Bureau of Mines

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J. A. KRUG, SECRETARY

BUREAU OF MINES
JAMES BOYD, DIRECTOR

REPORT OF INVESTIGATIONS

RIO GRANDE COPPER DEPOSIT, ELKO COUNTY, NEV.

BY

E. J. MATSON

R. I. 4120,
September 1947.

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UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

RIO GRANDE COPPER DEPOSIT, ELKO COUNTY, NEV.[1]

By E. J. Matson[2]

CONTENTS

SUMMARY

The Bureau of Mines has been investigating deposits of critical and essential minerals in the United States since 1939. Projects were set up on only the most promising properties. A preliminary examination of the Rio Grande property was made by Bureau of Mines engineers in July 1942 and the property was examined again in July 1943.

The Geophysical Branch of the Bureau undertook a Geophysical survey of the area in November 1943 and was intermittently active in the district until June 1946. The major portion of their work was done from June 1944 to November 1945. Favorable areas for exploration were recommended by the Geophysical Branch of the Geological Survey,[3] and all holes were drilled in them.

Two projects were set up by the mining branch in an endeavor to find ore bodies on the strength of the geophysical information.

1/ The Bureau of Mines will welcome reprinting of this paper, provided the following footnote acknowledgment is used: "Reprinted from the Bureau of Mines Report of Investigations 4120."

2/ Mining engineer, Reno Division, Mining Branch, Bureau of Mines.

3/ Dr. F. W. Lee, chief, Geophysical Branch, U. S. Geological Survey, Baltimore, Md.

The first work was begun on October 6, 1944, and completed on February 26, 1945. Two diamond drill holes totaling 942 feet were drilled.

The next project work was started in February 1946 and completed in September 1946. Four churn-drill holes totaling 1,808 feet were drilled. One hole indicated a 5-foot section with a possible copper content of 1.25 percent. This was the best showing on record of all holes drilled.

ACKNOWLEDGMENTS

In its program of investigation of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to national security and economy. It is the policy of the Bureau to publish the facts developed as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, performs the actual exploratory work and prepares the final report. The Metallurgical Branch, O. C. Ralston, chief, analyses samples of ore and performs beneficiation tests.

With respect to this report, special acknowledgment is due to C. H. Sandberg; K. L. Cook, of the Geological Survey; E. L. Stephenson, formerly supervising geophysicist, Reno Division, Geophysical Branch, Geological Survey; William Glassner and Frank L. Middleton, officials of the Rio Grande Copper Co.; and L. L. Wartes, consultant, C. J. Bollman, controller, and J. J. Spencer, engineer of the Damon Syndicate, which has a lease and option on the Rio Grande Copper property.

Acknowledgment is also due A. C. Rice, acting supervising engineer, and the Staff of the Rare and Precious Metals Experimental Station for sample analysis and aid in field qualitative tests, and to A. C. Johnson, chief, Reno Division, Mining Branch, for aid and advice on the project and for editing the report.

OWNERSHIP

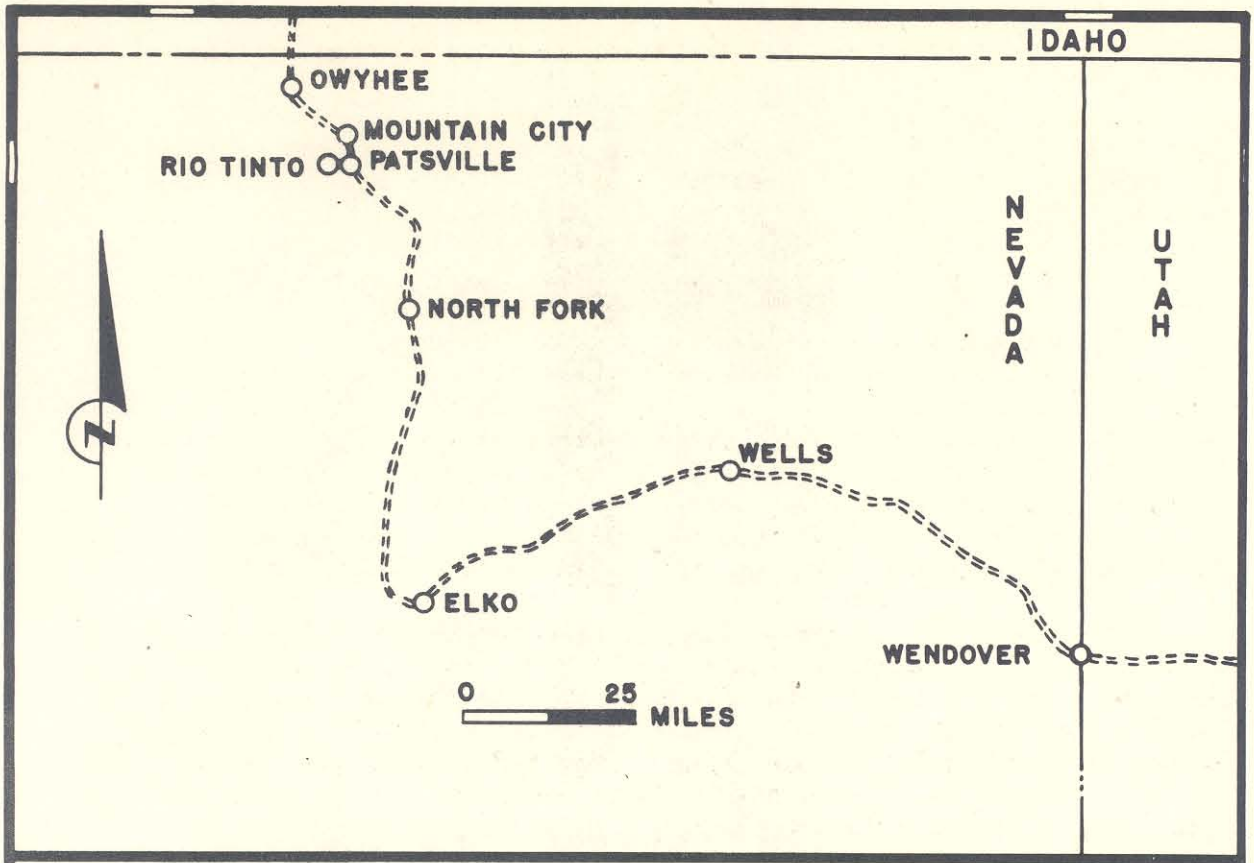
The property is owned by the Rio Grande Copper Co., 307 Henderson Building, Elko, Nev. Officers of the company are J. A. Davidson, president, J. E. Robbins, secretary, and Frank L. Middleton, vice president. The other principal stockholder is William Glassner of Mountain City, Nev.

