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BUREAU OF MINES
R. R. SAYERS, DIRECTOR

REPORT OF INVESTIGATIONS

MERCURY DEPOSITS OF SOUTHWESTERN ALASKA



BY

BURR S. WEBBER, STUART C. BJORKLUND, FRANKLIN A. RUTLEDGE,
BRUCE I. THOMAS, AND WILFORD S. WRIGHT

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By Burr S. Webber^{2/}; Stuart C. Bjorklund^{3/}; Franklin A. Rutledge^{4/},
Bruce I. Thomas^{5/}; and Wilford S. Wright^{2/}

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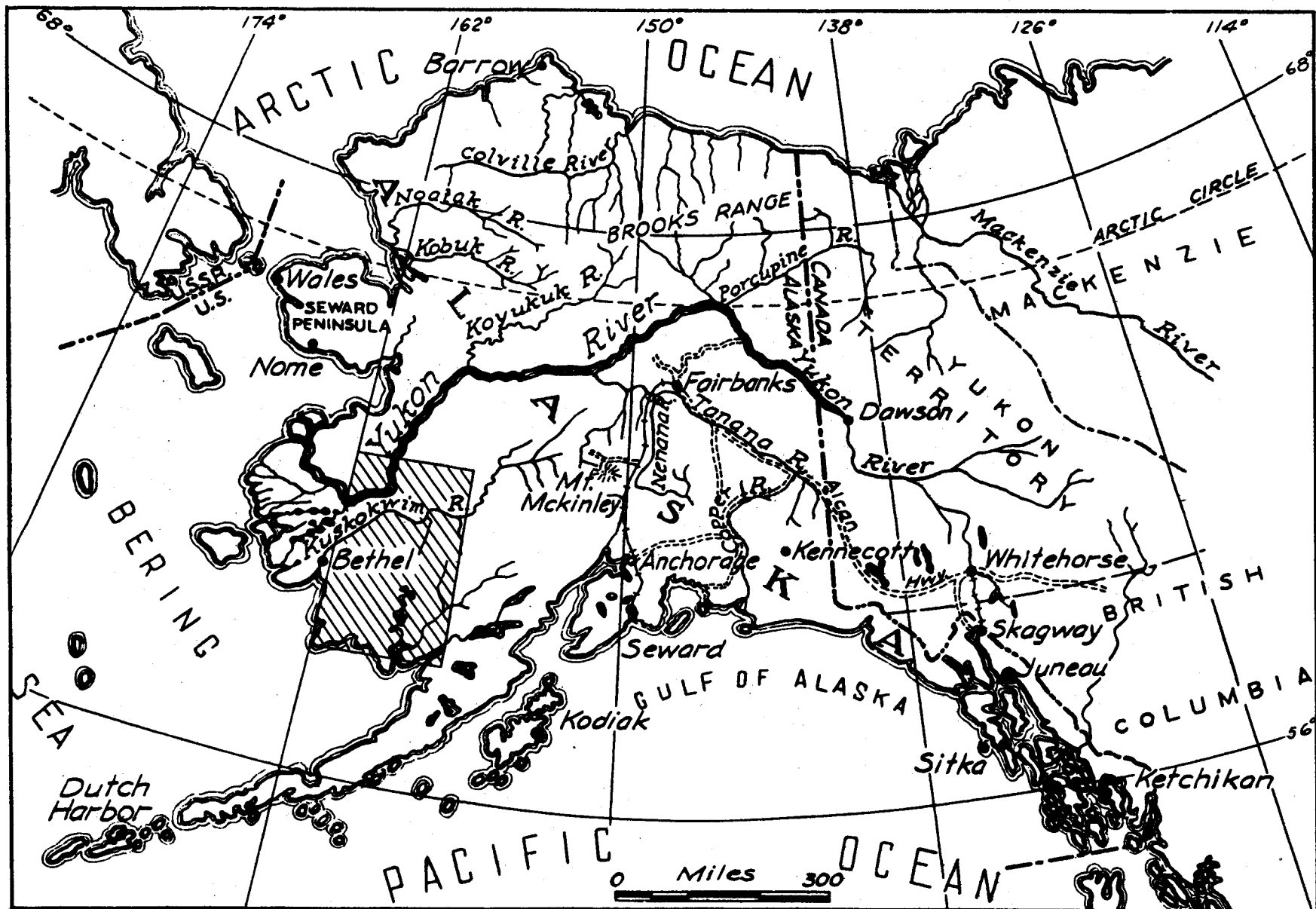


FIG. 1 INDEX MAP ~ MERCURY AREA OF SOUTHWESTERN ALASKA

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INTRODUCTION

Mercury deposits discovered in the United States have never been large enough to make this country self-sufficient with respect to quicksilver ore reserves, as is Spain with its vast Alamedan and Idria mines.

The Red Devil mine in the Sleitmut area was in the early stages of development when, in the summer of 1942, the senior author made a preliminary examination and started surface exploration. Since discovery of the lode in 1933, Red Devil ores, including mined and float material, had yielded 419 flasks. Exploration by bulldozer trenching and sampling went on at the Red Devil mine through the summer of 1942 and was followed that winter by shaft sinking and drifting under the direction of Norman Ebbley, Jr., and Robert L. Thorne, engineers of the Bureau of Mines. In the course of this exploration, four other deposits were examined by trenching and sampling - the Alice and Bessie, formerly known as the Parks property, the Barometer, the Willis, and the Fairview, all within an area of approximately 10 square miles.

In the summer of 1942, representatives of the Geological Survey^{6/} made a preliminary investigation of the DeCoursey deposits, where previous production amounted to less than 200 flasks. The results of the examination, together with a report by a Reconstruction Finance Corporation engineer,^{7/} were sufficiently encouraging to justify extensive surface trenching and mapping by the Bureau of Mines. The work started June 1, 1943, under the Bureau's supervision, and ended October 1, 1943.

^{6/} W. M. Cady and E. J. Webber.

^{7/} L. C. Doheny, supervising engineer R.F.C., Fairbanks, Alaska.

In the same summer, a field party of the Geological Survey^{8/} spent 4 weeks mapping and investigating mercury deposits in the upper Holitna River region, from which Russell Schaefer had brought out, by boat to Sleitmut, 2,300 pounds of high-grade cinnabar ore. At the close of the season's field operations by the Geological Survey, a report of the work led the Bureau of Mines to send a party to examine and sample the deposits further. This party was in the area from September 20 to 27, and spent most of the time in sampling the Lucky Day lode, though the Redskin lode claim and the placer deposits on Cinnabar Run were examined cursorily.

The Alaska Department of Mines, the Federal Geological Survey, and Frank H. Waskey supplied the Bureau with data that justified an examination of cinnabar lode and placer deposits on Marsh Mountain in the vicinity of Lake Aleknagik, Nushagak District, Alaska. The deposits were examined by Aner W. Erickson, an engineer of the Bureau, in May 1943 and, on the basis of subsequent information, were re-examined in October 1943 by one of the authors.

In 1944, the Geological Survey reported quicksilver deposits on the right limit of the Kuskokwim River 18 miles above Aniak at Kolmakof, a settlement established in 1829 by the Russian explorer of that name. The senior author examined the deposits in July 1944.

Recovery of cinnabar concentrates from a gold placer on Rainy Creek, a tributary of Eek River, was reported to the Bureau by Al. Jones, of Bethel, Alaska, the operator, and the location of realgar-cinnabar lodes was reported by prospectors familiar with the region. This deposit was examined in September 1944 by the senior author.

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 exploratory project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyses samples and performs beneficiation tests.

Special acknowledgment is extended to Harold Schmidt and Glen Franklin of the Kuskokwim Mining Co. for contributing valuable information on mining and ore reduction at the Red Devil mine; to R. F. Lyman for submitting detailed data regarding mine and plant operations at the DeCoursey Mountain mine; to L. C. Doheny of the Reconstruction Finance Corporation for cooperating with Bureau of Mines engineers in initiating projects in the Sleitmut mercury district; to Al Jones for bringing to the attention of Bureau's engineers the Rainy Creek deposits and for assisting in their examination; to James Crowdy, manager of the New York Alaska Gold Dredging Corp., who submitted results of his company's

^{8/} Cady, Wallace M., Preliminary Report on the Quicksilver Deposits in the Cinnabar Creek area, Alaska: Geological Survey.

