ROTARY DRILLING EXPLORATION OF THE RYAN LODE PROPERTIES, FAIRBANKS MINING DISTRICT, ALASKA

By Robert S. Warfield and Bruce I. Thomas

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UNITED STATES DEPARTMENT OF THE INTERIOR

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BUREAU OF MINES

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Robert S. Warfield[1] and Bruce I. Thomas[2]

ABSTRACT

A rotary drilling exploration system was tested at the Ryan Lode, Fairbanks mining district, Alaska to determine its application as a substitute for surface trenching to minimize environmental damage. The work was planned so that the data collected could be used to evaluate the open-pit mining potential of the wide shear zone that contains the gold-bearing gold-quartz veins of the lode system. The sampling method verified the payshoots that were indicated by previous private investigators in specific quartz veins. The verification of these enriched zones substantiated the reliability of the drilling method and the sampling procedure. Three wide-spaced lines of vertical holes were drilled across the shear zone. At these locations the shear zone material does not contain sufficient values, together with individual vein values, for open-pit mining. The subsurface information along with the reliability index demonstrated the applicability of the rotary drilling system as a substitute for surface trenching. The amount of work done by the Bureau of Mines at the Ryan Lode will not refute nor

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verify the estimated tonnages or unit values that were determined by previous investigators.

INTRODUCTION

During August and September 1969, and June 1970, the Bureau of Mines tested a rotary-drilling exploration system at the Ryan Lode gold properties, located 10-miles west of Fairbanks on the southeast slope of Ester Dome (See Fig. 1). The purpose of the test was to determine if rotary-drill sampling could be used in place of surface trenching for evaluating this and other similar deposits to avoid excessive environmental damage.

The Ryan Lode is a long known fairly high-grade multiple vein gold-quartz type deposit from which there was some underground production, but wet heavy ground made mining difficult and expensive. The gold quartz veins are contained in a shear zone of considerable width, reportedly 750 to 1,500 feet. The shear zone was a good test site because of the open-pit mining possibilities, the contained veins that were sampled by previous private investigators, and its favorable access. The results of the previous investigations could be used to indicate the reliability of the drilling and sampling methods. The work served a twofold purpose: (1) to determine the potential of the drilling system for minimizing exploration surface damage; (2) to determine if the precious metal content of the shear zone was high enough across a width sufficient for open-pit mining. With a reliability index developed from veins within the zone, the exploration system could be used to test other deposits with similar characteristics.

