

May 1947

UNITED STATES  
DEPARTMENT OF THE INTERIOR  
J. A. Krug, Secretary

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BUREAU OF MINES  
R. R. Sayers, Director

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SUPPLEMENTAL REPORT

RED DEVIL MERCURY-ANTIMONY MINE

SLEITMUT, ALASKA

By

W. S. Wright and F. A. Rutledge

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<sup>1/</sup> Mining Engineer, Bureau of Mines, Juneau, Alaska

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## INTRODUCTION

The first Bureau of Mines examination of the Sleitmut mercury area in southwestern Alaska was made in July 1942 by Burr S. Webber <sup>2/</sup>. After outlining a program of trenching and sampling Webber started exploratory work in mid-July. Surface exploration consisted of more than 2000 feet of bulldozer and hand trenching and the collection of 163 channel samples. Trenches, ranging in cross section from 2 by 3 to 24 by 10 feet, were excavated at intervals of 30 to 150 feet across the strike of mineralized zone. Samples 6 by 12 inches on cross section, were out across are lenses exposed in the trenches.

Robert E. Wallace of the Geological Survey cooperates with the Bureau of Mines in mineral examination and mapping.

Encouraged by favorable trench exposures, the Bureau outlined a sinking and drifting program for the winter of 1942-43. The

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<sup>2/</sup> Mining Engineer, Bureau of Mines, Juneau, Alaska

underground work was started in December 1942 under the supervision of Norman Ebbley, Jr., 3/ and completed March 31, 1943. The Main shaft, having been sunk by the owners 30 feet on a 59-degree incline, was extended to a depth of 55 feet. A station was out at 41 feet and a crosscut was driven 30 feet to intersect to the northwest the first 22 feet of drift on the 276-foot level. Both faces of the drift were in ore at this stage.

Starting at the shaft station the Bureau drove a heading 26 feet around the shaft toward the foot wall, but encountered no ore.

Exploration by the Bureau was also conducted on the 325-foot level. A cross cut 106 feet from the portal was extended from 40 feet to 166 feet. The advance by the Bureau amounted to 204 feet of crosscutting and drifting as well as 25 feet of shaft sinking.

Subsequent development by leasees amounted to 1,764 feet. In September 1946 at the close of the operating season virtually all ore above the 236-foot or lowest working level had been removed. The greater part of this ore had been mined and furnace during the war years, 1943 to 1945. the Kuskokwim Mining Co. suffered a loss in their 1946 operation because of an unforeseen low mercury price at the close of the year.

3/ Mining Engineer, Bureau of Mines, Juneau, Alaska

For this reason and because of a lack of developed ore the Red Devil leasees have decided to discontinue mercury mining until such time as a more favorable mercury market develops.

The operation history, including production data, loss and profit statements, lease agreements, and mine records were submitted to the Bureau of Mines by Harold Schmidt, company manager. A study of records led to a final destination to examine and map the mine and sample the lower workings. This work, conducted in conjunction with a mercury project on the Holtna River in southwestern Alaska, was started April 1, 1947. Ten days were required for transporting fuel from the Kuskokwim River to the power house, starting engines and pumps, and dewatering the mine. The authors then proceeded with the work of examining, sampling, and mapping.

#### ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to national security and economy. It is the policy of the Bureau to publish the facts developed by each project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, Chief, conducts preliminary examinations, performs the actual investigative work, and prepares the final report. The Metallurgical Branch, Oliver C. Halston, Chief, analyzes samples and performs beneficiation tests.

Mineral investigation in Alaska are under the supervision of Robert S. Sanford, Acting Chief, Alaska Division.

Special acknowledgment is extended to partners of the Kuskokwim Mining Co. who submitted historical, financial, and operating data for this report, and furnished the fuel and equipment for dewatering the mine.

Analytical tests on samples were made by H. E. Peterson of the Metallurgical Division.

#### LOCATION AND ACCESSIBILITY

The Sleitmut mercury area is at latitude 61 deg. 46 „ N. and longitude 157 deg. 20 „ W. and about 8 miles downstream from the village of Sleitmut as shown in figure 1. The cinnabar occurrences discovered to date are situated within a rectangles about 4

miles long and 2 miles wide. Figure 2 shows the location of the Red Devil mine in relation to the other mines and prospects of the area.

Sleitmut is a native village on the Kuskokwim about midway between Bethel and McGrath which are 500 miles apart. Shallow draft ocean-going vessels ascend the river about 80 miles from its mouth at Bethel where freight is transferred to river boats serving the villages as far inland as McGrath.

The population of Sleitmut, changing with the season, is about 75 in July and August during the salmon run and no more than half that number during the trapping season. In normal times, the several trading posts serving the region carry adequate stocks of living essentials, including gasoline and oil.

Figure 2 location of the mercury mines and prospects – sleitmut area

TEXT RETYPED FROM ORIGINAL

The Bureau of Indian Affairs maintains a school at the Sleitmut and a hospital at Bethel. Telegraphic communication by radio phone is possible from Fairbanks or Bethel, by routing through McGrath and Flat, thence to Sleitmut. This service at Sleitmut is an accommodation of the Bureau of Indian Affairs, available only during the regularly scheduled periods of transmission of their official messages.

Travel into the area is almost entirely by airplane. A weekly mail plane from Fairbanks makes scheduled stops at all villages along the Kuskokwim, including Sleitmut. Charter plane service is available at McGrath, Crooked Creek, Aniak, and Bethel. The area is isolated for a period of about one month during "freeze-up" in the fall and "break-up" in the spring at which times the river is full of floating ice. In 1943 the New Idria-Alaska Quicksilver Mining Co. built a landing strip 2 miles downstream from the Red Devil mine.

The mail planes carry 500 to 1000 pounds of freight and passengers in addition to the mail bag. Air express or air freight rates are: Fairbanks to Sleitmut, 24 cents a pound; McGrath to Sleitmut, 7 cents a pound; and Bethel to Sleitmut, 11 cents a pound.

The steamship minimum freight rate from Seattle to Bethel is \$22.50 a ton. River-boat freight rate from Bethel to Sleitmut is \$30.00 a ton; the downstream rate between the two points is \$15.00. Freight rates, both from Seattle and on the river are increased on bulky items. Including \$5.00 a ton handling charge at Bethel, freight rates from Seattle to Sleitmut will average about \$65.00 a ton.

#### HISTORICAL FEATURES AND CLIMATE

The valley of the Kuskokwim, except along its lower reaches, is moderately wide. Generally, the river meanders basic and forth across the valley and is flanked by ox-bow pounds and marshes now being filled by growth of mosses, low shrubs and stunted spruce progressing inwardly from their edges. Many of these out-off loops have been filled and again inclined by the river, exposing the accumulations of plant material as thin beds of peat. Through the Sleitmut area, the river is more deadly confined. Intricate patterns of folds and fault lines observed in the high out banks

below the village of Sleitmut, suggest the likelihood that the river here occupies a position within the broken crest of northwesterly trending anticline.

The region is unglaciated. In the Sleitmut area the low rounded hills lying athwart the Kuskokwim, have a general alignment paralleling the region northwesterly strike. The outstanding topographic feature is Barometer Mountain, elevation 2550 feet, the summit of which is clear in fair weather and becomes enshrouded with fog in advance of rain.

Along the banks of the river, and for short distances up the tributaries, there are many fair stands of spruce. The larger trees will yield one-inch boards up to a foot in width, two-inch planting 10 inches wide and structural timbers up to 6 by 8 inches. Other trees in order of their abundance are; quaking aspen, balsam, poplar, white birch, and shrubby maple. At elevations of a very few hundred feet

above the river, tree growth is absent, leaving only the usual carpet of moss, shrubs and herbaceous plants. Of the shrubs, by far the most common is the dwarf birch.

Average annual precipitation in the area approximates 20 inches, the greater portion of which is rainfall during the months of June to September, inclusive. During the summer the climate is mild with moderate nearly constant winds and frequent light rains. Winter sets in usually in October, and continues until May with minimum temperatures of 30 to 50 degrees below zero during December and January. The depth of snow seldom exceeds three feet.

#### HISTORY AND PRODUCTION

The first discovery of cinnabar in the Sleitmut area was made in 1906 at the Parks prospect on the north bank of the Kuskokwim 3 miles downstream from Red Devil mine and 15 miles upstream from Georgetown. Over a period Parks prospected the deposit and occasionally resorted a little mercury in conjunction with his occupation as a trader. From 1906 to 1941 the Parks deposit yielded 700 pounds of mercury, virtually the entire Alaskan production during that period.

The first discovery of the cinnabar on the south side of the Kuskokwim was made by Hans Helverson in 1921 at the Barometer deposit two claim lengths northwest of the Red Devil mine. To date, the Barometer has yielded a little more than 10 flasks of mercury mostly from float and detrital material.

Again in 1933 Halverson traced cinnabar float in a small stream bed on the left of the Kuskokwim 8 miles downstream from Sleitmut, discovered the source about 1000 feet from the river, and made the original Red Devil claim locations. A few years later a half interest was acquired by Niek Mellick and additional claims were jointly staked.

Halverson and Mellick started production of mercury in a small way from creek bed float and detritus in vicinity of the loads. Eleven flasks of mercury were retorted from selected ore with several used Johnson McKay tubes operated singly and without the addition of lime to the ore. The installation of 2 "D" retorts in 1940 increased production to 158 flasks for that year. Production in 1941 was 135 flasks and, during the first part of 1942, 117 flasks. During these years the partners had sluiced the overburden from the southeast extremity of the ore zone leaving, however, a considerable depth of bedrock rubble. It was ore from this loose material that yielded much of the early production.

An edit at an elevation of 311 feet above sea level was next driven from the open put a distance of 90 feet northwest. This furnished the balance of the Red Devil production prior to the midseason of 1942. The backs over this edit are negligible.

A second edit was started in the 1941 at a point 70 feet north of the portal of the 311-foot edit and at an elevation of 325 feet. The portal of the two edits is shown in figure 3. The drift on the 325-foot level was driven 130 feet northwest along the strike of the formations. No ore was encountered but a showing of cinnabar 40 feet

from the portal encouraged the owners to drive a crosscut 50 feet southwest. Also a crosscut at a point 106 feet from the portal was driven 40 feet S. 57 degrees W. Both crosscuts penetrated barren greywacke.

The owners started the Red Devil shaft 55 feet southeast of the 311-foot edit portal, and sunk to a depth of 30 feet on a 59-degree incline. At that depth it appeared that the shaft was leaving the ore in its hanging wall.

In the fall of 1942 Harold Schmidt and L. J. Stampe of Fairbanks scoured a lease on the claims. A little later the New Idria Quicksilver Mining Co. was formed with Harold Schmidt as superintendent. The new company brought in mining and furnacing equipment and resumed production on a larger scale. During the period of the sub-lease the New Idria-Alaska Quicksilver Mining Co. completed 632.3 feet of drifting and 134.9 feet of crosscutting on the 325 foot level, as well as 128.1 feet of drifting and 115 feet of crosscutting on the 38+-foot level. See figure 3. The company installed a 40-ton rotary kiln and condensing system. By June 30, 1944, production amounted to 2652 tons of ore from which 1096 flasks of mercury were recovered. The principal source of the ore was the 72 stops above the 325-foot level, and stops 1, 2, and 3, above the 267-foot level.

A discouraging mercury market caused the New Idria-Alaska Quicksilver Mining Co. to curtail operations for the remainder of 1944.

