

REPORTS

OF

EXPLORATIONS AND SURVEYS,

TO

ASCERTAIN THE MOST PRACTICABLE AND ECONOMICAL ROUTE FOR A RAILROAD

FROM THE

MISSISSIPPI RIVER TO THE PACIFIC OCEAN.

MADE UNDER THE DIRECTION OF THE SECRETARY OF WAR, IN

1853-4,

ACCORDING TO ACTS OF CONGRESS OF MARCH 3, 1853, MAY 31, 1854, AND AUGUST 5, 1854.

VOLUME I.

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REPORT
OF
THE SECRETARY OF WAR
ON THE
SEVERAL RAILROAD EXPLORATIONS.

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8. Such observations as to the navigability of the Columbia as may be practicable at this late season.
9. Moving the main party to Puget sound over the pass found by Captain McClellan to be the best.
10. Meteorological posts at Wallah-Wallah, at Olympia, and possibly at Fort Colville.
11. Office work at Olympia, preparing the report.

WORK PROPOSED FROM THE RESUMPTION OF OPERATIONS IN THE SPRING TO THE CLOSE OF THE
NEXT FISCAL YEAR.

1. Careful explorations of the Marias Pass of the Rocky mountains, and such other passes as from information acquired on the resumption of the survey shall come into competition with that at Cadotte's Pass.
2. The completion of the exploration of the Bitter Root and Cascade ranges, it being scarcely practicable to accomplish it the present season.
3. Instrumental surveys of the passes in all three ranges found by exploration to be the best.
4. These passes to be connected by reconnaissance in the best practicable manner.
5. The best pass in the Rocky mountains to be connected with the best crossing of the Mississippi, by a review of the whole line by a small party under the charge of a competent estimating civil engineer, regard being had to questions of supply and modes of construction; spur roads to the Missouri and a connexion with Lake Superior and the roads leading eastward from the Mississippi.
- 6. The careful survey of the Columbia river, to determine to what extent it can be made useful in transporting supplies, &c., for the construction of the road.
7. Examinations in relation to connecting the most practicable route with Oregon and California.
8. Re-continuance of the meteorological posts.
9. Information to be collected as to emigrant routes, wagon roads, and country adapted to settlement.

I append to this report copies of all the orders since leaving Camp Pierce, and copies of all the important instructions since leaving Fort Union. These papers will, in connexion with this communication, give as full a report of the present state of the exploration as my limited time will allow.

1. Copies of my three letters to the department of the 8th of September, forwarded by Dr. Evans, and which will not probably reach Washington till after this communication is received. They give a bird's-eye view of operations; state that the survey fund will probably be exhausted in October; state my determination to continue the survey, and organize a small but efficient winter force, in readiness to resume operations in the spring, and urge the recommending Congress to pass in the deficiency bill an appropriation of \$40,000 to continue the work the remainder of the present fiscal year. They ask that the \$10,000 now in the treasury, of the sum allotted from the appropriation to the survey of this route, and such other sums as may be applied to it from other appropriations, may be drawn from the treasury and be placed on deposit with the Treasurer, subject to my order. The only modification I now make of these views is, that I would recommend urging Congress to pass an appropriation of \$150,000 to *continue all these great railroad explorations* during the remainder of the present fiscal year, and the same amount in the general appropriation bills for the next fiscal year.

2. Copy of my Order No. 18, (marked No. 4,) issued on the arrival of Lieutenant Saxton at Fort Benton.

3. Copy of my instructions to Lieutenant Grover, (marked No. 5,) directing him to reconnoitre Cadotte's Pass, ascertain whether Lieutenant Saxton had arrived at Fort Benton, and

In my report from Fort Benton, my reasons were given for pushing all the parties through Cadotte's Pass, and for abandoning the examination of the Marias.

Previous, however, to this conclusion, Lieutenant Mullan had set out from Fort Benton to visit the Flathead camp on the Muscle Shell river, and thence to explore a more southern route to the St. Mary's valley.

Lieutenant Donelson moved from his camp on the Teton river, September 16, and pressed forward vigorously to his work, with two efficient civil engineer parties under Messrs. Lander and Tinkham for side reconnaissance and the general estimate, and an odometer party under that most able topographer, Mr. Lambert. I remained at Fort Benton till Mr. Stanley returned, on the 20th September, with a large delegation of the Blackfeet Indians, when a most amicable and satisfactory council was held with them on the next day, at which they agreed to respect all whites travelling through their country, to cease sending their war parties against the neighboring tribes, and to submit to the Great Father the settlement of their difficulties. One of their principal chiefs, Low Hone, in a speech of great eloquence and power, implored his people, now for the first time they had experienced the protecting care of the Great Father, to listen to his words; and he commanded them to abide by the promises just made in council. He desired me to say to all the Indians west of the mountains that the Blackfeet were no longer their enemies, and that they desired to meet them in council at Fort Benton next year. This I deem a measure essential to establishing a general peace, and have, in a communication to the Commissioner of Indian Affairs, earnestly recommended it.

