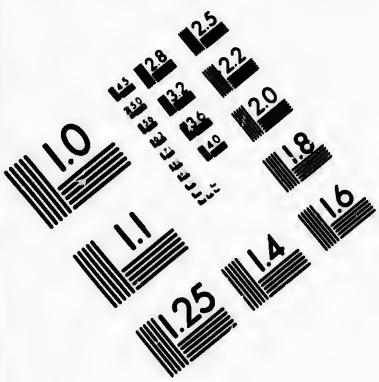

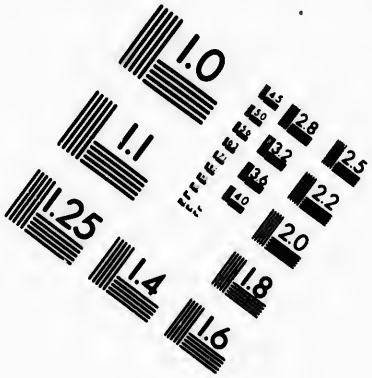

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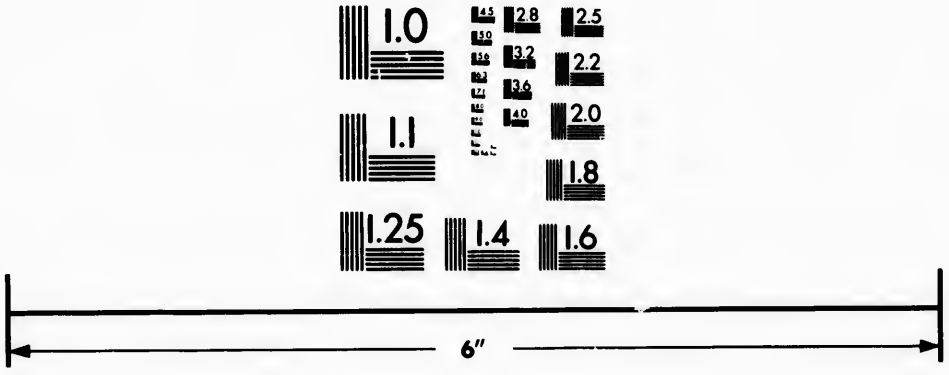

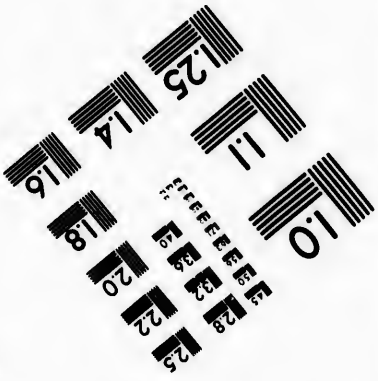

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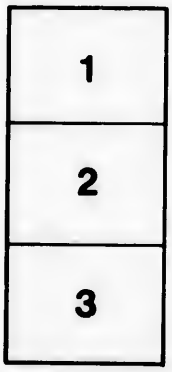

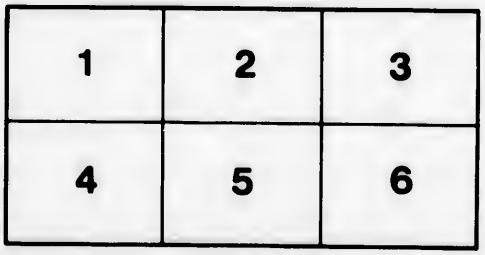

ROYAL ENGINEER CAMP,
NEW WESTMINSTER, BRITISH COLUMBIA,
16th September, 1862.

SIR,

In obedience to your instructions I have the honor to offer a few general observations on circumstances that I noticed while proceeding from New Westminster to Lake La Hache.

From New Westminster to the mouth of the Harrison there is a slight increase in the number of habitations on the banks of Fraser River since last year, particularly on the north side; these coupled with the gaps in the forest caused by the cutting of cord wood for the use of the steamers, and which expose in several places soil of a promising appearance, indicate a slowly but steadily progressive occupation. The river has altered its channel perhaps a little more than usual this year below the mouth of the Harrison; the banks remain the same but portions of the low islands near the Chilukweyuk are removed, and shoal places altered in position.

The top of the incomplete dam in Harrison River being covered, I could not see from the steamer its state of preservation: no part of it however appears to have been injured, but the beacons erected on it should be refixed before the next freshets. The shoal at the mouth of Harrison Lake has considerably increased, the channel now being driven close into the eastern shore. This cumulative obstacle, which is a natural formation, not arising from the dam, does not promise to become a serious one, being easily removed by means of a dredge which, with the increasing traffic, will soon be found an indispensable adjunct to the navigation from the mouth of the Chilukweyuk River to the towns of Douglas and Hope. The tortuous junction of the head of Harrison Lake with Douglas Lake would be greatly improved by the application of this machine, indeed all appearances tend to prove Captain Grant's observations, that a dam alone without dredging would not permanently remedy the obstacles to navigation on the Douglas route.