In February, 1945 a contract to extend the Red Devil shaft to a greater depth was granted the Kuskokwim Mining Co., a partnership consisting of Harold Schmidt, L. J. Stampe, Earl Ellingan, and Glen Franklin. The latter company sank 44 feet to the present bottom of the main shaft, and started crosscutting and drifting on the 236-foot level. In the summer of 1945 the Kuskokwim Mining Co. obtained a sublease to mine ore and use the furnacing equipment. The mine and plant were operated by the Kuskokwim Mining Co. for two 4-month seasons in 1945 and 1946, respectively. Development during the period amounted to 271 feet of drifting and 29 feet of crosscutting on the 325-foot level, 40 feet of winze below the 325-foot level, 40 feet of shaft sinking on "1" ore body, 228 feet of drifting and 125.5 feet of crosscutting on the 236-foot level and 32 feet of sinking below the 236-foot level. Production in the 1945 was 962 flasks from 2652 tons of ore; in 1946, 491 flasks were produced from 872 tons. The price of mercury was so low that the company suffered a loss in 1946 and was obliged to discontinue operations. At the close of the 1946 operating season little available ore remained above the 236-foot level.

On January 21, 1947, the New Idria-Alaska Quicksilver Mining Co. sold to Harold Schmidt and L. J. Stampe all mining and furnacing equipment at the Red Devil mine. Schmidt and Stampe hold a lease on the property and are now the sole owners of all equipment thereon.

#### PROPERTY AND OWNERSHIP

The property consists of 9 unpatented claims as follows: Red

Devil No. 1, No. 2, No. 3, and No. 4; Kosko No. 1, and No. 2; and Eurion No. 1, No. 2, and No. 3. They are within the Georgetown District in the Fourth Judicial Division of Alaska. The claim records are filed in the office of the U. S. Commissioner at Aniak, 135 miles downstream from Sleitmut.

The owners are Niek Mollick and Hans Halverson, of Sleitmut, Alaska.

#### DEVELOPMENT

The main opening of the southeast part of the mine is a single compartment inclined shaft with collar elevation 311 feet above sea level. Working levels occur at elevation of 276 and 236 feet. The shaft extends 11 feet below the 236-foot level making a total inclined depth of 99 feet. The shaft, 7 by 9 feet in cross section is equipped with a ladder, 2-inch air and water pipes, and skids. The skids are made of 2- by 4-inch boards nailed longitudinally over 6-inch timbers spaced 21 inches center to center. Ore is hoisted from the mine in a 12-cubic foot self-dumping skip which discharges into a 50-ton wooden storage bin. The shaft is serviced by a 12-horsepower single-drum electric hoist.

The shaft was sunk in ore for the first 30 feet, but was ontierly within the footwall for the remaining 69 feet. At the 276-foot elevation a 30-foot crosscut was driven southeasterly to the ore zone. Drifting from this intersection extends 11 feet southeast and 139.1 feet northwest. Stope 1, as shown on figure 3, was worked above the first 17 feet of drift northwest of the intersection. Stope 2 was

worked from ore between points 34 and 47 feet northwest of the intersection. Stopes 1 and 2, connected 26 feet above the drift level, are on the same ore lens. Stope 3, which may be considered a part of the same lens, opens to the 276-drift through chutes at points 82 and 108 feet northwest of the intersection. Stopes 1 and 2 have

been worked to the surface, and stope 3 opens to the surface through an edit at elevation 311 feet. These three stopes yield 1100 tons of ore.

A rise from the 276-level crosscut connects to the Little No. 1 stope in the footwall of the ore zone. This stope yielded 151 tons.

At a point 60 feet northwest of the intersection on a crosscut was driven southwest 40.3 feet diagonally across the ore zone. A small amount of ore was found about midway along this crosscut and some stoping was done. A drift in the hanging wall extends 55 feet northwest from the end of the crosscut. An andesite dike 25 feet from the crosscut yielded a small amount of ore.

The crosscut from the shaft was driven beyond the intersection 50 feet into the hanging wall but no ore was revealed in the area. Subsequent caving has blocked passage into the part of the crosscut.

Development on the 236-foot level consists of 125.5 feet of crosscutting and 197.4 feet of drifting. Two winzes were sunk below the level to depths of 11.0 and 21.0 feet, respectively. At a depth of 12 feet in the 21-foot winze a drift was driven 30.5 feet northwest.

A crosscut from the shaft at the 236-foot level intersects the ore zone at 45 feet, and drifts were driven southeast and northwest from the intersection as shown in figure 3.

Southeast of the intersection at distances 25-45 feet open stopes 101 and 102, which are connected 38 feet above the drift, yielded 400 and 150 tons, respectively.

From a point at the top of the 21-foot winze, a crosscut was advanced 55 feet northeast across the ore zone and into the footwall. A narrow band of ore 25 feet northeast of the winze was drifted along for 18 feet in a northerly direction. One hundred twenty eight tons of ore were mined from 104 stope above this drift. The last 30 feet of the crosscut was in shale and exposed no ore.

Little 103 stope was started from the 236-foot level at a point 17 feet northwest of the crosscut-ore zone intersection and was advanced upward 27 feet. This stope yielded 68 tons.

Ore encountered at a point 17 feet farther northwest was drifted along for 27 feet. Stope 103 was started in this ore and advanced to the 267-foot level, yielding 250 tons of ore. The drifting was continued 45 feet northwest but only a very small amount of ore along an andesite dike was found. An 11-foot winze below stope 103 yielded 16 tons of ore.

A crosscut from the southeast end of stope 103 and extending 24 feet into the hanging wall revealed no ore.

The 31-foot adit beginning at a point 55 feet northwest of the shaft collar, extends northwest 111 feet along the ore zone. A 10-foot crosscut into the hanging wall intersects stope 3.

A total of 1325 feet of drift and crosscuts have been driven on the 325-foot level. The adit was started 70 feet north of the portal of the 311-foot adit and advanced 130 feet northwest along the strike of the ore zone. No ore was encountered in the draft, but a turn-out off a 50-foot crosscut to the southeast exposes an occurrence of ore which fails to carry across into the adit. At a point 106 feet in from the portal a crosscut was driven 40 feet S. 57 degrees W. through barren greywacke. In 1943 the Bureau of Mines advanced this heading S. 86 degrees W. 126 feet without encountering ore. The operators drove a drift N. 40 degrees W. 60 feet, thence N. 80 degrees W. 60 feet to the "72 footwall" ore body, thence 35 feet in the same direction to the main "72" ore body. The "72 footwall" ore body was mined to a point near the surface and yielded 200 tons. The main "72" ore body was mined to the surface and yielded 550 tons. From the northwest end of this main "72" ore body a crosscut was driven 17 feet toward the hanging wall of the ore zone, and ore was encountered along an andesite-greywacke contact. The "72" hanging "all" stope produced 522 tons of ore.

A winze was sunk below the main "72" stope to a depth of 39.5 feet on a 50-degree incline. Two sublevels 15 and 29 feet in length, respectively, and 22 feet apart were driven southeasterly from the winze. There working below the drift, called "72 Sublevel Stope" yielded 159 tons of ore.

An additional 850 feet of drifting on this level yielded no minable ore, though a 222-foot branch to the right (facing N. W.) off the main drift revealed small stibnite lenses, believed to be offshoots of the "F" ore body. Several toat holes near the face

and extending 10 to 25 feet into the walls of this branch drift revealed only traces of metallic sulphides.

“F” ore body, discovered by the Bureau trenching in 1942, yield 400 tons of fair cinnabar ore. The ore was hoisted up a 40-foot shaft to the surface where it was trammed in a car to “72” stope, dumped to the 325-level chute, and then transported by ore car to the storage bin.

#### GERNERAL GEOLOGY

Underground working at the Red Devil mine expose alternate layers of blocky greywacke and thin-bedded dark gray shales. The strikes of the sediments throughout most of the mine range from N. 32 degrees W. to N. 40 degrees W.; likewise, the dips over a narrow range of 55 to 62 degrees southeast. The sediments in the Sleitmut area are intruded by numerous andesite ranging in thickness from a few inches to more than 20 feet. In the Red Devil working cinnabar and stibnite occur at or near the andesite-greywacke, or andeste-shale contacts. The two metallic occur as nearly massive lenses along along the contacts, and as blebs in andesite and sediments. Surface trenching by the Bureau of Mines underground mining by the operation have disclosed an ore zone at least 1050 feet long, trending N. 60 degrees W., and ranging in width from 30 to 100 feet. The intrusive bodies often parallel the bedding, but in many places the

andesite enda abruptly and reappears along another bedding plane, or cuts across the sedimentary layers. This tendency of the intrusive bodies to be offset at irregular intervals and the close association of the metallic minerals with the andesite has resulted in the ore lenses being arranged in somewhat echelon pattern.

Aside from some gangue material found in the drift that undercuts the “F” ore body little evidence of faulting appears in the underground working. Greywacke and shale beds in the northwest part of the mine under “F” ore body have regular strikes and dips, and, in places, show evidence of intense folding.

Most of the andesites of the area are somewhat lighter in color than the usual dark grey associated with these rocks. P.S. Smith 4 in describing intrusive of Sleitmut area states:

“The andesite rocks at the Parks quicksilver prospect are in composition more like the granite porphyries than the andesite, but they contain less quartz and their field spar is rich in lime and is probably andesite. They are so much altered that few od their original minerals are preserved. The scarcity of quartz in certain of the dike rocks shows that they originally contained very little of it. Carbonates occur in the rock in considerable quantities as secondary minerals. Some of the secondary carbonate

contains small particles of cinnabar. Sericite is a common secondary mineral and the rock is generally much stained

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4/ Smith, Philip S., The Lake Clark Central Kuskokwim Region, Alaska U.S. Geol. Surv. Bull. 66 page 121.

with iron hydroxides. A specimen found near the Parks prospect, which, however, was less weathered than most of the material examined, is a porphyritic rock whose phenocrysts are composed of quartz and completely altered feldspar. The feldspar has been altered to quartz, sericite, and fine-grained undermined material. The ground mass is a fine-grained mixture of primary quartz and secondary products, which were doubtless derived from feldspars by decomposition. This rock is probably a rhyolite porphyry or latite porphyry.”

#### ORE OCCURANCES

Surface exploration and underground mining indicate the existence of three major ore shoots on the Red Devil property, namely (1) the “F” ore body, (2) the “72” ore bodies, and (3) a group of ore bodies in the southeast part of the mine.

“F” ore body was mined to a depth of about 40 feet along two roughly parallel bodies about 12 feet apart and arranged in echelon pattern. The strike of lenses is N. 60 degrees W. and the dip is nearly vertical. Very little mine realization was found in the drift directly under this ore body, and test holes 20 feet or more in length failed to locate cinnabar or stibnite occurrence of any consequence. A few mineralized stringers were found on the 325-foot level between the area under “F” ore body and the “72” ore bodies, but none was large enough to be mined economically.

The "72" ore shoot is comprised of 3 separate lenses which were mined as the footwall stope, the main stope, and the hanging wall stope. The footwall ore lens occurred entirely within the andesite, and was mined to an inclined height of 73 feet above the 325-foot level. The main of largest ore body consisted of a mineralized andesite sill and cinnabar-stibnite lenses on the footwall and hanging wall of the sill. This ore was mined to the surface as shown in figure 4. The hanging wall stope was started in andesite, but was worked upward in an andesite sill and the underlying shale. The ore was mined to an inclined height of 90 feet. The "72" shoot rakes southeast as the ore is followed downstream.

