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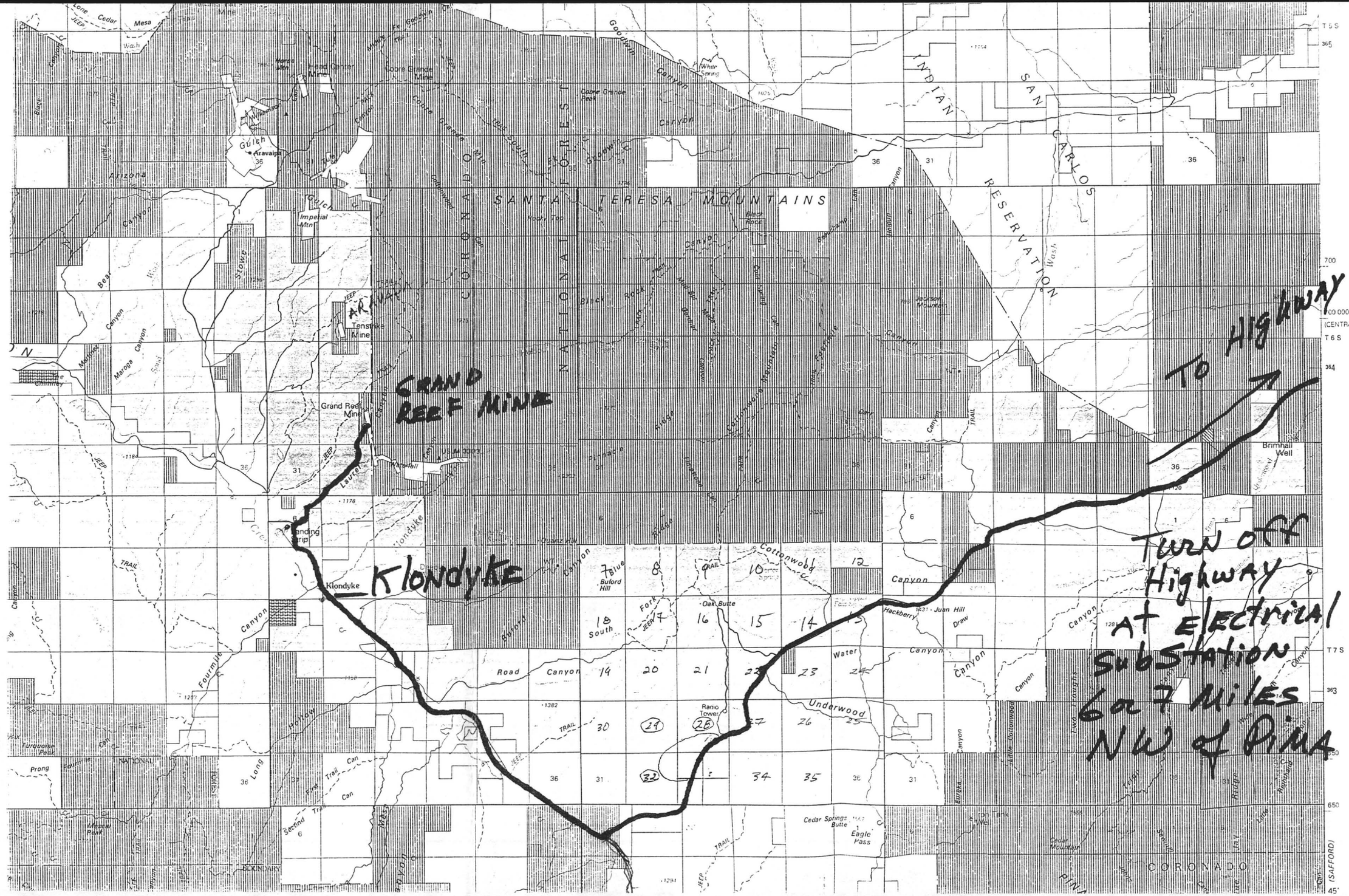
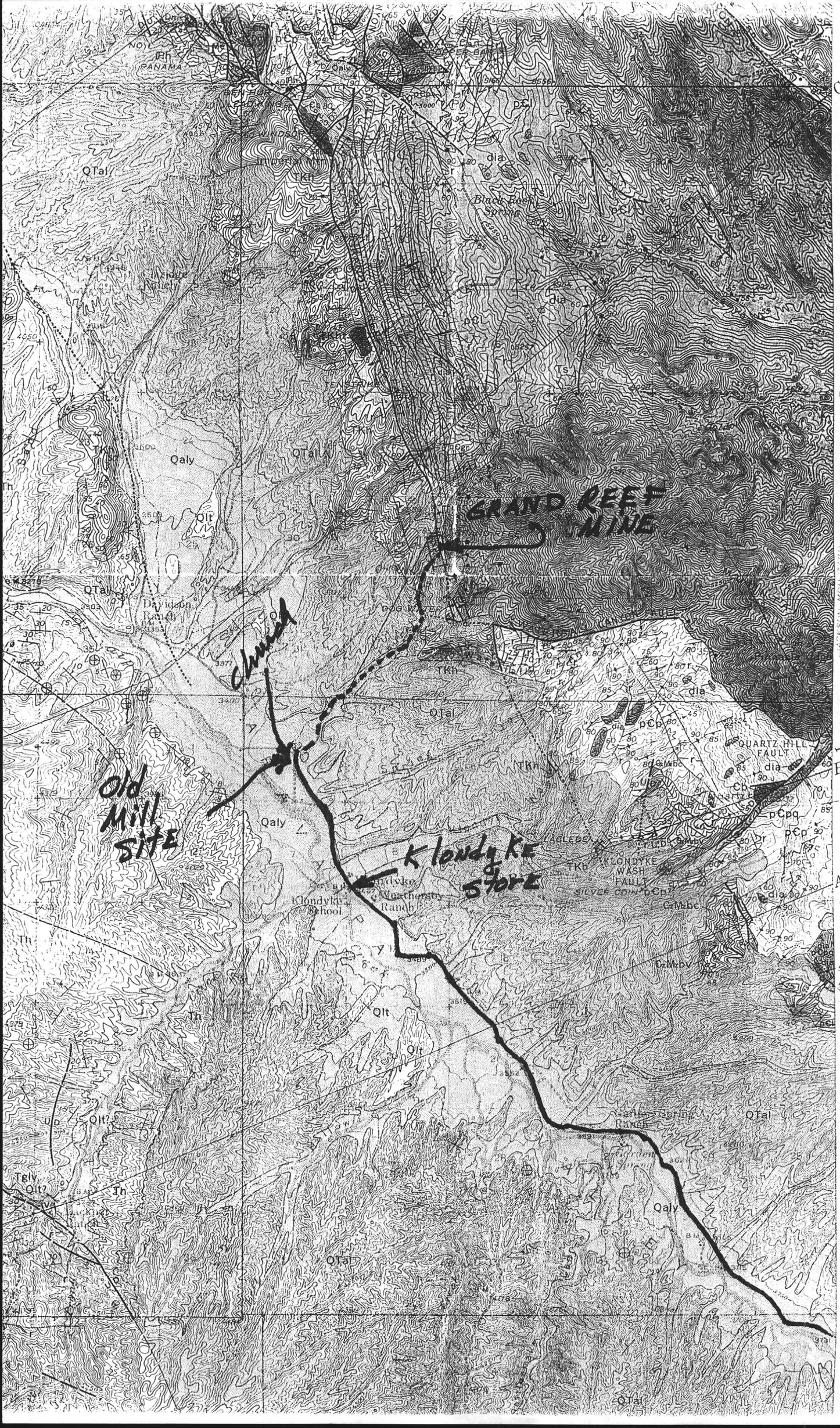