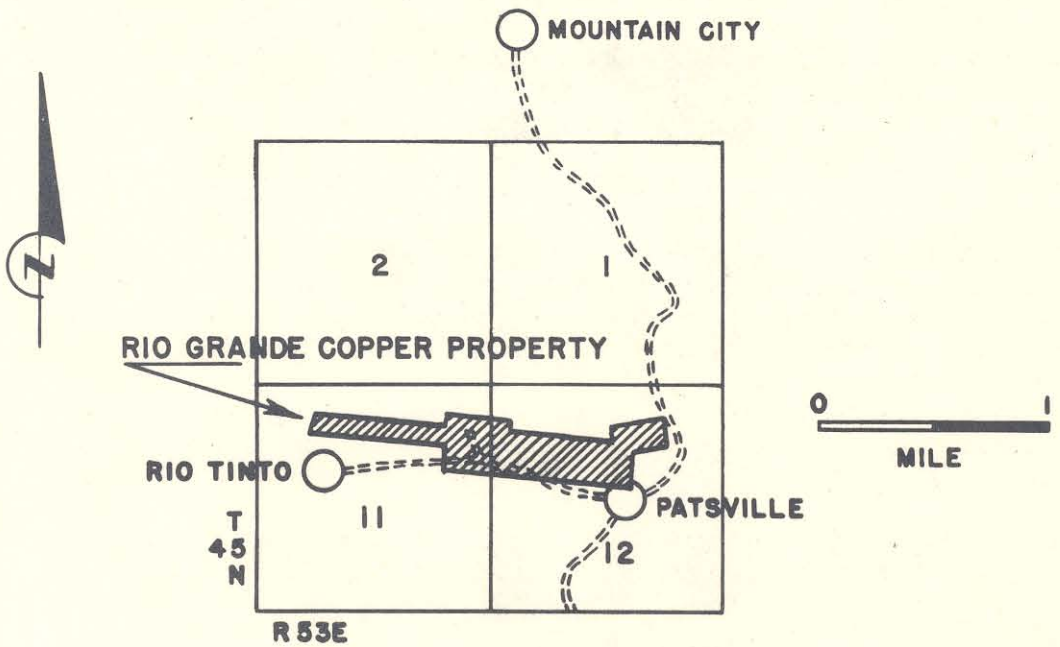
The property consists of 11 claims known as Rio Grande, Rio Grande Nos. 1 to 7, inclusive, Rio Grande North, Rio Grande Extension, and Rio Grande Extension No. 1, as shown by figure 2.

The Rio Grande Copper property is under lease and option to R. Hosken Damon and associates, 33 N. La Salle Street, Chicago 2, Ill.

HISTORY

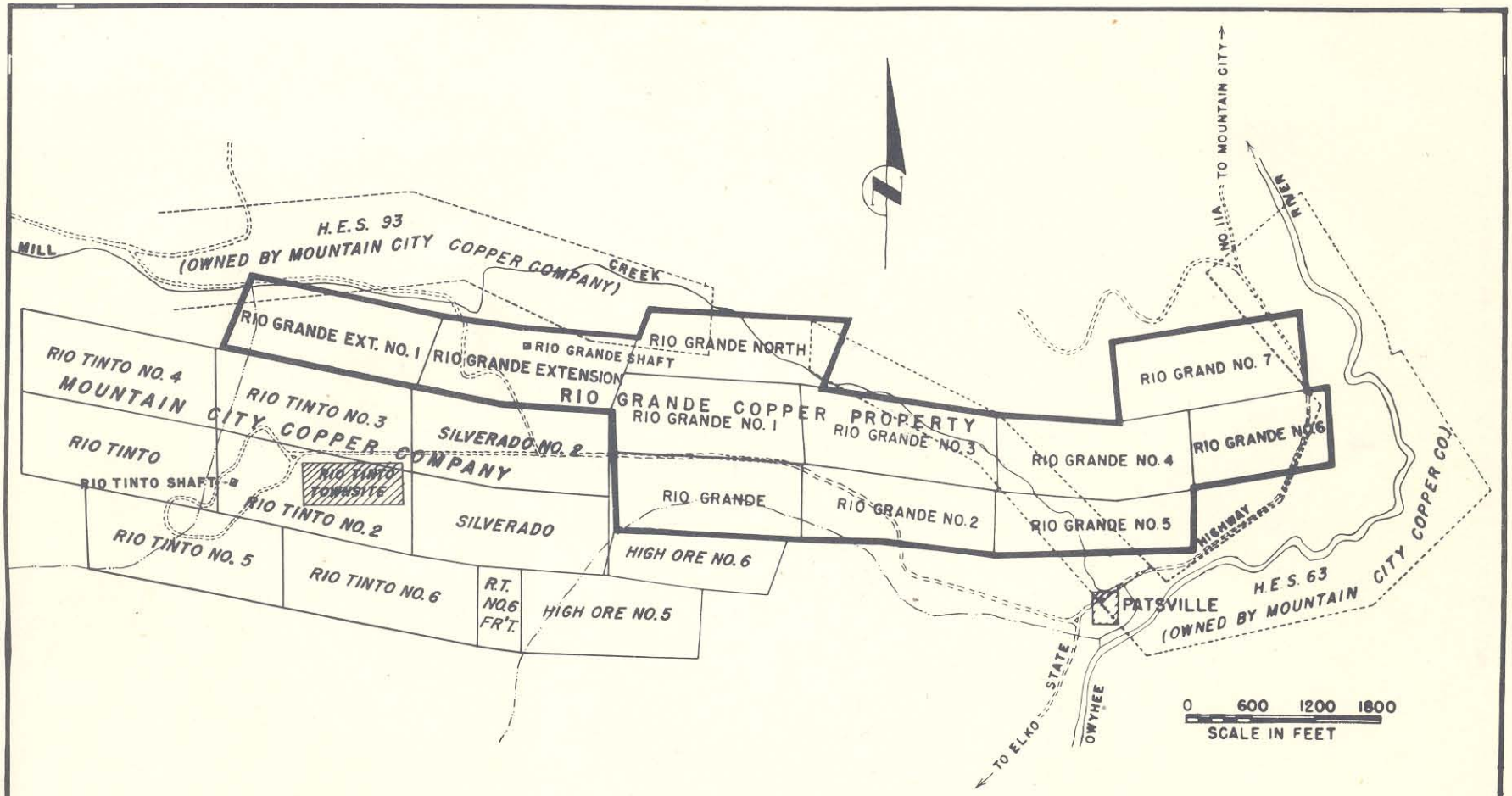
Although the Cope mining district was noted for its silver-mining activities as early as 1869, the first commercial copper deposit was discovered in November 1931 by the late S. Frank Hunt. Hunt's interests





