Bob Sutphin - for more data - to Victoria.
Spud Valley
NTS? 92L-2W. (84).

520318

Spud Valley.* This property, at the head of Spud Creek, is owned by Spud Valley Gold Mines, Limited, 703 Royal Trust Building, Vancouver. P. F. Knight, president; Dale Pitt, managing director; and W. Elliott, mine manager. The property includes the Crown-granted claims Goldfield (L. 1020), Last Chance (L. 1021), A.T. No. 2 Fraction (L. 1022), Gold Spring (L. 1023), Linton (L. 1024), Linton No. 2 (L. 1025), A.T. Fraction (L. 1026), Anvil (L. 1027), Spud (L. 1028), A.T. No. 1 (L. 1029), A.T. No. 6 Fraction (L. 1695), and Rimy No. 4 (L. 1903).

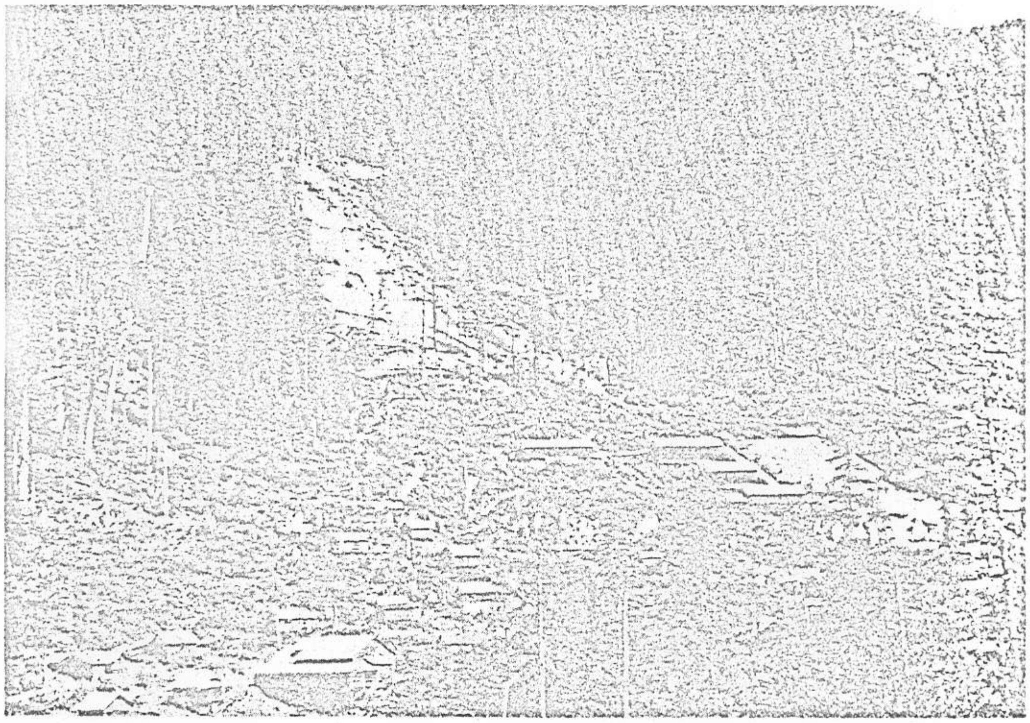


Plate XIV. Spud Valley mine camp—portal of No. 7 level at dump, lower right; portal of No. 4 level at top of dump, upper left.

The original claim, the Goldfield, was staked in 1935, and a mill, with a daily capacity of 10 tons, was erected by Sam Knutsen, one of the original prospectors in the Zeballos camp. In 1936 A. B. Trites acquired the property from Mr. Knutsen, drove the upper three levels, and built a small camp about 300 feet north of and at about the same elevation as the present No. 6 level. In 1937 Spud Valley Gold Mines, Limited, acquired the property from the Trites interests, continued underground work on the Goldfield vein, and commenced work on the Spur and Roper veins. The company built the present camp and, late in 1938, the mill. The mine was closed in 1942, and a watchman was retained on the property. Although the company has since started work on the property of its wholly owned subsidiary, Big Star Gold Mines, Limited, no further work has been done on the veins at the Spud Valley mine.