This business brought to so satisfactory a conclusion on the 21st September, I set out early on the 22d with a select party, consisting of Mr. Stanley, the artist, Mr. Osgood, the disbursing agent, and Dr. Suckley, our surgeon, who, leaving Lieutenant Donelson's command to visit the falls, was not able to rejoin it, and returned to Fort Benton. Messrs. Evans and Kendall, two young gentlemen, kept behind to assist me in my correspondence, and five voyageurs and an Indian guide; and camping with Lieutenant Donelson at the end of the fourth day, I reached the St. Mary's village at noon on the 28th instant, making a distance of about two hundred and forty-three miles in six and a half days. Lieutenant Donelson reached the village on the 29th instant, and Lieutenant Mullan on the 30th. In Lieutenant Donelson's exploration of the route from Fort Benton to the St. Mary's village, Mr. Lander was very successful in approaching the mountains high up at the Marias river, and towards the sources of the Teton, Medicine, and Dearborn rivers, and entered the mountains, finding in each case excellent railroad crossings, and crossed the dividing ridge some miles north of the pass pursued by both Lieutenants Donelson and Saxton, bringing with him an excellent railroad line to the junction of the two routes in the main pass. As regards both entrances to the pass, a small tunnel will be required in each case—not, however, exceeding one mile in length; and the grades approaching the passes will not probably exceed forty or forty-five feet per mile. The descent down the Hell Gate river was mostly through an open valley, till the Hell Gate passage is reached, where the river winds in a narrow defile, requiring for a railroad expensive sustaining walls and embankments, and probably some small tunnels to avoid short curves.

It is practicable, though expensive, for a railroad.

It can be turned, however, two ways: 1st, by tunnelling a marble mountain south of it on the route of Lieutenant Saxton, and in relation to which I shall soon receive a report; and, 2d, by crossing over from a tributary of the Hell Gate in the open valley of the pass to the valley of the river Jocko, one of the principal southern tributaries of Clark's fork. Mr. Tinkham was assigned by Lieutenant Donelson to this duty, and with his detached party left the main party on the 26th September, with instructions to reach Fort Benton in six days. Reserving to a future paragraph a notice of this important side route of Mr. Tinkham, I will notice Lieutenant Mullan's route; simply stating that the two routes come together at the Hell Gate passage, and that the St. Mary's valley affords an excellent railroad line, not only to the St. Mary's village, but high up towards its source.

camp, some hundred and seventy miles south of Fort Benton, by Lieutenant Mullan, and the Blackfeet, the same distance north, by Mr. Stanley; and that the exploring parties, Lieutenant Mullan, by the Hell Gate, Lieutenant Donelson, with the engineer parties, by the Blackfoot trail, all rendezvoused at the St. Mary's village by the 30th September, except Mr. Tinkham, who reached the St. Mary's valley on the 6th of October. Mr. Lander, who had gone sixty-five miles on his way to examine the Marias Pass, on the arrival of Lieutenant Saxton, made, under the direction of Lieutenant Donelson, a reconnaissance of the Marias, Teton, Sun and Dearborn rivers, and crossed the dividing ridge of the Rocky mountains by the pass of Lewis and Clark on their return route some eight miles northwest of Cadotte's Pass, crossed by the main party, and came upon the common trail thirteen and a half miles lower down the pass; and Mr. Tinkham, before reaching the narrow defile ending in Hell Gate, examined a route from the pass to the Jocko river flowing into Clark's fork, and then came into the St. Mary's valley in Lieutenant Saxton's trail.

At St. Mary's valley I found Lieutenant Arnold in charge of that post with six men and a considerable depot of provisions. Lieutenant Saxton's route to that post was by the Dalles, Wallah-Wallah, Peluse, Cœur d'Alene prairie, Clark's fork, and Jocko river. He reached the village on the 28th of August, and started for Fort Benton with a party of eighteen men on the 2d of September. Lieutenant Macfeely, in command of twenty-six enlisted men and quartermaster employés, left that village on the 4th day of September, by the southern Nez Perces trail, for the Dalles.

Lieutenant Mullan was placed in charge, with fifteen men, of a meteorological post at the St. Mary's village, with orders to explore a route to Fort Hall, and to make all possible examinations of the mountain passes, especially as to the depth and continuance of snows; and Lieutenant Donelson was sent over the general route explored by Lieutenant Saxton, with directions to send Mr. Lander down the St. Mary's river, and meet him at Horse Plain. Mr. Tinkham was sent back over the Rocky mountains by the Marias Pass, with orders to return, by some southern pass, to the St. Mary's village, thence by the southern Nez Perces trail to Wallah-Wallah, and thence over the military road to Steilacoom and Olympia. Dr. Suckley was directed to go down the St. Mary's river, Clark's fork, and the Columbia, and to make the best exploration his means permitted.

Leaving the St. Mary's valley, opposite Hell Gate, on the 7th of October, I pushed with a small party over the Cœur d'Alene mountains, and resting my animals one day at the Cœur d'Alene mission, I pushed on to Colville, and reached that place on the 18th of October, the day of the crossing of the Columbia river at that point by Captain McClellan.

