

REPORT ON THE COAL AND GOLD PLACER DEPOSIT OF THE LOWER
KUGRUK RIVER VALLEY, SEWARD PENINSULA

by Irving Reed

RESOURCE ASSOCIATES
OF ALASKA
3230 AIRPORT WAY
FAIRBANKS, ALASKA

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

The area herein considered lies on the northern coast of Seward Peninsula and embraces all the drainage to the Kugruk River north from Montana Creek, approximately between longitude 162°10'W. and longitude 162°50'W., and latitude 65°55'N. and latitude 66°05'N., or roughly about 385 square miles.

The general characteristics of the country are the same as the rest of Northern Seward Peninsula, namely an upland area with remarkably concordant summits and a lowland area comprising the flat valleys of the Kugruk River and its tributaries.

Kotzebue Sound was discovered by Otto von Kotzebue in 1816, but he does not seem to have named or mapped any part of the bay adjacent to the Kugruk River. As nearly as can be ascertained, Tom Rous and associates were the first to discover gold in paying quantities on Kugruk River in 1904. However the region had been previously geologically examined and mapped in 1903 for the U.S.G.S. by Fred H. Moffit and D. C. Witherspoon. The results of the expedition were published in U.S.G.S. Bulletin 247.

The writer made two examinations in the Kugruk River Valley. On September 1, 1929, a day was spent at the Coffin Brothers' hydraulic lift, but because of the necessity of meeting the airplane at a specified time at Deering, the coal mines could not be visited. On September 25, 1931, the writer walked from Candie to the Kugruk Coalmine where the remainder of the day was spent with George Mallin in examining the mine and vicinity. Mr. Mallin was practically out of food and intending to return to Candie, so the next day, after finishing the examination of the Kugruk and Superior Coalmines, the writer walked down the river to the Coffin hydraulic mine. At this place it was discovered the Coffin Brothers had closed down their plant, stored away and locked up all supplies in the main cabin and cookhouse, and departed by dogteam for Deering. The writer then went on to the Chicago Creek Coalmine which was examined, returning to the Coffin mine that night, where he found shelter in an outlying cabin. On September 27, after again examining and more extensively sketching the Coffin hydraulic mine, the 20-mile walk back to Candie was made.

G E O G R A P H Y

DRAINAGE

All the drainage of the area ultimately flows into Kotzebue Sound, an embayment of the Arctic Ocean. The only streams considered in this report are all tributary to Kugruk River. The most important tributaries of Kugruk River in the area are Montana Creek, Gold Bug Creek, Reindeer Creek, Short Creek, Chicago Creek, Portage Creek and Burnt River.

RELIEF

The highlands of the area herein considered consist of flat-topped hills from about 800 feet to 1200 feet in elevation. These hills have remarkable broad, gently sloping summits-- so much so in fact that it is almost impossible to tell by the eye alone when the top of a hill is reached. The slope of the hillsides increases, as a general rule very markedly near the valley bottoms, though in some cases, the same smooth, monotonous, tundra-covered slope rises from the valley floors to the summits of the hills.

The Kugruk Valley down to the big bend to the west is from 1500 to 2000 feet wide. On the eastern side, the valley is bounded, except where tributary valleys enter, by shale and limestone bluffs which mark the remnant of an old river level about 50 feet above the present river. Below the big bend to the west, the valley gradually narrows to where it bends sharply to the north again. Here the valley narrows down to almost canyon-like proportions, both sides being hemmed in by low limestone bluffs.

GLACIATION

The majority of the tributary valleys on the lower Kugruk River have either one or both sides near the valley floor steepened by glaciation. The floors of the valleys are consequently flattened, giving these valleys the superficial appearance of having been glaciated. These effects are particularly noticeable towards the heads of the creeks.

E C O N O M I C S

POPULATION

In the winter time, except for a few wandering reindeer herders, the lower Kugruk Valley is devoid of human life. In the summer about 8 persons are at the Coffin Brothers' hydraulic mine, and, part of the time, one man at the Kugruk Coalmine.