GRAND REEF MINE
Klondyke
TO HIGHWAY
TURN OFF Highway at Electrical SUBSTATION 6 or 7 Miles NW of PIMA
SANTA TERESA MOUNTAINS
CORONADO NATIONAL FOREST
SAN CARLOS INDIAN RESERVATION
Grand Reef Mine
Marshall
Landing Strip
Aravaipa
Imperial Mtn
Tenstrike Mine
Brimhall Well
Juan Hill
Oak Butte
Radio Tower
Cedar Springs Butte
Eagle Pass
Buford Hill
Cottonwood
Underwood
Hackberry
Road Canyon
Fourmile Canyon
Maroga Canyon
Bear Canyon
Stowe
Laurel
Klondyke
Blue
South
Water
Fork
Prong
Long
Hollow
Trail Can
Second
Cedar Mountain
Rocky Top
Black Rock
Cottonwood Mountain
Cedar Mountain
Eureka
Ridge
Rattlesnake
Tonto
Sawmill
Jay
Lake
Cedar
Canyon
Wash
Mine
Gulch
Arizona
Goodwin
Cobre Grande Mine
Cobre Grande Peak
Cobre Grande Mtn
Mesa
Lone Cedar
Black
Mallinckrodt
Chimney
Turquoise Peak
Mescal Peak
Tonto
Pinal
Coronado
(SAFFORD)
(CENTRAL)
T 5 S
T 6 S
T 7 S
700
650
45'


GRAND REEF MINE
Old Mill Site
Klondyke Store
Church
Black Rock Spring
Davidson Ranch
Klondyke School
Weathersby Ranch
KLONDYKE WASH FAULT
QUARTZ HILL FAULT
SILVER COIN
PANAMA
QTal
Qaly
Qlt
Th
TKh
dia
pЄp
pЄpq
Tgly
C'
B'
A'

PRINCESS PAT
LANDSMAN CAMP FAULT
COBRE GRANDE FAULT
COBRE GRANDE
GOODWIN CANYON
IRON CAP FAULT
OREJANA
ARIZONA
FAIRVIEW
BLACK HOLE
PANAMA
Black Rock Spring
TENSTRIKE
DOG WATER
WATERFALL CANYON FAULT
QUARTZ HILL FAULT
KLONDYKE WASH FAULT
SILVER COIN
LACLEDE
Klondyke School
Weathersby Ranch
Garden Spring Ranch
JACKSON MOUNTAIN
Qaly
Qlt
QTal
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A
A'
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B'
C
C'

THE UNIVERSITY OF ARIZONA
TUCSON, ARIZONA 85721

ARIZONA BUREAU OF MINES TEL. (602) 884-2733

17 January 1973

Hal Gardner
6102 East 24th Street
Tucson, Arizona 85711

Dear Hal:

This will transmit to you the results of the several tests performed on the sample of copper-lead-silver ore you delivered to this laboratory on or about 24 September 1972. I believe you said the ore came from your property in Mohave County.

An assay of a sample of the ore received showed 1.51 percent total copper, 1.00 acid soluble copper and 12.1 lead. You reported 2.99 opt. of silver.

The acid consumption per ton of ore was determined to be 210 pounds. This was derived from a 3-day test on a representative cut sample of finely-ground, approximately minus 100-mesh ore. Based on the heads assay, this equates to 7 lbs. per pound of copper, or 10.5 lbs. per pound of acid soluble copper.

A mineralogical examination revealed appreciable chrysocolla, some cuprite, malachite, brochantite (?), and what appears to be the hydrated lead-copper sulphate linarite. There is also an appreciable quantity of oxidized lead minerals, principally cerrussite ($PbCO_3$) and anglesite ($PbSO_4$), but only a trace of galena. No argentite was observed.

If you have any questions or if there is any matter we can discuss further, please let me know.

Very truly yours,

David D. Rabb

David D. Rabb
Mining Engineer

DDR:rj

LEACHING TESTS:

1. A 4-day agitation leach test on duplicate 200 gram samples of pulverized ore resulted in an extraction of 83.5 percent of the total copper and 92 percent of acid soluble copper. See Table 1. The acid consumption to maintain a pH of 1.8 was 220 pounds per ton.

2. When the test was repeated using 3-kilogram samples ground to pass one-quarter inch, corresponding extractions were 81.5 and 89 percent after 5 days at ambient room temperature (70° F). See Table 1. In this leach test, the acid requirement was 210 pounds per ton of ore to maintain an off-solution pH of 1.9. The acid was added by top flooding, with intermittent drainage so as to insure adequate oxidation of the 24-inch column. Temperature averaged about 70° F. The off-solution contained 18.0 gpl. of copper in 1750 cc. of off-solution from the 2 liters of on-solution applied. Leach bed was washed with 4 separate 200 cc. washes of 200 cc. each prior to drying and assaying. Solution retained in drained leach bed equated to about 10 percent moisture.

Using 18 gpl. in 2 liters of on-solution, the extraction in solution calculated to be 80 percent as compared to the 81.5 percent derived from assays of the tails.

At the primary addition of acidified on-solution, there was considerable gas evolution and a very black armored froth resulted. When a small sample of the material in this froth was analyzed by spectrograph, appreciable lead with some silver was indicated. We therefore concluded a flotation test might be interesting.

TABLE 1. RESULTS OF LEACHING TESTS

	Copper		Recovery	
	Total	Acid Sol.	Total	Acid Sol.
Heads	1.51	1.00		
Leached Tails (65 mesh)	0.26	0.08	83.0	92
Leached Tails (1/4 inch)	0.28	0.11	81.5	89

Solution Balance: $\frac{18 \text{ gpl} \times 2.\text{L} = 36 \text{ gms}}{3 \text{ Kg} \times 1.51 = 45.5 \text{ gms}} = 80\%$ Extraction

Table 1. 81.5% $\cong$ 80%

SHAKING TABLE TESTS:

Two runs were made to test the possibility of using a Welfley shaker table to concentrate the ore by wet gravity methods. As presented in Table 2, the data show that in Run I, using minus 12-mesh feed, a primary concentrate was recovered containing 41 percent of the lead and 35 percent of the silver: Grade, 41.2 percent lead, 8.6 opt. silver. Concentration ratio, 8.4 to 1.

Run II demonstrated that tabling of coarser material is not effective. In fact after viewing the products from Run I, it is clearly indicated that with finer grinding (particularly if it could be staged, non-sliming, very fine crushing in place of attrition-style grinding) the results of a wet gravity separation might be much better. It is suggested a 48 or a 65-mesh material would improve the recovery and the grade of the concentrates.

