R. I. 4346

September 1948

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

BUREAU OF MINES
JAMES BOYD, DIRECTOR

REPORT OF INVESTIGATIONS

# SAMPLING METHODS AND RESULTS AT THE SULLIVAN CREEK TIN PLACER DEPOSITS MANLEY HOT SPRINGS, TOFTY, ALASKA



BY

ROBERT L. THORNE AND W. S. WRIGHT

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By Robert L. Thorne[2] and W. S. Wright[2]

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ILLUSTRATIONS



## INTRODUCTION AND SUMMARY

Cassiterite deposits on Sullivan Creek in central Alaska were investigated by the Bureau of Mines in the spring of 1943. Gold miners in the area

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 4346."

2/ Mining engineer, Bureau of Mines, Juneau, Alaska.

have been recovering cassiterite each season as a byproduct of gold placer operations. Approximately 300 tons of tin concentrates have been shipped from the district.

The deposits were sampled through trenches and small shafts. An average tin content of 0.28 pound per cubic yard was indicated.

A detailed description of sampling methods and sample analyses is presented in this report.

## ACKNOWLEDGMENTS

This paper is one of many reporting various aspects of the Bureau of Mines program initiated in August 1939 by passage of the Strategic Minerals Act, the scope of which was greatly expanded by subsequent legislation.

Special acknowledgment is extended to Cleary Hill Mines Co., who supplied camp facilities, thawing equipment, and a caterpillar tractor for use in the conduct of this examination.

## LOCATION AND ACCESSIBILITY

The deposit is about 40 miles east of the junction of the Tanana and Yukon Rivers, longitude 150°55' W. and latitude 65°05' N., as shown in figure 1. The nearest settlement is Hot Springs, a village of 50 to 100 people, depending upon the season. It is served by a general store, a roadhouse, and a small commercial airfield. Freight is brought in from the coast by railroad to Nenana, then by river boat to Hot Springs, which is connected with the property by 15 miles of good truck road. Winter travel is by airplane or dog team. A small airfield is on the property.

## PHYSICAL FEATURES AND CLIMATE

The area is part of the Yukon Tanana upland and consists of smooth rounded ridges that rise from the valley floor of Sullivan and Baker Creeks. The main stream channels, flanked by wide flood plains and gentle gradients, range from 450 to 700 feet in altitude. North of the tin-bearing placers Roughtop Mountain rises to an elevation of 2,800 feet.

The climate is subarctic, the winters long and cold and the summers short but rather warm. The ground, except for seasonal surface thawing, is permanently frozen.

The average annual precipitation is about 12 inches[3], 3 inches of which falls as snow from November to March, inclusive. The snow ranges in depth from 3 to 4 feet on the level. In placer mining summer precipitation is more important than spring run-off. The frozen ground prevents any underground storage; hence, the run-off is very rapid.

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3/ Ellsworth, C. E., and Davenport, R. W., Surface Water Supply of the Yukon-Tanana Region: U. S. Geol. Survey Water-Supply Paper, 342, 1915, 343 pp.