The town of Douglas is increasing, but the stumps are still in the streets. A want of water in the Mill Race has caused the supply of lumber to fall short of the demand, and has delayed the erection of several buildings.

As you are aware, the Douglas Road, constructed by the Royal Engineers, is in good travelling order, and made of lasting material: the widening of the termini will be a great improvement. Settlement does not appear to increase along this road, probably from the rocky line of country through which it passes, but the

To
COLONEL R. C. MOODY, R. E.,
Commanding,
&c., &c., &c.

owners of wayside houses are generally enlarging their premises, and it is to be hoped, improving both their accommodation and their circumstances.

A new Steamer is partially built on Lake Lillooet, which it is thought will have power enough to stem the rapids just below the Lake, and take the freight direct from the Douglas Road to Pemberton, so soon as the dam near the outlet of the Lake shall be completed.

At Pemberton the landing is, and will be bad, until the waggon road be carried further down the Lake.

From Pemberton to Lake Anderson, the Waggon Road not having the advantage of such lasting material as the Douglas Road, is yielding to the very heavy traffic to which it is subjected, and in many cases requires early attention. There are more houses along it than last year. The mile of tramway between Lakes Anderson and Seton is in good order and is being plated with iron, but the Steamer on Lake Seton is quite inadequate to carry the traffic, and indeed scarcely safe for the Lake navigation; timber however is being cut for a new vessel.

The road from Seton to Lillooet, on which there is now a passenger stage, being alongside a rapid winding torrent will require attention during freshets.

The time occupied in travelling from Douglas to Lillooet by stages and steamers is three days; it should be only two, and it would be well for those interested in this route to the upper country, to take measures for the stages and steamers to run in concert, so as to effect this diminution of time.

Lillooet is rapidly improving both in the number and appearance of the houses.

I have already reported on the new waggon road commencing opposite Lillooet on the East bank of the Fraser and proceeding towards Alexandria. The land is not inviting along it for the first 20 miles, except at the Fountain Flat, 8 miles from Lillooet, where with irrigation a large and very good vegetable garden has been established in the sandy soil, and a field of barley had been cut by the 8th of September. The altitude of Fountain is about 1291 feet above the level of the sea. The road crosses Pavillon Creek by a bridge at 22 miles from Lillooet: a little further up the creek, with a soil derived from the disintegration of granite, metamorphic rocks, and crystalline limestone, which all meet near this spot, is a farm held by Captain Martley, where vegetables are in abundance, millet is of very fine growth, self sown grains of wheat have produced large ears, and barley was being thrashed on the 9th September: there is good grass also for cattle, producing milk and butter of excellent quality. This farm is situated in a valley at the base of Pavillon Mountain in latitude 50° 54 North: with such fertility one would perhaps hardly expect to find that its altitude above the sea was about 2500 feet, as shewn both by an Aneroid Barometer and boiling point Thermometer read upon the spot, and compared with a simultaneous observation of the standard Barometer at the Royal Engineer Observatory at New Westminster, which is 54 feet above the level of the sea. The temperature of the air in the shade at Captain Martley's, at 9.30 A.M. on the 9th August, was 59°, and 64° at noon.

From the Bridge the road ascends Pavillon Mountain in five zigzags with a broad landing place at each: its highest point in crossing the mountain is about 5012 feet above the sea. The land on the mountain is generally open and covered with good grass, large quantities of which have been cut for hay; intermixed with it on the general summit is a good deal of vetch, and wherever this is, are marks of pre-emption. A few houses and many fences are erecting on the plateau near the summit: the general level at this part may be indicated by that of "the Grotto" which has an altitude of about 3989 feet above the sea. The soil is generally a thin covering of humus with a full clayey sand below, and a miner's ditch traverses the whole surface plateau not far from the waggon road.

The descent of the north side of the mountain into Cut Off Valley is likewise accomplished in five stages, although it is about 1000 feet less than the rise, the base about 31 miles from Lillooet being 3535 feet above the sea. The temperature of boiling water at this spot on the 10th August was 205.25 degrees agreeing with the indications of the aneroid barometer. The temperature of the air was 42 degrees at 4 o'clock on the morning of the 10th August.

The few outcropping rocks to be seen on the gravelly flanks of Pavillon Mountain were a hard iron stained trap, breaking into slabs.

The very heavy work that has been executed in the ascent and descent of this mountain is highly creditable to Mr Wright the builder of the road, and it is much to be hoped that the winter snows at this considerable altitude will not interfere with such a well constructed communication.

The length of the air line, astronomically determined, from the commencement of the ascent to the base in Cut Off Valley is 7 miles. The length of the road between the two points is 12 miles.