TABLE 2. SHAKING TABLE TESTS

I. 12-mesh	Wt, gms	Wt %	Cu %	Pb %	% dstn	Ag, opt	% dstn
Heads	4770	100	1.51	12.1	100	2.99	100
Cone #1	570	12		41.2	41	8.6	35
Mids	1420	30		8.1*	59	2.2*	65
Tails	2700	58					

Ratio - 8.4:1

II. 1/4-inch	Wt, gms	Wt %	Cu %	Pb %	% dstn	Ag, opt	% dstn
Heads	4770	100	1.51	12.1	100	2.99	100
Cone #1	1480	31		14.7	37.5	4.3	45
Mids	920	19					
Tails	2350	50					

Ratio - 3.1:1

*calculated

FLOTATION TEST

The oxidized character of the ore, the froth observed in the leaching test, and the amount of silver in the heads and in the froth suggest that a sulphized flotation test was in order. As shown in Table 3, the results of a standard laboratory flotation test indicate a 51.4 percent recovery of the silver and 78.5 percent of the lead in a combined flotation concentrate.

A high grade silver (83.5 opt.) concentrate can be secured but only in a concentrate ratio of 100 to 1, with less than 20 percent silver recovery. A lead concentrate containing 75.2 percent of the lead was obtained at a grade of 55.8 percent. Concentration ratio, 7.5 to 1. Both of these concentrates appear to be of marketable grade. What smelter returns could be would depend upon negotiations with the purchasing smelter.

Note that almost 90 percent of the copper remains in the float tailings. It is probable that, should flotation be followed by leaching, acid consumption would be considerably less than the 200-plus pounds per ton on the raw whole ore because a considerable fraction of the acid consuming gangue will have reported to the flotation concentrate.

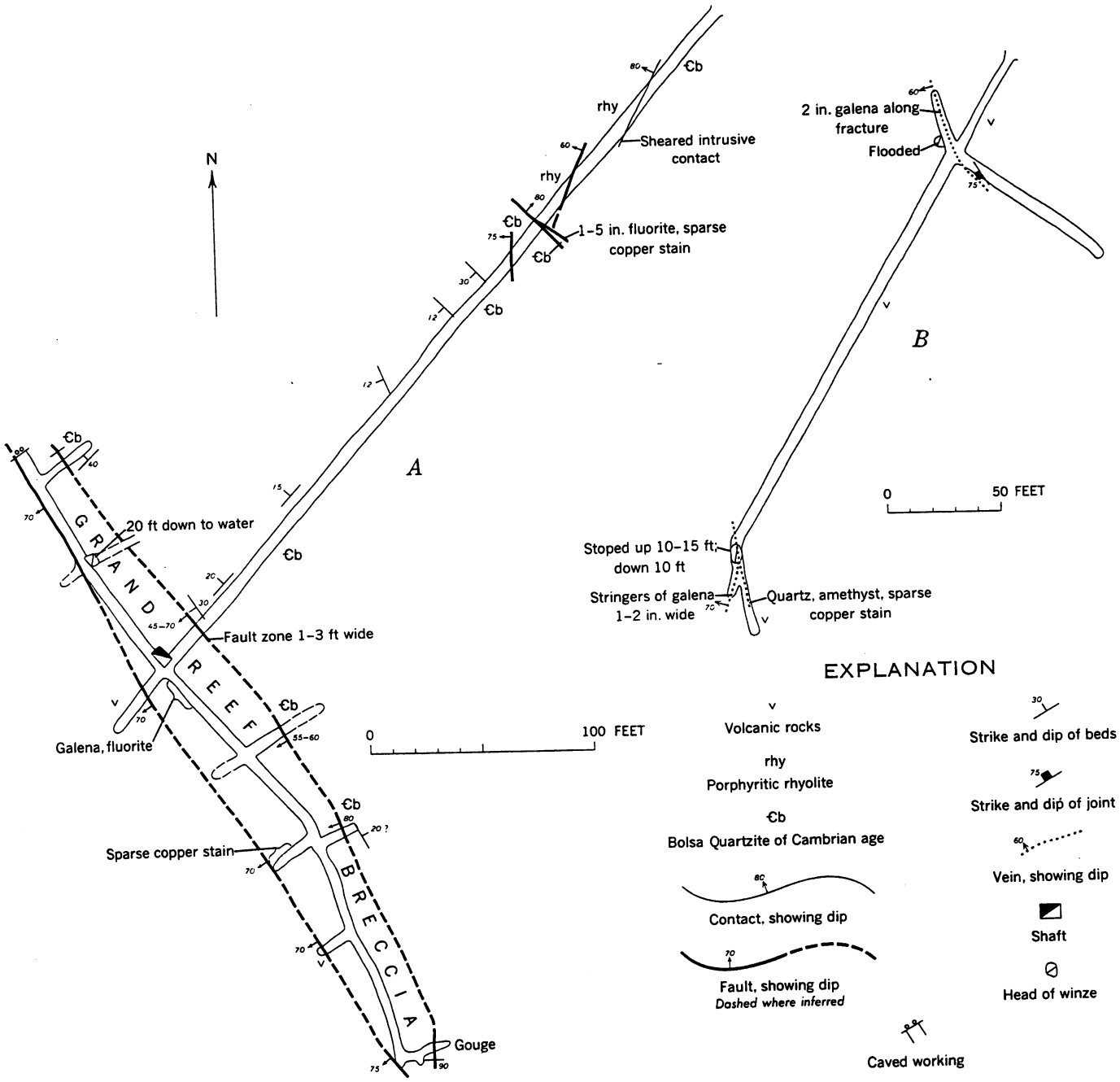


FIGURE 38.—Geologic maps of underground workings in the Windsor mine area. *A*, Adit level of the Windsor mine. *B*, Adit on the May Tustin(?) claim.

for the most part although some may be dike rock. Mine workings are shown in figure 47*B*. The veins are fracture zones having thin stringers of quartz, amethyst, and galena.

Several other shafts and adits penetrate Imperial Mountain; some along the Grand Reef were noted in the description of that structure (p. 109), and others are inaccessible or provide no evidence of mineralization.

PROSPECTS BETWEEN IMPERIAL MOUNTAIN AND THE TENSTRIKE MINE

Between Imperial Mountain and the Tenstrike mine, the Grand Reef has been prospected at several places.

In the SW. cor. sec. 8, T. 6 S., R. 20 E., a shaft now flooded is sunk on a breccia zone at least 20 feet wide.

Two prospects on the Grand Reef are in the SW¼ NW¼ sec. 17, half a mile northwest of the Tenstrike mine. At the northwestern prospect, the reef strikes N. 30° W., dips 75° SW., and is explored down the

dip for 40 feet. The hanging wall is a dike of porphyritic rhyolite 25 feet wide, the footwall is dark-brown hematitic breccia containing fragments several inches across. A little chrysocolla is the only ore mineral seen. The southeastern prospect is a series of shallow pits on highly silicified hematitic breccia that has only very sparse copper stain.

TENSTRIKE MINE

The Tenstrike mine is in the SW¼ sec. 17, T. 6 S., R. 20 E. It may be reached from Aravaipa Valley over a rough truck road. Mine workings consist of several short adits, a shaft 120 feet deep, and an open-cut south of the shaft. Ross (1925a, p. 88) says that probably a few carloads of ore had been shipped from this and contiguous claims. The only subsequent production reported is 311 tons of lead ore in 1942 and a few tons of ore in 1952; the workings now accessible give no evidence of appreciable production.

