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DEPARTMENT OF MINES
JUNEAU, ALASKA

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SUMMARY REPORT OF MINING INVESTIGATIONS AND ITINERARY OF J. C. ROEHM, ASSOCIATE MINING ENGINEER FOR TERRITORIAL DEPARTMENT OF MINES IN THE KETCHIKAN, WRANGELL, PETERSBURG AND JUNEAU MINING PRECINCTS
August 1 to September 13, 1942

A total of twenty prospects were examined by the writer during the period of August 1 to September 13, inclusive, of which thirteen were in the Ketchikan, two in the Wrangell, four in the Petersburg and one in the Juneau precinct. These examinations were confined to old prospects, both known and reported to contain base metals. Many of these prospects are little more than outcrops on which small amounts of development has been done years ago. Lack of new work makes possible only a very inaccurate investigation. Specific recommendations, other than further development work, cannot be made. Abundant growth of vegetation over and surrounding the workings in many places hinder accurate observation. Many tunnels and shafts were found to be caved. Accurate and fresh samples were only obtained in a few places. Re-examination following development work on several of these prospects is warranted. Interest should be encouraged to further development on base metal prospects in general.

Factors that would encourage the development of and mining on base metal prospects in Alaska are:

1. Assurance to producers of a stable market both during and after the war emergency.
2. Purchase depots where honest weights and values are obtained for all base metals.
3. Reasonable transportation rates for both small and large tonnages.
4. Free engineering advice and necessary engineering work during development.
5. Cooperation and help in building roads and other means of transportation.
6. Placing operators in touch with owners and furnishing available information.

The following is the itinerary of the writer from August 1 to September 13, inclusive, with summary reports of properties and prospects visited:

August 1-2. En route Juneau to Ketchikan.

August 3. Assay office, Ketchikan.

August 4. Ketchikan to McKenzie Arm, Prince of Wales Island.

August 5. The Lake View claims, now abandoned and further referred to as the Lake View prospect, is located 2 miles south of the head of McKenzie Arm. The latter is a long embayment which extends southerly off Skowl Arm on Prince of Wales Island. The workings are situated between elevations of 1200 and 1400 feet on the north slope of the divide between Skowl Arm and Cholmondeley Sound. They are reached by following the tramway which leads to the Khayyam mine as far as the loading station at the terminus of the Aerial tram. From here a trail leads due south up the steep valley wall to the lower adit at 1200 feet elevation.

The geologic formations within the area surrounding these workings consist of a wide contact zone with diorite to the south forming the main mountain mass and various greenstone schists and metamorphic sedimentary remnants to the north. The sediments occur as remnants lying uncomformably within the greenstone schists and occupying the higher portions of the latter.

The workings are situated on a shear zone in diorite and schists. The strike of the shear is N. 75° W. and the dip is steep to the northeast. Contact metamorphic sulphide bodies occur along this shear which maintains an average width of 20 feet. The sulphide bodies are distributed along as lenticular masses within the mineralized zone, some of which reach widths of 10 feet. Horses of greenstone occur within the sulphide bodies and the walls do not have definite boundaries.

The lower adit of the Lake View prospect is situated on the north slope at an elevation of 1200 feet. Its direction is S. 75° E., and it follows the shear zone into the mountain. The length is 230 feet and at a point 60 feet back from the face, a raise was noted which was not accessible. At a point 150 feet back from the face a 15-foot crosscut to the southwest cuts into the footwall of the zone. Small lenses of massive sulphides ranging in width up to 12 inches occur along the roof of the adit. Greenstone schists and contact phases of the diorite make up the formations in this adit.

The upper adit is located above on the same shear at an elevation of 1300 feet and 300 feet southeasterly from the lower adit. Its length is approximately 300 feet with the southern extension partly caved. Its direction is 75° east of south and follows the shear, and contains both a drift portal and a crosscut portal. The latter intersects the drift from the northeast at a point 150 feet from the former, and continues a few feet into the footwall. Sulphide bodies with considerable magnetite associated occur in this upper adit, showing in widths up to 8 feet. These surface sulphide lenses contain greater amounts of chalcopyrite, sphalerite and pyrrhotite than the lower adit lenses.

On the surface the shear zone can be traced nearly 500 feet, along which a few rock cuts have been made showing irregular bunches and small lenses of sulphide ore. Some contain minable ore, as noted by copper and zinc content, however, they appear too small and irregular for economic mining. The shear zone generally follows the contact which varies from greenstone schists to various contact phases of the diorite. The orebodies are irregularly distributed and irregular in shape.

The metallic minerals noted were mainly pyrite, magnetite, pyrrhotite, chalcopyrite and small amounts of sphalerite and malachite. The gangue minerals consisted of quartz, epidote, biotite, calcite, chlorite, lime silicates, limonite, hornblende and various other mineral products which make up the formation.

Sample 1058 was taken representing 8 feet in width at a point 100 feet south of the crosscut in the drift of the upper adit. This sample gave 1.35 per cent copper, nil in nickel, and small amounts of gold, silver and zinc are no doubt present.

This prospect is apparently not held at the present time, since no new development work is evident.

Descriptions of these old workings are given in U. S. G. S. Prof. Paper No. 1 at pp. 94-96 and in Bull. 347 at pp. 135-138.

The Khayyam mine is located one mile northwest of the Lake View prospect along the same diorite and greenstone contact. This location is three miles from the head of McKenzie Inlet and is reached by following the tramway from the beach to the aerial tram terminal, thence via trail to the workings at elevations of 2000-2500 feet.

This prospect was reported to have been discovered in 1899, and the larger part of the workings were driven in the following years 1901 to 1905, during which time the aerial tramway and tramming were extended to McKenzie Inlet. Some ore was shipped and in the year 1906 operations closed. In 1907 operations resumed for a few months and closed in the fall. According to reports, the property has been idle since then.

The geology surrounding the workings consists of a general contact zone between diorite to the south and greenstone schist and sedimentary remnants on the north. This is the same contact zone as the Lake View, however, here the zone is wider in extent and more shear zones are in evidence. Near the top of the ridge, at an elevation of 2500 feet, several cuts into scattered sulphide zones show remnants of limestone, part of which has been replaced by ore minerals. These upper bodies represent the higher grade ore. The ore occurs in sulphide bodies, lenticular in shape, along shear zones parallel to the contact. The diorite along the contact has developed a gneissic structure and the greenstone schists contain abundant contact minerals.

Various adits along the north slope into the mountain expose numerous lenticular sulphide masses. These masses occur across the contact zone 300 to 400 feet in width, and they can be traced for several hundred feet. The adits follow the strike of the ore bodies along the shears, which is N. 75-85° W., into the mountain. These adits range from a few feet to 680 feet in length. The dip of the shears and ore bodies is 80-85° N. The shears parallel the schistosity. The sulphide bodies are irregular in occurrence in the shears and of various sizes. They are contact metamorphic bodies, which show a small replacement with the limestone remnants on top, through the contact zone, and extend into mainly pyritic bodies at depth into the diorite, as shown by the lower adits. The change of the metallic mineral content of these bodies, from the upper cuts near the top to the lower adits, takes place within a short range of depth, less than 500 feet. In the upper cuts at the crest of the mountain, the ore consists of pyrite, chalcopyrite, pyrrhotite, magnetite, bornite; malachite, azurite in a gangue of calcite, dolomite, crystalline limestones in slates, and various lime silicates with some quartz. The metallic mineral content of the sulphide bodies in the lower adits is mainly pyrite with well developed cubes and small amounts of chalcopyrite. The gangue minerals consist mainly of quartz, which forms a matrix binding the pyrite crystals with other gangue minerals such as epidote, chlorite, and hornblende. The greater portion of these sulphide bodies are pyrite and some of the bodies have widths up to 10 feet, and lengths up to 100 feet were noted. The upper bodies carry more copper, with magnetite and pyrrhotite, than the lower, however, the copper content appears to be too small in amount and the bodies too irregular and scattered to be mined under present economic conditions. These pyrite bodies could be considered as a source of pyrite ore, however, the ore contains a considerable amount of silica, which would require milling to obtain a pure pyritic ore. Whether these bodies could be mined at a profit under present economic conditions is doubtful.

