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SFP FILE 0081

Tainter, S.L., 1947, Johnny Bull-Silver Knight lead-zinc property, Cerbat Mountains, Mohave County, Arizona: U.S. Bur. Mines, R.I. 3998, 14p.

OWNER Johnny Bull - Silver Knight (24.015 AC)
AS OF 12 Sept 1980 -
from County Tax Records

E.H. Dobbs
2529 E. 12th St.
Joplin, MO. 64801

SEE FIGURE 3
RELATIVE TO ORE
POSITION ON SOUTH END OF
ADJACENT TENNESSEE MINE.

R. I. 3998,
January 1947.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

JOHNNY BULL-SILVER KNIGHT LEAD-ZINC PROPERTY CERBAT MOUNTAINS, MOHAVE COUNTY, ARIZONA[1]

By Stanton L. Tainter[2]

CONTENTS

ILLUSTRATIONS

INTRODUCTION

The Johnny Bull and Silver Knight claims were selected for exploratory diamond drilling after having been examined by the Bureau of Mines.[3]

The property was considered attractive for two reasons: (1) A prominent outcrop, recognized as an extension of the Tennessee vein, persisted over a distance of 2,000 feet across the claims; (2) its proximity to the known ore shoots in the Tennessee-Schuylkill mine, one of the largest zinc-lead producers in Arizona.

Actual drilling was started September 16 and was terminated December 8, 1943. Eight holes, aggregating 2,979.5 feet, were drilled with two machines.

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 3998."

2/ Mining engineer, Bureau of Mines.

3/ J. H. Hedges, district engineer, and Thomas C. Denton, mining engineer, Bureau of Mines.

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 final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests.

Special acknowledgment is due J. H. Hedges, chief, Mining Branch, Tucson Division of the Bureau of Mines, who directed the function of the Mining Branch in carrying out the investigation reported in this paper.

Chemical analyses included in this paper were performed at the Bureau's laboratory, Reno, Nev., under the direction of A. C. Rice, acting supervising engineer.

LOCATION AND ACCESSIBILITY

The Johnny Bull and Silver Knight claims are at the foot of the western slope of the Cerbat Mountains, about 1 mile east of the town of Chloride, in the Wallapai mining district, Mohave County, Arizona. They adjoin and lie on the south of the property of the Tennessee-Schuylkill Corp. (fig. 1).

Chloride, a town of nearly 500 inhabitants, 21 miles north of Kingman and 60 miles south of Boulder Dam, is accessible over paved U. S. Highway 93. Kingman, the largest supply point in the region, has a population of 3,600 and is on the main line of the Santa Fe Railroad.

PHYSICAL FEATURE AND CLIMATE

The Cerbat Mountains form a range which extends about 30 miles northward from Kingman and averages 10 miles in width. The crest line lies at about 6,000 feet, and the peaks reach an altitude of about 7,000 feet, rising sharply for 1,500 to 3,000 feet above the Haulpai Valley on the east and the Detrital and Sacramento Valleys on the west. Chloride is at an altitude of 3,900 feet on the western side of the range.

The claims lie at an altitude of 4,250 feet. Vegetation is sparse, and timber for mining purposes is not locally available. The climate is arid, seasons are open, and all-year climatic conditions are ideal for mining operations. Water is scarce in both the Sacramento Valley and the Cerbat range.

HISTORY AND PRODUCTION

Mineral discoveries in the Cerbat Mountains date from 1863, when silver chloride, lead sulfide, and gold ores were found. Lead-zinc ores became important with cheaper transportation, improved milling methods,

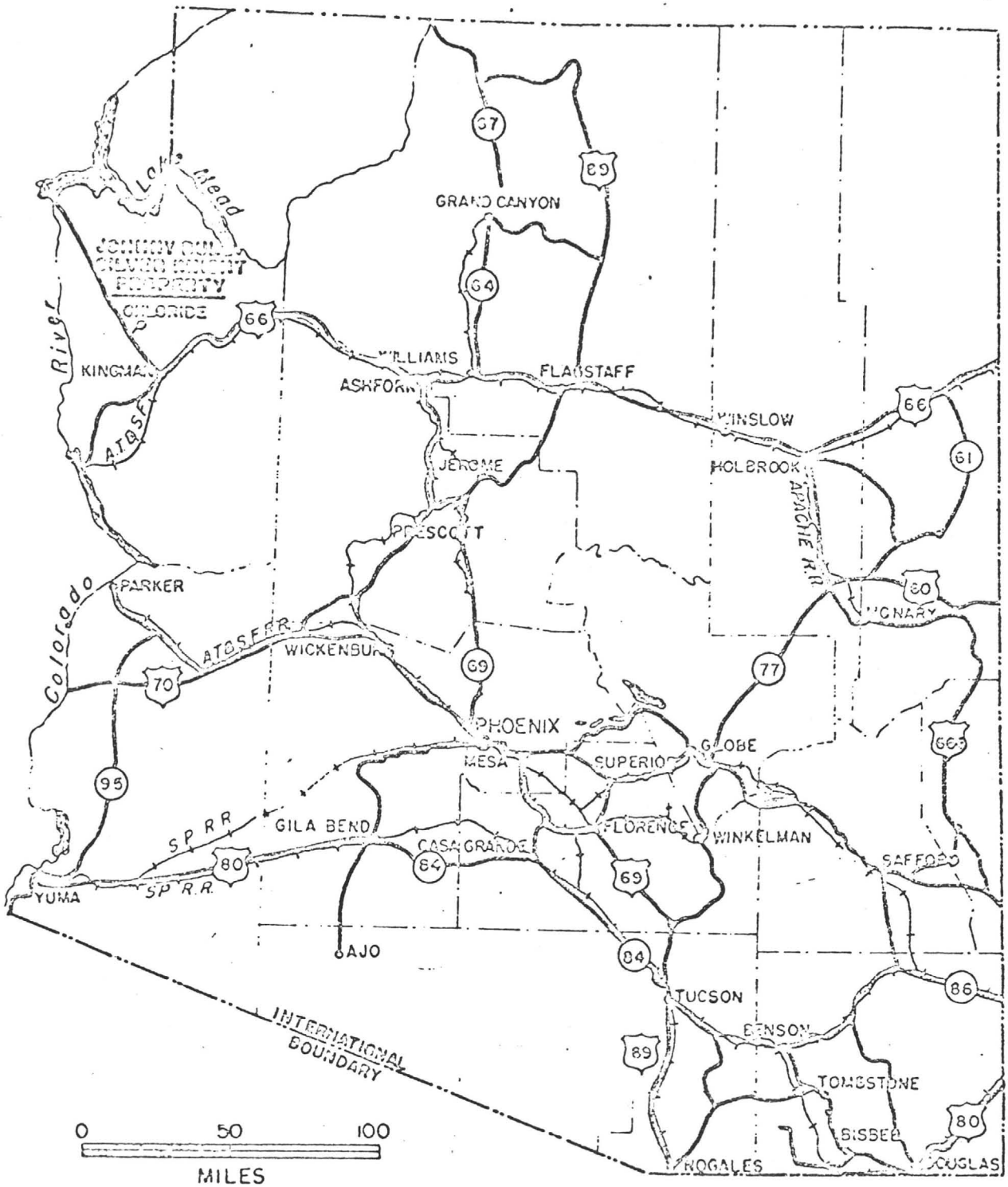


FIG.1-GENERAL LOCATION MAP, JOHNNY DULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJ. 1506, MOJAVE COUNTY, ARIZONA

and convenient smelting facilities. During the period 1908 to 1933 the Wallapai district is reported to have produced 95,587,344 pounds of zinc.4/

There has been no production from the Johnny Bull-Silver Knight property. Three mines, however, have produced from the Tennessee vein; these are, progressing northward from the Johnny Bull claim, the Tennessee, Schuylkill, and Elkhart.

The Tennessee mine is said to have been discovered in 1894. Its largest annual production of 59,990 tons of ore was in 1937, when the mine was the second largest producer of lead and zinc in the State. Metals recovered from ores from the Tennessee-Schuylkill mine from 1901 to 1938 were 43,645,889 pounds of zinc, 41,359,270 pounds of lead, 376,985 pounds of copper, 992,049 ounces of silver, and 31,257 ounces of gold.5/

During the latter part of 1943, the average monthly production was about 3,500 tons of ore, which was treated in the company's 150-ton flotation mill.

PROPERTY AND OWNERSHIP

The property comprises two contiguous, patented, lode-mining claims, namely, the Johnny Bull fraction and the Silver Knight, aggregating about 26 acres. It is owned by the Barnsdall Mining Co. of Delaware.

DESCRIPTION OF THE DEPOSIT

The rocks of the Cerbat range, as described by Hernon,6/ "consist of pre-Cambrian crystalline rocks, later crystalline rocks of an unknown age, and volcanic rocks of probable Tertiary and Quaternary age. These crystalline rocks form a complex predominantly of granite with diorite and gabbro, all generally somewhat gneissic and intruded by pegmatite, medium-grained granite, diabase, granite porphyry, and lamprophyric dikes. Small to medium-sized blocks of very dark schist (amphibolite) are locally common. All these rocks show various degrees of schistosity and represent two or more eras."

Faults of a northwest strike and steep dip cut the older rocks and structures. Striations generally indicate that movement along the faults had a larger horizontal than vertical component. Post-mineralization cross faults are known to occur at several places in the range.

4/ Elsing, Morris J., and Heineman, Robert E. S., Arizona Metal Production: Arizona Bureau of Mines Bull. 140, 1936, p. 73.

5/ Compiled by C. N. Gerry, Division of Mineral Production and Economics, Bureau of Mines, for Bureau of Mines Inf. Circ. 7077, 1939, p. 4.

6/ Hernon, Robert M., Cerbat Mountains: Arizona Bureau of Mines Bull. 145, 1938, p. 112.

The veins were formed chiefly along the system of northwest fault fissures. Near Chloride, the fissure veins are numerous and may be grouped according to strike. One group strikes nearly north and the other group strikes northwesterly. Many of the veins are persistent along the strike, and some persist in depth. The Tennessee vein has been explored to a depth of 1,600 feet and is traceable on the surface for nearly 2 miles. In general, it strikes N. 50° W. and dips steeply eastward. The average width is about 6 feet.

The primary minerals include crystalline pyrite, fine-grained gold-bearing pyrite, sphalerite, galena, and chalcopyrite. The most common gangue minerals are quartz and calcite. Limonite and hematite appear as products of oxidation.

In the Tennessee-Schuylkill mine, the wall rocks of gneiss, granite, and granite porphyry are hard and stand well. The vein material is soft and heavy and breaks easily. The vein walls are well-marked by soft gouge, although in the wider portions false walls are formed by "slickensided" gouge. Some secondary mineralization occurs to a depth of about 80 feet.

Minable ore shoots range from 2 to 25 feet in width and are as much as 800 feet in length. The present grade of ore mined is about 6.5 percent zinc and 3.5 percent lead, but higher-grade ore has been mined in the past.

Schrader[7] wrote of the Tennessee mine in 1917:

"The mine has been productive almost from the surface down. From between the surface and the 400-foot level, thousands of tons of rich galena ore has been shipped *** large bodies of good zinc ore, some 12 feet in width, on the 200-foot and the 500-foot levels, have been left standing in the mine."

Four ore shoots have been explored to depths ranging from 150 feet on the one farthest north of the Schuylkill shaft to 1,600 feet on the one immediately north of the Tennessee shaft. Two intervening shoots have been mined deeper than 1,200 feet. A fifth shoot is being mined currently, but is not completely developed, above the 900-foot level south of the Tennessee shaft. The south face of this stope is within 250 feet of the north end line of the Johnny Bull claim. The explored shoots rake northward above the 900-foot level and below the level change to nearly vertical.

The only influence noted on the extent or grade of the ore shoots is due to a change in strike or dip. Wide ore filling is usually confined to steeply dipping segments of the vein.

7/ Schrader, F. C., Geology and Ore Deposits of Mohave County, Arizona: Am. Inst. Min. Eng., Trans., vol. 56, 1917, p. 203.

Apparently the type of wall rock has no influence on the ore shoots. The position at which minor spur veins enter the main vein is considered a favorable structure for the formation of ore shoots. Cross faulting is rare, and the ore bodies have not been cut off abruptly.

On the Johnny Bull-Silver Knight Property, a vein crops out prominently, except where obscured by detritus, a distance of 2,000 feet across the property. The outcrop is straight and trends southward. The vein dips eastward at 80° to a point 100 feet north of an 88-foot prospect shaft, where a reversal in dip to about 88° towards the west occurs. This westerly dip continues 800 feet southward, where the normal easterly dip again prevails.

The vein is of the fissure type. Widths of the outcrop range from 2 to 12 feet. Intersections in the drill holes have indicated widths ranging from 3.3 to 32.4 feet. Exposed vein filling consists of quartz and iron oxides. Sulfide minerals are rarely visible. Oxidation is shallow, as shown by the drill holes. Heavy sulfides of iron and zinc were only slightly oxidized where intersected 100 feet below the surface.

The Tennessee vein is similar to the vein on the Johnny Bull-Silver Knight property in strike, dip, and mineral characteristics. Because of overburden and a mill tailings pond, it is impossible to trace the outcrop of the Tennessee vein for 450 feet from a south exposure on the Tennessee property to the north outcrop on the Johnny Bull claim. However, the vein extending southward across the Johnny Bull-Silver Knight property doubtless is the southerly extension of the Elkhart-Schuylkill-Tennessee vein.

SUMMARY OF VEIN INTERSECTION

Hole No.	Depth, feet From-	To-	Intersected length, feet	Width indicated, feet	In Percent Zn	Pb	Cu	Ounces Au	Ag	Indicated dip
1	219.2	227.8	8.6	6.3	0.6	0.1	0.03	tr	0.15	88-1/2°W
	236.9	241.5	4.6	3.3	0.8	0.2	tr	0.05	0.15	88-1/2°W
2	327.0	340.2	13.2	8.7	Low grade; no samples taken.					88-1/2°W
3	286.0	298.3	12.3	7.8	0.6	0.2	0.06	tr	none	81°E
4	165.7	175.7	10.0	7.9	1.2	tr	0.11	tr	none	82-1/2°W
5	367.7	372.5	4.8	2.6	2.8	0.2	0.04	tr	0.60	86-1/2°W
	367.7	426.5	58.8	32.4	0.4	0.1	0.03	tr	0.10	86-1/2°W
6	413.0	419.0	7.0	4.8	0.3	0.1	0.02	tr	none	77°E
	498.5	504.3	5.8	3.9	tr	tr	tr	tr	none	
7	172.6	181.8	9.2	5.6	0.1	tr	0.06	tr	0.08	
	253.0	255.2	17.2	10.6	0.3	0.1	0.02	tr	0.05	82°E
8	142.7	146.2	3.5	3.3	7.6	0.1	0.03	tr	0.50	65°W

1303

Flattest

Southernmost DH — highest values — shallowest depth

DEVELOPMENT AND MINE WORKINGS

No work has been done on the Johnny Bull-Silver Knight property for several years. Prospect workings consist of 6 inclined shafts ranging in depth from 25 to 88 feet, a drift tunnel 180 feet in length, and a number of trenches and pits. There is no mining equipment at the property.

The Tennessee shaft is 630 feet north of the Johnny Bull claim. The shaft is vertical and extends below the 1,400-foot level. A 1,600-foot level is accessible through an interior shaft.

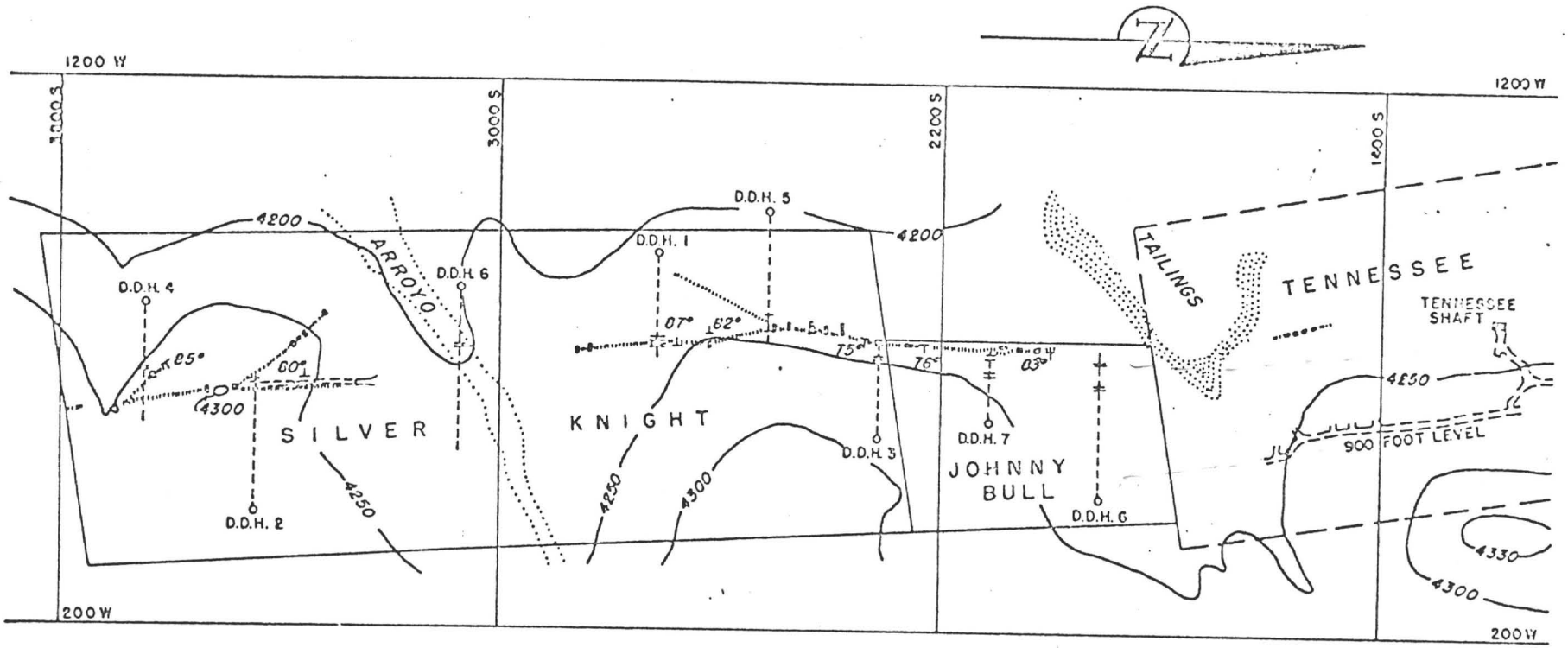
The Schuylkill inclined shaft, extending to the 800-foot level, is about 1,450 feet north of the vertical shaft along the strike of the vein. Only a small amount of development has been done south of the Tennessee shaft. The 900-foot level drift has been driven to within 200 feet of the north end line of the Johnny Bull claim. A crosscut 25 feet north of the drift face exposed a well-defined vein over 12 feet in width but rather low in grade. At present a high-grade ore shoot is being developed and mined to within 250 feet of the Johnny Bull claim.

WORK PERFORMED BY THE BUREAU OF MINES

A program of diamond drilling at the Johnny Bull-Silver Knight property was started in September 1943 and completed in December 1943. In all, eight holes aggregating 2,979.5 feet were drilled along the vein outcrop, prospecting it for a length of 2,000 feet. These holes, spaced not less than 200 or more than 371 feet apart, intersected the vein from 100 to 350 feet vertically beneath the surface. (Figures 2 and 3.)

