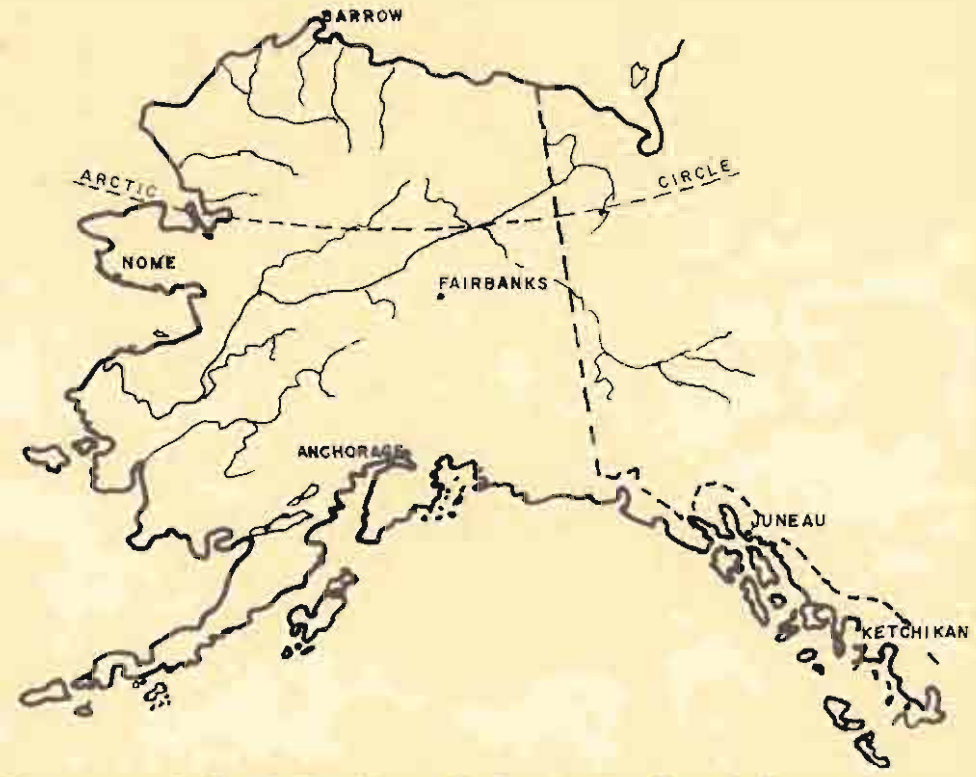
STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES



DIVISION OF MINES AND MINERALS

REPORT
FOR THE YEAR

1961

JUNEAU, ALASKA

STATE OF ALASKA

William A. Egan - Governor

Department of Natural Resources

Phil R. Holdsworth - Commissioner

DIVISION OF MINES AND MINERALS

James A. Williams, Director

REPORT

FOR THE YEAR

1961

Juneau, Alaska

Mr. Phil R. Holdsworth, Commissioner
Department of Natural Resources
Juneau, Alaska

Sir:

I have the honor to transmit herewith the Annual Report of the Division of Mines and Minerals for the year ending December 31, 1961. In this report the activities and accomplishments of the Division of Mines and Minerals are outlined. Summaries of mineral production, exploration, and developments, and data in other fields over which this Division exercises supervision are included.

Respectfully submitted,

James A. Williams

James A. Williams, Director
Division of Mines and Minerals
Box 1391, Juneau, Alaska
December 31, 1961

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December 31, 1961

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Center Piece: Better-Known Mineral Deposits, Possible Petroleum Provinces, and Exisiting and Proposed Roads

Introduction

The Division of Mines and Minerals is dedicated to greater development and utilization of Alaska's mineral resources, including hardrock, nonmetallic, coal, and petroleum products. This report is intended to help create interest in Alaska's minerals by disseminating information on the present status of the mineral industries, the possibilities of further developments, and the activities of the Division of Mines and Minerals in its efforts to assist and encourage new mineral developments. As the grade of ores in the other States decreases, and the foreign demand for ores increases, our deposits become more desirable. This is evidenced by the increasing attention given to exploration and investigation in Alaska by the larger mining companies of the other States and various foreign countries. It is therefore reasonable to expect that this interest will increase yearly. Considering the huge expenditures of the major oil companies in leasing and exploration, there is no doubt of the future interest in the petroleum field. Nevertheless, in view of Alaska's extreme need for basic industry, every effort within the State's means should be exerted to cause increased exploration and development.

Most of the hardrock deposits being examined are those that have been known to exist for many years. These discoveries are attributed mainly to the prospector. That prospector is becoming increasingly rare is evidenced by the lack of significant interest in the State-supported prospectors' aid program.

In view of these circumstances it becomes apparent that the Division can best anticipate the future demand for minerals by increasing its activity toward finding new deposits. This in turn requires more money and time spent in the field by competent technical men, investigating in detail areas or districts of known mineralization. The Division works in close harmony with the U. S. Geological Survey and the U. S. Bureau of Mines. With this mutual effort and exchange of information, it is possible by reading the reports available to select areas desirable for further field study. A start in the direction of detailed field studies for economic ore bodies has been made by the addition of a Mining Geologist to the staff. A planned program of collecting oil well samples and making them available for detailed study (after two years of confidentiality) to the petroleum industry will be of definite value in accelerating petroleum developments.

THE MINING INDUSTRY

Precious Metals

Alaska's lode gold mining continued on little more than the scale of development and sniping. A small tonnage of ore was mined from open pits by the Arctic Alaska Fisheries and Enterprises, Inc. near Cleary Summit, in the Fairbanks District, and milled at the Cleary Hill Mine mill. A mill was completed by Tury Anderson near Fairbanks, but no ore was mined. There were about 25 gold lodes being prospected, maintained, or developed throughout the State.

Placer mining was further curtailed by rising costs and the fixed price of gold. In order to offset the increased cost of labor and supplies, most operators reduced the size of their operations, thus reducing production. There were approximately 500 men employed in placer mining this year compared to about 550 last year and 4,240 in 1940. The total amount of employment quoted for the year is misleading since many mines were operated by one man for short periods of time. Many of these people only worked their property during periods of unemployment in other industries.

Goodnews Bay Mining Company continued its platinum dredging at Platinum, Alaska. It is reported the company had a successful season and intends to modify its dredge by lengthening the ladder in order to dig to greater depths. It still remains the only significant primary platinum producer in the United States.

A few gold operations noted during the year were as follows:

Bayless Brothers mined on O'Brien Creek in the Eagle District.

George Gilbertson moved his outfit from Mosquito Fork in the Fortymile to Canyon Creek.

Fred Purdy mined as usual in the Fortymile.

Aage Hansen drifted and did underground development work on the Wolverine Group on Craigie Creek in the Anchorage District.

Niemi and Goodman mined an old channel on Mills Creek, out of Talkeetna.

New York-Alaska Gold Dredging Corp. operated its No. 3 Dredge on a 24-hour basis and its No. 4 Dredge part time.

Fullerton Brothers mined at Flat, but suffered lost time while waiting for a broken dragline shaft replacement to be flown in from the South 48.

A big influx of skin-diving gold seekers from points south was notable in 1961.

This activity was widespread, but did little to raise the State's gold production.

Base Metals

No new production has as yet resulted from the exploration programs announced in last year's annual report. However the amount of this year's exploration continues to be encouraging, and early production of iron by Mt. Andrew Mining Company from Kasaan Peninsula of Prince of Wales Island seems assured.

Columbia Iron Mining Company, a subsidiary of United States Steel Corporation, exercised its option on the Klukwan iron deposits near Haines. The parent company filed notice of intention to do business in Alaska, paying $19,105 in registration fees for a State business license.

The Red Devil Mine, in the Kuskokwim area, continued to be the principal producer of mercury. In the same vicinity, Cordero Mining Company; Dorr Holloway and Mariano Juancorena; George Willis and John Murphy; and Norman Schaefer were all engaged in exploration for cinnabar.

Nickel and copper deposits continued to attract much attention and exploration activity.

The only significant producer of tin in the United States, the Lost River Mine, remained closed due to economic and financial matters. It was reported that the Lee Brothers of Nome contemplated placer mining for tin if economic conditions permitted.

Nonmetallics

Sand and gravel production remained dependent upon the military contracts and other construction. The Corps of Engineers, U.S. Army, U.S. Bureau of Public Roads, and the State Division of Highways were the principal producers.

Permanente Cement Company surveyed their Kings River limestone deposits and carried on development work. The company announced plans in 1960 for a cement plant near Sutton.

Radioactives

Bay West Inc. mined by underground methods and shipped 2500 tons of uranium ore from the Kendrick Bay property, Prince of Wales Island. This property was discovered in 1955 by Ross and Adams and mined by Climax Molybdenum Company in 1957.

Coal

Military contracts for the Fiscal Year 1961-62 totaled 577,000 tons of coal as compared to contracts for 516,000 tons for the previous fiscal year. The Division of Mines and Minerals estimates production of 750,000 tons for calendar 1961. Military consumption is usually approximately 70% of the total. Unusually cold weather late in 1961 may cause the above estimate to be low.

Primary producers were: Usibelli, Evan Jones Coal Company, Mrak Coal Company and Cripple Creek Coal Company. Cripple Creek Coal Company ceased operations and sold its equipment late in the year.

The Kenai and Point Barrow Fields contributed some production for local use.

Morgan Coal Company of West Virginia is reported to have applied for a Federal prospecting permit in the Arctic Coal Field near Wainwright.

The Beluga Field, NW of Cook Inlet and 50 miles W of Anchorage, was under further study and examination by the U.S. Bureau of Mines. At least one exceptionally large coal bed exists there. Upon acquisition of this area by the State, many persons and companies immediately secured State coal prospecting permits. These permits are of two years' duration with one two-year extension allowed under certain circumstances.

Mineral Production

Value of 1961 mineral production in Alaska increased 60 percent compared with that of 1960, according to estimates of production jointly compiled by the U.S. Bureau of Mines and the Division of Mines and Minerals. Petroleum and natural gas account for the tremendous increase. This increase absorbed the decreases in value of other mineral production, especially that of gold. Gold production decreased 33 percent from the previous year and is now surpassed by gravel, coal, and petroleum.

Table 1 - Mineral Production in Alaska

	1960		1961	
	Quantity	Value (Thousands)	Quantity	Value (Thousands)
Clay----------short tons	1,150	10	(3)	-----
Coal, bituminous----- thousand short tons	712	6,318	750	6,653
Copper (2) ----------short tons	41	27	(3)	-----
Gold (2)----------thousand troy ounces	168	5,887	114	3,973
Mercury ----------76-pound flasks	4,459	940	4,350	859
Natural Gas----------million cubic feet	246	30	568	151
Petroleum, crude-------thousand barrels	559	1,230	6,326	17,666
Sand and Gravel ---- thousand short tons	6,013	5,483	5,750	5,200
Silver (2) ---------thousand troy ounces	26	24	16	14
Stone---------- thousand short tons	275	852	300	900
Undistributed (3) ----------	-----	1,061	-----	1,150
Total ----------	-----	21,862	-----	36,566

(1) All figures for 1961 are preliminary (except petroleum) and subject to revision.
(2) Recoverable content of ores, etc.
(3) Undistributed includes gem stones, platinum group metals, uranium ore, clay and copper.

Note: Above statistics prepared under a cooperative agreement for the collection of mineral data between the Bureau of Mines, United States Department of the Interior, and the Division of Mines and Minerals, Department of Natural Resources, State of Alaska. Figures for coal, petroleum, natural gas, and undistributed commodities are presented on authority of the Division of Mines and Minerals only.

South Fork Mining Co. McCombe, Bob	Fortymile River Fairbanks	5	Nonfloat
Spirit Mountain Mining Co. Joe Boothby, Room 124 Administration Building Boeing Field, Seattle	Canyon Creek Chitina	3	Nickel-copper prospecting
Squaw Creek Mining Co. Jack Wilke, Boundary	Canyon Creek Fairbanks	1	Nonfloat
Stampede Mines Pilgrim, E. R.	Stampede Mine Fairbanks	2	Antimony lode maintenance
Steears, Al Box 826, Ketchikan	SE Alaska Several	2	Prospecting
Strandberg Mines, Inc. 926 4th Avenue or Box 2099 Anchorage	Alaska General Several	2	Mineral investigations
Strandberg Mines, Inc. 926 4th Avenue or Box 2099 Anchorage	Mespelt Mine Medfra	2	Gold Lode
Strandberg Mines, Inc. 926 4th Avenue or Box 2099 Anchorage	Eureka Creek Manley Hot Springs	14	Nonfloat
Strandberg Mines, Inc. 926 4th Avenue or Box 2099 Anchorage	Indian River Fort Gibbon	10	Nonfloat
Stover Brothers	Flat District Mt. McKinley	2	Nonfloat
Stuver, Jules Flat	Moore Creek Mt. McKinley	2	Hydraulic
Sultan Sawmill & Mining Co. Ray Trotachau Sultan, Washington	Kennecott Mine Mc Carthy	28	Sniping
T & T Mining Co. William Thomas 503 7th Avenue, Fairbanks, or Rampart	Hunter Creek Rampart	1	Nonfloat
Taylor, Arley & Associates c/o Snitely Brothers Wenatchee, Washington	Eureka Creek Fairbanks	6	Nonfloat & prospecting

Tetinek, Eugene Fortuna Ledge	Willow Creek Wade Hampton	1	Nonfloat
Texas Gulf Sulphur New York & Calgary	Alaska General Several	1	Exploration
Titus, Jack & Fred Cook Solomon	Shovel Creek Cape Nome	2	Small scale hand
Totem Exploration Co. Joe Blazek 317 Dock Street, Ketchikan	SE Alaska Several	2	Prospecting, Exploration & diamond drilling
Toussaint, Ed Fort Yukon	Big Creek Fairbanks	1	Gold lode development
Transworld Resources, Inc. (Geodynamics, Inc.) Phoenix, Arizona	Yakataga Beach Several	4	Placer exploration
Tweet, N.B. & Sons Teller	Kougarok River Cape Nome	5	Nonfloat, Hydraulic & Dredge
Twin Creek Mining Co. Tom Gordon & others Anchorage	Twin Creek Talkeetna	3	Nonfloat
Ulrich, Henry Nome	Rock Creek Cape Nome	1	Small scale hand
Uranium & Strategic Ore Development Co., Mr. Hammond Anchorage	Craigie Creek Wasilla	2	Gold lode prospecting
U.S.S.R.&M. Co. Box 1170, Fairbanks	Fairbanks District Fairbanks	120	4 gold dredges
U.S.S.R.&M. Co. Box 1170, Fairbanks	Hogatza River Ft. Gibbon	35	Gold dredge
U.S.S.R.&M. Co. Box 1170, Fairbanks	Mosquito Fork Fairbanks	19	Dredge
U.S.S.R.&M. Co. Box 438, Nome	Nome District Cape Nome	65	2 gold dredges
Uotila, Gus Ophir	Ophir Creek Mt. McKinley	4	Nonfloat
Uotila, Gus & Albert Yrjana Ophir	Birch Creek Nulato	2	Stripping
Wackwitz, Charles & Fred Box 1595, Fairbanks	Bedrock Creek Fairbanks	2	Prospect development

Wall, Melvin c/o Robert Hoedel Homer	Valdez Creek Talkeetna	4	Placer & lode prospecting
Wallace, William M. 5th & Denali, Anchorage	Granite Creek Chitina	3	Copper lode exploration
Watson, Mrs. Ben Cape Yakataga	Yakataga Beach Cordova	2	Small scale hand
Wattamuse Mining Corp. Nat Brown, R. 1, Burton, Washington, or Goodnews Bay Village	Slate Creek Bethel	2	Nonfloat
Weinard, Fred Candle	Mud Creek Fairhaven	2	Nonfloat
Weisner Trading Co. Ira Weisner & Jim Pierce Rampart	Little Minook & Hoosier Creeks	4	Nonfloat
Western Alaska Mining Co. R. J. Anderson Box 121, Spenard	Kolmakof Property Kuskokwim	1	Mercury lode development
Wheeler, Vernon Little Susitna Lodge, Wasilla	Fishhook Creek Palmer	1	Suction pumping
Williams, Burton A. May Creek via Cordova	Rex Gulch Mc Carthy	1	Small scale hand
Willis, George & John Murphy Red Devil	Parks Property Kuskokwim	2	Building mercury retort
Withrow, Alfred W. Bettles Field	Koyukuk River Fairbanks	1	Small scale hand
Wiurm, Andrew Box 491, Nome	Dome Creek Cape Nome	1	Hydraulic
Wolf Creek Mining Co. Inc. Box 141, Fairbanks	Fish Creek Fairbanks	8	Nonfloat
Woodman, I. N. Box 573, Valdez	Tonsina Lake Area Valdez	1	Prospecting
Worthington, John Ketchikan	Ketchikan Ketchikan	1	Prospecting
Yelinore, Inc. Paul Fretz, 947 Orcas Street Anchorage	Yellow Band Property McCarthy	4	Gold lode prospecting

Young, Frank R. Haines	Haines District Haines	1	Prospecting
Zaiser, Clarence Ruby	Greenstone Creek Nulato	2	Nonfloat
Zaiser, Leonard McGrath	Resurrection Creek Seward	2	Nonfloat
Zimin, Nick South Naknek	Alaska Peninsula & Bristol Bay District	1	Prospecting
Zukoev, James	Bonnifield District Nenana	1	Nonfloat

"Nonfloat" indicates mechanical placer gold operation using draglines and/or bulldozers to transport gravel to nonfloating washing plant, bedrock sluiceboxes, or elevated sluices.

"Hydraulic" indicates placer gold operation in which gravel is excavated and transported to sluiceboxes solely by water jets from hydraulic nozzles.

"Small scale hand" indicates placer gold operation in which gravel excavation and transportation is accomplished by hand or ground sluicing.

ACTIVE COAL MINES, 1961

Name and Address of Operator	Location of Mines & Coal Field	Type of Operation	Approx. Crew
Cripple Creek Coal Co. Box 529, Fairbanks	Cripple Creek Nenana Field	Strip	12
Evan Jones Coal Co. Box 619, Anchorage, or Jonesville	Jonesville Matanuska Field	Strip	40
Mrak Coal Co. Box 16, Sutton	Near Eska Matanuska Field	Strip	38
Paul Omlin	Premier Mine Matanuska Field	Strip	2
Usibelli Coal Mines, Inc. Usibelli	Healy Creek Nenana Field	Strip and underground	80

OIL AND GAS COMPANIES ACTIVE DURING 1961

Name and Alaskan Address of Company	Home or Regional Office	Type of Activity
Bass Drilling Co.	905 San Jacinto Bldg., Houston	Geophysical
British American Oil Producing Co. 1827 East 5th Ave., Anchorage	Mercantile-Dallas Bldg., Box 749, Dallas 21	Geophysical
British Petroleum Exploration Co. (Alaska), Inc. Mt. McKinley Bldg., Anchorage	620 5th Ave., New York City 20	Geologic field party, geophysical
Cities Service Oil Co.	Bartlesville, Okla.	Geologic field party
Colorado Oil and Gas Corp. Yakutat	Box 749, Denver	Drilling, geophysical
Hackathorn Drilling Co. 134 E. 2nd, Anchorage	715 Midland Savings Bldg. Denver 2, Colorado	Drilling
Honolulu Oil Corp.	215 Market St., San Francisco 5	Geophysical
Mobil Oil Co. Box 1734, Anchorage	612 S. Flower St., Los Angeles 54	Geophysical
Ohio Oil Co. 520 K St., Anchorage	550 S. Flower St., Los Angeles 17	Geophysical
Pan American Petroleum Corp. 333 B St., Anchorage	Box 591, Tulsa 2	Geophysical, geologic field party, drilling
Phillips Petroleum Corp. 211 Loussac-Sogn Bldg., Anchorage	Bartlesville, Okla.	Geologic field party, geophysical
Pure Oil Co. Box 1651, Anchorage	35 East Wacker Drive, Chicago	Geologic field party, geophysical, drilling
Richfield Oil Corp. Box 2241, Anchorage	555 S. Flower St., Los Angeles 17	Drilling, geophysical, geologic field party

Shell Oil Co.	Suite 1055, Dexter Horton Bldg., Seattle 4	Geologic field party, geophysical
Sinclair Oil and Gas Co. Box 584, Anchorage	Box 521, Tulsa	Geologic field party, geophysical
Standard Oil Co. of California Box 7-839, Anchorage	225 Bush St., Standard Oil Building, San Francisco 20	Production, drilling, geologic field party, geophysical
Superior Oil Co. 321 C St., Anchorage	550 S. Flower St., or Box 3015 Terminal Annex, Los Angeles	Geologic field party, geophysical, drilling
Texaco, Inc. Loussac-Sogn Bldg., Anchorage	3350 Wilshire Blvd., Los Angeles 5	Geophysical, geologic field party
Union Oil Co. of California 2805 Denali, Anchorage	Union Oil Center, Los Angeles	Drilling, geophysical, production

LIST OF REPORTS ISSUED BY THE DIVISION OF MINES AND MINERALS AND CORRESPONDING PRECEDING AGENCIES

*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1912.

*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1913.

*Report of the Mine Inspector for the Territory of Alaska to the Secretary of the Interior, fiscal year ended June 30, 1914.

*Report of the Territorial Mine Inspector to the Governor of Alaska for the year 1915.

*Report of William Maloney, Territorial Mine Inspector, to the Governor of Alaska for the year 1916.

*Report of the Territorial Mine Inspector to the Governor of Alaska for the year 1917.

*Annual Report of the Territorial Mine Inspector to the Governor of Alaska, 1920.

*Annual Report of the Territorial Mine Inspector to the Governor of Alaska, 1921.

*Annual Report of the Mine Inspector to the Governor of Alaska, 1922.

*Annual Report of the Mine Inspector to the Governor of Alaska, 1923.

*Report upon industrial accidents, compensation and insurance in Alaska for the biennium ending December 31, 1924.

*Report of the Territorial Mine Inspector, calendar years 1925-26.

*Report of cooperation between the Territory of Alaska and the United States in making mining investigations and in the inspection of mines for the biennium ending March 31, 1929.

*Report of cooperation between the Territory of Alaska and the United States in making mining investigations and in the inspection of mines for the biennium ending March 31, 1931.

*Mining investigations and mine inspection in Alaska, biennium ending March 31, 1933.

*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1936.

*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1938.

*Report of the Commissioner of Mines to the Governor, biennium ending December 31, 1940.

*Report of the Commissioner of Mines to the Governor, two biennia ended December 31, 1944.

*Report of the Commissioner of Mines, biennium ended December 31, 1946.

*Report of the Commissioner of Mines, biennium ended December 31, 1948.

*Report of the Commissioner of Mines, biennium ended December 31, 1950.

*Report of the Commissioner of Mines, biennium ended December 31, 1952.

*Report of the Commissioner of Mines, biennium ended December 31, 1954.

*Report of the Commissioner of Mines, biennium ended December 31, 1956.

*Report of the Commissioner of Mines, biennium ended December 31, 1958.

*Report of the Division of Mines and Minerals, for the year 1959.

Report of the Division of Mines and Minerals, for the year 1960.

*Joesting, Henry R., Strategic mineral occurrences in interior Alaska, Pamphlet No. 1, May 1942.

*Joesting, Henry R., Supplemental to Pamphlet No. 1 - Strategic mineral occurrences in interior Alaska: Pamphlet No. 2, March 1943.

*Anderson, Eskil, Mineral occurrences other than gold deposits in Northwestern Alaska: Pamphlet No. 5-R, May 1944.

*Stewart, R.L., Prospecting in Alaska (26-page pamphlet), December 1944. (Revised to November 1949).

*Glover, A.E., Industrial minerals as a field for prospecting in Alaska, including a glossary of elements and minerals (82-page booklet) March 1945. (Revised to May 1946).

*Anderson, Eskil, Asbestos and jade occurrences in the Kobuk River region, Alaska: Pamphlet No. 3-R, May 1945.

*Roehm, J.C., Some high calcium limestone deposits in Southeastern Alaska: Pamphlet No. 6, March 1946.

Proper Claim Staking in Alaska; Information Circular No. 1, April 17, 1961.

Rights of Canadians in Alaska under the Mining Laws; Information Circular No. 2, September 15, 1953.

Hints for Prospectors on the Mainland of Southeastern Alaska; Information Circular No. 3, March 15, 1954.

*Alaska Uranium Information; Information Circular No. 4, March 15, 1955.

General Alaskan Mineral Information; Information Circular No. 5, March 18, 1961.

Alaskan Prospecting Information; Information Circular No. 6, November 5, 1959.

Compulsory Assessment Work Affidavits; Information Circular No. 7, July 15, 1957.

Mineral Industry Consultants Available for Work in Alaska; Information Circular No. 8, July 6, 1959.

Dealers in Alaskan Rocks and Minerals; Information Circular No. 9, March 23, 1961.

Skin Diving for Gold in Alaska; Information Circular No. 10, June 6, 1961.

List of DM&M Publications; Information Circular No. 11, December 11, 1961.

* Out of print. On file in certain public and university libraries.

Figure 1 - Annual Value All Mineral Production - Alaska 1880 - 1961

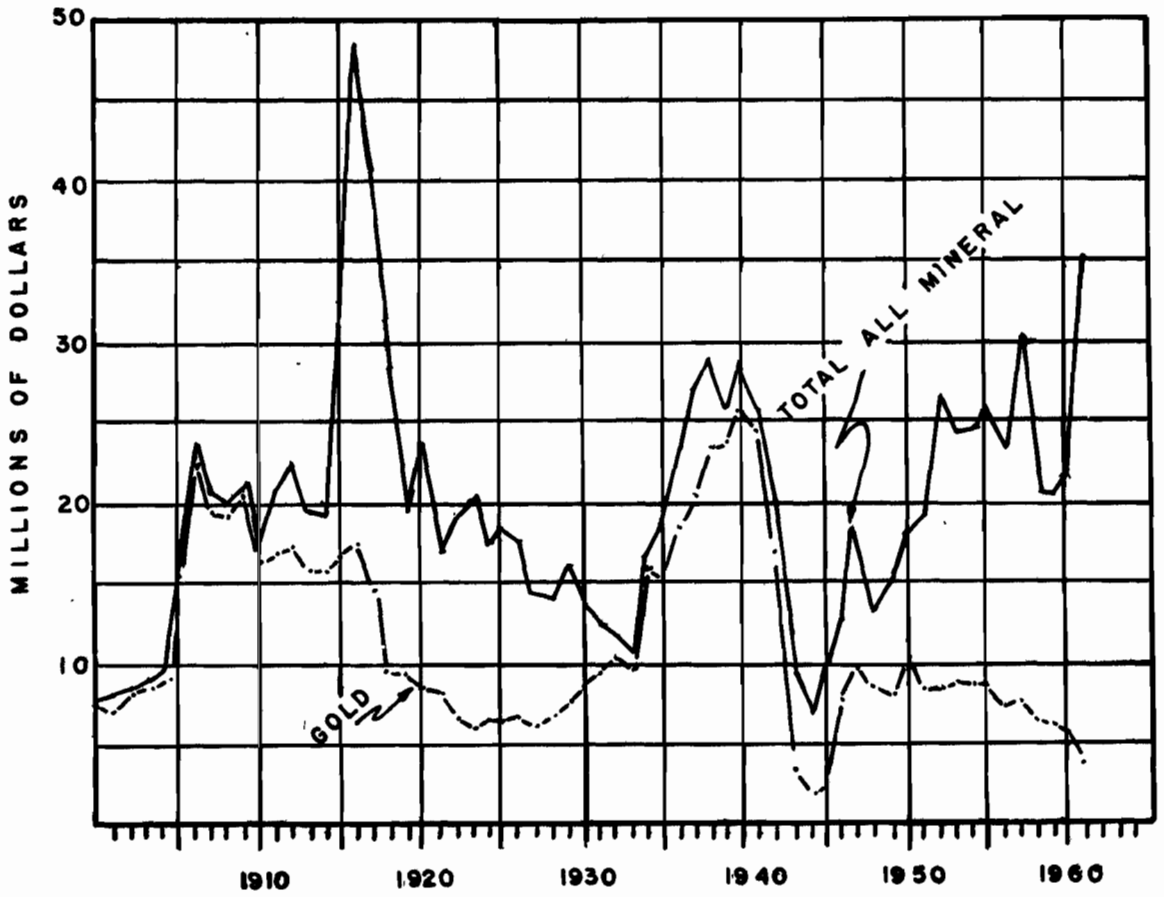


Table 2 - Production Major Commodities
Dollar Value (Thousands)

Year	Gold	Mercury	Coal	Oil and Gas	Sand and Gravel
1950	$10,125	$	$ 3,033	$	$ 2,377
1951	8,387		3,767		3,538
1952	8,420	6	5,779		8,651
1953	8,882	8	8,452		5,080
1954	8,699	277	6,442		6,302
1955	8,725	12	5,759		8,242
1956	7,325	853	6,374		5,880
1957	7,541	1,349	7,296		8,799
1958	6,525	774	6,931		3,871
1959	6,262	851	6,869	311	5,265
1960	5,887	940	6,318	1,496	5,483
1961	3,973	859	6,653	16,288	5,200
	$90,751	$5,929	$73,673	$18,095	$68,688

It can be seen by Table 2 that the value of gold produced dropped more than normal. This was a result of the continued curtailment of the United States Smelting Refining, and Mining Company dredging in the Nome and Fairbanks areas. These dredges are scheduled for closure by the end of 1963, leaving the USSR&M Company operating only the dredges at Chicken and Hogatza River and leading to a further decline in gold recovery. Nothing short of an increase in the price of gold will help the industry. It will be seen later in this report that the smaller operations have also curtailed their activity and the number of men employed has diminished as a result.

The value of mercury has also declined. This is due in part to cessastion of production from the Schaefer mine, slightly less production by the Red Devil Mine, and a decline in the price of mercury.

Coal production increased slightly due to an increase in the size of the military contracts.

Petroleum and natural gas production dominated the minerals production field for the first time. It now nearly equals the combined production of gold, mercury, coal, and sand and gravel. It is anticipated that this production rate will increase at least fifty percent this coming year.

Sand and gravel production was somewhat less this year due to a decline in military contracts.

