | | 2,499 |
| 287 | On small lake north of Cœur d'Alene Lake | | | 2,205 |
| 288 | On summit of spur bordering lake | | | 2,862 |
| 289 | Average height of rolling country north and northeast of lake | | | 3,170 |
| 290 | Plateau north and east of trail to Mission | | | 2,767 |
| 291 | Creek 3¼ miles east of arm of lake [Cœur d'Alene] | | | 2,121 |
| 292 | Plateau north of creek crossing | | | 2,681 |
| 293 | Shore of large lake south of Checolsum Mountain | | | 2,262 |
| 294 | Point on mountain spur between lakes | | | 3,577 |
| 295 | Trail to Sinyakwateen, 19 miles from Plant's | | | 2,200 |
| 296 | Little knoll 5 miles beyond and west of road | | | 2,835 |
| 297 | Tesemmcus lakes, [? Tesimini] | | | 2,322 |
| 298 | On edge of plateau 3 miles east of road | | | 2,540 |
| 299 | Top of plateau on road 4 miles south of Pekowla Lake | | | 2,539 |
| 300 | Bottom of plateau | | | 2,333 |
| 301 | On Pekowla Lake | | | 2,200 |
| 302 | Sinyakwateen depot, right bank of Clark Fork of the Columbia River | | | 2,084 |
| 303 | Vermilion Creek, mouth of fall of Clark Fork from [Pend Oreille] lake to falls about 0.44 foot per mile; falls about 5 feet | | | 2,074 |
| 304 | Checolsum Mountain | | | 5,706 |
| 305 | Crossing of trail near forks of creek north of Checolsum Mountain | | | 2,455 |

a From the northernmost bend to mouth of Spokane the average fall is about 9 feet per mile.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|-----------------------|
| 306 | Crossing of tributary of Little Spokane. Little Spokane has an average fall of about 15 feet per mile..... | o | o | <i>Feet.</i> 1,880 |
| 307 | Lake on Little Spokane..... | | | 1,947 |
| 308 | Trail north of lake..... | | | 2,093 |
| 309 | On plateau above Little Spokane..... | | | ? 2,441 |
| 310 | On high plateau on trail..... | | | 2,358 |
| 311 | Lake at head of Little Spokane..... | | | 2,237 |
| 312 | Trail between Spokane and Clark Fork Divide..... | | | 2,335 |
| 313 | Clark Fork at outlet of Pend Oreille Bay..... | | | 1,942 |
| 314 | Clark Fork 8 miles below falls..... | | | 2,024 |
| 315 | Clark Fork 4 miles above Mission..... | | | 1,937 |
| 316 | Clark Fork at mouth of Skomin Creek..... | | | 1,926 |
| 317 | St. Ignatius Mission..... | | | 1,894 |
| 318 | Skomin Creek, 5 miles above mouth..... | | | 2,769 |
| 319 | Skomin Creek, 9 miles above mouth..... | | | 2,901 |
| 320 | Skomin Creek, 11 miles above mouth..... | | | 3,736 |
| 321 | Divide between Skomin and Chelonscan creeks..... | | | 4,199 |
| 322 | Mountain 1½ miles south of divide..... | | | 5,218 |
| 323 | 2 miles below divide on eastern slope..... | | | 3,438 |
| 324 | Trail from Mission to Kaniksu Lake, 7 miles..... | | | 3,041 |
| 325 | Crossing of creek, 12 miles from Mission..... | | | 3,535 |
| 326 | Trail above and beyond crossing of creek..... | | | 3,640 |
| 327 | Teh-kwat Mountain, north of trail..... | | | 5,770 |
| 328 | Water on Teh-kwat Mountain, south of trail..... | | | 5,443 |
| 329 | Crossing of first creek east of divide..... | | | 2,740 |
| 330 | Creek 5 miles west of lake..... | | | 2,606 |
| 331 | Kaniksu Lake..... | | | a2,443 |
| 332 | Upper Kaniksu Lake..... | | | a2,435 |
| 333 | On creek, 2 miles above Upper Lake..... | | | 2,469 |
| 334 | Long bridge on trail from Sinyakwateen to Chelemta, 6 miles..... | | | 2,086 |
| 335 | Clark Fork, 14 miles above Sinyakwateen..... | | | 2,089 |
| 336 | Kalispelm Lake..... | | | 2,095 |
| 337 | Pack River crossing..... | | | 2,101 |
| 338 | Divide between Pack and Kootenay rivers..... | | | 2,138 |
| 339 | Small lake west of trail and north of divide..... | | | 2,090 |
| 340 | Trail in forks of creek..... | | | 2,064 |
| 341 | Chelemta depot..... | | | 1,796 |
| 342 | Kootenay River, 18 miles below Chelemta..... | | | 1,802 |
| 343 | Crossing of Acklew Creek..... | | | 2,248 |
| 344 | Acklew Cache..... | | | 2,304 |
| 345 | Camp Kootenay West (about 50 feet above water)..... | | | 1,823 |
| 346 | Mountain N. 42° E. from Camp Kootenay West..... | | | 5,573 |
| 347 | Trail from Chelemta to Acklew, 8 miles, first water..... | | | 2,695 |
| 348 | Trail from Chelemta to Acklew—10½ miles..... | | | 2,694 |
| 349 | Trail from Chelemta to Acklew—14 miles—crossing of stream..... | | | 2,557 |
| 350 | Trail from Chelemta to Acklew—17 miles—grassy mound..... | | | 2,548 |
| 351 | Trail from Acklew to Mooyie—1 mile—divide on trail..... | | | 3,260 |
| 352 | Trail from Acklew to Mooyie—3 miles—divide..... | | | 2,985 |

^a The contradiction here by which the upper lake level is less than the lower one is noted in the original MS., but not corrected.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° / | ° / | <i>Feet.</i> |
| 353 | Trail from Acklew to Mooyie—3½ miles—head of Ar-ka-klu-ne a Creek | | | 2,882 |
| 354 | Trail from Acklew to Mooyie—8 miles—prairie | | | 2,638 |
| 355 | Trail from Acklew to Mooyie—13 miles—creek crossing | | | 2,798 |
| 356 | Trail from Acklew to Mooyie—terrace south of crossing | | | 2,811 |
| 357 | Trail from Acklew to Mooyie—lower crossing of Ar-ka-klu-ne | | | 2,678 |
| 358 | Trail from Acklew to Mooyie—terrace above | | | 2,756 |
| 359 | Trail from Acklew to Mooyie—crossing of Mooyie | | | 2,682 |
| 360 | Camp Mooyie | | | 2,689 |
| 361 | Mooyie Cache | | | 2,742 |
| 362 | Mountain ridge east of Camp Mooyie | | | 6,639 |
| 363 | Summit of ridge | | | 6,698 |
| 364 | Same ridge 8 miles south | | | 4,466 |
| 365 | Crossing of Mooyie 8 miles below Camp Mooyie | | | 2,142 |
| 366 | Second crossing of Mooyie, from cache (14 feet above water) | | | 2,718 |
| 367 | Fourth crossing of Mooyie, from cache | | | 2,850 |
| 368 | Sixth crossing of Mooyie, from cache | | | 2,934 |
| 369 | 7 miles from sixth and 2½ miles from seventh crossing | | | 2,940 |
| 370 | Seventh crossing at foot of lake (3 feet above water) | | | 3,029 |
| 371 | Terrace east of seventh crossing—on trail | | | 3,291 |
| 372 | First stream—2½ miles beyond seventh crossing of Mooyie | | | 3,067 |
| 373 | Second stream—9½ miles beyond seventh crossing of Mooyie | | | 3,766 |
| 374 | Third stream—10½ miles beyond seventh crossing of Mooyie | | | 3,514 |
| 375 | 11 miles from seventh crossing, north of lakes | | | 3,136 |
| 376 | Headwaters of Mooyie, 13½ miles from seventh crossing | | | 3,296 |
| 377 | Terrace near headwaters of Mooyie | | | 3,383 |
| 378 | South and near divide between Mooyie and Kootenay | | | 3,544 |
| 379 | Divide between Mooyie and Kootenay | | | 3,642 |
| 380 | Joseph's Prairie | | | 2,959 |
| 381 | Crossing of stream [Akis-ka-klail] south of Joseph's Prairie | | | 3,041 |
| 382 | Kootenay River northeast of Joseph's Prairie | | | 2,451 |
| 383 | Crossing of first creek going down the Kootenay b | | | 2,682 |
| 384 | Crossing of second creek going down the Kootenay—10 miles beyond | | | 2,679 |
| 385 | Crossing of third creek going down the Kootenay | | | 2,619 |
| 386 | Crossing of fourth creek going down the Kootenay | | | 2,741 |
| 387 | Creek 9 miles beyond | | | 2,420 |
| 388 | Prairie on Kootenay—25 miles above Camp Kootenay East | | | c 2,400 |
| 389 | Prairie on Kootenay—10 miles above Camp Kootenay East | | | 2,364 |
| 390 | Kootenay River—6 miles above Camp Kootenay East | | | 2,361 |
| 391 | On creek—5½ miles north of Camp Kootenay East | | | 2,401 |
| 392 | Camp Kootenay East (30 feet above water) | | | 2,348 |