Sample 1059 represents a channel sample across 6 feet of nearly massive sulphide in a short crosscut adit midway between the upper workings and the lower adits. This gave results of 0.02 oz. Au., 0.20 oz. Ag. per ton, 0.52 per cent copper, and nil in nickel.

For further information and assays refer to Prof. Paper No. 1, pp. 94-96 and Bull. 347, pp. 135-138.

The tramway and aerial tram, as well as buildings and other materials and mining machinery on the property, are deteriorated and not useable.

August 6. Skowl Arm to Nichols Bay.

On the east side of Nichols Bay at the southern end of Prince of Wales Island, up the first creek from the head, a distance of 1000 feet, is located an old copper-lead prospect. This showing consists of a breccia zone with a slaty footwall and a limy greenstone schist as a

hanging wall. The zone strikes N. 30° W. and has a steep dip to the east. This brecciated zone is 20 feet wide and is made up of brecciated pieces of the wall rock cemented with lime carbonates and quartz. Some shearing is evident within the brecciated zone, and the mineralization appears to have accompanied this shearing.

The ore minerals consist of pyrite, galena, stibnite, tetrahedrite, and malachite. These were disseminated within the zone and particularly in the lime carbonates. The gangue minerals consist of quartz, lime carbonates, chlorite, slate and greenstone pieces. Small bunches of barite were noted in the breccia zone.

The workings on the prospect consist of two crosscut tunnels on the west bank of the creek through the zone, each about 25 feet in length.

Sample 1060 was taken in the lower tunnel across 15 feet of the breccia zone. Only traceable amounts of copper and lead, with low silver values were obtained.

What appears to be the same breccia zone outcrops on the east shore of Nichols Bay south of the mouth of the creek on which the above showings are located. Here a shaft located 15 feet above high tide line has been sunk. More limestone is contained in the zone in this section and greater amounts of chalcopyrite and tetrahedrite were noted in the dump samples. Some jasper and large blocks of white quartz were noted. The zone is not well exposed and the shaft was inaccessible.

Up the first creek, 1000 feet east? of the entrance of Nichols Bay, a copper prospect was noted along the west bank. This prospect consists of a limy quartz vein two feet in width which follows along the bank of a small creek for 1000 feet, beginning near the mouth. This vein strikes N. 50° W. and dips 68° SW. The formation in which it is contained, consists of a greenstone lava which, along the walls of the vein, is highly schistose and altered. The vein is banded and contains a banded drusy quartz. Its position is near a diorite contact to the east and the greenstone in which it is contained shows contact metamorphism. The metallic minerals are pyrite with small amounts of chalcopyrite and tetrahedrite. A sample taken at discovery cut, 1000 feet from the beach at an elevation of 50 feet, gave a trace of gold, 0.20 oz. silver and 2.18 per cent copper.

August 8-9. Nichols Bay to Long Island and Coning Inlet.

H. F. Foster, logger for the MacDonald Logging Co. situated at Coning Inlet, Long Island, made a discovery of lead, silver and zinc bearing siliceous ore in April of this year. The discovery is located at an elevation of 420 feet, 200 feet from a good planked logging road that extends from the head of Coning Inlet one and one-fourth miles to the top of the divide on Long Island. Two claims; namely, Coning Inlet No. 1 and No. 2, were staked following the strike of this deposit. Development to the extent of one trench into the deposit with a little stripping had been accomplished prior to date of visit.

Long Island is situated off the southeast portion of Dall Island and opposite the south end to the west of Prince of Wales Island. Its length is 15 miles and it reaches a maximum width of 7 miles at its widest portion. Coning Inlet is situated in the central portion of the east side.

The geology of the island, as shown by Buddington[1], consists mainly of sediments of the Wales group of greenstone schists, limestones and slates, underlying Silurian sediments of limestone, conglomerate and argillite beds. The central or higher portion of the island shows small intrusive masses of diorite and porphyry, which apparently is the underlying formation and invaded both the Wales group and the Silurian sediments. The ore discovery is genetically associated with the diorite, and parallels it in strike on the west contact of the diorite and in the sediments at a distance of 300 feet.

The discovery consists of a massive quartz lens or vein exposed a distance of 170 feet and maintains an average width of 12 to 15 feet. The strike and dip parallels the foliation of the sediments which average N. 42° W. in strike and 75° E. in dip. The foliation of the altered sediments may or may not represent the original dip and strike, and has resulted from the pressure and metamorphic action of the invaded diorite. The prevailing structure, which contains the quartz lens or vein, could not be determined due to lack of development and extensive cover. The quartz contains numerous partly replaced inclusions of limestone and green schist which give it an impure limy nature. The surface is leached and weathered to a dull brownish to chalky white. Buff colored limestone, with small thin strata of blue limestone, crystallized and in part silicified, forms the hanging wall and footwall. A band of schisted greenstone outcrops to the west on the footwall side of the vein and at a distance of 20 feet away. This schist band is mineralized and highly altered, and contains small quartz stringers. On the hanging wall small stringers lead off into the wall. These represent small tangent veins which apparently die out a few feet from the main vein. The showing goes under cover on both ends, and apparently has a greater length than its present exposure. However, on a small exposed knoll 300 feet to the

[1]U. S. G. S. Bull. 800, "Geology and Mineral Resources of Southeastern Alaska," Plate I.

northwest on the strike, no evidence shows of any vein. To the south float quartz of the same character can be traced a few hundred feet.

The outcrop as it appears on the surface is nearly barren due to leaching action. However, the cut as shown on accompanying sketch, has a depth of 10 feet on the vein, and reveals the metallic content. In fact the ore on the unaltered surfaces appears fresh, with a drusy nature, and contains an abundance of sulphides of lead and zinc. On the northwest end of the outcrop either a second quartz vein or lens begins parallel to the first or an undisclosed fault has offset the main vein. The sketch shows a mass of quartz, identified as the main vein, 20 feet to the northeast. There has not been sufficient work to determine the relation of this body to the main vein.

The metallic minerals noted in the vein in order of abundance consist of pyrite, chalcopyrite, sphalerite, and galena. In the weathered portion, secondary lead and zinc minerals with malachite, mainly stains, with iron oxides were noted. The gangue minerals consist of limy impure quartz, calcite, chlorite, talc, with other altered limestone and green schist pieces.

Two channel samples were taken in the discovery cut. Sample 1062 was taken in the bottom from the hanging wall toward the footwall and represents 5 feet in width. It gave the following returns: Au. nil, Ag. 0.10 oz. per ton, Cu. 1.20, Pb. 0.55 and Zn. 1.22 percentages.

Sample 1063 was also taken in the bottom of the cut and represents another 5 feet toward the footwall. The following assay results were received: Au. 0.02, Ag. 0.30 oz. per ton, Cu. 0.47, Pb. nil, Zn. 0.18 per cent.

The owner was encouraged to do further surface work along the strike and to cut the vein at a lower elevation. The latter could be done with a short crosscut tunnel. Geological conditions are favorable along the diorite contact zone for sulphide ore deposition.

T. D. M. 488 represents a slide of the ore containing galena, sphalerite, chalcopyrite and pyrite.

August 10. Coning Inlet to Sukkwan Island.