TRAVEL AND TRANSPORTATION

The only way for a traveller to reach in summer the lower Kugruk Valley, is by walking over the worst of "niggerhead" trails either from Deering or Canale. Roads or saddle horses are non-existent. Freight in summer is hauled to the Coffin hydraulic mine by Fordson tractor and wagons from Deering. In the winter, if any freight were to be hauled, it would be by dogs or horse-teams.

There are fair airplane fields at both Deering and Canale. Or a traveller may reach either of those points by the regular mail boat from Nome. However this last method of travel is not advisable if a person suffers at all from seasickness.

CLIMATE

The climate of the lower Kugruk River is distinctly arctic. In winter the temperature has been known to reach -60°F. High winds are extremely prevalent in winter time, occasionally blowing in very cold weather and making all travel impossible or excessively dangerous.

In summer the climate is very pleasant, the temperatures never going above 65°F. However freezing temperatures are liable to occur in any month of the year.

The precipitation is fairly light, being less than ten inches or about one-half that of Nome.

VEGETATION

With the exception of a few stunted willows, not over 5 feet high, there are no trees whatsoever in the lower Kugruk Valley. However the entire country is covered with a luxuriant growth of moss, grass and lichens.

ANIMAL LIFE

With the exception of Arctic hares, there are no mammalian game in the area. Ptarmigan are perennially present, though their numbers vary greatly from year to year. In the summer many ducks and geese nest and feed in the low-lying marshes along Kotzebue Sound.

Of the furbearers, a few fox and mink, and occasionally lynx, inhabit the area and are sporadically trapped by wandering natives and reindeer herders. Parka squirrels (*Citellus* sp.) occur in all the drier and more rocky places in the hills.

Grayling, dollywarden trout and, during the run, salmon, are found in the larger streams. However fish are not present in any great numbers.

A constant supply of fresh meat may be bought at all times and at very reasonable prices from any of the native or white companies owning the numerous reindeer herds which roam all over Northern Seward Peninsula.

During about two months in the summer mosquitoes and, in certain places, gnats, make life miserable for man and beast alike.

G E O L O G Y

GENERAL OUTLINE

So far as could be ascertained from the brief examinations of the area, all the rocks of the lower Kugruk Valley are of sedimentary origin. These sedimentary beds are divided into two distinct groups:

First, a blue and yellow, blocky limestone, which weathers on exposure to a gray color. These limestone beds are supposed to be, from Fred H. Moffit in U.S.G.S. Bulletin 247, of pre-Cambrian to possible Silurian age.

Second, a blocky, medium-hard shale, which is black on first exposure but weathers to a brown or burned color. It is in these shale beds that the seams of coal occur. Their age is assumed, from analogy with other districts, to be either upper Cretaceous or Eocene.

STRUCTURE

The exact contact and relationship between the limestone and shale could not be ascertained by the writer. On the Superior Coalmine, as nearly as could be found out from the miners who had worked there underground and from the old maps, the coal seam was cut off suddenly by the limestone, presumably by a fault-plane. However it is thought by the writer that the shale beds are in general in contact with the limestone without faulting. The general strike of the shale beds is north-south. The dip of the beds is from 50° to 70° to the west on the east side of the Kugruk Valley. The beds were seen in place on the mountain in between the heads of Montana and Reindeer Creeks, and also in place on Burnt River (which was named from the color of the weathered shale beds) on the west side of the valley. At or near this latter place, Moffit would seem to indicate an easterly dip, presumably at a high angle. If this is the case, there might be indicated an appressed anticlinal fold whose apex had been eroded away. The locus of the apex would now be approximately occupied by the Kugruk Valley.

UNCONSOLIDATED DEPOSITS

All of the tributary creeks and the valley of Kugruk River are covered with a mantle of Quaternary and Recent gravels. On the right limit, previously mentioned, bench on the Kugruk Coal Claim, these gravels are about ten feet thick. Although the shale bluff continues parallel to the general northerly trend of the river a short distance downstream from the mouth of the Kugruk incline, the bench projects for about 1000 feet to the west. The bench here is apparently all gravel down to the stream level.

