
EXPLORATION OF ALASKA, SEASON OF 1896.

FEBRUARY 3, 1897.—Referred to the Committee on Mines and Mining and ordered to be printed.

The VICE-PRESIDENT presented the following

LETTER FROM THE SECRETARY OF THE INTERIOR, TRANSMITTING, IN RESPONSE TO SENATE RESOLUTION OF FEBRUARY 1, 1897, COPY OF LETTER FROM THE DIRECTOR OF THE GEOLOGICAL SURVEY AS TO PROGRESS AND RESULT OF GEOLOGICAL SURVEY EXPLORATION OF ALASKA DURING THE SEASON OF 1896.

DEPARTMENT OF THE INTERIOR,
Washington, February 2, 1897.

SIR: I am in receipt of Senate resolution of the 1st instant—

That the Secretary of the Interior be, and he is hereby, directed to report to the Senate, at the earliest date possible, the progress and result of the Geological Survey exploration of Alaska during the season of 1896.

In response thereto, I have the honor to transmit herewith copy of a letter (with accompanying inclosures) from the Director of the Geological Survey, giving the information desired in the foregoing resolution.

Very respectfully,

D. R. FRANCIS, *Secretary.*

The PRESIDENT OF THE SENATE.

DEPARTMENT OF THE INTERIOR,
UNITED STATES GEOLOGICAL SURVEY,
Washington, D. C., February 3, 1897.

SIR: I am in receipt by reference from the Department of a copy of Senate resolution of February 1, 1897, calling for a report of the results of the work of the Geological Survey in Alaska during the season of 1896. In response thereto, the desired report is herewith transmitted, and I have the honor to make the following supplementary statement:

The sundry civil bill, approved June 11, 1896, appropriated \$5,000 for the investigation of the coal and gold resources of Alaska. A like amount was also appropriated the preceding year.

Under the first appropriation an expedition was sent out to determine the gold and coal deposits along the line of the coast from Sitka to Bering Sea. The report on the coal is now printed, and that on the gold is nearly completed. A portion of the appropriation for 1895 remaining, an expedition was sent out in May, 1896, to the gold fields of the Yukon River.

The reports that came from the Yukon River were that there were larger placer deposits along the stream beds, and that the country was generally covered with a heavy growth of moss, bushes, and forest, making geological exploration very difficult, if not impossible.

The party crossed to the head waters of the Yukon by the Chilkoot Pass and proceeded by boat down the Yukon to Forty-mile Creek. They found on arrival there that they could traverse the country in all directions, through canyons and over mountains, by having Indians act as packers. The party traversed the valley of the Yukon from the British boundary on the east to the mouth of the river on the west. All of the known placer deposits were examined and the origin of the gold in them was traced to the veins of quartz along the head waters of the various streams entering the Yukon. Sufficient data were secured to establish the presence of a gold belt 300 miles in length in Alaska, which enters the Territory near the mouth of Forty-mile Creek and extends westward across the Yukon Valley at the lower Ramparts. Its further extent is unknown.

It is the opinion of the geologist in charge of the expedition that it is entirely practicable to prosecute quartz mining throughout the year in this region. He also discovered along the river large areas of rocks containing hard bituminous coal.

In view of these facts, I thought it desirable that a reconnaissance map should be made of the gold and coal areas in order to secure an intelligent conception of the resources of the interior of Alaska, and it was on this account that I recommended that the estimate of \$2,500 for the fiscal year 1897-98 be increased to \$25,000. This amount will provide for the sending of five parties to the Territory early in the spring, provided the appropriation be made immediately available.

The boundary between Alaska and the British Possessions follows the line of the one hundred and forty-first meridian from the Arctic Ocean to Mount St. Elias. This cuts through the Yukon gold belt. It is known that the gold belt extends eastward for a considerable distance into the British Possessions. There can be little, if any, dispute, however, as to the position of the boundary line where it crosses the gold belt. The disputed boundary line is from Mount St. Elias southward to the head of Portland Channel. The line which has been recognized for many years is represented on the accompanying map by the heavy dotted line on the eastern side. The revised line on the latest Canadian maps is represented by a heavy dotted line extending from a point near Mount St. Elias across the heads of the various bays and terminating at the southern point of Prince of Wales Island.

I am, with respect, your obedient servant,

CHAS. D. WALCOTT, *Director.*

The SECRETARY OF THE INTERIOR.

PRELIMINARY REPORT ON A RECONNAISSANCE OF THE YUKON DISTRICT IN ALASKA BY THE UNITED STATES GEOLOGICAL SURVEY IN 1896.

PLAN AND ROUTE OF THE PARTY.