SHOWING LOCATION
OF
RIO GRANDE COPPER PROPERTY-PROJECT 1472A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES - MINING BRANCH - RENO DIVISION FIG. 1



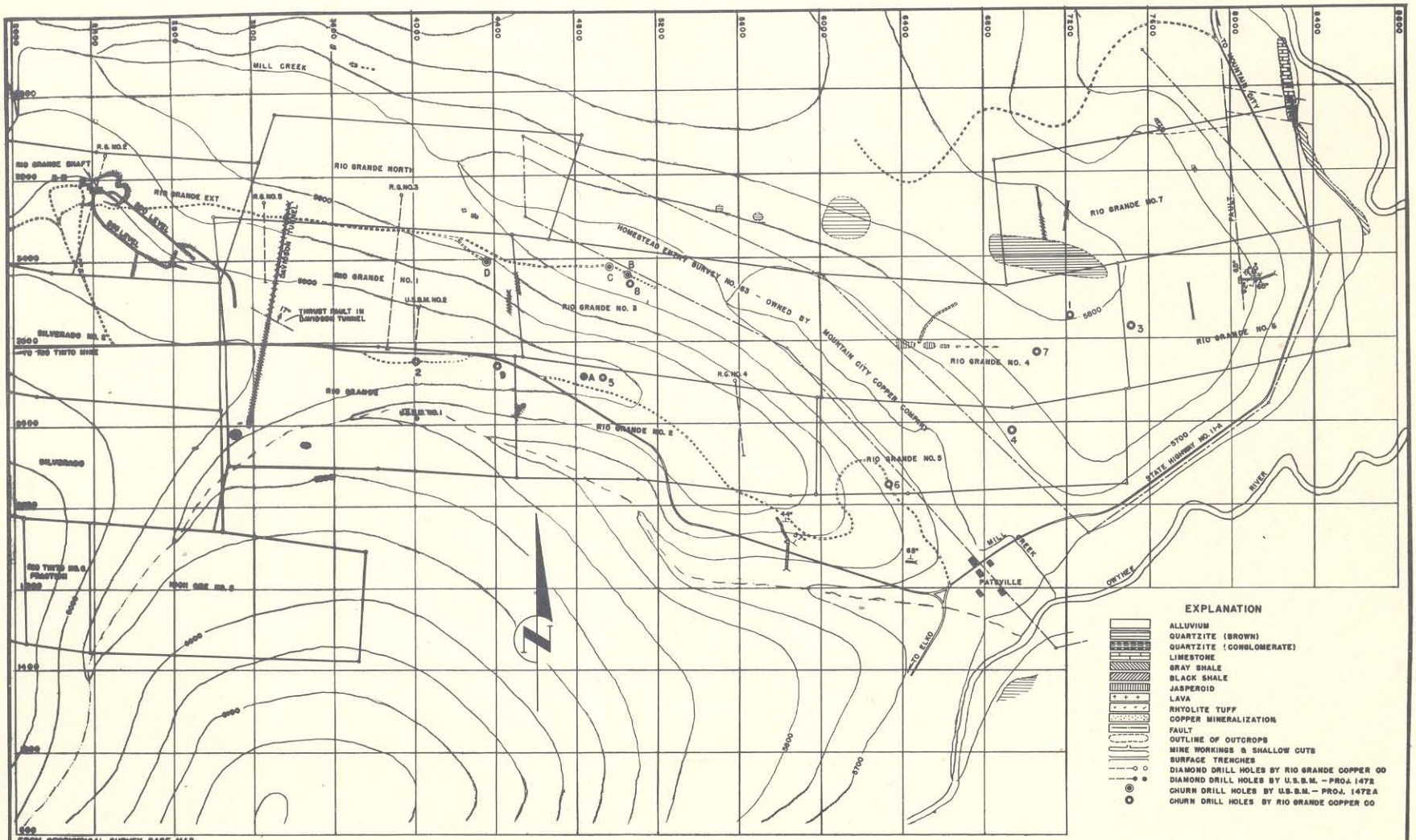
MAP SHOWING

CLAIMS OF RIO GRANDE COPPER PROPERTY AND PORTION OF PROPERTY OF MOUNTAIN CITY COPPER COMPANY

PROJECT 1472-A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES – MINING BRANCH – RENO DIVISION

FIG. 2



BASE MAP OF RIO GRANDE COPPER PROPERTY-PROJECT 1472A, COPE MINING DISTRICT, ELKO COUNTY, NEVADA

MINING BRANCH-RENO DIVISION-U.S. BUREAU OF MINES

FIG. 3

were acquired by the Anaconda Mining Co., and this resulted in the formation of the Mountain City Copper Co. The finding of fabulously rich pockets of copper ore in the Rio Tinto mine of the Mountain City Copper Co. stimulated interest in the district and created the formation of numerous new enterprises, among which was the Rio Grande Copper Co.

