3220 0024

(119)

ITEM 24.

REPORT
on

MT. HOPE ZINC PROPERTY
of the

UNIVERSAL EXPLORATION COMPANY
in

Eureka County, Nevada
by

E. B. Jennings

February, 1939.

I N D E X

M A P I N D E X

MT. HOPE ZINC PROPERTY, EUREKA COUNTY, NEVADA.

Introduction

The following report on the Mt. Hope zinc property of the Universal Exploration Company has been compiled from the data and maps used by Mr. J. H. Rodgers, former geologist for the company, in his reports of November 10, 1928 and December 31, 1930. The greater part of this data was obtained by the writer who was in charge of the exploration work at Mt. Hope in 1929. Some data, obtained in 1934, has been incorporated and used to substantiate the original geologic interpretation.

Reference has also been made to reports by Mr. Paul Billingsley, geologist for the International Smelting Company (Anaconda subsidiary), Messrs. Head and Crawford of the U. S. Bureau of Mines and to the correspondence which took place during the period in which the exploration was being conducted. These reports are on file at the offices of the Universal Exploration Company, Birmingham, Alabama.

Summary

Geologic study and exploration work by drifting and diamond drilling has disclosed the presence of three distinct ore-favorable beds or horizons in a synclinal structure. This structure, pitching to the northwest, is 2,500 feet in width and appears to extend for 1,500 feet along its axis where it is interrupted or terminated by igneous intrusives. Exploration work was largely confined to the eastern limb of the syncline and the two lower beds, leaving the greater part of the structure unexplored. Approximately one million (1,000,000) tons of zinc sulphide ores with a metallic zinc content in excess of eight percent (8%) is indicated. In addition and in conjunction with the zinc, copper-silver ores of commercial tenor were disclosed but insufficiently explored to evaluate. Some portions of the zinc orebodies carry values in lead and silver.

The location of Mt. Hope with respect to the Donora Zinc Works does not permit of operation except during periods of high metal prices. The property does, however, even in its present stage of partial development, constitute a substantial emergency reserve of zinc ore and geologic conditions favor increasing this reserve materially with a minimum of exploration. Essentially the entire structure can be explored by four thousand (4,000) feet of drifting and ten thousand (10,000) feet of diamond drilling. This work would consist of sinking a shaft or driving an adit to the lowest point of the structure and drifting on the footwall of the lower orebed with diamond drilling from underground and the surface. It is estimated that the underground development and drilling, if conducted simultaneously, can be done for $15.00 and $3.00 a foot respectively and the work indicated above completed at a total cost of $90.000.00.

General Description

Location

The Mt. Hope zinc district is located twenty-five miles north of the town of Eureka, Eureka County, Nevada and one mile west of the Eureka Nevada railroad, a narrow gauge line connecting Eureka with Palisades, a station on the main lines of the Western and Southern Pacific railroads, 60 miles to the north. Ely, the site of the Nevada Consolidated Copper Company (Kennecott) copper smelter, is 100 miles to the southeast and the Salt Lake Valley smelters 365 miles east. Fair automobile roads connect the property with two transcontinental highways at Eureka and Elko. The Universal Exploration Company property is situated on the southeastern slope of Mt. Hope, a lone volcanic peak rising some 2,000 feet above the general topography. The mine workings are at an elevation of 6,800 feet but readily accessible.

Power

There is no electric power available. Power from the Boulder Dam will probably be brought as far as Ely but there is little reason or likelihood for extending it beyond there.

Climate

The climate is the typical semi-arid climate of the desert at this latitude and elevation, mild winters and not uncomfortable summers. The average annual rainfall is about 10 inches, insufficient to maintain surface streams with the sparse vegetation of the country.

Water Supply

Ample water develops in the mine workings for domestic use and an unlimited supply for milling purposes can be obtained in the Diamond Valley four miles east.

Timber

Second growth pine, suitable for mine timbering, is available on the slopes of Mt. Hope. All accessible virgin timber was cut to supply charcoal for smelters at Eureka.

History

Lead and zinc ores were first discovered at Mt. Hope in 1870 but as they contained only minor amounts of silver they attracted scant attention from the bonanza discoveries on Ruby Hill in Eureka. In 1890, Thomas Wren drove the present No. 2 tunnel to prospect a heavily mineralized outcrop at depth. Finding only zinc sulphide ore he turned his attention to a small gold bearing vein in the Mt. Hope rhyolite flow and extracted some gold ore. On this showing he patented

the Good Hope claim, now part of the Universal group. No work of importance was done until 1926 when the U.S. Smelting Company drove the present No. 1 tunnel. Failing to develop commercial quantities of silver lead ores the project was abandoned. In 1928 the properties which comprise the present group were optioned by the Universal Exploration Company and exploration work started in the fall of 1928 and continued until January 1930. Approximately 1,000 feet of drifting and 3,500 feet of diamond drilling was completed.

Property and Title

The property consists of thirteen Lode Mining claims and one Millsite, a total of 256.213 acres. The claims are: Good Hope and Good Hope Millsite, Survey Nos. 374 and 3; Parallel, Parallel Extension, Magnolia, Dixon No.1, Dixon No.2, Lorraine, Lorraine No.1, Lorraine No.2, Silver Butte, Silver Butte No.1, Silver Butte No.2 and San Juan Chief, all included in Survey No. 4704. The claims form a compact group with no internal fractions and no conflicts and are shown on the claim map, plate II. The U.S. Land Office plat shows that the Batcheldor Lode and the Batcheldor Millsite were surveyed at the same time as the Good Hope but neither was patented.