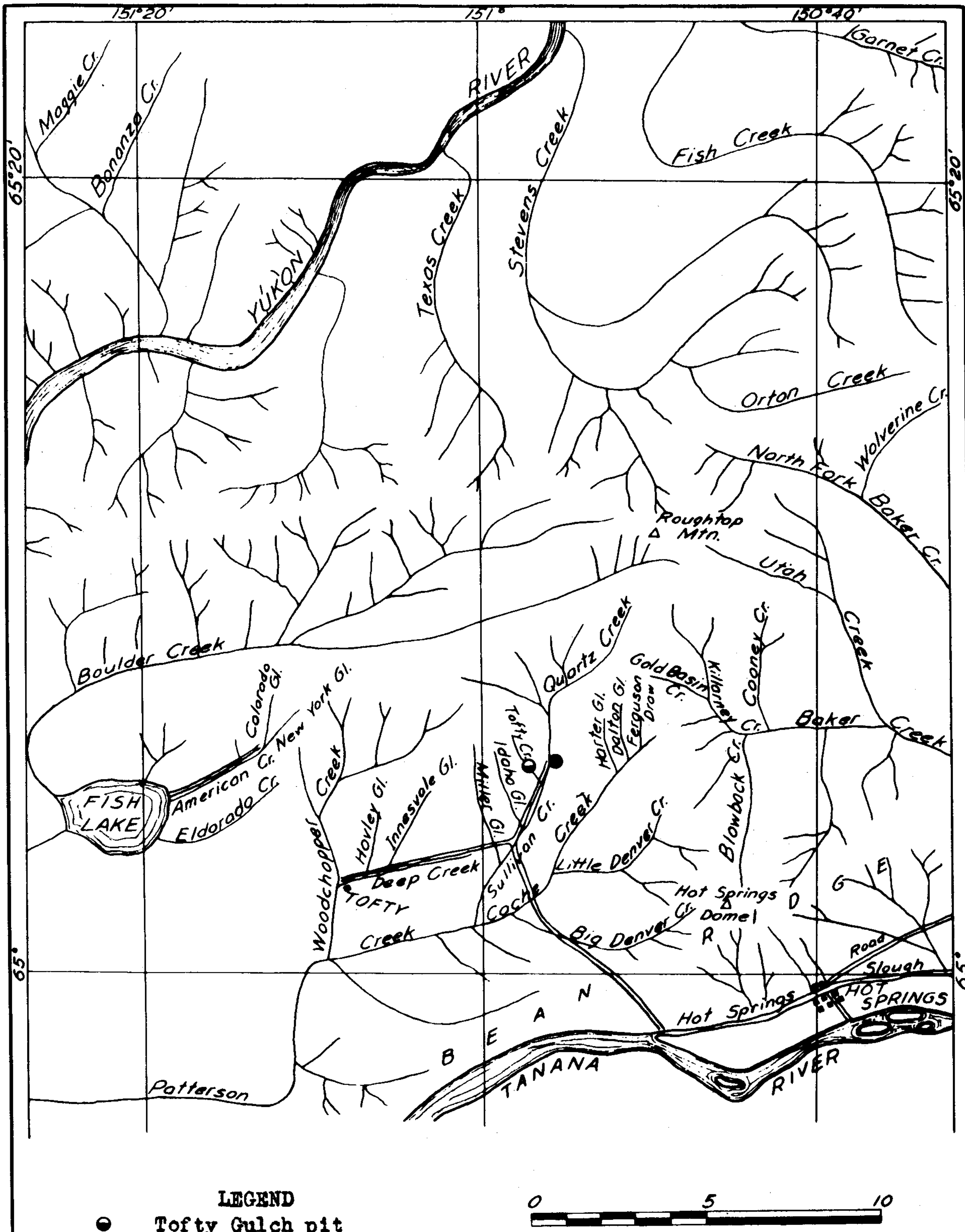



Figure 1. - Sketch of Tofty area, Hot Springs district, Alaska. (From U. S. G. S. Bull. 844(d).)

The region supports a sparse growth of spruce, birch, and cottonwood, the greater part having been cut or burned off during the last 20 years. Except in timbered areas and natural meadows, the surface is covered with the usual Alaskan carpet of mosses, brush, and creeping plants, which, to a degree, regulates the run-off from summer precipitation. Spruce, the most widely distributed tree, attains a diameter of 2 feet or more in favored locations. However, most of the spruce stands have been cut in the Sullivan-Patterson Creek drainage area. At the head of Baker Creek, 15 miles northeast, there is enough timber for camp lumber and mining needs. Wood for fuel may be obtained 3 miles east of the deposits.

## HISTORY AND PRODUCTION

Gold placers were first discovered in this area in the winter of 1906-7. Considerable drift mining was done on this and nearby creeks during the following decade. Howell and Cleveland drift-mined the greater part of the Sullivan Creek pit. Their operation consisted of first thawing and sinking a shaft through 50 to 100 feet of overlying muck and then thawing 4 feet of gravel adjacent to bedrock, hoisting it to the surface, and washing it in elevated washing plants. The method was wasteful, inefficient, and expensive. The mining costs were $3 to $5 a cubic yard.

The property was later taken over by an English company, who carried on an extensive drilling program, the results of which are not available. Tillison and L'Hereux followed, stripping and mining by means of a hydraulic lift at the lower end of the present pit.

This property was purchased by Cleary Hill Mines Co., 250 Pere Marquette Building, Minneapolis, Minn., in 1935. They have carried on mining and stripping in alternate years. Water from the head of Sullivan Creek is used to strip the 50 to 60 feet of muck with the aid of monitors. The 3 to 8 feet of gravel on bedrock is mined by dragline and elevated sluices. Considerable money and effort have been expended over a period of years in blocking out the ore reserves on Sullivan and neighboring creeks, but unfortunately no record of tin content was kept. Only recently have gold values been permanently recorded.

Gold production from the Hot Springs section in 1940[4/] was $518,000, of which $100,000 was from Sullivan Creek. The tin concentrate shipped by Cleary Hill Mines Co. in 1940 was accumulated during three mining seasons and amounted to 15,476 pounds containing 8,350 pounds of metallic tin. In 1941, 6,600 pounds of concentrates containing 3,500 pounds of metallic tin were shipped. Concurrently, drift-mine operators along the outlying creeks recovered and shipped several hundred pounds of cassiterite.

## WATER SUPPLY

Water is furnished by 7,000 feet of ditch, with intakes on Sullivan and Quartz Creeks. For the removal of overburden in the Sullivan Creek pit,

4/ Smith, Philip S., Mineral Industries of Alaska in 1940: U. S. Geol. Survey Bull. 933(a), 1942, p. 38.

enough water at a 50-foot head is available for stripping with three to five nozzles. Water for use at the elevated washing plant is circulated from a settling pond by means of a 12- by 12-inch Diesel pump.

## OCCURRENCE OF DEPOSITS

The following creeks drain the district progressively from west to east, and tin is said to occur in their associated placers: Woodchopper Creek, Deep Creek, Miller Creek, Idaho Gulch, Tofty Creek, Sullivan Creek, Harter Gulch, Dalton Gulch, Cache Creek, Ferguson Creek, Gold Basin Creek, and Lower Killarney Creek.

The zone called the tin belt is about 10 miles long, as shown in figures 1 and 2.

Mertie[5] describes it as follows:

> The country rock along this belt is probably more or less continually mineralized, but no continuous pay streak has been formed. Instead, a number of small, discontinuous pay streaks are present whose major directions are normal to the zone of mineralization. The sites of these pay streaks are the gulches that drain from the hills to the north, or more commonly the ground lying along the sides of such gulches. In general, cassiterite and gold occur together in placers, and where the cassiterite becomes scarce or absent the gold content also drops. The sharpness of the cut-off of these small pay streaks as they are followed north to the hills is amazing. The limit of the placer is suddenly reached, and north of this limiting line no tin and but little gold can be found. The south line is less exactly defined, because the ancient gulches draining southward had a tendency to distribute the gold and tin downstream from the mineralized zone, as in the deposit on Sullivan Creek.

Mertie gives the origin of the placers as follows:

> A relatively narrow zone in the country rock was originally mineralized with gold and tin. Where this belt was cut by streams the gold and tin were eroded and concentrated by the fluviatile action to form commercial placers, and subsequently these old gravel deposits were deeply buried by silt.

According to Waters:[6]

> The lodes were not localized along the present tin belt but originated nearer to Hot Springs Dome, and the present

5/ Mertie, J. B., Jr., Mineral Deposits of the Rampart and Hot Springs Districts, Alaska: U. S. Geol. Survey Bull. 844(d), 1931, pp. 207-208.
6/ Waters, A. E., Jr., Placer Concentrates of Rampart and Hot Springs Districts: U. S. Geol. Survey Bull. 844(d), 1931, p. 246.