A party consisting of Mr. J. Edward Spurr and two geologic assistants crossed the Chilkoot Pass about the middle of June and passed down the Yukon River in a small, roughly built boat, to the crossing of Forty-mile Creek. The main purpose of the journey was the investigation of the gold resources along the upper Yukon, and haste was

made to reach the district occupied by the gold-bearing formations. Most of the available time was devoted to the examination of the auriferous rocks and gravels. The main object of the expedition having been accomplished, the party continued down the river to its mouth, and from there procured transportation to San Francisco by steamer.

During the investigation of the gold-bearing region, all the creeks and gulches which are known to be actually productive of gold were visited, although the reaching of some of those districts involved a trip of several hundred miles on foot. The area reconnoitered is shown on the accompanying map, and comprises upward of 30,000 square miles. The examination of such a large extent of territory was necessarily of the nature of a rapid reconnaissance, but the general character and the probable economic value of the district were fairly well ascertained. A summary of the more important facts is given below.

YUKON GOLD BELT.

Running in a direction a little west of northwest through the territory examined is a broad, continuous belt of highly altered rocks, which crosses the area actually examined approximately as shown on the map. To the east this belt is known to be continuous for 100 miles or more in British territory. The rocks constituting this belt are mostly crystalline schists associated with marbles and sheared quartzites, indicating a sedimentary origin for a large part of the series. In the upper part a few plant remains were found, which suggest that this portion is probably of Devonian age. These altered sedimentary rocks have been shattered by volcanic action, and they are pierced by many dikes of eruptive rock. Besides the minor volcanic disturbances, there have been others on a large scale, which have resulted in the formation of continuous ridges or mountain ranges. In this process of mountain building the sedimentary rocks have been subjected to such pressure and to such alteration from attendant forces that they have been squeezed into the condition of schist, and often partly or wholly crystallized, so that their original character has in some cases entirely disappeared. In summarizing, it may be said that the rocks of the gold belt of Alaska consist largely of sedimentary beds older than the Carboniferous period; that these beds have undergone extensive alteration, and have been elevated into mountain ranges and cut through by a variety of igneous rocks.

Throughout these altered rocks there are found veins of quartz often carrying pyrite and gold. It appears that these quartz veins were formed during the disturbance attending the uplift and alteration of the beds. Many of the veins have been cut, sheared, and torn into fragments by the force that has transformed the sedimentary rocks into crystalline schist; but there are others, containing gold, silver, and copper, that have not been very much disturbed or broken. These more continuous ore-bearing zones have not the character of ordinary quartz veins, although they contain much silica. Instead of the usual white quartz veins, the ore occurs in a sheared and altered zone of rock and gradually runs out on both sides. So far as yet known, these continuous zones of ore are of relatively low grade. Concerning the veins of white quartz first mentioned, it is certain that most of them which contain gold carry it only in small quantity, and yet some few are known to be very rich in places, and it is extremely probable that there are many in which the whole of the ore is of comparatively high grade.

No quartz or vein mining of any kind has yet been attempted in the

Yukon district, mainly on account of the difficulty with which supplies, machinery, and labor can be obtained; yet it is certain that there is a vast quantity of gold in these rocks, much of which could be profitably extracted under favorable conditions. The general character of the rocks and of the ore deposits is extremely like that of the gold-bearing formations along the southern coast of Alaska, in which the Treadwell and other mines are situated, and it is probable that the richness of the Yukon rocks is approximately equal to that of the coast belt. It may be added that the resources of the coast belt have been only partially explored.

Besides the gold found in the rocks of the Yukon district there is reason to expect paying quantities of other minerals. Deposits of silver-bearing lead have been found in a number of localities, and copper is also a constituent of many of the ores.

GOLD PLACERS.

Since the formation of the veins and other deposits of the rocks of the gold belt an enormous length of time has elapsed. During that time the forces of erosion have stripped off the overlying rocks and exposed the metalliferous veins at the surface for long periods, and the rocks of the gold belt, with the veins which they include, have crumbled and been carried away by the streams, to be deposited in widely different places as gravels, or sands, or muds. As gold is the heaviest of all materials found in rock, it is concentrated in detritus which has been worked over by stream action; and the richness of the placers depends upon the available gold supply, the amount of available detritus, and the character of the streams which carry this detritus away. In Alaska the streams have been carrying away the gold from the metalliferous belt for a very long period, so that particles of the precious metal are found in nearly all parts of the Territory. It is only in the immediate vicinity of the gold-bearing belt, however, that the particles of gold are large and plentiful enough to repay working, under present conditions. Where a stream heads in the gold belt, the richest diggings are likely to be near its extreme upper part.

In this upper part the current is so swift that the lighter material and the finer gold are carried away, leaving in many places a rich deposit of coarse gold overlain by coarse gravel, the pebbles being so large as to hinder rapid transportation by water. It is under such conditions that the diggings which are now being worked are found, with some unimportant exceptions. The rich gulches of the Forty Mile district and of the Birch Creek district, as well as other fields of less importance, all head in the gold-bearing formation.

