IRON-ORE DEPOSITS NEAR NOME.

By HENRY M. EAKIN.

INTRODUCTION.

Considerable local interest has long attached to deposits of iron ore in an area that centers about 25 miles northwest of Nome. A day was spent at this locality by the writer in July, 1914, and some of the more important properties were hastily examined. No previous study of the deposits had been made by the Survey.

GEOGRAPHY.

Five groups of claims are held in the iron-bearing district. Three of these—the Mogul, Monarch, and Galena groups—are on the height of land between Sinuk River and Washington Creek, a south tributary of the Sinuk. The American group, comprising four claims, is west of Sinuk River below American Creek, and the Cub Bear group, also of four claims, crosses the divide between Washington Creek and Cripple River. Heavily iron-stained blossom occurs at half a dozen other places in the same general area.

The Monarch group was reached easily in a day's travel on horseback from Nome, the route followed being along the beach to Penny River, up this stream to Willow Creek, and thence northward across the heads of Arctic Creek, Cripple River, and Washington Creek. There is no definite trail to follow beyond Arctic Creek, but the country is open and easily traversed.

The immediate vicinity of the principal properties has a sharp topographic relief of 800 to 1,000 feet. The valleys are fairly broad, but the interstream ridges are generally steep sided and more or less broken along their summits. Timber is absent, and the rocks are well exposed on all the higher features.

Those interested in the iron ores have proposed the construction of a railroad from the vicinity of the properties to the coast along the Sinuk River valley. The route is apparently practicable and would give a down grade all the way to the coast, a distance of about 14 miles.

GEOLOGY.

The bedrock of the iron-bearing area consists chiefly of the several formations of the Nome group,[1] including the Port Clarence limestone and other limestones, schists, and slates of early Paleozoic age. The iron-ore deposits are chiefly in limestone areas that were mapped by Collier[2] with the undifferentiated members of the group. There is a small area of Tertiary sedimentary rocks, including thin coal seams, on Coal Creek, a west tributary of Sinuk River about 3 miles west of the Monarch group of claims.

The valleys are floored with alluvium, part of which is of glacial origin. Gravel beds and erratic bowlders are widely distributed at elevations up to 1,000 feet above sea level. The aggregate area covered by high-level gravel beds, however, is not large.

The iron-ore deposits consist of limonite veins and stockworks and their residual products. Hematite, galena, pyrolusite, and small quantities of gold also occur as accessories in some of the lodes. The examination was too brief to permit detailed studies, but the general impression gained is that there had been strong mineralization at certain localities, and that the mineralizing agencies had affected a considerable area. The following brief notes will serve to indicate the character of the ores at several localities.

CLAIMS.

MONARCH GROUP.

The Monarch group, including 14 claims, or about 300 acres, lies on the limestone ridge that trends eastward between Sinuk River and Washington Creek. It covers the ridge top for about 3,000 feet and extends laterally for over a mile. Within this property the ridge crest is broken by two gaps at an elevation of about 1,000 feet above sea level, in which are the chief deposits of iron ore. Elsewhere the limestone is more or less iron-stained and may contain small ore veinlets, but the average iron content of the limestone mass may be too low to permit its being classed as ore.

The east gap is mantled by a heavy residual deposit of limonite and hematite, derived from the weathering of unusually abundant ore veins that cut the underlying limestones. The residual ores have also slumped down into the head of the gulch that leads northward from the gap, where they occur in considerable amounts. The veins in bedrock beneath the gap are apparently numerous, and range in width from a few inches to about 30 feet. They are approximately

[1] Collier, A. J., and others, The gold placers of parts of Seward Peninsula, Alaska: U. S. Geol. Survey Bull. 328, 1908.

[2] Idem, pl. 10.

vertical, but their persistence, either vertically or horizontally, is not determinable from the exposures.

In the west gap there is no important accumulation of residual ore. The underlying limestone is cut, however, by a wide stockwork of limonite and pyrolusite veinlets. No heavy veins were seen at this locality.

The residual deposits of the east gap have been developed over an area approximately 600 by 800 feet, in open cuts that range from a few yards to several hundred feet in length. A shallow shaft and a short drift have been driven into the deposit in the head of the northerly gulch, 50 feet below the gap level. An open cut at the south margin of the gap has uncovered a mass of undisturbed limonite, apparently a vein 30 feet in width, cutting the limestone country rock.