Prospecting and Exploration

During 1961 an estimated $1,770,000 was spent on prospecting and exploration for mineral deposits in Alaska. While this amounts to only 84 percent of the amount expended for such work in 1960, it was the second best year since 1955 and appears to represent a continuation of the generally rising trend of exploration expenditures, as is shown by Figure 2. Well over half of the money was spent by four companies, so that large fluctuations in the total can result from decisions by one or two companies.

During 1961 the U.S. Bureau of Mines spent $424,200 on various mineral resources activities, mostly exploration of mineral deposits. The amount spent by the U. S. Geological Survey was not available when this report went to press.

During 1961 a total of 923 claims were staked as compared to 967 last year. As usual, the greatest number of claims were for placer gold in the central and south-central districts. This was followed in descending order by copper, lode gold, limestone, iron, mercury, and a few each of lead-zinc, molybdenum, nickel, uranium, and silver-lead. The staking of gold claims was the work of small companies and individuals. The four companies which spent the bulk of the exploration money were interested in base metals.

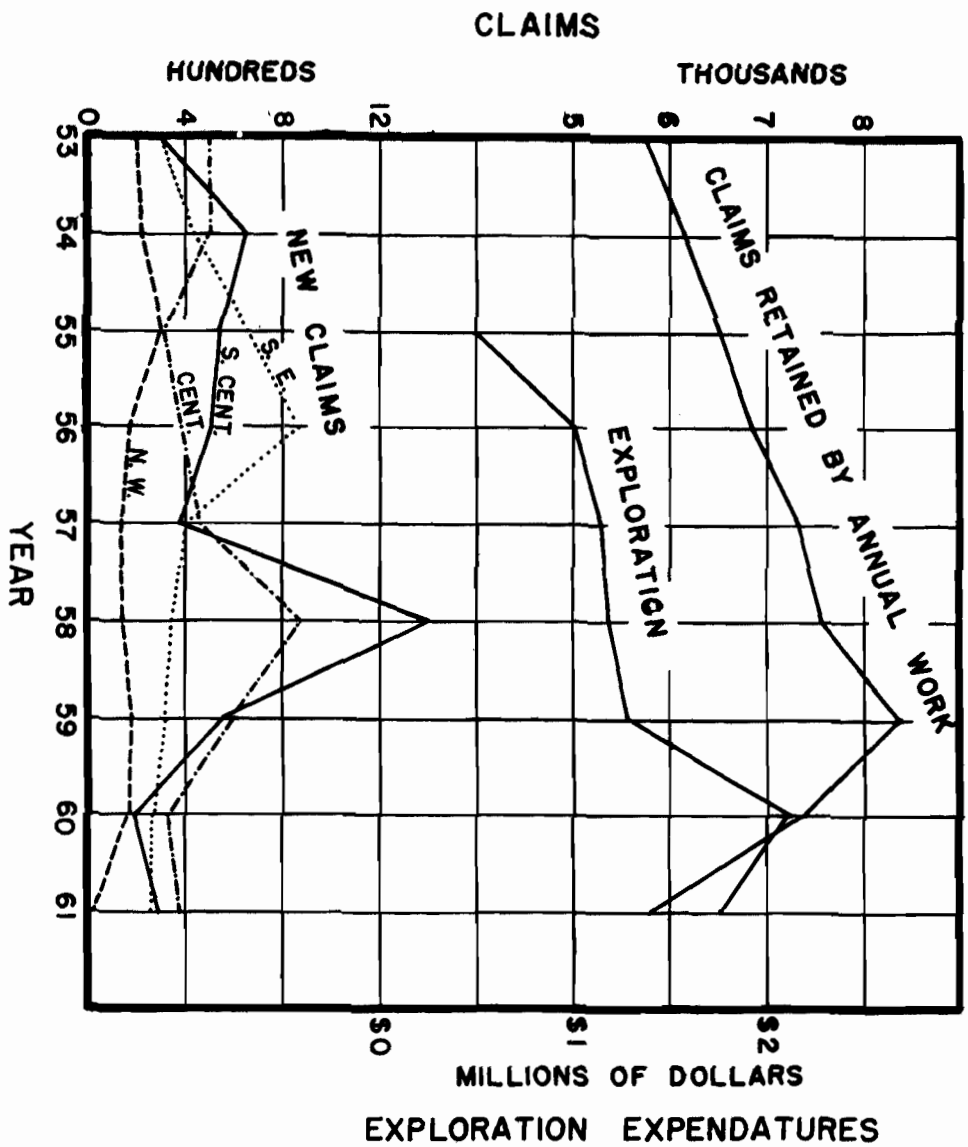
A few of the more notable mining activities in the various districts follow:

Southeastern -

1. Columbia Iron Mining Company - Iron lode exploration and drilling, 8 men.

2. Mountain View Property at Hyder - Gold lode development by Mineral Basin

Figure 2 - Barometer of Exploration Activity



Mining Corporation, 4 men.

3. Newmont Mining Company - Nickel lode exploration and drilling on Brady Glacier, 15 men.

4. Prince of Wales Mining Company - Reconnaissance, 4 men.

5. Transworld Resources - Test pitting beach sands for gold at Yakataga and drilling for placer gold in Slate Creek district, 4 men.

6. Minerals, Inc. - Drilling beach sands near Lituya Bay.

7. Mt. Andrew Mining Company - Drilling and geophysical exploration for iron-copper, 8 men.

8. W. S. Pekovich - Development work at Funter Bay nickel property of Admiralty Alaska Gold Mining Company.

9. Approximately 20 men engaged in 1-2 man prospecting ventures.

Southcentral District -

1. Permanente Cement Company - Limestone exploration and topographic mapping in Kings River area, 4 men.

2. Strandberg Mines, Inc. - Mineral investigations in the Talkeetna Mountains, 2 men.

3. Spirit Mountain Mining Company - Prospecting for nickel-copper deposits along a limestone-peridotite contact in Canyon Creek in the Chitina District, 3 men.

4. Yelinore (Paul Fretz) - Prospecting the Yellow Band lode gold property in McCarthy district, 4 men.

5. Bear Creek Mining Company - Miscellaneous mineral investigations in Alaska general.

6. American Metal Climax - Alaska general, 4 geologists.

7. William M. Wallace (Anchorage) - Contact metamorphic copper-iron-gold prospect on Granite Creek in Slana district and exploration on an iron property in the Cook Inlet area.

8. Seven men engaged in development and prospecting of gold lodes in the Willow Creek district. Curly Morgan and son contracted to cross-cut the Fern Fault at the Fern Mine in preparation for further exploration.

9. Approximately 12 men were engaged in 1-2 man prospecting ventures.

Central District -

1. Moneta Porcupine Mines, Ltd. - Exploration in Kantishna district, 5 men.

2. Arctic Alaska Fisheries and Enterprises, Inc. - Gold mining and exploration in the center of the Fairbanks district at the head of Wolf Creek, 3 men.

3. I. W. Purkeypile - Prospecting contact metamorphic lead-silver deposits in Tonzona River district (west of McKinley National Park), 3 men.

4. Dorr Holloway and Mariano Juancorena - Prospecting good showing of cinnabar float-altered dike rock in Sleetmute district.

5. Norman J. Schaefer - Exploration and drilling of Cinnabar Creek open cut mercury deposit, 7 men.

6. Approximately 4 men are known to have engaged in 1-2 man prospecting ventures.

Northwestern District -

1. Bear Creek Mining Company - Exploration mainly by drilling (46,000 feet in 1961) of lode copper property, 47 men.

2. Approximately 11 men were engaged in 1-2 man prospecting ventures in the region.

Claim Staking on State-Owned Lands

At the close of 1961, the State of Alaska had selected 10,884,060 acres of the 104,000,000 provided for in the Statehood Act, had received tentative approval on 1,957,687 acres, and had received final patent on 294,876 acres. So far, the State has not attempted to select areas of hardrock mining promise, though it has paid attention to areas of Leasing Act mineral possibilities and of promising value for various surface uses. If staking is done on State-owned land, it should be done according to State regulations. However, claims staked in good faith on State lands in accordance with the Federal mining laws will establish prior rights to the ground. Briefly, the State regulations for claim staking on State lands make no distinction between placer and lode claims and further provide that: (1) claims may be up to 40 acres in size; (2) claims may not exceed 1320 feet on a side; (3) only four claim posts (at the corners) are required; (4) although no discovery post is required, a discovery must be made on each claim; and (5) claims cannot be patented. One hundred dollars worth of assessment work is required for each claim before noon, September 1 each year and must be recorded within 90 days after the close of the assessment work year. Failure to do the assessment work or record the assessment work affidavit in time is deemed an abandonment of the claim.

The new regulations for prospecting and claim staking on State-owned lands were made quite lenient to encourage mining exploration as much as possible.

Prospecting Sites on State-Owned Land

On State-owned land, prediscovery protection can be obtained by staking prospecting sites. These may contain a maximum of 160 acres and may not exceed 2640 feet

on a side. Only one monument is required and boundaries may be marked by colored flagging. These sites carry exclusive right to do exploration work and stake claims within their boundaries. These rights last for one year from the date of posting the location notice. If during this year acceptable exploration work to the value of $5 per acre has been done and a need for further time is shown, the Director of the Division of Lands can grant a one-year extension. If further extensions are granted, the value of work required is $10 per acre.

The detailed regulations on claim and prospecting site staking on State-owned lands are available at any of the DM&M offices or from the State Division of Lands at 344 Sixth Avenue, Anchorage.

Staking on Federal Owned Land

On Federal lands, claim staking regulations are unchanged except that there is now no limit to the number of placer claims that can be staked in one month in any one district, providing the legal requirements for valid mining claims are met.

Proposed New Division Function

For the past 25 years the Division of Mines and Minerals and its predecessor, the Territorial Department of Mines, have maintained assay offices and given technical assistance to prospectors. During this time the economics and methods of exploration and mining have changed enormously; selective company-financed exploration ventures have to a great extent replaced the efforts of a large number of individual prospectors as a means of mine finding. This change entails a dependence on geological means to select areas for prospecting. Unfortunately, many of the companies are not sufficiently acquainted with Alaskan geology to make the best use of their money. If the Division is to aid and encourage this type of exploration as well as the smaller operations, it must keep up with the progress of technology. Large companies will do their own evaluation of prospects, but often need technical geological and mineralogical background information on favorable properties and districts in order to plan their work to best advantage. Property evaluations are still a vital help to prospectors and small operators, but additional areal economic geological work is necessary for guides in up-to-date regional exploration.

This winter an x-ray machine of the latest design is being put into operation in the DM&M District Office in Anchorage. This unit, when used as an x-ray spectrograph, will make rapid quantitative analyses which will take the place of much slow and laborious assaying. Not only will it accelerate assaying, but by rapid and extremely sensitive analysis of samples for many chemical elements in one operation, it will greatly facilitate geochemical exploration for ore deposits. Used as an x-ray diffractometer, this x-ray unit will provide rapid and positive identification of minerals. Its most important impact, in the long run, may be that it will provide a wealth of analytical data on the abundance of chemical elements in the ore deposits and rocks of Alaska which would not otherwise be available. This type of information is fundamental to the geochemical approach to mineral exploration which in the future will be of increasing importance in finding hidden ore deposits.

Since last summer, the Division has had a mining geologist. There is a need for detailed geological examinations of individual properties and geologically favorable areas, and to relate the individual deposits to the regional geological picture. Where the known ore deposits can be understood in their regional context, the regional geology known

from the mapping by the USGS can be most effectively utilized for prediction of the locations of areas favorable for hidden ore deposits. This work would fall between the regionally-oriented geologic mapping of the USGS and the trenching and drilling of the U. S. Bureau of Mines. It will be the aim of the Division to carry through on the investigations in each mineral province to the point where the preliminary reports on portions of the province can be integrated into a comprehensive report on the relationship of the known mineral deposits to the regional geology. These reports will be of value and encouragement to companies for further investigation and exploration of the areas for economic ore bodies. The availability of the x-ray analytical equipment will greatly increase the effectiveness of these geological investigations.

Needs of the Industry

A substantial increase in the price of gold would probably benefit Alaska more than any other single act with respect to mining. It would reopen an industry that at one time employed over 4000 men and produced over 26 million dollars per year. The year's estimated number of men employed in gold mining was 500, and the production is estimated at 3.973 million dollars. This indicates that 500 men produce approximately $8,000 each at the present time. If 4000 men were again employed at this rate, the amount of gold produced would be increased to about 32 million dollars. The income received from the sale of this gold would be spent largely in Alaska. The income tax and business tax generated by this amount of production would be substantial.

The base metal possibilities are exemplified by the famous Kennecott copper deposits. Kennecott produced an average of approximately 50 million pounds of copper per year which, at today's price, would amount to an annual income of 15 million dollars. The operation employed on the average about 400 men. The Kennecott ore was unusually high grade, but with modern mining methods, large low grade deposits can be mined economically. Fewer men are directly employed, but subsidiary employment is considerable, especially if the ore is milled, refined, or smelted before shipment.

There are several ways the base metal industry can be encouraged. Among them are the following two:

1. Instituting a multiple use policy in regard to Federal land usage. Federal legislation to insure adequate investigation and evaluation of land values before withdrawal would be a definite step in the right direction. State laws and regulations for State-owned land have provided the machinery for this. The restriction of the right to prospect and mine in large unexplored areas of the State of Alaska should not be allowed until such time as the lands have been fully investigated as to mineral, timber, recreational, and other development possibilities. Then they should be made available to as many uses as are compatible and most needed. Mining is compatible with almost any other use under proper management.

2. A determined effort by State and Federal agencies and industry in finding new ore bodies and in developing those already known.

Coal mining has remained fairly steady, but if mine-mouth power plants were to be installed, the industry would stabilize itself upon a much more productive basis. A mine-mouth power plant in some respects is more advantageous than hydro-power since the cost of power is about the same for small hydro-plants, yet the proportion of the cost for labor is greater. The larger payrolls are more advantageous since they generate

more business over a longer period of time. Mine-mouth power plants are also more compatible to multiple use since large areas of submerged land are not created.

Another aid to the coal mining industry would be achieved if longer military contracts were awarded. Longer contracts would result in the operators being able to cut the cost of delivered coal by investing in more productive equipment and methods. The present military contracts are on an annual basis only.

THE PETROLEUM INDUSTRY

Exploratory Activity

During 1961, Alaska witnessed a major increase in both exploratory drilling and geophysical activity, while surface mapping remained at the 1960 level. Following is a summary indicating the over-all increase in exploratory activity for 1961.

	Field Parties (Party Months)	Seismic Work (Crew Months)	Gravity Work (Crew Months)	Exploratory Wells Spudded	New Gas Field Discoveries
1960	57.5	40	4.9	10	1
1961	57.6	73.4	14.5	25	2

Twelve oil companies, compared with eighteen in 1960, participated in surface mapping in nine of Alaska's basins. Major emphasis in 1961 was directed to the Brooks Range-Arctic Slope, Gulf of Alaska and Cook Inlet Area with less attention given to the Copper River Basin, Alaska Peninsula, Nushagak Basin, Porcupine-Kandik area, Middle Tanana Basin, and the Alexander Archipelago.

Twenty-nine exploratory wells were drilled or drilling at the close of 1961. Of these wells, two resulted in new gas field discoveries, two in new gas zone discoveries, and four as extensions of existing production.

Cook Inlet Area

Six companies placed a total of seven field parties in the Cook Inlet area during 1961. Seismic activity reached a new peak of 40.8 crew months with operations confined primarily to the Tyonek Bombing Range, Susitna Flats, Kenai Peninsula and Cook Inlet itself. One gravity crew was in operation 5.5 crew months in the Upper Cook Inlet area.

Union Oil Company of California, operator, extended the productive limits of the Kenai Gas field approximately two miles due south during the year. Well No. Kenai Unit 44-18 was completed on January 29, 1961, flowing gas at an estimated rate of 5,321 MCF per day through a 3/8 inch bean from an interval 5,728 to 5,688 feet.

Approximately 17 miles southwest of the Kenai Gas field, Standard Oil Company of California, operator, drilled an exploratory well on the basis of both seismic and surface information. On June 21, 1961, a new gas field discovery was made when Well No. Falls Creek Unit 1 was completed flowing gas at a daily rate of 1,980 MCF from the perforated interval 7,600 to 7,562 feet. The well was originally drilled to a total depth of 13,795 feet to test the Hemlock Zone, which was found barren, and was subsequently plugged back and completed in sands of the upper Kenai Formation.

Union Oil Company of California, operator, spudded a well approximately 13 miles southwest of the Swanson River Oil Field and 8 miles northeast of the Kenai Gas field. Well No. Sterling Unit 23-15, was drilled to a total depth of 14,832 feet, also to test the Hemlock Zone which was found barren, and was subsequently plugged back to 8,400 feet. On August 24, 1961, the well was completed as a new gas field discovery flowing gas at an estimated rate of 3,500 MCF per day from the perforated interval 5,254 to 5,250 feet.

On December 21, 1961, Standard Oil Company of California, operator, abandoned Well No. Anchor River Unit 1 after reaching a total depth of 6,896 feet. The well, which was drilled as a test of the Hemlock Zone, bottomed in basement rocks without finding the objective sand.

In the Swanson River Oil field, Standard Oil Company of California, operator, three step-out wells were completed in the Hemlock Zone and two new gas zone discoveries were made during the year. Wells No. Soldotna Creek Unit, 32-9, 32-8, and 12-4 were all completed flowing oil at respectively calculated MER's of 750, 850 and 450 barrels per day. On September 2, 1961, Well No. Soldotna Creek Unit 243-4 was completed as a new gas zone discovery flowing at a rate of 2,550 MCF per day from a perforated interval 5,715 to 5,426 feet. On October 6, 1961, Well No. Swanson River Unit 212-27 was also completed as a new gas zone discovery in the 12-27 gas zone. No rates have been released pending installation of testing facilities.

At the close of 1961, both Pan American Petroleum Corporation and Superior Oil Company were drilling significant exploratory wells on the Tyonek Bombing Range and West Forelands area in the Cook Inlet Basin.

Copper River Basin

The number of oil companies conducting surface mapping in 1961 was reduced to four from the 1960 total of six. However, a definite increase was noted in geophysical activity with a total of 6.75 seismic crew months reported and one crew month of gravity work. In 1962, seismic activity should increase, while surface mapping will probably continue to decline. At least two wells are predicted in this area for 1962.

Gulf of Alaska

The Gulf of Alaska experienced a surge of activity in all phases of exploration during the year. Two oil companies placed three parties in the field for a total of 7.8 party months compared to 0.5 party months in 1960, and seismic operations reported 13.6 crew months while gravity crews worked 4 crew months. Drilling was at an all-time high since the discovery of the old Katalla Oil field in the early 1900's. Colorado Oil and Gas Corporation completed a drilling program of four stratigraphic tests in the Yakutat district, and the operator plans to resume operations early in 1962 after evaluating information obtained in the above program. Standard Oil Company of California drilled Well No. Chaix Hills Unit 1 as a test of the Tertiary rocks in Icy Bay near the base of the Malaspina Glacier. The well was abandoned after reaching a total depth of 10,017 feet. The operator subsequently plugged back to 1,500 feet and at the end of the year was directionally drilling a new hole as Well No. Chaix Hills Unit 1-A. In the Yakataga district, Richfield Oil Corporation, operator, drilled and abandoned three wells during 1961. Wells No. Kaliakh River Unit 2 RD, Duktoth River Unit 1, and White River Unit 1 were all abandoned at total depths of 12,135; 10,390 and 7,982 feet, respectively. Richfield Oil Corporation, operator, also drilled a stratigraphic test, Well No. Bering River Unit 1, which was abandoned at a total depth of 6,175 feet. A second well in the

unit, Well No. Bering River Unit 2 was also being drilled ahead at the close of 1961.

Southeastern Alaska

Exploration activity in the Alexander Archipelago portion of this southeastern region was confined to one oil company field party, which operated for 1.5 party months.

Alaska Peninsula

Only two oil companies, consisting of one party each, mapped on the Alaska Peninsula in 1961. There was, also, no geophysical activity in this area during the past year. However, Pure Oil Company spudded Well No. Canoe Bay Unit 1, Sec. 8, T.54S., R78W., Seward B&M, to test the Mesozoic rocks in the Pavlov-Canoe Bays district. The well was abandoned after reaching a total depth of 6,642 feet.

Nushagak Area (Bristol Bay)

As in 1960, two companies conducted field operations in this area. However, a sharp rise in geophysical activity was noted. Seismic operations reported a total of 7 crew months for the year and gravity crews worked 1 crew month in 1961. Toward the end of the year, Pure Oil Company attempted to land a drilling rig in the area, but was forced to suspend operations because of icing conditions. At least two wells are predicted for this basin in 1962.

Yukon Flats Basin

No surface parties worked in this area in 1961, and only 2 crew months of seismic activity were reported.

Bethel Basin

There were no surface field parties in operation in this area during 1961. Geophysical activity was confined to 3 crew months for seismic and 1.5 crew months for a gravity crew. Pan American Petroleum Corporation drilled the first deep test and most westerly located well in the United States, approximately 60 miles west of the town of Bethel. Well No. Napatuk Creek 1 was abandoned in September, 1961 after penetrating a sedimentary section of undetermined age to a total depth of 14,910 feet. Geophysical operations should remain about the same in 1962 with the possibility of another well during that year.

Middle Tanana Basin

One oil company placed a field party in this area for approximately two weeks. Geophysical activity was confined to 1.5 crew months of gravity work. It is of significance to note that following the completion of the gravity work, this area became the center of a land play involving approximately 200,000 acres. An increase in surface mapping and geophysical activity should be noted in 1962. Union Oil of California has announced its intention to drill a stratigraphic test in this area early in 1962.

Porcupine-Kandik Area

Only one oil company conducted surface mapping in this area during 1961. This represented a definite decline from the 1960 total of ten companies. There was no geo-

physical activity there in 1961.

Brooks Range-Arctic Slope

This region led all others for total number of field parties. Ten parties representing five oil companies completed 26.5 party months in 1961. A slight decrease is noted from 1960. Surface mapping will probably continue to decline in 1962, however, geophysical operations may commence and at least one well has been rumored for the area for 1962.

Expenditures for exploration in 1961 are estimated to be $24,405,000 compared to $13,705,000 in 1960. Following is a table comparing estimated exploration expenditures for the past two years.

	1960	1961
Field Parties	$ 1,680,000	$ 1,910,000
Seismic Activity	3,615,000	6,920,000
Gravity Work	130,000	500,000
Drilling Activity	8,280,000	15,075,000
Totals	$ 13,705,000	$ 24,405,000

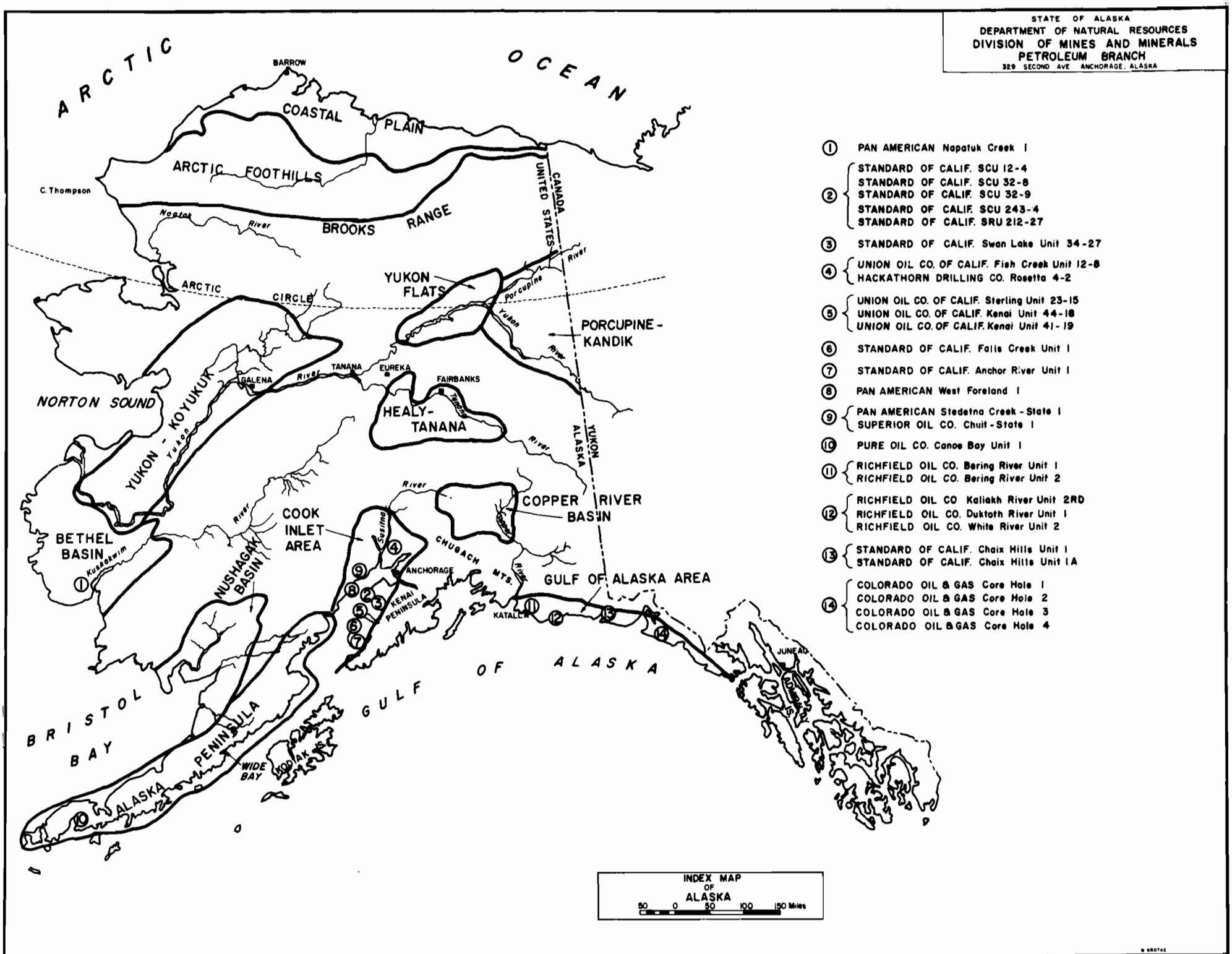
EXPLORATORY WELLS IN ALASKA, 1961

Operator	Well No.	1/4	Sec	T.	R.	B & M	T. D. (Feet)	Status	Remarks
Colo. O&G Corp.	Core Hole 1	SW	17	27S	35E	C	3230	Abd	1st in Series of 4 Stratigraphic Tests in Yakutat Area
Colo. O&G Corp.	Core Hole 2	SE	28	29S	36E	C	5690	Abd	
Colo. O&G Corp.	Core Hole 3	SW	6	31S	39E	C	5484	Abd	
Colo. O&G Corp.	Core Hole 4	SE	27	32S	41E	C	5326	Abd	
Hackathorn Drlg. Co.	Rosetta 4-A	NW	21	18N	3W	S	2380	Abd	
Pan Am Petr. Corp.	Napatuk Cr. 1	SW	34	7N	78W	S	14910	Abd	1st Well in Bethel Basin
Pan Am Petr. Corp.	West Foreland 1	SE	21	8N	14W	S	-	Drlg	
Pan Am Petr. Corp.	Stedatna Cr.-State 1	SW	30	12N	12W	S	-	Drlg	1st Well in Tyonek Area
Pure Oil Co.	Canoe Bay Unit 1	NE	8	54S	78W	S	6642	Abd	
Richfield	Kaliakh R. Unit 2 RD	NE	28	20S	14E	C	12135	Abd	
Richfield	Duktoth R. Unit 1	SE	24	20S	15E	C	10390	Abd	
Richfield	White R. Unit 1	SW	19	21S	18E	C	7982	Abd	
Richfield	Bering R. Unit 1	SE	32	18S	7E	C	6175	Abd	
Richfield	Bering R. Unit 2	NW	22	19S	7E	C	-	Drlg	

Standard of Cal.	Soldotna Cr. Unit 12-4	NW	4	7N	9W	S	10974	Comp.	SW stepout of Swanson R. Oil Field
Standard of Cal.	Soldotna Cr. Unit 32-8	NE	8	7N	9W	S	10828	Comp.	SW stepout of Swanson R. Oil Field
Standard of Cal.	Soldotna Cr. Unit 32-9	NE	9	7N	9W	S	10830	Comp.	SE stepout of Swanson R. Oil Field
Standard of Cal.	Soldotna Cr. Unit 243-4	SE	4	7N	9W	S	6660	Comp.	New Gas Zone Discovery
Standard of Cal.	Swanson R. Unit 212-27	NW	27	8N	9W	S	7800	Comp.	New Gas Zone Discovery
Standard of Cal.	Falls Cr. Unit 1	NE	6	1N	12W	S	13795	Comp.	New Gas Field Discovery
Standard of Cal.	Swan Lake Unit 34-27	SE	27	8N	7W	S	11984	Abd	
Standard of Cal.	Anchor R. Unit 1	NE	29	4S	11W	S	6896	Abd	
Standard of Cal.	Chaix Hills Unit 1	SW	4	22S	25E	C	10017	Abd	1st well in Icy Bay
Standard of Cal.	Chaix Hills Unit 1-A	SE	32	21S	25E	C	-	Drlg	
Superior	Chuit-State 1	SW	8	12N	11W	S	-	Drlg	
Union of Cal.	Kenai Unit 41-19	NE	19	4N	11W	S	5753	Abd	
Union of Cal.	Kenai Unit 44-18	SE	18	4N	11W	S	6020	Comp.	Southern extension of Kenai Gas Field
Union of Cal.	Sterling Unit 23-15	SW	15	5N	10W	S	14832	Comp.	New Gas Field Discovery
Union of Cal.	Fish Cr. Unit 12-8	NW	8	16N	3W	S	6418	Abd	

Abbreviations: Comp. - Completed; Abd - Abandoned; Drlg - Drilling

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES AND MINERALS
PETROLEUM BRANCH
329 SECOND AVE ANCHORAGE, ALASKA



① PAN AMERICAN Napatuk Creek 1

② STANDARD OF CALIF. SCU 12-4
STANDARD OF CALIF. SCU 32-8
STANDARD OF CALIF. SCU 32-9
STANDARD OF CALIF. SCU 243-4
STANDARD OF CALIF. SRU 212-27

③ STANDARD OF CALIF. Swan Lake Unit 34-27

④ UNION OIL CO. OF CALIF. Fish Creek Unit 12-8
HACKATHORN DRILLING CO. Rosetta 4-2

⑤ UNION OIL CO. OF CALIF. Sterling Unit 23-15
UNION OIL CO. OF CALIF. Kenai Unit 44-18
UNION OIL CO. OF CALIF. Kenai Unit 41-19

⑥ STANDARD OF CALIF. Falls Creek Unit 1

⑦ STANDARD OF CALIF. Anchor River Unit 1

⑧ PAN AMERICAN West Foreland 1

⑨ PAN AMERICAN Stedatna Creek - State 1
SUPERIOR OIL CO. Chuit - State 1

⑩ PURE OIL CO. Canoe Bay Unit 1

⑪ RICHFIELD OIL CO. Bering River Unit 1
RICHFIELD OIL CO. Bering River Unit 2

⑫ RICHFIELD OIL CO Kaliakh River Unit 2RD
RICHFIELD OIL CO. Duktoth River Unit 1
RICHFIELD OIL CO. White River Unit 2

⑬ STANDARD OF CALIF. Chaix Hills Unit 1
STANDARD OF CALIF. Chaix Hills Unit 1A

⑭ COLORADO OIL & GAS Core Hole 1
COLORADO OIL & GAS Core Hole 2
COLORADO OIL & GAS Core Hole 3
COLORADO OIL & GAS Core Hole 4

INDEX MAP
OF
ALASKA
50 0 50 100 150 Miles

Development

Swanson River Field - Hemlock Zone

Standard Oil Company of California, Western Operations, Inc., Operator

Basic Reservoir Data

Location of Field T7&8N, R9W, Seward Meridian, Kenai Peninsula; Type of Structure narrow anticline cut by numerous transverse faults; Discovery well and Completion Date Swanson River Unit 34-10, 10-1-57; Elevation 133'-373'; Producing Depths 10150'-11700'; Producing Sections 8'-300'; Permeability 0-3275 mds; Porosity 18-26%; Connate Water 40%; Formation Volume Factor 1.12; Oil Gravity 30°-38° API; Bottom Hole Temperature 160°F (avg); Original and Current GOR 116-200 SCF/STB; Current Spacing Pattern 80 acres; Approximate Developed Area 4720 acres; Reservoir Pressure 5000-5400 psig.