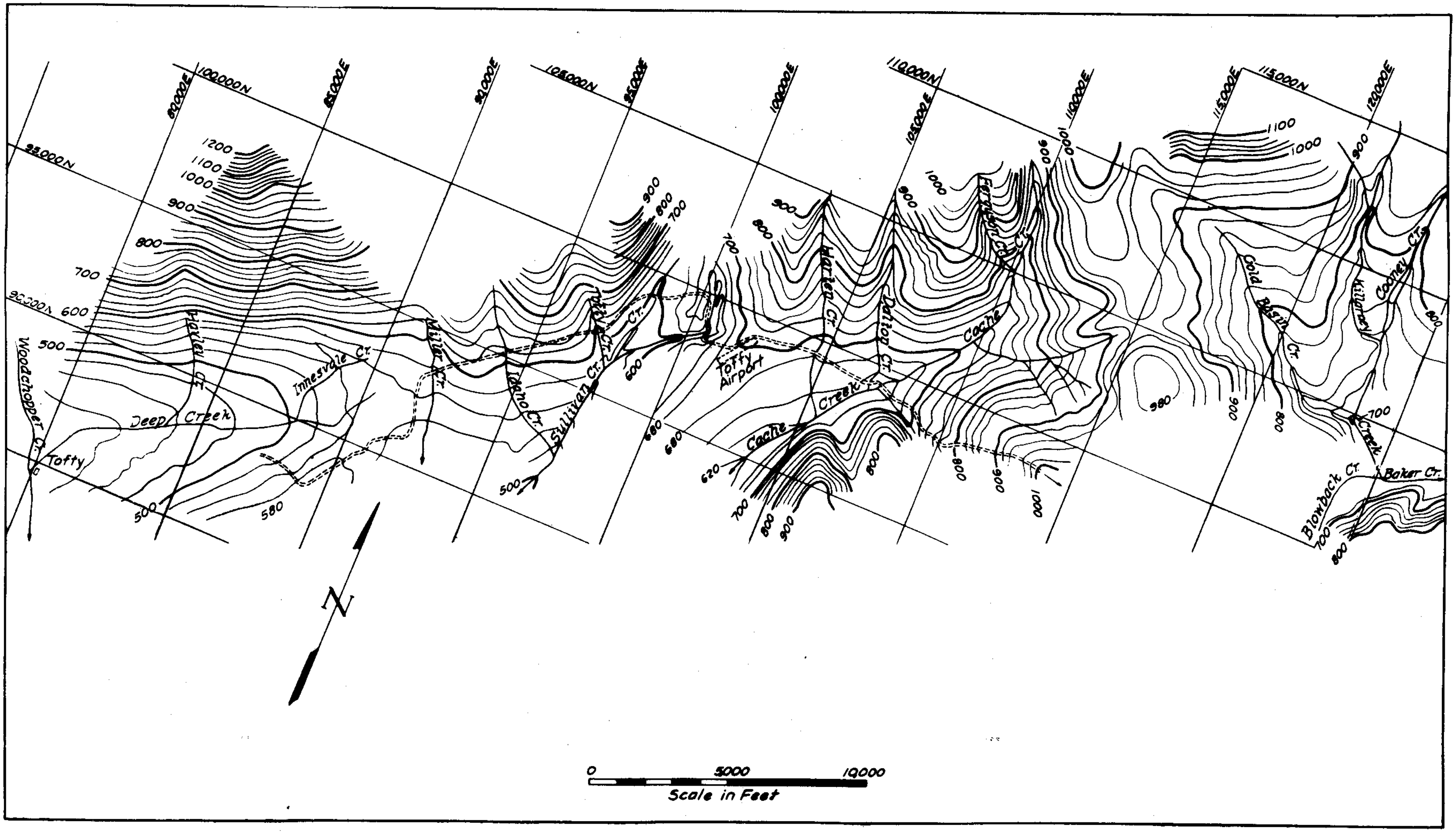
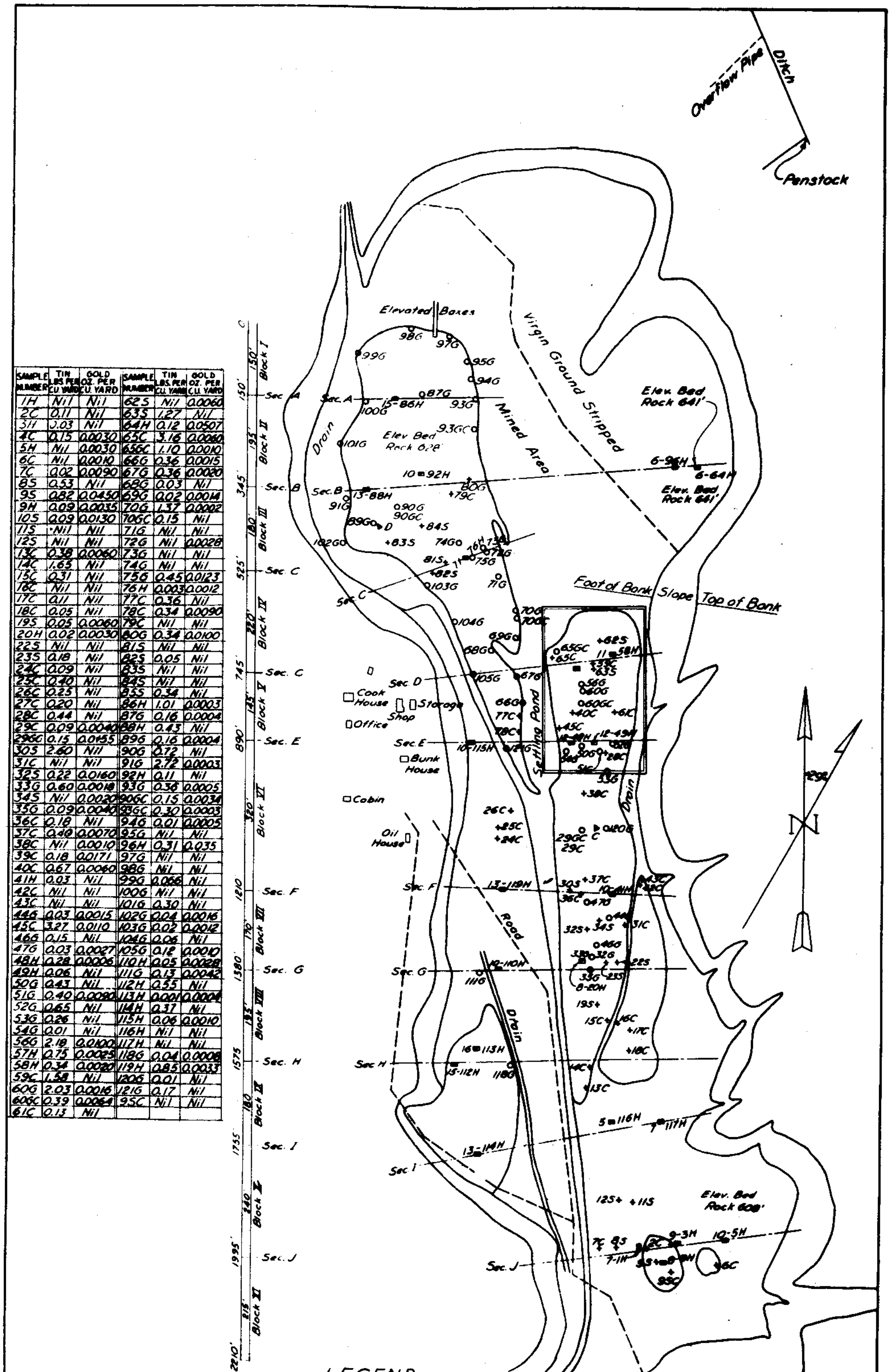