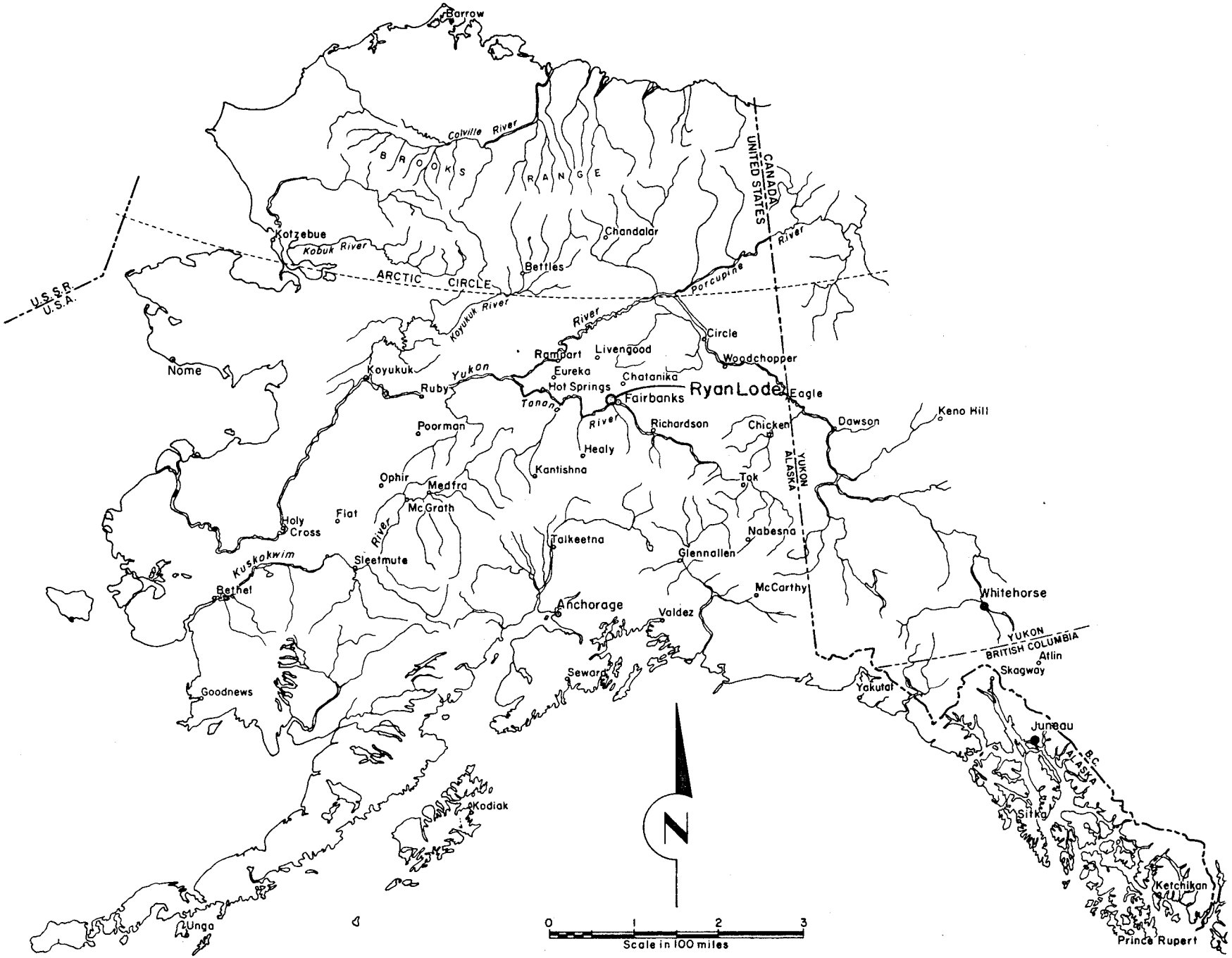

FIGURE I.- Index map of Alaska

GEOLOGY

Several publications cover the geology of the Ester Dome-Ryan Lode area. U.S. Geological Survey Open-file report, "Location and Descriptions of Lode Mines and Prospects in the Fairbanks District, Alaska"[3/], lists 34 references that cover the Fairbanks mining district. U.S. Geological Survey Bulletin 849-B, "Lode Deposits of the Fairbanks District, Alaska"[4/], gives a detailed description of the Fairbanks mining district, including the Ryan Lode; most of the following brief summary is taken from this publication.

Lode gold deposits of the Fairbanks district are concentrated in two areas--the Pedro Dome-Cleary Creek area, and the Ester Dome area. The lodes are generally fissure veins that cut various types of schists (Birch Creek Schist) of pre-Cambrian age, usually in fairly close proximity to bodies of intrusive acidic igneous rock. Four distinct phases of mineralization have been recognized. Phase 1 is characterized by barren quartz veins. Phase 2 consists of quartz, arsenopyrite-pyrite gold veins which cut both the schists and altered quartz monzonite intrusives. Most of the high-grade lodes of the district are of the phase-3 type, and characteristically contain quartz-stibnite-gold ± arsenopyrite and sulfosalts but, sulfides may be mostly absent. The phase-4 type of mineralization consists of quartz and stibnite, with little or no gold.

3/ Chapman, Robert M., and Robert L. Foster. Location and Descriptions of Lode Mines and Prospects in the Fairbanks District, Alaska. U.S. Geol. Open-file Report 279, 1967, 25 pp.

4/ Hill, James M. Lode Deposits of the Fairbanks District, Alaska. U.S. Geol. Survey Bull. 849-B, 1933, 163 pp.

The Ryan Lode is described as a fault zone of crushed schist and quartz veins from 40 to 70 ft. wide that strikes about N. 20° - 25° E., and dips 45°-70° E.,with an average dip of 50°. The enclosing schists lie nearly horizontal or dip 10°-15° ESE except near the hanging wall where the schistosity is essentially parallel. The fault zone or main-vein system, on the Ryan Lode properties, constitutes the hanging wall of a major shear zone that ranges from 750 to 1,500 ft. wide,with a zone of influence several miles long. The zone of influence probably includes a number of formerly productive properties to the north such as the Mohawk, Wandering Jew, Prometheus, Billy Sunday, and Sanford.