a Also written Acaclunah.

b The fall of Kootenay River for about 30 miles south from latitude 49° 35' N. is 2 feet per mile.

c At bend of Kootenay River above mouth of Elk River computed height is 2,381 feet. The fall of the Kootenay for about 20 miles from above mouth of Elk River south is 4½ feet per mile.

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|---|-----------|------------|--------------|
| | | ° / | ° / | <i>Feet.</i> |
| 393 | Camp Kootenay East—at water | | | 2,318 |
| 394 | South of Camp Kootenay East (3 feet above water) | | | 2,313 |
| 395 | Kootenay River 2¼ miles below camp (3 feet above water) | | | 2,300 |
| 396 | Kootenay Cache | | | 2,316 |
| 397 | First bench above river | | | 2,368 |
| 398 | Second bench above river | | | 2,566 |
| 399 | First creek south of Kootenay Cache | | | 2,355 |
| 400 | Trail on Tobacco Plains, highest point south of cache | | | 2,755 |
| 401 | Creek 9 miles from cache | | | 2,691 |
| 402 | Entrance of Akonoho Pass | | | 3,015 |
| 403 | 11 miles from entrance and 3 miles from summit of pass | | | 4,195 |
| 404 | 2¼ miles west of summit | | | 4,460 |
| 405 | One-half mile west of summit | | | 5,138 |
| 406 | Divide between Kootenay and Flathead rivers | | | 5,218 |
| 407 | On divide, one-half mile north of pass | | | 6,953 |
| 408 | On spur of divide, 2 miles north of pass | | | 6,278 |
| 409 | Divide between Wigwam and Akonoho | | | 5,332 |
| 410 | Wigwam Station | | | 4,694 |
| 411 | Small prairie one-half mile east of summit of pass | | | 5,065 |
| 412 | Four miles east of summit of pass (65 feet above water) | | | 4,731 |
| 413 | Crossing of stream, 7½ miles east of summit | | | 4,522 |
| 414 | Prairie, 12 miles east of summit | | | 4,164 |
| 415 | Large creek down which trail follows (water of Yakinikak creek opposite Prairie) | | | 4,112 |
| 416 | Flathead valley, upper terrace | | | 4,267 |
| 417 | Peak west of Flathead | | | 7,373 |
| 418 | Crossing of Flathead | | | 3,827 |
| 419 | 1½ miles beyond crossing, in Prairie | | | 3,763 |
| 420 | Camp Kishenehn, 4 miles to mouth of Kishenehn—fall 53 feet per mile | | | 4,184 |
| 421 | Three miles above Camp Kishenehn (3 feet above water)—fall 63 feet per mile | | | 4,252 |
| 422 | Prairie, 8 miles above Kishenehn—fall 58 feet per mile | | | 4,541 |
| 423 | Angle of valley, 12 miles above—fall 36 feet per mile | | | 4,705 |
| 424 | Angle of valley, 2½ miles above this angle | | | 4,808 |
| 425 | Open place in burnt timber | | | 5,133 |
| 426 | Mule camp | | | 5,191 |
| 427 | Summit of pass, 9 miles from angle, 21 miles from Camp Kishenehn and 25 from mouth of creek | | | 5,846 |
| 428 | Near outlet of lake east of summit | | | 5,407 |
| 429 | 1½ miles east of summit, on creek | | | 5,378 |
| 430 | Camp Akamina | | | 6,447 |
| 431 | On divide north of summit monument | | | 7,986 |
| 432 | Bluff SE. of Camp Akamina | | | 6,648 |
| 433 | Summit monument | | | α 7,490 |
| 434 | Mountain in divide 1½ miles N. of pass | | | 8,087 |
| 435 | Mountain in divide 1 mile NE. of last | | | 8,207 |
| 436 | Mountain in divide one-half mile N. of last | | | 8,313 |
| 437 | Mountain in divide 2¼ miles NE. of last | | | 8,333 |

α Another value given in the table, and without comment, is 6,548. Can this be an error for 7,548?

Elevations along the forty-ninth parallel, etc.—Continued.

| No. | Station. | Latitude. | Longitude. | Elevation. |
|-----|--|-----------|------------|------------|
| | | ° / | ° / | Feet. |
| 438 | Summit of Boundary Pass | | | 6,955 |
| 439 | Mountain, 1½ miles north of pass..... | | | 7,861 |
| 440 | Kishenehn Mountain | | | a 8,487 |
| 441 | Mountain up pass and to the north | | | a 7,409 |
| 442 | Kishnehenna Mountain, north and west peak | | | a 7,937 |
| 443 | Kishnehenna Mountain, center peak | | | a 8,170 |
| 444 | Kishnehenna Mountain, south and east peak | | | a 9,137 |
| 445 | Divide 2 miles east of Camp Kishenehn | | | 5,541 |
| 446 | In valley of creek west of camp and north of boundary..... | | | 5,119 |
| 447 | Boundary Mountain, highest peak | | | 8,574 |
| 448 | Southwest point of ridge of Boundary Mountain..... | | | 7,260 |
| 449 | Kootenay River, 3 miles below parallel | | | 2,803 |
| 450 | Kootenay River, 17 miles below parallel | | | 2,256 |
| 451 | Kootenay River, 33¼ miles below parallel | | | 2,204 |
| 452 | Kootenay River, 39 miles below parallel | | | 2,184 |
| 453 | Kootenay River, 50 miles below parallel at cross- ing of trail..... | | | 2,148 |
| 454 | Kootenay River, 13 miles below crossing (8 feet above water) | | | 2,057 |
| 455 | Kootenay River, 25 miles below crossing; below falls, at high-water mark..... | | | 1,967 |
| 456 | Kootenay River, 39 miles below crossing; mouth of the Yahk | | | 1,934 |
| 457 | Kootenay River, 44 miles below crossing; terrace above river | | | 2,298 |
| 458 | Forage cache on trail 13 miles from Yahk | | | 2,161 |
| 459 | Camp on terrace on trail 3 miles east of Mooyie Crossing | | | 2,260 |
| 460 | Kootenay River, 55 miles below crossing; mouth of Mooyie..... | | | 1,792 |
| 461 | Kootenay River, 61 miles below crossing; Chelemta depot (9½ feet above high water)..... | | | 1,796 |
| 462 | Summit of mountain range between waters of Wigwam River and Skits-ooch-nau-na Creek | | | 7,852 |
| 463 | Camp in forks of tributary of Tobacco River | | | 3,256 |
| 464 | Camp on west side of Kootenay Valley | | | 2,942 |
| 465 | Camp on waters of Kootenay, near divide with Yahk | | | 4,862 |
| 466 | Summit of divide between Yahk and Kootenay | | | 5,498 |
| 467 | Camp west of divide..... | | | 5,520 |
| 468 |do | | | 4,954 |
| 469 | Camp on mountain, tributary of Yahk | | | 4,794 |
| 470 | Camp on east fork of Yahk..... | | | 3,483 |
| 471 | Camp in forks of Yahk | | | 3,194 |
| 472 | Camp at east bend of Yahk | | | 2,983 |
| 473 | Camp on Yahk | | | 2,959 |
| 474 | Camp at west bend of Yahk..... | | | 2,935 |
| 475 | Camp on Yahk | | | 2,759 |
| 476 |do | | | 2,697 |
| 477 | Camp below falls..... | | | 2,414 |
| 478 | Camp at mouth of Yahk | | | 1,926 |