Figure 2. - Tofty area, Hot Springs district. (Source of topography unknown, possibly after U. S. Geological Survey.)




| SAMPLE NUMBER | TIN LBS. PER CU. YARD | GOLD OZ. PER CU. YARD | SAMPLE NUMBER | TIN LBS. PER CU. YARD | GOLD OZ. PER CU. YARD |
|---|---|---|---|---|---|
| 1H | Nil | Nil | 62S | Nil | 0.0060 |
| 2C | 0.11 | Nil | 63S | 1.27 | Nil |
| 3H | 0.03 | Nil | 64H | 0.12 | 0.0507 |
| 4C | 0.15 | 0.0030 | 65C | 3.16 | 0.0060 |
| 5H | Nil | 0.0030 | 65GC | 1.10 | 0.0010 |
| 6C | Nil | 0.0010 | 66G | 0.36 | 0.0015 |
| 7C | 0.02 | 0.0090 | 67G | 0.36 | 0.0020 |
| 8S | 0.53 | Nil | 68G | 0.03 | Nil |
| 9S | 0.82 | 0.0450 | 69G | 0.02 | 0.0014 |
| 9H | 0.09 | 0.0035 | 70G | 1.37 | 0.0002 |
| 10S | 0.09 | 0.0130 | 70GC | 0.15 | Nil |
| 11S | Nil | Nil | 71G | Nil | Nil |
| 12S | Nil | Nil | 72G | Nil | 0.0028 |
| 13C | 0.38 | 0.0060 | 73G | Nil | Nil |
| 14C | 1.65 | Nil | 74G | Nil | Nil |
| 15C | 0.31 | Nil | 75G | 0.45 | 0.0123 |
| 16C | Nil | Nil | 76H | 0.003 | 0.0012 |
| 17C | 0.11 | Nil | 77C | 0.36 | Nil |
| 18C | 0.05 | Nil | 78C | 0.34 | 0.0090 |
| 19S | 0.05 | 0.0060 | 79C | Nil | Nil |
| 20H | 0.02 | 0.0030 | 80G | 0.34 | 0.0100 |
| 22S | Nil | Nil | 81S | Nil | Nil |
| 23S | 0.18 | Nil | 82S | 0.05 | Nil |
| 24C | 0.09 | Nil | 83S | Nil | Nil |
| 25C | 0.40 | Nil | 84S | Nil | Nil |
| 26C | 0.25 | Nil | 85S | 0.34 | Nil |
| 27C | 0.20 | Nil | 86H | 1.01 | 0.0003 |
| 28C | 0.44 | Nil | 87G | 0.16 | 0.0004 |
| 29C | 0.09 | 0.0040 | 88H | 0.43 | Nil |
| 29GC | 0.15 | 0.0155 | 89G | 0.16 | 0.0004 |
| 30S | 2.60 | Nil | 90G | 0.72 | Nil |
| 31C | Nil | Nil | 91G | 2.72 | 0.0003 |
| 32S | 0.22 | 0.0160 | 92H | 0.11 | Nil |
| 33G | 0.60 | 0.0018 | 93G | 0.36 | 0.0005 |
| 34S | Nil | 0.0020 | 90GC | 0.15 | 0.0034 |
| 35G | 0.09 | 0.0040 | 93GC | 0.30 | 0.0003 |
| 36C | 0.18 | Nil | 94G | 0.01 | 0.0005 |
| 37C | 0.40 | 0.0070 | 95G | Nil | Nil |
| 38C | Nil | 0.0010 | 96H | 0.31 | 0.035 |
| 39C | 0.18 | 0.0171 | 97G | Nil | Nil |
| 40C | 0.67 | 0.0060 | 98G | Nil | Nil |
| 41H | 0.03 | Nil | 99G | 0.066 | Nil |
| 42C | Nil | Nil | 100G | Nil | Nil |
| 43C | Nil | Nil | 101G | 0.30 | Nil |
| 44G | 0.03 | 0.0015 | 102G | 0.04 | 0.0016 |
| 45C | 3.27 | 0.0110 | 103G | 0.02 | 0.0012 |
| 46G | 0.15 | Nil | 104G | 0.06 | Nil |
| 47G | 0.03 | 0.0027 | 105G | 0.12 | 0.0010 |
| 48H | 0.28 | 0.0006 | 110H | 0.05 | 0.0028 |
| 49H | 0.06 | Nil | 111G | 0.13 | 0.0042 |
| 50G | 0.43 | Nil | 112H | 0.55 | Nil |
| 51G | 0.40 | 0.0090 | 113H | 0.001 | 0.0004 |
| 52G | 0.65 | Nil | 114H | 0.37 | Nil |
| 53G | 0.26 | Nil | 115H | 0.06 | 0.0010 |
| 54G | 0.01 | Nil | 116H | Nil | Nil |
| 56G | 2.18 | 0.0100 | 117H | Nil | Nil |
| 57H | 0.75 | 0.0025 | 118G | 0.04 | 0.0008 |
| 58H | 0.34 | 0.0020 | 119H | 0.85 | 0.0033 |
| 59C | 1.58 | Nil | 120G | 0.01 | Nil |
| 60G | 2.03 | 0.0016 | 121G | 0.17 | Nil |
| 60GC | 0.39 | 0.0064 | 95C | Nil | Nil |
| 61C | 0.13 | Nil | | | |