The Rio Grande Copper property was located by William Glassner, Jack Davidson, William Walker, and Percy Ryler in 1932. In 1933, the property was bonded to the Warhorse Exploration Co., (Roan Antelope, Africa), and five diamond-drill holes were drilled in an attempt to find a commercial copper ore body. No ore was indicated by the drilling program, and the option was relinquished.

From 1934 to 1935, the four partners drove a 1,100-foot adit known as the Davidson Tunnel. Five short winzes and a raise to the surface were made from the tunnel.

In 1936, Walker's share was bought by Jack Davidson and Frank L. Middleton, and the Rio Grande Copper Co. was incorporated. The Rio Grande shaft was started and sunk to a depth of 265 feet, and a drift was driven at this level for a distance of about 800 feet.

In 1937, the Sunshine Mining Co. obtained a lease and option on the property. This company sank the shaft to a depth of 525 feet. A station was cut at a depth of 497 feet from the collar of the shaft. A drift from this station, known as the 500-foot level, was advanced for a distance of 620 feet. It is reported that a heavy flow of water was encountered, and most of the underground equipment had to be abandoned. The lease and option were abandoned, and no further underground development work has been done.

PHYSICAL FEATURES

The property is in northern Elko County and in the Cope mining district. The claims shown by figure 2 are roughly parallel to and on both banks of Mill Creek, a tributary of the Owyhee River. The relief of the area is moderate, with long, rounded ridges ranging in altitude from 5,700 to 5,950 feet.

Vegetation occurs as desert grass and sagebrush at the higher elevations, and small willow thickets are in the lower areas in the immediate vicinity of Mill Creek.

Annual precipitation, which occurs as snow in winter and rain in spring, is 10 to 15 inches. The summer and fall seasons are pleasant and there is very little or no precipitation. During the winter months, severe snowstorms may occur and temperature drops to -20 degrees have been recorded.

Chief railroad and shopping center is Elko, Nev., about 85 miles due south by road. The highway from Elko to the mine is oil-surfaced and paved, with the exception of the last 17 miles, which is a dirt-graveled road.

Patsville and Mountain City, local trading points, are 1/2 and 3 miles respectively, from the property. Living accommodations, domestic supplies, and telephone communications can be had at both places. Mountain City maintains a postoffice and several general stores.

The Mountain City Copper Co. also maintains a camp for its employees, called Rio Tinto, about half a mile from the focal point of the Rio Grande property. A postoffice and general store is maintained at Rio Tinto, and limited living accommodations can be obtained by visitors.

LABOR AND LIVING ACCOMMODATIONS

Only two dwellings are on the Rio Grande Copper property, one of which is usually occupied as a mine office and the other would suffice as a small family residence. Living accommodations would have to be obtained at Rio Tinto, Patsville, or Mountain City. No transmitted power is available at the property, although the above three locations have transmitted electricity, the same as that enjoyed in any community.

Labor is recruited from the U. S. Employment Service at Elko, Nevada, and from neighboring ranches and the Indian Reservation at Owyhee.

MINE WORKINGS AND PLANT

The property consists of two areas of development known as the Shaft area and the Davidson Tunnel area.

The shaft area consists of a 525-foot vertical shaft and two levels. One level is at an elevation of 265 feet below the collar of the shaft and the other is at 497 feet. This level is commonly called the 500.

The main drift on the 265-foot level was driven about 800 feet in a southeasterly direction and has three short crosscuts totaling about 260 feet.

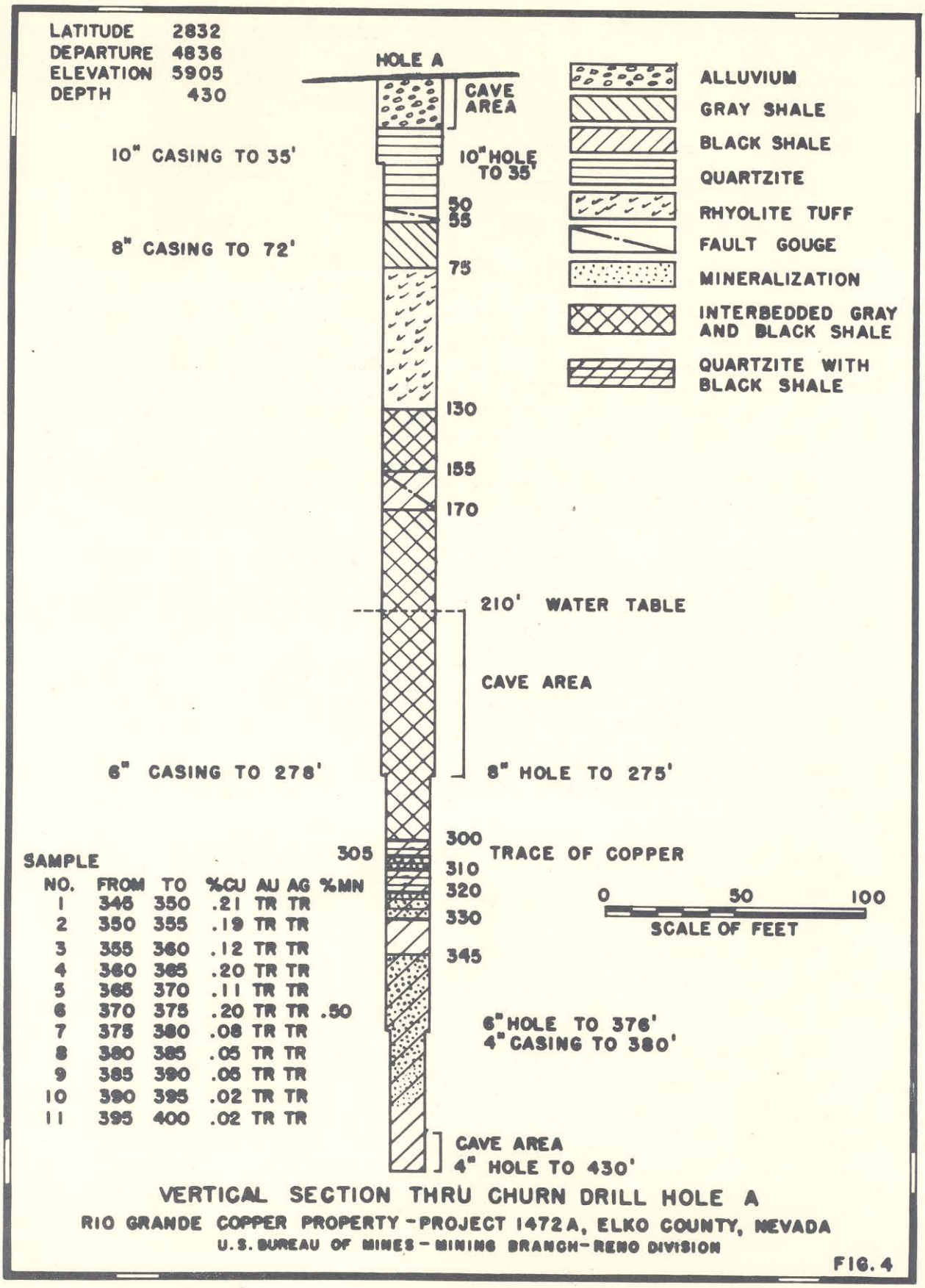
The 500-foot level consists of a main drift about 620 feet long driven in a southeasterly direction with two short stub drifts totaling about 80 feet.