GEOLOGY

Sedimentary Structure

The ore bearing formation of the Mt. Hope District is an isolated segment of sedimentary rock distorted and engulfed by an igneous complex. The formation, which is intensely metamorphosed, is probably an impure limestone from near the base of the Carboniferous series. The structure is a flat, north-south syncline, pitching to the north, with a maximum width across the basal beds of 2,500 feet and an apparent length of 1,500 feet. The stratigraphic thickness is between 400 and 500 feet. The dips are flat, not exceeding twenty degrees(20°). The north end of the structure is broken and unturned by the Mt. Hope instusives making it roughly saucer shaped. It is not known whether the syncline is terminated at this point or continues on under the rhyplite beyond the dike which appears to cut it off.

Igneous Rocks

To the north and west of the sediments is the complex of igneous rocks which forms Mt. Hope, largely extrusive rhyolite. There are numerous small dikes of intrusive rhyolite porphyry or quartz porphyry cutting thru the flows and some of them extending into the sediments as dikes or sills. The rock of the main igneous mass is a light colored, highly silliceous porphyry and could be called rhyolite porphyry, granite porphyry or quartz porphyry with equal accuracy. This igneous mass is the source of the intense alteration of the sediments and certain phases or differentiates are the source of the mineralization. The dikes are in general narrow and are more highly acidic and porphyritic than the flow rocks. Except at the immediate contact there is little additional alteration of the sediments in the vicinity of these dikes. They contain fewer sulphide minerals than the flow rocks and are definitely not mineralizers. Underlying the sediments and to the south and east is a wide area of dacite porphyry, probably an effusive phase of the main mass.

Faults

The only prominent fault observed is a thrust fault near the east limb of the syncline in the argillite beds below the limestone. Little is known of this fault and its effect on the structure. Numerous small faults are noted thruout the workings.

Gangue Minerals of the Sedimentary Series

With the exception of a bed of hard argillites and quartzite at the footwall and hangingwall and a few thin, intercalated beds of quartzite near the middle of the series the sediments are uniformly a dense, felt-like rock ranging in color from a light grey to olive green. This rock has been identified by Messrs. Head and Crawford of the U. S. Bureau of Mines as a pyroxene and more specifically as an intermediate between diopside and hedenbergite. Essentially this is a hydrous silicate of calcium, magnesium, alumina and iron. The only other gangue minerals noted are needle like quartz inclusions, lime and iron garnets and traces of calcite and siderite. The metamorphism is uniform and practically complete at all points in the structure that have been exposed.

Ore Minerals

The chief ore mineral is marmatite, a zinc-iron sulphide, which contains approximately 60% metallic zinc and 5% to 7% iron. Assays of specimens which contained no visible iron pyrite show 60.2% Zn and 5.5% Fe. Varying amounts of pyrrhotite occur contemporaneous with the marmatite. Galena, pyrite, chalcopyrite and tetrahedrite also occur with the zinc sulphides and appear to have been deposited after the marmatite and pyrrhotite. The tetrahedrite, a copper sulfantimonite high is silver, has been found only with the chalcopyrite and in minute quantitites in the rhyolite. No arsenic minerals have been found. There is considerable cadmium with the marmatite, part of it occuring as xanthochroite. Chemical analyses show a uniform cadmium content of .016% cadmium for each percent of Zn. A 50% concentrate would contain .80% cadmium. There are also minor amounts of unidentified manganese minerals.

Pyrite, pyrrhotite, chalcopyrite, chalcocite and tetra--hedrite have been identified microscopically in the igneous rocks.

Economic Geology

The appearance of the orebodies suggests that they were formed thru hyrdothermal replacement within definite horizons. The mineralizing solutions being distributed thru fissure systems which are generally transverse to the axis of the syncline. Billingsley classes the mineralization as "Contact Metasomatism", a transition between true contact metamorphism close to an intrusive and hydrothermal alteration at a greater distance. Development in the proximity of the igneous mass, subsequent to Mr. Billingsley's examination, shows increasing amounts of pyrrhotite, evidence of contact metamorphism. However, the source of the zinc mineralization is thru the fissure systems and both the zinc and copper mineralization appears distinct and from a different source than the contact mineralization. The replacement of the favorable beds is widespread and not confined to the immediate proximity of the fissures.

Ore Beds

Three distinct horizons separated by barren beds have been disclosed.

"A" bed, immediately above the footwall quartzites. The mineralization in this bed occurs as disseminated zinc sulphides and in large, coarsely crystalline masses from one inch to three feet in diameter.

"B" bed, superimposed and stratigraphically seventy-five feet above "A". The gangue material of this bed has a decided sandy appearance. The zinc mineralization has, in places, the appearance of bedding or banding with individual bands of marmatite from one inch to one foot thick and disseminated ore in the intermediate beds. There are fewer of the large, coarse blebs of mineralization than in "A" bed but they are in evidence at points where the bedded appearance is less distinct.

"C" bed is 125 to 175 feet stratigraphically above "B" bed. Development of this horizon has been at points near the outcrop with the exception of the drilling from No. 2 tunnel level. With the exception of the ore cut at this level all the exposures have been of oxidized ores. Heavy zinc-iron mineralization, completely oxidized, has obliterated all signs of structure. The bed can be identified by the presence of large masses of lime and iron garnets. If the correlation of a zinc sulphide showing in the No. 3 workings with the ore in No. 2 tunnel is correct, any ore found between these two points should occur as sulphide.

Exploration

Exploration was undertaken by underground drifting, churn drilling and diamond drilling. The work was started in the fall of 1928 and completed in January 1930.

Underground development

A total of 1,000 feet of drifting was done during this period. The work consisted of driving No. 1 tunnel to the rhyolite contact, the west drift was extended and X-cuts driven to determine the thickness of the orebodies. This work was done with air drills. Some 300 feet of drifting and raising was done by hand mining in the No. 3 workings. No. work was done in the No. 2 tunnel. There is a total of 3,800 feet of underground workings on the property, some of which will be of value to future mining operations.

Churn Drilling

Three churn drill holes totaling 1,005 feet were drilled. The churn drilling was unsatisfactory, due in part to the inefficacy of the equipment and personnl and in part to the nature of the formation. The presence of the mineralized beds was established for a distance of 400 feet beyond the development by the churn drilling but the samples were so badly diluted by caving that they were of little value.

