LODE MINING AND PROSPECTING ON SEWARD PENINSULA.

By J. B. Mertie, Jr.

INTRODUCTION.

The lodes of Seward Peninsula give promise of coming importance but are as yet for the most part undeveloped. The Big Hurrah mine, in the Solomon district, produced gold from 1903 to 1907 but has not been operated since that time. Several small shipments of gold ore have been made from the Sliscovich mine, on Manila Creek, in the Nome district, but these were more in the nature of samples for mill tests than commercial shipments. Except on these two properties, gold lode development is still in the stage of prospecting.

Lode mining of some of the semiprecious and base metals, however, has been done on a small scale, though these lodes also are still largely undeveloped. Work has been done chiefly on tungsten, antimony, copper, tin, iron, zinc, silver-lead, and bismuth lodes. A beginning has also been made in the development of certain graphite lodes.

The following description of the Seward Peninsula lodes is intended to be merely a statement of progress and development work. A more complete account, describing in some detail the mineralization of the lodes and embodying the results of microscopic and metallographic studies, will be published later.

GOLD.

SLISCOVICH.

The Sliscovich mine, near the head of Manila Creek, has been described in some detail by Chapin,[1] and as little or no recent work has been accomplished, this description will not be elaborated. The latest shipment from this mine was made in the fall of 1915,

[1] Chapin, Theodore, Mining on Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 592, pp. 403–404, 1914.

when 88 tons of picked antimony ore was shipped to Tacoma, Wash. From data in possession of the writer it appears, however, that this ore contained considerable gold and a rather low percentage of antimony. This justifies the designation of the mine as an antimony-gold mine, rather than an antimony mine.

CALIFORNIA.

The California quartz lode is near the mouth of an east-side tributary of Goldbottom Creek, at an elevation of about 630 feet. This is the same property referred to by Chapin[1] as the Connelly & Jannsen quartz mine.

The lode matter consists of shattered quartz and country rock, which are heavily iron stained and mineralized. The ore body lies along a shear zone, which has a general strike of N. 15° W. The shearing seems to have taken place along a number of faults, with this general strike and with variable dips to the northeast, but to have been concentrated along the hanging-wall side of the shear zone. The hanging wall is therefore marked by a well-defined fault, with slickensided walls. Below the hanging wall, for about 4 feet, the lode matter is greatly crushed, iron stained, and mineralized, and it is from this part of the lode that the ore has so far been taken. The footwall is not well defined, the lode merging gradually into the country rock on that side.

The country rock in this vicinity is chlorite and sericite schist, with considerable graphitic slate and some thin bands of limestone. These rocks contain a system of old quartz veins, which are parallel to one another and lie conformably with the cleavage of the schist, striking N. 40° E. and dipping 50° SE. The shear zone, which strikes N. 15° W., cuts diagonally across the quartz veins and the character of the lode matter is therefore variable. At one locality it may be entirely the red, iron-stained, shattered schist; at another it may be dominantly the mineralized vein quartz. Thus on the north bank of the creek the shear zone intersects a 10-foot quartz vein, whereas on the south bank the mineralization is largely in schist.

The lode system is crosscut by the creek and well exposed. The mineralizing solutions were effective for a considerable distance laterally, for the iron staining is plainly apparent for 300 feet upstream from the lode and for a considerable distance downstream. The owner says that this zone of shearing may be traced 1 mile to the northwest and 2 miles to the southeast.

Pyrite and arsenopyrite are the principal mineralizing agents, but here and there a little free gold may be seen. In this as well as in most other gold lodes in the Nome district very little quartz has been

[1] Chapin, Theodore, op. cit., p. 402.

introduced with the mineralizing solutions. Stibnite is reported to be present in seams 2 inches or less in thickness, but these were not seen by the writer. Hydrous manganese oxide is present in the gouge. Molybdenum and tungsten also are reported from assays.

The development work to date consists of a 70-foot shaft, sunk on a 60° incline on the bank of the creek and an open cut near the shaft. The shaft was filled with water at the time of the writer's visit and such ore as was being mined was taken from the open cut. Mining was being done on a very small scale. A mill with three 1,000-pound stamps and a concentrator are utilized in treating the ore. The mill is run by water power, the water being delivered by a ditch from Fred Gulch. The mill has a rated capacity of 10 tons in 24 hours, but it is not at present in the best condition. The owner milled but 30 tons in 1915 and on account of the deep snow in the creek and mill trouble had milled only 8 tons by the last of September, 1916.

The 4 feet of ore along the hanging wall is said to have a value of about $50 a ton, as indicated by assays, but the owner has been able to obtain only from $8 to $10 a ton from the plates. It is therefore inferred that much of the gold is either mechanically intergrown with the sulphides, in particles of microscopic or submicroscopic size, or chemically combined with the sulphides.

STEINER.

The Steiner gold lode, owned by Martin Steiner, is on a spur between Penny River and one of its small tributaries, about 4½ miles from the mouth of Penny River, at an elevation of 200 feet. No work was in progress at the time of the writer's visit, and the shaft house was closed and the mine inaccessible. The shaft is reported to be 135 feet deep, and a tunnel at the bottom has been driven 100 feet to the east.

The rock on the dump is an iron-stained pyritized schist. Two kinds of quartz are present—one dull, opaque, and iron stained, and the other clear and granular. A little calcite is present in the clear variety. The relation existing between the two varieties of quartz is not known, nor are any data available concerning the character of the lode.

BOULDER CREEK.

A number of lode claims on Boulder Creek, owned by W. L. Cochrane and Claus Rodine, are being prospected for gold. The Boulder lode, embracing several of these claims, is on the southwest side of Boulder Creek, at an elevation of about 250 feet. Development work on this lode up to November, 1916, consisted of a tunnel driven 92 feet into the hillside, on the southwest side of the creek. The direction of the tunnel, S. 60° W., is about the same as that of the cleavage in the

schistose country rock. The rock through which the tunnel is being driven is a much altered schist, heavily impregnated by iron-bearing solutions and cut by numerous veins and lenses of white, opaque quartz and also by thin stringers of limonitic material.

It is apparent that the gold in the tunnel has a genetic relation to the iron minerals, but it is not believed by the writer that the white opaque quartz had any direct connection with the gold mineralization, for the quartz shows the effects of shattering and iron impregnation in a measure comparable with the schist itself and therefore was present prior to the mineralization. The presence of the white opaque quartz is believed to be merely fortuitous, though it may have had an indirect influence on the mineralization by assisting mechanically or chemically in the precipitation from the mineralizing solutions.

The only quartz seen by the writer other than the white, opaque quartz was a veinlet of clear granular quartz, about three-eighths of an inch thick, near the face of the tunnel. Evidently the mineralization took place with very little deposition of silica by the auriferous solutions.

About 50 pounds of stibnite was taken from an open cut at the surface a short distance west of the tunnel. Scheelite in well-developed crystal outline has also been found in the white quartz in the tunnel. It is rather likely that the scheelite represents another stage in this mineralization, or possibly an entirely different period of mineralization.

At the time of the writer's visit to this lode the tunnel had been driven 85 feet, and although there was much evidence of mineralization in the iron-stained schist, sulphides in any notable amount had not been found. Subsequently, in further driving of the tunnel, sulphide ore was encountered in the lode material. Specimens of the last material taken from the tunnel were sent to the writer by Mr. Rodine and prove to contain both pyrite and arsenopyrite.

The Boulder lode is similar in many respects to the California quartz lode, on Goldbottom Creek—that is, it is a lode of the disseminated type—a mineralized body lying probably in a zone of shearing. Mr. Rodine says that the trend of the lode, or, in other words, of this zone of disturbance, is about N. 3° E. If this is the correct direction of the lode, it would appear that the tunnel has crosscut about 76 feet of the mineralized zone, and in striking the sulphide ore the tunnel is probably entering the higher-grade ore.

Assays have been made about every 10 feet in this tunnel, and these, known in a general way to the writer, are considered favorable in so large a body of mineralized rock. If the assays are reliable there is here evidently a good-sized body of low-grade ore. Yet

the owners should do a great deal more prospecting on the lode, particularly drill-hole prospecting, to determine its width and extension before making preparations for a milling plant.

On the northeast side of Boulder Creek another tunnel 35 feet long has been driven on the Dakota lode, which embraces 13 claims. The country rock here is limestone, with a minimum of iron staining and practically no sulphides. Veins of white, opaque quartz and of calcite are present, but there seems to be little indication of any intense mineralization.

Bedrock is uncovered in a pit in the creek bed on claim No. 1 below Discovery, Boulder Creek. The country rock is an iron-stained schist, the cleavage of which strikes N. 60° W. and dips 30° SW. A fault zone trending N. 30° W. and dipping southwest cuts through the schist at this locality. A vein of the white quartz near by strikes N. 60° E. and dips steeply northwest. The fault zone is greatly iron stained and cut by limonitic stringers. This material pans gold, and some very rich pieces of gold-bearing white quartz have been taken from this locality.

An open cut on the northeast side of Boulder Creek farther downstream has exposed a good-sized ledge of the white quartz. This is chiefly of interest on account of the presence of pyrite and pyrrhotite together in the quartz, the pyrrhotite being much less plentiful in the Nome district than pyrite or arsenopyrite.

BURSIK & KERN.

Eight claims extending from northwest to southeast across the divide between Anvil and Dexter creeks are being prospected by T. Bursik and Louis Kern. The main development work consists of several open cuts, several shallow shafts, a 20-foot tunnel, and the main shaft, about 85 feet deep.

On one of the open cuts a limestone-schist contact is exposed, the country rock striking N. 55° E. and dipping 20° SE. The limestone is white and contains some lenses of white (bull) quartz. The schist is dark and micaceous. In the shallow shafts iron-stained schist and fractured and iron-stained quartz may be seen.

At an elevation of 900 feet, at the southwest base of King Mountain, a prospect tunnel 20 feet long has been driven. The schist country rock at this locality strikes northeast and dips 5° SE.

The main shaft is at an elevation of 700 feet, on the slope between Anvil and Dexter creeks. Over 100 assays of material taken from this shaft are said to have been made, showing values ranging from $2.50 to $3.25 a ton.

HINES.

A number of claims are being prospected by Arthur Hines. Five of these are on top of King Mountain and are known as the Royal group. Four others lie along the left bank of Dexter Creek. None of the Hines claims were visited by the writer.

ANVIL CREEK.

Along the northwest side of Anvil Creek, from the mouth of Specimen Gulch downstream to a point below Quartz Gulch, a number of open cuts and short tunnels have been made in the course of prospecting for gold lodes by different men.

About opposite the mouth of Specimen Gulch a tunnel has been driven by J. C. Widstead, exposing graphitic schist cut by calcite veinlets and pyrite stringers. Antimony ore is said to have been mined from this tunnel. A short distance downstream, where the trail goes up on the ridge to Glacier Creek, an open cut made by F. McIntosh exposes a fault zone. About 7 feet of lode matter lies between two faults, of which the upper strikes N. 40° E. and stands vertical and the lower strikes about north and dips 60° W. The lode matter between these two faults is a shattered graphitic and calcareous schist, cut by irregular quartz stringers, the whole intensely iron stained. A few feet farther west this fault zone is again exposed, showing a fault striking N. 50° E., with an indeterminate thickness of sheared and iron-stained schist on each side.

Below the mouth of Quartz Gulch there are three other open cuts, also opened by F. McIntosh. At the upper of these a vertical fault striking N. 20° E. is apparent. Both schist and vein quartz are here cut by the fault, and show pyrite mineralization. The second cut (downstream) shows both limestone and schist on the dump and, though caved, evidently points to a contact between these two rocks. The third cut is in limestone, which is shattered and veined with calcite.

About 300 feet downstream from the last-mentioned open cut, on the same side of Anvil Creek, a tunnel has been driven by G. Christophosen in the iron-stained schist. This is caved and inaccessible.

About 500 feet farther down Anvil Creek an open cut and a short tunnel belonging to Charles Olsen show a well-marked fault striking east and dipping 53° N. The schistose country rock is cut by white quartz stringers, but these are earlier than the faulting and its attendant mineralization. Stibnite occurs along this fault. Assays made of this material are said to show 50 per cent of antimony and $21.60 in gold and $2.05 in silver to the ton.

At an elevation of about 300 feet on the northwest side of Anvil Creek, where the Miocene ditch comes through the divide, a tunnel

has been driven 150 feet by Hendrickson, Kotovic & Stipek. This tunnel is old, and the walls are covered with sediment, so that the structure is scarcely discernible. Caving has taken place in the rear of the tunnel. It is said that this tunnel goes 120 feet through a mineralized country rock carrying sulphides and that there is a particularly rich zone 15 feet wide in this mineralized belt, about 75 feet from the entry, which assays $11 to $12 a ton in gold.

On the southeast side of Anvil Creek opposite the tunnel a 30-foot shaft has been sunk by the same men. This shaft is inaccessible, but material on the dump shows the presence of mineralized schist and vein quartz. The sulphides are pyrite, arsenopyrite, and a little stibnite. The vein quartz carries feldspar.