Production Statistics

Cumulative Production

Date	Producing Wells	Oil (bbls)	Water (bbls)	Gas MCF
1- 1-61	17	790,343	45,213	148,563
12-31-61	45	7,116,844	203,628	1,391,920

Individual Well Production Summary

Well No.	Comp. Date	Annual Production - 1961 Oil-bbls	Water-bbls	Gas-MCF	Cumulative Prod. 12-31-61 Oil-bbls	Water-bbls	Gas-MCF
SRU 34-10	10- 1-57	59,933	19,126	7,567	184,604	26,384	26,957
SRU 31-27	12-26-58	40,032	30,119	8,730	153,318	61,343	22,908
SRU 14-15	7-25-59	7,332	642	1,414	10,567	696	5,084
SRU 32-15	10-24-59	186,776	14,650	25,855	309,448	16,228	41,061
SRU 12-27	11-30-59	183,713	6,437	27,892	253,536	7,812	36,665
SRU 14-27	6-14-60	238,272	2,512	42,503	244,854	2,584	43,973
SRU 23-22	3- 9-60	120,145	1,506	18,818	152,726	1,842	22,812
SRU 32-33	8-25-60	195,087	2,028	36,670	231,742	2,415	43,753
SRU 12-15	10- 5-60	34,327	525	6,488	55,714	746	9,391
SRU 12-34	10-21-60	142,787	1,478	26,077	same as 1961 annual production		
SRU 23-27	2- 5-61	98,751	26,192	14,775	" "	" "	"
SRU 41-33	3-12-61	182,225	1,864	32,944	" "	" "	"
SRU 23-15	4- 5-61	107,040	1,081	14,115	" "	" "	"
SRU 21-27	5- 5-61	119,571	1,224	19,467	" "	" "	"
SRU 21-15	6- 7-61	79,545	2,681	9,799	" "	" "	"
SRU 23-33	6-10-61	37,452	343	10,069	" "	" "	"
SRU 34-15	8- 4-61	66,800	682	7,900	" "	" "	"
SRU 43-28	7-22-61	83,914	991	14,309	" "	" "	"
SRU 43-15	11- 1-61	2,675	27	735	" "	" "	"
SCU 41-4	3-21-60	301,962	3,101	73,502	399,505	4,130	97,189
SCU 32-4	6- 5-60	317,492	3,250	63,024	391,495	4,014	77,554

SCU 14-4	8-13-60	305,632	3,154	60,735	389,400	4,025	77,054	
SCU 12-9	10- 9-60	275,247	2,841	64,822	same as 1961 annual production			
SCU 34-33	11-12-60	281,661	2,880	61,154	285,798	2,924	62,072	
SCU 34-4	11-27-60	246,747	2,527	56,269	same as 1961 annual production			
SCU 14-9	12-26-60	181,998	1,874	41,662	"	"	"	"
SCU 14-34	12-23-60	243,004	2,483	57,152	"	"	"	"
SCU 32-9	1-16-61	185,766	1,876	41,556	"	"	"	"
SCU 43-33	3- 8-61	164,602	1,695	32,237	"	"	"	"
SCU 32-8	2-22-61	130,883	1,325	26,440	"	"	"	"
SCU 12-3	3-23-61	201,829	1,936	37,270	"	"	"	"
SCU 12-4	4- 8-61	206,870	2,193	44,372	"	"	"	"
SCU 43-8	4-24-61	161,965	1,634	38,077	"	"	"	"
SCU 43-4	5-14-61	181,890	1,861	36,430	"	"	"	"
SCU 23-4	6- 1-61	175,004	1,759	34,975	"	"	"	"
SCU 43-5	5-28-61	91,504	910	21,684	"	"	"	"
SCU 41-9	6-11-61	118,240	1,189	25,658	"	"	"	"
SCU 21-9	7-19-61	137,997	1,380	27,816	"	"	"	"
SCU 23-9	7-17-61	115,333	1,158	24,238	"	"	"	"
SCU 41-8	7-14-61	119,506	1,307	26,761	"	"	"	"
SCU 14-3	8- 2-61	66,962	679	13,946	"	"	"	"
SCU 21-4	11- 5-61	29,605	299	5,743	"	"	"	"
SCU 41-5	9-20-61	41,594	421	7,450	"	"	"	"
SCU 34-5	10- 9-61	30,817	312	6,090	"	"	"	"
SCU 34-9	11- 8-61	26,014	263	4,609	"	"	"	"

Swanson River Field Development Wells
Spudded and/or Completed - 1961
SRU - Swanson River Unit well; SCU - Soldotna Creek Unit well

Well Number	1/4 Sec	Twp	Range	Spud Date	Completion Date	TD (ft)	Status 12-31-61
	(Seward Meridian)						
SRU 23-27	SW 27	8N	9W	11-25-60	2- 5-61	11384	POW
SRU 41-33	NE 33	8N	9W	1-22-61	3-12-61	11133	POW
SRU 23-15	SW 15	8N	9W	2-13-61	4- 5-61	11240	POW
SRU 21-27	NW 27	8N	9W	3-18-61	5- 5-61	11142	POW
SRU 21-15	NW 15	8N	9W	4- 9-61	6- 7-61	11344	POW
SRU 23-33	SW 33	8N	9W	5- 8-61	6-10-61	10895	POW
SRU 34-15	SE 15	8N	9W	6-12-61	8- 4-61	11190	POW
SRU 43-28	SE 28	8N	9W	6-16-61	7-22-61	10875	POW
SRU 43-15	SE 15	8N	9W	7-16-61	9- 8-61	11335	P&A
SRU 43-15RD	SE 15	8N	9W	9- 9-61	11- 1-61	11380	POW
SRU 41-28	NE 28	8N	9W	10-16-61	10-16-61	11211	P&A
SRU 21-22	NW 22	8N	9W	11-14-61		11012	testing
SCU 43-33	SE 33	8N	9W	12-30-60	3- 8-61	10995	POW
SCU 12-3	NW 33	7N	9W	2- 7-61	3-23-61	10851	POW
SCU 12-16	NW 16	7N	9W	3- 1-61	4-29-61	12759	P&A
SCU 43-8	SE 8	7N	9W	3-12-61	4-24-61	10886	POW
SCU 43-4	SE 4	7N	9W	3-29-61	5-14-61	11048	POW
SCU 23-4	SW 4	7N	9W	4-12-61	6- 1-61	10775	POW
SCU 43-5	SE 5	7N	9W	4-27-61	5-28-61	10852	POW
SCU 41-9	NE 9	7N	9W	5- 5-61	6-11-61	10852	POW
SCU 21-9	NW 9	7N	9W	5-18-61	7-19-61	10754	POW

SCU 23-9	SW	9	7N	9W	5-30-61	7-17-61	10750	POW
SCU 41-8	NE	8	7N	9W	6- 5-61	7-14-61	10820	POW
SCU 14-3	SW	3	7N	9W	6-16-61	8- 2-61	10850	POW
SCU 21-4	NW	4	7N	9W	7-19-61	11- 5-61	10896	POW
SCU 41-5	NE	5	7N	9W	7-23-61	9-20-61	11450	POW
SCU 34-5	SE	5	7N	9W	8- 9-61	10- 9-61	11220	POW
SCU 34-9	SE	9	7N	9W	9-25-61	11- 8-61	11038	POW
SCU 34-8	SE	8	7N	9W	11- 7-61		11175	testing
SCU 21-3	NW	3	7N	9W	11- 9-61		11100	testing

Kenai Gas Field

Union Oil Company of California, Operator

Basic Reservoir Data

Location of Field T4&5N, R11&12W, Seward Meridian, Kenai Peninsula; Type of Structure anticlinal; Discovery Well and Completion Date Kenai Unit 14-6, 10-11-59; Elevation (ground) 74'-91'; Producing Depths 4240'-5728'; Producing Sections 9'-135'; Permeability 350-3000 mds; Porosity 15-35%; Connate Water 18-35%; Gas Gravity .556; Current Spacing Pattern 640 acres; Approximate Developed Area 11,000 acres; Reservoir Pressure (org. & current) 1900-2400 psig.

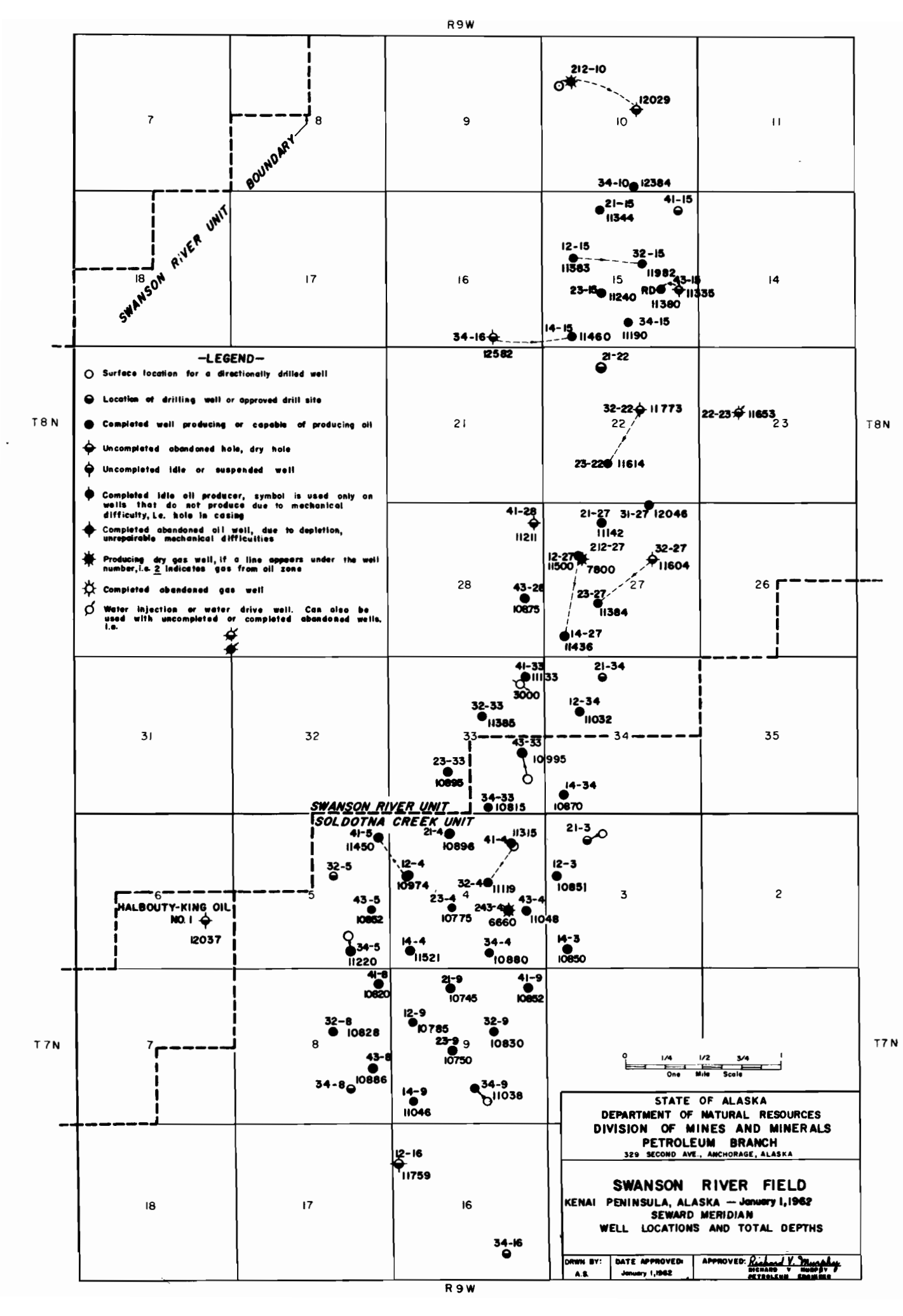
Production Statistics

Cumulative Production

Date	Producing Wells	Oil (bbls)	Water (bbls)	Gas MCF
1- 1-61	0	0	0	0
12-31-61	3	0	0	231,294

Individual Well Production Summary

Well No.	Comp. Date	Annual Production - 1961			Cumulative Prod. - 12-31-61		
		Oil-bbls	Water-bbls	Gas-MCF	Oil-bbls	Water-bbls	Gas-MCF
KU 14-6	10-11-59	0	0	92,098	0	0	92,098
KU 34-31	11-23-59	0	0	91,616	0	0	91,616
KU 33-30	12-21-59	0	0	47,580	0	0	47,580



—LEGEND—

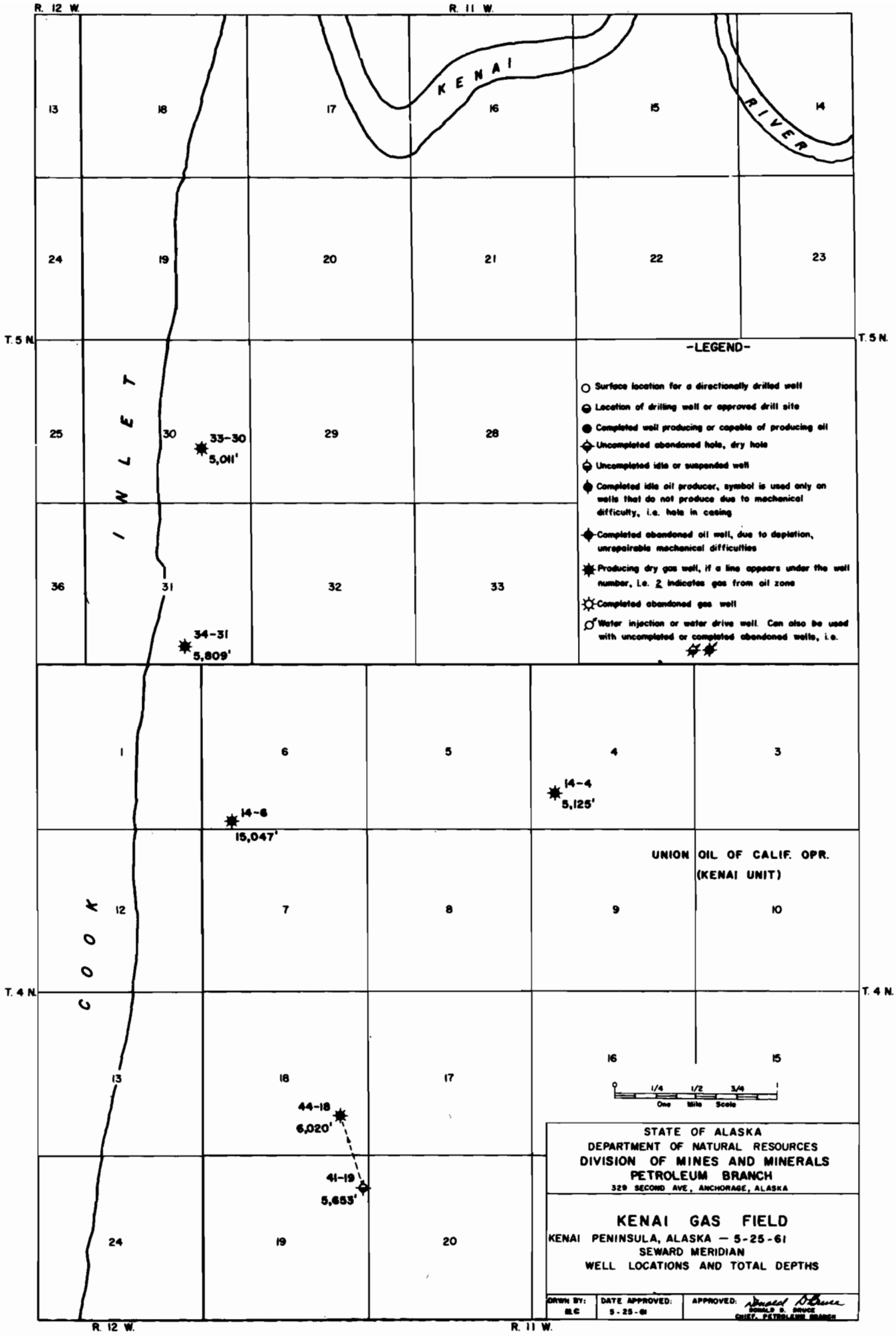
- ○ Surface location for a directionally drilled well
- ⊖ Location of drilling well or approved drill site
- ● Completed well producing or capable of producing oil
- ⊕ Uncompleted abandoned hole, dry hole
- ⊖ Uncompleted idle or suspended well
- ● Completed idle oil producer, symbol is used only on wells that do not produce due to mechanical difficulty, i.e. hole in casing
- ✦ Completed abandoned oil well, due to depletion, unrepairable mechanical difficulties
- ✸ Producing dry gas well, if a line appears under the well number, i.e. 2 indicates gas from oil zone
- ☼ Completed abandoned gas well
- ♁ Water injection or water drive well. Can also be used with uncompleted or completed abandoned wells, i.e.

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES AND MINERALS
PETROLEUM BRANCH
329 SECOND AVE., ANCHORAGE, ALASKA

SWANSON RIVER FIELD

KENAI PENINSULA, ALASKA — January 1, 1962
SEWARD MERIDIAN
WELL LOCATIONS AND TOTAL DEPTHS

DRWN BY:	DATE APPROVED:	APPROVED:
A.S.	January 1, 1962	Richard V. Murphy, RICHARD V. MURPHY, PETROLEUM ENGINEER



STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES AND MINERALS
PETROLEUM BRANCH
329 SECOND AVE, ANCHORAGE, ALASKA

KENAI GAS FIELD

KENAI PENINSULA, ALASKA — 5-25-61
SEWARD MERIDIAN
WELL LOCATIONS AND TOTAL DEPTHS

DRWN BY:	DATE APPROVED:	APPROVED:
BLC	5-25-61	DONALD D. BRUCE, CHIEF, PETROLEUM BRANCH

GENERAL

Construction of the natural gas transmission line from the Kenai Gas Field to Anchorage (82.5 miles) was resumed in the spring of 1961 and completed in August.

Williams Brothers Co., Inc. of Tulsa was the contractor for the overland line extending 64.2 miles from the Kenai Gas Field to Burnt Island on the south side of Turnagain Arm and 9.8 miles from Potter on the north side of the Arm to the city gate near Anchorage. For the overland line, 12-3/4" o.d. pipe with a .250 inch wall thickness was used. The cost of laying this portion of the line was estimated at two million dollars, not including the cost of pipe, concrete, weights, and coating and wrapping materials.

The 8.5-mile Turnagain Arm dual pipeline crossing was completed by Sharman, Allen, Gay and Taylor Co., Inc. During the 1960 construction season, more than two miles of line were buried under the tidal flats at Potter by use of a spud barge and a ditching plow. Due to difficulties created by the tides and highly abrasive silt of the Arm, work was suspended until 1961 at which time a 270' X 72' marine pipe-laying barge, a 135' X 40' service barge, and an ocean-going tug were employed to complete the job. For the submarine line, cement-coated 12-3/4' o.d. pipe with .500" wall thickness was used, and cost of the underwater crossing was estimated at $3.5 million.

The transmission line is owned and operated by the Alaska Pipeline Co. Daily line deliverability is estimated to be 71 million cubic feet using well head pressures.

In July, 1960, the Anchorage Natural Gas Co. awarded contracts for the installation of the initial phase of the $4 million natural gas distribution system. Work began immediately and continued in 1961. Ultimately, over 80 miles of pipe, varying in size from 3/4" to 12" i.d., will be used in construction of the distribution lines.

Two refineries are planned for construction on the Kenai Peninsula. The Standard Oil Co. of California plans to complete a 20,000 barrel-per-day refinery during 1963 to be located just north of the Nikiski Marine Terminal in the East Foreland area of the Kenai Peninsula. The Western Frontier Oil Co. of Long Beach, California, has announced plans to complete a 2,500 barrel-per-day topping plant during 1962 on land about one mile south of the Nikiski Marine Terminal.

The Kenai Pipeline Co. installed a 200,000 barrel tank during 1961 at the Nikiski Marine Terminal, and expanded the pumping facilities at the Soldotna Creek Pumping Station within the Swanson River Field. The additional tankage increased the terminal's storage capacity to 464,000 barrels.

During 1961, the development and production expenditures of the Alaskan petroleum industry, including pipeline construction, totaled an estimated $18,000,000. Similar expenditures for 1960 reached $24,100,000 due to the bulk of the pipeline, terminal, and

storage facilities having been completed during that year. The amount spent in 1961 for field development alone was almost double that for 1960.

A 50-year lease covering eight acres of land adjacent to the Anchorage Port has been signed by the City of Anchorage allowing the Shell Oil Company to continue with plans to construct a $1.4-million, 329,000-barrel tank farm for jet fuel. Completion of six tanks is planned for September, 1962.

The first electric power generation plant using natural gas in Alaska has been set up near the site of Union Oil Company of California's Sterling Unit 23-15 gas well. The plant is owned and operated by the Consolidated Utilities, Ltd. and serves the city of Kenai and community. Rated output is 1500 KW.

The Standard Oil Company of California, Western Operations, Inc., operator of the Swanson River Field, increased the posted price of the field's crude three times during 1961. The first increase of 20 cents per barrel became effective on April 17, a second increase of 25 cents per barrel was instituted on August 15, and the third increase of 8 cents per barrel became effective on December 15. The price increases were primarily results of reductions in the per-barrel amount being applied to the payout of the pipeline which transports the oil from the field to the Nikiski Marine Terminal. The posted crude prices now range from $2.41 per barrel for 25-25.9 degree gravity oil to $3.29 per barrel for 40-40.9 degree gravity crude.

Hearings

A hearing was held in Anchorage on August 24, 1961, upon the motion of the Department of Natural Resources at which the proposal to amend the last sentence of Section 2055, Bonding, of the Alaska Oil and Gas Conservation Rules and Regulations was made. There being no objections or comment, the last sentence of said Section 2055 now reads: "Operators having a valid bond deposited with the Federal Government or with any other department or agency of the State for the above purpose are not required to deposit a bond with the Commission."

An emergency order was issued October 6, 1961 at the petition of The Superior Oil Company for an exception to Section 2061.1 of the Alaska Oil and Gas Conservation Regulations. The operator requested permission to locate an exploratory well, Chuit-State No. 1, within 500 feet of a governmental quarter section boundary in Section 8, T12N, R11W, Seward Meridian. After due public notice, a hearing was held on October 18, 1961 and at that time evidence supporting the operator's request was presented. Order No. 6 was issued on October 20, 1961 wherein the Superior Oil Company was permitted to locate said exploratory well as requested.

Subsequent to a petition of the Pan American Petroleum Corporation, an emergency order was issued November 2, 1961 for an exception to Section 2061.1 within the purview of Section 2061.4 of the Alaska Oil and Gas Conservation Regulations. The operator requested permission to locate its exploratory well, Stedatna Creek-State No. 1, within 500 feet of a governmental quarter section line in Section 30, T12N, R12W, Seward Meridian. After legal public notice, a hearing was held at the Division of Mines and Minerals Building, 329 Second Avenue, Anchorage, commencing 10:00 a.m., November 13, 1961. Evidence was issued wherein the Pan American Petroleum Corporation was permitted to locate said exploratory well 815'N and 2365'E of the SW corner of Section 30, T12N, R12W, Seward Meridian.

In cooperation with the Division of Lands, the Petroleum Branch of the Division of Mines and Minerals approved the technical data submitted with the following development contracts which became effective during 1961: (1) Nushagak Bay - Pure Oil Company contract covers 476,824 acres in the northern Bristol Bay area and calls for the first of three wells to be spudded by January 1, 1963; (2) Baird Inlet - Pan American Petroleum Corporation contract covers 586,140 acres in the Bethel Basin about 60 miles west of Bethel and calls for the first of three wells to be spudded by November 11, 1963; (3) St. Elias - Standard Oil Company of California contract covers 247,500 acres in the Icy Bay region of the Gulf of Alaska and calls for the first of three wells to be spudded by January 1, 1962; (4) Tolsona - Pan American Petroleum Corporation contract covers 615,788 acres in the Glenallen area of the Copper River Basin and calls for the first of three wells to be spudded by January 5, 1964; (5) Kahiltna River - Pure Oil Company contract covers 398,880 acres in the Susitna River valley and calls for the first of three wells to be spudded by January 1, 1964; (6) Ugashik - Mobil Oil Company contract covers 528,065 acres bordering Bristol Bay southwest of Becharof Lake on the Alaskan Peninsula and calls for the first of three wells to be spudded by June 13, 1963.

The following unit agreements became effective during 1961: (1) Falls Creek - located in T1N-R13W and T2N-R12W, Seward Meridian, covering 16,749 acres with Standard Oil Company of California as operator; (2) Duktoth River - located in T20S-R14E, T20S-R15E, T20S-R17E, Copper River Meridian, covering 40,320 acres with Richfield Oil Corporation as operator; (3) Sterling - located in T4N-R10W, T5N-R8W, T5N-R9W, T5N-R10W, T6N-R8W, T6N-R9W, T6N-R10W, Seward Meridian, covering 63,618 acres with Union Oil Company of California as operator; (4) Swan Lake - located in T6N-R6W, T6N-R7W, T7N-R6W, T7N-R7W, T8N-R5W, T8N-R6W, T8N-R7W, T9N-R5W, T9N-R6W, Seward Meridian, covering 107,520 acres with Standard Oil Company of California as operator; (5) Bering River - located in T18S-R7E, T18S-R8E, T19S-R7E, T20S-R7E, Copper River Meridian, covering 54,122 acres with Richfield Oil Corporation as operator; (6) Canoe Bay - located in T53S-R76W, T53S-R77W, T53S-R78W, T54S-R76W, T54S-R77W, T54S-R78W, T54S-R79W, T54S-R80W, T55S-R79W, T55S-R80W, Seward Meridian, covering 66,316 acres with Pure Oil Company as operator; (7) Chaix Hills - located in T20S-R25E, T20S-R26E, T21S-R24E, T21S-R25E, T21S-R26E, T22S-R24E, T22S-R25E, T22S-R26E, Copper River Meridian, covering 82,326 acres with Standard Oil Company of California as operator; (8) White River - located in T21S-R17E, T21S-R18E, T21S-R19E, T21S-R20E, T21S-R21E, T21S-R22E, T22S-R19E, T22S-R20E, T22S-R21E, T22S-R22E, T22S-R23E, T22S-R24E, T23S-R21E, T23S-R22E, Copper River Meridian, covering 101,214 acres with Richfield Oil Corporation as operator.

State Oil and Gas Lease Sales

On January 25, 1961, a competitive sale involving University of Alaska lands was held which included three small tracts totaling 400 acres, all within the Falls Creek Unit area on the Kenai Peninsula. Standard Oil Company of California and Richfield Oil Corporation jointly submitted the high bids on the three tracts totaling $271,614.40, which averaged $679.04 per acre. There were ten bids on the three tracts.

Another competitive sale was held on May 23, 1961, at which 359 bids were submitted on 99 of 102 tracts offered. Ninety tracts totaling 56,379 acres in the Mental Health Selection area north of the Moquakie Indian Reservation some 50 air miles west of Anchorage on the west side of Cook Inlet brought a total of $7,038,673.38, an average of $124.85 per acre bonus bid. Nine tracts including 39,486 offshore acres located

in Pavlov Bay (Alaska Peninsula) and Controller Bay (Gulf of Alaska Region) averaged $3.34 for a total of $131,931.50 in bonus bids. The Richfield Oil Corporation was the successful bidder on the nine offshore tracts.

Successful bidders in the aforementioned Mental Health Selection area and their total bids were: Superior Oil Company $4,455,794.00; Pure Oil Company $1,043,081.00; joint bid of Phillips Petroleum Company, Pan American Petroleum Company, Sinclair Oil and Gas Company, and Skelly Oil Company $729,457.00; joint bid of Union Oil Company of California and Ohio Oil Company $488,064.20; Gulf Oil Corporation $117,513.16; Bristol Bay Oil Company $122,848.00; Shell Oil Company $37,049.60; joint bid of the Standard Oil Company of California and Richfield Oil Corporation $19,347.20; Jack Antry $8,088.25; and Sunray Mid-Continent Oil Company $5,120.17.