In the west gap several short open cuts have been made in loosened bedrock material which contains numerous veinlets of limonite and pyrolusite. Elsewhere on the claims the iron-stained limestone detritus has been thrown out of open cuts without revealing any high-grade ores.

The residual ore of the east gap has a loose granular texture and a high iron content, and is unusually free from injurious impurities. Two samples taken by the writer, one from an open cut at the east margin of the deposit and the other a composite sample from a line of open cuts 400 feet long across its center, were found to contain 53 and 55 per cent of metallic iron, respectively. The complete analysis of the composite sample, which is probably fairly representative of the whole deposit, is as follows:

Analysis of composite sample of iron ore from Monarch group of claims.

[Analyst, R. C. Wells, United States Geological Survey.]

SiO_2	5.53	TiO_2	None.
Al_2O_3	1.34	P_2O_5	.13
Fe_2O_3	78.30	S	Trace.
MgO	.10	MnO	1.37
CaO	1.97	BaO	Trace.
H_2O	10.40		
CO_2	1.10		100.24

The iron, manganese, phosphorus, and sulphur contents of the ore, calculated from this analysis, are as follows: Fe, 54.81; Mn, 1.06; P, 0.057; S, trace.

No samples were obtained from the veins from which this residual material has been derived. The character of the ores in the undisturbed veins was therefore not determined.

Only qualitative analyses of samples taken from the west gap were made. They contain limonite and pyrolusite in about equal amount.

The veinlets appear to comprise only a small part of the general mass of the stockwork, so that the iron and manganese content of minable material is probably not high.

The development work done so far on the Monarch property has failed to furnish an adequate basis for estimating the quantity of ore available in either the residual deposits or the underlying veins. The size and extent of the veins for the most part can only be conjectured. The area of the residual deposits is fairly well outlined, but their depths have not been generally demonstrated. However, it seems certain that the residual high-grade ores aggregate at least several hundred thousand tons. Apparently they cover an area 600 by 800 feet to a depth of several feet. In places shafts 12 feet deep are said to have been sunk in ore. Although ore occurs in the head of the northerly gulch 50 feet or more below the level of the east gap, it is unsafe to assume that the divide is underlain by ore to this depth, for this ore is apparently not in place, but has slumped down into the head of the gulch from the gap above. Obviously additional prospecting will be required to determine accurately the reserves of high-grade residual ores and to demonstrate the availability of the undisturbed vein ores. The stockwork of the west gap will also require careful investigation to determine its value. The relatively high manganese content of the veinlets and the reported association of gold with the manganese strengthens the possibility that this deposit may prove of commercial value.

The limestones on the property away from the gaps contain from 5 to 40 per cent of iron. The average content is probably nearer the lower figure, and if this proves true it seems doubtful that much of this material can be considered as commercial ore.

MOGUL GROUP.

The Mogul property consists of four claims situated on the Sinuk River and Washington Creek divide about 1½ miles east of the Monarch property. No development work has been done here, the locations being made on the strength of a few acres of the blossom of ore veins that cut the limestones locally. Evidence of the veins is found in heavily iron-stained limestone detritus that has a scant admixture of limonite nodules and vein fragments. There is little evidence as to the size and extent of the veins or the possibilities of commercial development.

GALENA GROUP.

The Galena group, which was not visited by the writer, consists of nine claims situated 2 miles southwest of the Monarch property. Several open cuts, shafts, and short drifts are reported to have been

made on the property, uncovering a number of veins and small stockworks bearing limonite and galena. No large bodies of ore are reported to have been developed up to midsummer, 1914, but sufficient encouragement had been given by the findings to stimulate further development work, which was then in progress.

AMERICAN GROUP.

The American group includes four claims situated at the base of a limestone ridge west of Sinuk River, below American Creek, 2 miles northwest of the Monarch property. The locations are said to cover an "iron-ore bed" over 50 acres in extent. The only development work done consists of a few pits 6 to 8 feet deep, and no analyses have been made of the ore. The locality was not visited by the writer.

CUB BEAR GROUP.

