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REPORT OF INVESTIGATIONS

EXPLORATION OF THE EL DORADO COPPER MINE

EL DORADO COUNTY, CALIF.

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BY

R. H. BEDFORD

R.I. 3896,
June 1946.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

EXPLORATION OF THE EL DORADO COPPER MINE, EL DORADO COUNTY, CALIF.[1]

By R. H. Bedford[2]

INTRODUCTION

The El Dorado copper mine is situated in the foothill copper-zinc belt of California, which traverses the western slope of the Sierra Nevada with unusual persistence from Butte County to Kern County, a distance of more than 300 miles. Although this area contains such important past producers as the Penn mine, Union, and others, a great part of the current production has been derived from smaller properties, which depend largely on premium metal prices for economical operation. The El Dorado mine is in the latter group, which constitutes an important source of metal in a national emergency.

Exploration by the Bureau of Mines by means of eight diamond-drill holes indicated narrow, intermittent lenses of copper ore along structures 600 feet in length. The copper occurs in massive sulfides composed of chalcopyrite, pyrite, pyrrhotite, and minor quantities of bornite. The sulfides have evidently replaced tuffs, which are interbedded with the Mariposa slates and shales.

H. A. Weiler and Hal T. Hall, owners of the El Dorado copper property, requested an examination by the Bureau during the latter part of 1944. In December of that year an engineer of the Bureau of Mines visited the mine and recommended the project work undertaken. The purpose was to aid the owners in bringing the property into production of copper and zinc, which at that time was critically essential to the war industries.

Complete factual data obtained by the exploration are embodied in this report.

ACKNOWLEDGMENTS

In its program of exploration of mineral deposits, the Bureau of Mines has as its primary objective the more effective utilization of our mineral resources to the end that they make the greatest possible contribution to national security and economy. It is the policy of the Bureau to publish the facts developed by each exploratory project as soon as practicable after its conclusion. The Mining Branch, Lowell B. Moon, chief, conducts preliminary examinations, performs the actual exploratory work, and prepares the

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 3896."

2/ Mining engineer, Bureau of Mines, U. S. Department of the Interior.

final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests. Both these branches are under the supervision of Dr. R. S. Dean, assistant director.

Acknowledgment is made to A. C. Johnson, chief, Reno Division, Mining Branch, and Lowell B. Moon, chief, Mining Branch, for their aid and direction.

LOCATION AND ACCESSIBILITY

The El Dorado property is in El Dorado County, California. Placerville, which is 12 miles south, and Auburn, 19 miles west, are the nearest rail centers, and the paved road between them passes within 1/8 mile of the mine, which is connected by a serviceable dirt road.

Two parcels of land, known as the Roosevelt claim, make up the property. Of these, the north portion, which is in SE1/4 sec. 24, T. 12 N., R. 10 E., M.D., is patented as parcel No. 1. The south portion, in NE1/4 sec. 3, T. 11 N., R. 10 E., is unpatented. Taken in conjunction, the two parcels fit together to give the picture of a conventional mining claim with parallel end lines; but as one portion is patented and the other unpatented, they should probably be regarded as separate claims.

PHYSICAL FEATURES AND CLIMATE

The country shows the characteristics typical of the western flanks of the Sierra Nevada at 2,000 feet, an elevation transitional between foothills and mountains proper. Situated on the south slope, just below the divide between the middle and south forks of the American River, the area is one of rolling hills separated by gently sloping valleys that plunge below into rugged ravines of the South Fork.

Summers are hot and dry, and the winters are moderate, with about 40 inches of rainfall and at times a transient fall of snow. Conditions are ideal for efficient all-year operations, and housing facilities and board for a small crew are available within a radius of 5 miles.

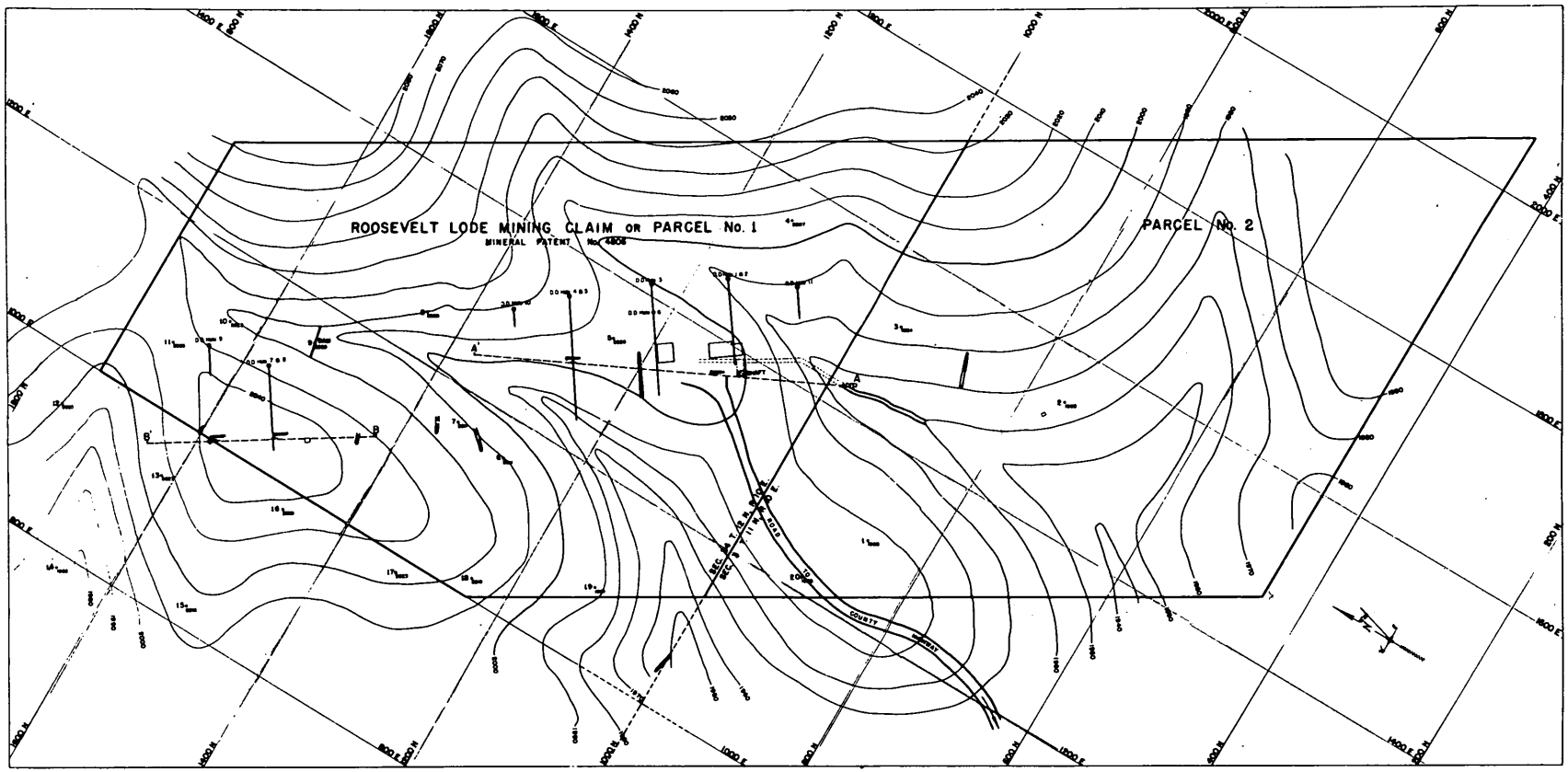
HISTORY AND OWNERSHIP

There is no record of past production, but numerous cuts and pits bear witness to former prospecting for gold. As a result of recent work, a stock pile of about 75 tons of copper ore has been accumulated on the surface, but to date none has been shipped.

H. A. Weiler, of Roseville, and Hal T. Hall, a mining engineer of Garden Valley, Calif., are the owners. Recently they equipped the mine with a good portable compressor, a homemade but serviceable gas-engine hoist, and a blacksmith shop with the usual small tools and facilities.

DESCRIPTION OF THE DEPOSIT

From Kern County in the south to Butte County in the north, mineralization in the Sierra Nevada, from its western flank to its summit, shows the zoning



ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

FIGURE 1

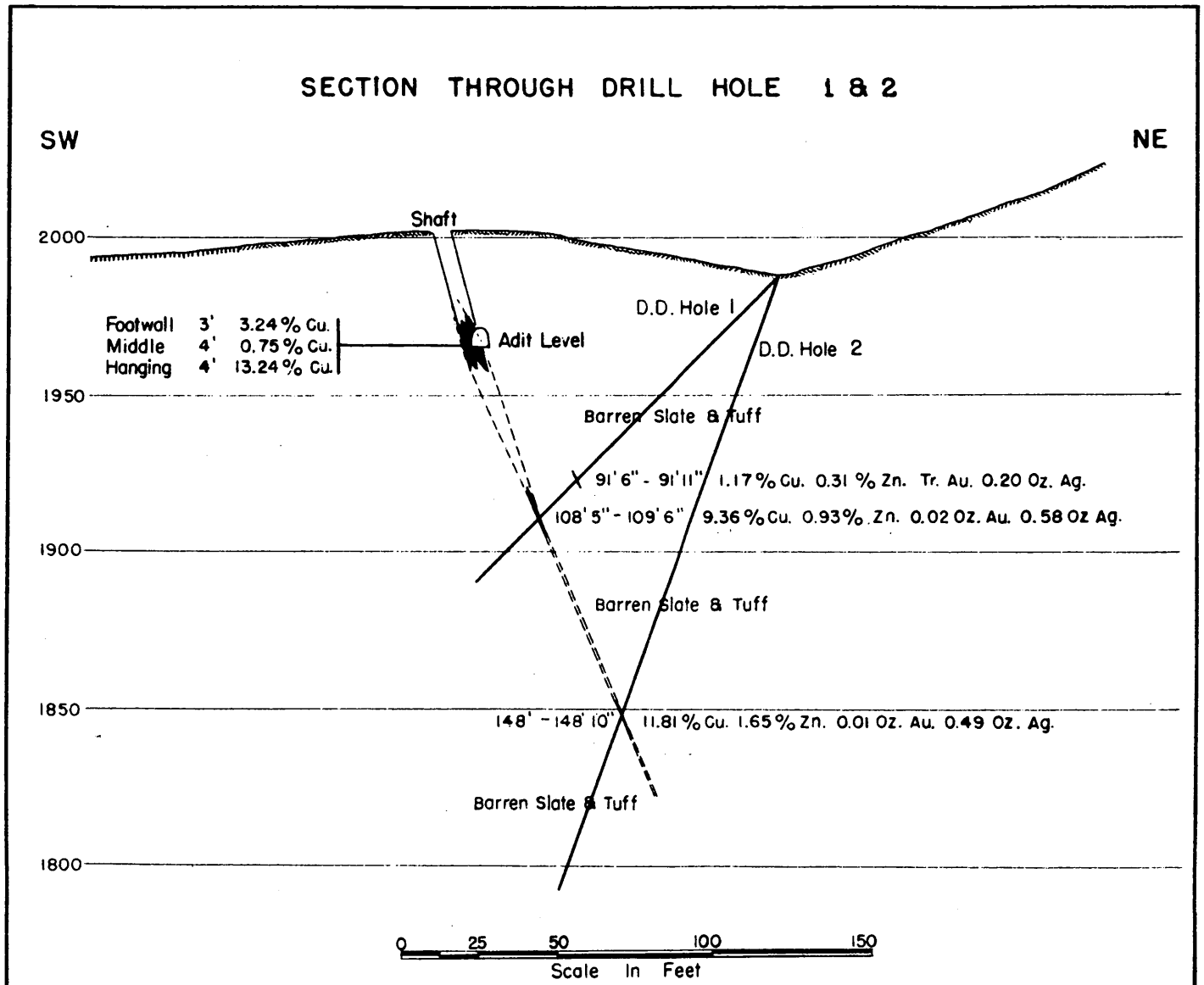


FIGURE 2

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

characteristics described by Emmons and other geologists. In the foothills along the west flank, a line of copper and copper-zinc deposits follows in direction the main northwest-striking axis of the batholith that constitutes the backbone of the range.