The Davidson Tunnel is driven into the hillside in a southwesterly direction for a total distance of 1,100 feet. It has one raise connecting to surface and five short winzes totaling about 275 feet.

The equipment on the property consists of the following:

1. One single-drum gasoline driven hoist. Engine has a 10-1/2-inch bore and about 20 inch stroke. Hoisting cable is 3/4 inch round.

2. One 440-volt, 60-cycle, alternating-current generator, capacity 100 kw. driven by a stationary caterpillar diesel of 125 horsepower.



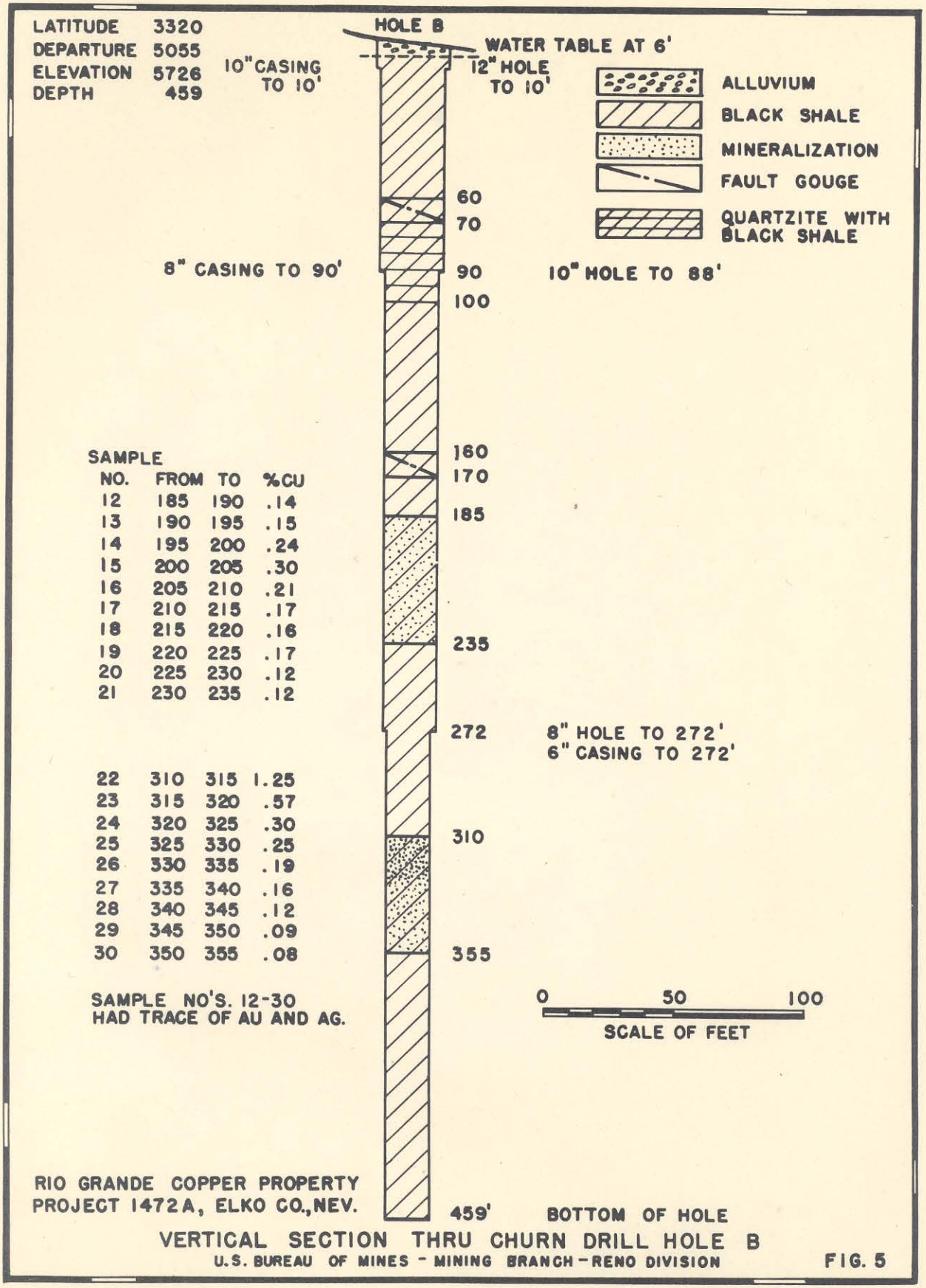
SAMPLE NO.	FROM	TO	%CU	AU	AG	%MN
1	345	350	.21	TR	TR	
2	350	355	.19	TR	TR	
3	355	360	.12	TR	TR	
4	360	365	.20	TR	TR	
5	365	370	.11	TR	TR	
6	370	375	.20	TR	TR	.50
7	375	380	.08	TR	TR	
8	380	385	.05	TR	TR	
9	385	390	.05	TR	TR	
10	390	395	.02	TR	TR	
11	395	400	.02	TR	TR	