a Measured with theodolite.

INDIAN NAMES.

In the prosecution of the survey considerable attention was given to the language of the native tribes along the line. George Gibbs, who accompanied the party, is referred to in various capacities as geologist, ethnologist, guide, interpreter, and naturalist. The first Chinook dictionary is said to have been prepared by him, and this was to form a part of the final report of the survey. Later Mr. Gibbs was engaged by the Smithsonian Institution in elaborating linguistic material from the tribes of the Northwest. This work was unfinished at the time of his death in April, 1873. Some of it has been published since. To secure uniformity in the spelling of the names of various camps and stations Mr. Gibbs prepared lists which were submitted to General Parke and made official. There are three such lists among the papers. The first two are signed; the third is not signed. The first list is as follows:

Adopted spelling of the names of camps, etc.

[Official: John G. Parke, chief astronomer and surveyor.]

| | |
|-----------------|--------------|
| Chiloweyuck. | Semiahmoo. |
| Chuch-che-hum. | Sen-eh-say. |
| En-saaw-kwatch. | Similkameen. |
| Fraser. | Skagit. |
| La-yome-sin. | Sumass. |
| Nooksahk. | Swehl-tcha. |
| Okinakane. | Tummeahai. |
| Pehosie. | |

The three lists have been combined, arranged, studied in company with the published maps of the boundary and later official maps. The results are here given with notes derived from such comparison and study. For easy reference on the maps the approximate longitudes are given.

| | Approximate longitude. |
|---|------------------------|
| A-kám-i-na; ¹ east fork of Kish-e-nehn Creek..... | 114 10 |
| A-kin-s-sahtl; Flathead River..... | 114 30 |
| A-kin-kwo-náh-ki; ² branch of Flathead River heading with Tobacco River..... | 114 30 |
| Ak-káph-kleh; falls of the Kootenay River, Flathead County, Montana..... | 115 45 |
| Ak-o-nó-ho; creek tributary to Tobacco River ³ | 115 05 |
| Ak-swák; creek from south at bend of the Kootenay ⁴ | 115 15 |

¹ Kam-i-na= watershed.

² Perhaps this is Yokinikah Creek of the Land Office map of Montana.

³ Tobacco River=Grave Creek of Land Office map of Montana.

⁴ Not named on boundary map; apparently Fisher Creek of Land Office map of Montana, and Masula River of official map of British Columbia, 1895.

| | Approximate longitude. |
|---|---------------------------|
| Ak-tlak-a; creek above Kish-e-nehm, tributary to Flathead River. Not named on boundary map | 114 25 |
| A-kwote-kátl-nam; Chief Mountain or Waterton Lake, upper part across boundary | 114 |
| An-i-áht-wah; Kamass Prairie | |
| Che-chéet-hu; Skagit cache | 121 05 |
| Chelenta (also written Cholemta); cache or depot. Not shown on map or identified. (See Swoots-kóse and Yah-kwoo-káh-keh) | 116 20 |
| Che-loús-kan; Little Pend Oreille | 116 40 |
| Chém-a-kane; bridge over Walkers Prairie Creek | 116 46.4 |
| Chiloweyuck; camp, lake, river, town, etc. Now written Chilliwhack | 121 30 |
| Chow-a-wee-la; Fool's Prairie. Not identified. | |
| Chuk-kóse; the Mooyie Lakes. Not shown on map. In British Columbia, latitude 49° 18' | 115 50 |
| Chuch-che-hum; camp and creek tributary to Chiloweyuck Lake | 121 15 |
| Chu-chu-wán-ten; creek tributary to N'shitl-shootl River, which is tributary to Pa-say-ten | 120 40 |
| En-cháhm; ¹ lakes near Statapoostin | 118 13 |
| En-kwool-eh-la; mouth of Clark fork of the Columbia. Name not on boundary map | 117 37 |
| En-saaw-kwatch; ² station and creek tributary to the Chiloweyuck | 121 30 |
| Háip-wil; ³ lake near camp Similkameen | 119 37 |
| Hó-zo-meen; mountain near camp Skagit | 121 |
| In-chú-in-tum; ⁴ station and river tributary to the Ne-hoi-al-pít-kwu | 118 25 |
| Ka-cha-átl; Indian village Aklew (or Acklew) cache | 116 22 |
| Kái-seet-lin; crossing of Spokane. Not identified. | |
| Kais-in; branch of Kat-láh-woke Creek. Not on map and not identified. | |
| Kal-is-pelm; Pend Oreille Lake in northern Idaho | 116 30 |
| Kam-i-na—a watershed. | |
| Kat-láh-woke; creek running to Flathead [river] through [Boundary] pass; not named on boundary map and not identified. It is near Kísh-e-nehm Creek | 114 20 |
| Ka-yak-ka; ⁵ creek, from south, tributary to Kootenay below falls; large lake on it | 115 50 |
| Kin-nook-kleht-nán-na; ⁶ creek running east from divide [of Rocky Mountains] to [Chief Mountain or Waterton] lake.... | 113 50 |

¹ Christina Lake of official map of British Columbia, 1895.

² Written En-saw-kwatch on boundary map and on above map called Nesquatch.

³ Harpwil of British Columbia map of 1895 and Blue Lake of Land Office map of Washington.

⁴ North fork of Kettle River of British Columbia map of 1895. Also Inishwointon in the manuscript notes.

⁵ Lake Creek of Land Office map of Montana.