The third competitive sale of 1961 was held on August 4, 1961. It included 13,280 acres of tidelands located near Icy Bay, Controller Bay, and the Bering Lake itself - all in the Gulf of Alaska region. The six tracts received eight bids. High bids totaled $110,671.55, an average per acre bid of $8.35. The joint venture of Richfield Oil Corporation, British Petroleum Exploration Company (Alaska) Inc., and Sinclair Oil and Gas Company was successful bidder on five of the tracts, and Socony-Mobil Oil Company was the other successful bidder.

The last competitive sale for 1961, held on December 19, was the most successful to date. The areas offered included 57 tracts (253,922 acres) of offshore lands in Cook Inlet, Kachemak Bay, Icy Bay-Yakutat region, and eleven tracts (1785.44 acres) of University of Alaska lands on the lower Kenai Peninsula. The 42 offshore tracts (185,332 acres) bid on brought a bonus bid of $14,680,489.33, an average of $79.21/acre. All 11 University of Alaska tracts were bid on and the bonus bid amounted to $182,560.00, an average of $102.24/acre. The 53 tracts bid on covered 187,118.44 acres and received 119 bids. Successful bidders and their total bids were: Halbouty Alaska Oil Company $13,223.50; Standard Oil Company of California $158,904.00; Texaco, Inc. $977,007.10; Superior Oil Company $389,120.00; Pure Oil Company $10,911.00; Albert Stevenson $10,373.40; H. L. Hunt $32,000.00; Franco-Western Oil Company $28,901.80; joint bid of Richfield Oil Corporation, Standard Oil Company of California, and Shell Oil Company $5,341,086.00; Pan American Petroleum Corporation $7,296,000.00; joint bid of Union Oil Company of California and Ohio Oil Company $164,950.00; joint bid of Richfield Oil Corporation and Standard Oil Company of California $330,086.33; and Colorado Oil and Gas Corporation $110,486.20.

The 1961 competitive oil and gas lease bonus bids totaled $22,415,940.16 covering 296,732 acres. Of this acreage 238,098 acres of offshore lands yielded $14,923,092.35, an average of $62.75 per acre; 2185.44 acres of University of Alaska lands brought in $454,174.40, an average of $207.82 per acre; and 56,379 acres of Mental Health lands totaled $7,038,673.38 for an average per acre bid of $124.85. Of the 306,688 offshore acres offered during 1961, 77.6% were bid on. All of the University of Alaska lands offered for lease were bid on, and of the 58,275 acres of Mental Health land offered, 96.7% received bids.

The State's first noncompetitive drawing for oil and gas leases was held on July 25,1961, following a simultaneous filing period from June 7 through July 6. Eighty-two tracts totaling 197,209 acres located due west of Anchorage within the former Tyonek Bombing Range and west of the competitive acreage offered in May, 1961 were offered. A total of 13,382 applications were received for the 82 tracts, varying in size from 1881

to 2560 acres, from 28 States, the District of Columbia, and Canada. The State's second noncompetitive oil and gas lease sale is tentatively scheduled from March 6, 1962.

Pursuant to Section 2008.1 of the Alaska Oil and Gas Conservation regulations, well records for the following wells drilled in Alaska were released to the public during 1961 through local scouting services and reproduction firms in Anchorage:

Well Name and Number	Operator
Swanson River Unit 31-27	Standard Oil Co. of California
Bear Creek Unit No. 1	Humble Oil and Refining Co.
Swanson River Unit 34-16	Standard Oil Co. of California
Yakutat No. 3	Colorado Oil and Gas Corp.
Halbouty-King No. 1	Halbouty Alaska Oil Co.
Swanson River Unit 14-15	Standard Oil Co. of California
Great Basins Unit No. 1	General Petroleum Corp.
Kenai Unit 14-6	Union Oil Co. of California
Swanson River Unit 32-15	Standard Oil Co. of California
Rosetta No. 4	Anchorage Gas & Oil Development Co.
Iniskin Unit-A. Zappa No. 1	Alaska Consolidated Oil Co.
Great Basins Unit No. 2	General Petroleum Corp.
Kenai Unit 34-31	Union Oil Co. of California
Swanson River Unit 12-27	Standard Oil Co. of California

Well records to be released during 1962 and their release dates are as follows:

Well Name and Number	Operator	Release Date
Kenai Unit 33-30	Union Oil Co. of Cal.	1-21-62
Swanson River Unit 32-22	Standard Oil Co. of Cal.	2- 3-62
Swanson River Unit 23-22	Standard Oil Co. of Cal.	4- 9-62
Soldotna Creek Unit 41-4	Standard Oil Co. of Cal.	4-21-62
Nulato No. 1	Benedum & Associates	6-25-62
Swanson River Unit 212-10	Standard Oil Co. of Cal.	6-28-62
Soldotna Creek Unit 32-4	Standard Oil Co. of Cal.	7- 5-62
Kaliakh River Unit No. 1	Richfield Oil Corp.	7- 7-62
Swanson River Unit 14-27	Standard Oil Co. of Cal.	7-14-62
Soldotna Creek Unit 14-4	Standard Oil Co. of Cal.	9-13-62
Swanson River Unit 41-33 (WI)	Standard Oil Co. of Cal.	9-17-62
Swanson River Unit 32-33	Standard Oil Co. of Cal.	9-25-62
Kaliakh River Unit No. 2	Richfield Oil Corp.	9-30-62
Bishop Creek Unit 11-11	Halbouty Alaska Oil Co.	10-10-62
Alaska O&M-King Oil 1-B	Halbouty Alaska Oil Co.	10-26-62
Swanson River Unit 12-15	Standard Oil Co. of Cal.	11- 5-62
Knik Arm No. 1	Union Oil Co. of Cal.	11- 8-62
Soldotna Creek Unit 12-9	Standard Oil Co. of Cal.	11- 9-62
Swanson River Unit 12-34	Standard Oil Co. of Cal.	11-21-62
Knik Arm No. 2	Union Oil Co. of Cal.	11-23-62
Soldotna Creek Unit 34-33	Standard Oil Co. of Cal.	12-12-62
Dangerous River Unit No. 1	Colorado Oil & Gas Corp.	12-19-62
Kenai Unit 14-4	Union Oil Co. of Cal.	12-21-62
Swanson River Unit 32-27	Standard Oil Co. of Cal.	12-24-62
Soldotna Creek Unit 34-4	Standard Oil Co. of Cal.	12-27-62

Summary of Statistics

Comparing the Past Three Years

	1959	1960	1961	% Increase Over 1960
Permits Approved	16	30	55	83.3
Exploratory Wells Spudded	8	10	25	150.0
Development Wells Spudded	8	16	29	81.3
Wells Completed (Oil)	3	13	27	107.7
Wells Completed (Gas)	3	3	5	66.6
Wells Abandoned	4	9	19	111.1
Footage Drilled, Exploratory	75,705	93,749	197,499	111.1
Footage Drilled, Development	62,197	166,592	302,989	81.9
Total Footage Drilled	137,902	260,341	500,488	92.2
Average No. Active Rotary Rigs/Week	5	7	9	28.6
Average Daily Oil Production (Bbls)	510	1,529	17,333	103.3
Geologic Field Party Months	129.0	57.5	57.6	0.1
Seismic Crew Months	92.0	40.0	73.4	83.5
Gravity Crew Months	7.5	4.9	14.5	195.9
Estimated Industry Expenditures Exploration, Production, and Development in thousands	$30,654	$37,805	$42,405	12.2

EMPLOYMENT AND ACCIDENTS

Statistics

In order to prevent duplication of effort, this chapter is presented in summary. The figures available at this time for 1961 are approximate only. The U. S. Bureau of Mines and the Safety Division of the Department of Labor, State of Alaska, publish a detailed account of the accident rate in respect to employment and the accident severity rate at a later date when complete information is available.

	No. of Mines(1)		No. of men Employed(1)		No. of Accidents			
					1960		1961	
	1960	1961	1960	1961	Fatal	Nonfatal	Fatal	Nonfatal
Placer Mines								
Dredges	20	14	390	260		22		29
Nonfloat	74	72	176	216		1		2
Hydraulic	15	10	18	21		0		0
Coal Mines								
Underground	2	1	41	13		21	1	12
Strip	7	4	261	279		42		34
Lode Mines								
Metal (2)	102	4	114	50		14		8
Nonmetal	2	3	474(3)	24				1
Petroleum								
Production & exploration	25	(?)	600	589	1	16		98
Exploration								
Metal	125	91	262	243	—	6	—	4
TOTALS	372	(199)	2336	1695	1	122	1	188

(1) Estimated from various reports
(2) Lode mines in 1960 included lode, prospector & intermittent operation and exploration projects, excluding sand, gravel and stone operations
(3) Including sand, gravel, & clay

NOTE: Estimated average monthly insured employment in the Alaska Mining Industry for 1961 is 1182.

PROPERTY AND AREAL REPORTS

Susitna-Maclaren Area
by Robert H. Saunders, Mining Engineer

Several interesting mineral occurrences have been reported in an area on the south side of the Alaska Range between the Alaska Railroad and the Richardson Highway. Information about these occurrences has come to the Division from a variety of sources including field examinations and aerial observations by Division engineers and verbal reports from other individuals that have been in the area. The occurrences lie within a belt in which the geology appears to be particularly favorable for three different types of copper deposits.

In addition to the mineral occurrences and the favorable geology, the accessibility of the belt contributes toward making it of special current interest. The belt was rather inaccessible before the construction of the Denali Highway four to five years ago. Undoubtedly it received some attention from early-day prospectors in their search for placer gold. Its southern boundary was crossed by trails that were travelled by dog-teams, pack horses, and foot-travellers for several decades, but none of it has been easily accessible to prospectors prior to the past four to five years. Off-the-road travel in the area can be difficult, and parts of the belt still are not easily accessible.

The favorable belt extends westward from Maclaren River across Susitna River thence southwestward to Watana Creek and is 15 to 20 miles wide and 50 miles long. Between Maclaren and Susitna Rivers, the southern boundary of the belt lies south of the Denali Highway, and the northern boundary lies in the mountains and glaciers south of the crest of the Alaska Range. The belt includes most of the drainage of the West Fork of Maclaren River, the drainage of Little Clearwater Creek, upper Clearwater Creek, and Windy Creek. It also includes the area drained by Valdez Creek, but the gold placer deposits and gold lode prospects of the Valdez Creek district will not be discussed here. West of Susitna River, the belt lies on both sides of lower Butte Creek and extends into the Watana Creek drainage basin.

The boundaries of the belt are determined by the boundaries of two west-trending geological formations. The formation underlying the northern part of the belt consists of a variety of sedimentary rocks with some diabasic flows or intrusives and with diorite and related intrusives. The sedimentary rocks include slate, shale, graywacke, sandstone, tuff, conglomerate, and limestone. The degree of metamorphism varies from place to place and probably is related to the distribution of the dioritic intrusives. The limestone appears to be more prevalent in the southern part of the formation than in the northern part. This formation has been assigned to the Triassic age.

The southern part of the belt is underlain by a formation consisting largely of diabasic flow rocks that have been assigned to the Permian or early or middle

Triassic age. Associated with the flows are argillites, tuffs, and tuffaceous conglomerates. The diabasic rocks are amygdaloidal locally.

The Mineral Occurrences

1. In U. S. Geological Survey Bulletin 608, Fred H. Moffit reported that olivine basalt carrying disseminated chalcopyrite had been found in the mountains south of the eastward bend in Butte Creek. The mountains referred to rise to 6000 feet altitude. The geology of the area has not been mapped. Basic igneous rocks predominate, and they most likely are the westward extension of the Permian or Triassic flow rocks that underly the southern part of the belt between Susitna and Maclaren Rivers. Two mining engineers of the Territorial Department of Mines made a reconnaissance of the area in 1954; no copper minerals were found in place, but several pieces of float were found in two gulches. The float was basic igneous rock carrying chalcopyrite and stained with malachite; a composite sample of the float assayed 1.44 percent copper.

2. Copper-bearing float has been reported three miles southwest of the mouth of Butte Creek in the same group of mountains as the No. 1 occurrence. In this float, however, the copper mineral was reported to be bornite rather than chalcopyrite; the green stain characteristic of malachite also was reported.

3. On the south side of lower Butte Creek in a small ravine opposite the mouth of Wickersham Creek, some specimens of chalcopyrite-bearing rock have been found.

4. On the south side of lower Windy Creek, small pieces of copper-bearing float have been reported in two places, one on each side of the first tributary to Windy Creek from the south.

5. A short distance east of the No. 3 occurrences, a few copper-bearing specimens have been found in a fault zone in sedimentary rock (limestone and argillite) near an intrusive contact.

6. Near the head of one of the left-limit tributaries to lower Windy Creek, a quartz-chalcopyrite-bornite vein has been discovered. At the point of discovery the vein is 30 inches wide; it tapers abruptly in both directions, and, although it can be traced for several hundreds of feet along the strike, no other place has been found where the width exceeds an inch or two.

7. Near the largest left-limit tributary to Windy Creek, a three-feet-wide vein carrying bornite and malachite has been exposed in a hand-dug trench.

8. On the south slope of the mountains south of Windy Creek, a high-grade specimen of bornite and malachite was found a few years ago.

9. Three prominent outcrops lie twelve miles from the mouth of the West Fork of Maclaren River in a deep ravine cut by a left-limit tributary to the West Fork. They resemble the outcrops of other copper-bearing deposits in the region. From the air they appear to be the tops of irregularly shaped masses with the longest dimensions probably equal to one hundred feet. Whether or not the three masses are connected and are parts of a single mineralized zone is not known.

10. On the south end of the ridge east of the West Fork of Maclaren River five miles from the mouth of the West Fork, specimens of bornite and malachite reportedly have been found.

11. The Kathleen-Margaret prospect on the west side of Maclaren Glacier is a quartz-chalcopyrite-bornite vein in green diabasic lava. The prospect has been described in U.S. Geological Survey Circular 332. Work on the property since the publication of Circular 332 has included the driving of more than 800 feet of underground workings and the drilling of more than 2000 feet of exploratory drill holes. The property is now under option to Transworld Resources.

12. Less than one mile west of the K-M prospect in a saddle at the edge of an ice field, a band of olivine basalt 1 to 3 feet wide carrying disseminated native copper and bornite was found. A sample across the band assayed 1.34 percent copper. The outcrop is partly covered by unconsolidated material that includes small pieces of the copper-bearing basalt. The wallrock on both sides of the band is basaltic flow rock containing little or no olivine. The band can be traced for only a short distance; in one direction it disappears under the ice and in the other direction it disappears under a talus slope. The width, grade, and inaccessibility of this outcrop make the band appear to be of no economic importance, but it is an important indicator of the widespread extent of copper mineralization in the basaltic rocks.

13. About four miles south of the K-M prospect in the valley of Maclaren River, a prospect has been located on a mineralized zone in the basaltic rocks. Chalcopyrite and bornite are disseminated through the zone, which is of unknown width. Samples from the zone have run about two percent copper.

14. A large body of magnetite has been reported on the east side of the West Fork of Maclaren River ten airline miles from the mouth of the West Fork. This deposit probably is in limestone. The outcrop is reported to be large enough to warrant further investigation; apparently it has been staked recently.

Summary

The mineral occurrences show that two different types of copper deposits have been formed in this belt. The first type is exemplified by the K-M prospect; typically it is a quartz-chalcopyrite-bornite vein carrying small amounts of gold and silver; probably chalcocite is present in parts of the veins. Only two of these veins have been traced for appreciable distances; they pinch and swell laterally so that the wider parts of the veins taper abruptly along the strikes. Any ore-shoot found on such a vein is likely to have a short strike-length limited not only by the pinching of the vein but also by the distribution of copper minerals within the wide part of the vein. According to the meager information thus far available, where a vein tapers to a narrow width it is likely to continue at that width for a great distance before it widens again. In some places appreciable amounts of copper minerals have been found in the basaltic wallrock as much as 15 feet from the vein; this suggests that any ore-shoots that are found may be wider than the vein and may be limited by "assay walls" rather than by structural walls. Careful examination of the wallrock of veins will be necessary to insure that mineable parts of the walls are not overlooked. There has been no exploration in depth except at one place on one vein, and there, the vein is of consistent width and tenor for at least a few hundred feet down the dip; thus, there is some justification for moderate optimism in regard to the probable vertical dimensions of ore-shoots. Vein deposits of this type have been formed at Maclaren River and on lower Windy Creek, and reported occurrences of float indicate that other similar veins are present within the belt.

The other known type of copper deposit is basaltic flow rock with copper minerals disseminated through it. In these deposits the copper may be in the form of native

copper, bornite, or chalcopyrite, or any combination of these minerals; in some of the specimens the copper minerals fill amygdules in the basalt. Several samples of rock of this type have assayed in the neighborhood of two percent copper. While the chances of finding such deposits that will average much higher than two percent copper may be remote, the chances of finding deposits of that grade sufficiently large for open-pit mining are reasonably good. Specimens exhibiting this type of mineralization have been found at Maclaren River and as far west as the Watana Creek drainage.

A third type of copper deposit which may be found in the future, but which apparently has not been found to date, is the replacement type deposit. The orebodies at Kennecott were classic examples of this type. Replacement deposits are formed in limestone or in other rocks rich in lime. The geologic map that accompanies U. S. Geological Survey Bulletin 498 shows a number of bodies of limestone along the southern boundary of the formation that underlies the northern part of the belt. The limestone and other lime-rich rocks and the copper minerals throughout the belt show that two essentials for the formation of replacement deposits are present.

Selected References

Capps, Stephen R., 1940, U.S. Geological Survey Bulletin 907, Geology of the Alaska Railroad Region.

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Moffit, Fred H., 1915, U.S. Geological Survey Bulletin 608, The Broad Pass Region, Alaska.

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Kings River Limestone Deposits
Anchorage Quadrangle
by Martin W. Jasper and Miro Mihelich, Mining Engineers

Summary

The reconnaissance study of the Kings River drainage area confirmed the occurrence of extensive highgrade limestone deposits along the 6 to 8 miles of the East Fork. The deposits are considered to be of a magnitude that can supply all requirements and foreseeable future demands for cement in the Cook Inlet-Anchorage region and the railway belt.

The discovery last summer of this natural resource, after an intensive, systematic search of the upper Cook Inlet-Anchorage region by the Permanente Cement Company's field team, in a readily accessible area that had not previously been studied or geologi-

cally mapped by a government agency or by private interests, came as a surprise to industry and to the public.

The three staked areas are within 8, 16, and 17 miles, respectively, from the Glenn Highway at Mile 71 to 72. From there it is an additional 10 miles to the railway at Sutton, where a 30-acre site for the proposed plant has been acquired. An ample supply of coal and other raw materials needed for cement manufacture are available within a few miles of the plant site.

While the three limestone areas acquired by the company are the most obvious and readily accessible, it seems reasonable to expect that within the 4 mile section downstream from Luster Creek other sections of nearly pure limestone formation will be found along the same formation. It is anticipated that topographic conditions in this latter area will make mining costs appreciably higher.

When development and mining of this natural resource is undertaken, the operation of the cement plant will have a beneficial impact which will be felt throughout this region. It can be predicted that the proposed operation will prove a real incentive for development of other natural resources, which are an absolute requirement to create a sound year-around economic climate.

Introduction

With discovery and location of a previously unmapped limestone deposit in the Anchorage Quadrangle by the Permanente Cement Company of California in June and July 1960, a reconnaissance study of the region was requested by James A. Williams, Director, State Division of Mines and Minerals. It was made during period of September 16 to 18, 1960 by Martin W. Jasper and Miro Mihelich. Pack and saddle horses were rented from Leo Kemmermyer, a homesteader and big game guide living at Drill Lake, Chickaloon district. As Mr. Kemmermyer was familiar with the area as a whole and the claims located by Permanente in particular, he was engaged as guide for the trip.

The objective of the preliminary investigation was to

(1) determine the location and approximately areal extent of the structure as a whole and in the areas in which the claims were located in particular;

(2) obtain samples to determine grade (chemical analysis) of the limestone;

(3) obtain information as to possible continuation of the limestone along and beyond limits of the Kings River East Fork drainage basin to the northeast and southwest;

(4) and to obtain information as to its relative accessibility for economic exploitation.

Location and Accessibility

For reference purposes the three locations staked by the Permanente Cement Company are designated Areas 1, 2, and 3. These areas are shown on Map I following this page.

Area 1 is situated approximately 1-3/4 miles N30°W of Castle Mountain between the 2500 to 4300 elevation on the steep west slope of the mountain. The four limestone

MAP SHOWING
Location of Limestone Deposits Discovered and Staked
by
PERMANENTE CEMENT COMPANY
for
Report Covering Investigation of Area

placer claims in this group (CAL Nos. 1, 2, 3, & 4) are located about 12 miles from mouth of Kings River. The distance followed along the trail from Drill Lake is estimated to be 6 miles.

These claims were the first located by Permanente, and are said to cover limits of this limestone "remnant" which is reported to be surrounded (?) by greenstone. Projection of existing Township and Section lines places them in Sections 4 and 5, Township 20 North, and Range 5 East.

Area 2, consisting of 2 limestone placer claims (CAL Nos. 5 & 6) along strike of the major limestone formation of the district is the second area staked by Permanente. They are situated at approximately Longitude 148° 31' West and Latitude 61° 57' North. This area is 5 miles N35°E from mouth of the East Fork to mouth of a northerly previously unnamed tributary (called Luster Creek by the locators for reference and identification purposes), thence 3/4 mile north from confluence of the latter stream with the East Fork. These claims lie on west side of Luster Creek within range of 2800 to 4400 foot elevations.

Area 3 is a group of 6 limestone placer claims (CAL Nos. 7, 8, 9, 10, 11, & 12) which are situated about 1 mile N50°E of Area 2. A central point in this group is at approximate Longitude 148° 24' West and Latitude 61° 57' North. Located on north side of the East Fork the claims lie within a vertical range of 3200 to 6000 feet elevations. They comprise the third group located by the company. The distance from Drill Lake to Area 3 over the pack and saddle horse trail is estimated at 17 miles. Drill Lake is accessible by car, a distance of 84 miles from Anchorage.

There are a number of short swampy sections along one mile of the trail between Area 1 and the mouth of East Fork, with gravel within two to three feet of the surface. Observations made during the trip indicate road construction to the limestone areas should be relatively easy.

It is understood that application has been made to the State Division of Lands by Permanente for a road right-of-way into the district. The plan is reported to be a route which would leave the Glenn Highway at about Mile 71, a mile or so southwest of Lake Ida. This route would be 9 to 10 miles shorter than it would be if it were started at the end of the existing Drill Lake road. The distance from Mile 71 to Area 1 would be around 8 miles, to Area 2 about 16 miles, and to Area 3 about 17 miles. From Mile 71 to the proposed plant site on a 30-acre tract at Sutton is 8 to 9 miles, making a total distance from Area 3 to Sutton of 26 miles.

Climate and Water Supply

Climatic conditions are similar to other areas along southern fringe of the Talkeetna Mountains. Winter snow accumulations in the upper Kings River and its East Fork valleys are reported to have five to six-foot maximum depths. The annual rainfall probably equals that of the Matanuska River Valley.

Stream flow of the East Fork at time of visit was estimated at 4000 to 6000 cubic feet per minute, and appeared to be greater than the volume flowing in Kings River above mouth of the East Fork. Stream flow in the East Fork above Luster Creek is considered ample to supply requirements for any scale limestone mining operation that may be undertaken by the Permanente Cement Company in Area 3.

Timber and Vegetation

Only scattered spruce are to be found along the lower East Fork's valley bottom, with no spruce noted on the valley slopes. Tree growth is largely limited to small diameter fairly abundant birch, poplar, and cottonwood, with their occurrence limited to the valley bottom and a few hundred feet up the mountain slopes.

Willow and alder are present in fairly dense growths at numerous points along the bottom and lower slopes of the East Fork valley, with the brush line within limits of the 3000 to 3500 foot contours. Above this elevation, vegetation is largely limited to a thin covering of moss, short grass, and low bush blueberry plants.

Topography

The East Fork of Kings River valley is a typical U-shaped glacier-scoured area. The ridge crests, especially around limits of Area 3's "hanging valley," are serrated. The highest peak on north side of the cirque has an elevation of 7185 feet.

History and Ownership

The only limestone noted in this district to date by the USGS has been limited to mention of the Area 1 occurrence, as the upper Kings River drainage system has not been geologically mapped or covered by detailed study. The U.S. Bureau of Mines also noted the Area 1 limestone, and years ago did some work on a coal bed 1 to 1-1/2 miles northeast of it.

Although prospectors and hunters over the years must have noted and recognized the limestone formation along the East Fork valley, its "discovery" and recognition of its purity and economic importance, must be credited to Permanente Cement Company's field party's thorough search for a deposit in the Anchorage-Palmer region, resulting in staking the 12 placer claims last summer as shown on the map.

In addition to the 12 placer claims, 2 lode claims (the RAM and EWE) were located to cover pyrrhotite occurrences. The Location Notice describes the RAM as being "2 miles northerly from Hill 6394." This "hill" is S58° to 60°E and scales 2-3/4 miles from east end of Area 2 claims.

The EWE Lode Claim is described on the Location Certificate as being "4000 feet in southerly direction from Hill 7185," which in fact is S15°E and scales 0.9 mile from peak marked 7185 foot elevation on the map. This "Discovery" lies short distance east from northeast corner of Area 3 placer claim group.

Geology

With the preliminary investigation of the limestone occurrences along the right limit (north and northwest side) of the East Fork confined to one day spent in Area 3, the time was largely devoted to sampling, and no detailed mapping of structures was attempted. This area was selected as it has the greater known exposed width and length, and the topography suggests it to be the easiest to exploit. Observations indicate the area as a whole to have a somewhat complicated structural system which would take considerable time to solve and map.

The limestone formation has a general N45° to 50°E strike in the six-mile section from the end of the ridge two miles north of the East Fork's mouth to head of the "hanging valley" in Area 3. It is reported to continue to the northeast to the there northwest-trending East Fork, but effort to trace it further to the northeast has not been made to date. The formation has not been picked up on its projected strike to the southwest on the west side of Kings River, which suggests a large displacement along the major fault in which that river valley is deeply entrenched.

The prevailing dip of the Limestone bed (s?) was not determined, and outcrops suggest it to be variable. Its outcrop on the west side of Luster Creek has an apparent dip of 50° to 60° northwest. The precipitous outcrops and peaks around the hanging valley in Area 3 suggest its dip in that section to be nearly vertical, and its great width (estimated at 3/4 to 1 mile, with a fine-grained light-colored acidic intrusive on northwest side of the cirque) suggests a tight truncated anticlinal (?) or synclinal (?) fold.

A large "bulge" in the limestone formation occurs to the east and northeast of the Area 3 claim group, covering an area roughly 3/4 to 1 mile in width (east-west) and 1-1/4 mile in length to the northeast, where it is abruptly terminated at the East Fork of Kings River. On the east and south sides of this "bulged" area, the limestone is in contact with granite for the most part and greenstone (andesite?) for the balance. The granite-limestone contact continues westerly to a point about midway on the south side of this claim group. From here to the southwest limits of this staked area, occasional small outcrops show that a blocky slate underlies the limestone. In two draws at the southwest end of Area 3, bedrock exposed in precipitous falls of small streams shows a 50 to 60 foot thickness of a brecciated greenstone flow remnant (?), with an estimated 200 to 300 foot thickness of weathered slates overlying the greenstone and underlying the limestone.

On south side of the East Fork in this area, the lower slopes of the mountain are non-calcareous highly-metamorphosed sediments, with no limestone measures in evidence.

Viewed from a distance, the mountainous area (to north and northwest) beyond the limestone formation of Area 3, shows a number of granite stocks as "islands" in surrounding sediments (and probably greenstone).

Area 2 was not examined for reasons noted above. Claims staked here were limited to two along the strike of the formation for a distance of one-half mile. From a three-quarter mile distance, it does not appear their 660 foot width fully covers the formation. This seems apparent, as outcrops on Luster Creek's east canyon wall, viewed from distance of 3/4 mile, appears, and is reported, to have several times that width.

Continuing southwesterly, no prominent exposures of the limestone were noted in the next 3.5 miles downstream from the mouth of Luster Creek along the northwest slopes (right limit) of the valley. It is possible that formation was obscured by the light snow cover above the 4000 foot level. However, the limited light-colored exposures on the steeper slopes a short distance below the snow line could possibly be limestone, but no limestone float was noted in the lower end of the draws of this 3.5 mile section.

In the 3.5 to 4.0 mile section below the mouth of Luster Creek there is a prominent precipitous exposure of the limestone in the bluff at the top of the northwest valley slope. Float in the gulch below this exposure shows the limestone to be generally impure, with considerable silicification and pyritization noted. Because of its apparent

impurities this occurrence was not examined, and no doubt was the reason for its not being staked by agents of the Permanente Cement Company.

For 2.5 miles along lower southeast side of the East Fork valley, and for an additional 1.75 miles below mouth of East Fork, on the east side of Kings River, the formation appears to be limited to the "white" granite and small isolated areas of greenstone, with the granite having an estimated width of 1.0 to 1.5 miles.

Area 1, located about one mile east of Kings River and about two miles downstream from mouth of East Fork, is reported to be surrounded by greenstone (andesite?). About 3/4 of a mile northeasterly of Area 1, there is an elongated occurrence of a dolomitic limestone along a steep narrow ridge reportedly traced for about 1 mile. Neither of these two occurrences were examined, as both of them appear to be "remnants." See Map I.

Faulting

The short tributaries on both sides of the East Fork are entrenched along planes of a block faulting system of a general northwesterly strike, with displacement of the limestone formation considered to be of minor importance. Luster Creek lies within a fault zone, which from a 3/4 mile distance suggests a horizontal displacement of 100 to 200 feet.

The Northwesterly trending sections of Kings River and the East Fork are entrenched in major fault zones along which displacements of large magnitude have occurred. This is evident by failure, to date, to locate continuation of the limestone formation to the southwest of Kings River and to the northeast of the East Fork.