Holes 1 and 2 were located opposite wide outcrops on which an 88-foot shaft had been sunk and a 180-foot tunnel had been driven. At each location the outcrop dipped steeply to the west, a reversal of the normal or more general easterly dip of the Tennessee vein. Holes 3, 4, and 7 were located opposite shallow inclined shafts sunk on an eastward-dipping outcrop. Holes 2, 4, and 5 are adjacent to the junction of the main vein and forking spur veins. Holes 2, 3, and 7 were drilled beneath iron-stained croppings, from which it is believed that zinc and lead may have been leached. Hole 5 was located near a surface dip reversal; the outcrop to the north dipped 75° eastward, and the outcrop to the south dipped 82° westward. Holes 6 and 8 were drilled opposite croppings covered by valley detritus. Hole 6 was located 300 feet south of the Tennessee 900-foot level south face and within 350 feet of an active stope. Hole 8 was located between holes 1 and 2 to shorten the interval that previously had been left undrilled because of the difficulties expected in getting the hole through detritus to bedrock.

The vein was intersected in all of the holes. Widths indicated range from 3.3 to 32.4 feet. The grade of the vein filling was disappointing, drilling indicating that most of the vein is barren or very low-grade, ranging from 0.1 to 7.6 percent in zinc and with negligible amounts of lead.



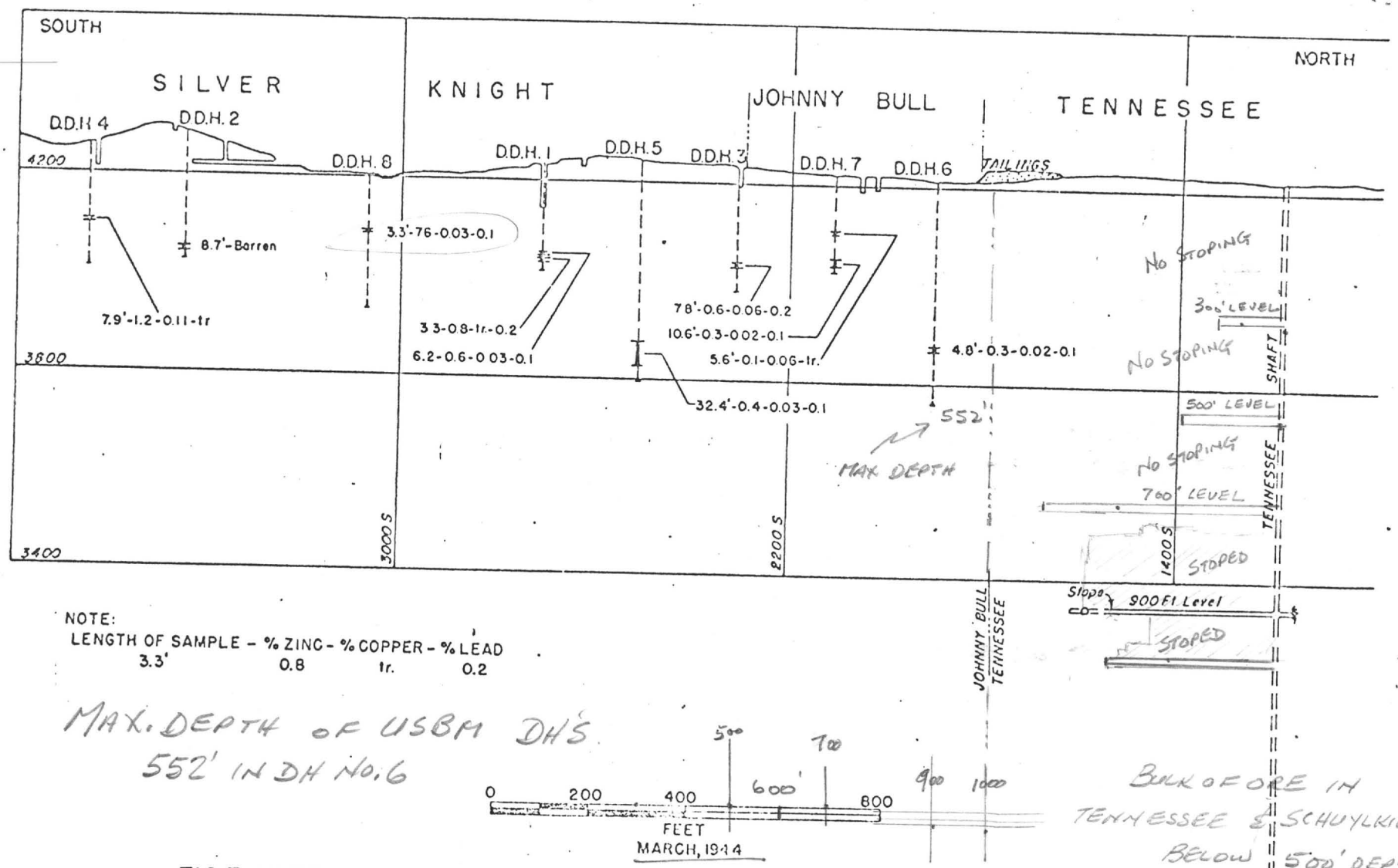
LEGEND

VEIN AT SURFACE (OUTCROPS AND FLOAT)
TRENCHES OR WORKINGS ON VEIN
VEIN INTERSECTIONS IN DIAMOND DRILL HOLES
60° STRIKE AND DIP OF VEIN
SHAFTS

0 200 400 800
FEET

MARCH, 1944

FIG. 2 - DIAMOND DRILL HOLE LOCATIONS, JOHNNY BULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZONA



NOTE:
LENGTH OF SAMPLE – % ZINC – % COPPER – % LEAD
3.3' 0.8 tr. 0.2

MAX. DEPTH OF USBM DH'S
552' IN DH No. 6

BULK ORE IN TENNESSEE & SCHUYLKILL BELOW 500' DEPTH

FIG. 3-VERTICAL LONGITUDINAL PROJECTION OF VEIN INTERSECTIONS, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZ.

[TENN. MINE MAP CONTAINED IN BLAKEMORE THOMAS PHD THESIS]

NOTE: With ref. to Tenn. Mine MAP Longitudinal Section 6-1-48

STOPING FROM TENNESSEE SHAFT SOUTH TO WITHIN 200' of Johnny Bull North Line TOOK PLACE FROM 780' to 1000' DEPTH. No stoping above 780' DEPTH.

Following are condensed logs for diamond drill holes

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 1

Location: 2710 S; 892 W.
Elevation of collar: 4210 foot

Inclination: 45 degrees
Bearing: East

Footage From	Footage To	Footage Feet	Formation
0.0	6.0	6.0	Mantle rock
6.0	66.0	60.0	Fractured granite porphyry
66.0	70.0	4.0	Amphibolite schist
70.0	71.0	1.0	Gouge and breccia
71.0	81.8	10.8	Granite and mica schist
81.8	113.5	31.7	Granite altered to schist
113.5	130.2	16.7	Pegmatite
130.2	184.5	54.3	Alternating schist and granite porphyry.
184.5	198.1	13.6	Mica schist
198.1	210.0	11.9	Granite
210.0	219.2	9.2	Altered amphibolite schist
219.2	223.5	4.3	Altered, mineralized amphibolite schist, pyrite, galena.
223.5	227.8	4.3	ditto
227.8	236.9	9.1	Siliceous schist, pyrite
236.9	241.5	4.6	Quartz, feldspar, kaolin, pyrite
241.5	254.5	13.0	Siliceous schist, garnet
254.5	268.2	13.7	Pegmatite
268.2	271.0	2.8	Schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 2

Location: 3443 S; 414 W.
Elevation of collar: 4285 feet

Inclination: 45 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	4.0	4.0	Mantle rock
4.0	97.3	93.3	Amphibolite schist, pegmatite stringers
97.3	103.0	5.7	Granite
103.0	117.0	14.0	Siliceous amphibolite schist
117.0	124.2	7.2	Granite
124.2	143.5	19.3	Amphibolite schist, quartz, pyrite
143.5	155.2	11.7	Pegmatite
155.2	176.3	21.1	Siliceous amphibolite schist, pyrite, chalcopyrite 155.2 to 159.2 feet
176.3	180.2	3.9	Pegmatite
180.2	228.2	48.0	Amphibolite schist, pyrite
228.2	234.8	6.6	Banded amphibolite schist and granite
234.8	253.1	18.3	Granite porphyry and schist
253.1	255.0	1.9	Pegmatite
255.0	267.5	12.5	Siliceous amphibolite schist
267.5	284.8	17.3	Granite and amphibolite schist
284.8	301.0	16.2	Granite porphyry and amphibolite schist
301.0	323.0	22.0	Schist
323.0	327.0	4.0	Mica schist
327.0	340.2	13.2	Sparsely mineralized quartz and feldspar, pyrite and sphalerite.
340.2	362.2	22.0	Siliceous amphibolite schist, pyrite Trace chalcopyrite, 356.8 to 357.2 feet

END OF HOLE.

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 3

Location: 2310 S; 560 W.
Elevation of collar: 4290 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	30.6	30.6	Mantle rock
30.6	53.5	22.9	Granite porphyry
53.5	62.3	8.8	Mica schist
62.3	146.5	84.2	Granite porphyry
146.5	210.5	63.5	Granite gneiss and porphyry
210.0	211.0	1.0	Quartz
211.0	217.8	6.8	Granite porphyry and schist
217.8	243.0	25.2	Amphibolite schist
243.0	247.0	4.0	Schist
247.0	250.0	3.0	Granite porphyry and gneiss
250.0	265.0	15.0	Amphibolite schist and mica schist
265.0	285.0	20.0	Mica schist, garnet
285.0	286.0	1.0	Granite
286.0	291.0	5.0	Mineralized quartz and feldspar, pyrite, galena, sphalerite
291.0	296.0	5.0	ditto
296.0	298.3	2.3	ditto
298.3	320.0	21.7	Granite, porphyry and schist
320.0	342.0	22.0	Mica schist
342.0	357.0	15.0	Fractured granite and gouge, pyrite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 4

Location: 3643 S; 795 W.
Elevation of collar: 4225 feet

Inclination: 45 degrees
Bearing: East

Footage			Formation
From	To	Feet	
0.0	10.0	10.0	Mantle rock
10.0	23.4	13.4	Pegmatite and granite prophyry
23.4	66.4	43.0	Schist and granite porphyry
66.4	128.6	62.2	Amphibolite schist
128.6	140.5	11.9	Quartz
140.5	150.7	10.2	Siliceous amphibolite schist
150.7	157.5	6.8	Schist, quartz stringers
157.5	160.1	2.6	Mineralized schist, quartz, pyrite sphalerite.
160.1	162.1	2.0	Schist
162.1	165.7	3.6	Mineralized schist, quartz, pyrite sphalerite
165.7	171.2	5.5	Quartz, gouge, pyrite, sphalerite
171.2	175.7	4.5	ditto
175.7	193.3	17.6	Schist
193.3	223.9	30.6	Amphibolite schist
223.9	274.9	51.0	Banded amphibolite schist and granite porphyry
274.9	284.7	9.8	Amphibolite and mica schist
284.7	305.0	20.3	Schist

END OF HOLE

R.I. 3998

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 5

Location: 2510 S;, 970 W.
Elevation of collar: 4200 feet

Inclination: 60 degrees
Bearing: East

Footage			Formation
From	To	Feet	
0.0	20.0	20.0	Mantle rock
20.0	33.3	13.3	Mica schist and granite
33.3	72.0	38.7	Alternating pegmatite and schist
72.0	159.7	87.7	Pegmatite
159.7	181.6	21.9	Alternating schist and pegmatite
181.6	190.6	9.0	Granite
190.6	231.5	40.9	Granite gneiss
231.5	242.0	10.5	Amphibolite schist and granite
242.0	264.0	22.0	Granite gneiss
264.0	319.8	55.8	Mica schist and granite
319.8	332.7	12.9	Amphibolite schist
332.7	339.2	6.5	Pegmatite and granitegneiss
339.2	367.7	28.5	Fractured, altered schist, quartz, pyrite
367.7	372.5	4.8	Gouge, quartz, pyrite, galena, sphalerite.
372.5	376.9	4.4	Gouge quartz
376.9	381.0	4.1	Gouge and schist, quartz, pyrite
381.0	386.0	5.0	ditto
386.0	393.5	7.5	Porphyry, quartz, pyrite, galena
393.5	398.5	5.0	Porphyry, quartz, pyrite
398.5	403.5	5.0	ditto
403.5	410.5	7.0	ditto
410.5	415.5	5.0	Ditto
415.5	420.5	5.0	ditto
420.5	426.5	6.0	Porphyry and schist, pyrite
426.5	431.5	5.0	Fractured porphyry and mica schist
431.5	467.0	35.5	Fractured pegmatite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 6

Location: 1910 S;, 454 W.
Elevation of collar: 4236 feet

Inclination: 60 degrees
Bearing: West

Footage			Formation
From	To	Feet	
0.0	28.5	28.5	Alluvium and decomposed mantle rocks
28.5	81.0	52.5	Schist and pegmatite
81.0	114.0	33.0	Granite gneiss and mica schist
114.0	204.0	90.0	Amphibolite schist, pyrite and chalcopyrite
204.0	206.5	2.5	Granite
206.5	301.5	95.0	Amphibolite schist
301.5	328.3	26.8	Granite, mica and amphibolite schists
328.3	334.1	5.8	Pegmatite and brecciated schist
334.1	351.5	17.4	Mica-hornblende schist, garnet 11" gouge, pyrite, sphalerite, galena, at 340.7 feet
351.5	364.8	13.3	Granite
364.8	376.0	11.2	Fractured hornblende-mica schist, garnet
376.0	391.0	15.0	Granite and garnetiferous mica schist
391.0	409.0	18.0	Siliceous hornblende-mica schist
409.0	412.0	3.0	Quartzitic schist
412.0	416.2	4.2	Mineralized quartz breccia and gouge
416.2	419.0	2.8	Mineralized, fractured porphyry, quartz, pyrite, sphalerite
419.0	423.5	4.5	Garnetiferous hornblende schist, pyrite
423.5	452.0	28.5	Siliceous hornblende-mica schist
452.0	471.5	19.5	Schistose granite
471.5	492.0	20.5	Garnetiferous mica schist
492.0	498.0	6.5	Schistose granite
498.0	504.3	5.8	Pyrite mineralized vein, gouge walls
504.3	519.5	15.2	Amphibolite schist, granite inclusions
519.5	552.0	32.5	Granite
			END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 7

Location: 2110 S.; 590 W.
Elevation of collar 4257 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	30.0	30.0	Weathered pegmatite
30.0	66.3	36.3	Fractured amphibolite and mica schist
66.3	132.5	66.2	Garnetiferous mica schist and granite
132.5	135.7	3.2	Granite
135.7	156.5	20.8	Garnetiferous mica schist
156.5	170.0	13.5	Pegmatite
170.0	172.6	2.6	Altered mica schist, pyrite
172.6	176.2	3.6	Vein material, pyrite
176.2	179.2	3.0	Vein material and gouge, pyrite
179.2	181.8	2.6	ditto 3/8" galena stringer at 180 feet
181.8	200.2	18.4	Altered mica schist and quartz porphyry
200.2	217.7	17.5	Mica schist
217.7	238.0	20.3	Granite, pyrite 1" stringer pyrite and galena at 221.5 ft.
238.0	240.2	2.2	Gouge and breccia, pyrite, sphalerite, and galena
240.2	245.2	5.0	Vein material and gouge
245.2	250.2	5.0	ditto
250.2	255.2	5.0	Vein material, gouge, and breccia
255.2	256.7	1.5	Altered granite
256.7	265.3	8.6	Fractured granite and mica schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 6

Location: 3072 S.; 825 W.
Elevation of collar: 4197 feet

Inclination: 44-½°; 150 ft., 41°; 350 ft., 40°
Bearing: East

Footage From	Footage To	Footage Feet	Formation
0.0	49.0	49.0	Alluvium and boulders
49.0	128.0	79.0	Alternating amphibolite schist and granite Mineralized fissure at 98.0 feet
128.0	130.5	2.5	Pegmatite
130.5	133.7	3.2	Altered feldspar, quartz, and kaolin
133.7	138.0	4.3	ditto Quartz veinlets, pyrite and sphalerite, at 134.4 and 135.4 feet.
138.0	142.7	4.7	Altered feldspar, quartz, and kaolin ½" quartz, pyrite, and sphalerite, at 139.2 and 140.0 ft.
142.7	146.2	3.5	Quartz, altered feldspar, and kaolin Sphalerite, pyrite, and trace of galena
146.2	150.0	3.8	Altered feldspar, quartz, and kaolin, pyrite in seams
150.0	169.7	19.7	Altered feldspar, quartz, and kaolin Gouge, quartz, pyrite, and sphalerite at 164.4 to 166.3 ft.
169.7	218.0	48.3	Granite. Pyrite and sphalerite seams at 205.0 to 206.0 ft.
218.0	221.3	3.3	Mica schist
221.3	275.0	53.7	Granite. 1" quartz, pyrite, and sphalerite at 263.0 feet. 4" pyrite mineralized shear at 271.3 feet
275.0	347.8	72.8	Alternating amphibolite schist and granite
347.8	362.0	14.2	Pegmatite
362.0	400.0	38.0	Granodiorite or quartz diorite.

END OF HOLE

Tainter, S.L., 1947, Johnny Bull-Silver Knight Lead-Zinc Property, Cerbat Mountains, Mohave County, Arizona: U.S. Bureau of Mines, R.I. 3998, 14 p.

R. I. 3998,
January 1947.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

JOHNNY BULL-SILVER KNIGHT LEAD-ZINC PROPERTY CERBAT MOUNTAINS, MOHAVE COUNTY, ARIZONA[1]

JOHNNY BULL MINE
CERBAT MTNS.
MOHAVE CO., ARIZ.
LEAD
ZINC

By Stanton L. Tainter[2]

CONTENTS

ILLUSTRATIONS

INTRODUCTION

The Johnny Bull and Silver Knight claims were selected for exploratory diamond drilling after having been examined by the Bureau of Mines.[3]

The property was considered attractive for two reasons: (1) A prominent outcrop, recognized as an extension of the Tennessee vein, persisted over a distance of 2,000 feet across the claims; (2) its proximity to the known ore shoots in the Tennessee-Schuylkill mine, one of the largest zinc-lead producers in Arizona.

Actual drilling was started September 16 and was terminated December 8, 1943. Eight holes, aggregating 2,979.5 feet, were drilled with two machines.

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 3998."

2/ Mining engineer, Bureau of Mines.

3/ J. H. Hodges, district engineer, and Thomas C. Denton, mining engineer, Bureau of Mines.

(1947)

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 final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests.

Special acknowledgment is due J. H. Hedges, chief, Mining Branch, Tucson Division of the Bureau of Mines, who directed the function of the Mining Branch in carrying out the investigation reported in this paper.

Chemical analyses included in this paper were performed at the Bureau's laboratory, Reno, Nev., under the direction of A. C. Rice, acting supervising engineer.

LOCATION AND ACCESSIBILITY

The Johnny Bull and Silver Knight claims are at the foot of the western slope of the Cerbat Mountains, about 1 mile east of the town of Chloride, in the Wallapai mining district, Mohave County, Arizona. They adjoin and lie on the south of the property of the Tennessee-Schuylkill Corp. (fig. 1).

Chloride, a town of nearly 500 inhabitants, 21 miles north of Kingman and 60 miles south of Boulder Dam, is accessible over paved U. S. Highway 93. Kingman, the largest supply point in the region, has a population of 3,600 and is on the main line of the Santa Fe Railroad.

PHYSICAL FEATURE AND CLIMATE

The Cerbat Mountains form a range which extends about 30 miles northward from Kingman and averages 10 miles in width. The crest line lies at about 6,000 feet, and the peaks reach an altitude of about 7,000 feet, rising sharply for 1,500 to 3,000 feet above the Haulpai Valley on the east and the Detrital and Sacramento Valleys on the west. Chloride is at an altitude of 3,900 feet on the western side of the range.

The claims lie at an altitude of 4,250 feet. Vegetation is sparse, and timber for mining purposes is not locally available. The climate is arid, seasons are open, and all-year climatic conditions are ideal for mining operations. Water is scarce in both the Sacramento Valley and the Cerbat range.