⁶ Kotanie River of official map of British Columbia, 1895.

| | Approximate longitude. |
|---|---------------------------|
| | ° ' " |
| Kínt-la; lake and mountains, Flathead County, Montana..... | 114 15 |
| Kísh-e-neh; camp, creek, and mountain..... | 114 20 |
| Kish-ne-néh-na; mountains..... | 114 15 |
| Kit-lat-laã-nook; creek heading east of Mount Wilson and emptying into lower [Chief Mountain or Waterton] lake..... | 113 50 |
| Kle-síl-kwu; ¹ creek tributary to upper Skagit, heading with Klehkwunum..... | 121 15 |
| La-yome-sin; ² creek, tributary to the Chiloweyuck..... | 121 54 |
| Man-sel-pán-ik; ³ creek, tributary to Kle-sil-kwu Creek, heading with Chuch-che-hum..... | 121 15 |
| Moo-yie; ⁴ camp, monument, river, and trail..... | 116 15 |
| Náfs-nu-loh; station and river, south fork of Similkameen..... | 120 |
| Ne-hoi-al-pít-kwu; ⁵ camp and river..... | 118 30 |
| Ne-pó-pe-éh-kum; creek, tributary to the upper Skagit..... | 121 |
| Nook-sahk; river, Whatcom County, Washington. Now written Nooksak..... | 122 15 |
| N ³ -shitl-shootl; ⁶ creek, tributary to Pa-say-ten River..... | 120 40 |
| Okin-á-kane, now written Okanogan; county and river tributary to the Columbia..... | 119 30 |
| O-só-yoos; camp, lake, and station..... | 119 25 |
| Pa-sáy-ten; ⁷ river tributary to Similkameen..... | 120 30 |
| Pehosie, or Pekosie; lake and creek tributary to the Nooksak..... | 122 05 |
| Pep-táh-shin; creek at [Colville?] depot..... | 118 |
| Sah-lílt-kwu; the forks [of?]. Not identified. Name not on boundary map. | |
| Se-háf-uks; the creek [at Archer's camp of October 10]. Not identified. | |
| Se-háf-ya-kan; Archer's camp of October 10. Not identified. | |
| Semiahmoo; bay and camp near western end of parallel..... | 122 45 |
| Sen-eh-say; ⁸ station and creek, tributary to the Chiloweyuck..... | 121 40 |
| Sháh-wa-tum; mountain on upper Skagit..... | 121 |
| Shwo-yél-pi; Kettle Falls of the Columbia..... | 118 10 |
| Si-míl-ka-meen; camp and river tributary to the Okanogan..... | 119 30 |
| Sin-páfl-hu; ⁹ creek running south to the Columbia..... | ?118 10 |
| Skagit; cache, camp, county, and river, Washington..... | 122 |

¹ Klesilkwa of official map of British Columbia, 1895.

² Written Layomesin on boundary map. Sweltzer River of official map of British Columbia, 1895.

³ Maselpanic, of official map of British Columbia, 1895.

⁴ The river is now known as Methow.

⁶ Kettle River, of official map of British Columbia, 1895.

⁸ Roche River, of official map of British Columbia, 1895.

⁷ Pasayton, of official map of British Columbia, 1895.

⁸ Slesse, of official map of British Columbia, 1895.

⁹ Not shown on boundary map. Land Office map of Washington has Sinpailhu, or Milk Creek (long. 118° 10'), just below Kettle Falls; also San Poil River and guide meridian. This latter is Sans Poil of official map of British Columbia, 1895.

| | Approximate longitude. |
|--|------------------------|
| Skits-oo-h-nán-na; small creek tributary to the Kootenay; not shown on boundary map..... | 115 05 |
| Skwái-kwi-éht; mountain at head of Chu-chu-wán-ten Creek. | 120 40 |
| Stat-a-poós-tin; camp on the Ne-hoi-al-pít-kwu..... | 118 15 |
| Stle-kéhm; Mill Creek [? near old Fort Colville, longitude 117° 40']. .. | |
| Sumass, now usually written Sumas; camp, lake, town, etc..... | 122 10 |
| Swehl-tchá; ¹ lake in British Columbia..... | 122 |
| Swoots-kóse; the Chelemta cache [not on boundary map]. See Yah-kwo-káh-keh. | |
| Tcho-páhk; ² mountain west of Camp Similkameen..... | 119 45 |
| Te-kum-whéhl-tin; Archer's camp of October 9; not identified.. | |
| Tummeahai; ³ camp and creek tributary to the Chiloweyuck.. | 121 45 |
| Twáf-yeep; upper forks of Ne-hoi-al-pít-kwu ⁴ | 119 |
| Wáf-haist; mountain on Upper Skagit; not named on boundary map | 121 |
| Yah-kwoo-káh-keh; the Chelemta cache. See Swoots-kóse. Not identified. | |
| Yahk; ⁵ station and river, Flathead County, Montana..... | 115 45 |
| Yak-in-a-kahk; ⁶ creek and pass..... | 114 30 |
| Yakl-tó-le-min; mouth of Pa-say-ten River; not named on boundary map..... | 120 35 |
| Yaks-koo-nák-he; ⁷ first creek from north below bend of Kootenay..... | 115 30 |
| Yak-toók-i-na; ⁸ third creek from north tributary to Kootenay, below bend | 115 45 |
| Yóme-tsin; ⁹ White Sheep Creek, tributary to the Columbia.... | 117 50 |

¹ Cultus of official map of British Columbia, 1895. A creek near by is called Sweltzer.

² Tcho Park Mountains of Land Office map of Washington.

³ Tamihy of official map of British Columbia, 1895.

⁴ Apparently junction of Rock Creek and Ne-hoi-al-pít-kwu.

⁵ Yahk'h on boundary map.

⁶ Yak-in-i-kak on boundary map and Yokinikah of Land Office map of Montana.

⁷ Ramy Creek of Land Office map of Montana.

⁸ Quartz Creek of Land Office map of Montana.

⁹ Sheep Creek of official map of British Columbia, 1895, and Yometsin or Sheep Creek of Land Office map of Washington.

SCIENTIFIC RESULTS.

In the conduct of the survey attention was given to the geology, natural history, etc., of the region traversed. Mr. George Gibbs was attached to the survey as geologist and interpreter, C. B. R. Kennerly as surgeon and naturalist, and James M. Alden as artist. Collections were made and forwarded to Washington. These collections were placed in the hands of specialists, who prepared reports thereon. The nature and extent of these collections can be inferred from the report of the Auditor of the Treasury, already referred to.

It appears from that report that about \$3,500 was expended on the preparation of reports on scientific subjects. The persons who prepared those reports, the subjects reported on, and the sums paid are set forth in the following table.¹

Amounts paid during 1861-62 for work done in the preparation of the scientific part of the final report.

| | |
|--|------------|
| J. S. Harris, report on magnetics, with computations, etc..... | \$743. 50 |
| F. B. Meek, report on fossil mollusks, with drawings..... | 375. 00 |
| Theodore Gill, report on fishes..... | 300. 00 |
| William Stimpson, report on crustaceæ and marine invertebrates..... | 300. 00 |
| George Suckley, report on salmonidæ, ornithology, and mammals..... | 300. 00 |
| P. B. Carpenter, report on recent mollusks..... | 250. 00 |
| J. S. Newberry, report on fossil plants..... | 150. 00 |
| Elliot Coues, report on birds, etc..... | 100. 00 |
| John Torrey, report on botany..... | 100. 00 |
| P. R. Uhler, report on insects..... | 25. 00 |
| J. H. Richard, drawings for natural history reports..... | 463. 00 |
| John Cassin, eight natural history drawings on stone..... | 160. 00 |
| W. B. McMurtrie, drawings for geological reports..... | 100. 00 |
| T. Y. Gardner, drawings of fossil plants..... | 65. 00 |
| Thomas Egleston, jr., analysis of mineral specimens and preparing catalogue..... | 50. 00 |
| Mary B. Codwise, copying natural history papers..... | 12. 90 |
| Total..... | 3, 494. 40 |

That the reports on these various topics were prepared for insertion in the final report of the commission is abundantly proved. Mr. George Suckley, M. D., assistant surgeon, United States Army, read before the New York Lyceum of Natural History, in June, 1861, a paper entitled "Notices of certain new species of North American salmonidæ, chiefly in the collection of the Northwest Boundary Commission, in charge of Archibald Campbell, esq., commissioner of the United States, collected by Dr. C. B. R. Kennerly, naturalist to the commission."² In this paper he says: "Owing to the unfortunate death of Dr. Kennerly on his return from a three-years' exploration, the preparation of a report on certain of the material collected by him was assigned to me. In the course of this undertaking I have prepared a copious synopsis of the species of American salmon and trout, *to appear in the final report of the commissioner*. It has been thought best to issue in advance brief descriptions of the species hitherto unnamed." And later he alludes to papers "to be referred to in the more extended report."