The main-vein system of the Ryan Lode is believed to have a continuous strike length of at least 2,500 ft. cut off on the southern end by a major fault, but traceable on the south side of the fault. Free gold, minor arsenopyrite and stibnite are the principle metallic minerals in the broken quartz and schist filling of the vein system.

HISTORY AND DEVELOPMENT

The Ryan Lode properties consist of 10 patented and 15 unpatented lode claims, and 4 unpatented placer claims; the date of the first patent survey of 5 claims is November 1914. The claims, patented and unpatented, form a consolidated group having a north-south distance along the general shear zone strike of 7,500 ft. and an average width of 2,500 ft. Location is between Ester Creek on the south, and St. Patricks Creek on the north approximately 10 miles west of Fairbanks.

The first lode claims in the Fairbanks district were staked in 1903, but it was not until 1908 that much interest was developed in lode or gold-

quartz mining. The first interest shown in the gold-bearing quartz veins of Ester Dome wasn't until 1912, and the first work recorded on the Ryan Lode was in 1913. Between 1914 and 1916 a great deal of prospecting and development work was done at Ester Dome. During the height of this intense interest the Kennecott Copper Corporation took an option on the Ryan Lode and other properties as well, and started exploration and development work in the fall of 1916. They sunk about 500 feet of shaft and winze, and drove 970 feet of drifts and crosscuts on the north orebody of the Ryan Lode. After thoroughly sampling all the workings the company dropped the options in April 1917. Shortly thereafter two of the owners of the Ryan Lode did some subsurface work on the south orebody by sinking a 65-ft. shaft and driving a cross-cut at the bottom. The property was then optioned to one individual who helped patent the principal claims. This option was terminated at the close of 1930. In 1931 the U.S. Smelting Refining and Mining Co. reviewed the history of the Ryan Lode development during a study of the lode-gold mining potential of Ester Dome. This investigation was terminated without exploration work being done on the Ryan Lode by the company.

In 1938, an option, and later, ownership was secured of the Ryan group of claims by Bartholomae Oil Corp. of Fullerton, California, and additional exploration and development commenced. Exploration and development as a result of this campaign totaled more than 1,500 ft. in shafts; 2,000 ft. of drifts, adits and crosscuts; and more than

2,800 ft. of surface trenches. Location of some of the shafts and workings is shown on fig. 2. Most of the underground development work was "A" shaft. This included cleaning out, enlarging, retimbering to the 100 ft. level, opening the incline winze to the 160 ft. level (where water level was encountered), and sinking vertically to the 200-ft. level. Six hundred feet of drifts were driven north and south from 50 ft., 100 ft., and 160 ft. levels, with 70 ft. of raises and 350 ft. of cross-cuts. Ore produced during development was treated through a custom-pilot mill to recover gold and to develop an optimum milling system which could later be adopted to the Ryan's own flowsheet in a mill built on the Ryan property. But before full scale production was attained World War II intervened.

Bartholomae interests did not attempt to reopen following World War II, but a Fairbanks group known as Gold Lodes, Inc., worked at the Ryan Lode from 1954-58 under a lease-purchase agreement. Their work consisted of surface trenching and churn-drill sampling, which confirmed earlier exploration results of a fairly high-grade vein system over widths of 5-10 ft., with strike continuity of several hundred feet. Purchase negotiations were unsuccessful, however, so the Fairbanks group dropped their hold on the property.

BUREAU OF MINES WORK

Units of the rotary drilling system of exploration used at the Ryan Lode consisted of (1) tracked trailer-mounted rotary drill with all hydraulic top drive and 6 ft. of power-head feed; (2) truck mounted

215 c.f.m. compressor; (3) cyclone separator; (4) soft terrain low-ground pressure-tracked vehicle with flat bed; (5) small diesel powered crawler tractor with hydraulic angle dozer and power winch; and (6) service truck with flat bed. The drill rod, pipe, auxiliary tools, cyclone separator and sampling equipment were carried on the soft-terrain tracked vehicle. The cyclone separator was permanently mounted, thus providing a mobile sampling unit.

The drilling system evolved into the following sequence of procedures: a length of 4-inch flush-joint-drive casing with a sealing-T device making up the upper 2 ft. was placed over NX drill rods previously attached to the top drive of the drill. Next a 4 3/4-inch tricone bit (large enough to make a hole for a 4-inch casing) was attached to the NX drill rod, and drilling commenced. As drilling proceeded, the casing followed closely behind the bit making possible the saving of samples from the very upper part of a hole. When enough hole was drilled in which to seat the casing, everything was withdrawn, the 4 3/4-inch bit removed and the casing then reinstalled. A 3 1/2-inch tricone bit was next attached to the NX drill rods and the regular drilling cycle commenced. Compressed air was used as the drilling medium.