CHARLES.

At an elevation of 900 feet on the left side of Cooper Gulch there is a caved-in shaft belonging to M. Charles. The country rock is an iron-stained limestone.

On the west side of Dry Creek, at an elevation of 525 feet, about where the valley opens out into the flats, Mr. Charles has driven a tunnel 25 feet long in the iron-stained crystalline limestone, which strikes N. 42° E. and dips 18° NW. Another tunnel 50 feet down the hill slope has been driven 15 feet in blue crystalline limestone, which has the same strike and dip. A fault striking N. 25° W. and dipping 68° NE. cuts the limestone in the tunnel, and a foot or more of calcite is present along the east side of the fault. The rock is iron stained, but no sulphides were observed.

HOMBURGER.

On Newton Gulch lode and placer claims aggregating more than 600 acres are owned by August Homburger. About a dozen shafts and two churn-drill holes have been put down on these claims. From these it appears that the country rock is largely schist, with beds of limestone and greenstone. The material taken from the shafts is iron stained and in some places mineralized by pyrite. Stringers of white, opaque quartz and veinlets of glassy quartz occur in the schist. The owner reports a mean value of $5 a ton in gold as the result of composite sampling.

OLSEN.

On the southeast side of Anvil Creek, midway between the mouth of Specimen and Quartz gulches, five lode claims extending in a direction about S. 25° W. are being prospected by Charles Olsen. The country rock at this locality is a graphitic schist, similar to that exposed by placer mining along the left-hand bench of Anvil Creek.

This graphitic schist strikes north and dips at varying angles to the east. White quartz veins standing nearly vertical cut the schist in a general N. 45° E. direction.

The property is being prospected by means of a 97-foot shaft from the bottom of which a 35-foot drift has been driven. It is evident from the description by the owner that the lode lies along a fault zone. The quartz in the lode is displaced by faulting. A little stibnite is reported from this lode. The owner reports an average value of $16 a ton for the ore from the shaft.

PETERSON & LAMOREAUX.

On the ridge between Anvil Creek and Snake River, southwest of Quartz Gulch, at an elevation of 650 feet, a big ledge of white, opaque (bull) quartz has been exposed by Peterson & Lamoreaux in an open cut and short tunnel. This body of quartz is 8 feet or more thick, strikes S. 45° W., and dips about 45°NW. It is heavily iron stained. The vein is not clean cut but shows stringers going off into the black schist country rock. Strongly developed fractures striking N. 35° W. are present in the quartz, as well as other irregular fractures and faults. This quartz has the appearance of having suffered considerable metamorphism and is probably an old quartz vein formed prior to the gold mineralization of the region. It is reported that galena was found disseminated in some of this quartz. A near-by shaft, about 40 feet deep, is filled with water.

STIPEK & KOTOVIC.

A number of claims on Rock Creek and on the divide between Rock and Glacier creeks are being prospected by W. Stipek and J. Kotovic. On the east side of Rock Creek, at an elevation of about 200 feet, about 25 feet above the creek bed, there is a shaft 76 feet deep, on the dump from which are pyritized schist and white quartz. The shaft is filled with snow and inaccessible. A 70-foot crosscut is said to have been made at the bottom of the shaft 35 feet in opposite directions, exposing a ledge of mineralized rock. This ledge trends S. 5° W. The dump from this shaft is said to assay $8.50 a ton in gold, and stringers rich in sulphides are said to have assayed as high as $150 a ton. It is a significant fact, in view of what has already been said concerning the scarcity of true gold quartz, that no quartz is present with these stringers.

Just below this shaft, on a level with the creek, a prospect tunnel has been driven 120 feet into the hill, crosscutting the lode. Just inside the entry the tunnel cuts through a 12-foot vein of the white opaque quartz, which is greatly shattered and iron stained. A mill run on this material has shown it to contain 250 pounds of concen-

trates to the ton of rock milled and $2.65 a ton in free gold. The concentrates, which are chiefly arsenopyrite and pyrite, are said to assay from $48 to $65 a ton in gold. Hence the total value of the mineralized quartz would be about $8.25 a ton.

Beginning at a point 15 feet from the entry and continuing to the face, sulphides are plentiful in the mineralized schist and shattered white quartz. Arsenopyrite is particularly abundant. A fault, striking east and dipping steeply to the north, cuts across the tunnel at the beginning of the sulphide zone. It is said by the owner that the schist in the mineralized zone carries more gold than the mineralized quartz.

About 75 feet downstream, on the same side of Rock Creek, another tunnel has been driven 40 feet, showing in part the same general section, including the large vein of white quartz above described. It appears, therefore, that the zone of mineralization has a general northeasterly extension.

On Sophie Gulch, above the scheelite deposits, another prospect tunnel belonging to the same owners has been driven. This is 65 feet long, but is caved and inaccessible. A short open cut below the tunnel, however, shows the presence of mineralized country rock.

NUGENT.

At an elevation of 300 feet on the southeast side of Rock Creek, at the level of the creek, the so-called Nugent tunnel has been driven 150 feet into the hillside. The country rock is a much iron-stained schist striking N. 20° E. and dipping 25° SE. It is cut by many quartz stringers which are reported to carry considerable gold. These quartz veins strike consistently N. 45° E. and dip steeply to the southeast. No recent work has been done in this locality, and the owner was not present to give any first-hand information.

NEW ERA MINING CO.

The New Era Mining Co. owns seven lode claims, known as the Big Four group, on Snow Gulch, a tributary of Glacier Creek. The New Era mine has been described by Chapin.[1] Little recent work has been done at this property. The principal development work consists of a 315-foot tunnel, driven to crosscut the lode. This was inaccessible at the time of the writer's visit and, having been described by Chapin, will not be further considered in this paper.

A shaft 60 feet deep has been sunk on the Big Four claim, east of Snow Gulch, at an elevation of about 500 feet. This likewise was inaccessible, but the writer was given information concerning con-

[1] Chapin, Theodore, Mining on Seward Peninsula: U. S. Geol. Survey Bull. 592, pp. 400–401, 1914.

ditions underground by Capt. Fred West, one of the owners. The country rock at this point is limestone, which is cut by numerous quartz veins and stringers ranging from a fraction of an inch to 18 inches in thickness. These stringers strike N. 65° E. in a zone about 60 feet wide. At the 30-foot level a drift has been driven 32 feet in a direction about N. 65° E., along the lode, and another S. 25° E., to crosscut the lode. The quartz is said to be true gold quartz—that is, little iron stained, with numerous open spaces, unshattered, and carrying crystalline gold. It resembles the so-called "water quartz," as it is termed by the miners of the Fairbanks district, or the true vein quartz of that district.

A short distance downhill from this shaft schist begins, and the mineralized zone continues into it. Schist strikes N. 15° E. and dips 30° E. The true vein quartz is said to be lacking in the schist, but there are parallel joints or slips that strike N. 55°–60° E. and dip about 65° NW. Some of the old white quartz lying along these joints is heavily iron stained with red ocher. The schist itself along the lode extension is iron stained and otherwise mineralized and is said to constitute a body of commercial ore.

GOLDEN EAGLE AND GOLD BUG.

The Golden Eagle and Gold Bug claims, owned by Capt. Fred West, are on the east side of Snake River about halfway between Mountain Creek and Snow Gulch, at an elevation of 400 feet. The development work consists of a tunnel 125 feet long, driven along a 6-foot vein of iron-stained, shattered quartz. The country rock, which is schist at this locality, strikes N. 32° W. and dips 25° SW. The quartz vein, which strikes N. 70° E. and dips 45° SE., cuts across the cleavage of the schist and is said to be traceable 1,500 feet at the surface. Some iron sulphides are present in the quartz, and assays taken at the breast indicate rather high grade ore, the extent of which, however, is not known.

JORGENSEN.

The Eureka and Borasco claims, at the head of Mountain Creek, a tributary of Snake River, are being prospected by A. C. Jorgensen. The development work on these two claims was of special interest to the writer because it shows clearly that the gold mineralization is absolutely independent of the presence of gold quartz.

The mica schist country rock strikes north and dips 28° E. It is cut by veins and stringers of the white vein quartz, somewhat irregular in character but striking in a general way about N. 60° E. and standing about vertical. A fault—in reality a fault zone about 1 foot thick—striking N. 65° W., with a high northeast dip, cuts both schist

and quartz veins. All the schist in the vicinity is iron stained, but this feature is particularly evident near the fault, where the country rock is heavily charged with arsenopyrite. The hematitic material along the fault is a granulated iron-impregnated schist which pans free gold. Joint planes striking N. 30° E. and dipping 70° NW. are present in the schist and are much iron stained. They probably afforded a channel for the transmission of the auriferous solutions from the fault zone out into the adjoining schist.

Arsenopyrite is the chief sulphide present, pyrite being subordinate. The sulphide-bearing schist gives exceptionally good returns in gold. It is believed that a large proportion of the gold is combined with the sulphides. The free gold in the hematitic gouge is fine, even grained, and much discolored by iron. Scheelite is also found in and along one of the shattered, iron-stained white quartz veins.

The owner of these two claims plans to build a homemade 3½-foot conical tube mill and treat the ore in a small way, saving the free gold on plates and shipping the concentrates.

LABAY & MEEGAN.

The Labay & Meegan gold quartz lode is in the basin of Daniels Creek, northeast of Bluff, in the Solomon district. The writer was not able to visit this property but gained a general idea of conditions at this locality by conversation with Mr. L. A. Labay.

According to description, the property includes 16 or more lode claims, staked from north to south in groups of three. There are three lode systems extending in a north-south direction, known as the Sea Gull, Idaho, and Esquimeaux lodes, named in order from west to east. Two of these, the Idaho and Esquimeaux, coalesce along the southeast side of Daniels Creek.

The Sea Gull lode is said to be 37 to 39 feet wide and appears to be a mineralized zone in schist and quartz. This lode system strikes north and dips steeply to the west. The Idaho lode is reported to be 150 feet wide and likewise strikes approximately north and dips steeply west. Between the Sea Gull and Idaho lodes lies 200 feet of black schist. From data given to the writer by Mr. Labay it appears that these lodes contain a large body of low-grade commercial gold ore.

The present developments consist of a 100-foot tunnel on the Idaho claim, with a 40-foot winze at the breast and a 50-foot crosscut at the bottom of the winze. A 50-foot timbered shaft is also open on the Idaho No. 1 claim and a similar 75-foot shaft on the Idaho No. 2. There are a number of other prospect shafts, some timbered and others untimbered, most of which are caved. The owners are now arranging for the installation of a mill on the property.

TUNGSTEN.

SOPHIE.

The property known as the Sophie lode, on Sophie Gulch, a tributary of Rock Creek, consists of one patented placer claim and two lode claims. Residually weathered tungsten ore was mined here by placer operations in 1916. The following notes are not intended as a final analysis of the conditions of mineralization but merely as facts evident from the field examination. The results of microscopic work on this lode will be included in a later report.

The country rock at this place is an iron-stained, thin-cleaving, foliated mica schist, the cleavage of which, measured at one place in the pit, strikes north and dips 23° E. It shows also a vertical jointing trending N. 35° W. Many well-developed fissures are present, striking N. 45° E. and nearly vertical or dipping steeply to the northwest. These are filled with iron-stained shattered quartz. Such veins range in thickness from a fraction of an inch to a foot or more. There is great irregularity in these quartz stringers, most of them thickening in places and thinning in others; also stringers run out into the country rock. Iron-stained fault planes striking N. 18° W. and dipping 54° E. cut both the country rock and the quartz stringers, and along these there is little or no quartz but considerable iron-stained gouge material.

The scheelite occurs for the most part along the sides of quartz stringers and disseminated in the mica schist. Locally the scheelite is present in the quartz. It is reported that gold occurs in the iron-stained schist outside of the zone of scheelite mineralization, but no gold is reported to have been found in the scheelite-bearing rock. Besides scheelite, however, arsenopyrite, pyrite, and galena are found in the form of later veinlets definitely cutting the quartz.

It is said by the owners that the belt of scheelite mineralization is about 50 feet wide and has so far been traced about 500 feet in each direction from the open cut. The trend of this zone appears to be that of the iron-stained quartz veins and stringers—that is, about N. 45° E. The northwest side of the lode is reported to carry more scheelite than the other side. Two shafts—one 32 feet deep, northeast of the open cut, and the other 28 feet deep, southwest of the cut—have been driven to ascertain the value of the ore along the lode. It is said that these shafts show a higher content of scheelite in depth than at the surface.

LOST RIVER.

The Lost River tin mine, on Cassiterite Creek, a tributary of Lost River, in the York district, is a potential source of tungsten. Wolframite, an iron-manganese tungstate, is an essential constituent of the

lode and may perhaps be present in an amount as great as 50 per cent of the cassiterite. When eventually this lode is worked the wolframite should constitute a valuable part of the product.

MISCELLANEOUS LOCALITIES.

Several other small tungsten lodes in Seward Peninsula have been worked by placer-mining methods. These include the lode on Twin Mountain Creek, the Lynx claim, on the north side of Glacier Creek, and another small lode on the divide between Glacier and Rock creeks.