Some of the fossils collected were described by Mr. F. B. Meek,³ who says, "The fossils described in this paper are the new species contained in the collections of the Northwestern Boundary Survey.

¹ House Ex. Doc. No. 86, Fortieth Congress, third session, p. 101.

² Annals Lyceum Nat. Hist. New York, vol. 7, pp. 306-313, 1862.

³ Proc. Acad. Nat. Sci. Phil., vol. 13, pp. 314-318, 1861.

Full illustrations and more extended descriptions of these and other species formerly described by the writer, from Vancouver Island, *will appear in the report of that survey*, which will also contain a report by Mr. George Gibbs, geologist of the expedition, on the general geology of the country along the boundary line."

This full report by Mr. Meek is, so far as I know, still unpublished. Dr. J. S. Newberry's report on the fossil plants seems, however, to have been published in full. At all events, he read, before the Boston Society of Natural History, on October 1, 1862, a paper entitled¹ "Descriptions of the fossil plants collected by Mr. George Gibbs, geologist to the United States Northwest Boundary Commission, under Mr. Archibald Campbell, U. S. Commissioner." This paper, published in February, 1863, "by permission of Archibald Campbell, esq., U. S. commissioner, Northwest Boundary Commission," makes no reference to any other or fuller report. The artist, Mr. James M. Alden, produced a fine series of colored sketches of scenery along the boundary line. These sketches, obviously intended to illustrate the final report, are in the State Department. There are 65 of these, all but two (large ones) included in three portfolios. These sketches and the constantly recurring allusions to the final report, and the conclusive proof that such report was prepared, sharpen the desire and emphasize the need of recovering it.

Whether the geologic report of Mr. Gibbs, alluded to by Mr. Meek, was ever published does not appear. It may be that the rather extensive paper entitled "Physical geography of the northwestern boundary of the United States, by George Gibbs, with twelve illustrations," read before the American Geographical Society November 11, 1869, and published in its journal (vol. 4, pp. 298-392, and vol. 5, pp. 134-157), is the report referred to.

¹ Boston Jour. Nat. Hist., vol. 7, pp. 506-524, 1863.

APPENDIX A

MODE OF DETERMINING POINTS ON THE PARALLEL.

The following is the agreement as to method of determining points on the parallel by measures from the tangent. This agreement and the accompanying table are copied from the original in the State Department.

TO DETERMINE POINTS ON THE FORTY-NINTH PARALLEL BY MEANS OF THE TANGENT.

Wherever points of the parallel between the astronomical stations are to be determined it is hereby agreed to adopt the method of offsets from the tangent to the parallel.

For computing the length of these offsets the following formula is adopted, being that used in computing the difference of latitude of points in secondary triangles or those whose sides do not exceed 12 miles in length:

$$-dL = kB \cos Z + k^2 C \sin^2 Z + h^2 D$$

where

dL = difference of latitude of the two points;

k = length of side connecting them;

$$B = \frac{1}{R \operatorname{arc} 1''};$$

$$C = \frac{\tan L}{2 N R \operatorname{arc} 1''};$$

$$D = \frac{\frac{3}{2} e^2 \sin L \cos L \operatorname{arc} 1''}{(1 - e^2 \sin^2 L)^{\frac{3}{2}}};$$

$$h = kB \cos Z;$$

$$R = \frac{a(1 - e^2)}{(1 - e^2 \sin^2 L)^{\frac{3}{2}}};$$

$$N = \frac{a}{(1 - e^2 \sin^2 L)^{\frac{1}{2}}};$$

a = equatorial radius of the earth = 6 974 127.31 yards;

e = eccentricity = 0.081 696 830;

Z = azimuth of tangent counting from south around by west; whence
west = 90°, east = 270°.

This formula becomes in the present case

$$-dL = k^2 C;$$

or, taking offset in yards = δ , distance in yards on the tangent = D

$$\log \delta = 2 \log D + 2.915491.$$

JNO. G. PARKE,

Lieutenant, Corps Topographical Engineers U. S., Chief Astronomer and Surveyor.

R. W. HAIG,

Captain, R. A., Astronomer British Commission.

CAMP SIMIAHMOO, *Forty-ninth Parallel, April 23, 1859.*

| Miles. | Offsets. | | | Miles. | Offsets. | | |
|--------|----------|-------|---------|--------|----------|-------|---------|
| | Yards. | Feet. | Inches. | | Yards. | Feet. | Inches. |
| 0.25 | 0 | 0 | 0.57 | 5.25 | 7 | 0 | 1.00 |
| .50 | 0 | 0 | 2.29 | .50 | 7 | 2 | 1.68 |
| .75 | 0 | 0 | 5.16 | .75 | 8 | 1 | 3.49 |
| 1.00 | 0 | 0 | 9.18 | 6.00 | 9 | 0 | 6.45 |
| .25 | 0 | 1 | 2.34 | .25 | 9 | 2 | 10.57 |
| .50 | 0 | 1 | 8.65 | .50 | 10 | 2 | 3.82 |
| .75 | 0 | 2 | 4.11 | .75 | 11 | 1 | 10.23 |
| 2.00 | 1 | 0 | 0.72 | 7.00 | 12 | 1 | 5.78 |
| .25 | 1 | 0 | 10.47 | .25 | 13 | 1 | 2.49 |
| .50 | 1 | 1 | 9.37 | .50 | 14 | 1 | 0.33 |
| .75 | 1 | 2 | 9.42 | .75 | 15 | 0 | 11.33 |
| 3.00 | 2 | 0 | 10.61 | 8.00 | 16 | 0 | 11.47 |
| .25 | 2 | 2 | 0.96 | .25 | 17 | 1 | 0.77 |
| .50 | 3 | 0 | 4.45 | .50 | 18 | 1 | 3.20 |
| .75 | 3 | 1 | 9.08 | .75 | 19 | 1 | 6.79 |
| 4.00 | 4 | 0 | 2.87 | 9.00 | 20 | 1 | 11.52 |
| .25 | 4 | 1 | 9.80 | .25 | 21 | 2 | 5.40 |
| .50 | 5 | 0 | 5.88 | .50 | 23 | 0 | 0.43 |
| .75 | 5 | 2 | 3.11 | .75 | 24 | 0 | 8.60 |
| 5.00 | 6 | 1 | 1.48 | 10.00 | 25 | 1 | 5.93 |

APPENDIX B.

REPORT OF J. G. PARKE, NOVEMBER 12, 1859.¹

UNITED STATES BOUNDARY SURVEY, COLVILLE DEPOT,
Washington Territory; November 12, 1859.

SIR: I have the honor respectfully to submit the following report of the progress made during the past season in the survey of the forty-ninth parallel by the several parties of the United States commission:

The organization of the parties throughout the greater part of the season has been as follows: Two astronomical parties, one surveying party, one reconnoissance party.

