Department of Mines
Territory of Alaska

THE UPPER KOYUKUK REGION, ALASKA

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UPPER KOYUKUK REGION, ALASKA

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I N T R O D U C T I O N

FOREWORD AND ITINERARY

In 1929 the writer made a hasty reconnaissance of the mining area of the Middle Fork and Bettles Rivers for the Mining Deparment of the Territory of Alaska. This was summarized in a brief report showing the different mining operations being carried on in that region.

In 1937 the writer with one assistant flew by pontoon plane to Wild Lake and after mapping the lake, secured a boat and made a topographic reconnaissance down the Wild River to Bettles on the Koyukuk River. From this place he rowed down the Koyukuk River to Allakaket where he secured a plane for Fairbanks. He then left alone by plane for Wiseman, whence, after securing the services of an Eskimo packer, he ran a foot traverse to Twin Lakes at the head of Feebee (Phoebe) Creek, one of the sources of Bettles River. Returning to Wiseman by way of Jimpup and Gold Creeks, he and his packer then went by poling boat to Porcupine Creek. After investigation of Porcupine Creek, he continued by poling boat to Frank's Roadhouse below the canyon of the Middle Fork River. Thence he walked across the divide to Gold Bench on South Fork River. After investigation of the mining on the South Fork, he returned to Tramway Bar on Middle Fork River by way of Cornucopia Creek. After investigating the mining at Tramway Bar and Mailbox Creek, he walked to Twelvemile Creek and thence to Slate

Creek and up the same to Myrtle Creek. He then returned to Coldfoot at the mouth of Slate Creek and walked back to Wiseman. From Wiseman he walked to Nolan and Mascot Creeks. After this he made a brief reconnaissance up Hammond River to Emma Creek, returning to Fairbanks the latter part of September.

The maps accompanying this report are from foot traverse, aneroid readingsand clinometer readings. A few of the main geographical features as around Wild Lake, Big Lake and Twin Lakes, were taken by traverse table outfit from crudely laid-out base lines. But the maps as a whole are in the nature of sketches with no accuracy claimed for details. However, they will serve to show the general appearance of the country with names and locations of the various creeks until more accurate maps can be made by other agencies with more precise instruments. Difficulty was found in fitting the present Wild River sketch map to the John River map as published by the U.S.G.S. This is mostly due to a difference in magnetic variation as determined in the two surveys. However this feature can be corrected in future and more accurate work, the present map serving to show the main features of the Wild River area.

L O C A T I O N

The upper Koyukuk region embraces all that drainage of the Koyukuk River above the town of Bettles, namely that of John River, Wild River, North Fork River, Middle Fork River and Bettles River. It also embraces that part of South Fork River above the mouth of Jim River and ~~and~~ of the Alatna River above the Iniakuk River. The John River and the Alatna River were not visited by the writer. However they naturally

fall in the region here mentioned and will be considered with it.

The region embraces practically all that portion of Alaska above 68 degrees north latitude to the Arctic divide, and from 149 degrees west longitude to about 153 degrees 30' west longitude.

EARLY EXPLORATIONS AND PREVIOUS REPORTS

The first geological and topographical survey of this region was made in 1899 by a U.S.G.S. expedition under F. C. Schrader with T. G. Gerdine as topographer. This expedition made a reconnaissance survey up the North Fork of the Chandalar River, portaged across the mountains to Robert Creek, surveyed that creek and Dietrich and Bettles Rivers, then descended Middle Fork River and Koyukuk River to Nulato. While this reconnaissance was being made of Middle Fork River, D. C. Witherspoon separated from the main party and portaged from Slate Creek to South Fork River and mapped it to its mouth. The results of this expedition were published in the Twenty-first Annual Report, U.S.G.S., part 2, 1906.

In 1901 F. C. Schrader made a reconnaissance survey of the John River to its head, crossed the Arctic divide and floated down the Anaktuvuk and Colville rivers to the Arctic Coast. The results of this expedition were published in U.S.G.S. Professional Paper No.20, 1904.

In 1901 W. C. Mendenhall and D. L. Rayburn of the U.S.G.S. made a similar reconnaissance geological and topographical survey up the Dall River, down the Kanuti to the Koyukuk and thence up the Alatna and across the divide to the Kobuk River which was traversed to Kotzebue Sound. The results of this expedition were published in U.S.G.S. Professional Paper No. 10, 1902.

In 1909 an expedition under A. G. Maddren of the U.S.G.S. ascended the Dall River to its headwaters and crossed over to the Mosquito Fork and South Fork River, thence through Sitkum Pass and down Slate Creek to Coldfoot. Reconnaissance, geological and topographical surveys, was then made to Wiseman, thence to Gold Creek across to the Chandalar River. A compilation of Maddren's and previous expeditions were published in U.S.G.S. Bulletin No.532, 1913.

No other investigations so far as the writer knows, have been made in the Koyukuk until 1929, when a brief reconnaissance was made by himself, followed in 1937 by a more detailed reconnaissance.

S U B D I V I S I O N S

The Upper Koyukuk region may be divided into two distinct subregions, which are distinguished by the bedrock on which the placers occur and by the origin of the gold in these placers.

The first and most northerly of these regions and by far the largest, lies in a belt of the Arctic Mountains which are the southern foothills of the Brooks Range. It will be called in this report from its main distributing point, the Wiseman subregion.

The Wiseman subregion is in an arc about 40 miles wide. It begins in the east at the Baby Mountains, which constitute the divide between the North Fork of Chandalar River and the Bettles and South Fork Rivers. The arc extends from the Baby Mountains due west to Hammond River. There it begins to swing to the southwest to Wild River, and continues bending more and more in a southwasterly direction as far as the Alatna River. At this place it turns almost due west and continues north of the

Kobuk River to Kotzebue Sound. To the east of the Baby Mountains this same arc extends to the southeast into the Chandalar at least as far as the East Fork of the Chandalar River.

The other subregion constitutes all of that part of the Upper Koyukuk region south of the great swale or transverse valley extending in a general east and west direction through Crooked Creek and south of Rosy Mountain as far as Middle Fork River. West of Middle Fork River it embraces all of the lowlands of North Fork, Wild and John Rivers, south and east of the mountains to Bettles. It will be called in this report from its main distributing point, the Bettles subregion.

For convenience of description, the Wiseman and Bettles subregions will be divided into mining areas.

In the Wiseman subregion, the first of these mining areas lies east of the Middle Fork region and embraces Sheep Creek, Gold Creek and all streams tributary fo Bettles River and the upper part of South Fork River. This will be called the Gold Creek - Bettles River mining Area.

The second of these areas embraces all the streams tributary to Middle Fork River above Tramway Bar as far north as and including the drainage of Hammond River and Rainbow Creek. It also includes the few gold-bearing streams running into the central part of the North Fork River opposite Wiseman, such as Mascot Creek and Conglomerate Creek. This will be called the Coldfoot - Wiseman Mining Area.

The third of these areas is the drainage basin of Wild River and will be known as the Wild River Mining Area.

The fourth is the drainage basin of John River below Crag Creek and will be known as the John River Mining Area.

The fifth is the drainage of the Alatna River above Iniukuk River as far as Unakserak River and will be known as the Alatna River Mining Area

In the Bettles subregion, the mining area of Middle Fork River

or around Tramway Bar, will be considered first. It will be known as the Tramway Bar Mining Area. The Mining area of the South Fork valley will be considered second and will be known as the South Fork Mining Area.

The third mining area and the last to be considered will be the bar diggings of the Koyukuk River near Bettles.

G E O G R A P H Y

A. DRAINAGE AND RELIEF

I. RELIEF

The belt of rough topography which constitutes the Wiseman subregion is composed of wide valleys and low passes separating isolated rugged groups of mountains. The valleys are flat-bottomed and have steeply rising sides. The side tributary streams flowing into these valleys are mostly short steep gulches. The mountain groups in the southern part of the subregion have a fairly uniform height between three and four thousand feet with isolated and much more rugged mountain masses rising above this elevation to four and five thousand feet. The whole effect is that of an undulating plateau, sloping towards the south and deeply dissected by river and glacier erosion, the above mentioned higher mountain masses representing old hill ranges rising above the plateau-like surface.

There appear to be two systems of low wide passes connecting east and west from one main drainage system to another and at the heads of many of the larger tributary streams. The first of these systems is only a few hundred feet above the floor of the main valleys. The second system of passes is from 1000 to 1500 feet higher than the first system. The passes in the second system are much wider and coalesce with high benches along the mountain sides. This gives to some of the passes a plateau-like effect. Such a plateau

pass is at the head of Glacier Creek. These two systems of passes along with the other anomalous features of this subregion are due to an intense glaciation and will be dealt with later in this report.

The northern part of the Bettles subregion is an area of well-eroded and rounded mountains from 2000 to 3500 feet high. These mountains as in the Wiseman subregion are also divided into isolated groups by similar main river valleys and two systems of passes. South and southeast of South Fork River the mountains become higher and more rugged. South of and towards the head of Jim River, still higher mountains could be seen. In the eastern part of the Bettles subregion the passes tend to lie in an east-west direction. In the western part the tendency is for the passes to turn more in a north-south direction. Between the eastern parts of the two subregions is a wide flat valley extending from Rosie Mountain on Middle Fork River to the Mosquito Fork of South Fork River. According to Maddren, this valley extends as a depression to the head of Mosquito Fork River to the West Fork of the Chandalar River. The marked east west trend of the Chandalar River from the mouth of the West Fork to the mouth of the East Fork of the Chandalar River would suggest that this part of the valley lies in the above depression. West of Middle Fork River and at ~~the same~~ a higher elevation than the above depression is an area of rolling hills and lakes, this type of topography extending over the western part of the Bettles subregion. It resembles an outwash plain or possibly a drift surface. Middle Fork River runs in a canyon through the upper part of this rolling country and North Fork and Wild Rivers have cut narrow V-shaped valleys in it. In fact the Koyukuk River, itself formed by the confluence of Middle Fork and North Fork Rivers, runs in a channel confined by bluffs of this same type of terrain as far as Bergman.

II DRAINAGE

In the Wiseman subregion of the Upper Koyukuk region the main streams have a tendency to flow in a direction at right angles to the general east-west trend of the mountains. These streams, named from east to west are: the South Fork River, Bettles River, Dietrich and Middle Fork Rivers, North Fork River, Wild River, John River and Alatna River. The tributary streams as a rule are much shorter and in the main are steep narrow gulches. The larger tributaries generally run parallel to the master streams of the region, then cut abruptly at right angles by short cross valleys into them.

The only tributary of South Fork River examined by the writer in this subregion was Glacier Creek. This stream heads in a lake in a low pass into Bettles River and flows directly south in a typical glaciated valley to the South Fork River.

Bettles River heads in the mountains in the north eastern part of this subregion near the headwaters of the North Fork of the Chandalar River, flows south to its junction with Feebee (Phoebe) Creek, then turns abruptly west, then north into the Dietrich River.

Dietrich River, the main headwaters of Middle Fork River, heads in the main Brooks Range north of this subregion and flows south to join the Bettles River. The combined streams then form the Middle Fork River, which flows east of south to ultimately, by way of Koyukuk River, join the Yukon. The North Fork River also heads in the main Brooks Range and flows directly south to join the Middle Fork River and form the main Koyukuk.

The Wild River heads in a series of moderately low rounded mountains between the Tinayguk River and the east fork of the John River. It flows in a many-branching winding stream through a wide, glaciated valley to the upper end of Wild Lake, which is about 7 miles long. The outlet of

the lake is a deep moderately swift stream, which flows into Trout Lake. After leaving Trout Lake, the current becomes very much swifter. About opposite the mouth of Old Stiff Creek, it splits into a braided stream which continues for over a mile and is almost impossible of navigation. From the splits to the mouth of Flat Creek, the river flows in a series of deep pools and riffles. Below Flat Creek for several miles the current is very slack and the river winds in many turns and ox bow bends as far as Medicine Creek. Below Medicine Creek the stream increases in swiftness and runs over many shallow riffles, making navigation very difficult as far as Cassiar Creek. From Cassiar Creek around Two-Day Mountain to Gilmore Creek, is another stretch of slack water with very little current and many deep pools. From there on to about 9 miles from the mouth is a stretch of alternate pools and riffles but not difficult to navigate. About 9 miles from the mouth, the grade of the river steepens perceptibly and many large boulders obstruct the channel. Navigation through this section is very hazardous, especially in high water. The last half mile of the river is in the flood plain of the Koyukuk with slack water prevailing.

John River heads in the high mountains of the Brooks Range and flows south, then east of south to join the Koyukuk about 1 mile above Bettles. In its upper course Alatna River roughly parallels John River, but swings to the east in its lower valley.

In the Bettles subregion the main stream is the South Fork River. This river and its main tributaries all have east west lines of drainage. North south tributary streams in this subregion are all short and inclined to flow with precipitous grade. The South Fork is a large stream, comparable in volume of water to Bettles River or the North Fork River. It

flows in a rather narrow deep canyon through the subregion with a swift and shallow current and navigation in it is confined almost entirely to poling boats, the water very seldom, except in the lower end, being deep enough for outboard motors.

B. SETTLEMENTS AND POPULATION

Practically the only settlement in the Upper Koyukuk region is at Wiseman, where there are three stores and the population of the surrounding creeks congregates for the winter. The summer population at Wiseman is very light and consists of a few natives besides the storekeepers. The old settlement at Coldfoot is now abandoned and a few tumble-down buildings are all that remains to mark the place of a once thriving mining camp. At Bettles the population has dwindled to two or three families of natives and a storekeeper and roadhouse man. Altogether the population of the upper Koyukuk region is very scarce, probably composed of 110 adults, native and white together.

C. TRANSPORTATION AND COMMUNICATION

The main transportation for all heavy freight and second-class mail is by river boat from Nenana on Tanana River to Bettles. From that place a fair winter tractor trail has been constructed to Wiseman. Transportation is by tractor over this trail in the winter time or by outboard motor and poling boat on the Middle Fork River in the summer. Two or three trips are made by this latter method each summer and about the same number by tractor every winter. There is a tractor trail also built from Wiseman to Wakeup Creek by way of Gold Creek, Linda Creek and Glacier Creek. There is a fair truck road from Wiseman to Nolan Creek and also from Wiseman

to Gold Bottom Creek on Hammond River. It is possible to haul freight from Wiseman for Mascot Creek by tractor in the winter time as far as Seattle River.

Freight rates from Seattle to Koyukuk Station at the mouth of Koyukuk River averages for all classes of goods about 5¢ a pound. From Koyukuk Station to Bettles the rate is 2¢ a pound by river steamer. From Bettles to Wiseman in summer by poling boats equipped with outboard motors, the rate is 6¢ a pound. In winter for the same haul from Bettles to Wiseman the rate is about 4¢ a pound. The cheapest rate from Seattle to Wiseman is the parcel post rate of 12¢ a pound. A great deal of the freight which can be sent by this means, is delivered into Wiseman by parcel post. The airplane freight rate from Fairbanks to Wiseman is 16¢ a pound. Perishables are taken to Wiseman entirely by airplane. The freight rates to any other section of the Koyukuk, other than those given, is by dogteam or poling boat and is a matter of private contract.

There is a weekly plane service carrying first-class mail to Wiseman, Bettles and Allakaket from Fairbanks. Pontoon plane service to Wild Lake and plane service on skiis to Flat Creek in the winter time, are the only means of getting freight into the mining area of Wild River. Planes will fly to the Wild River country only under charter. Charter rates run about $60 per hour of flying time, which is approximately 30¢ per pound, depending on the capacity of the plane chartered.

Pontoon planes in the summer or ski planes in the winter can also be chartered to Big Lake at the same price per pound as at Wiseman, if loaded to capacity. This supplies all the lighter and more perishable freight to Wakeup Creek and the tributaries of Bettles River.

Freight is brought into the mining areas of the South Fork by poling boats or is transported in the winter time by dogteam from Tramway Bar across the low pass at Jean D'Arc Creek.

The U. S. Signal Corps maintains commercial radio communication from Fairbanks to the private commercial station at Wiseman. There is also a private station at Allakaket. These two stations and another private station at Bergman, are the only means of radio communication with the outside world in the whole Koyukuk valley.

D. CLIMATE

The Upper Koyukuk region has a sub Arctic climate with a short, hot summer and long cold winter. The mining season in general is atleast two weeks shorter than at Fairbanks. In the upper Bettles River and Wild Lake country the season is about one month shorter than at Fairbanks. The snowfall averages about one foot more than at Fairbanks over most of the

Upper Koyukuk region. The early part of summer as a rule is generally dryer than at Fairbanks, but with a very heavy rainfall beginning in the middle of August until freeze-up, most of the precipitation of the year falling at this time.

B. VEGETATION

The Upper Koyukuk region is sparcely timbered with spruce up to 2500 ft. in elevation, straggling groves growing in favored spots occasionally to 3000 ft. This spruce is large enough to serve for firewood, but timber of sufficient length and diameter for saw logs is rare and grows only in very localized sections on southern hill slopes and in certain well-watered, protected valleys. Small birch trees are scattered throughout the spruce, though birch as a rule is rarer than in the Yukon Valley. Along the river banks and on well-drained slopes balsam poplar and aspen are quite common. Grass grows on the valley bottoms and is sufficient for horse feed during the summer months. In fact horses have wintered out for several winters in the Koyukuk and could probably do so in sheltered spots indefinitely, provided the snow did not crust and the horses were unshod when turned out in the fall.

The commonest berry is the blueberry. The lowbush cranberry is the second most common. So far as observed, the highbush cranberry does not come much further north than the mouth of John River. All country above two thousand feet in elevation is covered with mosses and lichens. Areas of typical tundra, or treeless niggerhead swamps, as occur in the Yukon Valley and along the Bering Sea and Arctic coasts, are rarer and smaller in extent than in other parts of the Interior of Alaska.

F. ANIMAL LIFE

Taken as a whole, the upper Koyukuk region is a very poor game country. East of the North Fork River and south of its valley and the mouth of Wild River, moose are practically non-existant. There is a run of caribou in the late fall through the South Fork River which usually extends as far west and north as Middle Fork and Bettles River. West of the Middle Fork and throughout the Wild River area caribou are very scarce. There are a few local bunches of caribou in the John River country which migrate as far south as Alatna. Sheep have been entirely killed off except in the rough mountains at the heads of the main rivers. None occur on the headwaters of South Fork River and they are scarce at the heads of Bettles, Matthews, Dietrich and Hammond Rivers. They are fairly numerous at the heads of the valleys of the John, Wild and Alatna Rivers. The grizzly bear also occurs only in the headwaters of the main streams. The only resident large game animal which is available to the prospector at all times during the summer is the black bear, though through constant killing he is becoming rather scarce.

The willow or ruffed grouse does not occur as far north as the Upper Koyukuk region. Ptarmigan and snowshoe hares vary in abundance through various cycles. However, since the advent of the coyote in Alaska, the rabbit cycle has never reached its former peak.

Salmon run up Middle Fork River as far as Wiseman, up South Fork River as far as Eagle Bluff and up Wild River as far as Flat Creek. Greyling occur plentifully in all the streams and lakes large enough to support aquatic life. Sucker-mouthed whitefish and lingcod are in the deeper pools of the larger streams. River herring(whitefish), northern pike and lake trout are plentiful in all the large lakes.

Mosquitoes and horse flies are prevalent during the summer months and in some particular summers are very annoying. Gnats are not so abundant as in the Yukon Valley.

All species of fur bearers are very scarce. This is probably not so much due to the incapacity of the country to support these animals nor to intensive trapping as it is to the coyote which has over-run all of the interior of Alaska during the last ten or fifteen years. Wolves are scattered in small bands wherever there are caribou or sheep for them to prey on.

The only animal sign in the valleys of the South and Middle Fork Rivers seen by the writer, were made by wolf or bear.

G E O L O G Y

A. GENERAL ROCK DESCRIPTION AND LOCATION

The rocks of the Upper Koyukuk Region have been classified and correlated by various expeditions of the U.S.G.S. These classifications will be followed as nearly as possible in this report. The first rock to be considered is a series of schists which cover most of the southern two-thirds of the Wiseman subregion. These schists lie in an east-west belt thirty to fifty miles wide, from the Baby Mountains on the east to the western limits of the region. East of the Baby Mountains this same belt extends at least to the East Fork of the Chandalar River. Westward it extends down the right limit of the Kobuk River and north to Noatak River as far as Hotham Inlet, possibly connecting with the schists of Seward Peninsula. These schists range in color from black through green and red to various shades of brown to white and range in texture from fine-grained, slatey phyllite to finely foliated micaceous schists. These

schists are very ancient and are placed by the U.S.G.S. in the Paleozoic era and of probable early Silurian age. They constitute as far as known the only favorable formation for gold occurance in the Wiseman subregion. They have been intruded in many places by granite-type rocks.

The Baby Mountains on the eastern border of the Wiseman subregion are such an intrusion, composed of quartz diorite. This rock was not seen by the writer but was described by Maddren and Mertie as being a light-colored, greenish-tinged rock, ~~[illegible]~~ in places gneissoid to schistose. The western limits of this intrusion do not extend as far as Twin Lakes, although the creeks tributary to the lakes from the east may head into it. West of the above locality intrusions of similar rock occur at Horace Mountain, and also, according to Maddren, on the north side of Bettles River valley opposite Garnet and Eightmile Creeks. Although not seen, it is thought from the wash in the creeks and from the reports of the miners, that granitic rocks occur in the area between Twin Lakes and Big Lake south of Bettles River and north of South Fork River. West of this again ~~[illegible]~~ the only intrusion mapped is at Emma Dome. However a dioritic dike crosses Gold Creek just above Discovery Claim and it is thought, from the reports of prospectors, that Sheep Mountain is partially at least an intrusive mass. East-west basic dikes occur on Smith Dome

No intrusions were seen on the North Fork River. On Wild River, Spring Creek is crossed by a northwest-southeast striking light green schistose dioritic dike. Dikes occur on"the Mint", the mountain ~~[illegible]~~ ridge between Spring Creek and Summit Creek. John River was not visited by the writer. However, no intrusions in the schist are reported by the U.S.G.S. On Alatna River a large granitic intrusion is shown in Bulletin 536 by Phillip S. Smith on the right limit directly north of

Walker Lake. Undoubtedly many of the intrusions into the paleozoic schist have a direct bearing on the genesis of the placers in the areas adjacent to them. However the relationship between the intrusions and the gold occurences has not been worked out, and will have to await much more detailed mapping and geological work.

North of and overlying the paleozoic schists, are beds of massive crystalline limestone. The main body of this limestone in the Middle Fork-Bettles River area lies north of the Bettles River. Outlying masses of it occur south of that river at the mouth of Gus Creek, also capping the mountain at the head of Canyon Creek and composing all of Horn Mountain. In the North Fork-Middle Fork Area schistose limestone occurs above Vermont Creek and in the canyon of Hammond River. It is unknown how far up Hammond River this limestone extends but from the report of the miners in the district the extent is very limited. No limestone could be seen on Seattle River. No limestone could be seen on lower North Fork River, nor so far as the writer is aware, was limestone mentioned in the accounts of the exploration of that river by Robert Marshall. It may possibly be that the limestone ends west of Hammond River to come in again west of North Fork River. In the Wild River Area limestone caps most of the higher mountains north of Schofield Creek. On Rye Creek it is faulted down so as to compose the bedrock of part of the creek valley. On Cleveland Creek it composes the walls of the valley, but the creek itself is cut down to schist. It also forms the divide between Toby Creek and Cleveland Creek. On John River, according to the U.S.G.S., it comes in at Crevice Creek and Sixtymile River and ends at Mashoosballuk Creek. On Alatna River the limestone comes in due west of the upper end of Inniukuk Lake and ends a short distance north of Peingaluk River.

On Mule Creek in the Middle Fork-Bettles River Area, the schist can be seen through imbedded strata of limestone and limestone schist to grade into the limestone. This conformable relationship was stated by J.B. Mertie, Jr. in Bulletin 773 in regard to schists and limestone of the Chandalar. In the Wild River Area this gradation is very distinctly brought out on all the mountain peaks examined, grading as on Mule Creek from occasional limestone beds to limestone schist and then to massive limestone. On Cleveland Creek the limestone is schistose on lower exposures but massive higher in the series. However in the first area, the mountain at the head of Canyon Creek seems to have a distinct non-conformity between the limestone and the schist, which possibly may be due to faulting. The limestone in the Upper Koyukuk Region has been definitely assigned by the U.S.G.S. to the Silurian Age.

North of the Silurian limestone is a belt of slate. This belt extends, except in the John River and Alatna River Areas, to the north and northwest as far as mapped. In the Middle Fork-Bettles River Area, this slate belt abuts directly on and overlies unconformably the Silurian limestone. A marked feature of this slate is the quartz veining throughout. The slate in this area has been fully described by J.B.Mertie, Jr. in Bulletin 773 and assigned to the Middle Devonian Age. In the North Fork-Middle Fork Area the relationship of the slate to the older limestone or schist has not been observed. In the Wild River Area, the slate is in direct contact with the Silurian limestone on the right limit of Toby Creek. It is here a black, barren-looking slate, with red and yellow stained cleavage planes. In places it appears more metamorphosed and looks like a phyllite. On Toby Creek the cleavage planes dip 20 degrees to the east. East of Upper Wild River the slate contacts the limestone at Divide Creek, although there is a small area of slate about 1/2 mile south of

this contact between Divide Creek and Swamp Creek. East of Flat Creek the contact occurs near the unnamed Creek north of Deadman Creek. Westward on the East Fork of the John River, the Devonian slate is in contact with the Silurian limestone and crosses the river north of Edwards Creek. On the John River and Alatna River there is, according to the U.S.G.S. in Bulletins 536 and 815, an intervening band of schist of Silurian age between the Silurian limestone and the Devonian rocks. The contact on John River is given at Hunts Fork and on Alatna River at its head.

South of the paleozoic schist and bordering the Bettles subregion on the north is a band of cherts, slates and volcanics, tentatively placed by the U.S.G.S. as of Upper Devonian or Mississippian Age. These rocks compose Rosy Mountain and, although not examined, appear to be at this place of igneous origin. On Wild River, the limestone capping on the mountains ends at Medecine and McIntyre Creeks. South of this is a schistose slate or phyllite which extends south to Michigan Creek. Two-Day Mountain and the southern half of Michigan Mountain appears to be a barren looking black to brownish slate. Where the contact is between the phyllite and slate was not observed.

All of the Bettles subregion north of the South Fork River and up the John and Alatna Rivers to Timber and Helpmejack Creeks is an area composed of conglomerates, sandstones and shales. These rocks are given by the U.S.G.S. as being of Cretaceous Age. South of South Fork River, according to the U.S.G.S,, is another short band of Upper Devonian rocks. South of this again and composing the valley of Jim River are schists with granite coming in at the head of Jim River and extend north to Mosquito Fork River and west to Chandalar River.

B. STRUCTURE

The superficial appearance of the whole of the Wiseman subregion is of a great curving anticlinorium, whose top has been eroded away, exposing the older rocks in a central belt flanked on each side by younger series. It is suggested that possibly the relationship between the Devonian schists and slates and the cretaceous conglomerates and sandstones on the eastern part of the southern border of the Wiseman subregion is due to a down faulting on the south side. This might account for the swale which lies between the two subregions of the Upper Koyukuk. Why Upper Devonian rocks do not outcrop again on the John River might possibly be due to some fault relationship. The Wiseman subregion looks as though it was originally a plateau, gently inclined towards the south and across which river valleys were cut in a north south direction, possibly on structural lines. These river valleys again were deepened and widened by glaciation.

C. GLACIATION AND CHANGES IN BASE LEVEL

All over the Upper Koyukuk region are evidences of intense glaciation. It is thought that the whole region was covered at one time by an ice cap. At first glance it would appear as though the following was the sequence of events in the Koyukuk's glacial history. First an ice cap covered the whole region. Then, on the gradual melting of this ice cap back to the northern mountains, valley glaciers still occupied the main valleys and were ice outlets for long periods of time after the surrounding hills were bare of ice, much in the same condition as the present icefields in the southern part of Kenai Peninsula. These valley glaciers caused the final deepening and widening of the valleys in the Wiseman subregion. However, a more detailed examination points to a more involved history, than in the obvious one above.

In a great majority of the creeks examined, three levels of stream deposits were noted. First, there is a deep channel cut into the bedrock. From 30 to 150 feet above this is the present creek channel which may or may not be cut into the bedrock of the valley walls. Ranging from 50 to 500 feet above this last are various levels of high channels, the remnants of which are generally cut into the bedrock of the valley walls. In some of the creeks where these channels are not in evidence it is possible that they are still there but have not yet been found by the Koyukuk miners. All these channels are undoubtedly due to the interplay of normal erosion and glaciation. Their history is of great importance to the gold mining industry and is directly related to the deposition and formation of the gold placers. It is thought that the deep channels are the oldest and that the high channels are next in age and represent an earlier period of erosion which has continued down to the present channels. The exact relationship of all these channels to glaciation is a problem that is hard to solve and when one remembers that the Upper Koyukuk Region, following the analogy of other parts of Alaska and North America, may have gone through atleast four glacial cycles in which the ice entirely disappeared in interglacial times as at present, the problem becomes even more complicated. However the facts about them so far as known will be noted here.

On Hammond River, Linda Creek and Sheep Creek, the deep channels are said to be cut off where they extend out about 3/4 miles beyond the hills forming the valley walls of Middle Fork Valley. A steep drop-off occurs at these places, just as though the channels had been gouged away by a glacier. It is therefore probable that these deep channels are older than the last glaciation of the region. They also undoubtedly represent a period of lower base level than that of the

the present and may possibly correspond to the deep channels of the Tanana Valley and parts of the lower Yukon Valley.

The high channels represent a period of higher base level than at present. The valleys were filled in with detrital material so that their floors stood from 50 to 200 feet higher than at the present time. The present creek channels would then be the result of the removal of part of this material and a gradual lowering of base level. One difficulty with the above hypothesis is the length of time required to remove so much material. If the last or Wisconsin Glaciation in southern Alaska ended from 30,000 to 60,000 years ago, it probably ended in the Koyukuk later, say from 20,000 to 40,000 years ago. Of course this last supposition may not be true, as glaciation seems to be due more to precipitation rather than to coldness of climate. If glaciation ended from 30 to 60 thousand years ago, it does not seem possible, if the rate of present erosion is at all analogous, to remove, in places up to 1000 feet of outwash material and rock, in the length of time given, after the filling of the valleys to that depth with such material.

A reconstruction of the pleistocene history of the Upper Koyukuk region should take into consideration the following items:

(1) Three (or more) levels of stream erosion, namely a deeply buried channel, a high channel and the present stream channel.

(2) The cutting off of the deep channels in the Middle Fork River valley and probably in the Glacier Creek and other valleys by a deep glacial gouge.

(3) Two systems of low wide passes between the main north-south valleys and between Bettles River valley and the valleys to the south, the system thought to be the older being much higher in elevation than the other.

(4) Two (or more) systems of benches more or less corresponding in level to the above passes, the highest being probably the oldest.
(5) Evidence by reason of high channels that the general level of the valleys at one time was raised by an (outwash) filling to the level of the above benches and subsequently eroded down to its present elevation.
(6) Glaciated valleys like those of Twin Lakes, Big Lake, Wild River Lake, etc. which show recent glaciation lying in and corresponding to the present level of the drainage systems.
(7) Comparatively short length of time since the end of glaciation to build up and then remove an enormous section of valley filling.

It seems probable to the writer that there were two periods of glaciation over an immense period of time. However the solution of this problem awaits much more detailed work and accurate mapping than has been done up to the present, and is outside the scope of this report. But it would seem that this solution would contain the key to the solution of the great muck and gravel deposits of the Tanana and Kuskokwim and lower Yukon valleys. It will also certainly have a direct bearing on the placer mining industry of the whole interior of Alaska and may point the way to the discovery of new deposits.

ECONOMIC GEOLOGY

A. GENERAL DESCRIPTION OF PLACERS

Most of the placers in the Wiseman subregion are situated in narrow gulches, the larger streams having been so recently glaciated that they contain no placer concentrations, although the gravels in them are more or less gold-bearing.

In the Bettles subregion, besides the above, other types of placers occur, as so-called bar placers and river bench placers.