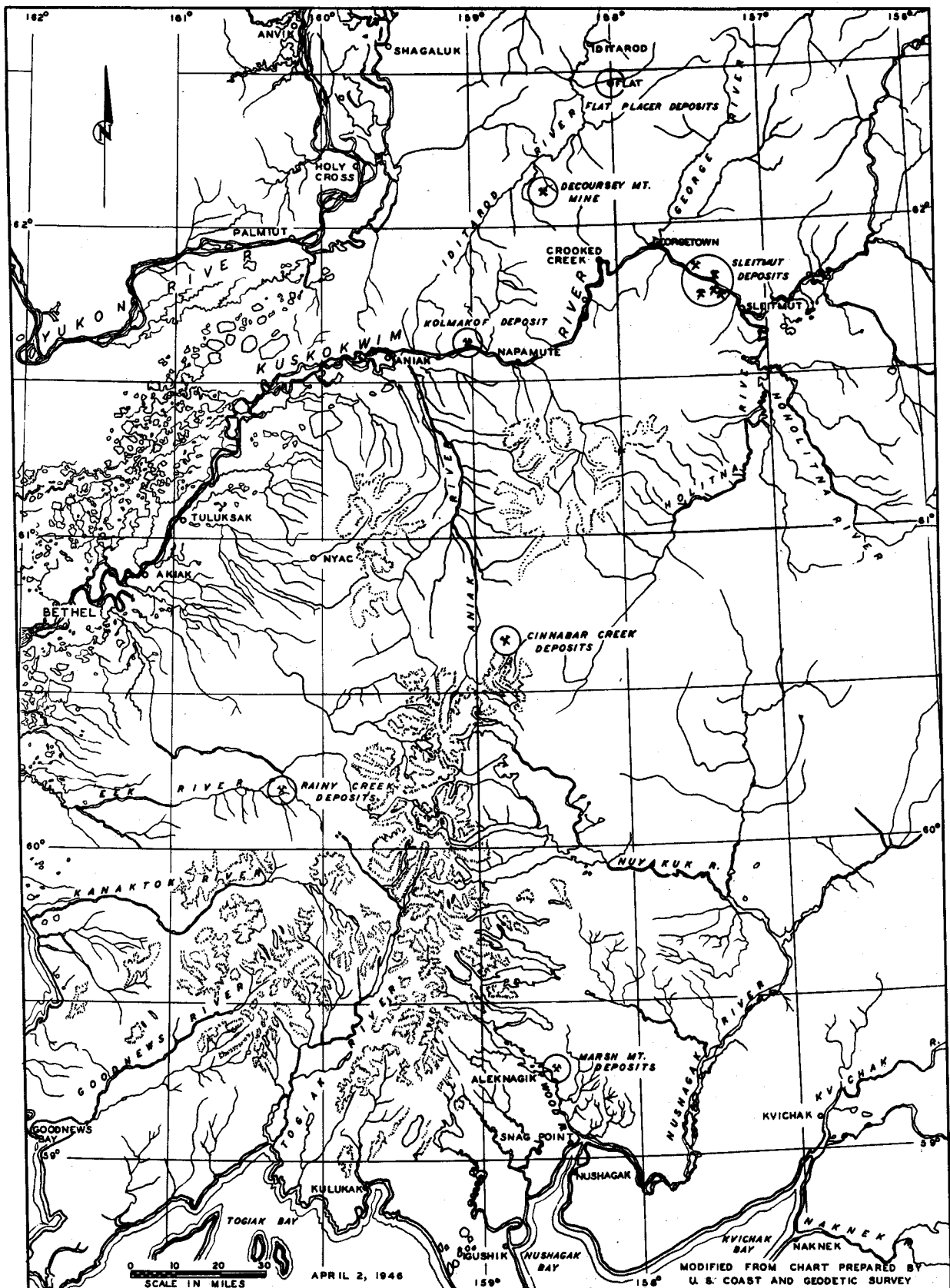


FIG. 2 MERCURY DEPOSITS IN SOUTHWESTERN ALASKA

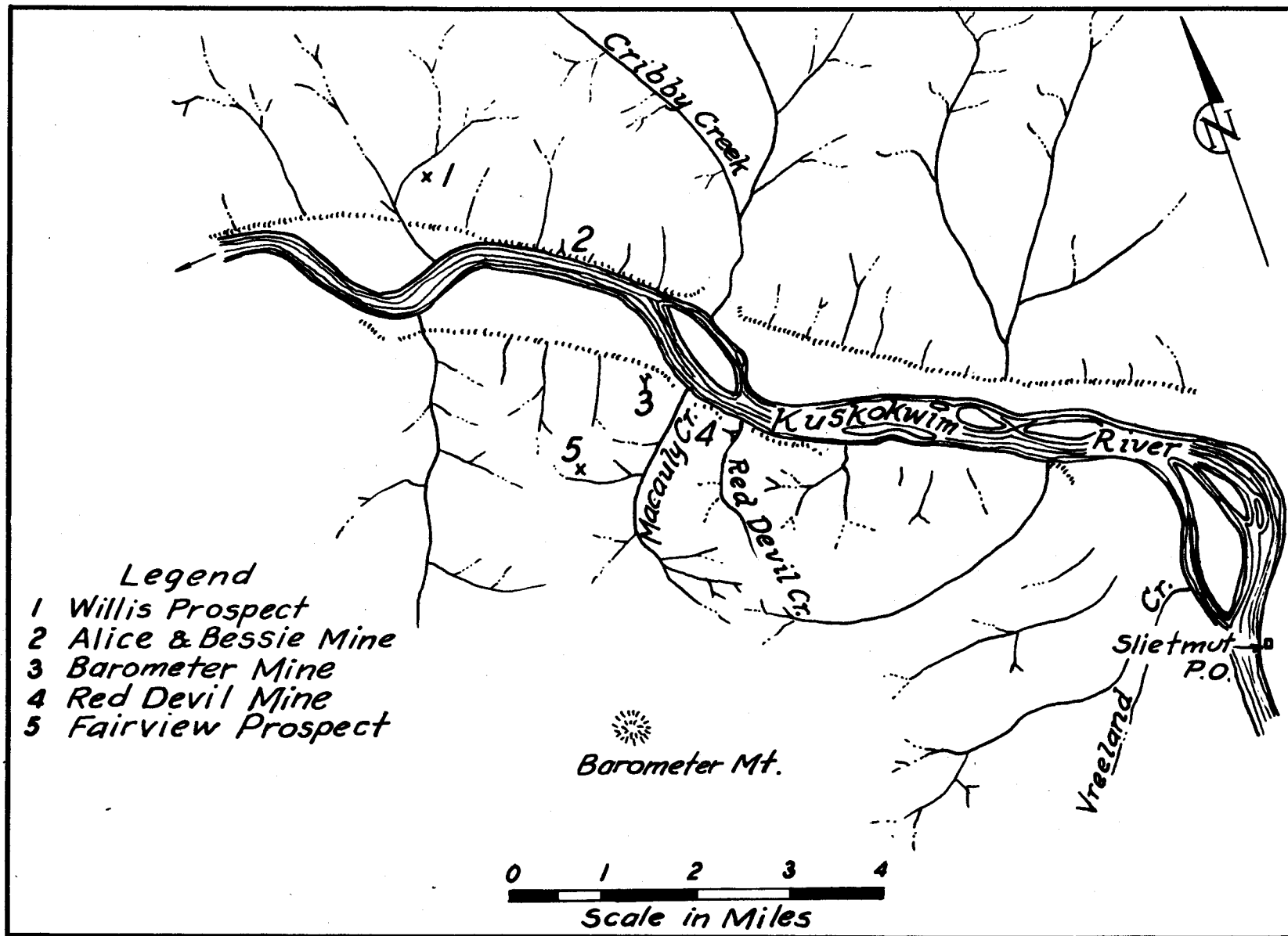


FIG. 3 LOCATION OF MERCURY MINES & PROSPECTS-SLEITMUT AREA

prospecting in the Upper Holitna River region; to Tony McDonald and Clyde Larabee, who assisted in obtaining transportation into the same area; and to Frank H. Waskey for contributing information leading to the examination of the Marsh Mountain deposits. Acknowledgment is also due Norman E. Ebbley and Robert L. Thorne, who directed Bureau of Mines underground exploration at the Red Devil mine in the winter of 1942-1943; Aner W. Erickson, who conducted the original examination of the Marsh Mountain deposit; Harold C. Pierce, who assisted in the Cinnabar Creek examination; and Robert S. Sanford, acting chief of the Alaska Division of the Bureau of Mines, who supervised all exploration and rendered much assistance in the compilation of this report.

LOCATION AND ACCESSIBILITY

Known cinnabar occurrences in Southwestern Alaska are situated within a rectangle 250 miles long by 130 miles wide, extending from latitude 59° N. to $62^{\circ} 30'$ N. and from longitude 157° W. to $160^{\circ} 40'$ W. Within this area are seven known zones of cinnabar mineralization situated approximately as follows:

Marsh Mountain,	$59^{\circ} 15'$ N. lat., $158^{\circ} 30'$ W. long.
Rainy Creek,	$60^{\circ} 12'$ N. lat., $160^{\circ} 20'$ W. long.
Cinnabar Creek,	$60^{\circ} 40'$ N. lat., $158^{\circ} 45'$ W. long.
Kolmakof,	$61^{\circ} 30'$ N. lat., $159^{\circ} 00'$ W. long.
Sleitmut,	$61^{\circ} 46'$ N. lat., $157^{\circ} 20'$ W. long.
DeCoursey Mt.,	$62^{\circ} 15'$ N. lat., $158^{\circ} 10'$ W. long.
Flat Placer area,	$62^{\circ} 30'$ N. lat., $158^{\circ} 01'$ W. long.

All except the Marsh Mountain and the Flat Placer deposits lie within the Kuskokwim drainage area, as shown in figure 2. Five deposits within a 4-mile zone lie 7 to 12 miles downstream from the village of Sleitmut in the Georgetown mining district. This zone, in which are located the Red Devil mine, Barometer mine, Alice and Bessie mine, Willis prospect, and Fairview prospect, is the most important mercury discovery in Alaska to date. (See fig. 3.)

The DeCoursey Mountain deposits, situated 63 miles northwest of the Sleitmut zone, 23 miles northwest of Crooked Creek, and 43 miles southwest of Flat in the Iditarod mining district, contributed materially to Alaska's mercury production during World War II.

The Kolmakof deposits are on the right limit of the Kuskokwim River about 18 miles above the village of Aniak and 12 miles below Napamute.

Quicksilver has been recovered from gold placers on Iditarod Creek near the village of Flat. Cinnabar has also been found in some of the placers in the Iditarod and McGrath districts, notably on Happy and Candle Creeks^{9/}.

The Rainy Creek quicksilver prospect is on the south side of Arsenic Creek, $1/8$ mile above its junction with Rainy Creek and 2 miles above the junction of Rainy Creek with the north fork of Eek River, a tributary of the Kuskokwim River. The location is shown in figures 2 and 22.

^{9/} Joesting, Henry R., Strategic Mineral Occurrences in Interior Alaska: Territory of Alaska, Department of Mines, May 1942.

Cinnabar Creek deposits consist of the Broken Shovel lode, near the headwaters of Cinnabar Creek, and Redskin and Lucky Day lodes on Beaver Creek. Cinnabar and Beaver Creeks unite to join the Gemuk River, which flows into the Chukawan River; that stream, in turn, flows into the Holitna River, a tributary of the Kuskokwim. Figure 18 shows the location of the cinnabar deposits with respect to these streams.

Marsh Mountain mercury deposits are on the south side of the mountain after which they are named and 4 miles east of Aleknagik, a native village on the southeast end of Lake Aleknagik, which discharges into Wood River 20 miles north of Nushagak Bay. (See fig. 25.)

Shallow-draft ocean-going vessels ascend the Kuskokwim River about 80 miles from its mouth to Bethel, where freight is transferred to river boats that serve the villages as far inland as McGrath. The minimum freight rate by steamship from Seattle to Bethel is \$22.50 a ton. River-boat upstream freight rates from Bethel are based at \$30 a ton, and down-river at \$15 a ton.