To guard against the possibility of Captain McClellan's passing the eastern division, on his way to the Rocky mountains, Lieutenant Donelson was directed to despatch Lieutenant Arnold on his second crossing of Clark's fork, by the northern trail to Colville, and orders were left at Colville, directing him to go up the Columbia river, make a general reconnaissance of the river in the vicinity of the 49th parallel, and then repair to Wallah-Wallah by the route of the left bank of the Columbia, by the Grand Coulée, and by the mouth of Snake river.

Word was sent to Lieutenant Donelson to meet the western division at a camp south of the Spokane river, and arrangements were made to complete the exploration of the Snoqualme Pass by a small party with one of the assistant engineers, Mr. Lander, and carry the line down to the harbor on the sound; to explore the route crossing the Columbia above the mouth of Snake river, and leading by its north bank to Vancouver, both parties under the charge of Captain McClellan, who was also to determine, in his way, one or two doubtful points as to the geography of the country; to explore a third route, by Lieutenant Donelson, from the Cœur d'Alene mission to Wallah-Wallah, and thence down the south bank of the Columbia river to the Dalles, and to send the animals and men not needed for those duties along the usual trail to Wallah-Wallah, under Lieutenant Hodges. On a careful inspection of the animals, made by Captain McClellan and Lieutenant Donelson,

other side, the tributary of Marias river descends near 1,200 feet in sixteen miles. There are, probably, passages of the mountains connecting other branches of the Marias river with other tributaries of Flathead river, and giving, perhaps, opportunities for passing the divide with more ease than by the way explored; and should a line in this direction be thought desirable, it should be remembered that the field has been very partially explored. The mountains here have, however, a very different character from what they have farther south, being higher and forbidding, their sharp, gray peaks stripped of all vegetation, in every direction towering above the mass of wooded mountains and valleys below them.

A route through this pass can be preferable only as connecting with a route to the north of Flathead river. To follow down the valley of Flathead river after arriving at Flathead lake, will make it greater in length, in addition to its other disadvantages. The reconnaissance did not show that it was impossible to proceed westwardly in a more direct line, but the only two places in the valley containing Flathead lake and river, which were not bounded by high hills or mountains on the western border, are at the north and south extremities of Flathead lake. These were the only places where there appeared any possibility of breaking through the mountains. At the south extremity of Flathead lake is a small break in the hills, running in a nearly west direction, but this small valley has no stream of any importance in it, and there is nothing to show that it extends farther than can be seen from the lake, a half dozen miles. At the upper end of the lake the hills on the west side of the valley appear to cease for a while. There is a prairie here of considerable extent, the eastern edge of which was followed by Mr. Tinkham, and it may be practicable upon this prairie to proceed westwardly direct, without following Flathead river to Clark's fork. It is a matter for future examination. Of the route actually examined, Flathead river, from Jocko river to Marias Pass, and from Marias Pass to Fort Benton across the prairie, the most difficult portion has already been noticed, the section of thirty-five miles, including the summit. West of this, for about twenty miles the valley continues narrow, closed in by high, precipitous, wooded mountains, and a railway here must be made with very heavy and expensive work, rock cutting, culvert and bridge work, and sustaining masonry, with some short curves, but without high grades. The valley then opens and closes again but once, and then only for a very short distance, and until reaching Flathead lake the route is very promising in its grades, curves, and the small amount of grading required; but little rock excavation will be necessary. The western shore of Flathead lake crooks abruptly and often, following the base of the wooded and rocky hills which border it. The construction of the road here involves short curves, expensive rock cutting and masonry. The eastern shore appears more promising, but has not been examined. From Flathead lake to Jocko river, following the valley of Flathead river, the route is favorable, generally unwooded, without heavy grading or masonry. East of the mountains a nearly straight line can be obtained from the point where the railway line leaves Milk river to the plains near the base of the mountains, sixteen miles from the divide. This is all dry prairie country, without wood, and with but little water on the surface during the dry season.

The six passes next mentioned above debouche into the valley of the Bitter Root. The routes of Lewis and Clark's Pass and Cadotte's Pass meet in the valley of the Big Blackfoot river, thirteen and a half miles west of the dividing ridge, (Cadotte's Divide.) Those by the two branches of the Little Blackfoot meet and continue for some distance in its valley, which finally connects with Hell Gate fork, in the valley of the Hell Gate river, and the five routes, thus becoming two, follow down these two rivers and enter the Bitter Root valley at Hell Gate. They will be called the Big Blackfoot, Little Blackfoot, and Hell Gate trails; each of the two former being easily reached from the east by two passes over the dividing ridge, and the latter having likewise several connexions, through the mountains, with the regions to the east.