HISTORY AND PRODUCTION

Mineral discoveries in the Cerbat Mountains date from 1863, when silver chloride, lead sulfide, and gold ores were found. Lead-zinc ores became important with cheaper transportation, improved milling methods,

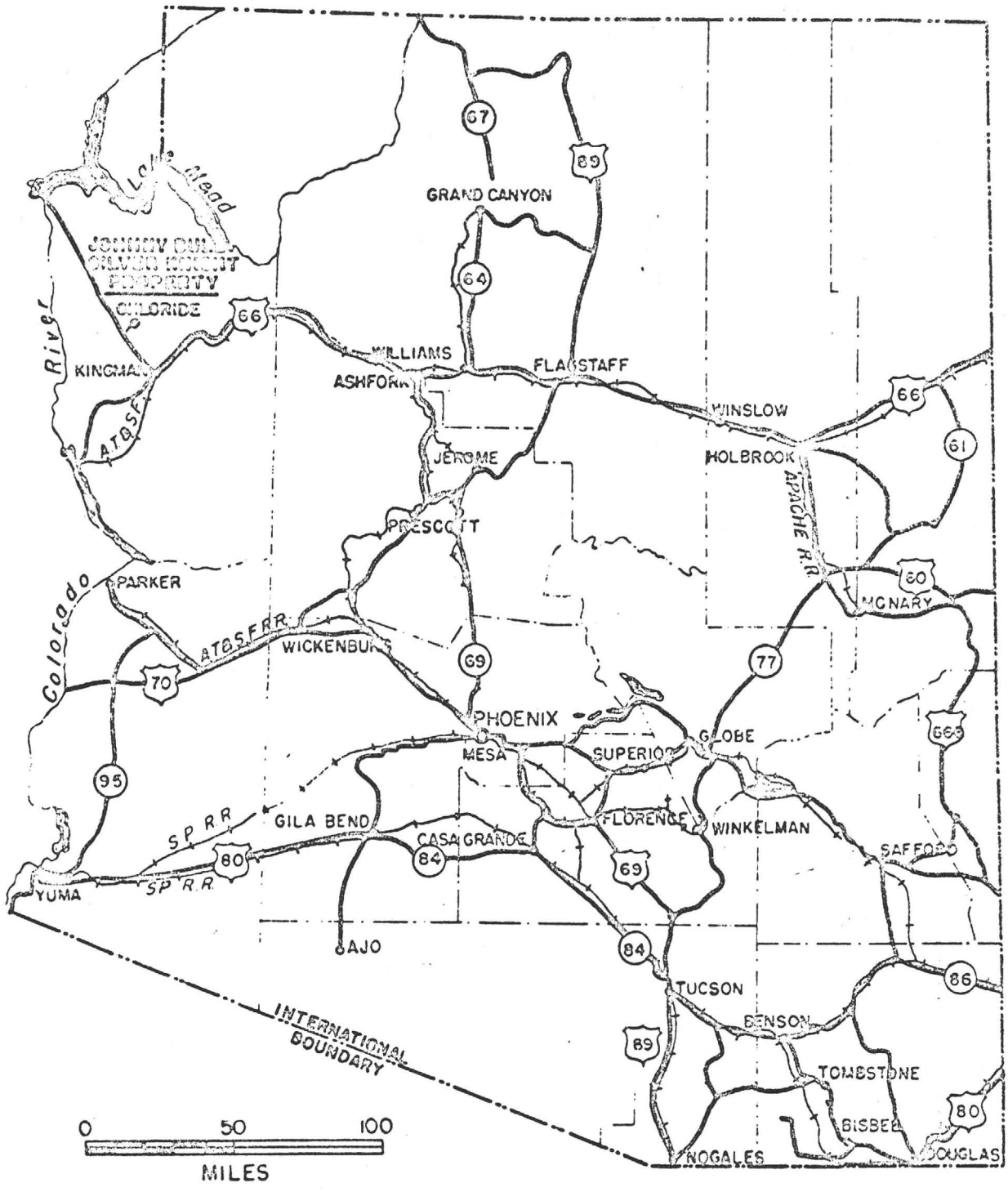


FIG.1-GENERAL LOCATION MAP, JOHNNY BULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJ. 1506, MOJAVE COUNTY, ARIZONA

and convenient smelting facilities. During the period 1908 to 1933 the Wallapai district is reported to have produced 95,587,344 pounds of zinc.4/

There has been no production from the Johnny Bull-Silver Knight property. Three mines, however, have produced from the Tennessee vein; these are, progressing northward from the Johnny Bull claim, the Tennessee, Schuylkill, and Elkhart.

The Tennessee mine is said to have been discovered in 1894. Its largest annual production of 59,990 tons of ore was in 1937, when the mine was the second largest producer of lead and zinc in the State. Metals recovered from ores from the Tennessee-Schuylkill mine from 1901 to 1938 were 43,645,889 pounds of zinc, 41,359,270 pounds of lead, 376,985 pounds of copper, 992,049 ounces of silver, and 31,257 ounces of gold.5/

During the latter part of 1943, the average monthly production was about 3,500 tons of ore, which was treated in the company's 150-ton flotation mill.

PROPERTY AND OWNERSHIP

The property comprises two contiguous, patented, lode-mining claims, namely, the Johnny Bull fraction and the Silver Knight, aggregating about 26 acres. It is owned by the Barnsdall Mining Co. of Delaware.

DESCRIPTION OF THE DEPOSIT

The rocks of the Cerbat range, as described by Hernon,6/ "consist of pre-Cambrian crystalline rocks, later crystalline rocks of an unknown age, and volcanic rocks of probable Tertiary and Quaternary age. These crystalline rocks form a complex predominantly of granite with diorite and gabbro, all generally somewhat gneissic and intruded by pegmatite, medium-grained granite, diabase, granite porphyry, and lamprophyric dikes. Small to medium-sized blocks of very dark schist (amphibolite) are locally common. All these rocks show various degrees of schistosity and represent two or more eras."

Faults of a northwest strike and steep dip cut the older rocks and structures. Striations generally indicate that movement along the faults had a larger horizontal than vertical component. Post-mineralization cross faults are known to occur at several places in the range.

4/ Elsing, Morris J., and Heineman, Robert E. S., Arizona Metal Production: Arizona Bureau of Mines Bull. 140, 1936, p. 73.

5/ Compiled by C. N. Gerry, Division of Mineral Production and Economics, Bureau of Mines, for Bureau of Mines Inf. Circ. 7077, 1939, p. 4.

6/ Hernon, Robert M., Cerbat Mountains: Arizona Bureau of Mines Bull. 145, 1938, p. 112.

The veins were formed chiefly along the system of northwest fault fissures. Near Chloride, the fissure veins are numerous and may be grouped according to strike. One group strikes nearly north and the other group strikes northwesterly. Many of the veins are persistent along the strike, and some persist in depth. The Tennessee vein has been explored to a depth of 1,600 feet and is traceable on the surface for nearly 2 miles. In general, it strikes N. 59° W. and dips steeply eastward. The average width is about 6 feet.

The primary minerals include crystalline pyrite, fine-grained gold-bearing pyrite, sphalerite, galena, and chalcopyrite. The most common gangue minerals are quartz and calcite. Limonite and hematite appear as products of oxidation.

In the Tennessee-Schuylkill mine, the wall rocks of gneiss, granite, and granite porphyry are hard and stand well. The vein material is soft and heavy and breaks easily. The vein walls are well-marked by soft gouge, although in the wider portions false walls are formed by "slickensided" gouge. Some secondary mineralization occurs to a depth of about 80 feet.

Minable ore shoots range from 2 to 15 feet in width and are as much as 800 feet in length. The present grade of ore mined is about 6.5 percent zinc and 3.5 percent lead, but higher-grade ore has been mined in the past.

Schrader[7] wrote of the Tennessee mine in 1917:

"The mine has been productive almost from the surface down. From between the surface and the 400-foot level, thousands of tons of rich galena ore has been shipped *** large bodies of good zinc ore, some 12 feet in width, on the 200-foot and the 500-foot levels, have been left standing in the mine."

Four ore shoots have been explored to depths ranging from 150 feet on the one farthest north of the Schuylkill shaft to 1,600 feet on the one immediately north of the Tennessee shaft. Two intervening shoots have been mined deeper than 1,200 feet. A fifth shoot is being mined currently, but is not completely developed, above the 900-foot level south of the Tennessee shaft. The south face of this stope is within 250 feet of the north end line of the Johnny Bull claim. The exploited shoots rake northward above the 900-foot level and below the level change to nearly vertical.

The only influence noted on the extent or grade of the ore shoots is due to a change in strike or dip. Wide ore filling is usually confined to steeply dipping segments of the vein.

7/ Schrader, F. C., Geology and Ore Deposits of Mohave County, Arizona: Am. Inst. Min. Eng., Trans., vol. 56, 1917, p. 203.

Apparently the type of wall rock has no influence on the ore shoots. The position at which minor spur veins enter the main vein is considered a favorable structure for the formation of ore shoots. Cross faulting is rare, and the ore bodies have not been cut off abruptly.

On the Johnny Bull-Silver Knight Property, a vein crops out prominently, except where obscured by detritus, a distance of 2,000 feet across the property. The outcrop is straight and trends southward. The vein dips eastward at 80° to a point 100 feet north of an 88-foot prospect shaft, where a reversal in dip to about 88° towards the west occurs. This westerly dip continues 800 feet southward, where the normal easterly dip again prevails.

The vein is of the fissure type. Widths of the outcrop range from 2 to 12 feet. Intersections in the drill holes have indicated widths ranging from 3.3 to 32.4 feet. Exposed vein filling consists of quartz and iron oxides. Sulfide minerals are rarely visible. Oxidation is shallow, as shown by the drill holes. Heavy sulfides of iron and zinc were only slightly oxidized where intersected 100 feet below the surface.

The Tennessee vein is similar to the vein on the Johnny Bull-Silver Knight property in strike, dip, and mineral characteristics. Because of overburden and a mill tailings pond, it is impossible to trace the outcrop of the Tennessee vein for 450 feet from a south exposure on the Tennessee property to the north outcrop on the Johnny Bull claim. However, the vein extending southward across the Johnny Bull-Silver Knight property doubtless is the southerly extension of the Elkhart-Schuylkill-Tennessee vein.

SUMMARY OF VEIN INTERSECTION

Hole No.	Depth, feet From-	To-	Intersected length, feet	Width indicated, feet	Percent Zn	Pb	Cu	Ounces Au	Ag	Indicated dip
1	219.2	227.8	8.6	6.3	0.6	0.1	0.03	tr	0.15	88-1/2°W
	236.9	241.5	4.6	3.3	0.8	0.2	tr	0.05	0.15	88-1/2°W
2	327.0	340.2	13.2	8.7	Low grade; no samples taken.					88-1/2°W
3	286.0	298.3	12.3	7.8	0.6	0.2	0.06	tr	none	81°E
4	165.7	175.7	10.0	7.9	1.2	tr	0.11	tr	none	82-1/2°W
5	367.7	372.5	4.8	2.6	2.8	0.2	0.04	tr	0.60	86-1/2°W
	367.7	426.5	58.8	32.4	0.4	0.1	0.03	tr	0.10	86-1/2°W
6	412.0	419.0	7.0	4.8	0.3	0.1	0.02	tr	none	77°E
	498.5	504.3	5.8	3.9	tr	tr	tr	tr	none	
7	172.6	181.8	9.2	5.6	0.1	tr	0.06	tr	0.08	
	238.0	255.2	17.2	10.6	0.3	0.1	0.02	tr	0.05	82°E
8	142.7	146.2	3.5	3.3	7.6	0.1	0.03	tr	0.50	65°W

DEVELOPMENT AND MINE WORKINGS

No work has been done on the Johnny Bull-Silver Knight property for several years. Prospect workings consist of 6 inclined shafts ranging in depth from 25 to 88 feet, a drift tunnel 180 feet in length, and a number of trenches and pits. There is no mining equipment at the property.

The Tennessee shaft is 630 feet north of the Johnny Bull claim. The shaft is vertical and extends below the 1,400-foot level. A 1,600-foot level is accessible through an interior shaft.

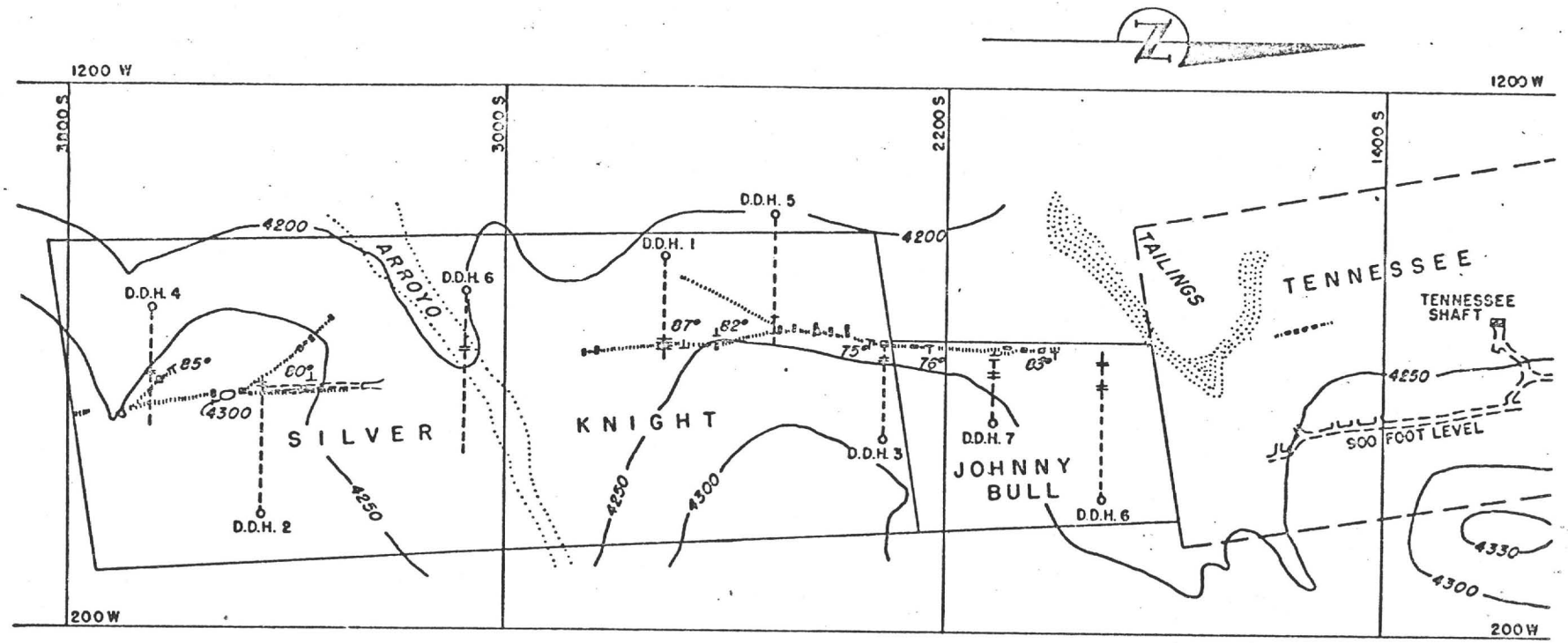
The Schuylkill inclined shaft, extending to the 800-foot level, is about 1,450 feet north of the vertical shaft along the strike of the vein. Only a small amount of development has been done south of the Tennessee shaft. The 900-foot level drift has been driven to within 200 feet of the north end line of the Johnny Bull claim. A crosscut 25 feet north of the drift face exposed a well-defined vein over 12 feet in width but rather low in grade. At present a high-grade ore shoot is being developed and mined to within 250 feet of the Johnny Bull claim.

WORK PERFORMED BY THE BUREAU OF MINES

A program of diamond drilling at the Johnny Bull-Silver Knight property was started in September 1943 and completed in December 1943. In all, eight holes aggregating 2,979.5 feet were drilled along the vein outcrop, prospecting it for a length of 2,000 feet. These holes, spaced not less than 300 or more than 371 feet apart, intersected the vein from 100 to 350 feet vertically beneath the surface. (Figures 2 and 3.)

Holes 1 and 2 were located opposite wide outcrops on which an 88-foot shaft had been sunk and a 180-foot tunnel had been driven. At each location the outcrop dipped steeply to the west, a reversal of the normal or more general easterly dip of the Tennessee vein. Holes 3, 4, and 7 were located opposite shallow inclined shafts sunk on an eastward-dipping outcrop. Holes 2, 4, and 5 are adjacent to the junction of the main vein and forking spur veins. Holes 2, 3, and 7 were drilled beneath iron-stained croppings, from which it is believed that zinc and lead may have been leached. Hole 5 was located near a surface dip reversal; the outcrop to the north dipped 75° eastward, and the outcrop to the south dipped 82° westward. Holes 6 and 8 were drilled opposite croppings covered by valley detritus. Hole 6 was located 300 feet south of the Tennessee 900-foot level south face and within 350 feet of an active stope. Hole 8 was located between holes 1 and 2 to shorten the interval that previously had been left undrilled because of the difficulties expected in getting the hole through detritus to bedrock.

The vein was intersected in all of the holes. Widths indicated range from 3.3 to 32.4 feet. The grade of the vein filling was disappointing, drilling indicating that most of the vein is barren or very low-grade, ranging from 0.1 to 7.6 percent in zinc and with negligible amounts of lead.



LEGEND

VEIN AT SURFACE (OUTCROPS AND FLOAT)

A TRENCHES OR WORKINGS ON VEIN

VEIN INTERSECTIONS IN DIAMOND DRILL HOLES

60° STRIKE AND DIP OF VEIN

SHAFTS

0 200 400 800

FEET

MARCH, 1944

FIG. 2 - DIAMOND DRILL HOLE LOCATIONS, JOHNNY BULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZONA

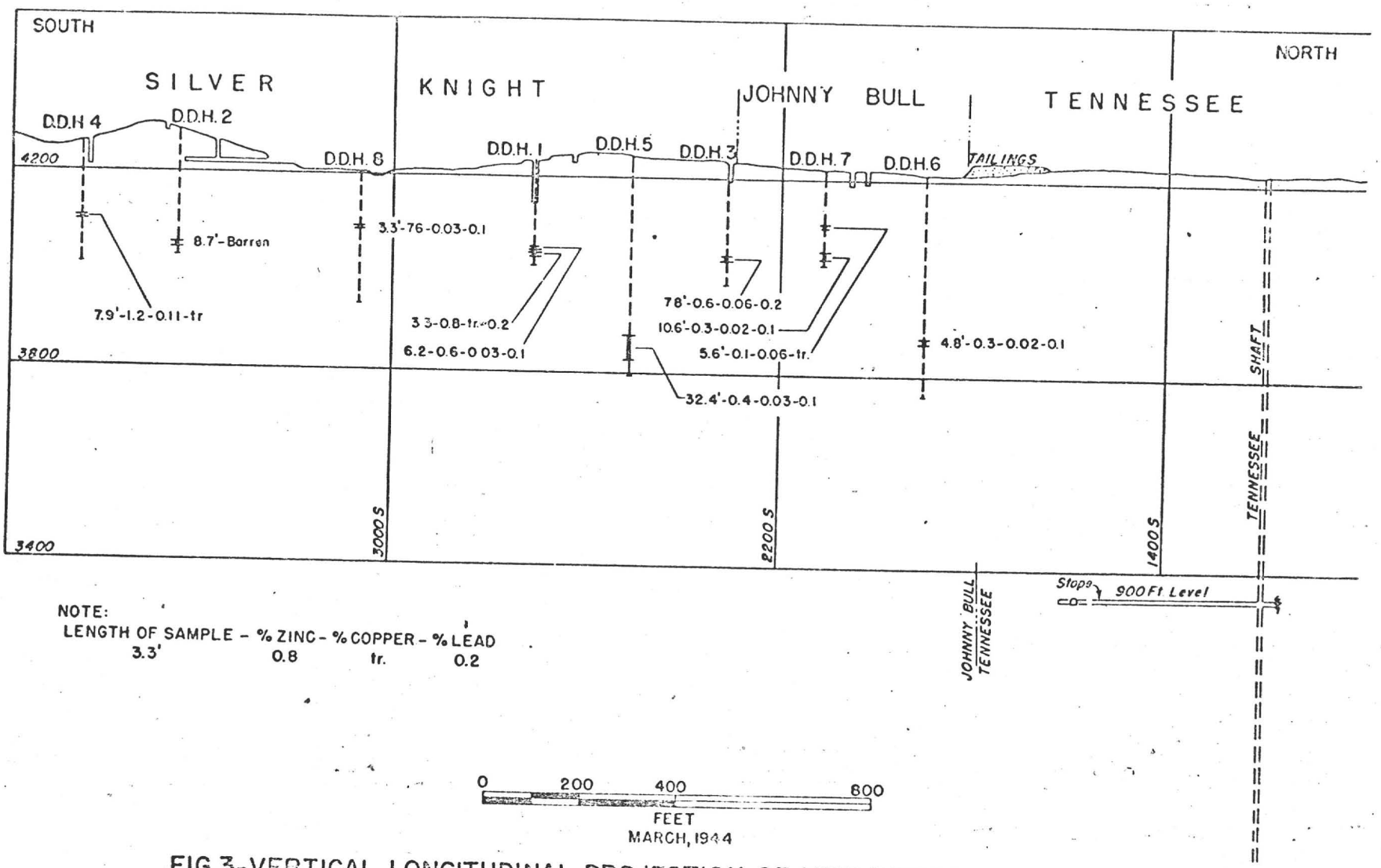


FIG.3-VERTICAL LONGITUDINAL PROJECTION OF VEIN INTERSECTIONS, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZ.