The Gould copper prospect is situated on the west side of the narrow peninsula which forms the southernmost tip of Sukkwan Island, 1000 feet from the end. A small salt-chuck lagoon divides the narrow neck on which the prospect is situated from the main peninsula to the east. The collar of the shaft is 30 feet above high tide level and the showing is situated along the shore. The shaft was reported to be 50 feet deep off which drifts were run following the shear and from which copper ore was mined by Mr. Gould of Ketchikan during the years 1917-1918. The total extent of the underground workings was not learned, however, from the shaft dump, two or three hundred feet is judged to be the extent. The amount of ore shipped was not learned.

The formation surrounding the prospect consists of hornblendite with many portions grading into gabbro. Several basaltic dikes, ranging in width from a few inches to four feet, cut the hornblendite, striking N. 45°-50° W. and dipping 60°-65° W. The showing consists of a shear zone in hornblendite 10-15 feet in width which strikes N. 18° W. and has nearly a vertical dip. This zone consists of schisted and altered hornblendite with included pieces of schisted limestone, together with numerous irregular bunches and stringers of quartz. Sulphides are contained in the shear as irregular bunches, seams and small disseminations. Those noted were pyrite, chalcopyrite and bornite. The gangue minerals consist of quartz, calcite, chlorite, epidote and altered feldspar and hornblende crystals. The dump from the shaft, which is located 40 feet west of the shear, has covered the area where apparently the higher grade ore outcropped. The shaft was inaccessible due to the rotten timbers and being partly filled with water. Pieces of nearly massive sulphide were noted on the dump, which showed the existence of a shipping grade of ore. The shear zone can be traced nearly 500 feet along the shore of the peninsula. However, along this distance only small amounts of copper minerals were noticed, which were too few to be considered as ore. Apparently the high grade ore was in the shear at a point opposite the shaft where the shear was intersected by parallel basaltic dikes.

No samples were taken and further information regarding the prospect might be obtained from some miner working there at the time of operation. The owner is deceased and the property is apparently not held.

The peninsula which forms the southern end of Sukkwan Island is made up of ultrabasic rocks. These were examined both along the shore line and inland for a distance of 2 miles to a point where they are covered with Devonian[1] lavas and sediments. On the east side of the peninsula diorite outcrops which, by following west, grades into a basic complex, which contains various phases of gabbro, syenite and hornblende. The latter makes up the greater portion of the ultrabasic mass. The hornblende mass throughout contains numerous gabbroic phases. Disseminated magnetite was noted associated with plagioclase feldspar in various places in the gabbro. Pyrite and occasionally a crystal of chalcopyrite were noted in the hornblendite near the basaltic dikes. Hornblendite was the most basic rock encountered and since this makes up the greatest portion of the ultrabasic area, search for more basic and associated minerals, such as chromite, was discontinued.

August 11. Sukkwan Island to Lime Point.

KX-119-97

A search was made for a lead-silver prospect situated on Lime Point, 3 miles north of the south end. Various claim lines and posts were discovered, but no showings or developments were encountered.

[1]U. S. G. S. Bull. 800 by Buddington, Plate I.

August 12. Lime Point to Old Sulzer.

An unnamed zinc-lead prospect was investigated, located 2 miles north of Old Sulzer at the head of Hetta Inlet. A trail leads up the east side of a small stream from Old Sulzer, thence crosses a steep ravine immediately below the tunnel of the prospect. The tunnel is situated near the top of the northwest bank at an elevation of 1300 feet. The tunnel, which apparently follows the vein into the bank, was found to be caved. However, a small slide directly above the tunnel, has uncovered the vein for 20 feet. The strike is N. 45° E. and the dip 70° S. The surrounding formation is fractured greenstone schist and folded argillite. The cuts above the tunnel are all caved and filled to the extent that further information could not be gained without extensive work.

The vein has an average width of 3 feet and consists of mineralized quartz on both walls with nearly massive sulphide 10 to 12 inches in width in the center. The walls are free and have been considerably altered and weathered near the surface. The metallic minerals noted consist of pyrite, galena, chalcopyrite and sphalerite (light colored variety). The gangue minerals noted were quartz, calcite, lead and zinc secondary products, chlorite and iron oxides.

Channel sample 1064 across 3 feet immediately above the caved tunnel portal gave the following assay results: Au. 0.02, Ag. 9.30 oz. per ton; Cu. 1.09, Pb. 13.38, and Zn. 0.81 percentages.

Further development is justified on this prospect to the extent of opening the tunnel and cuts, with further sampling. The length of the ore and the type of structure in which it is contained could not be determined due to lack of exposures.

August 13-14. Hetta Inlet to Coco Harbor, Dall Island.

A copper prospect was examined inland one-half mile from the head of Coco Harbor. A good trail leads from the beach on the north side to a 50-foot adit at an elevation of 350 feet. Several cuts and outcroppings, showing sulphides, were noted along a contact zone between diorite to the northeast and metamorphic greenstone on the southwest. The contact zone has a northwesterly strike and the greenstone near the diorite is altered to a hornfels.

The sulphide deposits are contact metamorphic in origin and occur as irregular bunches, masses, and disseminated areas distributed along a mineralized zone paralleling the contact. The largest outcropping mass occurs 100-150 feet above the adit portal. This mass of sulphide is exposed across a width of 20 feet and is exposed for a length of 30 feet. Strike and dip of the mass could not be determined. The adit below has a length of 50 feet and was driven to intersect the sulphide zone above. The tunnel has a N. 42° E. direction, but was not continued for a sufficient distance to intersect the sulphide mass.

The sulphides contained in this zone consist of pyrite, pyrrhotite and chalcopyrite. These occur both massive and disseminated in a gangue of metamorphosed greenstone, and the following minerals were noted: Epidote, feldspar, mica, biotite, quartz and garnet.

Sample 1065 consisted of 10 pounds of pieces taken from this outcrop and represents a general sample. The assay results were: Au.nil, Ag.nil oz. per ton; Cu.0.3%, and Ni.nil percentages.

Since many of the other outcropping masses show only small amounts of chalcopyrite, and consist mainly of pyrite with some pyrrhotite, economic values were not to be expected and no samples were taken.

August 15. A trip inland on the south side of Coco Harbor was made to locate a zinc-silver-lead prospect. A day's search failed to locate the tunnels or showings. High grade silver ore was reported to have been mined from these tunnels. Further inquiry after returning to Ketchikan disclosed that a small narrow lens of high grade silver, lead and zinc ore was completely mined out nearly 30 years ago. The prospect was reported to be in limestone and further exploration following the mining of this small lens failed to reveal further ore.

August 16. A high grade sample of molybdenite was received and reported to have been found by Albert Johnson of Hydaberg. Johnson was contacted at Hydaberg and he reported a large dump of this type of ore back of the bunker at the Jumbo mine at Sulzer. Johnson was of the impression that this ore came from a short tunnel in the vicinity. An examination of the dump revealed that this molybdenite ore was apparently sorted out along with waste rock from the ore trammed from the Jumbo mine. A few tons of this molybdenite ore could be sorted from this dump. Further examination of the workings of the Jumbo mine might possibly reveal additional tonnage. However, this molybdenite occurs with epidote, lime silicates and carbonates. It was reported as distributed in irregular bunches and small amounts in the copper ore of the Jumbo mine. The aerial tramway to the Jumbo mine is, however, beyond repair, as is also other machinery noted on the beach.

August 17-18. Hetta Inlet to South end of Gravina Island.