Freight rates from Seattle to Sleitmut, including a \$5 handling charge at Bethel, will average about \$65 a ton. The rate is higher for bulky items.

Sleitmut is a native village lying along both banks of the Kuskokwim, about midway between Bethel and McGrath, and has a population of about 75 persons during the salmon run (from July through August) and about half that number during trapping months. In normal times, adequate stocks of living essentials, including gasoline and oil, can be obtained from any of several trading posts that serve the lower Kuskokwim area.

Established mining camps of the area are ordinarily equipped with radio transmitting sets, by means of which telegraphic communication is established with the Alaska Communication System at Flat, Bethel, or McGrath. Telegraphic service at Sleitmut, as an accomodation, by the Alaska Native Service is available only during the regularly scheduled periods of transmission of their official messages.

Travel into the area is almost entirely by airplane. Scheduled flights are made several times weekly by six Alaska airlines from Anchorage and Fairbanks to McGrath, Flat, Aniak, and Bethel.

A mail plane equipped with floats in summer and skis in winter makes weekly stops at villages along the Kuskokwim, such as Sleitmut, Crooked Creek, Georgetown, and Aniak. Wheel-equipped planes make scheduled flights to Flat and charter trips to the Red Devil and DeCoursey Mountain mines. A landing field is situated on the south side of the Kuskokwim just across from the Parks (Alice and Bessie) property and 2 miles downstream from the Red Devil mine.

PHYSICAL FEATURES AND CLIMATE

The Lower Kuskokwim Valley in Southwestern Alaska comprises a vast expanse of unsurveyed terrain characterized by swampy lowlands, tundra-covered plateaus, and uplands. The large streams of the area originate in the uplands of the Alaska Range and in the plateau region to the west. The Kuskokwim River, by far the most important, receives many ice-fed tributaries and flows southwest in a wide, meandering channel to the Bering Sea. The stream basins form a vast lowland area comprising a greater part of the coastal region and much of the broad unexplored hinter-land. The ground surface rises gradually from the river basins into wide plateaus, which in turn merge into the rolling foothills. Taken as a whole, the area is one of moderate relief, with low, rounded mountains, plateaus, broad lowlands, lakes, and rivers.

Tundra is so prevalent in the area that few rock exposures are visible to the prospector. The lower valleys and hillsides are covered with scrub birch alder, and spruce, whereas the ridges are clear. Ox-bow ponds and marshes have been left in the river valleys by the shifting of meandering stream channels. Cut-off loops have been filled by decayed moss and scrubs that are buried each year by new growth and water-born silts. Thin peat beds formed thus are exposed at places along the banks where the river has rechanneled the old stream bed.

Fair stands of spruce grow along the river banks and for short distances up the tributaries. The larger spruce trees afford material for structural timbers and lumber up to 10 inches in width. Quaking aspen, balsam poplar, white birch, and shrubby maple, abundant in that order, are little suited to structural or mining use. Wood for fuel is available at most known mercury prospects.

Up to 1941, United States Weather Bureau statistics show the annual average precipitation at Bethel to be 17.98 inches. In 1944, precipitation at Bethel was 25.68 inches, whereas at McGrath, 500 miles inland, it was 20.01 inches. The average annual snowfall at Bethel, according to Weather Bureau records, is 39.9 inches.

During midsummer the climate is mild, with moderate, nearly constant winds and frequent light rains. The rainy season begins about July 15 and usually continues until September, with scarcely a day without some precipitation. Prior to the rainy season, the weather is ideal for field work, days are long, and the temperature is moderate. Snow usually comes about mid-October and the winter freeze-up shortly thereafter.

From June to October, it is necessary to protect the workman from mosquitoes and flies, which seriously impair working efficiency.

Records at Bethel show a temperature range from 90° to -46° F. The mean temperature for Bethel in 1944 was 30.2° F.; for McGrath, it was 27.6° F.

In the interior, subzero temperatures are prevalent through December and January, with annual minimums of -30 to -40° F. Low temperatures and abundant snowfall virtually eliminate outside work in winter except intermittent logging, wood cutting, and freighting.

In the coastal area, the climate is disagreeable much of the time because of fog, mist, and wind.

HISTORY AND PRODUCTION

For many years, cinnabar has been noted in the gold-bearing gravels of several placer-mining districts in Alaska, and, though they have not yielded mercury in commercial quantities, some of these deposits have led to the discovery of valuable lode deposits. Occurrences of placer cinnabar in the Yukon and Tanana regions have been reported from the Marshall, Bonfield, Rampart, Hot Springs, Circle, Seventy-mile, and Forty-mile districts. In most of these the mineral is scarce. In the Tolovana district, large amounts of placer cinnabar have been found on Olive Creek and smaller amounts on Lillian and Ruth Creeks. One lode occurrence was discovered on Olive Creek in 1917, but after considerable underground development it was abandoned.

There is a lode deposit at Bluff, east of Nome; but the region extending from Bristol Bay northward to include the central Kuskokwim valley is the only part of Alaska where, up to the present time (1946), quicksilver lode prospects have attracted serious attention.

The first known report authentically giving the regional location of quicksilver in Alaska is by Ivan Petrof^{10/}, who relates that in the Kuskokwim region are "well-defined veins of cinnabar, antimony and silver-bearing quartz. Cinnabar has also been discovered on the Kuskokwim, and assays made of the ore in San Francisco indicate a very valuable discovery there. * * *. The mountains eastward of the Redoute Kalmakovsky are high, heavily timbered around the base, and give ample evidence of the presence of mineral deposits, veins of quartz, cinnabar, and other ores being easily traced wherever the slopes and bluffs are exposed to view."

In 1898, J. E. Spurr,^{11/} of the Federal Geological Survey, made a reconnaissance examination in southwestern Alaska and reported cinnabar on the Kuskokwim 5 miles downstream from Kolmakof.

The same deposit was investigated by A. G. Maddren, of the Federal Geological Survey, during the course of a general examination of the Kuskokwim and adjacent regions in the summer of 1914.

The first real development work on a quicksilver lode in the region was done at the Parks prospect (now known as the Alice and Bessie claims) on the north bank of the Kuskokwim, about 15 miles upstream from Georgetown. Development work was started shortly after its discovery in 1906 and continued in a small way for several years thereafter. Philip S. Smith, of the Federal Geological Survey, examined and reported^{12/} on the deposit in 1914. Seven hundred

^{10/} Petrof, Ivan, Report on the Population, Industries, and Resources of Alaska: 1884, pp. 13, 77, 90.

^{11/} Spurr, J. E., A Reconnaissance in Southwestern Alaska in 1898: U. S. Geol. Surv., Twentieth Ann. Rept., 1900, pt. 17, p. 261.

^{12/} Brooks, A. H., et al, Mineral Resources of Alaska Report on Progress of Investigation in 1914: U. S. Geol. Survey Bull. 622, 1915, p. 274.

pounds of mercury had been produced from the property up to that time and constituted virtually the total Alaskan production during that period.

Several years later the DeCoursey Mountain prospect was discovered, and in 1921 Hans Halverson discovered the Barometer lode on the south side of the Kuskokwim. Halverson made the first Red Devil claim locations in 1933.

Up to July 1943, the total mercury produced from the lower Kuskokwim area amounted to about 800 flasks. In that year, under the stimulus of war demand and high prices, quicksilver producers became seriously interested in cinnabar deposits in Southwestern Alaska. In 1943, production from the Territory rose to 786 flasks, most of which came from the Red Devil mine. Several hundred feet of drifting was completed, and a 36-inch by 40-foot rotary kiln was installed at this property. At the DeCoursey mine, 30 miles southwest of the village of Flat, a block of high-grade ore was mined.

Activity increased through 1944 and 1945 at these properties, and renewed interest in cinnabar lode deposits was shown by prospectors in other parts of Alaska.

RED DEVIL MINE

History

In 1933, Hans Halverson, finding cinnabar float in a small stream bed on the left limit of the Kuskokwim 8 miles downstream from Sleitmut, traced it to its source, about 1,000 feet southwest of 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. Nine unpatented claims comprise the Red Devil property - Red Devil Nos. 1, 2, 3, and 4, Kusko Nos. 1 and 2, and Eurica Nos. 1, 2, and 3. They are within the Georgetown district in the Fourth Judicial Division of Alaska.

Halverson and Mellick started production of mercury in a small way from creek-bed float and detritus material in the vicinity of the lode. 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 two "D" retorts on the property in 1940 increased production to 158 flasks for that year. Production in 1941 was 135 flasks, and during the first part of 1942 it was 117 flasks. During these years, the partners sluiced the overburden from the southeastern 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 product.

An adit at an altitude of 311 feet was next driven from the open cut a distance of 90 feet northwest along an ore lens. This furnished the remainder of Red Devil production prior to the midseason of 1942. The backs over this adit are negligible.

A second adit was started in 1941 at a point 70 feet north of the portal of the 311-foot adit and at an altitude of 325 feet. The location of the two

adits is shown in figure 4. The 325-level adit 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° W. Both penetrated barren sandstone.

The owners started the Red Devil shaft 55 feet southeast of the portal of the 311-foot adit and sank it to a depth 30 feet on a 62-degree incline. At that depth the shaft appeared to be leaving the ore in its hanging wall.

In the fall of that year, Harold Schmidt and C. J. Stampe, of Fairbanks, obtained a lease on the property. The New Idria Quicksilver Mining Co. became interested in the property, also, and entered into the lease agreement jointly with Schmidt and Stampe. The New Idria-Alaska Quicksilver Mining Co. was formed with Harold Schmidt as superintendent.

The new company brought in mining and furnacing equipment and in 1943 completed more than 500 feet of drifting and crosscutting. Production was resumed on a larger scale and continued until the spring of 1944, when a discouraging mercury market caused the New Idria-Alaska Quicksilver Co. to curtail operations and eventually to sublease the property to the Kuskokwim Mining Co., consisting of Harold H. Schmidt, Glen Franklin, Earl Ellingen, and E. J. Stampe.