In the stream placers as mentioned before, three levels of concentration have occurred; the present stream channels, deeply buried channels and high channels. Such remnants of the last two left from subsequent erosion, lie inchannels cut into bedrock. The present streams may or may not have their beds cut into bedrock channels, depending on whether they run over the detrital filling in the original valleys or have cut new side channels in the valley walls.

For convenience of description, the Wiseman and Bettles subregions may be divided into mining areas. These are relisted below for the sake of clarity.

Wiseman Subregion

(1) Gold Creek - Bettles River Mining Area

(2) Coldfoot - Wiseman Mining Area

(3) Wild River Mining Area

(4) Alatna Mining Area

(5) John River Mining Area

BETTLES SUBREGION

(1) Tramway Bar Mining Area

(2) South Fork Mining Area

(3) River bars

B. SPECIFIC DESCRIPTION OF MINING AREAS AND CREEKS

W I S E M A N S U B R E G I O N

GOLD CREEK - BETTLES RIVER MINING AREA

This mining area lies between Middle Fork River on the west and the Baby Mountains on the east. To the south it includes Rainbow Creek, the head of Glacier Creek, King Creek and the head of South Fork River. On the north it is bounded by the limits of the watersheds of the creeks flowing south into the Bettles River.

GOLD CREEK p+ 3-30

One of the first streams to be mined in the Upper Koyukuk was Gold Creek, pay gravels having been found in it in the summer

of 1900. Gold Creek is a rather large left limit tributary of Middle Fork River about 12 miles north of the town of Wiseman. It heads in several gulches in Sheep Mountain, then runs in a northerly direction to the mouth of Little Gold Creek where it makes a wide bend to the northwest as far as the head of the canyon. From this place the creek turns sharply to the southwest then west to its confluence with Middle Fork River. Below its headwater gulches to as far as Little Gold Creek, the upper 4 miles of Gold Creek valley is rather open. Below Little Gold Creek the valley becomes more contracted and canyon-like with a deep, narrow V-shaped cross-section until about 2½ miles from its mouth when it swings sharply to the southwest and enters into a narrow canyon for about one mile. Below this canyon it runs in a wide shallow depression across the flat bottom of Middle Fork Valley.

The first good-sized tributary of Gold Creek below its headwaters branches is a small creek about 2 miles long, called by the miners, 18-Pup. 18-Pup heads into the flanks of Sheep Mountain and joins the main creek at Claim No. 18 Above.

The second tributary of Gold Creek below the headwaters branches is Little Gold Creek, coming in on the right limit at Claim No. 14 Above. This creek, about 2 miles long, heads in a low pass opposite Eden Creek, a tributary of Glacier Creek. It was through this pass the old trail from Wiseman to Big Lake originally ran.

Below Little Gold Creek at Claim No. 11 Above a small creek known as 11-Pup comes in on the right limit and heads against a limestone capped mountain which marks the divide between Gold Creek and Glacier Creek.

At Claim No. 8 Above, Webster Gulch, a small stream about one mile long, comes in on the left limit.

About 500 feet below this last gulch and on the right limit is another small gulch known as Creecy Gulch. The present trail to upper Gold Creek from the tractor road leads down this gulch.

At Claim No. 2 Above, Magnet Creek, the largest tributary of Gold Creek, comes in on the left limit. This creek heads in the outlying flanks of Sheep Mountain and has a total length of about 3 miles.

On Discovery Claim a small gulch known as Discovery Pup comes in on the right limit. This gulch is about 1½ miles long and heads into Gold Hill on the divide between Emory Creek and Linda Creek.

On 2 Below is another small gulch coming in on the left limit.

On Gold Creek, as is usual in the Upper Koyukuk, there are three channels or levels of stream concentration: a high channel, the present creek channel and a deeply buried concentration or deep channel. Their origin has been previously discussed under "Glaciation."

The bedrock on Gold Creek, with the exception of a dioritic dike, is schist. The only limestone seen was that capping a mountain on the right limit of Little Gold Creek. Gold Creek in the driest season discharges about 500 miners inches of water. The grade from the mouth to Claim No. 2 Below Discovery is 2.4 per cent. From No. 2 Below Discovery to No. 8 Above Discovery the grade is 3.4 per cent. The average width of the valley floor above the canyon and below Little Gold Creek is less than 100 feet.

Gold Creek hugs the left limit or south side of its valley where it has cut a trench in the bedrock of the south valley wall. What area of level land there is in its narrow V-shaped valley, is on the right or north limit.

In its present channel Gold Creek has been mined sporadically by hand methods from the canyon at No. 9 Below Discovery to Claim

No. 22 Above Discovery, a distance of about 8 miles. However, all this channel has not been equal in values per bedrock foot. The richest claim was Discovery Claim at the mouth of Magnetic Creek which empties into Gold Creek a short distance below a hard dioritic dike. This dike causes Gold Creek valley to narrow into a gorge-like stretch for about 200 feet. // At the present time there are three ground sluicing and shovelling in mining operations in the present channel of the creek. One of these is being conducted on the upper end of the creek by Charles and Jack Horner on Claim No. 11 Above Discovery. The second is being conducted opposite the mouth of Webster Gulch on Claim No. 8 Above Discovery by R. H. Creecy. The third is being conducted by Harry B. Leonard on Claim No. 2 Above Discovery. The depth to bedrock in the present channel varyies from 2 to 7 feet. The gravel is coarse and waterworn with many boulders. The gold is fairly coarse but finer than most of the gold in the Wiseman subregion. Values in the above three mining operations vary from 25¢ to $1.25 per bedrock foot. The fineness of the gold ranges from 900 to 931.

A remnant of the high channel was mined from 1921 to 1925 by Hans Christenson on the right limit of Gold Creek between claims No. 8 Above Discovery and 9 Above Discovery. The high channel in this place was about 8 ft. above the present level of the creek. The method used in mining was by ground sluicing from a ditch and shovelling in. The depth to the bedrock from the surface varied from 3 to 50 feet. The values averaged 24¢ per bedrock foot. Another small remnant of high channel was drift mined in the winter of 1935-1936 by Harry B. Leonard on the right limit of the creek opposite Claim No. 4 Above Discovery. No other parts of the high

Looking up Sheep Creek from Wilcox drift-mine to Sheep Mountain

Looking down upper Middle Fork River to Broken Mountain
Wilcox drift-mine in foreground

channel have been mined so far as is known by the writer.

The deep channel lies on the right limit of the valley. It has been mined on Claim No. 3 Below Discovery and on Discovery Claim. On Discovery Claim it lies under a high bench filling and is said to be about 100 feet below the surface. On Claim No. 3 Below Discovery the deep channel was about 50 feet below the present bed of Gold Creek. It was thoroughly explored in this place by George Manglas and A. P. Ness in 1925-1929. The deep channel at this place showed values of 74¢ per bedrock foot. The width of the channel is about 25 feet. No one is now mining on the deep channel in Gold Creek Valley. The deep channel on Gold Creek continues under the divide between Gold and Linda Creeks. It is now being worked by drift mining methods on the Linda Creek side of the divide by A. D. Wilcox, Frank J. Miller and E. N. Collins. The depth to bedrock in the deep channel at this place is about 100 feet and the values run about $1.50 per bedrock foot. The bedrock is rough but the gravel is fairly fine with much sediment and few boulders. The values occur mostly on bedrock, a foot of which is taken up in mining operations. The deposit covering the deep channel is unsorted and very little waterworn. It is described by the miners as slide but is probably morainal material. In places the roofs of the drifts are composed of a fine "chicken feed" gravel. Where this occurs the values are found in the gravel as high as 6 feet from bedrock.

LINDA CREEK K+31-8 K+31-50

Linda Creek is a left limit tributary of Middle Fork River about one mile upstream from Gold Creek. It is about 5 miles long and heads in a lake in a low pass opposite the head of French Creek. It runs in a southwesterly then southerly direction for the first 3½ miles of its length. At this place it joins the deep channel of Gold Creek and turns

abruptly to the west to run into Middle Fork River. The upper 3½ miles of Linda Creek lies in a flat, ~~flood~~ and possibly glacial-cut, valley. The upper end of this valley is a tundra marsh which overlies a fill of glacial outwash material. In the lower end of the valley just before its junction with the deep channel of Gold Creek, Linda Creek has cut through the outwash fill and is running in a shallow cut in the underlying schist bedrock. No prospects have ever been found in this upper valley of Linda Creek. That part of Linda Creek valley below the bend is a wide shallow depression in the gravel filling of the floor of Middle Fork Valley. There is no surface indication of where the deep channel from Gold Creek in this valley begins or ends. However, about 1/4 mile below where Linda Creek turns to flow over the deep channel of Gold Creek, the bedrock pitches off very steeply to an unknown depth, no values having been found beyond this point. It would appear as though a glacier coming down Middle Fork River valley cut the deep channel off at this place.

A short piece of the deep channel at the place where Linda Creek joins it, was overlooked by the old time miners. It is now being worked in the summers by A. D. Wilcox and Frank J. Miller by shovelling in. A maximum of about 30 miners inches of water is furnished by Linda Creek, barely enough with which to sluice. The gravel is waterworn and fine with few boulders, but much heavy sediment in the sand. The bedrock is hard schist. The depth to bedrock is about 8 feet, of which 7 feet is gravel. The gold occurs in the lower 3 ft. of gravel and upper 2 ft. of bedrock. The gold is fairly fine. The value of the ground is said to run about 95¢ per bedrock foot. The finess of the gold averages about 945.

LITTLE GOLD CREEK

This is a small westward flowing right limit tributary of Gold

Creek which heads against Eden Creek. About 200 ft. from its mouth a shaft 76 ft. deep was sunk to bedrock. Though prospects were found no workable pay was discovered in this shaft.

MAGNETIC CREEK

Open cut mining was done at the mouth of this creek in the present channel. A high channel was worked for about 500 or 600 feet between Gold Creek and Magnetic Creek. This high channel was about 50 feet in elevation above the present creek bed. Magnet Creek is the largest tributary of Gold Creek and comes in on the left limit.

SHEEP CREEK

This creek is a small stream which heads into the northwestern flanks of Sheep Mountain and runs in a narrow V-shaped valley first north and then west to where its valley opens out into the valley of Middle Fork River. At this place it turns abruptly to the south in a canyon similar to that of Gold Creek and wanders in a shallow trench across Middle Fork Valley, joining Middle Fork River about a mile downstream from the mouth of Gold Creek. Sheep Creek has, so far as found, two of the three usual Upper Koyukuk channels or placer concentrations, namely a present creek channel and a deep channel.

Similar to Gold Creek, Sheep Creek hugs the left limit or south bank, leaving a narrow strip of level ground on the right limit. In the summer of 1936 Frank J. Miller started mining by booming and shovelling in in the present channel about 1,000 ft. above the junction of Sheep Creek valley with the valley of Middle Fork River. The bedrock in the present channel is schist. The grade averages about 4 per cent. The gravel in the present creek channel is very coarse, there being many large schist boulders among which are scattered many conglomerate erratics. The depth to bedrock is about 6 feet. There has not been

enough work done in the present channelto give accurate values per square foot of ground. However it is estimated to run about 50¢ per bedrock foot. The gold is said to be very coarse and waterworn.

The deep channel lies on the right limit underneath the strip of level ground. It has been drift mined in early days from the place where Sheep Creek Valley opens out into Middle Fork Valley for a distance upstream of about 7,000 feet. Below the above point the deep channel has not been traced. Above 7,000 feet the deep channel gradually grades into the present creek channel. From the analogy with Gold Creek, the deep channel should continue out into the valley of Middle Fork River for about another one-half mile. At this place it is possible,it may be cut off,as was the deep channel of Gold Creek , by a former glacier occupying the Middle Fork River valley. At the lower end of the known part of the deep channel,Frank J. Miller drift mined in the winter of 1935-1936. The value of the ground at this place is said to have been $1 per bedrock foot. An examination of the tailings from Miller's shaft as well as the tailings of other shafts in the deep channel, does not show any erratics nor many large boulders of any kind. It is thought that these large boulders and erratics are derived from gravel deposits on the surrounding hills and lie mostly on the surface. The elevation of the deep channel at Miller's shaft is 1704 feet. The surface elevation of the bench in which Miller's shaft is sunk is 1792 ft. The elevation of the present channel of Sheep Creek opposite Miller's shaft is 1729 ft. The creek itself has very little water, the average being about 40 miners inches. It is Miller's intention to bring water by means of a ditch from the head portion of Nugget Creek over the low divide at the head of Sheep Creek and ground sluice off the entire length of the deep channel; also by this means to explore for the continuation of the deep channel out into the Middle Fork valley.

NUGGET CREEK

Nugget Creek is a left limit tributary of Middle Fork River which heads into Sheep Mountain and flows south and then a little north of west around the head of Sheep Creek to its confluence with the above river about one mile downstream from the mouth of Sheep Creek. Very little mining has been done on Nugget Creek. However fair prospects have been found and in time it may develop, with cheaper transportation, into a paying proposition.

RAINBOW CREEK

This creek comes into Middle Fork River on the left limit about a mile below the mouth of Nugget Creek. Rainbow Creek heads in Sheep Mountain and runs a little north of west in an almost direct line to its confluence with Middle Fork River. Mining on Rainbow Creek is on the same status as on Nugget Creek. It has good prospects and with improvement over present freight rates, will be a producer in the future.

EMORY CREEK K131-32

This creek heads against a small hill opposite the right limit of Claim No. 8 Above Discovery on Gold Creek and flows a little east of north to Bettles River. It is claimed by Maddren in Bulletin 532, Page 104, that Emory Creek produced about $10,000 up to 1909. There is no evidence on the creek at present where this was mined. In the summer of 1936, S. Richlew was prospecting at the junction of an eastward flowing tributary with the main creek at an elevation of 1855 ft. What results he obtained are unknown as he had not been at this place for a year when it was visited by the writer, though since then he has gone back to continue his prospecting.

READY BULLION CREEK

This is a small northward flowing left limit tributary of Bettles River whose mouth is about 1/2 mile above the mouth of Emory Creek. No

evidences were found where any mining or prospecting had been done on Ready Bullion Creek.

About 1/2 mile east of Ready Bullion Creek is another small northward flowing tributary of Bettles River which heads in a small lake opposite the head of Canyon Creek and near that of Ready Bullion Creek. No sign of any prospecting or mining was seen on this creek.

WILDMAN CREEK

This is another small northward flowing left limit tributary of Bettles River whose mouth is almost opposite that of Mathews River about 2 miles east of Ready Bullion Creek. It heads against the small lake at the head of Glacier Creek. No evidence of mining or prospecting was seen on this creek.

The bedrock on all these last four creeks was a light-colored mica schist.

CANYON CREEK

This is a small creek which heads into a limestone capped mountain forming the north side of the Little Gold - Eden Creek pass. Canyon Creek at first flows west, then north, then east to join Glacier Creek about 1/4 mile below the lake at its head. The upper valley of Canyon Creek is a wide shallow basin down to where the tractor road leaves it at an elevation of 2380 feet. The last 1⅛ miles runs in a narrow canyon between schist walls. No evidence of any mining or prospecting was seen on this creek. The upper part of the valley looks favorable for gold concentration.

EDEN CREEK

This is a small creek which heads into a pass opposite the head of Little Gold Creek. Eden Creek is about 3 miles long and runs almost directly east until it enters the Glacier Creek valley where it turns south and runs parallel to Glacier Creek for about a mile before joining

it. Oscar Stromdal and Charles Youngberg sank several shafts on this creek. One of these shafts is about 3/4 mile from the head of the creek and the other about 1½ miles from the head and where the trail crosses the creek. The upper hole was 55 ft. deep. It is unknown what the depths of any of the other holes sunk on that creek are. Water was reached in the upper hole and so far as known, no prospects were obtained in any of the shafts.

BOAR CREEK KT 31-31

This creek is called in Maddren's report "Boer Creek". However the miners in the district insist that the correct spelling is "Boar". Boar Creek is a fairly large stream about 6 miles long. It heads into the southern slopes of Sheep Mountain and runs northeast until the last mile where it turns to the east and southeast to join Glacier Creek. It is reported by Maddren in U.S.G.S. Bulletin 532, page 108, that mining had been done for several years on Boar Creek. However no evidence of this could be found and the miners in the neighborhood claim that although in early days several shafts were sunk, no pay has ever been found. This creek would be a good place to prospect as it heads into a highly mineralized area. The bedrock on Boar Creek is schist.

GLACIER CREEK KT 31-9

GLacier Creek heads in a small lake at an elevation of about 2200 feet opposite the head of Wildman Creek and runs in a southeasterly direction to South Fork River. The valley of Glacier Creek possibly has been the bed of a tongue of ice which overflowed from the glacier occupying the valley of Bettles River and Mathews River and discharged into the South Fork River. The valley of Glacier Creek is now filled with what is thought to be glacial outwash material. The depth to bedrock is unknown but it must be considerable from the few deep holes sunk on some

of the tributary streams. It is problematical whether Glacier Creek has had enough concentration by water action on its gravels to pay for mining.

CALIFORNIA CREEK Lt 31-9

This creek heads in high and rugged mountains on the left limit of Glacier Creek. It flows northeast for about 3 miles to its confluence with Jim Pup Creek. It then turns and flows west and then southwest to empty into the left limit of Glacier Creek above the mouth of Boar Creek. The upper part or northwest flowing portion of California Creek runs in a very narrow V-shaped valley. It has not been mined nor has prospecting shown any pay in its gravel, so far as known. Below its confluence with Jim Pup Creek the valley widens to about 500 ft.for approximately 3/4 mile. It then turns to the west and southwest and narrows to a gorge about 150 ft. wide with high muck banks on either side. Several high benches are traceable on the left limit of this part of California Creek, the lower benches being approximately 160 ft. and 270 ft. above the present creek bed, or at elevations of 2100 ft. and 2300 ft.

Eighteen shafts were sunk in the valley floor of the present channel of California Creek below its junction with Jim Pup Creek by Pat Kelleher in early days. It is unknown how much money was produced, but it is said the returns were fairly good. The depth to bedrock where the shafts were sunk is about 18 feet. At the confluence of Jim Pup and California Creeks in the present creek channel Pat Kelleher mined in an open cut by booming and shovelling in. The depth to bedrock at this place is from 2 ft. to 5 ft. About 350 ft. below Kelleher's cabin,Kelleher drove an incline on the right limit of California Creek to tap the deep channel beneath a high gravel bench. The incline was sunk at about 45 degrees 30 ft. to bedrock. He then drifted north from the end of the

incline 175 ft. 3½ feet of gravel was encountered in the bottom of the incline and drift. However, no pay was struck. Another incline was also started by Kelleher about 100 ft. west of the incline described above. The mouth of this incline is about 25 ft. lower than the first. It was abandoned because of flooding in the spring. Kelleher's death in 1931 stopped further prospecting in this area.

California Creek from its mouth to its junction with Jim Pup Creek should be given much more prospecting. It is possible that this part of the creek might develop into a dragline operation. Also the deep channel problem on the right limit of the creek has never been solved. This channel may lie further to the north than where explored by Kelleher.

JIM PUP CREEK μ+ 31-9

This creek is a right limit tributary of California Creek. It heads in a flat plateau-like pass opposite the head of Holy Moses Creek. From the head it flows southwest and a little north of west to its confluence with Wakeup Creek. Thence it flows again southwest to join California Creek on the right limit. From about 1/2 mile from its headwaters Jim Pup runs in a narrow V-shaped valley to its mouth. Jim Pup Creek has the usual three channels of the Upper Koyukuk, namely a high channel, present channel and deep channel.

The present channel was worked in early days by Pat Kelleher by booming and shovelling in. These workings extended from the confluence of Jim Pup Creek with California Creek for about 3/4 mile above its confluence with Wakeup Creek. It is said that Kelleher quit work on this creek because the bedrock became too rough for one man to handle. The gold in the present channel was very coarse, a $50 nugget having been recovered at the spot where Kelleher stopped work. Kelleher worked a strip about 10 ft. wide in the creek bed. Above the mouth of Wakeup Creek the

depth to bedrock is 3 ft. to 5 ft. The grade of the creek here is about 4½ per cent. The discharge of Jim Pup Creek is about 20 miners inches.

Below the mouth of Wakeup Creek on the right limit of Jim Pup Creek there is a deep channel. So far as prospected, this deep channel is thawed. It has been hypothecated to extend down the right limit of California Creek and it merges at its upper end with the deep channel on Wakeup Creek. At this place and for about 250 ft. upstream on Wakeup Creek from its mouth, it is thawed but dry and workable and about 55 ft. below the surface. (elevation 2190 ft.) At this point it has been worked out by Hans Christensen.

At an elevation of 2210 ft. on a projection of land extending from the hillside on the right limit and about 250 ft. north of the confluence of Jim Pup and California Creeks, a shaft 104 ft. deep was sunk by the miners in early days in an attempt to reach the deep channel. This shaft struck water on reaching gravel so that no results were obtained from it except an indication of the depth of the deep channel at this point.

At the upper end of the deep channel on lower Wakeup Creek as described before, at a depth of about 40 ft. from the surface, there is a sand and gravel streak about 3 ft. thick, lying on a false bedrock. This upper deep channel extends to the confluence of the Jim Pup and California Creek valleys where it is about 12 ft. below the surface. At the upper end of this higher deep channel at the point aforesaid on Wakeup Creek, it turns to the northeast and runs on true bedrock. It is possible that this upper deep channel continues on up the right limit of Jim Pup Creek. However, it has not been traced further than a shaft about 360 ft. southwest of Christensen's cabin, where it was 38 ft. deep.

A small section of this deep channel where it runs on true bedrock has been mined out by Hans Christensen. At this place it carries with the sand and gravel many medium sized boulders. It is said to contain values from 75¢ to $1 per bedrock foot. All the gravels and sands in it were permanently frozen.

It is probable that on Jim Pup Creek the present channel can be in the future again brought into production. This is especially true since the rise in the price of gold and reduced freight rates from Fairbanks by airplane to Big Lake would make the present ground much more attractive than it was when Kelleher was working. However, it will be a very small operation, confined to one or two men. It is possible that the deep channel on both Jim Pup and California Creeks can be worked by pumping the water with modern pumping machinery or by running in a drift for drainage purposes.

WAKEUP CREEK pt 31-9

This creek is a small right limit tributary of Jim Pup Creek flowing down out from a pass into Big Lake. Wakeup Creek has been mined for many years by Hans Christensen who is one of the original discoverers. Wakeup Creek has the same three levels of channels or stream concentrations as have many of the other creeks in the Upper Koyukuk region.

The bed of the present channel lies on the surface of a gravel filling and does not cut bedrock. A little gold was mined from it in early days but it is no longer worked and is at present covered with tailings from other operations.

The deep channel on Wakeup Creek is a continuation of the deep channel on Jim Pup Creek. It has been mined from the mouth of the creek a distance of about 1500 ft. upstream. It ranges in depth from

about 55 ft. at its junction with the Jim Pup deep channel to 112 ft. deep 1500 ft. upstream at an elevation of 2300 ft. The deep channel is a canyon-like cut in bedrock about 25 ft. wide at its lower end to 15 to 20 ft. wide where it is now being mined. The bedrock of the deep channel is a very hard and smooth schist. The bottom of the channel itself has 5 to 6 gutters eroded into it, 2 to 4 ft. deep. About 5 ft. of gravel overlies the bedrock and above this again is a roof of unassorted slide boulders, gravel and blue-grey clay. The gold is rather rough but fine. With it are a few larger pieces, the largest pieces found being worth $30. The gold lies mostly on the high points of bedrock between the gutters, but in places it is distributed up through the gravel. The values run from $3.50 to $4 per bedrock foot. Water for sluicing the winter dumps is secured by hillside ditches from the melting snows in the spring as Wakeup Creek itself is a mere trickle in the summer. At the present time Hans Christensen is drift mining at a depth of 112 ft. on the known upper end of this deep channel in the winter time.

The high channel on Wakeup Creek appears to be a former channel from Jim Pup Creek running in a reverse direction to Wakeup Creek towards the pass into Big Lake. Only about 1000 ft. of this high channel have been explored by Hans Christensen. It is possible that this high channel may extend back to Jim Pup Creek and also continue on through the pass to Big Lake. In this case it will make a much larger proposition than the present workings on Wakeup Creek. The depth to bedrock on the high channel is about 20 ft. where it is now being opened up by ground sluicing in the summer by Hans Christensen. There are not many boulders in this high channel. Those that do occur are not of large size and are easily handled. The gravel is coarse and subangular. So far no gold has

Big Lake from mountain on left limit of Lake Creek looking southeast

Base-line on island in Big Lake -- looking southwest

been produced from the high channel. The values are said to run about 50¢ per bedrock foot from the previous prospecting work done on it. A ditch has been dug to it from Jim Pup Creek and development work is being actively pushed.

LAKE CREEK 1+319

This creek is a small left limit tributary of Big Lake. It heads in a small mountain east of the pass between Wakeup Creek and Big Lake. It then flows southeast and northeast to a small lake in the summit of the pass. From the lake it flows northeast in a steep gulch to Big Lake where it makes a small delta at the lake shore. The creek was discovered by John Rooney about 1915 and work started in 1916 about 300 ft. south of the lake shore. The creek itself is a steep narrow gulch. Two channels of the usual three in the upper Koyukuk region are present on the creek, namely a deep channel and a present creek channel.

The present creek channel is being worked on the lower end of the creek by John Rooney. The method of mining used is ground sluicing and shovelling in. His present workings are now about 1500 ft. from the shore of Big Lake. The creek at this place is a narrow steep gully from 10 to 20 ft. wide. The depth to bedrock is from 9 to 12 ft. The grade of the creek at this place is about 6½ per cent. Water for mining purposes is dependent on rain, the creek being dry when rainfall is deficient. The gold is very coarse, no fine gold being obtained. The fineness of the gold is 906. The value of the ground is said to be about 50¢ per bedrock foot. The gravel is a coarse schist slide mixed with fine sand and coarse waterworn gravel. There is very little quartz but many erratic boulders in the upper part of the gravel. About 500 ft. from the lake shore on the left limit of Lake Creek, Rooney drift mined in early days. This place was very near the present creek workings and appears

to be a simple widening of the gulch near where it originally entered Big Lake. Rooney has not worked here for several years.

At the upper end of Lake Creek about 12 ft. below the small lake in the pass at an elevation of about 2160 ft. George Manglas is mining a deep channel in an open cut by ground sluicing and shovelling in. Work was started in this place in 1930. The depth to bedrock is from 30 to 40 ft., of which 20 ft. is a blue-grey mud, the rest gravel. The grade of the creek on the surface at this place is about 4 per cent. The gold is finer than in Rooney's open cut and lies on and in the upper foot of bedrock. The value of the ground is about 32¢ per bedrock foot. The bedrock is a grey schist. It lies almost flat with a slight grade to the left limit. The gravel is coarse and waterworn and contains many boulders. Quite a little quartz is noticeable in the gravel. The water in this place, as with Rooney, is dependent on the rain. The maximum obtainable is probably not over 100 miners inches.

At distances of about 150 ft. and 180 ft. to the north or left limit of the upper end of Manglas's open cut and at the same surface elevation, Manglas has sunk two shafts, both 38½ ft. deep, showing that the deep channel extends atleast this distance to the north. About 500 feet upstream from Manglas' open cut and on the right limit of Lake Creek, near the creek at an elevation of 2190 ft. is an old shaft reported to be 76 ft. deep. About 1000 ft. directly south of the head of Wakeup Creek and in the southern side of the pass to Big Lake at an elevation of 2520 ft., S.G.Larson in the winter of 1936-1937 sank a shaft 40 ft. to bedrock. This shaft was in blue-grey mud or clay its entire depth. No prospects were found and he appears to have been too far south to have tapped the deep channel.

It would appear possible that Manglas is on the Wakeup Creek high

channel. From the appearances of bench-like terraces on the Lake Creek side below Manglas' cabin, this channel may swing to the northeast towards Crab Creek and not to the east down Lake Creek.

CRAB CREEK

This is a small creek about 1 mile northwest of Lake Creek and running in a deep narrow V-shaped valley northeast into Big Lake. In 1922, Harry Owens and John Bowman sank a shaft on Crab Creek 30 ft. deep. They got a prospect of two coarse grains of gold in the bottom of the shaft. In 1932, A. G. Richardson cross-cut this creek with shafts in two places, one near the mouth where it is 15 ft. to bedrock and another unfinished cross-cut at the forks of the creek where it is 35 ft. to bedrock. Richardson obtained no prospects in his work except one 5¢ piece of gold in a 4-foot open cut near where the valley opens out into the valley of Lake Creek.

LAST CHANCE CREEK

This is a small creek running into Bit Lake parallel to Crab Creek and about 1½ miles to the northwest. Oscar Johnson and Billy Redman in about 1918 are reported to have sunk a shaft on this creek approximately 100 ft. deep. No known prospects were recovered from this shaft. Other shafts may have been sunk but no record is known of them. In the winter of 1937-1938 Fred Lessard expects to prospect on this creek.

HOLY MOSES CREEK

This creek is a small northeastward flowing tributary of Big Lake about 2 miles southeast of Lake Creek and heading against the head of Jim Pup Creek. Mike McCammit and Marshall Shea sank a 70-foot shaft on this creek. No prospects were reported.

BUTTE CREEK

This creek is a northward flowing tributary of Big Lake about

1½ miles southeast of Holy Moses Creek and also heading against Jim Pup Creek. George Manglas is at present actively prospecting Shamrock Creek and reports fair prospects have been found.

KING CREEK

King Creek heads up into the same mountains as Shamrock Creek and flows northeastward into Wolf Creek, a tributary of South Fork River. Charles Erickson, Jack Dodge and Billy Glynn sank a shaft 70 to 75 ft. deep on this creek. A small prospect was found in this shaft. Wesley Etherington and O. S. Anderson sank a shaft about 600 ft. below the former shaft but found no prospects.

LONG CREEK

This creek heads in a high mountain between Big Lake and South Fork River and flows northwest, then southwest, then northwest into the southeast end of Big Lake. It has been partially prospected by George Manglas but with no results up to the present time.

WOLF CREEK

This large creek heads in the same high mountain as Long Creek. It flows in a southerly direction, then southeast through the low pass from Big Lake to South Fork River of which it is a right limit tributary. There is no report of any prospecting having been done on this creek.

SHORT CREEK

This creek is a tributary of the north side of Big Lake, flowing in a southerly direction into the lake about 1 mile northwest of Long Creek. George Manglas has prospected this creek with no results.

BILL CREEK

This is a southerly flowing tributary of Big Lake, flowing into the lake opposite Holy Moses Creek and heading against Garnet Creek. No records of any prospecting on this creek could be found.

GARNET CREEK

K+31-34

Garnet Creek is a small northward flowing or left limit tributary of Bettles River about 3½ miles long. It joins Bettles River about 4 miles above the outlet of Big Lake. Garnet Creek flows in a narrow canyon with practically vertical walls from 50 to 100 ft. high for about one mile from its mouth. Above this canyon, the valley of Garnet Creek has a narrow V-shaped cross-section for about one mile. Above this again, as the forks of Garnet Creek are neared, the valley opens out into a comparatively shallow basin. One fork of Garnet Creek heads against Bill Creek and the other fork heads against a fork of Eightmile Creek. Garnet Creek shows two phases of the usual stream concentration in the Upper Koyukuk region, namely a present channel and a high channel.

Up to the present time all the mining in Garnet Creek has been done in the present channel which carries gold from the forks to the mouth of the creek. At present C. F. Moon is working by booming and shovelling in about 1/2 mile from the mouth. The depth to bedrock at this place is from 1 to 3 feet. The grade of the creek at this place is about 3 per cent. The width of the cut mined is about 8 feet. The bedrock is schist. Gravel is coarse and waterworn with many large boulders. The gold is fairly fine (about the size of rice grains) with few nuggets. It lies directly on bedrock. The fineness of the gold is 872. The value of the ground is said to be about 20¢ a bedrock foot. The water supply is fairly steady, the minimum amount being about 40 miners inches.

At the mouth of Garnet Creek, George Terrel and Fred Terrel are working the creek by booming and shovelling in. The bed of the creek where the Terrels are working is about 7 ft. wide between vertical walls. The depth to bedrock is about 8 ft. The gravel is coarse and waterworn with many boulders and all thawed. The bedrock is schist. The grade of the creek at this place is about 4 per cent with several sharp vertical drops. The gold lies all through the lower 4 feet of gravel but mostly on top of the bedrock.