The area between the "72" ore bodies and the southeastern ore shoot apparently has not been intruded by andesites, and is practically barren of metallic minerals. The 166-foot crosscut 106 feet from the 325 adit portal penetrated the rocks of this area, and exposed only intercalated greywacke and shale. Small lenses of stibnite and cinnabar were found in crosscuts 35 and 70 feet east of the "72" footwall stope. See figure 5.

The southeast ore shoot exceeds the other two in size and production. Continuous lenses of ore have been mined from the surface to the 236-foot level. The most productive lens was mined as stopes 1 and 2 above the 236-foot and 276-foot levels. Stope widths are 2 to 5 feet and average 3 feet. Massive sulphide lenses range from a fraction of an inch to more than a foot wide, and in many places the remaining vein material contained more or less scattered blebs of cinnabar and stibnite.

The most common mineral deposits are stringers containing both stibnite and cinnabar, but there are rare occurrences in which only one of the sulphides is present.

Lenses in the southeast ore shoot rake to the southeast as do the "72" ore lenses. Stope 3 was started 73 feet northwest of the 276-foot crosscut-drift intersection, and was worked upward to a point due north in a small crosscut off the 311-foot adit as shown in figure 3. Stope 3 above the 236-foot level, showing a similar raise was mined from a lens in the hanging wall of the ore zone.

The similar trend of the mined lenses in this part of the mine indicates that the ore in stope 4 was very probably a continuation of the ore lens that was passed

through in the first 30 feet of the shaft. Operators report that the ore was mined out but the periphery of the stope was in vein material. The stope caved from the surface when mining had progressed a comparatively short distance upward.

MINING

The ore is soft and friable and breaks free from the walls. The country rock is weak and required close spacing of stulls for support of stope walls and drifts. All ore was mined from stilled stopes, the holes being drilled in the ore from stull-supported standing. Air was compressed to 100 p.s.i. in a 2-stage vertical-type air compressor and delivered to the drills through 2-inch pipe. Broken ore was trimmed in 16-cu. ft. cars to shaft on the 267-foot levels, and to the storage bin on the 375-foot level.

Water was pumped from the mine at the rate of 100 gallons a minute with a 2-inch centrifugal pump. The water flow in the mine

Varies according to the moisture content of the sub-surfaced soil but is always considerably lower than the pump capacity. Water, if left to accumulate in the mine will rise to the 276-foot level.

The amount and grade of ore extracted from various parts of the mine are shown in table 1.

TABLE 1

RED DEVIL ORE SUMARY

EGT. GRADE		RECOVERED		WIDTH	
SEASON		LEVEL	STOPE		
FEET	TONS	LBS/TON	LBS/TON		
1943-44		325	72	3	550
60					
1943-44		325	72 HW	5	522
25					
1943-44		276	1	3	350
80					
1943-44		276	2	3	300
40					
1943-44		276	3	8	450
18					
1943-44		276	4	3	250
50					
1943-44		276	5	3	80
40					

1943-44		276	SUBLEVEL	2.5	100
25					
1943-44		276	SUBLEVEL X-CUT		<u>50</u>
18					

---

Total 1943-44  
31.2

1945		325 to surf.	F	4	400
40	23				
1945		325	72 FW	3	200
20-25					
1945		325 to surf.	Explore.	4	114
20					
1945		236	101	4	400
95	70				
1945		236	102	4	150
70	66				
1945		236	103	3	<u>250</u>
60	<u>57</u>				

---

Total 1945  
48.3

1946		325	little 72		54
1946		325	72 sublevel		159
1946		276	1		29
1946		236	104		128
1946		236	little #1		151
1946		236	102 sublevel		130
1946		236	103 sublevel		16
1946		236	little #3		68
1946			float		94
1946			pillars		<u>43</u>

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Total 1946  
42.8

#### FURNACING

Two "D" retorts used by Halverson and Mellick in reducing Red Devil cinnabar ore afforded a very low capacity. In 1943, the New Idrian-Alaska Quicksilver Mining Company installed a 40-ton rotary kiln, Sirocco dust collectors, a fan, condensers, a redwood tank, a 12-ton burned-ore bin and soot mixer. Ore was reduced by the flow-sheet shown in figure 7.

Power for the reduction plant and mine was generated by two Caterpillar 46-30 diesel-electric units. The plant was operated 3 shifts a day, 7 days a week by a crew consisting of 3 firemen, 2 retort operators and two helpers whose duties included soot clean up. A plan and profile of the reduction plant is shown in figure 6.

The antimonial content of the Red Devil ore equals or slightly exceeds the mercury content. Little or no effort has been directed to producing an antimony concentrate because of the high cost of transporting such a product to market. The present (May, 1947) price of antimony is high enough to more than offset the cost of producing and shipping a stibnite concentrate. The removal of stibnite, which sublimates at temperatures over 300 degrees C, would also facilitate the reduction of mercury and possibly increase plant capacity. At furnace temperatures around 700 degrees C. antimony vapor will accompany those of mercury into the condensing system. Vapor pressures of the oxides of antimony are much less than that of mercury and, in the decreasing temperatures of the condensing system, the oxides of antimony precipitate before the dew point of mercury is reached.

Hence, it is important that in furnacing Red Devil ores a close control of temperature is essential, and, at best, considerable antimony is carried over into the condensers. In past operations the antimony oxides were eliminated in the soot by extra hoeing and retorting.

Wood was used for furnace fuel during the first 3 years but in the last year the furnace was equipped with a burner and diesel oil was used thereafter. Some difficulty in regulating the fuel and air was attributed to an improper type of burner.

#### PROFIT AND LOSS STATEMENT

A summary of the financial outcome of four seasons of operation is shown in the following statement:

New Idria-Alaska Quicksilver Mining Co.

Statement of Royalty Account to

Harold Schmidt to June 30, 1944

Computation on of Contract Net Proceeds:

Sales of product (mercury)

Produced during pre operating period:

338 flasks (plus 38.5 lbs. for 86.70) @ \$183.69 each  
62,954.70

Produced during operating period:

758 flasks @ \$168.49 each

127,713.00

Less, deducted account N.R.C contract	<u>18,850.00</u>
<u>108,763.00</u>	
Total received from N.R.C. for 1096 flasks (net)	
<u>171,717.70</u>	
Deduct:	
Royalty paid owners:	
During pre operating period	
On ore treated	1,172.00
On gross proceeds	6,286.00
During operating period	
On ore treated	4,220.00
On gross proceeded	<u>12,771.30</u>
24,450.10	
Mining expenditures during pre operating period:	
Roadways	388.93
Repair and maintenance	693.27
Explosives	295.00
Fuel	1,937.40
Mine supplies	2,669.34
Salary Harold Schmidt	3,661.00
Labor	<u>20,330.49</u>
29,975.43	
General expenditures during pre operating period:	
Labor transportation	612.84
Communication	26.80
Insurance	1,719.26
Camp	1,364.43
Traveling	2,806.40
Shipping	3,471.07
Supervision \$ 20.00 a day	2,640.00
Management fee H. S. Could Co.	3,866.66
Other general expenses	<u>4,622.36</u>
21,129.78	
Expenditures during operating period:	
Mining	
Labor	15,631.40
Repairs	164.88
Timber	437.60
Supplies	61.95
Miscellaneous	<u>280.20</u>
16,576.03	
Furnacing	

Labor		12,802.43
Salary H. Schmidt (5 mo.)		3,375.00
Supplies		2,455.21
Wood-fuel		2,441.90
Repairs		626.90
Miscellaneous		<u>1,288.36</u>
22,989.80		
Camp		
Labor		3,031.51
Maintenance		<u>35.50</u>
3,067.01		
General mine expenses		
Salary H. Schmidt	2,025.00	
Supervision \$20 a day	2,340.00	
Other mine salaries	1,025.00	
Compensation Ins.	1,896.04	
Other insurance	1,469.57	
Payroll tares	2,530.38	
Traveling	307.80	
Tel. and tel.	261.83	
Office expenses	12.89	
Miscellaneous	<u>3,580.05</u>	<u>15,449.56</u>
58,082.40*		
58,064.75**		
*Total by W. S. Wright		
**Total as copied from repost		
Expenditures of company for equipment		
General equipment	870.50	
Camp equipment	357.22	
Tools	192.13	
Furnace	236.42	
Mine	<u>6,749.95</u>	8,749.95
Portion of final settlement paid to N.R.C. attributable to equipment		
Amount paid	15,000.00	
Attributable to supplies	<u>11,465.19</u>	
	3,534.81	
Credit for prior advances	335.30	3,199.51
11,605.73		
Allowance for return to be payable on preferred stock for 1 yr. to close of mine operation per agreement 6% of 50,000	3,000.00	
148,225.79		

To eliminate from the foregoing deductions, management free

to H. W. Could Co. included in above expenses at \$500 per mo.  
for 15 2/3 months  
7,866.66

Net amount for foregoing deductions  
140,359.13  
Basis for computing profit sharing royalty  
31,358.57  
Amount of royalty at 40 percent (to Schmidt and Stampe)  
12,543.43

Net proceeds show above 31,358.57  
Less management fee 7,866.66  
Net proceeds to co. after  
dividend payment on  
preferred stock 23,491.91

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Net Assets of company June 30, 1944  
Cash in San Francisco bank 36,622.36  
Cash in Alaska bank 8,080.59  
Accounts received from mercury  
sales after credit 30,791.00  
Proceeds from sale of supplies 9,060.00 84,553.95

Operating accounts payable 945.95  
Payroll taxes & withholding 641.99 8,062.04  
76,491.91  
Less dividend on preferred stock 3,000.00  
73,941.91  
Original cash investment in preferred  
stock (smt. Paid into company) 50,000.00  
Net proceeds to company after dividend reconciled 23,491.91

1945 STATEMENT

Income from sale of 962 flasks @ #119.36 each  
114,825.49

Expenses  
Mining and development  
Breaking 8,544.94  
Training and hoisting 3,058.78

Shop work	2,248.93
Caterpillar & misc.	<u>1,858.29</u>
15,710.94	

Reduction plan operation	
Firing	5,767.05
Wood	3,075.00
Cleanup and soot	2,875.76
Shop work	848.92
Misc. labor & supplies	<u>4,696.10</u>
17,259.83	

Miscellaneous	
Cookhouse	6,792.50
Shop operation	5,977.40
Camp operation	135.04
Retort operation	2,310.00
Depreciation of equipment	531.85
Marketing	<u>3,200.00</u>
18,947.23	

Depletion	
11,327.66	
Royalty	11,482.55
Taxes and misc. expenses	
<u>22,162.67</u>	<u>96,890.88</u>

Profit	
17,934.61	

#### 1946 STATEMENT

Income from sale of 491 flasks @ \$81.78 each

40,156.28

Expenses

Royalty (10% of gross)	4,015.63
------------------------	----------

Royalty \$2.00 a ton	<u>1,744.00</u>
----------------------	-----------------

5,759.63

Mining

Labor	6,106.06
-------	----------

Supplies	<u>204.57</u>
----------	---------------

6,310.63

Plant

Labor	5,966.90
-------	----------

Supplies	4,263.19
----------	----------

Oil & wood	<u>5,989.18</u>
16,219.27	
Shop operation	
Labor and supplies	
2,479.91	
Camp maintenance	
Labor	26.00
Supplies	190.97
Shut down expense	<u>897.01</u>
1,092.98	
Mess House	
Labor	2,012.62
Supplies	<u>2,060.09</u>
4,072.71	
Travel and transportation	
1,528.84	
Insurance	
924.42	
Payroll taxes	
768.16	
Office salary and expense	
4,077.34	
Marketing	
516.15	
Depreciation	
531.85	
Miscellaneous	
<u>6,672.29</u>	<u>50,954.18</u>
Loss	
10,797.90	

#### SAMPLING AND ANALYSIS

The Bureau collected 10 samples on the 236-foot level and one from the roof of a short hanging wall drift on the 325-foot level. Samples were out 6 inches deep by 12 inches wide across the heavy sulphide lenses. The material on either side those relatively narrow lenses was not sampled, because, in most places, it contained little or no metal, and would show misleading conditions if sampled across the customary stope width. Moreover, the ore is not continuous from one sample location to another, most of the lenses ranging in length from 4 to 12 feet. In general the mineral occurrences indicate that, below the 236-foot level, ore of a grade very near that extracted above the level could be mined to approximately the same widths and lengths. Samples were collected at places on the 236-foot level where downward extension of ore lenses is promising. The sampled lens on the 325-foot level may extend upward, downward or both.