Typical "West Belt" copper-zinc deposits are marked by an inconspicious gossan, below which may be expected a tabular or lenticular ore shoot that dips steeply, usually to the east. Although the average lense is small in some places, such as at the Penn mine in Calaveras County and the Big Bend mine in Butte County, ore reached a thickness of 30 feet.

The El Dorado mine is a member of the West Belt family and departs from the typical only to the extent that the host rock is slate of the Mariposa formation instead of the schist that is usual in the others. As seen at the El Dorado mine, the Mariposa formation comprises an alteration of dark slate and shale as the dominant constituents and minor amounts of an interbedded gray rock believed to be tuff.

Ore is indicated by narrow zones of gossan striking N. 27° W. and dipping 60 to 70 degrees to the west. The massive sulfides, consisting mostly of chalcopyrite, pyrrhotite, and pyrite, have evidently replaced the stratum of the tuffs, which seems to have been more susceptible to replacement than either the slate or shale, both of which are barren. Although the tuff has a thickness of as much as 10 feet, only narrow beds showed complete replacement. The thicker bands showed no more than scattered specks of mineral, an incipient replacement that did not rise to the level of protore. The reason for the complete replacement of thinner strata and virtually no replacement of the thicker, is not apparent.

Underground exploration consisted of a 173-foot adit driven as a crosscut for 46 feet and as a drift on the vein structure for 127 feet and a 48-foot shaft that connects with the adit 128 feet from the portal. The shaft bottom is 8 feet below the adit, which was driven near ground-water level, as shown by the oxidization of the vein to that horizon. The exposures in the adit suggest ore shoots that have but little strike length. At the point where the shaft intersected the adit, sampling by a Bureau engineer[3] showed 3.24 percent copper across 3 feet on the footwall side and 4 feet of 13.24-percent ore on the hangingwall side. A sample across the middle 4 feet assayed 0.75 percent copper. Zinc assays ranged between 0.5 and 0.6 percent. Gold values ranged from a trace to 0.025 ounce per ton, whereas silver values ran from 0.25 to 1.10 ounces per ton. The footwall band showed some quartz containing bornite. This ore extends from a few feet south of the shaft to a few feet north, at which point it dies out and reappears as a 12-inch vein of solid sulfides 5 feet from the present face.

In addition to the underground work, there are numerous old surface cuts and pits, which are evidently the work of prospectors in their search for gold.

WORK BY THE BUREAU OF MINES

The accompanying base map (fig. 1) shows surface evidence of two approximately parallel veins, one in the north and the other in the south portion

3/ R. H. Bedford.

of the Roosevelt claim. The gossan outcrops are not continuous and are now marked by old open cuts, shallow pits, and the main shaft.

Eleven drill holes aggregating 1,613 feet were drilled. Holes 1, 2, 3, 4, 5, 6, 10, and 11 explored the southerly vein, and holes 7, 8, and 9 explored the northerly one. A summary showing location of holes follows:

Hole	Bearing	Coordinates N.	Coordinates E.	Dip	Depth, ft.	Elevation of collar, feet
1	S. 55° W.	1,162	1,463	-45°	138	1,988
2	S. 55° W.	1,162	1,463	-70°	208	1,988
3	S. 55° W.	1,323	1,412	-40°	165	2,001
4	S. 55° W.	1,310	1,352	-50°	221	2,015
5	S. 55° W.	1,312	1,354	-77°	141	2,015
6	S. 55° W.	1,216	1,386	-78°	116	2,005
7	S. 55° W.	1,570	1,105	-45°	137	2,028
8	S. 55° W.	1,072	1,107	-80°	160	2,028
9	S. 55° W.	1,641	1,089	-75°	131	2,030
10	S. 55° W.	1,358	1,306	-78°	91	2,018
11	S. 55° W.	1,087	1,496	-70°	105	1,990

Where not in ore, all holes showed barren or only slightly mineralized Mariposa formation consisting of interbedded slates, shales, and tuffs.

Because the southerly structure was both more extensively developed and promising, it was selected as the target for the first two drill holes, which were designed to explore in depth the ore found at the intersection of the shaft with the adit. The holes showed narrow bands of ore at two horizons, 60 and 130 feet below the adit, respectively. This is shown graphically in the accompanying section through the plane in which they were drilled. The ore consisted of massive sulfides containing much chalcopyrite.

Hole	Distance	Cu, percent	Zn, percent	Au, oz.	Ag, percent
1	91'6"-91'11"	1.17	0.31	Tr.	0.20
	108'5"-109'6"	9.36	.93	0.02	.58
2	148'0"-148'10"	11.81	1.65	.01	.49

Holes 3 and 6 were drilled parallel to holes 1 and 2 about 90 feet to the north to explore for the possible extension of the ore body in that direction. This location was midway between the main-shaft gossan and that showing 180 feet north of it. To test the footwall, hole 3 was continued to a depth of 165 feet without finding any ore, although at 162 feet it did show 4 inches of slightly mineralized tuff. Figure 3 shows a section through holes 3 and 6.

Holes 4 and 5 were drilled to explore below the gossan 180 feet north of the shaft, and both of them intersected narrow widths of ore similar to that found in the shaft section. Section through these holes is shown in figure 4.

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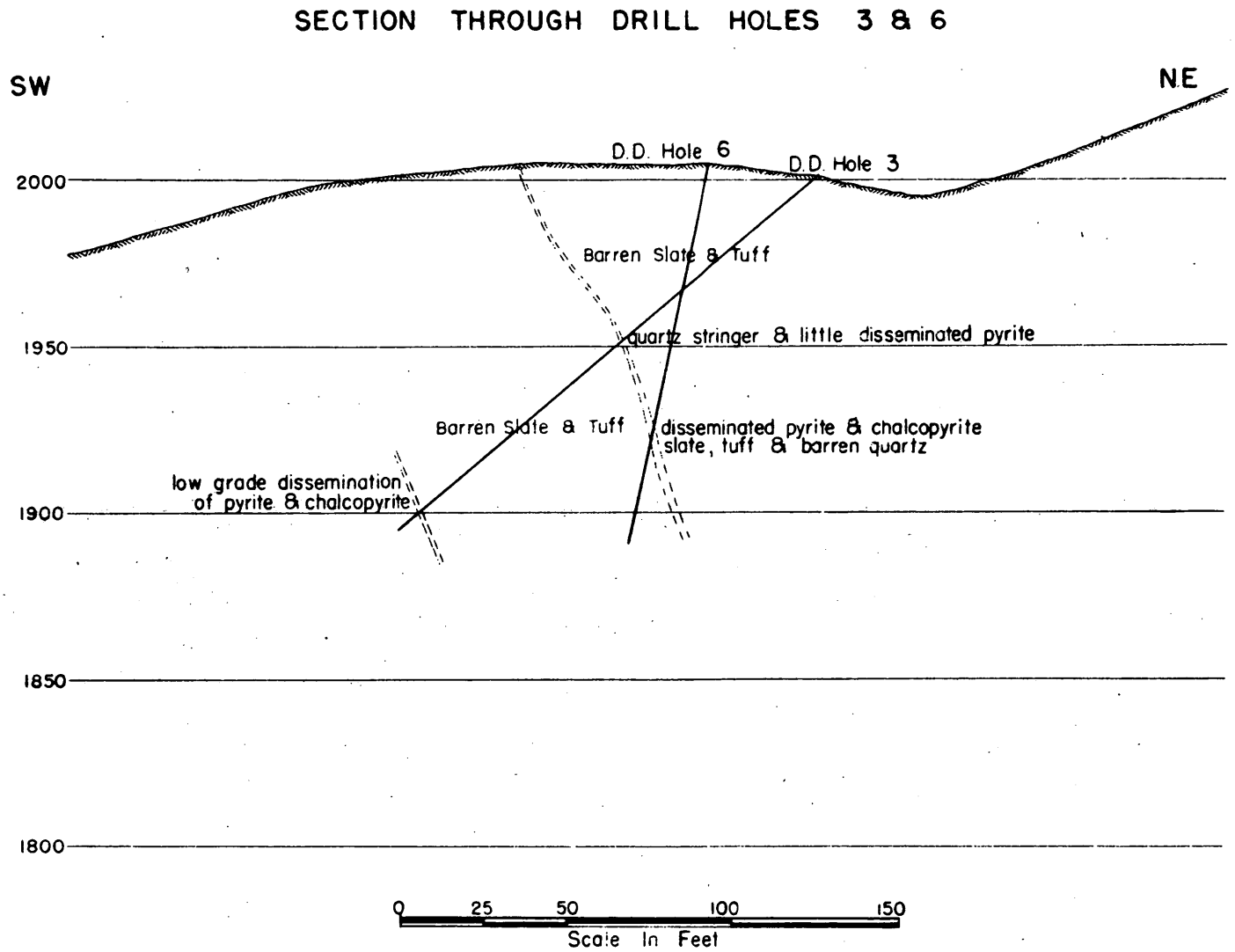