Moon's cabin on Garnet Creek

Head of Phoebe Creek and Baby Mountains looking northwest

The gold is similar in size to that in Moon's cut but with more nuggets. The fineness is 872. The average value of the ground is about 77¢ per bedrock foot.

There is a high channel on Garnet Creek which cuts across a point on the left limit about 1/4 mile downstream from the mouth to join a bench of Bettles River. It is the intention of the Terrels to prospect this bench for a high channel pay in the winter and summer of 1938.

BETTLES RIVER CANYON R43 1-33

Bettles River below the mouth of Garnet Creek runs between vertical schist walls about 100 ft. high. On the right limit or north side of the canyon, the schist walls are capped by vertical bluffs of cross-bedded sands and gravels about 100 feet high. On top of these deposits is a flat bench which extends downstream along the right limit of Bettles River valley to about a mile below Matthews River. For 1/2 mile below the mouth of Garnet Creek the river hugs the left limit or south side of the canyon, leaving a flat flood plain on the north or right limit side, about 600 feet wide. Below this flood plain the canyon wall narrows for about 1/2 mile and then abruptly ends in a wide U-shaped valley.

About 1/4 mile below the mouth of Garnet Creek is Discovery Claim on Bettles River. This and the claims above it to opposite the mouth of Garnet, have been drift mined by the old time miners. About the middle of Discovery Claim is Discovery Cabin. There was a small area of ground at this place that had not been mined. In the winter of 1936-1937, U.F. Moon drift mined this area out. The depth to bedrock was from 14 to 16 ft. Moon claims the ground ran 50¢ per bedrock foot.

On the left limit or south side and above or on top of the schist walls, Bettles River valley widens into a bench. This bench slopes towards the canyon and shows gravel deposits far up the mountainside, correllating

with the deposit on the right limit or north side of the canyon. The Terrells have sunk in these left limit gravel deposits , shallow shafts at elevations of 2240, 1905, 1870 and 1875 feet. In the winter of 1937-1938, they intend to sink another shaft at an elevation of 1930 ft. Below the canyon about 1/4 mile, a man named Hiltner prospected on the left limit flood plain of Bettles River in the winter of 1935-1936. The results of this prospecting are unknown but it is reported that he did not reach bedrock in the several shafts sunk because of water. The elevation of Bettles River at the mouth of Garnet Creek is 1790 ft. Opposite Hiltner's cabin the elevation is 1760 ft. Opposite Bettles airfield and at the mouth of Big Lake outlet, the elevation is 1715 ft. The valley of Big Lake to Bettles River is a plain filled with of unconsolidated material whose surface is about 60 feet above the level of Bettles River. Towards Bettles River this plain is cut into hillocks by gullies. Big Lake outlet flows in a channel slightly incised in this plain at the lake but which gradually increases to a canyon where it joins the flood plain of Bettles River. At no place does the outlet cut bedrock.

EIGHTMILE CREEK Kt 31-4

This creek is about 6 miles long and joins Bettles River on the left limit about 1½ miles above the mouth of Garnet Creek. At the mouth of Eightmile Creek is a schist canyon. However the valley widens further up the creek in a similar fashion to Garnet Creek. Very good prospects have been found on Eightmile Creek and in early days some mining was done at the mouth.

Half way between Garnet and Eightmile Creek another small creek comes in on the right limit of Bettles River. This creek is unnamed and so far as could be found out, has never been prospected.

Also at about 1/2 mile above Eightmile Creek on the right

limit of Bettles River another unnamed creek comes in on which no data of any kind could be found.

On the right limit of Bettles River directly across from the mouth of Eightmile Creek at an elevation of 1820 feet, James Kelly and Victor Neck sank a shaft 18 ft. to bedrock. Only light prospects were reported.

MULE CREEK K# 31-35

This is a small creek about 3⅛ miles long joining Bettles River on the north or right limit about 1⅛ miles above the mouth of Eightmile Creek. It runs in a narrow canyon with vertical walls of schist. However the mountains into which it heads are limestone and the creek appears to have cut through this limestone into the underlying schist. The schist contains interbedded strata of limestone and would seem to grade into the limestone and lie conformably under it. This creek was mined sporadically in early days. It is now being mined by S. G. Larson by booming and shovelling in. The value of the ground is about 10¢ per bedrock foot. The gravel is coarse and waterworn with many large boulders. The depth to bedrock is from 3 to 8 ft. The gold is medium fine, well worn and lies in the lowest foot of gravel and on top of bedrock. The fineness is 908. A few nuggets of copper occur with the gold. The grade of the creek is about 5 per cent. The average flow of water is about 40 miners inches.

Where Mule Creek empties into Bettles River quite a fan has been built out into the river valley, pushing the river channel against the left limit side of the valley. Several shafts have been sunk in this fan by George Eaton and James Kelly, ranging from 75 to 80 feet deep. Two or three of these shafts were sunk below Larson's cabin at the mouth of Mule Creek and one about 1000 ft. upstream at an elevation of 1900 ft. It is said that none of these shafts reached bedrock as water was struck in them, and that no prospects were found.

GUS CREEK

This creek is a small left limit tributary of Bettles River, coming in about 2⅛ miles above the mouth of Mule Creek and about 1/2 mile above the mouth of Spruce Creek. Gus Creek at its lower end runs through a limestone canyon. However about 1/4 mile above the mouth, Gus Creek opens into a wider valley with schist bedrock. It is said fair prospects have been found on this creek by S. G. Larson.

SPRUCE CREEK K-31-5

This creek is named in the map accompanying Bulletin 532 "Mule" Creek. Mule Creek itself is unnamed on the map, although its location is correctly given in the text and the creek correctly described. The correction on the U.S.G.S. map in Bulletin 532 of the names of the creeks on the upper Bettles River is as follows:

Mule Creek - unnamed.

Mule Creek on map should be Spruce Creek.

Spruce Creek on map should be Sheep Creek.

Sheep Creek on map should be Willow Creek.

Spruce Creek is a large southward flowing tributary of Bettles River about 2 miles above the mouth of Mule Creek. Spruce Creek heads in the mountains of Silurian limestone to the north but has cut its valley down to the underlying schists, so far as could be seen, above its confluence with Bettles River. Two shafts about 110 ft. apart were sunk on the right limit in the valley of Spruce Creek where that valley opens out into the valley of Bettles River, by Victor Neck and James Kelly. These shafts are at elevations of 1930 and 1932 feet respectively and are reported as having been both 45 feet deep. None, or very light, prospects are said to have been found. However it is claimed that good prospects were found on Spruce Creek further up the valley in early days.

On the right limit of Bettles River and about 250 feet below the last cabin in the Bettles River valley and about 3/4 mile below the mouth of Feebee Creek, Victor Neck and James Kelly sank three shafts at an average elevation of 1950 feet. The middle shaft was sunk 147 ft. to bedrock but only light prospects were found. Water was struck in the other two shafts and they were abandoned

Directly above the last cabin an incline was also started into the foot of a high gravel and sand bluff constituting a bench along the right limit of Bettles River at this place. No data on this incline could be obtained.

WILLOW CREEK

Willow Creek is one of the headwater branches of Bettles River. It flows directly east from the Baby Mountains to join Robert Creek, making the headwaters of Bettles River. Willow Creek was not visited by the writer. However it is claimed that James Kelly and George Eaton found very good prospects on this creek in early days.

PHOEBE OR FEEBEE (local spelling) CREEK K-31-36

This creek flows out of the Baby Mountains south of Willow Creek in a southwesterly direction. After it is joined by the outlet of Twin Lakes, it turns and flows in a slightly north of west direction to its junction with Bettles River. So far as examined the bedrock in Phoebe Creek is schist, though from the wash and appearance of the hills to the northeast it must head in the granite of the Baby Mountains. Below the outlet of Twin Lakes the valley of Phoebe Creek is U-shaped and as wide as the valley of Bettles River. The mouth of Phoebe Creek is at an elevation of 2005 feet. At the mouth of Phoebe Creek on the right limit are remnants of high gravel and sand terraces with many lakes corresponding to the high terraces or benches on Bettles River. These bench remnants extend up the right limit of Phoebe Creek to above the

There is no record of any prospecting on Phoebe Creek itself. However it is said that very good prospects were found on a right limit tributary of this creek by Manuel Mello in early days.

DEEP HOLLOW CREEK

This is the second right limit tributary of Phoebe Creek upstream from its mouth. Deep Hollow Creek has cut a deep gorge in the schist of the mountains to the north of Phoebe Creek. Though no definite record of any prospecting is known on the creek, it may be the tributary on which Mello found a prospect. The indications on the creek look favorable for a small placer deposit and it should be prospected.

SHE-BEAR CREEK

This creek is a right limit tributary of Phoebe Creek about 1½ miles upstream from Deep Hollow Creek. It has cut a narrow deep gorge in the schists of the mountains to the north of Phoebe Creek. There is a high channel on She-Bear Creek which could be very easily prospected by diverting the upper waters of the creek itself. There is no record of any prospecting having been done on this creek, which was named from a large grizzly bear and cubs which were hunted here in early days by the Eskimos. The creek looks favorable for a small placer deposit.

HIDE CREEK

This creek is a small left limit tributary of Phoebe Creek 1/4 mile downstream from the mouth of She-Bear Creek. There is no record of any prospecting having been done on this creek.

FALL CREEK

This is a large creek running in a canyon with several falls to the stream connecting the two Twin Lakes. Only the mouth of this stream was seen by the writer. However it is reported that it runs entirely in schist bedrock and that a few prospects have been found on its course.

Twin Lakes looking south from right limit of Phoebe Creek

Hide Moutain looking south from right limit across Phoebe Creek

SUKLAK CREEK

This is a small stream heading into the Baby Mountains and running into the northeast corner of the southern or larger Twin Lake. "Big Jim" Edwards, a native, lives with his family at the mouth of this creek and mines thereon. He was not at this place when visited by the writer. His recovery is unknown, though it cannot amount to much as the mining is mostly by rocker and panning. Nuggets of copper are found on this creek as well as on Mule Creek.

TWIN LAKES

Twin Lakes into which Suklak and Fall Creeks empty, have not previously been mapped. These lakes together are about 8 miles long and at an elevation of approximately 2265 ft. The southern twin lake is about twice as long as the northern one. Timber on the Twin Lakes, so far as seen, is mostly confined to the mouth of Suklak Creek, though there may be a few scrubby black spruce trees in other localities. Fish are very plentiful in the Twin Lakes and in season, black and grizzly bear, and caribou can be obtained.

Several other creeks besides Fall and Suklak Creeks empty into these lakes. All these streams are unnamed and entirely unprospected. So far as seen, the formation around the Twin Lakes is schist and favorable for placer deposits, although it is near the large granite intrusion of the Baby Mountains and may be too near for gold concentration. The lakes could be used for an airplane landing so that the usual transportation difficulties in prospecting would be solved.

COLDFOOT - WISEMAN MINING AREA

HAMMOND RIVER

K+ 30-4
30-6
30-8
30-11
30-16
30-17
30-14
30-15

Hammond River heads in the high mountains of the Brooks Range near the headwaters of Dietrich River. It then flows in a southerly direction roughly parallel to Dietrich River to a point opposite Adams Creek. At this point Hammond River turns abruptly to the southwest through a canyon about

1/2 mile long. Below the canyon the river again turns abruptly to the southeast and after flowing in a semi-circle around a large hill known as Butte Mountain, it joins Middle Fork River about 13 miles below its aforesaid canyon and about 5 miles above the town of Wiseman. Above the canyon Hammond River flows in a typical glaciated U-shaped valley. Below the canyon Hammond River shows much less intense glaciation. It would seem that the glaciation in the upper and lower valleys are of different origins, though at the period of maximum glaciation the two ice streams may have been connected across the flat plateau in which the canyon is cut. If the above theory is correct, the discharge from the upper Hammond River glacier was by way of Adams and Canyon Creeks into Middle Fork River about 8 miles above the present Hammond River. The blocking of this Adams Creek outlet with morainal material as the glacial flow melted back, coupled with the disappearance of ice from the lower Hammond River caused the glacial waters to find an outlet over the low divide between the two rivers and the subsequent cutting of the Hammond River canyon.

Gold was discovered on Hammond River about the year 1900. Most of the gold recovered has been from a deep channel, Hammond River showing the common phenomenon in the Koyukuk of a deep chahnel, present channel and high channel.

The bedrock of Hammond River is all schist. Above the mouth of Vermont Creek the schist on the surrounding hills begins to change from a calcareous schist to a schist limestone. Further upstream in Hammond River canyon is apparently massive limestone.

The discharge of Hammond River at the mouth of Vermont Creek averages about 3000 miners inches. Aneroid elevations on the lower Hammond River are as follows:

Rowden shaft on lower end of Discovery Claim - 1350 ft.

Collins cabin on upper end of Discovery Claim - 1355 ft.

Mouth of Gold Bottom Creek on upper end of Claim No. 4 Above Discovery - 1380 ft.

Mouth of Swift Creek on line between Claims No. 6 Above and No. 7 Above Discovery - 1395 ft.

Mouth of Buckeye Creek on lower end of Claim No. 9 Above Discovery -1400 ft.

Mouth of Vermont Creek on upper end of Claim No. 12 Above Discovery-1420 ft.

From the above figures, the average grade of the present channel of Hammond River is approximately 0.5 per cent.

The only part of the Hammond River valley where placer gold is found in paying quantities is the 13-mile section below the canyon.

Below the canyon the tributaries on the right limit of Hammond River are named consecutively downstream as follows:

1st - (large creek, name unknown)

2nd - Canyon Creek (probably original headwaters stream of lower Hammond River)

3rd - (medium sized creek, name unknown)

4th - Vermont Creek

5th - Buckeye Creek

6th - Swift Creek

7th - Lofty Creek (confluence about the middle of No. 5 Above Discovery)

8th - Gold Bottom Creek

9th - Steep Creek (confluence on upper end of No. 2 Above Discovery)

On the left limit the tributaries below the canyon are, named consecutively downstream, as follows:

1st - Butte Creek (confluence about the middle of No. 12 Above Discovery)

2nd - Jenny Creek (confluence on No. 2 Below Discovery)

At the mouth of Buckeye Creek there is said to be a deep pot-hole in the bedrock, which, if true, may mark the location of an ancient waterfall or some change in the deep channel.

In the present channel of Hammond River there has been some mining. This, however, was in early days and was a very small amount compared to the mining in the deep channel. It was confined to Discovery Claim and along the sides of Butte Mountain as far upstream as Claim No. 8 Above Discovery wherever the present river cut into the bedrock in its meandering from side to side in its present flood plain. No records of this mining, except the knowledge that it was done, have been preserved.

The deep channel has been explored from about Claim No. 9 Above Discovery to a fractional claim between Discovery Claim and Claim No. 1 Below Discovery. In the fractional claim the deep channel is about 114 ft. below the level of the present creek. On the upper end of Discovery Claim it is about 100 ft. deep. On Claim No. 3 Above Discovery it is about 65 ft. deep. On Claim No. 6 Above Discovery it is about 40 ft. deep and on Claim No. 8 Above Discovery 35 ft. deep. On Claim No. 1 Below Discovery the ground was so deep and wet that the deep channel has not been worked. Above Claim No. 8 Above Discovery to the canyon, no pay has been found in the present channel nor in the deep channel of Hammond River although some fair prospects have been obtained below the mouth of Vermont Creek on the upper end of Claim No. 12 Above Discovery. About 1/2 mile below Claim No. 1 Below Discovery the deep channel is cut off by the glacial gouge down Middle Fork valley.

In that portion of the deep channel from Discovery Claim to Claim No. 4 Above Discovery, there is a thawed layer of sand over the

gravel which required very careful handling in mining operations. On Discovery Claim and on Claim No. 1 Above Discovery there are stream-cut benches in the bedrock on the right limit of the deep channel which range from 40 to 60 feet higher than its deepest part. The grade of the deep channel is about 1.3 per cent. The width of the channel is about 30 ft. All evidence points to the fact that the deep channel was formed by a smaller, more precipitous stream than the present Hammond River.

Except for a few overlooked spots, most of the deep channel has been mined out where it was possible to mine. In this channel the pay streak is said to become progressively richer down to Discovery Claim where active mining ceased. The gold in the deep channel was very coarse, water-worn and rounded. Nuggets were very abundant. On Claim No. 1 Above Discovery, Harvey & Company, consisting of Jesse Allan, C. K. Harvey, Warren Stanton, and Donald Stanton, worked in the deep channel in the winter of 1936-1937. The depth to bedrock was 115 ft. The section was all gravel from the surface. The width of the channel at this place was 35 feet. The thickness of the pay gravel was from 8 to 10 feet. The bedrock was a hard schist. The ground was all frozen to bedrock. The gravel consisted of small boulders and large cobbles with a small amount of fine gravel and sand between. The gold occurred all through the gravel. It was coarse, heavy and water-worn, with many nuggets. The fineness of the gold was 961. The average value of the ground was about $1.46 per bedrock foot. These workings were conducted in a small area of ground which had been left by the old time miners. It was intended to continue the work in the winter of 1937-1938 and explore for further areas of unmined ground.

James Kelly and Peter Davy have been prospecting in the winters since 1931 on the left limit on Claim No. 6 Above Discovery in

the deep channel. So far they have not found paying ground but have very encouraging prospects. The ground is frozen and about 40 ft. deep. The gold is finer than further downstream in the deep channel but still coarse and water-worn. The fineness is about 960. There are no other drift mining operations on the deep channel at present on Hammond River. As this channel is mostly worked out, there are not likely to be very many more of these operations.

Opposite Discovery Claim and Claim No. 1 Above Discovery there are on the right limit sections of a high channel which have been worked by the old time miners. At the mouth of Swift Creek at an elevation on bedrock of 1450 ft. a high channel from Swift Creek was being mined by Miter Angelich. This channel cut across and into the bedrock on the right limit of Hammond River and evidently once joined that river when it ran at a level 40 to 50 feet higher than at present. The bedrock in this place is a micaceous schist. The depth to bedrock is about 33 ft., the section consisting of 30 ft. of clay and muck, 1/2 foot of flat schist pebbles up to 6 inches in diameter, 2½ ft. of round greenstone and diorite boulders up to 18 inches in diameter, a few inches of fine schist pebbles and sand. Further upstream towards the stream bed of Swift Creek the depth to bedrock increases to about 60 feet. The section to bedrock in this place is as follows: 15 ft. of grey mud and yellow clay, 10 ft. of red clay, 4 to 10 ft. of peat, 25 to 30 ft. of tight poorly sorted, coarse, subangular gravel containing a few boulders. The gold is coarse, rounded and water-worn but contains no large nuggets. It lies directly on top of bedrock. The fineness is about 936. The value of the ground runs from 12 to 70¢ per bedrock foot. Water for mining purposes is brought in a small ditch from Swift Creek. An average of about 40

miners inches is available. Mining is carried on by booming off the overburden as much as possible and shovelling in the remainder.

Downstream about 1/4 mile from Vermont Creek a high channel of Hammond River on the right limit was being prospected in the summer of 1937 by Miter Angelich and Martin Sliscom. Water was obtained from a high ditch from Buckeye Creek. This high channel has not yet been prospected enough to know its extent, depth to bedrock or gold content. There might be other high channels on Hammond River not yet developed, as several benches are visible on the hillsides above the river. Not enough prospecting is being done in the country to prove or disprove whether these benches are mineable or not.

VERMONT CREEK K 30-1 30-32

This creek is a small right limit tributary of Hammond River about 3½ miles long. About 1½ miles above its mouth Vermont Creek forks. The west or right-hand fork heads against Vermont Dome. The south or left-hand fork heads in a small lake in a high pass against the right fork of Nolan Creek. No pay has been found on the right-hand fork of Vermont Creek. There has been a little pay found on the left fork. The creek has been worked in its present channel from about 1/2 mile up this fork down through Discovery Claim which is about 3/4 mile from the mouth. The present channel is considered to have been entirely worked out. No one is attempting to do any work on it at the present time. The grade of the bedrock in upper Vermont Creek is about 5 per cent. An average of about 40 miners inches is available. The gold on upper Vermont Creek is fine with a few small nuggets. It lies directly on and in the upper 4 inches of bedrock. The fineness is about 935. The value of the gold mined in the present channel was about 13¢ per bedrock foot. The gravel

is coarse, subangular and poorly sorted. It contains much pyrites but little of the usual pay creek sediment. A section to bedrock is as follows: 6 to 8 ft. muck; 4 to 5 ft. gravel; soft micaceous schist bedrock.

At the lower end of Discovery Claim Vermont Creek narrows to a canyon and then suddenly broadens into a fairly wide valley eroded out of the floor of Hammond River Valley. It is in this part of the Vermont Creek valley that the deep channel has been found. This channel lies in a narrow area about 1/4 mile long on the left limit of the creek on Claim No. 2 Below Discovery. There is a low pass opposite and northwest of the deep channel into a southerly bend of Hammond River. It may be possible that this deep channel is a remnant of the deep channel of Hammond River. The deep channel is from 30 to 80 ft. below the surface. It has been worked out. The elevation of a shaft in this channel at Wanamaker's cabin about 3/8 mile from the mouth of the creek is 1485 ft. No authentic data on the value of the ground in this channel is available, though it is said that in some places it ran as high as $5 per bedrock foot. The gravel on the dumps seen was fairly fine and well waterworn with few boulders. Pieces of the bedrock seen on the dump would indicate that the bedrock was a micaceous schist.

BUCKEYE CREEK K+30-15

This is a small torrential stream, the present bed of which was mined in early days. As previously noted, a high channel from Hammond River is being explored on Buckeye Creek upstream from its mouth.

SWIFT CREEK K+30-11 30-30

This is a small torrential stream of which the present bed

was worked in early days. A high channel from this creek ran into a former high channel,now eroded away, of Hammond River. This high channel was worked out several years ago.

LOFTY CREEK

This creek is a small steep gully on the right limit of Hammond River. A small portion of the present channel at the mouth of the creek was mined out in early days.

GOLD BOTTOM CREEK K 30-19

This creek is the largest tributary on the right limit of Hammond River below Vermont Creek. The present channel of the creek was worked out in early days. No data is available on it and no one is now working on it, though it is said to have carried very good pay.

Where Gold Bottom Creek enters Hammond River valley, a high channel as well as a deep channel from that creek, is being mined by Albert P. Ness and Edward Marsand. Bedrock in the deep channel of Gold Bottom Creek at this place has not been reached and no production has been obtained up to the present, except from the gold scattered through the gravel. The section so far uncovered is as follows: 0 to 20 ft. of clay and slide; 6 ft. of fairly fine,waterworn gravel; 3 ft. of subangular fairly coarse gravel with a few boulders; bottom of open cut. There are two runs of the gold, which is scattered all through the gravel. The first is a very fine flaky gold, the second a coarse rounded gold resembling the finer gold in the Hammond River deep channel. It may be possible that the two runs are segregated in the different types of gravel. However, from the kind of mining carried on, it is impossible to make this differentiation. Most of the gold is of the coarser type. The average fineness is about 890. The deep channel here is thawed.

Mining is carried on by ground sluicing and shovelling in. Water is furnished by Gold Bottom Creek, a minimum of 20 miners inches being available.

The high channel is on the upstream or left limit side of Gold Bottom Creek and about 50 ft. higher than the bottom of the present open cut. It is now being prospected by Ness and Marsand. No data is yet available as to its extent, values or depth to bedrock.

STEEP CREEK

This creek is a small torrential gully at the mouth of which in the present channel some mining was done in early days.

BUTTE CREEK

This is quite a large stream coming in on the left limit of Hammond River below the mouth of Vermont Creek. No pay has been found in this creek.

JENNY CREEK

This creek is a left limit tributary of Hammond River about 1/2 mile below Discovery Claim. Some drilling was done at the mouth of this creek by James Kelly in early days but no pay has been found.

NECK CREEK

This is a small left limit tributary of Middle Fork River heading against the head of Rainbow Creek and emptying into the river about 1/4 mile above the mouth of Hammond River. Victor Neck prospected on this creek in early days with, it is said, very good results. Nobody has attempted to work on the creek since.

CONFEDERATE CREEK K+ 30-11

This is a small gulch on the right limit of Middle Fork River heading into Smith Dome and joining the river about one mile below the mouth of Hammohd River. No pay has been found on this

creek though quite a little prospecting has been done. The creek would probably pay looking over again, with the idea that it might now pay with present transportation rates and the new price of gold.

UNION CREEK KH 30-10

This small creek is a right limit tributary of Middle Fork River heading into Smith Dome and joining the river about one mile below the mouth of Confederate Creek. The present channel is the only stream concentration known on this creek. A small amount of mining has been done on the creek in early days and at the present time it is being worked by booming and shovelling in by Vern Watts. No production has been secured from the creek for many years as Watts has not yet reached the producing stage in his mining operations. The creek under present transportation costs and the price of gold should yield a good living with this type of mining.

MINNIE CREEK KH 30-78

This creek is a large left limit tributary of Middle Fork River about 4½ miles below the mouth of Hammond River. One fork of Minnie Creek heads into a low pass into Glacier Creek. The other fork heads in a lake opposite the head of Rainbow Creek and west of Poss Mountain.

A great deal of prospecting was done on Minnie Creek in early days and also a small amount of drift mining, all in the deep channel. However, at the old price of gold and with high transportation rates, the drift mining was not successful and was abandoned. L. C. Lawson worked for several years attempting to mine the deep channel by groundsluicing. However he did not succeed in reaching bedrock, though he took out some gold in the higher levels. Herman "Slim" Bassi and Fred Milain attempted to sink a shaft to the deep

channel of Minnie Creek in the spring of 1937 below the old drift mining area. They did not succeed in reaching bedrock as the depth at this place was greater than they had been led to expect from the records of the old timbers. They intended to continue this shaft in the winter of 1937-1938, but with Bassi's death in the fall of 1937, these plans were given up. This creek deserves further investigation with the possibility that it might become a good producer. Enough work has been done in the early days to indicate there is probably gold in paying quantities in the deep channel. The upper end of this deep channel may be at a high enough level so that the overburden can be groundsluiced off and it can be worked by open cut methods.

No prospects have been found in the present channel of the creek nor in a high channel, although several high benches indicate a high channel is present.

WISEMAN CREEK Kt 30-61

This is a large right limit tributary of Middle Fork River heading into Emma Dome. It first runs northwest then north and then east to join Middle Fork River at the town of Wiseman and about 1/2 mile below the mouth of Minnie Creek. The valley of Wiseman Creek is a wide and deep glacial gouge whose relative position to Middle Fork River is that of a hanging valley. This glacial gouge has been filled with muck and detrital material to the depth of atleast 350 ft. below the mouth of Nolan Creek. Distinct stream beds are visible in the moraines of the lower Wiseman Creek valley where it joins the valley of Middle Fork River. These stream beds are from 370 to 450 feet higher than the present level of Middle Fork River opposite them at an elevation of 1255 ft. The present creek empties into Middle Fork by a narrow canyon made impassible by an

eight-foot fall. This canyon was originally cut by another small creek running out of Emma Dome known as Jap Creek. Some small tributary of Jap Creek which had a much more precipitous grade than Wiseman Creek, robbed the mouth of Wiseman Creek so that the present canyon was formed.

No pay has been found in the Wiseman Creek valley and, considering the origin of that valley, it is not likely to be found. From 1924 to 1929 the American Koyukuk Gold Mining Company built a ditch 3 miles long from upper Wiseman Creek across over and through the moraine on the left limit of Wiseman valley and attempted to find a deep channel under the moraine where it abbutted against Middle Fork Valley. Two cuts were made, the largest being about 1½ miles by road from the town of Wiseman on the extreme left limit side of Wiseman Creek valley at the level of Middle Fork valley and not far from a projecting spur of the mountain which flanks the valley on the north. This cut was originally about 800 ft. long, 40 ft. wide and 6 ft. deep. The bedrock was a micaceous schist, worn very smooth and showing distinct glacial striations parallel to Middle Fork valley. Large faceted limestone boulders were imbedded in the gravel above bedrock. Above these boulders were alternate lenses of gravel and sandy clay. In the clay were imbedded small boulders of black chert. About 100 ft. from the upper end of the cut was a gravel strata containing many unworn schist boulders. The grade of this cut was about 10 per cent. Only very fine flour gold was found in it. It is estimated that the values in the cut ran from 6 to 10¢ per cu. yard. About 400 ft. towards the town of Wiseman south of the above cut the company sluiced another cut about 400 ft. long, 30 ft. wide and averaging about 10 ft. deep. The bedrock in this cut was also micaceous schist. Above bedrock was a gravel stratum with large faceted greenstone boulders. Over this again

was a stratum of cemented sand which crumbled on prolonged exposure to air. Above the cemented sand was an unassorted strata of small pebbles and loose sand. The grade of this second cut was about 8 per cent. Only fine flour gold was found in this cut also. There was a greater concentration of this fine gold in the upper end of the cut, where it was also a little coarser. The largest piece of gold found in the cut at this upper end was worth about 10¢. The ground was all frozen when mining operations started. After September 1929, no further work was done by this company.

Below the junction of the Nolan Creek valley with the Wiseman Creek valley, several shafts have been sunk. The deepest shaft and farthest out in the Wiseman valley, is about 2 miles below the above junctions of the two valleys. This shaft was sunk for 335 through varying layers of muck, ice and clay. A pipe was driven a depth of 30 ft. into the bottom of the shaft, but neither gravel nor bedrock were reached.

NOLAN CREEK

KR 30-32
30-31
30-39
30-45
30-46
30-68
30-81

This creek is a left limit tributary of Wiseman Creek, about 6 miles above the mouth of Wiseman Creek and the town of Wiseman. It has been the richest and best paying creek in the whole upper Koyukuk region. The righthand or east fork of Nolan Creek heads in a high pass against the lefthand or west fork of Vermont Creek. The lefthand or north fork of Nolan Creek heads in Vermont Dome and against one of the tributaries of Washington Creek. From the forks to the mouth, Nolan Creek is about 5 miles long and runs almost due south. However the lower two miles is the only part of the creek that has yielded gold in paying quantities. Nolan Creek has a number of tributaries, several of which on the left limit have been good gold producers. From the

forks downstream the tributaries on the right limit are as follows:

(1) Montana Creek, about 1/2 mile below the forks.

(2) Acme Creek, about 3⅓ miles below the forks.

The tributaries on the left limit are as follows:

(1) Webster Creek, about 1⅓ miles below the forks.

(2) A small, unnamed gulch about 2 miles below the forks.

(3) Fay Creek, about 2⅓ miles below the forks.

(4) Archibald Creek, about 3 miles below the forks.

(5) Smith Creek, about 4 miles below the forks and about 1/2 mile from the junction of Nolan Creek valley with the valley of Wiseman Creek.

The upper part of Nolan Creek valley is a narrow V-shaped gorge. About 1/2 mile above the mouth of Fay Creek the bottom of this gorge begins to widen until at the end of Nolan Creek valley, it is about 1/4 mile wide. Nolan Creek has a grade of about 130 feet to the mile or about 2½ per cent. The average amount of water in Nolan Creek below the mouth of Smith Creek is about 200 miners inches. Nolan Creek has the three types of stream concentration usual in the upper Koyukuk region, i.e., the present creek channel, deep channels and high channels.

The present channel below the mouth of Webster Creek lies entirely in the muck filling of the Nolan Creek valley. On Discovery Claim just below the mouth of Fay Creek, the present channel was mined in early days by shovelling in. The gravels of the present channel were here about 3½ feet deep and lay on a false bedrock in the muck. Production at this place is unknown. It is said that this was the place where the first discovery of gold was made on Nolan Creek in the year 1901. No other part of the present channel has carried enough values to mine. The enrichment on Discovery Claim was

undoubtedly due to dumping into the streambed of Nolan Creek gold-bearing gravels from Fay Creek.