VERTICAL SECTION THRU CHURN DRILL HOLE A

RIO GRANDE COPPER PROPERTY - PROJECT 1472 A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES - MINING BRANCH - RENO DIVISION

FIG. 4

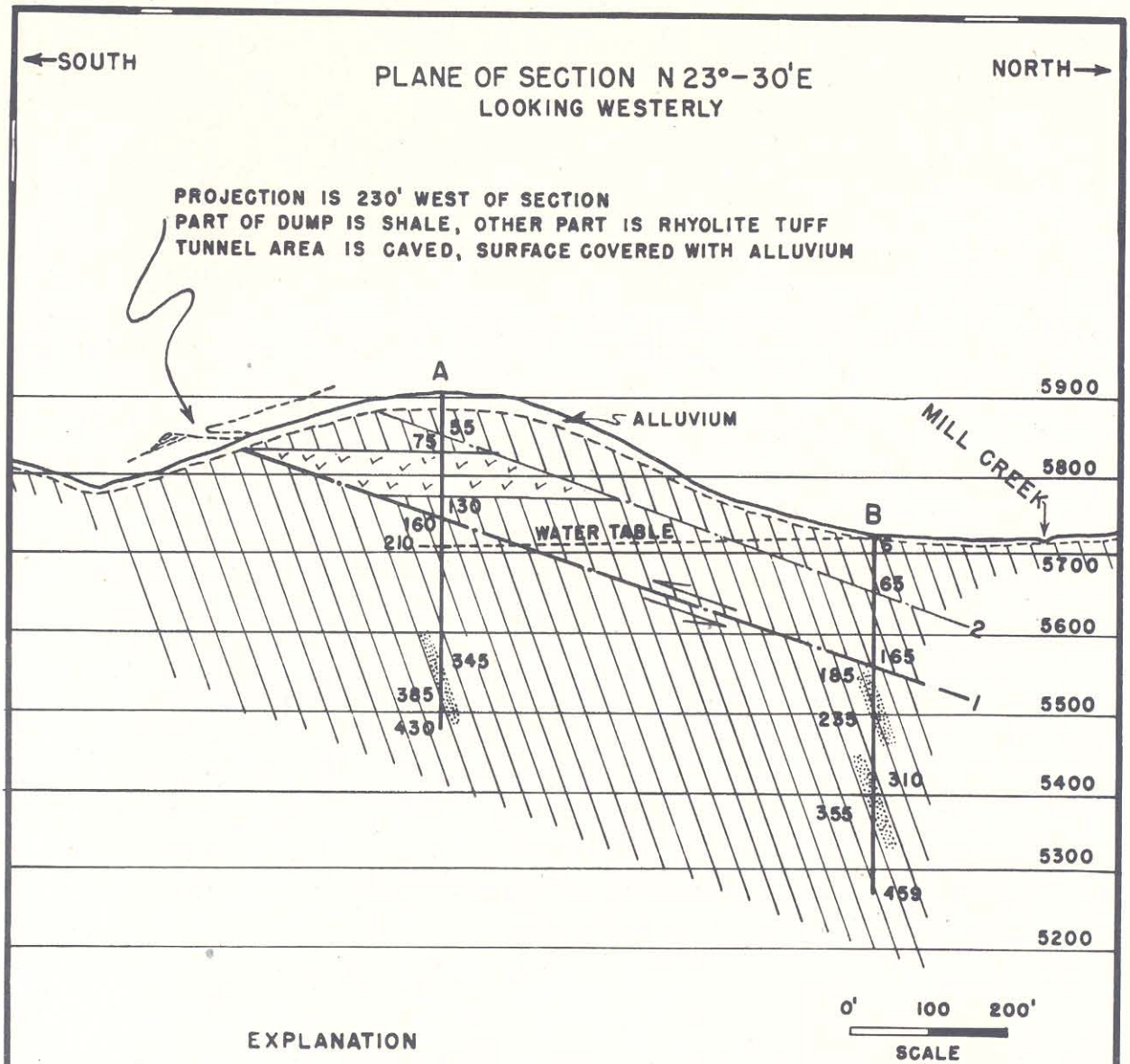


SAMPLE NO.	FROM	TO	%CU
12	185	190	.14
13	190	195	.15
14	195	200	.24
15	200	205	.30
16	205	210	.21
17	210	215	.17
18	215	220	.16
19	220	225	.17
20	225	230	.12
21	230	235	.12
22	310	315	1.25
23	315	320	.57
24	320	325	.30
25	325	330	.25
26	330	335	.19
27	335	340	.16
28	340	345	.12
29	345	350	.09
30	350	355	.08

VERTICAL SECTION THRU CHURN DRILL HOLE B

U.S. BUREAU OF MINES - MINING BRANCH - RENO DIVISION

FIG. 5



EXPLANATION

RIO TINTO FORMATION. GRAY TO BLACK CARBONACEOUS SHALES AND QUARTZITES. (SEE DRILL HOLE SECTIONS FOR DETAILS) DIAGONAL LINES SHOW GENERAL NORTHERLY DIP WHICH VARY FROM 60°—80°