The mine workings (Fig. 22) include several adits with connecting raises. In 1942 most of the ore was being delivered through an ore-pass to No. 7 level and trammed to the mill, but prior to the driving of No. 7 level it had been conveyed from the portal of No. 4 adit to the mill by an aerial tramway 1,200 feet long.

The mill employed both amalgamation and flotation, had a crushing capacity of 250 tons, and a milling capacity of 125 tons in twenty-four hours. About half of the

* *See* Figures 22 and 23 in pocket and Figure 24 in text.

ore mined was discarded from a picking-belt before milling; concentrates amounted to 2½ to 3 per cent. of the tonnage milled. In 1942 slightly over half of the ore mined was being discarded as waste, after crushing, but much of this was from the Big Star property on Goldvalley Creek, where bad sloughing caused dilution of the vein matter.

Production and operation data for the entire life of the mine are given in the following table. About one-quarter of the gold and half of the silver were recovered in concentrates and the remainder in bullion.

Production and Operating Data, Spud Valley Gold Mines, Limited.[1] [2]

	Ore mined.	Ore treated.	Gold, Gross.[3]	Silver, Gross.[3] [4]	Costs per Ton Milled.[5]		
					Development and Exploration.	Mining.	Milling.
	Tons.	Tons.	Oz.	Oz.	$	$	$
1936	44	.....	47[6]	17	.....	.....	.....
1938	1,900[7]	1,702	473	171	.....	.....	.....
1939	35,607[6]	20,950	15,369	4,779	.....	8	.....
1940	56,184[6]	28,426	18,039	5,501	.....	.....	.....
1941	72,943[6]	34,549	14,031	6,004	0.70	7.25	2.71
1942[8]	20,060[6]	20,060	6,020	2,003	0.584	5.587	2.369
Weighted average[9]	.....	.....	.....	.....	0.66	6.63	2.58
Totals	186,698	105,687	54,039	18,475	.....	.....	.....

[1] Information, except where noted, from Yearly Summary Reviews of the Gold Mining Industry in Canada, published by Dominion Bureau of Statistics, Ottawa.

[2] Production includes about 15,000 tons of sorted ore from the Big Star operation.

[3] Total metal content in bullion and concentrates as determined by settlement assay.

[4] Information from British Columbia Bureau of Economics and Statistics and British Columbia Department of Mines.

[5] Figures do not include taxes or head office, marketing, depreciation, and depletion charges.

[6] Mine-run ore, includes waste discarded on picking-belt.

[7] Estimated from ore treated.

[8] Information not available.

[9] Weighted for variation in yearly tonnage.

No rock types other than quartz diorite are found on the property (Fig. 2), except for a few spindle-shaped feldspathized inclusions in the quartz diorite and a diabase dyke 2 feet wide on the No. 7 level.

Three main veins, the Goldfield, the Spur, and the Roper, have been developed on the property.

The Goldfield vein, strike north 50 to 62 degrees east and dip 75 to 85 degrees northwestward, ranges in width from a fraction of an inch to 16 inches and usually is from 6 to 8 inches wide. It follows a well-defined shear zone that is a few inches to 2 feet wide. In places the shear zone passes along the strike into a sheeted zone that consists of joints spaced 4 to 18 inches apart and spread over a width of from 4 to 12 feet. Such joints frequently contain quartz ranging in width from half an inch to 2 inches. Along some sections of the vein, particularly towards the southwestern end, the only evidence of the vein is a stringer of quartz an eighth of an inch to half an inch wide, which follows a jagged fracture in the rock. In many places diagonal quartz stringers, which strike more easterly than the main vein and dip vertically, range in width from half an inch to 4 inches and cross from one wall of the vein shear to the other.