The deep channel produced the greater part of the gold recovered from Nolan Creek. High values were found it from the mouth of Fay Creek to about 3/4 miles below the mouth of Smith Creek on Claim No. 8 Below Discovery, a distance of about 2 miles. Above the mouth of Fay Creek, no workable placers have been found. On Claim No. 8 Below Discovery, the values in the deep channel out into the valley of Wiseman Creek gradually become too lean for profitable mining. The deep channel is permanently frozen. At the mouth of Fay Creek the depth from the surface to this channel is about 20 feet. At a shaft at creek level on the upper end of Claim No. 2 Below Discovery opposite the valley of Archibald Creek at an elevation of 1785 feet, the depth to bedrock was 65 feet. At a shaft on the lower end of Claim No. 4 Below, the depth to bedrock was 110 feet. On the upper end of Claim No. 5 Below Discovery at an elevation of 1740 feet, the depth to bedrock was 115 feet. At the mouth of Smith Creek on the upper end of Claim No. 6 Below Discovery at an elevation of 1635 feet, the depth to bedrock was 140 feet deep. At a shaft sunk in the middle of Claim No. 7 Below Discovery at an elevation of 1595 feet, the depth to bedrock was 182 feet. On the upper end of Claim No. 8 Below Discovery the depth to bedrock was 190 feet. At this last place the values in the ground barely paid to mine. On the lower end of Claim No. 8 Below Discovery, the depth to bedrock was 210 feet. The values here were so light that the ground did not pay to work. The average grade of the deep channel is about 4½ per cent.

As on Hammond River, there are sections preserved of other deep channels at higher elevations than the one described. These

sections may represent high benches when the deep channel was the bed of an active stream. However because of their irregular distribution and lack of continuity, it is thought that these higher deep channel sections were caused by an aggrading creek cutting bedrock trenches in its valley walls as it meandered across its flood plain.

The bedrock in the deep channel ranges from a micaceous to a black carbonaceous schist and phyllite. In it are several drop-offs, probably marking the sites of ancient waterfalls. A typical section to bedrock on the lower end of Claim No. 4 Below Discovery is as follows:

(1) 20 feet of tough vegetable muck containing several layers of moss.

(2) 30 feet of vegetable muck containing a few layers of moss.

(3) 60 feet of finely broken schist (chicken feed gravel)

(4) 1/2 to 1½ feet of waterworn gravel containing medium sized boulders.

A typical section to bedrock in a higher deep channel opposite Claim No. 6 Below Discovery on the left limit is as follows:

(1) 1½ feet of moss.

(2) 20 feet of muck and ice.

(3) one foot old land surface moss.

(4) 28 feet of muck and ice.

(5) 3 inches to 2 feet of sand and gravel.

Pleistocene fossils are found in the gravels of the deep channel and in the lower muck above the gravel. The gravel in this channel was waterworn and fairly fine but had scattered through it many large boulders which made driftmining in certain sections difficult.

The gold in the deep channel was coarse, rounded and waterworn but contained no large nuggets. On the upper end of Claim

No. 4 Above Discovery, the gold was much finer and brighter colored than from other parts of the channel. It is thought that this difference in the gold may be due to the influence of Acme Creek whose valley joins Nolan Creek valley on the right limit a little upstream from this place. The fineness of the gold in the deep channel of Nolan Creek is about 850. The gold all lay directly on bedrock. Values ranged from $1.15 to as high as $15 a bedrock foot. At present the deep channel is considered to be mined out. The last drift mining operation was conducted in the winter of 1936-1937 by John Wooll and W. J. Welch. This was on a higher level deep channel at the mouth of Archibald. The value of the ground here was $1.15 a bedrock foot.

About 1400 ft. above the mouth of Fay Creek in the bottom of the valley on the left limit of Nolan Creek, James Tobuck and Peter Dow sank a shaft in the winter of 1928-1929. Vertical section down through the shaft is as follows: - 2 ft. of moss; 15 ft. of muck; 8 ft. of gravel and greenstone boulders carrying flour gold and running from 5 cents to 25 cents a pan; 14 ft. muck; soft micaceous schist, all frozen except the moss. The shaft seemed to be on the rim of a channel farther over towards the right limit.

Another shaft was sunk by Tobuck and Dow about 300 ft. upstream from the last hole. The section through this shaft is as follows:- 2 ft. of moss, 6 ft. of muck, 7 ft. of mud and gravel, 15 ft. of gravel, 10 ft. of blue clay--all frozen except the moss. The upper 4 to 5 ft. of the 15 ft. body of gravel has many greenstone boulders and carries coarse gold. The rest of the gravel is finer and carries flour gold. Not enough pay was found in these two shafts to warrant further prospecting or mining.

There are several sections of high channels on Nolan Creek.

The lowest is on the right limit above the mouth of Acme Creek. This section of high channel is about 20 feet in elevation above the present creek level. It was mined out in early days. Values in it are said to have been low.

Just below the mouth of Smith Creek on the left limit of Nolan Creek valley opposite Claims No. 5 and 6 Below Discovery, is a section of high channel known as the Workman channel. This channel was discovered by Harper Workman in 1919 when mining in it started. For about 550 feet this channel lies parallel to the valley of Nolan Creek. The widest part is 40 feet. Between Nolan Creek valley on the west and the Workman channel there is a rim which is 8 or 9 feet high at the upper end of the channel but which gradually lowers downstream to disappear 250 feet from the lower end. This lower 250 feet is a flat shelf which narrows and disappears at the end of the channel. The last 150 feet of the Workman channel on this shelf carried very low values, the paystreak seeming to have turned to the west and been eroded away by Nolan Creek. The channel at its upper end turns to the east and continues up Smith Creek. The bottom of the channel rapidly rises so that the rim disappears about 75 feet above the turn. Not enough work has yet been done in this upper part of the Workman channel above the turn to determine whether the channel is entirely from Smith Creek or whether the break in the rim on the [illegible] Smith Creek or north side indicates a channel down Nolan Creek joining at this place a channel down Smith Creek. The bedrock in the Workman channel is micaceous schist with cleavage dipping to the northwest. The elevation of the bedrock in the turn is 1800 feet, a rise of 50 feet above the bed of Smith Creek opposite the turn and where Smith Creek valley joins Nolan Creek valley. The gravel in the Workman channel is coarse and water-worn, and contains many boulders up to 2 ft. in diameter. A section

to bedrock below the turn is as follows: 5 to 15 ft. of muck containing thin streaks of gravel and large boulders; 6 to 8 ft. of gravel; micaceous schist bedrock. The deposit is permanently frozen. The gold in the Workman channel is coarse, ranging from wheatgrain size to small nuggets, but containing no large nuggets. It lies mostly on top of bedrock. The fineness is from 953 to 962. The value of the ground below the turn was $4.20 a bedrock foot (old price of gold). The grade of the bedrock in the Workman channel below the turn is about 3 per cent. Above the turn it rapidly rises to about 5 per cent or more. Water for mining purposes is brought in two ditches from Smith Creek, one at an elevation of 1810 ft. and one at an elevation of 1945 ft. At present H. S. Wanamaker is groundsluicing off the overburden at the end of the Workman channel above the turn in order to expose the gravel for shovelling in. The section here consists of about 80 feet of muck and ice over about 5 feet of gravel. No production was contemplated in 1937.

On the left limit of Nolan Creek across Smith Creek valley, north of and opposite the Workman high channel, is the Pingel high channel. It lies mostly in the Nolan Creek valley but makes a wide curve to the east up the right limit of the valley of Smith Creek where it has been traced about the same distance as the Workman high channel. This channel is a flat bench about 30 ft. wide which pitches at either end as a broad shelf, at a grade of 4 to 5 per cent into Nolan Creek on the west and Smith Creek on the south, without a rim. The bedrock of this bench is at an elevation of 1800 feet. The bedrock is micaceous, phyllitic and quartzite schist, the last composing the bedrock of the east end of the channel. The gravel is coarse and unassorted and contains many medium sized boulders. In it waterworn and fresh angular pieces are mixed. A section through this

channel on the Nolan Creek end is as follows: 2 ft. of moss; 16 ft. of dark bluish mud and ice; 3 ft. of gravel; phyllite schist bedrock. The gold is coarse and unworn but with no large nuggets. The fineness is from 885 on the Nolan Creek side to 925 on the Smith Creek side. The values of the ground originally ran about $1.40 a bedrock foot (old price). No one is working in the Pingel high channel at the present time.

To the north of the downstream end of the Pingel high channel (in the valley of Smith Creek) the bedrock of the hillside rises steeply then flattens out into a terrace sloping to the south, known as the Jones high channel. At about the center of the Jones high channel the bedrock has an elevation of 1870 feet. The bedrock of the Jones high channel is a soft graphitic schist. The average depth to bedrock is about 30 feet. The gravel is coarse and subangular but contains very few large boulders. A section to bedrock is as follows: 20 ft. of muck and ice; 10 ft. of gravel, soft graphitic schist bedrock. The gold is coarse, well worn and rounded. The fineness is 888. It lies all through the gravel. The value of the ground is about 25¢ a bedrock foot. The deposit is permanently frozen. At present Pingel and Company (consisting of Henry Pingel, R. H. Jones and J. E. H. Wooll) are mining the Jones high channel by groundsluicing off the muck and ice, then hydraulicking the gravel with a nozzle and canvas hose into the sluiceboxes. Operations started in 1936. An average of about 40 miners inches of water is obtained through a mile ditch from Smith Creek. The penstock of this ditch is at an elevation of 1925 feet or about 55 feet above the center of the bedrock in the channel.

About 1/2 mile upstream from the Pingel high channel opposite the lower end of Claim No. 3 Below Discovery on the left limit of Nolan Creek is a bald rounded outcropping of schist known as Gobbler's Knob. East of Gobbler's Knob is a slight swale before the

east side of Nolan Creek valley again begins to slope up to Smith Dome. About 300 feet east of Gobbler's Knob, at an elevation of 1965 feet, John Wooll sank a shaft 96 feet to bedrock. About 3 feet of boulders and coarse gravel was found above bedrock in this shaft. Only light prospects were obtained.

On the left limit of Nolan Creek and extending upstream or north from Gobbler's Knob about 1/4 mile to where Fay Creek valley joins the valley of Nolan Creek is another section of high channel known as the Williams high channel. O. R. Williams in early days mined this channel from its upstream end below Archibald Creek about 600 feet downstream towards Gobbler's Knob. His workings were about 40 feet wide and were on a flat bench separated by a rim about 3 feet high from the valley of Nolan Creek. The elevation of bedrock in Williams' workings is about 1970 feet or about 190 feet higher than the level of Nolan Creek directly west about 1000 feet. East of the Williams workings towards the side of Nolan Creek valley rising to Smith Dome, the bedrock pitches sharply downward to an elevation of 1950 at the bottom of the Williams channel. The width of the bottom of the channel at this place is about 200 feet. The bedrock is a soft graphitic schist. The depth to bedrock is from 65 to 80 feet. The gravel is medium fine, well waterworn and contains very few large boulders. A section to bedrock is as follows:
60 to 75 ft. of muck and ice; 5 ft. of gravel; soft graphitic schist bedrock. The gold is coarse, rounded and well waterworn. It is distributed all through the gravel. The fineness is 950. The value of the ground is said to be $3.13 a bedrock foot. The deposit is permanently frozen. This deepest part of the Williams high channel was first mined by Captain E. G. Rowden in 1929. He cut through the rim on the upstream side of Gobbler's Knob with a drain 10 feet deep. However this drain was not deep enough to allow him to reach bedrock so the venture was

abandoned in the fall of 1929. In 1931 Sam Stanich and E. J. Ulen took over the Rowden cut and deepened the drain. Mining operations were then resumed and continued to the present time by groundsluicing off the muck and ice and then hydraulicking with a pipeline, canvas hose and hand nozzle the gravel into the sluiceboxes. An average of about 40 miners inches of water is available from ditches to both Archibald and Smith Creeks. The penstock of these ditches is at an elevation of about 2080 or about 130 feet above the level of the bedrock in the high channel.

On the left limit of Nolan Creek north of and directly from the Williams high channel, opposite across the Fay Creek valley is another section of high channel known as the Wooll high channel. This high channel consists of a flat bench which has been uncovered for a width of about 400 feet. This bench is separated from the valley of Nolan Creek to the west by a rim 6 to 8 feet high. The bottom of the bench is very irregular and is cut longitudinally (north to south) by a number of roughly parallel gutters or minor channels. These have drop-offs and pot holes in their courses so as to make the entire surface of the bedrock very uneven. The average grade of the high channel is 2 to 3 per cent south towards Fay Creek. The elevation of the bedrock between gutters is about 2025 feet. The bedrock is composed of alternating bands of micaceous and graphitic schist. The total depth of the deposit is from 10½ to 37 feet. The gravel is coarse and poorly sorted but contains few boulders. A section to bedrock is as follows: 8 feet of muck containing a few medium sized boulders; 1 to 15 feet of ice; 0 to 12 feet of gravel; soft micaceous or graphitic schist bedrock. The gold is coarse and well worn. It is found mostly in the form of small nuggets. The gold lies mostly on the high points of bedrock in the gutters and between the gutters. Very little is found

in the pot holes. The value of the ground is said to have been about $2.70 a bedrock foot. This rich ground is said to have been worked out but more is expected farther towards the left limit. The deposit is parmanently frozen. Fossils are scarce in other sections of high channel on Nolan Creek. However in the Wooll high channel in the muck and ice a few feet above the gravel, fossils of sheep, muskox and bison are quite numerous. The Wooll high channel was opened in 1916 by John E. H. Wooll who has worked here to the present time. Water for mining purposes is brought by a one-mile ditch from Fay Creek. The elevation of the penstock is at about 2100 feet. A maximum amount of 80 miners inches is available. The muck and ice are ground sluiced off to the gravel and the gravel hydraulicked into the boxes with a hand nozzle and canvas hose. About 1000 feet of channel has been uncovered upstream from Fay Creek. The channel seems to swing away from Nolan Creek and into the hill at the upper end of the cut.

On the south side of the confluence of Fay and Nolan Creeks and on the left limit of both creeks at an elevation of about 225 feet above the present creek bedx, is a small section of high channel which was worked about 15 years ago.

The high channels of Nolan Creek are at present the only places in its valley where mining can be carried on by the old methods without modern equipment and engineering. In time the whole Nolan Creek valley will be mined as a unit. However the problem of how to accomplish this depends on more extensive and careful data and much engineering planning.

KK 30-5
30-33
KK 30-34
30-61

SMITH CREEK

This creek is a large left limit tributary of Nolan Creek, joining that creek about 1/2 mile above the opening of the Nolan Creek valley into the valley of Wiseman Creek. Smith Creek is about 3½ miles

Wanamaker open-cut looking east and upstream on Smith Creek

Emma Dome looking east from trail opposite mouth of Emma Creek

long. It heads in a high flank of Smith Dome to the north of the town of Wiseman. The head of Smith Creek affords an easy though high pass east to the head of Union Creek and also north to the head of Gold Bottom Creek. From its head Smith Creek flows northwest and then west to its confluence with Nolan Creek. The valley of Smith Creek is narrow and V-shaped. It shows in miniature the same features as Nolan Creek, possessing high channels, a present channel and a deep channel.

The lower 2 miles of the present channel of Smith Creek was worked in the richer spots in early days. At this time, the only mining in the present channel is being done by H. S. Wanamaker on Claim No. 7 Above Discovery about 2 miles from the mouth. Work was started here in 1929 by H. S. Wanamaker and John Hurley. Mining operations were started after Hurley's death by Wanamaker in 1934. The elevation of the bedrock in the upper end of the open cut is 2445 feet. The bedrock is a micaceous schist. The depth to bedrock is from 6 to 20 feet. The gravel is fairly coarse and subangular and with some large boulders. The section to bedrock is entirely of gravel, there being no overburden. There are two runs of gold, one coarse, rough and much pitted, the other coarse but smooth, rounded and waterworn. With study these runs might be correllated with different types of gravel and origin. The average fineness of the gold is about 950. The deposit is permanently frozen. Water for mining purposes is brought in a 1/4 mile ditch from Smith Creek at a head of 60 feet above the upper end of the present open cut. A fairly steady supply averaging about 40 miners inches is available. The gravel is hydraulicked into the sluice boxes with a hand nozzle and canvas hose. The value of the ground is about 30¢ a bedrock foot. The grade of the lower 3/4 miles of Smith Creek is about 5 per cent. The grade of the 1¼ miles above is about 7½ per cent.

At the mouth of Smith Creek the depth to bedrock on the lower end of Discovery Claim is about 135 feet. At the lower end of Claim No. 3 Above Discovery the depth to bedrock is about 20 feet. The grade of the deep channel up to this point is about 8 per cent. From this point on up the deep channel gradually rises to coincide with the present channel. The deep channel on Smith Creek at the present time is considered to be mined out by such mining methods as are now available. No one is at present working on it.

There are several remnants of high channel on Smith Creek that are being mined or have been in the past. Also there is the possibility of much further development in these channels, especially if more water were available.

On the right limit opposite the lower end of Claim No. 5 Above Discovery, John Hurley opened up in 1929 by hydraulicking with a hand nozzle and canvas hose two small cuts in remnants of old high channels at levels of 150 and 200 feet above the creek bed. Since his death shortly afterwards, no one has worked at this place. The bedrock is micaceous schist. The gravel is coarse and subangular and unassorted. Bedrock was not reached. The deposits were permanently frozen. Not enough work was done in the cuts to secure data as to recovery. Water for mining purposes was brought by a 1/2 mile ditch from Smith Creek with heads of 25 and 75 feet above the cuts. About a maximum of 40 miners inches was available.

Opposite the lower end of Claim No. 3 Above Discovery on the right limit of Smith Creek at an elevation of 2035 feet, a man named Calhoun in early days mined out an open cut in a remnant of a high channel. The bedrock in his cut is a micaceous schist. The gravel is fairly coarse and subangular. No furtherdata on this cut is available.

On the right limit of Smith Creek opposite Claim No. 2 Above Discovery, Hugh Boyle has been mining in a remnant of high channel since 1918. The elevation of the bedrock in the cut is about 1910 feet. The bedrock is a soft graphitic schist with cleavage planes dipping gently to the northeast. The depth to bedrock ranges from 20 to 80 feet. The gravel is coarse, subangular and poorly sorted but with no large boulders. A section to bedrock in the lower part of the cut near where work first started is as follows: 1/2 foot of moss; 8 to 10 feet of blue clay containing waterworn boulders; 30 to 40 feet of dry sand; 2½ to 4 feet of gravel. At the upper end of the cut where present mining is being done, the section is all gravel. There are two runs of gold. The greater part of the gold is fairly coarse, unworn and pitted. The rest of the gold is also fairly coarse but smooth, rounded and worn. No large nuggets occur in any of the gold. The average fineness is about 950. The gold lies all through the gravel but mostly in the lower few feet. The value of the ground was formerly about $1.81 a cubic yard. The present value of the ground is about 27¢ a bedrock foot. The deposit is permanently frozen. Water for mining purposes is brought from Smith Creek in a 1/2 mile ditch at a head over bedrock of about 60 feet. Mining is carried on by hydraulicking with a hand nozzle and canvas hose.

ARCHIBALD CREEK K+30-48

This creek is a small left limit tributary of Nolan Creek about 1 mile above Smith Creek. Archibald Creek is about 1½ miles long and has a very steep grade. It shows two phases of placer concentration usual in the upper Koyukuk region, namely a present channel and a deep channel. It may be possible that Archibald Creek with the further development of the adjacent high channels on Nolan Creek, may

show remnants of high channels.

The present channel in Archibald was mined near the mouth in early days. At this time Peter Dow and son are mining in the present channel about 3/8 miles from the mouth of the creek. The elevation of the bedrock in their cut is 1905 feet. The bedrock is a soft schist. The depth to bedrock is 8 to 15 feet. The gravel is coarse and subangular with many boulders. A section to bedrock is as follows: 1 foot of moss; 3 feet of muck; 5 to 12 feet of gravel and boulders; soft schist bedrock. There are two runs of gold, one fairly fine, smooth, flat and worn, the other coarse, rough and porous. The average fineness is 905. The gold occurs all through the gravel. The value of the ground is about 44¢ a bedrock foot. The deposit is permanently frozen. The average grade of this lower part of the present channel is about 5½ per cent. Mining operations are carried on by groundsluicing with the water from Archibald Creek down to about 3 feet, then shovelling in. The water supply is very intermittent, depending on rain. A maximum would be about 80 miners inches.

On the right limit of Archibald Creek about 100 feet downstream from Dow's open cut and about 50 feet north, Dow and Company (consisting of Peter Dow and son, Oliver Chappelle and Dennis O'Keefe) are drift mining in the deep channel. The elevation of the surface of the last shaft farthest upstream is 1920 feet. The depth to bedrock in this shaft in the deep channel is 25 feet. The width of the deep channel is about 14 feet. The bedrock is alternating bands of black graphitic and yellow schist. The gravel is coarse and subangular but with no large boulders. The section to bedrock is as follows: 1 foot of moss; 16 to 18 feet of muck; 7 to 9 feet of gravel; soft black or yellow schist bedrock. There are 2 runs of gold, one coarse,heavy, rounded and worn, the other also coarse but porous and unworn. The

average fineness is about 904. The value of the ground is about $2.11 a bedrock foot. The deposit is permanently frozen. The average grade of the bedrock in the deep channel is between 8½ and 9 per cent. Upstream in the last shaft the bedrock in the deep channel rises rapidly to coincide with the present channel. The deep channel itself at this place was narrowing to about 5 feet and was swinging to the left limit under the present channel. Further drift mining operations at this place were considered very doubtful.

FAY CREEK

K430-31
30-34

This creek is a small left limit tributary of Nolan Creek about 2 miles long and situated about 1 mile upstream from Archibald Creek. Fay Creek heads in the north flanks of Smith Dome and runs a little south of west to its confluence with Nolan Creek. Mining on the present channel of Fay Creek started in 1901, Fay Creek being the first creek in the Nolan valley to be mined. This present channel was all mined out in early days.

The deep channel on Fay Creek was also mined out in early days. It was at the mouth of Fay Creek that the first work in the deep channel was done on Nolan Creek. The bedrock in the deep channel at this place was about 20 feet below the surface. No data on any of this early mining is available.

Sections of the high channel have been found on the right limit of Fay Creek. About 1000 ft. upstream from and about 275 ft. in elevation above the mouth of Fay Creek, Robert McIntyre opened up a section of high channel in the spring of 1929. After his death no more work was done at this place. Further up the right limit of Fay Creek above McIntyre other small sections of the high channel were mined in early days. McIntyre did not reach bedrock. There is no data on any

of the mining done on these remnants of high channel. No one at present is working on the creek. The creek needs a more thorough going over in the light of present transportation facilities and the higher price of gold.

WEBSTER CREEK

This creek is a small gulch flowing into the left limit of Nolan Creek about one mile above Fay Creek. It is said to carry a little gold in its gravel and attempts in early days have been made to mine it. No one at present is doing anything on this creek.

MONTANA CREEK

This is a large right limit tributary of Nolan Creek about 1/2 mile above Webster Creek. In the winter of 1928-1929 a man named Rafferty, since deceased, put down some shafts at the mouth of Montana Creek. From the appearance of the dumps, these shafts appear to have been in slide rock and are of no use as prospect shafts. No data is available on what he secured in them.

ACME CREEK

This creek is a large right limit tributary of Nolan Creek opposite to and a little downstream from Archibald Creek. Acme Creek heads in a low pass to Washington Creek. From its headwaters it flows east and then southeast to its confluence with Nolan Creek. The elevation of the confluence is about 1760 feet. No gold has been found in the present channel of Acme Creek. Also no high channels have been found though it is thought that if the valley walls of Acme Creek were prospected, remnants of high channels might be found.

The deep channel of Acme Creek lies in a narrow gutter which runs out into the Nolan Creek valley to join the deep channel of Nolan

Uhlen open-cut on Williams Bench on Nolan Creek looking south

Seattle River and cabin looking southwest from left limit

Creek. At the junction of the Acme Creek valley with the valley of Nolan Creek this deep channel is said to be about 70 ft. below the surface. In the valley of Nolan Creek where it joins the Nolan deep channel it is said to be 110 ft. deep. A little money has been found in this lower part of the deep channel of Acme Creek. This money did not extend up the Acme Creek valley over a few hundred feet. The gold is said to have been fine and very bright and easily distinguished from the Nolan Creek gold. If these reports are true, and it would seem that the valley of Acme Creek, especially the deep channel, needs more attention paid to it by the prospector.

SEATTLE RIVER

This river is probably the largest tributary of North Fork River. It heads in the Arctic Mountains south of the main crest of the Brooks Range near the headwaters of Clear River and flows south roughly parallel to Middle Fork and North Fork rivers for about 60 miles to about 2 miles above the mouth of Mascot Creek. It then swings to the southwest to join North Fork River on the left limit below Delay Pass.

The trail to Seattle River leaves the truck road at the mouth of Nolan Creek, follows up the left limit of Wiseman Creek, past the mouth of Snowshoe Creek and Pascoe Creek to Wiseman Pass, which is a wide U-shaped pass showing distinct marks of glaciation and is at an elevation of 1855 ft. The trail then leads past a small lake at an elevation of 1830 ft. down Pass Creek in the Seattle River valley to Seattle River. There is a short cut on this trail from the mouth of Pascoe Creek over a high pass at the head of Pascoe Creek at an elevation of 2385 ft. to the aforesaid small lake. In the winter time tractor travel to Seattle River is very feasible by way of Wiseman Pass

and a summer tractor road could be built at a very little expense. The trail to Mascot Creek crosses Seattle River about 10 miles due west of the town of Wiseman and about 2 miles below the mouth of Washington Creek. The elevation of Seattle River at the trail crossing is about 1335 ft. About 500 ft. from the trail crossing, on the right limit of the river, at an elevation of 1355 ft., a large cabin was built by the miners in early days. This cabin is now used as a rest cabin for people travelling through the country to Mascot Creek and beyond.

Seattle River shows the usual three phases of stream concentration in the Upper Koyukuk region. The bedrock in Seattle River, so far as seen from the specimens on the dumps, is schist, mostly of the graphitic variety. The discharge of Seattle River averages about 10,000 miners inches.

No values have been found in the present creek channel. About 400 ft. downstream from the above cabin, on the right limit, at an elevation of 1335 ft., a shaft was sunk in early days by Charles Yehle, 168 ft. to bedrock in the deep channel. Some drifting was done in this shaft and an attempt made to mine it. However, the values were too low to make mining profitable. About 1/2 mile above this shaft, A. P. Ness sank three shafts in early days to bedrock on the deep channel. The deepest of these was 258 ft. At the mouth of Mascot Creek on the right limit, a shaft was sunk in early days 250 ft. deep. At the mouth of Blue Cloud Creek about 1/2 mile below the mouth of Mascot Creek and on the left limit, a shaft was sunk in early days 250 ft. deep. No ground on the Seattle River, except at the Yehle shaft, showed enough values to warrant further prospecting. There is no definite data on what was found in any of the shafts of Seattle River. It is not thought that the deep channel at the Yehle shaft is likely to carry enough values for mining purposes, even at the present price

of gold.

There are three high channels traceable on the left limit of Seattle River at the trail crossing, and two or three traceable on the right limit. It is not believed,however, that any of these high channels are liable to be gold-bearing. It is possible that some of them may be in the nature of moraines or lateral glacial stream beds.

WASHINGTON CREEK R 30-63

This creek is a large left limit tributary of Seattle River, flowing roughly parallel to and about 4 miles west of Nolan Creek. Washington Creek is about 10 miles long. The left or north fork heads into Vermont Dome. The right or east fork heads in a comparatively low pass against the head of Acme Creek. Washington Creek has a narrow V-shaped valley. The amount of water in the creek will average about 500 miners inches. Washington Creek shows two of the usual three placer concentrations of the upper Koyukuk region, a present creek channel and a high channel.

In the present creek channel about one mile above the mouth of the right fork, a dam was built in early days and a small cut boomed out. It is said that the amount of gold recovered from this cut was not satisfactory. About 2 miles downstream from the mouth of the right fork, a cabin was built and some work done in the bed of the creek. About 1/2 mile below the last workings and at the mouth of a small left limit tributary, a small cut has been shovelled out of the creek bed. No data on any of this work in the present creek bed is now available. It is only said that although there was gold in the creek, the recovery was insufficient to make mining the creek attractive.

Duffy cabin on Mascot Creek looking north and upstream

Ikovich cabin
on Mascot Creek
looking north
and upstream

From above the mouth of the right fork to three miles downstream, high channels are plainly visible on the right limit. About 3 miles below the mouth of the right fork, high channels can be seen on the left limit extending downstream for about a mile. In early days a man named Candle (now dead) prospected and sank several pits in a slide from the highchannel on the right limit of the creek opposite the cabin previously mentioned. The results obtained here are unknown.

With present transportation rates and facilities and the rise in the price of gold, Washington Creek deserves the attention of prospectors. It may be that with further work, a deep channel will be discovered.

MASCOT CREEK

This creek is a right limit tributary of Seattle River about 3 miles above Delay Pass and about 2 miles below where the trail to Wiseman crosses the river. At the upper end of Claim No. 8 Above Discovery, Mascot Creek forks. The right or north fork heads against one of the tributaries of Swede Creek. The left or west fork is the larger stream. About 2 miles above its mouth, the main fork again forks, the right fork heading against a pass to Conglomerate Creek and the left fork against a pass to Big Four Creek. From the forks Mascot Creek flows almost due south about 7 miles to its confluence with Seattle River. From its headwaters to about 3 miles above its mouth, Mascot Creek runs in a narrow V-shaped valley whose flood plain or floor is from 50 to 200 feet wide. At about 3 miles from its mouth, Mascot Creek narrows for about 1500 feet to a canyon or gorge whose bottom is 20 to 30 feet wide. Below the canyon the valley floor rapidly widens to 300 to 600 feet, which width it maintains to the mouth. The tributaries on the right limit below the forks are as follows:

(1) No. 4 Pup Gulch, about 1/2 mile below the forks and at the lower end of Claim No. 6 Above Discovery.

(2) No. 1 Pup Gulch, about 1¼ miles below the forks and at the upper end of Claim No. 3 Above Discovery.

(3) O'Neil Creek, about 2¼ miles below the forks.

(4) Preacher Creek, about 1 mile above the mouth of the creek or about 6 miles below the forks.

On the left limit below the forks, the tributaries of Mascot Creek are as follows:

(1) Discovery Pup Gulch, about 1⅛ miles below the forks and at the lower end of No. 3 Above Discovery.

(2) KnowrCreek, about 3 miles below the forks.

(3) Canyon Creek, about 4 miles below the forks and about 200 feet below the lower end of the canyon.

Discovery Pup Gulch heads in a high pass to Seattle River and runs in a southwesterly direction to its confluence with Mascot Creek. O'Neil Creek heads in a high pass to Big Four Creek and runs almost due east to its confluence with Mascot Creek. Preacher Creek also heads in a high pass to Big Four Creek and flows southeasterly to its confluence with Mascot Creek. Canyon Creek heads in a moderately high pass to Seattle River and flows almost due west to its confluence with Mascot Creek.

The aneroid elevations of various points on Mascot Creek are as follows:

Forks of creek at upper end of Claim No. 8 Above Discovery - 1920 feet.

Creek opposite Ikovich's cabin on upper end of Claim No. 6 Above Discovery - 1860 feet.

Creek at mouth of No. 1 Pup Gulch at the upper end of Claim No. 3 Above Discovery - 1695 feet.

Creek at mouth of Discovery Pup Gulch on lower end of Claim No. 3 Above Discovery - 1675 feet.

Creek opposite Duffy's cabin on upper end of Claim No. 1 Above Discovery - 1655 feet.

Creek at mouth of O'Neil Creek - 1635 feet.

Creek at mouth of Knorr Creek - 1575 feet.

Creek at old cabin 500 feet above canyon - 1550 feet.

Creek at mouth of Canyon Creek - 1495 feet.

Creek at mouth of Preacher Creek - 1385 feet.

The average grade of the creek from the forks to the head of the canyon is about 1.4 per cent. The grade through the canyon is about 2.5 per cent. The average grade of the creek from the end of the canyon to Preacher Creek is about 1.05 per cent.

The average discharge of Mascot Creek at the head of the canyon is about 1000 miners inches. Mascot Creek is very subject to sudden freshets when the amount of water varies greatly.