The 3 1/2-inch hole size was selected to bring about sufficient uphole air velocity to lift all cuttings from the drill hole when utilizing drilling equipment already on hand--namely a 215 c.f.m. compressor and NX drill rods. Samples were directed from the drill hole through the casing-head sealing-T device via a flexible rubber-lined hose to a cyclone separator. The system worked very well until

water was encountered. Water caused mudding and caking of the sample cuttings and thus noncomplete return of the sample to the surface. This was overcome by introducing, under pressure, additional water into the intake air stream, which caused a washing and cleaning action in the drill hole. Except for sloppy, hard-to-handle samples, this system also worked satisfactorily.

Samples were collected from the underflow of the cyclone--dry samples directly into a sample sack and wet samples into an ordinary washtub. Because of the necessity for rapidly handling wet samples in order to keep pace with the drilling cycle, fairly large amounts of slimes were sometimes discarded from the washtub to waste. As a check to determine whether a disproportionate amount of gold was being discarded, as compared to the saved sample, total slimes from three samples, 137.5-152.5 ft. of hole 2 were saved and assayed for gold by the University of Alaska. The average of the three slime assays was 0.014 ounce gold per-ton as compared to an average of 0.006 ounce gold per-ton for the regular sample. By the time this was discovered, the 1969 field season had ended. It was intended that additional slime samples be collected during the June 1970 drilling but with the exception of the bottom 10 ft. of hole 25, not enough water was encountered that extensive mudding and caking of samples occurred. The deleterious effects of small inflows of water, it was discovered, could be overcome by rapidly carrying out the drilling process and to some extent by the drying action of hot compressed air. No detailed records of drilling

times were kept but penetration rates were generally in excess of 0.5 ft. per minute.

Rotary test drilling of the Ryan Lode properties consisted of 26 vertical holes in three lines totaling 3,652 lineal ft. of hole. The lines were approximately normal to the strike of the vein system and spaced on either 50 or 75 ft. centers--close enough that a complete cross section of the 10°-15° dipping shear zone schist materials and of the 50°-70° dipping vein systems would be obtained. Such a pattern also intersected any parallel veins within the shear zone. Figure 2 shows the plan location of drill holes and figures 3, 4, and 5 are cross-sectional views of each line of drill holes giving all assay data.

Hole 1, located about 60 ft. east of the Ryan Lode south orebody outcrop in the hanging wall, was collared August 23, 1969. From this location 10 additional holes were spaced on about 50 ft. centers in a northwesterly direction along an old trench. Hole 11, completed September 24 ended the 1969 field season. Holes 12-18 started June 6, 1970, comprise a line of holes just south of "A" shaft main workings; hole 12 was located 65 ft. east of the apparent hanging wall outcrop. Holes 12 and 13 each encountered underground workings at depths of 105 ft. and 52.5 ft. respectively.

Holes 19-26 comprise a line of holes in the vicinity of "B" shaft along the apex of a low ridge between the northern workings of "A" shaft and the south orebody. Hole 26 was bottomed June 25 to

complete the Bureau of Mines drilling campaign of the Ryan Lode.

Analysis of the assay data does not appear to indicate sufficient enrichment of schist shear-zone materials enclosing the main-vein system and probable parallel veins to support large-scale open-pit mining. Analysis of the assay data does, however, appear to attest to the accuracy of the sampling system. For example: In hole 2, a hole purposely located to intersect the south orebody vein at shallow depth, the interval 4.5 ft. to 17.5 ft. had a weighted average gold assay of 2.82 troy ounces per-ton. In hole 14, the interval 10 ft. to 60 ft. had a weighted average gold assay of 0.308 ounce per-ton. Both fire assaying and atomic-absorption assaying were used as indicated on figures 3, 4, and 5.

Logs of drill holes were kept by occasional observation of materials entering or leaving the cyclone separator and by observation of drill penetration rates. Representative examples of entire hole logs are presented in Table 1, and summaries of individual hole logs are presented in Table 2.