Production in 1944 was 1,090 flasks of mercury from 2,652 tons of ore. In 1945 the plant was operated 127 days from April to September, and 962 flasks were produced from 1,514 tons of ore. A dropping market price and difficulty in obtaining prompt notice of price changes caused the Kuskokwim Mining Co. to suspend operations early in the fall of that year.

Work done by the Bureau of Mines

Exploration of the Red Devil deposits was started by the Bureau of Mines in August 1942 about the time that Halverson and Mellick found it necessary to curtail their small-scale operation. A bulldozer was rented from Dan McDonald, and trenching in heavy overburden was started northwest of the open cut. Trenching in shallow overburden near the open cut was done by hand. Nineteen trenches with a combined length of more than 2,000 feet were cut at intervals of 30 to 150 feet across the strike of the mineralized zone. The dimensions of these excavations ranged in cross section from 2 by 3 feet to 24 by 10 feet and averaged 6 by 10 feet.

Figure 4 shows the location of trenches and samples. Table 2 gives the mercury and antimony content of samples collected.

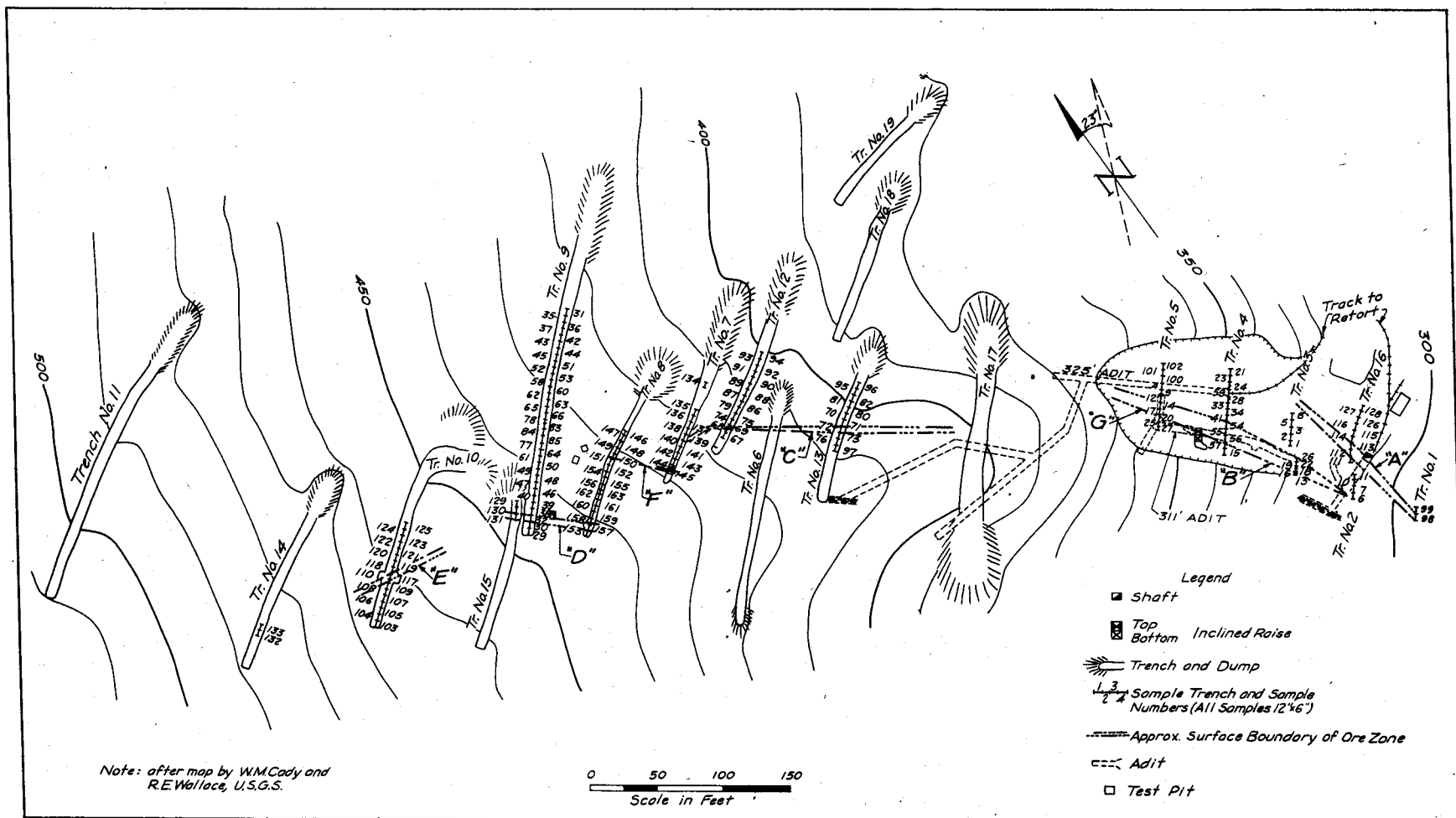


FIG. 4, TOPOGRAPHIC AND MINE MAP, RED DEVIL MINE

TABLE 2. - Analyses of samples from Red Devil trenches

Sample	Trench	Lb. Hg per ton	Percent Sb	Sample	Trench	Lb. Hg per ton	Percent Sb
1.....	3	0.1		48.....	9	0.1	
2.....	3	0.7		49.....	9	0.1	
3.....	3	0.8		50.....	9	0.1	
4.....	5	0.2	0.05	51.....	9	0.1	
5.....	3	0.2		52.....	9	0.2	
6.....	2	0.1		53.....	9	0.1	
7.....	2	0.1		54.....	4	34.4	0.91
8.....	3	0.1		55.....	4	23.2	0.13
9.....	5	0.1		56.....	4	19.0	
10.....	2	1.1		57.....	4	0.1	
11.....	2	0.5		58.....	9	0.1	
12.....	5	0.4	0.05	59.....	4	0.2	
13.....	3	4.2		60.....	9	0.1	
14.....	5	0.1	0.05	61.....	9	0.1	
15.....	4	0.1		62.....	9	0.2	
16.....	3	53.8	5.47	63.....	9	0.2	
17.....	5	23.3	0.60	64.....	9	0.1	
18.....	3	11.8	0.95	65.....	9	0.1	
19.....	3	28.5	1.13	66.....	9	0.1	
20.....	5	15.0	0.45	67.....	12	0.5	
21.....	4	0.5		68.....	12	1.1	
22.....	3	80.8	0.75	69.....	12	110.4	15.10
23.....	4	0.8		70.....	13	6.7	
24.....	4	0.4		71.....	13	2.5	0.08
25.....	5	7.2		72.....	13	27.9	
26.....	3	89.0		73.....	13	4.5	0.27
27.....	5	15.4	1.75	74.....	12	4.1	
28.....	4	0.5		75.....	12	0.4	
29.....	9	0.1		76.....	13	2.2	
30.....	9	0.5		77.....	9	0.1	
31.....	9	0.4		78.....	9	0.2	
32.....	9	3.7	0.05	79.....	12	0.3	
33.....	4	0.8		80.....	13	0.2	0.04
34.....	4	1.5	0.07	81.....	13	0.1	
35.....	9	0.2		82.....	13	0.9	
36.....	9	0.7	0.10	83.....	9	0.3	
37.....	9	0.1		84.....	9	0.1	
38.....	9	0.1		85.....	9	0.3	
39.....	9	0.1		86.....	12	0.2	
40.....	9	0.2		87.....	12	0.1	
41.....	4	1.5		88.....	12	0.1	
42.....	9	0.3		89.....	12	0.2	
43.....	9	0.2		90.....	12	0.2	
44.....	9	0.1		91.....	12	0.1	
45.....	9	0.1		92.....	12	0.2	
46.....	9	0.1		93.....	12	0.2	
47.....	9	0.1		94.....	12	0.1	

TABLE 2. - Analyses of samples from Red Devil trenches - continued

Sample	Trench	Lb. Hg per ton	Percent Sb	Sample	Trench	Lb. Hg per ton	Percent Sb
95.....	13	0.2	.....	130.....	15	1.6	0.33
96.....	13	0.2	.....	131.....	15	1.4	0.16
97.....	13	3.3	.....	132.....	14	0.3	.....
98.....	1	4.9	0.05	133.....	14	0.2	.....
99.....	1	0.4	0.07	134.....	7	0.1	.....
100.....	5	0.5	.....	135.....	7	0.4	.....
101.....	5	0.3	.....	136.....	7	0.2	.....
102.....	5	0.5	.....	137.....	7	0.2	0.05
103.....	10	0.2	.....	138.....	7	0.4	.....
104.....	10	0.5	.....	139.....	7	8.6	0.05
105.....	10	0.1	.....	140.....	7	0.9	0.30
106.....	10	0.1	.....	141.....	7	0.1	.....
107.....	10	0.5	.....	142.....	7	0.1	0.10
108.....	10	0.1	.....	143.....	7	0.1	.....
109.....	10	0.8	.....	144.....	7	0.1	.....
110.....	10	21.8	0.10	145.....	7	0.2	12.40
111.....	16	0.5	.....	146.....	8	0.1	.....
112.....	16	32.1	0.13	147.....	8	0.2	.....
113.....	16	26.1	0.15	148.....	8	0.1	.....
114.....	16	3.6	0.10	149.....	8	0.1	.....
115.....	16	0.4	0.08	150.....	8	0.1	.....
116.....	16	0.4	.....	151.....	8	0.1	.....
117.....	10	52.8	0.46	152.....	8	0.1	0.23
118.....	10	6.2	.....	153.....	8	0.1	.....
119.....	10	0.1	.....	154.....	8	0.8	.....
120.....	10	0.2	.....	155.....	8	0.6	.....
121.....	10	0.1	.....	156.....	8	0.2	.....
122.....	10	0.2	.....	157.....	8	0.2	2.45
123.....	10	0.7	0.12	158.....	8	0.1	.....
124.....	10	1.3	.....	159.....	8	0.1	.....
125.....	10	0.1	.....	160.....	8	0.2	.....
126.....	16	1.6	.....	161.....	8	0.1	.....
127.....	16	0.9	.....	162.....	8	0.1	.....
128.....	16	0.5	.....	163.....	8	0.1	.....
129.....	15	0.6	.....			