These passes are probably all practicable for a railroad; but the pass from Wisdom river is out of direction, and the Hell Gate and southern Little Blackfoot passes are approached with some

Comparison of ten days before reaching the summit with the corresponding temperature periods eastward :

Between Fort Benton and the Rocky mountains.....	2d to 11th January,	+24°
Pembina, Red River valley.....	3d to 12th “	+ 5°
Fort Snelling.....	4th to 13th “	+ 7°.7
Fort Ripley.....	4th to 13th “	+ 3°.9
Lacquiparle, Minnesota.....	2d to 12th “	+13°.6
Fort Ridgely.....	4th to 12th “	+ 8°.5
Madison, Wisconsin.....	4th to 13th “	+17°.5
Pittsburg.....	4th to 13th “	+32°.4
Rochester.....	4th to 16th “	+30°.4
West Point.....	5th to 16th “	+32°
Amherst, Massachusetts.....	6th to 16th “	+27°.4
Oldtown, Maine.....	6th to 18th “	+14°.2
Albion Mines, Nova Scotia.....	6th to 18th “	+20°.4
		<hr/>
Mean.....		21°.4
		24°.0
		<hr/>
		2°.6
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Mr. Tinkham met with no snow on the Marias Pass till the day after crossing the divide, October 21st, when a few inches fell. His course back was by the Little Blackfoot trail, and the snow was about an inch or two deep in the divide. On the southern Nez Perces trail over the Bitter Root mountains, the snow was six feet deep for one hundred miles or more. This trail is from one hundred to one hundred and fifty miles south of the railroad line. This depth of six feet occurred in December, when there was but twelve to fifteen inches in the passes of the Rocky mountains, the divide being at least 7,500 feet high, and it covered a much greater extent of country. The snows are of an entirely different character, being wet and compact, and the temperature much milder than in the Rocky mountain divide.

Mr. Tinkham's passage of the Cascades on the 21st January furnishes the only observations we possess as to the depth of snow in that range. Crossing after mid-winter, he found for six miles the snow six feet deep, with occasional depths of seven feet, as also of four feet. For twenty additional miles the snow was from four to six feet deep, and for twenty-five miles more, two to four feet. Of this depth one and a half to two feet fell on the night of the 19th and 20th January, so that in mid-winter the snow was but four to five feet deep in the divide. This snow was very light, in layers of one and a half to two feet, and Mr. Tinkham is of opinion that the rains of February would tend to make the snow more compact, so that the depth would diminish, notwithstanding more snow fell, making the pass practicable in March. I will particularly refer you to his report for the details of his interesting trip, and the conclusion which his judgment has reached in this question. I discredit the evidence of Indians, except when they have actually made personal observations. The Indians cannot be competent witnesses as to the snow being six or ten feet deep in one place, or twenty to twenty-five feet in another, lying in their lodges as they do all winter, and seldom ever using snow-shoes at all. Early in January the Indians at the Snoqualme falls were of opinion that the snows in the pass were twenty to twenty-five feet deep, where, according to Mr. Tinkham's measurements, making the allowances for the intermediate fall of snow, it could not have exceeded four or five feet. Among the Yakimas, Mr. Tinkham was hardly able to get shoes enough for his party, and none were found among the Snoqualme Indians on the other side. It was with difficulty he could get guides, and was in consequence detained two days; yet he was assured by them that the snow in the pass would only be up to,

[Hell Gate] valley does not exceed forty (40) feet per mile. The width of the valley is such that, by using curvature of twelve hundred (1,200) feet radius, at a few sudden changes of direction, the line need not make crossings of the stream; or should larger radii seem preferable, the character of the route may still be preserved, the river crossed at right angles to the current, and a reasonable length of straight line secured between the changes. The cost of all the bridging upon the division will be excessive, from the scarcity of the proper material for masonry, the basaltic rock of the section being unfit for such structures.

Should the line keep the northern bank of the river, an embankment formed of rock and earth by borrowing would avoid many deep ledge cuttings, and could be protected from the danger of sudden freshets by placing the weightier material upon the outer slope. For a portion of the distance through this valley, however, it will be necessary to make several crossings of the stream at high cost. The general grade down the Blackfoot [Hell Gate] fork of forty (40) feet per mile will probably be broken by the severe work, and lead to the location of steeper inclinations.

The descent of the Bitter Root is very severe. The general grade of the river valley for that distance is not great, but the changes in level are abrupt; the valley extremely narrow and crooked; sharp curvature and steep gradients will be needed under any system of location, and, by the best mode of conquering these difficulties, the line will be extreme in cost and nearly impracticable.

Many crossings of the stream are made; deep rock-cuttings occur, and all embankments must be thoroughly sustained against the effects of the rapid current and the danger of sudden freshets.

From the junction of the Bitter Root and Clark's fork to the crossing of Clark's fork, below Lake Pend d'Oreille, the line assumes a more favorable character, and although still severe, may be readily adjusted to reasonable rate of curvature and grade. The crossing of the summit section between Lake Pend d'Oreille and the valley of the Spokane is very favorable, and can be made upon gradients of forty (40) feet per mile.

All great difficulties of location upon the route, as delineated upon the sketch, cease at the valley of the Spokane, and choice can be made of several practicable lines to the great valley of the Columbia.