ENVIRONMENTAL ASPECTS

The Ryan Lode properties with the exception of roads, surface trenches, and developed areas, is densely covered by poplar, birch and spruce trees and in places, by alders, particularly where previous surface disturbance has taken place. In order to carry out the drilling program, it was necessary to clear the non-previously cleared parts of drill lines of trees, but only minimal surface soil disturbance was

necessary. Natural reforestation of cleared areas should begin during the 1971 growing season. This system of exploration versus a surface trench wherein vegetation does not occur until after erosion and sloughing resoil exposed bedrock would seem an environmentally acceptable substitute.

No detailed cost estimates were made, but in the judgment of the authors, drilling a line of holes on the non-permafrost Ryan Lode properties during summer months was probably considerably more costly than a surface trench of equal length bulldozed at the same time of year. But if the surface was frozen and/or exploration took place in a permafrost area, costs would tend to equalize. Additionally, if environmental requirements did not allow time (probably a good many years) for natural revegetation of a surface trench in an area such as the Ryan Lode and backfilling became necessary, then perhaps even here costs would tend to equalize. Another advantageous feature of rotary drilling versus trenching is the greater resultant value gained in the form of subsurface exploration knowledge.

Table 1. - Logs of Ryan Lode rotary-drill holes, Fairbanks Mining District[1/] [2/]

Location : See Fig. 2
Elevation of collar: 1,143 feet
Dip of hole : Vertical
Dates drilled : June 10-11, 1970

Depth, ft From	Depth, ft To	Material	Remarks
		HOLE 13	
0.0	1.0	Soil, vegetation.	No sample, 4 3/4 in. hole.
1.0	6.0	Schist.	4 3/4 in. hole, 4 in. casing set to 6 ft.
6.0	9.0	Schist with quartz stringers.	3 1/2 in. hole.
9.0	14.0	Quartz, probably vein.	-
14.0	17.0	Schist.	Caving, losing air, reamed and installed 4 in. casing to 16 ft.
17.0	20.0	Schist with quartz stringers.	New 3 1/2 in. bit K7T8985.
20.0	40.0	Schist with very occasional quartz stringers.	-
40.0	45.0	Much quartz.	-
45.0	50.0	Quartz lower 1 ft.	June 11, 1970.
50.0	52.5	Some quartz.	Lost air and cuttings at about 52.5 ft., probably old workings, ran down to 55 ft. but no sample from 52.5 ft.

Location : See Fig. 2
Elevation of collar: 1,147 feet
Dip of hole : Vertical
Date drilled : June 11, 1970

Depth, ft From	Depth, ft To	Material	Remarks
		HOLE 14	
0.0	1.0	Soil vegetation.	No sample, 4 3/4 in. hole.
1.0	6.0	Schist.	4 3/4 in. hole, 4 in. casing set to 6 ft.
6.0	20.0	Schist.	3 1/2 in. hole, continued with K7T8985, soft fast drilling.
20.0	25.0	Quartz upper 1 ft.	Large sample, probably some cave.
25.0	30.0	Schist, quartz lower 0.5 ft.	-

See footnotes at end of table.

Table 1. - Logs of Ryan Lode rotary-drill holes, Fairbanks Mining District[1/] [2/]--Continued

Depth, ft From	Depth, ft To	Material	Remarks
		HOLE 14--Continued	
30.0	35.0	Schist, quartz stringers about 33 to 35 ft.	-
35.0	40.0	Schist, quartz stringers upper 2 ft. and lower 1 ft.	-
40.0	45.0	Schist, quartz stringers upper 3 ft.	Slow drilling.
45.0	60.0	Schist.	Fast drilling.
60.0	65.0	Schist, quartz stringers lower 1 1/2 in.	-
65.0	70.0	Schist, quartz stringers upper 2 in.	-
70.0	75.0	Schist.	Fast drilling, large sample.
75.0	80.0	Schist, quartz stringers lower 1 in.	-
80.0	115.0	Schist, very occasional quartz stringer.	Fast drilling.
115.0	135.0	Schist, very occasional quartz stringer.	Fast drilling.
135.0	150.0	Schist, very occasional quartz stringer.	Fast drilling.
150.0	155.0	Schist, several quartz stringers.	Bottom 5:10 p.m.