The Cub Bear group includes four claims located end to end along the croppings of iron-ore veins cutting across the limestone ridge between Washington Creek and Cripple River. The blossom of the veins, where it shows through the vegetation at intervals, consists of the usual iron-stained limestone detritus mixed with limonite nodules and vein fragments. A few shallow pits have been dug, revealing limonite-hematite veins as much as several feet in width. Large blocks of ore taken from some of the pits exhibit botryoidal and mammillary forms and fibrous texture and are essentially pure limonite with possibly a very little accessory hematite. No estimate of the amount of ore in the deposit or of its availability for mining is possible at the present stage of development.

PLACER MINING IN SEWARD PENINSULA.

By HENRY M. EAKIN.

GENERAL PROGRESS.

The chief progress made in the placer-mining industry in Seward Peninsula in 1914 consisted in further consolidation of properties for new dredging ventures, the financing of additional mining concerns, the construction of new dredges, and a general improvement in the success of dredging operations. Forty dredges (including one tin dredge), with an aggregate daily capacity of 42,000 cubic yards, operated for all or a part of the open season in 1914, against 34 dredges, with an aggregate daily capacity of 33,400 cubic yards, in 1913. Four new dredges were completed, and four others that were reported as under construction in 1913 were in the same condition in 1914. At least three additional dredges were contemplated for construction before the season of 1915.

The dredging season of 1914 was unusually short. On account of winter frost, snowbanks, and valley ice but few dredges commenced operations before July 1, and many were tied up until July 15 or 20. The four new dredges completed during the summer began operating at still later dates. The operations were cut short in the fall by an unusually early freeze-up.

Other forms of placer mining were carried on with varying success in all the productive districts. The water supply for hydraulic and ground-sluicing operations, although much better than in 1913, was only fair, and some of the larger plants were unable to work at full capacity much of the season. A little drift mining was done both in summer and in winter, but in general these operations were of relatively minor importance.

An important element of progress in the mining industry in Seward Peninsula is the development of economies that render gravels of lower and lower grades available for exploitation. Among these may be mentioned the removal of hazard in dredging operations by systematic prospecting, the reduction of overhead costs by the formation of larger companies that operate a number of dredges under the same superintendency, reduction of fuel expenses by use of

internal-combustion engines burning crude oil, a more efficient use of steam in thawing frozen ground, and a closer attention to economy in the commissariat. Attention is also being given to the saving of gold from the black sands that are produced in large amounts in the vicinity of Nome. A plant was installed at Nome for this purpose during the summer, and presumably it began operating before the end of the season. There is promise of a further economy in thawing the frozen coastal-plain deposits near Nome by systematic application and withdrawal of surface waters. Fortuitous occurrences incident to the artificial drainage of dredging ground indicate the possibility of developing such a method of thawing, which is a crucial necessity to the economic exploitation of the enormous low-grade reserves of the Nome coastal plain.

In all about 1,200 men were employed in mining on Seward Peninsula in 1914 for an average season of 100 days. About 450 of these men were employed on dredge crews and in dredge construction. The total production of the placers has an estimated value of $2,700,000.

OPERATIONS BY DISTRICTS.

NOME DISTRICT.

DREDGING.

The dredging situation in the Nome district showed marked improvement in 1914 over the preceding year. In 1913 there were thirteen dredges in the district, of which seven were operating, three were idle, and three were under construction. In 1914 eleven dredges operated, and the same three were still incomplete. Two new dredges were installed during the year, and the old Peluk Creek dredge was taken to Anikovik River, in the Port Clarence district.

The two new dredges were built on Bangor and Arctic creeks. The Bangor dredge has a close-connected line of 3½ cubic-foot buckets, develops 150 horsepower with an internal-combustion engine using crude oil as fuel, and has an estimated daily capacity of 2,000 cubic yards. The fuel consumption is estimated at 6 barrels of crude oil a day. It was planned to complete its construction and begin operating by September 1.

The Arctic Creek dredge is of the flume type, with a 2½ cubic-foot open-connected bucket line. It has 60-horsepower distillate engines, using 100 gallons of fuel a day. Its capacity is estimated at 1,000 cubic yards daily. The dredge was completed and operation commenced July 20.

There is considerable divergence of opinion as to the most economical size and type of dredge for use in the district. The capacity of buckets in the active dredges ranges from 1¾ to 10 cubic feet.

The estimated costs per yard of gravel do not differ materially with the size of dredge employed, being, as a rule, 10 to 15 cents in thawed ground and 20 to 30 cents where steam thawing is required. These figures do not include royalty, amortization, or other overhead charges. Some significance may attach, however, to the fact that the more recently built dredges now operating are of the smaller type and the dredges that have been under construction for several years and are still incomplete are of the larger type.