Diamond Drilling

Sixteen diamond drill holes with a combined depth of 3,500 feet were drilled. Eleven were located at a point 125 feet from

the face of No. 1 tunnel, drilled at various angle and directions, two were drilled in the face of No. 1 tunnel and three from the north cross-cut in No. 2 tunnel. The drilling gave satisfactory core recovery. All the core wassaved and the mineralized portions split for assay. Assays were made by the Union Assay Office in Salt Lake City and Burlingame in Denver. Only part of the diamond drill records were found in the files but a complete assay record is available. Compressed air for the drilling was supplied by two small, gasoline driven compressors which were inadequate for the work, limiting the depth of the holes.

Ore Reserves

It is not often practical or customary in the Western mines of this type to attempt to block out ore. Knowledge of the continuity of the mineralizing fissures and ore-favorable formations is considered sufficient. The drilling at Mt. Hope was planned to obtain information on the structure and establish the presence of ore over as wide a territory as possible, rather than definitely block out ore. As is the case in much underground drilling the point of attack was limited. The following tonnages of sulphide ore are reasonably assured.

"A" Ore Bod: Exposed for a distance of more than 1,000 feet along the strike, 200 feet on the dip with an average thickness of 28.5 feet. Using a factor of 10 cubic feet per ton , this represents 575,000 tons of ore which has a zinc content of 7.0% (Zn).

"B" Ore Bod: Exposed for a distance of more than 800 feet along the strike, 200 feet on the dip with an average thickness of 26.5 feet. This represents 425,000 tons which has a zinc content of more than 10.0% (Zn).

"C" Ore Bod: Insufficient data to estimate any tonnage.

The total sulphide ore approximates 1,000,000 tons with an average zinc content in excess of 8.0% (Zn). Mr. J. H. Rodgers, in his report of December 31, 1930, estimates this same area to contain 875,000 tons. The copper-silver ores are insufficiently explored to evaluate.

Mining

Mining should be simple and costs low. The uniformity of the orebodies makes them readily adaptable to mechanization. The rock was found to drill and break easily and to stand without timbering. A minimum of development per ton of ore mined will be required. An 85% to 90% mine extraction should be attained.

Metallurgy

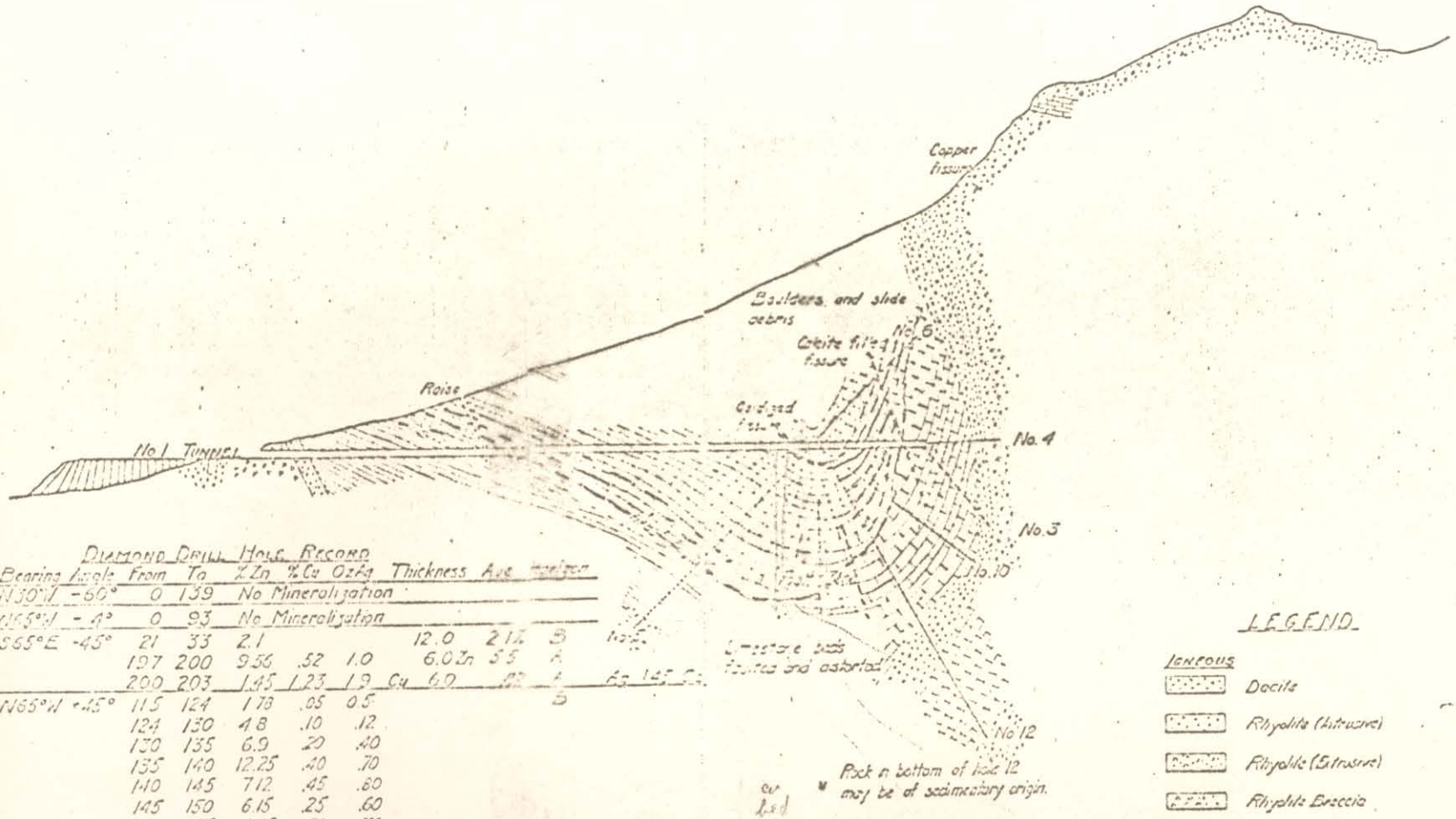
Flotation tests by the General Engineering Company gave an average zinc recovery of 90% and a rougher or primary concentrate grade of 46% Zn. Tests by the American Technical Laboratories of Salt Lake, in 1934, gave an 88% recovery and a 54% concentrate. These were "Series" tests and the concentrate was cleaned twice to obtain this grade.