Location : See Fig. 2
Elevation of collar: 1,223 feet
Dip of hole : Vertical
Dates drilled : June 24-25, 1970

Depth, ft From	Depth, ft To	Material	Remarks
		HOLE 26	
0.0	2.6	Soil, vegetation.	4 3/4 in. hole, no sample.
2.6	6.0	Dirt, quartz fragments and gray schist.	4 3/4 in. hole, fast drilling, 4 in. casing set to 6 ft.
6.0	10.0	Tan schist.	Fast drilling, new 3 1/2 in. bit.
10.0	15.0	Tan schist.	June 25, 1970, fast drilling.
15.0	20.0	Tan to gray schist.	Fast drilling.

See footnotes at end of table.

Table 1. - Logs of Ryan Lode rotary-drill holes, Fairbanks Mining District[1/] [2/]--Continued

Depth, ft		Material	Remarks
From	To		
		HOLE 26--Continued	
20.0	25.0	Tan to gray schist.	Fast drilling.
25.0	30.0	Dry and dusty tan to gray schist.	Fast drilling, but tough.
30.0	35.0	Tan to gray schist with a few quartz fragments.	Tough drilling.
35.0	40.0	Tan schist.	Tough drilling with rough spots.
40.0	45.0	Gray schist.	Tough drilling.
45.0	50.0	Gray schist.	Tough drilling.
50.0	55.0	Tan schist.	Tough drilling with tough spots.
55.0	65.0	Tan schist.	Fast drilling.
65.0	75.0	Tan to gray schist.	Fast drilling.
75.0	115.0	Tan schist.	Fast drilling.
115.0	120.0	Gray dusty schist.	Medium tough drilling.
120.0	135.0	Tan schist.	Fast drilling.
135.0	140.0	Gray schist.	Medium tough drilling.
140.0	145.0	Tan schist.	Fast drilling.
145.0	150.0	Tan schist.	Rough fast drilling.
150.0	155.0	Tan to gray schist.	Fast drilling, hole bottomed at 11:35 a.m.

1/ Holes 13 and 14 logged by R. S. Warfield, Mining Engineer, Bureau of Mines, Alaska Field Operation Center.

2/ Hole 26 logged by R. J. Kemp (seasonal employee), Engineering Equipment Operator, Bureau of Mines, Alaska Field Operation Center.

Table 2. - Log Summaries of Ryan Lode Individual Rotary-drill holes, Fairbanks Mining District

HOLE 1
Collared August 23, 1969; schist with occasional to much quartz; hit water at about 35 ft.; attempted to work out a system of water injection; down 4 days repairing drill power head; abandoned August 29, 1969 at 97.5 ft. because of repeated plugging of bit.
HOLE 2
Collared August 29, 1969; intersected south-orebody vein 4.5-17.5 ft. (determined from assays); hit water at about 40 ft.; injected additional water from 52.5 ft.; added detergent to injection water as a foaming agent to help lift cuttings from hole; schist with occasional to much quartz; saved slimes 137.5-152.5 ft. for separate assay by University of Alaska; bottomed at 152.5 ft. September 1, 1969.
HOLE 3
Collared September 2, 1969; hit water at about 35 ft.; injected additional water from 47.5 ft.; schist with occasional to much quartz, bottomed at 152.5 ft. September 3, 1969.
HOLE 4
Collared September 3, 1969; hit water at about 35 ft.--started water injection; schist with occasional to much quartz; small samples from 77.5-112.5 ft.; bottomed because of plugged bit at 112.5 ft. September 4, 1969.
HOLE 5
Collared September 4, 1969; hit water at 35 ft.--started water injection; schist with occasional to much quartz; smaller sample 122.5-127.5 ft.; bottomed September 5, 1969 at 152.5 ft.

Table 2. - Log Summaries of Ryan Lode Individual Rotary-drill holes, Fairbanks Mining District--continued

HOLE 6

Collared September 6, 1969; schist with occasional to much quartz; exceptionally slow drilling 57.5-62.5 ft.; larger than normal sample 127.5-132.5 ft.; bottomed September 6, 1969 at 152.5 ft.

HOLE 7

Collared September 9, 1969; drill crew reduced by one man for holes 7-11; lost air circulation between 7.5-9.5 ft.--no samples 9.5-11.5 ft.; power-head drive spindle broke at 82.5 ft.--down 2 days for repairs, schist with occasional to much quartz; slow tough drilling 87.5-112.5 ft.; small samples 112.5-125.0 ft.; hole bottomed September 12, 1969 at 125.0 ft. because of worn out bit; when pulled, lower 20 ft. of rods were wet and muddy, which is probably reason for small samples.

