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AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 29, 1954

MEMORANDUM FOR MR. T. A. SNEDDEN

ARIZONA CONSOLIDATED Au & Cu MINES
Mineral Creek District
Pinal County, Arizona

Reference is made to Mr. F. V. Richard's letter of October 27 to you regarding the porphyry copper prospect being promoted to the Hunt Company by a Mr. Thompson.

Early this year Mr. Thompson talked with me about the Arizona Consolidated property upon which he had obtained the option. I am sure this is the property that Mr. Frank Briber was referring to. This property has been turned down by us several times, most recently by Mr. Papke when he was making ground checks in that area following aerial reconnaissance.

There seems no reason to look into this particular property any further. However, there are other possible alteration areas in this general region which we have on our list of places to be checked for porphyry copper possibilities. In view of the possible activity in the area by the Hunt Oil Company, we will plan to go into that region and finish our ground and aerial reconnaissance as soon as possible. Mr. Courtright may be able to go up there next week for a day or two and Mr. Papke will start working the area whenever he is finished with starting Mr. Johns on the Silver Bell mapping.

Yours very truly,

Original Signed By
K. Richard

KENYON RICHARD

KR:ar

cc: FVRichard
WRLandwehr
JHCourtright
KGPapke

Mr. Johnson:

Aa-16A. 13.0A

This will introduce to you our Mr. Courtright who may call on you if I am absent from the office when we hear from you. I will greatly appreciate any help you can extend us.

L.K.W.

October 16, 1950

Mr. John F. Johnson, President
Arizona Consolidated Gold & Copper Mines, Inc.
Florence, Arizona

Arizona Cons. Gold & Copper Mines, Inc.
Mineral Creek District
Pinal County, Arizona

Dear Mr. Johnson:

Mr. Richard C. Holmquist of the General Electric Company recently submitted to our New York Office reports by Mr. Thompson on the Arizona Gold and Copper, east of Florence.

You may recall that earlier last year you very kindly gave us your permission to examine the surface showings of the property. At that time you were also in the midst of a program of diamond drilling but it did not seem opportune then to permit an inspection of the cores.

We were very much interested in your undertaking and inasmuch as there now seems to be some possibility of our considering the matter further, may I inquire if we may now at this time go into the results of your diamond drilling and your underground work? If so I would appreciate your telephoning me here, at our expense, at 3-2566 Tucson, in order that we may arrange the meeting either at the mine or at your home in Mesa, or here in Tucson, whichever would be most suitable to you.

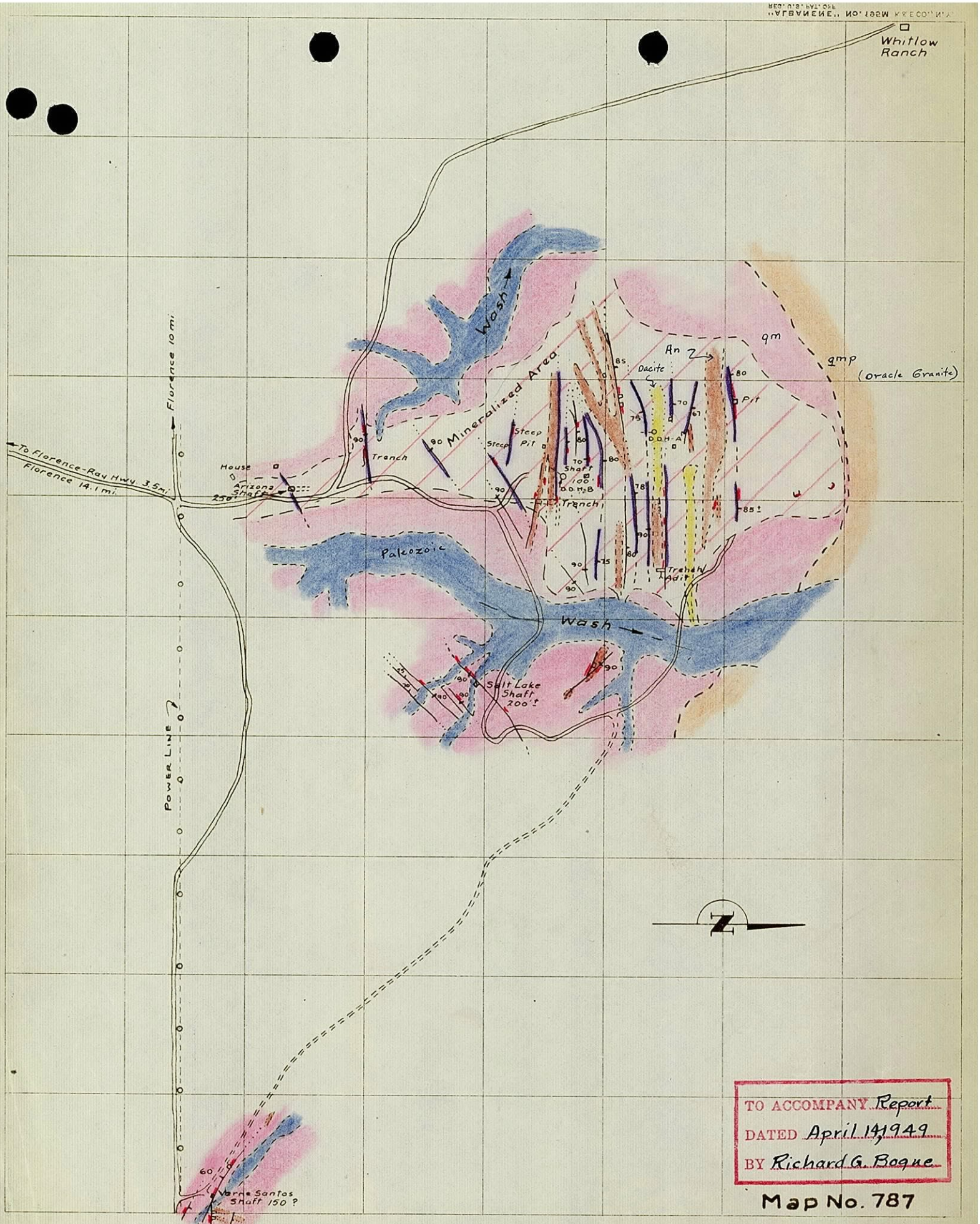
Yours sincerely,

L. KENNETH WILSON
Chief Geologist
Southwestern Division

LKW:ar

cc: Mr. Johnson
122 S. Mesa Blvd.
Mesa, Arizona

bcc: LHHart
WRLandwehr



TO ACCOMPANY Report
DATED April 14, 1949
BY Richard G. Bogue

Map No. 787

MINE Ariz. Consol. Gold & Copper Mines Co. LOCATION Florence District LEVEL Surface

GEOLOGY BY R.G. Bogue, G.A. Dirom SURVEY Brunton-Tape SCALE 1" = 1000' DATE 1-20-49

Aa-16A.2.3

R. I. 3914

AUGUST 1946

UNITED STATES
DEPARTMENT OF THE INTERIOR
J. A. KRUG, SECRETARY

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

REPORT OF INVESTIGATIONS

EXPLORATION OF THE COPPER BUTTE MINE
MINERAL CREEK MINING DISTRICT
PINAL COUNTY, ARIZ.

BY

HARLOW D. PHELPS

R.I. 3914,
August 1946.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION OF THE COPPER BUTTE MINE, MINERAL CREEK MINING DISTRICT, PINAL COUNTY, ARIZ.[1]

By Harlow D. Phelps[2]

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INTRODUCTION

The Copper Butte mine was examined, surveyed, and mapped (fig. 1) by a Bureau of Mines engineer in January 1944. As a result, it was decided to diamond-drill the deposit, using Bureau of Mines equipment, and drilling was started October 14, 1944, under the supervision of two Bureau engineers, and stopped April 5, 1945. Nine holes were drilled for a total of 1,274 feet, not including 48 feet on a lost hole. Figures 2 and 3 are sections at AA' and BB' of figures 1, and show the adjusted average assays of drill-hole samples. Figures 4 and 5 are separate maps of holes 4 and 6, respectively.

ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources, to the end that they make the greatest possible contribution to the national security and economy. It is the policy of the Bureau to publish the facts developed by each exploitation project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests. Both these branches are under the supervision of R. S. Dean, Assistant Director.

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from Bureau of Mines Report of Investigations 3914."

2/ Mining engineer, Bureau of Mines.

Special acknowledgment is due Dr. Eldred D. Wilson, geologist, Arizona Bureau of Mines, University of Arizona, Tucson, for his contribution of the chapter on Geology and the accompanying geologic maps of the Copper Butte area, which are a part of this report. Acknowledgment is made, also, to Robert M. Grantham, who assisted as project engineer during the life of the project, and to S. R. Zimmerley, regional engineer; H. W. St. Clair, assistant regional engineer; Paul T. Allsman, principal mining engineer, all of the Western Region, to J. H. Hedges, chief, and Thomas C. Denton and W. R. Storms, acting chiefs, Tucson Division, for aid and direction given.

LOCATION AND ACCESSIBILITY

The mine is in the Mineral Creek Mining District, sections 19 and 30, T. 3 S., R. 13 E., G. and S. R. Meridian, Pinal County, Arizona. It may be reached by taking the Ray-Superior highway west from Ray and turning left at the top of a hill, 4 miles from Ray. It is 4 miles from this point to the property on a fair mine road, with a steep climb for the last mile.

OWNERSHIP

The property, consisting of eight patented lode claims, is owned by C. Fred Mitchell, Ray, Ariz.