In the flood plain of Kugruk River, the depth of the gravel is from 12 to 15 feet. However there are a few shafts which indicate an old channel about 35 feet deeper than the present valley surface. This old channel has not been traced out. On the lowest part of the divide between the heads of a tributary of Portage Creek and Willow Creek, a shaft is said to have been sunk over 200 feet deep without reaching bedrock. No details could be found out about this shaft. It is considered by the miners that this low divide marks an old channel of Kugruk River. With this opinion the writer tentatively concurs.

QUATERNARY AND RECENT HISTORY

The writer has assumed a working hypothesis for late Pleistocene and Recent history with which the more recent geological history of the lower Kugruk River area may be explained. During most of the Quaternary the base level of the area was lower than at present. Towards the close of the Pleistocene there was a marked subsidence of the land, the base level possibly rising as much as 1200 feet. Elevated gravel marine terraces are mentioned by Moffit 500 to 600 feet above sea level. Since the period of maximum subsidence there has been a gradual elevation of the land surface down to present times.

In the first period mentioned above, Kugruk River was a comparative small stream flowing in what is now the deep channel. It received, as now, Burnt River as its main tributary from the west which joined it at the big bend below Chicago Creek. However the valley continued north through the valleys of Portage and Willow creeks and did not bend sharply to the west as does the present valley. During the period of subsidence at the close of the Pleistocene, the Kugruk Valley was filled with gravel and fine detrital material to the depth of possibly 300 feet. After re-irrigation the greatly enlarged stream began the removal of the aforesaid material. However the stream did not occupy the same channel in its lower course, but cut through the divide of some southeastward flowing tributary of Burnt River to a large embayment to the west of the original valley. The bench along the right limit of the valley as seen

below Montana Creek, marks some stage where a long halt was made in the re-raising of the land surface.

E C O N O M I C G E O L O G Y

HISTORY OF MINING AND DISCOVERIES

So far as known Tom Rous made the first discovery of gold in paying quantity in the lower Kugruk Valley about 1904, although previous prospecting had been done on Chicago Creek, and other creeks in the area. This was on Discovery Association about 1½ miles above the mouth of Chicago Creek on the Kugruk River itself. Sporadic mining was thenceforth carried on for a number of years.

In 1912 a dredge was built on Discovery Association, which worked upstream, mainly in the riverbed, for four years, a distance of about 1½ miles. The operations of the dredge being unsuccessful, it was moved in the winter of 1916-1917 to Canale Creek where it has operated every year since.

In 1927, Henry and Jerry Coffin installed a home-made hydraulic elevator on Discovery Association which continues in operation to the present time. Various other parties have mined the placers of the lower Kugruk Valley, without however finding a continuous paystreak. A detailed description of these placer workings will be given later.

According to Moffit in U.S.G.S. Bulletin 247, Tom Rous, Peterson and Nelson made the first discovery of coal on Chicago Creek while prospecting for gold placers in 1902. In 1903, they drove in an incline about 200 feet and commenced mining coal. Subsequently the claim was acquired by T. S. Solomon, a company organized and patent applied for. (Survey No. 194, Serial No. 0118). The patent application was rejected. Since about 1920, no amount of coal has been mined from the Chicago Creek Coalmine. At present the Coffins haul coal from the slack pile for domestic use. In the winter of 1929, E. F. Matthews spent about \$500 in an attempt to again open the mine. He retimbered the incline for a distance of about 45 feet from the surface. At present the incline is full of water.

In 1903 John McCartney discovered coal on the right limit bench of Kugruk River between Montana and Reindeer Creeks. At that time he staked the Kugruk Coal Claim but let it lapse the following year when it was relocated by George Wallin and John Mellon. At the same time McCartney located the Kugruk Coal Claim, Van Garvey located the Superior Coal Claim. The Superior

Coal Claim was allowed to lapse after development work had shown the coal to be cut off to the south by faulting against the limestone. The Kugruk Coal Claim is still worked on by George Wallin, who does a little development every year.