Following are condensed logs for diamond drill holes

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 1

Location: 2710 S; 892 W.
Elevation of collar: 4210 feet

Inclination: 45 degrees
Bearing: East

Footage			Formation
From	To	Feet	
0.0	6.0	6.0	Mantle rock
6.0	66.0	60.0	Fractured granite porphyry
66.0	70.0	4.0	Amphibolite schist
70.0	71.0	1.0	Gouge and breccia
71.0	81.8	10.8	Granite and mica schist
81.8	113.5	31.7	Granite altered to schist
113.5	130.2	16.7	Pegmatite
130.2	184.5	54.3	Alternating schist and granite porphyry.
184.5	198.1	13.6	Mica schist
198.1	210.0	11.9	Granite
210.0	219.2	9.2	Altered amphibolite schist
219.2	223.5	4.3	Altered, mineralized amphibolite schist, pyrite, galena.
223.5	227.8	4.3	ditto
227.8	236.9	9.1	Siliceous schist, pyrite
236.9	241.5	4.6	Quartz, feldspar, kaolin, pyrite
241.5	254.5	13.0	Siliceous schist, garnet
254.5	268.2	13.7	Pegmatite
268.2	271.0	2.8	Schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 2

Location: 3443 S; 414 W.
Elevation of collar: 4285 feet

Inclination: 45 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	4.0	4.0	Mantle rock
4.0	97.3	93.3	Amphibolite schist, pegmatite stringers
97.3	103.0	5.7	Granite
103.0	117.0	14.0	Siliceous amphibolite schist
117.0	124.2	7.2	Granite
124.2	143.5	19.3	Amphibolite schist, quartz, pyrite
143.5	155.2	11.7	Pegmatite
155.2	176.3	21.1	Siliceous amphibolite schist, pyrite, chalcopyrite 155.2 to 159.2 feet
176.3	180.2	3.9	Pegmatite
180.2	228.2	48.0	Amphibolite schist, pyrite
228.2	234.8	6.6	Banded amphibolite schist and granite
234.8	253.1	18.3	Granite porphyry and schist
253.1	255.0	1.9	Pegmatite
255.0	267.5	12.5	Siliceous amphibolite schist
267.5	284.8	17.3	Granite and amphibolite schist
284.8	301.0	16.2	Granite porphyry and amphibolite schist
301.0	323.0	22.0	Schist
323.0	327.0	4.0	Mica schist
327.0	340.2	13.2	Sparsely mineralized quartz and feldspar, pyrite and sphalerite.
340.2	362.2	22.0	Siliceous amphibolite schist, pyrite Trace chalcopyrite, 356.8 to 357.2 feet

END OF HOLE.

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 3

Location: 2310 S; 560 W.
Elevation of collar: 4290 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	30.6	30.6	Mantle rock
30.6	53.5	22.9	Granite porphyry
53.5	62.3	8.8	Mica schist
62.3	146.5	84.2	Granite porphyry
146.5	210.5	63.5	Granite gneiss and porphyry
210.0	211.0	1.0	Quartz
211.0	217.8	6.8	Granite porphyry and schist
217.8	243.0	25.2	Amphibolite schist
243.0	247.0	4.0	Schist
247.0	250.0	3.0	Granite porphyry and gneiss
250.0	265.0	15.0	Amphibolite schist and mica schist
265.0	285.0	20.0	Mica schist, garnet
285.0	286.0	1.0	Granite
286.0	291.0	5.0	Mineralized quartz and feldspar, pyrite, galena, sphalerite
291.0	296.0	5.0	ditto
296.0	298.3	2.3	ditto
298.3	320.0	21.7	Granite, porphyry and schist
320.0	342.0	22.0	Mica schist
342.0	357.0	15.0	Fractured granite and gouge, pyrite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 4

Location: 3643 S; 795 W.
Elevation of collar: 4225 feet

Inclination: 45 degrees
Bearing: East

Footage			Formation
From	To	Feet	
0.0	10.0	10.0	Mantle rock
10.0	23.4	13.4	Pegmatite and granite prophyry
23.4	66.4	43.0	Schist and granite porphyry
66.4	128.6	62.2	Amphibolite schist
128.6	140.5	11.9	Quartz
140.5	150.7	10.2	Siliceous amphibolite schist
150.7	157.5	6.8	Schist, quartz stringers
157.5	160.1	2.6	Mineralized schist, quartz, pyrite sphalerite.
160.1	162.1	2.0	Schist
162.1	165.7	3.6	Mineralized schist, quartz, pyrite sphalerite
165.7	171.2	5.5	Quartz, gouge, pyrite, sphalerite
171.2	175.7	4.5	ditto
175.7	193.3	17.6	Schist
193.3	223.9	30.6	Amphibolite schist
223.9	274.9	51.0	Banded amphibolite schist and granite porphyry
274.9	284.7	9.8	Amphibolite and mica schist
284.7	305.0	20.3	Schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 5

Location: 2510 S;, 970 W.
Elevation of collar: 4200 feet

Inclination: 60 degrees
Bearing: East

Footage			Formation
From	To	Feet	
0.0	20.0	20.0	Mantle rock
20.0	33.3	13.3	Mica schist and granite
33.3	72.0	38.7	Alternating pegmatite and schist
72.0	159.7	87.7	Pegmatite
159.7	181.6	21.9	Alternating schist and pegmatite
181.6	190.6	9.0	Granite
190.6	231.5	40.9	Granite gneiss
231.5	242.0	10.5	Amphibolite schist and granite
242.0	264.0	22.0	Granite gneiss
264.0	319.8	55.8	Mica schist and granite
319.8	332.7	12.9	Amphibolite schist
332.7	339.2	6.5	Pegmatite and granitegneiss
339.2	367.7	28.5	Fractured, altered schist, quartz, pyrite
367.7	372.5	4.8	Gouge, quartz, pyrite, galena, sphalerite.
372.5	376.9	4.4	Gouge quartz
376.9	381.0	4.1	Gouge and schist, quartz, pyrite
381.0	386.0	5.0	ditto
386.0	393.5	7.5	Porphyry, quartz, pyrite, galena
393.5	398.5	5.0	Porphyry, quartz, pyrite
398.5	403.5	5.0	ditto
403.5	410.5	7.0	ditto
410.5	415.5	5.0	Ditto
415.5	420.5	5.0	ditto
420.5	426.5	6.0	Porphyry and schist, pyrite
426.5	431.5	5.0	Fractured porphyry and mica schist
431.5	467.0	35.5	Fractured pegmatite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 6

Location: 1910 S;, 454 W.
Elevation of collar: 4236 feet

Inclination: 60 degrees
Bearing: West

Footage			Formation
From	To	Feet	
0.0	28.5	28.5	Alluvium and decomposed mantle rocks
28.5	81.0	52.5	Schist and pegmatite
81.0	114.0	33.0	Granite gneiss and mica schist
114.0	204.0	90.0	Amphibolite schist, pyrite and chalcopyrite
204.0	206.5	2.5	Granite
206.5	301.5	95.0	Amphibolite schist
301.5	328.3	26.8	Granite, mica and amphibolite schists
328.3	334.1	5.8	Pegmatite and brecciated schist
334.1	351.5	17.4	Mica-hornblende schist, garnet 11" gouge, pyrite, sphalerite, galena, at 340.7 feet
351.5	364.8	13.3	Granite
364.8	376.0	11.2	Fractured hornblende-mica schist, garnet
376.0	391.0	15.0	Granite and garnetiferous mica schist
391.0	409.0	18.0	Siliceous hornblende-mica schist
409.0	412.0	3.0	Quartzitic schist
412.0	416.2	4.2	Mineralized quartz breccia and gouge
416.2	419.0	2.8	Mineralized, fractured porphyry, quartz, pyrite, sphalerite
419.0	423.5	4.5	Garnetiferous hornblende schist, pyrite
423.5	452.0	28.5	Siliceous hornblende-mica schist
452.0	471.5	19.5	Schistose granite
471.5	492.0	20.5	Garnetiferous mica schist
492.0	498.0	6.5	Schistose granite
498.0	504.3	5.8	Pyrite mineralized vein, gouge walls
504.3	519.5	15.2	Amphibolite schist, granite inclusions
519.5	552.0	32.5	Granite END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 7

Location: 2110 S.; 590 W.
Elevation of collar 4257 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Feet	Formation
0.0	30.0	30.0	Weathered pegmatite
30.0	66.3	36.3	Fractured amphibolite and mica schist
66.3	132.5	66.2	Garnetiferous mica schist and granite
132.5	135.7	3.2	Granite
135.7	156.5	20.8	Garnetiferous mica schist
156.5	170.0	13.5	Pegmatite
170.0	172.6	2.6	Altered mica schist, pyrite
172.6	176.2	3.6	Vein material, pyrite
176.2	179.2	3.0	Vein material and gouge, pyrite
179.2	181.8	2.6	ditto 3/8" galena stringer at 180 feet
181.8	200.2	18.4	Altered mica schist and quartz porphyry
200.2	217.7	17.5	Mica schist
217.7	238.0	20.3	Granite, pyrite 1" stringer pyrite and galena at 221.5 ft.
238.0	240.2	2.2	Gouge and breccia, pyrite, sphalerite, and galena
240.2	245.2	5.0	Vein material and gouge
245.2	250.2	5.0	ditto
250.2	255.2	5.0	Vein material, gouge, and breccia
255.2	256.7	1.5	Altered granite
256.7	265.3	8.6	Fractured granite and mica schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 8

Location: 3072 S.; 825 W.
Elevation of collar: 4197 feet

Inclination: 44-½°; 150 ft., 41°; 350 ft., 40°
Bearing: East

Footage From	Footage To	Footage Feet	Formation
0.0	49.0	49.0	Alluvium and boulders
49.0	128.0	79.0	Alternating amphibolite schist and granite Mineralized fissure at 98.0 feet
128.0	130.5	2.5	Pegmatite
130.5	133.7	3.2	Altered feldspar, quartz, and kaolin
133.7	138.0	4.3	ditto Quartz veinlets, pyrite and sphalerite, at 134.4 and 135.4 feet.
138.0	142.7	4.7	Altered feldspar, quartz, and kaolin ½" quartz, pyrite, and sphalerite, at 139.2 and 140.0 ft.
142.7	146.2	3.5	Quartz, altered feldspar, and kaolin Sphalerite, pyrite, and trace of galena
146.2	150.0	3.8	Altered feldspar, quartz, and kaolin, pyrite in seams
150.0	169.7	19.7	Altered feldspar, quartz, and kaolin Gouge, quartz, pyrite, and sphalerite at 164.4 to 166.3 ft.
169.7	218.0	48.3	Granite. Pyrite and sphalerite seams at 205.0 to 206.0 ft.
218.0	221.3	3.3	Mica schist
221.3	275.0	53.7	Granite. 1" quartz, pyrite, and sphalerite at 263.0 feet. 4" pyrite mineralized shear at 271.3 feet
275.0	347.8	72.8	Alternating amphibolite schist and granite
347.8	362.0	14.2	Pegmatite
362.0	400.0	38.0	Granodiorite or quartz diorite.

END OF HOLE

Mine: Silver Ash

Year	Cu lb	Ag oz	Au oz	Pb lb	Zn lb	Short Tons
1931						
1932						
1933						
1934						
1935						
1936						
1937						
1938						
1939						
1940						
1941	0	3550	24			521
1942						
1943						
1944						
1945						
1946						
1947						
1948						
1949						
1950						
1951						
1952						
1953						
1954						
1955						
1956						
1957						
1958						
1959						
1960						
1961						

Year	Mine	Silver Ase					
	Cu lbs	As oz	Au oz	Pb lbs	Zn lbs	Short Tons	
1900							
1901							
1902							
1903							
1904							
1905							
1906							
1907							
1908							
1909							
1910							
1911							
1912							
1913							
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1916							
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1918							
1919							
1920							
1921							
1922							
1923							
1924							
1925							
1926							
1927							
1928							
1929							
1930							

EXPLORATION RESEARCH ASSOCIATES Incorporated

1701 Clinton Street
Suite 212
Los Angeles, California 90026
Telephone [213] 483-5127

24 September 1980

76.0360
Johnny Bull

Santa Fe Pacific Railroad Company
4775 Indian School Road
P.O. Box 3588
Albuquerque, New Mexico 87190

Attn: William H. Crutchfield, Jr.
Chief Geologist

Subject: Mohave County Tax Assessor's Records of Ownership for Johnny Bull and Silver Knight Patented Mining Claims

Dear Bill:

This is to confirm our telephone conversation of last week regarding ownership of the subject mining claims located in the Chloride Mining District. The assessor's records indicate the following owner:

E.H. Dobbs
2529 E. 12th Street
Joplin, Mo. 64801

The Johnny Bull and Silver Knight claims together cover 24.015 acres.

The "Silver Age" patented claim is located just east (but not contiguous) of the Silver Knight claim and has the following owners of record:

Neels, W.B., & Nasmi E. 1/2 &
Neels, W.B., Jr. & Marion 1/3 (sic).
4481 SE Concord Avenue
Milwaukee (sic), Or. 97222

The Silver Age claim is listed at 20.66 acres.

Please let me know if you are interested in any additional information.

Best regards,

M. A. Liggett

MAL:ct

Santa Fe Pacific Railroad Company

A SANTA FE INDUSTRIES COMPANY
P.O. Box 3588
Albuquerque, New Mexico 87190
(505) 262-2211

June 12, 1980

76.0360-I
Johnny Bull Property

Mr. C. G. Patterson
Chloride, Arizona 86431

Dear Pat:

Enclosed is a copy of U.S.B.M. Report of Investigations 3998, reporting upon an eight hole diamond - drilling program at the Johnny Bull - Silver Knight property undertaken by the Bureau in late 1943.

Drilling results were negative grade-wise although the vein was persistent and of mineable widths. This is disappointing. However I wonder if the reported values are entirely valid. Since I do believe the report is questionable I am forwarding it to you for your consideration and comment when we get together on my next trip to Chloride.

Incidentally early last week I talked to our Contracts people in Los Angeles concerning your land request at Chloride and was told that the Arizona law department has the matter under study. I was given to understand that certain legal complications exist. However Contracts promised to keep on top of this so don't give up the ghost.

Warmest regards,

Bill

Wm. H. Crutchfield, Jr.
Manager-Exploration

WHC:law
Enclosure (1)

EXPLORATION RESEARCH ASSOCIATES Incorporated
1701 Clinton Street
Suite 212
Los Angeles, California 90026
Telephone [213] 483-5127

4 June 1980

Santa Fe Pacific Railroad Company
4775 Indian School Road
P. O. Box 3588
Albuquerque, New Mexico 87190

Attn: William H. Crutchfield, Jr.
Chief Geologist

Subject: Assay reports for samples collected by W.H. Crutchfield, Jr. and M.A. Liggett in the Gold Basin, Chloride, and Music Mountains Districts, 20-23 April 1980

20-IV-80-1 High-grade samples from dumps of prospect shafts on Silver Knight claim, Chloride District. Oxidized pyrite, chalcopyrite, and galena associated with quartz veinlets from vein system in Precambrian gneiss. Sample location approximately 700 feet north of road located in NE corner of SE¼ Section 3, T23N-R18W, Chloride 7.5' quad. (See Tainter, 1947, USBM RI 3998)

20-IV-80-2 High-grade samples of oxide ore from dump adjacent to shaft on Silver Knight claim just north of road in NE corner of SE¼ Section 3, T23N-R18W, Chloride 7.5' quad.

20-IV-80-3 High-grade samples of generally un-oxidized massive sulfide ore containing galena, chalcopyrite, pyrite, sphalerite and vein quartz from dump adjacent to shaft on Silver Knight claim. Same location as sample 20-IV-80-2.

20-IV-80-4 Representative sample of massive sulfide ore from dump adjacent to shaft of Minnesota-Conner mine, Chloride District. Sample contains partially oxidized sphalerite, galena, pyrite and quartz vein material. The vein system occurs within a fault zone which cuts Precambrian gneiss. A dike of altered rhyolite(?) is exposed within this fault zone just north of the shaft. Sample location in NE corner of NW¼ Section 11, T23N-R18W, Chloride 7.5' quad.

21-IV-80-1 Random sample of mill tailings from piles at workings NW of Golden Rule mine. Sample consists of approximately 0.5 mm grains of quartz vein material with hematitic staining and minor feldspar and biotite. SE¼ Section 19, T28N-R18W, Garnet Mountain SW quad.

21-IV-80-2 Random sample from quartz vein system exposed adjacent to road at mill site at same location as sample 21-IV-80-1.

21-IV-80-3 Random sample of quartz vein material from dumps and veins exposed just north of road, approximately 600 feet east of mill site in SE¼ Section 19, T28N-R18W, Garnet Mountain SW quad.

21-IV-80-4 Representative chip sample from sheared and slightly altered porphyritic quartz monzonite exposed in bulldozer cut on hill just west of prospect shaft in SW¼ NW¼ SW¼ Section 33, T28N-R18W, Garnet Mountain SW quad.

22-IV-80-1 High-grade sample of sulfide-bearing quartz veins from dump of main workings on the Rosebud claim (Southwick vein of Schrader, 1909, p. 149) Music Mountains mining district. Narrow vein system occurs within fault zone adjacent to a quartz porphyry dike, 10 to 15 feet wide. Host rock is cataclastically foliated granitic gneiss. Sample location in NW¼ SW¼ Section 17, T26N-R15W, Music Mountains NW quad.

Mark A. Liggett
Geologist

HUNTER MINING LABORATORY, INC.

994 Glendale Avenue • SPARKS, NEVADA 89431 • TELEPHONE: (702) 358-6227

REPORT OF ANALYSIS

Submitted by:

Date: May 29, 1980

EXPLORATION RESEARCH ASSOCIATES, INC.
Mr. Mark Liggett
1701 Clinton Street, Suite 212
Los Angeles, California 90026

Laboratory Number: 6930

Analytical Method: Fire, AA

Your Order Number: 346

Report on: 9 samples.

Sample Mark:	Gold oz/ton	Silver oz/ton	Copper percent	Lead percent	Zinc percent
20-4-80-1	0.122	3.08	0.15	5.8	0.54
2	0.220	3.80	0.38	0.77	21.1
3	1.626	14.47	1.00	12.2	17.7
20-4-80-4	0.022	1.18	0.14	0.25	21.4
21-4-80-1	0.048	none			
2	0.044	0.42			
3	0.056	0.42			
21-4-80-4	0.010	0.01			
22-4-80-1	0.750	5.39			

HUNTER MINING LABORATORY, INC.