To the eastward of the Pavillon Mountain, and separated from it by a small valley, is the northerly continuation of the crystalline limestone range of the Pavillon (or Marble) Gap. The Cut Off Valley cuts through this range 8 miles, commencing at three miles from the base of the mountain; it has abundance of good grass with vetch or pea vine interspersed, and wild rye. There is open timber, principally Scotch Fir, generally a good soil, and a fair supply of water. The length of the valley is about sixteen miles by a mile in width, and I understand nearly the whole of it is pre-empted. The altitude of the valley at the 46th mile post from Lillooet is about 2973 feet above the sea: this is not far from the Government Reserve for the probable site of a future town, and where the waggon road from Lytton is to join that from Lillooet. The following temperatures of air in the shade were observed in this valley:

13th August, 7 A.M., 52° 7.
" 9 A.M., 54° 0.
15th August, 9 A.M., 63° 0.
16th August, 3.30 A.M., 38° 0.
17th August, 10 A.M., 60° 0.
24th August, 8 A.M., 54° 0.

The Grave Creek Valley, through which the Lytton road will pass from the Bonaparte to the Cut Off Valley, is in a metamorphic and schistose formation; it has good grass, I think some good soil, several stinking ponds, and a stream of very good water near its southern entrance. The Bonaparte Valley from the junction of Grave Creek to that of the Hat River with the Bonaparte, is principally undulating ground, with a surface of stony sand on which wild thyme grows: close to the river, at a low stage of water, and on the hills, there is a moderate quantity of feed for animals. At the junction of the Hat and Bonaparte Rivers there is a farm with good soil, occupied by Mr. McLean; its altitude is about 1686 feet above the level of the sea. From the mound in Bonaparte Valley to the spot known as the Upper Crossing there is more feed, but great obstacles to road making.

From the junction of the roads from Lillooet and Lytton, the line proceeds to cross Beaver Creek at the head of Cut Off Valley, and to ascend the general plateau on which Green Lake and its associated alkaline ponds are situated. This plateau rises rather abruptly from the Cut Off Valley; its altitude at the head of the Great Chasm is about 3653 feet above the sea, thence it falls about 500 feet to Green Lake. There is one fine stream with a belt of apparently good land along it, between Beaver Creek and the Great Chasm: hay has been cut here and a house is building where the road crosses it. The Great Chasm is a remarkable feature; it is as if a strip of the plateau 6 or 7 miles in length and from 200 to 500 yards in width had subsided to a depth exceeding 950 feet, exposing horizontal strata of close dark grained sandstone containing occasional small holes, probably the casts of fossils, which are lined with minute crystals of quartz. Some small bands of red ochreous earth lie in the strata. The head and walls of the chasm are vertical; into it a small swamp drainage stream falls, which bears no indication of ever being of any magnitude; it is dammed in the chasm, probably by Beavers, into a small pond, on which there was ice on the morning of 26th August, the Thermometer outside my tent at the head of the chasm standing at 32 at 5 A.M. The mouth of the chasm, which is at the commencement of the defiles of the Bonaparte, is contracted and interrupted by the Castle Rocks which have a perpendicular face toward the Bonaparte, and are composed of nearly horizontal beds of angular fragments of trap, metamorphic rocks, and vesicular lava embedded in a mortar-like paste, giving the compound the appearance of an artificial concrete of angular materials. It is greatly disintegrated by the weather and worn into turrets, &c: where the stream issues from the chasm a small portion of underlying compact black rock is visible, which has fractured a little of the strata and given it a dip of perhaps 25° southerly. The waggon road not being completed to the head of the Great Chasm, I rode through the forest to join the Hudson's Bay Brigade trail at Green Lake.

The surface of the Green Lake Plateau from Cut Off Valley to the Chasm is covered with firs and pines, among which is very good bunch grass; beyond the

chasm towards Green Lake the timber becomes thicker, the grass less abundant while the ground becomes hummocky and strewn with boulders: large ponds of water, alive with wild fowl, are scattered in the hollows, together with swamps, through which they apparently connect with each other when the water is raised by the melting of the snows. All these ponds are more or less alkaline, some rapidly discolour turmeric test paper, while others quite close to them will only restore the colour to reddened litmus. In the summer none of these waters should be used for drink, their alkalinity being increased by evaporation; in case of necessity, that known as Strawberry Lake, 3 miles south of Green Lake, is perhaps one of the best to resort to, yet so much alkali is there in this, that in preparing coffee with it, a soapy scum is formed by combination with the grease in which the berries have been roasted: there is good feed on its margin, and indeed around all of these Lakes.