Sample data are presented in table 2 and locations are shown in figure 3.

TABLE 2  
SAMPLES FROM RED DEVIL MINE

<u>- Percent</u> Sample	feet	Sample length		<u>Analysis</u>	
		Hg	Sb		
1		1.5	2.96	0.98	
2		1.1	4.40	14.0	
3		0.4	3.40	26.5	
4		0.3	32.0	23.7	
5		1.2	3.20	9.1	
6		0.25	6.36	6.1	
7		2.6	28.4	8.5	
8		1.1	6.60	12.4	
9		0.5	8.37	18.8	
10		0.4	24.1	12.1	
11		0.75	4.15	22.4	
Weighted average 11.27			1.1		12.25

### PROPOSALS

In the four operating seasons of 1943 to 1946, inclusive, the Red Devil mine yielded 5,038 tons of ore, from which was recovered 2,549 flasks of mercury, or 38.5 pound of mercury a ton. The operators received for the product a total of \$326,699.47, and realized a net profit of \$38,495.28. The mercury was sold at an average price of \$128.17 a flask. In 1946, when the season's yield was sold at an average price of \$81.78, the operators suffered a loss of 10,797.90 in producing 491 flasks which caused the Kuskokwim Mining Company to discontinue operations. The present lenses are not interested in undertaking the development of new ore in a leased mine so long as the mercury price remains too low to permit the amortization of the development cost.

At the present time the lessees would be unable to realize a profit by mining developed ore of the average Red Devil grade unless a greater recovery of marketable products could be affected. Recovery of antimony offers the greatest promise of increasing the dollar-a-ton value of this ore. The problem is to find an effective and economical method of separating two sulphide minerals into furnaceable mercury concentrate and marketable antimony concentrate. The solution of this problem would considerably increase the value of the ore and bring about the conservation of a metal that is in considerable demand at this time (1947). Heretofore, the antimony has been wasted, and there is no record of any tests for its recovery by the operators.

In all probability the removal of the antimony would eliminate much of the furnacing difficulty heretofore encountered.

The other problem is to prove greater ore reserves. The ore represented by exposures in the lowest working on the "72" and the southeast ore shoots strongly indicate the existence of more ore below the present mine openings. The samples collected at the time of this examination indicate the probable quality and antimony mercury ratio of lenses shows no signs of ore exhaustion.

The production record and the favorable ore indications in the bottoms of the mine suggest the advisability of additional development.

Inasmuch as the present lessees are not financially able to invest in a long range development program, it is suggested that this work be done by the Bureau of Mines. The trend of the ore shoots indicate that the "72" and southeast ore bodies might be further developed by deepening the shaft 75 feet on the present incline, crosscutting to the ore zone, and drifting at least 200 feet southeast and 250 feet northwest. It is reasonable to expect from this development the exposure of the southeast and "72" ore shoots at the greater depth, and the indication of a reserve equal in size and metal content to the Red Devil production to date.

#### SUMARY AND CONCLUSIONS

Development at the Red Devil mine consistent of 139 feet of shaft sinking and 2,170 feet of drifting and crosscutting. The major part

May 1947

SUPPLEMENTAL REPORT

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

RED DEVIL MERCURY-ANTIMONY MINE  
SLEITNEVE, ALASKA

By N. S. Wright 1/ and F. A. Rutledge 1/

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1/ Mining Engineer, Bureau of Mines, Juneau, Alaska

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INTRODUCTION

The first Bureau of Mines examination of the Sleetmat mercury area in southwestern Alaska was made in July 1942 by Burr S. Webber <sup>2/</sup>. After outlining a program of trenching and sampling Webber started exploratory work in mid-July. Surface exploration consisted of more than 2000 feet of bulldozer and hand trenching and the collection of 163 channel samples. Trenches, ranging in cross section from 2 by 3 feet to 24 by 10 feet, were excavated at intervals of 30 to 150 feet across the strike of the mineralized zone. Samples 6 by 12 inches in cross section, were cut across ore lenses exposed in the trenches.

Robert E. Wallace of the Geological Survey cooperated with the Bureau of Mines in mineral examination and mapping.

Encouraged by favorable trench exposures, the Bureau outlined a sinking and drifting program for the winter of 1942-43. The

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<sup>2/</sup> Mining Engineer, Bureau of Mines, Juneau, Alaska

underground work was started in December 1942 under the supervision of Norman Kibley, Jr.,  $\frac{1}{2}$  and completed March 31, 1943. The main shaft, having been sunk by the owners 30 feet on a 59-degree incline, was extended to a depth of 55 feet. A station was cut at 41 feet and a crosscut was driven 30 feet to intersect the hanging wall of the ore zone. From this point the Bureau drove to the northwest the first 22 feet of drift on the 276-foot level. Both faces of the drift were in ore at this stage.

Starting at the shaft station the Bureau drove a leading 25 feet around the shaft toward the footwall, but encountered no ore.

Exploration by the Bureau was also conducted on the 325-foot level. A crosscut 106 feet from the portal was extended from 48 feet to 166 feet. The advance by the Bureau was S. 86° W. through 126 feet of almost barren sandstone.

Underground exploration by the Bureau amounted to 204 feet of crosscutting and drifting as well as 25 feet of shaft sinking.

Subsequent development by lessees amounted to 1,761 feet. In September 1946 at the close of the operating season virtually all ore above the 236-foot or lowest working level had been removed. The greater part of this ore had been mined and furnished during the war years, 1943 to 1945. The Eastern Mining Co. suffered a loss in their 1946 operation because of an unforeseen low mercury price at the close of the year.

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$\frac{1}{2}$  Mining Engineer, Bureau of Mines, Juneau, Alaska

For this reason and because of a lack of developed ore the Red Devil lancers have decided to discontinue mercury mining until such time as a more favorable mercury market develops.

The operating history, including production data, loss and profit statements, lease agreements, and mine records were submitted to the Bureau of Mines by Harold Schmidt, company manager. A study of records led to a final decision to examine and map the mine and sample the lower workings. This work, conducted in conjunction with a mercury project on the Holitna River in southwestern Alaska, was started April 1, 1947. Ten days were required for transporting fuel from the Kuskokwim River to the power house, starting engines and pumps, and dewatering the mine. The authors then proceeded with the work of examining, sampling, and mapping.

#### ACKNOWLEDGEMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to national security and economy. It is the policy of the Bureau to publish the facts developed by each project as soon as practicable after its conclusion. The Mining Branch, Lowell E. Hunt, Chief, conducts preliminary examinations, performs the actual investigative work, and prepares the final report. The Metallurgical Branch, Oliver C. Halston, Chief, analyzes samples and performs beneficiation tests.

Mineral investigations in Alaska are under the supervision of Robert S. Sanford, Acting Chief, Alaska Division.

Special acknowledgment is extended to partners of the Katchuwin Mining Co. who submitted historical, financial, and operating data for this report, and furnished the fuel and equipment for dewatering the mine.

Analytical tests on samples were made by H. E. Peterson of the Metallurgical Division.

#### LOCATION AND ACCESSIBILITY

The Sleight mercury area is at latitude  $61^{\circ} 16'$  N. and longitude  $157^{\circ} 20'$  W. and about 8 miles downstream from the village of Sleight as shown in fig. 1. The cinabar occurrences discovered to date are situated within a rectangle about 4 miles long and 2 miles wide. Fig. 2 shows the location of the Red Devil mine in relation to the other mines and prospects of the area.

Sleight is a native village on the Katchuwin about midway between Bethel and McGrath which are 100 miles apart. Shallow draft ocean-going vessels ascend the river about 80 miles from its mouth at Bethel where freight is transferred to river boats serving the villages as far inland as McGrath.

The population of Sleight, changing with the season, is about 75 in July and August during the salmon run and no more than half that number during the trapping season. In normal times, the general trading posts serving this region carry adequate stocks of living essentials, including gasoline and oil.

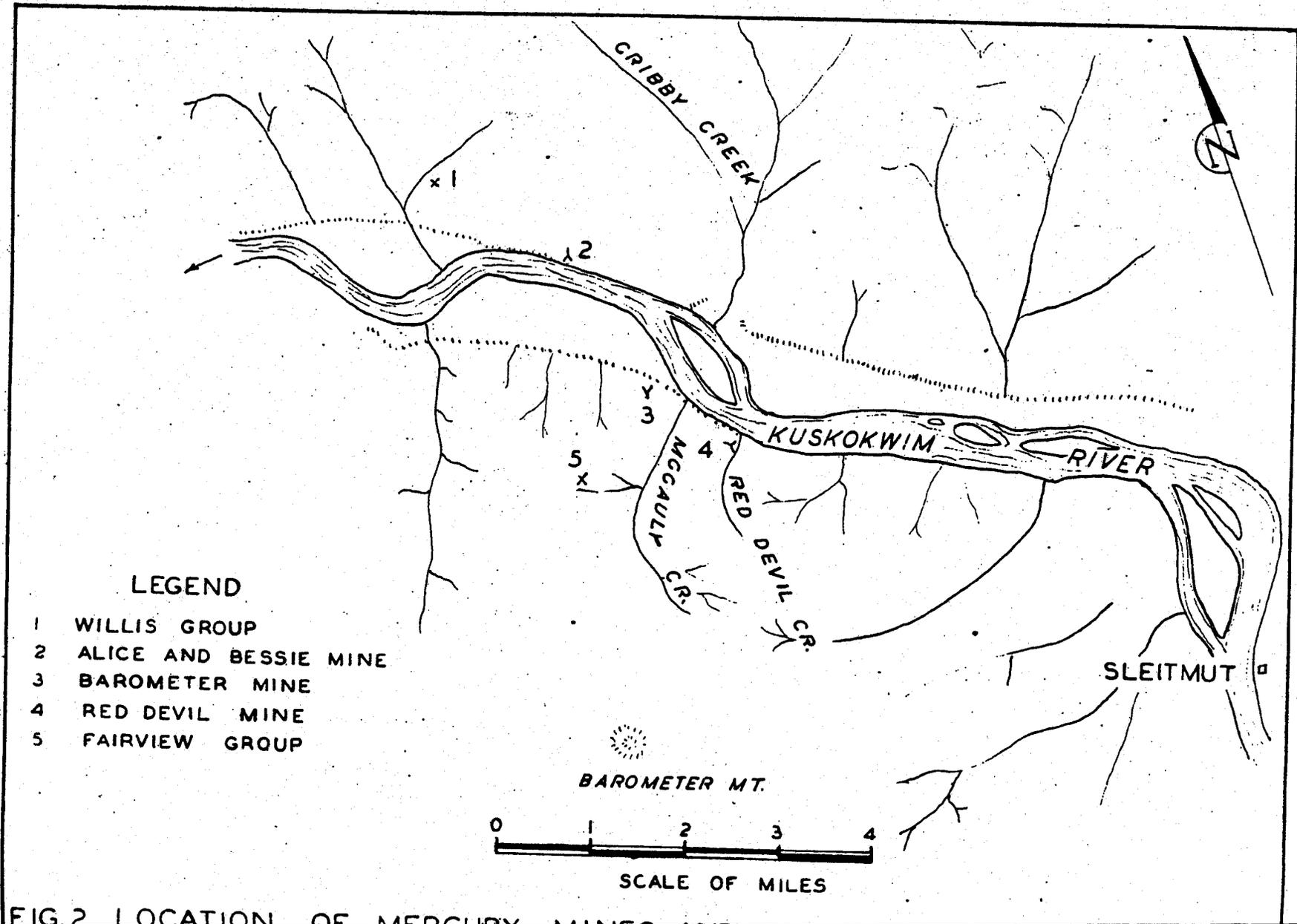


FIG. 2. LOCATION OF MERCURY MINES

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The Bureau of Indian Affairs maintains a school at Sleitaut and a hospital at Bethel. Telegraphic communication by radio phone is possible from Fairbanks or Bethel, by routing through McGrath and Flat, thence to Sleitaut. This service at Sleitaut is an accommodation of the Bureau of Indian Affairs, available only during the regularly scheduled periods of transmission of their official messages.