Mr. G. Clinton Gardner, assistant astronomer and surveyor, in charge of an astronomical party; Professor Nooney, assistant.

Mr. Joseph S. Harris, in charge of second astronomical party; Mr. Hudson, assistant.

Mr. Charles T. Gardner, in charge of the surveying party.

Mr. H. Custer, in charge of the reconnoissance party.

Mr. J. Nevin King, in charge of Chiloweyuck depot, on Fraser river and forwarding supplies to the parties in the field.

Dr. C. B. R. Kennerly, in charge of depot, Chiloweyuck lake, in addition to his duties as surgeon and naturalist.

Mr. George Gibbs, in addition to the geological reconnoissance, had charge of a party engaged in opening a trail through from the Skagit valley to the Similkameen.

Mr. R. V. Peabody, in charge of the subsistence and transportation for the parties to the eastward of the lake depot.

Mr. Major assisted in the computations at the astronomical stations.

The reconnoissance at the close of the last season extended as far east as the valley of the Skagit, and the astronomical observations necessary for marking the three points of the parallel in the valley of the Chiloweyuck were completed. On taking the field the present season, the first object was to complete the measurements and marking the parallel at these three stations, Tummeahai, Chiloweyuck lake, and Chuch-che-hum. Then make reconnoissance for the location of astronomical stations and the opening of trails in advance of the parties occupying these stations.

The first party, under the charge of Mr. G. C. Gardner, left Camp Simiahmoo for the Chiloweyuck depot on the eighteenth day of April.

¹ Reprinted from Senate Ex. Doc. No. 16, 36th Cong., 1st sess., pp. 2-7.

The zenith telescope and transit instrument were put up and observations made for latitude and time. Reconnoitering and surveying parties took the field, with instructions to connect Sumass station with the depot and continue on over the trail, connecting the several astronomical stations, and to obtain the topography of the country along and adjacent to the boundary line. The pack mules were sent from their wintering station to the depot, and arrangements were made for the delivery of subsistence, stores, and forage, at that place.

A chronometer trip was made between Camp Simiahmoo and Chiloweyuck depot by a party under charge of Mr. Harris. Eleven chronometers were transported back and forth, and the entire trip being performed in whale-boats, it is confidently expected that a very nice determination of the difference of longitude will be obtained. The observations for time at the depot were made by Mr. Gardner, and those at Camp Simiahmoo by myself.

On the 19th of May, Mr. Harris left Camp Simiahmoo with the outfit for an astronomical and surveying party. On arriving at the depot, he started for the Tummeahai station, Mr. Custer having previously found a practicable route for a pack trail to that point on the left bank of the Chiloweyuck, it being impracticable at that time to cross the stream opposite the mouth of the Tummeahai. Mr. Custer commenced opening the trail; and, on Mr. Harris taking charge of the party, Mr. Custer continued his reconnoissance over to the Nook-sahk, and up the tributaries of the Chiloweyuck.

The trail from the depot to Chiloweyuck lake was reopened and made practicable for pack mules, requiring bridging, corduroying, and heavy grading. The high water of the streams, and the great quantity of fallen timber, made the work very heavy, and required a strong force.

On the third of June I arrived at Chiloweyuck depot, and on the fourth, Mr. G. C. Gardner started for the lake depot. Arriving there, he put the boats in order, built a storehouse for the supplies, and commenced marking the parallel by cutting a vista through the timber across the valley, at the southern end of the lake. On the completion of this, he proceeded to Chuchchehum station, and made a cut there on the parallel, embracing the two crossings of the trail. The parallel at these stations was marked by pyramidal piles of stones from six to eight feet high, covering posts accurately marking points on the line. Mr. Harris marked the parallel in the same manner at the Tummeahai station, having cut a vista through the timber, embracing the two forks of the stream. On the completion of the work at Tummeahai, Mr. Harris proceeded to the lake depot, and commenced opening the trail through to the station on the Skagit river. Here again the work was very heavy, it requiring a force of from ten to eighteen men nearly one month to open about thirty-five miles of trail, of which nearly one-

half had been traveled during the previous year. On reaching the valley of the Skagit Mr. Harris located his observatory, and commenced observations for determining the point where the parallel crosses the river.

While at Chiloweyuck depot, I found that our supply of pack mules was insufficient to enable the parties to progress with the work without great loss of time. Mules, aparejos, and pack-saddles were purchased, and additional packers employed, so that the supplies and outfits of the several parties were carried forward as rapidly as the work progressed and the trail was opened.

On Mr. Gardner's completing the work at Chuchchehum station, we proceeded to make a reconnoissance of the country to the east of Skagit station, with a view of locating astronomical stations and determining a route for a trail through to the Similkameen and Okinakane valleys, a region of country that had been heretofore unexplored and known only to a few Indian hunters. We found a mass of rugged and heavily timbered mountains, extending north and south, and having a breadth of about seventy-five miles. Through by far the greater portion of this distance, no trails were found; but, by dint of constant work of four axemen, we were enabled to force our way through the Similkameen. A good and practicable route was however found, crossing two summits having an elevation of about six thousand feet. A road party was immediately placed upon this route, under charge of Mr. Gibbs. He was supplied with axes, picks, and shovels; and, after five weeks' labor with a strong force, a trail was opened, so that our instruments and supplies could be packed through without difficulty.

On returning from this reconnoissance Mr. Gardner started with his party to occupy a station on the Similkameen. And Mr. Harris, having completed his determination and marking of the parallel at the Skagit station, proceeded to occupy one nearly midway between the Skagit and Similkameen, on the Pasayten, a tributary of the latter. In the meantime, the survey connecting the astronomical stations was continued by the trail, the nearest practicable line to the parallel, as well as the reconnoissance of the country on both sides of the parallel. On the completion of the observations, computations, and marking the parallel at Pasayten, Mr. Harris's party moved on to the Similkameen, and remained there in camp, while Mr. Harris accompanied me on a reconnoissance, to select another station on the Nechoialpitkwu, about thirty-five miles to the eastward. After reaching the Similkameen, we had no difficulty in traveling, the country being open and grassy, and occupied by horseback Indians; numerous well-worn trails were found running in every direction. One of these we found particularly advantageous, leading eastward from the Similkameen to Fort Colville, on the Columbia river, a distance of about one hundred miles. After

crossing the divide to the east of Lake Osogoos [sic], the trail strikes the Nehoiapitkwu, and follows down the valley of this stream crossing the parallel three times.

From the astronomical station on the Similkameen, two points of the parallel, at an interval of about fifteen miles, were determined and marked by triangulation: one at the crossing of the Similkameen and the other at Lake Osoyoos, in the valley of the Okinakane. The intervening country is generally destitute of timber, and made up of a collection of knobs and high hills with intervening plains and valleys, affording good ground for the location of well conditioned triangles.

The first station on the Nehoiapitkwu was occupied by Mr. Harris, and the parallel was determined by a measurement from the observatory, on the meridian, and marked by a cut, nearly a mile in length, across the valley, and by three monuments—two of earth and one of stone. At this station the stream passes from north to the south of the parallel.

The second station on the Nehoiapitkwu, about thirty miles distant by the trail, is now occupied by Mr. Gardner's party; and Mr. Harris's party is in position on the right bank of the Columbia river, near the mouth of Clarke's Fork. It is believed that these points of the parallel will soon be determined and marked, when these parties, together with the surveying and reconnoitering parties, are instructed to repair to this point and go into winter quarters. The weather, however, is at present very severe, the ground being covered with three or four inches of snow, and the thermometer giving readings for the last three mornings as low as four, two, and ten degrees below zero.