HISTORY AND PRODUCTION

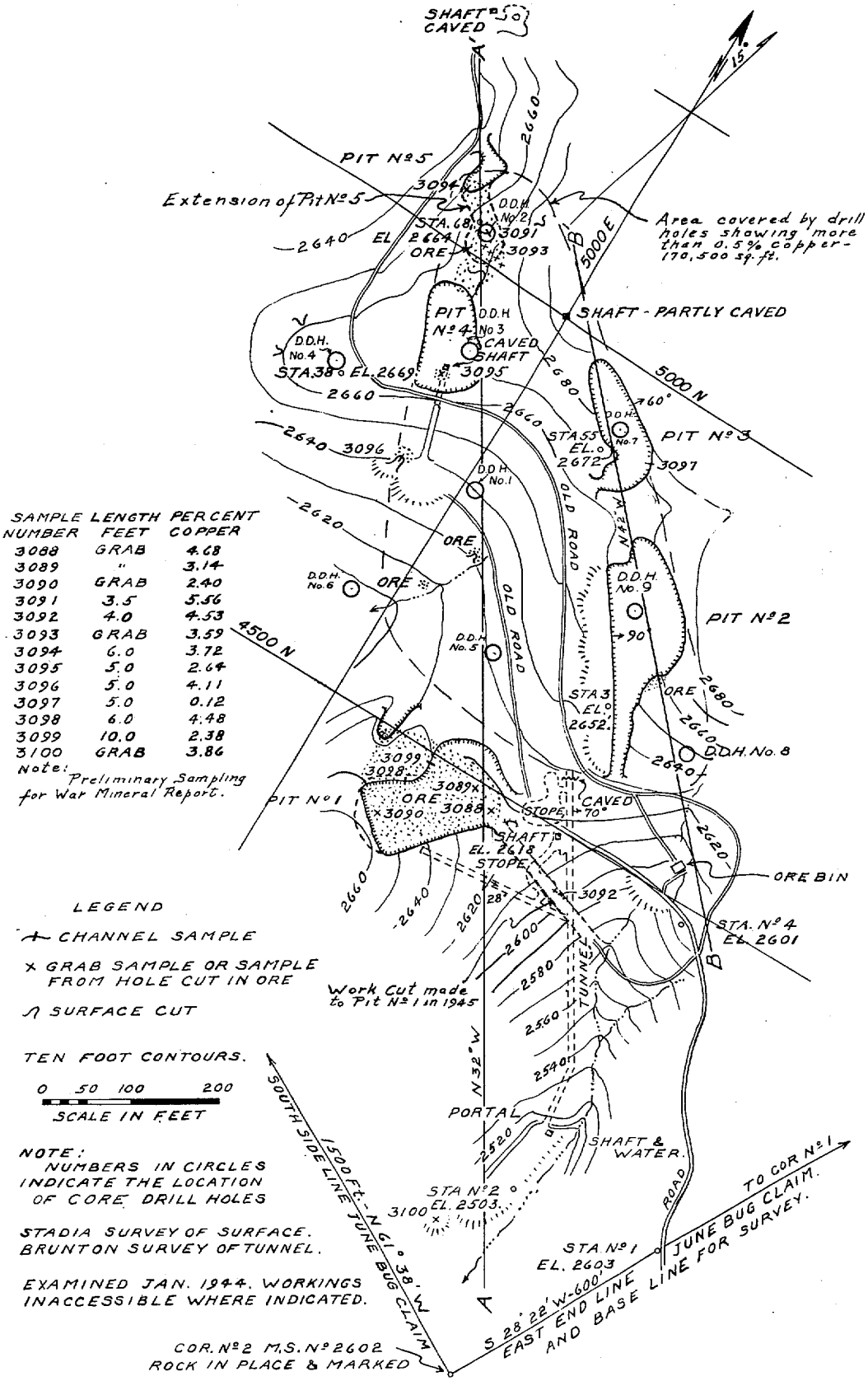
The property is believed to have been located about 1901. Eight lode claims were patented by the Copper Butte Mines in March 1909, Mineral Survey No. 2602, consisting of the June Bug, Cochise, and Butte Nos. 1 to 6, inclusive.

The only known record of early production was furnished by the American Smelting & Refining Co., as follows:

Tons	Cu, percent	Fe, percent	SiO_2, percent	Al_2O_3, percent
6,646	4.64	8.0	60.0	11.0

Shipments were made by F. C. Armstrong during 1917, 1918, and 1919 to the Hayden Smelter. The ore was trucked from the mine tunnel to Butte siding on the Southern Pacific Railroad over a 3-mile road. This road, all downgrade, followed a wash south to the Gila River. The railroad is on the opposite side of the river from the mine. At that time there was very little water in the Gila River, and the crossing was passable most of the year. Now the road is not practicable because of the larger amount of water released down the Gila river from the San Carlos reservoir.

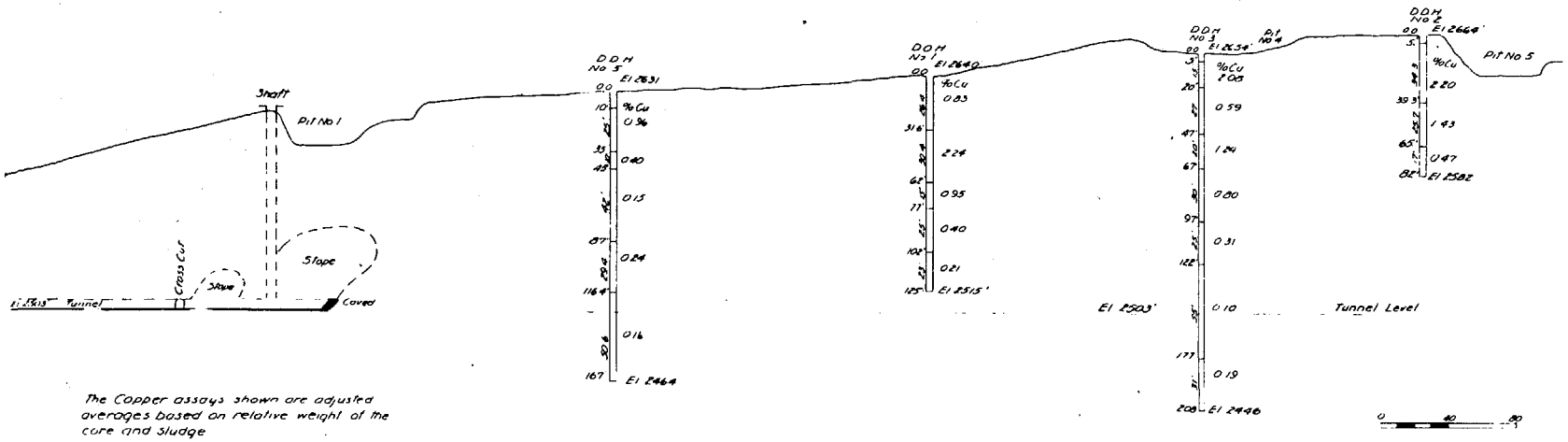
Fred Mitchell bought the property at a tax sale in 1941 and believes he has a clear title to it. The first mining done by the present owner was in an old stope south of the shaft on the tunnel level. A headframe was constructed and a hoist installed at the shaft (this shaft ends at the tunnel level). The ore from the stope was trucked directly to the International Smelter at Miami. Shipments were as follows:



SAMPLE NUMBER	LENGTH FEET	PER CENT COPPER
3088	GRAB	4.68
3089	"	3.14
3090	GRAB	2.40
3091	3.5	5.56
3092	4.0	4.53
3093	GRAB	3.59
3094	6.0	3.72
3095	5.0	2.64
3096	5.0	4.11
3097	5.0	0.12
3098	6.0	4.48
3099	10.0	2.38
3100	GRAB	3.86

Note: Preliminary Sampling for War Mineral Report.

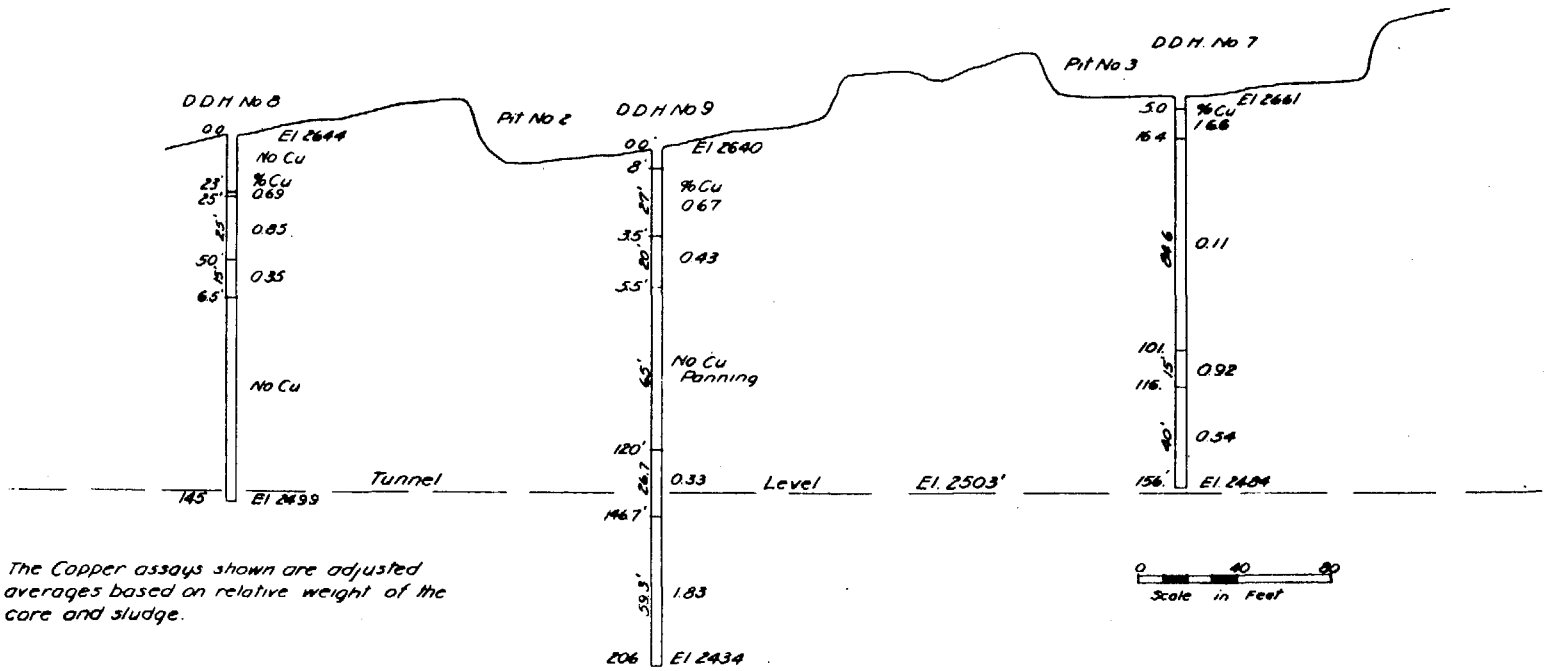
FIG. 1 — MAP OF COPPER BUTTE MINE — 1471



The Copper assays shown are adjusted averages based on relative weight of the core and sludge

PROJECTION ON VERTICAL SECTION A-A'-N32°W

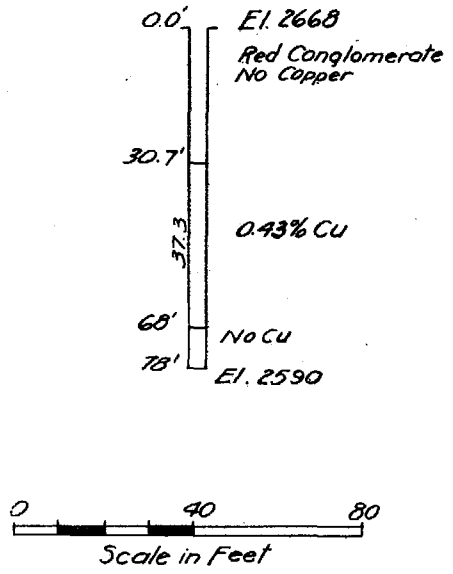
FIG. 2-COPPER BUTTE MINE-PROJECT 1471-PINAL COUNTY, ARIZ.



PROJECTION ON VERTICAL SECTION B-B'-N 42° W

FIG. 3-COPPER BUTTE MINE - PROJECT 1471 - PINAL COUNTY, ARIZ.