Mineralization

The known mineral concentrations along this limestone belt are limited to two massive pyrrhotite occurrences in limestone-granite contact areas. The EWE and RAM lode claims (mentioned earlier) were located to cover these deposits. It is reported that samples taken carried no copper, nickel, gold, nor silver values and the deposits are not considered of special interest at the present time. Disseminated pyrite was noted in limestone float near the southwest end of this formation. Minor amounts of chalcopyrite and malachite have been reported at several points, but were not considered to be of special interest. The limestone-intrusive contacts, however, should be more thoroughly prospected, as similar areas in other regions have proven to be a favorable environment for ore deposition in many cases.

Sampling

Sampling was limited to two sections in the Area 3 claim group, neither of which included the full width of the formation. Total width (or thickness) of the limestone was not determined with any degree of certainty at either section.

Sample Nos. 313-314-315 were taken across a continuous total width of 500 feet (paced) from southeast to northwest, beginning approximately 200 feet from southeast limestone-granite contact, more or less at right angles to the northeast-southwest strike of the limestone formation. This section is located in the flat area near the southwest end of the glacial cirque, where the limestone outcrops are differentially weathered and form large talus slabs.

Sample Nos. 313 and 314, taken by Mihelich and totaling 200 feet, consisted of chips at 1 foot intervals. Sample 315, taken by Jasper across 300 feet, consisted of chips at 5 foot intervals. Elevation along this line was 4750 (by aneroid).

Sample Nos. 316-317-318 were taken down a draw along a course bearing S10°W, which is at a 45° angle to the general strike of the limestone formation. The sampling began at a point an estimated 1000 feet S10°W of first section sampled.

Sample No. 318, with chips taken at 10 to 15 foot intervals from outcrops, was 1100 feet in length. This section has a 10 to 15° slope, and a vertical range of about 4550 to 4400 foot elevation.

Sample Nos. 316-317, taken by Mihelich at 5 to 10 foot intervals, were down an average 30° slope for 500 feet (horizontal distance about 400 feet), between the 4300 and 4100 elevations. Between Sample Nos. 318 and 316 a distance of 100 to 150 was not taken, due to few limestone bedrock exposures.

In the 200 to 300 feet from the southeast limestone-granite contact (some of which was included in Sample No. 313), the limestone has a typical marbleized, mottled, light blue-gray color and is fine-grained. Beyond that to the northwest within limits of the sample, it is coarsely crystalline and white.

Megascopically, impurities - except minor humus stain - were considered negligible, and in the field it was estimated to be a practically pure $CaCO_3$ deposit.

Analyses of the samples gave the following results:

Assay No.*	Sample No.**	LOI***	CaO	MgO	Fe_2O_3	SiO_2	Al_2O_3
12278	313	42.3%	52.9%	0.08%	0.55%	2.16%	Not run
12279	314	42.8%	54.6%	0.11%	0.62%	1.89%	
12281	315	43.7%	54.9%	0.16%	1.01%	0.64%	
12280	316	42.1%	55.5%	0.17%	0.53%	0.57%	
12282	317	43.1%	55.1%	0.13%	0.62%	1.17%	
12283	318	43.4%	55.1%	0.25%	0.47%	0.81%	

* Assay No. assigned at Anchorage DM&M Assay Office, Irwin W. Mitchell, Assayer.
** Field sample tag No.
*** LOI - Loss on Ignition

Split pulp samples were sent to the Ceramic Laboratory of the USBM Northwest Experiment Station, Seattle, for check analyses, results of which were as follows:

Sample No.	LOI	CaO	MgO	Fe_2O_3	SiO_2	Al_2O_3
313	43.0%	54.7%	-0.1%	0.16%	1.47%	0.68%
314	43.7%	55.5%	-0.1%	0.15%	0.65%	0.33%
315	43.7%	55.7%	-0.1%	0.17%	0.38%	0.29%
316	43.8%	55.5%	-0.1%	0.10%	0.39%	0.38%
317	43.6%	55.9%	-0.1%	0.06%	0.40%	0.36%
318	43.6%	55.7%	-0.1%	0.08%	0.40%	0.42%

The USBM reported further: "Differential thermal analyses of these samples showed them to be nearly pure $CaCO_3$, the thermal reaction was sharp and of such a magnitude that indicated very pure calcium carbonate. All of the samples were white after firing."

It is interesting to note that Samples 313 and 314, composed of chips taken at 1 foot intervals, agreed closely with chips taken at 5 foot intervals in No. 315. The principal difference was in the silica content, with the first two being the higher, probably due to their proximity to the limestone-granite contact.

The analyses confirm the field observation of Mr. Mihelich that, in his opinion, the obvious uniformity and purity of the deposit would show same results whether it was channel sampled or limited to chips taken at regular intervals.

Conclusions

The limestone deposits located in the Kings River drainage system are extensive, and information gathered from this preliminary investigation indicates nearby practically inexhaustible reserves of nearly pure calcium carbonate suitable for almost any use. Sampling by others of the three areas is reported to show the limestone to have the same nearly pure $CaCO_3$ content.

From a mining point of view, the topography, width, and visible lateral extent of the limestone in vicinity of Area 3 should realize lowest costs in planning a long range operation.

Area 2 outcrops, although not examined except from a distance, also indicate presence of a very large tonnage potential. Here, however, the slopes are very steep and mining costs would probably be somewhat higher.

The more limited nature of the Area 1 limestone deposit indicates its tonnage potential to be a small fraction of that available in the other two areas. Reported to be surrounded by andesite, it is possible that this 80-acre remnant may have sufficient tonnage of nearly pure $CaCO_3$ to supply the planned cement plant at Sutton for all requirements in the foreseeable future. Should a diamond drilling program prove that to be the case, this deposit would be the logical one to exploit first, as it is located within 8 miles of the highway, and would save 8 to 10 miles of road construction and truck haul.

* * * *

Mespelt Mine
Medfra Quadrangle
by Martin W. Jasper, Mining Engineer

Introduction

The old Mespelt gold-copper property was visited July 31 and August 1, 1960 at the invitation of T.R. Strandberg of Strandberg Mines, Inc.

Location and Accessibility

The property is located at approximate coordinates 154°W Longitude and 63° 13'N Latitude in the Medfra Quadrangle. It is presently most readily accessible via "bush" plane from McGrath, a 25 to 30 minute flight. Landings are made on a fair airstrip at the south end of a ridge about 1 mile from camp.

The mine shaft, hoist, power plant, and shop, situated on the west slopes of a low well-rounded mountain, are 1/2 to 3/4 of a mile west of the ridge at the end of the Medfra road, which was built in the early days of the camp to serve the various mining property owners. This road has not been maintained for many years, and a 2 or 3 mile section across the lowlands is reported to be impassable for trucks or tractors during the wet summer months.

History and Ownership

The first activity in the Nixon Fork mining district followed discovery of placer gold on Hidden Creek by F.E. Mathews in June 1917. Before the end of that season, other prospectors examined all the streams in the area and staked numerous claims. Character of the placer gold generally indicated a nearby source, and search for it resulted in discovery of high-grade outcrops and the staking of numerous gold-lode claims in the district the following year. 1/

During 1918 and 1919, trenching was done and a number of shafts were put down with very encouraging values found in the small orebodies developed. During the winter of 1919-1920 the original (Crystal Lode) discovery of Pearson and Strand at the head of Ruby Creek, was optioned to Thomas Eakin. He mined several hundred tons of high-grade and shipped to the Tacoma smelter the following summer.

The most promising claims were taken over in the spring of 1920 by the Treadwell Yukon Company, Ltd., which conducted an intensive prospecting and development program that summer. In 1921, this company installed a 10-stamp mill to handle the ore from the claim groups acquired. With the ore shoot found to be erratic in occurrence, small in tonnage, and of limited extent, the company discontinued milling operations in 1923 except for the Whalen Lode which it continued to work for another year. The properties then reverted to the various owners.

The Treadwell Yukon Company, Ltd., is unofficially reported to have produced $114,024.00 in gold during the 4-month mill operating season of 1922, with a slightly higher production in 1923, for a total $235,000.00. 2/ This production is said to have

1/ USGS Bulletin 864, page 229.
2/ USGS Bulletin 783, pages 127-128.

come largely from the Whalen mine, with some from the Pearson-Strand claims. These operations are considered to have been at a loss. In 1924 E.M. Whalen and 4 associates leased the Treadwell mill. The small tonnage of broken ore remaining in the Whalen mine was milled, and $80,000.00 was recovered.

Upon relinquishment of the several claim groups (including the Whalen & Griffen, Pearson & Strand, and McGowan & Mespelt) by the Treadwell Yukon Company, "seven claims at head of Ruby Creek, which included site of the Crystal Lode, together with the stamp mill, were taken over by Pearson & Strand but subsequently passed into the hands of the Mespelt Brothers and their associates, who have operated these lodes continuously during period of 1926-1933." 3/ These operators continued their operation up to their granting a lease to H.G. Wilcox and Associates in 1950 and 1951. Since 1952, Strandberg and Sons, Inc., have held the property under lease agreement.

Information from persons generally familiar with the Mespelt Brothers operation suggests their gold production to have been approximately $1,000,000.00. This indicates a total production from the several lodes to have been in the neighborhood of $1,315,000.(

During the total period from the 10-stamp mill operation to date, the mill tailings were saved in a pond on the mountain slope, built up by use of brush. This pond has been calculated to contain 10,000 tons. Allowing for possible loss of 2,000 tons escaping down the slope through the brush dam, a total of 12,000 tons is probably the maximum milled. Assuming the gold production to have been $1,135,000.00, and accepting the claim that average gold values in the tailing to be $30.00 to $35.00 per ton (taking $30.00 as an average), the mill heads would have averaged $139.00 per ton - a much higher average value than the $25.00 to $35.00 per ton (gold at $20.67 per oz) suggested by Mr. Mertie. 3/ The copper values in the tailings were not determined; the ore ranged within limits of 2 to 12 percent. No effort has been made to recover the copper to date.

Scarcity of water above the mill elevation has limited milling operations to a maximum of 4 months a year. Moving of the mill to the base of the slope in Ruby Creek valley might solve the water problem if sufficient ore can be developed to justify the expense.

The work of Strandberg Mines, Inc., has been confined to underground development, surface exploration, extensive geochemical and geophysical work, and mapping. Ore encountered in development work has been stock-piled in an ore bin where it is readily available for drawing whenever a decision is made to start up the mill.

During the summer months of 1960, three men (one miner, one helper, and Mr. Strandberg as hoistman) were carrying on a limited mining operation, underhand stoping on a small orebody below the 460 level. A calculated 144 tons had been removed up to the time of the visit from this stope and hauled to the mill ore bin, nearly a mile from the shaft. An additional 253 tons (as a minimum) was estimated for a 10-foot depth below the floor of this stope. 4/ The lessee later reported that a total of 300 tons had been mined and hauled to the mill by the end of the season, with an additional estimated 50 to 100 tons of broken ore in the stope. This operation is located on the original Garnet Mineral Claim Group.

3/ USGS Bulletin 864, pages 230, 232.
4/ Refer to 460 Level Mine Plan included later in this report.

Geology

The geology of the Nixon Fork mining district is somewhat complex and to date not thoroughly understood from the mineralization and structural viewpoint. The area as a whole has been reported upon by several U.S. Geological Survey parties during the past 40 years. The district lies within (or along southern limits of) the Iditarod Fault Zone, a regional structural feature having a general N60E strike for several hundred miles.

In USGS Bulletin 864, pages 230 to 231, J.B. Mertie, Jr., summarizes their studies of the area up to 1933 under the heading of Geology and Mineralization, from which the following extract has been taken:

"In vicinity of the lodes the country rock consists of early Paleozoic limestone and Cretaceous sandstone and shale. Both the Paleozoic and Cretaceous rocks have been invaded by a mass of quartz monzonite and related rocks, along the borders of which mineralization has taken place. The intrusive mass occurs as a plug, which outcrops in a roughly elliptical area with major and minor axes about five and two miles in length. Trend of the major axis is about N35°E. The intrusive rocks consist dominantly of quartz monzonite but include porphyritic variants of similar composition, which occur as marginal facies and as dikes. These monzonitic rocks are considered to be of Tertiary age.

"The principal gold lodes lie at or near the contact of this intrusive mass with the Paleozoic limestone, and most of those so far discovered occur in the limestone, though few of them are more than 100 feet from the contact. As these lodes occur on low ridges where outcrops are lacking, and as the underground work has been done mainly in bodies of ore, the contact relations between intrusive and country rocks are not well known. Sufficient work has been done, however, to show that the western margin of the quartz-monzonite, along which the lodes occur, is very irregular in outline and has numerous apophyses. It is also apparent that this irregular contact line has been further modified by cross faulting, some of which occurred prior to the deposition of ores. In fact it seems probable that the ore-bearing solutions followed fault planes as well as contact planes in their upward migration.

"The lodes consist of irregular-shaped masses of ore, which have no definite boundaries but fade into less mineralized or unmineralized country rock. Some of these ore bodies are roughly lens-shaped or disk-shaped. Most of them, regardless of their shape, have vertical or horizontal dimensions of less than 100 feet. In addition to irregularity in shape there is a marked irregularity in the distribution of gold in them, for the ore commonly occurs in irregular shoots, of varying value, within a generally mineralized ore body. The methods employed for following and recognizing ore of workable grade differ at different properties, for at some places the prevalence of copper minerals is an index of high gold content, and at other places the reverse is true.

"The ores consisted originally of gold-bearing copper and iron sulfides but have been extensively altered by processes of surficial oxidation, so that much of the gold has been released from the sulfides and now occurs as free gold recoverable by amalgamation. Most of the operating shafts so far sunk (1933) have shown this mixture of free gold and oxidized sulfides, but the ratio of oxidized to unoxidized ores differs in different ore bodies. Thus, the ore at the Whalen Mine is described as being almost wholly oxidized, whereas in the Crystal lode, at the head of Ruby Creek, the ore consisted of unoxidized chalcopyrite, pyrite, and bornite. The oxidized ores consist largely of the

basic carbonates of copper and oxides of copper, intimately mixed with iron hydroxides. These oxidized ores have also doubtless been materially enriched by surficial processes, and as a result of such conditions it is to be expected that the ores will not only become leaner with depth but will also contain less free gold and will therefore become progressively less adapted to free milling. Inasmuch, however, as present mining operations have not extended below the zone of oxidation, and much surficial prospecting and mining remains to be done, this matter of decreasing tenor and increasing refractoriness with depth at present merits only placing on record for future consideration."

The limited surface exposures plus the relatively limited exploration and development work in the past have not been mapped in detail as work progressed. That has had an end result of having no available detailed records upon which the casual examiner could make intelligent predictions of "guesstimates" as to where the next isolated highgrade ore body might be located. During early days of the camp, first attention was directed toward trenching and/or sinking shafts on the few highgrade outcrops. From that work, the owners gained considerable knowledge of the ore habits, signals, and/or markers that often served as clues leading to another ore shoot. These "signals" included:

(a) Areas within 100 feet of the contact of the limestone and quartz monzonite plug or "tongues" extending from it, with the limestone at or near its contact with the intrusive being the most favored area. Ore shoots in the intrusive were reported found in few places.

(b) Fractured zones associated with cross faulting.

On the surface, or where found in underground exploration drifts and crosscuts, fractures (or jointing systems) filled with limonite served as "markers"; the stronger ones, especially, justified following by drift, raise or winze for reasonable distances. Mr. T. E. Strandberg's exploration has included "tying in" and mapping (map not available at the mine) locations of the original discoveries and shafts sunk upon them, and the dozer stripping of an approximate five-acre area in search of possible clues or markers to other oreshoots. This latter work - located one-half to three-quarters of a mile east of the present working shaft near ridge crest - did not expose the critical limestone-quartz monzonite contact area or reveal any particular signals of special interest. Of possible future interest, however, is the occurrence of occasional blebs and disseminations of malachite and/or chrysocolla in the exposed white limestone. It is reported that these disseminated minerals have been noted over a wide area, and may have been the incentive for the extensive geophysical-geochemical exploration program by the Phelps Dodge Corporation for a four or five week period last summer in an area several miles to the north with a crew (reported) of 14 men, a helicopter, and one bush plane.

The oreshoot being mined below the 460 Level by underhand stoping is of the so-called "chimney" type - that is, in this case it presently occupies a cavern created by downward-migrating acid surficial waters. The ore has the appearance of large slabs that have been loosened by the downward-migrating water and falling into the enlarged cavern. Post-mineral faulting was probably also a major factor in dislodgment of the slabs. Wedged in tightly by secondary iron and copper mineral deposition and a crushed limonite-limestone gouge-like material on the south side, and against a limestone and quartz-monzonite wall on the north side, it requires drilling and blasting occasionally to permit mucking into a bucket which is raised by tugger hoist and dumped into a hand trammed car on the 460 Level.

The floor of the stope at the time of the visit was an average five feet below the level. At the southeast limit of this floor area, the cavern is open for an 11-foot width and for a distance of two feet to the limestone cavern wall, which latter has a minus slope of 40 to 50 degrees. Looking down, the opening was estimated to extend for at least 30 to 35 feet, with the southeast wall appearing to steepen at that distance. This oreshoot has an estimated 50° rake to the southeast. The oreshoot appears to terminate 10 feet above the 460 track level. Its north and south walls are quartz-monzonite, with "slips" having 80°N and 50°S dips respectively, indicating this intrusive to be a "tongue" of the large quartz-monzonite plug. The diverging dips suggest possibility of the oreshoot widening downward. The converging dips above the track level show narrowing width of the oreshoot, although where the latter terminates above the track level the quartz-monzonite was not evident and the material appeared to be a sheared, gouge-like limestone with considerable limonite. The walls at the southeast and northwest limits of the oreshoot are a somewhat altered limestone. The two-foot width of limonitic, limestone gouge at northwest limit of the oreshoot indicates a fairly strong fault of nearly vertical dip and northwest strike.

The Brunton-tape survey of the 460 Level shows a winze at Sta. 11, which was sunk several years ago to depth of about 35 feet, with objective of crosscutting to the oreshoot at that horizon. The distance to the oreshoot from this winze should be within limits of 25 to 30 feet. (See map of 460 Level on following page.)

Mineralization

The ore minerals present in order of their abundance in the oreshoot are chrysocolla, malachite, azurite, free gold, and minor amounts of disseminated pyrite and chalcopyrite. The gangue material is largely composed of highly oxidized limestone with abundant limonite, and there is little doubt that a good deal of the gangue is highly altered quartz-monzonite.

The free gold - as observed in numerous hand samples - appears most abundant in the limonite, with a few specimens showing it present in chrysocolla. The silver content is negligible, with samples assayed showing only traces - that is, less than one ounce per ton of ore.

Sampling

Picked samples of the ore, brought in by T.E. Strandberg last summer for gold-silver analysis only as an aid in sorting the ore for mill feed by the lessee, showed the following values:

Sample Marked	Au Oz	Ag Oz	Taken by
1	2.02	Tr	T.E. Strandberg
2	0.82	Tr	"
3	0.14	Tr	"
4	14.90	6.57	"
5	93.00*	Nil	"
6	0.20	Nil	"
7	0.22	Nil	"
8	25.82	6.18	"

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

ALASKA

COMPILED FROM ALL AUTHENTIC SOURCES

SCALE 1:5,000,000

1 INCH = APPROXIMATELY 80 MILES

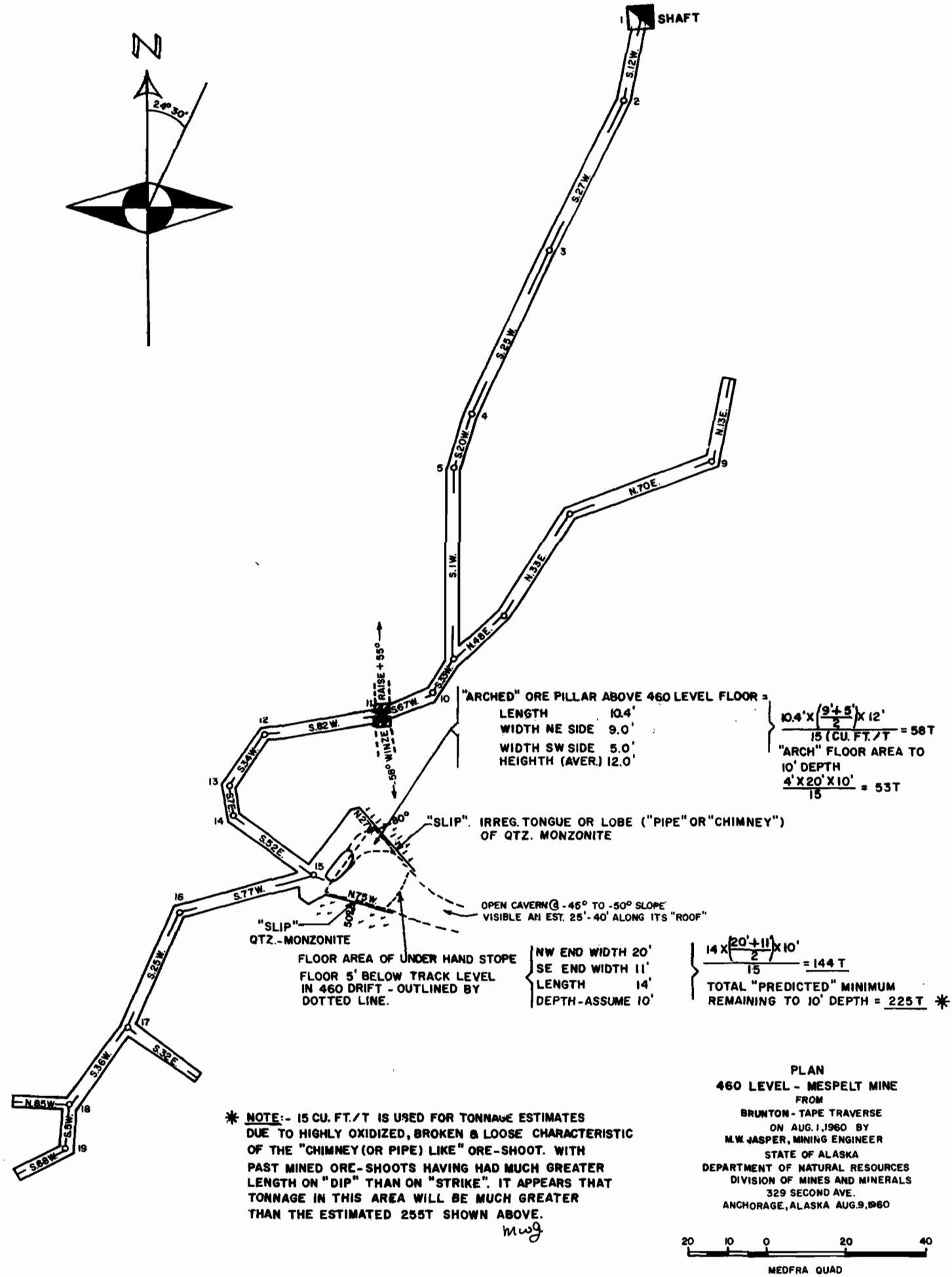
BETTER-KNOWN MINERAL DEPOSITS, POSSIBLE PETROLEUM PROVINCES, AND EXISTING AND PROPOSED ROADS

STATE DIVISION OF MINES AND MINERALS

LEGEND

- ANTIMONY
- CHROMITE
- COAL
- COPPER
- GOLD-SILVER
- IRON
- LEAD-ZINC
- MERCURY
- MOLYBDENUM
- NICKEL
- OIL-GAS FIELD
- PLATINUM
- SULFUR
- TIN
- TUNGSTEN
- EXISTING ROAD
- PROPOSED ROAD
- RAILROAD
- POSSIBLE OIL PROVINCE

ARCTIC OCEAN
BEAUFORT SEA
NORTON
BERING SEA
BRISTOL BAY
GULF OF ALASKA
PACIFIC OCEAN
ALEUTIAN ISLANDS
FOX ISLANDS
PRIBILOF ISLANDS


N
24° 30'
1 SHAFT
S.12W.
2
S.27W.
3
S.23W.
4
S.20W.
5
S.1W.
N.48E.
N.33E.
N.70E.
N.13E.
9
10
S.53W.
S.67W.
RAISE + 55°
11
12
S.82W.
58° WINZE
S.34W.
13
S.57E.
14
S.52E.
15
N.27W.
60°
16
S.77W.
N.75W.
50°
S.25W.
17
S.32E.
S.36W.
N.85W.
18
S.5W.
S.86W.
19
"ARCHED" ORE PILLAR ABOVE 460 LEVEL FLOOR =
LENGTH 10.4'
WIDTH NE SIDE 9.0'
WIDTH SW SIDE 5.0'
HEIGHTH (AVER.) 12.0'
10.4' X (9'+5')/2 X 12' / 15 (CU. FT./T = 58T
"ARCH" FLOOR AREA TO 10' DEPTH
4' X 20' X 10' / 15 = 53T
"SLIP". IRREG. TONGUE OR LOBE ("PIPE" OR "CHIMNEY") OF QTZ. MONZONITE
OPEN CAVERN @ -45° TO -50° SLOPE VISIBLE AN EST. 25'-40' ALONG ITS "ROOF"
"SLIP" QTZ.-MONZONITE
FLOOR AREA OF UNDER HAND STOPE
FLOOR 5' BELOW TRACK LEVEL IN 460 DRIFT - OUTLINED BY DOTTED LINE.
NW END WIDTH 20'
SE END WIDTH 11'
LENGTH 14'
DEPTH - ASSUME 10'
14 X (20'+11')/2 X 10' / 15 = 144 T
TOTAL "PREDICTED" MINIMUM REMAINING TO 10' DEPTH = 225 T *
* NOTE:- 15 CU. FT./T IS USED FOR TONNAGE ESTIMATES DUE TO HIGHLY OXIDIZED, BROKEN & LOOSE CHARACTERISTIC OF THE "CHIMNEY (OR PIPE) LIKE" ORE-SHOOT. WITH PAST MINED ORE-SHOOTS HAVING HAD MUCH GREATER LENGTH ON "DIP" THAN ON "STRIKE". IT APPEARS THAT TONNAGE IN THIS AREA WILL BE MUCH GREATER THAN THE ESTIMATED 255T SHOWN ABOVE.
mwj
PLAN
460 LEVEL - MESPELT MINE
FROM
BRUNTON - TAPE TRAVERSE
ON AUG. 1, 1960 BY
M.W. JASPER, MINING ENGINEER
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF MINES AND MINERALS
329 SECOND AVE.
ANCHORAGE, ALASKA AUG. 9, 1960
20 10 0 20 40
MEDFRA QUAD

9	0.70	Nil	T. E. Strandberg
10	4.25	2.00	"
11	2.59	Nil	"

* Checked in triplicate

On August 1, 1960, 4 samples were taken with Dorr Holloway assisting, and analysis of them were as follows:

Sample No.	Width in's.	Gold Oz.	Silver Oz.	Cu %	Description
301	Grab	2.61	Tr	1.64	T.E. Strandberg. Grab from 9 tons of ore as hoisted to surface.
302	34"	3.03	Tr	3.05	By MWJ & DH. Oxodized fault gouge, mostly oxidized Ls & limonite. Channel taken 6' below track level & SW corner of stope.
303	40"	4.28	Tr	8.28	By MWJ & DH. Adjoins #302 going NE. Estimated 50% chrysocolla, malachite & Azurite. Limonite abundant. Balance is highly oxidized crystalline Ls.
304	63"	4.81	Tr	2.75	By MWJ & DH. Adjoins #303. Abundant chrysocolla, malachite, azurite in oxidized & crystalline Ls.
305	18"	0.59	Tr	2.56	By MWJ & DH. From slab lying against NE wall of stope. Chrysocolla, malachite, azurite. Oxidized Ls (or highly altered qtz monzonite?)

Note: Balance of NW side (approx. 10') of stope not sampled, being covered with broken ore. (Refer to map of the 460 level).

The weighted average value of the above 4 samples taken in the underhand stope is 3.79 oz. ($132.65) per ton. With the reported gold values of the impounded mill tailing being in the range of $30.00 to $35.00 it is guesstimated that gold recovery will be less than 75% of mill heads.

Summary and Conclusions

The small tonnage mined and milled during the past 40 years in the Nixon Fork district is of special interest. Generally high-grade, the individual gold-lode occurrences have been small isolated oreshoots with no presently known well defined or direct association leading from one to another. Their practical exploitation has been largely limited to sinking shafts following the oreshoot of each occurrence.

With natural high-grade outcrops limited in number, it was soon learned that oreshoots were limited to proximity of the irregular limestone-quartz monzonite contacts (mostly obscured by vegetation and overburden) and fractured fault zones, and that limonite-filled fractures (on surface or underground) was a possible clue or marker that might lead to an orebody.

On basis of the estimated $1,315,000 past gold production record, the calculated average value of the maximum estimated 12,000 tons mined and milled indicates $139.00 per ton mill heads, and a recovery record of around 75%. With a ball mill grinding the stamp mill discharge to minus 100 mesh, the gold values in the final tails are either enclosed in finely ground ore particles and/or coated with iron or other oxides. With amalgamation the only gold extraction method used by the operators, their recovery would be a very good record in any area.

Since only small tonnage oreshoots have been found to date, it has not been considered practical to add additional milling equipment for recovery of the copper values. Chrysocolla, a predominant copper mineral in most of the orebodies, has been an unsolved metallurgical problem until recently.

The small gold-copper oreshoots developed and mined in the area to date have not had the tonnage potential to attract interest of large mining companies, but the area continues to be an attractive one for small groups of experienced miners. However, the encouraging results obtained by T.E. Strandberg from extensive geophysical and geochemical exploration over a several year period, and the disseminated copper occurrence in the Paleozoic limestone revealed by extensive stripping near the ridge crest, suggests that a possible large tonnage copper deposit may be proven by an extended diamond drilling program. Structural conditions are considered favorable for finding a deposit of real magnitude in that area.

Bonanza Creek Placers
Lake Clark Quadrangle
by Martin W. Jasper, Mining Engineer

Gold Alluvials

A surficial examination of the alluvials and general geological conditions along the central 8 mile section of Bonanza Creek was made during period of May 22 to 26, 1961. The study was devoted largely to determine extent and influence of glaciation in the area as a whole, and the possible extent, depth, character, and economic effect glacial alluvials may have had on preglacial gold bearing stream sorted gravels.