H. H. Scales

ppm = parts per million. oz/ton = troy ounces per ton of 2000 pounds avoirdupois. percent = parts per hundred. fineness = parts per thousand. ppb = 0.001 ppm. Read — as "less than." 1 oz/ton = 34.286 ppm. 1 ppm = 0.0001% = 0.029167 oz/ton. 1.0% = 20 pounds/ton.

EXPLORATION RESEARCH ASSOCIATES Incorporated
1701 Clinton Street
Suite 212
Los Angeles, California 90026
Telephone [213] 483-5127

4 June 1980 76.0360

- Assays
- Johnny Ball-Silver Knight
- Gold Basin
- Music Mt. District

Santa Fe Pacific Railroad Company
4775 Indian School Road
P. O. Box 3588
Albuquerque, New Mexico 87190

Attn: William H. Crutchfield, Jr.
Chief Geologist

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Mark A. Liggett
Geologist

HUNTER MINING LABORATORY, INC.

~~XXXX GREGORY STREET~~
994 Glendale Avenue
SPARKS, NEVADA 89431
TELEPHONE: (702) 358-6227

REPORT OF ANALYSIS

Submitted by:

Date: May 29, 1980

EXPLORATION RESEARCH ASSOCIATES, INC.
Mr. Mark Liggett
1701 Clinton Street, Suite 212
Los Angeles, California 90026

Laboratory Number: 6930

Analytical Method: Fire, AA

Your Order Number: 346

Report on: 9 samples.

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2		0.220	3.80	0.38	0.77	21.1
3		1.626 (95.60)	14.47 (224.86)	1.00 (17.60)	12.2 (85.40)	17.7 (132.75)
20-4-80-4		0.022	1.18	0.14	0.25	21.4
21-4-80-1	Minnesota - Copper	0.048	none			
2		0.044	0.42			
3		0.056	0.42			
21-4-80-4		0.010	0.01			
22-4-80-1	Music Mt. Dist.	0.750	5.39			

88' DUMP & SHAFT
$1436.21/T

HUNTER MINING LABORATORY, INC.

H. H. Scales

H. H. Scales

ppm = parts per million. oz/ton = troy ounces per ton of 2000 pounds avoirdupois. percent = parts per hundred. fineness = parts per thousand. ppb = 0.001 ppm. Read — as "less than." 1 oz/ton = 34.286 ppm. 1 ppm = 0.0001% = 0.029167 oz/ton. 1.0% = 20 pounds/ton.

May 22, 1980

76.0360-I
Assays
Johnny Bull

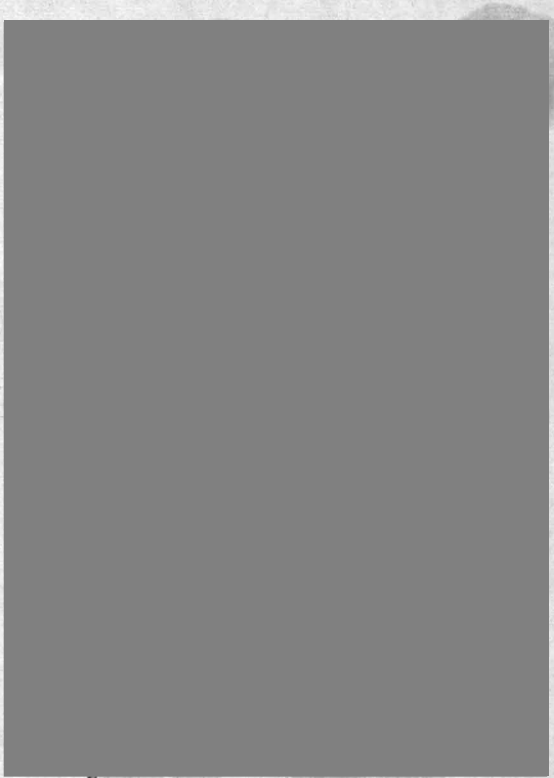
FILE MEMO

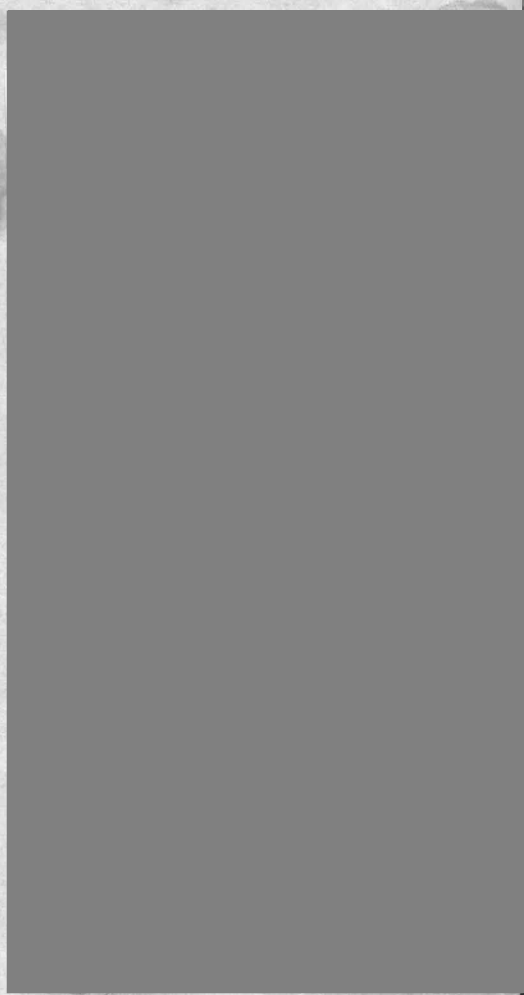
April 6, 1980 Sampling by WHCJr. MAL at 90-foot Johnny Bull shaft. High grade samples off of old dump.

		Au-oz/T	Ag-oz/T
	#1	0.122	3.08
	#2	0.220	3.80
	#3	1.626	14.47
Minnesota-Connor	#1	0.022	1.18

Wm. H. Crutchfield, Jr.

V. 0050





Engineering Mining Journal
May 1947

Mining World
May 1947

AL.0050

R. I. 3998

JANUARY 1947

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

BUREAU OF MINES
R. R. SAYERS, DIRECTOR

REPORT OF INVESTIGATIONS

JOHNNY BULL-SILVER KNIGHT LEAD-ZINC PROPERTY

CERBAT MOUNTAINS, MOHAVE COUNTY, ARIZONA

BY

STANTON L. TAINTER

R. I. 3998,
January 1947.

REPORT OF INVESTIGATIONS

UNITED STATES DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

JOHNNY BULL-SILVER KNIGHT LEAD-ZINC PROPERTY CERBAT MOUNTAINS, MOHAVE COUNTY, ARIZONA[1]

By Stanton L. Tainter[2]

CONTENTS

ILLUSTRATIONS

INTRODUCTION

The Johnny Bull and Silver Knight claims were selected for exploratory diamond drilling after having been examined by the Bureau of Mines.[3]

The property was considered attractive for two reasons: (1) A prominent outcrop, recognized as an extension of the Tennessee vein, persisted over a distance of 2,000 feet across the claims; (2) its proximity to the known ore shoots in the Tennessee-Schuylkill mine, one of the largest zinc-lead producers in Arizona.

Actual drilling was started September 16 and was terminated December 8, 1943. Eight holes, aggregating 2,979.5 feet, were drilled with two machines.

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 3998."

2/ Mining engineer, Bureau of Mines.

3/ J. H. Hedges, district engineer, and Thomas C. Denton, mining engineer, Bureau of Mines.

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 final report. The Metallurgical Branch, R. G. Knickerbocker, chief, analyzes samples and performs beneficiation tests.

Special acknowledgment is due J. H. Hedges, chief, Mining Branch, Tucson Division of the Bureau of Mines, who directed the function of the Mining Branch in carrying out the investigation reported in this paper.

Chemical analyses included in this paper were performed at the Bureau's laboratory, Reno, Nev., under the direction of A. C. Rice, acting supervising engineer.

LOCATION AND ACCESSIBILITY

The Johnny Bull and Silver Knight claims are at the foot of the western slope of the Cerbat Mountains, about 1 mile east of the town of Chloride, in the Wallapai mining district, Mohave County, Arizona. They adjoin and lie on the south of the property of the Tennessee-Schuylkill Corp. (fig. 1).

Chloride, a town of nearly 500 inhabitants, 21 miles north of Kingman and 60 miles south of Boulder Dam, is accessible over paved U. S. Highway 93. Kingman, the largest supply point in the region, has a population of 3,600 and is on the main line of the Santa Fe Railroad.

PHYSICAL FEATURE AND CLIMATE

The Cerbat Mountains form a range which extends about 30 miles northward from Kingman and averages 10 miles in width. The crest line lies at about 6,000 feet, and the peaks reach an altitude of about 7,000 feet, rising sharply for 1,500 to 3,000 feet above the Haulpai Valley on the east and the Detrital and Sacramento Valleys on the west. Chloride is at an altitude of 3,900 feet on the western side of the range.

The claims lie at an altitude of 4,250 feet. Vegetation is sparse, and timber for mining purposes is not locally available. The climate is arid, seasons are open, and all-year climatic conditions are ideal for mining operations. Water is scarce in both the Sacramento Valley and the Cerbat range.

HISTORY AND PRODUCTION

Mineral discoveries in the Cerbat Mountains date from 1863, when silver chloride, lead sulfide, and gold ores were found. Lead-zinc ores became important with cheaper transportation, improved milling methods,

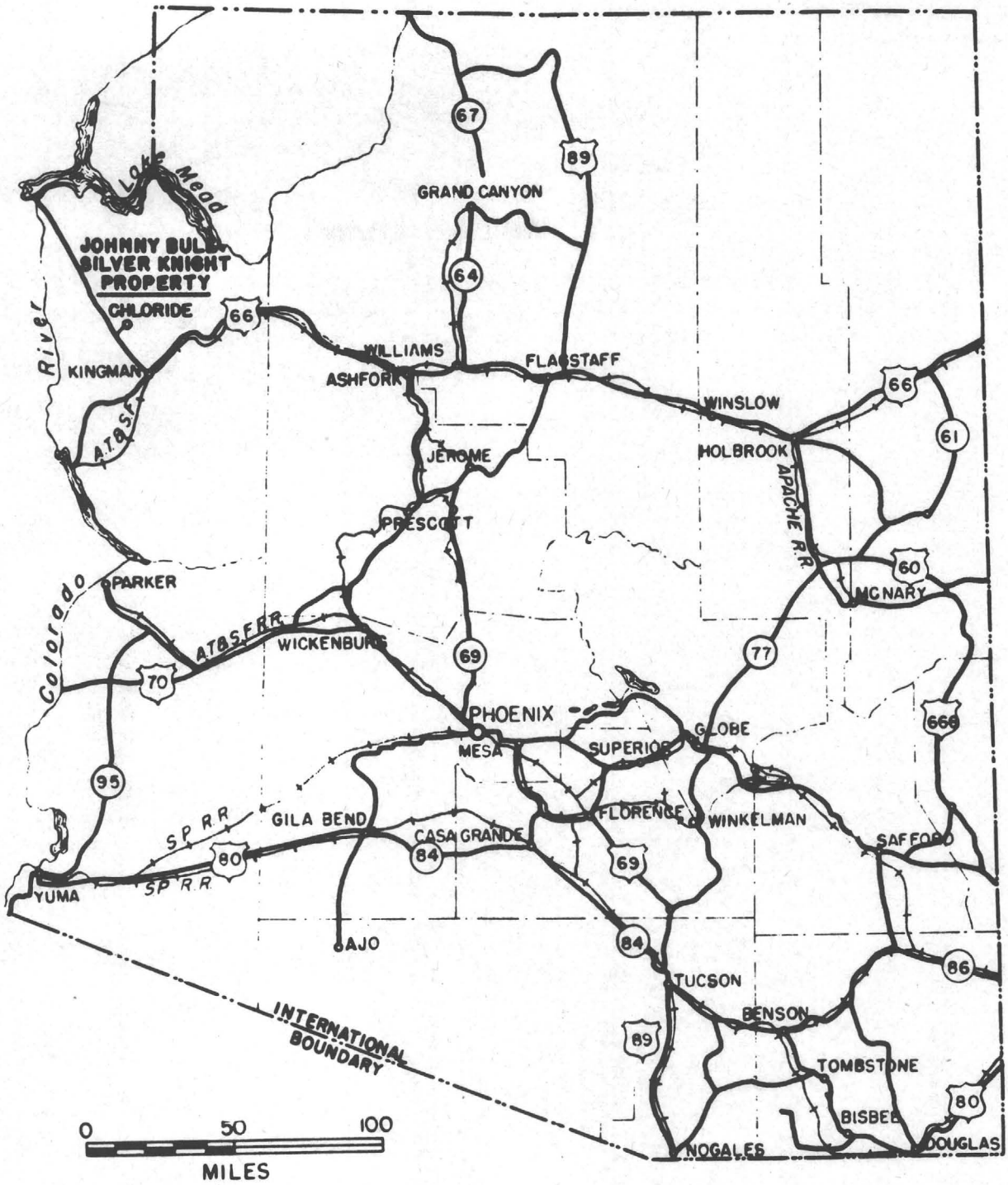


FIG.1-GENERAL LOCATION MAP, JOHNNY BULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJ. 1506, MOJAVE COUNTY, ARIZONA

and convenient smelting facilities. During the period 1908 to 1933 the Wallapai district is reported to have produced 95,587,344 pounds of zinc.[4]

There has been no production from the Johnny Bull-Silver Knight property. Three mines, however, have produced from the Tennessee vein; these are, progressing northward from the Johnny Bull claim, the Tennessee, Schuylkill, and Elkhart.

The Tennessee mine is said to have been discovered in 1894. Its largest annual production of 59,990 tons of ore was in 1937, when the mine was the second largest producer of lead and zinc in the State. Metals recovered from ores from the Tennessee-Schuylkill mine from 1901 to 1938 were 43,645,889 pounds of zinc, 41,359,270 pounds of lead, 376,985 pounds of copper, 992,049 ounces of silver, and 31,257 ounces of gold.[5]

During the latter part of 1943, the average monthly production was about 3,500 tons of ore, which was treated in the company's 150-ton flotation mill.

PROPERTY AND OWNERSHIP

The property comprises two contiguous, patented, lode-mining claims, namely, the Johnny Bull fraction and the Silver Knight, aggregating about 26 acres. It is owned by the Barnsdall Mining Co. of Delaware.

DESCRIPTION OF THE DEPOSIT

The rocks of the Cerbat range, as described by Hernon,[6] "consist of pre-Cambrian crystalline rocks, later crystalline rocks of an unknown age, and volcanic rocks of probable Tertiary and Quaternary age. These crystalline rocks form a complex predominantly of granite with diorite and gabbro, all generally somewhat gneissic and intruded by pegmatite, medium-grained granite, diabase, granite porphyry, and lamprophyric dikes. Small to medium-sized blocks of very dark schist (amphibolite) are locally common. All these rocks show various degrees of schistosity and represent two or more eras."

Faults of a northwest strike and steep dip cut the older rocks and structures. Striations generally indicate that movement along the faults had a larger horizontal than vertical component. Post-mineralization cross faults are known to occur at several places in the range.

4/ Elsing, Morris J., and Heineman, Robert E. S., Arizona Metal Production: Arizona Bureau of Mines Bull. 140, 1936, p. 73.

5/ Compiled by C. N. Gerry, Division of Mineral Production and Economics, Bureau of Mines, for Bureau of Mines Inf. Circ. 7077, 1939, p. 4.

6/ Hernon, Robert M., Cerbat Mountains: Arizona Bureau of Mines Bull. 145, 1938, p. 112.

The veins were formed chiefly along the system of northwest fault fissures. Near Chloride, the fissure veins are numerous and may be grouped according to strike. One group strikes nearly north and the other group strikes northwesterly. Many of the veins are persistent along the strike, and some persist in depth. The Tennessee vein has been explored to a depth of 1,600 feet and is traceable on the surface for nearly 2 miles. In general, it strikes N. 5° W. and dips steeply eastward. The average width is about 6 feet.

The primary minerals include crystalline pyrite, fine-grained gold-bearing pyrite, sphalerite, galena, and chalcopyrite. The most common gangue minerals are quartz and calcite. Limonite and hematite appear as products of oxidation.

In the Tennessee-Schuylkill mine, the wall rocks of gneiss, granite, and granite porphyry are hard and stand well. The vein material is soft and heavy and breaks easily. The vein walls are well-marked by soft gouge, although in the wider portions false walls are formed by "slickensided" gouge. Some secondary mineralization occurs to a depth of about 80 feet.

Minable ore shoots range from 2 to 15 feet in width and are as much as 800 feet in length. The present grade of ore mined is about 6.5 percent zinc and 3.5 percent lead, but higher-grade ore has been mined in the past.

Schrader[7/] wrote of the Tennessee mine in 1917:

"The mine has been productive almost from the surface down. From between the surface and the 400-foot level, thousands of tons of rich galena ore has been shipped *** large bodies of good zinc ore, some 12 feet in width, on the 200-foot and the 500-foot levels, have been left standing in the mine."

Four ore shoots have been explored to depths ranging from 150 feet on the one farthest north of the Schuylkill shaft to 1,600 feet on the one immediately north of the Tennessee shaft. Two intervening shoots have been mined deeper than 1,200 feet. A fifth shoot is being mined currently, but is not completely developed, above the 900-foot level south of the Tennessee shaft. The south face of this stope is within 250 feet of the north end line of the Johnny Bull claim. The exploited shoots rake northward above the 900-foot level and below the level change to nearly vertical.

The only influence noted on the extent or grade of the ore shoots is due to a change in strike or dip. Wide ore filling is usually confined to steeply dipping segments of the vein.

7/ Schrader, F. C., Geology and Ore Deposits of Mohave County, Arizona: Am. Inst. Min. Eng., Trans., vol. 56, 1917, p. 203.

Apparently the type of wall rock has no influence on the ore shoots. The position at which minor spur veins enter the main vein is considered a favorable structure for the formation of ore shoots. Cross faulting is rare, and the ore bodies have not been cut off abruptly.

On the Johnny Bull-Silver Knight Property, a vein crops out prominently, except where obscured by detritus, a distance of 2,000 feet across the property. The outcrop is straight and trends southward. The vein dips eastward at 80° to a point 100 feet north of an 88-foot prospect shaft, where a reversal in dip to about 88° towards the west occurs. This westerly dip continues 800 feet southward, where the normal easterly dip again prevails.

The vein is of the fissure type. Widths of the outcrop range from 2 to 12 feet. Intersections in the drill holes have indicated widths ranging from 3.3 to 32.4 feet. Exposed vein filling consists of quartz and iron oxides. Sulfide minerals are rarely visible. Oxidation is shallow, as shown by the drill holes. Heavy sulfides of iron and zinc were only slightly oxidized where intersected 100 feet below the surface.

The Tennessee vein is similar to the vein on the Johnny Bull-Silver Knight property in strike, dip, and mineral characteristics. Because of overburden and a mill tailings pond, it is impossible to trace the outcrop of the Tennessee vein for 450 feet from a south exposure on the Tennessee property to the north outcrop on the Johnny Bull claim. However, the vein extending southward across the Johnny Bull-Silver Knight property doubtless is the southerly extension of the Elkhart-Schuylkill-Tennessee vein.