Travel into the area is almost entirely by airplane. A weekly mail plane from Fairbanks makes scheduled stops at all villages along the Kuskokwim, including Sleitaut. Charter plane service is available at McGrath, Crooked Creek, Aniak, and Bethel. The area is isolated for a period of about one month during "freeze-up" in the fall and "break-up" in the spring at which times the river is full of floating ice. In 1943 the New Idria-Alaska Quicksilver Mining Co. built a landing strip 2 miles downstream from the Red Devil mine.

The mail planes carry 500 to 1000 pounds of freight and passengers in addition to the mail bag. Air express or air freight rates are: Fairbanks to Sleitaut, 24 cents a pound; McGrath to Sleitaut, 7 cents a pound; and Bethel to Sleitaut, 11 cents a pound.

The steamship minimum freight rate from Seattle to Bethel is \$22.50 a ton. River-boat freight rate from Bethel to Sleitaut is \$30.00 a ton; the downstream rate between the two points is \$15.00. Freight rates, both from Seattle and on the river are increased on bulky items. Including \$5.00 a ton handling charge at Bethel, freight rates from Seattle to Sleitaut will average about \$65.00 a ton.

### PHYSICAL FEATURES AND CLIMATE

The valley of the Kuskokwim, except along its lower reaches, is moderately wide. Generally, the river meanders back and forth across the valley and is flanked by ox-bow ponds and marshes now being filled by a growth of mosses, low shrubs and stunted spruce progressing inwardly from their edges. Many of these cut-off loops have been filled and again incised by the river, exposing the accumulations of plant material as thin beds of peat. Through the Sleetmoot area, the river is more closely confined. Intricate patterns of folds and fault lines observed in the high cut banks below the village of Sleetmoot, suggest the likelihood that the river here occupies a position within the broken crest of a northwesterly trending anticline.

The region is unglaciated. In the Sleetmoot area the low rounded hills lying athwart the Kuskokwim, have a general alignment paralleling the regional northwesterly strike. The outstanding topographic feature is Barometer Mountain, elevation 2550 feet, the summit of which is clear in fair weather and becomes enshrouded with fog in advance of rain.

Along the banks of the river, and for short distances up the tributaries, there are many fair stands of spruce. The larger trees will yield one-inch boards up to a foot in width, two-inch planking 10 inches wide and structural timbers up to 6 by 8 inches. Other trees in order of their abundance are; quaking aspen, balsam, poplar, white birch, and a shrubby maple. At elevations of a very few hundred feet

above the river, tree growth is absent, leaving only the usual carpet of moss, shrubs and herbaceous plants. Of the shrubs, by far the most common is the dwarf birch.

Average annual precipitation in the area approximates 20 inches, the greater portion of which is rainfall during the months of June to September, inclusive. During the summer the climate is mild with moderate northerly constant winds and frequent light rains. Winter sets in usually in October, and continues until May with minimum temperatures of 30 to 50 degrees below zero during December and January. The depth of snow seldom exceeds three feet.

#### HISTORY AND PRODUCTION

The first discovery of cinnabar in the district area was made in 1906 at the Parks prospect on the north bank of the Kaskawatin 9 miles downstream from the Red Devil mine and 17 miles upstream from Georgetown. Over a period of years Parks prospected the deposit and eventually reworked a little mercury in conjunction with his occupation as a trader. From 1906 to 1911 the Parks deposit yielded 700 pounds of mercury, virtually the entire Alaskan production during that period.

The first discovery of cinnabar on the south side of the Kaskawatin was made by Hans Halverson in 1921 at the Karameter deposit two claim lengths northwest of the Red Devil mine. To date, the Karameter has yielded a little more than 10 flasks of mercury mostly from float and detrital material.

Again in 1933 Halverson traced cinnabar float in a small stream bed on the left limit of the Kaskakwin 8 miles downstream from Elitaut, discovered the source about 1000 feet from the river, and made the original Red Devil claim locations. A few years later a half interest was acquired by Nick Mellick and additional claims were jointly staked.

Halverson and Mellick started production of mercury in a small way from creek bed float and detritus in the vicinity of the ledge. Eleven flasks of mercury were retorted from selected ore with several used Johnson McKay tubes operated singly and without the addition of lime to the ore. The installation of 2 "D" retorts in 1940 increased production to 158 flasks for that year. Production in 1941 was 135 flasks and, during the first part of 1942, 117 flasks. During these years the partners had sluiced the overburden from the southeast extremity of the ore zone leaving, however, a considerable depth of bedrock rubble. It was ore from this loose material that yielded much of the early production.

An edit at an elevation of 31 feet above sea level was next driven from the open cut a distance of 90 feet northwest. This furnished the balance of the Red Devil production prior to the mid-season of 1942. The backs over this edit are negligible.

A second edit was started in 1941 at a point 70 feet north of the portal of the 31-foot edit and at an elevation of 325 feet. The location of the two edits is shown in fig. 3. The drift on the 325-foot level was driven 130 feet northwest along the strike of the formations. No ore was encountered but a showing of cinnabar 40 feet

In February, 1941 a vertical shaft was driven from the portal encouraged the owners to drive a crosscut 50 feet southwest. Also a crosscut at a point 106 feet from the portal was driven 40 feet S. 57° E. Both crosscuts penetrated barren gravels.

The owners started the Red Devil shaft 55 feet southeast of the 311-foot adit portal, and sunk to a depth of 30 feet on a 59-degree incline. At that depth it appeared that the shaft was leaving the ore in its hanging wall.

In the fall of 1941 Harold Schmidt and L. J. Stange of Fairbanks secured a lease on the claims. A little later the New Idria Quicksilver Mining Co. became interested, and entered into a sub-lease agreement with Schmidt and Stange. It was thus the New Idria-Alaska Quicksilver Mining Co. was formed with Harold Schmidt as superintendent. The new company brought in mining and fumacing equipment and resumed production on a larger scale. During the period of the sub-lease the New Idria-Alaska Quicksilver Mining Co. completed 632.3 feet of drifting and 134.9 feet of crosscutting on the 325-foot level, as well as 126.1 feet of drifting and 115 feet of crosscutting on the 276-foot level. See fig. 3. The company installed a 40-ton rotary kiln and condensing system. By June 30, 1944, production amounted to 2652 tons of ore from which 1096 flasks of mercury were recovered. The principal source of the ore was the 72 stopes above the 325-foot level, and stopes 1, 2, and 3, above the 276-foot level.

A discouraging mercury market caused the New Idria-Alaska Quicksilver Mining Co. to curtail operations for the remainder of 1944.

In February, 1945 a contract to extend the Red Devil shaft to a greater depth was granted the Kuskokwim Mining Co., a partnership consisting of Harold Schmidt, L. J. Stamps, Earl Ellington, and Glen Franklin. The latter company sunk 41 feet to the present bottom of the main shaft, and started crosscutting and drifting on the 236-foot level. In the summer of 1945 the Kuskokwim Mining Co. obtained a sub-lease to mine ore and use the furnacing equipment. The mine and plant were operated by the Kuskokwim Mining Co. for two 4-month seasons in 1945 and 1946, respectively. Development during the period amounted to 271 feet of drifting and 29 feet of crosscutting on the 229-foot level, 40 feet of winze below the 229-foot level, 40 feet of shaft sinking on 4" ore body, 228 feet of drifting and 125.5 feet of crosscutting on the 236-foot level and 32 feet of sinking below the 236-foot level. Production in 1945 was 962 flasks from 1514 tons of ore; in 1946, 491 flasks were produced from 672 tons. The price of mercury was so low that the company suffered a loss in 1946 and was obliged to discontinue operations. At the close of the 1946 operating season little available ore remained above the 236-foot level.

On January 21, 1947, the New Idria-Alaska Quicksilver Mining Co. sold to Harold Schmidt and L. J. Stamps all mining and furnacing equipment at the Red Devil mine. Schmidt and Stamps hold a lease on the property and are now the sole owners of all equipment thereon.

#### PROPERTY AND OWNERSHIP

The property consists of 9 unpatented claims as follows: Red

Devil No. 1, No. 2, No. 3, and No. 4; Kosko No. 1 and No. 2; and  
 Russian No. 1, No. 2, and No. 3. They are within the G. Argoson  
 District in the Fourth Judicial Division of Alaska. The claim records  
 were filed in the office of the U. S. Commissioner at Sleetna, 177 miles  
 downstream from Sleetna, Alaska. The owners are Nick Mellist and  
 John Halverson, both of Sleetna, Alaska.

The main opening of the southeast part of the mine is a single-  
 compartment inclined shaft with collar elevation 311 feet above sea  
 level. Working levels occur at elevations of 276 and 236 feet. The  
 shaft extends 11 feet below the 236-foot level making a total shafted  
 depth of 99 feet. The shaft, 7 by 7 feet in cross section is equipped  
 with a ladder, 2-inch air and water pipes, and chills. The chills are  
 made of 2- by 4-inch boards nailed lengthwise over 6-inch timbers  
 spaced 21 inches center to center. Ore is hoisted from the mine in a  
 18-inch foot self-dumping skip which discharges into a 50-ton wooden  
 storage bin. The shaft is serviced by a 12-horsepower single-phase  
 electric hoist.

The shaft was sunk in ore for the first 30 feet, but was entirely  
 within the footwall for the remaining 69 feet. At the 276-foot  
 elevation a 30-foot crosscut was driven northwesterly to the ore zone.  
 Drifting from this intersection extends 11 feet southeast and 199.1  
 feet northwest. Slope 1, as shown on fig. 3, was drilled above the  
 first 17 feet of drift northwest of the intersection. Slope 2 was

worked from ore between points 34 and 47 feet northwest of the intersection. Stages 1 and 2, connected 28 feet above the drift level, are on the same ore lens. Stage 3, which may be considered a part of the same lens, opens to the 276-drift through shafts at points 62 and 108 feet northwest of the intersection. Stages 1 and 2 have been worked to the surface, and stage 3 opens to the surface through an shaft at elevation 311 feet. These three stages yielded 1100 tons of ore.

A raise from the 276-level crossed connects to the Little No. 1 stage in the footwall of the ore zone. This stage yielded 151 tons.