FIGURE 3

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

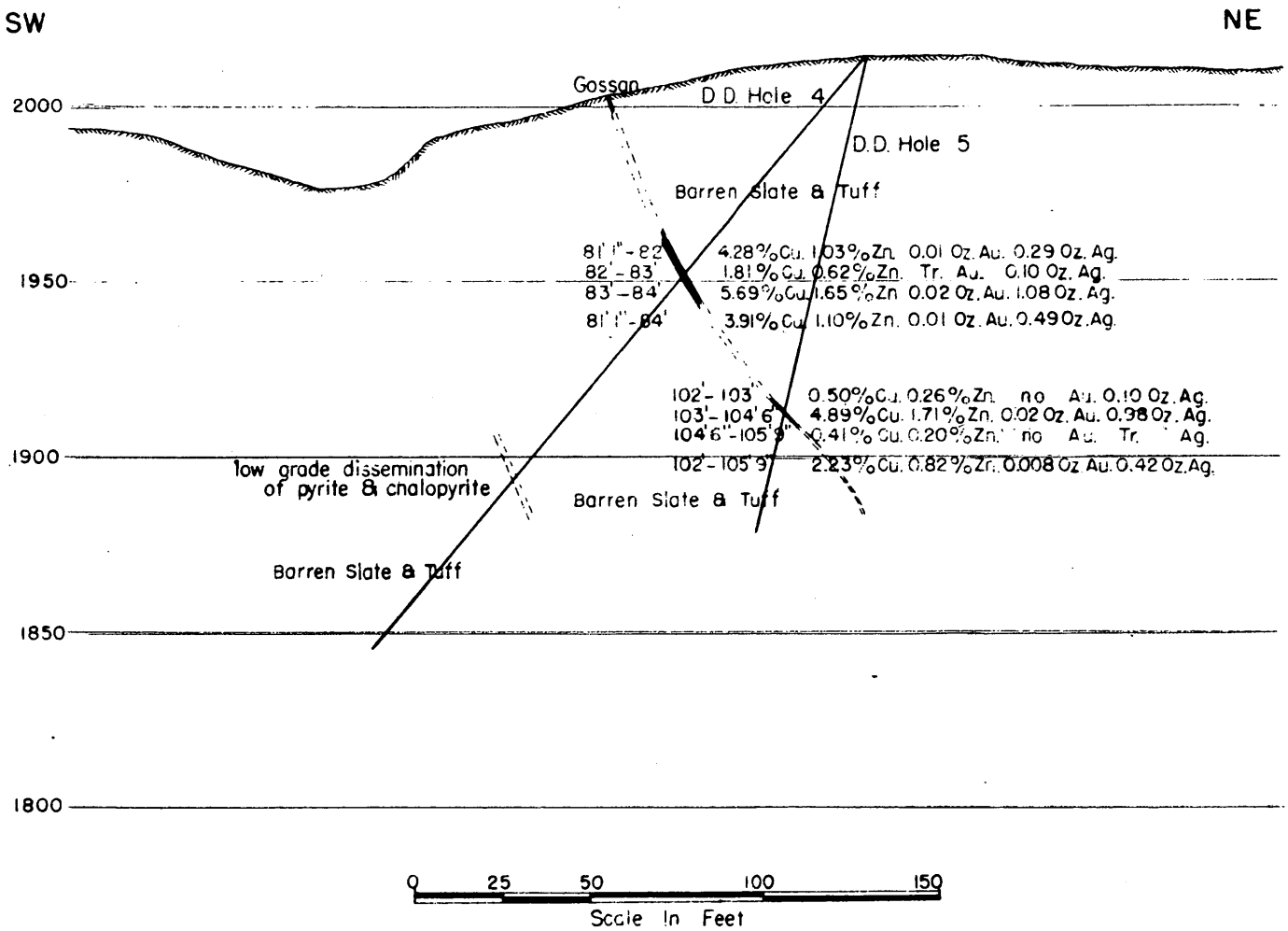


FIGURE 4

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

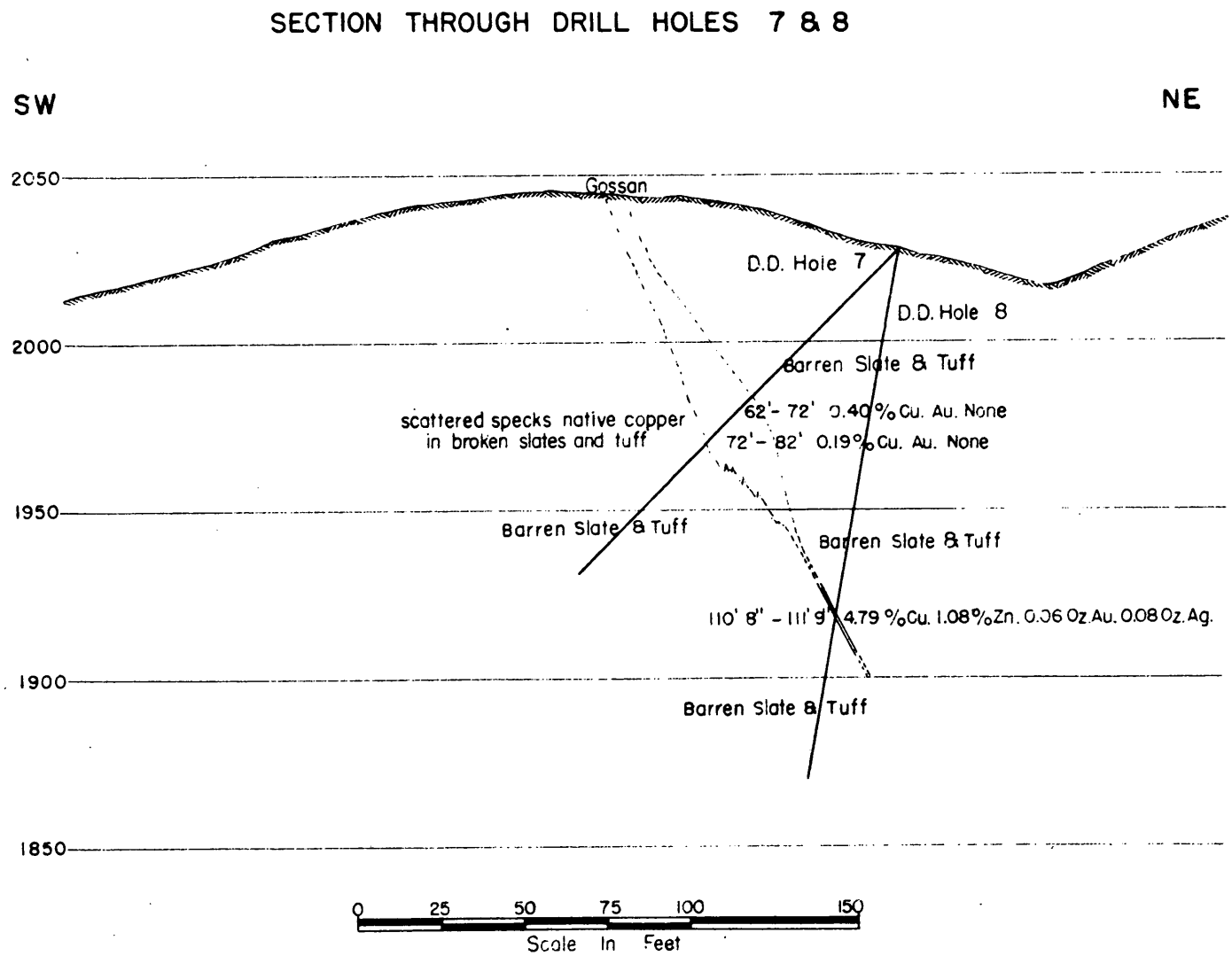


FIGURE 5

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

Hole	Distance	Cu, percent	Zn, percent	Au, oz.	Ag. oz.
4	81'1"-82'0"	4.28	1.03	0.01	0.29
	82'0"-83'0"	1.81	.62	Tr.	.10
	83'0"-84'0"	5.69	1.65	0.02	1.08
5	102'0"-103'0"	.50	.26	None	.10
	103'0"-104'0"	4.89	1.76	0.02	.98
	104'0"-105'9"	.41	.20	None	Tr.

At this stage, two small shoots of ore were indicated in the southerly section. Holes 7 and 8 were then drilled to explore below the northerly gossan. Hole 7 did not intersect the vein below the oxidized zone, and small specks of native copper appeared in the core between 62 and 72 feet. Hole 8 showed solid sulfide ore from 110'8" to 111'9". This ore was the same type as found in the southerly lenses. Figure 5 shows sections through holes 7 and 8.

Hole	Distance	Cu, percent	Zn, percent	Au, oz.	Ag, oz.
7	62'-72'	0.48		None	
	72'-82'	.19		None	
	82'-92'	.10		None	
8	110'-8"-111'9"	4.79	1.08	0.06	0.08

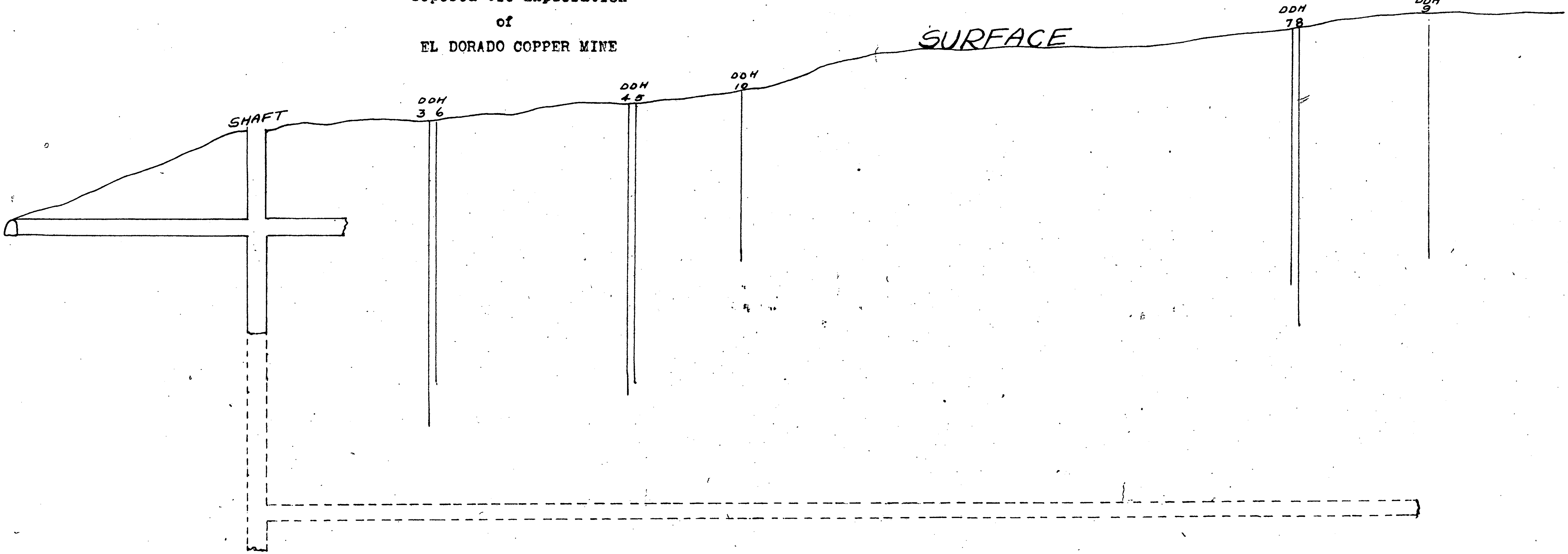
Three more short holes, 9, 10, and 11, explored for lateral extension of the ore shoots indicated. Hole 9, drilled 65 feet north of 7 and 8, showed scattered mineral in tuff between 118 to 122 feet but was otherwise in barren slate.

Hole 10, drilled 65 feet north of sections 4 and 5, intersected 1 inch of pyrite at 87 feet but was otherwise barren of mineralization.

At 75 feet south of holes 1 and 2, hole 11 was barren except for a little scattered pyrite between 84 and 86 feet.

In its final results, drilling indicated in the sections of holes 1 and 2, 4 and 5, and 7 and 8 three shoots of ore of limited lateral extent. The average thickness of ore in the three lenses where cut by the drill holes is 1 foot. Persistence in depth was not determined, but in the West Belt the Penn mine has ore to a depth of at least 2,800 feet, Copperopolis to 1,800 and the Newton has ore below 900 feet.

Proposed Ore Exploration
of
EL DORADO COPPER MINE



Dotted lines indicate proposed ore exploration by sinking the shaft an additional 100 feet with 35 feet more for sump; and also drifting north from the shaft at the 200 foot level for 600 feet.