The Tenstrike shaft is sunk on a strong gougy fracture along the Grand Reef, striking N. 20°–25° W. and dipping 75° W. to 85° E. No ore was seen. In the canyon to the southeast of the shaft, an adit 120 feet long is driven S. 70° W. through the Grand Reef to the southwest wall, which is a fault striking N. 35°–45° W. and dipping 85°–90° SW. Along the fault is 1.5–2 feet of banded amethystine quartz and ground-up rock. The northeast wall of the Grand Reef has about 10 feet of gouge and breccia along it. No sulfide minerals were seen anywhere in the adit.

A second adit south of the first is driven N. 5° W. 45 feet along a barren fault in the Grand Reef breccia. The fault dips 70°–75° W.

The location of the Aravaipa shaft mentioned by Ross (1925a, p. 79) could not be ascertained definitely; it may be the caved shaft a short distance north of the Tenstrike shaft. Ross reports that the shaft was less than 100 feet deep and was connected to the Tenstrike mine by about 500 feet of drifts.

PROSPECTS BETWEEN THE TENSTRIKE AND GRAND REEF MINES

Between the Tenstrike and Grand Reef mines, the Grand Reef has been explored unsuccessfully at several places.

In the center of sec. 20, T. 6 S., R. 20 E., a shaft has been sunk on a fracture zone in Laurel Canyon Granodiorite 100 feet northeast of the Grand Reef fault. The fracture strikes N. 15° W., is vertical and has along it a little azurite, chrysocolla, and malachite. The shaft is filled with water to within 50 feet of the collar. Below the shaft, an adit has been driven in a N. 10° W. direction in granodiorite.

In the SW¼ sec. 20, another shaft 80–100 feet deep was sunk in greenish-gray altered Laurel Canyon Granodiorite near the Grand Reef fault. The shaft is probably on the Alto No. 3 claim, formerly the Copper Prince claim of the Tenstrike group (Ross, 1925a, p. 88). It is inclined 80°–85° in a S. 35° W. direction and apparently is entirely in barren granodiorite.

GRAND REEF MINE

The Grand Reef mine is in Laurel Canyon in the NE¼ sec. 29, T. 6 S., R. 20 E. It was formerly accessible by truck but the road is now in very bad condition above Waterfall Canyon. The mine has been described by Ross (1925a, p. 78–85) and Wilson (1950, p. 60–62). It was one of the largest producers of the Aravaipa district, probably second only to the Head Center mine.

The Grand Reef mine was developed in the 1890's but apparently no ore was shipped until 1915. For the period 1915–20, Ross reported that about 30,000 tons of ore was mined to yield 1,389 tons of crude shipping ore and 2,613 tons of concentrate. The crude ore had an average assay of 40.9 percent lead, 2.83 percent copper, 1.4 percent zinc, 20 ounces of silver per ton, and traces of gold. The mine appears to have been inactive from 1921–29. Most of the production shown for the period 1929–31 in table 7 came from the Grand Reef mine (Wilson, 1950, p. 56). According to the Minerals Yearbooks, most of the production from the Aravaipa district in 1939, 1940, and 1941 was also from the Grand Reef mine. No production has been recorded since 1941. In summary, the Grand Reef mine appears to have produced about 40,000 tons of ore that may have averaged about 8–9 percent lead, 1–2 percent copper, and 7 ounces of silver per ton (Ross, 1925a, p. 83).

The Grand Reef deposit is developed by an adit about 1,200 feet long (fig. 39), an interior shaft extending 300 feet below the adit level, and levels off the shaft at 100-foot intervals; Ross estimates the total length of workings at more than 4,000 feet. At present the shaft is flooded below a level (the 55-foot level of Ross?) some 70 feet below the adit level. The main ore shoot has been stoped for 200 feet above and at least 70 feet below the adit level, and other stopes, now backfilled or caved, are west of the main stope (the No. 3 stope of Ross) and 500–900 feet north of the main stope.

The Grand Reef at Laurel Canyon rises spectacularly above the canyon as a nearly vertical sheet of silicified breccia as much as 150 feet wide, striking just west of north. Laurel Canyon is a very narrow

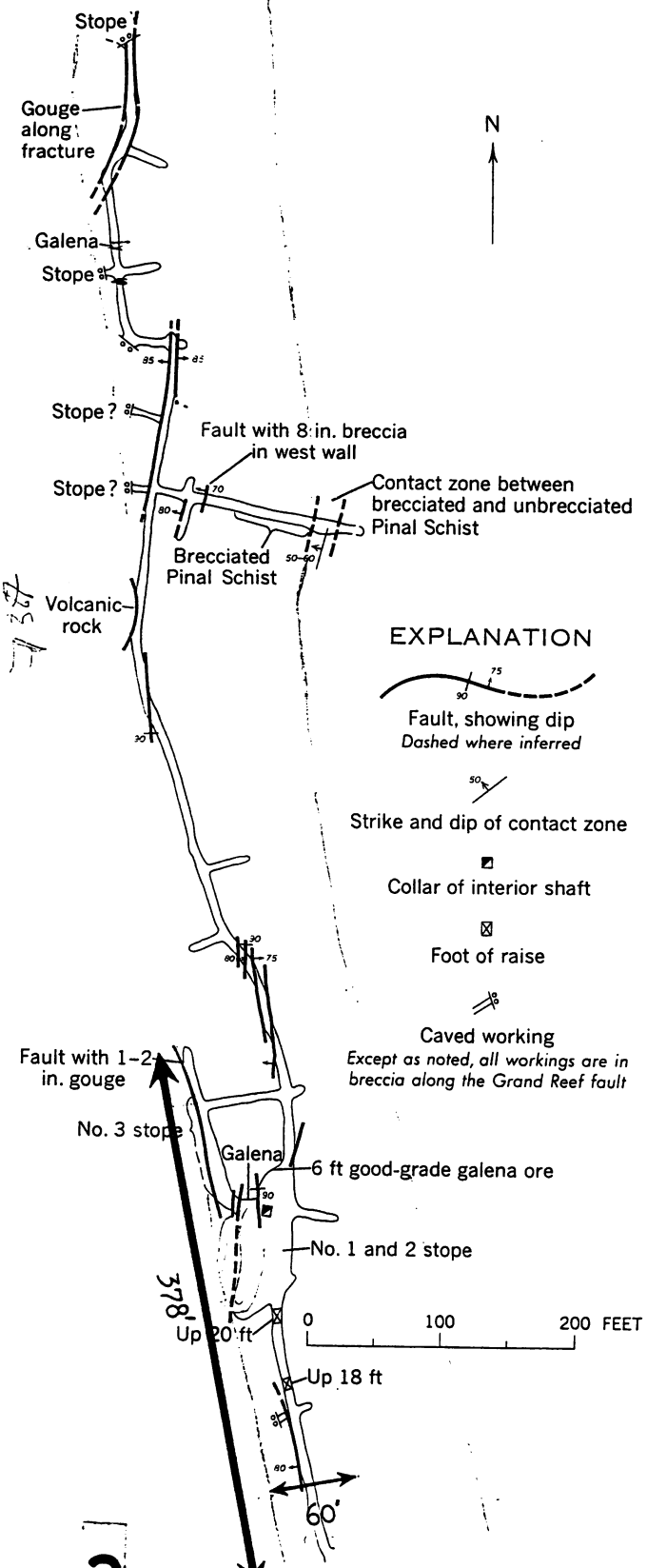


FIGURE 2.—Geologic map of the adit level of the Grand Reef mine.

notch where it crosses the Grand Reef. The Grand Reef mine workings are all north of the canyon.