Crushing and grinding costs should be low as the ore is soft and non-abrasive. It is not practical to attempt to estimate costs of flotation from the data at hand but they should be comparable to any of the Western plants treating similar ores.

MAP
SHOWING LOCATION OF
MT. HOPE ZINC PROPERTY
OF THE
UNIVERSAL EXPLORATION COMPANY
EUREKA COUNTY, NEVADA

SCALE
50 100 0 100 200 MILES

PLATE I



Diamond Drill Hole Record

No	Bearing	Angle	From	To	% Zn	% Cu	Oz/T	Thickness	Ave		
3	N30°W	-60°	0	139	No Mineralization						
4	N65°W	-4°	0	93	No Mineralization						
5	S65°E	-45°	21	33	2.1			12.0	2.1%	B	
			197	200	9.56	.32	1.0	6.0 Zn	5%	A	
			200	203	1.45	1.23	1.9	Cu 6.0	.8%	A	Ag 1.45 Cu
6	N65°W	-45°	115	124	1.78	.05	0.5			B	
			124	130	4.8	.10	.12				
			130	135	6.9	.20	.40				
			135	140	12.25	.40	.70				
			140	145	7.12	.45	.60				
			145	150	6.15	.25	.60				
			150	155	4.45	.20	.30				
			155	160	4.35	.20	.12				
			160	165	3.55	.05	.06	40.0 Zn	5.9%	A	
			165	172	2.56	.05	.05	Cu 10.0	.8%	A	Ag 4.2 Cu
10	N65°W	-37°	35	52	1.58	·				B	
			52	62	3.3	·					
			62	70	2.9	·		35.0 Zn	9.5%		
			70	78	15.4	·				A	
			78	90	8.3	.10					
			90	111	4.2	.71		41.0 Zn	7.6%		
12	N65°W	-65°	37	39	4.1					B	
			50	57	1.0						
			57	63	10.1						
			63	68	3.9			11.0 Zn	7.3%		
			111	122	7.9	.12				A	
			122	127	16.9						
			127	135	19.1						
			135	141	14.8			30.0 Zn	13.2%		
			167	173	13.1			6.0 Zn	13.1%	A	

SECTION A-A

MT. HOPE MINE

Eureka County, Nevada

SCALE

N 65° W — Look S 25 E

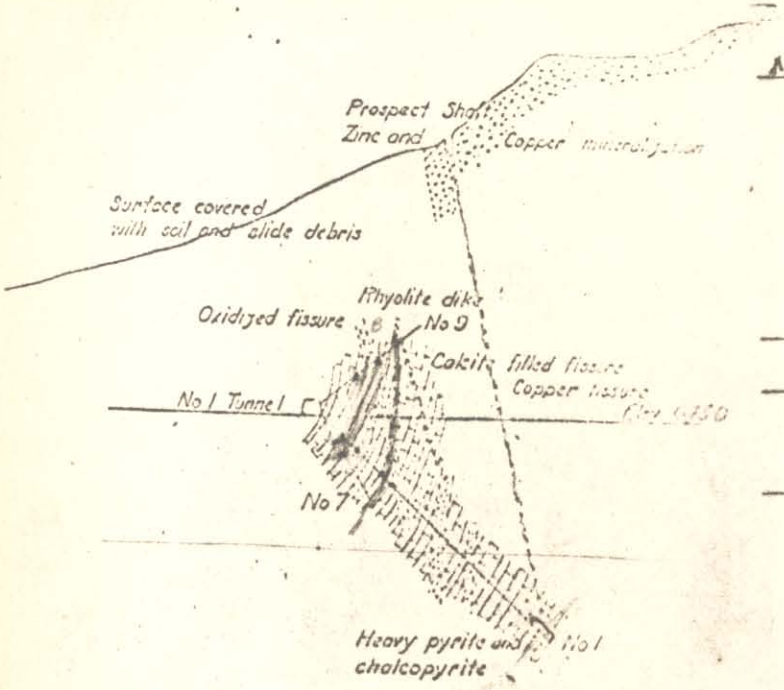
Diamond Drill Holes
5, 4, 5, 6, 10, 12

LEGEND

IGNEOUS
- Dacite
- Rhyolite (Intrusive)
- Rhyolite (Extrusive)
- Rhyolite Breccia

SEDIMENTARIES
- Limestone (including metamorphic)
- Limestone (sandy)
- Shales
- Argillites
- Zinc Mineralization
- Copper Mineralization