Green Lake which is a couple of miles in width by at least 15 in length, with deep water, is alkaline. Good feed is found on its undulating western shore, along which an Indian trail runs through Bridge Creek to Canoe Creek on the Fraser: the eastern shore is hilly, and both have an open growth of timber. I do not know whether this large body of water has any outlet; if there be one at this time of the year, it does not seem to be into the Bonaparte, which is apparently not contaminated with alkali. I did not examine the water of these Lakes, but they probably contain the same impurities as those met with when travelling with you near Okanagan, viz; Sulphur, Carbonic Acid, Soda (as Sulphate of Soda or Sulphide of Sodium and Carbonate of Soda), and common Salt, probably derived from decomposing trachyte in the soil; as these substances are not lost by evaporation while they are being constantly supplied by drainage, the lakes must gradually become more alkaline. Green Lake was frozen last winter; its altitude is about 3164 feet above the sea. The temperature of the air in shade at 5 A.M. on 27th and 28th August was 33° 5 and 37° 5, respectively.

The Brigade Trail touching the southern extremity of Green Lake crosses and runs along a stream of fresh water that flows into it, then winds between swamps and lakes and low closely wooded hills, attaining an increased elevation until shortly before it makes an abrupt descent to Bridge Creek.

Bridge Creek is in a valley about 3 miles long, lying N.E and S.W., the hills on the north side having a gentle slope and not rising so high as those opposite to them: there is a house here, but although the soil is good, nothing has been sown but lettuce and turnips which grow very well. There is a considerable amount of swamp in the valley, an open growth of cotton wood, and grass that near at hand has been much eaten off by the large pack trains that halt here: One train, I was informed, passed the last severe winter at this place in good condition. Bridge Creek flows into a large stream which is said to be a tributary of Horse Fly Creek. Troughton's boiling point thermometer shewed a temperature at the level of the house of 206° 0 on 29th August, and of 206° 40

on 31st August, indicating altitudes of about 3119 and 3054 feet respectively, or a mean of 3086 feet above the level of the sea, nevertheless the temperature of the air in the shade at 8 A.M. on 29th was 57° and of the water of the creek 54°; on the 31st, at 7 P.M., the air was 69° 75, and on 1st September, at 7 A.M., it was 48° of Fahrenheit.

The Brigade Trail, from Bridge Creek to Lake La Hache, passes over a park-like country, with good grass nearly the whole distance, with a number of large ponds or lakes to the westward, and crosses two streams of good water. The entire distance is about 15 miles, with a fall of about 600 feet. There is a difficult hill side to descend about 2 miles from Bridge Creek Farm, the country then is open and gently rolling. A house has been built on the shore of a lake at 7 miles from Bridge Creek, and another 3 miles further, where hay has been cut, and barley, peas, and potatos were growing on 29th August.

Lake La Hache is about 12 miles long by from one to two wide, and has deep fresh water with a bottom of gravel and sand. The northern shore of the lake, along which the Brigade trail runs, is a continuation of the same rolling country as that between the lake and Bridge Creek: a few small streams flow into it, some of which dry in the summer; these water the valleys in the undulations to the north of the lake, which would probably be worth examining for agricultural purposes. The south shore is much more thickly wooded than the north, and the hills appear higher. There were about a dozen Indians fishing in the lake, who came from Kamloops; these were the only Indians met with north of Pavillon Mountain, except two or three at Bridge Creek who came from Canoe Creek on the Fraser to shoot ducks and gather berries, which are in great abundance at the former place. Lake La Hache is about 2488 feet above the sea. The temperature of the air at 5 A.M. on 30th August was 42° 5, and at 7.30 A.M. 54° at which time the temperature of the water in the lake was 64°; on the same day the Thermometer (not blackened) shewed 80° at noon in the sun. The river flowing out of Lake La Hache, passing through Williams Lake, falls into the Fraser.

From the foregoing description you will see the great altitude of even the valleys between Lake La Hache and the Pavillon, while the casual Thermometer readings mentioned, will serve to indicate the temperatures during the month of August and first half of September. The whole period was excessively hot in the day time with a pleasant mildness at night. There was no frost except at the head of the Great Chasm on the occasion mentioned, but it seems reasonable to suppose that about a month later, night frosts would be found to prevail, and although the snow may disappear early, partly perhaps on account of the comparatively small quantity which is thought to fall, and the absence of shelter from the forest, it does not follow that cold nights may not extend late into the spring. Heavy dews were prevalent, but it seems probable both from report and the appearance of the water courses that very little rain falls in this part of the country. During six weeks, from the

commencement of August, there were only two days on which rain fell, and then it was accompanied by heavy thunder and lightning.