Estimated cost:

135 feet of shaft @ $ 92.08, per foot - - - - - - - - - - - - - - -
600 feet of drifting north of shaft at
200 foot level @ $ 41.48 - see item #6 in application. Total $37,260.15

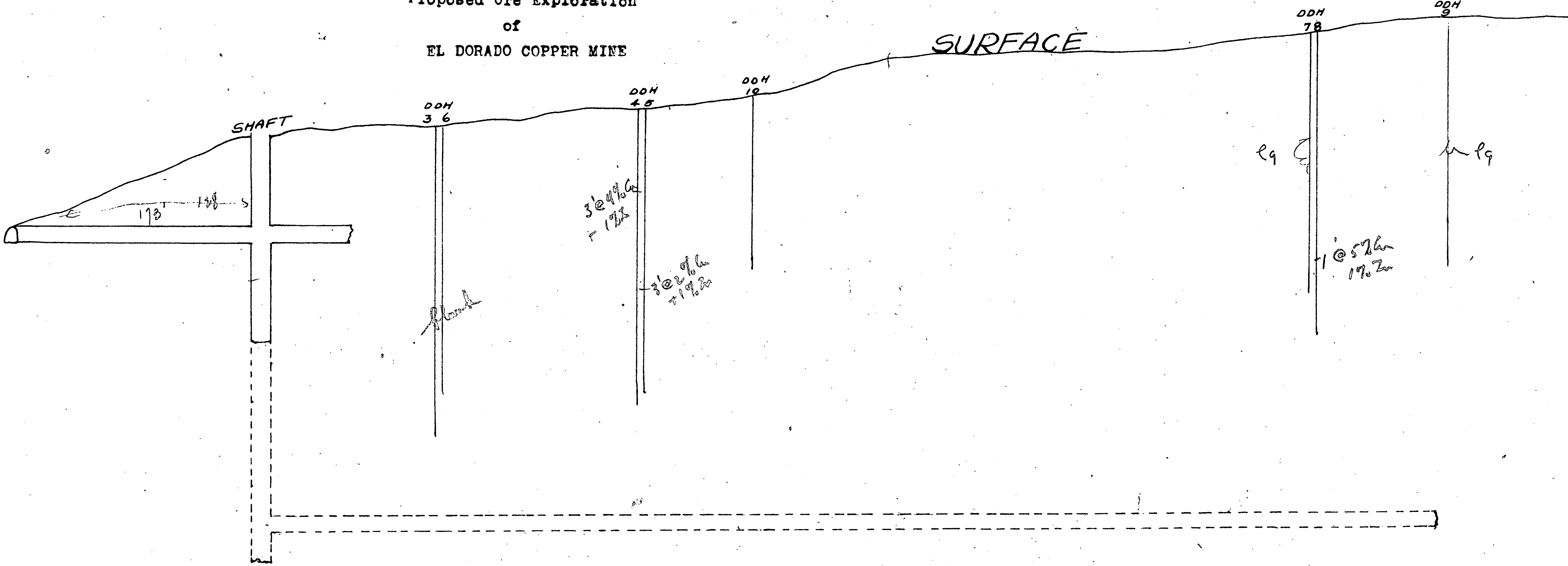
Scale One inch 50 feet

HTH Oct. 1952

Proposed Ore Exploration

of

EL DORADO COPPER MINE



Dotted lines indicate proposed ore exploration by sinking the shaft an additional 100 feet with 35 feet more for sump; and also drifting north from the shaft at the 200 foot level for 600 feet.

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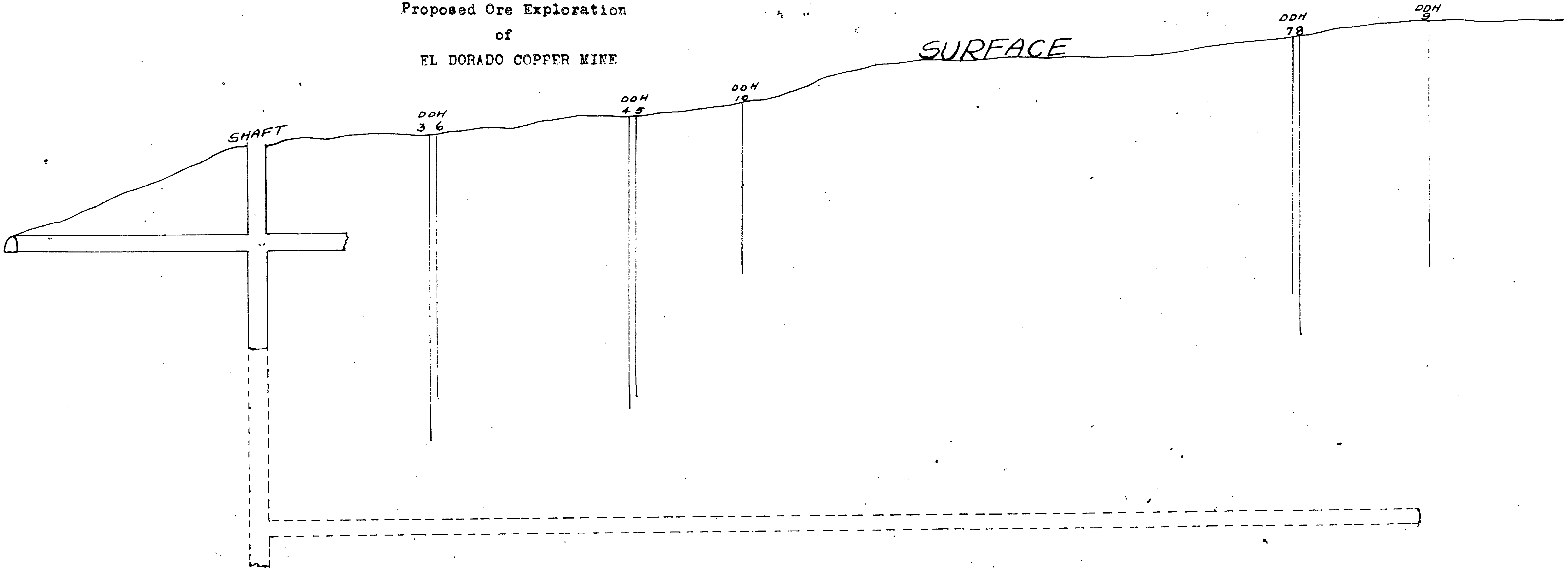
Scale One inch 50 feet

HTH Oct. 1952

Proposed Ore Exploration
of
EL DORADO COPPER MINE



Dotted lines indicate proposed ore exploration by sinking the shaft
an additional 100 feet with 35 feet more for sump; and also drifting
north from the shaft at the 200 foot level for 600 feet.

Estimated cost:

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600 feet of drifting north of shaft at
200 foot level @ $ 41.48 -