HOLE 8

Collared September 13, 1969; schist with occasional to much quartz; damp section at about 90.0 ft. but not necessary to inject additional water; slow tough drilling 97.5-112.5 ft.; very small sample 132.5-137.5 ft.; injected water 137.5-142.5 ft.--very slow drilling--sample recovery good; hole bottomed September 16, 1969 at 142.5 ft.

HOLE 9

Collared September 17, 1969; schist with occasional quartz; damp and somewhat small sample 77.5-82.5 ft.; small sample 122.5-125.0 ft.; hit water at about 128 ft.--injected additional water; hole bottomed September 18, 1969 at 182.5 ft.

Table 2. - Log Summaries of Ryan Lode Individual Rotary-drill holes, Fairbanks Mining District--continued

HOLE 10

Collared September 19, 1969; schist with occasional quartz; a few damp and smaller samples 97.5-182.5 ft. but not necessary to inject additional water; very slow tough drilling 172.5-182.5 ft; bottomed at 182.5 ft. September 22, 1969.

HOLE 11

Collared September 23, 1969; schist with occasional to much quartz; samples damp and a few smaller 42.5-107.5 ft.; slow drilling 82.5-107.5 ft.; bottomed at 107.5 ft. September 24, 1969; bit worn out; end of field season.

HOLE 12

Collared June 6, 1970; about 65 ft. east of apparent hanging wall outcrop; schist with occasional quartz stringers; intersected underground workings at about 104-105 ft.; added 10 ft. of drill rod to 114 ft. without hitting sill; bottomed June 8, 1970.

HOLE 13

See Table 1.

HOLE 14

See Table 1.

HOLE 15

Collared June 12, 1970; schist with occasional to much quartz; mostly tough drilling 110-155 ft.; damp small samples 145-155 ft.; completed at 155 ft. June 12, 1970.

HOLE 16

Collared June 13, 1970; schist with occasional to much quartz; slow tough drilling 90-107 ft.--estimated 60 percent of sample 100-105 ft. quartz; bottomed at 155 ft. June 13, 1960.

HOLE 17

Collared June 13, 1970; schist with occasional to much quartz; small damp sample 120-125 ft.; slow tough drilling 150-154.5 ft.--much bluish-white quartz 151-154.5 ft.; bottomed at 155 ft. June 15, 1970.

Table 2. - Log Summaries of Ryan Lode Individual Rotary-drill holes, Fairbanks Mining District--continued

HOLE 18

Collared June 15, 1970; schist with occasional to much quartz; completed June 16, 1970 at 155 ft.

HOLE 19

Collared June 17, 1970; 1st hole of line along apex of low ridge; schist with occasional to much quartz; completed June 18, 1970 at 155 ft.

HOLE 20

Collared June 18, 1970; schist with occasional to much quartz; ran same bit as Hole 19 which was run to destruction at 109 ft.; bottomed at 109 ft. June 19, 1970.

HOLE 21

Collared June 19, 1970; schist with occasional to much quartz; bottomed 2:10 p.m. at 155 ft. June 19, 1970; 50 minutes off for lunch.

HOLE 22

Collared June 19, 1970; schist with occasional to much quartz; small sample 150-155 ft.--bottom rods wet when pulled from hole; bottomed at 155 ft. June 20, 1970.

HOLE 23

Collared June 20, 1970; schist with occasional to much quartz; tan colored schist to 130 ft. then changed to gray schist--gray schist apparently had higher silica (quartz) content as evidenced by slower tougher drilling; bottomed at 155 ft. June 22, 1970; when pulled, lower 70 ft. of rods were wet.

HOLE 24

Collared June 22, 1970; tan schist with occasional to frequent quartz stringers to 140 ft. then gray schist--tan schist apparently had higher silica content in this hole; bottomed at 155 ft. June 23, 1970; water accumulated to 40 ft. during lunch interval between bottoming and pulling.

Table 2. - Log Summaries of Ryan Lode Individual Rotary-drill holes, Fairbanks Mining District--continued

HOLE 25

Collared June 23, 1970; schist with occasional to much quartz; intersected strong water strata at 110 ft.--small wet samples 110-120 ft.; bottomed at 120 ft. June 24, 1970; water was allowed to accumulate for a few minutes then the hole was flushed by blowing to obtain sample 115-120A.

HOLE 26

See complete log, Table 1; this hole completed the Ryan Lode drilling program.