ANTIMONY.

SLISCOVICH.

No work was in progress at the Sliscovich mine at the time of the writer's visit, but the mine was entered and an examination made of the antimony ore in place. At the end of the main adit, about 300 feet from the tunnel entry, an inclined shaft has been sunk on the vein, which has a general northeast strike and dips 45° NW. At about the 25-foot level in this incline a drift has been driven to the southwest, and from this drift the antimony ore was apparently taken. Below this point a good deal of caving has occurred in the incline.

At the 25-foot level the quartz vein strikes N. 45° E. and dips 48° NW. The attitude of the country rock, which is schist, is nearly horizontal, a measurement at one place on the cleavage giving a strike of N. 55° E. and a dip of 5° NW. The quartz vein is 3 feet thick in this drift and has a smooth, slickensided hanging wall and gouge along the footwall. The antimony ore (stibnite) occurs as lenses in the quartz, which is much shattered and iron stained. Plainly the quartz vein has been reopened and the stibnite deposited in the shattered vein. On the 25-foot level the body of stibnite is 1 foot thick and contains much glassy quartz, which accounts for the low percentage of stibnite reported from the last shipment of ore.

HED & STRAND.

The Hed & Strand mine is near the head of Lost Creek, a tributary of Stewart River, at an elevation of about 1,250 feet. The present developments consist of a tunnel driven southeast 250 feet into the hillside, a drift for 100 feet to the northeast and 140 feet to the southwest at 90 feet from the entry, and another drift 170 feet to the northeast, at 190 feet from the entry. The tunnel intersects the vein 90 feet from the entry. At this point the vein is about 4 feet thick and consists of white quartz and stibnite. The antimony occurs as a body 2 feet thick along the footwall. The vein strikes

N. 45° E. and dips 48° NW. but is irregular, thickening and thinning, and is offset slightly by numerous slips. At the end of the northeast drift, which starts 90 feet from the entry, the vein consists of two thin seams of stibnite with about 2 feet of crushed schist and gouge lying between them.

From the first drift southeast in the main tunnel some interesting structural data may be obtained. The strike of the schist country rock is N. 15° W. and the dip 15° E. Numerous faults cut across the tunnel, striking in a general northeasterly direction and dipping as a rule conformably with the antimony vein—that is, northwest. Several measurements on these faults were as follows: Strike N. 50° E., dip 58° NW.; strike N. 45° E., dip 75° NW.; several striking about N. 45° E., with varying degrees of dip to the northwest; one striking northeast and dipping steeply southeast. One of these faults, striking N. 45° E. and dipping 75° NW., which shows in the main tunnel 190 feet from the entry, cuts through and displaces a vein of white quartz, that stands vertical and strikes N. 52° W. The quartz is offset 2 feet along the tunnel wall. In general these fault planes are merely iron stained and slickensided, but here and there one carries a thin seam of clear granular quartz.

Most of the stibnite is of high grade, but "ore of lower grade, consisting of stibnite, pyrite, and vitreous quartz, also occurs in the deposit."[1] The vitreous quartz resembles the quartz which occurs sparingly along the fault planes, as above described. No gold is reported from the stibnite in the mine, but a little gold is present in the quartz and schist in the vein and along the walls.

Shipments of antimony ore were made from the Hed & Strand mine in August and October, 1915, and in June, 1916. In all, 106 tons of ore has been mined and shipped. Of the last shipment, consisting of 71 tons, only 19 tons has yet been sold.

At the forks of the creek, upstream from the mine, the stibnite crops out in a vein about 1 foot thick, with a footwall of the white, opaque quartz. At another locality in the creek near by the stibnite lies in two narrow stringers, separated by about 2 feet of similar white quartz. This quartz is said to assay as high as $6 a ton, and gold to the value of $2 a ton is said to be present in the stibnite at this point.

A body of granitic rock, considerably metamorphosed, crops out on the ridge at the head of Lost Creek, and this also is reported to show on assay a low content of gold.

CHRISTOPHOSEN.

The Christophosen property is at an elevation of 1,500 feet on Waterfall Creek, a tributary of Last Chance Creek, in the Snake

[1] Brooks, A. H., Antimony deposits of Alaska: U. S. Geol. Survey Bull. 649, p. 56, 1916.

River drainage basin. The property consists of four claims, known as the Bunker Hill, Monitor, Mabel, and Isabel.

The principal development work consists of two tunnels and a number of open cuts. The upper tunnel is 105 feet long and the lower one 270 feet long. The tunnels are said to intersect a stockwork of iron-stained schist and quartz in which the stibnite occurs as lenticular masses. None of the antimony stringers are over 12 inches in thickness.

In the open cuts it is apparent that a shear zone, striking about N. 20° E., runs through the property. The attitude of the faults is about vertical. This zone is about 100 feet thick and is heavily iron stained and mineralized by pyrite, pyrrhotite, stibnite, and gold. In one of the open cuts a vein of massive white quartz from 1 to 3 feet thick is intersected and offset by the shear zone. The quartz is mineralized by sulphides, including stibnite. This vein is conformable with the cleavage of the schist country rock, which strikes N. 60° E. and dips 57° NW. It is confidently believed by the writer that this body of white, opaque quartz, like numerous others described in this paper, had no direct connection with the mineralization, being present long before the mineralization took place.

About 2½ tons of high-grade stibnite has been mined at this property and sold. This stibnite assays over 58 per cent antimony and carries also some gold and silver. Assays of the crushed schist and quartz in the shear zone also show a little gold.

GRAY EAGLE.

The Gray Eagle antimony claim is in the Solomon district, on the north side of Big Hurrah Creek, three-fourths of a mile upstream from the railroad and about 200 feet from the creek. The country rock is schist. Mining has been done on a stringer of stibnite about 18 inches wide that follows the right-hand bench and dips steeply south. Little or no quartz is present with the antimony ore. The stibnite is of very high grade, assaying 63.7 per cent of antimony. It contains no lead or zinc and only a trace of arsenic.

Four tons of antimony has been mined from this property, of which 3 tons was mined and shipped in the fall of 1915. One ton mined in the spring of 1916 has not yet been shipped from Nome.

PETERSON & LAMOREAUX.

At an elevation of 550 feet on the west side of Anvil Creek southwest of Quartz Gulch there is a caved shaft with iron-stained schist on the dump. About 1,500 pounds of stibnite is said to have been mined from this shaft by Peterson & Lamoreaux, but this ore was never shipped, owing to the subsequent drop in the price of antimony.

WIDSTEAD.

The Widstead tunnel, on the northwest side of Anvil Creek about opposite the mouth of Specimen Gulch, is referred to on page 430. Three tons of stibnite is said to have been mined from this tunnel.

MISCELLANEOUS LOCALITIES.

Brooks[1] has noted a number of reported occurrences of stibnite on Seward Peninsula, as follows:

1. East of Nome River, on the divide between Mineral and Osborn creeks. This is probably what is known as the Nelson property, at the head of Bonita Creek, a tributary of Osborn Creek. A shaft 15 feet deep has been sunk on this property. The stibnite is said to be exceptionally pure and is reported further to carry abnormally large quantities of gold.
2. The California quartz lode on Goldbottom Creek. Reference is made to this lode on page 426.
3. On Last Chance Creek. This is assumed by the writer to be the Christophosen property (p. 438).
4. In the quartz veins in the Solomon-Casadepaga region.
5. At the head of Tin Creek, in the York district.
6. On the west side of Brooks Mountain, in the York district.
7. In the Omalik mine, a silver-lead mine in the upper basin of Fish River, in the Council district.

To these may be added the occurrence of stibnite in the Boulder lode, on Boulder Creek, described on page 427.

COPPER.

WARD.

The Ward property is about 3½ miles north of west of Kougarok Mountain, in the Kougarok district. The eight claims that constitute this property lie between Bismark and Star creeks, tributaries of Quartz Creek, which is the head of the South Fork of Serpentine River.

The development work consists of a number of open cuts and shallow shafts. From a description of the property given by the owners it appears that the lode is an impregnated zone lying along or near a limestone-schist contact. The schistosity of the rocks is said to strike N. 30° W. and dip northeast. The width of the ore body is not apparent from the present workings.

The commercial ore consists of malachite and azurite in about equal amounts. A little chalcopyrite is also reported. Quartz is the main

[1] Brooks, A. H., Antimony deposits of Alaska: U. S. Geol. Survey Bull. 649, pp. 57–59, 1916.

gangue mineral, but calcite and blue fluorite occur as float in the vicinity.

The following table, published with the permission of the owner, gives all available information concerning the copper shipments made from this property to date:

Copper ore shipped from Ward property, 1906–1916.

Year.	Quantity.	Copper content (per cent).	Value.
1906.....tons..	8	41	$1,200.00
1907.....do....	8	41	1,200.00
1913.....do....	14	30.34	1,400.00
1916.....pounds..	18,947	.....	981.12
			4,781.12

WHEELER.

The Wheeler copper claims are at the head of several small tributaries of Iron Creek on the west side, below the mouth of Canyon Creek. The principal development work to date consists of a tunnel 60 feet long and a shaft 80 feet deep. Outcrops on the hill southwest of the claims show about 9 feet of quartz stained with malachite and several stringers of malachite. Ore taken from the shaft shows both chalcopyrite and bornite in small quantities, with a surficial oxidation of malachite. The strike of the zone of mineralization is said to be about northeast. The shaft is now filled with water, and the tunnel is frozen. It is reported that several tons of ore has been shipped from this property.

IRON CREEK-KRUZGAMEPA RIVER DIVIDE.

Other copper mineralization along the divide between Iron Creek and Kruzgamepa River has been described by Smith[1] as follows:

Between Iron Creek and the broad flat drained by tributaries of the Kruzgamepa and of the Niukluk there is a ridge of heavy white limestone underlain by chloritic and feldspathic schists. From the scattered evidence collected in a hurried examination it appears that the limestone is very considerably folded, but that the major structure is nearly flat. The limestone would appear to be a continuation of the limestone already described as forming the western margin of the Solomon and Casadepaga quadrangles. In those areas the contact with the underlying schist seems to have been a zone of mineralization. In general the mineralization is sparsely disseminated, but in places there are stringers of ore which tempt prospecting.

The greatest amount of prospecting for copper in this contact zone has been at the headwaters of Sherrette Creek, a tributary of the Kruzgamepa. At one place about 4 miles east of the mouth of Iron Creek an inclined shaft has been

[1] Smith, P. S., Investigations of the mineral deposits of Seward Peninsula: U. S. Geol. Survey Bull. 345, pp. 242–243, 1908.

sunk on a mineralized zone 5 feet in width. The footwall is a silvery-gray chloritic schist destitute of feldspars. The hanging wall is ill defined, and the width of the ore would have to be drawn on a commercial basis. The footwall is so poorly exposed that its character may be due to alterations effected by the mineralizing solutions, but it is believed that it is not a schist derived from an igneous rock.

The ore so far disclosed consists chiefly of malachite, but there are also some copper sulphides, mainly chalcopyrite, with only a subordinate amount of bornite. The stringers are very narrow, and no commercial ore has yet been discovered. All over the hill, however, may be found fragments showing copper stains. This has given rise to the popular belief that the belt of mineralization is very wide. If, however, the interpretation that the ore occurs near the schist-limestone contact is correct and if this contact forms a more or less flat surface, with local wrinklings here and there, it seems more likely that the width of the mineralized area is not very great and therefore that the chance of finding valuable lodes is not promising except in those places where the mineralization, instead of being disseminated over a large area, has been more restricted.

All the float or ledges on the higher ground north of Iron Creek which show copper carbonate stains carry that mineral in the form of malachite. Lower down the slopes, near the upper branches of Left Fork, a tributary of Iron Creek, there is a copper lead where malachite is almost wanting and where the copper carbonate occurs in the form of azurite. The reason for this difference in character is not known. At this place only a small amount of exploration has been done, and the ore so far developed is not found in commercial quantities.

WORCESTER.

Five lode claims about 3 or 4 miles southeast of Kougarok Mountain, in the Kougarok district, are owned and have been prospected by William Worcester. Little is known of this property, but it was reported to the writer that the copper ore is malachite and azurite. Lead ore in the form of galena is said also to be present.

MISCELLANEOUS LOCALITIES.

Copper ore is reported by Mr. G. Christophosen to be present on the mountain at the head of Waterfall Creek, in the vicinity of the Christophosen antimony claims. The ore is said to be chalcopyrite, with azurite and malachite. Galena is also reported.

On Twin Mountain, at the head of Twin Mountain Creek, copper has been discovered and the area staked as the Ruby and Golconda claims. A tunnel has been driven to prospect this deposit but was inaccessible at the time of the writer's visit. The deposit appears to be localized in a shattered quartz vein. The copper minerals are chiefly malachite and azurite, but chalcopyrite is also reported to be present.

Four other copper prospects on Seward Peninsula have been described by Smith.[1] These were located as follows:

1. On the ridge between Copper and Dickens creeks, at the head of Nome River.

[1] Smith, P. S., op. cit., pp. 241, 244.