The reef breccia consists of various-sized angular fragments of Pinal Schist in a matrix of silicic dike rock and quartz. So little ore is left in the accessible parts of the underground workings that not much is known about the occurrence of the ore minerals within the breccia, but apparently the breccia is replaced locally by massive galena. Specks of galena, sphalerite, and chalcopyrite also are disseminated in a granular quartz-fluorite breccia matrix. Pyrite appears to be scarce. Supergene minerals include considerable anglesite and minor cerussite, malachite, azurite, and chrysocolla. The only hypogene gangue minerals of consequence are quartz and fluorite.

The main ore shoot is reported by Ross to have a stope length of 120 feet and a width of 15–30 feet or more on the adit level. At a distance of 70 feet below the adit level, the main stope is 40–50 feet long and 10–15 feet wide and has a clearly defined north-striking vertical fracture along its west wall. The No. 3 stope extends from 30 feet below the adit level nearly to the surface and has a stope length of 60 feet and a width of 3 feet. Sizes of the other stopes are not known, but that near the north end of the adit may have been as much as 200 feet long. Wilson (1950, p. 62) also reports a stope on the 200-foot level south of the shaft.

DOGWATER MINE

The Dogwater mine is in an east branch of Laurel Canyon in the NW. cor. sec. 33, T. 6 S., R. 20 E. It was described briefly by Ross (1925a, p. 79, 85, fig. 4). The only production reported is an unknown part of 117 tons of mixed ore from the Grand Reef, Aravaipa, and Dogwater mines in 1920, and the size of the workings indicates that only a small amount of ore could have been produced.

Mine workings consist of an adit 190 feet long, driven S. 10°–25° E. on a vein along a fault of the Grand Reef structure, and a stope to the surface in the interval between 110 and 160 feet from the portal. The vein dips 80°–90° SW. In the face of the adit, the vein structure is 4–5 feet wide, and the vein consists of silicified fault breccia containing galena concentrated in small bunches in a layer 6–8 inches wide along the southwest wall or disseminated in silicic gangue. Gangue minerals are quartz, chalcedony, and purple to white fluorite. Supergene minerals include anglesite, cerussite, and a little malachite, azurite, chrysocolla, and plumbojarosite. Wulfenite in veins as much as an inch thick and in vugs is sufficiently abundant to suggest that it may be a hypo-

gene mineral; no source of the molybdenum is apparent, galena being the only sulfide mineral seen.

A second adit 250 feet north-northeast of the main adit and possibly on the Silver Cable claim is caved 50 feet from the portal. Ross (1925a, p. 79) stated that the adit is a few hundred feet long, and has stopes above. The adit trends southeast along a fault zone between Santa Teresa Granite and Pinal Schist; the fault zone dips steeply northeast. Near the fault, the Pinal is cut by several narrow fine-grained gray porphyritic dikes that trend about parallel to the fault. Over a width of as much as 3 feet the zone is marked by veinlets of quartz carrying a little copper stain, flecks of galena, and some anglesite and cerussite; the largest quartz vein is about a foot across, and a few anglesite veins are as much as an inch across.

JUNCTION PROSPECT

A prospect on the Grand Reef fault north of Waterfall Canyon in the center of the N½ sec. 33, T. 6 S., R. 20 E., is believed to be on the Junction claim. Country rock includes Pinal Schist, silicic dikes, and breccia of the Grand Reef fault; a section along the south side of the gulch in which the prospect is located is shown on figure 40. A specimen of the more westerly vein consists mostly of finely crustified quartz and fluorite with a little carbonate, hematite, barite, and galena. These minerals are cut by late quartz veins.

LACLEDE MINE

The Laclede mine is in a branch of Klondyke Wash just north of the center of sec. 10 (unsurveyed), T. 7 S., R. 20 E. It was described by Ross (1925a, p. 86), who said that a production of three carloads of ore (copper-silver?) had been reported.

The mine is in blue-green fine-grained amygdaloidal and scoriaceous andesite of the volcanic member of the Buford Canyon Formation; the volcanic rocks rest on the conglomerate member just northeast of the mine. The country rock is cut by many fractures that trend N. 10°–50° W., dip 55°–80° NE., and are filled with epidote. According to Ross, the mine is on a nearly vertical vein that strikes about east.

On the northwest side of the gulch, an adit 40 feet long trends N. 10° W. and connects to a shaft 30 feet deep; and on the southeast side of the gulch is a second, flooded shaft. A very small amount of chrysocolla is on the dump of the first shaft. Ross cites reports of native silver and of assays very high in silver.

SILVER COIN MINE

The Silver Coin mine is in the south branch of Klondyke Wash in the SW¼ sec. 11 (unsurveyed), T. 7 S., R. 20 E. The mine was described by Ross (1925a, p. 87), who reported that small lots of ore had been shipped up to 1925. The only recorded production since then is an unknown tonnage in 1947.

The Silver Coin vein is along a fault between a small plug of biotite quartz latite(?) to the north and the volcanic member of the Buford Canyon Formation to the south. The fault strikes N. 70° E., dips steeply north, and has been traced along the strike for about 700 feet; it may be a southwesterly extension of the Quartz Hill fault (p. 106). Wallrock exposed along the south side of the vein on the adit level and also in both walls on the lower level is believed to be a fault sliver of Pinal Schist. At the portal of the adit, the latite has a dark chilled selvage 3 feet wide against Pinal Schist, indicating that the fault may be nearly along the original intrusive contact. The vein has been explored by a shaft 105 feet deep, an adit connecting with the shaft, and a level 40 feet below the adit level. Geologic maps of the two levels are shown on figure 41.

The vein consists mainly of silicified brecciated wallrock. The south wall of the vein commonly is well defined, whereas toward the north wall the breccia passes gradually into massive rock. Along the adit level, most of the vein is low grade or barren