Figure 3. - Sullivan Creek bench pit.

placers are the result of a reworking of older tin-bearing gravel laid down by an ancient stream that once flowed parallel to the present site of the tin placers but at a higher level.

The position of this ancient stream could well have been above the level of the divide now separating the headwaters of Baker and Sullivan Creeks. The present topography suggests the possibility of the Baker-Sullivan Creek depression being in line with what was once an ancient stream. The specific gravity of the concentrates at the west end is reported to be lower than that of the concentrates at the east end of the tin belt. This difference could have been the result of alluvial transportation from east to west. In addition, the tin belt is at a lower level west of Sullivan Creek. The individual particles are more rounded than would be expected had their source been along, or just above, the tin belt. The concentrates in Sullivan Creek are coarser than rice grains, with no finer particles. This fact suggests selective reconcentration. However, cassiterite has not been found outside the tin belt. Placers of the streams that drain from the north are not deeply buried and have been prospected, whereas south of the tin belt the placers are deeply buried and have not received so much attention. Unless cassiterite occurs in considerable quantity, it is usually overlooked by the average prospector.

Possibly the lower aggraded portion of Sullivan Creek contains a large area of very low grade tin- and gold-bearing gravels. This ground is wet and is therefore difficult to prospect by sinking shafts. Moreover, it is deep, and prospectors have found the values distributed throughout the gravel, rather than lying directly on bedrock. If mineable values are discovered in these lower alluvial deposits, considerable time and money would be required to adequately explore and bring them into production.

## CHARACTER OF DEPOSITS

The gravel is principally quarzite but also includes considerable vein quarz and some phyllite. Pay gravel averages 3 to 10 feet in thickness and is overlain by 50 to 60 feet of muck. Both the muck and gravels are permanently frozen. The gravels are not cemented and contain few rocks larger than 10 inches in diameter. The better concentrations of tin are associated with gold.

The bedrock of phyllite and pyritized slate is easily cleaned to a depth of 2 feet. Cassiterite and gold have not penetrated the bedrock below this level.

As the gravel approached economic grade it was noted that cassiterite occurred as fine grains and that the gold was coarse. Lower values were represented by a few pebbles of cassiterite and flaky gold; that is, as values increase, the cassiterite particle size decreases proportionately. The cassiterite pebbles usually carry quartz inclusions, which are freed as the pebbles are worn down in size, with concurrent increase in specific gravity. Cassiterite ranged in size from 1 inch down to the size of rice grains, with virtually no finer particles. The gold, in general, was fine and flaky and would not yield a high recovery if reworked.

Tailing-pile structures reflect the position of contained pay streaks, and may determine their economic value. For each mining location in the pit there is a distinct reversal of material. The mining sequence was as follows:

1. Top sediments, sluiced and piled on bedrock.

2. Barren gravel, sluiced and piled on sediments.

3. Pay gravel containing some bedrock, sluiced and piled on gravel.

4. A small amount of bedrock containing slight value, sluiced and piled on pay gravel.

The tailing would be relatively easy to sample if the materials were entirely true, but as each type was washed it was repiled with a bulldozer, resulting in a highly erratic distribution of values. In general, the lower portion of the present tailing, representing that portion of top sediments sluiced and piled on a bedrock, definitely has no value. However, in certain places the tailing has been repiled in such a manner that some strata contain erratic values, enclosed by barren material. This condition is the result of placing material from several pits into one pile.

After the tailings were piled new drains were dug with a dragline, and the material was heaped along the sides in irregular cones. Later these drains were cleared or deepened, and the original cones bordering the drains were covered with fine, barren sediments.

The gravels are free from pyrite, but the bedrock contains about 0.1 pound a cubic yard. As considerable bedrock is mined in each section, pyrite is now found in that general portion of the tailings containing the better values. In the event of reworking the tailings by sluicing one might expect this pyrite to cause some difficulty by clogging the riffles.

## SAMPLING

### General Information

The sampling was done at temperatures of 35° to 45° below zero, with only about 6 hours of daylight. Under these conditions the efficiency of the men was very low. Samples froze quickly, and warm cabins were required in which to pan. Difficulty was experienced in preventing the steam lines and exterior fittings from freezing. Shafts and gopher holes rapidly returned to their original frozen state and made rethawing frequently necessary. As the winter progressed, more daylight was available, and less severe temperatures were experienced. Everything was covered with snow, and trails had to be broken with caterpillars or snowshoes.

### Shaft Sampling

The irregular topography of the pit was not conducive to shaft sampling. Some horizontally deposited gravel piles with flat tops were sampled by shafts.

The gravel was first thawed with a boiler and steam points, and each successive foot was sampled. The average size of the shafts was 5 by 3 by 10 feet. Each shaft was sunk through gravel and at least 1 foot of bedrock. No gold or tin was found in the lower part of the shafts or on bedrock.

## Sampling Horizontally

Horizontal cuts were made in sampling piles or cones of tailings. Gopher holes, 18 inches in diameter and 6 feet long, were thawed to cut the internal structure of the coned piles. These holes were started midway up the pile, and each linear foot was sampled separately.