A short distance below the heads of these gulches the stream valley broadens and the gravels contain finer gold more widely distributed. Along certain parts of the stream this finer gold is concentrated by favorable currents and is often profitably washed, this kind of deposit coming under the head of "bar diggings." The gold in these more extensive gravels is often present in sufficient quantity to encourage the hope of successful extraction at some future time, when the work can be done more cheaply and with suitable machinery. The extent of these gravels which are of possible value is very great. As the field of observation is extended farther and farther from the gold-bearing belt, the gold occurs in finer and finer condition, until it is found only in extremely small flakes, so light that they can be carried long distances by the current.

It may be stated, therefore, as a general rule, that the profitable gravels are found in the vicinity of the gold-bearing rock.

The gold-bearing belt forms a range of low mountains, and on the flanks of these mountains, to the northeast and to the southwest, lie various younger rocks which range in age from Carboniferous to very recent Tertiary, and are made up mostly of conglomerates, sandstones, and shales, with some volcanic material. These rocks were formed subsequent to the ore deposition, and therefore do not contain metalliferous veins. They have been partly derived, however, from detritus worn from the gold-bearing belt during the long period that it has been exposed to erosion, and some of them contain gold derived from the more ancient rocks and concentrated in the same way as is the gold in the present river gravels. In one or two places it is certain that these conglomerates are really fossil placers, and this source of supply may eventually turn out to be very important.

COAL.

In the younger rocks which overlie the gold-bearing series there are beds of black, hard, glossy, very pure lignitic coal. An area of these coal-bearing strata lies very close to the gold-bearing district, in the northern part of the region examined, and as the beds of coal are often of considerable thickness and the coal in some of them leaves very little ash and contains volatile constituents in considerable amount, it is probable that the coal deposits will become an important factor in the development of the country.

CONDITIONS OF MINING.

There were probably 2,000 miners in the Yukon district during the past season, the larger number of whom were actually engaged in washing gold. Probably 1,500 of them were working in American territory, although the migration from one district to another is so rapid that one year the larger part of the population may be in American territory and the next year in British. As a rule, however, the miners prefer the American side, on account of the difference in mining laws. These miners, with few exceptions, were engaged in gulch digging. The high price of provisions and other necessaries raises the price of ordinary labor in the mines to \$10 per day, and therefore no mine which pays less than this to each man working can be even temporarily handled. Yet in spite of these difficulties there were probably taken out of the Yukon district the past season, mostly from American territory, approximately \$1,000,000 worth of gold.

An overland route should be surveyed and constructed to the interior of Alaska. All the best routes which can be suggested pass through British territory, and the cooperation of the two Governments would be mutually beneficial, since the gold belt lies partly in American and partly in British possessions. At the present time Mr. Spurr thinks that the best route lies from Juneau by way of the Chilkat Pass overland to the Yukon at the junction with the Pelly. This trail has already been gone over with pack horses by a pioneer named Dalton, who reports a good grazing country and no great obstacles to overcome. The Chilkat Pass is considerably lower than the Chilkoot, over which the Geological Survey party of 1896 passed. If a wagon road, or even a good horse trail, could be built as indicated, the cost of provisions and other supplies would be greatly reduced, many gravels now useless

could be profitably worked, and employment would be afforded for many men. With the greater development of placer diggings would come the development of mines in the bed rock.

Besides the coal which has been alluded to, there is abundant timber throughout the whole of the interior of Alaska, along the valleys of the Yukon. For four or five months in the summer the climate is hardly to be distinguished from that of the northern United States—Minnesota or Montana, for example; and although the winters are very severe, the snowfall is not heavy. Work could be carried on underground throughout the whole of the year quite as well as in the higher mountains of Colorado.

FUTURE DEVELOPMENT.

As shown on the map, the area hastily examined during the past season is but a portion of the great interior of Alaska. That gold occurs over a large extent of country has been determined, but the richness of the various veins and lodes remains to be ascertained by actual mining operations. Gold is known to occur in the great unexplored regions south of the Yukon, because of its presence in the wash of the streams; and it is quite probable that the Yukon gold belt extends to the north and west; but this can be determined only by further exploration. That a second "California gold belt" exists in Alaska may not be probable, but that there is fair prospect of a steady yield of gold is certain.