2. In the upper basin of Koyuk River.
3. On Dexter Creek.
4. On Mount Dixon and in the Moonlight Creek divide, in the Solomon district.

TIN.

LOST RIVER.

The Lost River tin mine, comprising the Cassiterite and Ida Bell lodes, is located on Cassiterite Creek, a tributary of Lost River, in the York district. Prospecting and development work have been in progress on this property for a number of years. Knopf[1] and Eakin[2] have visited this mine and have described the lode system and the character of the mineralization in some detail.

An option on the property was assumed in 1916 by W. W. Johnson and associates, who further prospected and developed the mine during the summer. A 50-ton ball mill, together with jigs, concentrators, etc., was shipped to Teller for use in making test runs on the tin ore, to determine the average tin content.

MISCELLANEOUS LOCALITIES.

Another tin lode, farther downstream on Lost River, is known as the O'Brien lode. The lode is said to be in a rhyolitic dike in limestone. Development work was being done on it in 1916.

The Empire Tin Mining Co. has 33 (?) claims on Cape Mountain, about 2½ miles from Tin City. The writer was informed that the lode here consists of an ore shoot about 18 feet wide, more or less parallel to a limestone-granite contact. A mill at Tin City with three stamps, operated by gasoline engines, is not in use. No recent development work has been done on this property.

The Percy lode, farther up on Cape Mountain, is owned by Ludlow Botts. It is understood that this lode is in or near a small rhyolitic dike, which invades the limestone country rock. The property is being developed by open cuts, but most of the recent work has been in the nature of assessment work.

The property of the United States Tin Mining Co. is likewise on Cape Mountain. This company owns a 10-stamp mill at Tin City, equipped with card tables and driven by gasoline engines. The mill is not in operation. A tunnel, driven in granite, is now closed.

Denny Bros. own a number of tin claims on Potato Mountain. The lode is said to be connected with several rhyolitic dikes that cut a body of calcareous slate. The development work consists principally of a tunnel and a shaft, the former opened recently.

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[1] Knopf, Adolph, Geology of the Seward Peninsula tin deposits: U. S. Geol. Survey Bull. 358, pp. 48–50, 1908.

[2] Eakin, H. M., Tin mining in Alaska: U. S. Geol. Survey Bull. 622, pp. 84–88, 1915.

IRON.

MONARCH GROUP.

The Monarch group of fifteen patented and three unpatented claims lies on the divide between Sinuk River and Washington Creek, at the head of a small tributary of Sinuk River known as Iron Creek. This and four other groups of iron claims near by have been described by Eakin,[1] and little development work has been accomplished since the time of his visit in 1914. The writer examined with considerable care the outcrops and development work on the Monarch claims and, so far as concerns their economic possibilities, has little to add to the generalizations and recommendations made by Eakin.

The country rock is limestone, which has been brecciated and replaced by limonite. Hematite is present only as a subordinate constituent. A specimen of the ore taken from a trench at the head of Iron Creek shows on a polished surface massive limestone with numerous angular inclusions of iron-stained limestone, residual fragments of the shattered country rock. Pyrolusite, in places intergrown with calcite, is present in veinlets that cut the limonite and the replaced limestone. These relations and the probable genesis of this iron deposit will be discussed more fully in a later paper on the iron resources of Alaska. For this report it is sufficient to say that the iron ore now exposed on the ridge and in Iron Creek is a residual concentration, a surficial enrichment of an underlying lode. The iron content of this lode at depth can not be judged from the surface indications; in fact, it is entirely possible that this deposit is only a surface capping, or "iron hat," covering some other metalliferous deposit. The occurrence of galena and sphalerite with limonite in the Galena group near by, the presence of similar limonitic material in considerable amount in a silver-lead lode in the Inmachuk basin, and the constant association of limonitic material and other iron minerals with most of the gold lodes on the peninsula might be cited as evidence of this possibility.

The best showing of iron ore is in a saddle on the ridge at the head of Iron Creek, at what is designated by Eakin the "east gap," in contradistinction to the "west gap," a similar saddle a short distance to the southwest. At this locality two shallow trenches aggregating 350 or 400 feet in length have exposed a continuous body of iron ore, chiefly limonite with a small amount of hematite. This limonitic ore is botryoidal in character but inclined to be porous, with fair-sized open spaces. It is considered by the owners of the property to

[1] Eakin, H. M., Iron-ore deposits near Nome: U. S. Geol. Survey Bull. 622, p. 361, 1915.

be the best iron ore on the property. An analysis of this ore[1] shows the content of iron and manganese to be respectively 54.81 and 1.08 per cent. Phosphorus is low, being only 0.057 per cent; sulphur is present only as a trace; and titanium is entirely absent.

Limonite was seen in a number of other trenches, pits, and open cuts examined by the writer on the different claims, but this surficial development work does not afford a basis for any estimate of the amount of iron ore available for mining. It seems to the writer that an accurate estimate could be made only after blocking out the ore by a comprehensive system of drilling. At all events, scientific prospecting of this lode, to gain a knowledge of its character in depth, should be a necessary preliminary step to any extensive preparations for mining.

GALENA GROUP.

The Galena group, consisting of nine claims, is about 2 miles southwest of the Monarch group on the divide between Sinuk River and Washington Creek. These claims, though prospected chiefly for their iron content, have also surface indications of both lead and zinc, in the form of galena and sphalerite.

It appears that the ore-bearing solutions have followed in large measure one or more of a system of joint planes in the country rock. On the Sunrise claim, one of this group, the country rock is crystalline limestone, the cleavage of which strikes east and dips 25° S. This limestone is cut by a number of joint planes, the more prominent of which had the following strikes and dips: N. 40° E., 65° NW.; N. 80° E., 70° N.; N. 15° W., 90°. Disseminated galena in a quartz gangue occurs along the vertical joint plane. This ore is said to show considerable values in gold.

An open cut on the Oso claim shows disseminated sphalerite, with a little pyrite, in the crystalline limestone. The extent of the zinc mineralization is not known. In a pit at another locality on the Oso claim the same system of jointing as above described was exposed, and vein quartz, with some iron-stained vein material, occurs along a joint plane striking N. 10° W. and dipping 75° N. Lilac-colored fluorite was also seen in this pit, but its exact relation to the mineralization could not be determined.

On the Fox and the Williams claims disseminated galena accompanied by quartz was observed in limestone and calcareous schist.

Considerable botryoidal limonite was seen on the dump at a prospect on the Kentucky claim.

[1] Eakin, H. M., Iron-ore deposits near Nome: U. S. Geol. Survey Bull. 622, pp. 361–365, 1915.

OTHER CLAIMS.

The Mogul, American, and Cub Bear are the three other groups of iron claims in the Sinuk district. No recent work has been done on these claims, and they were not examined by the writer. Limonitic iron ore is also reported from Tub Mountain, on the ridge between Rulby Creek and Sinuk River.

SILVER-LEAD.

Six silver-lead lodes have been reported on Seward Peninsula, but none of these have been visited by the writer. These are as follows:

1. The Omalik mine, in the eastern part of the upper basin of Fish River, in the Council district, has been described by Mendenhall[1] and Smith.[2] The mine is now idle.

2. A silver-lead lode on Fish River, about 5 or 6 miles above the mouth of Niukluk River, in the Council district, is said to have been worked sporadically for several years. Some silver-lead ore is reported to have been mined in 1915. Cinnabar is also present at this property, and it is reported that a number of flasks of mercury have been produced annually for several years past.

3. A silver-lead lode in the Inmachuk basin, in the Fairhaven district, was being prospected in 1916. A specimen of this ore, in possession of the writer, shows galena (said to be silver bearing), together with limonite, magnetite, and a little pyrite.

4. A silver-lead lode owned by G. Christophosen is on the north side of Last Chance Creek, a tributary of Snake River, about half a mile above the mouth of Waterfall Creek. The prospect consists of two lode claims. A tunnel 70 feet long has been driven to prospect the lode. The ore body is said to be 4 feet thick and consists of galena, with some pyrite, in a gangue of quartz. The lead ore carries gold and silver. Stibnite is also reported to be present.

5. A galena prospect on Kruzgamepa River, near the mouth of Iron Creek, has been described by Smith.[3]

6. A number of silver-lead deposits on Brooks Mountain, in the York district, have been described by Knopf.[4]

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[1] Mendenhall, W. C., A reconnaissance of the Norton Bay region, Alaska, pp. 213–214, U. S. Geol. Survey Spec. Pub., 1901.

[2] Smith, P. S., A geologic reconnaissance in southeastern Seward Peninsula and the Norton Bay-Nulato region, Alaska: U. S. Geol. Survey Bull. 449, pp. 130–133, 1911.

[3] Smith, P. S., Investigation of the mineral deposits of Seward Peninsula: U. S. Geol. Survey Bull. 345, pp. 246–247, 1908.

[4] Knopf, Adolph, The mineral deposits of the Lost River and Brooks Mountain region, Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 345, pp. 269–271, 1908.

ZINC.

CHRISTOPHOSEN.

A zinc prospect consisting of two claims owned by G. Christophosen is on the ridge between Penny River and the head of Oregon Creek, at an elevation of 1,600 feet. The prospect lies N. 64° E. from the mouth of Nugget Creek.

The ore occurs in a small saddle on the ridge, in a narrow band of limestone country rock. A short distance away, on both sides of the saddle, the country rock is schist, and this rapid alternation of limestone and schist is a characteristic geologic feature in this vicinity. The strike of the country rock is N. 30° E., and the dip about 30° SW. There appears to be no well-defined vein, but instead an iron-stained zone of mineralization, which trends approximately S. 8° E. The lode was located originally by float in the valley of Penny River. Development work consists mainly of a caved shallow shaft.

The ore is sphalerite, with a little pyrite, in a quartz gangue. Two kinds of quartz are present—the white, opaque variety and the clear, vitreous quartz. The latter appears to be either contemporaneous with the ore deposition or at least closely connected with it genetically. The ore is said to carry also some gold.

NELSON.

On Steep Creek, a tributary of Goldbottom Creek, at an elevation of about 1,050 feet, is the Nelson prospect tunnel, driven 55 feet N. 55° E. into the hill on the east side of the creek. The country rock is limestone striking N. 15° W. and dipping 18° W. A well-developed vertical joint plane strikes in same direction as the tunnel. The tunnel was full of water at the rear, and no one was seen on the property.

About 20 feet above the tunnel a small lead-zinc stringer was observed in the limestone. A little pyrite is also present with the galena and sphalerite.

Sphalerite is also reported in association with metalliferous lodes in other parts of Seward Peninsula.

BISMUTH.

The following extract from a report by Moffit[1] gives the only information so far collected concerning the bismuth lodes on Seward Peninsula:

> It has been known for a number of years that bismuth is present on Charley Creek, a tributary to Sinuk River from the south. It was first found in the

[1] Moffit, F. H., Geology of the Nome and Grand Central quadrangles, Alaska: U. S. Geol. Survey Bull. 533, p. 133, 1913.

sluice boxes at the lower end of the creek, and later the float was discovered farther up and traced to its source. On the east branch of Charley Creek, at a point about 1,000 feet from the forks and at an elevation of 950 feet above sea level, two parallel quartz veins appear near the stream bed and have been found to carry the bismuth. These two veins are about 12 inches and 8 inches in thickness and are separated by 16 to 18 inches of schist. They occur in strike joints dipping 50° to 60° and may be traced on the surface for only a short distance because of the covering of loose slide rock. At one place they are offset about 8 to 10 inches by a small fault. The proportions of bismuth seen in the veins is small, but some boulders found in the stream below show a larger amount. Up to the present time little has been done toward prospecting the veins.

A number of bismuth claims on Charley Creek are now held by Homburger & Shoemaker, but no recent development work has been done on them.

GRAPHITE.

Graphite deposits on Seward Peninsula have been known for a number of years and have been described and discussed by Moffit,[1] as follows:

Graphite is abundant in some of the black schist beds belonging to the Nome and Kigluaik groups and gives them their characteristic color but is not known in a form to make it of economic importance within the Nome and Grand Central quadrangles. Just north of the Grand Central area, however, in the headwater areas of Grand Central River and Windy Creek, especially in the vicinity of the divide between these two streams, are graphite deposits of considerable size. Their occurrence, as well as that of graphite on the north side of the Kigluaik Range west of Cobblestone River, has been known for a long time, but only recently have they received especial attention from prospectors.

A sharp ridge made up of biotite schist striking east and west and intruded by dikes and sills of coarse granitic rock or pegmatite rises on the south from the saddle between the Grand Central and Windy Creek. Some of the schist is highly graphitic, the graphite appearing as abundant small scales on the cleavage surface and much of it not being distinguishable on casual examination from flakes of biotite. Locally graphite is segregated in beds or much flattened lenticular masses that conform in direction with the schist cleavage and reach thicknesses of 6, 8, or even 18 inches. These beds include thin layers of schist containing numerous large garnets and much quartz. The raw graphite found at this place is heavier than the higher grades of graphite, owing to its included quartz.