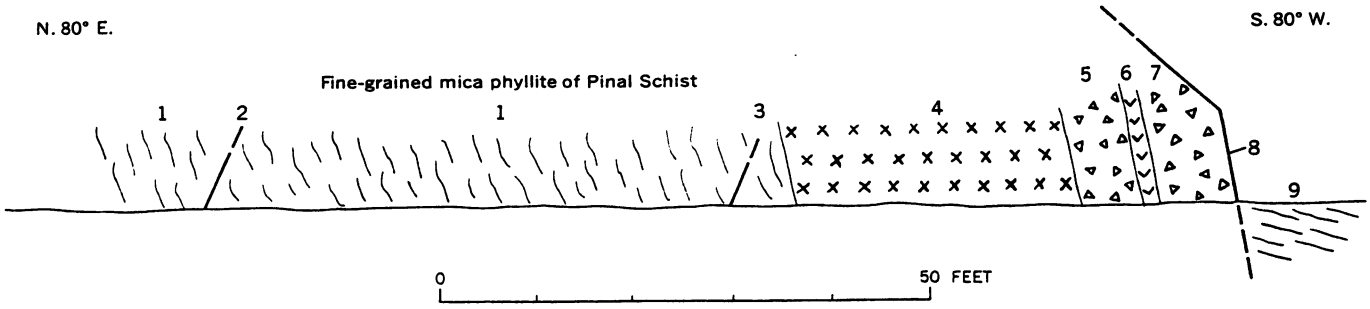
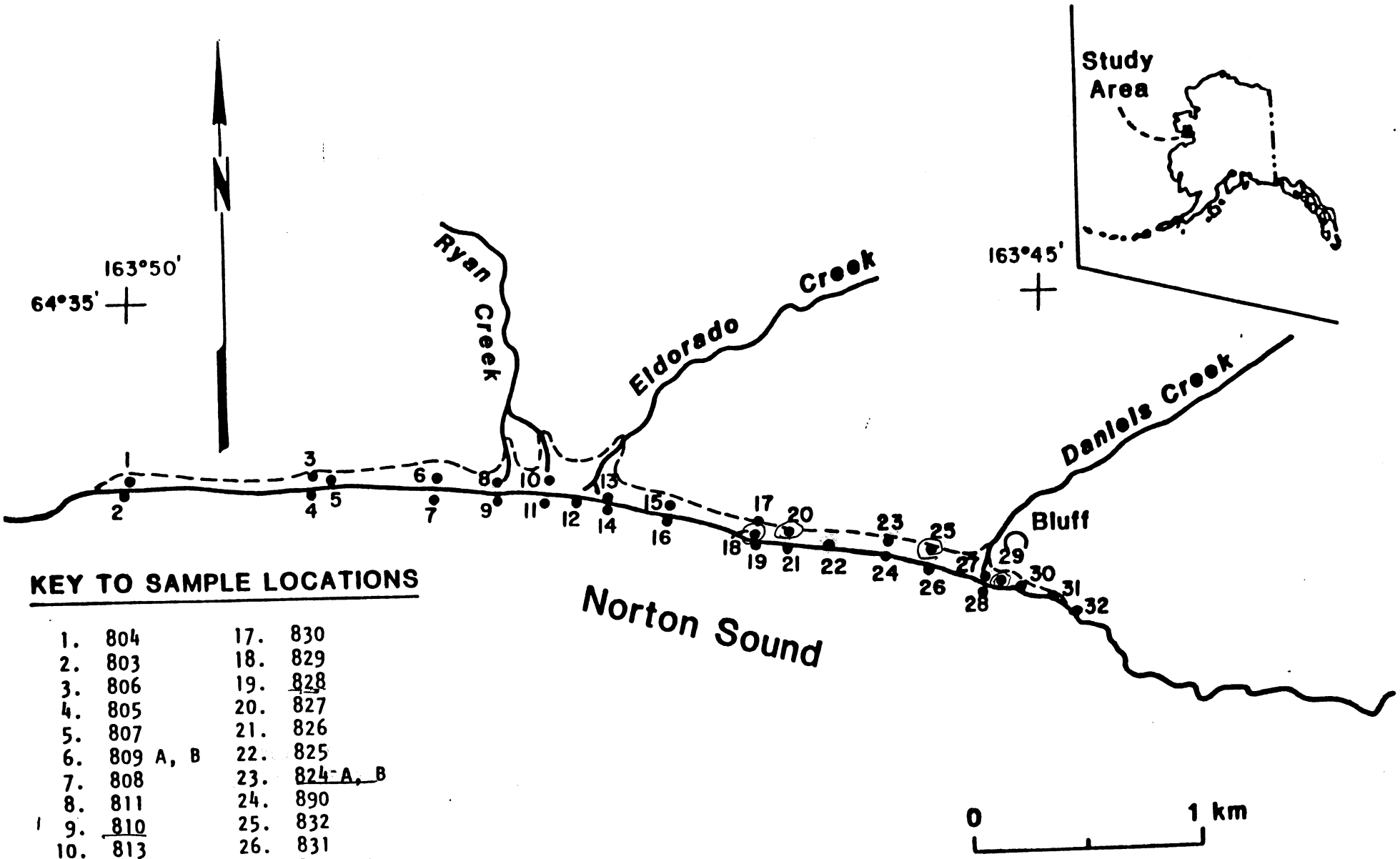


FIGURE 40.—Sketch of geologic section along south side of gulch, Junction prospect, looking about south. 1, Pinal Schist: fine-grained mica phyllite. 2, Vein; hard quartz-galena-anglesite 5–10 inches wide; very low grade. 3, Vein; finely banded quartz-fluorite-carbonate-galena 10–12 inches wide; very low grade. 4, Gray fine-grained porphyritic rhyolite dike. 5, Green fine-grained breccia; some rhyolite, some may be Pinal. 6, Light grayish-green altered porphyritic latite(?) breccia. 7, Red breccia; footwall has finely banded chalcedony or opal. 8, Hanging wall of Grand Reef fault. 9, Horse Mountain Volcanics; not exposed at gulch level.