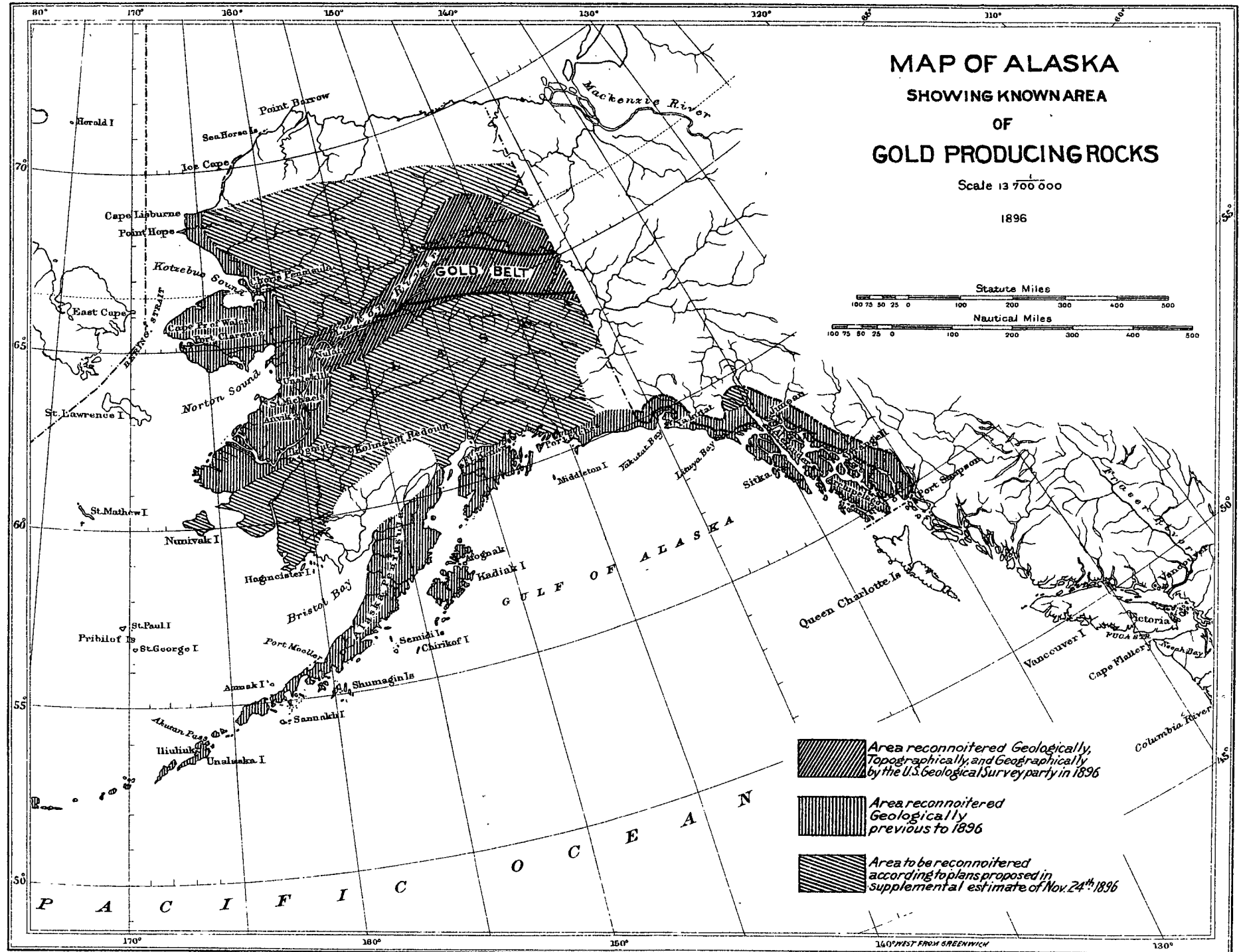
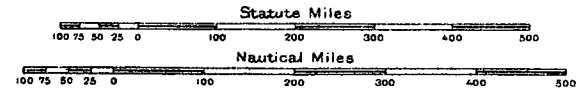
There appeared in the New York Sun of January 24, 1897, a description of the unknown region lying north of Cooks Inlet, accompanied by a sketch map made by the prospectors. This map takes in a rather large area and shows that the Alaska Mountains are broken down north of Cooks Inlet and that the Sushitna River extends almost directly north 150 miles, when it branches, one large tributary coming from the west and another from the northeast. The latter was followed up northward 200 miles to a large lake. The prospecting party report that they found fine gold in nearly every pan, and on the upper river platinum. The rocks for the last 40 miles below the falls and above the forks of the river are slate, porphyry, and granite, many veins of white quartz running through the slate. One specimen assayed well in silver, copper, and gold. This is in the area to which it has been proposed to send one of the Geological Survey parties the next field season.




It is anticipated that the full report of the reconnaissance of the Yukon region by the Geological Survey, with accompanying maps, will be transmitted to the Public Printer by the 15th of April.

MAP OF ALASKA SHOWING KNOWN AREA OF GOLD PRODUCING ROCKS

Scale 1:3700000

1896



-  Area reconnoitered Geologically, Topographically, and Geographically by the U.S. Geological Survey party in 1896
-  Area reconnoitered Geologically previous to 1896
-  Area to be reconnoitered according to plans proposed in supplemental estimate of Nov. 24th 1896