Appended to this report are sketches of the ground with astronomical positions and a barometric section of 360 miles of British Columbia, from the mouth of the Fraser River by the Harrison to Douglas and Lillooet, thence along the line of waggon road and Brigade Trail as far as Lake La Hache. The section and sketch are coloured to shew the nature of the rocks beneath the soil only wherever outcrops or walls of rock distinctly expose their characters. From the mouth of the Fraser to that of the Harrison River, the deposit is shewn as alluvial; it seems probable that a line drawn easterly from Port Moody in Burrard Inlet, crossing the head of Pitt River and touching the Fraser near the Harrison, thence running about south westerly towards Bellingham Bay, would represent the outline, or at all events the northern limits of an estuary formation. The only Fossils I have yet seen in this part, are leaves and stems of dicotyledonous plants in the sandstones and indurated clays of the Coal Peninsula of Burrard Inlet, where lignite is found: and a single tertiary *Mytilus* attached to a fragment of sandstone found in a small stream about 4 miles east of New Westminster. All the sandy soils of this part of the country, as well as the river banks and bars wherever gold has been prospected on the Fraser, contain black magnetic iron sand, easily recognised by the application of a magnet.

From the mouth of the Harrison River along all the lakes and waggon roads to Lillooet, igneous and metamorphic rocks are everywhere visible, the Fraser flows through them at that place and the lofty mountains as far as the Pavillon appear of the same formation, with the occasional addition of some masses of hard conglomerate. Lillooet is prettily situated in an amphitheatre of mountains of perhaps 2 miles in diameter: the banks of the river are terraced here, the town being built on the second sandy level 190 feet above the Fraser.

To the east and north of Pavillon Mountain is a lofty limestone range with a general bearing of N.W. the rock is crystalline, of a whitish blue colour, and in the Pavillon gap, rises with a perpendicular face perhaps a thousand feet high: beyond this range at the head of Cut Off Valley are outcrops of splintery dark coloured trap, then no more rocks are visible above the soil until the Great Chasm exposes the sandstone. From this, northerly, there are no other direct indications of the underlying formation, except perhaps the defile of the upper part of the Bonaparte, which flows between nearly perpendicular walls of massive rock, iron stained, and apparently basaltic, and forms the western boundary of a portion of the Green Lake plateau, the undulating surface of which is vegetable soil and gravel, with stones and boulders of every description. The only other rock in situ between the Chasm and the end of Lake La Hache was a mass of trap at the head of the southern descent to Bridge Creek, but beyond this about half way to Lake La Hache, I thought there were indications of sandstone, my impressions being strengthened by small angular fragments of the same being mixed with other

rounded stones on the surface. The beds of the streams, wherever they had cut through the vegetable soil, and of those of Green Lake and La Hache, contained pebbles of granite, greenstone, quartz, &c., but their banks, being low, did not afford sections of the underlying strata.

I have the honor to be,
Sir,
Your most obedient Servant,
R. M. Parsons,
Captain Royal Engineers.

Approximate Altitudes above the sea of some places in British Columbia.

	Feet.		Feet.
R. E. Observatory, New Westminster,	51.	The Grotto, Pavilion Mountain,	3089.
Harrison Lake,	71.	Summit of Road, Do.	5012.
Douglas Court House,	125.	48th Mile Post, Cut off Valley,	2754.
Hot Spring House,	471.	Cut off Stream near head of Valley,	2490.
Temp. of spring, 129°. (Dr. Sheppard, R.E.)		Bonaparte River at the mound	2114.
Lillooet Lake,	620.	Junction of Bonaparte and Hat Rivers,	1686.
Summit Lake,	1182.	Head of Great Chasm,	3653.
Anderson Lake,	1055.	Immediately below in Chasm,	2721.
Seton Lake,	808.	Green Lake	3104.
Fraser River at Lillooet, (June level.)	692.	Bridge Creek Farm,	3086.
Fountain,	1491.	Lake La Hache,	2488.
Captain Martley's Farm House,	2707.		

R. M. P.

Printed at the Royal Engineer Press, New Westminster, B.C.