In early days freight was brought by packtrain to Mascot Creek by a trail from the crossing down the right limit of Seattle River to the mouth of the creek, then up the creek and over the top of the canyon to the workings. Subsequently a packroad was graded by hand up the valley wall on the right limit of Seattle River to the pass at the head of Canyon Creek at an elevation of 2095 feet. From the top of the pass the trail leads in a long slant upstream on the left limit of Mascot Creek to about 500 feet below the mouth of Knorr Creek. On the Mascot Creek side the trail has been destroyed in several places by slides. It would have to be regraded if used again to any extent.

The bedrock of Mascot Creek is entirely of schist. This ranges from a graphitic to a reddish ironstained quartzite schist which

seems to have some relation to the mineralization in the creek. The gravel in the creek is fine and waterworn with few boulders above the canyon. All the gravels in the creek are thawed.

Mascot Creek has two of the usual three stream concentrations in the upper Koyukuk region, namely a present creek channel and high channels. The present creek channel has been the place from which most of the gold has been recovered. From about 200 feet below Ikovich's cabin on the upper end of Claim No. 7 Above Discovery to about 2 miles downstream or to about 150 feet below the mouth of O'Neil Creek, the values in the creekbed ranged from $3.70 to $6.94 a bedrock foot. The depth to bedrock is about 3 feet. A strip from 15 to 50 feet wide was mined out by shovelling in. Above Ikovich's cabin to the forks, the bed of the creek was worked in spots. About 1/4 mile below Knorr Creek, a section of the creek bed about 150 feet long was mined but did not pay as the wages at that time were $12.50 a day plus board. Below the canyon the dumps of many old prospect shafts were found by the writer. No bedrock was seen on these dumps and it looks problematical whether or not bedrock was reached. It is claimed that the depth to bedrock is about 20 feet in this part of the Mascot Creek valley.

On Claim No. 1 Below Discovery, Vincent Knorr is groundsluicing and shovelling in. The bedrock is a soft schist. The gravel is fine and waterworn and with very few boulders The depth to bedrock is about 3 ft. The gold is fairly coarse and well worn. It lies in and on the top of bedrock. The fineness is about 965. Knorr lost his setup in a sudden flood or freshet in the fall of 1937 so no estimate could be made of the value of his ground. Knorr owns Discovery Claim, Claims No. 1, 2 and 3 Below Discovery and Claim No. 5 Above Discovery.

On Claim No. 7 Above Discovery, Nick Ikovich is groundsluicing and shovelling in. The bedrock is soft schist. The depth to

bedrock is from 1/2 to 3 ft. The gravel is medium fine and well waterworn. It contains a few greenstone erratics from the surrounding hillsides. The gold is about 10 per cent fine and 90 per cent coarse, consisting of 50¢ to $7 pieces. It lies on and in the top of bedrock. The fineness is about 965. The value of the ground ranges from $1.25 to $1.50 a bedrock foot. Ikovich owns Claims No. 6, 7 and 8 Above Discovery.

On Claim No. 1 Above Discovery, Austin Duffy is prospecting along the edges of the old workings. No production was made in 1937, though it is said he produced a relatively large amount of gold for one man in 1936. Duffy owns Claims No. 1, 2, 3 and 4 Above Discovery.

The remants of high channels which have produced gold on Mascot Creek lie on the right limit. Just below and on the right limit of No. 4 Pup Gulch is a remnant of high channel at an elevation of 1770 ft. This remnant was about 100 feet long and 10 feet wide. Water for working it was brought in a ditch from No. 4 Pup Gulch. The value of the ground in it is said to have been $1.80 a bedrock foot.

Opposite the mouth of Discovery Pup Gulch is another small remnant of a high channel about 30 feet above the present creek level. No data is available on this remnant although it is said to have been very rich.

About 1/4 mile above the mouth of Preacher Creek and to the east of a low hill on the left limit of Mascot Creek, is a low pass from a westward turn in Mascot Creek valley to an eastward turn. This low pass has every appearance of a high channel. It has never been prospected.

There never has been a deep channel definitely found on Mascot Creek. However on the upper end of Claim No. 6 Above Discovery, a deep hole about 150 feet long was encountered in the bedrock. Bedrock was never reached in this hole although the creek was very rich above and below. On the lower end of Claim No. 6 Below Discovery on the right

limit of the valley floor was another deep hole about 200 feet long. An attempt was made to mine this hole but with no success on account of water, although it is said to have carried very good pay. However, enough work was done to identify this as a section of channel about 10 to 15 feet wide.

From the above, it would appear as though the two holes were sections of an old channel several feet deeper than the present creek channel. If this is so, there is a future for mining on Mascot Creek as the deep channel paystreak would probably be as long as the present channel paystreak. The canyon on Mascot Creek looks as though a rock slide or cave-in of the canyon wall had occurred on the left limit. If this is so, the deep channel would run under the left limit side of the canyon (provided, of course, there is a deep channel). Further prospecting is needed to solve the problem.

CONGLOMERATE CREEK

This is a large left limit tributary of Seattle River, whose mouth is about 2 miles downstream from the mouth of Mascot Creek. This creek was not visited by the writer. It flows roughly parallel to Mascot Creek. It is said to receive its name from the large congomerate erratic boulders which are scattered over its surface. Very good prospects are said to have been found on this creek in early days. Some mining has been done on the creek. However, mining operations were greatly handicapped by the aforesaid congomerate boulders. Congomerate Creek should have more investigation under present gold prices and modern methods of mining. No one is on the creek at the present time.

BIG FOUR CREEK

This creek is a left limit tributary of Conglomerate Creek, between that creek and Mascot Creek. It was not visited by the

writer. However, it is said to have been mined in a small way in early days. No one is on this creek at the present time.

JAP CREEK

This creek is a right limit tributary of Wiseman Creek, running into Wiseman Creek canyon about a mile above the town of Wiseman. Jap Creek heads in Emma Dome and runs northwest, north and then northeast to its confluence with Wiseman Creek. Quite a little prospecting has been done on Jap Creek but no results have been obtained so far, sufficient to justify mining. However, Jap Creek has not been prospected for several years. It might possibly repay another examination in the light of higher priced gold and better transportation facilities.

COW CREEK, MOOSE CREEK

These two creeks are small right limit tributaries of Middle Fork River below the mouth of Wiseman Creek. It is not known if they have produced any gold. At present they are abandoned, no one having been on them for many years.

SAWYER CREEK K430-13

This creek is a small tributary of Middle Fork River on the right limit, about 6 miles below the mouth of Wiseman Creek. A. D. Wilcox and Frank J. Miller were prospecting on this creek during part of the summer of1936. Their intention is to go ahead with this prospecting work and open up the creek, if possible.

EMMA CREEK K430-1

This creek is a large right limit tributary of Middle Fork River about 7 miles below the town of Wiseman. Emma Creek heads in the high ridge of Emma Dome and is apparently a dissected hanging valley. The upper end of the creek has many large tributaries running in narrow V-ahaped valleys. The upper part of the valley below the headwater

tributaries is about 1/2 mile wide. About 2½ miles from the mouth, the valley constricts into a canyon with almost perpendicular walls. This canyon is about 2 miles long and ends very suddenly at the edge of the valley of the Middle Fork River. About 1/4 mile below the canyon is a small right limit tributary, running from the southwest known as Frisbie Creek, on which no money has ever been found.

Emma Creek shows two phases of the usual three upper Koyukuk stream concentrations, namely a high channel phase and a present channel. The present channel has been worked from about 1/2 mile above the canyon to about 1/4 mile below, or a distance of 2 and 3/4 miles. The last man to work the present channel was John R. Laané, who was prospecting above the canyon in the present channel in 1929. After his disappearance in the fall of 1929, no one has been prospecting in this upper part of the valley.

A high channel about 30 ft. in elevation above the present creek bed and about 150 ft. wide was being prospected and mined in 1929 and 1930 by J. L. Wilson. This high channel was on the right limit of Emma Creek below the mouth of Frisbie Creek and swung away from the present creek to the southeast towards Middle Fork River. No one has prospected or mined at this place since J. L. Wilson ceased work. The bedrock in this place was micaceous and graphitic schist with bands of limestone in it. The total depth to bedrock was from 5 to 91 ft. The gravel was small and waterworn with many granite and limestone boulders. A section to bedrock is as follows: 1 foot of moss; 0 to 50 feet of sand and clay, 4 to 40 feet of gravel. The gold was coarse, consisting mostly of small nuggets from 25¢ to $1, old price of gold. It lay on and in the top of bedrock. 4 or 5 feet of the gravel above bedrock was thawed. The rest of the deposit was

frozen. Water for mining purposes was brought in a small 1/2 mile ditch from Frisbie Creek. The maximum amount of water available was about 40 miners inches.

Wilson ran two adits into the hill in this high channel, each about 30 ft. long. He also opened up a small cut by booming from his ditch. This cut was about 50 ft. long and 10 ft. wide and averaged about 6 ft. deep. The cut is a short distance above the 2 adits aforesaid. Below the two adits he ran an incline on the high channel, following bedrock for about 50 ft. On the right limit of the high channel he sank a shaft 90 ft. deep. A section from this shaft is as follows: 20 ft. of gravel and boulders; 50 ft. of sand; 20 ft. of gravel and boulders; soft graphitic schist bedrock. It is said that up to the year of 1928, this high channel, mined by the old timers, had produced about $12,000. The value per bedrock foot is unknown.

Lane in the summer of 1929 was said to have been prospecting on an old high channel above the canyon. What he did at this place is unknown.

MARIAN CREEK K 31-28

This creek is a large left limit tributary of Middle Fork River, whose mouth is about 1/4 mile upstream from the mouth of Emma Creek. Marian Creek runs in a fairly wide, steep-walled valley from a high mountain opposite the head of Minnie Creek, a little south of west to its confluence with Middle Fork River. Quite a little prospecting has been done in early days on Marian Creek. However, not enough gold was found to justify mining. It is thought that Marian Creek deserves more thorough investigation with the present price of gold and more modern transportation facilities.

KELLY'S MISTAKE CREEK KX 30-12

This creek is a small, steep, right limit tributary of Middle Fork River about 2 miles below Emma Creek. The creek is a narrow canyon, mostly running on bedrock. A little money has been found on Kelly's Mistake and some mining attempted. In the early part of the summer of 1937, R. H. Creecy started to open cut on this creek. In the latter part of the summer, before the district was covered by the writer, he had moved to Gold Creek. According to Maddren in U.S.G.S. Bulletin 532, page 89, about $500 was produced from this creek in 1901. There is no record of any further production.

CLARA CREEK KX 30-25

This creek is a small left limit tributary of Middle Fork River about 4 miles below Marian Creek. Clara Creek has had quite a little prospecting done on it and, according to Maddren (U.S.G.S. Bulletin 532, page 89) several thousand dollars were mined from it in 1900 and 1901. No one seems to have mined on it since that time so far as could be found out. The valley of Clara Creek is well worn and the creek itself throws almost as much water as Marian Creek. Both Marian and Clara Creeks deserve to be more thoroughly looked into as they have been neglected by the Koyukuk miners during the last 20 years.

SLATE CREEK KX 30-29

This creek is a large left limit tributary of Middle Fork River about one mile below Clara Creek. The north or main fork of Slate Creek heads against Poss Mountain. The east fork heads against a low pass at the head of Boulder Creek. Slate Creek runs in a general southerly direction from its head in Poss Mountain for about 10 miles. Thence it swings sharply to the west for about 3 miles where it is joined by Myrtle Creek. From this place it continues on a course a little north of west for 6 more miles to its confluence with Middle Fork River at the old town of Coldfoot.

Below the headwater tributaries, the main fork of Slate

Creek runs in an open U-shaped valley for several miles. About 2 miles above its confluence with the east fork, it enters a canyon about 1½ miles long. Below the canyon, the valley of Slate Creek gradually widens until about 1/2 mile below the confluence with the east fork, the valley widens to a flat about 1/2 mile wide and 1¼ miles long. This flat is the seat of a great winter accumulation of aufeis which sometimes persists throughout the year. Below the flat, the Slate Creek valley again narrows to a canyon about 1/4 mile long. Below this last canyon, the valley gradually widens. The creek flows along the left or south limit of the valley at this place and a low bluff borders the valley on that side to about 1½ miles below themouth of Myrtle Creek. Below this again it flows in a direction more north of west in a wider valley with gently sloping sides.

From the mouth to the eastern edge of the flat previously described, a distance of about10 miles, the valley of Slate Creek is cut in the bottom of a trough between two ranges of hills to the north and south. This trough averages about 1½ miles wide. It swings to the southeast at its eastern end and continues on through Sitkum Pass to South Fork River. The grade of lower Slate Creek is about 1.05 per cent. The average discharge of Slate Creek at the mouth is about 5000 miners inches. The aneroid elevation at the mouth of Slate Creek is about 1100 feet. The bedrock examined on Slate Creek is a dark graphitic schist or phyllite.The gravel in lower Slate Creek is fine with no large boulders.

There has been no deep channel found on Slate Creek. There are, however, the other two phases of placer concentration common to the Upper Koyukuk region, the present creek channel and high channels. On the bars of the present channel of Slate Creek from the mouth of the creek upstream to the confluence with Myrtle Creek, it is said that $3 to

$4 a day in fine flour gold can be rocked out. In the present channel in the first canyon above the mouth of the east fork, it is said that the oldtimer miners rocked out about $8 a day (old price of gold). James Kelly drilled in the present creek bed just above the aforesaid canyon. What results he obtained are unknown. Charles Weinert worked in the present creek bed about 1/4 mile above Kelly's drilling and the head of the canyon for many years until his death. Weinert worked also on a low left limit bench whose bedrock is said to have been only a few feet above the bedrock in the present channel. Weinert's workings and the workings of other old time miners are said to extend in the creek bed and on the aforesaid low bench for 1½ miles upstream from the previously mentioned point about 1/4 mile above the head of the canyon.

Below Myrtle Creek on the right limit of Slate Creek valley, many evidences of high channels are discernable. Some of these are without doubt from Myrtle Creek, but the majority are high channel from former levels of Slate Creek. Three high channels have been prospected in several places by the old time miners. However not enough gold was found to warrant the mining of any one of them. No one at present is mining or prospecting on Slate Creek.

Slate Creek undoubtedly warrants further investigation. Lower Slate Creek ~~It~~/is very accessible to river transportation on Middle Fork River. If values justified, this part of the creek has possibilities as a dredging proposition. The high right limit channels should also be prospected for hydraulic operations.

MYRTLE CREEK

Kt 31-6
31-7
31-10
31-15

This creek is a large right limit tributary of Slate Creek about 7 miles from its mouth. Myrtle Creek is about 8 miles long. It heads in a high pass to upper Slate Creek and flows in a valley

between mountain walls southwesterly for about 2 miles. It then turns, about 1/2 mile before its confluence with Nelson Creek, to the south and flows about 5 miles to its confluence with Slate Creek. Two miles above its mouth Myrtle Creek enters the east-west trough in which lies the valley of Slate Creek.

There are three tributaries to Myrtle Creek before it leaves the mountains on the left limit and six on the right limit. Of these only three on the right limit are named, so far as could be found out. They are Kelly's Pup Creek, about 3 miles above the mouth of the creek, Victoria Creek about 4⅛ miles from the mouth and Nelson Creek about 5½ miles above the mouth. The valley of Myrtle Creek from its headwaters to about 2 miles from its mouth is flat bottomed with steeply rising sides and, probably at some time in its history, was the bed of a small valley glacier. The valley gradually widens to Victoria Creek. Between Victoria Creek and Kelly's Pup Creek, the valley is from 200 to 300 feet wide between rims. Below Kelly's Pup Creek there is a high bluff on the right limit and the valley narrows to about 200 feet between rims. Below this point the valley continues to gradually narrow to a canyon. At the canyon a hard greenstone (altered diorite)dike about 300 feet wide, striking about S.60 degrees west and dipping about vertically, crosses through the schist. Myrtle Creek has cut a narrow gorge, 300 to 400 feet in length and about 20 feet in width at the bottom, through this dike. The wall of this gorge is vertical and about 80 feet high. This vertical cliff continues below the canyon in the graphite schist of the west or right limit of Myrtle Creek with a gradually decreasing height to its mouth. At the mouth of the creek a portion of the cliff has been cut off by the stream cutting to the southwest, leaving a rock island standing at the confluence of Slate and Myrtle Creek.

Below the canyon on the east or left limit, the valley widens to a bench with a gently sloping eastern wall and about 150 feet wide. This bench is traceable to the mouth of the creek. The creek flows in a gorge about 30 feet wide and 20 feet below the bedrock level of the bench between the high cliff previously described on the right limit and a low 20-foot cliff on the left limit.

The bedrock in Myrtle Creek below the canyon and greenstone dike appears to be a graphitic schist. Above the canyon it is more siliceous, approaching a quartzite schist. The bedrock above the canyon is rough and much broken. The schist of which it is composed breaks into thick slabby pieces and, although soft in places, is mostly hard and difficult for the miners to handle. The discharge of Myrtle Creek averages better than 500 miners inches. The grade of Myrtle Creek averages about 1.7 per cent.

Transportation to Myrtle Creek is by a 7-mile winter tractor road. This road leaves the old deserted town of Coldfoot on the south side of the mouth of Slate Creek at an elevation of 1105 feet. It crosses Slate Creek two miles upstream at an elevation of 1210 feet and Sutton Creek about 4½ miles above at an elevation of 1315 feet. About 5½ miles from Coldfoot the trail crosses the summit of the rise between Slate and Myrtle Creeks at an elevation of 1660 feet. It then drops rapidly to cross Myrtle Creek in front of Haslem's cabin at an elevation of 1500 feet. There is also a winter airplane landing field brushed out on the summit just south of the trail.

Myrtle Creek shows two of the usual placer concentrations of the Upper Koyukuk, a present creek channel and high channels. The present creek channel has been worked in the bed of the creek, according to A. G. Maddren in Bulletin 532, Page 87, "more or less from a point

near the mouth of the creek up to Claim No. 20----", a distance of about 5 miles. The width of the present creek channel below the canyon is about 30 feet and above the canyon from 30 to 150 feet. The depth to bedrock, according to Maddren, was from 2 to 4 feet. All evidence of the oldtime mining has now disappeared except for a short distance above Kelly's Pup Creek.

At the present time (1937) Knut Ellington and Company are mining on Claim No. 14 Above, 3½ miles from the mouth of the creek, on the right limit side of the present creek channel, by groundsluicing and shovelling in. The bedrock is a slabby schist of which 1½ to 2 feet are taken up in mining. The gravel is fairly coarse and subangular but does not contain many boulders. The depth to bedrock is from 6 to 7 feet. The section is as follows: 1 foot of moss; 5 to 6 feet of gravel; slabby schist bedrock. Towards the creek the gravel is thawed but towards the bench it is permanently frozen. There are two runs of gold in about equal amounts. One run is fine and flaky; the other is rounded, heavy and waterworn. No large nuggets are found. The gold occurs on and in the top one to three feet of bedrock. The fineness of the gold is about 886. The value of the ground is about $1.20 a bedrock foot.

There are several high channels traceable on Myrtle Creek. The bedrock in the high channel that is at present being worked is only about 6 feet in elevation above the present creek bed or from 10 to 12 feet higher than the bedrock in the present creek channel. About 1/4 mile above Kelly's Pup Creek on the right limit this low high channel merges with the present creek channel. From this section above Kelly's Pup Creek, at least $20,000 was mined in early days in one summer. The channel is cut off by Kelly's Pup Creek and the high bluff on the right limit previously described. It appears again on the right limit for a

few hundred feet and then crosses over to the left limit whence it continues on downstream with a gradually increasing height above the creek level to the canyon. Below the canyon, the channel continues on the bench on the left limit, previously described, to the mouth of the creek.

On Claim No. 11, about 2 and 3/4 miles from the mouth of the creek, Victor Neck is groundsluicing and shovelling in on this low high channel. His workings are on the right limit below the bluff previously described at an elevation of 1560 feet. The bedrock consists of schist slabs standing on end. The schist is mostly soft but has occasional hard reefs running through it. The depth to bedrock is from one to 20 feet, averaging about 8 feet. The gravel is fairly fine, consisting of flat schist rocks well waterworn with an occasional fairly large greenstone boulder. The section, except for one foot of muck, is all gravel. The gravel is all thawed. There are two runs of gold at this place. One run is fine and flaky and occurs all through the gravel. The other run is coarse, well worn thick pieces, with occasional small nuggets, occuring on and in the top 3 feet of bedrock. The fineness is 914. The value of the ground is about 75¢ a bedrock foot. Water for mining purposes is brought in a small ditch from Kelly's Pup Creek. About 40 miners inches are available at a head of 170 feet. Below these workings Neck is groundsluicing in the low high channel where it has crossed Myrtle Creek to the left limit. No mining has as yet been done at this place. Water is furnished for this work by a repaired part of an old ditch built for hydraulicking on the lower creek.

About opposite Claim No. 10 and above the aforesaid old ditch, at an elevation of 1550 feet, Isaac Spinks and Associates sank an incline shaft about 35 feet deep. This incline was sunk to a low high channel about 6 feet higher than the low high channel in Neck's workings.

Opposite Neck's cabin on the upper end of Claim No. 10 and about 550 feet towards the east or right limit at an elevation of 1590 feet a shaft was sunk in early days, 40 feet deep to another high channel. Fifty feet farther to the left limit than the last shaft, at an elevation of 1605 feet, another shaft was sunk in early days 60 feet to bedrock in the same high channel. Although considerable work was done in all three of the above shafts, not enough gold was found to continue extending the operations.

In the low high channel on the left limit of Myrtle Creek on Claim No. 8, Peter Haslem and Peter Doherty are groundsluicing and shovelling in. The bedrock is a slabby schist standing on end. It is fairly soft but has occasional hard reefs running through it. The depth to bedrock is from 3 to 12 feet. The gravel consists of fairly fine flat schist rocks with a few large greenstone boulders. Except the upper foot of muck, the section is all gravel. The gravel is permanently frozen. There are two runs of gold, as in Neck's workings. One run is fine and flaky and found all through the gravel. The other run is coarse, round and well worn and contains a few small nuggets. It occurs on and in the top 3 feet of bedrock. The fineness is 914. The value of the ground is about 35¢ a bedrock foot. Water for mining purposes is brought in a small ditch about 1½ miles long from King Gulch. The amount depends on the rain, but probably averages about 40 miners inches.

Adjacent to the downstream end of their present workings, Haslem and Doherty have groundsluiced off a section of channel whose bedrock is about 6 feet higher than that in the present cut. This section of channel may be part of the channel found by Spinks in the above described incline shaft.

About 500 feet below the canyon, a hydraulic pit was mined

out in the summers of 1909 and 1910 in the low high channel on the left limit. This pit is about 500 feet long and 100 feet wide. Two monitors were used with water from a ditch about 1½ miles long from Myrtle Creek under a head of about 95 feet. Tailings were disposed of by two cuts through the rim into the channel of Myrtle Creek. The bedrock is a graphitic schist and not hard to handle. The elevation of the bedrock in the pit is 1450 feet. The gravel contains many fairly large greenstone boulders. The deposit is said by Maddren to have been 15 to 20 feet deep. A mast and boom was set up to handle the boulders. The death of a workman due to the falling of this mast is said to have been one of the determining factors in the abandonment of the operation. The failure of this enterprise seems to have been due to lack of knowledge of hydraulic mining in general and of how to handle the large rocks and to dispose of the tailings in particular. That there was sufficient gold in the ground to yield a profit is certain from the fact that several men mined by hand along the edges of the cut for some years after the hydraulicking had been abandoned.

The other high channels discernable on Myrtle Creek are as follows: (1) a channel on the right limit to lower Slate Creek south of the road and striking about S.60 degrees west; (2) a narrow channel on the left limit where the old ditch was brought through the top of the canyon; (3) a channel on the left limit over the top of the greenstone dike at an elevation of 1610 feet; (4) a channel on the left limit running from a point opposite the mouth of Kelly's Pup Creek southeast towards the wide flat described on Slate Creek. This channel is at an elevation of 1785 ft. Part of it is occupied by the valley of King Gulch. None of these last 4 high channels have been prospected.

The future type of mining on Myrtle Creek would seem to be

hydraulicking with the aid of a bulldozer and possibly a small dragline for tailings. The high channels on the creek should be further prospected.

KELLY'S PUP CREEK

This creek is a small right limit tributary of Myrtle Creek flowing into that creek on Claim No. 12. Victor Neck is booming out a small cut on this creek where its valley opens out into Myrtle Creek valley, in order to prospect its gravels. So far as known, this is the only prospecting done on the creek.

HUNGARIAN CREEK

This creek is a medium sized tributary of upper South Fork River. It was not seen by the writer, except at a distance. It is said by the miners to head in two forks a little south of the east fork of Slate Creek and opposite the upper end of the big flat of Slate Creek. Hungarian Creek then runs due south parallel to upper Slate Creek to its confluence with South Fork River. It is separated from the valley of Slate Creek by a low range of hills. A high range of mountains borders its valley on the east. The valley of Hungarian Creek does not connect with Sitkum Pass. There is a high isolated hill between the gap through which Hungarian Creek enters the valley of South Fork River and Sitkum Pass on the west. No one is mining on Hungarian Creek nor has it been prospected so far as known. However, several prospectors in the Koyukuk were intending to go to Hungarian Creek at a future date to prospect.

KING CREEK, OR GULCH

This creek is a small right limit tributary of Slate Creek, joining the same about one mile downstream from the upper end of the large flat previously described. The valley of King Creek is a shallow trench, deepening to a canyon at its lower end and pitching

steeply from its head southeast to its confluence with Slate Creek. The valley of King Creek is cut into the right limit of a wide depression which was once a high channel from Myrtle to Slate Creek, as previously noted.

James J. Larson and M. Arrestouilh are prospecting on the upper part of King Creek on the left limit benches. When visited by the writer, they had just finished building their cabin and were contemplating their first shaft sinking on the left limit bench.

SITKUM CREEK

This is a small left limit tributary of Slate Creek heading in a lake in Sitkum Pass and running northwest to join Slate Creek at its bend to the west. No money has been found on Sitkum Creek and it is doubtful whether such will be found, though considerable prospecting has been done. The valley in which Sitkum Creek is situated looks as though it had been intensely glaciated and that it was at one time a part of Middle Fork River.

PORCUPINE CREEK K130-26

This creek is a medium sized right limit tributary of Middle Fork River heading into Emma Dome and flowing southeast to join the above river about 2 miles below the mouth of Slate Creek. Porcupine Creek discharges about 1000 miners inches of water in the driest seasons. From its headwaters to its confluence with Quartz Creek, a distance of about 5½ miles, Porcupine Creek runs in a narrow V-shaped valley which contracts in two places to canyons. Below Quartz Creek the valley of Porcupine Creek is about 200 ft. wide to where it opens out into the main valley of Middle Fork River. The total length of Porcupine Creek is about 9 miles. The grade of Porcupine Creek below Quartz Creek and above the junction of the Porcupine valley with Middle Fork valley is

about 2 per cent. Porcupine Creek shows two of the usual three placer concentrations in the upper Koyukuk region, a present channel and a deep channel.

In the present channel about 3 miles above the confluence of the creek with Quartz Creek, Nelson Pendleton groundsluiced and shovelled in for three months in the early part of the summer of 1937. Three-fourths of a mile above Pendleton, Dennis O'Keefe groundsluiced and shovelled in in the summers of 1936 and 1937. Both of these men had stopped work for the season when visited by the writer in the fall of 1937. The results from the work of both these men are said to have been very encouraging, though not enough gold was recovered to make the two enterprises yet profitable.

About 600 feet below the confluence with Quartz Creek Obren Stannich and Sam Stannich have been working the present creek channel since 1916. The bedrock is a micaceous schist. The depth to bedrock is from 6 ft. under the creek bed to 30 ft. towards the bench on the left limit. The workings are progressing towards this left limit bench, and the bedrock is gradually pitching towards a deep channel. The gravel is composed of flat pieces of schist, not much waterworn, mixed with a coarse sand. Large boulders are numerous. A cross section to bedrock towards the left limit is as follows: 3 to 20 ft. of muck, clay, sand, coarse gravel and large boulders, practically unsorted; 5 ft. of broken schist; 3 to 6 ft. of subangular gravel; schist bedrock. The deposit is permanently frozen. The gold is fairly fine with an occasional nugget. A few colors occur with the large boulders, but most of the gold is in the lower 3 to 6 ft. of gravel. Very little gold occurs on the top of bedrock. The fineness of the gold is 854. The value of the ground is about 59¢ a bedrock foot.

The deep channel on Porcupine Creek is drift mined every winter, except in the winter of 1936-1937, by the Stannich Brothers. In 1922 they started a drain to tap the water in the deep channel. This drain is now 1350 ft. long. It was excavated for 900 ft. before bedrock was struck in the deep channel. The mouth of the drain is at an elevation of 1185 ft. Drift mining was started at the end of the drain in the deep channel in the winter of 1923-1924. The width of the channel is from 20 to 25 ft. Where mined in 1935-1936 the bedrock in the deep channel was about 30 ft. below the surface. A section about 450 ft. long has been mined out. The deep channel itself is thawed, though the ground over it is frozen to a depth of about 15 ft. It is mined by sinking 5 or 6 shafts, 13 ft. deep in the winter in the frozen ground of the surface. This allows the cold air to freeze an area which has previously been drained of its live water through the drain. This area is large enough for one winter's mining. The value of the ground is about 67¢ per bedrock foot.

About 1/4 mile below the mouth of the Stannich drain at an elevation of 1165 ft., Ed Marsand and Associates sank a shaft in early days in the deep channel 74 ft. to bedrock . This shaft was on the right limit bench about 100 ft. south of the creek bed. Considerable drift mining was done in it, but the ground was thawed and the water so hard to handle, that returns were not satisfactory.

There has been a great deal of prospecting for a high channel on Porcupine Creek. It is possible that such a high channel once existed but that its bed was cut entirely in the deposit of detrital material which once filled Porcupine and Middle Fork valleys, and that in no place did it entrench itself in bedrock. Subsequent erosion would then have destroyed all traces of such a high channel.

QUARTZ CREEK

Quartz Creek is a large right limit tributary of Porcupine Creek, also heading in Emma Dome. From its headwaters Quartz Creek flows southeast and then east to join Porcupine Creek about $3\frac{1}{8}$ miles from its mouth, the total length of the creek being about 4 miles. Quartz Creek runs in a narrow V-shaped valley with a depth to bedrock of about 3 ft. The present channel of Quartz Creek has produced about $2500 from shovelling in operations. The mining on it was done at various times by the Stannich brothers and by Angelich and Stanton.

ROSIE CREEK KH 30-71

This creek is a medium sized left limit tributary of Middle Fork River, heading against Chapman Creek and flowing north and then west around Rosie Mountain into the above river about 3 miles below Porcupine Creek. The bedrock of Rosie Creek is said to be a greenstone formation. About 3 miles from the mouth a large tributary enters from the north known as Lake Creek. Lake Creek heads in two large lakes in a low pass through the hills to lower Slate Creek. The bedrock on Lake Creek is said to be schist. One shaft was sunk at the head of Lake Creek just below the larger lake, 275 ft. to bedrock by Eugene Peverall. Another shaft was sunk at the mouth of Lake Creek in the Rosie Creek valley, 105 ft. to bedrock by Jack Rafferty and Joe Haley. A shaft was sunk about 1300 ft. above the Rafferty and Haley shaft 106 ft. to bedrock by Peter Haslam, Joe Pelzel and Joe Kaiser. About 1300 ft. below the Rafferty and Haley shaft on Rosie Creek a shaft was sunk 105 ft. to bedrock by Henry Day and Enos Sweasy. Maddren (U.S.G.S.Bulletin 532,Page 86) reports two other shafts to bedrock, one two miles from the mouth 130 ft. deep and the other 3 miles from the mouth and 105 ft. deep.(possibly Rafferty and Haley shaft). It is said that in all these shafts no prospects were found except some fine flour gold in the Lake Creek shafts distributed through the gravels from 20 feet from the surface to bedrock.