The sills and dikes of pegmatite cutting the schist also contain graphite, which is associated with them in such a way as to suggest a close relationship between the intrusives and the graphite. Graphite appears to be an original mineral in the pegmatite as well as to be associated with it in the schist. At one place about 8 inches of solid graphite is included between a pegmatite sill and the overlying schist. The steep slopes of the mountain are strewn with graphite fragments, which, owing to the fact that they are much lighter in weight than either the schist or the pegmatite, appear more abundantly on the surface, especially in gullies where water has brought about a rough

[1] Moffit, F. H., op. cit., 135–136.

sorting. One block, with dimensions of approximately 7 feet, 6 feet, and 30 inches, consists of about equal thicknesses of schist and apparently almost pure graphite.

The graphite-bearing schist extends eastward beyond the east fork of Grand Central River and westward across Windy Creek and the head of Cobblestone River to the region south of Imuruk Basin, in which the graphite is even more extensively developed than in the locality described and from which a number of commercial shipments have been made.

Two mining companies are now interested in the graphite deposits on the north side of the Kigluaik Range, west of Cobblestone River. The property of one of these, known as the Uncle Sam Alaska Mining Syndicate, is on Graphite Bay, an arm of Imuruk Basin, about 2 miles south of tidewater and 3 miles west of Cobblestone River. That of the other, known as the Alaska Graphite Mining Co., is between the Uncle Sam Alaska Mining Syndicate's claims and Cobblestone River.

According to information given to the writer by Mr. G. Christophosen, of Nome, the country south of Imuruk Basin in the vicinity of the graphite claims is a moss-covered gravel plain, barren of timber and sloping gently upward with a grade which increases from 5 per cent near Imuruk Basin to 10 per cent or more near the foothills. The graphite claims adjoin the foothills and are cut by numerous streams, which have exposed the graphite beds to view.

The graphite occurs in seams from 1 inch to 18 inches thick. All the deposits contain bunches and veinlets of quartz, but the graphite is said to be readily separable from these and is easily hand sorted. The graphite is claimed to be of good commercial character. A 200-pound sample from the claims of the Uncle Sam Alaska Mining Syndicate is said to have contained 60 per cent of graphite, 12.5 per cent of which is high-grade graphite flake comparable with the best commercial flake.

Shipments of 130 tons of graphite were made by the Uncle Sam Alaska Mining Syndicate in 1912, and 300 tons is now ready for shipment. The Alaska Graphite Mining Co. in 1916 employed seven men and mined 100 tons of graphite.

PLACER MINING ON SEWARD PENINSULA.

By J. B. MERTIE, Jr.

INTRODUCTION.

Placer mining on Seward Peninsula was favored in 1916 by an abundance of rainfall, which was rather evenly distributed throughout the summer and was never torrential. As a result, an adequate supply of water was available for mining operations, yet there was little or no damage done to the ditches through flooding.

Gold and tin were recovered, as in previous years, chiefly by placer-mining methods. In addition to these, however, two other metals, tungsten and platinum, were brought to light in 1916 as potential resources of the peninsula. One large scheelite lode and a number of smaller ones were located and worked, and scheelite was recovered elsewhere in placer operations. Placer platinum was found at two localities.

GOLD.

The placer gold on Seward Peninsula is recovered by dredging, by underground mining, and by open-cut work, including hydraulicking. It is estimated that in 1916 33 per cent of the gold was won by dredges, 18 per cent by underground mining, and the remaining 49 per cent by open-cut work.

DREDGES.

A total of 27 gold dredges were operating during the season of 1916, as compared with 31 operated in 1915. Seven of these were in the Nome district, nine in the Council district, five in the Solomon district, and two each in the Kougarok, Fairhaven, and Port Clarence districts. Several other dredges were either temporarily idle or in process of moving and reconstruction. Among these were the two gold dredges of the American Gold Dredging Co. on Anikovik River, which were to be moved to Swanson Creek, in the Agiapuk River basin, a short distance southeast of Mukacharni Mountain. The Johnson dredge, which had previously operated on Kugruk River, was to be moved during the winter of 1916–17 to Candle Creek, in the Keewalik basin. Ground was being prospected for dredging at four other localities on the peninsula. The following list gives

by districts the operating dredges and the localities where the work was being carried on:

Dredges operated on Seward Peninsula, 1916.

NOME DISTRICT.

Arctic Gold Dredging Co	Hobson Creek.
Arctic Placer Mining & Milling Co	Bangor Creek.
Center Creek Dredging Co	Center Creek.
Ernst Alaska Dredge Co	Nome Beach.
Guinan & Ames	Glacier Creek.
Hastings Creek Dredging Co	Hastings Creek.
Julien Dredging Co	Osborn Creek.

COUNCIL DISTRICT.

Adams & Edin	Goose Creek.
Blue Goose Mining Co	Ophir Creek.
Flume Dredge Co	Crooked Creek.
Flume Dredge Co	Melsing Creek.
Northern Light Mining Co	Ophir Creek.
Oro Dredging Co	Elkhorn Creek.
Uplift Mining Co	Camp Creek.
Warm Creek Dredge Co	Warm Creek.
Wild Goose Mining & Trading Co	Ophir Creek.

SOLOMON DISTRICT.

Dredge (formerly Seward Dredging Co.)	Solomon River.
Kimball dredge	Solomon River.
Kimball dredge	Solomon River.
Newburg & Flower	Solomon River.
Moody Mining Co	Canyon Creek.

KOUGAROK DISTRICT.

Behring Dredging Co	Kougarok River.
Kelliher dredge	Kougarok River.

FAIRHAVEN DISTRICT.

Candle Creek Mining Co	Candle Creek.
Deering Dredging & Mining Co	Inmachuk River.

PORT CLARENCE DISTRICT.

Estabrook dredge	Windy Creek.
Welch & Doren	Budd Creek.

Most of the dredges now being operated are using distillate for fuel. The generation and delivery of power to the dredges from one or more hydroelectric plants, a project which has been under consideration for some years, was given new impetus in 1916 by two companies. The Wild Goose Mining & Trading Co. installed and made ready for operation in 1917 a hydroelectric plant on Ophir

Creek, in the Council district. A ditch with intakes at the heads of Ophir Creek and Casadepaga River will deliver 2,500 inches of water at claim No. 15 above Discovery on Ophir Creek, with a fall at that point of approximately 30 feet. The power thus generated will be utilized to run two dredges.

Another company has under consideration a dam and power site in the Kigluaik Mountains on Pass Creek, a tributary of Kruzgamepa River. During the summer of 1916 a corps of civil and mining engineers were at work at that locality making preliminary surveys and studying other details of the project. It is reported that this work will be continued in 1917. Detailed measurements of stream flow, extending over a number of years, are the prime essential for determining the feasibility of such a project, for the success of the undertaking seems to depend in large measure on the amount of water available at different times in the year. The transmission of power and the demand for it are likewise important details for consideration.

It is estimated that the 27 gold dredges on Seward Peninsula in 1916 employed 430 men and handled about 1,870,000 cubic yards of gravel, yielding gold to the value of $985,000, compared with the handling of 3,000,000 cubic yards of gravel, yielding $1,050,000, by 31 dredges in 1915.

Dredge operations on Seward Peninsula in 1916.

District.	Production (per cent).	Yardage (per cent).	Average value per cubic yard.
Nome	32	34	$0.50
Council	42	33	.66
Solomon	11	18	.33
Kougarok	15	15	.51
Fairhaven			
Port Clarence			

The average value per cubic yard of the gravel handled by the dredges for the whole peninsula is about 53 cents. From the above table it will be seen that the value of the gravel in the Nome district approaches the average value, while the gravel mined in the Council district is above the average and that of the Solomon district is below the average. From data at hand it is known that the Fairhaven gravel is near the normal value, the Kougarok considerably exceeds it, and the Port Clarence falls below it to a corresponding degree.

UNDERGROUND MINING.

Approximately 77 deep placer mines were worked on Seward Peninsula during the last year, most of them in the Nome district. It is estimated that 50 mines were worked during the winter and

about 48 during the summer, employing in all about 400 men. The following list shows the distribution of the mines so far as they are known:

Deep placer mines worked on Seward Peninsula, 1916.

Nome district:	
Dexter Creek and Hill	12
Center Creek	12
Third beach line	15
Second beach line	4
Submarine beach	2
Present beach	1
Dry Creek	3
Irene Creek	2
Sledge Creek	2
Manila Creek	2
Cooper Gulch	1
Specimen Gulch	1
Anvil Creek	1
Wonder Creek	1
	59
Fairhaven district:	
Candle Creek and vicinity	6
Inmachuk River	2
Joseph Creek	1
	9
Solomon district:	
Solomon River	1
Koyuk district:	
Dime Creek	8

One feature of the underground mining worthy of particular mention is the development of a new placer camp on Dime Creek, a tributary of Koyuk River. Brooks[1] has described the location of this camp and has given some details regarding the extent of the pay streak and the earlier mining operations.

The distributing point for this camp is the town of Haycock, on the north bank of Koyuk River, about 3 miles above the mouth of Dime Creek. Most of the supplies and mining outfits have so far been brought in by way of Golovin, on the east side of Golofnin Bay.

The pay streak is 2 miles or more in length, and the auriferous gravel lies in a deep bench channel. All the mining so far has been done by drifting. The gold on Dime Creek is of remarkably high grade. One assay shows a fineness of 957 parts gold and 38 parts silver, which gives a value of $19.80 an ounce. Another assay is known to have shown a value of $19.77 an ounce, and a third a value of $19.84. With the exception of some of the Koyukuk gold, this is probably the highest grade gold found so far in Alaska. Dime Creek is also of interest on account of the occurrence of placer platinum with the gold.

It is estimated that the deep mines of Seward Peninsula produced during 1916 gold with a total value of about $528,000, of which more than $100,000 was taken from the deep mines on Dime Creek during the winter. In all, about 157,000 cubic yards of gravel was handled.

[1] Brooks, A. H., The Alaska mining industry in 1915: U. S. Geol. Survey Bull. 642, p. 70, 1916.

OPEN-CUT WORK.

In all 62 open-cut mines, at 11 of which the hydraulic giant was used, were operated during the summer of 1916 on bench, creek, and beach gravels. The distribution of these mines, so far as known, is as follows:

Open-cut mines on Seward Peninsula, 1916.

Nome district:	
Nome Beach	10
Anvil Creek	2
Dexter Creek	1
McDougall Creek	1
Buster Creek	3
Twin Mountain Creek	2
Coffee Creek	1
Hazel Gulch	1
Moss Gulch	1
Oregon Creek	3
Glacier Creek	2
Wonder Creek	1
Rock Creek	1
Grass Gulch	1
Bangor Creek	2
Derby Creek	1
Willow Creek	1
Osborne Creek	1
	35
Solomon district:	
Casadepaga River	2
Moonlight Creek	1
Silver Bow Creek	1
Problem Creek	1
Solomon district—Continued.	
Daniels Creek	1
Big Hurrah Creek	1
	7
Council district	1
Kougarok district:	
Macklin Creek	3
Dick Creek	1
Kougarok River	2
Harris Creek	1
Miscellaneous	3
	10
Fairhaven district:	
Candle Creek	3
Bear Creek	2
Inmachuk River	1
	6
Port Clarence district:	
Dahl Creek	2
Gold Run	1
	3

Besides these, hydraulic elevators were at work at the following localities: Little Creek, 5; Boulder Creek, 1; Inmachuk River, 2; Ophir Creek, 2.

It is estimated that the open-cut placer mines handled 723,000 cubic yards of gravel, producing gold to the value of $1,437,000. About half of this output, or about 25 per cent of the total gold output of Seward Peninsula, was recovered by the hydraulic elevators. This is due in large measure to the remarkable richness of the placers on Little Creek. About 400 men were employed in the open-cut mines.

PRODUCTION.

In all, about 150 gold placer mines and 27 gold dredges were operated on Seward Peninsula in 1916. About 1,230 men were at work at these plants. The production of gold for the year is esti-

mated to be $2,950,000, practically all of which was taken from the placers.

Gold and silver produced on Seward Peninsula, 1897–1916.

Year.	Gold.		Silver.	
	Quantity (fine ounces).	Value.	Quantity (fine ounces).	Value.
1897	725.63	$15,000	87	$52
1898	3,628.12	75,000	435	256
1899	135,450.00	2,800,000	16,254	9,752
1900	229,781.25	4,750,000	27,574	17,097
1901	199,822.61	4,130,700	24,579	14,747
1902	220,677.07	4,561,800	26,481	14,035
1903	215,994.38	4,465,000	24,171	13,052
1904	201,462.52	4,164,600	24,175	14,021
1905	232,200.00	4,800,000	27,864	16,997
1906	352,812.50	7,500,000	43,537	29,605
1907	338,625.00	7,000,000	25,497	16,828
1908	247,680.00	5,120,000	20,577	10,905
1909	207,077.50	4,260,000	20,871	10,853
1910	169,312.50	3,500,000	20,317	10,971
1911	149,962.50	3,100,000	17,996	9,718
1912	145,125.00	3,000,000	17,415	10,710
1913	120,937.50	2,500,000	12,094	7,305
1914	130,612.50	2,700,000	15,673	8,667
1915	140,287.50	2,900,000	17,510	8,878
1916	142,706.25	2,950,000	14,271	9,391
	3,593,880.33	74,292,100	397,378	233,840

TIN.