Location and Accessibility

Central point of examined area is at approximate coordinates Longitude 154° 42' and Latitude 60° 43' North. Bonanza Creek heads in the Bonanza Hills and flows westerly 24 miles (airline) to its confluence with the Mulchatna River. During the late '90's to 1909, access to area by trappers and prospectors was by use of shallow draft boats for a distance of 200 miles from the mouth of the Nushagak to points beyond the mouth of Bonanza Creek on the Mulchatna River.1/ During the next 25 to 30 years, an overland route from Nondalton was favored, a distance of 70 to 80 miles, requiring crossing numerous streams and swamp areas. During the past 15 years, float planes have been

the favored transportation medium to various lakes and rivers in the region. 2/ During past 2 years, a Port Alsworth pilot has made number of landings on an unimproved right limit bench within 1 mile of Terry Gill's camp and placer property.

Study of the region to date has been insufficient to determine whether a practical all year overland route can be located at reasonable cost.

Climate and Water Supply

Lying northwest of Alaska Range, the winters are said to be somewhat milder than along the Kuskokwim valley, with severe sub-zero periods of shorter duration. Average annual snow depths are reported to be 2 to 3 feet. Hot weather is common during summer months, and seasonal rains must be moderate as no evidence of flood conditions was noted.

Along the entrenched section of Bonanza Creek the ground water level is within 2 to 3 feet of surface, with same ground water condition reported in the low-lands. Permafrost appears limited to small areas on north-facing slopes. The spring run-off was over before the time of visit, with snow remaining limited to small drifts in depressions on north slopes. Stream flow at that time was said to be normal for the summer season, and was estimated to be well in excess of 2000 cubic feet per minute, which should be sufficient for dredging or dragline operations. Stream gradient along Bonanza Creek is within limits of 1 to 1-1/2% in the area examined, with its tributaries being considerably greater.

Timber and Vegetation

Timberline in the district is around 1800 feet above sea level. Tree growth is fairly abundant along the creek's entrenched, narrow valley, and upon some south slope areas having the required soil cover; on north slopes it is scattered and generally "scrubby." Spruce is the most common, grows to 30 or 40 foot heights, and up to 10 or 12-inch diameters. Birch is next with occasional trees having 8 to 10-inch diameters. Poplar and cottonwood are fewer but reach greater heights. Alder and willow occur in fairly dense growths along some sections of the narrow valley.

Along the traversed section, moss growth was limited to few inches in thickness; ir much of the area it occurs in small bunches with bedrock shale and argillite exposed between them, making it "bumpy" for landing and take-off of small aircraft. Caribou moss is plentiful in the uplands (sixteen caribou were noted on airstrip). Muskeg is confined to small, swampy areas on gentle slopes on both sides of valley. Other vegetation generally found in northern latitudes is not plentiful above timberline due to the general shallow soil cover.

History and Ownership

First reported finding of placer gold along upper Bonanza Creek was in 1914, with a party of six establishing a camp near the mouth of Little Bonanza Creek (present site of Mr. Gill's camp). A 65 foot shaft was reported put down to bedrock, but no evidence was found of it. 3/

O. B. Millett, then of Iliamna, was one of the original locators, and spent 5 years prospecting the 6 claims he held. His first work was sinking a 14 foot shaft on the right limit of Creek which was abandoned as his hand pump would not handle the water. Bed-

rock was not reached, but he reported finding pay. His next work was an open-cut on an old short and narrow channel remnant on the right limit rim, 80 feet above the 14 foot shaft, from which he reported recovering $400.00 from 100 cubic yards, with nuggets up to $1.50 (values based on $20.67/oz.). The gravels were lowered to the creek level by cable for washing. One-third of the gold was considered of local origin and reported to be 846 "fine" ($17.50/oz.). This cut was examined and it was estimated that not more than 100 cubic yards had been mined.

In the mid-twenties, Mr. Millett brought in a 4-inch hand drill and hand pump to test the narrow valley alluvials. A total of 6 holes were put down - 3 holes on each of two drill lines 4-1/2 miles apart. Line 1 is 6 miles below Gill's camp, and Holes 1, 2, and 3 were reported bedrocked at 26 to 40 foot depths with average values of 37¢/cy. Line 2 was located 1-3/4 miles below Gill's camp with Holes 4, 5, and 6 drilled to reported bedrock at 40 to 60 foot depths with 35¢ to 40¢/cy values (gold at $20.67/oz.). This hand drill equipment was observed where left along Line 2. With values too low and 1 to 1-1/2 stream gradient, small scale operation was impractical and only assessment work was done by Mr. Millett for some years thereafter.

Interest of other claim holders during this period was sporadic, and so far as observed, was limited to ground sluicing on two tributaries - Scynneva and Pass Creeks. Scynneva appeared to have had the most work done upon it. This was limited to a ground-sluice and shovelling-in operation of one man at mouth of this stream's narrow gulch, from which an unconfirmed $1,200.00 was recovered from an estimated 800 to 900 cubic yards. There was no evidence indicating bedrock had been reached in this small working, as the "wash" exposed in bottom of cut was too large to handle by hand.

Less work was done on upper Pass Creek, 2-1/4 miles above Gill's camp due to scarcity of water, although unconfirmed reports claim coarsest gold found in the area (up to $4.00 nuggets?) was obtained here.

A number of old shafts (small dumps indicating their depth to be shallow due to high ground water level) were observed in the valley floor above Gill's camp. Near them are remains of old cabins or caches.

During the early 1930's, Mr. Millett optioned 30 placer claims on the upper end and 40 on the lower end, which, with his 6 placer claims, made a continuous block of 76 placer claims. His efforts in 1934 to interest an operating company in the project were unsuccessful. In 1935, he made an agreement with Mr. William Hill and associates to drill the property, and Mr. Hill brought in a 4-inch Hillman Airplane Drill overland from Nondalton. Enroute several holes were reported drilled on Dummy and Chilikindrotna Creeks with discouraging results. On reaching Bonanza Creek, nc holes were put down due to lack of funds and the venture was abandoned. This equipment was briefly examined, appeared to be complete, and was in excellent shape.

The next reported interest shown in this area was during 1946 when four men located 27 claims for an operating company. No work was done upon them, however, and the claims were dropped. No interest was reported in the area for the next 12 years.

The next known interest was that of Mr. Terry Gill, who has been prospecting Bonanza Creek since 1959. During this period he has staked about 5 miles of ground, which includes the areas where most of past interest has been centered.

Topography

The Bonanza Hills region is one of general low relief and mature topography. To date it has not been thoroughly mapped geologically or topographically. There are no indications pointing to glaciation having been a major agent in erosional cycle of the district.

In the 8-mile canyon section studied, Bonanza Creek is entrenched to 50 to 200-foot depths below the canyon rims to creek level. Slopes on both sides of the narrow valley are quite steep.

Geology

The Bonanza Creek area, as shown by outcrops along the entrenched valley section, lies within a belt of slates, argillites, shales, and graywackes of great thickness. No limestone, sandstone, or quartzite was noted. Granitic stocks are reported present in the district but were not observed. A number of fine grained, porphyritic, granitic dikes, 10 to 20 feet thick outcrop in the narrow valley walls. Strike of the metamorphosed sediments is N40 to 45E and their dip varies from 60° to 75° southwest.

Mineralization

Many quartz veins were noted along the section of valley studied. The only one of these closely examined is located on the steep left limit valley slope about 1-1/2 miles upstream from Gill's camp. Here a narrow gulley was recently "washed-out", exposing a 12-foot wide shear zone extending 150 feet up the slope to the "rim." This zone is about two-thirds quartz and the balance is sheared slate. The quartz occurs as more or less continuous stringers from few inches to 10 or 12 inches in width. This shear zone strikes easterly and dips 45 to 50° north, cutting the sediments at about 45°. The vein as a whole carries an estimated 5 or 6% pyrite (most of which is altered to limonite) and minor amounts of arsenopyrite. No other metallic minerals were noted. One pan taken across 18 inches of outcrop showed 3 fine gold colors. The sample was not crushed to free possible gold included in quartz fragments.

The structural components and formations of this district are similar to some others elsewhere that have proven to be sources for highly productive placers.

Glaciation

No lateral or terminal moraines, eskers, drumlins, or sink-holes were noted in the area. "Hanging" (cirque) valleys or other evidence of deep glacial scouring are absent, and no glacial clay deposits were observed. "Signals" remaining appear to be limited to predominantly granitic gravels remaining on both Bonanza Creek rims - more frequently on the left limit. The several terraced benches beyond the left limit rim could be of glacial origin; this is suggested by the well rounded, unsorted, predominantly granitic gravels where exposed, especially along left limit rim. Their thickness ranges from nil to 10 feet. However, Mr. Millett's open-cut 80 feet above his 14 foot shaft, and the reported coarse gold found in upper limits of Pass Creek, together with values found in canyon at lower end of Scynneva Creek, suggest some of the low terraces may be remnants of old channels.

Along considerable portion of the right limit rim there is no soil cover - except for the small moss hummocks - with bedrock slate and shale being at or within few inches of surface. From the rim westerly for one mile across unimproved air strip to crest of a

long, well rounded hill, soil cover is within a few inches of bedrock. In this section, about 2 miles north of Gill's camp, there are 5 or 6 scattered granitic glacial erratics on the right limit rim. Their diameters were estimated to be 10 to 15 feet. No other erratics were noted in the area.

Valley Alluvials

With evidence indicating that glacial scouring was not an important factor in erosional cycle of this area, it is believed that pre-glacial alluvials were undisturbed, and that placer gold concentrations remain more or less as originally deposited along Bonanza Creek's course. Entrenched in a relatively narrow valley throughout the area traversed, its surface width varies from 300 to 700 feet with an estimated average width around 400 feet.

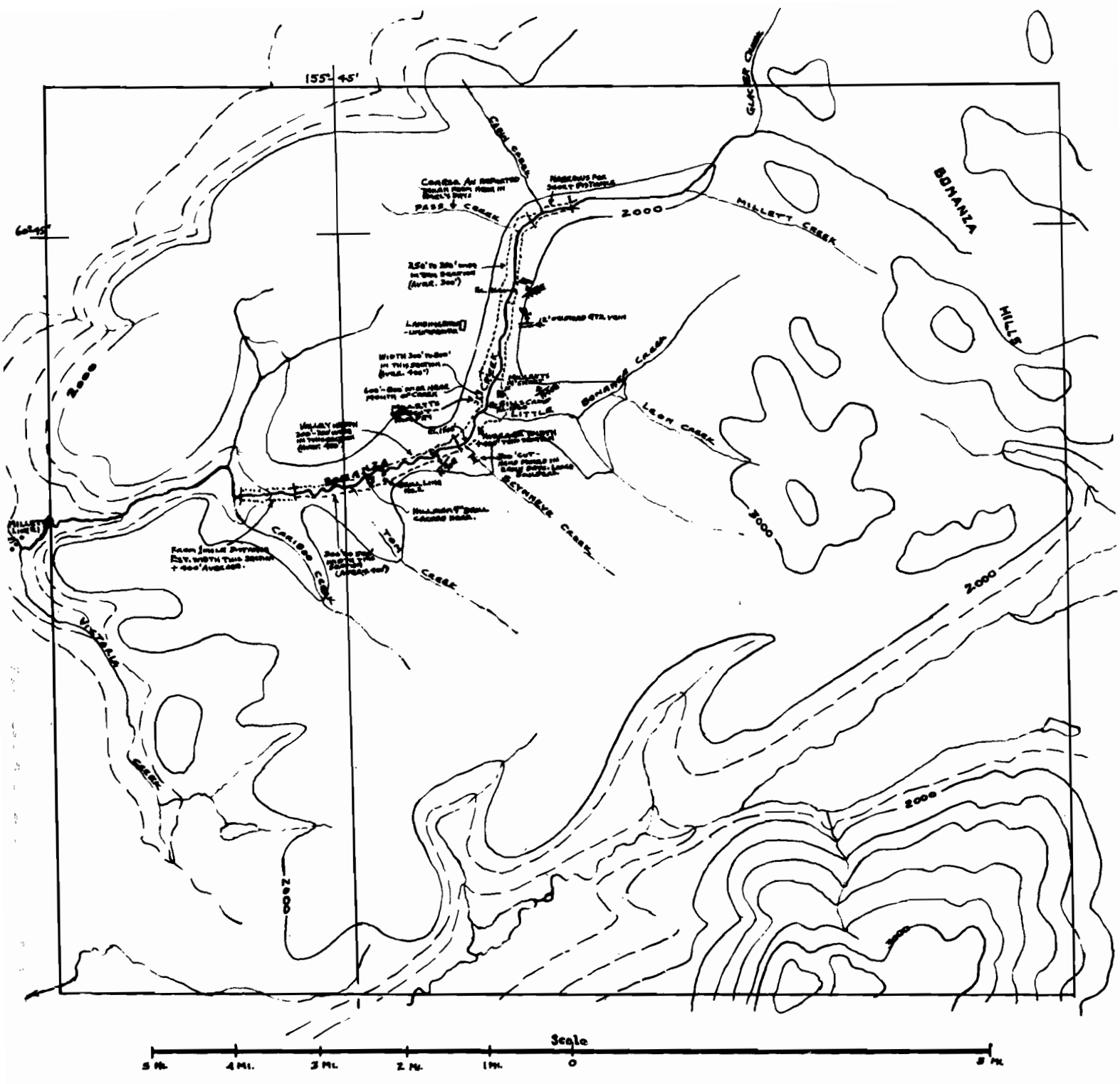
In the 5 mile section below Gill's camp, the gravel exposed in the creek bed is over 90% local shingly slate, argillite, and some quartz. An occasional well rounded, small granite boulder (up to 12 or 14-inch diameter) was noted. Near side limits of the valley floor - especially along the left limits - granite boulders up to 2 and 3-foot diameters, are more common and are half covered with soil and moss: these glacial source boulders have been gradually moved down the slopes by bank creep, and so far as observed were confined to 40 or 50 feet from base of slope.

The meager information available on Mr. Millett's two drill lines suggest that he did not encounter large boulders in his holes. One hearsay report claims that the gravels were uniform in character from top to bottom of holes, which could be interpreted as meaning it was sedimentary in origin. Holes drilled by Millett report depth to bedrock varied from 26 to 40 feet in 3 holes across Line 1, and from 40 to 60 feet in three holes across Line 2. These drill lines indicate a flatter bedrock gradient than that of Bonanza Creek and 20 feet or more greater depth of gravels across the upper drill line. This is contrary to the general rule that depths of alluvials decrease more or less uniformly upstream. The greater depth across Line 2 may have been caused by a larger volume of glacial alluvials being fed into the valley by Little Bonanza Creek than could be carried away by the master stream. This does not seem likely, however, as surface gradient is uniform for the 8-mile section studied.

In the first 1-1/2 to 2-mile section above Gill's camp, the gravels are also predominantly sedimentary, (estimated 90%) and stream gradient the same - 1 to 1-1/2%. However, granite boulders occur a little more frequently, with one measuring 10 by 12 feet across the top where it rises a foot or so above the surface. The fan built up about two-thirds across valley width at the mouth of Pass Creek is largely composed of well-rounded medium granitic wash, up to 12 inches in diameter. Farther up-stream, the gradient increases, and granitic boulders are more plentiful in the creek bed.

The near-surface ground water level, together with the oldtimers trouble in completing shafts to bedrock because of the water problem, suggests fairly loose gravel due to lack of sufficient sediment to "tighten" the ground. Under these circumstances, the greater gold concentrations (if any) may be on or near bedrock. However, Mr. Millett reported finding "fair" pay in his 14-foot shaft; this makes it a reasonable expectation that appreciable gold values may be found at number of horizons from surface to bedrock.

Little Bonanza Creek has a gradient of 2% or more for the lower mile traversed along this drainage. Granitic boulders (up to 3 and 5 foot diameters) are abundant in the creek, on surface, and in fairly wide areas where they are partially covered by small



MAP SHOWING

UPPER BONANZA CREEK, BONANZA HILLS AREA

Lake Clark Quadrangle, Alaska

Section of U. S. G. S. map enlarged 4 diameters

by

M. M. Jasper, Min. Eng. State Div. of Mines & Minerals

Anchorage June 1961

MAP 1

willow brush, grass and other vegetation. No evidence of serious prospecting was noted, probably because of the obvious abundance of boulders. In any event, the valley is too narrow for a dredging venture.

Only the lower canyon section of Scynneva Creek was examined. Good values apparently were found here by the early day prospector, but the large boulders proved too difficult to handle by hand and the claims were abandoned.

Summary

The Bonanza Creek drainage system has received little attention from prospectors and none from competent mining companies. Another retarding influence has probably been due to general belief that the valley was too narrow for dredging or large dragline operations; however, the recent study of the area shows a minimum width of 300 feet and an average of 400 feet along the 8 mile section. The major handicap has been its inaccessibility.

Information on values and depth of ground is limited largely to results obtained by Mr. Millett's work. Geological conditions, erosional maturity of the area, the presence of many mineralized quartz veins and acidic type dikes, all combine to make favorable conditions for placer gold concentrations of interest.

Using an average 400 foot width and 30 foot minimum depth, the yardage potential of the 8 mile section is calculated to be 18,000,000 cubic yards. The favorable possibility of economic gravels of that yardage appear to justify drilling the balance of the narrow valley, and an exploration program in the lowlands of this drainage system where early day prospectors reported appreciable fine gold in near surface panning will be justified.

This district's development, however, will continue to be retarded until a practical, all-season overland route is located.

References: 1/ Refer to Map I
2/ Refer to USGS Bul. 622 pages 262-263; USGS Bul. 655 pages 26, 90 and 136
3/ USGS Bul. 655 page 136

* * * *

Copper Creek Prospect
Eagle Quadrangle (Abstract)
Robert H. Saunders, Mining Engineer

The Copper Creek prospect is in the northwestern part of the Eagle quadrange at 64° 51' N Latitude and 143° 20' W Longitude, 40 miles from the nearest airstrip and 100 miles from the nearest road.

In 1949, the U. S. Geological Survey made a radiometric survey of the prospect. The results of the radiometric work were published in U. S. Geological Survey Circular 335, Reconnaissance for Radioactive Deposits in East-Central Alaska, 1949, by Helmuth Wedrow, Jr. and G.E. Tolbert. Only minor amounts of radioactive materials were detected.

The copper deposit is in a roof pendant between amphibolite and a lime-silicate rock. Chalcopyrite, malachite, and azurite are the chief metallic minerals. Minor amounts of galena, gold, silver, zinc, tungsten, and bismuth have been reported in samples. Quartz is the chief gangue mineral.

The deposit crops out in the face of a steep cliff beside Copper Creek. An adit has been drive 10 to 15 feet above the creek. Though accessible in 1949, the adit was caved at the time of the examination. U.S. Geological Survey Circular 335 states that the adit is 114 feet long, that it leaves the mineralized zone 40 feet from the portal, and that the inner part of it is in barren rock. Apparently the miners failed to follow the mineralized zone because they did not understand the structure of the deposit. The mineralized zone is 4 to 5 feet wide at the outcrop above the portal.

Two samples were taken during the examination. The first assayed a trace of gold, 0.80 ounces per ton of silver, and 5.26 percent copper. The second sample assayed no gold, 1.16 ounces per ton of silver, and 2.50 percent copper. Spectroscopic analyses indicated that both samples contained 0.3 percent zinc and that the second sample contained 1 to 5 percent bismuth.

Observations made during this trip confirmed verbal reports by prospectors that, although granitic rock (the Charley River batholith) is the predominant country rock in this region, many of the ridgetops consist of remnants, probably roof pendants, of metasedimentary rock. The area is more favorable for prospecting than it would be if no metasedimentary rocks were present.

* * * *

Cinnabar Province
Kuskokwim Region
by Martin W. Jasper, Mining Engineer

Cinnabar deposits and float have been found over an area 250 miles long and 150 miles wide in the Kuskokwim Region. Cinnabar ranging in size from fine particles to nuggets has been so abundant in some placer mines as to be a nuisance during clean-up. Prospects of fine cinnabar and some native quicksilver have been found in panning stream gravels and soil cover of low lying slopes and hills over considerable areas near known lode occurrences. This wide spread occurrence of cinnabar justifies the title.

Using a N52E reference line drawn between Bethel and McGrath, a distance of 250 miles, the better known deposits are shown on both sides of the line on the recently released U. S. Geological Survey Resources Map MR-11. 1/ On northwest side 11 occurrences are shown; one of these, the Decoursey Mountain deposit at head of Crooked Creek, has had a small production record. On southeast side of the line 11 occurrences are also shown; 5 of these have production records. The promising White Mountains prospect, situated 60 miles S25E of McGrath and located in 1958, was not shown as it was staked after Map MR-11 was published. 2/

1/ Refer to attached section of USGS Map MR-11
2/ Area 4 on Map MR-11

Section of U.S.G.S. Map MR-11
Showing
KUSKOKWIM CINNABAR REGION
for
STATE OF ALASKA
Division of Mines & Minerals
1961 ANNUAL REPORT

Scale

50 Mi. 0 50 Mi.

OCCURRENCES

Single	Groups in 3-Mi. Radius
⊕ Antimony	⊕
⊕ Bismuth	⊕
⊕ Cinnabar	⊕

ADAPTED BY MWJ-JAN. '62

The deposits range from 50 miles northwest to 60 miles southeast of McGrath, and 150 miles south of Bethel.

Of the 22 single and groups of occurrences (in 3 mile radius) only those examined by Territorial Department of Mines and State Division of Mines during past 9 years will be reviewed, plus the White Mountains prospect.

Kolmakof Prospect. Area 1

Location and Accessibility

This old prospect is situated on the bluff on north side of the Kuskokwim River at the east limit of the Russian Mission Quadrangle, 18 miles upstream from Aniak. Elevation of river is about 175 feet above sea level and the bluff edge above about 475 feet. It is accessible by river boats run on regular summer and fall schedules, and by float or ski equipped aircraft the year around. 3/

History and Development

It is of historical interest as indirect mention of it in 1870 by W. H. Dall, and again in 1884 by Ivan Petrof. It was known to the Russians and is the first cinnabar occurrence known to the white man in Alaska. 4/

J. E. Spurr of the USGS referred to it in 1898, reporting a trader named Lind had found a vein several years earlier, staked some claims, and made a small ore shipment to the States. In 1914 A. G. Maddren reported others had done some work on the property but could not find evidence of it. 4/ A Mr. Rabideau was the next known locator, holding the property for many years, and produced 2 flasks of mercury in a homemade retort. In 1908 or 1909 Gordon Bettles of Nome optioned or relocated (?) the Kolmakof prospect, drove an adit an undetermined distance, and abandoned it the following year. Prior to 1953 Willie Rabideau, son of the oldtimer and raised in the native village four or five miles upstream, held the property for a number of years.

Recent Work

The U.S. Bureau of Mines carried on a trenching and sampling program in 1944 on a persistent narrow stringer believed to be the one mentioned by Lind. This showing is about 500 feet downstream from Bettles caved adit portal. Their 12 trenches, spaced at irregular intervals, cross-cut the stringer, proving a length of 250 feet in bluff slope strike distance of 350 feet with a 100 foot vertical range. Trenching in Bettles adit area and at number of points beyond the bluff found nothing of interest. 5/

A Bethel group, known as Western Alaska Mining Company (WAMCO), staked the property in 1954. As they were inexperienced in mining, the Territorial Department of Mines was asked to lay out a surface exploration program; that was done and supervised for a 6 day period. A large tractor, equipped with hydraulic dozer, was rented by the company, and 8 trenches and stripped areas were excavated, during course of which over 5000 cubic yards of soil, clay, and residually weathered sedimentary and sill material was moved; its disposal was largely over bluff edge.

3/ Map MR-11
4/ USGS Bul. 622, pgs 272-274
5/ USBM R.I. 4065, pg 49

Geology and Mineralization

The rhyolite sill, in which a narrow stringer was traced by the USBM, was uncovered and followed 140 feet and the cut widened to 100 feet from bluff edge. A warped fault zone of N10E strike and steep westerly dip was uncovered 30 feet from bluff; the fault cuts the formation at a 70 to 75° angle, and showed only a few feet horizontal displacement and no visible cinnabar. At 40 feet east of the fault an oreshoot, 24 feet in length, was uncovered. It occurs in a "bedded" shear zone in shale on the hanging-wall side of the rhyolite sill. Width of mineralization varied from 24 to 51 inches; sampled at 2.5 foot intervals, the weighted value of samples was 16 pounds of mercury per ton. Very little disseminated cinnabar was noted in the sill and it was not sampled. Strike and dip of the sheared shale was same as that of the formation. Stripping this showing for several foot depth indicated it to have a flat "rake" to the east, and suggested it to be possibly of limited vertical extent.

A narrow high-grade stringer of 1/2 to 3 inches in width was uncovered for 30 feet. Its strike is N62W and dip 50° north; it is largely confined to a highly weathered arkosic sandstone along a narrow fracture. The stringer intersects the 24 foot oreshoot at its east end; its total length was not determined as it runs under an isolated permafrost area along its northwest strike. 6/ No appreciable cinnabar mineralization was found in stripping this rhyolite sill and shale structure for 130 feet east of the small oreshoot.

A deep trench, 300 feet in length and 350 feet east of the small oreshoot, cross-cutting the formation, uncovered nothing of interest. This location was selected to "follow down" an old timbered shaft of unknown depth to determine what justification there may have been for that work, as no cinnabar was noted in their dump. The shaft, located 80 feet from bluff edge was carried on east side of the trench to about 20 foot depth; and its bottom was not reached; no cinnabar was noted in shaft area in bottom of the trench. Near bluff edge in west bank about 25 feet below surface 3 small pieces of good float ore were found.

None of the other 6 trenches uncovered anything of interest. During course of this work all old and new work was surveyed by Brunton-tape traverse and mapped. Although the dump of the old inclined shaft (reputed to be of 80 foot depth) showed no visible cinnabar, a grab sample of it ran 3.2 pounds per ton.

Mineralization is confined to cinnabar. It occurs as more or less continuous narrow veins, as in the vein trenched by the USBM, and the one found by stripping in 1954. It is found as short stringers and veinlets, small lenses, and pods; as found in the rhyolite sill, the 24 foot oreshoot in shale, and the 30 foot narrow vein in sandstone. No stibnite was noted on the property. 6/

Although nothing of economic interest has been found on the property to date, the two stringers plus the small oreshoot uncovered in 1954 would possibly be profitable for an experienced miner to work. Unconfirmed reports of other occurrences within a 4 mile radius suggest further prospecting of the area is warranted.

6/ 1954 report by MWJ

Parks Property. Area 2

Location and Accessibility

This property is about 9 airline miles northwest of Sleetmute in the Sleetmute Quadrangle, and is located on the northeast side of the Kuskokwim River. The Red Devil Airport is on southwest side of the river, a distance of about one mile. The property, being on the river bank, is well situated for river freighting service from Bethel of equipment and bulk supplies, and by prop-jet air service direct from Anchorage.

History and Development

E. W. Parks learned of cinnabar occurring in that area through a Tulikuk native in 1905, and following a short period of prospecting made a discovery and staked the Alice and Bessie claims in 1906. These were the first claims staked in the Sleetmute area. Later he staked 6 additional claims, held them for several years and then dropped them.

During the next 18 years the property was prospected largely by trenching and test-pitting; one short and shallow adit below bluff edge and a 200 foot cross-cut, about 30 feet above river level, were driven. From the shallow surface diggings 120 flasks of quicksilver was produced first by use of a steel drum; a few years later that was replaced by a Scott furnace, which in turn, was shortly replaced by a 12 tube Johnson-Scott retort. This production was made for and limited to use of placer miners in the district. 7/

In 1936, following the death of Parks, the property was leased by W.E. Dunkle, who extended the 200 foot adit to total length of 525 feet. Strongest mineralization encountered was at 450 feet from portal along the hanging wall side of a wide sill, and was drifted on for 240 feet to the southeast. Values were discouraging and the lease was dropped in 1937.

During 1942 an extensive trenching and sampling program was undertaken by the USBM on the Parks property. Results of their work indicated three separate orebodies. Subsequent work since then has neither proved nor disproved the occurrence of orebodies having tonnages of economic importance. 8/

In 1954 the Alice and Bessie claims were acquired by George F. Willis and Robert F. Lyman, and 8 additional claims were staked. Two claims wide, they filled in the area between the Parks and Willis property. In 1955 Willis and Lyman installed a 6 inch diesel powered pump on a river raft. Water was pumped to the top of the bluff, and during August and part of September numerous ground sluice cuts exposed bedrock down the slope to the river. No mineralization of interest was uncovered.

From mid-September to October 6 an area 225 feet wide at the northwest end and 100 feet wide at the southeast end had been stripped by dozer for 350 feet. At time of visit to the property on October 6 an interesting showing on the northeast side of the stripping was exposed at intervals for length of the cut, and at several points in the wide sill. Mapping of the area was not done due to steady rainfall obscuring the showings with mud flows as rapidly as exposed. The northwest end of the open-cut was approximately over the long Parks-Dunkle cross-cut, and the mineralized zone on northeast side was consi-

7/ USBM R.I. 4065, pgs 19-23
8/ 1954 report by MWJ

dered to be same as that followed in Dunkle's drift southeast from the cross-cut. By mid-October this open-cut was extended to 500 feet. 9/

Surficial work was continued during the 1956 season, and late that fall the property was optioned by Cordero Mining Company, a Nevada quicksilver producer. In 1957 that company drilled 27 "long-holes" from the Dunkle drift ranging from 14 to 45 feet in length at 7° to 16° plus slopes. The holes were oriented to cut the sill at about 45° angles, and more or less due south and due east. In addition one hole was drilled 50 feet to the northeast, cross-cutting the hanging-wall, and one drilled 50 feet to the southeast from face of drift. At cross-cut and drift intersection 2 holes, each 42 feet long and one of 26 feet were "fanned" and drilled more or less along the formation. Another hole, 390 feet from portal, was drilled 20 feet to the north. Results from the drilling program were not especially encouraging nor were they conclusive.