Appendix II - Gold data

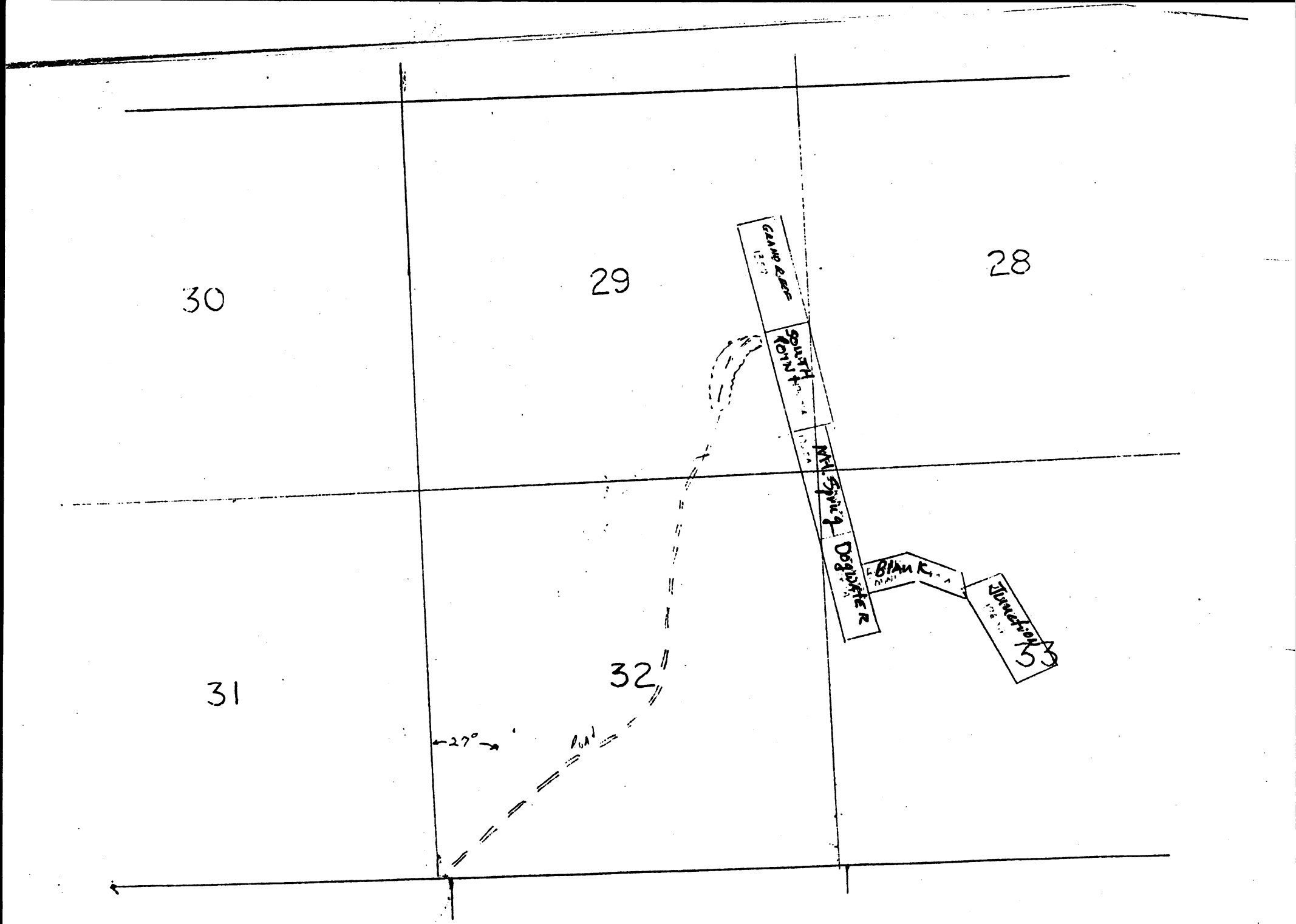
Sample No	Initial wt. of sample for Au analysis (g)	Total µg Au	Total ppm Au	Range of ppm Au	Size fraction (mm) containing largest concentration of Au in ppm.	
801-A	4905	548.1	0.1117	0.05-0.87	.088 (62,44 & <44 portions lost)	@ $100.00/oz
801-B	4848	807.9	0.1438	0.11-16.8	.044	
801-C	5091	1014.6	0.1993	0.20-42.5	.062	$164.00
801-D	5266	73,522.0	13.97	4.1-314.3	.125	
802-A	4907	447.4	0.0912	0.08-9.3	.062	$15.27
802-B	6003	7790	1.2977	0.52-650.1	.062	
802-C	5204	318.3	0.0610	0.06-45.1	.062	
802-D	5257	3146.8	0.5986	0.11-343.0	.062	$7.00
802-E	5928	17,230.4	2.91	0.68-21.35	.500	$34.00
803	5456	74.3	0.128	<0.003-11.4	.062	
804	5349	33.7	0.0061	0.01-2.4	.088	
805	5271	47.5	0.0085	0.003-12.9	.044	
806	6039	693.2	0.1148	0.05-2.15	.177	
807	6460	1369.2	0.2119	0.08-48.0	.088	$2.49
808	6179	610.9	0.0989	0.01-204.0	.044	
809-A	5178	863.6	0.1668	0.03-4.0	.125	
809-B	3449	46.2	0.0134	0.008-0.099	.062	
810	6116	1461.6	0.2390	0.05-138.6	.062	$2.81
811	6046	5117.6	0.8464	0.24-37.0	.125 (88,62,44 and <44 portions lost)	$9.96
812	5207	154.5	0.0293	0.003-56.4	.044	
813	4997	73.3	0.0146	0.01-8.3	.062	
814	5054	139.7	0.0270	0.0006-32.2	.044	
815	4884	88.8	0.0182	0.008-8.8	.062	
816	5339	106.0	0.0197	0.02-3.3	.088	
817	4810	114.4	0.0238	0.02-3.7	.062	
818	5427	309.6	0.0569	0.05-5.6	.088	
819	4822	103.4	0.0214	0.01-15.6	.062	
820	5551	869.2	0.1566	0.011-10.6	.062	
821	5098	110.3	0.0216	0.01-8.6	.044	
822-A	4907	200.6	0.0409	0.02-0.13	.044 and <.044 (equal amounts)	
822-B	5275	569.6	0.1080	0.09-10.0	.062	
823-A	5537	4557.6	0.8231	0.05-303.3	.062	$9.68
824-A	6526	6127.4	0.9389	0.37-144.0	.062	$11.05
824-B	3923	2345.0	0.5978	0.11-80.0	.062	$7.03
825	5388	4376.2	0.8122	0.31-227.6	.062	$9.55
826	4813	184.9	0.0384	0.01-3.0	<.044 (62 portions lost)	
827	6275	16,344.0	2.6046	1.0-1640.0	.088	$30.64
828	4203	252.3	0.0600	0.068-8.6	.062 (88 portions lost)	
829	5703	5967.6	1.0464	0.25-460.0	.062	$12.31
830	5639	699.7	0.1241	0.08-0.82	<.044	
831	4458	617.2	0.1373	0.06-28.9	.062	
832	4695	16,760.0	3.5697	0.35-1117.7	.088	$42.00
890	3970	136.4	0.0344	0.02-2.5	.062	



KEY TO SAMPLE LOCATIONS

1.	804	17.	830
2.	803	18.	829
3.	806	19.	828
4.	805	20.	827
5.	807	21.	826
6.	809 A, B	22.	825
7.	808	23.	824 A, B
8.	811	24.	890
9.	810	25.	832
10.	813	26.	831
11.	812	27.	801 A-D
12.	814	28.	819
13.	816	29.	802 A-E
14.	815	30.	823 A
15.	818	31.	821 & 822 A, B
16.	817	32.	820

Figure 1. Index map showing location of study area and sample locations at Bluff, Alaska (U.S. Geological Survey Solomon C-4 Quadrangle).


30
29
28
31
32
33
GRAND REEF
SOUTH POINT
MH. Spring
DOGWATER
BLANK
Junction
27°

T6S, R20 E

ham and Pinal
55 miles north-
t of Globe; the
in Pinal County
d by parallels
5′ and 110°30′,
iles.