see item #6 in application. Total $37,260.15

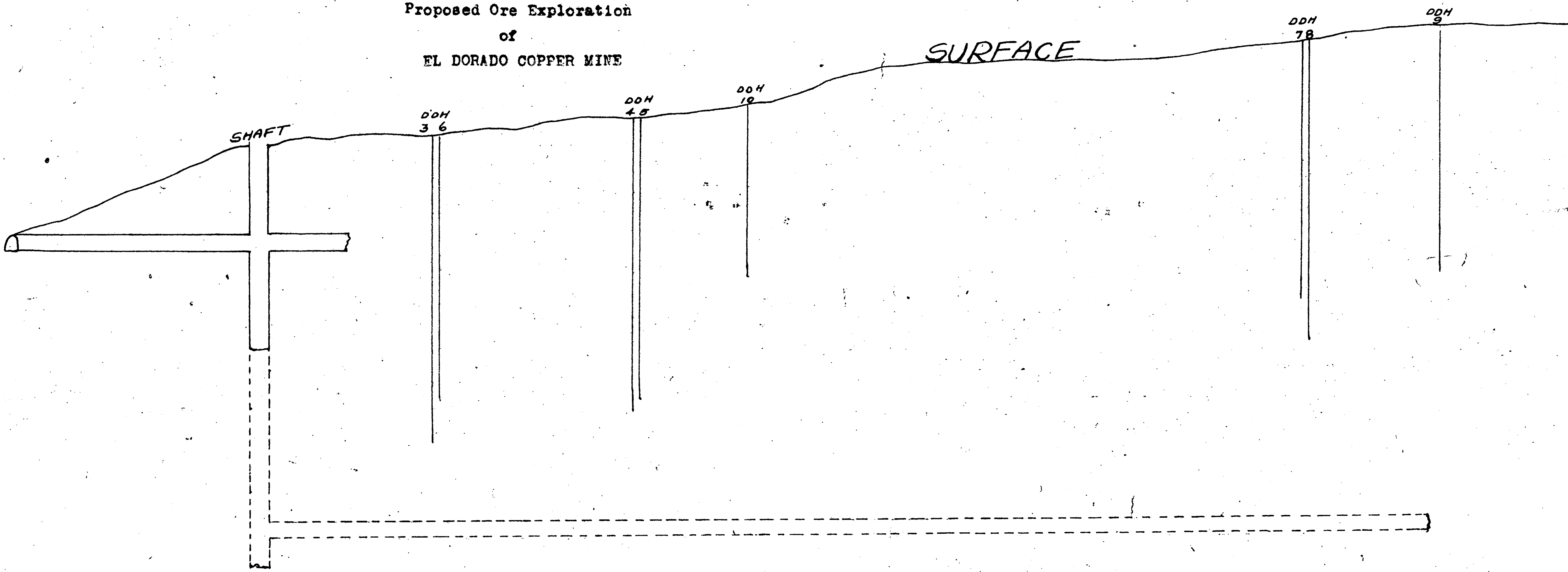
Scale One inch 50 feet

HTH Oct. 1952

Proposed Ore Exploration

of

EL DORADO COPPER MINE



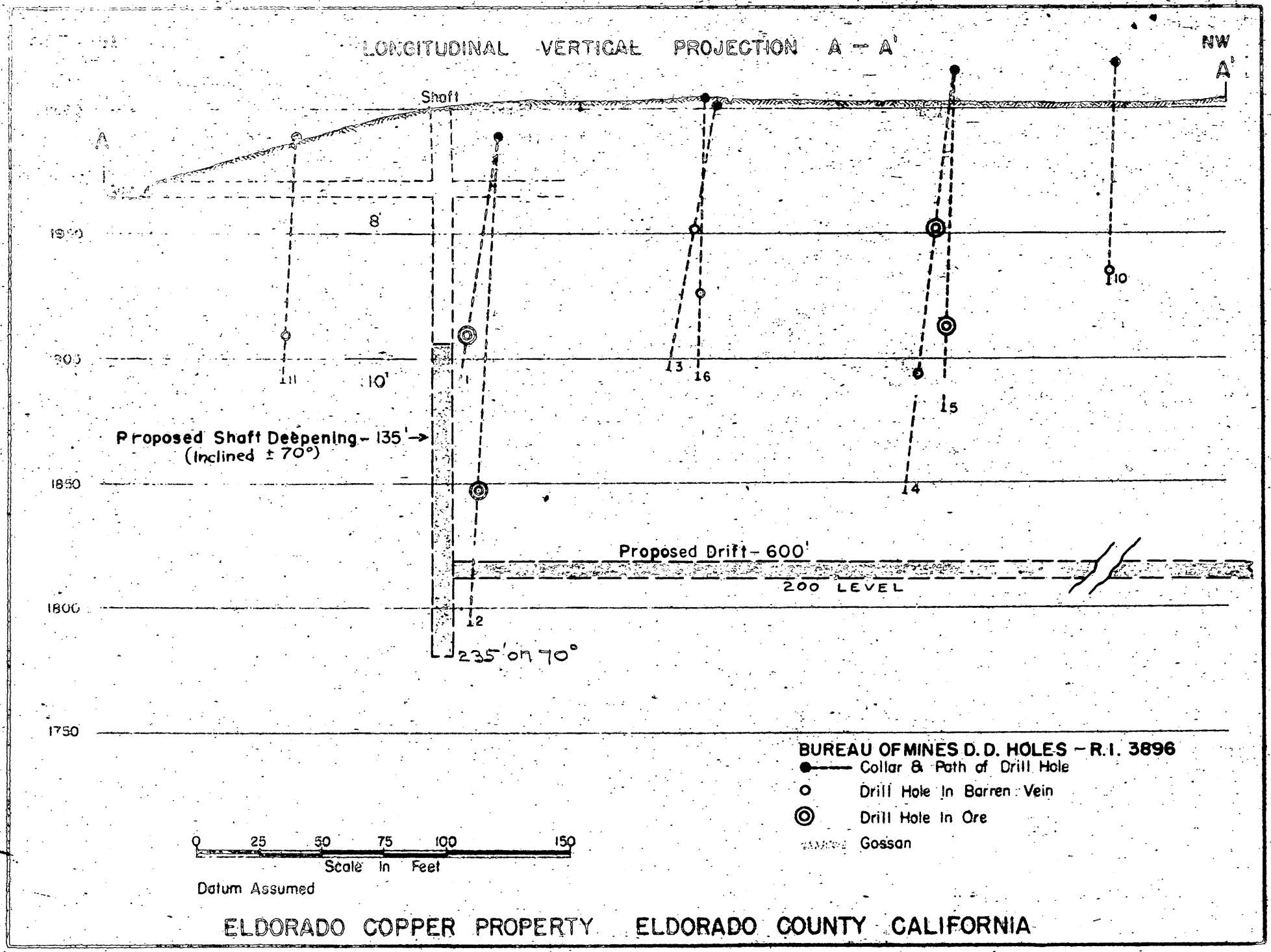
x → Dotted lines indicate proposed ore exploration by sinking the shaft an additional 100 feet with 35 feet more for sump; and also drifting north from the shaft at the 200 foot level for 600 feet.

Estimated cost:

135 feet of shaft @ $ 92.0838 per foot - - - - - - - - - - - - - - -
600 feet of drifting north of shaft at
200 foot level @ $ 41.4808 - see item #6 in application. Total $37,~~260.15~~ 37,319.79