At a point 60 feet northwest of the intersection a crosscut was driven northwest 10.3 feet diagonally across the ore zone. A small amount of ore was found about midway along this crosscut and some stoping was done. A drift in the hanging wall extends 35 feet northwest from the end of the crosscut. An adit 23 feet from the crosscut yielded a small amount of ore.

The crosscut from the shaft was driven beyond the intersection 30 feet into the hanging wall but no ore was revealed in that area. Subsequent caving has blocked passage into this part of the crosscut.

Development on the 216-foot level consists of 125.5 feet of crosscutting and 197.4 feet of drifting. Two winzes were sunk below the level to depths of 11.0 and 21.0 feet, respectively. At a depth of 12 feet in the 21-foot winze a drift was driven 30.5 feet north,

west.

A crosscut from the shaft at the 230-foot level intersects the ore zone at 45 feet, and drifts were driven southeast and northwest from the intersection as shown in Fig. 5.

Southeast of the intersection at distances 25 and 45 feet open stopes 101 and 102, respectively, were started in ore and mined to the 270-foot level. Stopes 101 and 102, which are connected 30 feet above the drift, yielded 400 and 190 tons, respectively.

From a point at the top of the 21-foot winze, a crosscut was advanced 55 feet northeast across the ore zone and into the footwall. A narrow band of ore 25 feet northeast of the winze was drifted along for 18 feet in a northerly direction. One hundred twenty eight tons of ore were mined from 104 stope above this drift. The last 30 feet of the crosscut was in shale and exposed no ore.

Little 105 stope was started from the 230-foot level at a point 17 feet northwest of the crosscut-ore zone intersection and was advanced upward 27 feet. This stope yielded 68 tons.

Ore encountered at a point 17 feet further northwest was drifted along for 27 feet. Stope 107 was started in this ore and advanced to the 270-foot level, yielding 250 tons of ore. The drift was continued 45 feet northwest but only a very small amount of ore along an anticline dike was found. An 11-foot winze below stope 107 yielded 16 tons of ore.

A crosscut from the southeast end of stope 107 and extending 24 feet into the hanging wall revealed no ore.

The 31-foot drift beginning at a point 55 feet northwest of the  
 shaft collar, extends northwest 112 feet along the ore zone, then  
 feet across into the hanging wall intersects zone 3. A total of 1325 feet of drift and  
 crosscuts have been driven on the 325-foot level. The drift was started 70 feet north of the portal  
 of the 31-foot drift and advanced 130 feet northwest along the strike  
 of the ore zone. No ore was encountered in the drift, but a vein cut  
 off a 30-foot crosscut to the northwest exposed an occurrence of the  
 high grade ore zone. At a point 100 feet N.  
 from the portal a crosscut was driven 40 feet S. 57° W. through barren  
 graywacke. In 1919 the Bureau of Mines advanced the heading 37° 05' W.  
 126 feet without encountering ore. The operator drove a drift N. 40°  
 W. 60 feet, thence N. 20° W. 40 feet to the "72" level and then  
 thence 35 feet in the same direction to the main "72" level. The  
 "72" level drift was then advanced to a point near the surface and  
 yielded 200 tons. The main "72" level body was then advanced to the surface  
 and yielded 330 tons. From the surface a drift was driven 27 feet toward the hanging  
 wall, ore was encountered along an indefinite graywacke belt. The  
 "72" hanging wall drift steps produced 322 tons of ore. The drift and  
 crosscuts was sunk below the main "72" steps to a depth of 39.5  
 feet on a 30-degree incline. The drift was 29 feet long, 29 feet long,  
 respectively, and 22 feet apart were driven easterly from the  
 mine. Deep workings below the drift, the "72" level steps  
 extensive bodies often parallel the heading, but in many places the

yielded 159 tons of ore. An additional 830 feet of drifting on this level yielded an sizable ore, though a 221-foot branch to the right (facing N.W.) off the main drift revealed small stibnite lenses, believed to be offshoots of the 27' anomaly. Several test holes near the face and extending 10 to 25 feet into the walls of this branch drift revealed only traces of stibnite. ~~Several test holes near the face and extending 10 to 25 feet into the walls of this branch drift revealed only traces of stibnite.~~

The ore body, discovered by Bureau geologists in 1912, yielded 400 tons of fair grade ore. The ore was hoisted up a 40-foot shaft to the surface where it was dumped in a car to 575' stage, dumped to the 325-level mine, and then transported by ore car to the storage bin.

Most of the ~~mineralization~~ GENERAL GEOLOGY is somewhat lighter in color than the ~~underground workings~~ at the Red Bull mine except ~~alternating~~ alternating layers of black granite and thin-bedded dark gray shale. The strikes of the contacts throughout most of the mine range from N. 32° E. to N. 40° E.; likewise, the dips cover a narrow range of 55 to 62 degrees northwest. The contacts in the district are ~~are~~ intruded by numerous acidic dikes and sills ranging in thickness from a few inches to more than 20 feet. In the Red Bull workings spherule and stibnite occur at or near the granite-granite, or granite-shale contacts. The few stibnite lenses occur as nearly massive lenses along the contacts, and as blinks in the massive and sedimentary ~~primary~~ secondary ~~sediments~~ sediments. None of the secondary ~~sediments~~ sediments

Surface trenching by the Bureau of Mines and ~~underground~~ underground mining by the operators have disclosed an ore zone at least 2050 feet long, trending N. 60° W., and ranging in width from 30 to 100 feet. The intrusive bodies often parallel the bedding, but in many places the

andesite ends abruptly and reappears along another bedding plane, or with iron hydroxides. A specimen found near the Parks cuts across the sedimentary layers. This tendency of the intrusive bodies to be offset at irregular intervals and the close association of the metallic minerals with the andesite has resulted in the lenses being arranged in a somewhat echelon pattern.

Aside from some gangue material found in the drift that undercuts the "F" ore body little evidence of faulting appears in the underground workings. Graywacke and shale beds in the northwest part of the mine under "F" ore body have irregular strikes and dips, and, in places, show evidence of intense folding.

Most of the andesites of the area are somewhat lighter in color than the usual dark gray associated with these rocks. P. S. Smith in describing intrusives of the Sleight area states:

"The andesite rocks at the Parks quicksilver prospect (1) the "F" ore body, (2) the "72" ore bodies, and (3) a group of ore bodies in the southwest part of the mine.

the andesite, but they contain less quartz and their foldings are less pronounced. The strike of the lenses is N. 30° W. and the dip is preserved. The scarcity of quartz in certain of the dike rocks shows that they originally contained very little of it. Carbonates occur in the rock in considerable quantities lengthwise to locate stibnite or antimonite occurrences of any consequence. Some of the secondary carbonate contains small particles of cinnabar. Sericite is a common secondary mineral and the rock is generally much stained

Smith, Philip S., The Lake Clark Central Rastobin Region, Alaska U. S. Geol. Surv. Bull. 695 page 121.

The 72' ore body is composed of 2 separate lenses with iron hydroxides. A specimen found near the Parks prospect, which, however, was less weathered than most of the other prospects, was less weathered than most of the other prospects. The material examined, is a porphyritic rock whose phenocrysts are composed of quartz and completely altered feldspar. The feldspar has been altered to quartz, sericite, and fine-grained undertermined material. The ground mass is a fine-grained mixture of primary quartz and secondary products, which were doubtless derived from feldspars by decomposition. This rock is probably a rhyolite porphyry or latite porphyry.

**ORE OCCURRENCES**

The area between the 72' ore bodies and the southeastern ore body has not been intensively explored by the natives, and in existence of three major ore shoots on the Red Devil property, namely (1) the "F" ore body, (2) the "72" ore bodies, and (3) a group of ore bodies in the southeast part of the mine.

The "F" ore body was mined to a depth of about 40 feet along two roughly parallel bodies about 12 feet apart and arranged in echelon pattern. The strike of the lenses is N. 60° W. and the dip is nearly vertical. Very little mineralization was found in the drift

directly under this ore body, and test holes 20 feet or more in length failed to locate cinnabar or stibnite occurrences of any consequence. A few mineralized stringers were found on the 325-foot level between the area under "F" ore body and the "72" ore bodies, but none was large enough to be mined economically.

The #72 ore shoot is comprised of 3 separate lenses which were mined on the footwall stop, the main stop, and the hanging wall stop. The footwall ore lens occurred entirely within the andesite, and was mined to an inclined height of 73 feet above the 325-foot level. The main or largest ore body consisted of a mineralized andesite sill and chamber-stibnite lenses on the footwall and hanging wall of the sill. This ore was mined to the surface as shown on fig. 4. The hanging wall stop was started in andesite, but when worked upward is an andesite sill and the underlying shale. The ore was mined to an inclined height of 90 feet. The #72 shoot trends southeast as the ore is followed downward.

The area between the #72 ore bodies and the southeastern ore shoot apparently has not been intruded by the andesite, and is practically barren of metallic minerals. The 166-foot adit about 106 feet from the 325 adit portal penetrated the rocks of this area, and exposed only intercalated graywacke and shale. Small lenses of stibnite and chamber were found in crosscuts 75 and 70 feet east of the #72 footwall stop. See fig. 4.

The southeast ore shoot shows the stibnite in size and production. Continuous lenses of ore have been mined from the surface to the 325-foot level. The most productive lens was mined on stopes 1 and 2 above the 325-foot and 326-foot levels. Stibnite widths are 2 to 5 feet and average 3 feet. Massive sulphide lenses range from a fraction of an inch to more than a foot wide, and in many places the remaining vein material contained more or less scattered bits of

...cinnabar and stibnite. The most common mineral deposits are ... stringers containing both stibnite and cinnabar, but there are rare occurrences in which only one of the sulphides is present.

The lenses and groups of ore associated with various parts of the ... Lenses in the southeast are short rake to the southeast as do ... the "72" ore lenses. Stop 3 was started 73 feet northwest of the 276-

foot crosscut-drift intersection, and was worked upward to a point due north in a small crosscut off the 311-foot adit as shown in fig. 3.

Stop 3 above the 276-foot level. Another similar stop was started ... lens in the hanging wall of the ore lens.

The similar trend of the mined lenses in this part of the mine indicate that the ore in stop 4 was very probably a continuation of the ore lens that was passed through in the first 30 feet of the shaft.

Operators report that the ore was mined out at the periphery of the ... slope was in vein material. The slope caved from the surface when

1945	375 to surf.	7	4	200	40	23
1945	375 to surf.	4	4	114	20	
1945	375	102	4	100	75	70
1945	375	102	4	150	75	86

The ore is soft and friable and breaks free from the walls. The ... stibnite rock is weak and requires close spacing of stulls for support

1946	375	72	157			
1946	376	104	128			
1946	376	102	170			
1946	375	110	60			
1946			47			
1946			572			12.2

Water was pumped from the mine at the rate of 100 gallons a minute with a 2-inch centrifugal pump. The water flow in the mine

varies according to the moisture content of the sub-surface soil

but is always considerably lower than the pump capacity. Water, if left to accumulate in the mine will rise to the 276-foot level.

The amount and grade of ore extracted from various parts of the mine are shown in table 1.