K+ 30-13
30-23
30-24
30-27
30-28

TWELVEMILE CREEK

This creek is a large right limit tributary of Middle Fork River about 2 miles below the mouth of Rosie Creek and about 18 miles by trail below the town of Wiseman. Twelvemile Creek heads in several forks, though properly speaking, the real head is probably the South Fork. South Fork Creek itself heads in two forks. The most southerly of these two heads in a low pass west of Twelvemile Mountain and opening towards the head of Mailbox Creek. From this pass it then flows one mile due north where it is joined by the other fork, the two together forming South Fork Creek. From this point, South Fork Creek flows east of north about 3 miles where it is joined at an elevation of 1530 feet by the West Fork to form main Twelvemile Creek. About 2⅛ miles below the mouth of the West Fork, at an elevation of 1290 feet, Twelvemile Creek is joined by its Middle Fork. About 2 miles below Middle Fork Creek, at an elevation of 1185 feet, it is joined by its North Fork. About 1/2 mile below the mouth of North Fork Creek, the valley of Twelvemile Creek narrows to a so-called canyon which continues for about 2 miles to where the valley of Twelvemile Creek opens out into the valley of Middle Fork River. From the head of South Fork Creek, Twelvemile Creek flows to its mouth in a half circle around Twelvemile Mountain.

The West Fork of Twelvemile Creek heads in a low pass against the head of Alder Creek. It flows almost due east about 4 miles to its confluence with the South Fork of Twelvemile Creek. The Middle Fork of Twelvemile Creek is the longest and has the largest discharge. It also forks near its head. Both of these forks head in a large mountain on the right limit and near the head of Quartz Creek. From its headwaters, Middle Fork Creek

Middle Fork of Twelve Mile Creek
at
at Spinks mine looking north
and upstream

Tramway Bar and Canyon of the Koyukuk looking south

flows about 8 miles east of south to its confluence with Twelvemile Creek. The North Fork of Twelvemile Creek heads in a high pass to Porcupine Creek and flows due south about 4 miles to its confluence with Twelvemile Creek.

Twelvemile Creek attains the dimensions of a small river, the discharge at the mouth being more than 10,000 miners inches in the driest season. The valley of Twelvemile Creek shows evidence of much glaciation. The creek shows the usual three levels of placer concentration in the Upper Koyukuk region, a deep channel, a present creek channel and high channels. Claims have been staked from the canyon up Twelvemile Creek to Middle Fork Creek, then up Middle Fork Creek. The head of the canyon on Twelvemile Creek is on Claim No. 8 Below Discovery, Claim No. 7 Below Discovery starting 600 ft. above the canyon. North Fork Creek joins Twelvemile Creek on the lower end of Claim No. 6 Below Discovery. Middle Fork Creek joins Twelvemile Creek on the upper end of Claim No. 2 Below Discovery. Discovery Claim itself is on Middle Fork Creek and the claims are numbered on up this creek, as it was considered the main creek by the early miners.

The flood plain of Twelvemile Creek from the canyon to the mouth of Middle Fork Creek is about 400 ft. wide. It is said that the depth to bedrock here, exclusive of the deep channel, is about 5 feet. The whole valley of this part of the creek, between Twelvemile Mountain on the south and the hills to the north is about 1 mile wide. Twelvemile Creek has cut itself a secondary valley towards the south side of this main valley in a manner analagous to Slate Creek. On Middle Fork Creek the flood plain narrows to 25 to 60 feet, and the creek runs in a canyon between vertical walls about 20 feet high for about 1/2 mile above its

mouth. On Discovery Claim the walls of this canyon become lower and disappear. On the right limit at this place the valley walls slopes back rather gently before rising to the slope of the hill. On the left limit the valley wall is steep and precipitous. The average grade of Twelvemile Creek up to the mouth of Middle Fork Creek, is about 1 per cent. On Middle Fork Creek, the grade is about 2 per cent.

The bedrock, wherever seen, on Twelvemile Creek is schist, graphite and quartzite varieties predominating. However, Twelvemile Mountain to the south is composed of a greenstone or some similar altered igneous rock.

Above the canyon to the mouth of Middle Fork Creek, the gravel is comparatively fine with a few large boulders. On Middle Fork Creek, the gravel is rather fine but contains many large schist, greenstone and quartz diorite boulders.

The present creek channel of Twelvemile was mined by hand methods sporadically in early days from the canyon to the mouth of Middle Fork Creek. This type of mining continued on up Middle Fork Creek in suitable places as far as Claim No. 3 Above Discovery. No evidence of this mining is now visible. It is said that this mining was much handicapped by the water in the gravels and was only undertaken when other means of livelihood failed the miners in the district. Certain places in the present creek channel were very remunerative. It is said that during a period of low water, $500 were rocked out from a spot on Claim No. 1 Above Discovery. On Claim No. 2 Above Discovery, Charles Irish is said to have rocked out $12 from a 5-foot shaft before he was drowned out.

There are two main levels of high channels on Twelvemile Creek. The lower high channel, or secondary one, is only traceable on the left limit of Middle Fork Creek. It extends from the lower

part of Discovery Claim to the upper part of Claim No. 2 Below Discovery. The elevation of this secondary bench is about 20 feet above the creek bed and the width is about 60 feet. Thomas Kovich and Isaac Spinks mined out by shovelling in the upper end of this secondary bench. Various other parties shovelled in below them for at least 500 feet. The old workings are still traceable for about 800 feet.

The main high channel, or primary bench, is about 125 feet higher than the secondary bench. The main high channel lies on the left limit of Middle Fork Creek and Twelvemile Creek and is about 600 feet wide. Towards the left limit, the main high channel rises at a gentle slope to the bordering hills. To the east, or downstream, this channel is cut off by the valley of North Fork Creek. East of North Fork Creek the channel is not so high and gradually merges with the high rolling benches of Middle Fork River. At and below the canyon, high channels at about the same elevation as the main high channel, are traceable on the right limit of Twelvemile Creek

Opposite Discovery Claim an adit is said to have been dug into the main high channel. Values at this place are said to have been 75¢ a cubic yard. In the winter of 1928-1929, Miter Angelich and Thomas Kovich are said to have sunk a shaft opposite Claim No. 1 Above Discovery 40 feet without reaching bedrock. Opposite Claim No. 2 Above Discovery, 5 shafts, each about 30 feet deep are said to have been sunk to bedrock in the main high channel. Opposite Claim No. 3 Above Discovery, an open cut 600 feet long is said to have been groundsluiced out in an effort to reach bedrock in this high channel. In 1934, 40 4-inch drill holes were sunk [illegible]

on Twelvemile Creek. One crosscut of drill holes was put in the present creek channel, on Claim No. 2 Below Discovery and one crosscut in the present channel on Claim No. 6 Below Discovery. One crosscut of drill holes was put in the primary high channel opposite Claim No. 6 Below Discovery. One crosscut was put in this high channel opposite Discovery Claim. Although gold was found in these drill holes, the distribution was so irregular that further drilling on the creek was given up.

The only mining enterprise at the present time in the Twelvemile Creek watershed is a hydraulicking operation by Isaac Spinks and Mrs. E. R. Marsan. The workings are on the upper end of Claim No. 1 Below Discovery on the right limit, west or back of the secondary high channel just previously described. The bedrock in the cut is about 14 feet higher than the present creek bed. However the bedrock further to the left limit at the upper end of the cut, seems to be dipping down towards the valley wall and may mark the rim of a deep channel. The slope of the original surface at this place towards the creek is about 30 per cent. The bedrock is schist. The gravel is coarse and waterworn and contains many boulders up to 2 ft. in diameter. These boulders are mostly of greenstone, though there are a few of quartz diorite and gneiss. The depth to bedrock is from 8 to 21 feet. A cross-section at this place is as follows: 2 to 12 feet of muck; 6 to 9 feet of gravel; schist bedrock. The gold is in very fine flat pieces. It is distributed all through the gravel. The fineness averages 914. The value of the ground is about 35¢ a bedrock foot. There is a rim about 2 feet high between this high channel and the secondary high channel. A cut has been made through this rim and down through the secondary high channel so that

the tailings from the hydraulic operations can be run directly into the creek. Water for mining purposes is obtained from Twelvemile Creek just below the mouth of West Fork Creek in a 2-mile ditch at about a 70-foot head. About an average of 125 miners inches is available. The elevation of the penstock is 1465 feet.

There is a well authenticated deep channel on Twelvemile and Middle Fork Creeks. Near the mouth of the first small gulch downstream from North Fork Creek, on a left limit bench, Miter Angelich sank a shaft 80 feet to bedrock. This shaft was about 60 feet below the level of the present creek bed. No gold at all was found. On the upper end of Discovery Claim on Middle Fork Creek, on the right limit of the creek, George Huey in early days sank several shafts to bedrock in a deep channel about 2 feet lower in elevation than the bedrock in the present channel.

WEST FORK CREEK

About 200 feet above the mouth of this creek on the right limit, Jim Stevenson and C. H. LaBoyteaux sank a shaft. The depths of this shaft is unknown. The results could not have been satisfactory as the work was not continued. No evidences of any other work were seen on the creek

POTATO CREEK

This creek is a small left limit tributary of Twelvemile Creek about one mile downstream from the mouth of Middle Fork Creek. John Kleffin is said to have found payon Potato Creek several years ago but died before he could open up the ground.

NORTH FORK CREEK

This left limit tributary of Twelvemile Creek has been previously described. The present channel of the creek on Claim No.

1 Below Discovery, is said to have been mined quite extensively in early days by shovelling in. The value of the ground is said to have been from 40 to 50¢ a bedrock foot, the depth to bedrock being about 2½ ft. No traces of any of this past mining can now be seen on the creek.

ALDER CREEK

This creek is a large left limit tributary of North Fork River. It heads in a low pass against the head of the West Fork of Twelvemile Creek and flows south and southeast to its confluence with North Fork River. This creek was not visited by the writer. One man, Jim Rogers, has been prospecting on it but so far without finding a rich enough deposit to warrant active mining.

K+30-52 WILD RIVER MINING AREA

This area embraces all the watershed of Wild River, a medium sized stream originally known to the Indians of the Koyukuk as the Hokatina. Wild River heads in the Endicott Range and flows through Wild Lake directly south to join the Koyukuk River about 7 miles northeast of the town of Bettles. As this river has been heretofore undescribed in any report, a description of it will be given herewith. The river itself heads in a group of low rounded mountains not over 3500 feet in height. To the north and east of these mountains is the Tingayguk River, which heads in a much higher group or subrange known as the Grey Mountains. To the east of the upper Wild River is the East Fork of the John River and there is apparently, though not seen, a low divide between the upper waters of the East Fork of the John River and the Tingayguk River north of

Upper Wild Lake from Spring Creek landing looking north

Headquarters cabin at Spring Creek looking southeast

~~north~~ of the group of mountains in which upper Wild River heads. These mountains, so far as seen, are composed of slate which is soft~~er~~ and incompetent at the head of the river but which becomes harder and more competent at the contact with the lime and schist on the right limit of Toby Creek. Eight or ten miles from the head of upper Wild River, it is joined on the right limit by Toby Creek. This creek heads in a high, lime-capped, schist mountain on the divide between Wild River and the East Fork of John River and flows almost directly east to the valley of upper Wild River. It then turns south and flows parallel to Wild River for about 2 miles before turning abruptly to join it below the mouth of Divide Creek. Divide Creek is a small left limit tributary of Wild River heading in a low pass to Flat Creek and flowing west directly opposite to Toby Creek. There is a winter trail through the low pass at the head of Divide Creek on through the low pass at the head of Flat Creek to the Tingayguk River. Thence the trail leads down Tingayguk River to the North Fork River, thence through Delay Pass, up Seattle River through Wiseman Pass and down Wiseman Creek to the town of Wiseman.

About 2 miles downstream from and parallel to Toby Creek, is Cleveland Creek, a right limit tributary of Wild River, joining it in the same manner as Toby Creek. Cleveland Creek is running on schist bedrock with the surrounding mountains composed of lime. The contact between the limestone and slate lies about 1/2 mile south of Toby Creek. Opposite Toby Creek on the left limit of Wild River and running north and then west out of Mathews Dome is Swamp Creek. The bedrock of this creek is schist. About 2 miles below Cleveland Creek, upper Wild River enters Wild Lake. This lake is about 7 miles long and about $1\frac{1}{2}$ miles wide. Three of the paying

creeks in the Wild River section enter this lake on the left limit. The lake itself is a very beautiful body of water, abounding in fish and game and is from known measurements over 500 feet deep.

Wild River below Wild Lake has been used in the past as a waterway to haul freight to the gold producing creeks of the district. At present most of this freight is brought by pontoon plane to the lake itself at a cost of about 30¢ a pound in plane-load lots. However, the river is still used occasionally to distribute freight to the creeks from the lake as a base. Also miners and prospectors still travel up and down it in the spring and fall when going to and leaving their properties. Therefore, a description of navigation on the river is given below.

The outlet of Wild Lake, or head of lower Wild River, is rather deep and runs with a smooth current for almost 1½ miles. In the next half mile, and as the river enters a small lake known as Trout Lake, it becomes spread out and is very shallow and difficult to navigate. The distance between Trout Lake and Wild Lake is about one mile in a direct line but this distance is practically doubled by the river. Trout Lake is about one mile long and 3/4 mile wide. From the outlet of Trout Lake to Timber Creek is very good boating. At Timber Creek the river splits into two channels and runs over a series of gravel riffles so that boating becomes more and more difficult until Old Stiff Creek is reached. At this place the river splits up into many channels as far as Point Creek. Boating is extremely difficult over this stretch. Below Point Creek, though running in one channel, the river flows over a series of gravel riffles until about one mile above the mouth of Flat Creek. At this point the boating becomes good again and continues that way for about 2 miles below Flat Creek.

Navigation below this point then becomes very arduous as the river again runs in a wide channel over many gravel riffles until about a mile above the mouth of Michigan Creek. From there on until the mouth of Chicken Creek, the current is slack and the channel deep with boating good. Below the mouth of Chicken Creek, Wild River though running over many riffles, is still fairly navigable until about 8 miles by river from its mouth. From this point it runs in a narrow canyon-like valley cut into a conglomerate formation. The current is swift and the channel choked with large blocks of conglomerate fallen from the canyon walls. Boating through this section of the river is arduous and dangerous, especially when the water is high. About 1/2 mile from the mouth of Wild River the current slackens and navigation becomes easy. The mouth itself is on a side slough or channel of the Koyukuk River, the main channel of that river being about 1/2 mile to the east.

The aneroid elevation of Wild Lake is about 1500 feet. A tabulation of aneroid elevations of the main points on Wild River is given below:

Mouth of Flat Creek -n-	1360 feet
Mouth of Medicine Creek	1330 "
Mouth of Little Medicine Creek	1315 "
Mouth of Bear Creek	1260 "
Mouth of Michigan Creek	1200 "
Mouth of Cassiar Creek	1185 "
Mouth of Gilroy Creek	1150 "
Mouth of Wild River	810 "
Bettles airfield (bar on left limit of Koyukuk River about 1/4 mile below mouth of John River)	735 "
Allakaket airfield (bar 1/4 mile below town)	490 "

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Wild Lake from outlet looking northwest toward Battery Mountain

4-11

East shore of Wild Lake looking south towards Lake Creek delta

Stevens village airfield (Bar in Yukon River)- - - - - - - 320 feet.

Fairbanks airfield (Weeks Field) (assumed)- - - - - - - - 450 "

The bedrock of Wild River below the contact between the slate and the limestone between Toby and Cleveland creeks is schist downstream as far as Cassiar Creek. Below this point the bedrock is slate atleast as far as the mouth of Iron Creek, though the actual contact of the slate with the more southerly lying rocks was not seen. Below Chimney Creek the bedrock of Wild River is a coal-bearing sandstone and conglomerate.

DESCRIPTION OF CREEKS

UPPER WILD RIVER

On the upper Wild River no gold has been found in the slate formation of Toby Creek and Divide Creek nor in the schist and limestone of Cleveland Creek. Good prospects are said to have been found on Swamp Creek, though no mining has ever been attempted there. Prospects have also been found, it is claimed, on a small left limit tributary of Wild River south of Cleveland Creek about 1/2 mile north of Wild Lake. Cleveland Creek seems to be on the contact between the limestone and the schist or where the schist grades into limestone. The mountain north of Cleveland Creek is composed of slabby and schistose limestone. The north side of Swamp Creek is a blue-grey limestone and Swamp Creek is also seemingly on the contact between the schist and the lime. The contact between the limestone and the slate is on the right limit and about 1/2 mile south of Toby Creek. Divide Creek apparently ~~this~~ lies on the contact between the slate and the limestone. However the limestone is not continuous as the hill about 1/2 mile south of Divide Creek is schist with limestone

4-4

Upper Wild River looking north from right limit to East Pass Creek

4-2

Upper Wild River from same point as above looking toward Divide Creek

south of it again. The cleavage in the slate on Toby Creek dips about 20 degrees to the east. South of Cleveland Creek the limestone seemingly grades into a limestone schist then into a graphitic schist.

SUMMIT CREEK K+30-53

This small creek heads in Mathews Dome and flows southeast, then southwest and then west to Wild Lake, about 2 miles from its upper end. Summit Creek is about 2½ miles long. It runs in a very narrow V-shaped valley from the junction of its valley with Wild Lake Valley up to a comparatively large left limit tributary or fork from the west. At this place Summit Creek valley opens into a basin about 200 feet across and continues at this width upstream for about 3/4 of a mile. It then narrows to another narrow V-shaped valley as far as a small left limit tributary near its head. From this point on Summit Creek valley is a wide fan-shaped basin, the headwater streams flowing in narrow troughs to a common center. The bedrock of Summit Creek is schist. The top of Mathews Dome is greenstone schist. This greenstone schist contains many quartz lodes and stringers. The amount of quartz is so great that the float from it constitutes a considerable percentage of the detrital material carried down the slopes into the head of the creek. Quartz ledges are also found lower down in the Summit Creek valley, notably one at the bend at an elevation of 1815 ft. and about 3100 ft. from the mouth of the creek. The hill to the west of the head of Summit Creek and between Summit Creek and the lake is a graphitic schist. The saddle between this hill and Mathews Dome is a quartzite schist. The bedrock first seen in old workings about 1/2 mile from the mouth of the creek is a reddish yellow quartzite schist. Three hundred feet upstream this schist was succeeded by a greenstone schist strip about 100 feet wide. Above the greenstone schist is a

black graphitic schist for 300 ft. Above the graphitic schist is another hundred feet of greenstone schist, which in turn is again succeeded by about one hundred feet of graphitic schist. Above the graphitic schist is micaceous schist as far upstream as the bedrock could be examined. The width of the valley floor of the original creek as far upstream as the basin heretofore described ranges from 10 to 30 feet. However, it is thought that part of the channel is covered by slide on the right limit and that the real width of the channel from rim to rim is 75 to 100 feet. The depth to bedrock is from 12 to 14 feet, though the bedrock is said to be dipping to the right limit under slide from the hillside so that the final depth of the deepest part of the channel is unknown.

The gravel in Summit Creek is very coarse and angular. Enormous slabs of schist and erratic boulders of Arctic conglomerate and black chert lie on top of the gravel and slide down from the hillside on the right limit. The deposit is all thawed. The gold is very coarse with many nuggets, mixed with a run of very fine flour gold. It all lies in the lower three feet of gravel and on top of bedrock. The fineness averages about 920. Water for mining purposes depends on snow in the spring and the rainfall. An average of about 20 miners inches is available. The grade of the creek averages from the mouth to the aforesaid basin about 13.3 per cent.

Summit Creek was discovered in 1904 by Jack Lamont, who made $6 a day on the creek by shovelling in. Various men attempted since then to mine and prospect on the creek. In early days Joe Mathews built a dam about 3200 ft. from the mouth of the creek and Wild Lake at an elevation of 1835 ft., and mined for about 100 ft. below the dam. About 6900 ft. from the lake at an elevation of

2375 ft., Austin Duffy in early days put in a dam and built a cabin. He piled out rocks and boomed in the creek bed 6 or 7 feet deep for about 1200 feet. It is said that he had to quit work on account of lack of supplies and that bedrock was not reached in his cut. Another dam was built in early days about 4900 ft. from the lake at an elevation of 2020 ft. by unknown parties (possibly Mathews). What work, if any, was done from this dam, could not be ascertained. In 1927 R. H. Creecy re-staked the whole creek. Creecy mined in his upper cut about 350 ft. of streambed. His workings were not over 6 ft. wide. The lower end of these workings is about 2400 ft. from the lake. Also Creecy and various other parties before him mined out a lower cut about 500 ft. long and not over 15 ft. wide. The lower end of this cut is about 1550 ft. from the lake. It is said that the top three feet of gravel only was shovelled in at this lower cut. The bedrock in a 23-foot shaft on the right limit of the creek about 1550 feet from the lake, at an elevation of 1650 feet, is about 13 feet below the level of the creek bed opposite.

In 1933, Creecy sold out to Volney B. Wakefield. Wakefield built a dam about 2650 ft. from the lake at an elevation of 1760 ft. He is now (1937) booming out a cut about 250 ft. below the dam. The method of mining used by Wakefield as well as by all others who worked on the creek, is to boom off the fine materials, pile the rocks in a wall on the left limit bank and shovel in the lower 3 ft. of gravel. The boulders and slabs of schist too large to handle are broken up by blasting and a crowbar. As the cut progresses upstream, the lower 3 ft. of gravel which have been uncovered in the lower end of the cut, are protected by a carefully laid pavement of flat schist rocks. After sufficient gravel has been uncovered for a season's work,

boxes are set up and shovelling in commenced. Wakefield gets about 3 splashes an hour when water is available. Each splash lasts about 5 minutes. The grade of the creek on Wakefield's operations is 10.3 per cent. He is held back in his work by enormous slabs of schist which have slid down on top of the gravel. Because of this he had only reached bedrock in one spot by the fall of 1937. It is not known what the value of the ground on Summit Creek is per bedrock foot. The mining done on the creek has been so sporadic and as bedrock has not been reached in many cases, no correct figures can be arrived at.

SPRING CREEK K+30:30

This creek is a small left limit tributary of Wild Lake about 1/2 mile south of Summit Creek. About 1 and 3/4 miles from the mouth, Spring Creek forks. The right fork, running about N.29°W., heads against the head of Lake Creek back of Smith Dome. The left or main fork, running S.80°W., heads against Two-Cent Creek. From the forks, Spring Creek runs a little north of west to Wild Lake.

The bedrock of Spring Creek consists of several kinds of schist, principally of quartzite, graphite and greenstone varieties. The grade of Spring Creek is from 6 to 8 per cent. Spring Creek was discovered in the fall of 1903 and was first worked in the summer of 1904 by Joe Mathews and Joe Perry.

From the lake up, the claims on Spring Creek are named as follows: No. 1 Below Discovery, length 1320 ft.; Discovery Claim, length 1320 ft.; No. 1 Above Discovery, length 1320 ft.; U. S. Association, length 2640ft.; Homebrew Association, length 1800 ft.; No. 6 and 7 Claim or Larimore Claim, length 650 ft.; Forks Claim, length 600 ft. Joe Smith is the owner of the Forks Claim, and Sammy Hope and the Larrimore claim. All the rest belong to Frank J. Smith.

At the forks of Spring Creek on the Forks Claim about 9650 ft. from the mouth of the creek at Wild Lake and at an elevation of 2305 ft., Joe Smith sank a shaft in the winter of 1936-1937, 25 ft. to bedrock. From the bottom of this shaft a 50-foot drift 6 to 10 ft. wide was run in an easterly direction. $360 was recovered from this operation, making the value of the ground about 90¢ a bedrock foot. The bedrock is a graphitic schist. The deposit is all frozen. Thawing was done with wood fires. Two hundred feet below the upper end of the Forks Claim a shaft 50 ft. deep was sunk by Joe Smith. $93 was obtained from the bottom of this shaft. On the Larrimore Claim, about 100 ft. below the upper end line, is a dike of schistose altered diorite about 200 ft. wide and striking about north 19 degrees west. Near the lower end line of this claim an open cut, 15 by 75 ft. produced $199, making the value of the ground at this place about 18¢ a bedrock foot. About 100 ft. above the aforesaid open cut, 2 shafts sunk to bedrock (depth unknown), produced $45 and $212 respectively. No work has been done on the Homebrew Association below the Larrimore Claim. On the U. S. Association about 5300 ft. from the lake at an elevation of 1950 ft., Frank Smith has built an automatic dam. 250 ft. below this dam on the right limit bench, a 25-foot shaft produced $10. About 1650 ft. below the dam, Frank Smith in 1926 boomed out a cut. This cut is 50 ft. wide and has now progressed 1200 ft. upstream from its beginning. The average depth to bedrock is about 25 ft. In the creek bed the depth to bedrock is 6 to 10 ft. The bedrock is a graphitic schist. The gravel is very coarse but waterworn. Many erratic boulders of Arctic conglomerate and black chert, as well as large boulders of schist, lie on top of the gravel. A cross section to bedrock away from the creek bed, is as follows: 1 ft. of top soil; 0 to 19 ft. of slide gravel and clay; 6 ft. of gravel; graphitic schist bedrock.

The gold is very coarse and very little worn. It lies in the lower 3 ft. of gravel and upper 1 ft. of bedrock. The fineness of the gold is 920. The value of the ground per bedrock foot is about 59.4¢. Water for mining purposes depends on melting snows in the spring and on the rainfall, a possible average of 20 miners inches being available. When water can be had, Smith gets about 3 splashes an hour. The duration of the splashes is about 5 minutes. Below Smith's open cut the bedrock is greenstone schist for 200 ft. Below this again is red quartzite schist. Adjoining the lower end of Smith's open cut, Ben Sirr mined $7,000 between 1927 and 1932. Below Ben Sirr's open cut, Ed Marsand and Joe Penny took out in the year 1904 about $6,000. On the upper end of Discovery Claim and the lower end of Claim No. 1 Above Discovery, between the years 1920 and 1922 and in the year 1925, Frank Smith mined out a cut about 150 ft. long and 12 ft. wide. The depth to bedrock in this cut averaged from 5 to 6 ft. The value of the ground was about 70¢ a bedrock foot. From the lower end of Smith's lower cut, through Discovery Claim and Claim No. 1 Below Discovery to the mouth of the creek, in the years 1904 to 1912, Joe Mathews mined out about $22,500. There has also been about $3500 produced by laymen and various other parties at different times and places on the creek. The total production of Spring Creek has been about $59,500.

LYNX CREEK

This creek is a small gulch heading in Smith Dome and flowing due west to Wild Lake. Lynx Creek looks as though it occupied the basin made by a slide from Smith Dome. From the appearance, it is thought that very little concentration has taken place in this creek. However good prospects are said to have been found near the mouth. No mining has been done on it.

5-2

West Pass at head of Seward Creek looking west to East Fork of John River.

5-4

East Fork of John River looking west from West Pass

SEWARD CREEK

This creek is the largest tributary of Wild Lake, flowing into it from the west. The delta from Seward Creek projecting into the lake narrows its width to about 1/2 mile. About 2 miles from the mouth, Seward Creek forks, the larger fork coming from Battery Mountain in the north and known as the North Fork. The other fork is known as the West Fork. The North Fork again forks about 3 miles from its mouth, the main creek heading in Battery Mountain and the other fork, known as Sirr Creek, heading in the mountains bordering Wild Lake on the Northwest. Sirr Creek was extensively prospected and had some mining done on it by Ben Sirr who died while working there. No prospects other than on Sirr Creek have been found on the North Fork of Seward Creek. On the West Fork of Seward Creek several shafts have been sunk about one mile above its confluence with the North Fork. No records of these shafts could be obtained, although it is said very encouraging prospects were found in them. The bedrock in Seward Creek is a dark-colored micaceous schist. Battery Mountain is composed of this same schist. Seward Mountain is composed of schist. Mt. Eleanor is composed of limestone down to an elevation of about 3500 ft. At this point schist starts to replace the limestone. All the mountains on the left limit of the west fork of Seward Creek to its head, are composed of schist. From Mt. Eleanor, all the mountains on the right limit of the same creek to its head, are capped with limestone, schist forming their bases. The mountain at the head of Sirr Seward Creek and between that creek and Wild Lake, is capped with limestone, with a schist base.

The West Fork of Seward Creek forks again about 3 miles above its confluence with the North Fork. The southerly fork of the

two forks of the West Fork, is known as West Pass Creek and heads in a very low pass to the East Fork of John River at an elevation of 2580 ft.

North of Battery Mountain and west of the head of Toby Creek is probably the most interesting mountain in the Wild River watershed. This mountain, known as Mt. Dornraiak, is about 5200 ft. high, and rises 2,000 ft. in sheer limestone cliffs from its rounded base to its summit. It is totally unexplored and seems to have escaped the observation even of the oldtimers and has only been seen by the natives, who occasionally used to roam the Wild River region. The writer saw this mountain from the top of Mathews Dome.

LAKE CREEK Kt 30-37 30-3

Lake Creek is a left limit tributary of Wild Lake about 2⅛ miles long. About 4600 ft. from its mouth at Wild Lake, Lake Creek forks. The west fork is the main creek. It heads at an elevation of 3405 ft. in a pass to the south fork of Spring Creek, west of Smith Dome. The south, or Murphy's Fork, about 1½ miles long, heads in Lake Mountain and flows northwest to its confluence with the main creek. From its head the main creek flows north of west, then southwest, then north of west again, to Wild Lake, about one mile from the south end of the lake. At the head of Lake Creek the pass to Spring Creek is in a reddish soft schist with many stringers of quartz. About 1/4 mile down the slope from the head, the schist becomes more micaceous. About 1/2 mile below this, the micaceous schist gives way to a graphitic schist. About 200 ft. above the last of the old workings, or about 10,300 ft. from the lake, is a greenstone schist dike, about 300 ft. wide. Below this again is graphitic schist which alternates as far down as exposed with micaceous schist in bands of varying width. From a point about 11,400 ft. from the lake to about 10,100 ft. from

the lake, the width of the creekbed between rims is about 100 ft. This width gradually narrows to about 16 ft. where Murphy is now working, about 9300 ft. from the lake. This width between rims continues downstream to the forks of the creek about 4600 ft. from the lake. Below the forks the valley again widens to about 100 ft. between the rims. This widening continues to 200 ft. between the rims at the head of the delta, about 1700 ft. from the lake. At the head of the delta, the surface channel splits. The north channel is artificial and has been made by groundsluicing out a cut around and to the north of a residual knob or low hill of bedrock. This channel is much the shorter, being about 1700 ft. long. The south, or original channel, lies to the south of the aforesaid bedrock knob and is about one mile long to the lake.

The gravel on Lake Creek is coarse, though waterworn. There are many very large schist boulders as well as large erratics of Arctic conglomerate and black chert on and in the top of gravel. The gold is coarse and waterworn and mixed with a second run of very fine flour gold. The average fineness is about 920.

Water for mining purposes depends on the melting snows in the spring and on the rainfall. A minimum of about 10 and an average of about 40 miners inches is available.

Lake Creek is unique among the creeks emptying into Wild Lake, in that winter drift mining was possible on it in that portion of the creek lying in the Wild Lake valley. The bedrock seems to extend as a gently sloping shelf quite a ways out into the lake from the bordering hills. On this shelf the creek has built its delta. At the upper end, or head of the delta, the depth to bedrock was from 60 to 95 ft. Because of thawed ground, the limits

of this shelf towards the lake and the depth to bedrock from the surface of the delta except in that small area mined near the head, has never been ascertained. In the creek valley above the delta, the depth to bedrock in the creek bed is about 3 ft. On the benches this increases to about 20 ft. As on Summit Creek, the deepest part of the channel may lie under slide on the right limit and never have been found. The grade of Lake Creek averages about 11.3 per cent.

Lake Creek was discovered in 1904 by Emil Holmgren, who first worked it in the summer of 1905. The first three years to 1908 inclusive, he produced about $14,000. Larsen and Jensen in 1913 driftmined about one mile from the mouth of Lake Creek in ground whose depth to bedrock is about 60 ft. They produced about $1,000. Fred Swift and Frank Smith in the winters of 1919, 1920 and 1925 driftmined in a small area just above Larsen and Jensen. They produced altogether $511. A shaft 95 ft. deep was sunk to bedrock in the south channel about 500 ft. below Swift and Smith's drift mine. No pay was found in this shaft. About 200 ft. above this shaft another shaft was sunk 85 ft. to bedrock. Good prospects were found in this last shaft. Jim O'Brien, Joe Healy and Charles Dennison boomed out an open cut about 250 ft. long and 15 ft. wide where the present north channel is located in the summers of 1917 and 1918. About $7,000 is said to have been taken from this cut, making the value of the ground at this place about $1.86 a bedrock foot. Frank Smith worked in the winter of 1933, attempting to put down a shaft below the Larsen and Jensen drift mine, but was drowned out. John Butrovich, Fred Merrill, Jim Chepot and a man named White, produced on so-called lower Discovery Claim in the summer of 1916 about $900.