19. REPORT OF MR. A. W. TINKHAM, ASSISTANT ENGINEER, AS TO THE RAILROAD PRACTICABILITY OF THE LINE OF THE MARIAS PASS OF THE NORTHERN LITTLE BLACKFOOT TRAIL, AND OF THE SOUTHERN NEZ PERCES TRAIL.

WASHINGTON, D. C., *July 19, 1854.*

SIR: On the 7th of October, 1853, in the valley of the St. Mary's river, I received from you instructions to examine Marias Pass, to return to Fort Benton, and again from that post to travel westward, crossing the Rocky mountains by such pass as shall be expedient, and the Bitter Root mountain by the southern Nez Perces trail, to Wallah-Wallah.

Three days later, having rested my animals, I left the last camping ground made by Lieutenant Donelson with the main train on Jocko river, and travelling northwardly, followed Jocko river to its mouth, and then journeyed up the valley of Flathead river. Until near Flathead lake, the valley of this river continues wide, grand, and bordered by partially-wooded hills. Most of this land is capable of occupation and settlement. The river is a fine, clear stream, one hundred to one hundred and fifty yards wide, occasionally fordable, swift current, and is estimated to have a descent of about ten feet per mile. About ten miles before reaching Flathead lake we leave the river and pass out of sight of it, and its issue from the lake could not be ascertained. The trail wound around the western shore of the lake. Its edge curves sharply and often, winding around the woody and rocky hills rising from the waters. The lake itself is a sheet of water of great beauty, some twenty-five miles long, and six or eight broad; is adorned

with a number of picturesque islands rising some three hundred feet above the water; and on its west and east sides is shut in by dark wooded hills, or, on the east, more properly mountains. The east side has not been explored. Its exploration is desirable to show the entrance and issue of Flathead river, its character as a travelling or railroad route, and to ascertain which rivers enter it from the mountains from the east, indicating if there exist any chances of passage of the mountains from the head of the Teton and southern branches of the Marias to the valley in which is Flathead lake. At the foot of the lake is a small green prairie of good soil—a dark soil, with mingled fragments of trap-rock and gravel. At the upper end of the lake is a comparatively level and considerably extensive district, inviting settlement. In the immediate vicinity of the lake it is prairie; further from the lake it is diversified with woodland and prairie. Its limits are not known; it is six miles or more in width near the lake, and is apparently as much as twenty miles in its greatest width. The limit to its length was not seen. It appeared to extend in a north-west direction for upwards of twenty miles. A brook, forty feet wide and one foot deep, a tributary to Flathead river, flows through it. The general valley of Flathead river and lake, including the valley where the Hudson's Bay Company's small trading post is, I consider as one of the most desirable for settlement, having much fertile soil and wooded lands, with all the other desirabilities of good wood and timber, pure water and air, and agreeable locations. Residences on the lake will be most agreeably situated, for attractive scenery and advantages of water communication are of considerable extent. The river abounds with fish, mostly salmon and trout, and the lake is probably also well supplied with them. The hills which border the western side of the valley of Flathead river apparently retire at the upper end of the lake, and the only place promising an opportunity to pass from the valley directly westward is at the open spot, northward of the lake, described above. A few miles north of the lake we again fall into Flathead river. This river is ascended to its forks, about forty-two miles above the lake, and the trail then follows up the most eastern fork. At twenty-eight miles from the lake the wooded mountains close in upon the river and trail. To this point the valley continues wide and open, with a slight fall towards Flathead lake, and the river for this distance is very similar to what it was when first seen. Here it was one hundred yards wide, two and a half feet deep, clear, pebbly bottom, banks sixty feet high. After first closing upon the river, the mountains again retire, and there is a further nearly level, though wooded, basin for some fourteen miles. At the upper end of the basin the river forks—one fork coming from the northward through a straight and promising valley, and one from the east. On this route is the trail leading to Marias Pass. There is very likely a trail up the other. Beyond the fork the stream is walled in by high precipitous mountains, whose gray, naked peaks, in bold relief, rise from dark masses of fir and pine below them. The valley is narrow and always wooded; the trail is sometimes laborious and difficult, and grass for camping is always scarce, and so continues until the summit is passed. The divide of the Rocky mountains at Marias Pass is seventy-eight miles from the head of Flathead lake. In the last seventeen miles the valley rises rapidly; several small falls—one of about one hundred and forty feet rise—break the flow of the stream, gradually losing its tributaries and its volume; and besides the comparatively narrow ridge with which the valley abruptly terminates in the seventeen miles, the ascent is 2,170 feet; the divide at its lowest point is still 2,150 feet higher, and is 7,600 feet above the sea. A bare, rocky, circular ridge closes the valley, over which the trail crooks and winds, and is often just wide enough for the feet of the horse. It is wholly impracticable as a wagon pass. The passage of the summit was made on the 20th October; the air was chilly and the snow flying. To this time we had enjoyed fine, clear autumnal weather; as we rose in the valley, getting frost, and finally ice, in the night. Dropping down some 2,000 feet into the valley on the eastern side of the divide, where heads one of the tributaries of Marias river, we passed those small lakes or ponds, clear and cold, on whose shaded borders the snow-banks of the previous winter were still resting. The contrasts in the growth of the trees on the west and east sides of the mountains are very noticeable. On the west the trees continue large

and thrifty almost to the summit. On the east, what little growth there is consists of short, scrubby pines, only suitable for fuel. On one of the snow-bordered ponds we camped.