SUMMARY OF VEIN INTERSECTION

Hole No.	Depth, feet		Intersected length, feet	Width indicated, feet	Percent			Ounces		Indicated dip
	From-	To-			Zn	Pb	Cu	Au	Ag	
1	219.2	227.8	8.6	6.3	0.6	0.1	0.03	tr	0.15	88-1/2°W
	236.9	241.5	4.6	3.3	0.8	0.2	tr	0.05	0.15	88-1/2°W
2	327.0	340.2	13.2	8.7	Low grade; no samples taken.					88-1/2°W
3	286.0	298.3	12.3	7.8	0.6	0.2	0.06	tr	none	81°E
4	165.7	175.7	10.0	7.9	1.2	tr	0.11	tr	none	82-1/2°W
5	367.7	372.5	4.8	2.6	2.8	0.2	0.04	tr	0.60	86-1/2°W
	367.7	426.5	58.8	32.4	0.4	0.1	0.03	tr	0.10	86-1/2°W
6	412.0	419.0	7.0	4.8	0.3	0.1	0.02	tr	none	77°E
	498.5	504.3	5.8	3.9	tr	tr	tr	tr	none	
7	172.6	181.8	9.2	5.6	0.1	tr	0.06	tr	0.08	
	238.0	255.2	17.2	10.6	0.3	0.1	0.02	tr	0.05	82°E
8	142.7	146.2	3.5	3.3	7.6	0.1	0.03	tr	0.50	65°W

DEVELOPMENT AND MINE WORKINGS

No work has been done on the Johnny Bull-Silver Knight property for several years. Prospect workings consist of 6 inclined shafts ranging in depth from 25 to 88 feet, a drift tunnel 180 feet in length, and a number of trenches and pits. There is no mining equipment at the property.

The Tennessee shaft is 630 feet north of the Johnny Bull claim. The shaft is vertical and extends below the 1,400-foot level. A 1,600-foot level is accessible through an interior shaft.

The Schuylkill inclined shaft, extending to the 800-foot level, is about 1,450 feet north of the vertical shaft along the strike of the vein. Only a small amount of development has been done south of the Tennessee shaft. The 900-foot level drift has been driven to within 200 feet of the north end line of the Johnny Bull claim. A crosscut 25 feet north of the drift face exposed a well-defined vein over 12 feet in width but rather low in grade. At present a high-grade ore shoot is being developed and mined to within 250 feet of the Johnny Bull claim.

WORK PERFORMED BY THE BUREAU OF MINES

A program of diamond drilling at the Johnny Bull-Silver Knight property was started in September 1943 and completed in December 1943. In all, eight holes aggregating 2,979.5 feet were drilled along the vein outcrop, prospecting it for a length of 2,000 feet. These holes, spaced not less than 200 or more than 371 feet apart, intersected the vein from 100 to 350 feet vertically beneath the surface. (Figures 2 and 3.)

Holes 1 and 2 were located opposite wide outcrops on which an 88-foot shaft had been sunk and a 180-foot tunnel had been driven. At each location the outcrop dipped steeply to the west, a reversal of the normal or more general easterly dip of the Tennessee vein. Holes 3, 4, and 7 were located opposite shallow inclined shafts sunk on an eastward-dipping outcrop. Holes 2, 4, and 5 are adjacent to the junction of the main vein and forking spur veins. Holes 2, 3, and 7 were drilled beneath iron-stained croppings, from which it is believed that zinc and lead may have been leached. Hole 5 was located near a surface dip reversal; the outcrop to the north dipped 75° eastward, and the outcrop to the south dipped 82° westward. Holes 6 and 8 were drilled opposite croppings covered by valley detritus. Hole 6 was located 300 feet south of the Tennessee 900-foot level south face and within 350 feet of an active stope. Hole 8 was located between holes 1 and 2 to shorten the interval that previously had been left undrilled because of the difficulties expected in getting the hole through detritus to bedrock.

The vein was intersected in all of the holes. Widths indicated range from 3.3 to 32.4 feet. The grade of the vein filling was disappointing, drilling indicating that most of the vein is barren or very low-grade, ranging from 0.1 to 7.6 percent in zinc and with negligible amounts of lead.

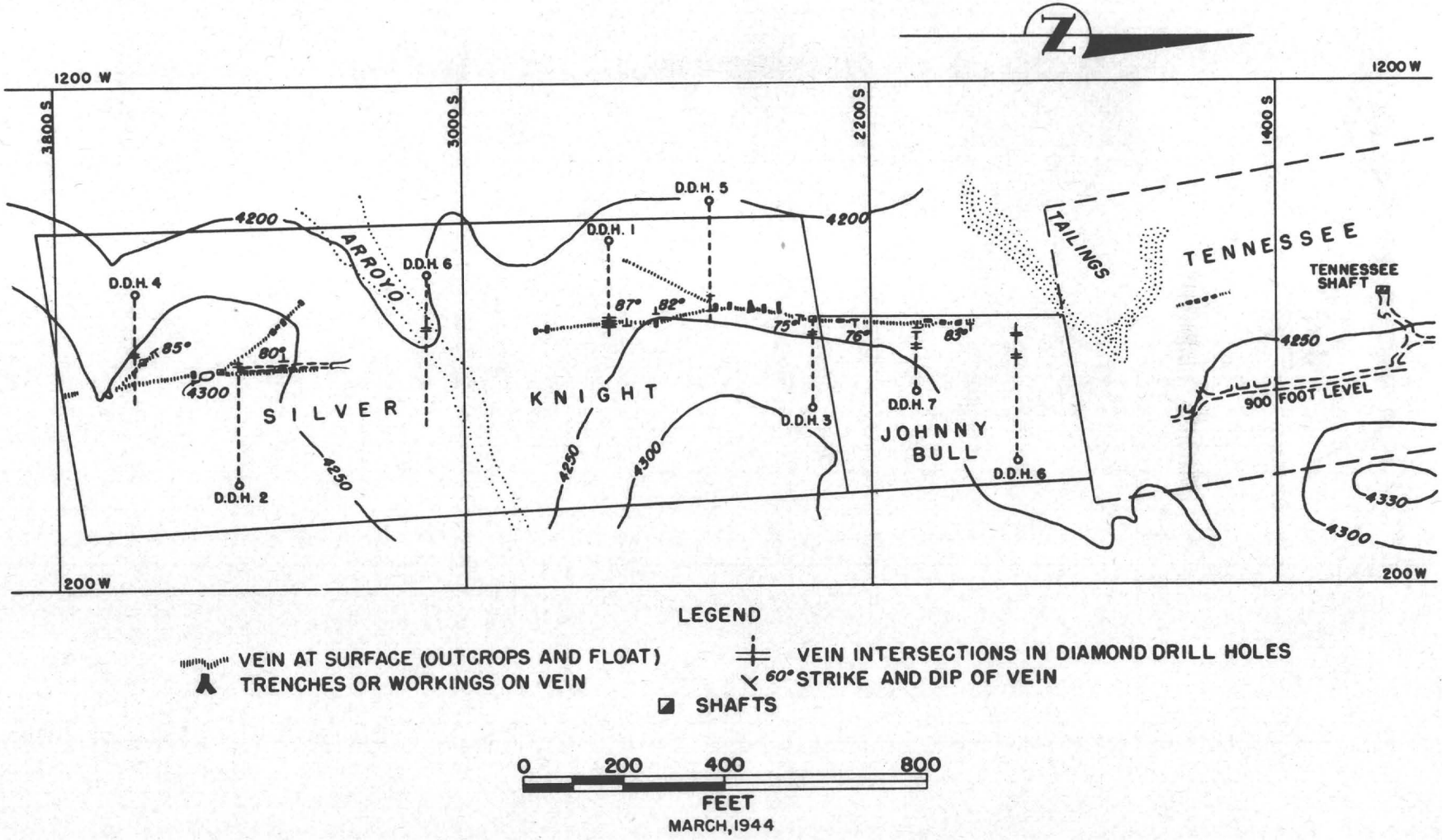


FIG. 2 - DIAMOND DRILL HOLE LOCATIONS, JOHNNY BULL-SILVER KNIGHT PROPERTY, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZONA

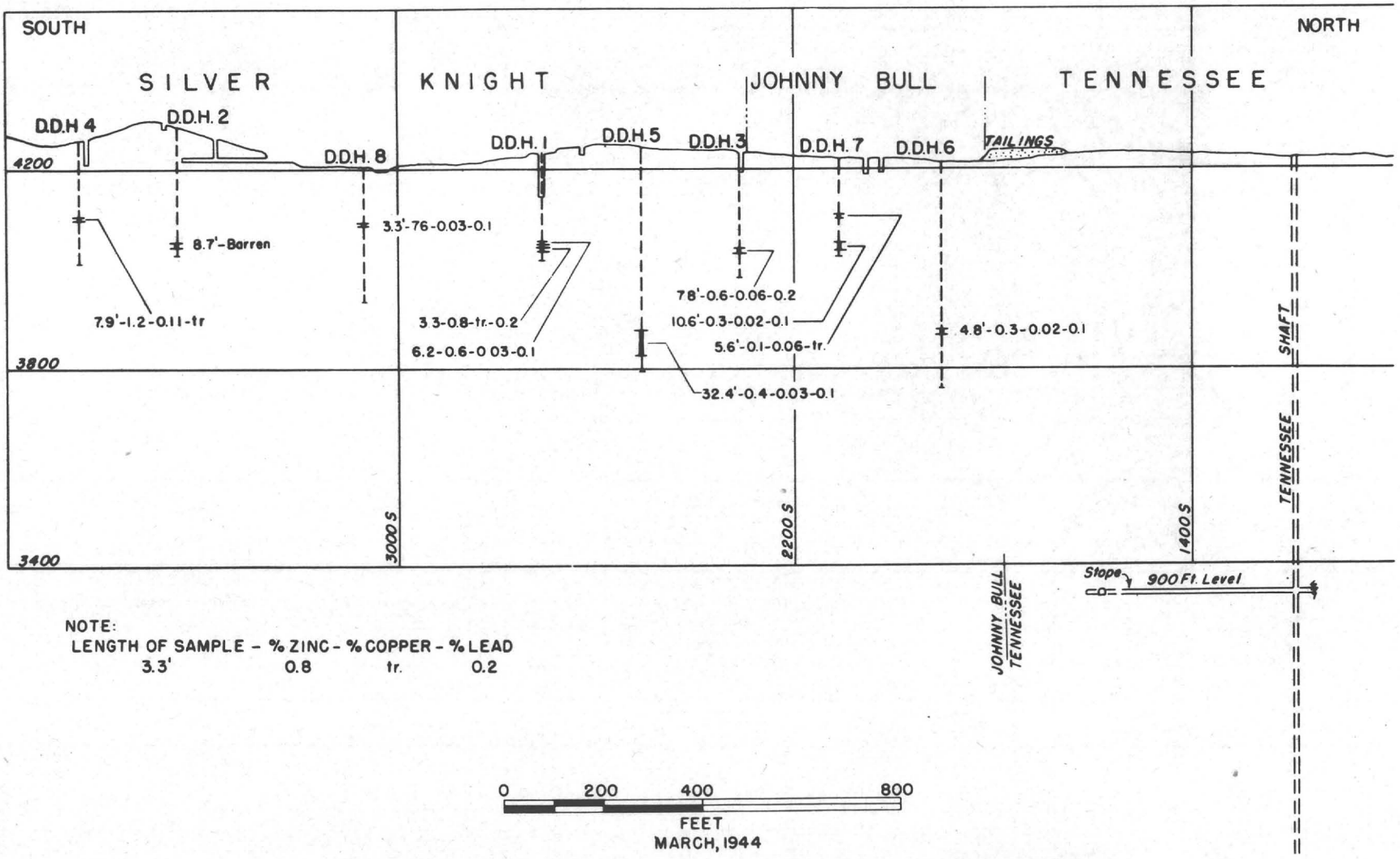


FIG. 3-VERTICAL LONGITUDINAL PROJECTION OF VEIN INTERSECTIONS, CERBAT MT. PROJECT 1506, MOHAVE COUNTY, ARIZ.

Following are condensed logs for diamond drill holes

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 1

Location: 2710 S; 892 W.
Elevation of collar: 4210 feet

Inclination: 45 degrees
Bearing: East

Footage From	Footage To	Footage Feet	Formation
0.0	6.0	6.0	Mantle rock
6.0	66.0	60.0	Fractured granite porphyry
66.0	70.0	4.0	Amphibolite schist
70.0	71.0	1.0	Gouge and breccia
71.0	81.8	10.8	Granite and mica schist
81.8	113.5	31.7	Granite altered to schist
113.5	130.2	16.7	Pegmatite
130.2	184.5	54.3	Alternating schist and granite porphyry.
184.5	198.1	13.6	Mica schist
198.1	210.0	11.9	Granite
210.0	219.2	9.2	Altered amphibolite schist
219.2	223.5	4.3	Altered, mineralized amphibolite schist, pyrite, galena.
223.5	227.8	4.3	ditto
227.8	236.9	9.1	Siliceous schist, pyrite
236.9	241.5	4.6	Quartz, feldspar, kaolin, pyrite
241.5	254.5	13.0	Siliceous schist, garnet
254.5	268.2	13.7	Pegmatite
268.2	271.0	2.8	Schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 2

Location: 3443 S; 414 W.
Elevation of collar: 4285 feet

Inclination: 45 degrees
Bearing: West

Footage From	Footage To	Feet	Formation
0.0	4.0	4.0	Mantle rock
4.0	97.3	93.3	Amphibolite schist, pegmatite stringers
97.3	103.0	5.7	Granite
103.0	117.0	14.0	Siliceous amphibolite schist
117.0	124.2	7.2	Granite
124.2	143.5	19.3	Amphibolite schist, quartz, pyrite
143.5	155.2	11.7	Pegmatite
155.2	176.3	21.1	Siliceous amphibolite schist, pyrite, chalcopyrite 155.2 to 159.2 feet
176.3	180.2	3.9	Pegmatite
180.2	228.2	48.0	Amphibolite schist, pyrite
228.2	234.8	6.6	Banded amphibolite schist and granite
234.8	253.1	18.3	Granite porphyry and schist
253.1	255.0	1.9	Pegmatite
255.0	267.5	12.5	Siliceous amphibolite schist
267.5	284.8	17.3	Granite and amphibolite schist
284.8	301.0	16.2	Granite porphyry and amphibolite schist
301.0	323.0	22.0	Schist
323.0	327.0	4.0	Mica schist
327.0	340.2	13.2	Sparsely mineralized quartz and feldspar, pyrite and sphalerite.
340.2	362.2	22.0	Siliceous amphibolite schist, pyrite Trace chalcopyrite, 356.8 to 357.2 feet

END OF HOLE.

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 3

Location: 2310 S; 560 W.
Elevation of collar: 4290 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	30.6	30.6	Mantle rock
30.6	53.5	22.9	Granite porphyry
53.5	62.3	8.8	Mica schist
62.3	146.5	84.2	Granite porphyry
146.5	210.5	63.5	Granite gneiss and porphyry
210.0	211.0	1.0	Quartz
211.0	217.8	6.8	Granite porphyry and schist
217.8	243.0	25.2	Amphibolite schist
243.0	247.0	4.0	Schist
247.0	250.0	3.0	Granite porphyry and gneiss
250.0	265.0	15.0	Amphibolite schist and mica schist
265.0	285.0	20.0	Mica schist, garnet
285.0	286.0	1.0	Granite
286.0	291.0	5.0	Mineralized quartz and feldspar, pyrite, galena, sphalerite
291.0	296.0	5.0	ditto
296.0	298.3	2.3	ditto
298.3	320.0	21.7	Granite, porphyry and schist
320.0	342.0	22.0	Mica schist
342.0	357.0	15.0	Fractured granite and gouge, pyrite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 4

Location: 3643 S; 795 W.
Elevation of collar: 4225 feet

Inclination: 45 degrees
Bearing: East

Footage From	Footage To	Feet	Formation
0.0	10.0	10.0	Mantle rock
10.0	23.4	13.4	Pegmatite and granite prophyry
23.4	66.4	43.0	Schist and granite porphyry
66.4	128.6	62.2	Amphibolite schist
128.6	140.5	11.9	Quartz
140.5	150.7	10.2	Siliceous amphibolite schist
150.7	157.5	6.8	Schist, quartz stringers
157.5	160.1	2.6	Mineralized schist, quartz, pyrite sphalerite.
160.1	162.1	2.0	Schist
162.1	165.7	3.6	Mineralized schist, quartz, pyrite sphalerite
165.7	171.2	5.5	Quartz, gouge, pyrite, sphalerite
171.2	175.7	4.5	ditto
175.7	193.3	17.6	Schist
193.3	223.9	30.6	Amphibolite schist
223.9	274.9	51.0	Banded amphibolite schist and granite porphyry
274.9	284.7	9.8	Amphibolite and mica schist
284.7	305.0	20.3	Schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 5

Location: 2510 S;, 970 W.
Elevation of collar: 4200 feet

Inclination: 60 degrees
Bearing: East

Footage From	Footage To	Feet	Formation
0.0	20.0	20.0	Mantle rock
20.0	33.3	13.3	Mica schist and granite
33.3	72.0	38.7	Alternating pegmatite and schist
72.0	159.7	87.7	Pegmatite
159.7	181.6	21.9	Alternating schist and pegmatite
181.6	190.6	9.0	Granite
190.6	231.5	40.9	Granite gneiss
231.5	242.0	10.5	Amphibolite schist and granite
242.0	264.0	22.0	Granite gneiss
264.0	319.8	55.8	Mica schist and granite
319.8	332.7	12.9	Amphibolite schist
332.7	339.2	6.5	Pegmatite and granitegneiss
339.2	367.7	28.5	Fractured, altered schist, quartz, pyrite
367.7	372.5	4.8	Gouge, quartz, pyrite, galena, sphalerite.
372.5	376.9	4.4	Gouge quartz
376.9	381.0	4.1	Gouge and schist, quartz, pyrite
381.0	386.0	5.0	ditto
386.0	393.5	7.5	Porphyry, quartz, pyrite, galena
393.5	398.5	5.0	Porphyry, quartz, pyrite
398.5	403.5	5.0	ditto
403.5	410.5	7.0	ditto
410.5	415.5	5.0	Ditto
415.5	420.5	5.0	ditto
420.5	426.5	6.0	Porphyry and schist, pyrite
426.5	431.5	5.0	Fractured porphyry and mica schist
431.5	467.0	35.5	Fractured pegmatite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 6

Location: 1910 S;, 454 W.
Elevation of collar: 4236 feet

Inclination: 60 degrees
Bearing: West

Footage			
From	To	Feet	Formation
0.0	28.5	28.5	Alluvium and decomposed mantle rocks
28.5	81.0	52.5	Schist and pegmatite
81.0	114.0	33.0	Granite gneiss and mica schist
114.0	204.0	90.0	Amphibolite schist, pyrite and chalcopyrite
204.0	206.5	2.5	Granite
206.5	301.5	95.0	Amphibolite schist
301.5	328.3	26.8	Granite, mica and amphibolite schists
328.3	334.1	5.8	Pegmatite and brecciated schist
334.1	351.5	17.4	Mica-hornblende schist, garnet 11" gouge, pyrite, sphalerite, galena, at 340.7 feet
351.5	364.8	13.3	Granite
364.8	376.0	11.2	Fractured hornblende-mica schist, garnet
376.0	391.0	15.0	Granite and garnetiferous mica schist
391.0	409.0	18.0	Siliceous hornblende-mica schist
409.0	412.0	3.0	Quartzitic schist
412.0	416.2	4.2	Mineralized quartz breccia and gouge
416.2	419.0	2.8	Mineralized, fractured porphyry, quartz, pyrite, sphalerite
419.0	423.5	4.5	Garnetiferous hornblende schist, pyrite
423.5	452.0	28.5	Siliceous hornblende-mica schist
452.0	471.5	19.5	Schistose granite
471.5	492.0	20.5	Garnetiferous mica schist
492.0	498.0	6.5	Schistose granite
498.0	504.3	5.8	Pyrite mineralized vein, gouge walls
504.3	519.5	15.2	Amphibolite schist, granite inclusions
519.5	552.0	32.5	Granite