Seven mineralized lenses were exposed by surface trenches and were designated A, B, C, D, E, F, and G, as shown in figure 4. Lenses D and F were occurrences of weak mineralization; the others represent commercial ore bodies.

The Bureau also conducted underground exploration in the winter of 1942-43. The inclined shaft was sunk and timbered from 30 feet to a depth of 55 feet, but pump failure and inability to obtain repair parts prevented further advance. Ore was not found in the shaft below the 30-foot depth. A station was cut at 41 feet, and a crosscut was driven into the hanging wall to lens B. A drift was driven in this lens 22 feet northwest and was later extended by the operators. At this stage of the development, both faces of the drift were in high-grade ore.

From the 41-foot station, a heading was driven 26 feet around the hanging wall of the shaft to find the projection of lens A at that depth. Ore was not found, however.

The Bureau explored on the 325-foot level, also. The crosscut 106 feet from the portal was extended from 40 feet to 166 feet. The advance was S. 86° W. through 126 feet of almost barren sandstone.

Ore Deposits

The sediments in the Sleitmut area consist of graywacke, sandstones, and shales. At most places on the Red Devil property their strike is about N. 45° W.; dips are not uniform but average about 55 degrees southwest. The formations are predominantly shales in a part of the Red Devil property, but to the northwest these pass successively into intercalated shales, graywackes, and sandstones. In places, thin andesite intrusions in the form of sills separate the sedimentary beds. The intrusions are in the form of lenses and occur "en echelon" successively to the northwest.

Cinnabar and stibnite lenses occur principally along hanging-wall contacts within both the small sills and the adjacent sediments. In mining the Red Devil ore, it has been found that the lenses cut off sharply after being followed a short distance along their strike, and that they abutt a cross-trending joint plane. These planes are the loci of very weak mineralization with or without narrow, perhaps discontinuous andesitic material. They are believed not to extend beyond the zone of disturbance, which corresponds to the Red Devil ore zone with an average width of 30 feet. This structure is characteristic of the Red Devil deposits and has been found very useful in following the ore.

Six cinnabar-stibnite deposits have been found along a mineralized zone more than 800 feet in length. Five of these lie parallel to the bedding, or about N. 45° W., whereas, the trend of the sixth is across the bedding at N. 75° W. The deposits occur in various lengths and widths from 3 inches to 10 feet.

An approximate antimony:mercury ratio of 1:1 is indicated in the Red Devil ore by the following 17 determinations:

TABLE 3. - Mercury:antimony ratio in Red Devil ore

Sample	Trench	Hg, lb.	Sb, lb.
4.....	5	0.2	1.0
16.....	3	53.8	109.4
12.....	5	0.4	1.0
17.....	5	23.3	12.0
18.....	3	11.8	19.0
19.....	3	28.5	22.6
20.....	5	15.0	9.0
22.....	3	80.8	15.0
27.....	5	15.4	35.0
54.....	4	34.4	18.2
55.....	4	23.2	2.6
69.....	12	110.4	302.0
110.....	10	21.8	2.0
112.....	16	32.1	2.6
113.....	16	26.1	3.0
117.....	10	52.8	9.2
139.....	7	8.6	1.0
		538.6	564.6
Arithmetical av.		31.7	33.2

Mine Development

After the organization of the New Idria-Alaska Quicksilver Co., a program of systematic development of the Red Devil mine was begun. The inclined shaft was put down from 55 feet to 100 feet. A crosscut at 231 feet above sea level was driven from the shaft 50 feet southwest to penetrate the ore zone where drifts led northwest and southeast. A total of 390 feet of drifting and crosscutting was completed on this level.

The 30-foot crosscut driven from the shaft on the 270-foot level by the Bureau of Mines was extended 50 feet southwest by the company, though no ore was encountered. On this same level, 30 feet from the shaft, a drift was driven 100 feet northwest; then, at 60 feet from the crosscut, a meandering branch to the left was driven westerly 104 feet. Two short crosscuts were driven 12 feet each side of the branch drift at 25 feet from the main drift. A considerable amount of ore averaging 50 pounds of mercury a ton was mined from stopes above the main drift on the 270-foot level.

Following the Bureau of Mines exploratory program of crosscutting on the 325-foot level, the operators started a drift 71 feet from the adit, drove 60 feet N. 45° W., and then turned the heading N. 80° W. After advancing 95 feet in this direction, an ore lens corresponding to the Bureau's "C" ore lens at the surface was encountered.

Further development, including drifting and crosscutting, by the New Idria-Alaska Quicksilver Co. amounted to 580 feet. This work, most of which was completed in 1943, was a continuation of the 325-foot adit along the strike of the mineralized zone. Figure 5 shows the plan of the Red Devil mine at its present stage of development.

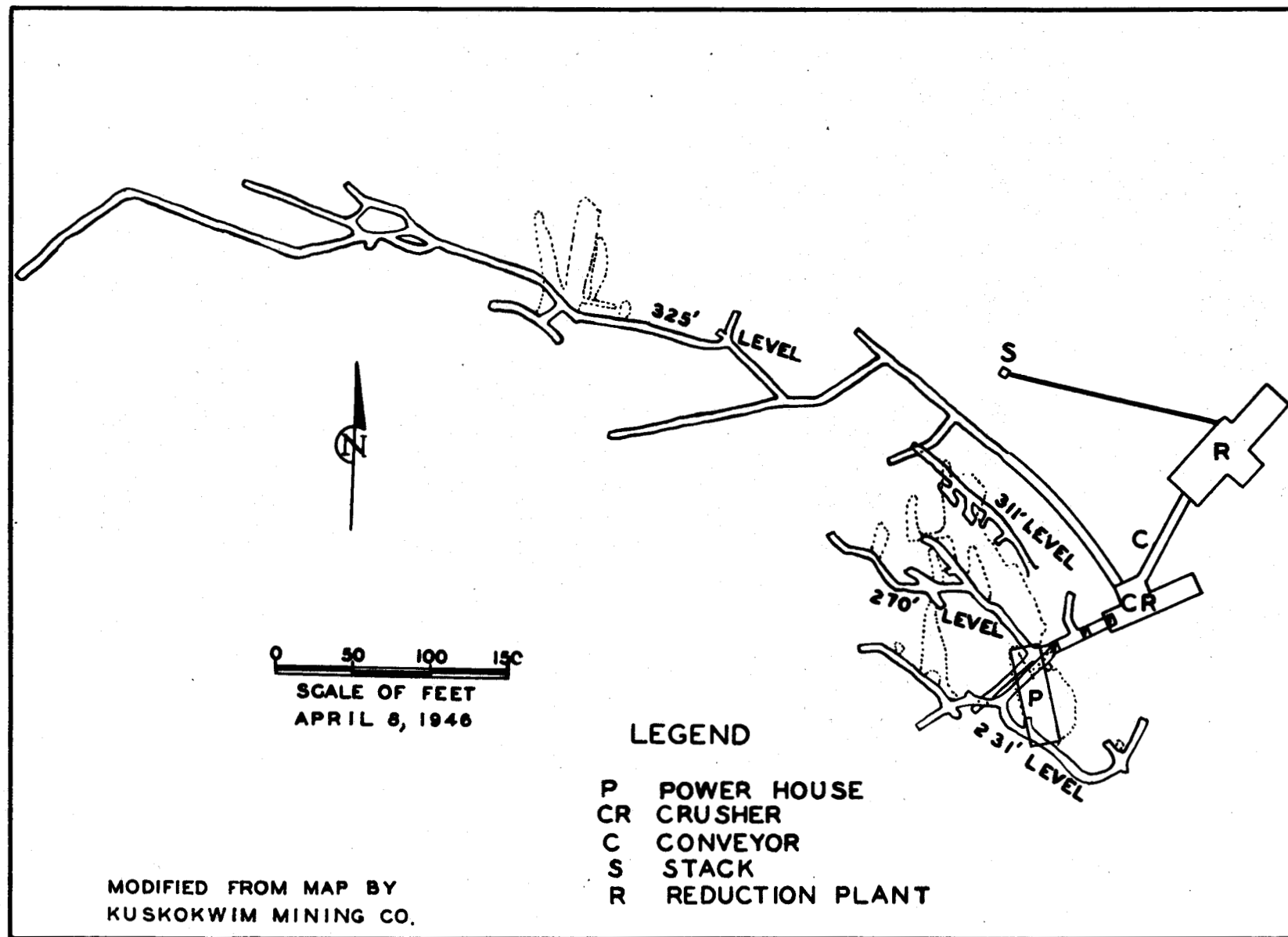


FIG.5 PLAN OF RED DEVIL MINE, SLEITMUT, ALASKA.

Mining

The ore is soft and friable and breaks free from the walls. The country rock is weak and requires close spacing of stulls for support of stope walls and drifts. All ore is mined from stulted stopes, the holes being drilled in the ore from stull-supported staging. Broken ore is trammed to the shaft on the 270-foot level and to the storage bin on the 375-foot level.

Water is pumped from the mine at a rate of about 100 gallons a minute.

The amount and grade of ore extracted from the various parts of the mine are given in table 4.