Klondyke was
m the Klondike
wever, long be-
ay be reached
tween Safford
l road, and also
hway 666, over
y be difficult or
route, seldom
tion Pass Road
ghway 666 be-
the Willcox-
Klondyke. 'A
ley of the San
as the Glory
mines, and a
ero Butte and
eep road leads
iver near the
ountain mine,
mine with the
mouth of Tur-
ands from the
up Goodwin
om a point on
of Coolidge
d Deer Creek
gravel roads
Ranch in the
Ranch just
and Turkey
r Creek, and
states of re-
d stock tanks.
rangle is more
gle, mainly in
tional Forest.
adrangle, and
miles east of
center of the
ump, a school-

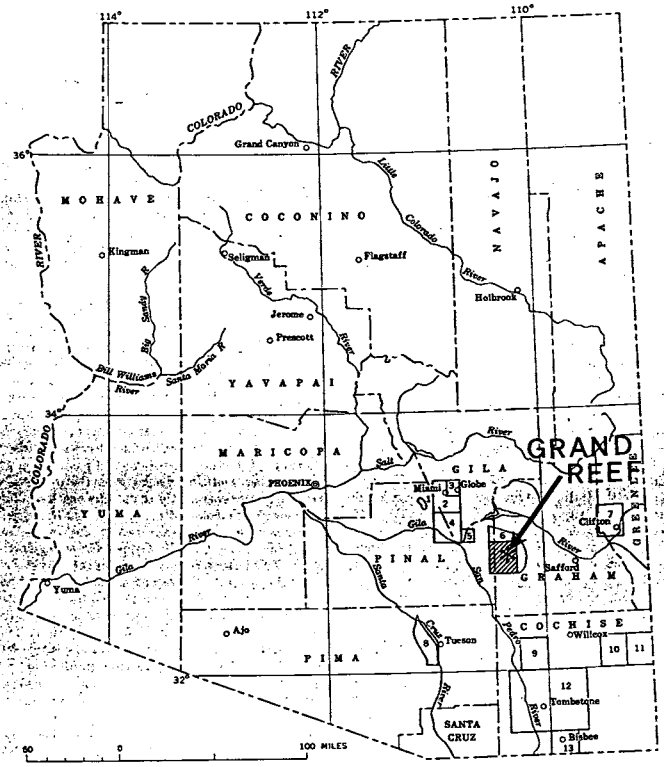


FIGURE 1.—Index map of Arizona showing location of the Klondyke quadrangle and of nearby areas on which detailed geologic studies have been published.

1. Superior district (Short and others, 1943)
2. Globe-Miami district (Ransome, 1903, 1904a)
3. Globe 7½′ quadrangle (Peterson, 1954)
4. Ray quadrangle (Ransome, 1919, 1923)
5. Christmas area (Ross, 1925b; willden, 1964)
6. Aravaipa-Stanley districts (Ross, 1925a)
7. Clifton-Morenci district (Lindgren, 1905a, 1905b)
8. Tucson Mountains (Brown, 1939)
9. Dragoon quadrangle (Cooper and Silver, 1964)
10. Cochise Head quadrangle (Sabins, 1957b)
11. Vanar quadrangle (Sabins, 1957b)
12. Central Cochise County (Gilluly, 1956)
13. Bisbee district (Ransome, 1904b, 1904c)

Ore Block

200' × 378' × 60' = 2,268,000 cubic feet
10 cubic ft/ton = 226,800 Tons of ore to Creek level

stope #1 & #2 material removed
81' × 188' × 40' = 308,320 cubic feet
10 cubic ft/ton = 30,832. Tons removed.

Total Tons to creek level = 195,968 Ton
(Cu = 1.15%)
Total Tons Copper present = 2,253.6 Tons
70% Recovery Heapleach = 1,577.5 Tons
or 3,155,000 lbs Copper

Depending on the current market price of copper

0.30/lb	= 946,500.00	Gross value
.38/lb	1,198,900.00	Gross value
0.40/lb	= 1,262,000.00	Gross value
0.50/lb	= 1,577,500.00	Gross value

[– less 10% Royalty payment after current taxes]

GRADE:

115 Samples for Cu Average 1.15% Cu
60 Samples for Ag Average 3.002% Ag
96 Samples for Pb Average 4.45% Pb

Tunnel X-cut ½ way up hill side

Date: 4-22-68

Dated: 4-7-69

	Ag	Au	Cu	Pb	Zn
GR#1	.3	Tr	4.3	2.8	1.30
GR#2	3.5	.08	2.6	2.7	1.10
GR#3	3.1	.05	.75	4.5	1.15
GR#4	2.6	.035	2.15	3.0	1.70
GR#5	4.8	.04	0.50	5.40	0.75
GR#6	1.4	.02	0.35	2.75	0.95
GR#7	1.10	.02	.05	3.10	1.00
Aver.	2.4	.036	1.53	3.46	

	Ag	Cu	Pb
GR#70	7.68	4.0	5.5
GR#80	1.66	2.5	5.6
GR#90	5.24	1.70	4.5
GR#100	4.44	1.30	3.5
GR#110	.60	.60	.70
Aver.	3.92	2.05	3.96

Reef ZONE Bottom to top

Date: 3-10-69

	Zn	Pb	Cu	Ag	Au
#6 + 30'	Tr.	.20	1.90	1.10	.011
#7 + 30'	Tr.	0	1.10	1.88	.02
#8 + 100'	Tr	15.2	7.00	3.02	.02
#9 + 100'	Tr	27.4	4.00	1.64	.06
#10 + 100'	Tr	Tr.	4.5	2.28	.02.
#11 Grab from tunnel	0	13.1	1.2	8.10	.012
#12 Funks Tunnel	0	45.3	1.5	17.28	Tr.
Aver.		14.46	3.03	5.04	

Reef Zone Top to bottom

Cu	Pb
.70	0
.80	1.4
.00	1.0
.40	1.0
.40	1.0
1.80	.90
.40	.50
.20	.20
.20	.90
.40	.40
.50	.40
1.00	.30
1.00	8.40
2.00	.30
.90	.60
1.00	1.00
.70	.60
.60	1.30
.90	.90
.30	.60
.90	.60
.40	.60
1.00	1.00
.40	
Aver. .70 Cu	1.05 Pb

Total Average Reef For Samples.

Ag = 3.79 oz/ton.

Cu = 1.83 %

Pb = 5.73 "

Dump Samples Along Creek

Date: 4-22-68

	Ag	Au	Cu	Pb	Zn
GR#23	3.90	.020	.24	.95	0.40
GR#24	1.10	.030	.48	1.25	.80
GR#25	7.70	.085	.20	.40	Tr.
GR#26	10.50	.105	1.98	35.50	14.00
AVER.	5.80	.060	.73	9.53	

Date: 4-7-69

	Ag	Cu	Pb
GR#10	1.31	.85	.95
GR#20	1.33	.70	2.3
GR#30	1.18	.50	1.0
GR#40	1.61	.50	.90
GR#50	4.78	1.40	7.8
GR#60	1.30	1.0	.70
Aver.	1.84	.83	2.28

Date: 3-10-69

	Zn	Pb	Cu	Ag	Au
#13	1.5	6.5	1.10	3.38	.014
#14	1.7	3.5	1.10	1.82	.01
#15	1.5	4.3	1.20	3.74	.01
#16	1.5	1.4	1.0	1.08	.01
#17	Tr.	.70	.50	.52	.014
Aver.		3.28	.98	2.11	.010

North Side Creek, & So Side

4-8-69

	Ag	Cu	Pb
GR#131	5.41	1.50	10.20
GR#141	5.05	2.0	6.30
GR#151	6.50	1.2	8.20
GR#161	2.63	1.0	3.5
GR#171	3.62	.75	4.0
Aver.	4.64	1.29	6.44

Date: 4-11-69

[So side Creek]

	Pb	Cu
GR#9	2.2	1.25
#10	4.60	1.0
#11	5.0	1.0
#12	3.3	.60
#13	2.2	.40
#14	2.2	.60

[Northside]

	Pb	Cu
#15	5.2	.80
#16	5.8	.70
#17	6.2	.80
Average	4.08	.79

Dump
Average for all sample.

Cu = .92 %

Ag = 3.60 oz/ton

Pb = 5.12