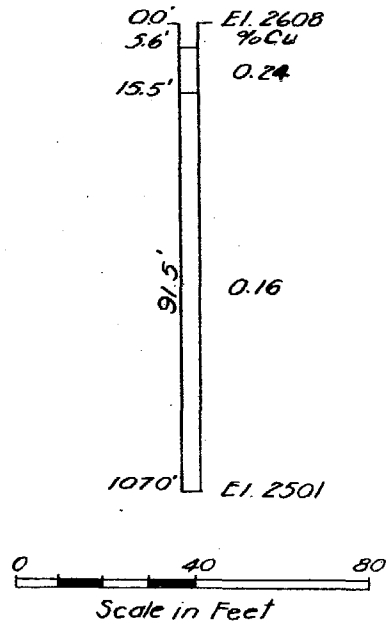
U.S. DEPARTMENT OF INTERIOR - BUREAU OF MINES



D.D. Hole No. 4

FIG. 4 - COPPER BUTTE MINE - 1471 - PINAL CO., ARIZ.

U.S. DEPARTMENT OF INTERIOR - BUREAU OF MINES



D.D. Hole No. 6

FIG 5 - COPPER BUTTE MINE - 1471 - PINAL CO., ARIZ.

TABLE 1. - Ore shipments

Date	Tons	Gold, oz. per ton	Silver, oz. per ton	Copper, percent
2/4/42	8.703	-	0.12	4.42
6/12/42	10.508	-	0.26	4.85
11/28/42	42.485	-	-	3.83
12/15/42	29.243	-	-	3.56
12/17/42	49.410	-	-	4.35
12/24/42	48.072	-	-	3.72
12/31/42	41.501	-	-	3.74
	229.922		Weighted average	3.95

No further shipments were made by the present owner until August 1, 1943, when shipments were started to the American Smelting & Refining Co. at Hayden. A total of 1,357.92 dry tons having a weighted average of 2.88 percent copper was shipped during the remainder of 1943. This ore was mined from surface pit 1 (fig. 1).

Shipments in 1944 totaled 5,140.75 dry tons averaging 3.1 percent copper. All of this ore was mined from surface pits, the greatest part coming from pit 1.

Shipments for 1945 up to August 1, amounted to 13,916.1 dry tons averaging 2.96 percent of copper. All of the ore shipped since July 1943 has gone to the American Smelting & Refining Co. smelter at Hayden.

The ore mined from the surface by the present owner has all come from pits 1, 2, and 5. No accurate record has been kept of the tonnage mined from the various pits.

After the Bureau's drilling disclosed 20 feet of ore at hole 2, mining operations were started there, and it is estimated that 1,700 tons of that ore had been mined from cut 5 up to August 1945. Only about 94 tons had been mined from pit 2, as selective mining and sorting was necessary to keep the ore up to shipping grade.

The total ore shipped by the present owner, from the first shipments in 1942 to July 1945, inclusive, was 20,644.6 dry tons averaging 3 percent copper. The moisture, as assayed by the smelter, averages about 10 percent, giving a total of 22,709 tons of ore mined.

PHYSICAL FEATURES

The mine is situated on a saddle or small divide in the Tortilla Mountains west of Ray. From this saddle the drainage is toward the south and west by three gulches. The run-off eventually reaches the Gila River. The river, about 3 miles south and several hundred feet lower, can be seen from

the mine. The assumed elevation of 2,500 feet near the portal of the tunnel was taken from the Federal Geological Survey map of the Florence Quadrangle.

Vegetation is scanty, mostly cacti and mesquite. The climate is arid, summers are hot and winters mild.

Drinking water must be hauled from Ray. A shaft at the portal of the tunnel supplies enough water for drilling and mining.

The nearest source of electric power probably would be Ray, although there is a high-tension transmission line along the Ray-Superior highway about 2-3/4 miles north of the property.

LIVING CONDITIONS

There are no living accommodations or water for domestic use at the mine. Ray, 8 miles by road from the property, is the nearest town. At present, labor is scarce.

GEOLOGY[3]

The Copper Butte deposit occurs in conglomerate that is faulted against granite porphyry on the east and overlain by dacitic volcanic rocks, as shown by the accompanying map and cross sections (figs. 6 and 7). This conglomerate is equivalent to the Whitetail conglomerate of the Ray area. As described by Ransome,[4] this conglomerate typically consists of rather coarse and somewhat angular stony detritus that accumulated in the hollows of a former land surface prior to eruption of the dacite in early Tertiary time. Its thickness varies greatly but amounts to more than 800 feet at Teapot Mountain, northwest of Ray.

In the Copper Butte area, the fragments composing the Whitetail are chiefly of altered schist together with locally abundant quartzite and limestone. These fragments are firmly consolidated by a sandy clay cement that is relatively impermeable. As mapped on figure 6, some areas of the Whitetail are of dull gray color, whereas others are brown to reddish with iron oxide. The formation shows weak stratification, which dips eastward 30° to 55°. Where opened by pit or mine workings, it is seen to be cut by numerous faults, as shown in figure 6. The most prominent faults strike N. 30° to 70° W. and dip steeply. Their displacement has not been determined, but on some of them considerable horizontal movement is indicated. A fault of northwest strike and steep southwest dip separates dacite from the Whitetail conglomerate in the southern part of the June Bug claim. Other less prominent faults range in strike from N. 15° E. to East and at places appear to have offset the northwesterly faults.

3/ By Eldred D. Wilson, geologist, Arizona Bureau of Mines, University of Arizona, Tucson, Ariz.

4/ Ransome, F. L., Copper Deposits of Ray and Miami, Ariz.: U. S. Geol. Survey Prof. Paper 115, 1919.

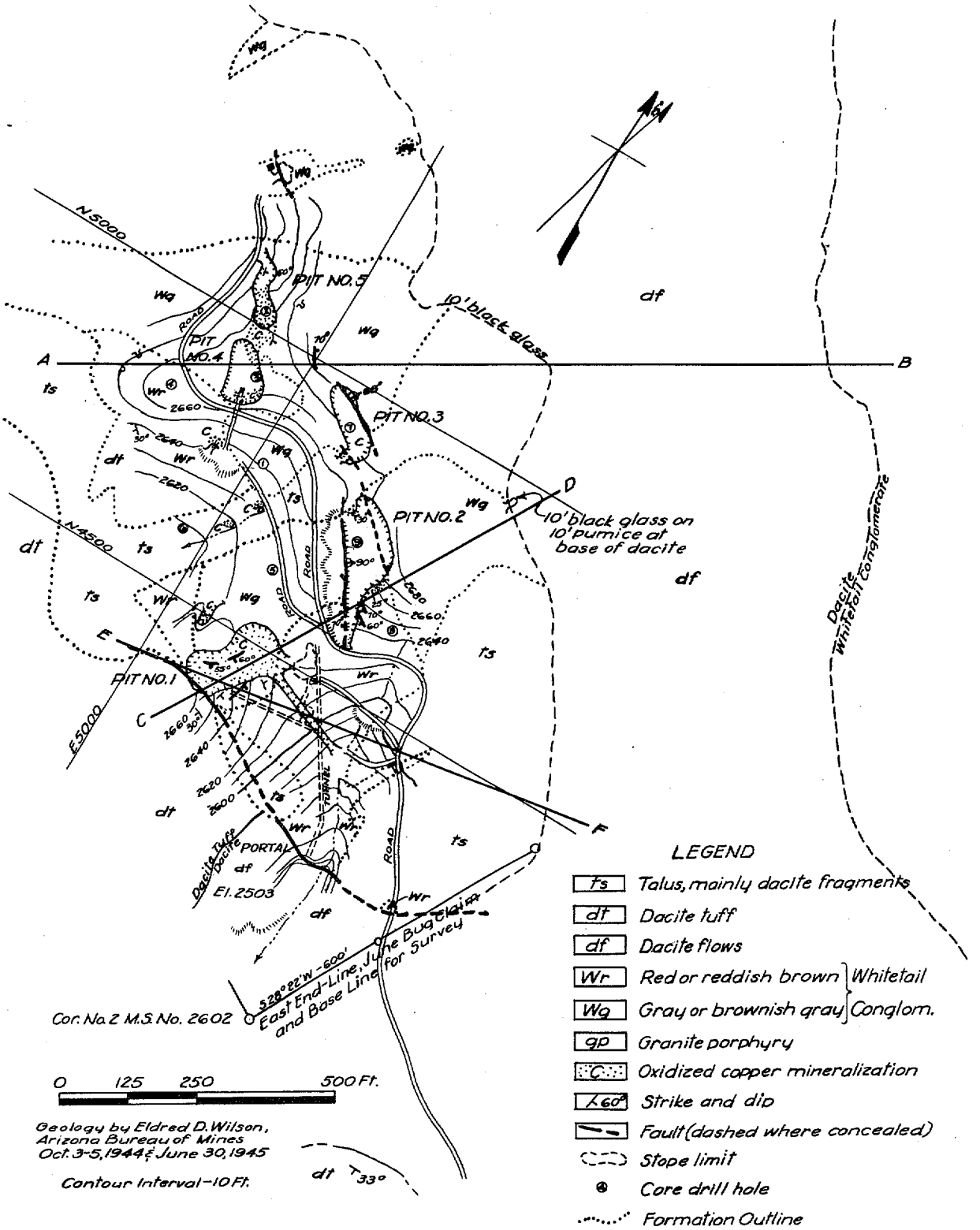
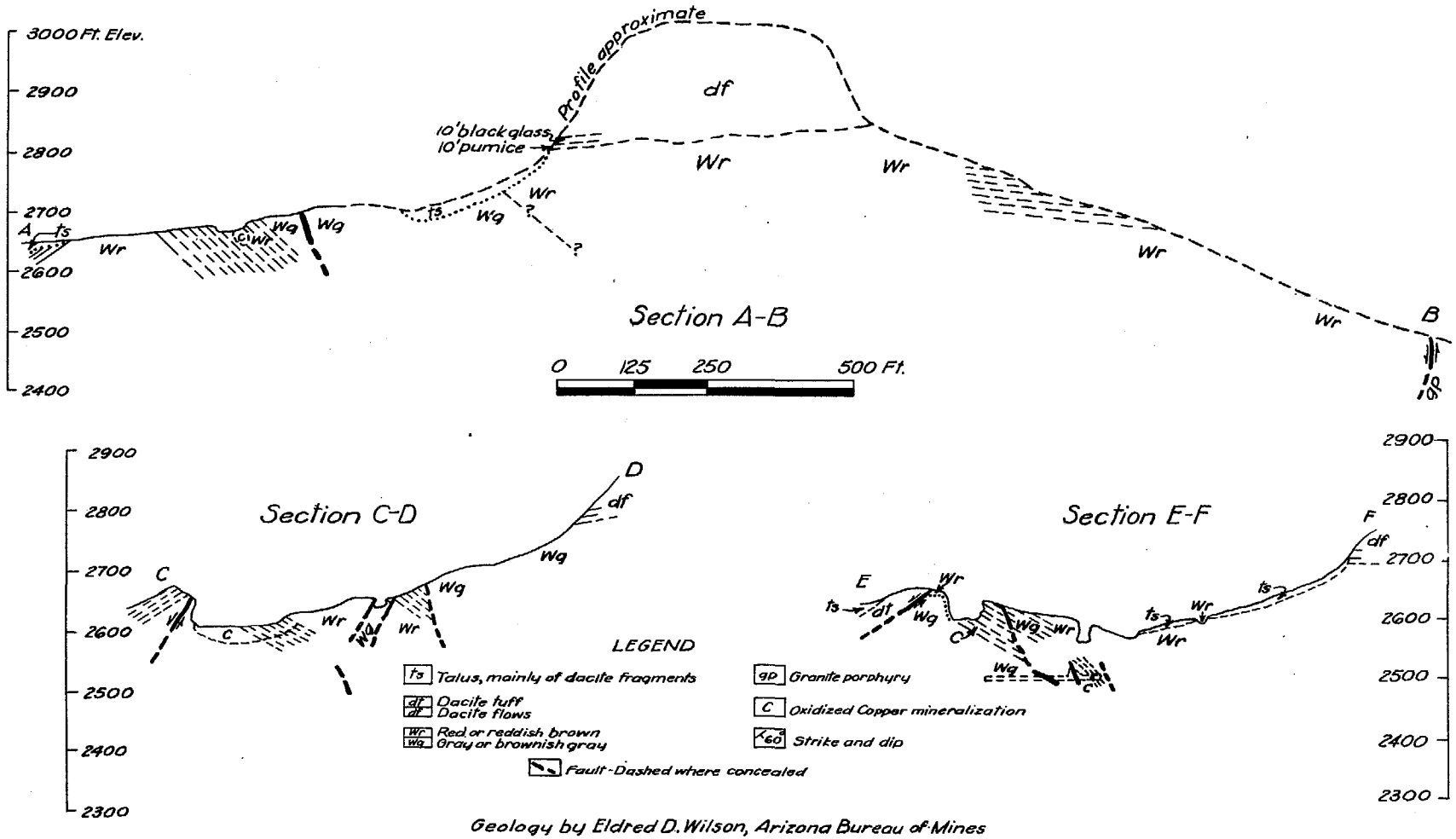