Geology and Mineralization

The property was re-visited July 13 to 18, 1957. During that period the stripped area's showings and structural details were mapped on 1 inch to 10 foot scale with assistance of Ed Hager, Cordero Mining Company mining engineer. This work showed a predominantly N30° to 50°E cross fracturing system in the sill, along which the principal cinnabar-stibnite deposition occurred. Repeated post-mineral movement developed slickensiding to a marked degree along these fractures. Horizontal displacement of numerous block segments varied from 5 to 20 feet. Half of the long-hole foot-wall drilling more or less paralleled the general strike of the cross fracturing system; this resulted in only a few of the holes intersecting them. Consistent intersection of them could possibly have shown appreciably higher values.

Later that season a mine slusher-scraper was used in the stripped area to trench certain sections to 4 and 5 foot depths; no well defined oreshoots were uncovered in them. At southeast end of this area a 55 foot winze was sunk on a shear zone of N10E strike and 30 to 35 N slope; good values were reported for the first 25 feet in sandstone, and low values for the last 30 feet in rhyolite.

The exposed bedrock on the bluff shows numerous thin sills between thin beds of shale, graywacke, and sandstone; some of the sills show appreciable mineralization.

The ore minerals on this property are limited to cinnabar and stibnite, with small amount of arsenic reported in some composite sample analyses made by the USBM. Cinnabar is the most abundant mineral. 9/

The potential of this property, from present knowledge, is considered to be limited to a low grade and large tonnage operation. The higher grade cinnabar cropping reported visible in shales in river bed below the Dunkle-Parks adit, during periods of extreme low water level, should be investigated; a higher grade ore zone in that area would greatly improve the future of this property.

Willis Property. Area 2

9/ 1956 report by MWJ

Location and Accessibility

The Willis property now adjoins the Parks, and lies 1 mile to northwest of the Parks Creek campsite; it is 1-1/4 miles down river and about 1-1/2 miles from the river landing to the Willis campsite. The same transportation facilities used by others in that area are available.

History and Development

Ozwald Willis and partner Jack Fuller discovered and staked 15 claims on the property in 1909, following two years of tracing mineralization northwesterly from the Parks property. During the prospecting period Willis reported shallow test pits and trenches were dug in a staggered pattern spaced 150 to 200 feet apart, with most of the prospect holes showing "fair" prospects on panning. The original claims staked were held until 1951 when 9 of them were dropped. In 1943 George H. Willis, nephew of Ozwald, acquired half interest and was largely responsible for performance of assessment work thereafter. In 1953 the remaining 6 claims were amended and relocated to conform with new findings considered more encouraging. 10/ Ownership of the Willis interests was continuous from original staking until the Alaska Mines and Minerals Company (formerly Decoursey Mountain Mining Company) acquired the property about 1957.

Up to 1953 prospecting and development work was on the west slope of the ridge. It consisted of numerous trenches and eight adits along both walls as well as adits crosscutting the 30 to 70 foot dike width. Four of the adits were less than 50 feet long. One at the 605 elevation was driven 100 feet, and another 200 feet with 180 feet of that working reported to follow one wall of a sill. During the earlier years, a few flasks of quicksilver were produced in a home made retort.

Recent Work

During 1943 the USBM conducted a trenching and sampling program largely along the wide, northerly striking and steep dipping dike, where Willis and Fuller concentrated most of their early work. Results of the Bureau's work were not encouraging. 11/

In 1953 and 1954 an extensive stripping program with dozer equipment was done by George Willis. Location of this work was along the low rounded ridge crest to the east of the previous area prospected. In mid-July a Territorial Department of Mines mining engineer spent 5 days on the property. A Brunton-tape traverse was run and all workings were tied-in, mapped, and recent stripped areas sampled. 10/ Only two old adits were open for inspection.

Mineralization and Sampling

The mineralization is limited to cinnabar and stibnite, with stibnite the more abundant. It occurs as thin, short discontinuous veinlets and stringers, in small lenses or "pods", and scattered "blebs" along fractures and shears within the dikes and sills, usually favoring the hanging-wall side.

The best mineral concentrations found to date, however, are in the sheared shales of the 1953-54 stripped and trenched area. Another favored section is along an 8 to 10

10/ 1954 report of MWJ
11/ USBM R. I. 4065, pg 28-29

foot wide shear zone in a sill paralleling its contact with shale and sandstone; three samples totaling 25.5 feet across the zone had a weighted average of 13.7 pounds per ton, and scattered "blebs" of cinnabar were noted beyond the 10 foot width. In a large cut 400 feet northeast of that sampled section, a 57 foot width across the andesite gave a weighted average of 5 pounds per foot of width. 12/

In a dump of a caved adit 1000 feet to northwest of the last mentioned sample, some pieces of high-grade cinnabar-stibnite ore in brecciated shale were noted. Eighteen hundred feet to the northeast of the same reference point, a few small pieces of high-grade in sandstone were noted in the dump of an old trench and caved adit; dug by Nick Mellick on claims he located in 1910 and held for a few years. 12/

The USBM sampling results on the northerly striking Willis dike on the west slope of the ridge were not encouraging. The caved adits prevented an appraisal and better understanding of sub-surface mineralization encountered in those old workings. 13/

Results of the 1953-54 stripping were the most encouraging found on the property to date. They indicate that a more intensive exploration program could possibly develop a substantial large tonnage, low grade operation.

Barometer Property. Area 2

Location and Accessibility

This property is located about 2 miles southeasterly from the Parks campsite, and a half mile from the southwest bank of the Kuskokwim River in the Sleetmute Quadrangle. An area of low relief, it is situated near the base of the Barometer Mountain foothills at elevations of 300 to 500 feet above sea level. The showings are about 3/4 of a mile northwest of the Red Devil Mine camp, and one mile south of the airport. The Red Devil and Barometer properties adjoin and are on the same mineralized structure.

Transportation facilities serving the property are the same as those used for the local mining properties and settlements.

History and Development

Hans Halvorson discovered and located the property in 1921. Two ore occurrences were found at the 370 and 440 to 470 elevations, and 6 claims were staked. Test pits and trenches were dug on both showings, and in 1922 Halvorson drove an adit 122 feet to intersect the upper showing oreshoot at 46 foot depth. E. W. Parks bought the property in 1923 and did additional work on both showings. A one-tube Johnson-McKay retort was set up at the lower showing, and some quicksilver production was made from residual surface material. 12/

In 1931 the property was leased to Otto Rohlphs, Seattle mining engineer, after his examination of the property. A cross-cut was driven from Halvorson's adit to pick up the oreshoot exposed at the upper surface showing. Mr. Rohlphs dropped his lease the following year. In 1938, A. C. Skidmore leased the property from the Parks estate, and produced 10 flasks from surface float and from the pit on the lower occurrence. The lease was dropped in the fall of that year. In 1939 and 1940 a few flasks were produced in performance of annual assessment work.

12/ 1954 report of MWJ
13/ USBM R.I. 4065, pgs 24-26

From 1941 to the mid-50's work was limited to annual assessment requirements. The Decoursey Mountain Mining Company (now known as the Alaska Mines and Minerals Company) then leased the property, and have carried on an extensive stripping and sampling program from the Red Devil Mine to the Barometer adit area. For sampling, both hand and power driven augers have been used.

During performance of assessment work in 1961, John Murphy and George Willis mined 50 to 75 tons of good surface ore exposed in the 1959 stripping. Amount of quicksilver recovered from that tonnage is not known.

Geology and Mineralization

The formation crossing the Barometer ground is the same as that on the adjoining Red Devil property. Predominantly, shale, graywacke and sandstone are reported increasingly evident westerly beyond the lower deposit. Mineralization in the Barometer area is considered dependent upon and associated with andesite dikes, as elsewhere in the district. 14/

Faulting in the area of the upper deposit is responsible for the formation's strike variations of N20° to 60°W, as beyond that point it is N10°W. 14/

Mineralization in the two oreshoots consists of cinnabar, stibnite, and realgar; the latter mineral is not commonly found in this district. The ratio of mercury, antimony, and arsenic is given by the USBM as 4.6 : 9.7 : 5.4, respectively. The USBM 1943 trenching program found visible cinnabar mineralization in the upper oreshoot to be 165 feet in length. Extent of the lower oreshoot along its projected northerly strike was not determined as it runs into swampy ground. 14/

More intensive exploration is planned for the Barometer property, as geological conditions are considered favorable for finding oreshoots of economic interest.

Red Devil Property. Area 2

Location and Accessibility

The Red Devil mine is located in the gulch and on west side of Red Devil Creek, about 1000 feet from the southwest bank of the Kuskokwim River. It is 8 miles down river from Sleetmute, in the quadrangle of same name. Like the Barometer property, which it adjoins on the northwest, it is situated near the base of Barometer Mountain foothills in a local area of low relief. Elevation at the shaft collar is 308 feet and at river level 180 feet above sea level.

With completion of a 4000-foot airstrip by the State several years ago near the river bank 2 miles downstream, it has twice-weekly prop-jet air service direct from Anchorage, except for the several weeks "break-up" period in the spring and when bad weather conditions cancel flights. Bulk supplies and heavy equipment are freighted up the river during the four or five months navigation season from Bethel by a company-owned barge.

History, Development and Production

14/ USBM R.I. 4065, pgs 24-26

The property was discovered and located by Hans Halvorson in 1933. Several years later Nick Mellick, trader near Sleetmute, acquired a half interest and additional ground was staked, making a group of 9 claims. The property covers the area northwesterly from Red Devil creek to the southeast boundary of the Barometer claim group, a distance of about 1 mile, with both covering the same geological structure.

Mercury production from cinnabar pebbles and boulders found in the creek bed and float found in the residually weathered west side gulch slopes was started with several old Johnson-McKay retort tubes, and 11 flasks were recovered from that set-up. Two "D" retorts were installed, and production was 158 flasks in 1940, 135 flasks in 1941, and 117 flasks in early 1942. Ore source for those years was obtained by ground sluicing overburden covering the ore zone in the same area.

The 311 (elevation above sea level) Adit was started in 1940 in the face of the sluiced open-cut and driven 90 feet, where an oreshoot was found that supplied the ore for the balance of 1942. The 325 Adit, located 70 feet north of the 311 portal, was started and driven 130 feet in 1941 along the strike of the formation but found no ore. Two cross-cuts, 40 and 50 feet in length, were driven to the southwest from the 325 Level with negative results. In late 1942 a shaft was started 55 feet southeast of the 311 portal, and sunk to 30 foot depth on a 62° slope, where the ore being followed swung into the hanging-wall.

Harold Schmidt and E. J. Stamps of Fairbanks acquired a lease on the property in late 1942, and interested the New Idria Quicksilver Mining Company of California in the venture. The New Idria-Alaska Quicksilver Mining Company was then formed to develop and operate the mine. Mining equipment and reduction plant were shipped from California and installed in 1943, and 500 feet of drifting and cross-cutting was completed that year. Production at the property on a larger scale was started and continued until spring of 1944, when the low quicksilver prices discouraged the operators. During this period of activity the total footage of development headings, including deepening the shaft 45 feet, was 1418 feet. The company subleased the property to the Kuskokwim Mining Company, the latter composed of Harold Schmidt, E. J. Stampe, Glen Franklin, and Earl Ellingen of Fairbanks.

The 1944 production was 1090 flasks from 2,652 tons of ore. During the 127 days of the April to September, 1945, operation, 962 flasks were produced from 1514 tons. The steady decline in quicksilver market prices was responsible for suspension of the Kuskokwim Mining Company operation in September, 1945. 15/

The USBM carried on a surface exploration program in 1942, which resulted in the finding of seven oreshoots through their trenching. During the winter of 1942-43 they continued sinking the shaft to 55 foot depth, where pump failure suspended their work. No ore was found below the 30 foot level. A station was then cut at the 41 foot level, and a cross-cut driven into hanging-wall and an oreshoot, found on the surface, was intersected. This was then driven upon for 20 feet with good ore in both faces of the drift. 15/

It is reported that in 1946 Robert F. Lyman held a lease on the property and produced 500 flasks. For the next 5 years work on the property was again limited to annual assessment requirements.

15/ USBM R.I. 4065, pg 10

In 1952 the Decoursey Mountain Mining Company acquired lease on the property, and in 1953 dewatered the mine and started operations. During the 1953-54 period they produced 1084 flasks from 2500 tons of ore in the Gould rotary kiln reduction plant, installed by the New Idria-Alaska Quicksilver Mining Company. Production was then interrupted with loss of the plant by fire. Since completion of the new Herrshoff 6 hearth furnace in 1955 the operation has been continuous, and up to end of 1960 the quicksilver production has been approximately 19,800 flasks from around 47,250 tons of ore. Production for 1961 is 4089 flasks.

Geology and Mineralization

The formation in the Red Devil property is composed of shales, graywacke, and sandstone measures. The shales are the predominant beds in the ore zones. As elsewhere in the district, dikes of varying width are numerous, and the mineralization is dependent upon and directly associated with them.

At the Red Devil, the oreshoots found and mined to date are associated with andesite dike segments more or less in an eschelon pattern along bedding plant faults. Strike lengths of the ore bodies vary from 15 to 50 feet and their widths from few inches to 5 or 6 feet, with some lower grade ore zones of greater width. The ore zones and dike segments have a rake of around 45° to the southeast in the 55° to 65° dip of the bedded fault planes, and are continuous from surface to lowest level driven to date (800 feet vertically). The ore grade has been fairly consistent, particularly in the upper levels, but tends to fall off at depth.

Lateral development in the mine has been limited to an over-all horizontal length of 1450 feet. Future plans call for an expanded exploration program to known and indicated structurally favorable areas to the north toward the Barometer and westerly to the adjoining Fairview properties, and easterly toward the river.

Ore minerals are largely limited to cinnabar and stibnite; realgar is found occasionally in one of the ore zones and minor amounts of pyrite and arsenopyrite have been noted. The USBM reported the mercury-antimony in 17 determinations had a ratio of approximately 1 : 1. 16/ In recent years the amount of stibnite appears to be greater as greater depths are attained. Native quicksilver has not been reported in Red Devil ore, but oldtimers report it is found in appreciable amounts in panning along McCaully Creek for several miles.

It is considered that a well planned and intensive exploration program has a reasonable expectation to greatly increase life of the operation.

White Mountains Cinnabar Prospect

Location

The White Mountain cinnabar prospect is located near the crest and on south side of a well rounded ridge in the McGrath Quadrangle, 60 miles S25E. from McGrath. Its elevation at point of discovery is about 1800 feet above sea level. This area of interest lies at the head waters of an unnamed northeasterly tributary, parallel to and 10 to 14 miles southeast of Tatlawiksuk River, both northeasterly tributaries of Swift River, which

16/ USBM R.I. 4065, pg 13

is tributary to the Kuskokwim River. The shortest distance to that waterway is 42 miles northwesterly.

History

Fine cinnabar was observed by Jack Ignaty in the narrow valley creek bed on south side of the ridge and on that mountain slope during the trapping season of 1938. In late fall of 1957 Ignaty mentioned that observation to Edward Hager, Cordero Mining Company, and Robert F. Lyman at Red Devil. Ignaty was encouraged to return to the area and try to locate source of the fine float which he readily found, and returned with high grade samples. In May of 1958, Ignaty located 4 claims along strike of the outcrops. After examination of the occurrences, the property was optioned by the Cordero Mining Company, and an extensive hand trenching program during June and July was carried on by Mr. Hager and two men. In 1959, prospecting of the area continued, resulting in staking of 3 additional claims giving a strike length of 10,000 feet along the mineralized zone. During the following year a more or less parallel mineralized zone was discovered and four claims located along its strike 1/2 mile to the southeast of the original discovery.

In 1960 the USBM undertook an exploration program, limited that season to sampling with power auger, followed up with hand trenching. Results of that work were encouraging. Accessibility the first three years was limited to landings of small planes on an unimproved air strip on the rounded ridge crest. Dozer equipment which was driven-in overland from Farewell during the spring of 1960 by the USBM was used to construct a field a few hundred yards from the original discovery. Balance of the season, limited to about a month, was devoted to the start of a diamond drilling and trenching program by the Bureau in one area of the original discoveries. It is expected to be resumed this year.

Geology

There is no published U.S. Geological Survey coverage on this region to date. In 1958, however, two of their geologists visited the property, and in 1959 this immediate area was mapped by the Survey.

The mineralization along the zone of the original discovery and claim locations occurs within a wide highly shattered shear zone. This shear zone has been pegged as being within the wide limits of the regional Farewell fault system, which in this area appears to be a strike fault. The mineralized host rock is a gray dolomite of undetermined thickness The attitude of a 30 foot, thin-bedded shale outcrop within 100 feet and on the southeast side of original cinnabar discovery suggests a 45° dip to the northwest. Strike of the shear zone and formation is northeast. To the northwest of the dolomite the formation surficially appears to be limestone of great thickness.

No dikes, sills or other type intrusives have been noted in the immediate area to date, which elsewhere in the Kuskokwim region has been considered favorable for cinnabar deposition.

This highly fractured formation and mineralized zone is a permafrost section, and it is anticipated this condition will continue to several hundred feet in depth.

The second roughly parallel mineralized shear zone has the shearing and fracturing as intense as that along the original discovery, and at no point appeared to be as strongly

mineralized. The formation in which it occurs is dolomitic limestone of undetermined thickness, with shale and conglomerate outcropping occasionally in the fairly steep slopes above to the southeast.

Mineralization

Mineralization along the two zones is limited to cinnabar. The cinnabar occurs in several ways; as scattered small and thin plates along closely spaced fractures; as short discontinuous veinlets; as stringers up to 1/2 inch thick in a network enclosing and surrounding brecciated dolomite fragments with cinnabar cementation and as small lenses and pods.

The various outcrops and showings in trenches suggest oreshoots of interesting width and length but as yet of unknown vertical extent. The highly fractured and frozen ground has proven very difficult to drill; core and sludge recovery has been poor, loss of water in hole frequent, wear on drill bits excessive, and as a result, it was difficult to obtain conclusive information from the few holes drilled last fall.

The absence of other visible sulfide mineralization occurring with the cinnabar is considered unfavorable to the finding of cinnabar orebodies of economic importance by some mining men. However, until that has been proven to be the case, grade, width, and length of the numerous surface exposures makes this deposit the most promising prospect in the Kuskokwim region.

Cinnabar Creek. Area 4

Location and Accessibility

The Schaefer cinnabar property is located near the west limits of the northwest section of the Taylor Mountains Quadrangle, about 60 miles S23E of Aniak, with the open-pit workings at about 1250 feet above sea level. It is situated in the Kuskokwim Mountains at head of Cinnabar Creek, a tributary to Beaver Creek which latter stream joins the Gemuk River, a tributary of Chikululnuk River, that in turn joins the Chukowan River, a principal western drainage system of the Holitna River. 17/

Overland freighting to the Cinnabar Creek area is presently limited to winter months, following a route for 65 miles southeasterly from Aniak. A winter route due east from Nyac, a distance of 76 miles, also exists. A fair air strip, built by Russell Schaefer, is adequate for small aircraft. During the summer months at normal water stages, outboard motor boats can be run up the Holitna River and its western tributaries to within 20 miles of the property. The trip requires a week to 10 days upstream, and about 4 days downstream.

History and Production

In 1941, Russell Schaefer and Harvey Winchell located three placer claims containing numerous cinnabar nuggets in gravels and detrital material at the base of the slopes on each side of Cinnabar Run, and 1 claim on Cinnabar Gulch, a short easterly tributary of Cinnabar Creek. During the same season, they also located and sampled the Lucky Day lode in Canary Gulch, a short tributary of Beaver Creek 6 miles to the south. The

17/ USBM R.I. 4065, pgs 44-48

same season, Herschel Landru located placer claims adjoining Schaefer's claims on Cinnabar Creek, and the Broken Shovel Lode claims at head of Broken Shovel Creek about 1 mile to northeast of Cinnabar Run Creek. Broken Shovel Creek drains north into the East Fork of the Aniak River.

During October 1941, the Bristol Bay Mining Company sampled the Cinnabar Gulch placer deposits and the Lucky Day Lode lode occurrences.

In 1942, Schaefer retorted 2300 pounds of cinnabar ore from the Lucky Day Lode residually weathered material, recovering 15 flasks of mercury. An additional 11 flasks were recovered from same source the following year. No ore in place was found of economic interest. In 1943, the New York Alaska Gold Dredging Company, operators in the Nyac area, prospected and sampled the Cinnabar Run and Cinnabar Gulch placers; encouraging values were found but available yardage was too small to be of interest.

The short period spent in the area by the USBM in 1943 was limited to the Lucky Day Lode. The deposit examined by the DM&M in 1961 is situated to north of Cinnabar Gulch. It was not located and staked for some years after 1943. Since 1943, all the production from that area has been produced from this deposit by Schaefer in an ingenious reduction plant built by him. His total production is reported to have been over 500 flasks to the time of his death in 1960, making that property the No. 2 mercury producer in Alaska.

During month of August and first week of September, 1961, an exploration program was undertaken by the Schaefer estate, under direction of a consulting geologist. Initial work was limited to geological mapping and sampling in the area of the 20 to 50-foot-deep and 100-foot-long bulldozer trench excavated by Schaefer over a several-year period. A diamond drilling program was started and may possibly be continued next year.

Geology and Mineralization

The area is one of low relief and rolling hills, with a few rocky peaks scattered through the district. Maximum elevations in the vicinity range from 1500 to 2000 feet above sea level. At the deep open-cut, the elevation is about 1250 and the ridge above it is around 1750.

The bedrock in the district is composed of great thicknesses of interbedded shales and graywackes, probably of early Mesozoic age. 18/ They are intruded by sills of interlayered lava flows and dikes that are commonly porphyritic andesite. Quartz diorite dikes and sills are also reported in the district. 19/

The oreshoot mined by Schaefer in the Cinnabar Run open-cut occurs in a wavy shear zone along a bedding fault at the shale-andesite sill contact. Strike of the formation and the fault is N10° to 20°W and dip is 75° to 80°E. The mineralization is largely in the shale with an appreciable amount in the first foot or two of the sill. Maximum width showing appreciable mineral distribution was 12 feet, which is located in the central section of the 90 to 100-foot length of the ore zone. It occurs as discontinuous veinlets and stringers, short lenses, and blebs. At the north end of the open-cut, it pinches down to 4 or 5-inch width. The south end of the ore shoot was obscured by muck in the bottom of the open-cut. Sampling results of the oreshoot were encouraging.

18/ USGS Prof. Paper 268
19/ USBM R.I. 4065, pgs 44-48

The extensive stripping and trenching across the strike of the ore zone by Schaefer was examined. It appeared that no appreciable mineralization was uncovered. In the area to the north of the open-cut, the strike of the formation appeared to be swinging five to ten degrees to the north, which possibly accounts for the failure of the trench to intersect the ore zone. In the stripping done across the southerly projection of the zone, a similar sill was uncovered but no visible mineralization was found. It is the opinion of the writer that the ore zone has been offset by a cross fault which runs along Cinnabar Gulch and that the southerly continuation of the ore may lie along the south side of Cinnabar Gulch.

The ore minerals in the open-cut oreshoot are limited to cinnabar and native quicksilver. The latter is especially abundant along fractures across the small lenses, with fine beads noted in the shale along the fault. Minor post-mineral movement was shown by slickensiding.

With geological conditions generally similar to those of the Sleetmute District, numerous cinnabar occurrences known in the Cinnabar Creek District, and with recent reported (but unconfirmed) discoveries in that general region, it appears there are good chances of finding deposits of economic importance within a 5 to 10-mile radius.

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THE DIVISION OF MINES AND MINERALS

This report is made on an annual basis, not so much to recount the DM&M accomplishments but more to provide a reference for the benefit of those who wish to be informed on the status and possibilities of Alaska's mineral resources and industry. It is used by this and other departments to acquaint people and commercial firms in other states and countries of some of the possibilities in the State of Alaska. To better accomplish this, the contents have been increased this year to include several reports of interesting mineralized areas investigated by the Division's staff of engineers.

The State Division of Mines and Minerals has charge of matters affecting mining and minerals exploration, development and production in Alaska. It collects and disseminates official information relative to the mineral resources, production, mining, and petroleum projects in the State. It administers the laws with respect to all kinds of mining, mining safety, and conservation of oil and gas.

The Division conducts a continuing survey of the mineral resources and operations in the State and disseminates information in regard thereto with a view toward assisting prospectors and miners. It protects investors in the mineral industries. It fosters and promotes the best interests in the mining, mineral, and related industries of the State toward greater mineral production, increased stability of the economy, and protection of the welfare of mineral industry workers. In short, the DM&M is dedicated to the overall improvement of Alaska's mineral economy.

For the purpose of directly and personally aiding miners and prospectors and stimulating mineral discoveries, the Division maintains four public assay laboratories at district offices in the State located at Ketchikan, College, Anchorage, and Nome. Mining engineers travel "into the bush" to give advice and help to miners and prospectors who desire it. Assistance is also rendered to mining people and others at the Juneau office through the use of claim files and library of maps and reports.

The Division of Mines and Minerals is the result of laws and Legislative Acts that date to 1935, when the Territorial Department of Mines was established.

Administration

The Division of Mines and Minerals is one of three Divisions of the State Department of Natural Resources. Headquarters of the Division is at Juneau, Alaska, and the Division is administered by James A. Williams, Director. The headquarters office is staffed by a Mining Geologist, a Mining Engineer, an Administrative Assistant, a Mineral Analyst and a Secretary.

The Division maintains District offices in Anchorage, College, Nome and Ketchikan. The Anchorage office is staffed by a Mining Engineer, Coal Mine Inspector, Petroleum

Engineer, Petroleum Geologist, Assayer, and a Clerk-Stenographer. The College office is staffed by a Mining Engineer and an Assayer. The Nome office is staffed by an Engineer-Assayer. The Ketchikan office is staffed by an Assayer. The Petroleum Branch, Mineral Analyst, and Mine Geologist are the only additions to the staff since 1953.

The headquarters office maintains a library of all Alaskan publications issued by the U. S. Geological Survey, U. S. Bureau of Mines and the Atomic Energy Commission. The office also maintains a collection of classified rocks and minerals, a complete set of U. S. Geological Survey topographic maps of Alaska, and the many maps and reports by the Divisions' engineers.

The Division's Mineral Analyst maintains the bibliography and inventory of Alaskan mineral deposits and the central recording files of mining documents. This project and these files have been of great assistance to many individuals and mining company representatives who are searching for various kinds of information on Alaskan mineral properties and prospects. The Central Recording of up-to-date claim location and assessment work affidavits from all parts of Alaska is a service unique to Alaska, and is praised highly by miners and exploration men. At the close of 1961 there were a total of 23,162 documents filed, 1862 of them having been received during 1961. This function has also been particularly helpful to the various State and Federal agencies in determining ownership of various properties and in State land selections.

A monthly Mines and Petroleum Bulletin is published and given wide circulation to keep the minerals industries informed on Alaskan affairs and developments.

The other DM&M offices maintain similar publication libraries and mineral collections for the public. The Anchorage office is the location of the Petroleum Branch, which supervises and inspects the development of oil and gas deposits, and provides petroleum information to the industry and technical advice and help to the State Division of Lands in the administration of lands within possible petroleum provinces.

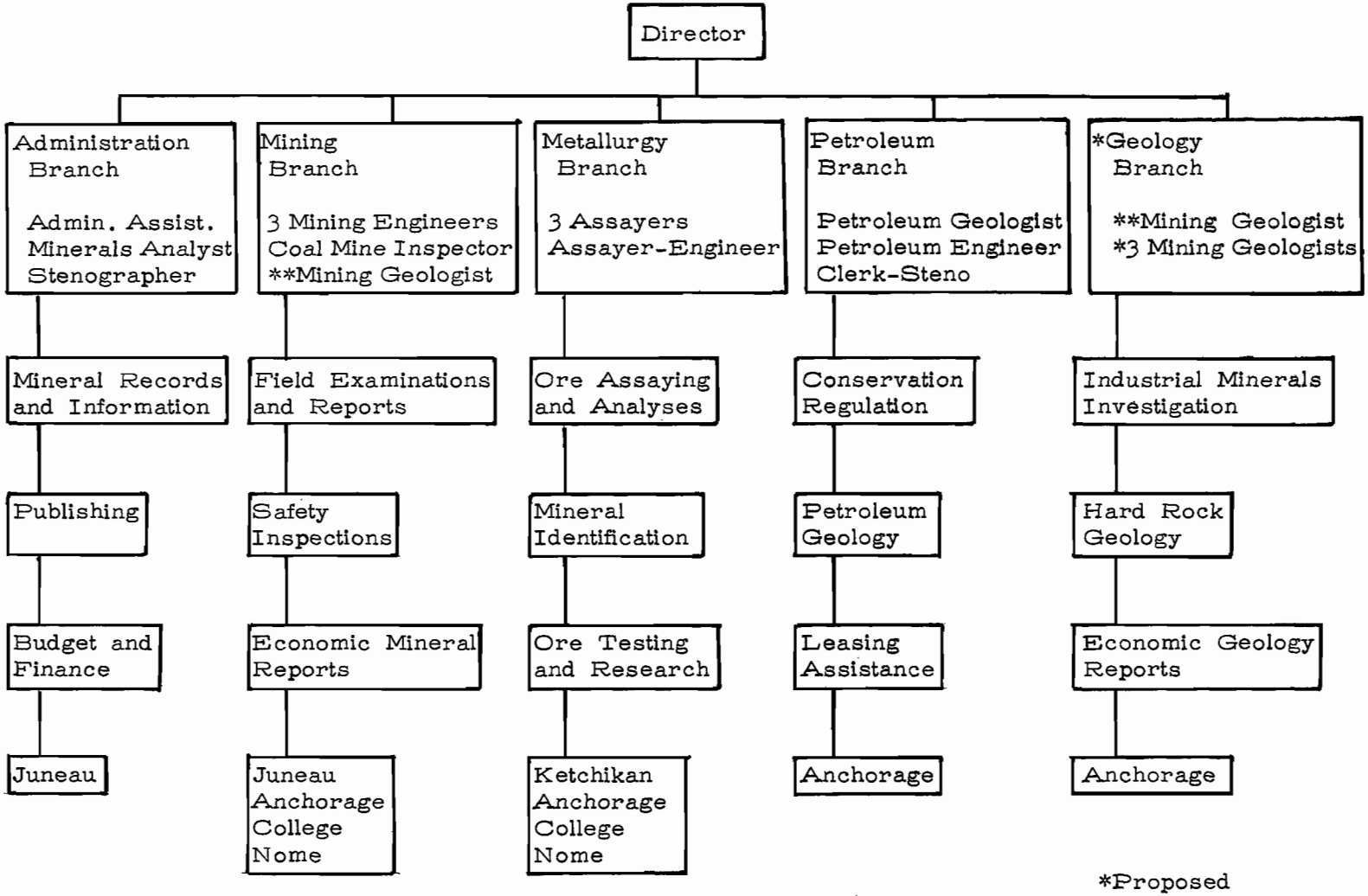
All offices of the Division give professional advice in the way of consultations, reports and field examinations to prospectors and miners who so request it.