To recapitulate, the following is the amount of work accomplished by parties of the United States commission during the present season:

A completion of the determination and marking the parallel from three points astronomically fixed at the close of the last season.

A complete set of observations for latitude at four stations, from which the parallel has been determined and marked at the crossings of the following streams: the Skagit, Pasayten, Similkameen, Okinakane, (Lake Osoyoos,) and Nehoiapitkwu. And before the astronomical parties leave the field, the necessary observations will be completed for determining two other points of the parallel, the third crossing of the Nehoiapitkwu, and the Columbia river.

A chronometer trip for difference of longitude between Camp Simiahmoo and Chilowayuck depot.

Observations of the transit of the moon and moon-culminating stars at two of the latitude stations for absolute longitude.

A triangulation covering an area of about fifty square miles.

A survey of the nearest practicable lines to the parallel, connecting the astronomical stations, making a total distance chained of about three hundred and seventy miles.

Reconnoissances for developing the topography along and adjacent to the boundary line, and for locating routes of communication. These reconnoissances have extended over an area of about six thousand square miles.

A full set of magnetic observations were made at one station. And throughout the work, all the necessary observations for time, azimuth, micrometer value, and instrumental corrections were carefully made.

The two astronomical parties and the reconnoissance party were furnished with sets of meteorological instruments. Full and detailed registers have been kept at the different stations, and, as far as possible, simultaneous readings of the barometer have been taken, while the parties were moving from station to station; which, with the corresponding observations at camp Simiahmoo and the fixed stations, will enable us to give very exact profiles of the country traversed.

The geological reconnoissance has been extended over the field of operations, and valuable collections made of botanical and natural history specimens.

The forty-ninth parallel, as far as determined during the present season, traverses a mountainous country, and, excepting a few localities, the entire region is eminently unfit for occupation or settlement. The mountains are rugged and precipitous, and attain great elevations; the ridges and peaks of the Cascade mountains being covered with perpetual snow. Glaciers were discovered; and during the months of June and July snow to the depth of two feet was encountered on our very route of travel. A heavy growth of pines and fir abounds throughout the entire line from the Gulf of Georgia, with the exception of short intervals in the valleys of the Similkameen, Okinakane, and Nehoiapitkwu.

Under the forty-ninth parallel the Cascade mountains have a breadth of about two degrees in longitude, and as the general trend of these mountains is at right angles to the line of our work, we were necessarily forced into crossing the ridges with our routes of communication, involving much labor in cutting, grading, and bridging to make these routes practicable for even pack-mule transportation. The water courses are numerous and rapid, rendering the fords frequent and dangerous. A slight rise in these streams makes them impassable. Notwithstanding the difficulties of the country and the precarious mode of transporting the instruments, I am happy to report that we have got thus far through the season's work without any damage to our astronomical instruments. I regret, however, that we have been less fortunate with the magnetic instruments. The mule carrying these missed his footing and rolled down a precipitous bank. The magnetic theodolite will have to be replaced, and the other instruments will require repairing. I also have to report the breakage of our barometer. We were, however, able soon to replace this instrument from the lake depot.

On reaching the valleys of the Similkameen and Okinakane we were met by our additional escort, under the command of Captain Archer, United States army. I take great pleasure in acknowledging my obligations for the timely and valuable assistance rendered us by himself and officers of his command.

Preparations are now making at this place to winter the several parties on their return from the field. A great abundance of material for building quarters is found directly at hand. A supply of provisions has been procured.

The winters of this region are reported to be very severe on animals, the snow falling to a great depth. We have laid in a good stock of hay, and, by erecting temporary shelter, we have little fears of losing any of our mules.

Our work during the next season will extend from the Columbia river to the Rocky mountains. From careful inquiry, the entire distance is represented as mountainous and timbered, excepting perhaps a short stretch in the valley of the Kootenay, near the base of the Rocky mountains. In this valley the Hudson's Bay Company have a trading post near to the parallel. This post is supplied from Fort Colville, and the company's trail to that point will no doubt be of great service to us in sending parties to the line, particularly to those stations close to the Rocky mountains.

In reference to the mode or order of proceeding with the astronomical stations during the next season, I would respectfully suggest that we be allowed to proceed directly to the extreme eastern stations, so that on the melting of the snows, we will be able to complete those, and retire in good season, leaving these nearer this depot for the last. By following this plan we will have less difficulty in falling back on this place, in the event of any great detention or delay from ruggedness of country and swollen streams, or even should the winter set in before the completion of the work. It is confidently expected, however, that we will be able to complete all of the astronomical stations during the next season. Mr. Gibbs is at present making a reconnoissance of the trail in the direction of the Kootenay. This will enable us to commence in the early spring with a working party on this route. It is believed that we will have to build bridges and make flat-boats for ferrying Clarke's Fork (Pend d'Oreille) and one of its tributaries, besides much cutting and corduroying.

Before closing this report I take great pleasure in again commending to you the great zeal and devotion to duty evinced by the assistant astronomer and surveyor, and the several assistants engaged upon the work; and I am happy to say that the amount of work accomplished during the season has quite equalled the highest estimates.

I have the honor to be, very respectfully, your obedient servant,

JOHN G. PARKE,

Lieut. Corps Top. Eng's, Chief Astron'r and Surv'r.

APPENDIX C.

REPORT OF ARCHIBALD CAMPBELL, FEBRUARY 3, 1869.¹

UNITED STATES NORTHWESTERN BOUNDARY COMMISSION.

Washington, D. C., February 3, 1869.

SIR: I have the honor to acknowledge the receipt of your letter of the 16th ultimo, asking for information concerning the matters mentioned in a resolution of the House of Representatives of the 13th of January:

That the Secretary of State be directed to communicate to the House the total amount expended for the northwestern boundary commission, and to give in detail the items of expenditure, the number and names of persons employed in such commission, how long employed, and at what salaries, and the nature and extent of the services performed.

In reply to your letter I have the honor to transmit herewith the following papers:

Financial statement, January 1, 1869, marked A.

List of persons composing the commission, with rates of salaries, &c., marked B.

List of assistants employed in running and marking the boundary line, with statement of pay, &c., marked C.

List of assistants employed in working up the results of the survey, with statement of pay, &c., marked D.

Statement of labor employed in running and marking the boundary line, marked E.

Statement of services of Indians, marked F.

In regard to "the nature and extent of the services performed," nothing short of the full reports of the chief astronomer and surveyor, and other officers of the commission, and the detailed maps of the survey of the boundary line, can give an adequate idea of the subject. It is not supposed, however, that the House of Representatives desires so comprehensive a reply to their inquiry. I shall therefore endeavor as briefly as possible to furnish the information called for.

On the 11th August, 1856, Congress passed a law, authorizing the appointment of a commission on the part of the United States, to unite with a similar commission to be appointed by Great Britain, for the purpose of carrying into effect the first article of the treaty of June 15,

¹ Reprinted from House Ex. Doc. 86, 40th Congress, 3d session.

1846, that is, to determine and mark the boundary line between the United States and British possessions, agreed upon in the treaty, viz:

From the point on the 49th parallel of north latitude, where the boundary laid down in existing treaties and conventions between the United States and Great Britain terminates, * * * westward along the said 49th parallel of north latitude, to the middle of the channel which separates the continent from Vancouver's island, and thence southerly, through the middle of the said channel and of Fuca's straits, to the Pacific ocean.