At the present time James E. Murphy is groundsluicing and shovelling in on Lake Creek. His workings are alongside of and

along the edges of old workings about 9300 ft. from the lake. It is claimed that the value of the ground where he is at present working is about $2.50 a bedrock foot. Murphy started work on Lake Creek in 1932. In the winter of 1936-1937 about 10,100 ft. from the lake and at an elevation of 2590 ft., Murphy sank a 9-foot shaft on the right limit 30 ft. north of the creek. Very good prospects were found in this shaft. Lake Creek has been mined in early days from a point about 8160 ft. from the lake to a point about 10,160 ft. from the lake. These old workings are about 12 ft. wide.

It is impossible to get the true production of Lake Creek. So far as known, Lake Creek has produced only about $26,000. However, from the extent of the above described old workings, the total production must have been many thousands of dollars in excess of this amount.

LUKE CREEK

This is a small creek heading in the flanks of Mt. Eleanor and running east to the head of Trout Lake. Prospects are said to have been found on this creek.

MARY'S CREEK

This creek is a small right limit tributary of Luke Creek heading in Mary's Mountain and running northeast to its confluence with Luke Creek about a mile from Trout Lake. Very good prospects are said to have been found on this creek, though as on Luke Creek, no mining has been done on it.

THUNDER GULCH

This is a small left limit tributary of Trout Lake heading in Thunder Mountain and running northeast into the lower end of Trout Lake. Thunder Gulch is a deep narrow canyon in limestone bedrock. It derives its name from the thundering noises that large limestone boulders made in rolling down this canyon in the spring

freshets. No prospects have been found on this creek.

TIMBER CREEK

This creek is a large right limit tributary of Wild River. It heads in the mountains outside of the area mapped and flows north and then northeast to join Wild River about 1 mile in an air line below Trout Lake. No data could be found as to any prospecting having been done on this creek. However the valley is wide and flat bottomed and may have been the bed of a small glacier. In this case, which is identical with that of Seward Creek, it is doubtful whether placer concentrations in paying quantities could be found.

OLD STIFF CREEK

This creek is a medium sized left limit tributary of Wild River. It heads in the south flanks of Lake Mountain and runs southwest to join Wild River about 2 miles below Timber Creek and at the head of "The Splits" of Wild River. At this place the channel of Wild River splits into many streams, possibly due to the amount of material dumped in the river by Old Stiff Creek. The creek received its name from an old man, name unknown, who prospected on it in early days and was nicknamed "old stiff" by the miners. No records of his prospecting could be obtained nor has anybody attempted to prospect on the creek since. The creek is very favorably located and could possibly stand more work on it.

HARDNUT CREEK

This creek is a small right limit tributary of Wild River about 1½ miles below Old Stiff Creek. Hardnut Creek heads in the north flanks of Hardnut Mountain outside the area mapped and runs north and then northeast to its confluence with Wild River. This creek received its name because when prospected in early days it was so hard to sink shafts on. The results of the prospecting were

3-10

Head of Flat Creek looking north from Matthew's Dome

3-8

Upper Wild River looking north from divide at head of Summit Creek

were not satisfactory and no mining has been done on the creek.

POINT CREEK

This is a large left limit tributary of Wild River heading in the mountains on the right limit of Flat Creek and flowing southwest to its confluence with Wild River about 1/2 mile below the mouth of Hardnut Creek. No record of any prospecting could be obtained on Point Creek. The valley of the creek is large and looks as though it might have been the bed of a small glacier. If so, it is doubtful whether it would be favorable for prospecting.

HOT CREEK

This is a small right limit tributary of Wild River running out of Hardnut Mountain on the northeast to the river about 1/4 mile above the mouth of Flat Creek. This creek is never frozen in the winter time, from which fact it received its name. No prospecting has been done on this creek and it is doubtful if there has been enough erosion to make mining profitable in the creek bed.

FLAT CREEK

This creek is probably the largest tributary of Wild River. It flows into Wild River on the left limit about 8 miles by trail from the lower end of Wild Lake. Flat Creek heads in small lakes and glacial pot holes in a low pass to Tingayguk River opposite the upper end of Wild River and a little north of east from Toby Mountain. From its headwaters Flat Creek flows in a meandering course through several lakes as far as Deadman Creek. Below Deadman Creek the grade of the valley floor increases. The creek flows in a southeasterly direction in a torrential course to a bend to the south around a low mountain above the mouth of Oregon Creek. From there on Flat Creek valley widens and has a very low gradient to its junction with the valley of Wild River about 8 miles below.

5-7

Looking down Flat Creek from right limit of Rye Creek to Hardnut Mountain

5-5

Looking up Flat Creek to the north from the same point as above.

Gold in paying quantities has not been found on Flat Creek itself. The valley shows every evidence of having been the bed of a very extensive glacier, possibly a tongue from the glacier that occupied the valley of Tingayguk River.

About half way between Birch Creek and Rye Creek on the left limit of Flat Creek at an elevation of 1465 ft., a shaft was sunk by the old time miners about 180 ft. deep. No gravel was found in this shaft and it did not reach bedrock. Fifty feet of the shaft was in pure ice. About 100 ft. below the shaft James Kelly and associates sank a drill hole 350 ft. deep. The entire depth of this drill hole was in frozen muck and ice. Thawed gravel was reached at 350 ft. At this point the hole sloughed in and had to be abandoned. Wherever seen, the bedrock of Flat Creek consisted of schist as far upstream as Deadman Creek. Above Deadman Creek the bedrock is slate. On the left limit, the mountains at the head of Agnes Creek are composed of schist bases with a capping of limestone. On the right limit, the mountains are all schist as far as Oregon Creek. Below Oregon Creek some of the mountains such as Point Mountain and White Spire Mountain, and Hardnut Mountain across Wild River valley, are limestone capped. On the left limit below Agnes Creek the mountains between Birch and Rye Creek are schist. On the left limit of Rye Creek the mountains such as Spire Mountain, Leichman Mountain and Whiskey Dome, are limestone. All the mountains on the left limit of Flat Creek from Rye Creek to Wild River, such as Flat Mountain, are limestone.

Flat Creek is navigable in high water for poling boats as far as Rye Creek and possibly as far as Birch Creek. The discharge of Flat Creek at its mouth in the driest season is about 3500 miners inches of water.

DEADMAN CREEK

This creek is a small right limit tributary of Flat Creek due east of Mathews Dome. Deadman Creek was named from the fact that a dead man was found on it by the early miners. The bedrock of Deadman Creek is schist. It runs in a canyon-like valley deeply incised in the mountain from which it flows. No records are available of any prospecting having been done on Deadman Creek. However it is possible that the creek might have some money on it and should be prospected.

TWOCENT CREEK

This creek is a small right limit tributary of Flat Creek heading against Spring and Summit Creeks and running due east. Twocent Creek received its name from the fact that the old time miners could get two cent pans, old price of gold, in the gravels of its valley. It is thought that this creek would stand considerable more prospecting with a fair chance of small workable placers being found.

About 1/2 mile above the mouth of Twocent Creek a fairly large unnamed creek joins Flat Creek on the left limit. It has a large watershed and it may be possible, as its valley is cut into schist bedrock, that there are workable placers on it. No records could be found of any prospecting having been done on it.

AGNES CREEK

This is a large left limit tributary of Flat Creek about one mile below the mouth of Twocent Creek and due east of Oregon Mountain. This creek was not visited by the writer. It has been extensively prospected by the miners in early days and some mining done on it. All records of what mining was done on the creek have been lost. It should be extensively prospected again as it has a fair chance of having workable placers on it.

OREGON CREEK

This is a small right limit tributary of Flat Creek heading against Lake Creek near Lake and Oregon Mountains. Good prospects have been found on Oregon Creek though no mining has been done on it. The bedrock on Oregon Creek is schist. The creek should be further prospected.

BIRCH CREEK Kt 30-54

This is a fair-sized left limit tributary of Flat Creek about 2 miles below Oregon Creek. Birch Creek heads in two forks in rounded, well eroded mountains on the divide between Michigan Creek and Flat Creek, and flows due west. About 2 and 3/4 miles below the forks at an elevation of 2055 feet, Birch Creek receives a large tributary, Rue Creek, from the north. Louis Rue discovered Birch Creek in 1904 and mined about $1800 from the creek in 1905. The creekbed has been mined for about 1/2 mile below the mouth of Rue Creek to about 1/2 mile above.

For at least a mile above the mouth of Rue Creek, Birch Creek flows in a narrow canyon about 40 to 60 feet wide with almost vertical walls. Below the mouth of Rue Creek, the valley bottom widens to about 100 to 150 feet for a distance of about 1500 feet. At this point the valley sharply contracts to about 50 feet between rims with a high schist cliff on the left limit and continues at this width for about 750 feet. Below this again the valley gradually widens to merge into the valley of Flat Creek.

The gravel in Birch Creek is coarse and waterworn. It contains many boulders, especially just above the schist cliff previously mentioned. However the boulders in this creek are not so numerous nor so large as the boulders in the creeks tributary to Wild Lake.

The grade of Birch Creek averages about 6 per cent. The discharge in the driest season is about 200 miners inches.

Below Rue Creek on a left limit bench a few feet in elevation above the level of the creek for a distance of about 1700 feet, there has been considerable driftmining. From the appearance of the shafts and tailings, the depth to bedrock at this place is about 20 feet deep and is probably at the same level as the bedrock in the creekbed.

Where the valley of Birch Creek debouches into the valley of Flat Creek there is a very pronounced alluvial fan. Several shafts have been sunk on this fan from the head out towards the base about 1000 ft. From the amount of tailings it would appear that drift mining had been attempted from several of these shafts. The results of these ventures are entirely unknown. Birch Creek itself produced from twenty to thirty thousand dollars in gold (old price) in early days. However the finding of the much richer Rye, and Jay Creeks a few miles below caused Birch Creek to be deserted. One man, Ben Sirr, returned to it about 1929 and both driftmined in winter and shovelled in by himself in summer until 1933. Since that time no mining has been attempted on this creek.

RYE CREEK 114 30.55

Rye Creek is a large left limit tributary of Flat Creek about 3 miles below Birch Creek and about 2½ miles from Wild River. Rye Creek heads into Whiskey Dome, a large limestone mountain on the divide between Michigan Creek and Flat Creek and flows in a general westerly direction. The bedrock of the lower part of Rye Creek is blue crystalline limestone. About 3/4 mile below the mouth of Jay Creek schist begins to come in on the right limit and the limestone becomes more and more schistose. On the upper part of the creek the limestone lies on the left limit and schist on the right limit.

It is thought that this relation between the limestone and the schist is due to faulting though the true relation is obscured by detrital material and will have to be worked out at some later time when more accurate data is available.

Rye Creek shows the usual three levels of placer concentration in the upper Koyukuk region, namely a high channel, a present creek channel and a deep channel. The creek flows in a canyon 100 to 200 feet wide with vertical walls. On the left limit the cliffs extend almost down to Flat Creek valley. On the right limit the vertical walls gradually flatten about 1/2 mile from the above valley. The bedrock in lower Rye Creek is blue crystalline limestone to about 1/2 mile below the mouth of Jay Creek. Above this point the bedrock is various kinds of schist. The gravel in Rye Creek is very coarse and angular. Boulders are numerous but not very large. The average grade of Rye Creek from its mouth to the mouth of Jay Creek is about 3½ per cent. The discharge of Rye Creek at its mouth averages about 100 miners inches.

In the present channel about 1500 ft. below the mouth of Jay Creek on the Rosie Claim, Hans Leichman has groundsluiced out a drain. In the summer of 1938 he intends to shovel in a cut at this place. In the present channel in early days Rye Creek was worked sporadically from the mouth of Jay Creek to where the valley debouches into the valley of Flat Creek in a wide alluvial fan. No gold in paying quantities was found in the valley of Rye Creek above the mouth of Jay Creek. The 300 feet in the present channel of Rye Creek below the mouth of Jay Creek produced in early days about $25,000, making the value of the ground at this place about $3.35 a bedrock foot.

In the lower part of the valley of Rye Creek and about 1/4 mile towards the right limit from the creek, is a high channel.

In this high channel at an elevation of 1835 ft. a shaft was sunk to bedrock (depth unknown). The results obtained from this shaft are said to have been unsatisfactory, and no more prospecting was done in this high channel. The high channel deserves much more prospecting as one or two shafts do not condemn it. The chances would seem to be very good for pay to be found here.

In the lower part of the valley, near the present creek bed on the right limit at an elevation of 1610 ft. a shaft was sunk 85 ft. to bedrock in a deep channel. It is said that $126 was taken from the bottom of this shaft. Also a section of the deep channel was drift-mined a short distance above the place where Rye Creek valley opens out into the valley of Flat Creek. In the deep channel on the right limit of the creek on the Rosie Claim about 1200 ft. below the mouth of Jay Creek, Ben Sirr driftmined in the winters of 1933, 1934 and 1935, producing $1652. In the winter of 1936 Hans Leichman continued this driftmining. The depth to bedrock in this part of the deep channel is about 20 feet. The total production from Rye Creek has been about $55,000.

JAY CREEK 114 30-57

This creek is a right limit tributary of Rye Creek about 4½ miles above its mouth. The valley of Jay Creek is cut in schist formation. The creek heads in the same rounded mountains as Birch Creek. From its headwaters Jay Creek flows in a southeasterly direction to its confluence with Rye Creek. Jay Creek was the richest creek in the Wild River district. The creek was discovered in 1904 by Louis Rue. However by some accident of prospecting, he did not consider it worth mining and moved on to Birch Creek. In 1912, Joe Matthews started prospecting and mining on the creek. It proved so rich that Birch Creek was deserted. It is interesting to know how

the original claims on the creek were staked. Joe Matthews staked Discovery Claim and Claim No. 1 Below Discovery. This last claim projected 500 feet into the valley of Rye Creek. Larsen and Jensen staked Claim No. 1 Above Discovery, Claim No. 2 Above Discovery and a fraction between No.s 2 and 3 Above Discovery. Fred A. Swift staked Claim No. 3 Above Discovery. August Tobin staked Claim No. 4 Above Discovery and Bob Buchan Claim No. 5 Above Disccovery.

Jay Creek from Claim No. 5 Above Discovery to its mouth, flows in a narrow canyon, the walls of which are in many places perpendicular. The width of the valley floor on Jay Creek averages about 50 feet wide. On the lower end of Claim No. 5 Above Discovery, the perpendicular valley walls close in to a narrow gap 25 feet wide. The bedrock on Jay Creek consists of alternating bands of graphitic, micaceous and greenstone schist. About 300 feet above the lower end of Claim No. 5 Above Discovery is a band of greenstone schist which continues up the creek for 1500 feet. Above this again is micaceous schist, then calcareous schist and schistose limestone. The gravel in Jay Creek is very coarse and subangular. There are many large erratic boulders of Arctic conglomerate in the creek but very few of the erratics of black chert so numerous on some of the creeks tributary to Wild Lake. The depth to bedrock is from 3 to 12 feet. The cross-section is all gravel. The gravel is all thawed. The gold is coarse, unworn and very dark in color. It is distributed all through the gravel and in the upper foot of bedrock. The fineness if 971. The grade of the creek from its mouth to Claim No. 6 Above Discovery averages about 10.9 per cent. The discharge at the mouth of Jay Creek averages not over 20 miners inches.

The creek was mined by booming and shovelling in in early days from the mouth to the lower part of Claim No. 5 Above Discovery.

The total production of the creek up to 1935 was about $200,000, making the value of the ground for this part of the creek average about 50.5¢ a bedrock foot.

Three small tributaries flow into the creek. The first is about 3/4 mile long and flows into Jay Creek on the right limit on Discovery Claim about 1/4 mile from the mouth and is known as Trail Gulch. About one mile above Trail Gulch another small tributary about one mile long flows into Jay Creek on the right limit known as Eagle Gulch. About 1/4 mile above Eagle Gulch, another small tributary about 1/2 mile long flows into Jay Creek on the left limit and is known as Cinnamon Gulch. No pay was found on Cinnamon Gulch nor on Trail Gulch as their valleys are very narrow steep canyons. A little pay was found on Eagle Gulch for a short distance from its mouth.

In 1935 Hans Leichman boomed out an open cut on Claim No. 4 Above Discovery. This cut is in the old workings and was not very successful. At present he has moved to Claim No. 5 Above Discovery. He is mining in a large cut at the upper end of the old workings about 900 feet above the lower end line of Claim No. 5 Above Discovery. His automatic dam is at the upper end line of the claim. The depth to bedrock is about 12 feet. The bedrock is graphitic, micaceous and greenstone schist. The gravel is very coarse and subangular. The grade of the bedrock at this place is 8.3 per cent. The value of the ground is about $1.17 a bedrock foot. When water is available, he gets about 3 splashes an hour. The duration of a splash is about 5 minutes.

KAY CREEK

This creek is a small right limit tributary of Michigan Creek that heads against Jay Creek and flows southeast. Kay Creek was extensively prospected in early days and some mining done. It

was not visited by the writer because of lack of time nor could any definite data be secured on it.

LUCKY CREEK

This creek is a large right limit tributary of Rye Creek about 1/2 mile above the mouth of Jay Creek. It is really the head or main fork of Rye Creek. The other forks considered the main creek by the early miners, head into Whiskey Dome and Spire Mountain. Lucky Creek heads against Rye and Jay Creek and flows in a half circle south and southwest to its confluence with Rye Creek. Lucky Creek valley lies entirely in schist formation. It has been extensively prospected but only small amounts of gold have been found on it.

TWOSTEP CREEK

This creek is a small left limit tributary of Flat Creek about one mile from its mouth. Twostep Creek heads in the limestone flanks of Flat Mountain and flows almost due west. The bedrock of Twostep Creek except for the lower third, is limestone. It has ~~been~~ been prospected by the oldtime miners but no pay has been found on it nor has any mining been attempted.

MEDICINE CREEK

This creek is a large right limit tributary of Wild River about 3 and 3/4 miles below the mouth of Flat Creek. The bedrock of Medicine Creek is a barren looking, dark colored phyllite. Medicine Creek forks 3 or 4 miles from its mouth. The north fork known as Limestone Creek, heads into the limestone mountains back of Hardnut Mountain. Limestone Creek is said to head also against one of the tributaries of the John River. No prospecting nor mining of any kind so far as could be ascertained, has ever been done on Medicine Creek.

MCINTYRE CREEK

This creek is a medium sized left limit tributary of Wild

River about one mile below Medicine Creek. It is named after a man named McIntyre who prospected on it in early days. Since he left, so far as any data could be found, no one has been on the creek. McIntyre Creek is about on the divide between the phyllite to the south and the limestone to the north. It is possible that this creek may have some pay on it, which could be discovered by more careful prospecting.

LITTLE MEDICINE CREEK

This creek is a small right limit tributary of Wild River about one mile below McIntyre Creek. The valley of Little Medicine Creek lies entirely in dark colored phyllite. No record of any prospecting could be found. The creek itself does not look as though it flowed through a favorable gold-bearing formation.

SCOFIELD CREEK

This creek is a medium sized left limit tributary of Wild River about 3 miles below McIntyre Creek. Scofield Creek is named after the man who prospected on it in early days. No record of any mining or prospecting since that time could be found. Scofield Creek, like McIntyre Creek, might possibly lie in a favorable gold-bearing formation and should be further prospected.

BEAR CREEK

This creek is a medium sized right limit tributary of Wild River directly opposite Scofield Creek. There is no record of any prospecting or mining on this creek. Its valley lies entirely in dark colored phyllite and does not look as if it would be a favorable place for the occurence of gold.

GALENA CREEK

This creek is a medium sized left limit tributary of Wild

6-10

Micigan Moutain from Wild River looking northwest

5-11

Moutains on left limit of Rye Creek from mouth of Flat Creek

River about a mile below Scofield Creek. Galena Creek was named for a large piece of galena found in its bed by early prospectors. The creek [redacted] has a very steep gradient. The formation combined with the steep gradient gives the creek the appearance of not being very favorable for prospecting. However, it should be looked into further as it heads into Galena Mountain, a highly mineralized zone.

MICHIGAN CREEK K+30-56

Michigan Creek is the second largest tributary of Wild River. It joins Wild River on the left limit about 14 miles below the mouth of Flat Creek. Michigan Creek is a large stream which in the driest season discharges at its mouth about 2000 miners inches of water. The valley of Michigan Creek shows evidence of having been intensely glaciated. The creek itself lies in a narrow canyon cut into what must have been a hanging valley about 300 feet higher than the present creek level. The grade of lower Michigan Creek averages about 2 per cent. The creek is very torrential and the bed filled with large rocks so that navigation in it is impossible. These boulders consist of Arctic conglomerate and black chert erratics, also boulders of graphitic schist, altered diorite and white quartz. The bedrock of the creek is a dark colored phyllite grading into a slate. About $2\frac{1}{2}$ miles from the mouth of Michigan Creek is a lode deposit known as the Silver King Mine.

About 100 feet north of the creek and about 50 feet in elevation above it at an elevation of 1490 feet, an adit, 7x7 ft. in cross-section, has been driven into the north wall of the canyon for 75 ft. The canyon is at this place about 500 ft. wide. The adit has a strike of N.21 degrees E. No quartz nor traces of ore were seen in this adit and it is evident that it is not long enough to cut any ore body. About 150 ft. north of the tunnel and about 100 ft. in

elevation above it, a small trench has been dug in the hillside. In this trench is exposed an outcrop of quartz with galena, 6 ft. wide and 10 ft. long, the longer axis striking northeast. Not enough work has been done at this place to tell whether this quartz is a large piece of float or is in place. At the foot of the canyon wall beside the creek are two old rotted cabins which could be repaired for temporary quarters if further work were ever contemplated.

About 200 ft. above the aforesaid cabins, the creek turns sharply to the northeast and the canyon narrows to less than 200 ft. wide. The walls of the canyon become perpendicular cliffs about 300 ft. high, or as high as the original floor of the glacial valley at an elevation of 1880 feet. About 1000 ft. from this bend on the right limit and at the top of the canyon wall in an inaccessible spot, is an outcrop of quartz which can be seen to be thickly speckled with silver galena. The extent of this outcrop could not be ascertained. About 100 ft. further upstream at the base of the cliff, is a 5-foot vein of quartz dipping about 80 degrees to the northwest and striking to the northeast. At this place the canyon swings to the east in a wide arc. About 200 ft. further upstream in this arc, at the base of the cliff, is another small outcrop whose dimensions were so obscured they could not be ascertained. About 500 ft. still further upstream is a mass of float in the creek bed fallen from an outcrop above. This outcrop was inaccessible and its size could not be seen. The canyon walls at all these places, are perpendicular, and all the outcrops, except the two above noted, are inaccessible. Vegetation, wherever there is the least crack or shelf, thickly covers the cliffs, so the outcrops could not be traced for any distance. The 3-foot lead at the base of the cliff

was only visible for about 10 ft. vertically because of this vegetation. No quartz was seen in the walls of the canyon on the left limit and it is thought the veins strike in a northeast direction so as not to cut the left limit walls of the canyon. Large pieces of float were seen among the boulders in the bed of lower Michigan Creek. Very little of this float was seen above the 5-foot ledge heretofore described and none above the last mass of float from the farthest upstream outcrop. No float was seen on the hillside above the so-called Silver King Lead above the tunnel, though much broken quartz was seen below it to the creek level. The Silver King Mine should have much more work done on it than has been done up to the present. The work should be done by practical hardrock miners under the direction of an engineer and geologist so that definite data on the lead can be secured.

EAST CREEK, FALL CREEK AND BOURBON CREEK

East Creek and Fall Creek are medium sized left limit tributaries of Michigan Creek. They were not visited by the writer. Their valleys lie entirely in schist formation. Very good prospects were found on these creeks in early days. Bourbon Creek is a left limit tributary of Fall Creek heading into Bourbon Mountain. It was not visited by the writer. This creek was mined extensively in early days. However no data could be secured on it at the present time except that it is considered to have been mined out. These three creeks should be further investigated. With the rise in the price of gold and new mining methods, it is possible that they might develop into very good small mining propositions.

CASSIAR CREEK

This creek is a medium sized right limit tributary of Wild

6-6

Twoday Mountain from Wild River looking southwest

6-4

Looking up Wild River from same point as above to the north

River about 2 miles below Michigan Creek. Cassiar Creek heads in high mountains on the divide between Wild River and John River and flows southeast. Cassiar Creek apparently lies near the contact between the phyllite and younger slates. No record of any prospecting or mining could be found on Cassiar Creek. It is possible that this creek might be worth while prospecting though the formation does not look as though it were gold-bearing.

Below Cassiar Creek all the creeks lie in slate and conglomerate formation. It is doubtful if any mining will ever be developed on them. These creeks are named and situated as follows: Just above Cassiar Creek and heading into Michigan Mountain is Little Iron Creek. Below Cassiar Creek and on the right limit heading into the northern flanks of TwoDay Mountain is Twoday Creek. Below Twoday Creek and also heading into Twoday Mountain is Mountain Creek. Below Mountain Creek on the left limit and heading into the flanks of Florence Mountain is Chicken Creek. Below Chicken Creek on the right limit and heading into the high mountains on the divide between John River and Wild River is Gilroy Creek. Below Gilroy Creek on the right limit is Little Death Valley Creek. Below Little Death Valley and on the left limit is Iron Creek. Below Iron Creek and Little Death Valley Creek on the right limit is Death Valley Creek. Below Death Valley Creek on the right limit is a small creek known as Chimney Creek whose valley is in conglomerate. Below Chimney Creek and in conglomerate bedrock and heading towards Timber Creek on the John River, is Channel Creek. Heading in Florence Mountain and running south to Koyukuk River is a creek that, although not a tributary of Wild River, is almost in the Wild River drainage. This creek is Florence Creek. It was very extensively prospected in the early days of the Koyukuk. Very little gold was found on it.

JOHN RIVER AND ALATNA RIVER MINING AREAS

Neither one of these rivers were visited by the writer except at their mouths. On the John River, Timber Creek, a large left limit tributary about 15 miles from the mouth, is said to be gold-bearing. It is said a man could rock out on the bars of this creek about $4 a day. In the early days no mining claims were allowed, by popular agreement, to be staked on this creek. It was reserved for those men who had not made enough money during the first half of the summer, to mine out a grubstake for the winter. Since these early days no record has been left of any mining on the creek.

K430-2 The only other creek on the John River where mining has been attempted is on Crevice Creek. Crevice Creek is said to run almost entirely on bedrock and what gold is found in it was picked up in pot holes and crevices.

In the Alatna River watershed Ernest Johnson and Axel Johnson are mining on Colorado Creek, a small left limit headwaters tributary of Mettenberg Creek, a left limit tributary of Iniakuk River. The Johnson Brothers are booming and shovelling in and have opened up a small cut.

K439-10 No other mining is being done on either the John River or Alatna River, although extensive prospecting and claim staking was done on Alatna River in the summer of 1937 by Sam Dubin, Al West, Frank Tyson, "Red" Labelle and three or four natives from Allakaket. So far as known up to the present time, no results were obtained from this prospecting.

BETTLES SUBREGION

TRAMWAY BAR MINING AREA

MIDDLE FORK RIVER

Middle Fork River about 5 miles below Twelvemile Creek at a place called Winter Arm, enters the Koyukuk canyon and flows through this canyon for a distance of about 10 miles. The terrain into which the canyon is cut, has a rolling topography and resembles an outwash plain. On the left limit of the canyon is a range of hills between South Fork River and Middle Fork River. These hills appear high from the river above which they rise about 1000 feet. However they are only a few hundred feet above the surface of the above plain which to the northwest rises to about the same elevation. Opposite Tramway Bar one of the highest of these hills rises to an elevation of 1960 feet. This range of hills is cut through by three very low passes known from north to south as Pat Judge's Pass, Jean D'Arc Pass, and South Fork Pass.

Following the southern base of Rosie Mountain and the mountains on the right limit of Slate Creek is a deep depression leading from the upper South Fork River to Middle Fork River. This depression is separated from Pat Judge's Pass to the south by a range of hills whose summits rise to an elevation of about 2000 feet. The depression ends at Middle Fork River just above the canyon. On the right limit of the canyon is a continuation of the upland plain into which the canyon is cut, with rolling hills, lakes and the typical disordered drainage of an outwash surface. It extends to North Fork River and John River on the west. On the south this

plain extends to the high mountains on the right limit of the lower South Fork River and the mountains on left limit of the upper South Fork River. Running through this plain in a northwest-southwest direction is a shallow trough. This trough is tilted to the southwest and becomes wider in that direction until it merges into the flood plain of Koyukuk River near the mouth of North Fork River. It is into this trough that the canyon of the Koyukuk is cut. At its upper end the trough has sides sloping up to the surrounding hills at a grade of about 2 per cent. This grade steepens sharply on the left limit for 1000 feet before the perpendicular walls of the canyon are reached. On the right limit the trough is about 1/2 mile wide. The steepening of its slope to the canyon is not so pronounced on the right limit. This trough is undoubtedly the original valley of Middle Fork River. The canyon is about 60 feet in depth below the floor of the trough. In the floor of the trough on top of the canyon walls are preserved in certain places the original river bed of Middle Fork River.

TRAMWAY BAR

About 3 miles by river below Windy Arm there is a segment of this old river bed about 60 feet in elevation above the river which has been preserved from erosion. This segment is known as Tramway Bar. Tramway Bar was discovered, according to Maddren (U.S.G.S. Bulletin 532, page 84) between the years 1885 and 1890. It was mined intermittently by rocking. After the introduction into the Koyukuk by Knut Ellington, of mining with sluice boxes on Myrtle Creek in the year 1899, mining was carried on more vigorously by this last method. According to Maddren (U.S.G.S. Bulletin 532, page 85) a fair supply of water for mining purposes was first brought to Tramway Bar by ditch in 1908. The intake of this ditch is on upper Mailbox Creek at an elevation of 1115 feet. From there the water is conducted by a series

of narrow ditches and drops about 4 miles to Tramway Bar. The method of mining used was to pile the boulders of the old channel into windrows and shovel in the gravel between. The tailings were disposed of by cutting channels in the top of the canyon wall and running them into the river below. Tramway Bar was mined in early days for about one mile on the right limit along the top of the canyon wall by the above methods. The width mined was about 50 feet back from the rim of the canyon.

The bedrock of Tramway Bar is conglomerate composed of a matrix of fine sand with small white quartz pebbles. This conglomerate dips 20 degrees to the northwest. The original gravel of Tramway Bar was a coarse waterworn river wash. It contained many boulders. Among these were identified boulders of micaceous and graphitic schist, greenstone, quartz, granite (quartz diorite), gneiss, Arctic conglomerate, black chert and red and green quartzite. Most of the boulders are waterworn and rounded but a few show facetted faces which may have been originally due to glacial action. The average depth to bedrock was originally about 4 feet.

At the present time, Charles Suckik, an Eskimo, is groundsluicing and shovelling in on a continuation of the Tramway Bar deposit adjacent to and upstream from the old workings. Suckik started work in 1935. The depth to bedrock in this place is from 5 to 7 feet. The bedrock and upper gravels are the same as described above for the rest of Tramway Bar. Below this gravel and about 25 feet back towards the right limit from the canyon rim is a layer of fine sand and brown silt about one foot thick resembling the present river silt. Below this brown silt is fine gravel with some silt intermixed which undoubtedly is decomposed conglomerate. A cross-section

to bedrock would be as follows: 1 foot of moss; 3 to 5 feet of coarse gravel; 1 foot of brown silt and fine sand; 4 to 6 inches of decomposed conglomerate; conglomerate bedrock. Most of the boulders occur in the lower part of the coarse gravel and in the silt.