A silver-lead prospect known as the Nels Nelson prospect was examined in McCarthy Cove on the southwest end of Gravina Island. Along the beach on the east side of this cove small veins of quartz and carbonates occur which contain variable amounts of galena. The veins are small, irregular, and brecciated, showing variable contents of galena. They occur along the contacts of argillites and green porphyry. This porphyry weathers to a brownish red color. Small stringers strike into both the argillites and porphyry, however, the largest and most persistent veins follow the strike of the argillites and porphyry sills, N. to N. 10° E. The dip of the argillites is 35° E. Small acid dikes

cut across the argillite and porphyry sills. One small vein, which starts on the beach and strikes N. 26° E., cuts into the porphyry. Nels Nelson sank a short shaft on this vein at high tide level. From a small pocket on the vein, $275 worth of native silver was mined. Apparently, this rich pocket did not persist in depth or to the northeast, where the vein is followed by a large open cut. The vein still shows in the face of the cut to the east. The cut and shaft are supported on the beach or west side by a concrete wall to keep out salt water. This vein averages 6 inches in width. An assay received from a channel sample taken across the vein gave only traces of silver and lead. Along the beach for a distance of 1000 feet, small seams and stringers containing galena were observed. The largest was found to be 6 inches in width, and some of them contained bunches of nearly massive galena. Small brecciated zones and fractures were the apparent structures containing the veins.

The metallic minerals noted were pyrite and galena. The gangue minerals consisted of jasper, calcite, quartz with inclosed sillimanite needles, siderite, manganese oxides, carbonate, and altered wall rock pieces.

Specimens T. D. M. 484 to 487 represent the various porphyries and acid dikes found in the area. These show a highly altered condition with abundant sillimanite, andalusite and other lime contact metamorphic minerals.

A deposit of hematite iron ore was reported as located in Nehenta Bay on the southwest end of Gravina Island, a mile south of McCarthy Bay. Small amounts of copper were discovered in this prospect and a small amount of development which consisted of a 125-foot tunnel and a few rock cuts was done on it. An examination disclosed this prospect to be a vein deposit consisting mainly of siderite with small amounts of chalcopyrite and pyrite. This vein has an average width of 20 feet and a known length of 1000 feet between the workings. Geologically, it lies between a conglomerate on the southeast or footwall and a limestone hanging wall. The vein has a general strike of northeast-southwest and the dip is northwesterly at a steep undetermined angle.

The first cut encountered is situated 500 feet inland from the south end of Nehenta Bay. This consists of a rock cut across the width of the vein, which here is located on a small bluff 30 to 40 feet above sea level. This cut shows the width of the vein, which is oxidized to a deep red color and to a depth of 12 inches in the weathered portions. This oxidized material is a mixture of red hematite and limonite. The blasted portion shows the primary contents of the vein as mainly siderite, with a blue quartz and scattered crystals of pyrite and chalcopyrite. Other cuts expose the vein for a distance of 1000 feet to the

northeast. On the east end, and located 100 feet from the small creek that empties into Nehenta Bay on the east side, and 1200 feet from the beach, a tunnel, elevation 50 feet, has been driven into a small ridge. This cuts the siderite vein at the face. The tunnel has a length of 125 feet and cuts 15 feet of the vein. Here the vein is nearly massive siderite, with small amounts of quartz, calcite, pyrite and chalcopyrite.

Sample 1069 represents a picked sample from pieces of heavy siderite on the dump of the tunnel. This gave results of nil both in gold and silver.

Sample 1070 was taken from the open cut 500 feet inland from the beach, and represents a sample of the entire width of the vein. This gave results of Au.nil, Ag.niloz. per ton and Pb.nil, Zn.nilpercentages.

This deposit of siderite represents a replacement deposit with the siderite replacing the crystalline calcite and dolomite into which the limestone has been altered. These sediments are classified by Buddington[1] as of upper Triassic in age and are shown in contact with the intrusive mass of quartz diorite which forms the southern and eastern end of Gravina Island. The contact between the conglomerate and limestone was apparently a zone of weakness in which a brecciated zone was formed. This zone was also the path of ascending hot solutions carrying large amounts of iron, a little copper, sulphur and minor amounts of lead and zinc (?), together with silica. Replacement of the fractured pieces in the zone is evident, together with fracture filling. The outcrop of this deposit shows a near surface deposition since siderite is a mineral belonging to the upper middle vein zone.[2]

Specimen 477 of the fresh siderite vein material shows 75-80 per cent siderite which has replaced the calcite and dolomite crystals of the limestone. Slight oxidization is evident along the outer faces of the crystals and minute fractures. A fresh bluish vein quartz has formed small veinlets through the original rock and replaced a portion of the original minerals. The amount of quartz averages from 15 to 20 per cent, with less than one per cent sulphides of pyrite and chalcopyrite.

The vein material, mainly siderite, is reddish brown in color and contains small bluish blebs of quartz which are visible to the eye. A few crystals of calcite, dolomite and other lime silicates are evident in the vein material, as noted from the thin sections.

Siderite contains, when pure, 62 per cent iron oxide or 48 per cent metallic iron. It is mined in some European countries where found in nearly massive form. The amount of silica present in this vein

[1]U. S. G. S. Bull. 800, Plate I.

[2]Farrell, E. M., "Practical Field Geology," p. 133.

deposit would make concentration necessary to produce a pure siderite ore. This deposit may be of future value as a self-fluxing iron ore. In depth this vein may change to a mineralization with greater amounts of copper, lead and zinc.

Nelson, of Nelson and Tift, reported that three tons of sulphide ore was shipped this spring from their property at McLean Arm, Prince of Wales Island. This ore consisted of float pieces found on the east side of the dike which cuts off the original ore body to the east. The float was scattered up the bank from the beach. They expect to follow this float further in hopes of picking up another or the continuation of their original ore body. Mr. Nelson further reported that the total value of shipments mined from the McLean Arm property amounted to $110,000.

August 22-23. A trip was made to Shrimp Bay on the northwestern end of Revillagigedo Island, upon receiving reports of a large red mountain inland three or four miles from the east end of Orchard Lake. Continued foggy weather prevented a glimpse of this mountain. However, it was reported to be nearly 4000 feet in elevation and the entire top is said to be a distinct red color. A careful investigation of the creeks draining into Orchard Lake failed to reveal any ultrabasic rocks. However, quartz diorite rocks and boulders were much in evidence. The shores of Orchard Lake consist of highly metamorphosed schists. These are in close contact to the quartz diorite to the east and have a definite red color where exposed. The writer is of the opinion that the high red mountain is located well within the quartz diorite mass and contains a small area on its top of the highly metamorphosed schists which give the reddish color due to their mineralization and exposure above timber line.

August 24-26. Ketchikan to Bradfield Canal.

August 27-28. Several showings were examined within the wide contact zone that cuts across the eastern end of Bradfield Canal. These were mainly quartz veins and mineralized areas discovered by Carl Thysen and Jack Anderson. Low gold values were reported and careful attention was given to the possible presence of tungsten and other important minerals. The formations that outcrop along the shore of Bradfield Canal are mainly gneissic schists made up of metamorphosed sediments with intercalated beds of lime schist and marble. Intrusive masses of quartz diorite, with basic border phases and dioritic dikes, strike as does the schistosity N. 30° to 40° W. and have a steep dip to the east. Wide mineralized shear zones have developed along many of the bedding contacts of the weaker strata, some of which contain quartz veins. While these veins vary somewhat in widths, they contain nearly

identical features as to type of quartz, mineralization and structure. They are high temperature in origin, have developed under conditions of high pressure and slow growth. Some veins occur in the contact of the diorite masses and dikes, others in the mica and limy schists. Contact minerals such as various kinds of garnet, epidote, andalusite, tourmaline, and other lime silicates were noted in them. Metallic sulphides; namely, pyrite, pyrrhotite, chalcopyrite, galena and sphalerite with low values in gold and silver occur disseminated in scattered and sparse amounts in the quartz. Several pieces of vein material were tested for scheelite under the fluorescent light with negative results. Other specimens were tested for tin with negative results.