TABLE 1

**RED DEVIL ORE SUMMARY**

Season	Level	Grade	Width feet	Tons	Pct. Grade lbs/ton	Recovered lbs/ton
1943-44	275	72	3	578	60	
1943-44	276	72	3	578	60	
1943-44	276	1	3	38	80	
1943-44	276	2	3	38	15	
1943-44	276	3	3	150	18	
1943-44	276	4	3	150	18	
1943-44	276	5	3	80	40	
1943-44	276	Sublevel	3	100	25	
1943-44	276	Sublevel K-out	3	30	18	
<b>Total 1943-44</b>				<b>2632</b>		<b>31.2</b>
1945	225 to surf. F		4	400	40	20
1945	225 to surf. Explorer.		4	114	20	
1945	226	102	4	100	75	70
1945	226	102	4	150	70	66
1945	226	103	3	230	60	57
<b>Total 1945</b>				<b>1314</b>		<b>48.9</b>
1946	226	Little F	3	51		
1946	226	72 Sublevel	3	19		
1946	226	101	3	12		
1946	226	101	3	12		
1946	226	Little F	3	18		
1946	226	102 Sublevel	3	150		
1946	226	103 Sublevel	3	14		
1946	226	Little F	3	60		
1946	226	East Pillars	3	13		
<b>Total 1946</b>				<b>378</b>		<b>42.8</b>

FURNACING

The "B" retorts used by Halverson and Mallick in reducing Red Devil sinchur ores afforded a very low capacity. In 1943, the New Idaho-Alaska Quicksilver Mining Company installed a 40-ton rotary kiln, sixaco dust collectors, a fan, condensers, a reduced tank, a 12-ton burned-ore bin and a host mixer. Ore was reduced by the plant about shown in fig. 7.

Power for the reduction plant and mine was generated by two Caterpillar 46-30 Diesel-electric units. The plant was operated 3 shifts a day, 7 days a week by a crew consisting of 3 firemen, 2 retort operators and two helpers whose duties included wet clean-up. A plan and profile of the reduction plant is shown in fig. 6.

The antimonial content of the Red Devil ore equals or slightly exceeds the mercury content. Little or no effort has been directed to producing an antimony concentrate because of the high cost of transporting such a product to market. The present (May, 1947) price of antimony is high enough to more than offset the cost of producing and shipping a stibnite concentrate. The removal of stibnite, which sublimes at temperatures over 700° C., would also facilitate the reduction of mercury and possibly increase plant capacity. At furnace temperatures around 700° C., antimony vapors will accompany those of mercury into the condensing system. Vapor pressures of the oxides of antimony are much less than that of mercury and, in the decreasing temperatures of the condensing system, the oxides of antimony precipitate before the dew point of mercury is reached.

FIG. 6 LAYOUT OF RED DEVIL SINCHUR PLANT

MODIFIED FROM DRAWINGS BY U.S. GOVERNMENT

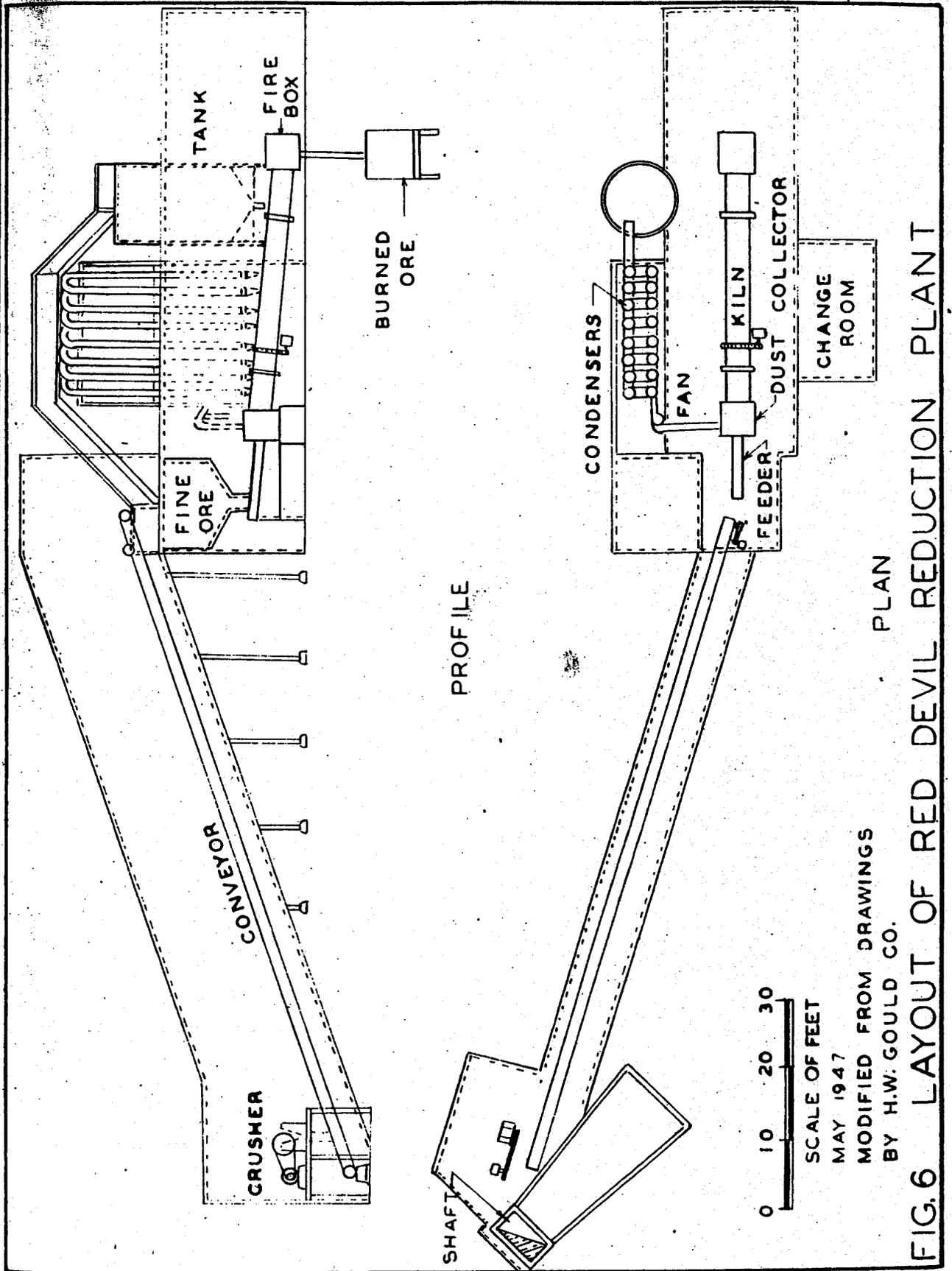


FIG. 6 LAYOUT OF RED DEVIL REDUCTION PLANT

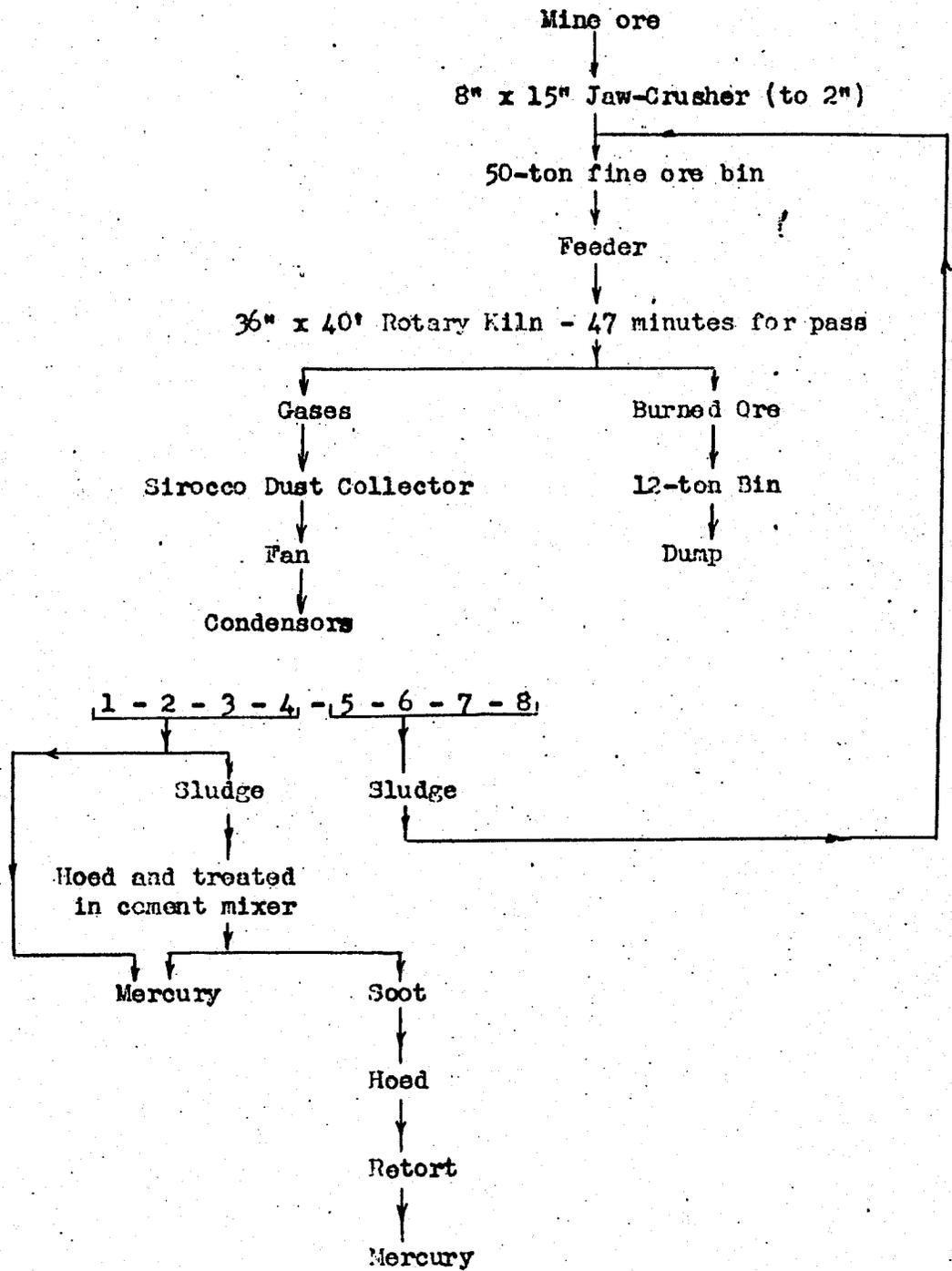


FIG. 7 RED DEVIL REDUCTION PLANT FLOW SHEET



Fig. 8  
RED DEVIL CAMP

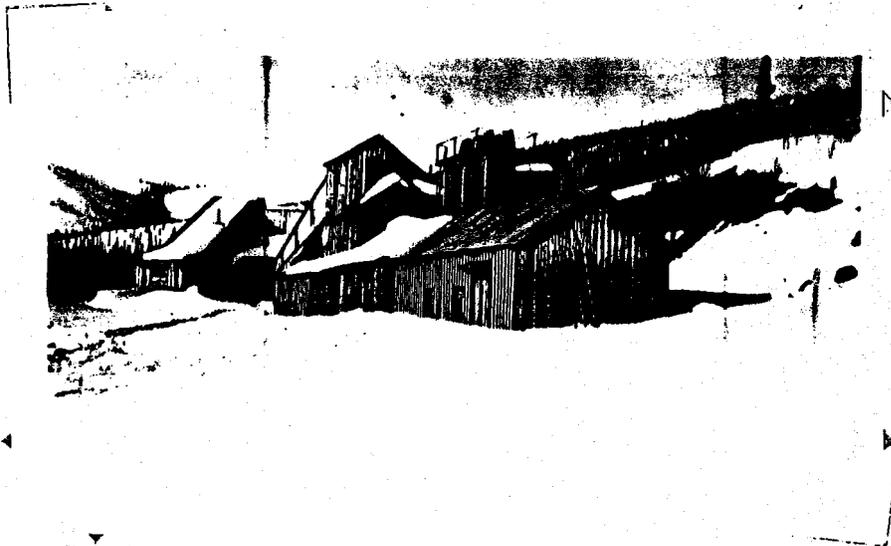


Fig. 9  
RED DEVIL REDUCTION PLANT

Hence, it is apparent that in furnacing Red Devil ores a close control of temperatures is essential, and, at best, considerable antimony is carried over into the condensers. In past operations the antimony oxides were eliminated in the soot by extra heating and retorting.