FIG. 6 - COPPER BUTTE PROJECT 1471, PINAL COUNTY, ARIZONA



Geology by Eldred D. Wilson, Arizona Bureau of Mines

FIG. 7 - COPPER BUTTE PROJECT 1471, PINAL COUNTY, ARIZONA

In this area the thickness of the Whitetail conglomerate and the kind of rocks upon which it rests are not revealed.

At several places in the Copper Butte area, the Whitetail, as shown by pit and mine workings and by drill holes, is impregnated with oxidized copper minerals. This mineralization apparently favors certain series of beds, but the extent to which these beds are mineralized horizontally and down the dip has not been determined. The faulting does not seem to have guided or controlled the mineralization.

As pointed out by Ransome,[5] the Whitetail conglomerate was formed as a result of profound erosion during which the principal supergene enrichment at Ray and Miami occurred. The Copper Butte deposit may represent placer or alluvial material formed when this erosion cut into the outcrop of some preexisting copper ore body not now exposed.

In places, as east of pit 1, beds of high iron oxide content overlie the copper-bearing beds. In other places, however, as shown by drill hole 4, the beds below reddish iron oxide outcrops are poor in copper. This may be regarded as evidence that the iron outcrops do not represent gossans above the copper, but rather that the iron was oxidized before its deposition in the conglomerate.

As the Whitetail is a rather tight formation that does not admit of much water circulation except along faults, there was no great opportunity for migration of iron or copper-bearing solutions through it. Consequently, no important zone of supergene enrichment is anticipated here.

ORE OCCURRENCE

The copper minerals are mostly chrysocolla and malachite. A small amount of tenorite occurs with the ore in the surface pits. Azurite is found in some of the ore, particularly from the stopes at the tunnel level. The ore carries only a trace of gold and silver.

The copper minerals are found almost entirely in beds or zones of the so-called gray conglomerate. Apparently there is no clearly defined division between the barren and the copper-bearing conglomerate. The change from one to the other is gradual in some places and abrupt in others. Copper is not evenly disseminated throughout the rock.

The red iron-stained conglomerate carries little or no copper. Sample 3097 (fig. 1), which was taken entirely from a red oxidized conglomerate, assayed only 0.12 percent copper.

There is considerable faulting. Often a fault is found separating the gray from the red conglomerate, as shown in the accompanying sections.

5/ Ransome, F. L., Work cited in footnote 4, p. 173-174.

There appears to be a local ground-water level a little below the tunnel level. The shaft at the portal of the tunnel has water standing about 5 feet below that level. The water pumped from that point for drilling only temporarily lowered the water. This shaft, reported to be several hundred feet deep, is believed to be an incline, dipping to the north and into the conglomerate. Drainage is towards the Gila River. This river basin would seem to be the permanent ground-water level for the district.

No trace of sulfides has been found in any of the conglomerate. Three holes drilled below the tunnel level showed no change in the oxidization or character of the rock.

DEVELOPMENT AND MINING

Most of the exploratory work and developing was done prior to the present ownership. All of the pits, (1 to 5, inclusive) and small cuts shown on the map (fig. 1) had been worked previously.

The tunnel is said to extend a considerable distance beyond the place marked "caved" on the map. All four shafts were the result of former operations. The 114-foot shaft, which connects with and ends at the tunnel level, alone is accessible at present. There has been no underground mining since the first 230 tons were shipped by the present owner.

Until recently, mining in the pits had been done with hand labor, including stripping of 2 to 3 feet of overburden at pit 1. The ore was broken from small benches with vertical holes and loaded into the trucks by hand shoveling. The ore is comparatively soft and breaks easily. The owner now has a 1-1/8-cubic yard Athey Mobile mechanical loader mounted on a caterpillar tractor, which eliminates hand loading. One truck operates between the pit and the loading bin on the property. Two other trucks, which are loaded to about 6 tons each, take ore from the bin to the railroad siding at Ray Junction, 15 miles away. There it is dumped directly into railroad cars and hauled 18 miles to the Hayden smelter.

A force of 6 to 8 men, including the owner, has been shipping two to four 50-ton cars a week.

Mine equipment consists of three self-dumping trucks capable of hauling 6 tons of ore, two portable compressors, and a 1-1/8-yard Athey mobile loader mounted on a caterpillar tractor; also, a hoist, bucket, car, track, jack hammer, steel, and miscellaneous equipment necessary to carry on small-scale mine operations. There is a head frame at the shaft and a good ore bin with a capacity of about 90 tons on the mine road.

WORK DONE BY THE BUREAU OF MINES

The Bureau drilled nine vertical holes (1,274 feet) with a prospecting diamond drill owned by it. Drilling started October 14, 1944, and stopped April 5, 1945. The holes varied in depth from 78 to 208 feet. That was about the maximum depth to which it was possible to drill with the Bureau's equipment.

The locations of the diamond-drill holes are shown on figure 1. The vertical projections at A-A' and B-B' are shown on figures 2 and 3. No drilling could be done close to pit 1 because of blasting and mine operations then in progress. It was intended to drill all the holes to a depth somewhat below the tunnel level. This procedure was not always possible because of mechanical difficulties encountered. The ground proved very difficult and costly to drill. Very little core was recovered, and the ground caved badly in places.

Hole 9, which was drilled to a depth of 69 feet below the tunnel level, showed 60 feet of 1.83 percent copper, with the bottom of the hole still in copper conglomerate. Holes 3 and 5 showed a trace of copper in about 50 feet of conglomerate below the tunnel level. No change was apparent in the oxidized character of the ore below that level.

The adjusted average of the first 10 feet of ore (5 to 15 feet) at hole 2 is 2.50 percent copper. The adjusted average for 20 feet of ore is 2.20 percent copper. After drilling was completed at this hole, the owner began mining at pit 5, 30 feet to the northwest. He carried the pit to the southeast to include the hole. At the time of writing, it was 30 feet beyond the hole and included the first 10 feet of ore indicated by the drilling.

A total of 974.2 tons of ore shipped from here averaged 3.29 percent copper. The minimum assay on any shipment was 2.89 percent copper, and the maximum was 3.61 percent copper. This was ore not mixed with material from any other pit. There is no apparent reason for the discrepancy between the diamond drillhole assays and the assay of the ore shipments, except for the fact that the copper content varies considerably throughout the copper-bearing conglomerate.

Smelter returns showed very little variation in the percentage of silica, alumina, and lime in the ore shipments. The average was approximately 60 percent SiO_2, 11 percent Al_2O_3, and 0.4 percent CaO.

To save unnecessary assaying, only composite assays of diamond drillhole samples were made for silica and alumina. None was made for lime. The composite sludge assays for alumina in holes 1, 2, 3, 5, and 8 averaged 11.3 percent Al_2O_3, the minimum being 9.9 percent and the maximum 12.5 percent. Holes 7 and 9 in pits 3 and 2 averaged 23.2 and 30.1 percent Al_2O_3, respectively. The copper content was better where the Al_2O_3 was lower. No composite assays were made for holes 4 and 6, as the samples assayed less than 0.5 percent copper.

Core recovery varied from a minimum of 1.6 percent in hole 8 to a maximum of 12.0 percent for hole 6. The average was 6.5 percent.

The assay results and log of the diamond drill holes are given on the following pages.

Diamond drill-hole log

HOLE NO: 1
Location: 4778 N., 5010 E.
Elevation of collar: 2640 feet
Depth: 125 feet
Dip: vertical
Bearing: - -
Date begun: 10/14/44
Date finished: 11/2/44

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0.0	5.2	5.2	0			0			1-5/8			Overburden, clay and pebbles.
5.2	11.5	6.3	0.2	45	9895	3	108	100	1-3/16	3381	3382	Qtzt. core; some copper-stained silica.
11.5	17.2	5.7	0	0	22605	0	270	100	"		9395	Sand sludge.
17.2	22.2	5.0	0	0	15895	0	217	100	"		9396	Do.
22.2	27.0	4.8	0	0	17650	0	249	100	"		3383	Sprinkling of copper.
27.0	31.6	4.6	0.5	85	2885	11	68	100	7/8		9397	Qtzt. core; sand sludge.
31.6	37.0	5.4	0.6	140	4020	11	82	100	"		9398	Do.
37.0	42.0	5.0	0.8	135	3265	16	72	90	"	3384	3385	Qtzt. core, sand sludge, a little copper
42.0	47.0	5.0	0.2	30	2115	4	45	90	"	3386	3387	Do.
47.0	52.0	5.0	0.2	45	3945	4	85	90	"	3388	3389	Qtzt. core with copper on fractures.
52.0	57.0	5.0	0.2	25	4050	4	87	90	"	3390	3391	Qtzt. and cgl. core with copper; a little sludge.
57.0	62.0	5.0	1.0	15	4800	2	103	90	"		9399	Qtzt. and qtz. core, sand, sludge.
62.0	67.0	5.0	0.3	70	5970	6	129	90	"		9400	Qtzt. core; sand sludge.
67.0	72.0	5.0	0.1	15	12670	2	271	90	"		9401	Do.
72.0	77.0	5.0	0.2	45	11820	4	255	90	"	3392	3393	Qtzt. core; a little copper panned.
77.0	82.0	5.0	1.3	305	11655	26	266	100	7/8		9402	Core mostly limestone; sand sludge.
82.0	87.0	5.0	0.1	20	10750	2	230	100	"		9403	Qtzt. core; sand sludge.
87.0	92.0	5.0	0.2	60	9700	4	209	100	"		9404	Do.
92.0	97.0	5.0	0.4	100	11495	8	250	100	"		9405	Qtzt. and limestone core; sand sludge.
97.0	102.0	5.0	1.3	310	12595	26	287	100	7/8		9406	Qtzt. and limestone core; sand sludge.
102.0	104.9	2.0	0.7	155	5840	24	228	100	"		9407	Mostly limestone core; sand sludge.
104.9	110.0	5.1	1.0	210	7970	20	174	100	"		9408	Do.