The Lucky Chance claim contains one of the most promising quartz veins noted. This claim lies on the south side of Bradfield Canal in the second bite west of the mouth of Eagle River. Here a small creek empties and the showings, which consist of a 55-foot tunnel and two surface exposurers, is situated 700 feet from the beach along the bank of the creek at an elevation of 120 feet. The tunnel has a northeast direction and crosscuts a brecciated shear zone 30 to 40 feet in width. The formation is mica schist and narrow intercalated schisted limestone strata. The limestone is highly silicified and small quartz veins paralleling the schistosity are intercalated and have a brecciated appearance. The schistose strata and veins strike with the gneissic structure of the area N. 40° W. and the dip is slightly off vertical to the east. The brecciated veins range from seams to two feet in width. The quartz is drusy, hard, and has a brecciated texture, showing recementation by a younger quartz. Lime contact minerals are in abundance with epidote and some garnet. The only metallic sulphide noted was pyrite. Assay of three dollars per ton (old price) was reported from samples taken from this tunnel.

The following channel samples were taken in the tunnel:

1072 - Point 40-45 feet in from portal - Au. nil, Ag. nil, Wo nil.

1073 - Point 35 - 40 feet in from portal - Au. nil, Ag. nil, Wo nil.

1074 - Point 30-35 feet in from portal - Au. nil, Ag. nil, Wo nil.

The exposures outside the tunnel along the creek bank were too oxidized and leached for taking a representative sample.

Another shear zone, which contains a quartz vein with gold values, has been exposed by two open cuts 50 feet above high tide level in the head of the second bite west of the mouth of the Harding River on the north of Bradfield Canal. This vein has an average width of 12 inches and is exposed in the two cuts for a distance of 40 feet. This shear has developed on the contact of mica schist on the foot wall and metamorphosed limestone on the hangwall. The strike is N. 40° W. and the dip is 70° E. The vein contains bunches of sulphides showing large developed crystals of chalcopyrite, pyrite, pyrrhotite, galena and sphalerite. The gangue material is made up of a milky white quartz showing large crystal forms, interlocked and striated. It also contains many small vugs. Other gangue minerals were lime silicates and garnet. Specimens taken from this vein gave no reaction for tungsten. Assays totaling $7 in gold and silver (old price) were reported to have been obtained from this vein.

Located on the south side of Bradfield Canal on the beach between the first and second bites west of the mouth of Eagle River, thin bands of crystalline limestone are intercalated with thin bands of mica and graphitic schist and small quartz diorite dikes. Folding is evident with some crushed zones developed. The strike of the formation, including the dikes, is N. 35-40° W. and the dip is nearly vertical. Flake and amorphous graphite occurs in scattered amounts in some of the narrow bands of mica schist near the diorite dikes. Some of the limestone has graphite flakes disseminated through it. Some small areas appeared to have a graphite content of 2 to 3 per cent. However, no structure for continuous mining was observed.

Sample 1075 was taken across a 6-inch band which contained the most noticeable graphite. This gave an assay content of 8.56 per cent C.

August 28. Additional quartz veins were investigated on the north side of Bradfield Canal at the mouth of the Bradfield River on the east contact of the main diorite mass that crosses Bradfield Canal. These were of the same type and kind as found on the west side. One vein was noted with a 3-foot gouge on the hanging wall.

Sample 1078 was taken of this material and the following assay results were received: Au. 0.01, Ag. 0.30 oz. per ton, and Wo. nil. Another vein, which contained numerous lime contact minerals, was sampled. Sample No. 1079 was taken and the following results were received: Au. trace, Ag. nil, and Wo. nil.

August 29. A trip was made up Eagle River on the south side of Bradfield Canal to investigate further showings of quartz and mineralized shear zones. The river follows a contact of quartz diorite and gneissic schists. Several large inclusions of limestone were observed in these schists, some of which represented remnants of a former overlying limestone. These were highly garnetized and contained abundant lime silicates. No tin or tungsten minerals were identified from a number of samples taken, however, small widely disseminated crystals of sphalerite, galena, chalcopyrite and pyrite were noted in most showings. None was considered of importance.

August 30-31. A trip was made up Big Ed Tom, a river which parallels the Harding River on the north side of Bradfield Canal. Jack Anderson and partner obtained a few pieces of stream tin while carrying out placer prospecting in the headwaters of this river. This and the Harding River drain an extensive area with high dioritic mountains to the east and gneissic schists underlying the greater portion of the drainage area to the west. Zones of black hornblendite were found along the main contact of the diorite, and these represent marginal phases in the cooling of the quartz diorite. This hornblendite contained some resinous looking crystals, which upon testing with hydrochloric acid and zinc gave no reaction for tin. Examination of the schist and diorite failed to locate the parent rock which was the source of this placer tin. Again this concentrate may have been transported by ice from a great distance.

September 1-2. Bradfield Canal to Wrangell and Wrangell to Lake Bay, Prince of Wales Island.

September 3. The McCullough or Lake Bay copper prospect, inland from the head of Lake Bay, northeast side of Prince of Wales Island, was examined. This prospect is reached via a narrow roadbed 6,000 feet in length, starting at a point midway between Sweet and Barnes lakes and extending in a southwesterly direction. The discovery was reported to have been made by McCullough in 1905 following which some prospecting and development was done and four tons of the ore shipped. A shaft was started on the vein and a small water-power development was completed from a small lake above the showing. A building 40 feet north of the shaft consists of a hoist house, water-power, sawmill and blacksmith shop. Part of this building is still erect and a portion of the machinery is still intact. In 1915 work was resumed on the property and the shaft was extended to a depth of 61 feet. In the years 1929-30 development was resumed and a crosscut off the shaft was driven a distance of 40 feet. the prospect became known as the Ken-Gordon group of claims and a small account of the operation is given in a "Report on Cooperative Mining Investigations," 1931 by B. D. Stewart, Supervising Mining Engineer, p. 16. Since then the property has been restaked, but there is no evidence of recent assessment work. The only workings that are accessible

for examination of the vein at the present time are two rock cuts north of the shaft, and the shaft dump. A portion of the vein is exposed 150 feet north of the shaft along the creek bank. The headframe of the vertical shaft has toppled, ~~however~~, the collar and first three sets of timber in the shaft are intact. Water has filled the shaft to between the second and third sets of timber. Old workings near the shaft have become caved.

The geology of the area of Lake Bay consists of Ordovician and Silurian graywacke and slate with limy beds and thin-layered black chert.[1] Small remnants of carbonated limestone were noted along the shore of Lake Bay, which suggest that formerly the area was covered with limestone, and later removed by erosion. The area surrounding this prospect is low and contains numerous swamps and lakes and is situated below 200 feet in elevation. The only exposures noted were those along the creek bank which generally follows the brecciated zone which contains the vein. The formation, as exposed 400 feet north of the shaft and along the west side of the creek, consists of thinly bedded graywacke and slate. The strike ranges from north and south to N. 10° W. and the dip is 40-45° E. Strong fracturing is evident here which strikes N. 30° W. and dips 80-85° E. These fractures are closely spaced, but are not mineralized. A small 14-inch diabase dike cuts the formation with a strike of N. 77° W. and dips 84° N. The formation in the vicinity of the shaft and the cuts to the northeast are covered to the extent that definite structural relations and detail geology could not be obtained. The breccia vein has a width of 20 feet in the first cut 200 feet north of the shaft. The strike is N. 30° W. and the dip is 80-85° E. This corresponds to a fracture zone which is exposed 400 feet north of the shaft. The footwall is a silicified graywacke and the hanging wall is in the creek bed and covered. The hangwall, as exposed to the north, is thinly bedded slate. The brecciated pieces noted in the vein consist of graywacke, black and gray slate, and highly altered blue limestone. The breccia zone was apparently partially filled with limestone mixed with brecciated pieces of graywacke and slate. Replacement of the limestone pieces is very much in evidence, while the graywacke and slate pieces show concentric bands of silica on their outer surfaces. In the No. 1 cut north of the shaft fractured pieces of a green dike rock were noted in the zone. The vein as exposed from the shaft dump to the second cut north of the shaft has a known length of 300 feet. No doubt the vein continues south of the shaft, however, extensive cover has obscured it further in this direction. The vein is classified as a breccia vein in which ascending silica solutions were very active and in part filled the existing fractures and open spaces, and in part replaced the contents of the zone. The brecciated zone was apparently subject to movement after the deposition by the silica solutions, as small slippage planes cut through the vein parallel to strike. This shows a reopening of the zone and small seams

[1]U. S. G. S. Bull. 800, "Geology and Mineral Deposits of Southeastern Alaska" by Buddington, p. 340.

of massive pyrite and chalcopyrite were later deposited. The greater portion of the disseminated mineralization, however, was deposited by the silica solutions at the time of precipitation. Later small cross-fractures, which strike N. 67° E. and dip 80° S., were developed in the vein. These are minor fractures along which there appears to be no slippage. The general structure on which the zone was formed was not learned due to extensive cover.