RHYOLITE TUFF

—·—1 GOUGE ZONES IN HOLES INDICATING FAULTING. THE GENERAL DIP & STRIKE OF THIS FAULT COINCIDES WITH LOW ANGLE THRUST FAULT IN DAVIDSON TUNNEL

—·—2 FAULT RELATED TO MAIN THRUST

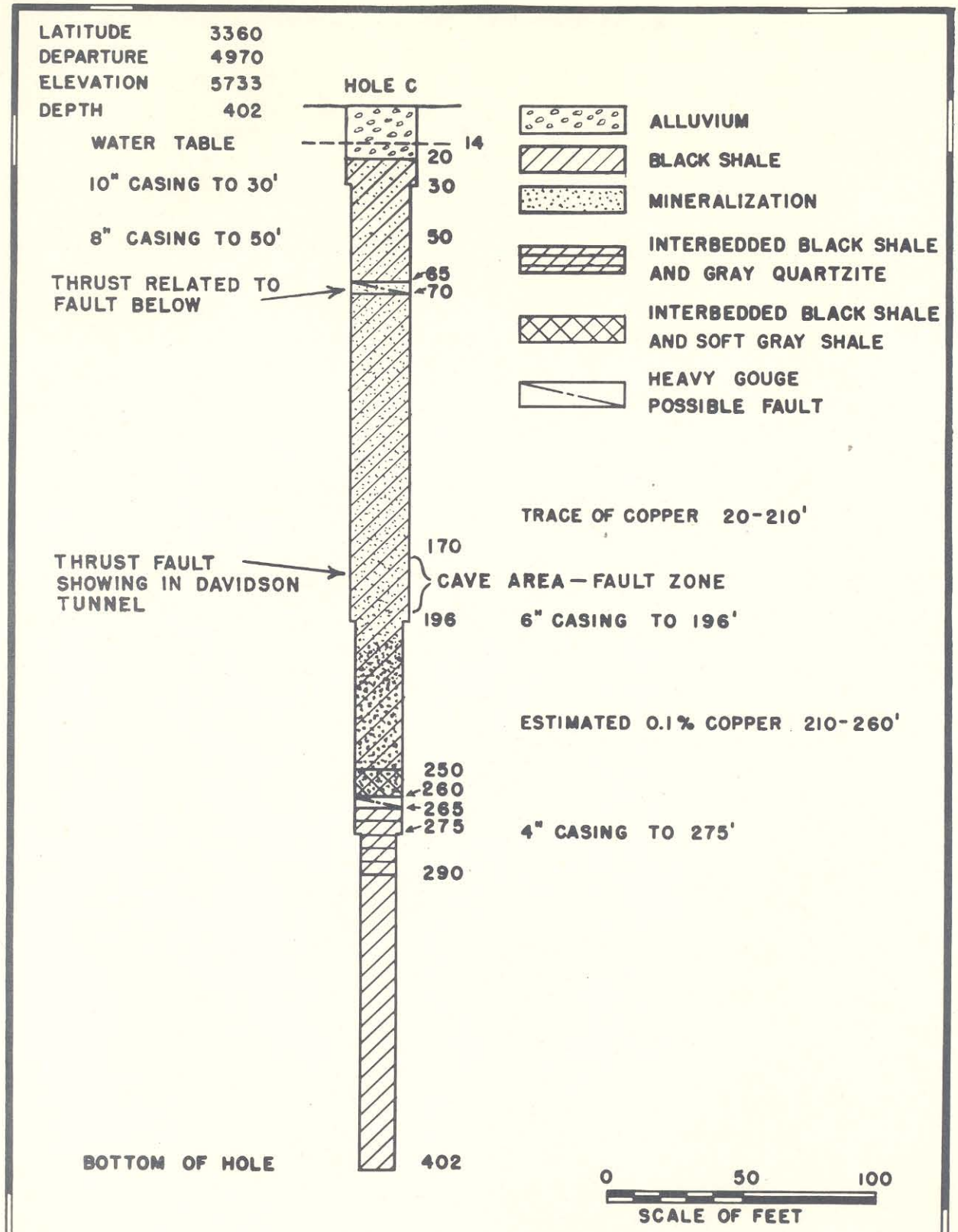
COPPER MINERALIZATION

VERTICAL SECTION THRU CHURN DRILL HOLES A & B

RIO GRANDE COPPER PROPERTY- PROJECT 1472A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES-MINING BRANCH-RENO DIVISION