## Channel Samples

Channel samples, 4 by 6 inches, were cut in vertical faces along roads and drains.

## Surface Samples

Surface samples were taken where no other type of sampling was practicable. These were cut as shallow holes in the surface of piles.

## Sampling Procedure

Shaft and gopher-hole samples were removed in the thawed state. Surface and channel samples were cut from frozen gravels. When taken, each sample filled a sample bucket having a capacity of 1,900 cubic inches. It was determined that shaft and gopher-hole samples represented 0.95 cubic feet in place, while surface and channel samples equaled 0.67 cubic feet in place. The average weight of material was 135 pounds a cubic foot in place. The following method was used to determine the ratio between the quantity of thawed gravel and that of gravel in place: A number of shallow holes were thawed within a small area; the gravel was removed and measured. The excavation was then filled with a measured volume of water. This quantity was corrected for seepage during the measuring period by noting the length of the measuring period, allowing the water to stand an additional equal period of time, and then adding enough water to again fill the hole. The latter quantity equals the amount of seepage and was subtracted from the original water measurement to give the volume of the excavation.

Thawed samples freeze rapidly on being cut and are difficult to wash. To facilitate panning, all samples were panned as rapidly as taken.

A few samples were washed by rocker, but the coarse particles of cassiterite remained in the hopper and were difficult to distinguish from associated gravels. The rocker was soon discarded, and all samples were panned. Two panners were employed; each cut wood, melted snow, and panned 6 cubic feet of samples a day. Each evening samples were collected to be cleaned and weighed at the office, at which time the gold and tin were separated.

## SAMPLING RESULTS

Sample results ranged between wide limits. The location and metal content of Sullivan Creek samples are shown in figures 3, 4, 5, and 6. Figure 2 shows the location of samples in the upper part of the block, where the highest tin content was found. A summary of sampling results is shown in table 1.

TABLE 1. - Grade of Sullivan Creek tailing deposit

| Block | Tin, pound per cubic yard | Gold, ounce per cubic yard |
|---|---|---|
| I | 0.218 | 0.0002 |
| II | .589 | .0003 |
| III | .285 | .0014 |
| IV | .382 | .0017 |
| V | .613 | .0020 |
| VI | .260 | .0021 |
| VII | .270 | .0022 |
| VIII | .151 | .0017 |
| IX | .203 | .0003 |
| X | .043 | .0014 |
| XI | .082 | .0038 |
| Average | 0.241 | 0.0015 |
| | Upper part of small block | |
| Parts of IV, V, and VI | .777 | .0028 |

It appears that the recovery of tin from gold placer mining has been about 0.04 pound a cubic yard. This, added to the average tin content of the tailing, gives an indicated original content of 0.28 pound of tin a cubic yard.

## BIBLIOGRAPHY

1. EAKIN, HENRY M. A Geological Reconnaissance of a Part of the Rampart Quadrangle, Alaska. U. S. Geol. Survey Bull. 535, 1913, 38 pp.

2. MERTIE, J. B., JR. Mineral Deposits of the Rampart and Hot Springs District, Alaska. U. S. Geol. Survey Bull. 844(d), 1931, pp. 207-208.

3. WATERS, A. E. JR. Placer Concentrates of Rampart and Hot Springs District. U. S. Geol. Survey Bull. 844(d), 1931, p. 246.

4. DOHENY, L. C. Placer Evaluation in Alaska. Eng. and Min. Jour., December 1941.

5. SMITH, PHILIP S. Mineral Industry of Alaska in 1940. U. S. Geol. Survey Bull. 933(a), 1942, p. 38

6. ELLSWORTH, C. E., AND DAVENPORT, R. W., Surface Water Supply of the Yukon-Tanana Region, Alaska. U. S. Geol. Survey Water Supply Paper 342, 1915, 343 pp.