PLATE VI



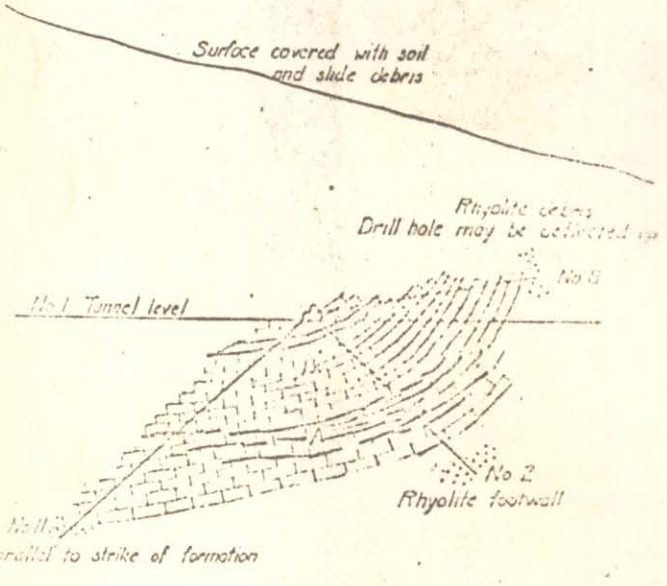
DIAMOND DRILL HOLE RECORD

No	Bearing	Angle	From	To	% Zn	% Cu	Oz Ag	Thickness	Ave	Horizon
1	N 55° W	-45°	30	34	3.9			4.0	3.9	B
			38	42	2.9					
			42	49	4.5					
			49	52	1.0			14.0	3.3	B
			91	99	4.7					
			105	108	7.5			17.0	3.5	A
			322	325		3.41	7.5			
			325	330		8.27	14.1			
			330	335		4.75	10.2			
			335	340		3.41	6.1 Cu	23.0	4.26%	Fissure
			340	345		1.13	1.4 Ag	23.0	7.9 Oz.	"
7	N 55° W	-50°	31	37	9.5					B
			37	47	9.7			18.9	9.6%	
9	N 55° W	+41°	49	54	13.9					B
			54	59	12.4					
			59	75	10.4			26.0	11.45%	
			100	102	10.1			2.0	10.1%	A

SECTION B-B

N 30° W — Looking S 60 W

Diamond Drill Holes
1, 7, 9



DIAMOND DRILL HOLE RECORD

No	Bearing	Angle	From	To	% Zn	% Cu	Oz Ag	Thickness	Ave	Horizon
2	N 60° E	-45°	36	40	7.0					B
			40	48	15.7					
			48	52	13.7					
			52	59	8.6			23.0	12.1%	
			121	125	2.5					A
			125	128	1.5					
			128	136	12.9			15.0	7.8%	A
			140	145	5.4					
			145	152	3.0			12.0	4.0	A
			160	164	22.2					Total 7
			164	173	2.0			13.0	8.2	A 52' 6
3	N 60° E	+10°	65	68	2.0	(Oxidized)				
			159	165		0.2				
	N 55° W	-45°	115	120	14.1					B
			120	129	3.1			14.0	7.0	
			166	176	6.6			10.0	6.6	A
			199	203		0.1				A