The future of the dredging industry in the Nome district hinges strongly on the possible development of cheap methods of thawing the frozen coastal-plain deposits. These deposits comprise the greater part of the known reserves of the district. The thawed gravels along the courses of streams have a much smaller areal extent and their exploitation is a comparatively simple matter. At present the frozen deposits are thawed in advance of dredging operations by means of steam points driven from the surface to the required depth. Although this method is fairly economical in relatively shallow and rich deposits, its present cost is prohibitive for the deeper and leaner placers that constitute the larger reserves of the coastal plain.

A possible method of thawing the coastal-plain deposits more cheaply by means of ditch water is suggested by the results of an artificial drainage project in the vicinity of Nome. A drainage ditch was dug across the tundra at a short distance from one of the natural watercourses and parallel with it. In places the excavation penetrated through the muck and into the surface of the underlying gravels. After a time it was noted that considerable water was lost from the ditch by seepage, presumably through the gravels toward the natural watercourse, along which there was a zone of thawed ground. Later the thawed strip of gravel along the stream was dredged, and it was found that the area between the ditch and the stream was also thawed and available for dredging. Apparently the ditch water seeping through the gravels eliminated the ground frost to progressively greater depths, until the circulation affected the whole thickness of the gravels down to bedrock. The depth of thawing the first summer exceeded the depth of winter frost of the following season, so that the second summer's thawing was added to that of the first, and so on to bedrock. It is estimated that the surface of ground frost was lowered about 20 feet a year.

This occurrence accords with the laws of ground-water circulation as developed by Slichter[1] and applied by Van Hise.[2] The waters

[1] Slichter, C. S., Theoretical investigation of the motion of ground waters: U. S. Geol. Survey Nineteenth Ann. Rept., pt. 2, pp. 297–384, 1899.

[2] Van Hise, C. R., A treatise on metamorphism: U. S. Geol. Survey Mon. 47, pp. 571–576, 1904.

do not move in straight lines between the point of entrance into the gravels and the point of their withdrawal, but tend to follow a number of divergent paths from the former and of convergent paths near the latter. The coastal-plain gravels, where thawed, are fairly homogeneous and offer a nearly uniform degree of permeability to ground waters. The ideal circulation would be modified at the inception of the process by the high level of the surface of ground frost. As this surface was lowered by the influence of the relatively warm ditch waters the circulation would take on more and more the ideal form. The rate of circulation of ground water is affected by the difference in elevation between the points of entrance and exit, being more rapid under a higher head. The depth of gravels affected would depend somewhat on the horizontal distance between these points.

The general principles of a possible method of thawing by systematic application of ditch waters and withdrawal of ground waters seem clear. The details of such projects will have to do with topographic conditions, the muck overburden of the gravels, and the degree of homogeneity of the deposits. Although no insurmountable obstacles to the development of this method are apparent, it will probably require a great deal of careful experimental investigation to develop an efficient practical application of it.

OTHER FORMS OF PLACER MINING.

Extensive hydraulic-mining operations were carried on by the Pioneer Mining Co. on and near Center Creek. Four hydraulic lifts on different claims were used intermittently, as water from the Miocene and Pioneer ditches was available. An average of about 125 men were employed. A considerable shortage of water prevented continuous operation of all the plants at full capacity, but a large production was made.

Drift mining in the vicinity of Nome has fallen off greatly in relative importance each year since 1907, but there is still a considerable production from this source. The present operations are confined to placers of moderate gold tenor that are available only for the most economical methods. Expenses are reduced by a more economical use of steam for thawing, pressure being turned on the points for three hours instead of six as formerly, and a longer period of sweating allowed. The expense of the commissariat is also reduced, so that the daily cost of board per man is in some places as low as 90 cents instead of the $2 or $3 formerly allowed. These practices have permitted the reopening of several mines that previously had been abandoned on account of their low gold tenor.

Other mining operations reported in the vicinity of Nome during 1914 are as follows: Anvil Creek, one open-cut plant; Dexter Creek,

deep mining during winter; Nugget Gulch, open-cut mine; Daisy and Nicola gulches, open cut; Glacier Creek, open cut; Last Chance and Jess creeks, one hydraulic plant each; Cripple River basin, one small hydraulic plant on Oregon Creek and one open-cut mine on Willow Creek; Osborn Creek, one hydraulic mine; Boulder Creek, one open-cut mine with hydraulic lift; Buster Creek, one open-cut mine. Some drift mining was also reported on the third beach line.