Much of the vein quartz is firm and is ribboned by thin stringers of sulphides, but some of it is friable and consists of loosely aggregated crystals. Between the ends of these crystals, pyrite, sphalerite, and galena are frequently found. In the diagonals, sulphides are not abundant, and the quartz is usually coarsely crystalline with a well-developed comb texture.

Some diagonal quartz stringers cross the main vein shear, and many diagonal joints, some of which contain quartz a fraction of an inch thick, lead into the walls from the main shear. Both the diagonal quartz stringers and the quartz-filled joints are short and usually have frozen walls, suggesting an origin by tension rather than by shear. They both strike more easterly than the main vein shear and dip vertically, which indicates that the hangingwall of the main vein shear moved northeasterly and down with respect to the footwall.

The Goldfield vein is not cut by any cross-faults, but on Nos. 6 and 7 levels a strong fault comes into the north wall of the drift at a small angle, and going northeasterly along the drift the fault is close to the vein for some distance before actually joining and following it to the northeastern faces of these drifts.

Movement along the vein shear, though not great, has been intense. Slips cut the ends of diagonal veins and slice the quartz of the main vein into disconnected lenses. In places within the vein shear, crushing has reduced the quartz to sugary masses and the sulphides to masses of black powdery material.

Quartz-sulphide vein matter, although narrow, assayed high in gold. A sample taken by the writer in 1935 from the original open-cuts on the Goldfield vein across 1 foot of quartz and sulphides assayed: Gold, 7.32 ounces per ton; silver, 2.6 ounces per ton. A sample taken across 9 inches of rusty quartz assayed: Gold, 5.40 ounces per ton; silver, 2 ounces per ton. A sample taken in 1938 (Stevenson, Lode-gold Deposits, 1938, pp. 17, 18) 100 feet from the northeastern portal of No. 2 adit across 4½ feet of sheeting that included quartz-filled joints 2 to 6 inches apart and an eighth of an inch to half an inch wide assayed: Gold, 8.30 ounces per ton; silver, 2.5 ounces per ton. A sample taken 276 feet from the northeastern portal of No. 2 adit along 2 feet of quartz pyrite 4 inches wide assayed: Gold, 13.20 ounces per ton; silver, 6.5 ounces per ton. Much of the vein quartz contains less sulphide than the above samples and contains correspondingly less gold.

Numerous slabs of barren rock that were breaking at gouge seams sloughed into stopes, thus lowering the grade of mine-run ore.

Ore mined from the Goldfield vein amounted to 70,000 tons and ranged from 0.10 to 1.86 ounces of gold per ton, with an average grade of about 0.34 ounce of gold per ton.

The Spur vein (Figs. 22 and 24), strike north 70 degrees east and dip 85 degrees northwestward to vertical, branches from the southeastern side of the Goldfield vein and has been followed by drifting on Nos. 1 to 6 levels and stoped on Nos. 1 to 5 levels.

The structure and texture of the vein quartz are similar to that of the Goldfield vein. However, the widths of the shear zone and of the vein quartz in it are less than in the Goldfield vein. Although the width of quartz in places is as much as 1 foot, the average width is less than 6 inches. Some short sections of very high-grade ore assaying up to 20 ounces in gold per ton have been found, but, on the whole, the vein is poorer than the Goldfield. The sections of high-grade ore were found at varying distances from the Goldfield vein and do not seem to bear any relation to the intersection of the veins. The vein is straight and varies less in strike and in dip than the Goldfield.

The northeastern end of the Spur vein, as seen in the drift faces, is only half an inch of gouge and a quarter of an inch of quartz and sulphides.

Towards its southwestern end, near its intersection with the Goldfield vein, the Spur vein narrows to a shear 1 inch wide containing quartz one-quarter of an inch to half an inch wide.