TABLE 4. - Red Devil ore summary

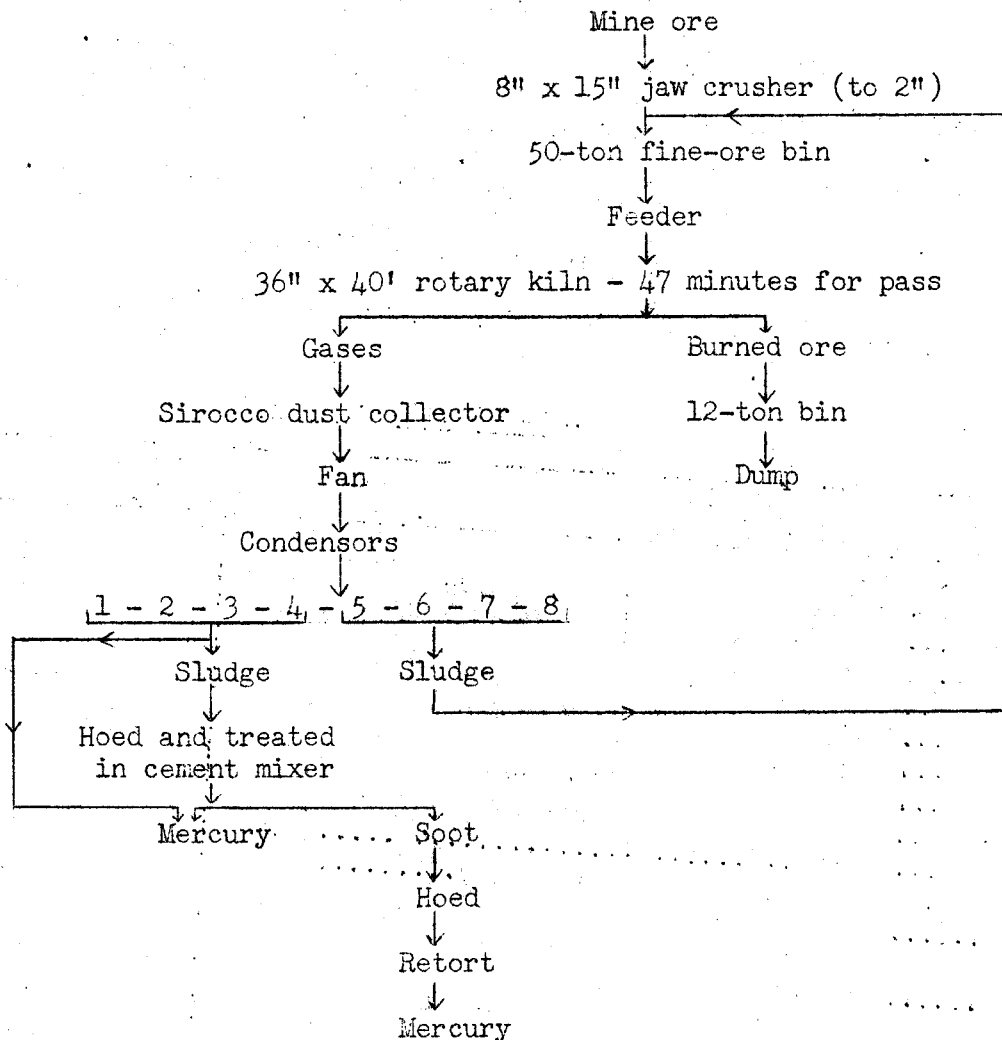
Season	Level	Width, feet	Stope No.	Tons	Est. grade, lb./ton	Recovered, lb./ton
1943-44....	325	3	72	550	60	
1943-44....	325	5	72 HW	522	25	
1943-44....	50' shaft	3	1	350	80	
1943-44....	50' shaft	3	2	300	40	
1943-44....	50' shaft	8	3	450	18	
1943-44....	50' shaft	3	4	250	50	
1943-44....	50' shaft	3	5	80	40	
1943-44....	50' shaft	2½	Sublevel	100	25	
1943-44....			Sublevel crosscut	50	18	
1943-44....	Total.....			2,652		
1943-44....	Mercury recovered (flasks).....			1,090		
1945.....	325 to surface	4	F	400	40	23
1945.....	325 to surface	3	72 FW	200	20-25	?
1945.....	325 to sur- face shaft	4	Exploratory stope	114	20	?
1945.....	100' level shaft	4	1	400	95	70
1945.....	100' level shaft	4	2	150	70	66
1945.....	100' level	3	3	250	60	57
1945.....	Total and average.....			1,514		48.3
1945.....	Mercury recovered (flasks).....			962		

NOTE: 270-ft. level designated 50-ft. shaft; 231-ft. level, 100-ft. shaft.

Six miners and two hoistmen are employed two shifts a day, 7 days a week during the operating season.

Furnacing and Retorting

In 1943, a New Idria-Alaska Quicksilver Mining Co. installed modern equipment for furnacing and retorting the Red Devil ore. The reduction plant was equipped with a 50-ton fine-ore bin, a 12-ton burned-ore bin, a 36-inch by 40-foot rotary kiln, Sirocco dust collectors, fan, condensers, and redwood tanks. Ore is reduced by the following flow sheet.



Power for the reduction plant and mine is furnished by two caterpillar 46-30 Deisel-electric units. The plant is operated three shifts a day, 7 days a week, by a crew consisting of three firemen, two retort operators, and two helpers, whose duties include cleaning up soot. A plan and profile of the conveyor room and condensor system are shown in figure 6.

The plant was placed in operation in 1944 to treat the 2,652 tons mined in 1943 and 1944. The yield in that year was 1,000 flasks of mercury from the kiln operation and 90 flasks from the retorts. Operations were resumed in April 1945. The rate of charge to the furnace, as shown by table 5, was more than 25 tons a day, and the recovery of mercury was less than 24 pounds a ton. By June, the rate was reduced to $6\frac{1}{2}$ tons a day, and recovery had increased to 66.6 pounds of mercury a ton. The mercury content of the raw ore was not determined, but according to the operators there was no great difference in the ore fed to the furnace during the two periods. They concluded that the passage of a heavy bed of crushed material through the kiln prevented air from circulating freely between the ore particles, retarded the formation of sulfur dioxide, and thus allowed only a partial reduction of the cinnabar ore.

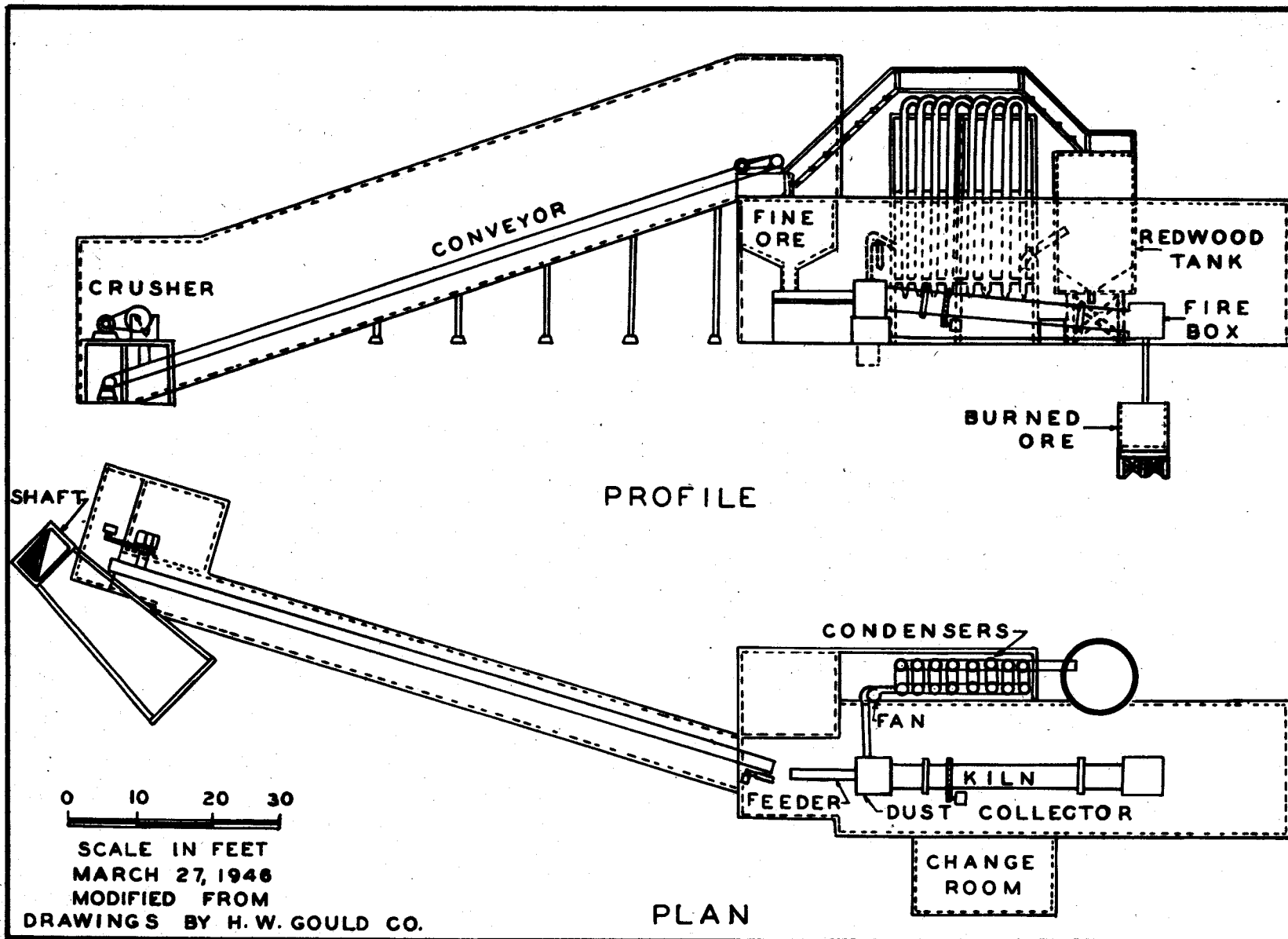


FIG. 6 LAYOUT OF RED DEVIL REDUCTION PLANT

TABLE 5. - Reduction plant record, 1945

Month	Tons	Days	Flasks	Recovery, lb./ton
April.....	387	15	108	23.8
May.....	311	20	113	27.6
June.....	194	30	173	66.6
July.....	324	30	300	70.3
August.....	265	27	200	57.3
September.....	33	5	56	-
Total.....	1,514		950	48.3

Note. - Additional flasks recovered from soot - 12.

The antimonial content of the Red Devil ore is nearly as great as that of mercury. Very little arsenic is present.

Stibnite sublimes at temperatures over 300°C ., and the resultant oxides become volatile at about 500°C .. The vapor pressure of cinnabar rises rapidly above 450°C ., and reaches atmospheric pressure at 580°C .. 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. 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. Improvements might be gained through experiments with design, draft, regulation, rate of temperature decrease, and character of feed. Antimony oxides passing into the condensing system are eliminated in the soot by extra hoeing and retorting. Little effort has been made to produce an antimony concentrate because of the high cost of transporting such a product to market.

Mercury flasks are shipped down the Kuskokwim by river boat to Bethel, thence to market at San Francisco by ocean steamer.