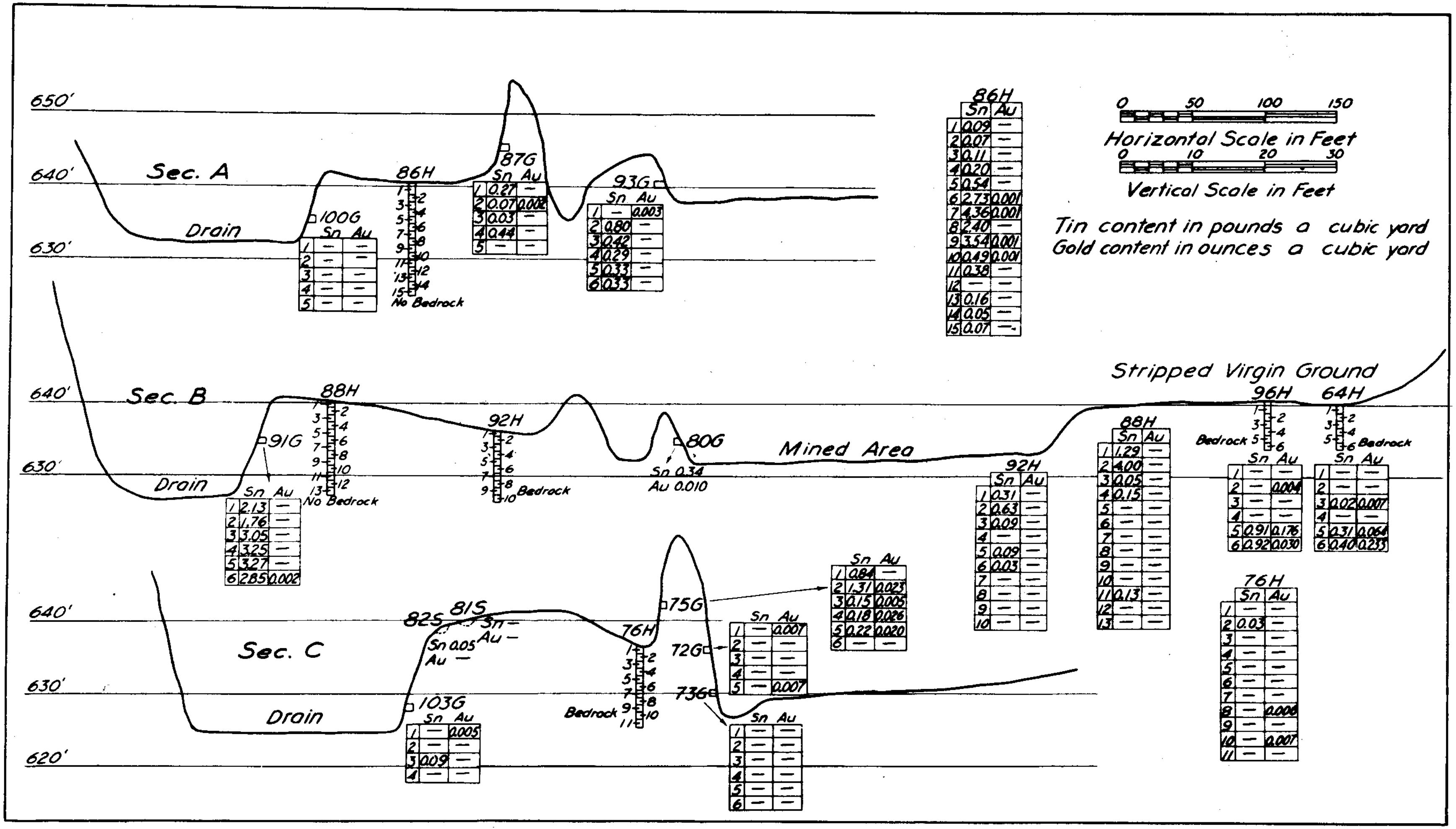



Figure 4. - Cross sections, Sullivan Creek pit.

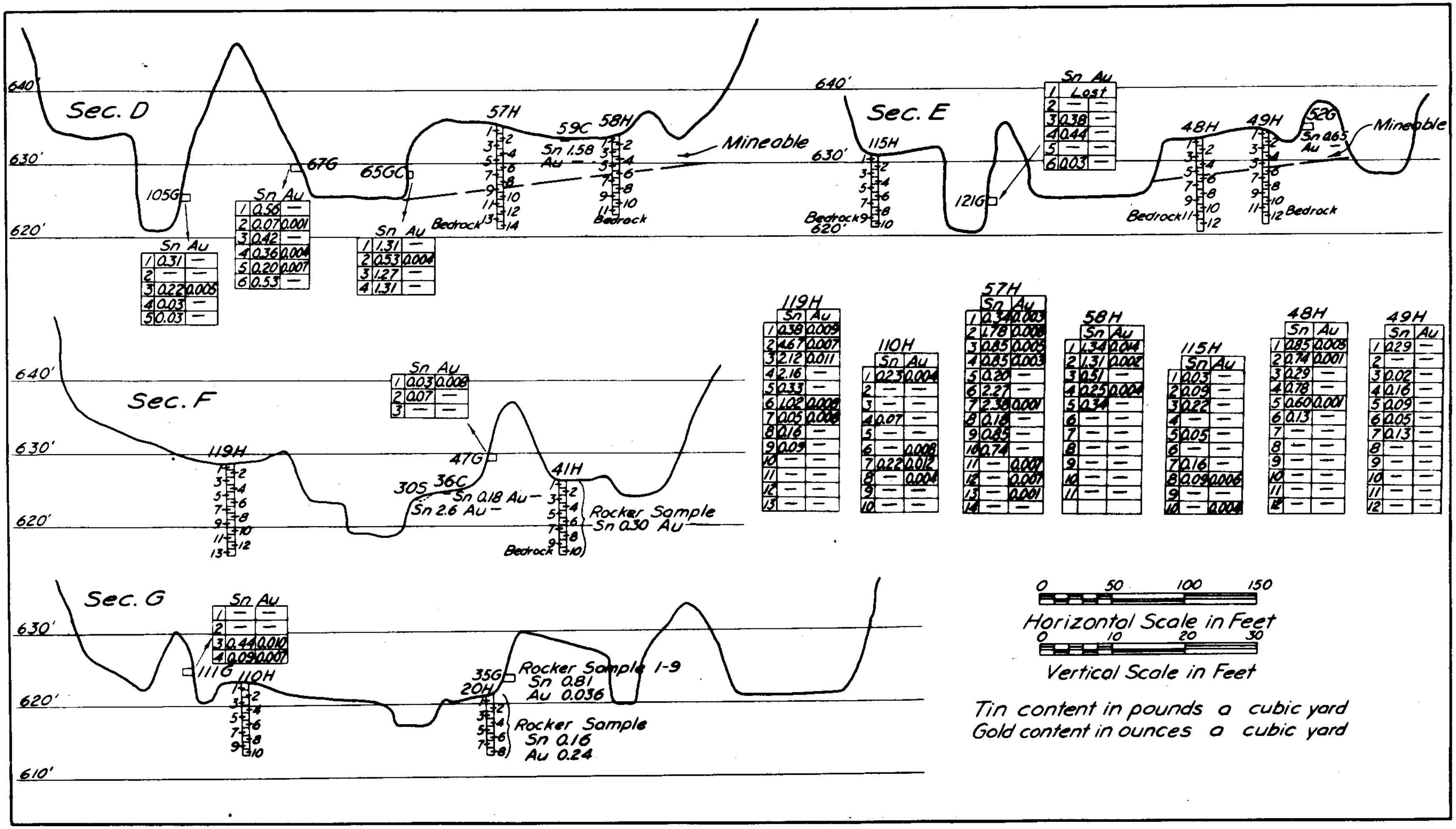
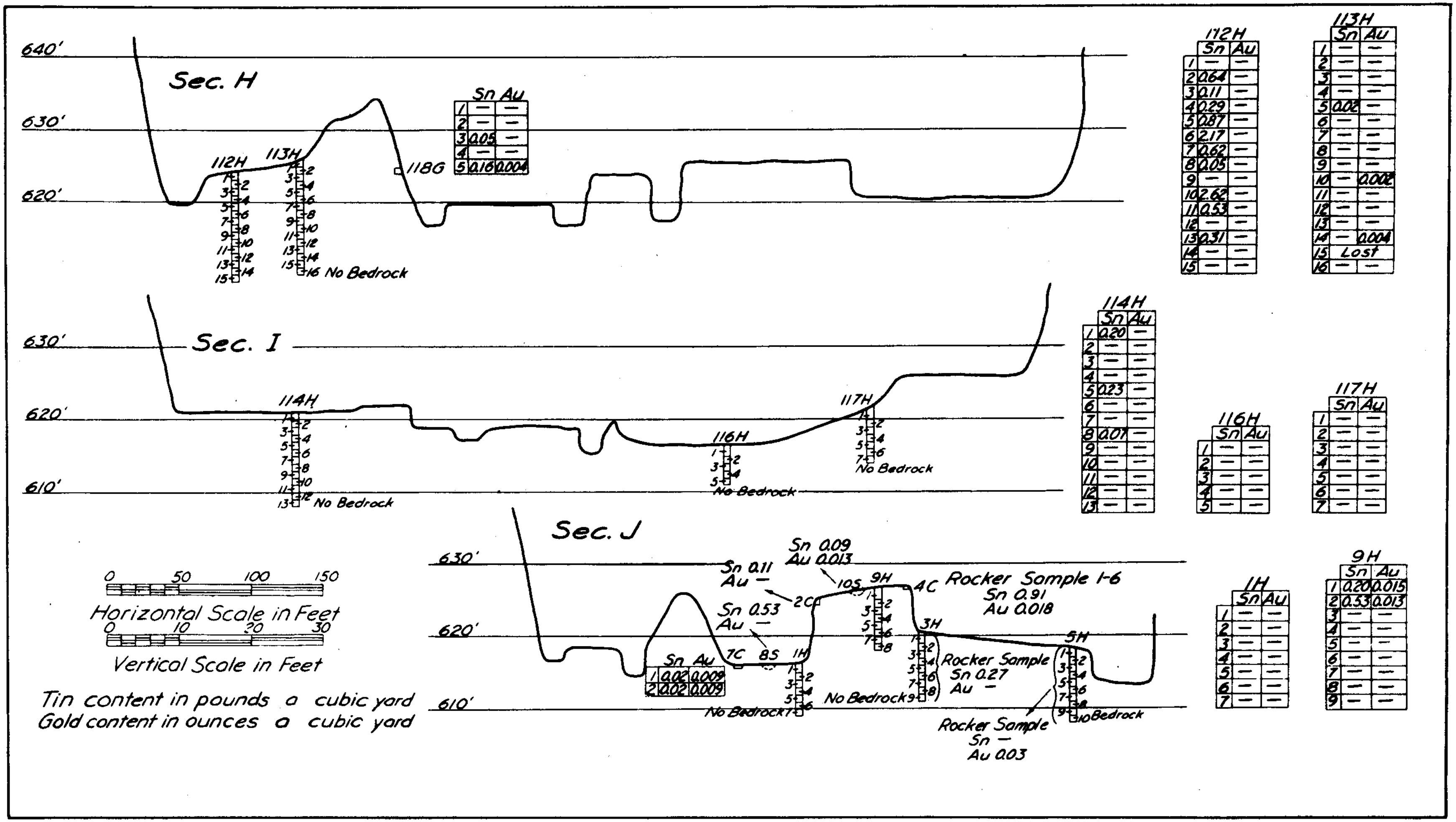