Diagonal quartz veins up to 2 inches wide, striking more northerly and dipping less steeply than the Spur vein, indicate that its northwestern wall moved southwesterly and down with respect to the other wall. This is the opposite of the movement on the Goldfield and suggests that locally the Goldfield and Spur veins constitute the two

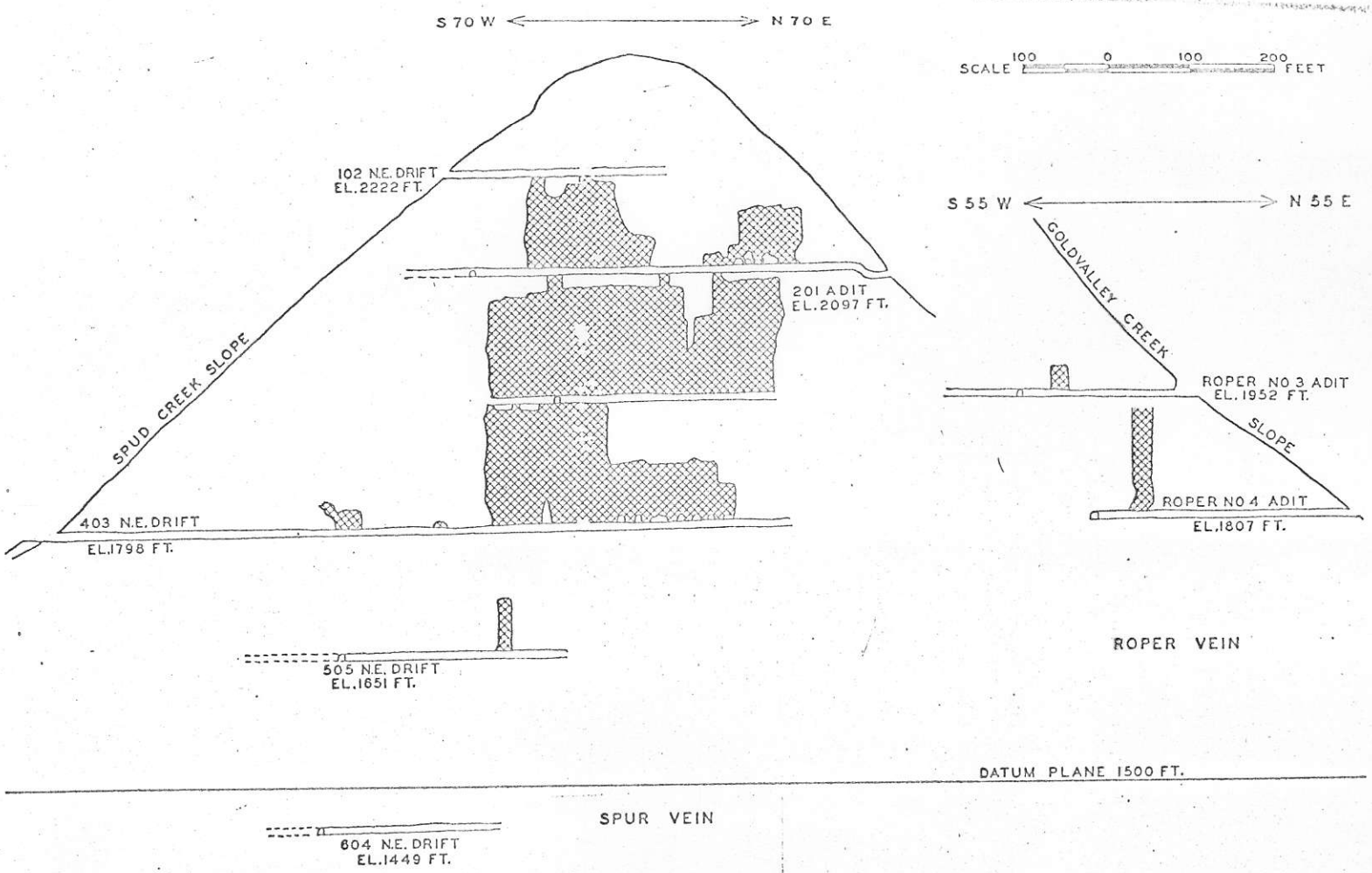


Fig. 24. Spud Valley: Longitudinal projection of the Spur and Roper veins, showing stoped areas.

planes of maximum shearing stress, with the Goldfield vein following the direction of stronger and the Spur vein the direction of weaker shearing respectively.