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 7

Location: 2110 S.; 590 W.
Elevation of collar 4257 feet

Inclination: 60 degrees
Bearing: West

Footage From	Footage To	Footage Feet	Formation
0.0	30.0	30.0	Weathered pegmatite
30.0	66.3	36.3	Fractured amphibolite and mica schist
66.3	132.5	66.2	Garnetiferous mica schist and granite
132.5	135.7	3.2	Granite
135.7	156.5	20.8	Garnetiferous mica schist
156.5	170.0	13.5	Pegmatite
170.0	172.6	2.6	Altered mica schist, pyrite
172.6	176.2	3.6	Vein material, pyrite
176.2	179.2	3.0	Vein material and gouge, pyrite
179.2	181.8	2.6	ditto 3/8" galena stringer at 180 feet
181.8	200.2	18.4	Altered mica schist and quartz porphyry
200.2	217.7	17.5	Mica schist
217.7	238.0	20.3	Granite, pyrite 1" stringer pyrite and galena at 221.5 ft.
238.0	240.2	2.2	Gouge and breccia, pyrite, sphalerite, and galena
240.2	245.2	5.0	Vein material and gouge
245.2	250.2	5.0	ditto
250.2	255.2	5.0	Vein material, gouge, and breccia
255.2	256.7	1.5	Altered granite
256.7	265.3	8.6	Fractured granite and mica schist

END OF HOLE

CONDENSED LOG OF DIAMOND DRILL HOLE NO. 8

Location: 3072 S.; 825 W.
Elevation of collar: 4197 feet

Inclination: 44-½°; 150 ft., 41°; 350 ft., 40°
Bearing: East

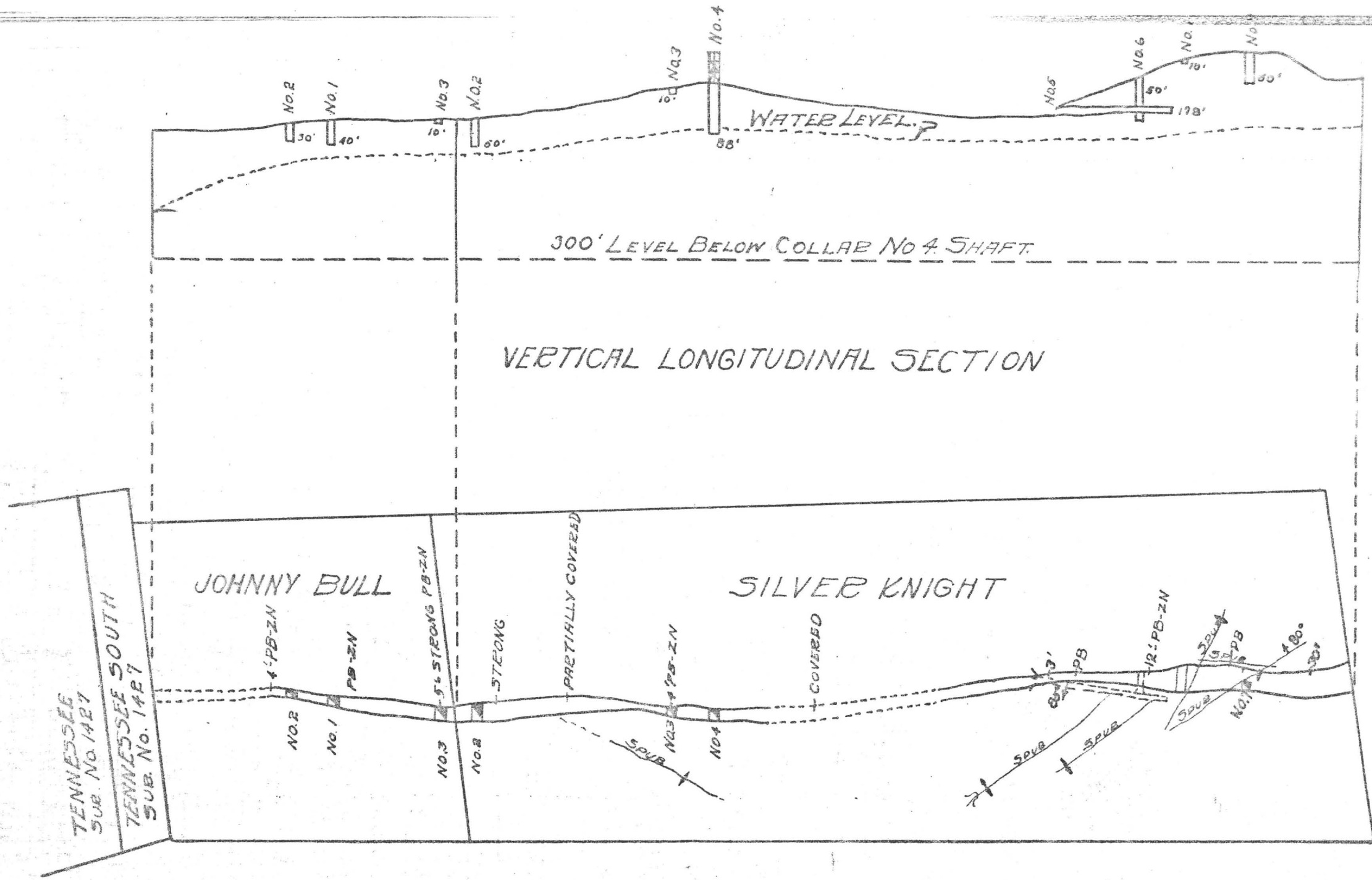
Footage			Formation
From	To	Feet	
0.0	49.0	49.0	Alluvium and boulders
49.0	128.0	79.0	Alternating amphibolite schist and granite Mineralized fissure at 98.0 feet
128.0	130.5	2.5	Pegmatite
130.5	133.7	3.2	Altered feldspar, quartz, and kaolin
133.7	138.0	4.3	ditto Quartz veinlets, pyrite and sphalerite, at 134.4 and 135.4 feet.
138.0	142.7	4.7	Altered feldspar, quartz, and kaolin ½" quartz, pyrite, and sphalerite, at 139.2 and 140.0 ft.
142.7	146.2	3.5	Quartz, altered feldspar, and kaolin Sphalerite, pyrite, and trace of galena
146.2	150.0	3.8	Altered feldspar, quartz, and kaolin, pyrite in seams
150.0	169.7	19.7	Altered feldspar, quartz, and kaolin Gouge, quartz, pyrite, and sphalerite at 164.4 to 166.3 ft.
169.7	218.0	48.3	Granite. Pyrite and sphalerite seams at 205.0 to 206.0 ft.
218.0	221.3	3.3	Mica schist
221.3	275.0	53.7	Granite. 1" quartz, pyrite, and sphalerite at 263.0 feet. 4" pyrite mineralized shear at 271.3 feet
275.0	347.8	72.8	Alternating amphibolite schist and granite
347.8	362.0	14.2	Pegmatite
362.0	400.0	38.0	Granodiorite or quartz diorite.

END OF HOLE

MAPS

JOHNNY BULL-SILVER KNIGHT

Sample Map Cerbat Mt. Zinc Project #1506
MAP SHOWING WORKINGS by A. S. Lewis
COMPOSITE SAMPLE MAP SURFACE & DRILLING
VALUES CUT IN HOLE #1
" " #2
" " #3
" " #4
" " #5
" " #6
" " #7
" " #8
VERTICAL LONGITUDINAL SECTION ON A-A'
SAMPLE LOCATIONS
SAMPLE LOCATIONS



MAP SHOWING WORKINGS ON JOHNNY BULL & SILVER KNIGHT CLAIMS.
(TRACED FROM PHOTOSTATIC COPY OF MAP BY A.S. LEWIS)

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 3443, LOOKING NORTH. CERBAT MT. ZINC PROJECT NO. 1506

VALUES CUT IN HOLE NO. 2 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1" = 50'

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 2310, LOOKING NORTH, CERBAT MT. ZINC PROJECT NO. 1506

Notes:
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is % Lead.

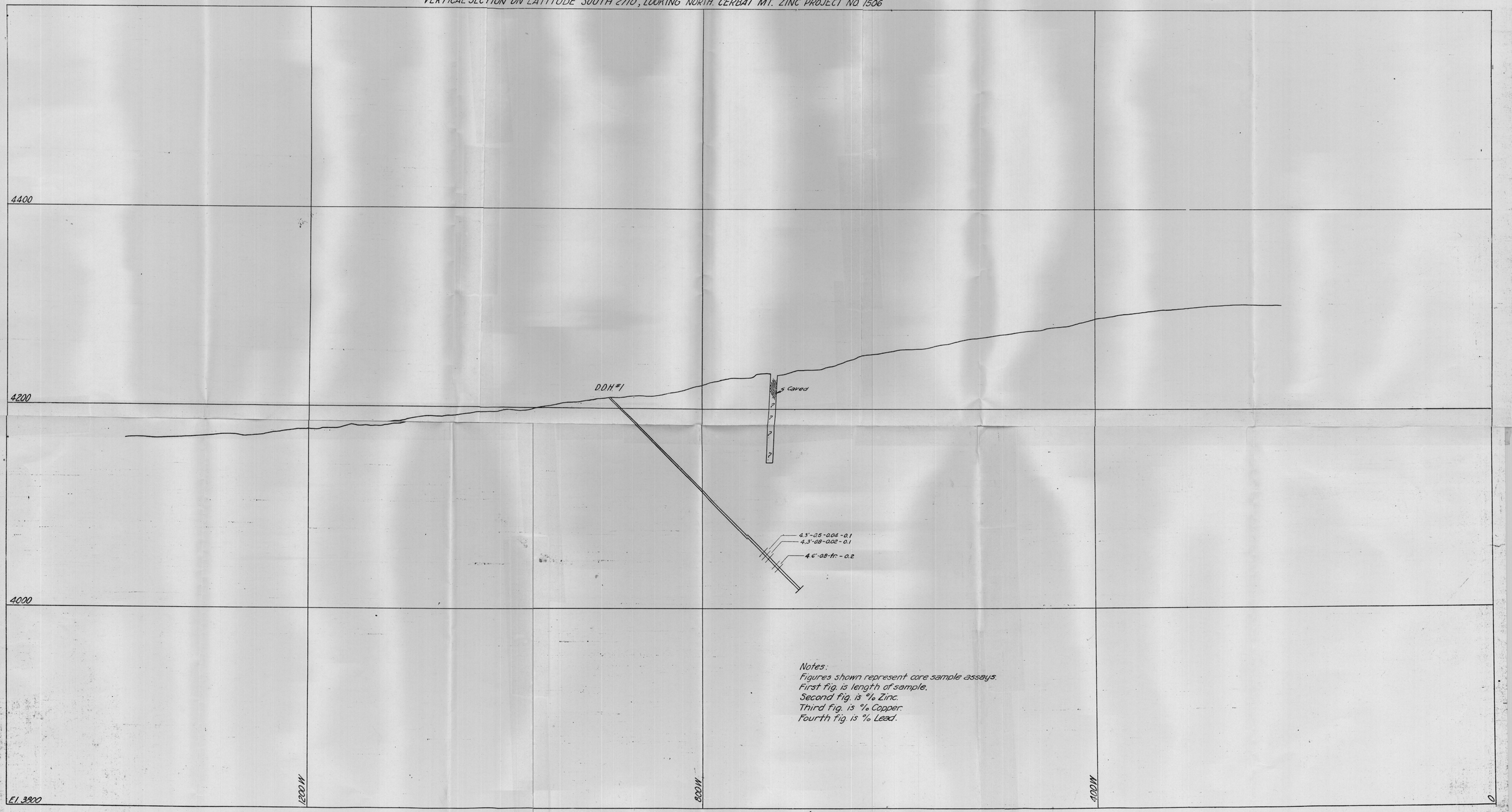
VALUES CUT IN HOLE NO. 3 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1" = 50'

Dec. 1, 1943

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 2710, LOOKING NORTH. CERBAT MT. ZINC PROJECT NO 1506



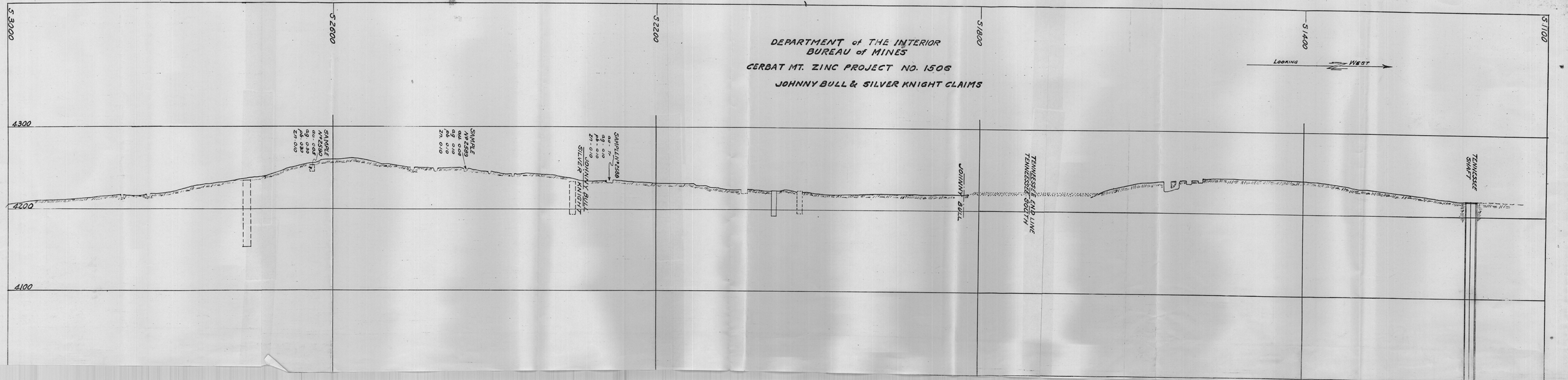
Notes:
Figures shown represent core sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is % Lead.

VALUES CUT IN HOLE NO. 1 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1"=50'

Oct. 20, 1943

DEPARTMENT of THE INTERIOR
BUREAU of MINES
CERBAT MT. ZINC PROJECT NO. 1506
JOHNNY BULL & SILVER KNIGHT CLAIMS



U.S. BUREAU OF MINES

JOHNNY BULL & SILVER KNIGHT CLAIMS

REVISED	BY
9-9-43	C.M.W.
9-23-43	C.M.W.
10-20-43	C.M.W.
11-1-43	C.M.W.

LEGEND

- Transit sta. & elev.
- Open cut
- Shallow pit
- Shaft
- Dump
- Unimproved road
- Underground workings
- Claim post

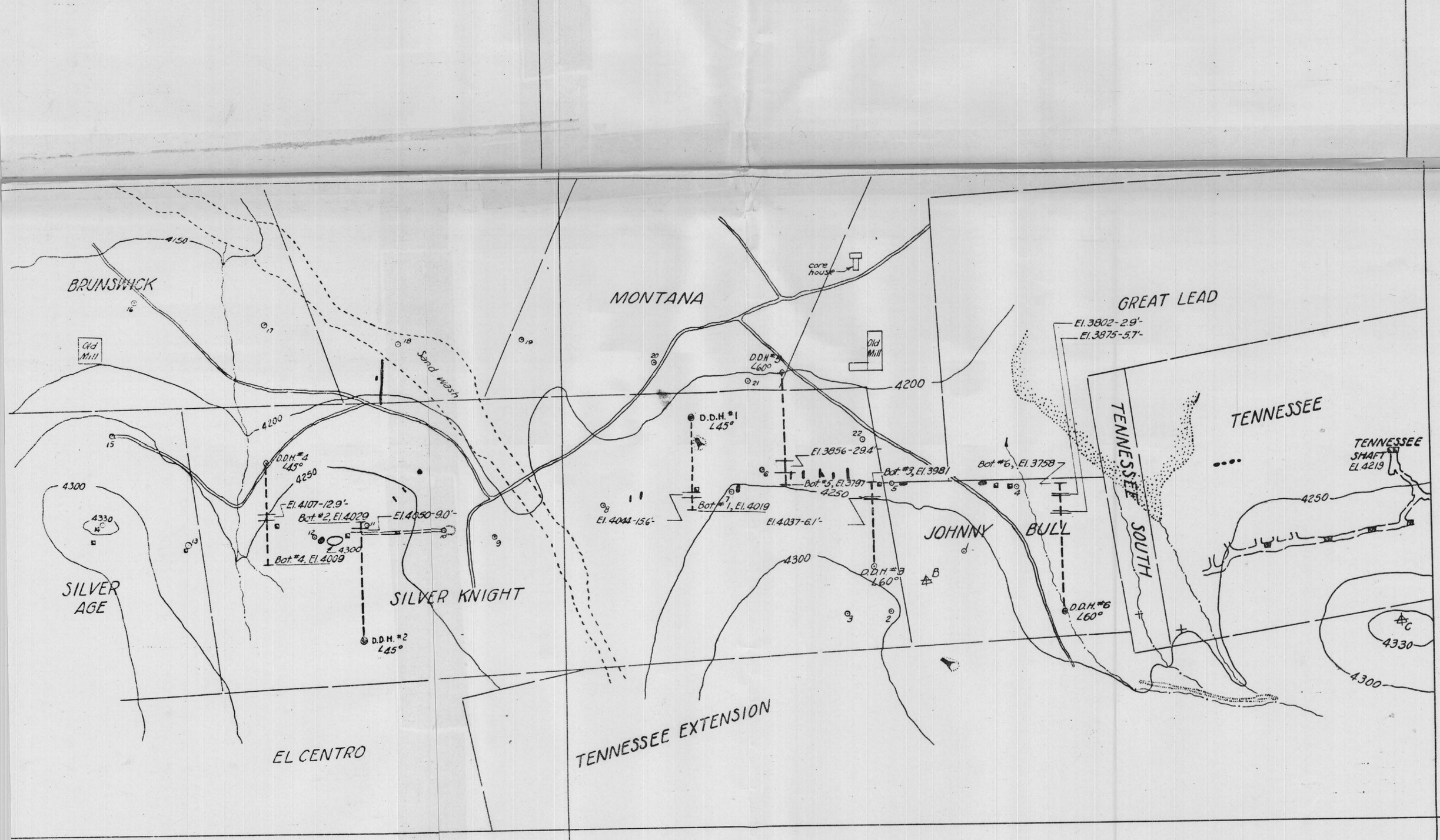
Notes:
Elevations are m.s.l.
V.W. indicates width of exposed vein.
Claim lines & corners are approx.
Coordinates are Tennessee - Schuylkill Corp.
All sample widths indicated are true widths.

SHEET B-2

CERBAT MT. ZINC PROJECT NO. 1506

SCALE: 1" = 50'

U.S. BUREAU OF MINES



LEGEND

- Shaft
- Underground workings
- Pits & trenches
- Open cuts
- Road
- Tailings
- Streams
- Claim lines
- ⊕B Triangulation point
- ⊙11 Transit sta.
- \+ Claim post

Notes:
For further details see sheets B-2 & C-2.
All widths designated are true widths.

S-3006

CERBAT MT. ZINC PROJECT NO. 1506

U.S. BUREAU OF MINES

1400 W
1200 W
1000 W
800 W
600 W
400 W
200 W

4140
4150
4160
4170
4180
4190
4200
4210
4220
4230
4240
4250
4260
4270
4280
4290
4300
4310
4320
4330

OLD MILL

BRUNSWICK
SILVER AGE
SILVER KNIGHT

SILVER KNIGHT

Sand wash

DDH #1 @ EL. 4225
45°

DDH #2 EL 4285
45°

SOUTH END CENTER LINE SILVER KNIGHT

SILVER KNIGH SILVER AGE

EL CENTRO

SILVER KNIGHT

TENNESSEE EXT.

PIT 6' DEEP

Poor exp

TRENCHES 2' DEEP

Bot #2 El 4029

Bot #4 El 4000

SAMPLE WA 2592

SAMPLE WA 2593

SAMPLE WA 2595

SAMPLE WA 2596

75° INCL. 40' DEEP V.W. 10'

10' VERT. V.W. 10'

50' VERT.

25° INCL. 28' DEEP

4800 S
4600 S
4400 S
4200 S
4000 S
3800 S
3600 S
3400 S
3200 S
0

REVISED	BY
9-8-43	C.M.W.
10-20-43	C.M.W.
11-1-43	C.M.W.