Wood was used for furnace fuel during the first 3 years but in the last year the furnace was equipped with a burner and Diesel oil was used thereafter. Some difficulty in regulating the oil and air was attributed to an improper type of burner.

PROFIT AND LOSS STATEMENTS

A summary of the financial outcome of four seasons of operation is shown in the following statements:

<u>New Idria-Alaska Quicksilver Mining Co.</u>		
<u>Statement of Revalty Account to</u>		
<u>Harold Schmidt to June 30, 1941</u>		
(a) <b>Computation of Contract Net Proceeds:</b>		
Sales of product (mercury)		
Produced during pre operating period:		
338 flasks (plus 30 1/2 lbs. for 66.70) @ \$183.69 each		62,954.70
Produced during operating period:		
730 Flasks @ \$183.49 each	127,913.00	
Less, - debited account M.R.C. contract 18,830.00		<u>109,083.00</u>
<b>Total received from M.R.C. for 1096 flasks (net)</b>		<b>171,717.70</b>
Salary H. Schmidt	2,525.00	
Deduct: Mining Co. Co. 2,240.00		
Revalty paid during pre operating period	1,320.00	
As are credited	1,440.97	1,172.00
As gross proceeds	1,320.00	6,286.80
during operating period	2,240.00	
As are credited	2,010.00	4,220.00
As gross proceeds	12.00	<u>12,771.30</u>
<b>Mining expenditures during pre operating period:</b>		
Roadways		383.93
Repair and Maintenance		693.27
Explosives		295.00
Fuel		1,937.40
Mine supplies		2,669.34
Salary Harold Schmidt		3,061.00
Laber		<u>20,330.49</u>
		<b>29,975.43</b>

**General expenditures during p.m. operating period:**

Labor transportation		612.84	
Communication		26.00	
Insurance		1,719.26	
Camp		1,964.43	
Traveling		2,888.48	
Shipping		3,471.07	
Supervision \$20.00 a day		2,640.00	
Management fee E. H. Gould Co.		3,866.66	
Other general expense		<u>4,622.32</u>	21,129.78

**Expenditures during operating period:**

<b>Mining</b>			
Labor		15,631.40	
Repairs		164.88	
Timber		437.60	
Supplies		61.95	
Miscellaneous		<u>289.20</u>	16,576.03

<b>Processing</b>			
Labor		12,802.43	
Salary H. Schmidt (5 mo.)		3,375.00	
Supplies		2,455.21	
Coal		2,441.90	
Shipping		626.90	
Miscellaneous		<u>1,288.36</u>	22,989.80

<b>Camp</b>			
Labor		2,011.81	
Miscellaneous		<u>35.90</u>	1,067.01

<b>General mine expense</b>			
Salary H. Schmidt	2,025.00		
Supervision \$20 a day	2,512.00		
Other Mine salaries	1,025.00		
Communication fee	1,896.04		
Other expenses	1,449.87		
Payroll taxes	2,590.78		
Traveling	387.80		
Tel. and tol.	261.83		
Office expense	12.87		
Miscellaneous	<u>3,029.92</u>	15,449.56	38,082.40 *

\* Total by E. H. Gould  
 \*\* Total as copied from report

Expenditure of company for equipment

General equipment	870.98	
Camp equipment	397.88	
Tools	192.13	
Furnace	236.42	
Mine	<u>6,749.95</u>	8,486.22

Portion of final settlement paid to M.R.G. attributable to equipment

Amount paid	15,000.00	
Attributable to supplies	<u>11,465.19</u>	
	3,534.81	

Credit for prior advance	395.90	3,199.51	11,605.73
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Allowance for return to be payable on preferred stock for 1 yr. to close of mine operation per agreement 6% of 50,000		3,000.00	148,225.79
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To eliminate from the foregoing deductions, management fee to H. W. Condit Co. included in above expenses at \$500 per mo. for 15 2/3 months			<u>7,866.66</u>
--	--	--	-----------------

Net amount of foregoing deductions			140,359.13
Basis for computing profit-sharing royalty			31,358.57
Amount of royalty at 40 percent (to Schmidt and Stamp)			12,543.43

Net proceeds shown above	31,358.57	
Less management fee	<u>7,866.66</u>	
Net proceeds to co. after dividend payment on preferred stock	<u>23,491.91</u>	

(b) Net assets of company June 30, 1944

Cash in San Francisco bank	96,622.96	
Cash in Alaska bank	6,080.99	
Accounts receivable from mercury sales after credit of \$15,000 to M.R.G.	30,791.00	
Proceeds from sale of supplies	<u>9,060.00</u>	84,553.95

Operating accounts payable	945.95	
payroll taxes & withholding	<u>61.77</u>	8,062.04
		76,491.91
Less dividend on preferred stock		<u>3,000.00</u>
		73,491.91
Original cash investment in preferred stock (amt. paid into company)		<u>70,000.00</u>
Net proceeds to company after dividend reconciled		23,491.91

1945 Statement

Income from sale of 962 flasks @ \$119.96 each 114,623.49

**Expenses**

<b>Shipping and development</b>		
Shipping	8,544.94	
Trussing and hoisting	3,058.78	
Shop work	2,212.93	
Caterpillar & Misc.	<u>1,895.29</u>	15,710.94

<b>Reduction plant operation</b>		
Firing	5,767.05	
Wood	3,072.00	
Cleanup and soot	2,873.76	
Shop work	222.92	
Misc. labor & supplies	<u>4,696.10</u>	17,279.83

<b>Miscellaneous</b>		
Culmination	6,792.50	
Shop operation	5,977.40	
Camp operation	193.04	
Robot operation	2,310.00	
Depreciation of equip.	531.85	
Marketing	<u>3,280.80</u>	18,947.23

Depletion	11,527.66	
Royalty	11,482.55	
Taxes and Misc. expense	<u>23,162.67</u>	96,890.88

**Profit** 17,934.61

1914 Statement

Income from sale of 491 tons @ \$21.75 each = 10,658.25

Expenses:  
 Royalty (10% of gross) 4,015.63  
 Royalty \$2.00 a ton 982.00 5,759.43

Mining:  
 Labor 6,106.06  
 Supplies 296.57 6,402.63

Plant:  
 Labor 5,966.90  
 Supplies 4,263.19  
 Oil & wood 5,989.18 16,219.27

Shop operation:  
 Labor and supplies 2,479.91

Camp maintenance:  
 Labor 26.00  
 Supplies 198.97  
 Shut down expense 677.01 1,092.98

Mass House:  
 Labor 2,022.62  
 Supplies 2,060.09 4,072.71

Travel & transportation 1,528.84  
 Insurance 224.40  
 Payroll taxes 288.15  
 Office salary and expense 4,977.94  
 Marketing 26.13  
 Depreciation 1,321.83  
 Miscellaneous 6,373.32 30,924.18

Less 10,797.90

SAMPLING AND ANALYSIS

The Bureau collected 10 samples on the 215-foot level, and one from the roof of a short hanging wall drift on the 325-foot level.

Samples were cut 6 inches deep by 12 inches wide across the heavy

sulphide lenses. The material on either side of these relatively narrow lenses was not sampled, because, in most places, it contained little or no metal, and would show misleading conditions if sampled across the customary stop width. Moreover, the ore is not continuous from one sample location to another, most of the lenses ranging in length from 4 to 12 feet. In general the mineral occurrences indicate that, below the 235-foot level, ore of a grade very near that extracted where the level could be mined to approximately the same widths and lengths. Samples were collected at places on the 235-foot level where downward extension of ore lenses is promising. The samples taken on the 325-foot level are taken upward, downward or west.

Sample data are presented in table 2 and locations are shown in fig. 9.

**TABLE 2**  
**SAMPLES FROM THE 235-FOOT LEVEL**

Sample	Sample length feet	Analysis - Percent	
		Cu	Pb
1	1.5	2.96	0.98
2	1.1	2.23	12.6
3	0.4	3.49	26.5
4	0.3	22.0	23.7
5	1.2	3.28	9.1
6	0.25	6.73	6.1
7	2.6	22.4	8.5
8	1.1	6.86	12.2
9	0.5	8.37	18.8
10	0.4	22.1	12.1
11	0.75	4.15	22.4
<b>Weighted average</b>		<b>1.01</b>	<b>11.37</b>

**PROPOSALS**

In the four operating seasons of 1943 to 1946, inclusive, the Red Devil mine yielded 5,038 tons of ore, from which was recovered 2,549

flasks of mercury, or 38.5 pounds of mercury a ton. The operators received for the product a total of \$326,699.47, and realized a net profit of \$38,495.28. The mercury was sold at an average price of \$128.17 a flask. In 1946, when the season's yield was sold at an average price of \$81.78, the operators suffered a loss of \$10,797.90 in producing 491 flasks which caused the Kuskokwim Mining Company to discontinue operations. The present lessees are not interested

in undertaking the development of new ore in a leased mine so long as the mercury price remains too low to permit the amortization of the development cost.

At the present time the lessees would be unable to realize a profit by mining developed ore of the average Red Devil grade unless a greater recovery of marketable products could be effected. Recovery of antimony offers the greatest promise of increasing the dollar-a-ton value of the ore. The problem is to find an effective and economical method of separating the two sulphide minerals into a furnaceable mercury concentrate and a marketable antimony concentrate. The solution of this problem would considerably increase the value of the ore and bring about the conservation of a metal that is in considerable demand at this time (1947). Heretofore, the antimony has been wasted,

and there is no record of any tests for its recovery by the operators.

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Devil mine live  
vies to small  
received for  
of \$1.8510  
average price  
in produced  
to aluminum  
in production  
the recovery  
development  
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profit by  
a price  
to maintain  
value of the  
to hold  
recovery program  
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of the mine

In all probability the removal of the outcrop would eliminate much of the remaining difficulty heretofore encountered.

The other problem is to prove greater ore reserves. The ore represented by exposures in the lowest workings on the "72" and the southeast are clearly strongly indicative of the existence of more ore below the present mine openings. The samples collected at the time of this examination indicate the probable quality and intensity of the ore at greater depths. The latter level with its highly magnetic sulfide lenses shows a sign of ore enrichment.

The production record and the favorable ore indications in the bottom of the mine suggest the advisability of additional development.

Inasmuch as the present lessees are not financially able to invest in a long range development program, it is suggested that this work be done by the Bureau of Mines. The trend of the ore shoots indicates that the "72" and southeast are vertical might best be further developed by deepening the shaft 75 feet on the present incline, crosscutting to the ore zone, and drifting at least 200 feet southeast and 250 feet northwest. It is reasonable to expect from this development the exposure of the southeast and "72" ore shoots at the greater depth, and the indication of a reserve equal in size and metal content to the Red Devil production to date.

The strike and direction of development are indicated on the map of the mine.

Development at the Red Devil mine consists of 139 feet of shaft sinking and 2,170 feet of drifting and crosscutting. The major part