An interesting though relatively unimportant phase of placer mining at Nome was the renewal of beach mining. The severe storm of 1913 was attended by a notable attack on the seaward scarp of the coastal plain, which in places was eroded back 60 to 100 feet. This resulted in the formation of new concentrations along the beach above the usual strand line, and during the summer of 1914 from 50 to 100 men were engaged in working them with rockers, surf washers, and short sluice boxes along the beach from Nome to Penny River. The concentrations were not very rich, and only ordinary wages were made.

SOLOMON DISTRICT.

Eight of the nine dredges that operated in the Solomon district in 1913 continued work in 1914, and one new dredge, built early in the summer, began work in August. The only dredge reported idle was that of the Nome, Montana & New Mexico Mining Co. on Goose Creek, which suspended operations pending additional prospecting. It is reported that at least four of the active dredges exhausted their available ground during the summer.

The new dredge was built for C. E. Kimball on Adams Creek. It has an open-connected line of 2½ cubic-foot buckets, develops 60 horsepower with distillate engines, uses 100 gallons of fuel a day, and has an estimated daily capacity of 1,000 cubic yards.

An innovation was introduced among the various types of power plants used on Seward Peninsula by W. H. Esterbrook, who has taken an option lease on the ground and equipment of the Seward Dredging Co. on Solomon River. The new plant is equipped with a 4-cylinder 4-cycle Diesel engine of 200 horsepower and a corresponding electric generator. It began operating the later part of July, and is said to have given very satisfactory results for the rest of the season. The fuel consumption is reported as 6 to 10 barrels of crude oil a day, compared with 42 to 50 barrels required by the steam plant that was replaced.

No mining other than dredging was in progress in the Solomon district. Two small outfits are reported to have prospected for elevated beach deposits in the vicinity of Jerome Creek during the summer and to have found such deposits at two levels, 130 and 150 feet above sea. The value of the discoveries is not disclosed.

CASADEPAGA DISTRICT.

Four dredges operated in the Casadepaga district, as in 1913, with the exception that the small dredge of the Oro Dredging Co. was moved from Goose Creek to Elkhorn Creek, a tributary of Niukluk River below the Casadepaga. The other three dredges worked on Casadepaga River, Willow Creek, and Goose Creek. No other mining was done in the district.

COUNCIL DISTRICT.

Six dredges continued operation in the Council district, as in 1913, with the exception that one of the Flume Dredging Co.'s dredges was moved from Ophir Creek to Crooked Creek. Of the other dredges, two worked on Ophir Creek and one each on Melsing, Mystery, and Warm creeks.

Hydraulic mining was carried on by the Wild Goose Mining Co. on Dutch Creek and by Stick & Co. on Albion Creek. A steam-scraper plant was operated on Melsing Creek.

It is estimated that fifteen different plants, employing about 120 men, were operated in the district, distributed as follows: Ophir Creek and tributaries, five; Crooked Creek, three; Melsing Creek, three; Warm Creek, three; Elkhorn Creek, one. There was no winter work in the district. The value of the gold produced in the district in 1914 is estimated to be $525,000.

KOYUK RIVER DISTRICT.

Renewed mining activity is reported on Sweepstakes Creek, where ten men are working four separate claims. Recent discoveries are said to have disclosed valuable placer ground in this section, and an increased activity is expected in 1915.

On Kenwood Creek, a south tributary of Koyuk River 20 miles above its mouth, a single outfit was working in a small way.

FAIRHAVEN DISTRICT.

About 75 men are reported to have engaged in mining on Candle Creek and tributaries in 1914. The Candle Creek Mining Co.'s dredge had a successful season. On claim No. 20, above Discovery, a steam-scraper plant was operated. Twelve smaller outfits were engaged in ground-sluicing and drifting on the benches of the Candle Creek valley, and one plant drifted on Jump Creek.

Four plants operated on Bear Creek during 1914, and one on Sheridan Creek, a tributary. About 20 men were employed. One plant operating on Discovery claim had a hydraulic equipment, including a Ruble elevator, and used water from the Bear Creek ditch

under a 240-foot head. The other outfits used manual methods in open-cut work.