The Assay offices this past year have made 1940 analyses, the X-ray spectrograph has been installed in the Anchorage office and will be available for use by the next prospecting season. Letters seeking information for prospectors aid have been received, of which perhaps two would have resulted in actual field trips had there been funds available.

Financial Statement

Estimated expenditures of approximately $240,000 by the Division of Mines and Minerals during the Fiscal Year 1961-62 show an increase of $70,000 over the previous Fiscal Year. This increase is a result of the addition of a Geologist to the Mining Branch; the increase in salaries through job reclassification by the Personnel Division; contributions to retirement, group health, and workmen's compensation; the purchase of an X-ray spectrograph; and the new cooperative program with the University of Alaska in student geological mapping.

Department of Natural Resources - DIVISION OF MINES AND MINERALS



*Proposed
**Existing. To be shifted to Geology Branch, if created.

Public Services & Functions

Mr. James A. Williams, Director, addressed the Rotary Club of Nome on future plans and possibilities of Northwest Alaska. He also gave a paper, "Alaska's New Approach to Mining Rights on State Lands," at the Northwest Mining Association Convention at Spokane, Washington.

Mr. Donald D. Bruce, Petroleum Geologist and Chief of the Petroleum Branch, presented the topic, "Oil, Present and Future," to the Pioneers Convention at Anchorage. Mr. Bruce also contributed an article on Alaska's petroleum industry to the June issue of the Bulletin of the American Association of Petroleum Geologists.

Mr. Williams and Mr. Gordon Herreid contributed articles on the geology of Alaska, Alaska's new mining laws, and Alaska's mining future to the December issue of Mining Engineering. This is apparently creating widespread interest in Alaska judging from the number of inquiries already received at the Division's offices.

Mr. Williams serves as the Chairman of the Alaska Oil and Gas Conservation Committee, Chairman of the Alaska Map Advisory Committee, and Chairman of the Western Governors Mining Advisory Council.

A total of 1940 samples of minerals, ores and rocks were analyzed or identified for the public by the several assay offices.

A total of 4399 visitors were accommodated at the Division's various offices.

Nome

Willow M. Burand, Assayer-Engineer, made field trips to mining operations or prospects at or near Teller, Noatak River, Kobuk, Ruby Creek, Council, Solomon, Utica Creek, Shungnak, Cold Creek, Lost River, and other places in the Nome area. He manned the Ketchikan office for five months during the absence of an assayer at that office. He completed a total of 115 assays and identifications in addition to his field trips. The Nome office had 180 visitors. The building at Nome is owned by the DM&M and shared with the State Department of Revenue.

College

Robert H. Saunders, Mining Engineer, completed reports of the previous season's investigations. He attended and greatly assisted the Anchorage conference and hearings on mining rights regulations, and did research on mine safety regulations. He carried on field investigations at Dome Creek, Silvertone Lode, Steamboat Creek, Rainbow Mountain, Fortymile, Bonnifield, Kantishna, and other areas. He assisted over 200 visitors.

Donald R. Stein, Assayer, completed a total of 888 assays and identifications. He assisted 669 visitors. The College assay laboratory is in the basement of a condemned building. The DM&M has been hoping for many years to be able to move this lab into suitable quarters.

Anchorage

Martin W. Jasper, Mining Engineer, completed reports on the previous season's field trips. He made field investigations at Bonanza Hills, Paxson, Kenai, Resurrection Creek, Kuskokwim River, Willow Creek, Windy Creek, and other areas. He helped a large number of the 2,486 people that visited the Anchorage office. The basement of the Anchorage building was remodeled during the spring to accommodate the x-ray equipment. The building is owned by the DM&M.

Irwin W. Mitchell, Assayer, completed a total of 509 assays and identifications. He supervised the installation of the x-ray machine after attending a special course in New York City on its use. He gave talks to the Anchorage chapter of the AIME and local school organizations. He accommodated a number of the 2,486 visitors.

Wiley D. Robinson, Coal Mine Inspector, carried on his duties as shown under "Safety Inspections."

The primary function of the Petroleum Branch is the administration of Chapter 40, SLA 1955, Alaska Oil and Gas Conservation Act, and the operating rules and regulations created pursuant to Section 4.3 of said Act. Duties of the Branch include advance approval of drilling permits, specifying equipment and materials to be used; periodic inspections of drilling operations to assure orderly and efficient development of oil and gas fields; maintenance of classified records; accumulation of stratigraphic geologic and production information for use in engineering studies; and assistance to the Alaskan petroleum industry in the employment of general engineering practices peculiar to northern climates.

The Petroleum Branch cooperates closely with the State Division of Lands, giving it technical advice on oil operations and information on land areas with petroleum-favorable geologic conditions, enabling the Division of Lands to effectively classify lands and determine how to offer them for the greatest financial benefit of the State.

Members of the Petroleum Branch are Donald D. Bruce, Petroleum Geologist and Chief of Branch, and Richard V. Murphy, Petroleum Engineer.

Mrs. Bobby Jo Brasch, Clerk-Steno, serves all Anchorage DM&M personnel.

Juneau

James A. Williams, Director, in addition to activities reported earlier, frequently visited the other offices for administrative purposes and also inspected various mineral industries in these areas.

Miro Mihelich, Mining Engineer, left the Division in March and was replaced by William H. Race in December, hence no field investigations were made by engineers from this office.

Gordon Herreid, Mining Geologist, employed in June, made field trips to Admiralty Island, Haines, Alaska Juneau Mine area, Fairbanks, and other areas. He assisted part of the 500 visitors to the office.

Jean L. Crosby, Administrative Assistant, handled the bookkeeping, purchasing, and other administrative details for the whole Division in addition to answering a large share of the inquiries.

Dorothy C. Mihelich, Mineral Analyst, processed all claim notices, affidavits of assessment work, maps, reports, and answered inquiries from various sources with

regards to claim ownership.

Judith L. Endell, Secretary, helped assist visitors and answer correspondence regarding the work of the Division in addition to her regular clerical and stenographic duties.

Ketchikan

Ralph E. Pray, Assayer, completed 276 assays and mineral identifications before leaving the Division.

Richard L. Denny, Assayer, completed 87 assays and mineral identifications after joining the Division in September. A total of 479 visitors were interviewed at this office. The Ketchikan building is owned by the DM&M. It was purchased and remodeled from an old church building several years ago.

Safety Inspections

The Division of Mines and Minerals shares equal responsibility with the Safety Division of the U.S. Bureau of Mines for the inspection and enforcement of safety regulations and conditions in Alaska's coal mines. During the year, Wiley D. Robinson, DM&M Coal Mine Inspector, made monthly inspections of all operating coal mines. He also investigated coal mines that were being developed or prospected by private concerns. The Usibelli Mine, one of the safest operations, was the scene of an underground mine accident during December in which one miner lost his life. This was the first underground fatality in Alaska's coal mines for four years.

The Division mining engineers inspect all mining operations with regard to safety in conjunction with their field trips. This is required by law as part of the Division's duties, i.e., safeguard the lives and health of miners. The Division is also required to inspect all tunnel and underground excavations.

It has been well proven by industry that safety programs are essential to keeping their compensation costs at a minimum. A good safety awareness program in Alaska's mining industry would go far toward reducing their costs of compensation insurance.

Field Investigations

Field trips made by Division Engineers, 1961

The Division Engineers made a total of 49 field trips, some of which entailed the investigation of several properties or prospects in the general area. Reports on these trips when of significant interest to the mining public, will be published as soon as possible.

Reports completed of 1960 field trips by Division Engineers

Preliminary Examination of a Prospect on Steamboat Creek, R. H. Saunders

Report on the Examination of a Bulldozer Trench at the Vuyovich Prospect, R. H. Saunders

Notes and Prospect Map of the Fairbanks-Wolf Creek Divide, R. H. Saunders

Notes on the Glaciation in the Circle Quadrangle, R. H. Saunders

Report on Preliminary Investigation of the Kings River Area Limestone Deposits, Martin W. Jasper and Miro Mihelich

Report on Mespelt Mine Operation of Strandberg Mines, Inc., Martin W. Jasper

Cordero Mining Company Cinnabar Prospect-White Mountains, Martin W. Jasper

Report covering Preliminary Investigations of McArthur River Black and White Sands Deposit, Martin W. Jasper

Property Examination Report - Electromagnetic Survey J & J Claims, Miro Mihelich

Reports completed of 1961 field trips by Division Engineers

Mineral Investigation Report - Slide Lake Area, Gordon Herreid

Emerick's Nickel Prospect, R. H. Saunders

Report on Preliminary Examination of the Bonanza Creek Valley Alluvials, Martin W. Jasper

LIST OF ALASKA MINING OPERATIONS ACTIVE DURING 1961

Name and Address of Operator	Location of Mine & Recording District	Approx. Crew	Type of Operation*
Admiralty Alaska Gold Mining Co., Box 2642, Juneau	Funter Bay Juneau	4	Nickel-copper lode development
Aho, John, and Associates	Fortymile River Fairbanks	3	Nonfloat
Alaska Exploration & Mining Co., Talkeetna	Bird Creek Talkeetna	1	Hydraulic
Alaska Horizons Co. Vic Fondy and Ray Jones	Treasure Creek Talkeetna	2	Testing ground with caisson
Alaska Mines & Minerals, Inc. Box 422, Anchorage	Red Devil Mine Kuskokwim	38	Mercury production
Alaska Nickel Co., Fred Jenkins Box 913, Fairbanks	Flume Creek Fairbanks	5	Gold lode development
Alaska Portland Cement Co.	Foggy Pass Nenana	3	Limestone exploration
Alaska Resources, Inc. Fairbanks	Goldstream Creek Fairbanks	2	Peat production
Alaska State Mines 10330 Serrano Avenue San Jose 27, California	Hyder Hyder	3	Prospecting
Alluvial Golds, Inc. 4732 - 46th N.E., Seattle, or Coal Creek	Woodchopper Creek Fairbanks	19	Gold dredge
American Metal Climax, Inc. 718 Granville St., Suite 908 Vancouver, B. C.	Alaska General Several	5	Mineral investigations
Amero, A. W. Chandalar	E. Fork Chandalar R. Fairbanks	1	Prospecting

* Types of operations are explained at end of list.

Anderson, Einart & Farrell, Ed 315 Front St., Graehl Fairbanks	Goose Creek Fairbanks	2	Prospecting
Anderson, Ellis Chandalar	Tobin Creek Fairbanks	1	Small scale hand
Anderson, Tury and Associates Fairbanks	Fairbanks Fairbanks	1	Lode prospecting
Arctic Alaska Fisheries & Enterprises, Inc., John Sheldon, Adolph & Roudolph Vetters, 1314 6th Ave., Fairbanks	Wolf Creek Fairbanks	3	Lode gold production and prospecting
Asbestos Corporation Vancouver, B. C.	Alaska General Several	1	Exploration
Atlas Mines, George J. Waldhelm Box 755, Nome	Dahl Creek Cape Nome	1	Nonfloat
Bailey, Jerry Ketchikan	Ketchikan Ketchikan	2	Prospecting
Barrett, Frank Chicken	Mosquito Fork Fairbanks	1	Prospecting
Basin Creek Mining Co. Herbert Engstrom Box 554, Nome	Basin Creek Cape Nome	3	Dredge
Bayless Brothers	O'Brien Creek Eagle	2	Nonfloat
Bay West, Inc. 317 Main Street Grand Junction, Colorado	Bokan Mountain Prince of Wales Island	6	Lode mining & development
Beckwith, Rea Box 119, Anchorage	Alaska General Several	2	Mineral investigations
Bear Creek Mining Co. 4016 Palmer Highway Anchorage	Alaska General Several	1	Examinations & sampling
Bear Creek Mining Co. West 508 Cataldo Spokane, Washington	Ruby Creek Noatak-Kobuk	47	Copper lode development
Berg, L. C. Box 58, Sitka	Chichagof District Sitka	1	Prospecting

Berg, Rhinehart Chitina	Ruby Creek Noatak-Kobuk	1	Copper lode development
Beshores, Paul & Associates Box 1161, Mollala, Oregon	Kugruk River Fairhaven	1	Nonfloat
Bierman, William Yakima, Washington	Slate Creek Copper Center	2	Nonfloat
Bittner, Paul Central	Hot Springs Manley Hot Springs	1	Prospecting
Bliss, Patrick & Son 129 East 11th, Anchorage	Ungalik Creek Cape Nome	3	Nonfloat
Boedecker, Bill Hollis	Hollis Ketchikan	2	Prospecting
Bodis, George Nome	Macklin Creek Cape Nome	2	Hydraulic
Blackman & Dyer	Friday Creek Fairbanks	2	Nonfloat
Brandl, P. & R., Box 4042 Star Route, Spenard	Nugget Creek Talkeetna	4	Nonfloat
Breseman, John W. Box 796, Pelican	Chichagof District Sitka	1	Prospecting
Brockway, John T., & Sid Ellis 2500 E Street Bellingham, Washington	Chichagof District Sitka	2	Gold lode development
Bronson, Robert; Wilbur & Jack France; William Johnson Palmer	Craigie Creek Palmer	3	Development work
Brown, Erwin General Delivery, Petersburg	SE Alaska Several	1	Prospecting
Brown & Renshaw Anchorage	Fishhook Creek Palmer	1	Gold lode development
Burnette, Dewey & Martha Hunter, Box 1995, Fairbanks	Crooked Creek Fairbanks	2	Nonfloat
Carr, G. W. Miller House	Miller Creek Fairbanks	2	Nonfloat
Carstens, Heine C. Central	Portage Creek Fairbanks	2	Nonfloat

Casanoff, Jack Kiana	Klery Creek Noatak-Kobuk	1	Small scale hand
Cassell, J. B. Hollis	Hollis Ketchikan	1	Prospecting
Casto, Steve 33 Mile, Haines	*Porcupine Creek* Haines	1	Small scale hand
Chatham Creek Mining Co. Berg, Tweiten & Wickstrom Box 64, Fairbanks	Ready Bullion Creek Fairbanks	3	Nonfloat
Chena Mining Co., Bill Pinto 216 3rd Avenue, Fairbanks	Dome Creek Fairbanks	2	Nonfloat
Cline, Harvey Cordova	Yakataga Beach Cordova	1	Small scale hand
Coffield, Lawrence Fairbanks	Black Creek Talkeetna	1	Gold lode prospecting
Coffield, Lawrence Fairbanks	Black Creek Talkeetna	2	Nonfloat
Columbia Iron Mining Co. 525 William Penn Place Pittsburg 30, Pennsylvania	SE Alaska Several	8	Mineral Investigations, aerial recon., drilling
Cordero Mining Co. 131 University Avenue Palo Alto, California	White Mountain Kuskokwim	5	Mercury lode explorations
Crane, Fred and Associates Kotzebue	NW and N Alaska Regions Several	2	Prospecting
Canyon Creek Mining Co. Jens Kvamme & Sons, Akiak	Canyon Creek Kuskokwim	4	Nonfloat
Dahl Creek Mine, Charles E. "El" Stout, 709 5th Ave., Fairbanks, or Kobuk	Dahl Creek Noatak-Kobuk	2	Nonfloat & jade
Davis, Bon Box 45, Nome	Gold Run Cape Nome	2	Nonfloat
Davis Mines, Inc., Talbert E. Davis, 1511 Mary Ann Fairbanks	Shovel Creek Noatak-Kobuk	2	Nonfloat
Davis Mining Corp., C.E. Davis Box 881, Juneau	Windham Bay Juneau	1	Suction dredge

Degnan, Joseph A. Ophir	Mastodon Creek Innoko	2	Nonfloat
Dickman, O. J. Teller	Kigluaik Mountains Cape Nome	2	Prospecting, nonfloat
Eckers, Theron Kasaan	Kasaan Peninsula Ketchikan	2	Prospecting
Edgecumbe Exploration Co. C.T. & G.H. Morgan Box 758, Sitka	Silver Bay Sitka	2	Gold lode maintenance
Emerick, Rollie Delta Junction	Alaska General Several	1	Prospecting
Empire Jade Co. Gene Joiner, Kotzebue	Jade Creek Noatak-Kobuk	1	Jade recovery & cutting
Falls, Bentley Box 33, Livengood	Wilbur Creek Fairbanks	1	Nonfloat
Fassler & McLeod Mile 124, Glenn Highway	Albert Creek Chitina	2	Nonfloat
Fern Gold Mining Co. G.F. Kalmbach	Willow Creek Palmer	2	Gold lode development
Flat Creek Placers Fullerton Brothers, Flat	Flat Creek Mt. McKinley	3	Nonfloat
Foster, Neal W. Box 279, Nome	Seward Peninsula Several	2	Lode prospecting
Foster, Neal W. Box 279, Nome	Hannum Creek Fairhaven	3	Nonfloat
Fremont Mining Co., Box 125 Forest Grove, Oregon	Alaska General Several	16	Mineral explorations & drilling
Gagnon Placers Talkeetna	Cottonwood & Willow Creeks Talkeetna	2	Placer testing
Ghezzi, Alfred, Sr. Box 1857, Fairbanks	Third & Fourth Divisions Several	1	Prospecting
Gilbertson, George	Canyon Creek Fortymile	2	Nonfloat
Glacier Mining Co. Anchorage	Hays River Anchorage	2	Molybdenite exploration

Gold Stream Mining Co. Denny G. Breaid Box 2116, Fairbanks	Goldstream Creek Fairbanks	2	Stripping only
Goodnews Bay Mining Co. 422 White Bldg., Seattle 1, or Platinum	Salmon R. and tribs Bethel	40	Platinum dredge and nonfloat
Grant Mining Co. Frank C. Edgington Box 53, Tanana	Grant Creek Ft. Gibbon	2	Nonfloat
Grigsby, Jack & Jim Price	Lost Chicken Hill Fairbanks	2	Nonfloat
Hancock, K.S. Haines	Porcupine Creek Haines	1	Small scale hand
Hanna Mining Company	Alaska General Several	1	Mineral investigations
Hansen, Burnett F. Eagle	Ben Creek Fairbanks	2	Nonfloat
Hanson, Aage 1108 10th Ave. N., Seattle	Wolverine Group Palmer	1	Development
Hassel Mining Co. Harold Hassel Box 1071, Fairbanks	Ready Bullion Creek Fairbanks	2	Nonfloat
Havrilack, Harry Rampart	Ruby Creek Rampart	1	Nonfloat
Henton, Fred Mile 42, Seward Highway	Slate Creek Seward	2	Gold lode development
Hickok, Clara Talkeetna	Thunder Creek Talkeetna	2	Hydraulic
Hofstad, Richard Petersburg	Petersburg District Several	1	Prospecting
Hogendorn, Jack Deering	Inmachuck River Fairhaven	1	Hydraulic
Holloway, Dorr & Mariano Juancorena	Sleetmute Kuskokwim	3	Exploration
Huff, J.W. Rt. 1, Box 567B, Ketchikan	Gravina Island Ketchikan	1	Prospecting

Humble Oil & Refining Co. 1829 E. 5th Ave., Anchorage	Bristol Bay District Bristol Bay	10	Iron lode exploration
Hall, Weldon & Associates	Napoleon Creek Fairbanks	2	Hydraulic
Hyder Mines, Inc. 904 4th Ave., Seattle, or Hyder	Riverside Mine Hyder	2	Silver-lead-tungsten lode preparations
Inmachuck Mining Co. Grant H. Nelson, Nome	Inmachuck River Fairhaven	6	Gold dredge
Jak Mining Co. Fairbanks	Crooked Creek Fairbanks	4	Dredge
Johnansen, Engbret Chicken	Ingle Creek Fairbanks	2	Small scale hand
Johnson, Iver M. Fairbanks	Chisana District Fairbanks	2	Nonfloat
Keleske, R. Ketchikan	Ketchikan Ketchikan	1	Prospecting
Kettendorf, James Box 657, Hagamon Road Fairbanks	Rose Creek Fairbanks	1	Small scale hand
Kimball, John Glenallen	Valdez Creek Talkeetna	2	Placer
Kloss, Herman & Jack Davis (K&D Lode) Sunset Cove	Sunset Cove Juneau	2	Gold-antimony lode development & prospecting
Knaack, William & Associates Seward	Beauty Bay Seward	2	Gold lode
Kodiak Exploration Co. Box 448, Kodiak	Kodiak Island Kodiak	3	Tungsten & copper prospecting
Kopanski, Max Skagway	Juneau District Skagway	1	Prospecting
Koshalk, Louis & Associates 833 4th Ave., Fairbanks	Steamboat Creek Fairbanks	2	Nonfloat
Kupoff, Nick & Charles Lazeration	Pedro Creek Fairbanks	2	Nonfloat
Ladybird Mining Co. Anchorage	Valdez Creek Talkeetna	9	Placer preparations

Lake Creek Placers E.H. Pitts, Big Lake Bettles Field	Lake Creek Fairbanks	1	Hydraulic
Langlow, Jens Central	Switch Creek Fairbanks	1	Hydraulic
Lanning, Tony Manley Hot Springs	Thanksgiving Creek Manley Hot Springs	2	Nonfloat
Lee Brothers Dredging Co. Box 208, Nome	Solomon River Cape Nome	12	Gold dredge
Leonard, Harry B. Wiseman	Smith Creek Fairbanks	1	Small scale hand
Lindquist, Hjalmer, 133 N. Marion, Bremerton, Washington, or Ophir	Bedrock & Ester Creeks Innoko	1	Nonfloat
Lindsay George c/o R.E. Baumgartner, Seward	Oracle Property Seward	1	Development work
Little Creek Mine Ivor C. Carlson, Ophir	Little Creek Innoko	2	Nonfloat
Little Squaw Mining Co. 309 Radio Central Building Spokane, Washington	Chandalar District Fairbanks	1	Gold lode development
Locke, Barney Anchorage	Third Division Several	2	Prospecting
Long Creek Mining Co. "Ash" Richardson, Ruby	Long Creek Nulato	4	Nonfloat
Lucky Seven Mining Co. Walter E. Roman Miller House	Portage Creek Fairbanks	3	Nonfloat
Lucky Syndicate A.L. Schneider Box 615, Nome	Kougarok River Cape Nome	8	Gold dredge
McMahn, C.J., Interests Palmer	Albert Creek Palmer	2	Placer drilling & development
McReynolds, Warren; Eichner, Ken, Williams,E.C.; Hawkins, W.A.; Peterson, K.C. Box 292, Ketchikan	Kasaan Peninsula Ketchikan	2	Prospecting

McWilliams, Howard F. Box 1317, Anchorage	Third Division Several	1	Prospecting
Magill, Fred Box 444, Petersburg	SE Alaska Several	1	Lode prospecting
Magnuson, Warren Ophir	Fourth Division Several	1	Prospecting
Marvel Creek Mining Co. Charles Awe, Aniak	Marvel Creek Bethel	3	Nonfloat
Meldrum, William Chicken	Stonehouse & Chicken Creeks Fairbanks	2	Stripping only
Mendenhal, Roy Deering	Milroy Creek Fairhaven	1	Nonfloat, small scale hand
Mercer, Sam & Mr. Barbeau Anchorage	Lucky Gulch, Valdez Cr. Talkeetna	2	Nonfloat
Miller, James; Earl Lindgrin; M.J. Atwood	Sheep Creek Fairbanks	3	Nonfloat
Minalaska, Inc. Magnuson Brothers, Ophir	Gaines Creek Mt. McKinley	3	Gold dredge
Mineral Basin Mining Corp. Arthur Moa, Box 126, Hyder	Mtn. View Property Hyder	4	Lode exploration
Minerals, Inc., W. W. Gilkey Box 1211, Juneau	Yakutat District Juneau	4	Beach placer investigations
Miscovich Brothers Flat	Otter Creek Mt. McKinley	6	Dredge
Moneta Porcupine Mines, Ltd. 408-402 W. Pender Street Vancouver 2, B. C.	Kantishna District Fairbanks	8	Mineral investigations & reconnaissance
Monte Cristo Mining Co. R. W. Beck, Gakona	Slate Creek Chitina	7	Nonfloat
Mrak, William Sutton	Grubstake Gulch Palmer	4	Nonfloat
Mt. Andrew Mining Co. Box 358, Ketchikan, or 1011-1030 W. Georgia St. Vancouver 5, B. C.	Kasaan Peninsula Ketchikan	8	Iron & copper exploration drilling & geophysical

Mt. Parker Mining Co. A.F. Parker, Box 2127, Juneau	Mt. Parker Mine Juneau	1	Gold lode maintenance
Munoz, Juan Box 553, Ketchikan	Kasaan Peninsula Ketchikan	3	Diamond drilling
Murdaugh, C. B. Anchorage	Johnson Pass Seward	3	Placer prospecting
Newcomb Brothers Moose Pass	Canyon Creek Seward	2	Exploration & maintenance
Newlun, O. H. Ketchikan	Prince of Wales Island Ketchikan	1	Prospecting
Newmont Mining Corp. of Canada, Ltd. 604-749 West Hastings Vancouver, B. C.	Alaska General Several	15	Mineral investigations & nickel lode exploration
New York-Alaska Gold Dredging Corp., 2503 Smith Tower Seattle, or Nyac	Tuluksak R., Calif. Cr., Rock Cr.	28	2 gold dredges
Niemi, Wayne & R. Goodman	Mills Creek Talkeetna	2	Nonfloat
Nugget Mining Co. Steven Petersen, Nome	Niukluk River Cape Nome	2	Gold dredge
O'Brien, Jim & Jim Densmire Cooper Landing	Surprise Creek Seward	2	Placer drift
O'Carroll, Michael Fairbanks	Spruce Creek Innoko	2	Nonfloat
Olive Creek Mines, Carl Parker Box 552, Fairbanks	Little Eva Creek Fairbanks	5	Nonfloat
Olson, Henry T. "Tiger" Taku Harbor	Juneau & Admiralty Dist. Juneau	1	Prospecting
O'Neill Ventures William O'Neill 505 8th Ave., Anchorage	Dan Creek	3	Placer prospecting
O'Neill Ventures William O'Neill 505 8th Ave., Anchorage	Upper Falls Creek Talkeetna	2	Placer exploration
Operators Unknown (2) Anchorage	Friday Creek Fairbanks	2	Nonfloat

Pade, Otto Skagway	Skagway Skagway	1	Prospecting
Padilla, Paul Anchorage	Willow Creek Palmer	1	Prospecting
Palmer, R.B. Fairbanks	Sourdough Creek Fairbanks	1	Prospecting
Pannick, Harry	Flume Creek Fairbanks	1	Nonfloat
Pekovich, W. S. Box 2642, Juneau	Port Snettisham Juneau	1	Iron lode development
Permanente Cement Co. Oakland, California	Kings River Palmer	5	Limestone development
Pettyjohn, Fred S.	S. Slope Alaska Range Talkeenta	1	Lode prospecting
Phelps Dodge Corp Box 991, Douglas, Arizona	Alaska General Several	1	Mineral investigations
Pratt, Jack & Tony Dube Suntrana	No Grub Creek Fairbanks	2	Nonfloat
Price, Stanton c/o Dean Goodwin Box 1262, Juneau	Windfall Harbor Juneau	1	Prospecting
Prince Creek Mining Co. S. E. Agoff, Flat	Prince Creek Mt. McKinley	4	Nonfloat
Prince of Wales Mining Co. Box 898, Ketchikan, or Room 3, 1807 Fir Street Vancouver, B. C.	SE Alaska Several	5	Mineral reconnaissance & prospecting
Purdy Brothers Chicken	Myers Fork Fairbanks	2	Nonfloat
Purkeypile, I. W. & Associates Fairbanks	Tonzona District Mt. McKinley	3	Lode prospecting
Quail Creek Mining Co.	Quail Creek Rampart	2	Nonfloat
Quitsch, William Valdez	Mineral Creek Valdez	1	Gold lode prospecting
Radovan, Martin McCarthy	Glacier Creek McCarthy	1	Copper lode prospecting

Redstone Mining Co. Carl Heflinger, Fairbanks	Livengood Creek Fairbanks	2	Nonfloat
Renshaw & Sons Anchorage	Willow Creek Palmer	2	Gold lode
Rhode Island Creek Mines A. W. Pringle Manley Hot Springs	Rhode Island Creek Manley Hot Springs	3	Nonfloat
Rice, Harry Palmer	Independence Mine Wasilla	1	Caretaking & maintenance
Ricks, Dean Fairbanks	Fairbanks District Fairbanks	1	Prospecting
Robinson, George F. Boundary	Wade Creek Fairbanks	1	Nonfloat
Rosander & Gates Ophir	Bear Creek Mt. McKinley	3	Nonfloat
Rosander & Reed Ophir	Yankee Creek Mt. McKinley	4	Nonfloat
Ross, Donald Ketchikan	SE Alaska Several	2	Aerial magnetometer
Schaefer, Norman J. 62 Copeland Avenue LaCrosse, Wisconsin	Cinnabar Creek Kuskokwim	7	Mercury lode exploration
Shattuck Denn Mining Corp. 120 Broadway, New York	Alaska General Several	1	Exploration
Sheldon, Charlie Shungnak	Shungnak River Noatak-Kobuk	1	Jade placer
Shell, Louis & Associates Moose Pass	Mills Creek Seward	5	Hydraulic
Shrove, Ward c/o Ken Hinchy, Anchorage	Purchase Creek Palmer	1	Placer exploration
Sirilo, Julius Box 625, Bethel	Aniak District Kuskokwim	1	Prospecting
Slate Creek Mining Co.	Slate Creek Slate Creek	2	Nonfloat
Snider, Heinie Wasilla	Gold Chord Palmer	1	Exploration