Two tin dredges, belonging to the American Tin Dredging Co. and the York Tin Dredging Co., were operated in the York district in 1916. The former was working upstream on Buck Creek, and the latter was at the mouth of Buck Creek, working downstream into Grouse Creek. Both dredges worked all summer and are reported to have had a successful season.

TUNGSTEN.

The presence of scheelite (calcium tungstate) on Seward Peninsula has been known to the Geological Survey for many years. Moffit,[1] in his report on field work done in 1905 and 1906, referred to the presence of scheelite in the placers and quartz veins of Seward Peninsula as follows:

> Tungsten occurs in the Nome region in the form of scheelite, the tungstate of calcium. It is a heavy white mineral, and is found in many of the streams. Because of its weight it remains in the sluice boxes or pan and causes some trouble in cleaning the gold. Scheelite is also found associated with quartz in small veins in the schist, but its principal source is the gold-bearing gravel.

Within the last two years the high price of tungsten has rendered the recovery of scheelite profitable on the peninsula, and it is now possible that scheelite mining may become an established industry.

[1] Moffit, F. H., Geology of the Nome and Grand Central quadrangles, Alaska: U. S. Geol. Survey Bull. 533, p. 134, 1913.

The most extensive scheelite mining operations were carried on by the Pioneer Mining Co., on Sophie Gulch, an eastern tributary of Rock Creek. On the south side of Sophie Gulch, at an elevation of about 300 feet, a scheelite-bearing lode has been opened, and the decayed residual material was worked during the summer of 1916 by placer-mining methods. This lode and its mineralization will be described in a separate publication dealing with the tungsten resources of Alaska. Between 4,000 and 5,000 cubic yards of the shattered and weathered residual lode material has been removed by hydraulicking and run off into a narrow cut through sluice boxes. It is necessary, in this work, to clean up four times a day, on account of the amount of quartz and other rock handled and on account of the bulkiness of scheelite as compared with the precious metals. Naturally in such work a considerable amount of the scheelite is lost with the tailings, as the nozzle can break to pieces only the material that is much weathered and disintegrated. To remedy this loss, the owners are contemplating the installation of a plant to mill the lode material before sluicing. Mining on the Sophie lode had been in progress for six weeks at the time of the writer's visit, October 7, and it is reported that the lateness of the fall enabled the operators to continue work for two or three weeks longer. This mine produced a large part of the scheelite mined in Alaska in 1916.

Smaller lodes, essentially similar in character to the one above described, were worked in a small way by the Pioneer Mining Co. Thus, on Twin Mountain Creek, on a right-hand bench claim opposite claim No. 4 above Discovery, about 500 pounds of scheelite was said to have been sluiced from a weathered lode. Likewise the Lynx claim, on the north side of Glacier Creek, just above the Guinan & Ames dredge, was worked by the same company. At this locality a shaft was sunk 60 feet, and the lode material, consisting of scheelite, quartz, and iron-stained schist, was raised to the surface and sluiced. It is reported that about 600 pounds of scheelite was recovered.

Another small lode of similar character, on the Glacier-Rock Creek divide, was prospected by Stipek & Kotovic and found to carry scheelite.

Placer-mining operations for scheelite were also carried on by the Pioneer Mining Co, and by J. Warren and partners on Rock Creek. The Warren party operated on claim No. 2 above Discovery.

The Guinan & Ames dredge, operating on Glacier Creek, saved the scheelite from the concentrates taken with the gold in 1916, and another dredge on Sunset Creek, in the Port Clarence district, is reported to be planning to do the same. Other gold placer operators are also beginning to save the scheelite from their concentrates.

PLATINUM.

Placer platinum was found in the gold placers on Dime Creek, in the Koyuk basin, in 1916. It was reported to the writer that the platinum is present in the gravels on Greenstone Creek, a tributary of Dime Creek, and also on Dime Creek below the mouth of Greenstone Creek. This metal in commercial amount has been recovered by at least two operators, and probably also by others. An analysis of some of the platinum from Dime Creek, made in the chemical laboratory of the Geological Survey by R. C. Wells, showed that the material submitted contained 71.5 per cent of platinum. The analysis showed also 11.5 per cent of silver, lead, and gold, which was probably due in large measure to fine gold in the sample. On recalculation exclusive of these elements the platinum appears to be 81 per cent fine. The impurities in the alloy are iron, iridium, osmium, palladium, and copper, named in their order of relative abundance.

Placer platinum was also discovered in 1916 on Bear Creek, in the Fairhaven district, about 35 miles in an air line north of Dime Creek. The details of this discovery are not yet known, but returns from the placer operators show that at least one operator on Bear Creek has recovered platinum in the gold placers.

INDEX.

RECENT SURVEY PUBLICATIONS ON ALASKA.

[Arranged geographically. A complete list can be had on application.]

All these publications can be obtained or consulted in the following ways:

1. A limited number are delivered to the Director of the Survey, from whom they can be obtained free of charge (except certain maps) on application.

2. A certain number are delivered to Senators and Representatives in Congress for distribution.

3. Other copies are deposited with the Superintendent of Documents, Washington, D. C., from whom they can be had at prices slightly above cost. The publications marked with an asterisk (*) in this list are out of stock at the Survey, but can be purchased from the Superintendent of Documents at the prices stated.

4. Copies of all Government publications are furnished to the principal public libraries throughout the United States, where they can be consulted by those interested.

The maps whose price is stated are sold by the Geological Survey and not by the Superintendent of Documents. On an order amounting to $5 or more at the retail price a discount of 40 per cent is allowed.

GENERAL.

REPORTS.

*The geography and geology of Alaska, a summary of existing knowledge, by A. H. Brooks, with a section on climate, by Cleveland Abbe, jr., and a topographic map and description thereof, by R. U. Goode. Professional Paper 45, 1906, 327 pp. No copies available. May be consulted at many public libraries.

Placer mining in Alaska in 1904, by A. H. Brooks. In Bulletin 259, 1905, pp. 18–31.

The mining industry in 1905, by A. H. Brooks. In Bulletin 284, 1906, pp. 4–9.

*The mining industry in 1906, by A. H. Brooks. In Bulletin 314, 1907, pp. 19–39. 30 cents.

*The mining industry in 1907, by A. H. Brooks. In Bulletin 345, 1908, pp. 30–53. 45 cents.

*The mining industry in 1908, by A. H. Brooks. In Bulletin 379, 1909, pp. 21–62. 50 cents.

The mining industry in 1909, by A. H. Brooks. In Bulletin 442, 1910, pp. 20–46.

The mining industry in 1910, by A. H. Brooks. In Bulletin 480, 1911, pp. 21–42.

The mining industry in 1911, by A. H. Brooks. In Bulletin 520, 1912, pp. 19–44. 50 cents.

The mining industry in 1912, by A. H. Brooks. In Bulletin 542, 1913, pp. 18–51.

*The Alaskan mining industry in 1913, by A. H. Brooks. In Bulletin 592, 1914, pp. 45–74. 60 cents.

The Alaskan mining industry in 1914, by A. H. Brooks. In Bulletin 622, 1915, pp. 15–68.

The Alaskan mining industry in 1915, by A. H. Brooks. In Bulletin 642, 1916, pp. 17–72.

The Alaskan mining industry in 1916, by A. H. Brooks. In Bulletin 662, 1917, pp. 11–62.

Railway routes, by A. H. Brooks. In Bulletin 284, 1906, pp. 10–17.

Railway routes from the Pacific seaboard to Fairbanks, Alaska, by A. H. Brooks. In Bulletin 520, 1912, pp. 45–88.

*Geologic features of Alaskan metalliferous lodes, by A. H. Brooks. In Bulletin 480, 1911, pp. 43–93.

*The mineral deposits of Alaska, by A. H. Brooks. In Bulletin 592, 1914, pp. 18–44.

*The future of gold placer mining in Alaska, by A. H. Brooks. In Bulletin 622, 1915, pp. 69–79.

*The petroleum fields of the Pacific coast of Alaska, with an account of the Bering River coal deposits, by G. C. Martin. Bulletin 250, 1905, 64 pp. 15 cents.

Alaska coal and its utilization, by A. H. Brooks. Bulletin 442–J, reprinted 1914.

*The possible use of peat fuel in Alaska, by C. A. Davis. In Bulletin 379, 1909, pp. 63–66. 50 cents.

The preparation and use of peat as a fuel, by C. A. Davis. In Bulletin 442, 1910, pp. 101–132.

*Methods and costs of gravel and placer mining in Alaska, by C. W. Purington. Bulletin 263, 1905, 362 pp. No copies available. (Abstract in Bulletin 259, 1905, pp. 32–46.)

*Geographic dictionary of Alaska, by Marcus Baker; second edition prepared by James McCormick. Bulletin 299, 1906, 690 pp. 50 cents.

Tin mining in Alaska, by H. M. Eakin. In Bulletin 622, 1915, pp. 81–94.

Antimony deposits of Alaska, by A. H. Brooks. Bulletin 649, 1916, 67 pp.

The use of the panoramic camera in topographic surveying, by J. W. Bagley. Bulletin 657, 1917, 88 pp.

The mineral springs of Alaska, by G. A. Waring. Water-Supply Paper 418, 1917, 114 pp.

TOPOGRAPHIC MAPS.

Map of Alaska (A); scale 1 : 5,000,000; 1911, by A. H. Brooks. 20 cents retail or 12 cents wholesale.

Map of Alaska (B); scale 1 : 1,500,000; 1915, by A. H. Brooks and R. H. Sargent. 80 cents retail or 48 cents wholesale.

Map of Alaska (C); scale 1 : 1.,000,000; 1916. 1 cent retail or five for 3 cents wholesale.

Map of Alaska showing distribution of mineral deposits; scale 1 : 5,000,000; 1909, by A. H. Brooks. 20 cents retail or 12 cents wholesale. New editions included in Bulletins 642 and 662.

Index map of Alaska, including list of publications; scale 1 : 5,000,000; by A. H. Brooks. Free.

SOUTHEASTERN ALASKA.

REPORTS.

*The Porcupine placer district, Alaska, by C. W. Wright. Bulletin 236, 1904, 35 pp. 15 cents.

Economic developments in southeastern Alaska, by F. E. and C. W. Wright. In Bulletin 259, 1905, pp. 47–68.

*The Juneau gold belt, Alaska, by A. C. Spencer, pp. 1–137, and A reconnaissance of Admiralty Island, Alaska, by C. W. Wright, pp. 138–154. Bulletin 287, 1906, 161 pp. 75 cents.

Lode mining in southeastern Alaska, by F. E. and C. W. Wright. In Bulletin 284, 1906, pp. 30–53.

Nonmetallic deposits of southeastern Alaska, by C. W. Wright. In Bulletin 284, 1906, pp. 54–60.

Lode mining in southeastern Alaska, by C. W. Wright. In Bulletin 314, 1907, pp. 47–72.

Nonmetalliferous mineral resources of southeastern Alaska, by C. W. Wright. In Bulletin 314, 1907, pp. 73–81.

Reconnaissance on the Pacific coast from Yakutat to Alsek River, by Eliot Blackwelder. In Bulletin 314, 1907, pp. 82–88.

*Lode mining in southeastern Alaska, 1907, by C. W. Wright. In Bulletin 345, 1908, pp. 78–97. 45 cents.

*The building stones and materials of southeastern Alaska, by C. W. Wright. In Bulletin 345, 1908, pp. 116–126. 45 cents.

*The Ketchikan and Wrangell mining districts, Alaska, by F. E. and C. W. Wright. Bulletin 347, 1908, 210 pp. 60 cents.

*The Yakutat Bay region, Alaska; Physiography and glacial geology, by R. S. Tarr; Areal geology, by R. S. Tarr and B. S. Butler. Professional Paper 64, 1909, 186 pp. 50 cents.

*Mining in southeastern Alaska, by C. W. Wright. In Bulletin 379, 1909, pp. 67–86. 50 cents.

Mining in southeastern Alaska, by Adolph Knopf. In Bulletin 442, 1910, pp. 133–143.

Occurrence of iron ore near Haines, by Adolph Knopf. In Bulletin 442, 1910, pp. 144–146.

Geology of the Berners Bay region, Alaska, by Adolph Knopf. Bulletin 446, 1911, 58 pp.

Mining in southeastern Alaska, by Adolph Knopf. In Bulletin 480, 1911, pp. 94–102.

The Eagle River region, southeastern Alaska, by Adolph Knopf. Bulletin 502, 1912, 61 pp.

The Sitka mining district, Alaska, by Adolph Knopf. Bulletin 504, 1912, 32 pp.