Production from the Spur vein, including wallrock, which sloughed into stopes, was 26,600 tons, averaging 0.28 ounce of gold per ton.

The Roper vein is 520 feet southeasterly from the Goldfield vein. It strikes north 60 degrees east and dips 85 degrees northwestward. It is parallel in strike but steeper in dip than the Goldfield.

Two drifts have been driven on the vein, and a small stope has been made on each level.

The Roper vein (Figs. 22 and 24) consists of quartz up to a foot wide, but usually about 2 inches wide, in a shear zone up to 2 feet wide. The quartz contains ribbons of fine-grained sulphides, usually pyrite and arsenopyrite. Vein matter near the portal is reported to have assayed several ounces in gold per ton, but elsewhere it assayed less than half an ounce per ton. For short sections the quartz vein matter gives way to crystalline calcite with cleavage fragments up to an inch long.

From the upper drift a crosscut 15 feet long intersects a branch vein, strike north 67 degrees east and dip vertical, that consists of quartz up to 3 inches wide in a crush zone 1 to 6 inches wide. Ore in this vein yields less than a third of an ounce of gold per ton.

Structural Controls in Localization of Ore.—The Goldfield, Spur, and Roper veins are wholly within massive quartz diorite, and it is difficult to demonstrate that local rock structures determined the localization of oreshoots in them.

However, the workings on the Goldfield vein are sufficiently extensive to permit a structural analysis of the vein and to determine favourable changes in its dip and strike following the method of analysis outlined by Newhouse.*

The Goldfield vein occupies a narrow well-defined shear that strikes north 50 to 62 degrees east and dips 75 to 87 degrees northwestward (*see* Fig. 22). Numerous joints, short gash veins, and one persistent vein, the Spur vein, branch from the main vein, with an average strike of north 70 degrees east and dip from 85 degrees to vertical. These are probably tension breaks formed by movement along the main vein shear, and, because of their more eastern strike and steeper dip, they indicate that the hangingwall of the main vein shear moved northeasterly and down with respect to the footwall, and that the vein therefore occupies a normal fault.

Newhouse† has shown, by drawing contours on curved planes and on composite mine plans, and it is generally conceded, that in a vein occupying a normal fault, openings and orebodies form in the more steeply dipping parts. It may be seen in Figure 22 that the main stoped area on the Goldfield vein lies above No. 5 level in the more steeply dipping portion of this vein. Again, in the figure, it may be seen that the vein-contours converge—that is, the vein steepens—at the northeastern end of the stoped area above No. 5 level and that this convergence or steepening trends southwesterly across the stoped area from the northeast end of Nos. 1, 2, and 3 levels to the southwest ends of Nos. 3, 4, 5, and 6 levels. Smaller stoped areas, separate from the main stoped area above No. 5 level, are found where contours in southwest portions of Nos. 6 and 7 levels converge locally. That is, the orebodies are where, according to the theory outlined, the changes in dip and strike indicate that openings would occur along a curving normal fault.

Britannia M. This group includes the M-1 (L. 1065), M-2 (L. 1066), M-3 Fraction (L. 1067), M-4 (L. 1068), M-5 (L. 1070), and M-6 Fraction (L. 1069) Crown-granted claims, staked in 1935, brought to Crown grant in 1939, and owned by Britannia Mining and Smelting Co., Limited, Britannia Beach. The property is on the northeast side of Spud Creek (Fig. 2) and is adjacent to the south-

* Newhouse, W. H.: Openings due to movement along a curved or irregular fault plane; *Econ. Geol.*, Vol. XXV, 1940, pp. 445–464.

† Newhouse, *op. cit.*, pp. 447–453.