DESCRIPTION OF MINES AND OPERATIONS

GOLD PLACERS OF LOWER KUGRUK RIVER

On Discovery Association Claim the paystreak is about 200 feet wide and lies about $\frac{1}{2}$ mile long in a crescent shape with the apex of the crescent towards the west. According to Fred F. Henshaw in U.S.G.S. Bulletin 379, the gold was coarse at the center of the crescent and became progressively finer towards both ends. This claim is said to have produced over \$200,000. The depth to bedrock is about 12 feet, consisting of 3 to 5 feet of silt and sand, and 7 to 9 feet of river gravel. The bedrock is a blue and yellow, blocky limestone. At present the Coffin brothers operate a homemade hydraulic lift, elevating about 16 to 36 feet of 14 x 18 - inch sluices with steel-covered wooden riffles. The lift has a 2 $\frac{1}{2}$ - inch nozzle and is made of heavy sheet-iron. Water under pressure is supplied to it from the river by a 4-inch Delasalle centrifugal pump connected to a 20-H.P. Fordson Tractor. The gravel is fine with no boulders. The gold is fairly fine (about "mustard seed" size) and lies in the lower 6 inches to 4 feet of gravel. The value of the gold is about \$18.60 an ounce. The ground is said to yield about \$1.00 to \$2.50 a bedrock foot. The cost of running both engines is said to be about \$7 for a 10-hour shift. Besides themselves one native is sometimes employed. The Coffin brothers hold 5 claims containing approximately 440 acres.

Slightly south of Discovery and about $\frac{3}{4}$ mile to the west, a shaft is said to have been sunk on a spot of very good pay. A ring of shafts sunk around this spot failed to yield any other values. This may be the shaft mentioned by Henshaw on page 361 of U.S.G.S. Bulletin 379, although this could not be definitely ascertained. The shaft's approximate location is marked "C" on the accompanying map.

On the association claim just south of Discovery two lines of shafts, each line about $\frac{1}{2}$ mile long, were sunk about $\frac{1}{2}$ mile apart in an attempt to locate a continuation of Discovery paystreak. The approximate locations of these lines of shafts are marked "A" and "B" on the accompanying map.

About $\frac{1}{2}$ mile below or north of the Kugruk Coalmine on a bar on the left

limit of Kugruk River, \$3000 is said to have been taken out of a small spot. The bedrock at this place was 15 feet deep, but dropped suddenly into an old channel about 35 feet deep. About ½ mile below the above spot on a slight bluff medium coarse, about that of rice or wheat grains.

COALMINES OF LOWER KUGRUK RIVER

Chicago Creek Coalmine

This mine is situated on Chicago Creek about 2 miles by trail from the Coffin gold placer and about 1 mile upstream from the mouth of Chicago Creek. On the surface is a house and barn and two large slack piles separated by the creek. The incline is a short distance south of the house and is at present filled with water. From the entrance the incline slopes downward about 15°. The strike of the coal seam is N.9°W. The dip is given by Henshaw on page 362, U.S.G.S. Bulletin 379, as 53° to the west. However the miners on Candle Creek who worked underground in the mine claim the dip is about 70° to the west. Henshaw states in the aforesaid bulletin that the width of the vein was from 85 to 88 feet. The miners claim about 80 feet. A description of the underground workings is here quoted from Henshaw: "An inclined shaft that follows the coal bed-----is 330 feet long and slopes downward at an angle of 13° to 36°. The shaft reaches a depth of 144 feet below its mouth and the bottom is more than 200 feet below the surface of the ground perpendicularly above it. The coal is solidly frozen to this depth. The incline lies 20 to 30 feet from the hanging wall down to a point near the lowest level, where the irregularity of the dip of the coal bed brings them nearly together."

"The mine has been worked on four levels at approximately 33, 80, 100 and 144 feet below the shaft house. On the upper level a cross-cut 55 feet long-----did not reach the footwall. On the lowest level a cross-cut 104 feet long exposes the whole width of coal. The bed is here at least 85 feet thick, but appears to be somewhat thinner than at other points." To quote again from Henshaw, "The coal is of a lignitic character; it burns easily with a bright flame and leaves a small amount of white ash." The calorific value is given by the same authority as 6,194 B.T.U. From the appearance of the ground a short distance northwest of the incline, the old workings have badly caved.