The shaft dump, which is made up of the material from the shaft and crosscut below, consists mainly of vein material. This material is mainly brecciated pieces of graywacke, slate, chert and limestone cemented by silica and containing pyrite and chalcopyrite. Three generations of quartz were noted within the brecciated zone. These are evident by the variations in color and interlaced veinlets. Bluish quartz and some sulphide represents the first in age, milky white quartz represents the second, while a fresh, nearly clear quartz accompanies the fractures which are nearly filled with massive sulphides. The material on the top apparently represents the bottom of the shaft and crosscut, which shows the same type and kind of ore as found in the cuts to the north.

Sample 1076 represents an 8-pound grab sample from the dump. This gave returns of nil in gold and silver and 0.7 per cent copper.

The exposure along the west bank of the creek below the hoist house shows a portion of the vein. In this small exposure the mineralization is very scant and no sample was taken.

No. 1 cut, 200 feet north of the shaft, is a cut into the bank and exposes the vein across its width of 20 feet. The footwall is a massive hard graywacke. Smooth walls paralleling the strike show a small amount of slippage and divides the vein zone into bands. All bands are similar, having a brecciated appearance, however, some contain greater amounts of sulphides. These are mainly in minor fractures, which apparently preceded the later zone of fracture and movement. This cut shows fractured pieces of altered dike material inclosed within the brecciated material. A greater amount of sulphides show in the vein at this cut than does the material from the shaft dump.

Sample 1077 represents 10 pounds gathered from the dump of this cut. Results from an assay were nil in gold and silver and 3.3 per cent copper.

Cut No. 2 is located 50 feet north of cut No. 1 and only exposes the vein in part. This portion is similar in appearance to cut No. 1. No samples were taken. Another filled cut is located north of No. 2. A few pieces of vein material show on the dump.

The metallic minerals noted in this siliceous ore consist of pyrite and chalcopyrite. Small amounts of gold and silver were reported by former owners, however, the two samples taken by the writer show nil in gold and silver. The gangue minerals consist of three generations of vein quartz, calcite, dolomite, chlorite, graphite and angular pieces of graywacke, slate, chert and dike material.

Considerable more development and sampling is necessary on this prospect before any conclusion can be reached as to its value. Further development is warranted, as this ore, with combined lime and silica with copper, makes a good fluxing ore for smelting.

Slides 463 to 468 are representative of this ore and the associated diabase dike.

September 4. Lake Bay to Petersburg.

September 5. Petersburg to Totem Bay.

Veins of red ocher were examined inland one and a half miles from the head of Totem Bay, Kupreanof Island. These were reported by I. M. Hofstad of Petersburg. The veins are located along the first ridge inland from the head of Totem Bay which contains a steep bluff composed of folded, amygdaloidal and zeolitic lavas. The trend of the folds are N. 30° W. and the plunge is at a very low angle off horizontal. These bedded veins of red ocher were found to be contained in the anticlinal structure. At one location three veins across a slope distance of 50 feet were noted. These veins are bedded veins occupying the small anticlinal structure between the lava beds. The largest vein measured 4 feet in width. The walls of these veins are amygdaloidal lava with abundant zeolites on the hanging wall showing hydrometamorphism. The veins strike mainly east-west and dip with the plunge and the limb of the anticline to the northwest. The material making up the veins contains some silica in the form of quartz, and red hematite, limonite, pieces of lava and zeolitic minerals.

Sample 1080, taken from the larger vein midway up the bluff at an elevation of 350 feet, gave the following assay results: Mn. 1.28, Zn. nil, Pb. 0.15 and Fe_2O_3 12.87 per cent.

The presence of the above minerals in these veins with the strong action of hot ascending aqueous solutions, shown by the deposition of the zeolites, warrants further prospecting in these lavas. The abundance of the zeolites present in these lava beds with abundant iron oxides caused the area to be staked by I. M. Hofstad and Rustgard a few years ago in the belief that the beds were bauxite ore. No development work was accomplished.

A trip was made inland on Kupreanof Island from a point two miles west of Totem Bay. This area is locally known as the Columns due to the existence of basaltic columnar masses of lava. These extend inland from the beach. A small creek was followed inland to an extensive exposure of lavas and basaltic columns, at an elevation of 300-400 feet. At this point along the creek which shows a flow of columnar basalt overlying a small flow of obsidian, ash beds, and other lava flows beneath, the formation is exposed. At the bottom of the columnar basalt flow, movement and pressure has broken down the obsidian flow and some of the thin ash strata below. This action has formed a viscous clay that runs out along the contact and up through the columnar joints of the basalt. Analyses by the Denver Assay Office of samples submitted by I. Myre Hofstad of Petersburg gave a 70 per cent silica content for this clay. The noteworthy feature of this material is the extreme fineness of the contained particles, and with added water the greater portion forms a jell. The color varies from light green to yellow and red. This material upon becoming dry becomes compact and hard. The impurities, as both ferric and ferrous iron, and inclosed fragments of silica and ash, makes this material of little value unless the impurities are extracted. The dry compact material swells, but not to the extent or with the rapidity of pure bentonite. However, a great portion of the clay forms a jell of extraordinary stickiness and fineness. Thus this clay could be termed an impure bentonite. The amount of this clay in place could not be determined due to talus from the columnar basalt.

Hydrothermal action of hot solutions was noted also in some sections in the basaltic lava. The solutions followed the jointing of the columns and deposited considerable iron oxide with small amounts of manganese oxides. Traces of lead and zinc were noted in assays made of this material. Further prospecting is warranted in the surrounding area.

September 7. Totem Bay to Coronation Island.

KX-119-15c

A showing of sulphides was reported to the writer by I. M. Hofstad as being located on the beach in Akihula Bay, Coronation Island. This deposit of metallic sulphides is exposed at high tide level at a point at the foot of a high limestone bluff one-quarter mile from the entrance of Akihula Bay on the east side. Akihula Bay is on the northern portion of Coronation Island, and is the next bay east of Egg Harbor on the northwest end.

The formation surrounding this deposit consists of massive buff and blue limestone which forms the high bluff along the shore, and which has been invaded by greenstone lava, a small area of diorite, and acid and basic dikes. The showing consists of both massive bunches and disseminated sulphides in a light buff colored limestone. The showing is

exposed over only a few square feet in area along the beach line. A few tons of sulphide float are scattered along the beach and in the slide material which covers the eastern extension of this deposit. The ore occurs on a zone of fracturing at the intersection of two zones of fracturing; one set striking N. 20° E., and dipping 60-65° SE., and the other set striking N. 20° W. and dipping 50° SW. These zones of fracturing occur near the intersection of a basic and an acidic dike. The basic dike is 50 feet in width and its location is 100 feet south of the showing. The strike is N. 70° W. and the dip is 55° S. This is a trap dike nearly black in color and weathers to a greenish brown. It intersects a mass of greenstone lava and a dike or small acid stockwork which follows a northwesterly strike and is exposed at low tide along the beach.