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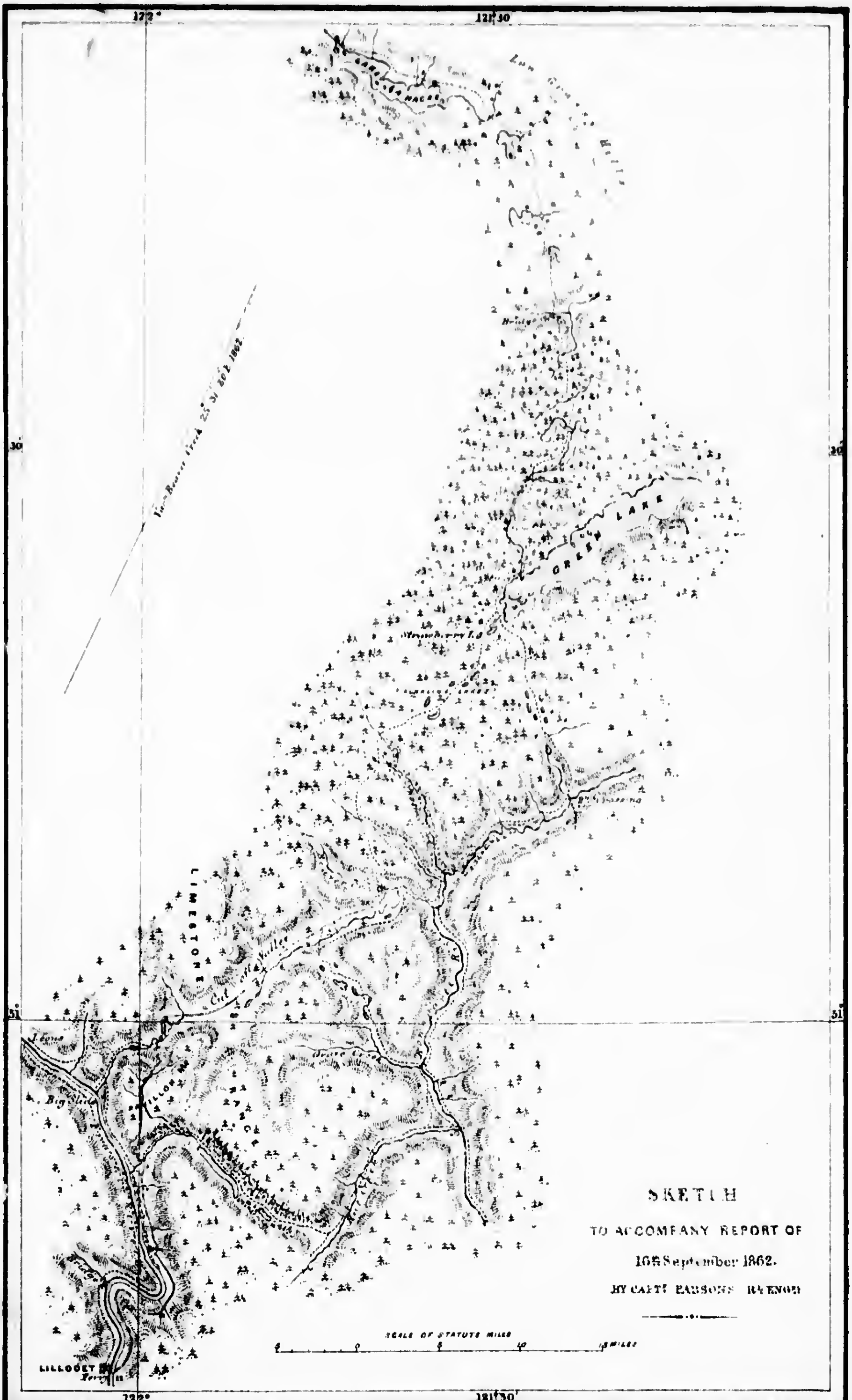