Diamond drill-hole log (Cont'd.)

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
110.0	115.0	5.0	0.8	140	6465	16	142	100	7/8		9409	Limestone and qtzt. core; sand sludge.
115.0	120.0	5.0	1.3	310	7045	26	161	100	"		9410	Mostly limestone core; sand sludge.
120.0	125.0	5.0	1.0	230	7880	20	177	100	"		9411	Do.

5.2 - 27.0 feet drilled with casing to 5.2 feet.
27.0 - 31.6 feet drilled with casing to 27.0 feet.
31.6 - 41.7 feet drilled with casing to 31.6 feet.
41.7 - 125.0 feet drilled with casing to 41.7 feet.

Record of diamond drill-hole value

Footage			Sample Nos.		Analyses		Adjusted average* percent	
					Core, percent	Sludge, percent		
From	To	Feet	Core	Sldg.	Cu.	Cu.	Cu.	Av.
5.2	11.5	6.3	3381	3382	0.11	1.07	1.07	
11.5	17.2	5.7		9395		0.90	0.90	
17.2	22.2	5.0		9396		0.68	0.68	
22.2	27.0	4.8		3383		0.64	0.64	
27.0	31.6	4.6	9447	9397	0.06	0.81	0.79	0.83
31.6	37.0	5.4	9448	9398	0.06	1.80	1.75	
37.0	42.0	5.0	3384	3385	0.48	2.50	2.42	
42.0	47.0	5.0	3386	3387	0.64	2.35	2.33	
47.0	52.0	5.0	3388	3389	0.36	2.70	2.67	
52.0	57.0	5.0	3390	3391	1.65	2.42	2.42	
57.0	62.0	5.0	9449	9399	0.45	1.89	1.84	2.24
62.0	67.0	5.0	9450	9400	0.09	1.17	1.15	
67.0	72.0	5.0	9451	9401	0.09	0.81	.81	
72.0	77.0	5.0	3392	3393	0.11	0.90	.90	0.95
77.0	82.0	5.0		9402		0.35		
82.0	87.0	5.0		9403		0.40		
87.0	92.0	5.0		9404		0.33		
92.0	97.0	5.0		9405		0.50		
97.0	102.0	5.0		9406		0.42		0.40
102.0	104.9	2.9		9407		0.17		
104.9	110.0	5.1		9408		0.20		
110.0	115.0	5.0		9409		0.24		
115.0	120.0	5.0		9410		0.20		
120.0	125.0	5.0		9411		0.25		0.21
SLUDGE COMPOSITS								
5.2	31.6			9484		0.80		
31.6	62.0			9485		2.27		

*Based upon relative weights of core and sludge recovered.

Composite samples, hole 1

Footage			Sample Nos.		Analyses							
					Core, percent			Sludge, percent			Composite*	
From	To	Feet	Core	Sldg.	Group	SiO_2	Al_2O_3	Group	SiO_2	Al_2O_3	SiO_2	Al_2O_3
5.2			3381 and 9447	3382 to 9397								
	31.6	26.4			4	69.94	6.92	1	65.67	12.21	63.7	12.2
31.6			9448	9398								
			3384	3385								
			3386	3387								
			3388	3389								
			3390	3391								
	62.0	30.4	9449	9399	5	59.58	6.77	2	63.20	9.98	63.2	10.0
62.												
			9450	9400								
			9451	9401								
	77.0	15.0	3392	3393	6	87.02	4.60	3	60.10	12.45	60.1	12.5

*Sludge only.

Diamond drill-hole log

HOLE NO: 2
Location: 5032N., 4874 E.
Elevation of collar: 2664 feet
Depth: 82 feet
Dip: vertical
Bearing: - -
Date begun: 11/3/44
Date finished: 11/15/44

Theoretical weight in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0	5.0	5.0	0.8	555	0	16	0	0	1-5/8			Part loose fill, part conglomerate.
5.0	10.0	5.0	0.7	245	6240	14	88	85	1-3/16	3395	3396	Cgl. core with copper; good copperpanning.
10.0	15.0	5.0	0.4	130	6090	8	84	90	"	3397	3398	Qtzt. and diabase core with copper; good copper panning.
15.0	20.0	5.0	0.4	115	7230	8	100	90	1-3/16	3399	3400	Qtzt. and cgl. core; fair copper panning.
20.0	25.0	5.0	0.5	135	5890	10	82	90	1-3/16	9351	9352	Mostly qtzt. core; poor copper panning.
25.0	30.0	5.0	0.7	240	6090	14	86	90	1-3/16	9353	9354	Qtzt. and cgl. core; fair copper panning.
30.0	35.0	5.0	0.1	15	7740	2	106	90	1-3/16	9355	9356	Qtzt. core; fair copper panning.
35.0	39.3	4.3	0.1	30	7290	2	116	90	1-3/16	9357	9358	Qtzt. core; poor to fair copperpanning.
39.3	45.0	5.7	0	0	11455	0	148	90	1-3/16	-	9359	Poor copper panning.
45.0	50.0	5.0	0.1	10	4965	2	106	100	7/8	9360	9361	Qtzt. core; no copper panned.
50.0	55.0	5.0	0.3	60	5340	6	115	100	"	9362	9363	Qtzt. and cgl. core; a little copper on fractures; no copper panned.
55.0	82.0	27.0	0.9			3		100	"			Qtzt., cgl., and schist core; no copper panned.
55.0	60.0	5.0	0	0	3415	0	73	90	"		9412	No copper panned.
60.0	65.0	5.0	0	0	4420	0	94	100	"		9413	Do.
65.0	70.0	5.0	0.2	40	9590	4	206	100	"		9414	Qtzt. and cgl. core; no copper panned.
70.0	75.0	5.0	0.4	95	9440	8	205	100	"		9415	Qtzt. core; no copper panned.
75.0	77.0	2.0	0.2	30	2115	10	113	100	"		9416	Do.
77.0	82.0	5.0	0.1	25	4240	2	91	80	"		9417	Qtzt. and schist core; no copperpanned.

5 - 45 feet drilled with casing at 0 - 5 feet.
45 - 82 feet drilled with casing at 0 - 45 feet.

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses		Adjusted average*	
From	To	Feet	Core	Sldg.	Core, percent Cu.	Sludge, percent Cu.	Percent Cu.	Av. Cu.
5.0	10.0	5.0	3395	3396	5.11	2.40	2.50	
10.0	15.0	5.0	3397	3398	0.21	2.55	2.50	
15.0	20.0	5.0	3399	3400	0.67	2.05	2.03	
20.0	25.0	5.0	9351	9352	0.81	2.22	2.19	
25.0	30.0	5.0	9353	9354	0.94	2.14	2.09	
30.0	35.0	5.0	9355	9356	0.11	2.22	2.22	
35.0	39.3	4.3	9357	9358	0.35	1.88	1.87	
								2.20
39.3	45.0	5.7	--	9359		1.17	1.17	
45.0	50.0	5.0	9360	9361	0.46	1.27	1.27	
50.0	55.0	5.0	9362	9363	0.78	1.88	1.87	
55.0	60.0	5.0		9412		1.59	1.59	
60.0	65.0	5.0		9413		1.26	1.26	
								1.43
65.0	70.0	5.0		9414		0.63		
70.0	75.0	5.0		9415		0.40		
75.0	77.0	2.0		9416		0.41		
77.0	82.0	5.0		9417		0.45		
							0.47	

Composite Sample

5	55	50	9351	9363	65.32 percent SiO_2	10.6 percent Al_2O_3
55	65	5	9412	9413	55.86 percent SiO_2	11.5 percent Al_2O_3

*Based upon relative weights of core and sludge recovered.

Diamond drill-hole Log

HOLE NO: 3
Location: 4910 N., 4926 E.
Elevation of collar: 2654 feet
Depth: 208 feet
Dip: Vertical
Bearing: - -
Date begun: 11/16/44
Date finished: 12/16/44

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.	Description and remarks
			Core		Sldg.	In percent					
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Sldg.	
0	5.0	5.0	0	0	0	0	0	0	1-5/8		Overburden.
5.0	10.0	5.0	0.2	65	7200	4	99	75	1-3/16	9364	Qtzite. and cg. core; fair copper panned.
10.0	15.0	5.0	0.5	105	6400	10	89	100	"	9365	Qtzite. and schist core; poor copper panned.
15.0	220.0	5.0	0.5	160	6060	10	85	100	"	9366	Qtzite. and schist core; poor copper panned.
20.0	26.0	6.0	0.4	120	11320	7	130	100	"	9367	Qtzite. and schist core; fair copper panned.
26.0	32.0	6.0	0.3	90	13840	5	159	100	"	9368	Qtzite. core; poor copper panning.
32.0	37.0	5.0	0.4	125	14120	8	196	100	"	9369	Do.
37.0	42.0	5.0	0.5	85	4320	10	94	100	7/8	9370	Qtzite core; very poor copper panning
42.0	47.0	5.0	0.1	25	4400	2	94	100	"	9371	Ls. and qtz. core; poor copper panning.
47.0	52.0	5.0	0.3	40	5880	6	126	100	"	9372	Qtzite. and cg. core; fair copper panning.
52.0	57.0	5.0	0.2	30	3840	4	82	100	"	9373	Qtzite. core; poor copper panning.
57.0	62.0	5.0	0.9	225	8000	18	179	100	"	9374	Do.
62.0	67.0	5.0	0.1	15	5900	2	127	100	"	9375	Do.
67.0	72.0	5.0	0.2	45	10800	4	233	100	"	9376	Qtzite. and qtz. core; poor copper panning.
72.0	77.0	5.0	0.4	60	21200	8	458	100	"	9377	Qtzite core; poor copper panning.
77.0	82.0	5.0	0.5	125	16800	10	368	100	"	9378	Qtzite. and qtz. core; poor copper panning.
82.0	92.0	10.0	0	0	27000	0	288	90	"	9379	Very poor copper panning.
92.0	97.0	5.0	0.4	100	12260	8	267	90	"	9380	Qtzite. and sch. core; poor copper panning.
97.0	102.0	5.0	0.2	30	8100	4	174	90	"	9381	Do.
102.0	112.0	10.0	0.5	115	18000	5	194	90	"	9382	Ls., qtzite. and sch. core; poor copper panning.
112.0	118.0	6.0	0	0	16630	0	177	90	"	9383	Poor copper panning.
118.0	122.0	4.0	0.1	15	3970	3	106	100	"	9384	Diorite and qtz. core; no copper panned.
122.0	132.0	10.0	1.3	280	12560	13	138	80	"	9385	Ls. and qtzite. core; no copper panned.