Before the close of the day the snow was gathering on the ground, and continued falling until next day. When at a distance of only about a dozen miles from the summit we made the prairies, covered with some four inches of snow.

Smooth, dry prairie extends hence to Fort Benton; in traversing which to that post, we cross the tributaries of Marias and Teton rivers. This prairie is very sparingly supplied either with water or wood, but the soil appeared to be of fair quality, and, near the mountains, very good. The distance from the summit to Fort Benton is estimated at 136 miles, and the week spent in accomplishing this distance was a time of excessive cold, severe for the latter part of October; and it is probable that so cold weather did not occur again until considerably later in the season. One or two snow-storms occurred during the earlier part of the week, and in two instances the extreme cold reached as low as 3° above zero, Fahrenheit. The snow on the prairies had a greater depth of five inches, and disappeared altogether one day's journey out from Fort Benton. The weather had not been so cold there as on the prairies to the north and west.

On November 1st we left our camp opposite Fort Benton on our westward march to St. Mary's village. After several days of clear and mild weather, the air had again become cold, and we were visited with another snow-storm. For about seventy miles our march lay along the south side of the Missouri—sometimes in sight of it, and sometimes losing it for the whole day. We travelled slowly; our animals were worn with their previous work; and the week spent in making but little more than this distance was cold and snowy, the thermometer in one instance ranging as low as 3° above zero, and the snow once becoming as deep as eight inches. The air was often thick with snow, so that I could get but very limited and imperfect views of the country; and though passing within hearing of the Falls of the Missouri, I could get no view of them. Game was generally plenty. A few buffalo, and a good many elk and deer, were feeding on the prairie. The air resounded with the cries of the continually-passing flocks of swan, geese, and ducks; and near our different camps great quantities of these fowl would be found on the river, swimming among the floating ice moving down with the current. The ground was a good deal broken with coulées in the first half of the distance named, but above the falls marked changes occur in the valley of the Missouri; the river no longer flows in a deep channel, whose banks are again cut with deep coulées, but the river appears raised more nearly to the level of the surrounding country, and, in place of the bluffs, broken with coulées, grassed, and more or less irregular slopes, from which the trap for the first time is beginning to show itself, reach down to the river's edge. For most of the above distance the soil is good, often rich and black in the valleys.

At the end of the seventy miles, the traps, rock hills, and precipices crowd upon the river, and it was with great difficulty that we could get along in its vicinity. Here, I judge, is the so-called "Gate of the Mountains." I may here say that, immediately prior to our leaving Fort Benton, the disposition of the Blackfeet to waylay and murder our Pend d'Oreille guide had led to a change in our intended route; and then, finally, the floating ice in the Missouri made the fording of the stream dangerous, so that our guide did not think it safe to follow the usual and best route. In this way we got forced in among the turbulent mass of irregular and rocky hills, through which, for over twenty miles, lay our travelled route, the river winds its way; and where almost perpendicular precipices, obtruding at frequent intervals into the river's edge, make it impossible to travel along its banks. These hills are partially wooded with the pines. The principal difficulty in reaching the Little Blackfoot Pass is in getting through this broken region of country. A wagon-route, I think, will be obtained here; probably there already exists a good trail—the continuation of a trail which we followed for some distance above the falls, and on which we probably should have continued, had not the ice with the high water prevented our making the passage in the usual place. Of this matter I cannot speak positively, not always rightly interpreting the signs of my Indian guide.

An interval of only about thirty-three miles lies between the broken, volcanic country resting on the Missouri and the summit of the pass by which I crossed the Rocky Mountain divide, entering the valley of a fork of Hell Gate river—termed by Lieutenant Mullan Little Blackfoot river. We were little troubled either with snow or cold after getting within forty miles of the summit of the mountains, the thermometer never ranging lower than 20° above zero, and generally much higher. The exact configuration of the pass I have given in my general railroad report. On the 10th of November I passed over, in company with a large troop of Pend d'Oreille Indians returning from the buffalo hunt. The ridge which constitutes the divide is a mere hill, up which, on the eastern side, loaded wagons can be drawn without serious difficulty; and the descent on the western slope is very gradual, and, for a wagon-road, all that is desirable. An inch or two of snow lay on the ground on the eastern side of the hill, and what little was on the summit was whirled into small heaps and drifts.