SECTION C-C

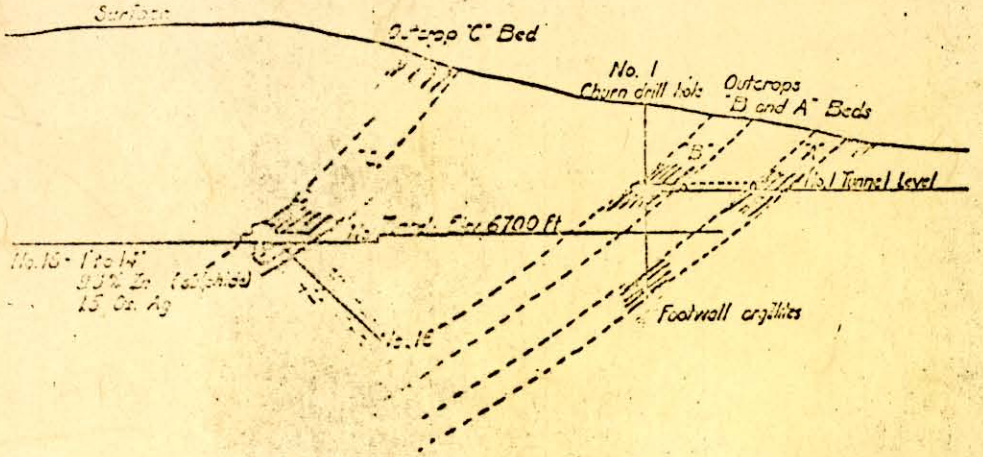
MT HOPE MINE
Eureka County, Nevada

100 ft 0 100 ft
SCALE

N 60° E — Look N 30 W

Diamond Drill Holes
2, 3, 11

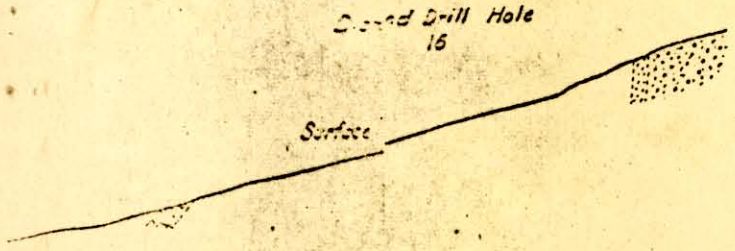
PLATE VII

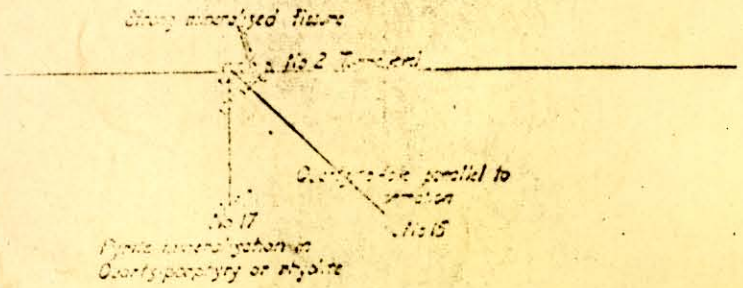


SECTION E-E

West — Look N 30 W

Diamond Drill Hole
16





SECTION F-F

MT-OPE MINE

Eureka County, Nevada

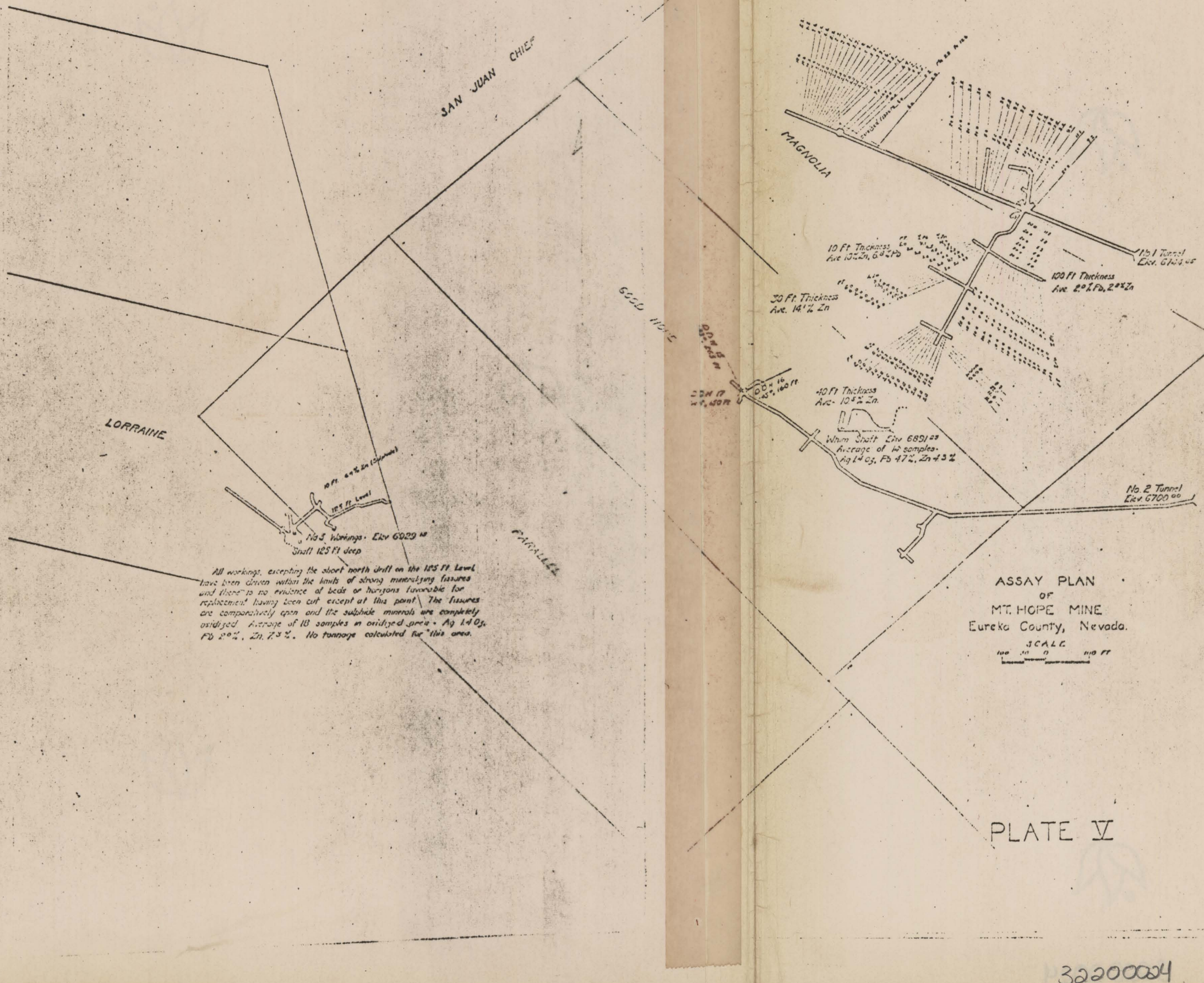
0 100 FT

SCALE

Look S 65 W

Diamond Drill Holes
15, 17

PLATE IX

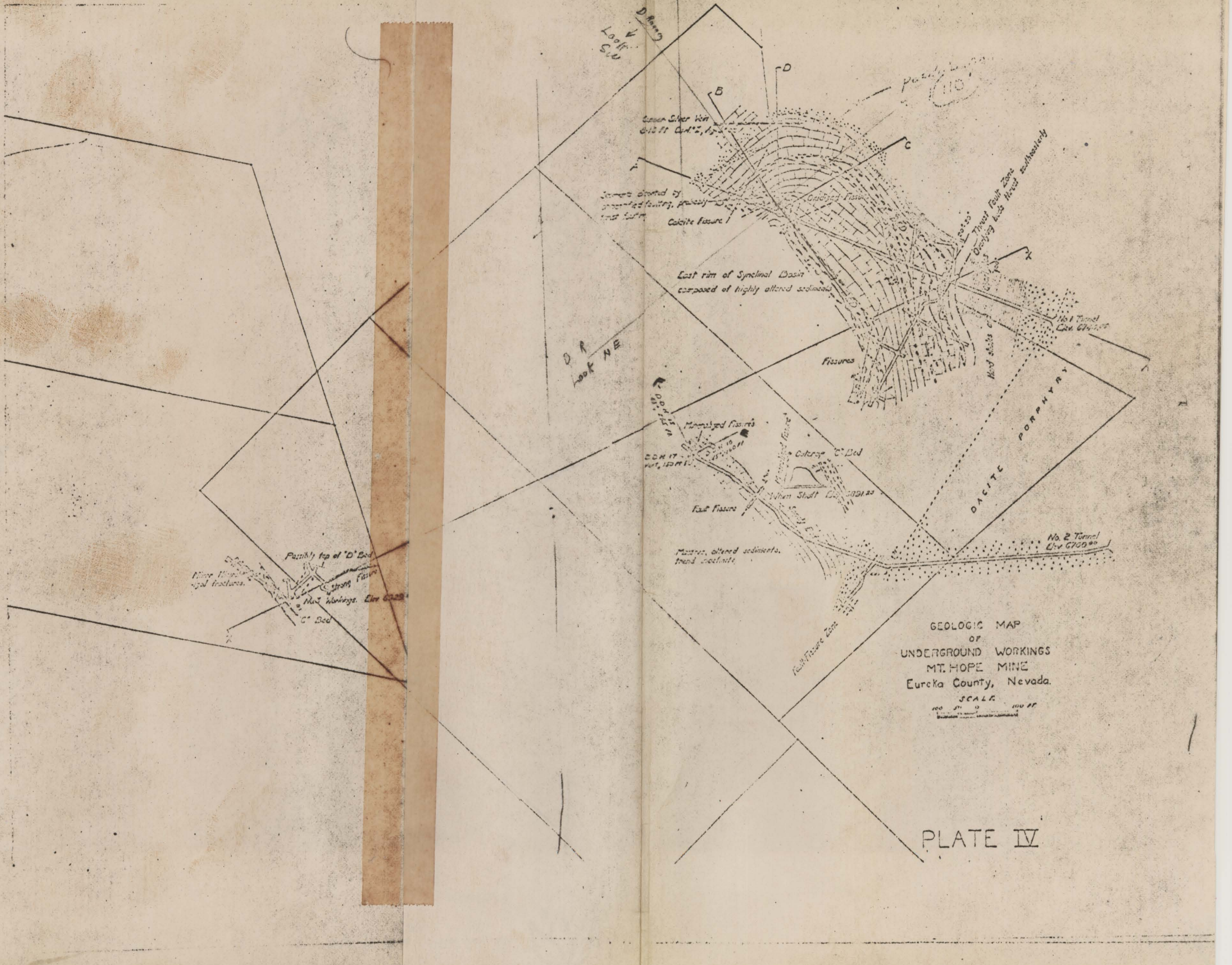


ASSAY PLAN
OF
MT. HOPE MINE
Eureka County, Nevada.

SCALE
100 50 0 100 FT

PLATE V

32200024



GEOLOGIC MAP
OF
UNDERGROUND WORKINGS
MT. HOPE MINE
Eureka County, Nevada.

SCALE

PLATE IV

LEGEND

Igneous

- Dacite: Quartz and biotite phenocrysts in a fine-grained Quartz mass
- Rhyolite (Intrusive): Quartz and orthoclase in a fine-grained feldspar