Diamond drill-hole log (Cont'd.)

Footage			Recoveries						Core diam., in.	Sample Nos.	Description and remarks
			Core		Sldg.	In percent					
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Sldg.	
132.0	141.0	9.0	1.0	235	6800	11	83	70	7/8	9386	Ls. and qtzite. core; no copper panned.
141.0	147.0	6.0	0.3	70	4800	5	86	60	"	9387	Qtzite. and ls. core; poor copper panning.
147.0	157.0	10.0	1.1	235	10450	11	114	100	"	9388	Qtzite., qtz., and ls. core; poor copperpanning.
157.0	167.0	10.0	1.5	325	10800	15	119	95	"	9389	Ls., qtzite., and sch. core; poor copper panning.
167.0	177.0	10.0	0.5	120	7670	5	83	100	"	9390	Ls, and qtzite core; fair copper panning.
177.0	187.0	10.0	1.2	290	11620	12	128	100	"	9391	Do.
187.0	195.0	8.0	0.4	60	6640	5	87	75	"	9392	Ls. and qtzite. core; poor copper panning.
195.0	205.0	10.0	0.8	180	14130	8	154	100	"	9393	Qtzite., ls., sch., and amphibolite core; poor copper panning.
205.0	208.0	3.0	0.4	80	7110	13	260	80	"	9394	Qtzite., qtz., and sch. core; poor copper panning.

5.0 - 37.0 feet drilled with casing to 5.0 feet.
37.0 - 118.0 feet drilled with casing to 37.0 feet.
118.0 - 141.0 feet drilled with casing to 106.5 feet.
141.0 - 167.0 feet drilled with casing to 106.5 feet.
167.0 - 208.0 feet drilled with casing to 160.5 feet

Qtzite. = quartzite
Qtz. = quartz
Ls. = limestone
cg. = conglomerate
sch. = schist.

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses		Adjusted average*	
					Core, percent	Sludge, percent		
From	To	Feet	Core	Sldg.	Cu.	Cu.	Percent Cu.	Av. Cu.
5.0	10.0	5.0	9468	9364	0.39	1.97	1.97	
10.5	15.0	5.0	9469	9365	1.50	2.68	2.66	
15.0	20.0	5.0	9470	9366	0.28	1.64	1.61	2.08
20.0	26.0	6.0	9471	9367	0.12	0.68	0.67	
26.0	32.0	6.0	9472	9368	0.05	0.60	0.60	
32.0	37.0	5.0	9473	9369	0.06	0.55	0.55	
37.0	42.0	5.0	9474	9370	0.05	0.40	0.39	
42.0	47.0	5.0	9475	9371	0.06	0.71	0.71	0.59
47.0	52.0	5.0	9476	9372	0.96	1.11	1.11	
52.0	57.0	5.0	9477	9373	0.06	1.36	1.34	
57.0	62.0	5.0	9478	9374	0.07	1.00	0.96	
62.0	67.0	5.0	9479	9375	0.04	1.56	1.56	1.24
67.0	72.0	5.0	9480	9376	0.07	0.81	0.81	
72.0	77.0	5.0	9481	9377	0.05	0.80	0.80	
77.0	82.0	5.0	9482	9378	0.10	0.82	0.82	
82.0	92.0	10.0	-	9379	-	0.84	0.84	
92.0	97.0	5.0	9483	9380	0.10	0.71	0.71	0.80
97.0	102.0	5.0		9381		0.40		
102.0	112.0	10.0		9382		0.34		
112.0	118.0	6.0		9383		0.43		
118.0	122.0	4.0		9384		0.20		0.31
122.0	132.0	10.0		9385		0.08		
132.0	141.0	9.0		9386		0.08		
141.0	147.0	6.0		9387		0.14		
147.0	157.0	10.0		9388		0.10		
157.0	167.0	10.0		9389		0.10		
167.0	177.0	10.0		9390		0.14	0.10	
177.0	187.0	10.0		9391		0.24		
187.0	195.0	8.0		9392		0.18		
195.0	205.0	10.0		9393		0.15		
205.0	208.0	3.0		9394		0.15	0.19	

*Based upon relative weight of core and sludge recovered.

Composite samples, hole 3

Footage			Sample Nos.		Analyses							
					Core, percent			Sludge, percent			Composite*	
From	To	Feet	Core	Sldg.	Group	SiO_2	Al_2O_3	Group	SiO_2	Al_2O_3	SiO_2	Al_2O_3
5			9468	9364								
			9469	9365								
	20	15	9470	9366	8	78.10	7.10	12	57.64	12.26	57.6	12.3
20			9471	9367								
			9472	9368								
			9473	9369								
			9474	9370								
	47.0	27	9375	9371	9	90.56	3.38	13	57.88	11.42	57.9	11.4
47			9476	9372								
			9477	9373								
			9478	9374								
	67	20	9479	9375	10	86.00	3.96	14	60.64	11.34	60.6	11.3
67			9480	9376								
			9481	9377								
			9482	9378								
			-	9379								
	97	30	9483	9380	11	63.18	8.46	15	56.20	11.54	56.2	11.5

*Sludge only.

Diamond drill-hole log

HOLE NO.: 4
Location: 4822 N., 4808 E.
Elevation of collar: 2668 feet.
Depth: 78 feet
Dip: Vertical
Bearing: - -
Date begun: 12/16/44
Date finished: 1/11/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.	Description and remarks
			Core		Sldg.	In percent					
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Sldg.	
0.0	14.0	14.0	0.5			4			1-5/8		Red conglomerate.
14.0	30.7	16.7	0.7			4		100	1-3/16		Red conglomerate, quartzite core, no copper.
30.7	39.0	8.3	0	0	29750	0	226	100	"	9418	Red sludge; very poor copper panning.
39.0	48.0	9.0	0	0	40800	0	309	100	"	9419	Buff sludge; very poor copper panning.
48.0	56.0	8.0	1.0	135	10925	13	94	100	7/8	9420	Quartzite core; poor copper panning.
56.0	64.0	8.0	1.6	315	12950	20	113	100	"	9421	Do.
64.0	68.0	4.0	1.0	205	8475	25	150	90	"	9422	Do.
68.0	78.0	10.0	0.5	95		5		90	"	*	Quartzite and schist core; poor copper panning.

*Sample ruined by excessive sand washing.
14.0 - 48.0 feet drilled with casing at 14 feet.
48.0 - 78.0 feet drilled with casing at 48 feet.

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses, percent Cu.		
From	To	Feet	Core	Sludge	Core	Sludge	Composite
30.7	39.0	8.3		9418		0.40	
39.0	48.0	9.0		9419		0.39	
48.0	56.0	8.0		9420		0.41	
56.0	64.0	8.0		9421		0.51	
64.0	68.0	4.0		9422		0.44	

Diamond drill-hole log

HOLE NO.: 5
Location: 4631 N., 5129 E.
Elevation of collar: 2631 feet
Depth: 167 feet
Dip: Vertical
Bearing: - -
Date begun: 1/12/45
Date finished: 1/29/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.	
			Core		Sldg.	In percent					
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core Sldg.	Description and remarks
0	10.0	10.0							1-5/8		0-3 feet overburden; 3-10 feet congl.
10.0	15.0	5.0	0	0	7375	0	99	100	1-3/16	9423	Conglomerate; poor copper panning.
15.0	20.0	5.0	1.0	520	12775	20	188	100	"	9424	Ls. and qtzt. core; poor copper panning.
20.0	25.0	5.0	0.2	55	8150	4	112	100	"	9425	Qz. with cu. on fractures; fair cu panning
25.0	30.0	5.0	0	0	18300	0	250	100	"	9426	Conglomerate; good copper panning.
30.0	35.0	5.0	0	0	15275	0	209	100	"	9427	Conglomerate; poor copper panning.
35.0	40.0	5.0	0.4	125	17510	8	243	100	"	9428	Qtzt., sch., and qz. core; poor copper panning.
40.0	45.0	5.0	0.1	20	12250	2	168	100	"	9429	Qtzt. core; poor copper panning.
45.0	50.0	5.0	0.4	90	12250	8	170	100	"	9430	Qtzt. and ls. core; poor copper panning.
50.0	55.0	5.0	0.5	150	9900	10	138	100	"	9431	Qtzt. and ls. core; poor copper panning.
55.0	60.0	5.0	0.7	180	8750	14	122	100	"	9432	Qtzt. and sch. core; poor copper panning.
60.0	65.0	5.0	0.4	165	12540	8	175	100	"	9433	Ls. and qz. core; poor copper panning.
65.0	70.0	5.0	1.0	370	7425	20	107	100	"	9434	Ls. core; poor copper panning.
70.0	75.0	5.0	1.0	440	10075	20	146	100	"	9435	Ls., qtzt., and chert core; poor copper panning.
75.0	82.0	7.0	0.4	110	12125	6	119	100	"	9436	Sch., ls., and qtzt. core; very poor copper panning.
82.0	87.0	5.0	0.4	130	12725	8	177	100	"	9437	Qtzt. and sch. core; very poor copper panning.
87.0	92.0	5.0	0.3	75	10375	6	143	100	"	9438	Ls. and sch. core; fair copper panning.

Diamond drill-hole log (Cont'd.)

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
92.0	102.0	10.0	1.0	405	29700	10	208	100	1-3/16		9439	Ls., sch., and qtzt. core; fair copper panning.
102.0	109.6	7.6	0.8	270	30650	10	282	100	"		9440	Do.
109.6	116.4	6.8	0.7	155	4750	10	76	100	7/8		9441	Sch., qtzt., and ls. core; very poor copper panning.
116.4	127.0	10.6	0.5	105	7325	5	74	100	"		9442	Ls., qtzt., and sch. core; no copper panned.
127.0	137.0	10.0	0.5	130	8000	5	86	100	"		9443	Sch., ls. and qtzt. core; no copper panned.
137.0	147.0	10.0	0.6	150	9125	6	99	100	"		9444	Sch. and qtzt. core; no copper panned.
147.0	157.0	10.0	1.0	240	10300	10	113	100	"		9445	Qtzt., sch., ls. core; no copper panned.
157.0	167.0	10.0	1.5	305	24400	15	269	100	"		9446	Ls., sch., and qtzt. core; no copper panned.

10.0 - 109.6 feet drilled with casing at 10.0 feet.
109.6 - 167.0 feet drilled with casing at 109.6 feet.