Costs

Costs at the Red Devil mine and reduction plant for the 5-month operating period in the summer of 1945 are shown in the following table:

TABLE 6. - Operating costs at the Red Devil mine in 1945(Published by permission of Harold Schmidt, president,
Kuskokwim Mining Co.)

Flasks produced - 962

Tons mined - 1514

Mining and development

	Per ton ore mined	Per flask mercury	Total	
Breaking.....	\$ 5.644	\$ 8.882	\$8544.94	
Tramming and hoisting.....	2.021	3.180	3058.78	
Shop work.....	1.485	2.338	2248.93	
Caterpillar and misc.....	1.227	1.932	1858.29	
	<u>10.377</u>	<u>16.332</u>		\$15,710.94

Reduction-plant operation

Firing.....	3.809	5.995	5767.05	
Wood.....	2.029	3.193	3072.00	
Clean-up of soot.....	1.899	2.989	2875.76	
Shop work.....	0.561	0.882	848.92	
Misc. labor and supplies.....	3.102	4.882	4696.10	
	<u>11.400</u>	<u>17.941</u>		17,259.83

Undistributed miscellaneous

Cook house.....	4.486	7.061	6792.30	
Shop operation and supplies....	3.948	6.214	5977.40	
Camp operation.....	0.089	0.140	135.04	
Retort operation.....	1.526	2.401	2310.00	
Depreciation of equipment.....	0.351	0.553	531.85	
Marketing.....	2.113	3.326	3200.00	
	<u>12.513</u>	<u>19.695</u>		18,947.23
Total.....	34.290	53.968		51,918.00

In addition to the 8 men employed at the mine and 7 at the reduction plant, there is a superintendent, a blacksmith, a cook, and a flunky, making an average crew of 19 men.

Dry, seasoned wood is used as fuel in the furnace and is consumed at the rate of one-tenth cord per ton of ore. The consumption in retorting is about eight-tenths cord per ton. Power units require about thirty-five 55-gallon drums of Deisel oil a month.

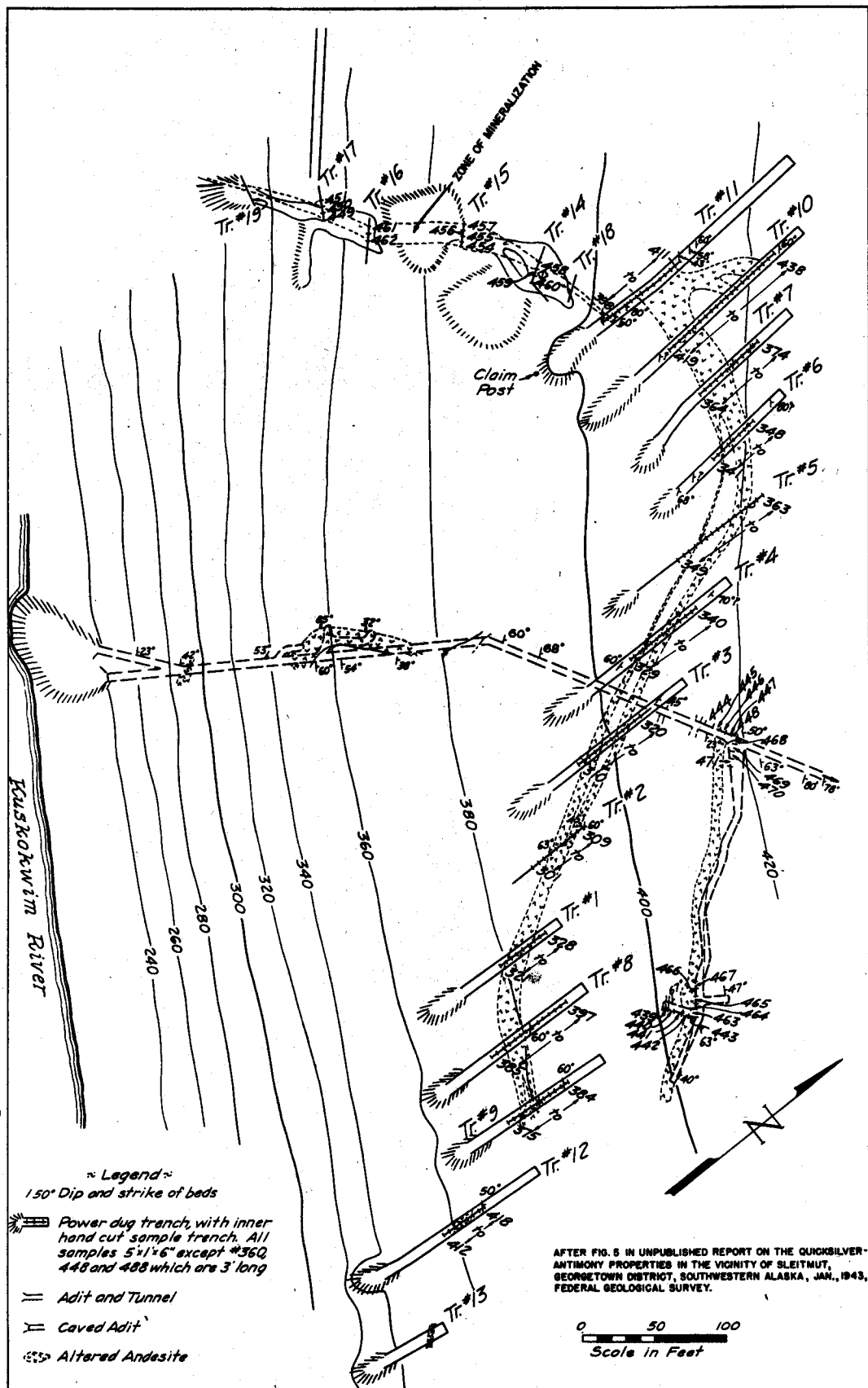


FIG. 7, ALICE AND BESSIE MINE

ALICE AND BESSIE MINE

History and ownership

The Alice and Bessie deposit on the north bank of the Kuskokwim River, 2 miles below Red Devil landing and 8 miles downstream from Sleitmut, as shown in figure 3, is believed to be the first known occurrence of mercury in the area. This first location consisted of two claims staked in 1906 by E. W. Parks. Six more claims were added to the group but were subsequently relinquished.

The ownership of the two unpatented claims, Alice No. 1 and Bessie No. 1, is distributed as follows:

	<u>Percent</u>
Daniel B. Trefethen, Dexter-Horton Building, Seattle, Wash.	40
Estate of E. W. Parks, Trustee, Bank of California, Seattle, Wash.;	
Alaskan Administrator, Nick Mellick, Sleitmut, Alaska.....	30
Edith R. Parks, Sacramento, Calif.	20
W. Delbar, Seattle, Wash.	10

Over a period of years, Parks prospected the property and occasionally retorted a little mercury in conjunction with his occupation of trader. Successively, he is reported to have used in retorting a steel drum, a small Scott furnace, and a Johnson-McKay furnace. Park's operation was apparently designed to supply the mercury requirements of the Georgetown and Iditarod gold placers, and toward meeting this demand he produced about 120 flasks up to and including 1923. There has been no production from the property since 1924.

Shallow pits and irregular surface excavations furnished the ore for this intermittent operation. His first production is reported to have been derived from an outcrop near the top of the river bluff. Later he mined ore from open cuts and a shallow short adit presumably in that portion of the main ore body represented by Bureau of Mines trenches 14 to 17 or in an offshoot extending westerly from the main ore body. (See fig. 7.)

He also obtained a considerable amount of this ore from shallow pits over the main ore body in the vicinity of Bureau of Mines trenches 4 and 5.

Parks had driven a crosscut adit for about 200 feet and encountered mineralization reported by the U. S. Geological Survey in 1914. In 1936, following the death of Parks, W. E. Dunkle leased the property and extended the adit to an over-all length of 525 feet. The main ore zone was encountered 450 feet from the portal, and a 240-foot drift was driven within the ore zone to the southeast.

Development

An adit driven by Parks and Dunkle is usable in its present condition, though it is without timber over most of its length.

The track has been removed from both the adit and drift, and no mining equipment remains at the property.

Two principal buildings, built by Parks, are on the river bank near a small permanent side stream and about 1,500 feet downriver from the adit. Both could be made habitable with the expenditure of a small amount of time and money.

Ore deposits

The graywackes and shales of the Alice and Bessie property strike northwest and dip to the northeast. It is believed that they are on the northeast limb of an anticline whose crest coincides with the Kuskokwim River for several miles.

The andesite on this property, wherever observed, has been altered from a buff to a white rock readily distinguishable from the unaltered, dark, biotite-andesite outcrop along the river bank below Parks' camp. Cinnabar mineralization has been found consistently in association only with the altered andesite, and the latter thus serves as a guide in prospecting. There is much more andesite in evidence at the Alice and Bessie than at the Red Devil property. As a rule, these intrusions are thin and parallel the bedding of the sediments, though they often cut across the bedding. The increasing areal extent of the andesite from the river northwestward to the Willis group of claims suggests the possibility that the parent igneous mass occurs at less depth here than on the opposite limb of the anticline.

Three separate ore bodies exist on the Alice and Bessie property: (1) The main deposit, exposed in the Bureau of Mines trenches and also in the drift driven from the crosscut adit; (2) a deposit that outcropped on the river bank above the adit at an altitude of 340 feet; and (3) an occurrence outcropping in the river bed.

The zone in which the main ore body occurs has been explored by a series of trenches. It has also been developed by a drift to the southeast from the crosscut adit about 160 feet vertically below the outcrop. Using the calculated average dip of 56° , the average dip interval between these exposures is 193 feet.

It is believed that the present underground exposures serve to prove the continuation of mineralization to that depth, but that they are insufficient to be considered in an estimation of reserves.

On the basis of the apparent N. 45° W. strike of the zone at the adit level, the trenches were excavated due north and south to cut the zone at an angle of 45 degrees. It had been observed underground that mineralization occurred as small veinlets generally oriented in a direction normal to that of the andesite contact. This structure was not discernable at the surface, possibly because the detail was obscured by the muddy smear resulting from almost continual rain.