The earthquakes at Yakutat Bay, Alaska, in September, 1899, by R. S. Tarr and Lawrence Martin, with a preface by G. K. Gilbert. Professional Paper 69, 1912, 135 pp.

Marble resources of Ketchikan and Wrangell districts, by E. F. Burchard. In Bulletin 542, 1913, pp. 52–77.

Marble resources of the Juneau, Skagway, and Sitka districts, by E. F. Burchard. In Bulletin 592, 1914, pp. 95–107.

A barite deposit near Wrangell, by E. F. Burchard. In Bulletin 592, 1914, pp. 109–117.

*Lode mining in the Ketchikan district, by P. S. Smith. In Bulletin 592, 1914, pp. 75–94. 60 cents.

The geology and ore deposits of Copper Mountain and Kasaan Peninsula, Alaska, by C. W. Wright. Professional Paper 87, 1915, 110 pp.

Mining in the Juneau region, by H. M. Eakin. In Bulletin 622, 1915, pp. 95–102.

Mining in southeastern Alaska, by Theodore Chapin. In Bulletin 642, 1916, pp. 73–104.

Water-power investigations in southeastern Alaska, by G. H. Canfield. In Bulletin 642, 1916, pp. 105–127.

Mining developments in the Ketchikan and Wrangell districts, by Theodore Chapin. In Bulletin 662, 1917, pp. 63–75.

Lode mining in the Juneau gold belt, by H. M. Eakin. In Bulletin 662, 1917, pp. 71–92.

Gold placer mining in the Porcupine district, by H. M. Eakin. In Bulletin 662, 1917, pp. 93–100.

Water-power Investigations in southeastern Alaska, by G. H. Canfield. In Bulletin 662, 1917, pp. 101–154.

In preparation.

Marble deposits of southeastern Alaska, by E. F. Burchard. Bulletin 682.

The Porcupine district, by H. M. Eakin.

The Juneau district, by A. C. Spencer and H. M. Eakin.

TOPOGRAPHIC MAPS.

*Juneau gold belt, Alaska; scale, 1:250,000; compiled. In *Bulletin 287. 75 cents. Not issued separately.

Juneau special (No. 581A); scale, 1:62,500; by W. J. Peters. 10 cents retail or 6 cents wholesale.

Berners Bay special (No. 581B); scale, 1:62,500; by R. B. Oliver. 10 cents retail or 6 cents wholesale.

Kasaan Peninsula, Prince of Wales Island (No. 540A); scale, 1:62,500; by D. C. Witherspoon, R. H. Sargent, and J. W. Bagley. 10 cents retail or 6 cents wholesale. Also contained in Professional Paper 87.

Copper Mountain and vicinity, Prince of Wales Island (No. 540B); scale, 1:62,500; by R. H. Sargent. 10 cents retail or 6 cents wholesale. Also contained in Professional Paper 87.

Eagle River region (No. 581C); scale, 1:62,500; by J. W. Bagley, C. E. Giffin, and R. E. Johnson. In Bulletin 502. Not issued separately.

In preparation.

Juneau and vicinity (No. 581D); scale, 1:24,000; by D. C. Witherspoon.

CONTROLLER BAY, PRINCE WILLIAM SOUND, AND COPPER RIVER REGIONS.

REPORTS.

*Geology and mineral resources of Controller Bay region, Alaska, by G. C. Martin. Bulletin 335, 1908, 141 pp. 70 cents.

*Notes on copper prospects of Prince William Sound, by F. H. Moffit. In Bulletin 345, 1908, pp. 176–178. 45 cents.

Mineral resources of the Kotsina-Chitina region, by F. H. Moffit and A. G. Maddren. Bulletin 374, 1909, 103 pp.

*Copper mining and prospecting on Prince William Sound, by U. S. Grant and D. F. Higgins, jr. In Bulletin 379, 1909, pp. 78–96. 50 cents.

*Gold on Prince William Sound, by U. S. Grant. In Bulletin 379, 1909, p. 97. 50 cents.

Mining in the Kotsina-Chitina, Chistochina, and Valdez Creek regions, by F. H. Moffit. In Bulletin 379, 1909, pp. 153–160.

Mineral resources of the Nabesna-White River district, by F. H. Moffit and Adolph Knopf; with a section on the Quaternary, by S. R. Capps. Bulletin 417, 1910, 64 pp.

Mining in the Chitina district, by F. H. Moffit. In Bulletin 442, 1910, pp. 158–163.

Mining and prospecting on Prince William Sound in 1909, by U. S. Grant. In Bulletin 442, 1910, pp. 164–165.

Reconnaissance of the geology and mineral resources of Prince William Sound, Alaska, by U. S. Grant and D. F. Higgins. Bulletin 443, 1910, 89 pp.

Geology and mineral resources of the Nizina district, Alaska, by F. H. Moffit and S. R. Capps. Bulletin 448, 1911, 111 pp.

Headwater regions of Gulkana and Susitna rivers, Alaska, with accounts of the Valdez Creek and Chistochina placer districts, by F. H. Moffit. Bulletin 498, 1912, 82 pp.

*The Chitina district, by F. H. Moffit. In Bulletin 520, 1912, pp. 105–107. 50 cents.

Coastal glaciers of Prince William Sound and Kenai Peninsula, Alaska, by U. S. Grant and D. F. Higgins. Bulletin 526, 1913, 75 pp.

The McKinley Lake district, by Theodore Chapin. In Bulletin 542, 1913, pp. 78–80.

Mining in Chitina Valley, by F. H. Moffit. In Bulletin 542, 1913, pp. 81–85.

Mineral deposits of the Ellamar district, by S. R. Capps and B. L. Johnson. In Bulletin 542, 1913, pp. 86–124.

The mineral deposits of the Yakataga region, by A. G. Maddren. In Bulletin 592, 1914, pp. 119–154.

The Port Wells gold-lode district, by B. L. Johnson. In Bulletin 592, 1914, pp. 195–236.

Mining on Prince William Sound, by B. L. Johnson. In Bulletin 592, 1914, pp. 237–244.

Geology of the Hanagita-Bremner region, by F. H. Moffit. Bulletin 576, 1915, 56 pp.

The geology and mineral resources of Kenai Peninsula, by G. C. Martin, B. L. Johnson, and U. S. Grant. Bulletin 587, 1915, 243 pp.

Mineral deposits of the Kotsina-Kuskulana district, with notes on mining in Chitina Valley, by F. H. Moffit. In Bulletin 622, 1915, pp. 103–117.

Auriferous gravels of the Nelchina-Susitna region, by Theodore Chapin. In Bulletin 622, 1915, pp. 118–130.

Mining on Prince William Sound, by B. L. Johnson. In Bulletin 622, 1915, pp. 131–139.

The gold and copper deposits of the Port Valdez district, by B. L. Johnson. In Bulletin 622, 1915, pp. 140–188.

The Ellamar district, by S. R. Capps and B. L. Johnson. Bulletin 605, 125 pp.

A water-power reconnaissance in south-central Alaska, by C. E. Ellsworth and R. W. Davenport. Water-Supply Paper 372, 173 pp.

Mineral resources of the upper Chitina Valley, by F. H. Moffit. In Bulletin 642, 1916, pp. 129–136.

Mining on Prince William Sound, by B. L. Johnson. In Bulletin 642, 1916, pp. 137–145.

Mining in the lower Copper River basin, by F. H. Moffit. In Bulletin 662, 1917, pp. 155–182.

Mining on Prince William Sound, by B. L. Johnson. In Bulletin 662, 1917, pp. 183–192.

Copper deposits of the Latouche and Knight Island districts, Prince William Sound, by B. L. Johnson. In Bulletin 662, 1917, pp. 193–220.

In press.

The Nelchina-Susitna region, by Theodore Chapin. Bulletin 668.

The upper Chitina Valley, by F. H. Moffit. Bulletin 675.

In preparation.

The Kotsina-Kuskulana district, by F. H. Moffit.

The Valdez district, by B. L. Johnson.

TOPOGRAPHIC MAPS.

Central Copper River region; reconnaissance map; scale, 1:250,000; by T. G. Gerdine In *Professional Paper 41. 50 cents. Not issued separately.

Headwater regions of Copper, Nabesna, and Chisana rivers; reconnaissance map; scale, 1:250,000; by D. C. Witherspoon, T. G. Gerdine, and W. J. Peters. In *Professional Paper 41. 50 cents. Not issued separately.

Controller Bay region (No. 601A); scale, 1:62,500; by E. G. Hamilton and W. R. Hill. 35 cents retail or 21 cents wholesale. Also published in *Bulletin 335. 70 cents.

Chitina quadrangle (No. 601); reconnaissance map; scale, 1:250,000; by T. G. Gerdine, D. C. Witherspoon, and others. 50 cents retail or 30 cents wholesale. Also published in Bulletin 576.

Nizina district (No. 601B); scale, 1:62,500; by D. C. Witherspoon and R. M. La Follette. In Bulletin 448. Not issued separately.

Headwater region of Gulkana and Susitna rivers; scale, 1:250,000; by D. C. Witherspoon, J. W. Bagley, and C. E. Giffin. In Bulletin 498. Not issued separately.

Prince William Sound; scale, 1:500,000; compiled. In Bulletin 526. Not issued separately.

Port Valdez district (No. 602B); scale, 1:62,500; by J. W. Bagley. 20 cents retail or 12 cents wholesale.

The Bering River coal fields; scale, 1:62,500; by G. C. Martin. 25 cents retail or 15 cents wholesale.

The Ellamar district (No. 602D); scale, 1:62,500; by R. H. Sargent and C. E. Giffin. Published in Bulletin 605. Not issued separately.

In preparation.

The Kotsina-Kuskulana district (No. 601C); scale, 1:62,500; by D. C. Witherspoon.

Nelchina-Susitna region; scale, 1:250,000; by J. W. Bagley, T. G. Gerdine, and others.

COOK INLET AND SUSITNA REGION.

REPORTS.

*Geologic reconnaissance in the Matanuska and Talkeetna basins, Alaska, by Sidney Paige and Adolph Knopf. Bulletin 327, 1907, 71 pp.

The Mount McKinley region, Alaska, by A. H. Brooks, with descriptions of the igneous rocks and of the Bonnifield and Kantishna districts, by L. M. Prindle. Professional Paper 70, 1911, 234 pp.

A geologic reconnaissance of the Iliamna region, Alaska, by G. C. Martin and F. J. Katz. Bulletin 485, 1912, 138 pp.

Geology and coal fields of the lower Matanuska Valley, Alaska, by G. C. Martin and F. J. Katz. Bulletin 500, 1912, 98 pp.

The Yentna district, Alaska, by S. R. Capps. Bulletin 534, 1913, 75 pp.

Gold lodes and placers of the Willow Creek district, by S. R. Capps. In Bulletin 592, 1914, pp. 245–272.

Mineral resources of the upper Matanuska and Nelchina valleys, by G. C. Martin and J. B. Mertie, jr. In Bulletin 592, 1914, pp. 273–300.

Mining in the Valdez Creek placer district, by F. H. Moffit. In Bulletin 592, 1914, pp. 307–308.

The geology and mineral resources of Kenai Peninsula, Alaska, by G. C. Martin, B. L. Johnson, and U. S. Grant. Bulletin 587, 1915, 243 pp.

The Willow Creek district, by S. R. Capps. Bulletin 607, 1915, 86 pp.

The Broad Pass region, by F. H. Moffit and J. E. Pogue. Bulletin 608, 1915, 80 pp.

The Turnagain-Knik region, by S. R. Capps. In Bulletin 642, 1916, pp. 147–194.

Gold mining in the Willow Creek district, by S. R. Capps. In Bulletin 642, 1916, pp. 195–200.

In press.

The Nelchina-Susitna region, by Theodore Chapin. Bulletin 668.

In preparation.

The geology of upper Matanuska basin, by G. C. Martin.

TOPOGRAPHIC MAPS.

Kenai Peninsula, southern portion; scale, 1:500,000; compiled. In Bulletin 526. Not issued separately.

Matanuska and Talkeetna region, reconnaissance map; scale, 1:250,000; by T. G. Gerdine and R. H. Sargent. In *Bulletin 327. 25 cents. Not issued separately.

Lower Matanuska Valley (602A); scale, 1:62,500; by R. H. Sargent. In Bulletin 500. Not issued separately.

Yentna district, reconnaissance map; scale, 1:250,000; by R. W. Porter. Revised edition. In Bulletin 534. Not issued separately.

Mount McKinley region, reconnaissance map; scale, 1:625,000; by D. L. Reaburn. In Professional Paper 70. Not issued separately.

Kenai Peninsula, reconnaissance map; scale, 1:250,000; by R. H. Sargent, J. W. Bagley, and others. In Bulletin 587. Not issued separately.

Moose Pass and vicinity (602C); scale, 1:62,500; by J. W. Bagley. In Bulletin 587. Not issued separately.

The Willow Creek district; scale, 1:62,500; by C. E. Giffin. In Bulletin 607. Not issued separately.