Qtzt. = quartzite
Qz. = quartz
Sch. = schist
Ls. = limestone

Record of diamond drill-hole values

Footage			Sample Nos.		Sample No.	Analyses							
						Core, percent			Split assay	Sludge, percent		Adjusted average*	
From	To	Feet	Core	Sludge		Cu	SiO_2	Al_2O_3		Cu	Re assay	percent Cu	Av. Cu
0	10.0	10.0											
10.0	15.0	5.0		9423						1.24		1.24	
15.0	20.0	5.0	10072	9424		0.08	55.05	5.65		0.52		0.50	
20.0	25.0	5.0	10073	9425		1.35				0.90		0.90	
25.0	30.0	5.0		0426						1.17		1.17	
30.0	35.0	5.0		9427						0.99		0.99	0.96
35.0	40.0	5.0		9428						0.55		0.50	
40.0	45.0	5.0		9429						0.30		0.30	0.40
45.0	50.0	5.0		9430						0.17			
50.0	55.0	5.0		9431						0.18			
55.0	60.0	5.0		9432						0.10			
60.0	65.0	5.0		9433						0.15			
65.0	70.0	5.0		9434						0.12			
70.0	75.0	5.0		9435						0.16			
75.0	82.0	7.0		9436						0.14			
82.0	87.0	5.0		9437						0.19			0.15
87.0	92.0	5.0		9438	10025+				0.27	(0.08)	0.19	0.23	
92.0	102.0	10.0		9439	10026+				0.24	(0.20)	0.24	0.24	
102.9	109.6	7.6		9440	10027+				0.27	(0.38)	0.27	0.27	
109.6	116.4	6.8		9441					0.22	(0.14)	0.22	0.22	0.24
116.4	127.0	10.6		9442					0.09			0.09	
127.0	137.0	10.0		9443					0.20			0.20	
137.0	147.0	10.0		9444					0.08			0.08	
147.0	157.0	10.0		9445					0.07			0.07	
157.0	167.0	10.0		9446					0.11			0.11	0.11

Other analyses

15.0	25.0	10.0	10072 10073	9424 9425			55.05	55.65		SiO_2 53.66	Al_2O_3 9.94	SiO_2 53.7	Al_2O_3 9.9

+Split assays of sludge.
*Based upon weights of core and sludge.

Diamond drill-hole log

HOLE NO.: 6
Location: 4608 N; 4955 E.
Elevation of collar: 2608 feet
Depth: 107 feet
Dip: Vertical
Bearing: - -
Date begun: 1/30/45
Date finished: 2/8/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0	5.6	5.6	0.2	120		4			2-1/8			0-2 Alluv. 2-5.6 cgl. with a little copper.
5.6	8.7	3.1	0	0	7975	0	109	100	1-5/8		9452	Cg.; poor copper panning.
8.7	13.7	5.0	0	0	12450	0	106	100	"		9453	Do.
13.7	15.5	1.8	0	0	7030	0	166	90	"		9454	Do.
15.5	20.5	5.0	0	0	9575	0	131	90	1-3/16		9455	Do.
20.5	27.4	6.9	0.1	55	10225	2	102	100	"		9456	Ls. qz. core; no copper panned.
27.4	32.0	4.6	0.3	120	6625	7	100	100	"		9457	Ls. sch. and qz. core, no copper panned.
32.0	37.0	5.0	0.8	380	5975	16	86	90	"		9458	Ls. and sch. core; very poor copper panned.
37.0	47.0	10.0	0.8	325	15440	8	107	90	"		9459	Ls. and qtzt. core; very poor copper panned.
47.0	52.5	5.5	0.9	420	15825	16	207	90	"		9460	Ls. quzt. core; fair copper panning.
52.5	61.2	8.7	0.9	205	6675	10	84	100	7/8		9461	Qtzt. sch. and ls. core; no copper panned.
61.2	71.0	9.8	0.8	175	6970	8	77	90	"		9462	Sch. qtzt. and ls.; no copper panned.
71.0	81.0	10.0	3.0	645	7225	30	83	90	"		9463	Ls. qtzt. and sch. core; no copper panned.
81.0	91.0	10.0	2.3	495	23300	23	262	80	"		9464	Ls. sch. qtzt. core; no copper panned.
91.0	93.0	2.0	0.2	35	4325	10	235	90	" "		9465	Sch. and qtzt. core; no copper panned.
93.0	102.0	9.0	2.0	400	9825	22	122	75	"		9466	Qtzt. ls. and sch.; no copper panned.
102.0	107.0	5.0	0.5	95	3500	10	76	75	"		9467	Qtzt. and sch.; no copper panned.

5.6 - 8.7 feet drilled with casing at 5.6 feet.
8.7 - 15.5 feet drilled with casing at 8.7 feet.
15.5 - 20.5 feet drilled with casing at 15.5 feet.
20.5 - 52.5 feet drilled with casing at 20.5 feet.
52.5 - 107.0 feet drilled with casing at 52.5 feet.

Qtzt. = quartzite
Sch. = schist
Ls. = limestone
Qz. = quartz

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses	
From	To	Feet	Core	Sldg.	Sludge, percent Cu.	Adjusted average, percent Cu.
0	5.6	5.6				
5.6	8.7	3.1		9452	0.21	
8.7	13.7	5.0		9453	0.24	
13.7	15.5	1.8		9454	0.30	0.24
15.5	20.5	5.0		9455	0.17	
20.5	27.4	6.9		9456	0.15	
27.4	32.0	4.6		9457	0.14	
32.0	37.0	5.0		9458	0.12	
37.0	47.0	10.0		9459	0.13	
47.0	52.5	5.5		9460	0.20	
52.5	61.2	8.7		9461	0.07	
61.2	71.0	9.8		9462	0.19	
71.0	81.0	10.0		9463	0.27	
81.0	91.0	10.0		9464	0.16	
91.0	93.0	2.0		9465	0.13	
93.0	102.0	9.0		9466	0.18	
102.0	107.0	5.0		9467	0.10	0.16

R.I. 3914

Diamond drill-hole log

HOLE NO: 7
Location: 4928 N., 5118 E.
Elevation of collar: 2661 feet
Depth: 156 feet
Dip: Vertical
Bearing: - -
Date begun: 2/9/45
Date finished: 3/1/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0	5.0	5.0										Loose fill.
5.0	8.3	3.3	0.5	140	7725	15	101	75	1-5/8		9486.	Grn. cgl. qtzt. and sch. core; good cu. pan.
8.3	11.4	3.1	0.6	205	10425	19	147	100	"		9487.	Grn. cgl. qtzt. and sch. core; fair cu. pan.
11.4	16.4	5.0	0.4	140	15500	8	134	95	"		9488	Do.
16.4	18.7	2.3	0.3	.55	5775	13	174	95	1-3/16		9489	Red cgl. qtzt. and sch. core; poor cu. pan.
18.7	23.7	5.0	0.6	220	5675	12	80	85	"		9490	Do.
23.7	31.0	7.3	0.6	270	9150	8	88	95	"		9491	Buff cgl. qtzt. core; poor cu. pan.
31.0	41.0	10.0	0.4	120	26100	4	179	80	"		9492	Red cgl. qtzt. and sch. core; no cu. pan.
41.0	51.0	10.0	0.1	30	12725	1	87	80	"		9493	Red cgl. qtzt. core; no cu. pan.
51.0	61.0	10.0	0.1	20	24700	1	169	75	"		9494	Red cgl. sch. core; no cu. pan.
61.0	71.0	10.0	0.2	35	29550	2	202	85	"		9495	Red cgl. qtzt. core; no cu. pan.
71.0	78.2	7.2	0	0	17550	0	166	95	"		9496	Red cgl.; no cu. pan.
78.2	83.5	5.3	0	0	4850	0	62	75	7/8		9497	Do.
83.5	91.0	7.5	0.1	20	12100	1	172	90	"		9498	Red cgl. qtzt. core; no cu. pan.
91.0	101.0	10.0	0.3	45	7300	3	78	90	"		9499	Do.
101.0	106.0	5.0	1.3	245	14375	26	324	90	"		9500	Grn. cgl. qtzt. cgl. and cu. core; good cu. pan.
106.0	111.0	5.0	0.9	130	10100	18	222	90	"		10001	Grn. cgl., qtzt. cgl., and cu. core; fair cu. pan.
111.0	116.0	5.0	0.1	15	11700	2	251	90	"		10002.	Grn. cgl., qtzt. core; fair cu. pan.
116.0	121.0	5.0	0.1	25	11800	2	254	90	"		10003	Grn. cg., qtzt. core; fair cu. pan.
121.0	126.0	5.0	0	0	10375	0	221	90	"		10004	Grn. cgl.;; fair cu. pan.
126.0	131.0	5.0	0	0	11350	0	242	90	"		10005	Do.

Diamond drill-hole log (Cont'd.)

Footage		Recoveries							Core diam., in.	Sample Nos.		Description and remarks
		Core			Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
131.0	136.0	5.0	0.1	20	14850	2	318	90	7/8		10006	Grn. cgl., qtzt. core; poor/fair cu. pan.
136.0	141.0	5.0	0.3	60	13500	6	292	90	"		10007	Grn. cgl., qtzt. and sch. core; poor/fair cu. pan.
141.0	151.0	10.0	0.9	160	19800	9	215	90	"		10008	Grn. cgl., qtzt. and ls. core; poor/fair cu. pan.
151.0	156.0	5.0	0	0	13950	0	297	90	"		10009	Grn. cgl., poor/fair cu. pan.

5.0 - 16.4 feet drilled with casing at 5.0 feet.
16.4 - 78.2 feet drilled with casing at 16.4 feet.
78.2 - 156.0 feet drilled with casing at 78.2 feet.

grn. = green
cgl. = conglomerate
cu. = copper
qtzt. = quartzite
ls. = limestone
sch. = schist

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses			
					Core, percent	Sludge, percent	Adjusted average	
From	To	Feet	Core	Sldg.	Cu.	Cu.	percent Cu.	Av. Cu.
5.0	8.3	3.3	10062	9486	0.28	1.69	1.66	
8.3	11.4	3.1	10063	9487	0.21	1.98	1.95	
11.4	16.4	5.0	10064	9488	0.10	1.45	1.44	1.66
16.4	18.7	2.3	-	9489		0.35		
18.7	23.7	5.0	-	9490		0.36		
23.7	31.0	7.3	-	9491		0.49		
31.0	41.0	10.0	-	9492		0.18		
41.0	51.0	10.0	-	9493		0.10		
51.0	61.0	10.0	-	9494		0.09		
61.0	71.0	10.0	-	9495		0.06		
71.0	78.2	7.2	-	9496		0.10		
78.2	83.5	5.3	-	9497		0.10		
83.5	91.0	7.5	-	9498		0.10		
91.0	101.0	10.0	-	9499		0.18		0.11
101.0	106.0	5.0	10065	9500	5.04	1.00	1.07	
106.0	111.0	5.0	10066	10001	2.00	0.96	.97	
111.0	116.0	5.0	10067	10002	0.06	0.72	.72	0.92
116.0	121.0	5.0	10068	10003	0.08	0.53	.53	
121.0	126.0	5.0	-	10004		0.52	.52	
126.0	131.0	5.0	-	10005		0.39	.39	
131.0	136.0	5.0	10069	10006	0.18	0.47	.47	
136.0	141.0	5.0	10070	10007	0.04	0.55	.55	
141.0	151.0	10.0	10071	10008	0.12	0.63	.63	
151.0	156.0	5.0	-	10009		0.63	.63	0.54

Composite samples, hole 7

Footage			Sample Nos.		Analyses							
					Core, percent			Sludge			Composite*	
From	To	Feet	Core	Sldg.	Group	SiO_2	Al_2O_3	Group	SiO_2	Al_2O_3	SiO_2	Al_2O_3
5			10062	9486								
			10063	9487								
	16.4	11.4	10064	9488	E	73.07	14.83	F	55.21	16.67	55.2	16.7
101.0			10065	9500								
			10066	10001								
	116.0	15	10067	10002	H	79.97	10.31	G	66.53	25.06	66.5	25.1
116			10068	10003								
			-	10004								
			-	10005								
			10069	10006								
			10070	10007								
	151.0	35	10071	10008	I	76.22	5.96	J	55.96	27.83	56.0	27.8

*Sludge only.