Sulphide float pieces can be followed from the showing in place into the slide material nearly to the basic trap dike. Massive bunches of sulphides occur at the intersection of the fractures. Replacement between the fractures in the limestone is evident, but this is only partial. Some masses of sulphides occur as flat-lying lenses which follow down on the apexes of the fracture intersections toward the dike at a low angle of plunge.

The metallic minerals contained in the sulphides are, in order of abundance: Pyrite, pyrrhotite, sphalerite, stibnite, a little chalcopyrite and small amounts of gold and silver. The gangue minerals are calcite, blue and white quartz, limonite, manganese oxides, an unidentified black mineral, and lime silicates.

Sample 1082 consisted of a 10-pound sample made up of pieces taken from the outcrop and numerous small pieces taken from the larger float pieces. This sample gave returns of 0.14 oz. Au., 0.20 oz. Ag. per ton; Sb. 3.55, Zn. 1.89 and trace of Cu. percentages. One hundred to two hundred tons of this ore could be readily mined from the showing and the loose float on the beach.

September 8. Coronation Island to Kell Bay, Kuiu Island.

A zinc-lead vein was reported to the writer by I. M. Hofstad as located inland from the head of Kell Bay. The showing is situated inland, two miles west of the head of Kell Bay on the south end of Kuiu Island. There is no trail to this prospect and it is most easily accessible by following the valley at the head of Kell Bay to the divide, elevation 800 feet, and thence down the Christian Sound slope along a small creek to an elevation of 550 feet. Geologically its position is along the west contact of the diorite mass which makes up the central portion of the southern end of the island. The showing consists of a breccia vein in close folded lime schist. It is exposed at the foot of a small waterfall

for a distance of 50 feet. One large cut was put into the north bank along the strike of the vein and represents the amount of development work. The vein strikes N. 65° W. and dips 82° NE. The latter is toward the main diorite. The width ranges from 3 to 4 feet with the greater portion consisting of brecciated limestone pieces. The formation of lime schist in which the zone is inclosed has the same strike, N. 65° W., but dips 75° to the southwest. This lime schist is thinly banded and platy and has been subject to close folding with a high degree of schistosity. The color varies from light gray to dark gray and blue. Some small bands of graywacke were noted interbedded in the lime schist. The limestone pieces of the vein have been cemented by silica and they are to a slight extent replaced. Small slips paralleling the walls have developed and along these slips massive seams of sulphides occur.

Port Alex. 116

The ore minerals consist of pyrite, galena, sphalerite, chalcopyrite, secondary lead, zinc and copper minerals, silver and gold. The gangue minerals consist mainly of limestone, carbonated and partly silicified, calcite, milky white, clear and drusy quartz, limonite and lime silicates.

Sample 1083 consists of a channel sample from the bed of the creek across the vein, a width of 3 feet. Results by assay amount to 0.01 oz. Au., 0.50 oz. Ag. per ton, Zn. 1.98, Pb. 0.25 and trace of copper percentages.

The area along this west contact which contains the vein is well mineralized and further prospecting in the area is warranted.

September 9. Return to Petersburg.

September 10. Petersburg to Tracy Arm.

September 11. Examination of Neglected Prize, Tracy Arm.

Sept. 11, 15

KR-1145-3

The Neglected Prize is a copper-lead-zinc prospect located on Tracy Arm, one mile south of the first elbow. A blazed trail leads up along the west side of the first creek past the point of the elbow to the east. The workings, which consist of several opencuts and a short shaft, are located along a high bench land which follows the east shore of the outer arm at an elevation of 800 feet. This prospect was discovered by Alex Butterball in 1916. The greater portion of the cuts and the shaft were sunk following this discovery. In the years 1922 and 1923 the property was relocated by Eugene Owens and additional cuts extending the length of the vein were dug. Since then no work has been performed on the prospect.

Butterball

The showing is contained in a belt of gneissic schist one-fourth mile in width and inclosed between a massive wide zone of diorite to the east and a narrow zone of diorite to the west. This zone strikes N. 25-35° W., which conforms to the normal strike found along the west contact of the Coast Batholith. The dip of the schistosity in the gneiss, and of the veins noted in the zone, are steeply to the west, which is contrary to the persistent east dip of the sediments and schist found along the west contact. This west dip may be explained by the overturning of the beds from a steep east dip to a steep west dip by continuous overlying pressure and weight. The gneissic schist is thinly banded and folded with considerable metamorphism evident. Metamorphic bands of phyllite are evident within the zone and due to their presence the writer is of the opinion the other schists were sedimentary, which are now altered beyond recognition. Gneissic and banded structures are prevalent throughout the zone. Paralleling the strike of the schistosity and the zone are mineralized zones which range in width from 10 to 50 feet. Three such zones were noted and the sulphide veins of this prospect occupy the central portion of one of the larger zones.

Sumdum 115

The high bench ridge along which this vein is situated is covered with timber and vegetal growth. The vein is exposed in eight cuts and at the collar of the shaft, reported to be 16 feet in depth, for a distance of 700 feet. The strike is N. 35° W. and the dip is 80° SW. Over the exposed length the vein maintains an average width of 5 feet. Both walls are gneissic schist with some shearing paralleling the strike. Generally, the sulphides range from nearly massive near the center to lean disseminations into the walls. Along some of the shears near the center of the vein, which denotes a reopening of the vein, later sulphides consisting mainly of marcasite and some pyrite with minor amounts of sphalerite, galena and chalcopyrite, form massive bands. These range from seams to widths of 4 or 5 inches. The metallic sulphides noted in this ore are, in order of abundance: Pyrite, pyrrhotite, marcasite, sphalerite, chalcopyrite and galena. Low gold and silver values were determined by assay. The gangue minerals consist mainly of quartz, sericite, biotite, limonite, and other unidentified minerals.

Samples 1084 to 1091 represent channel samples from seven cuts and one at the collar of the shaft across the vein, ranging in width from 4 to 6 feet. These gave gold and silver values ranging from traces to 0.12 oz. per ton in gold and a trace to 1.60 oz. per ton of silver. Zinc ranges from 1.53 to 13.50 per cent, averaging 5 to 6 per cent. Copper ranged from 2.41 to 6.31 per cent and averaged 3 per cent.

Further prospecting and surface development is warranted on this prospect to extend the limits of the vein along the strike, followed by detail geological mapping.

September 12-13. Return to Juneau.

Territory of Alaska
DEPARTMENT OF MINES

Excerpt from
SUMMARY REPORT OF MINING INVESTIGATIONS
IN THE KETCHIKAN, WRANGELL, PETERSBURG
AND JUNEAU PRECINCTS BY J. C. ROEHM.
May 24 - June 27, 1942.

The Mahoney Prospect is located on the west shore of George Inlet, 4 miles north of the Cannery on the north side of Mahoney Creek at its mouth. A trail leads from the north shore of a small lagoon at the mouth of Mahoney Creek to the adit, 250 feet from the beach at an elevation of 50 feet.

This prospect was originally known as the Ashe group and is described by Wright, F. E. & C. W., in Bulletin No. 347, "The Ketchikan and Wrangell Mining Districts", pp. 150-151.

This showing consists of a bedded vein ranging from 12 inches to 3 feet in width, averaging over 2 feet, and is exposed in twelve surface cuts and one adit. The strike is in a general east-west direction and it is exposed on the surface for 400 feet.