Following down the valley to its junction with Blackfoot river, as I estimated, about ninety-five miles from the summit, (much too small an estimate, according to Lieutenant Mullan's odometer measurement,) the valley is unusually favorable either for a wagon route or a railway. From the running water at the foot of the divide to Hell Gate, the valley, according to my estimated distances, has an average descent of twenty-two and a half feet per mile, (undoubtedly greater than the actual fall by several feet per mile,) is generally wider than Blackfoot River valley, is generally unobstructed by the woods; and, although the present trail in several instances for a few miles is steep and difficult when forced to the hill-side by the river, all these difficulties could be removed with a small amount of labor, or apparently avoided without labor sometimes, by taking the bed of the river for a short distance, (the river has a general depth of near three feet,) or by making river crossings.

The greater portion of this valley is a desirable region for settlement. The soil is often gravelly, as is the soil in St. Mary's valley, but it is fertile, and there are many agreeable and promising locations for farming, where a good soil, plenty of good wood sufficiently near for lumbering or fuel, pure cool water, good grazing, an agreeable and healthy climate, and a pleasing prospect, are inducements not often found united, and are sufficiently attractive to throng these mountain valleys at no distant day with a central population of vast importance, making in the heart of the mountains, and midway between the Missouri and Columbia, a central depot of supplies, a distributing point of labor and materials, and finally a region productive of valuable exports. I do not think there will be any essential increase of distance over the route by way of Blackfoot river from Fort Benton to St. Mary's.

I reached Hell Gate, near the river of Hell Gate, and Blackfoot river, on the 15th of November. In descending the valley the weather was generally mild, but still colder than what we experienced for nearly a month following. The mercury in one case descended as low as 12° above zero, but this was an exceptional case. We had several short squalls of damp snow, lodging for only a short time on the ground, and some little rain.

Turning up the St. Mary's valley, on November 17th I rested at Lieutenant Mullan's winter establishment, in St. Mary's valley, fourteen miles above Fort Owen; the weather mild and pleasant, and, during my stay there, occasionally rainy; the grass good, and the animals of the expedition, with the multitude of horses and cattle owned by the Indians and half-breeds, in the most thriving condition.

On November 20th, with a fresh band of animals, and renewed outfit of provision, &c., I was in camp, halting on the Sabbath, some nine or ten miles from Lieutenant Mullan, up the valley of St. Mary's river—a mild moist day, raining gently most of the day, with a temperature rising to near 50° above zero. About twenty-six miles from Lieutenant Mullan's winter post, and some sixty miles above Hell Gate, the St. Mary's forks to the southeast and southwest. Here we left the fine open valley characterizing the St. Mary's river, and tracing up the western fork, the wooded hills immediately closed in upon the stream; the valley narrowed until it was

not over a quarter of a mile wide; patches of snow discovered themselves, and the air grew chilly. A few miles farther the snow was several inches deep, the streams were partially or wholly frozen; and when, on November 23d, about 24 miles up the valley from where we entered it, we left the stream near its source, there a brook only twelve feet across, the snow was still deeper; and a mile or two farther on, as we ascended the mountain divide, whose western waters are tributary to the Kooskooskia, the snow was two feet, and soon after two and a half feet deep. The passage of this divide was very laborious; is by the trail some twenty-five miles long, attaining a summit elevation of 7,040 feet, the trail keeping mostly on the open hill-tops, and with its ascent and descent, and the snow, gave us three days of hard labor, during most of which time our animals had nothing to eat. The snow at times wholly disappeared from the open southern hillslopes, and had a greater depth of three feet. Tributaries of the Kooskooskia are either side of this long summit ridge—can be discovered on either side. Their dark wooded valleys, making up to the heads of the streams of the St. Mary's fork, and a constructed road keeping the wooded valleys, would avoid the extreme elevation attained by the trail. The country is not promising, however, as a railway route; and the Kooskooskia valley, the only outlet through the mass of mountains still intervening between this summit and the Great Plain of the Spokanes and Nez Percés, is narrow, dark, and shut in by steep wooded hills. There is no good trail down its valley. With a precipitous descent of 2,000 feet the trail drops down to the bed of the Kooskooskia, which we cross at a level of 3,760 feet above the sea, and immediately turn again to the mountain on its opposite side, and wind up their steep projecting spurs and ridges. There was no snow in the valley of the Kooskooskia; the stream was thirty to sixty feet wide and two feet deep at the crossing. All this country is wooded mainly with pines, firs, spruces, and hemlocks. A few miles farther on we again entered the snow, and not over five or six miles from the river, on the 27th of November, were brought to a halt in snow about four feet deep; crossing the precipitous hill before us, after a week's delay in fruitless efforts to get our animals farther, we commenced on foot the balance of the journey, abandoning everything that could not be taken on our backs, and with snow-shoes made during the week's detention, and heavily packed, left the camp in the snow where our progress had been so abruptly arrested. The elevation of this camp is 7,250 feet, (as measured on the profile.) During our stay there the snow increased in depth to six feet. Hence to the water-base of the mountains is about ninety miles; but with our heavy packs, the very steep and laborious ascents, and our inferior snow-shoes, we were fourteen days making this distance; finally, on the 17th of December, emerging into the unwooded (save in the bottom) valley of the Clearwater river, a few miles above its junction with the Kooskooskia. The barometer was left at the snow camp, and the thermometer was lost soon after we left there. I estimated at the time that the greatest elevation attained was something over 8,000 feet above the sea. All of the route lay over high ground, probably very little if any of it so low as 3,000 feet, and then rising as high as 8,000 feet. We had, of course, a great deal of thick, misty, and snowy weather; at one time, gaining a high elevation, thrusting our heads through a chilly vapor to enjoy the bright sun, while the mountains and valleys below us were buried under a sea of cloud. The views which I did gain discovered mountains of remarkable sameness, most of them wooded nearly or quite to their summits; no sharply-obtruding peaks; few with their gray-brown ridges breaking the monotonous evenness of dark, rounded summits, and no open valleys, pleasant lakes, or mountain prairies, such as distinguish the main range of the Rocky mountains. In several instances the trail descended to the valleys of the small streams, and in all these instances the snow disappeared.