Scale One inch 50 feet

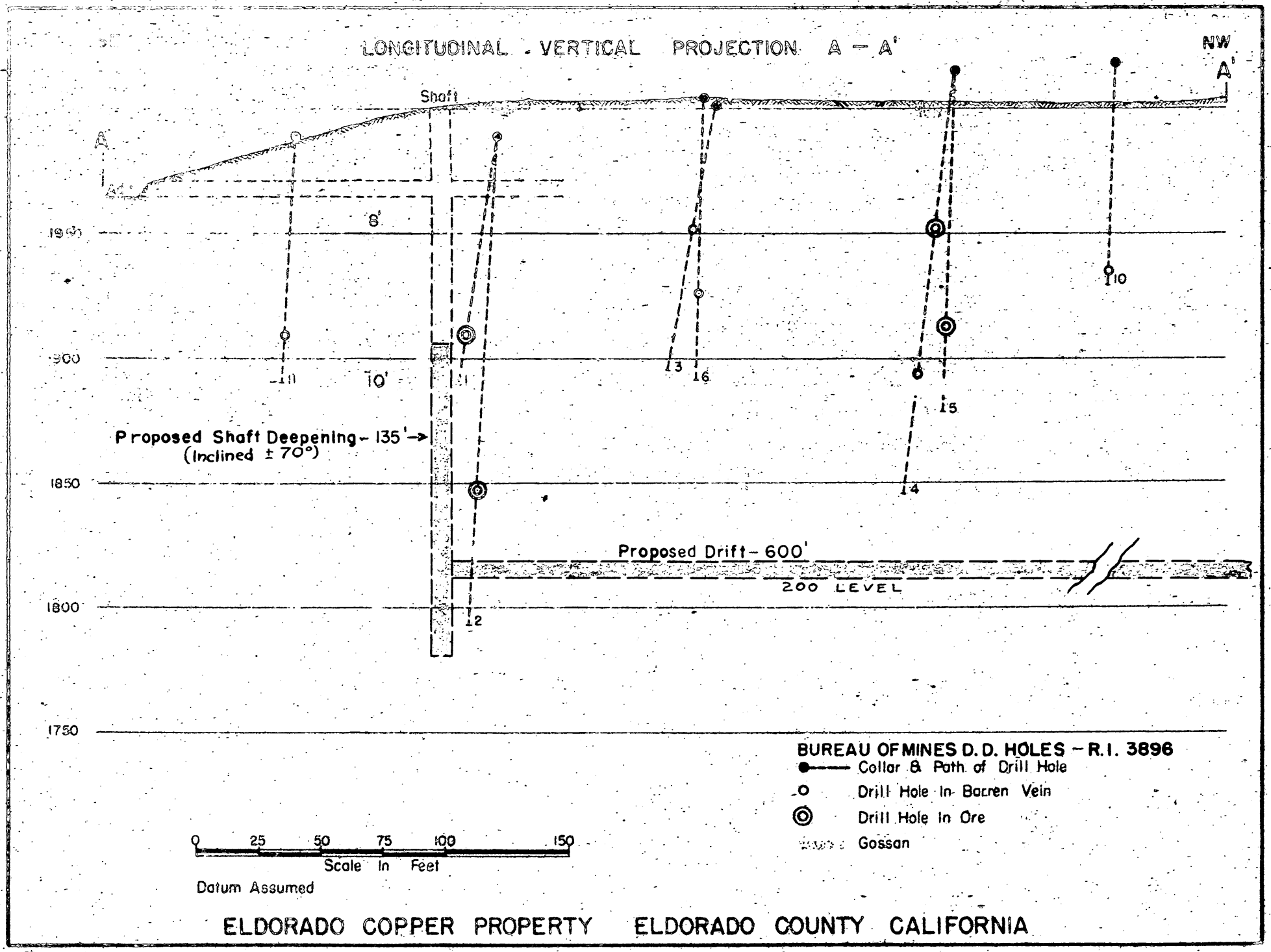
HTH Oct. 1952



ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

Proposed Exploration Project — DMEA-2770

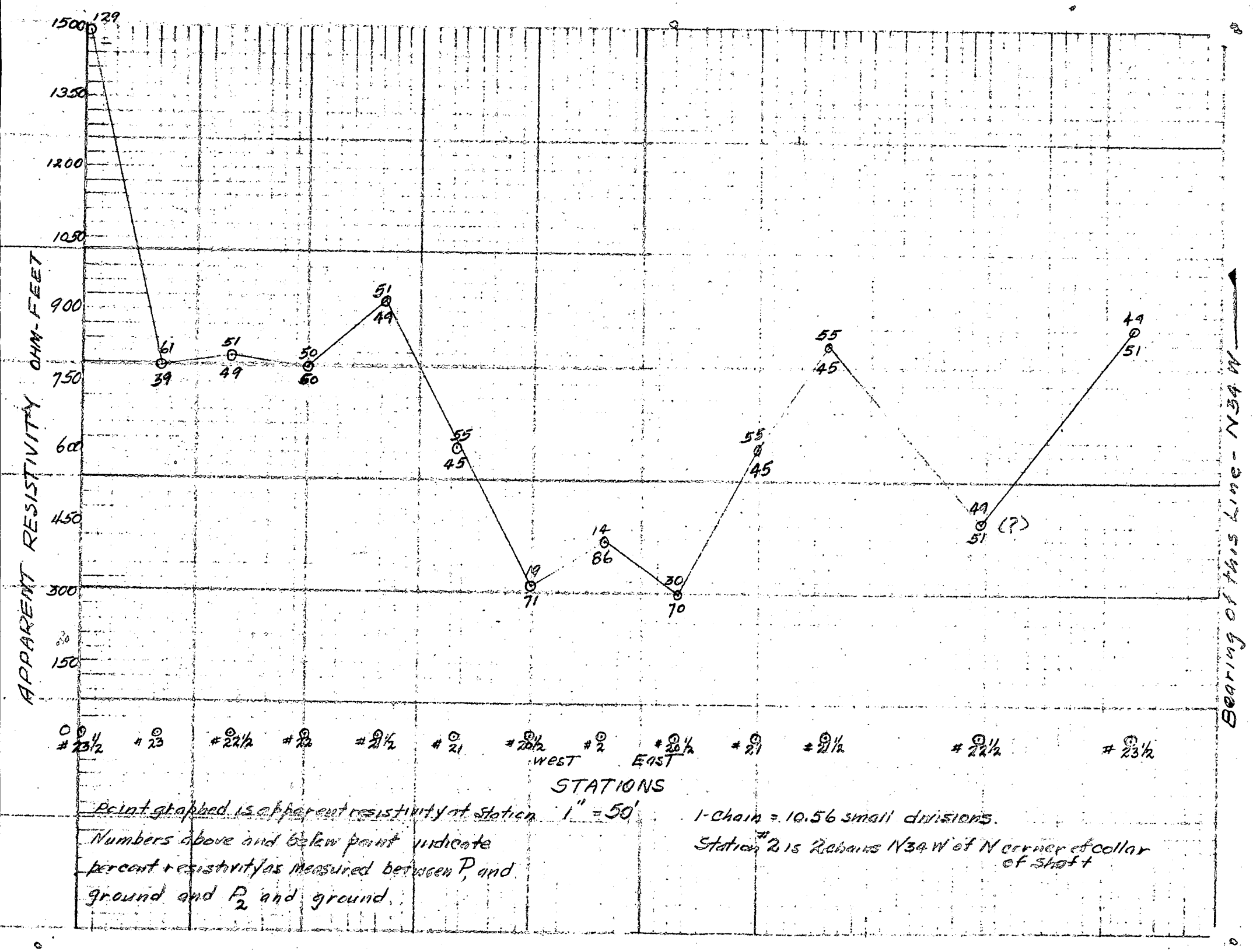
FIGURE 2



ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

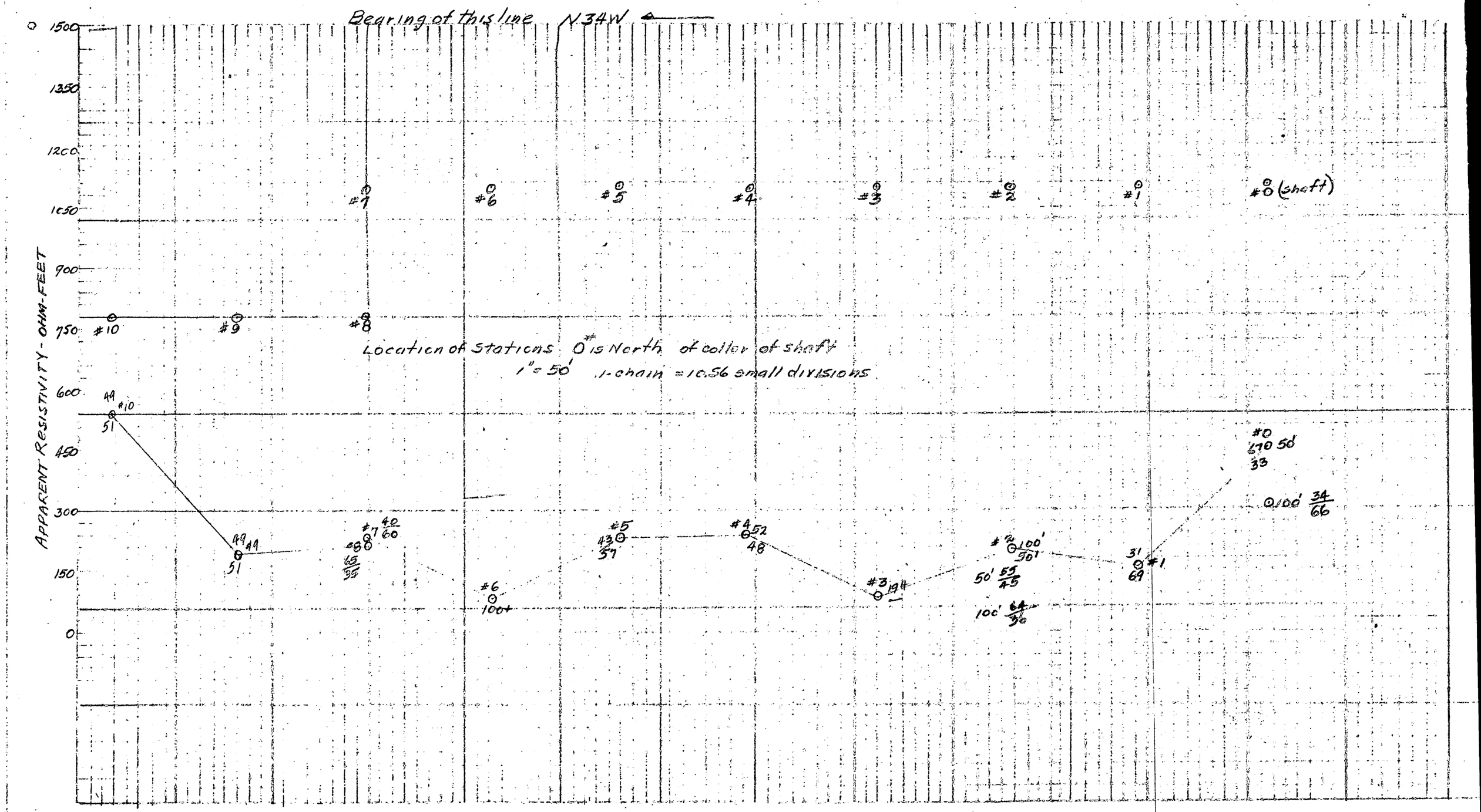
Proposed Exploration Project — DMEA-2770

FIGURE 2

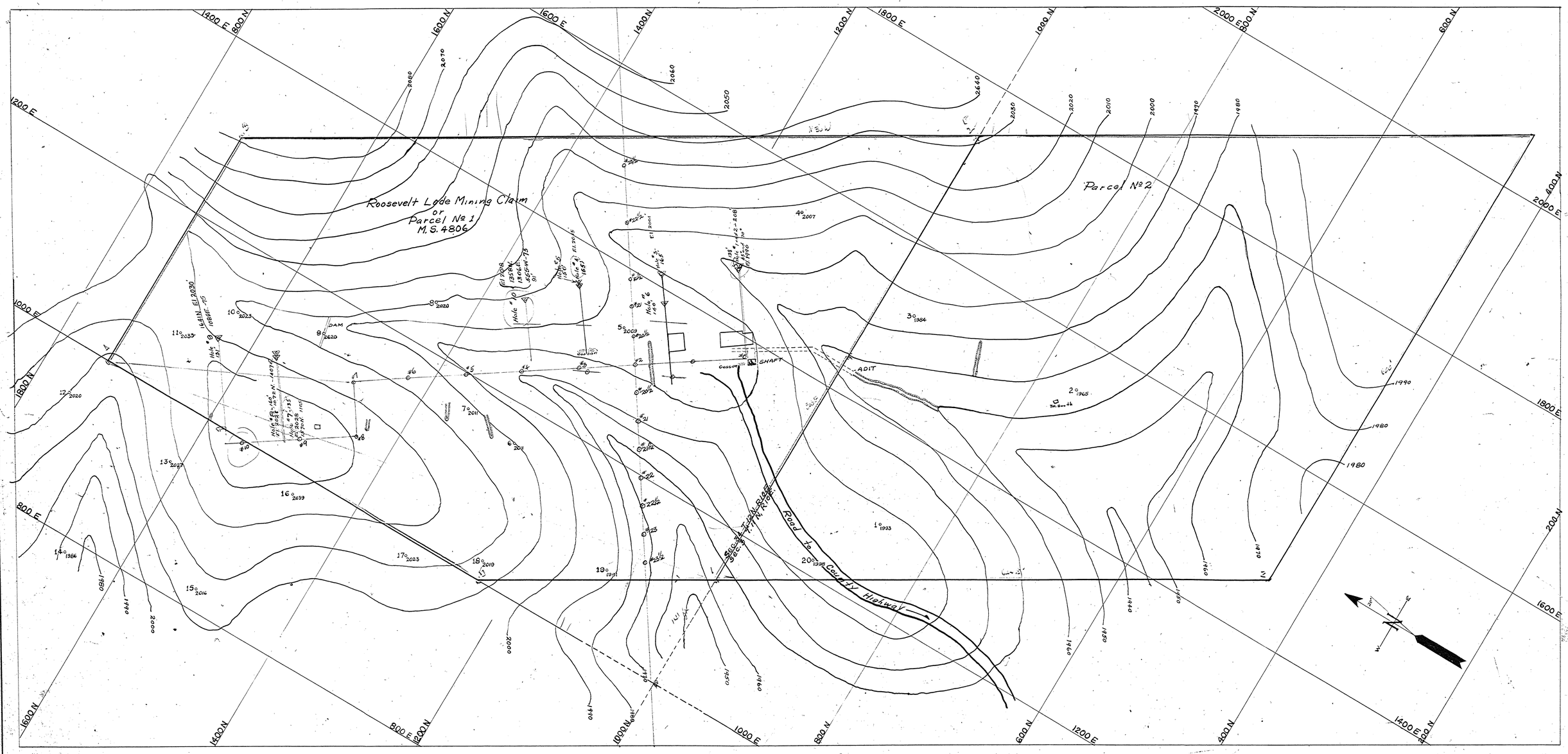


Point graphed is apparent resistivity at station
Numbers above and below point indicate percent resistivity as measured between P_1 and ground and P_2 and ground.

N. H. Dolloff 7/5/52.



N. H. Dolloff
7-5-52



Topographical Map
and
Drill Log

ELDORADO COPPER MINE

Hal T. Hall
Mining Engineer

No Scale

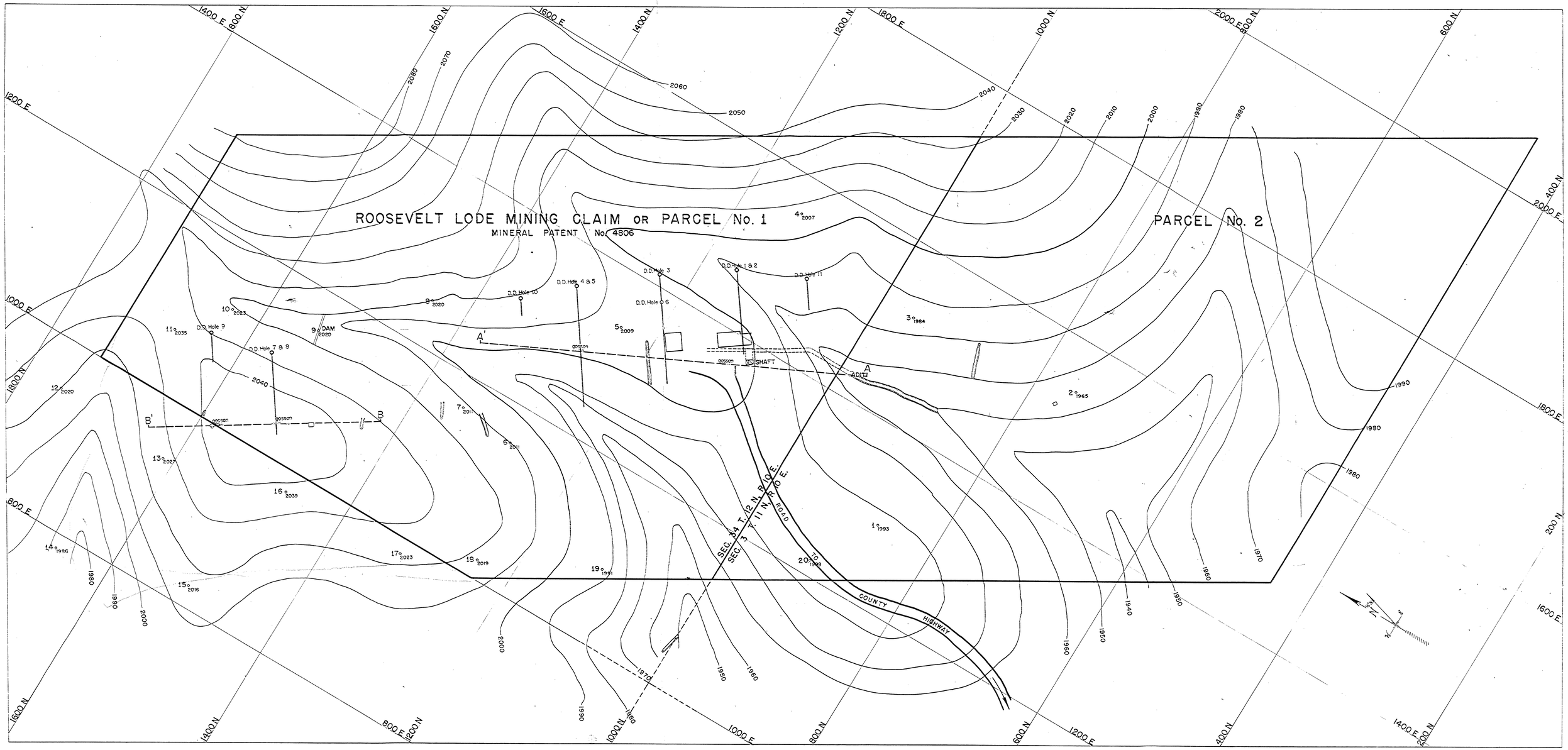
0 25 50 100 150 200
SCALE IN FEET

RESISTIVITY SURVEY
Stations 1/2 or 1 chain apart
#0 Station at north end of shaft

Projection of vein shown by dd. holes from 1950' level to surface (E vein)
" " " " " " " 1900' " " " (W vein)