- Rhyolite (Extrusive): Less porphyritic than intrusive phase
- Rhyolite Breccia: Angular fragments of rhyolite and sediments cemented by fine particles of the same material.

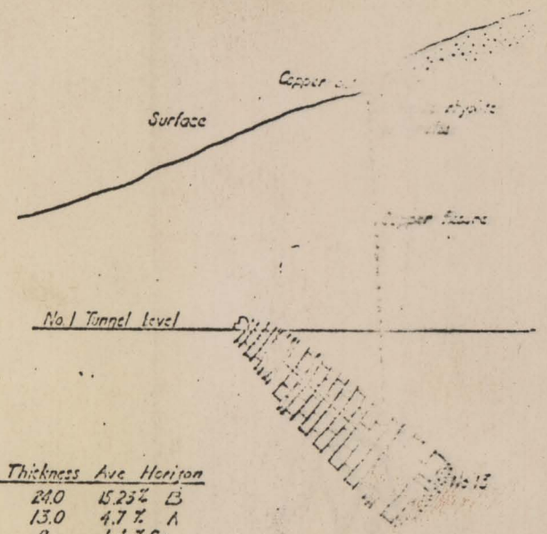
Sedimentaries

- Metamorphic: Intensely metamorphosed sedimentaries. Essentially of pyroxene.
- Quartzite: Coarse and fine-grained quartzites.
- Limestone: Limestone and calcareous conditions. Portions highly altered.
- Argillites:
- Mineralizing fractures, ore fissures and mineralizing dikes.
- Mineralization (Cotinued)

MAP SHOWING
SURFACE GEOLOGY
OF
MT. HOPE MINE
Eureka County, Nevada.

SCALE

PLATE III



Diamond Drill Hole Record

No	Bearing	Angle	From	To	%Mn	%Cu	Oz/Ag	Thickness	Ave	Horizon
13	North	-43	36	60	15.23			24.0	15.23%	B
			92	105	4.7			13.0	4.7 %	A
			240	248		1.4		8	1.4 % Cu	
			254	263	3.1			9.0	3.1 %	Footwall A and fissure vein