With a single exception—a sharp, exposed and elevated ridge, where the wind had drifted the snow until it was piled to the depth of probably ten feet—I found the snow nowhere deeper than at the camps where commenced the snow-shoeing and packing; it rarely exceeded three feet in depth, and in places there was more. The average depth for the whole mountain portion of the trail, from the head of St. Mary's fork to the western edge of the mountains, about 120 miles,

would be less than two feet. In this elevated route, with the depth of the snow, there was a very remarkable and unexpected mildness of temperature. The temperature was never quite so low as the extreme endured on the prairies, and the weather was occasionally warm. The snow, as a mass, was damp, and generally more or less incrustrated. Several small falls of snow occurred during the passage, and the trees and bushes were always heavily loaded with snow. There was but little high wind, and generally it was nearly calm, and, as I have already said, the air was for most of the time thick and misty.

A few miles from the mountains I found the Nez Perces Indians—remaining with them nearly a week. Their horses and cattle, with some young calves, were grazing in the river valley and slopes. The short grass of the river bottom was still bright and green. In the small gardens of the Indians, pea-vines, started from the seed of the summer crop, were several inches high, and the whole appearance of the valley was in contrast with the cold and snow of the mountains. A slight fall of snow occurred while I was there.

On the 30th day of December I reached Wallah-Wallah. The wooded country ends with the mountains, and then commences the great plain known farther north and west as the great Spokane Plain, and through which, in deep channels, flow the Clearwater, Snake, and Wallah-Wallah rivers, and other and smaller streams. There is a great deal of good land along the whole route through this section. The bottom lands of the Clearwater were to some extent cultivated by the Indians, and looked fertile—a dark, gravelly soil. Their corn was of good size and heavy; wheat of good weight. Corn, wheat, peas, potatoes, and melons, are produced by the Indians. The upland plains, where I traversed them, showed a good dark soil, exposing fragments of trap-rock, and were generally clothed with good grass, on which were feeding large bands of Indian horses. Mr. Craig, who lives on the Lapwai among the Nez Perces, about forty-five miles from the mountains, has about eight acres of land under tillage, with opportunity for extending his field as he pleases. Peas, corn, wheat, squashes, onions, potatoes, melons, &c., all thrive well here, and Mr. Craig spoke favorably of the productiveness of the soil. His field was on the river bottom, while the hills bordering on the river afforded excellent pasturage for horses, cattle, and goats. On the high plain between the Clearwater river and his house I found eight inches of snow, lasting only for a short distance. There was none on the Lapwai, and none thence to Wallah-Wallah. The Clearwater, Lapwai, Tokannon, Touchet, Wallah-Wallah, with other small streams tributary to Snake river, have a great deal of fertile, tillable land upon them, which, at an early day, will attract attention from its farming qualities. Most of these streams are scantily wooded. The wild flax, of good quality, is to be found in all this region.

Leaving the Touchet river and approaching Wallah-Wallah, we enter upon the sandy, wild-sage plain, in the midst of which that post is established. This post I reached just before New Year's day of 1854; the weather continuing mild, without snow.

I must, in conclusion, gratefully mention the members of my party: Pearson and French, who, from the snow-camp, attempted to regain the St. Mary's valley with the animals, and, as we have since learned, succeeded with the loss of but five; and artificers Wilson, Agnew, and Brocken, who, with me, crossed the Bitter Root mountain with pack and snow-shoes, and who maintained a steady cheerfulness under circumstances of reasonable apprehension, with unusual discomfort and fatigue.

Our guide, Charleer, a handsome Nez Perces lad, showed himself to be thoroughly acquainted with the particular route we travelled, and was very faithful.

Much information in the power of a guide to impart is lost when he is such that your only means of communicating with him are by signs. It is always desirable, in similar explorations, to be able to converse with your guide directly or through an interpreter.

I am, sir, very respectfully, your obedient servant,

A. W. TINKHAM.

Governor I. I. STEVENS,
Chief of North Pacific Railroad Exploration Survey.