Trenching proved that the andesite had been intruded as a sill between trenches 1 and 5, a distance of 340 feet. Over this length, the andesite is divided by several feet of sediments into two thin, roughly parallel bodies, both of which contain visible cinnabar in trenches 2 and 5. Cinnabar was observed in all but one trench within this strike interval, and although the principal concentration appeared to be within the andesite, it also extended into the enclosing sediments.

Southeast of this portion of the ore zone, the andesite swings easterly through trenches 8 and 9, both of which contain visible cinnabar in the andesite as well as in the sediments. Further to the southeast, traversing trenches 12 and 13, the andesite again conforms to the strike of the country rock, but is without observed mineralization. It is possible, however, that a branch from the sill may occur east of trench 9 and beyond the north limits of trenches 12 and 13. This possibility would be in keeping with its proved general structure.

Northwest of trench 5 the andesite sill turns rather sharply to the west through trenches 6, 7, 10, and 11. Mineralization, mostly within the andesite, was observed in all except trench 11. The form of the intrusive there was not determined, and the fingering toward the east, suggested by observations made in trenches 10 and 11, presents two other possibilities: First, the more northerly of the andesite occurrences in trench 11 may extend southeasterly, roughly paralleling the known mineralized body. It would traverse an area wholly unprospected at the surface and only approached underground by the face of the crosscut adit. Second, it is possible that in the neighborhood of trench 11 the andesite intrusive as a whole swings sharply southwest through trench 14 to trench 19.

Through this latter section, from which a considerable portion of the ore extracted by Parks is believed to have been taken, the rock is highly altered. At the shallow depths reached in hand trenching between the old filled pits, the presence of andesite was not definitely determined. The press of time and lack of equipment and men prevented adequate surface exploration of this strike length, though a definite zone of mineralization was determined. Its relationship to the main ore zone is not clear at the present stage of exploration.

According to Halverson, who was formerly employed by Parks, a small production was made from an open cut near the top of the cut-back directly over the adit. This cut, now filled by sloughing and soil creep, was not investigated by the Bureau. In 1914, the Geological Survey reported a short adit that, near its face, showed cinnabar mineralization. Though no cinnabar was observed here in 1942, the circuitous course of the original adit, 200 feet from the portal or near its face in 1914, suggests that an attempt had been made to develop the reported cinnabar. It is probable that this represented the downward extension of the ore taken from the open cut.

The third occurrence is reported by Halverson to occur in the river bed. According to his information, this deposit shows considerable strength. The river bed consists of closely compacted shales.

Exploration by the Bureau of Mines

The 19 trenches excavated by the Bureau of Mines in the course of the investigation are shown on figure 7. The average depth of the overburden along the main ore zone was from 3 to 6 feet, and rapid excavation of trenches with a D-2 caterpillar and bulldozer was possible. Eight of the nineteen trenches were excavated by hand.

Table 7 shows the mercury content of all samples and the antimony and arsenic content in certain composites.

TABLE 7

Sample	Trench	Lb. Hg per ton	Percent		Sample	Trench	Lb. Hg per ton	Percent	
			Sb	As				Sb	As
301.....	2	0.6			337.....	4	0.2		
302.....	2	2.4)			338.....	4	0.2		
303.....	2	11.8)			339.....	4	0.2		
304.....	2	1.2)	Tr.	Tr.	340.....	4	0.4		
305.....	2	1.6)			341.....	6	0.2		
306.....	2	15.0)			342.....	6	0.2		
307.....	2	1.0)			343.....	6	0.4		
308.....	2	0.2)	0.27	Tr.	344.....	6	0.2)		
309.....	2	2.4)			345.....	6	16.4)	0.04	0.031
310.....	3	0.4			346.....	6	1.8)		
311.....	3	0.2			347.....	6	0.6		
312.....	3	0.4			348.....	6	0.2		
313.....	3	Tr.			349.....	5	0.4		
314.....	3	0.2			350.....	5	0.2)		
315.....	3	0.4			351.....	5	0.4)	0.13	0.036
316.....	3	0.4			352.....	5	24.8)		
317.....	3	0.8			353.....	5	0.6)		
318.....	3	Tr.			354.....	5	0.4		
319.....	3	2.2			355.....	5	0.2		
320.....	3	0.2			356.....	5	0.2		
321.....	1	0.2			357.....	5	0.4		
322.....	1	0.2			358.....	5	0.2		
323.....	1	7.0)			359.....	5	0.2)		
324.....	1	39.0)	0.29	0.04	360.....	5	0.4)	Tr.	Tr.
325.....	1	1.2)			361.....	5	0.6)		
326.....	1	0.8)			362.....	5	2.8		
327.....	1	Nil			363.....	5	0.4		
328.....	1	0.4			364.....	7	0.8		
329.....	4	0.2			365.....	7	0.2		
330.....	4	0.2			366.....	7	0.2		
331.....	4	0.2			367.....	7	11.0)		
332.....	4	1.2			368.....	7	0.8)	Tr.	Tr.
333.....	4	8.4)			369.....	7	1.0)		
334.....	4	16.8)	0.22	0.048	370.....	7	0.6		
335.....	4	1.30)			371.....	7	0.2		
336.....	4	0.4)			372.....	7	0.2		

TABLE 7 - Continued

Sample	Trench	Lb. Hg per ton	Percent		Sample	Trench	Lb. Hg per ton	Percent	
			Sb	As				Sb	As
373.....	7	Nil			423.....	10	0.4		
374.....	7	0.2			424.....	10	0.2		
375.....	9	4.6			425.....	10	0.6		
376.....	9	0.6			426.....	10	0.2		
377.....	9	4.4)			427.....	10	0.4		
378.....	9	32.4)	0.06	Tr.	428.....	10	0.4		
379.....	9	1.30)			429.....	10	0.4		
380.....	9	0.4			430.....	10	0.4		
381.....	9	0.6			431.....	10	0.2		
382.....	9	0.4			432.....	10	Tr.		
383.....	9	0.8			433.....	10	Tr.		
384.....	9	0.2			434.....	10	6.6)		
385.....	8	Tr.			435.....	10	5.0)	Tr.	Tr.
386.....	8	0.2			436.....	10	0.2)		
387.....	8	1.0			437.....	10	0.2		
388.....	8	3.6)			438.....	10	Nil		
389.....	8	7.6)	Tr.	0.10	439.....	Undergr.	0.4		
390.....	8	8.8)			440.....	Undergr.	Nil		
391.....	8	1.2			441.....	"	0.2)		
392.....	8	7.0			442.....	"	0.2)	0.36	Tr.
393.....	8	1.4)			443.....	"	9.4)		
394.....	8	0.2)	0.02	0.02	444.....	"	Nil		
395.....	8	1.8)			445.....	"	Nil		
396.....	8	2.6)			446.....	"	Nil		
397.....	8	0.4			447.....	"	0.2		
398.....	11	0.4			448.....	"	0.4		
399.....	11	0.4			449.....	17	Nil		
400.....	11	0.2			450.....	17	0.6		
401.....	11	0.4			451.....	17	0.4		
402.....	11	0.4			452.....	Undergr.	0.2		
403.....	11	0.4			453.....	"	0.4		
404.....	11	0.4			454.....	15	3.4		
405.....	11	0.2			455.....	15	4.0		
406.....	11	0.2			456.....	15	9.2		
407.....	11	0.6			457.....	15	1.6		
408.....	11	0.2			458.....	14	0.2		
409.....	11	0.2			459.....	14	11.0		
410.....	11	0.2			460.....	14	0.4		
411.....	11	0.2			461.....	16	0.4		
412.....	12	0.2			462.....	16	0.6		
413.....	12	0.2			463.....	Undergr.	3.2		
414.....	12	Nil			464.....	"	8.6		
415.....	12	Tr.			465.....	"	3.0		
416.....	12	Nil			466.....	"	1.0		
417.....	12	0.2			467.....	"	0.4		
418.....	12	Nil			468.....	"	0.4		
419.....	10	0.6			469.....	"	4.0		
420.....	10	0.4			470.....	"	1.0		
421.....	10	0.2			471.....	"	10.0		
422.....	10	1.6							

BAROMETER MINEIntroduction

The Barometer property lies two claim lengths northwest of the Red Devil deposit and about one mile from the south bank of the Kuskokwim River. (See fig. 3.) It consists of six unpatented claims, the Barometer 1 to 6, inclusive, and is part of what is known as "Parks Property," being held jointly by the same individuals and in the same ratio as the Alice and Bessie claims. A slough about half a mile in length between the property and the river effectually prevents access direct from the river during the summer months. A landing from the river is made just below the mouth of Macauley Creek, and the brows of the hills facing the river are followed three-quarters of a mile to the Barometer deposits.

History and Production

Like most of the known deposits of cinnabar in the Sleitmut area, the Barometer lode was found by tracing pieces of float ore found along a small creek. Two occurrences in close proximity were discovered in 1921 by Hans Halverson, the first to be made in the area on the south side of the Kuskokwim River.

Both occurrences were opened by pits, and during the following year Halverson drove an adit 122 feet in length, which exposed the upper deposit at a dip depth of 46 feet. In 1923, E. W. Parks, trader and owner of the Alice and Bessie property, purchased the Barometer claims from Halverson and prospected both properties by means of additional surface work.

A retort made from one Johnson-McKay pipe was erected at the lower deposit, and a very small production was made, principally from the detrital material below the deposit.

In 1931, Otto Rohlphs, mining engineer, of Seattle, examined the Barometer mine. The property was leased in 1931, and a crosscut was driven across the upper deposit from Halverson's adit. This option was relinquished the following year, and the claims were leased by the E. W. Parks estate to A. C. Skidmore in 1938. Skidmore retorted 10 flasks of mercury from float ore and from ore obtained in a pit at the lower deposit. No development was undertaken, and the lease was surrendered at the close of the season.

In conjunction with annual assessment work in 1939 and 1940, a few flasks were retorted from ore taken from both the upper and lower deposits. The mine has since been inactive.

Ore Deposits

The succession of sediments at the Barometer property, in the immediate vicinity of the two deposits developed to date, is predominantly of shale. Graywacke or sandstone is increasingly in evidence in a westerly direction from the lower deposit. Although the strike of the sediments at the upper deposit