The Broad Pass region; scale, 1:250,000; by J. W. Bagley. In Bulletin 608. Not issued separately.

In preparation.

The Matanuska Valley; scale, 1:250,000; by R. H. Sargent and T. G. Gerdine.

Nelchina-Susitna region; scale, 1:250,000; by J. W. Bagley.

SOUTHWESTERN ALASKA.

REPORTS.

*A reconnaissance in southwestern Alaska, by J. E. Spurr. In Twentieth Annual Report, pt. 7, 1900, pp. 31–264. $1.80.

Gold mine on Unalaska Island, by A. J. Collier. In Bulletin 259, 1905, pp. 102–103.

Geology and mineral resources of parts of Alaska Peninsula, by W. W. Atwood. Bulletin 467, 1911, 137 pp.

A geologic reconnaissance of the Iliamna region, Alaska, by G. C. Martin and F. J. Katz. Bulletin 485, 1912, 138 pp.

Mineral deposits of Kodiak and the neighboring islands, by G. C. Martin. In Bulletin 542, 1913, pp. 125–136.

In press.

Lake Clark-Central Kuskokwim region, by P. S. Smith. Bulletin 655.

TOPOGRAPHIC MAPS.

Herendeen Bay and Unga Island region, reconnaissance map; scale, 1:250,000; by H. M. Eakin. In Bulletin 467. Not issued separately.

Chignik Bay region, reconnaissance map; scale, 1:250,000; by H. M. Eakin. In Bulletin 467. Not issued separately.

Iliamna region, reconnaissance map; scale, 1:250,000; by D. C. Witherspoon and C. E. Giffin. In Bulletin 485. Not issued separately.

*Kuskokwim River and Bristol Bay region; scale, 1:625,000; by W. S. Post. In Twentieth Annual Report, pt. 7. $1.80. Not issued separately.

In preparation.

Lake Clark-Central Kuskokwim region; scale, 1:250,000; by R. H. Sargent.

YUKON AND KUSKOKWIM BASINS.

REPORTS.

*The coal resources of the Yukon, Alaska, by A. J. Collier. Bulletin 218, 1903, 71 pp. 15 cents.

The Fortymile quadrangle, Yukon-Tanana region, Alaska, by L. M. Prindle. Bulletin 375, 1909, 52 pp.

Water-supply investigations in Yukon-Tanana region, Alaska, 1907–8 (Fairbanks, Circle, and Rampart districts), by C. C. Covert and C. E. Ellsworth. Water-Supply Paper 228, 1909, 108 pp.

Mineral resources of Nabesna-White River district, by F. H. Moffit and Adolph Knopf, with a section on the Quaternary by S. R. Capps. Bulletin 417, 1910, 64 pp.

Lode mining in the Fairbanks district, by J. B. Mertie, jr. In Bulletin 662, 1917, pp. 403–424.
Lode deposits near the Nenana coal field, by R. M. Overbeck. In Bulletin 662, 1917, pp. 351–362.
Gold placers of the Anvik-Andreafski region, by G. L. Harrington. In Bulletin 662, 1917, pp. 333–349.

In press.

The Lake Clark-Central Kuskokwim region, by P. S. Smith. Bulletin 655.
The Cosna-Nowitna region, by H. M. Eakin. Bulletin 667.

In preparation.

The Anvik-Andreafski region, by G. L. Harrington. Bulletin 683.
The Ruby-Kuskokwim region, by J. B. Mertie, jr., and G. L. Harrington.
The Lower Kuskokwim region, by A. G. Maddren.
The Kantishna district, by S. R. Capps.
The Nenana coal fields, by G. C. Martin.

TOPOGRAPHIC MAPS.

Circle quadrangle (No. 641); scale, 1:250,000; by T. G. Gerdine, D. C. Witherspoon, and others. 50 cents retail or 30 cents wholesale. Also in *Bulletin 295. 35 cents.
Fairbanks quadrangle (No. 642); scale, 1:250,000; by T. G. Gerdine, D. C. Witherspoon, R. B. Oliver, and J. W. Bagley. 50 cents retail or 30 cents wholesale. Also in *Bulletins 337 (25 cents) and 525.
Fortymile quadrangle (No. 640); scale, 1:250,000; by E. C. Barnard. 10 cents retail or 6 cents wholesale. Also in Bulletin 375.
Rampart quadrangle (No. 643); scale, 1:250,000; by D. C. Witherspoon and R. B. Oliver. 20 cents retail or 12 cents wholesale. Also in *Bulletin 337 (25 cents) and part in Bulletin 535.
Fairbanks special (No. 642A); scale, 1:62,500; by T. G. Gerdine and R. H. Sargent. 20 cents retail or 12 cents wholesale. Also in Bulletin 525.
Bonnifield region; scale 1:250,000; by J. W. Bagley, D. C. Witherspoon, and C. E. Giffin. In Bulletin 501. Not issued separately.
Iditarod-Ruby region, reconnaissance map; scale, 1:250,000; by C. G. Anderson, W. S. Post, and others. In Bulletin 578. Not issued separately.
Middle Kuskokwim and lower Yukon region; scale, 1:500,000; by C. G. Anderson, W. S. Post, and others. In Bulletin 578. Not issued separately.
Chisana-White River region; scale, 1:250,000; by C. E. Giffin and D. C. Witherspoon. In Bulletin 630. Not issued separately.
Yukon-Koyukuk region; scale, 1:500,000; by H. M. Eakin. In Bulletin 631. Not issued separately.

In preparation.

Lake Clark-Central Kuskokwim region; scale 1:250,000; by R. H. Sargent.
Lower Kuskokwim region; scale, 1:500,000; by A. G. Maddren.
Cosna-Nowitna region; scale, 1:250,000; by H. M. Eakin.
Ruby district; scale, 1:250,000; by C. E. Giffin and R. H. Sargent.
Innoko-Iditarod region; scale, 1:250,000, by R. H. Sargent and C. E. Giffin.
Marshall district; scale, 1:125,000; by R. H. Sargent.

SEWARD PENINSULA.

REPORTS.

The Fairhaven gold placers of Seward Peninsula, Alaska, by F. H. Moffit. Bulletin 247, 1905, 85 pp.
Gold mining on Seward Peninsula, by F. H. Moffit. In Bulletin 284, 1906, pp. 132–141.

The Kougarok region, by A. H. Brooks. In Bulletin 314, 1907, pp. 164–181.

Geology and mineral resources of Iron Creek, by P. S. Smith. In Bulletin 314, 1907, pp. 157–163.

The gold placers of parts of Seward Peninsula, Alaska, including the Nome, Council, Kougarok, Port Clarence, and Goodhope precincts, by A. J. Collier, F. L. Hess, P. S. Smith, and A. H. Brooks. Bulletin 328, 1908, 343 pp.

*Investigation of the mineral deposits of Seward Peninsula, by P. S. Smith. In Bulletin 345, 1908, pp. 206–250. 45 cents.

Geology of the Seward Peninsula tin deposits, by Adolph Knopf. Bulletin 358, 1908, 72 pp.

Recent developments in southern Seward Peninsula, by P. S. Smith. In Bulletin 379, 1909, pp. 267–301. 50 cents.

*The Iron Creek region, by P. S. Smith. In Bulletin 379, 1909, pp. 302–354. 50 cents.

*Mining in the Fairhaven district, by F. F. Henshaw. In Bulletin 379, 1909, pp. 355–369. 50 cents.

Geology and mineral resources of the Solomon and Casadepaga quadrangles, Seward Peninsula, Alaska, by P. S. Smith. Bulletin 433, 1910, 227 pp.

Mining in Seward Peninsula, by F. F. Henshaw. In Bulletin 442, 1910, pp. 353–371.

A geologic reconnaissance in southeastern Seward Peninsula and the Norton Bay-Nulato region, by P. S. Smith and H. M. Eakin. Bulletin 449, 1911, 146 pp.

Notes on mining in Seward Peninsula, by P. S. Smith. In Bulletin 520, 1912, pp. 339–344.

Geology of the Nome and Grand Central quadrangles, Alaska, by F. H. Moffit. Bulletin 533, 1913, 140 pp.

*Surface water supply of Seward Peninsula, Alaska, by F. F. Henshaw and G. L. Parker, with a sketch of the geography and geology by P. S. Smith and a description of methods of placer mining by A. H. Brooks; including topographic reconnaissance map. Water-Supply Paper 314, 1913, 317 pp. 45 cents.

*Placer mining on Seward Peninsula, by Theodore Chapin. In Bulletin 592, 1914, pp. 385–396. 60 cents.

*Lode developments on Seward Peninsula, by Theodore Chapin. In Bulletin 592, 1914, pp. 397–407. 60 cents.

Iron-ore deposits near Nome, by H. M. Eakin. In Bulletin 622, 1915, pp. 361–365.

Placer mining in Seward Peninsula, by H. M. Eakin. In Bulletin 622, 1915, pp. 366–373.

Lode mining and prospecting on Seward Peninsula, by J. B. Mertie. jr. In Bulletin 662, 1917, pp. 425–449.

Placer mining on Seward Peninsula, by J. B. Mertie, jr. In Bulletin 662, 1917, pp. 451–458.

TOPOGRAPHIC MAPS.

Seward Peninsula, compiled from work of D. C. Witherspoon, T. G. Gerdine, and others, of the Geological Survey, and all available sources; scale, 1:500,000. In Water-Supply Paper 314. Not issued separately.

Seward Peninsula, northeastern portion, reconnaissance map (No. 655); scale, 1:250,000; by D. C. Witherspoon and C. E. Hill. 50 cents retail or 30 cents wholesale. Also in Bulletin 247.

Seward Peninsula, northwestern portion, reconnaissance map (No. 657); scale, 1:250,000; by T. G. Gerdine and D. C. Witherspoon. 50 cents retail or 30 cents wholesale. Also in Bulletin 328.

Seward Peninsula, southern portion, reconnaissance map (No. 656); scale, 1:250,000; by E. C. Barnard, T. G. Gerdine, and others. 50 cents retail or 30 cents wholesale. Also in Bulletin 328.

Seward Peninsula, southeastern portion, reconnaissance map (Nos. 655–656); scale, 1:250,000; by E. C. Barnard, D. L. Reaburn, H. M. Eakin, and others. In Bulletin 449. Not issued separately.

Nulato-Norton Bay region; scale, 1:500,000; by P. S. Smith, H. M. Eakin and others. In Bulletin 449. Not issued separately.

Grand Central quadrangle (No. 646A); scale, 1:62,500; by T. G. Gerdine, R. B. Oliver, and W. R. Hill. 10 cents retail or 6 cents wholesale. Also in Bulletin 533.

Nome quadrangle (No. 646B); scale, 1:62,500; by T. G. Gerdine, R. B. Oliver, and W. R. Hill. 10 cents retail or 6 cents wholesale. Also in Bulletin 533.

Casadepaga quadrangle (No. 646C); scale, 1:62,500; by T. G. Gerdine, W. B. Corse, and B. A. Yoder. 10 cents retail or 6 cents wholesale. Also in Bulletin 433.

Solomon quadrangle (No. 646D); scale, 1:62,500; by T. G. Gerdine, W. B. Corse, and B. A. Yoder. 10 cents retail or 6 cents wholesale. Also in Bulletin 433.

NORTHERN ALASKA.

REPORTS.

*A reconnaissance in northern Alaska across the Rocky Mountains, along Koyukuk, John, Anaktuvuk, and Colville rivers and the Arctic coast to Cape Lisburne in 1901, by F. C. Schrader, with notes by W. J. Peters. Professional Paper 20, 1904, 139 pp. 40 cents.

*Geology and coal resources of the Cape Lisburne region, Alaska, by A. J. Collier. Bulletin 278, 1906, 54 pp. 15 cents.

Geologic investigations along the Canada-Alaska boundary, by A. G. Maddren. In Bulletin 520, 1912, pp. 297–314.

The Noatak-Kobuk region, by P. S. Smith. Bulletin 536, 1913, 160 pp.

The Koyukuk-Chandalar region, Alaska, by A. G. Maddren. Bulletin 532, 1913, 119 pp.

In press.

The Canning River region of northern Alaska, by E. de K. Leffingwell. Professional Paper, 109.

TOPOGRAPHIC MAPS.

*Koyukuk River to mouth of Colville River, including John River; scale, 1:1,250,000; by W. J. Peters. In *Professional Paper 20. 40 cents. Not issued separately.

Koyukuk and Chandalar region, reconnaissance map; scale, 1:500,000; by T. G. Gerdine, D. L. Reaburn, D. C. Witherspoon, and A. G. Maddren. In Bulletin 532. Not issued separately.

Noatak-Kobuk region; scale, 1:500,000; by C. E. Giffin, D. L. Reaburn, H. M. Eakin, and others. In Bulletin 536. Not issued separately.

In preparation.

Canning River region; scale, 1:250,000; by E. de K. Leffingwell.

North Arctic coast; scale, 1:500,000; by E. de K. Leffingwell.

Martin Point to Thetis Island; scale, 1:125,000; by E. de K. Leffingwell.

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