Figure 5. - Cross sections, Sullivan Creek pit.




118G

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | — | — |
| 3 | 0.05 | — |
| 4 | — | — |
| 5 | 0.16 | 0.004 |

112H

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | 0.64 | — |
| 3 | 0.11 | — |
| 4 | 0.29 | — |
| 5 | 0.87 | — |
| 6 | 2.17 | — |
| 7 | 0.62 | — |
| 8 | 0.05 | — |
| 9 | — | — |
| 10 | 2.62 | — |
| 11 | 0.53 | — |
| 12 | — | — |
| 13 | 0.31 | — |
| 14 | — | — |
| 15 | — | — |

113H

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | — | — |
| 3 | — | — |
| 4 | — | — |
| 5 | 0.02 | — |
| 6 | — | — |
| 7 | — | — |
| 8 | — | — |
| 9 | — | — |
| 10 | — | 0.002 |
| 11 | — | — |
| 12 | — | — |
| 13 | — | — |
| 14 | — | 0.004 |
| 15 | Lost | |
| 16 | — | — |

114H

| | Sn | Au |
|---|---|---|
| 1 | 0.20 | — |
| 2 | — | — |
| 3 | — | — |
| 4 | — | — |
| 5 | 0.23 | — |
| 6 | — | — |
| 7 | — | — |
| 8 | 0.07 | — |
| 9 | — | — |
| 10 | — | — |
| 11 | — | — |
| 12 | — | — |
| 13 | — | — |

116H

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | — | — |
| 3 | — | — |
| 4 | — | — |
| 5 | — | — |

117H

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | — | — |
| 3 | — | — |
| 4 | — | — |
| 5 | — | — |
| 6 | — | — |
| 7 | — | — |

Sec. J

| | Sn | Au |
|---|---|---|
| 1 | 0.02 | 0.009 |
| 2 | 0.02 | 0.009 |

1H

| | Sn | Au |
|---|---|---|
| 1 | — | — |
| 2 | — | — |
| 3 | — | — |
| 4 | — | — |
| 5 | — | — |
| 6 | — | — |
| 7 | — | — |

9H

| | Sn | Au |
|---|---|---|
| 1 | 0.20 | 0.015 |
| 2 | 0.53 | 0.013 |
| 3 | — | — |
| 4 | — | — |
| 5 | — | — |
| 6 | — | — |
| 7 | — | — |
| 8 | — | — |
| 9 | — | — |

Figure 6. - Cross sections, Sullivan Creek pit.