There are two runs of gold at this place on Tramway Bar; first, a very coarse, rounded and worn gold scattered all through the coarse gravel but mostly in the lower part; second a very fine, flaky gold resembling the gold of South Fork River and Smalley Creek. A small amount of this last gold occurs in the brown silt and some down in the decomposed conglomerate. However the greatest amount occurs in a layer on top of the decomposed conglomerate and below the silt. The oldtime miners are said to have mined only the coarse gravels and to have secured only the coarse gold. The average fineness of all the gold from Suckik's operations is 883. The value of the ground is 31¢ a bedrock foot. Water for mining purposes is obtained from the ditch previously described. An average of about 40 miners inches is available. The elevation of Middle Fork River at the boat landing at Tramway Bar is 940 feet. The elevation of the bedrock in Suckik's cut is 1015 feet. The elevation of the top of the bank to the right limit of Suckik's cut is 1030 feet. The elevation of the top of the steepening of the slope or break-over in the valley trough as previously described, is 1130 feet. The origin of the gold in Tramway Bar is quite puzzling. The writer's personal opinion is that the coarse gold was derived from the reconcentration of the outwash material in the upland plain by Middle Fork River while the fine gold was derived from the erosion of the conglomerate. The coarse gold contained no large nuggets. The largest found by Suckik was worth $13.50.

FRYINGPAN BAR — On the left limit of Koyukuk canyon, at the present river

level, 2 miles above Tramway Bar and about 1500 feet above the mouth of Chapman Creek, is Fryingpan Bar. This bar owes its enrichment to a segment of the high channel on top of the canyon wall on the opposite side of the river from Tramway Bar, which was eroded away by the river being forced towards the left limit by the waters of Mailbox Creek. A remnant of this segment of high channel is still visible a short distance upstream from Fryingpan Bar. No one at present is mining on Fryingpan Bar. It was mined in 1908 by pumping water from Middle Fork River with a steam boiler. Fuel was secured from coal seams in the walls of the canyon about 1/2 mile above Mailbox Creek. The recovery from Fryingpan Bar and details of mining operations are unknown.

About $2\frac{1}{2}$ miles below Tramway Bar, a small stream from a lake in the previously described upland plain, cuts through the canyon walls. This stream has built out an alluvial fan or delta into the river. This fan is known as Hamil Bar and was worked by hand methods in early days. The concentration on Hamil Bar is undoubtedly due to the stream cutting in the conglomerate bedrock and eroding away a segment of high channel similar to Tramway Bar. The recovery from Hamil Bar is unknown. No one is working there at the present time.

MAILBOX CREEK kt 30-14

This is a small creek tributary to Middle Fork River on the right limit about 2 miles upstream from Tramway Bar and about 8 miles below Twelvemile Creek. Mailbox Creek cuts through the bedrock of the high channel of Middle Fork River in a narrow cliff-walled canyon opposite to Fryingpan Bar. The walls of this canyon are composed of conglomerate. The mouth of the creek is at an elevation of 945 ft. The top of the cliff above the mouth, at the same level as the Tramway Bar high channel, is at an elevation of 1020 feet. Thus, Mailbox Creek has cut down its canyon 75 feet to the level of the Koyukuk. The width of the canyon in which Mailbox Creek flows is about 200 feet. At about 1000 feet from the mouth of the canyon, the walls begin to lower as

as the creek level rises, and the canyon widens into a V-shaped valley. About a mile from the mouth the valley gradually widens into a shallow depresion in the upland plain. The creek valley lies south of Twelvemile Mountain and heads almost to the pass at the head of the south fork of Twelvemile Creek. The conglomerate cliffs at the mouth of the canyon have a very flat dip of about 20 degrees to the northwest. There is much faulting shown in the cliffs. As the cliffs recede from the mouth of the creek upstream the pebbles in the conglomerate become smaller and finally grade into a sandstone. About 2000 ft. above the mouth of the creek at an elevation of 995 feet, Thomas Kovich and George Stores have opened up a cut by groundsluicing and shovelling in. The canyon at this point has broadened to a wide V-shaped valley, about 400 ft. in width. The bedrock is a fire clay with coal occurring in it. Towards the right limit this fire clay gives way to a fine-grained conglomerate. The gravel in Mailbox Creek is rather fine and derived mostly from the conglomerate. It contains many erratic boulders consisting of the same rocks as at Tramway Bar. There are two runs of gold in Mailbox Creek; One is fine and flaky and occurs all through the gravel. The other is rough and thick and is said to occur only in a reddish layer of gravel near bedrock. The average fineness of gold is 898. The value of the ground so far opened up is about 75¢ a bedrock foot. The grade of the creek is about 2½ per cent. The amount of water in Mailbox Creek averages about 80 miners inches.

CHAPMAN CREEK KT 30-61

This is a small creek heading in a lake in Pat Judge's Pass and flowing west into the left limit of Middle Fork River about 1500 feet below the mouth of Mail Box Creek. Chapman Creek in the last mile of its course flows in a gradually deepening canyon with vertical

conglomerate walls to its confluence with Middle Fork River. It is claimed that the mouth of Chapman Creek is deep and thawed so that no shafts have been sunk to bedrock. According to Maddren in U.S.G.S. Bulletin 532, page 85, several shafts were sunk in early days on Chapman Creek. Quoting Maddren from the above bulletin: "During the winter of 1908-9 prospectors sunk 13 or 14 holes from 9 to 14 feet deep along Chapman Creek from a quarter of a mile to a mile above its mouth. These holes passed through a layer of sand and reddish gravel without gold to a bed of blue schist gravel resting on clay and prospecting from 2 to 3 cents to the pan. Some bench deposits from 20 to 30 feet above the creek about 2 miles above its mouth were also prospected and found to contain from 5 to10 cents' worth of gold in a layer of blue schist gravel 1 to 3 feet thick, but the deposit was not considered to be favorably situated on account of a lack of an adequate supply of water for sluicing."

According to Maddren in the same bulletin and page as above, quite a little prospecting was done on Middle Fork River in the canyon. Quoting him again: "Three holes from 12 to 22 feet deep were also sunk in the channel of the Middle Fork through washed gravels to hard conglomerate bedrock, and one of the men who did this work told the writer that these present river gravels showed gold to the amount of 75 cents to the square yard of bedrock surface, and that immediately on the bedrock from 2 to 3 cents to the pan was found. The object of this work was to test the gravels for dredging."

A shaft is said to have been sunk by Isaac Spinks in the canyon on the left limit about 1/4 mile upstream from Tramway Bar. Bedrock was not reached because of water in this shaft, although it was 40 feet deep. It is thought that the bottom of this shaft

[illegible] was about on a level with the bottom of the river at this place.

SOUTH FORK MINING AREA

SOUTH FORK RIVER

K & 30-60

Between the mouth of Mosquito Fork and the mouth of Jim River the South Fork runs in a narrow gorge cut into a valley whose floor was about 120 feet higher than the present river channel. This old channel may still be traced as a wide bench along the right or north limit of the river opposite Ironside Bar and also on the left limit or south side of the river at Eagle Bluff. It can also be seen on the left limit below Gold Bench. There are also lower high channels or benches cut by the river when a few feet higher than in its present channel. Remnants of these, as at Gold Bench and Ironsides Bench, have been mined. South Fork River is a deeper clearer stream than Middle Fork River but only has about 1/2 the discharge. It is navigable during high water as far as Eagle Creek by poling boats without outboard motors. There is not so much evidence of glaciation in the South Fork River valley as in the Middle Fork River valley. As explained before, there are three passes from the Middle Fork to the South Fork. At the heads of Eagle and Grayling Creeks are low passes south to Jim River. Of these two, the Eagle Creek pass is used as the most feasible entrance to the Jim River valley.

The shortest pass from water transportation on Middle Fork River to South Fork River, is South Fork Pass. It is situated about 2 miles above Carl Frank's roadhouse on Middle Fork River and is about 7 miles across to Gold Bench on South Fork River. The trail through South Fork Pass was once corderoyed for a

South Fork River and Eagle Creek looking south from Mountain at head of Smalley Creek and opposite Hanshaw Bar.

Gold Bench old workings looking east and up South Fork River

wagon road, though much of this corderoy is now rotted and the work destroyed. The trail follows up the right limit of what is probably called on the map in Bulletin 532, South Creek, to its head, at an elevation of 1325 feet, and comes down the left limit of a small valley tributary to South Fork River. About a mile from the river the trail swings to the east around the base of a hill to the mouth of Jean D'Arc Creek at Gold Bench at an elevation of 1050 feet. The elevation of the boat landing at the mouth of South Creek on Middle Fork River is about 890 feet.

All the bedrock in South Fork River valley so far as seen, is conglomerate or shale. From Jean D'Arc Pass to Judd's Pass on the right limit of South Fork River the mountains are composed of a fairly competent black shale with interbedded strata of conglomerate with small angular to rounded pebbles of quartz. These strata are from 1/2 foot to 3 feet thick. On the south side of the hill facing Hanshaw Bar on the right limit of the river, outcrops were seen of much coarser conglomerate containing quartz boulders up to 1 foot in diameter. Some of these strata are atleast 20 feet thick and contain much quartz though not as large a proportion of quartz to the total volume of rock as the smaller strata. The hill on the left limit of Pat Judge's Pass is conglomerate. The hill which lies on the divide between South Fork River and Middle Fork River watersheds at Tramway Bar is conglomerate and sandstone. The bedrock at the summit of the divide between South Fork River and Jim River from Eagle Creek to opposite Gold Bench is said to be greenstone. On the right or north limit of Jim River south of the greenstone is said to be granite. On the south or left limit side of Jim river the rocks are said to be schist. The high mountains on the right limit of Grayling Creek is said to be composed of conglomerate.

Due south of Ironside Bench one of the mountains is said to be conglomerate and the other schist(?-probably shale).

GOLD BENCH K4 30-60

At the mouth of Jean D'Arc Creek on the right limit of South Fork River and about 7 miles south of the landing at the mouth of South Creek on Middle Fork River, is a section of high channel about 30 feet higher than the present river channel or at an aneroid elevation of 1080 feet. This section of high channel is known as Gold Bench. The bench slopes gently south towards the river. About 100 acres of it has been mined by hand methods, water being brought by a ditch from Jean D'Arc Creek. On the west the bench is cut off by Jean D'Arc Creek and on the east and south by South Fork River. On the north is a gradually rising slope which marks the edge of the old river channel. The bedrock is a blue clay, probably decomposed shale. Where seen, the gravel was medium fine river wash, containing many large waterworn boulders. The bench is about 1000 feet wide and about 3/4 mile long. At the bank of the bench only the top gravels have been mined as there was no grade to dispose of the tailings. The original depth to bedrock is unknown but appears to have been, judging from the rock piles on the banks, about 6 feet. The northern limits of the bench, except at the eastern end where there is an abrupt rise to the mountain to the northeast, are ill defined and it is not known how far the deposit extends to the north with certainty. No records of production on Gold Bench are available except those given by Maddren in U.S.G.S. Bulletin 532, page 106. His report shows $150,000 was produced by 1909. It was considered in early days one of the richest spots in the Koyukuk River watershed. At present no one is mining on Gold Bench. The gold is said to have been fine, flat and very much worn. It occurred throughout the gravel but mostly near the clay

bedrock. Pleistocene bones are said to have been common in the gravel.

IRONSIDE BENCH 12-30-66

About one mile above Gold Bench on the left limit of South Fork River is Ironside Bench. Ironside Bench is at about the same elevation above the river as Gold Bench and evidently is a remnant of the same high channel. The bedrock in Ironside Bench is a blue clay which seems to be a decomposed shale. The gravel in Ironside Bench is a heavy coarse wash, well waterworn with few large boulders. The depth to bedrock is from 6 to 30 feet, the upper 5 or 6 feet being muck and ice. The deposit was originally all frozen but is now partially thawed due to the stripping of the top gravels. The gold is fine, flaky and waterworn and occurs all through the gravel but mostly on top of the clay bedrock. The value of the ground is from 25¢ to 50¢ a bedrock foot. The average fineness of the gold is 907½.

Ironside Bench is owned by Henry Messap. Fritz Werther and Henry Messap are at present working on the bench by ground sluicing and shovelling in. Water is brought by a ditch from Ironside Creek, a small creek running back of the bench. The upper gravels are boomed down to about 3 feet. About 40 acres of Ironside Bench have been worked up to the present time by hand methods. The extent of this deposit on the left limit of the creek is unknown but it is thought it would extend in a parallel direction to the river here atleast 2 miles.

In 1930, Capt. E. G. Rowden with driller, James Kelly and panner, Robert Jones, drilled one hole on Ironside Bench about 1/4 mile west of Messap's cabin. The results from this hole could not be ascertained. The drill, which now belongs to Kelly, is still on the bench. It has been exposed to the weather without any care

South Fork River looking downstream from mountain at head of Smalley Creek and opposite Hanshaw Bar.

South Fork River looking upstream from same mountain as above

but appears to be in fair condition although the canvas covering over the machinery has rotted away and the machinery is badly rusted. The drill rope is badly weathered and would have to be replaced if the drill were to be used again. The drill is a regulation 30 Keystone with a wood-burning steam power plant. It was brought on scows from Flat Creek down Wild River, up Koyukuk River to South Fork Pass and taken overland to Gold Bench. From thence it was brought across to Ironside Bench.

HANSHAW BAR kk 30-60

About 4 and 3/4 miles by river above Ironside Bench on the left limit of South Fork River at an elevation of 1110 feet, is Hanshaw Bar. This is a high-water bar in the present river channel and is a superficial deposit lying on a false bedrock of clayey sand. The depth to bedrock is 2 to 3 feet and the material composing the bar is a medium to fairly fine gravel and sand. The gold is in fine flat flakes and is distributed all through the gravel. The average value of the ground in the deposit is about 23¢ a bedrock foot. The average fineness of the gold is 907. William Glenn and Fred Clark mined on this bar in the summer of 1937 by raising water for mining purposes with a small gasoline pump from South Fork River and shovelling into sluice boxes.

GRUBSTAKE BAR kk 30-12

About 2 miles above Hanshaw Bar on the right limit of South Fork River between the mouths of Grubstake Creek and Frisbee Creek is a superficial river deposit of the present river channel known as Grubstake Bar. This bar was not visited by the writer as no one is working on it at the present time. Also due to lack of supplies, no more time could be spent in the South Fork country. Grubstake Bar is said to be similar in every way to Hanshaw Bar.

EAGLE BLUFF 1930-32

About 15 and 3/4 miles by river trail above Hanshaw Bar is Eagle Bluff. This was not visited by the writer as no one was working there at the time he was on the South Fork. However at this place it is said there is another high channel resembling Ironside Bench and Gold Bench. William Glenn is said to be planning to work this bench in the summer of 1938.

Names of the creeks on South Fork River which are in the gold-bearing area are as follows:

Beginning on the right limit just below Gold Bench is Jean D'Arc Creek; one mile above Gold Bench on the left limit is Ironside Creek just below Ironside Bench; on the left limit about one mile above Ironside Bench is Gus Deland Creek; one mile above Gus Deland Creek on the right limit of the river is Rock Creek; 1½ miles above Rock Creek on the left limit is Eagle Creek; one mile above Eagle Creek on the left limit is Davis Creek; 1/4 mile above Davis Creek is Hanshaw Bar; 3/4 mile above Hanshaw Bar on the left limit is Bear Creek; 1/2 mile above Bear Creek on the left limit is Fritz Creek; 1/4 mile above Fritz Creek on the right limit is Grubstake Creek; 1/4 mile above Grubstake Creek on the right limit is Frisbe Creek; 1/2 mile above Frisbe Creek on the left limit is Cripple Creek; 1/2 mile above Cripple Creek on the right limit is Clark Creek; 1½ miles above Clark Creek on the left limit is Greyling Creek; 2 miles above Greyling Creek on the right limit is Old Timer Creek; 9 miles above Old Timer Creek on the left limit is Eagle Bluff; one mile above Eagle Bluff on the right limit is Ruby Creek; 3 miles above Ruby Creek on the left limit is Hunter Creek; one mile above Hunter Creek on the right limit is Wilson Creek; 9 miles above Wilson Creek

on the left limit is Billy Glenn Creek; 4 miles above Billy Glenn Creek on the left limit is Granite Creek; 2 miles above Granite Creek on the left limit is the mouth of Mosquito Fork. Above Mosquito Fork the South Fork crosses the low flat depression that bounds the Bettles Subregion on the north. No more gold-bearing creeks are tributary to it in the Bettles Subregion in this direction. Below Gold Bench it is 30 to 40 miles by river to the mouth of Jim River. Below Jim River it is 30 to 40 miles by river to Fish Creek. Below the mouth of Fish Creek it is about 20 miles by river to the confluence of the South Fork River with Koyukuk River.

JEAN D'ARC CREEK K 130-60

This is a large right limit tributary of South Fork River joining that river at Gold Bench and heading in Jean D'Arc Pass opposite Pasco Creek. Jean D'Arc Creek arises about 3½ miles from its mouth by the confluence of its two forks, Cosmopolitan Creek and Smalley Creek, and flows south to South Fork River west of Gold Bench. In 1930, 17 drill holes were sunk by Capt. E. G. Rowden, with John Kelly as driller and Robert Jones as panner, on Jean D'Arc Creek about 1/4 mile from its mouth and about where the valley of Jean D'Arc Creek opens out into the valley of South Fork River. The results of this drilling are unknown. However they are said not to have been satisfactory. So far as known, this is the only prospecting in the valley of Jean D'Arc Creek. The depth to bedrock is said to be very great. The formation is in conglomerate and shale, judging from the surrounding hills, though no bedrock exposures can be seen. It appears as though a tongue of ice from Middle Fork Glacier had occupied the valley of Jean D'Arc Creek or that it had been the bed of a stream discharging from Middle Fork Glacier.

CORNUCOPIA CREEK 43 30-60

This is a small left limit tributary of Jean D'Arc Creek emptying into it about 3 miles from the mouth. So far as seen, one hole was sunk on Cornucopia Creek about 1/2 mile from its head at an elevation of about 1370 feet. The results of this prospecting are unknown. Cornucopia Creek is in a good location and though the water supply is small, deserves a more thorough prospecting.

SMALLEY CREEK

This creek is the right or south fork of Jean D'Arc Creek, joining that creek about 1/2 mile above the mouth of Cornucopia Creek. Smalley Creek heads in two forks. The main or south fork of Smalley Creek heads into a high pass at an elevation of 2360 feet leading down into South Fork River opposite Hanshaw Bar. It then flows north about 2 miles to its confluence with the east fork which heads against Grubstake Creek. Below the confluence of the two forks, Smalley Creek turns abruptly to the northwest and then to the west to its confluence with Cosmopolitan Creek, their combined waters forming Jean D'Arc Creek.

Smalley Creek was discovered and mining started on it in early days by a man named Smalley. It is now being mined by Eli Hansen and Edwin Erickson. The mining is confined to a small area in the creek bed about 1000 feet above the confluence of the two forks. At this place Hansen and Erickson are opening up a small cut by groundsluicing and shovelling in. A ditch is being run from both forks with about 90-foot fall above the cut. It is planned to bring in hydraulic pipe, giants and possibly a small tractor and bulldozer, so as to mine more efficiently. The bedrock on Smalley Creek is black shale and quartz conglomerate. The depth to bedrock is about 17 feet, of which 7 to 4 feet is muck and the

rest gravel. The gravel is a heavy, coarse, well water-worn wash with many erratic boulders in it. The average value of the ground is about 59 cents a bedrock foot. The average fineness of the gold is about 907. The gold is in flat flakes and very fine, though a very few coarse pieces have been found. It occurs in the lower 6 feet of gravel but mostly on bedrock. The conglomerate in the bedrock is the usual Tramway Bar and South Fork conglomerate. It is composed of a fine sand matrix of angular quartz fragments with pebbles in it up to one inch in diameter composed of quartz, greenstone and red and green chert, the quartz predominating. This conglomerate grades down in places to finer and finer pebbles until it becomes almost a pure sandstone grit. It is thought by the writer to be most probably the source of all the fine gold in the South Fork Mining Area as well as that in the Tramway Bar Mining Area. It is thought that the conglomerate is a fossil placer of very low grade which is being eroded down to form the present placers. An occasional pan of the decomposed conglomerate when shovelled up from the top of bedrock contains a few colors. The Arctic conglomerate occuring as erratic boulders in the wash is considered to have been derived from the high ranges of the Arctic Mountains and to have been brought into the South Fork watershed by glacial action. This glacial conglomerate is quite distinct and is composed of pebbles up to 3 inches in diameter in a fine sandstone matrix. The conglomerate is firm, competent and very hard. The pebbles in it are composed of quartz, greenstone, diorite and green and black chert. It evidently has an entirely different origin than the South Fork conglomerate. The grade of Smalley Creek where being mined is about $4\frac{1}{2}$ per cent. The fork of Smalley Creek on which mining is being done discharges about 80

miners inches of water.

COSMOPOLITAN CREEK K4 30-60

This creek, which is sometimes called by the miners Jack Dodge Creek, is the east fork of Jean D'Arc Creek. It heads in two small lakes which lie in a low pass opposite the lake at the head of Chapman Creek in Pat Judge's Pass. Cosmopolitan Creek then runs for about 1/2 mile due west where it is joined by a small fork from the south heading against the east fork of Smalley Creek. It then flows a little south of west gradually turning to the southwest to join Smalley Creek and make the head of Jean D'Arc Creek. In early days Jack Dodge prospected on this creek at an elevation of 1375 feet, almost exactly on the present trail that leads from Smalley Creek to Tramway Bar. Two or three shafts were sunk in this place. From the amount of tailings and efforts expended, it is thought the results must have been fairly encouraging. However, no data on these results are available. The creek should be investigated again as it is running in the same formation as Smalley Creek and is about opposite Tramway Bar.

ROCK CREEK K4 30-60

This is a small creek heading against Cornucopia Creek and into a high pass at an elevation of 1715 feet opposite the main fork of Smalley Creek. There is no discernable divide between the head of Cornucopia Creek and Rock Creek. Rock Creek flows west into the valley at the head of Cornucopia Creek and then south through the pass down to the right limit of South Fork River. In the top of this pass Rock Creek has cut a narrow V-shaped valley into the conglomerate. This valley pitches very precipitously down to South Fork River. Where Rock Creek leaves the head of Cornucopia Pass to begin its precipitous descent into the valley

of South Fork River and about one mile south of the shaft on Cornucopia Creek, about $800 was mined in early days. No other work has been done on this creek nor is any other data known except the amount of money recovered.

DAVIS CREEK K4 39-2

This creek is a medium sized left limit tributary of South Fork River about 4½ miles above Ironside Bench. Considerable mining was done on Davis Creek in early days. It was not visited by the writer and the extent of this mining is unknown. In early days Davis Creek is said to have been acquired by a mining company who made elaborate preparations at the head of the creek for mining operations. It is said that a shipment of hydraulic pipe was brought up the South Fork some distance but a sudden drop in the level of the river caused the shipment to be unloaded on the bank. The location of this pipe, though diligently sought for by the miners to use on their ground, has been lost. The above mining company ran into financial difficulties that same year and no further development work was done on the creek. No mining has been done on Davis Creek since, so far as could be found out.

FRISBE CREEK K4 30-60

This creek is a medium sized right limit tributary of South Fork River 2½ miles above Davis Creek. Frisbe Creek heads in the hills on the north side of Pat Judge's Pass. It then flows west and then south. It joins South Fork River at the southern end of Pat Judge's Pass just above Grubstake Bar. Frisbe Creek is named after two brothers who mined and prospected on this creek in early days. The creek was not visited by the writer and the extent of this mining is not known. No one has mined there since the Frisbe Brothers left.

FRITZ CREEK K+30-60

This creek is a small right limit tributary of South Fork River 1/2 mile below Frisbe Creek. Fritz Werther prospected on this creek in early days but without results.

GUS DELAND CREEK K+30-60

This creek is a small right limit tributary of South Fork River about one mile above Ironside Bench. A ditch was started from this creek to bring water to Ironside Bench. One shaft was sunk on this creek by Gus Deland in early days, but the results are unknown. No other prospecting has been done on the creek so far as could be found out.

WILSON CREEK K+30-65

Wilson Creek is a large left limit tributary of South Fork River about 15 miles below the mouth of Mosquito Fork. It is reported by Maddren in U.S.G.S. Bulletin 532, page 107, that mining and prospecting was done on Wilson Creek in early days. This creek was not visited by the writer because of lack of time and supplies. No data on the work done on the creek could be secured from the present miners on South Fork River. No one is working on the creek at the present time.

No information on the other creeks tributary to the South Fork in the gold-bearing area could be obtained from the miners. All data on the prospecting and mining done in early days on these creek are lost. The whole district deserves another thorough and intensive prospecting campaign. There are many creeks which might be developed with proper prospecting into paying mining ventures.

JIM RIVER K+39-3

A. G. Maddren in U.S.G.S. Bulletin 532, page 105, reports having found good prospects in 1909 on Prospect Creek, one of the

headwater tributaries of Jim River. The miners of the South Fork have hunted many years for this creek but, due to the inadequacies of the Geological Survey map, have never been able to locate it. This creek is one of the "lost mines" of the Koyukuk which should be easily located by an intensive prospecting campaign.

BAR DIGGINGS NEAR BETTLES

Bar diggings are peculiar deposits of the Koyukuk River which occur below the canyon of the Koyukuk as far as the town of Bettles. They also occur on the lower Koyukuk River near the town of Hughes and opposite Red Mountain. The bar examined opposite the town of Bettles is a deposit of rounded cobbles. This deposit is as much as 15 feet in height above the low water level of the river and is capped by fine river sands and silt where not washed by the high water stages of the river. The gold is in the upper layers of this deposit below the sands and silts. It does not extend over three feet below the surface of the cobbles and is distributed all through the fine sand in which the cobbles are embedded. Mining is done by carrying water in tubs to a long tom or by having a gasoline engine distribute a small stream of water into the same. Strips of carpet are laid in the bottom of the long tom. The cobbles are piled at the head of the long tom, washed and thrown to one side. The fine sand surrounding the cobbles is then sluiced through the long tom and the gold caught in the nap of the carpet strips. These strips are taken up every few days and washed carefully in a pan. The gold is then panned down to a reasonable purity or amalgamated with quicksilver. No other method of saving the gold has proven

successful as it is so fine that when dry it will float. It is said that with diligent work one man can make as high as $10 a day on these bar diggings. It is said that they occur in occasional spots up the Koyukuk River as far as the confluence of North Fork and Middle Fork Rivers. There are said to be similar bars on the Alatna and John River though much less extensive than on the Koyukuk. The origin of the gold in these places is quite puzzling. It might be that these cobble bars are remnants of outwash deposits which have fine flour gold mixed through them. The water action of the river during high water concentrates the gold in these deposits. Changes in the river bed will wash the rich spots in them out or reconcentrate them according to the whims of chance so that the bars are workable in one place one year and in another place another year, though the locations of any of the places where the bar diggings might occur are permanent. Sometimes by chance these bar diggings are concentrated so as to be fairly rich. It is said one man produced about $600 in two weeks from a bar a short distance above Bettles in the late fall of 1937.

GENERAL REMARKS ON THE KOYUKUK

In the Wiseman subregion most of the creeks where mining is being done are small and precipitous. ~~It is not thought,~~ With the exception of Myrtle and Slate Creeks, ~~that~~ Not many of them appear to offer opportunity for large scale mining operations. This is especially true of all the creeks on Wild River and John River. It is said that on the Alatna there are possibilities for large scale mining. However this has not yet been demonstrated, nor have the deposits been examined by any competent engineer.

In the Bettles subregion, the South Fork has possibilities for dredging and dragline operations.

Under the present economic set-up, the Upper Koyukuk region as a whole is gradually reverting to wilderness. At present many of the miners are not able, with their crude methods of mining, to make a living from the depleted gold deposits left, and rely on work from the better-off miners and the Road Commission, to carry them over each winter. It is thought that if no new strikes are made, the next four or five years will see the end of mining in most of the areas in the Wiseman subregion, provided, of course, that conditions as to transportation and supplies are the same as at present.

The Upper Koyukuk region is one of the oldest mining districts in Alaska. There is a great reserve supply of lower grade mining ground in the region. This ground, which would be considered very good in other parts of Alaska, is not mineable in the Upper Koyukuk watershed, mainly because of the difficulties of transportation and the high freight rates.

That the Government has neglected the Koyukuk in its road-building programs is a great pity. A road starting at the Yukon River about 5 miles downstream from Stevens Village and following along the base of the hills west of Dall River, crossing the head of Jim River and South Fork River below the Mosquito Fork, through Sitkum Pass to Wiseman, would open up a vast country of potential mining development. This road would follow approximately the old Koyukuk trail to Coldfoot and could be brought through low passes all the way. It should offer no great engineering difficulties as the terrain is generally gravelly and does not look difficult to

build roads on. With the exception of the South Fork, there would be no rivers larger than creeks to cross. The total length of such a road would not be over 175 miles. A branch from this road could follow up through Boulder Creek and down Cripple Creek to the Chandalar.

The starting of the road on the Yukon at the place suggested, would make this highway a continuation of the road system which will ultimately be built from Livengood to Rampart through the Hot Springs District. This system, with a ferry across the Yukon River, would give a trunk line road through central Alaska from Valdez to Wiseman. It would be a highway of great recreational and military value to the United States as a whole, as well as of great practical value to the development of mining. Such a road would cost around three-quarters of a million dollars to build.

Navigation is possible, except in the very lowest water, by river steamer to the mouth of North Fork River. If funds were not available to build the above road, a road could be built from a point opposite the mouth of North Fork River along the left limit of the Middle Fork River to Wiseman. However high ground extends below the mouth of this river for about ten miles. It might be possible to find even a better landing place than the one suggested farther downstream. If this road were built, a branch could be run from the landing at the mouth of South Creek seven miles to Gold Bench on South Fork River. This road would cut the cost of freighting by poling boats to Wiseman by atleast three, or cause freight rates from Bettles to Wiseman to drop to about 2¢ a pound from the present 6¢ a pound. The terrain over which this road would be built is mostly composed of gravel. There would be no rivers to cross

except the Koyukuk at Wiseman where a ferry could be installed. If this road were continued on to Bettles River or Big Lake a bridge could be put across Middle Fork River below the mouth of Gold Creek which could connect with the present Hammond Creek road, eliminating the ferry at Wiseman. However such engineering details could be worked out when the road was surveyed. Such a road would not be over 50 miles long and its cost would probably be less than a quarter million dollars.

Irving McK. Reed

QUARTZ IN THE UPPER KOYUKUK REGION

With the exception of the Silver King Mine on Michigan Creek, previously described in this report, there has been no attempt to develop quartz in the Upper Koyukuk region.

A man named McQueen has been prospecting for two years on Rye and Jay Creeks in the hopes of finding quartz, so far without success.

In the Coldfoot-Wiseman area on the right limit of the left fork of Vermont Creek, about 1/2 mile above the mouth, is a small seam of quartz. No work has been done on this seam except to expose it on the hillside. This seam needs further exploration.

The Koyukuk region as a whole deserves the attention of the quartz miner. The gold in the creeks has evidently travelled a very short distance and experienced quartz prospectors should not have difficulty in finding some of the leads.

COAL IN THE UPPER KOYUKUK REGION

LH 30-62

In the conglomerate and shales of the Bettles subregion, seams of coal occur. One of these is exposed in the bedrock of Mailbox Creek in the Kovich and Stores cut. The coal in the bottom of this cut is very much broken up and mixed with clay.

About 1/2 mile above the mouth of Mailbox Creek is a seam of coal which may be a continuation of the one previously mentioned. This seam was seen in the walls of the canyon. It is much faulted and broken up.

About 2 miles above this last seam, three or four seams of coal are exposed in the walls of the canyon. The thickest of these is about 4 feet. The seams dip to the northwest at low angles. These seams are in fair shape. The coal in them has been used by the miners in early days in the Tramway Bar area for blacksmith coal and for firing their boilers.

Near the mouth of Death Valley Creek in the Wild River area, a large piece of float coal was picked up in the creek bed by Frank Smith. This coal is very much higher grade than that near Tramway Bar. It might be possible that this coal was brought down as part of glacial outwash material and eroded out of its bed by the creek. The origin of it may be nearby, or it may be, as previously suggested, outwash material from the high ranges of the Arctic Mountains to the north.