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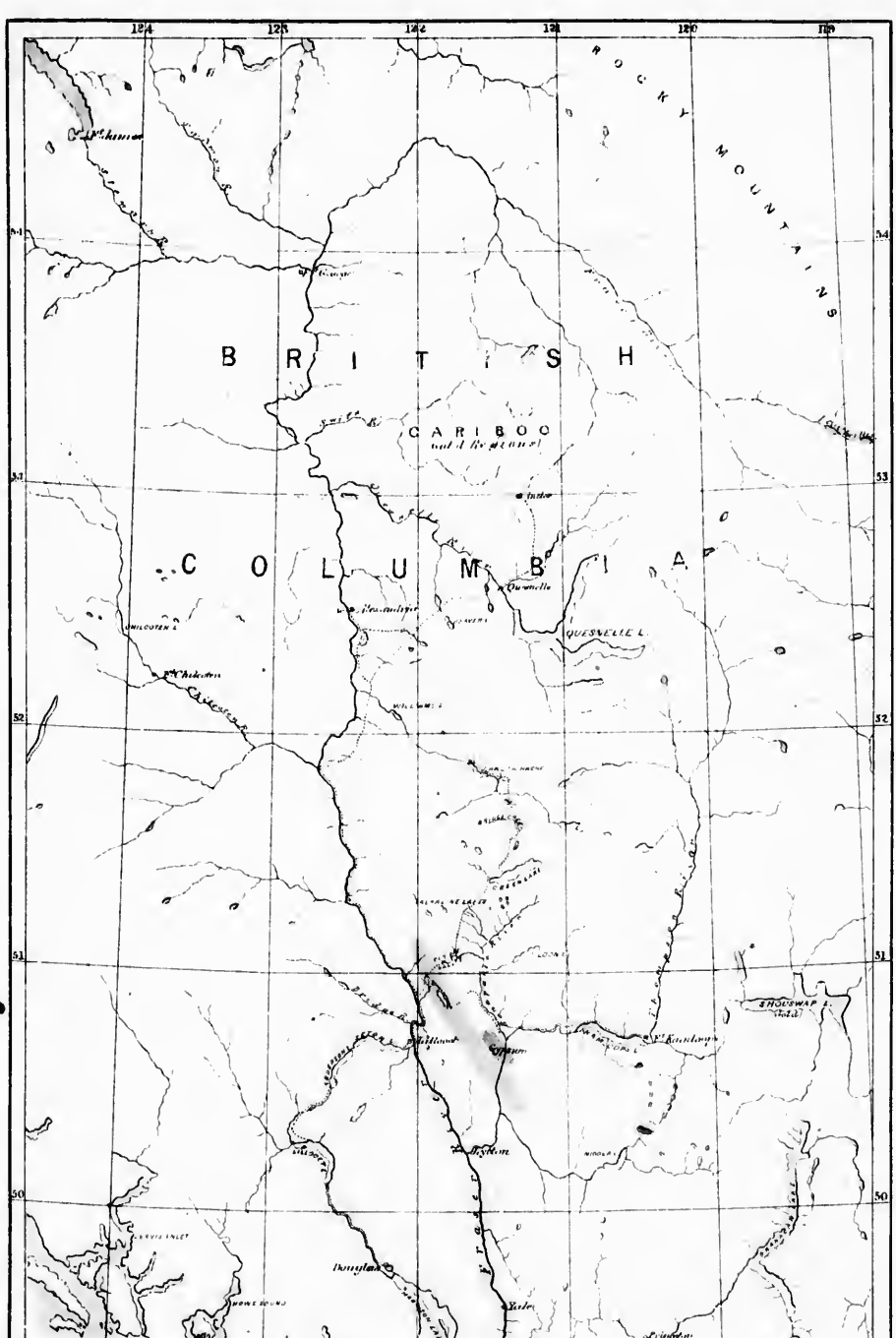
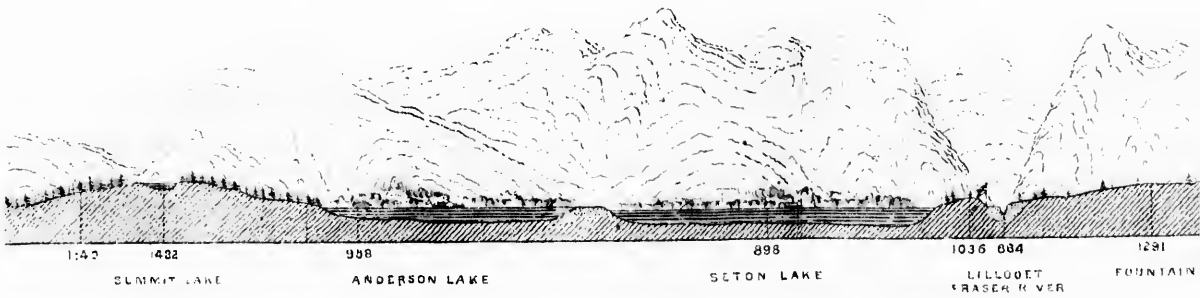


To accompany the Section. J.M. Bernard. Capt R.E.
30 Oct. 1862.