The Kugruk dredge operated successfully for a part of the open season. Two drilling outfits were engaged in testing ground for further dredging operations, and one drift mine was worked by a small force.

The two dredges on Inmachuk River were late in starting, owing to an unusual accumulation of winter ice, but operated successfully the later part of the season. The other mining activities in the Inmachuk region have not been reported.

KOUGAROK DISTRICT.

The Alaska-Kougarok Dredging Co. operated its 2¾-cubic-foot dredge successfully on Kougarok River at the mouth of Henry Creek during the open season. The Behring Dredging Co. has drilled extensively on its holdings and has a 2½-cubic-foot close-connected bucket-line dredge landed at the head of navigation ready for transportation to Kougarok River below the mouth of Taylor Creek, where it is to be installed for operation during the summer of 1915. Plans have also been made for installing a dredge on Iron Creek.

The North Star ditch, which takes water from Taylor Creek, was used in hydraulic mining on claim No. 15, above Discovery, Kougarok River. A small hydraulic plant was installed on Macklin Creek. The other activities include five sluicing plants on Kougarok River, four on Dahl, two on Coffee, seven on Iron, two on Willow, one on Benson, two on Macklin, and two on Garfield.

The winter work in this district included two deep-mining plants on Kougarok River, one on Willow Creek, and one on Iron Creek, employing in all seven men and producing about $12,000 worth of gold. Thirty-four plants were operated in summer, employing about 130 men. The value of the gold produced in the district in 1914 was about $150,000.

PORT CLARENCE DISTRICT.

Six dredges operated in the Port Clarence district in 1914, but only three of them for much of the season. The open season was unusually short, extending only from the middle of July to early in October.

Three of the dredges operated for gold on Windy, Dick, and Sunset creeks. The York Dredging Co.'s dredge continued working for tin alone on lower Buck Creek.[1]

The American Gold Dredging Co. put two dredges on Anikovik River and operated for tin and gold together. One of these dredges

[1] Eakin, H. M., Tin mining in Alaska: U. S. Geol. Survey Bull. 622, pp. 89–92, 1915.

was formerly on Peluk Creek near Nome and the other was new. The Peluk dredge was towed along the shore of Bering Sea to the mouth of the Anikovik, where it dug its own way across the bar into the river. It was then laid up in order to remodel the digging ladder and bucket line. The new dredge was installed on the river about a quarter of a mile from its mouth. It has buckets holding 2 cubic feet in an open-connected line, develops 80 horsepower by distillate engines, and has an estimated daily capacity of 800 cubic yards.

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.

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. $1.

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.

*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.

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

*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.

*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.

*Tin resources of Alaska, by F. L. Hess. In Bulletin 520, 1912, pp. 89–92. 50 cents.

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

Administrative report, by A. H. Brooks. In Bulletin 259, 1905, pp. 13–17.

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*Administrative report, by A. H. Brooks. In Bulletin 379, 1909, pp. 5–20. 50 cents.

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*Administrative report, by A. H. Brooks. In Bulletin 520, 1912, pp. 7–18. 50 cents.

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Administrative report, by A. H. Brooks. In Bulletin 622, 1915, pp. 7–14.

Report on progress of surveys of public lands in Alaska during 1910, by A. H. Brooks. In Bulletin 480, 1911, pp. 15–20.

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.

Alaska coal and its utilization, by A. H. Brooks. Bulletin 442J, 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. (Abstract in Bulletin 259, 1905, pp. 32–46.)

*Prospecting and mining gold placers in Alaska, by J. P. Hutchins. In Bulletin 345, 1908, pp. 54–77. 45 cents.

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

MAPS.

*Map of Alaska showing contours; scale 1:2,500,000; 1906, by R. U. Goode and E. C. Barnard. In * Professional Paper 45. $1. Not issued separately.

Map of Alaska; scale 1:5,000,000; 1912; by Alfred H. Brooks. 20 cents.

Map of Alaska; scale 1:1,500,000; 1915; by A. H. Brooks and R. H. Sargent. 80 cents.

Map of Alaska showing distribution of mineral deposits; scale, 1:5,000,000; by A. H. Brooks. 20 cents. Also included in * Bulletin 520. 50 cents. (New edition included in Bulletin 592.)

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