Toward the close of the year the British Government appointed Captain Prevost, royal navy, commanding steamer *Satellite*, first commissioner to determine that part of the line which runs through "the channel which separates the continent from Vancouver's island," and announced that he had started on his way to the vicinity of the boundary line, and that Captain Richards, royal navy, second commissioner, would shortly follow.

Although the powers of the British commission were limited to the determination of the water-boundary alone, while the act of Congress authorized, on the part of the United States, the determination of the boundary from the crest of the Rocky mountains to the Pacific ocean, the President decided to carry out the law by the appointment of officers authorized thereby, and to notify the British government of the difference between the powers of the two commissions. In February, 1857, I was appointed commissioner, Lieutenant John G. Parke, United States army, chief astronomer and surveyor, and G. Clinton Gardner, assistant astronomer and surveyor, on the part of the United States.

Under instructions from the State Department, the United States commission was duly organized and directed to repair to Fuca's straits, via San Francisco, to meet the British commission. At the close of June, I met Captain Prevost, the British commissioner, at Esquimalt harbor, at the southern end of Vancouver's island, and was informed by him that until the arrival of Captain Richards, second commissioner, with the surveying party, he was not prepared to enter upon the determination of the water boundary. The United States commissioner therefore proceeded to the western terminus of the 49th parallel, on the main land, and established a depot and located an observatory, for the commencement of the survey along the 49th parallel, eastward, to the crest of the Rocky mountains. The British government not yet having provided a commissioner for that part of the boundary line, we were obliged to commence the work without its co-operation. Reconnoissances and explorations in the vicinity of the boundary line were at once commenced, and continued as long as the season permitted field operations. Before the spring, four astronomical points on the 49th parallel were determined, and the country thoroughly reconnoitered in the vicinity of the parallel, for a considerable distance eastward.

Towards the close of October, Captain Prevost visited the 49th parallel and informed me that Captain Richards had not yet arrived, but that, as he had satisfied himself of the general accuracy of the United States Coast Survey chart of the channels and islands between the continent and Vancouver's island, he should act independently of him. He therefore proposed that we should at once proceed to the determination of the water boundary. Several meetings of the joint commission accordingly took place, at which the question of the boundary channel was verbally discussed. The British commissioner claimed Rosario straits (the channel nearest the continent,) while I claimed the Canal de Haro, (the channel nearest Vancouver's island) as the boundary channel, intended by the treaty. Between these two channels lies the Haro archipelago, a group of islands, of which San Juan forms a part.

The verbal discussion was followed by a correspondence on the subject, in which the merits of the question were fully set forth. Captain Prevost concluded the correspondence by a proposition to compromise the difference, by running the boundary through an intermediate channel which would secure the island of San Juan to Great Britain. This proposition I declined.

For more full information in regard to the question of the water boundary I would respectfully refer to Senate Ex. Doc. No. 29, 2d session, 40th Congress. This document contains the correspondence above referred to, with a geographical memoir of the islands in dispute, and a map and cross-sections of the channels.

In conformity with the fifth section of the act organizing the commission, the President (through the Secretary of the Treasury) directed the Superintendent of the Coast Survey to place the steamer *Active* and brig *Fauntleroy* at the disposal of the commissioner when required. Both vessels were accordingly employed for the survey and soundings of the various channels and islands between the continent and Vancouver's island, a portion of the expenses of the *Active* being paid by the commission during the time that vessel was employed on this duty.

After the arrival of the British surveying steamer *Plumper*, Captain Richards co-operated with the United States Coast Survey vessels, and a thorough and complete survey of all the channels and islands between the continent and Vancouver's island south of the 49th parallel was made.

The map above referred to is the result of this joint survey, which occupied several seasons.

In the summer of 1858 Col. J. S. Hawkins, royal engineers, appointed by the British government commissioner to determine the boundary line along the 49th parallel, arrived from England with a suitable party organized for field operations. At the time of his

arrival the excitement arising from the discovery of gold on Frazer river was at its height. This event caused for a time great increase in the price of labor and supplies, and created considerable embarrassment, delay, and additional expense in the field operations of the season.

A meeting of the joint commission was held for the purpose of agreeing upon a plan of field operations for the survey of the land boundary. The following is a copy of the arrangement made:

After discussing plans for determining and marking the line as far eastward as the Cascade mountains, it was concluded to be inexpedient at the present time, in consequence of the great expense, consumption of time, and the impracticable nature of the country, to mark the whole boundary by cutting a track through the dense forest.

It was therefore agreed to ascertain points on the line by the determination of astronomical points at convenient intervals on or near the boundary, and to mark such astronomical stations, or points fixed on the parallel forming the boundary, by cutting a track of not less than 20 feet in width on each side for the distance of half a mile or more, according to circumstances. Further, that the boundary be determined and similarly marked where it crosses streams of any size, permanent trails, or any striking natural feature of the country.

In the vicinity of settlements on or near the line, it is deemed advisable to cut the track for a greater distance, and to mark it in a manner to be determined hereafter.

The work of running and marking the land boundary was carried on through a country previously almost unknown. The 49th parallel extends over rugged and precipitous mountains that attain great elevation, and in the Cascade range, on and near the boundary, perpetual snow covers many of the peaks, whose northern gorges are filled up with immense glaciers. The timber on the western slope of the Cascade mountains is dense, being a heavy growth of pine and fir, that in many places stands over a fallen forest not yet decayed. This is the character of the country as far east as the valley of the Similkameen river, one of the tributaries of the Columbia. Here the timber becomes more open and surveying operations less difficult.

After passing the Okinokane river, which is the lowest line of the great valley between the Cascade and the Rocky mountains, the country again becomes rough and the timber more dense, but less so than the western slope of the Cascade mountains.

It being impossible to follow the 49th parallel continuously, the line of survey was carried over the nearest practicable route for a pack trail, connecting each astronomical station, making a total length of line of survey of about 800 miles. Astronomical stations were established by parties of the joint commission at almost every accessible point from which the boundary line is ascertained, and marked by a vista across all valleys and trails, where rough stone monuments were erected over posts buried in the ground to indicate the exact line.

The reconnaissance work extends over an area of about 30,000 square miles. Within this space the barometrical heights of over 800 points have been obtained.

A magnetic survey, extending over a range of $3^{\circ} 20'$ in latitude and 4° in longitude, with the necessary observations of the magnetic elements of the astronomical stations, was also made.

The entire length of the land boundary line is over 9° in longitude, or about 410 miles, and the length of the route traveled in surveying it is double that distance. Trails had to be opened for three-fourths of the distance traveled, involving great labor in cutting, grading, and bridging to make the route practicable for pack-mule transportation. The water-courses were numerous and rapid, rendering the fords frequent and dangerous; and a slight rise of many of the streams would have made them impassable but for the timely precaution of building bridges at small streams and ferry boats at the river crossings. Many of the trails opened are now traveled routes to the mines then and since discovered, which are rapidly developing that section of the country, where almost every valley of any extent affords facilities for agricultural pursuits.

In collating the results of the survey reports upon the geology, botany, and natural history of the country reconnoitered were prepared, and complete maps, on a large scale, made of the entire boundary and the adjacent country. A general map has also been made, showing the extent of the country traversed. And to facilitate the survey of the public lands, photographic duplicates of the detailed sheets, showing each monument on the boundary line, with its geographical position, were furnished to the General Land Office. Photographic duplicates of the detailed sheets of the water boundary have also been made and furnished the Department of State in illustration of the question of the boundary channel.

I have the honor to be, very respectfully, your obedient servant,

ARCHIBALD CAMPBELL,

Commissioner Northwest Boundary Survey.

Hon. WILLIAM H. SEWARD,

Secretary of State.

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