LEGEND
- 1 0.4260.9 Transit sta. & elev.
- Open cut
- Shallow pit
- Shaft
- Dump
- Unimproved road
- Underground workings
- Claim post

Notes:
Elevations are m.s.l.
VW-Indicates width of exposed vein.
Claim lines & corners are approx.
Coordinates are Tennessee-Schuylkill Corp.
All sample widths indicated are true widths.

JOHNNY BULL & SILVER KNIGHT CLAIMS

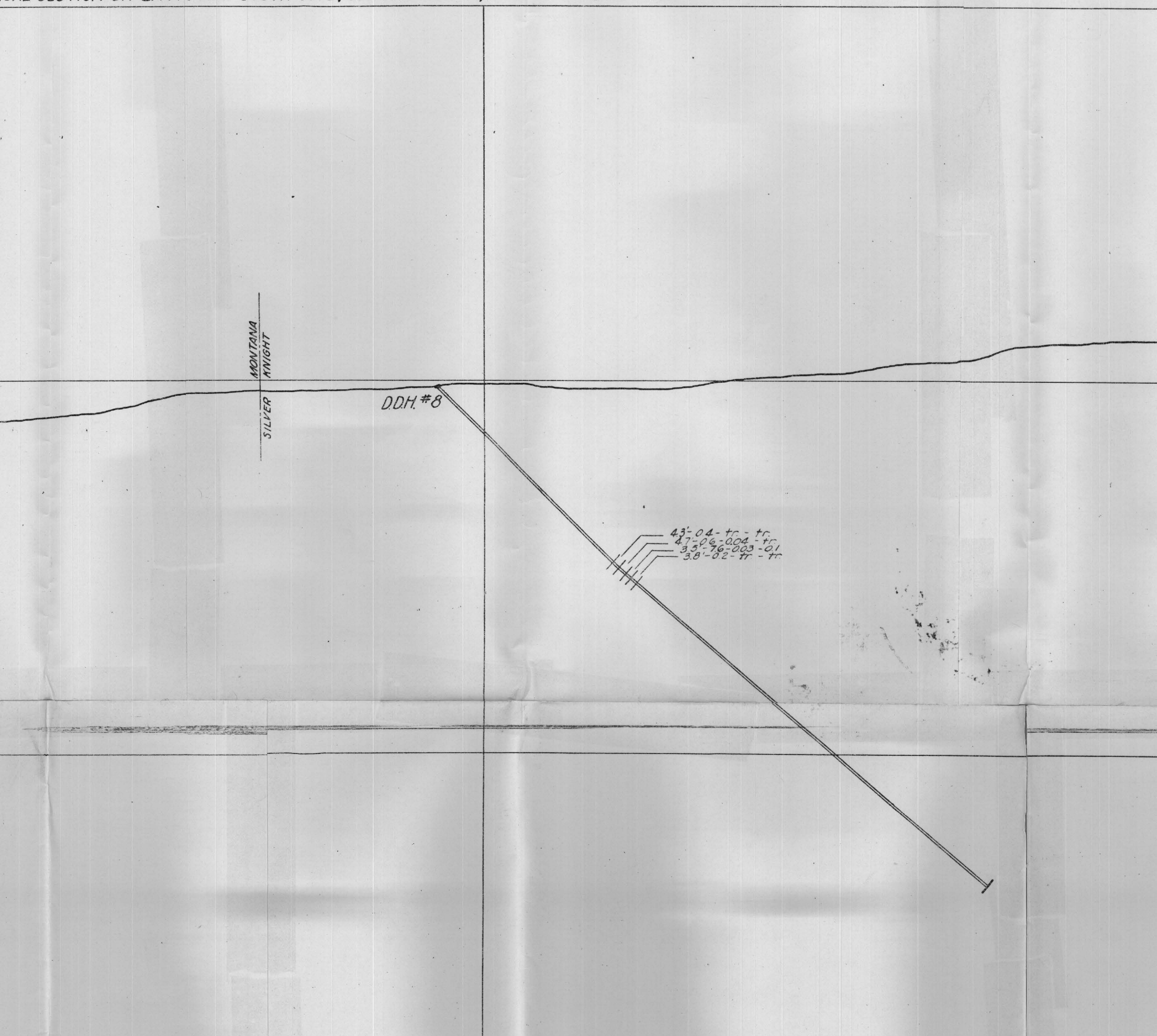
SHEET C-2

CERBAT MT. ZINC PROJECT NO. 1506

SCALE: 1"=50'

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

ICAL SECTION ON LATITUDE SOUTH 3072, LOOKING NORTH, CERBAT MT. ZINC PROJECT NO. 1506



Notes:
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is. % Lead.

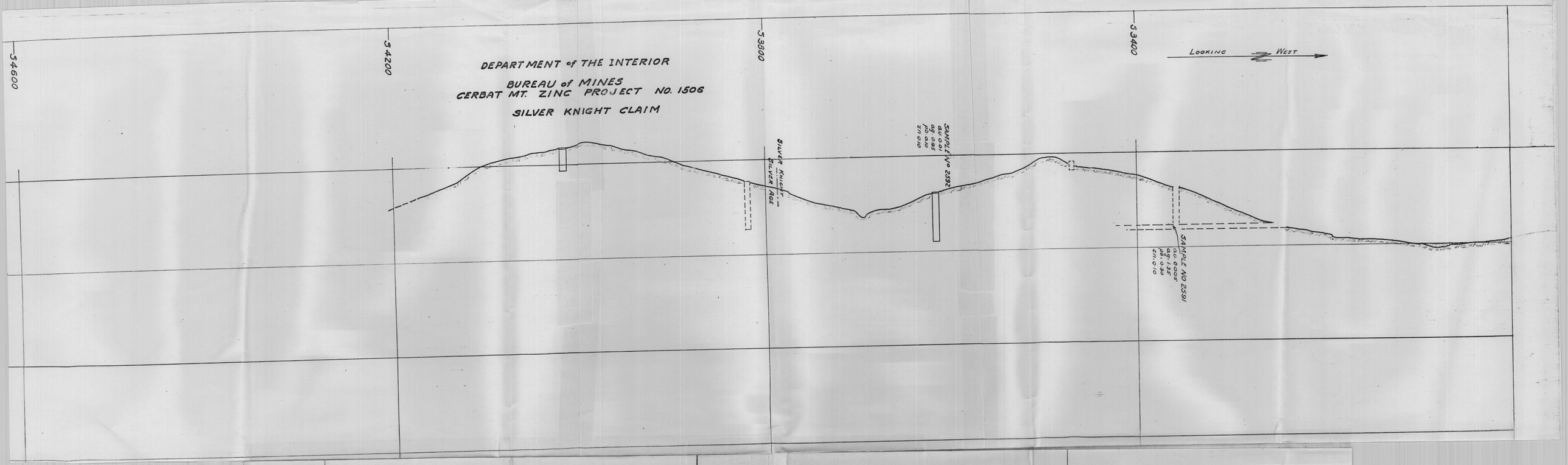
W 800

VALUES CUT IN HOLE NO. 8 - JOHNNY BULL & SILVER KNIGHT CLAIMS

DEPARTMENT of THE INTERIOR

BUREAU of MINES
CERBAT MT. ZINC PROJECT NO. 1506

SILVER KNIGHT CLAIM

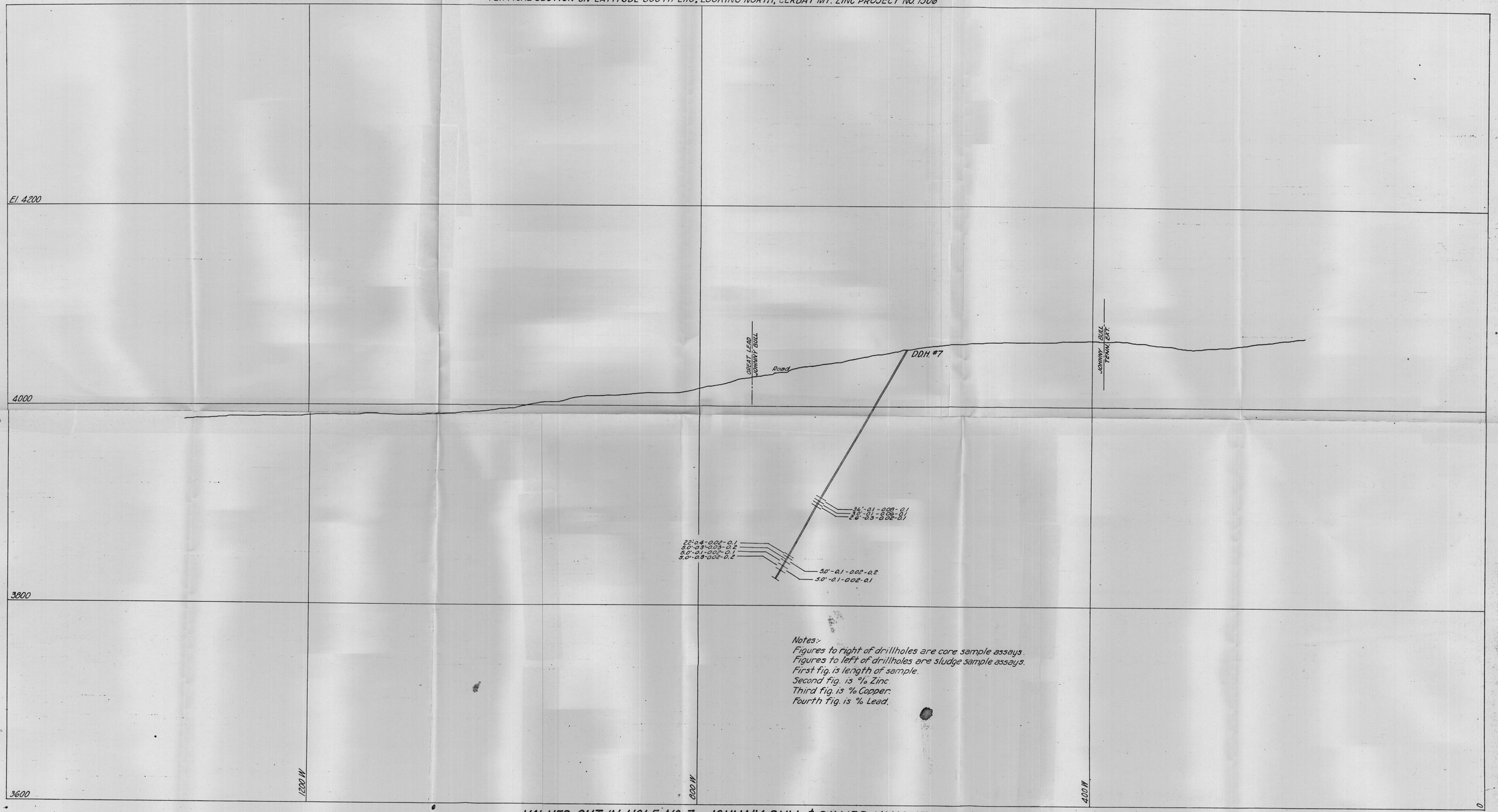


VERTICAL LONGITUDINAL SECTION ON A-A' SHEET C-2.

SCALE 1"=50'

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 2110, LOOKING NORTH, CERBAT MT. ZINC PROJECT NO. 1506



Notes:-
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc
Third fig. is % Copper.
Fourth fig. is % Lead.

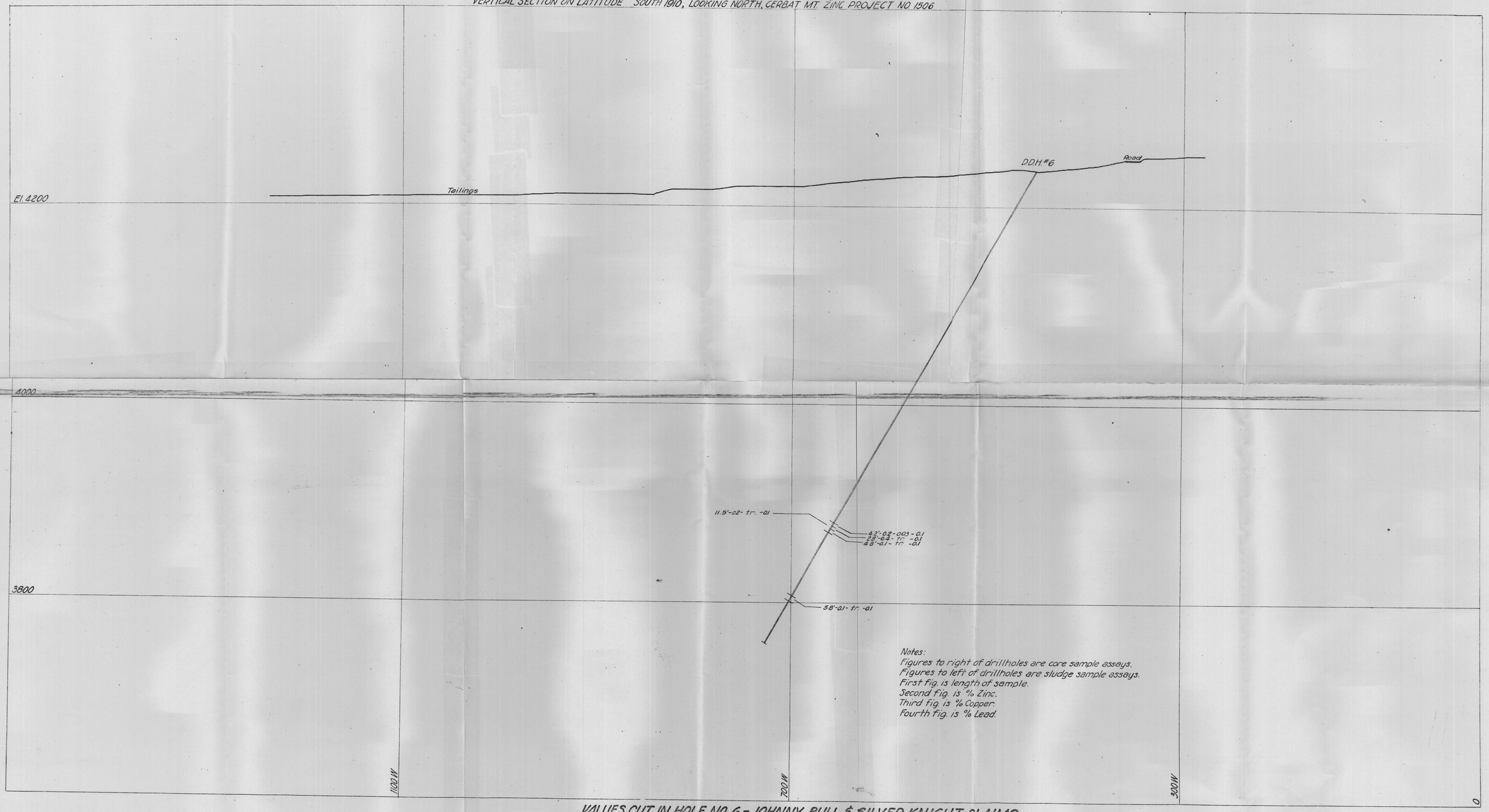
VALUES CUT IN HOLE NO. 7 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1"=50'

Dec. 27, 1943

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 1910, LOOKING NORTH, CERBAT MT. ZINC PROJECT NO. 1506



Notes:
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is % Lead.

VALUES CUT IN HOLE NO. 6 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1" = 50'

Dec. 7, 1943

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 2510, LOOKING NORTH, GERBAT MT. ZINC PROJECT NO. 1506

Notes:
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is % Lead.

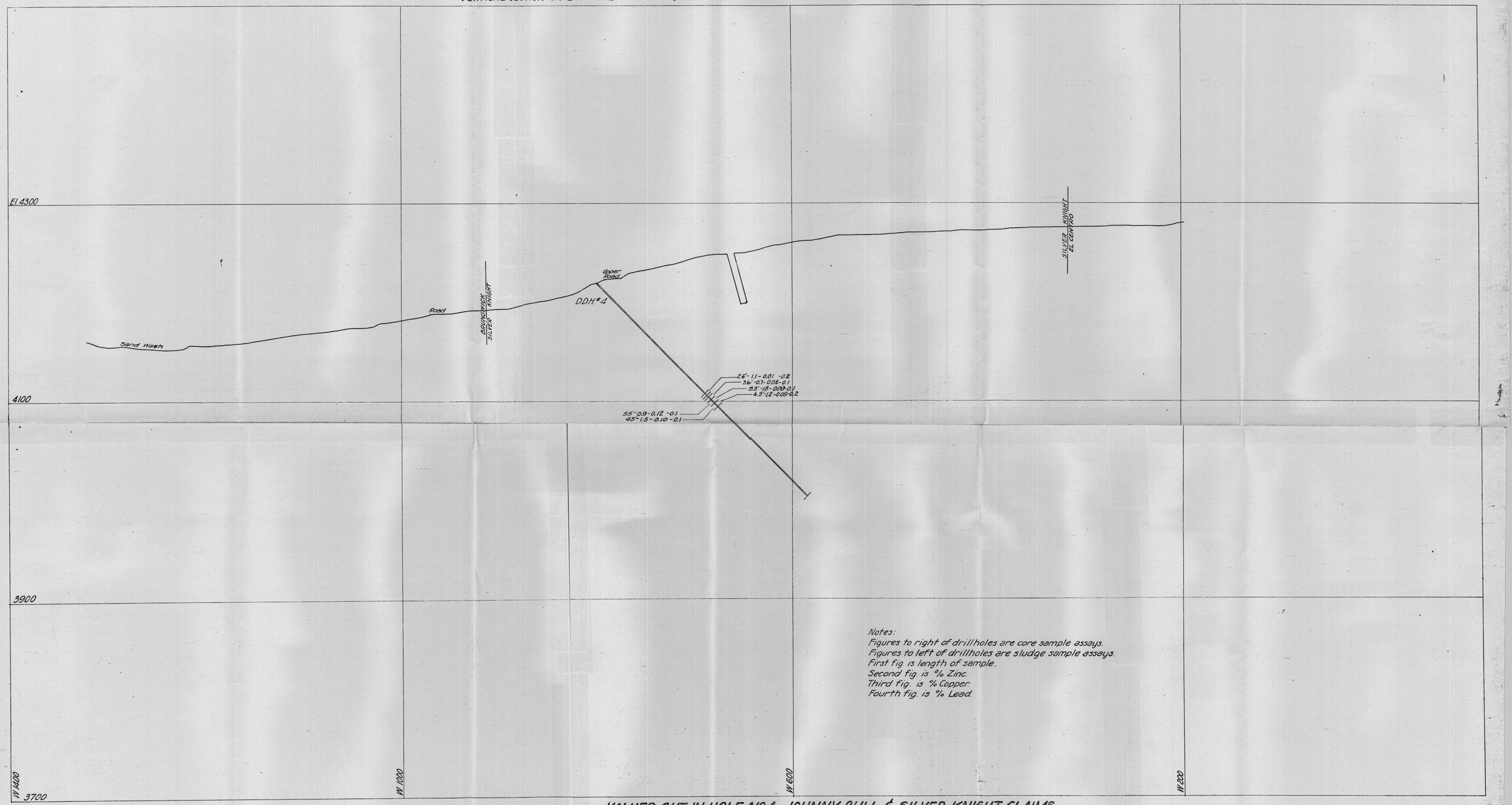
VALUES CUT IN HOLE NO. 5 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1" = 50'

Dec. 6, 1943

U.S. DEPARTMENT OF THE INTERIOR - BUREAU OF MINES

VERTICAL SECTION ON LATITUDE SOUTH 3643, LOOKING NORTH. CERBAT MT. ZINC PROJECT NO. 1506



Notes:
Figures to right of drillholes are core sample assays.
Figures to left of drillholes are sludge sample assays.
First fig. is length of sample.
Second fig. is % Zinc.
Third fig. is % Copper.
Fourth fig. is % Lead.

VALUES CUT IN HOLE NO.4 - JOHNNY BULL & SILVER KNIGHT CLAIMS

Scale: 1" = 50'

Dec. 1. 1943