Diamond drill-hole log

HOLE NO.: 8
Location: 4648 N. and 5373 E.
Elevation of collar: 2644 feet
Depth: 145 feet
Dip: Vertical
Bearing: - -
Date begun: 3/2/45
Date finished: 3/19/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0	8.0	8.0	0	-	-	-	-	-	-	-	-	Pink cgl.; no copper.
8.0	14.2	6.2	0	0	35500	0	243	90	1-5/8			Do.
14.2	23.0	8.8	0.2	80	19300	2	94	100	"			Pink cgl. qtzt. core; no copper panned.
23.0	25.0	2.0	0	0	6475	0	138	100	"	-	10017	Pink cgl.; a little copper at end of run.
25.0	30.0	5.0	0.2	75	8550	4	118	100	1-3/16	10010	10018	Grn. cgl., qtzt. core; fair copper pan.
30.0	35.0	5.0	0.1	25	10350	2	142	100	"	10011	10019	Do.
35.0	40.0	5.0	0.4	75	13250	8	182	100	"	10012	10020	Green cgl.; qtzt. core; fair to good panning.
40.0	45.0	5.0	0.3	50	6500	6	140	95	7/8	10013	10021	Green cgl.; qtzt. core; fair copper panning.
45.0	50.0	5.0	0.2	35	7100	4	153	100	"	10014	10022	Grn. and buff cgl., qtzt. core; poor/fair panning.
50.0	60.0	10.0	0.3	45	7700	3	166	100	"	10015	10023	Buff cgl. to red, qtzt. core; very poor panning.
60.0	65.0	5.0	0.1	20	12000	2	257	90	"	10016	10024	Red cgl., qtzt. core; very poor panning.
65.0	75.0	10.0	0.1	20	8150	1	87	95	"			Red cgl., qtzt. core; no copper panned.
75.0	80.0	5.0	0.2	40	5400	4	116	75	"			Red cgl., qtzt. & sch core; no copper panned.
80.0	90.0	10.0	0	0	18400	0	196	95	"			Do.
90.0	100.0	10.0	0	0	25300	0	270	100	"			Do.
100.0	105.0	5.0	0	0	11150	0	238	100	"			Do.
105.0	115.0	10.0	0.1	15	25090	1	268	100	"			Do.

Diamond drill-hole log (Cont'd.)

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Cm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
115.0	125.0	10.0	0	0	24000	0	256	100	7/8			Red cgl.; qtzt. & sch core; no copper panned.
125.0	135.0	10.0	0	0	25700	0	274	80	"			Do.
135.0	145.0	10.0	0.2	35	18900	2	201	75	"			Red cgl., qtzt. core; no copper panned.

8.0 - 14.2 feet drilled with casing at 8.0 feet.
14.2 - 25.0 feet drilled with casing at 14.0 feet.
25.0 - 40.0 feet drilled with casing at 25.0 feet.
40.0 - 65.0 feet drilled with casing at 40.0 feet.
65.0 - 145.0 feet drilled with casing at 65.0 feet.

cgl. = conglomerate
qtzt. = quartzite
grn. = green
sch. = schist

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses			
					Core, percent Cu.	Sludge, percent Cu.	Composite*	
From	To	Feet	Core	Sldg.			percent Cu.	Av. Cu.
23.0	25.0	2.0	-	10017		0.69		0.69
25.0	30.0	5.0	10010	10018	0.06	1.07	1.06	
30.0	35.0	5.0	10011	10019	0.20	0.85	0.85	
35.0	40.0	5.0	10012	10020	0.07	0.83	0.83	
40.0	45.0	5.0	10013	10021	0.10	0.75	0.75	
45.0	50.0	5.0	10014	10022	0.18	0.78	0.78	0.85
50.0	60.0	10.0	10015	10023	0.06	0.36	0.36	
60.0	65.0	5.0	10016	10024	0.08	0.32	0.32	0.35

Composite sample

					SiO_2	Al_2O_3	
25	50	25	10010 to 10014	10018 to 10022	64.1	14.7	

*Based upon relative weights of core and sludge recovered.

Diamond drill-hole log

HOLE NO.: 9
Location: 4752 N., 5241 E.
Elevation of collar: 2640 feet
Depth: 206 feet
Dip: Vertical
Bearing: - -
Date begun: 3/20/45
Date finished: 4/5/45

Theoretical weight, in grams, of sludge per foot of hole:
Bx-- 2352
Ax-- 1466
Ex-- 938

Footage			Recoveries						Core diam., in.	Sample Nos.		Description and remarks
			Core		Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
0	8.0	8.0										Loose fill.
8.0	13.0	5.0	0.2	135	15950	4	132	100	1-5/8	10028	10044	Grn. and buff cgl., qtzt. core; fair Cu panned.
13.0	20.0	7.0	0.5	290	13950	7	86	100	"	10029	10045	Grn. and buff cgl., qtzt. and sch. core; poor Cu panned.
20.0	25.0	5.0	0.5	135	5630	10	78	100	1-3/16	10030	10046	Buff cgl., qtzt. core; poor Cu panned.
25.0	35.0	10.0	0.4	105	11150	4	77	100	"	10031	10047	Do.
35.0	45.0	10.0	0.3	55	18350	6	126	95	"	10032	10048	Do.
45.0	55.0	10.0	0.2	55	14300	2	98	80	"	10033	10049	Buff cgl., qtzt. core; very poor Cu panned.
55.0	120.0	75.0	0.4			1		100	1-3/16, 7/8			Red cgl., qtzt. core; no Cu panned.
120.0	130.0	10.0	0.2	35	20700	2	222	100	7/8	10034	10050	Red and buff cgl., qtzt. core; very poor Cu panned.
130.0	139.2	9.2	0.9	200	6500	10	77	100	"	10035	10051	Red cgl., qtzt. core; no Cu panned.
139.2	146.7	7.5	0.2	30	8850	3	126	100	"	10036	10052	Buff cgl., qtzt. core; very poor Cu panned.
146.7	156.0	9.3	0.4	60	8650	4	100	95	7/8	10037	10053	Green cgl. qtzt. core; poor Cu panned.
156.0	166.0	10.0	0.3	30	8650	3	93	100	"	10038	10054	Green cgl. qtzt. and cgl. core; poor Cu. panned.
166.0	171.0	5.0	0.2	20	11750	4	252	100	"	10039	10055	Green cgl. qtzt. core; good Cu panned.

Diamond drill-hole log (Cont'd.)

Footage		Recoveries							Core diam., in.	Sample Nos.		Description and remarks
		Core			Sldg.	In percent						
From	To	Feet	Feet	Gm.	gm.	Core	Sldg.	Wtr.		Core	Sldg.	
171.0	176.0	5.0	0.4	45	8650	8	193	100	7/8	10040	10056	Green cgl. and qtzt. core; fair Cu panned.
176.0	181.0	5.0	0.5	65	12150	10	263	100	"	10041	10057	Green cgl. qtzt. core; fair Cu panned.
181.0	183.5	2.5	0	0	5800	0	247	95	"	-	10058	Do.
183.5	191.0	7.5	0.1	20	13550	2	193	95	"	10042	10059	Do.
191.0	196.0	5.0	0	0	9500	0	203	95	-		10060	Green cgl., fair Cu panned.
196.0	206.0	10.0	0.4	60	20450	4	219	95	"	10043	10061	Green cgl., qtzt. core; fair Cu panned.

8.0 - 20.0 feet drilled with casing at 8.0 feet.
20.0 - 55.0 feet drilled with casing at 20.0 feet.
55.0 - 130.0 feet drilled with casing at 55.0 feet.
130.0 - 206.0 feet drilled with casing at 130.0 feet.

grn. = green
cgl. = conglomerate
qtzt. = quartzite
sch. = schist
Cu. = copper

Record of diamond drill-hole values

Footage			Sample Nos.		Analyses			
					Core, percent Cu.	Sludge, percent Cu.	Adjusted average*	
From	To	Feet	Core	Sldg.			percent Cu.	Av. Cu.
8.0	13.0	5.0	10028	10044	0.14	1.22	1.21	
13.0	20.0	7.0	10029	10045	0.10	0.87	0.86	
20.0	25.0	5.0	10030	10046	0.15	0.45	0.44	
25.0	35.0	10.0	10031	10047	0.06	0.38	0.38	0.67
35.0	45.0	10.0	10032	10048	0.11	0.40	0.40	
45.0	55.0	10.0	10033	10049	0.15	0.46	0.46	0.43
120.0	130.0	10.0	10034	10050	0.05	0.21	0.21	
130.0	139.2	9.2	10035	10051	0.04	0.40	0.40	
139.2	146.7	7.5	10036	10052	0.12	0.39	0.39	0.33
146.7	156.0	9.3	10037	10053	0.10	1.69	1.69	
156.0	166.0	10.0	10038	10054	1.85	1.77	1.77	
166.0	171.0	5.0	10039	10055	0.40	2.02	2.02	
171.0	176.0	5.0	10040	10056	0.48	2.02	2.02	
176.0	181.0	5.0	10041	10057	0.20	1.92	1.92	
181.0	183.5	2.5	-	10058		1.92	1.92	
183.5	191.0	7.5	10042	10059	0.18	1.72	1.72	
191.0	196.0	5.0	-	10060		1.83	1.83	
196.0	206.0	10.0	10043	10061	0.18	1.64	1.64	1.83

*Based upon relative weight of core and sludge recovered.

Composite assays, hole 9

Footage			Sample Nos.		Analyses							
					Core, percent			Sludge, percent			Composite*	
From	To	Feet	Core	Sldg.	Group	SiO_2	Al_2O_3	Group	SiO_2	Al_2O_3	SiO_2	Al_2O_3
8	35	27	10028 to 10031	10044 to 10047	A	75.34	23.48	B	61.96	34.21	62.0	34.2
156	206	50	10038 to 10043	10054 to 10061	C	86.54	8.41	D	63.83	26.00	63.8	26.0

*Sludge only.