BAROMETRIC SECTIO

WAGGON RO

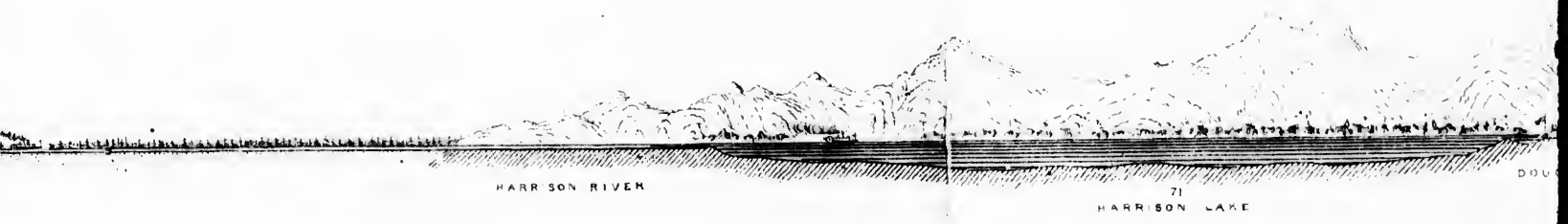


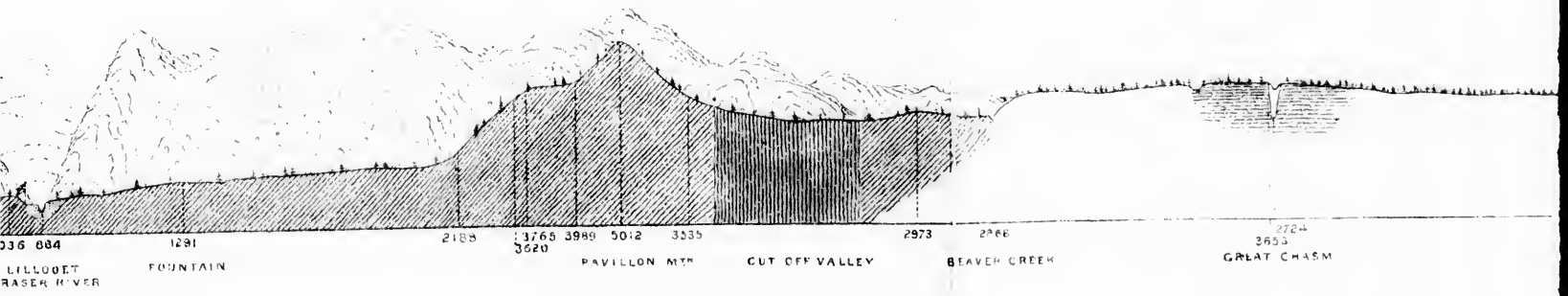
HORIZONTAL SCALE 10 MILES TO ONE INCH.

BRITISH COLUMBIA.

OMETRIC SECTION FROM THE GULF OF GEORGIA UP THE FRASER AND HARRISON RIVERS TO DOUGLAS AND LILLOOET, THENCE A

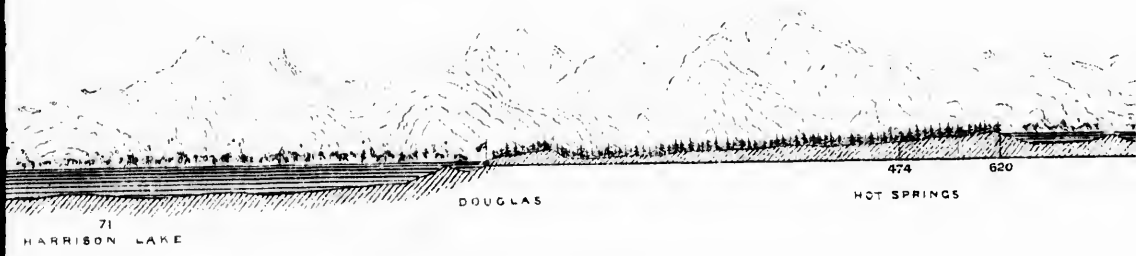
WAGGON ROAD AND BRIGADE TRAIL TO LAKE LA HACHE.-THE LEFT HAND PROFILE WITHIN HALF A MILE OF DISTANCE

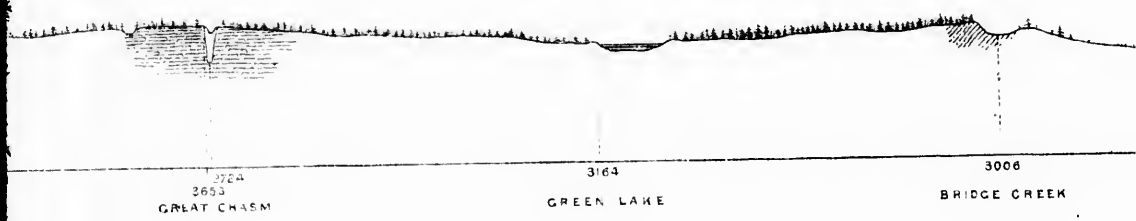




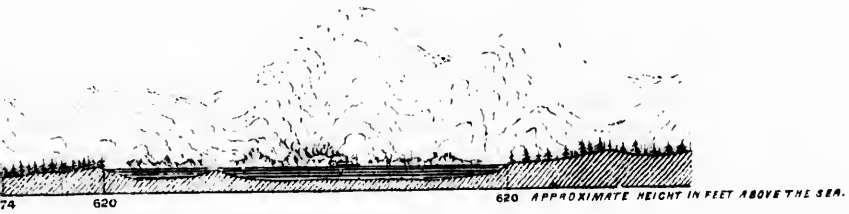
S TO DOUGLAS AND LILLOOET, THENCE ALONG THE LINE O.

ILE WITHIN HALF A N LE OF DISTANCE IS INDICATED.





VERTICAL SCALE 1 MILE TO ONE INCH OR TEN TIMES THE HORI



74 620 620 APPROXIMATE HEIGHT IN FEET ABOVE THE SEA.

SPRINGS LILLOOET LAKE

3006 2488

BRIDGE CREEK LAKE LA HACHE

R.M. Parsons.
Capt. R.E.

OR TEN TIMES THE HORIZONTAL SCALE

DRAWN BY J. LAUNDERS, R.E. PRINTED BY W. OLDHAM, R.E. OCTOBER 1862.