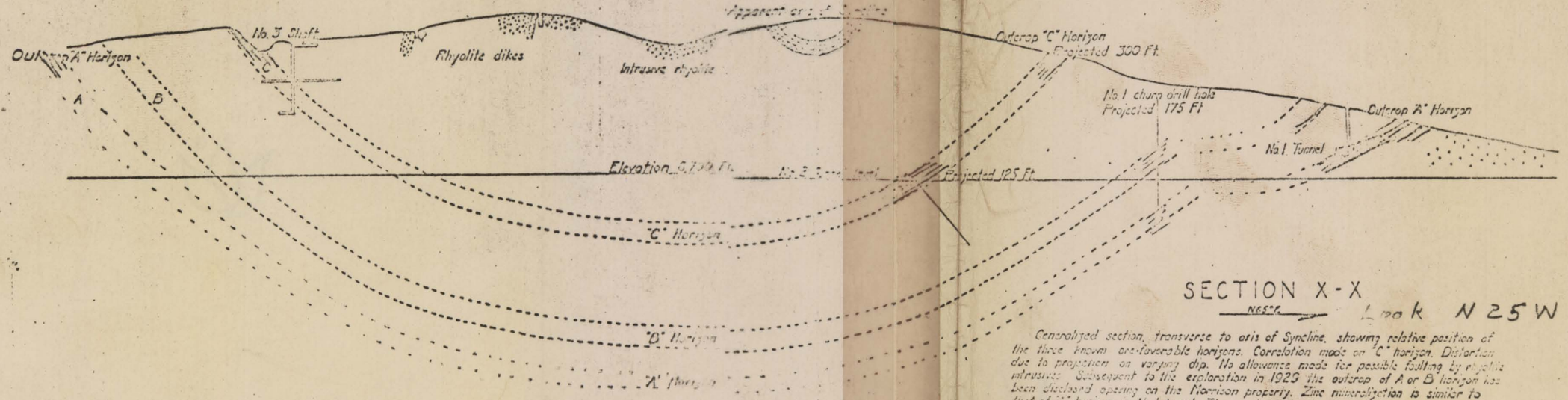
SECTION D-D

North — Look W

Diamond Drill Hole 13

MT. HOPE MINE
Eureka County, Nevada

100 50 0 100 Ft
SCALE

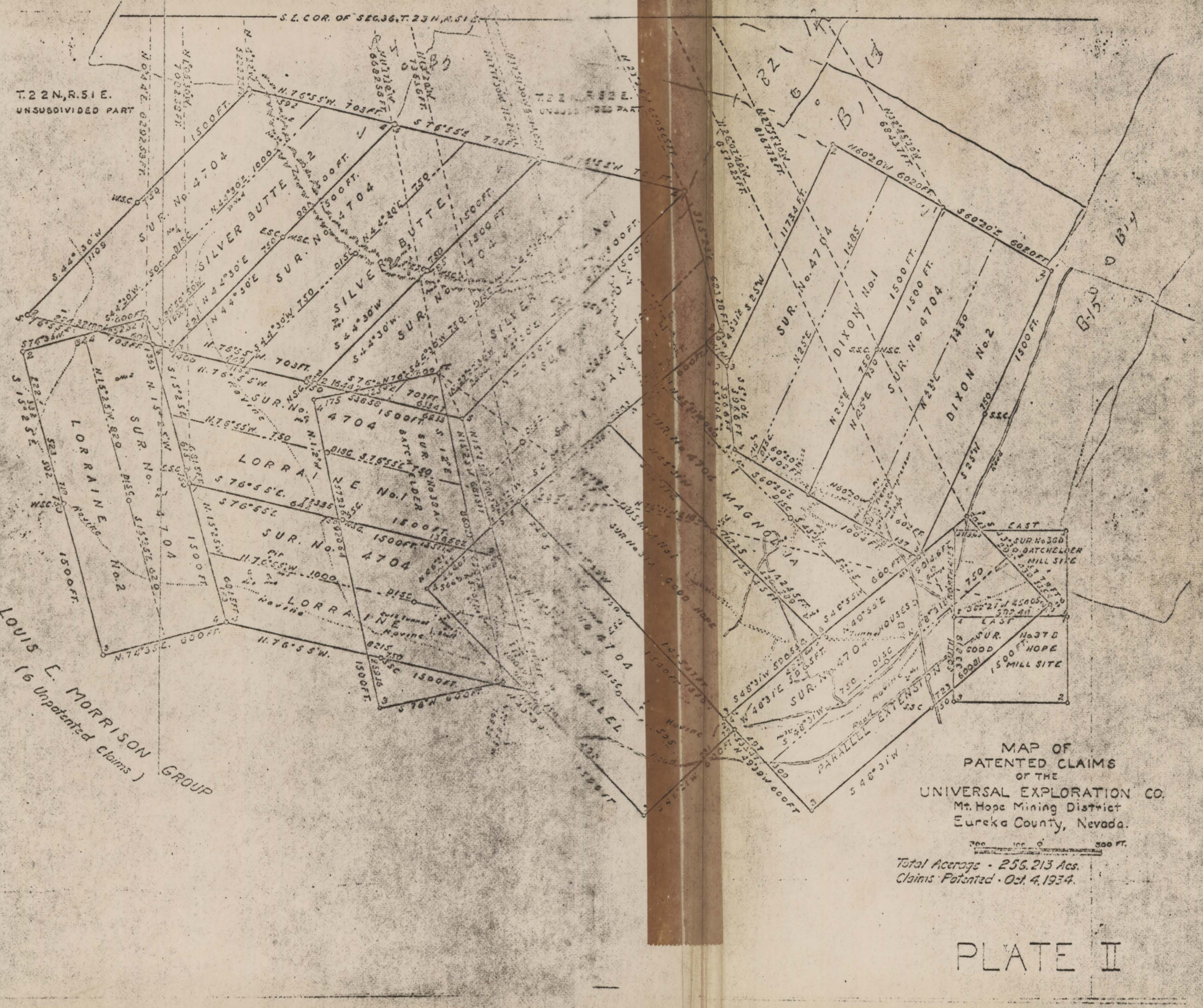


SECTION X-X

NE 65° — Look N 25 W

Generalized section, transverse to axis of Syncline, showing relative position of the three known ore-favorable horizons. Correlation made on "C" horizon. Distortion due to projection on varying dip. No allowance made for possible faulting by rhyolite intrusive. Subsequent to the exploration in 1929 the outcrop of A or B horizon has been disclosed opening on the Morrison property. Zinc mineralization is similar to that of "A" horizon in No. 1 tunnel. The exact location is not available.

PLATE VII


S.E. COR. OF SEC.36, T.23 N., R.51 E.
T.22 N., R.51 E.
UNSUBDIVIDED PART
SILVER BUTTE
SUR. No. 4704
LORRAINE
LORRAINE No. 1
LORRAINE No. 2
DIXON No. 1
DIXON No. 2
MAGNOLIA
PARALLEL EXTENSION
SUR. No. 36 B
BATCHELDER MILL SITE
SUR. No. 37 B
GOOD HOPE MILL SITE
LOUIS E. MORRISON GROUP
(6 Unpatented Claims)
MAP OF
PATENTED CLAIMS
OF THE
UNIVERSAL EXPLORATION CO.
Mt. Hope Mining District
Eureka County, Nevada.
Total Acerage - 256.213 Acs.
Claims Patented - Oct. 4, 1934.
PLATE II

32200024