The geology and structure surrounding this showing is of interest; however, a complete survey of conditions could not be made due to extensive cover. This compound bedded vein is inclosed in black slates which, due to their overlying positions relative to a small protruding tongue of quartz diorite to the south, have been folded in gentle plunging anticlines and synclines and along which a schistose structure has been developed. The footwall of the vein is a small porphyry dike along which the vein has been formed. The alternating anticlinal and synclinal folds have a width of nearly 150 feet measured from crest to crest, and they were apparently formed by the pressure and thrusting of the intruding quartz diorite. Associated with this folding was the injection of three different types of dikes into the sediments (alternating sandstones and slates) paralleling the bedding and occupying the crests and limbs of the developed folds. The small dike associated with the vein maintains a width of from 3 to 5 feet. It is of a light gray color with inclosed greenish porphyritic crystals of unidentified nature. It has a fine grained highly crystalline texture, and appears to have a high silica content. In some localities it is slightly mineralized.

Another form of dike intercalated in the folding of the sediments is of a dark gray color and fine crystalline texture. This form weathers black and maintains a larger size than the siliceous dike along the vein. These dikes appear to be closely related to the diorite and represent the first series to have been injected. These dikes are not mineralized and have no associated veins.

The third type of dike found is situated above the vein dike and outcrops along the beach. It ranges from 2 to 3 feet in width and is intercalated with the folded structure of the sediments. This dike has a dull bluish gray color and it is very fine grained with abundant phenocrysts of blue quartz and a light green crystalline mineral. It weathers to a light reddish brown color.

The sediments as shown in this vicinity on Plate No. 1, U. S. G. S. Bulletin 800, are classed as of Triassic age. The quartz diorite, from which the above dikes are believed to have originated, is classified as upper Jurassic or lower Cretaceous. The acid dike, with associated vein, appears to be in a weaker section of the slate stratum. This stratum differs slightly in composition and texture from the other slate strata in that it represents a conglomerate phase and has become more schistose and altered by heat and pressure. It has a speckled appearance.

The vein is a compound bedded vein in that the footwall portion is banded quartz with scattered metallic minerals and the hangwall portion is made up of nearly massive sphalerite, galena, pyrite and chalcopyrite. Both the quartz portion and the massive sulphide portion reach their maximum widths at the crests of the anticlines, and gradually narrow down on the extensions of the limbs.

Two anticlines, and one syncline in between, show along the outcrops as exposed in the cuts. The vein outcrops along a general east-west strike, which is irregular due to folds and it has a variable dip of 10 to 20°, which also represents the plunge of the folds slightly east of north. The eastward extension of the vein in the long cut 120 feet northeast of the adit portal dips along the east limit of the east anticline and goes under cover. It has not been exposed on the beach 400 feet east. The westward extension was lost past St. 12 (Note sketch map) by change in strike of downward plunging limit of west anticline. This west end could, no doubt, be further extended by calculating changes in strike and dip.

A crosscut adit, elevation 50 feet, was driven and intersected the vein at a point 65 feet from the portal. Thence the vein was followed by a drift to the west for 80 feet, at which

point the drift overran the vein and was later exposed in the bottom of a 6-foot winze. At a point 20 feet west of the small winze a raise nearly vertical was extended upward 30 or 40 feet. Lack of timber prohibited the inspection of this raise. The vein as shown in the small winze plunges downward on the limb of the fold and is under the drift as it continues westward. At a point 60 feet west of the winze the vein again shows in the bottom of the drift for 30 feet. Thence again the vein dips under and the remaining drift, plus two crosscuts, one north and one south, failed to intersect the vein (Note sketch) The total underground workings consist of 172 feet of crosscut, 270 feet of drift, 30-40 feet of raise and a 6-foot winze.

The ore minerals noted in the vein consist of sphalerite (dark variety), galena, pyrite, chalcopyrite, hydrozincite, hematite, limonite and secondary lead minerals. Gold and silver are apparently contained in the ore. The gangue minerals consist of crushed and altered slate pieces, quartz, calcite, dolomite and a green variety of mica. A total of 18 channel samples were taken in the tunnel and various cuts which, with the results, will later be shown on a sketch of the adit and surface workings.

The use of a fluorescent light underground was an advantage due to the alteration of the sphalerite to a thin coating of hydrozincite on the exposed surfaces. This latter mineral gives off a bluish white glow under the ultra violet light, which in itself is almost identical in color and intensity of the illumination of the tungsten mineral scheelite. This enabled the writer to immediately determine the limits of the ore underground.

Excerpt from
SUMMARY REPORT OF MINING INVESTIGATIONS AND ITINERARY
OF J. C. ROEHM, ASSOCIATE MINING ENGINEER FOR
TERRITORIAL DEPARTMENT OF MINES IN THE
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MINING PRECINCTS
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The Khayyum mine is located one mile northwest of the Lake View prospect along the same diorite and greenstone contact. This location is three miles from the head of McKenzie Inlet and is reached by following the tramway from the beach to the aerial tram terminal, thence via trail to the workings at elevations of 2000-2500 feet.

This prospect was reported to have been discovered in 1899, and the larger part of the workings were driven in the following years 1901 to 1905, during which time the aerial tramway and tramming were extended to McKenzie Inlet. Some ore was shipped and in the year 1906 operations closed. In 1907 operations resumed for a few months and closed in the fall. According to reports, the property has been idle since then.

The geology surrounding the workings consists of a general contact zone between diorite to the south and greenstone schist and sedimentary remnants on the north. This is the same contact zone as the Lake View, however, here the zone is wider in extent and more shear zones are in evidence. Near the top of the ridge, at an elevation of 2500 feet, several cuts into scattered sulphide zones show remnants of limestone, part of which has been replaced by ore minerals. These upper bodies represent the higher grade ore. The ore occurs in sulphide bodies, lenticular in shape, along shear zones parallel to the contact. The diorite along the contact has developed a gneissic structure and the greenstone schists contain abundant contact minerals.

Various adits along the north slope into the mountain expose numerous lenticular sulphide masses. These masses occur across the contact zone 300 to 400 feet in width, and they can be traced for several hundred feet. The adits follow the strike of the ore bodies along the shears, which is N. 75-85° W., into the mountain. These adits range from a few feet to 680 feet in length. The dip of the shears and ore bodies is 80-85° N. The shears parallel the schistosity. The sulphide bodies are irregular in occurrence in the shears and of various sizes. They are contact metamorphic bodies, which show a small replacement with the limestone remnants on top, through the contact zone, and extend into mainly pyritic bodies at depth into the diorite, as shown by the lower adits. The change of the metallic mineral content of these bodies, from the upper cuts near the top to the lower adits, takes place within a short range of depth, less than 500 feet. In the upper cuts at the crest

of the mountain, the ore consists of pyrite, chalcopyrite, pyrrhotite, magnetite, bornite, malachite, azurite in a gangue of calcite, dolomite, crystalline limestones in slates, and various lime silicates with some quartz. The metallic mineral content of the sulphide bodies in the lower adits is mainly pyrite with well developed cubes and small amounts of chalcopyrite. The gangue minerals consist mainly of quartz, which forms a matrix binding the pyrite crystals with other gangue minerals such as epidote, chlorite, and hornblende. The greater portion of these sulphide bodies are pyrite and some of the bodies have widths up to 10 feet, and lengths up to 100 feet were noted. The upper bodies carry more copper, with magnetite and pyrrhotite, than the lower, however, the copper content appears to be too small in amount and the bodies too irregular and scattered to be mined under present economic conditions. These pyrite bodies could be considered as a source of pyrite ore, however, the ore contains a considerable amount of silica, which would require milling to obtain a pure pyritic ore. Whether these bodies could be mined at a profit under present economic conditions is doubtful.

Sample 1059 represents a channel sample across 6 feet of nearly massive sulphide in a short crosscut adit midway between the upper workings and the lower adits. This game results of 0.02 oz. Au., 0.20 oz. Ag. per ton, 0.52 per cent copper, and nil in nickel.

For further information and assays refer to Prof. Paper No. 1, pp. 94-96 and Bull. 347, pp. 135-138 .

The tramway and aerial tram, as well as buildings and other materials and mining machinery on the property, are deteriorated and not usable.