N.H. Delloff
7/6/72

August 1945



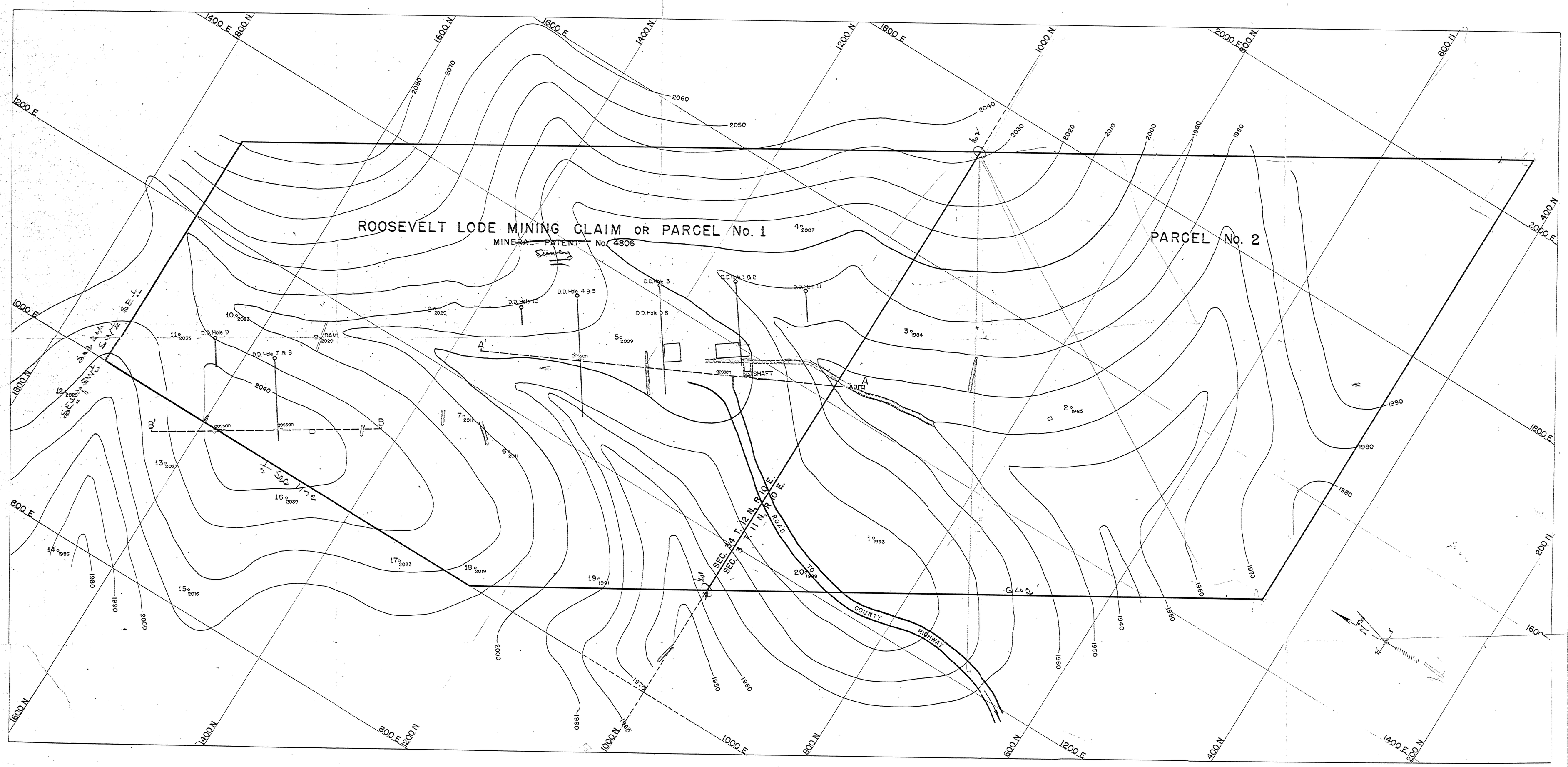
Datum Assumed

0 25 50 100 150 200 250

SCALE IN FEET

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

FIGURE 1



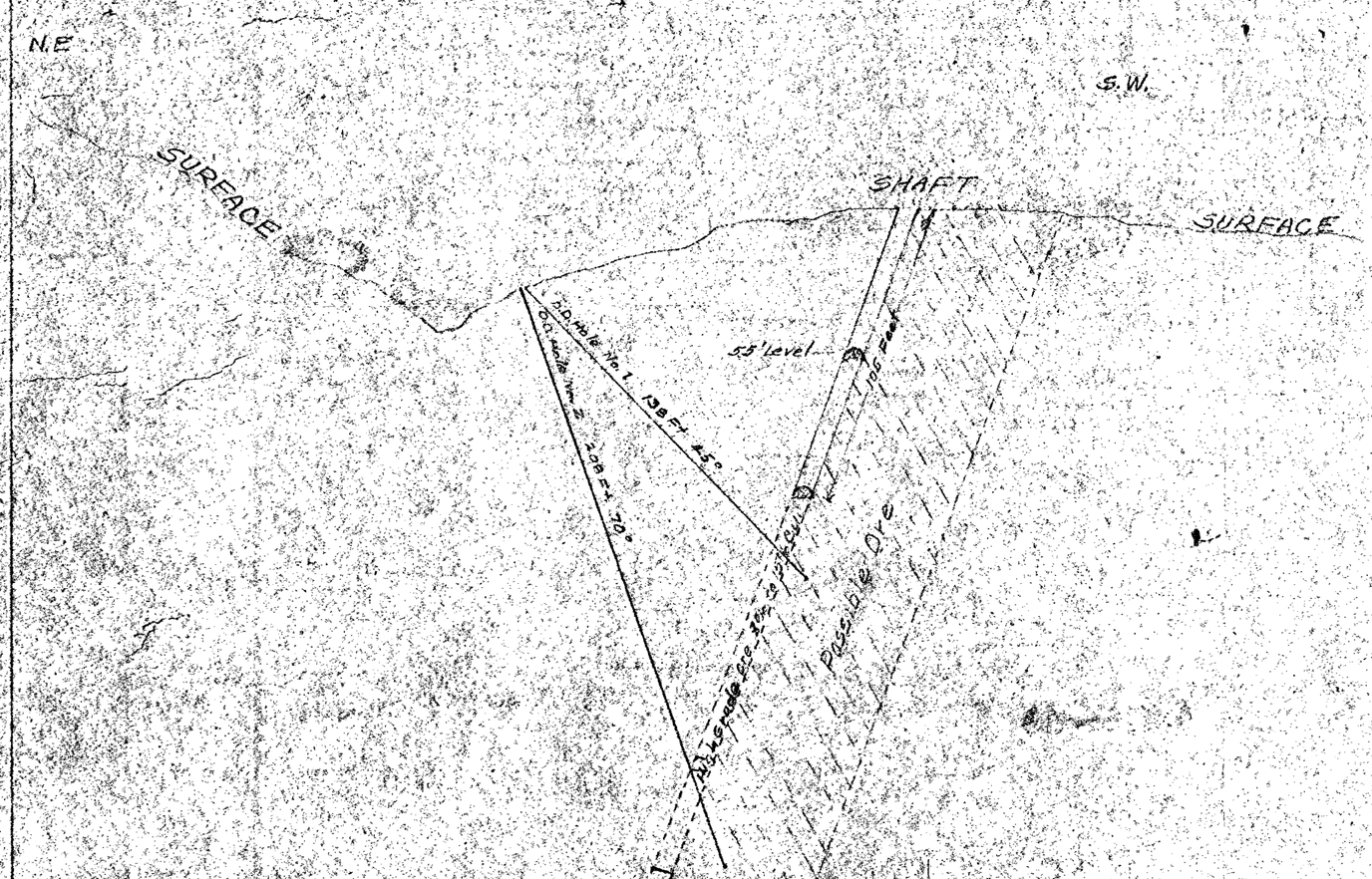
Scale 50:1"