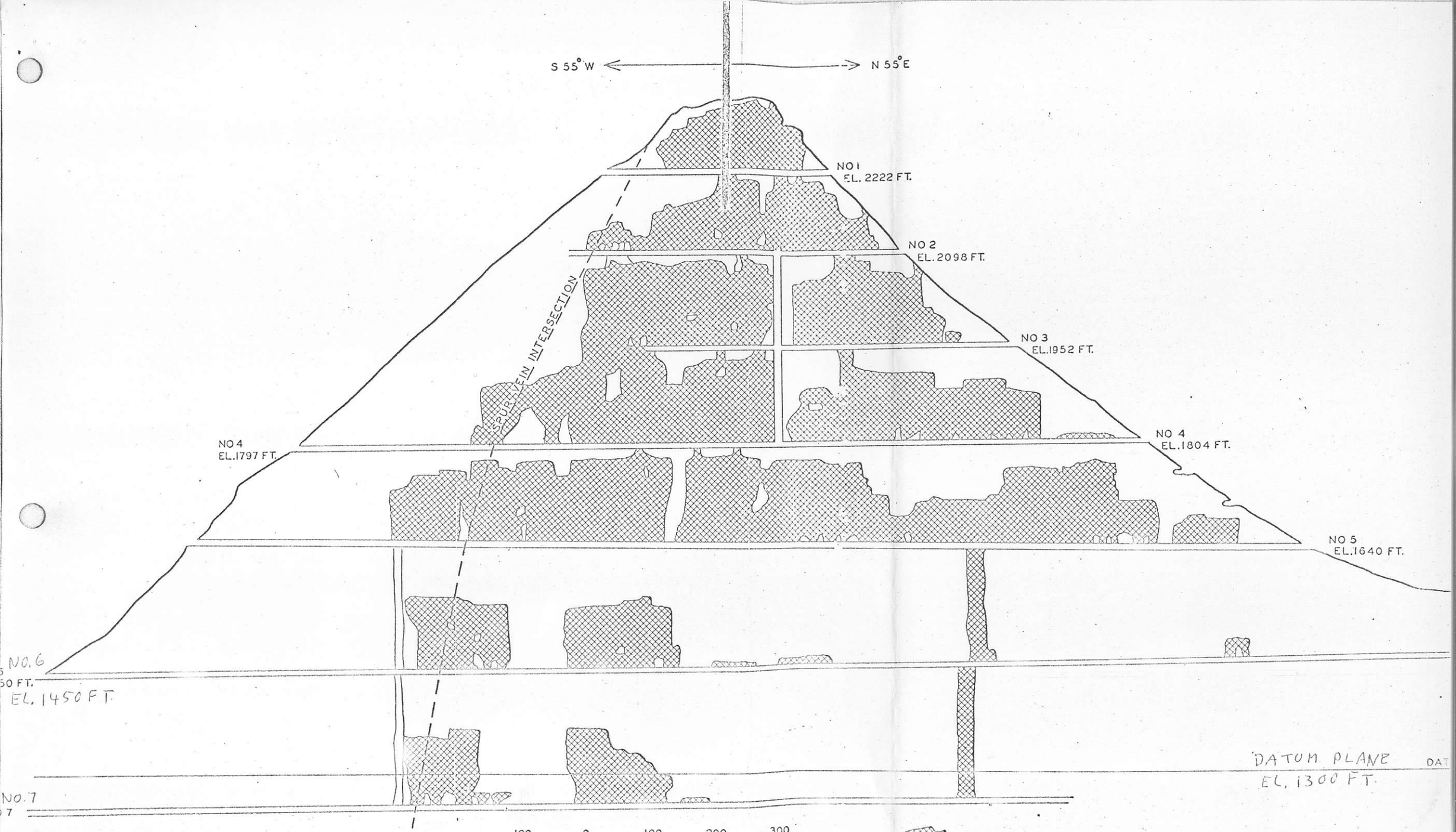
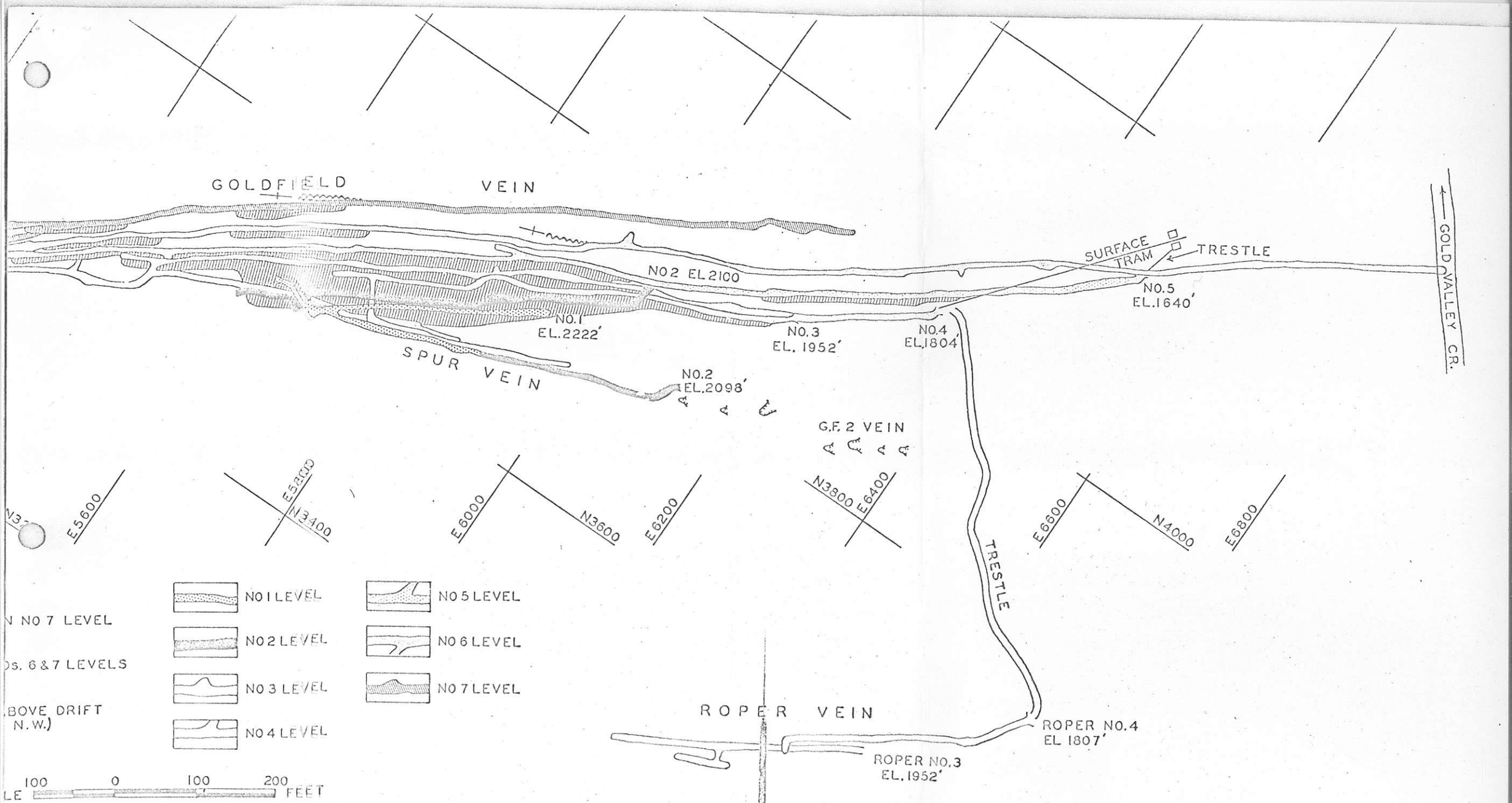
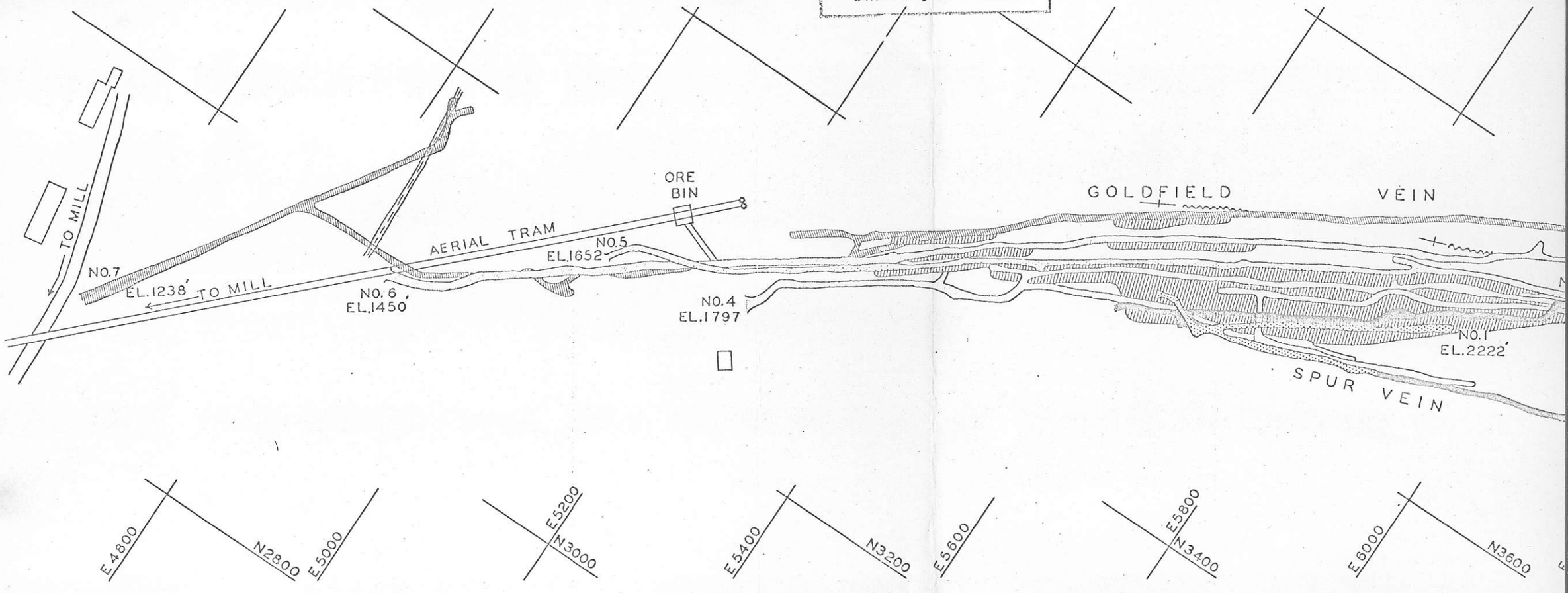


FIG 23



GOLD MINES LIMITED. PLAN OF LEVELS ON GOLDFIELD, SPUR, AND ROPER VEINS, SHOWING STOPED AREAS IN PLAN ON THE GOLDFIELD VEIN.



DIABASE DYKE ON NO 7 LEVEL

"BIG FAULT" ON NOS. 6 & 7 LEVELS

STOPED AREA ABOVE DRIFT (VEIN DIPS N.W.)

NO 1 LEVEL

NO 2 LEVEL

NO 3 LEVEL

NO 4 LEVEL

NO 5 LEVEL

NO 6 LEVEL

NO 7 LEVEL

SCALE 100 0 100 200 FEET

FIG 22. SPUD VALLEY GOLD MINES LIMITED. PLAN OF LEVELS ON GOLDFIELD, SPUR, AND ROPER AREAS IN PLAN ON THE GOLDFIELD VEIN.