KUGRUK COALMINE

This coalmine is situated on the right limit of Kugruk River about

half way between Montana and Reindeer Creeks. The mouth of the incline is in a shale bluff about 12 feet above the level of the river and about 50 feet north of the waters edge. The incline slopes downward from 5' to 20' for 156 feet to the first level. It then slopes downward 35' for 144 feet to the main level. On the main level, 427 feet of drift has been run northerly along the strike, and more than 200 feet southerly. On the upper level, besides stoping out coal, a crosscut was run to both foot and hanging walls.

The outside improvements consist of a large combination bunk and cook-house situated about 600 feet east of the incline, a hoist house and machinery now in ruins, and the remains of bunkers which were used for loading scows on the river in summer or horseteams on the river ice in winter.

The dip of the coal seam from clinometer readings averages about 62'. However from drawings the dip scales about 50'. The vertical depth of the main drift from the mouth of the incline is 116 feet, and from the surface of the bench above the incline about 158 feet. From the crosscut on the upper level, the coal seam is said to be as follows: hanging wall of reddish shale; 3 feet of coal; 3 inches of fire-clay; 17 feet of coal with 8 inches of shale bone in the middle which sometimes disappears; 10 inches of fire-clay; 12 feet of coal; 10 inches of fire-clay; 8 feet of coal; 3 inches of fire-clay and shale; 12 feet of coal; 11 inches of fire-clay and shale; 6 feet of coal; hard shale footwall, though this last is not known to be definitely the footwall as now attempt has been made to penetrate into it. Total width, so far as known, 66 feet 11 inches. The main drift is at a depth great enough to be below the frozen zone. The coal does not creak so badly as the Chicago Creek, being free burning and lignitic in character. The strike of the coal seam is about N.15'E.

SUPERIOR COALMINE

The incline of the coal mine is across Kugruk River and about 500 feet south of the Kugruk Coalmine incline. Only the ruins of the shaft-house are visible, the incline being filled with gravel from flood stages of the river. Drawings of the workings have been made from old maps on file in the recorder's office at Canule. The incline was 165.7 feet long at an angle of 29' from the vertical, making the lowest drift 75 feet below the surface. The lowest or main drift was 90.5 feet long. At right angles to the above drift and at the foot of the incline another drift was run 63.1 feet. 30 feet from the surface another drift 52 feet long was run from the incline parallel to the main drift.

The coal seam is said to be 52 feet wide, although no certainty exists that the hanging wall was ever reached. The strike and dip are presumed to be the same as those in the Kugruk Coalmine. As said before, it is claimed that this coalmine was abandoned because the coal was faulted off by the limestone on the south.

PRODUCTION

The total gold production of the lower Kugruk valley area is approximately \$250,000. What the total tonnage of coal mined is the writer has no way of ascertaining. For the Kugruk and Superior Coalmines, Scaling of drifts and stopes might give a very rough approximation. It might be possible to compile from old records of the Alaska branch of the U.S. Geological Survey, the tonnage for the Chicago Creek Coalmine. However these records are not available to the writer.

FUTURE DEVELOPMENT

Except for the small hydraulic mine on Discovery Association, which may last for several years to come, the future of gold mining in the lower Kugruk valley area appears practically blank. An extensive drilling campaign might reveal a paystreak or at least some order out of the isolated spots where pay has been found. However such a campaign would be a pure gamble in which the chances for success would be much lower than many other creeks in Alaska hither to unprospected.

The future of coalmining is not much brighter. At almost any other place except in such an isolated spot, the coal seams so far known would be of very great value. So far as the writer is aware these seams rank among the largest known. However unless some large company takes over the development of both Candle Creek and Inmachuk River, and plans longtime operations, there is no chance of any coal development. Roadbuilding in the type of country in which the area lies would be far too expensive. The only feasible plan would be a power plant at the coal mine; the power distributed to the aforesaid gold mining operations on Candle Creek and Inmachuk River by powerline. A powerline could not be built in such country for less than \$3000 a mile. Diesel oil is so comparatively cheap and can be landed at Deering and Keewalik so easily that even a powerline might not be feasible. At any rate relative costs would have to be balanced very carefully to see which would be the cheaper.