FIG. 6

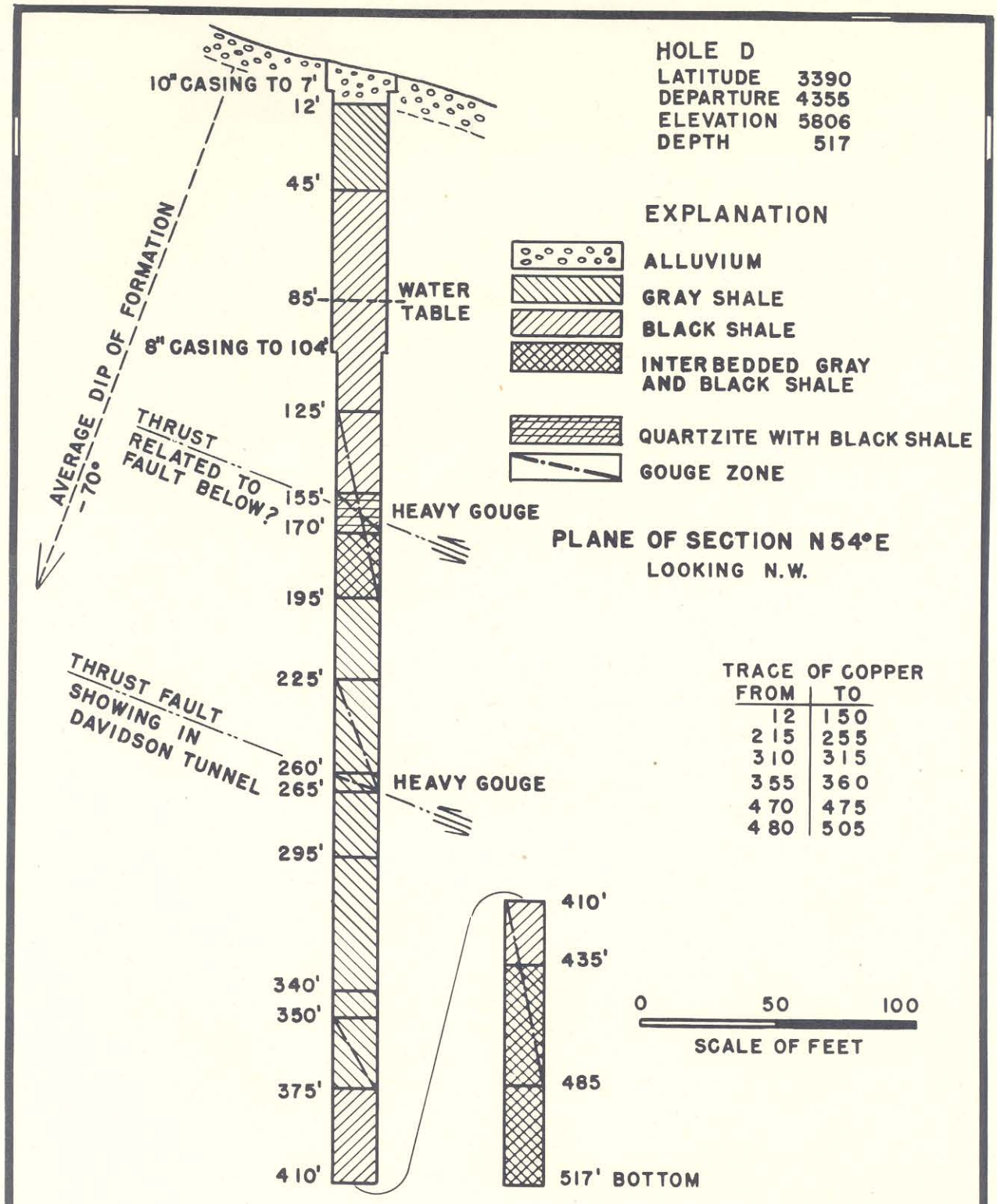


VERTICAL SECTION THRU CHURN DRILL HOLE C

RIO GRANDE COPPER PROPERTY - PROJECT 1472A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES - MINING BRANCH - RENO DIVISION

FIG. 7



VERTICAL SECTION THRU CHURN DRILL HOLE D

RIO GRANDE COPPER PROPERTY-PROJECT 1472A, ELKO COUNTY, NEVADA

U.S. BUREAU OF MINES - MINING BRANCH - RENO DIVISION

FIG. 8

3. One diesel-operated, stationary air compressor with a capacity of 200 cubic feet per minute.

A wood-frame building covered with corrugated sheet iron houses the hoist and is large enough to accommodate a small machine and blacksmith shop.

Both levels of the mine (shaft area) workings are under water. The water in the shaft was 157 feet below the collar on August 27, 1946. Since measurements of the water level were first recorded in the shaft in 1945, it has dropped from 150 to 157 or 7 feet.

DESCRIPTION OF THE PROPERTY

The Mountain City or Cope mining district owes its productive capacity to the Rio Tinto mine of the Mountain City Copper Co. No new copper deposits have been found, although considerable activity by numerous mining ventures along the eastern and western extensions of the general trend of the Rio Tinto formation have been and are still being carried on.

The general strike of the sedimentary formation of the district is, roughly, east-west or nearly south 80° east. The beds dip steeply to the north in a homoclinal fold varying from 50 degrees to vertical and averaging about 70 degrees.

Briefly, the geological section covered by the Rio Grande Copper property is as follows:

Hanging-wall series:	Grayish-blue limestone, locally called Banner limestone; quartzite, interbedded shales and conglomerates at the base.
Shale series and mineralized areas:	Light-gray to black carbonaceous shales, finely bedded and shistose, with interbedded quartzite, locally called the Rio Tinto formation.
Footwall series:	Quartzite and gray shales.

The Rio Tinto formation, in which the Rio Tinto mine of the Mountain City Copper Co. is situated, is believed to be the most favorable horizon for ore exploration and is the zone in which the present work has been done. The zone covers an area about 2,600 feet in thickness and 3 to 4 miles in length.

Owing to the small amount of work done on the Rio Grande property, correlation of shales and quartzite members of the Rio Tinto formation is extremely difficult and has not been attempted. Low-angle thrust faults and vertical sheer zones are known to exist. The only known fault on the property, which shows conclusive evidence of lateral movement, appears in the Davidson Tunnel. Correlation of this fault has been attempted, as shown by the churn drill-hole sections.

Mineralization in the shales occurs chiefly as iron pyrite, quartz, and sooty chalcocite. No evidence of chalcopyrite was detected in the churn-drill cuttings. The iron pyrite appears to be widely disseminated in the sediments and also in tiny fractures and seams.

No ore croppings or structural features indicating ore mineralization are exposed on the surface. In several places in the district there appears a "gossan" that looks somewhat similar to outcropping at the Rio Tinto mine, and to local observers this appears to indicate ore mineralization beneath. However, much of the so-called "gossan" is apparently due to hydrothermal alteration of the iron pyrites in the shales.

MINING METHODS

No stoping has been done at the Rio Grande property. All work has been confined to drifting and sinking in search of an ore body.

WORK DONE BY BUREAU OF MINES

The work outlined under Project 1472A was to explore by churn drilling favorable areas indicated by a geophysical survey made of the district.

The survey was conducted by the Geophysical Branch of the Geological Survey, in which potential and resistivity methods were used.

Four holes were drilled and were lettered A, B, C, and D. Traces of copper mineralization were found in all the holes. The best mineralization was encountered in hole B, in which 5 feet of 1.25 percent copper was found.

Plans showing the location and vertical sections of the holes and sample analysis accompany this report.