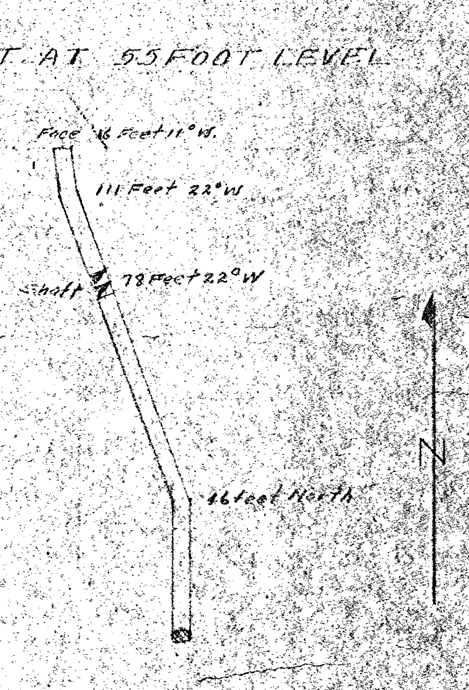
SW¼ SE¼ Sec 34
T 12 N R 10 E
8.402 Ac

ELDORADO COPPER PROPERTY ELDORADO COUNTY CALIFORNIA

FIGURE 1

SECTIONALS
of
EL DORADO COPPER MINE



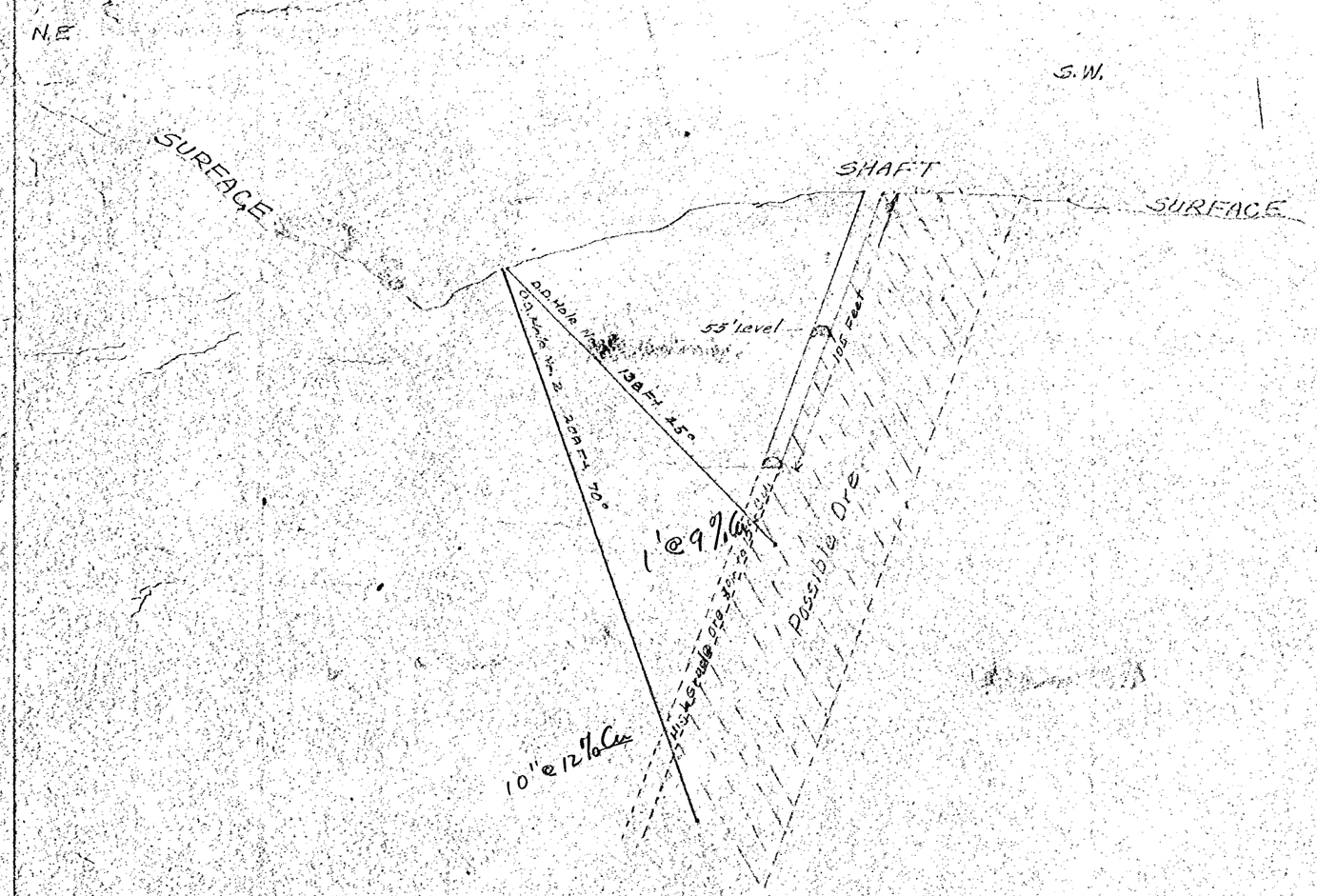


Scale One inch - 40 Feet

Hall T Hall
Mining Engineer

October 19, 1951

SECTIONALS
of
EL DORADO COPPER MINE



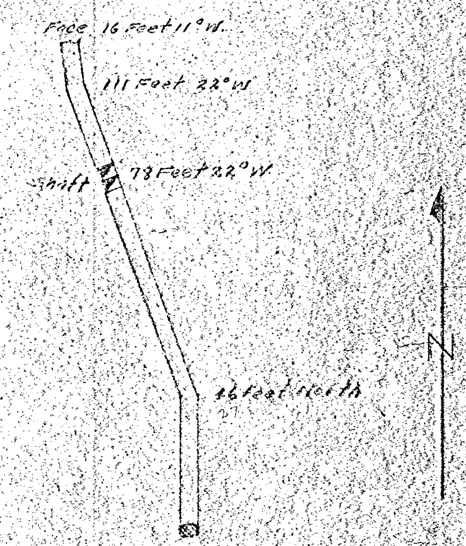
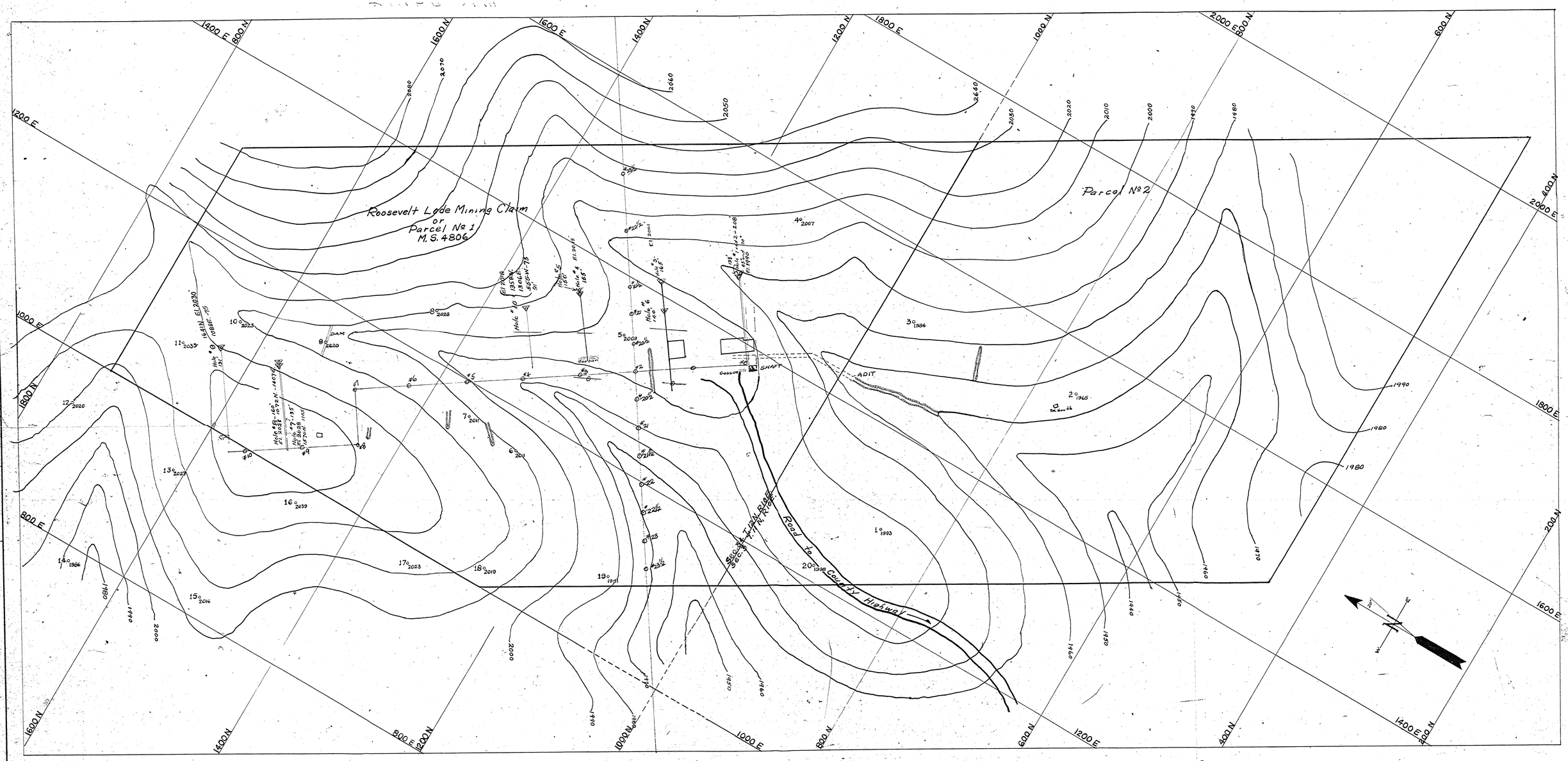


Fig 3

Hal T. Hall
Mining Engineer

Scale One inch - 40 Feet

October 15, 1944



Topographical Map
and
Drill Log

ELDORADO COPPER MINE

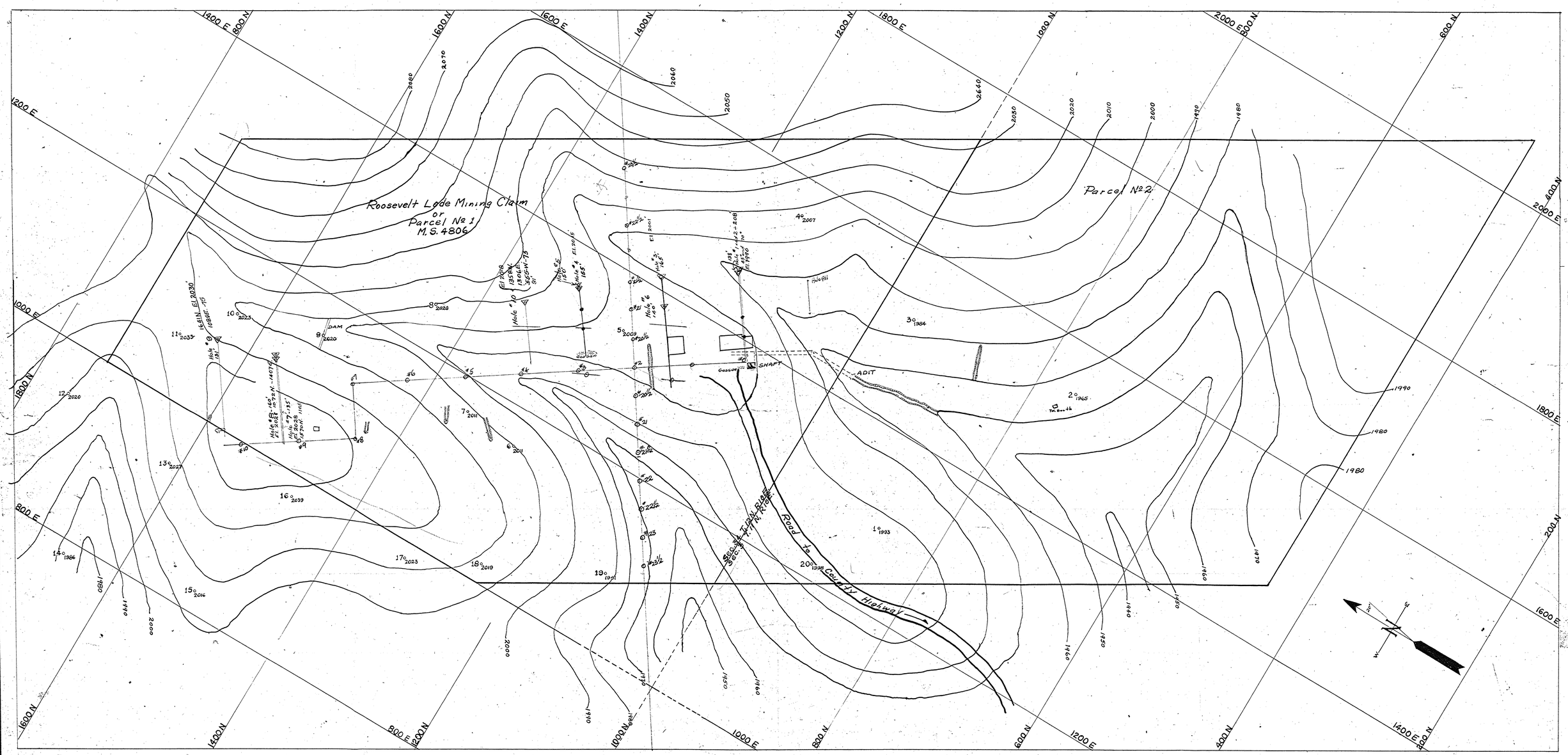
Hal T. Hall
Mining Engineer

RESISTNITY SURVEY
Stations 1/2 or 1 chain apart
#0 station at north end of shaft

Projection of vein shown by dd. holes from 1950' level to surface (E vein)
" " " " " " " " 1900' " " " (W vein)

N.H. Dolloff
7/6/72

August 1965



Topographical Map
and
Drill Log

ELDORADO COPPER MINE

Hal T. Hall
Mining Engineer

0 25 50 100 150 200
SCALE IN FEET

REGISTIVITY SURVEY
Stations 1/2 or 1 chain apart
#0 Station at north end of shaft

Projection of vein shown by dd. holes from 1950' level to surface (E vein)
" " " " " " " 1900' " " " (W vein)

N.H. Dolloff
7/6/72

August 1945