4190 0028

ITEM 28

207

To be returned to Geo F. Houldsworth 231 Fulton St. Redwood City, Calif.

Report by
HOWARD W. SQUIRES
REGISTERED PROFESSIONAL
ENGINEER

CIVIL ENGINEERING
WATER RIGHT SURVEYS
MINING SURVEYS
GENERAL LAND SURVEYS

Sampling Report on Copper Mine Dumps of the Santa Fe Mining District, Mineral County, Nevada

LOCATION: The Santa Fe Mining District lies on the West flank of the mountain range to the east of Luning in the East of Mineral County, Nevada. Luning is on the Southern Pacific Railroad and the mines are a few miles to the East of town. The elevation of Luning is at 4,500 ft. while the mine ranges in elevations from 5,500 ft. to 7,000 ft.

HISTORY: The Santa Fe silver mine was discovered in 1879 and a number of other gold, silver, lead and copper mines were located in the district. Substantial production on the copper deposits began about 1906 and was encouraged by the "blowing in" of the Thompson Smelter at Wabuska, Nevada, some 80 miles distance by railroad, in 1912. Until the event of the Thompson Smelter, all Smelter shipments were sent to Salt Lake City, some 500 miles by rail. During World War I, the district was an important copper producer with some 49 operators shipping.

PRODUCTION: From 1906 thru 1921 the district produced 88,019 tons of ore containing 8,849,597 lbs. of copper, $129,146 in gold, 233,059 oz. silver and 253,019 lbs. of lead, valued in all at $2,406,829 according to Mineral Resources of the U.S. Geological Survey.

Geology: The country rock of the district consists of white and grey crystalline limestones, probably of Triasic age, which have been intruded by granitoid rocks ranging from quartz monzonite to quartz diorite that the probably Cretaceous Eruptive rock has broken through the surface for several miles. The result of this disturbance has been extensive fissuring and through the bedding planes ore solutions have circulated.

Ore Deposits: The most common type of ore deposit in the district is typical contact-metamorphic deposit, carrying ores of gold, silver lead and copper. Surface bearing zones consist of siliceous and magnesea bearing gangue impregnated and coated with chrysacolla and malachite. Replacement bodies of copper and lead ores also occur and are at a distance from known intrusives. Bodies of copper and lead ores also occur and are a distance from known intrusives. Ores readily recognized in the field are: Chrysocolla, $CUSiO3.2H2O$; Malachite, $Cu(OH)2.CuSO3$; Azurite, $Cu(OH)2.2C3$; some Gerargyrite, $AgCl$ (horn-silver) was observed and at the lowest elevation sampled, one dump showed Chalcopyrite, $CuFES2$ and Bornite, $Cu5FeS5$.

DESCRIPTION OF AREA SAMPLED: The large quantities of copper dumps existing in the district were surveyed and sampled and resolved themselves into two distinct areas or basins. The lower basin, situated at an elevation of some 5,500 ft., is readily reached by dirt road traveling some four miles Easterly from Luning across a dry lake to the base of the mountains, thence, up a dry wash into the basin where all of the dumps are accessable by roads. The upper basin, at an elevation of roughly 6,500 ft., is reached by traveling an old wagon road Southerly along the base of the mountains, thence, turning Easterly up a steep narrow canyon, thence, turning Northerly into the upper basin. This road is some seven miles in length and is in very poor shape. It can only be negotiated by special trucks or jeeps adapted to this rough type of going.

The upper and lower basins are within a mile of each other. The lower basin is situated generally in section 32 with the upper basin situated generally in Section 33 of Township 8 North, Range 35 East, Mt. Diablo Meridian. The two basins, however, are separated by an almost vertical mountain ridge extending up to elevation of 7,000 ft.

Evidence in the field indicates that there has been no mining of any importance in the district for the past 25 years as far as the copper deposits are concerned. Earlier mining operations were accomplished by scores of independent operators utilizing primitive methods of transportation including pack animals, ore-sleds, crude gravity trams and teams and wagons. In every case, evidence shows that the veins and ore deposits were mined their entire widths and the material then hand-picked for shipment. Countless numbers of ancient ore picking platforms stand in the district. As a result of this type of operation in the district, there remains today the large tonnages of cooper bearing dumps in the district which would not bear the excessive costs of the earlier independent operators in freighting their ores to the smelters.

Until this sampling program was carried out, there was no evidence of any extensive sampling of the dumps of the district. About half of the copper properties of this area are patented with the remainder being held by location. It is understood that Mr. William Beatty, Jr. of P. O. Box 2, Steamboat, Nevada is at present tying up the various properties under leases, options, and agreements, making it possible for the first time in the history of the area to bring the copper reserves existing in the dumps under one comprehensive engineering plan.

METHOD OF SURVEY AND SAMPLING OF DUMPS: Survey and sampling of the copper bearing dumps of the area was carried on in the field for five days between December 10 through December 14, 1951 by an experienced crew of three men especially trained in this type of work from Virginia City, Nevada. A special truck was utilized together with sampling tools, survey equipment and other essentials necessary to this type of program. Blasting was resorted to in some instances where the dumps had become frozen on Northern exposures. The sampling was under the immediate direction of Howard W. Squires, registered professional engineer with nineteen years experience in this type of work and recommended by the District Office of the U.S. Bureau of Mines at Reno, Nevada. Mr. Beatty was present and directed the crew to the various properties.

Seventy-seven samples in all were cut, crushed, split and sacked in duplicate in the field. All samples taken were tied in by survey to set stakes or a permanent object nearby. New heavy paper hardware sacks were used for the duplicate samples split in each case. A complete set of 77 samples was then shipped to the Union Assay Office, Salt Lake City, Utah for assay while a duplicate set of 77 samples are stowed at Virginia City, Nevada.

In each case where a group of large dumps resulted from mining a main shaft, tunnel, adit or open-pit, a survey was made and tonnages computed on actual measurements taken and computed on the factor that 20 cubic feet of the dumps weigh one ton. This factor was checked by the weight of one cubic foot of a test made up of a composite of the samples taken.

A total of 133 thousand tons of copper bearing dumps was accounted for, of this total, 40,500 tons were surveyed and sampled in the lower basin all being easily accessible. Seventy-one thousand five hundred tons were accounted for in the upper basin with the majority being accessible by present roads with the remainder being accessible with modern earth-moving equipment. Twenty-one thousand tons of dumps exist at the Wall Street Patent which can be made accessible after building about one mile of new road. The old timers hand sorted and then "stone-boated" every pound of ore from the Wall Street Patent which lies about a half mile by trail from the upper basin and at an elevation of about 7,000 ft.

Care was taken to obtain samples which are representative of the tonnages measured. Sampling was accomplished by first digging a good sized pit with pick and shovel down through the top of the dump or into the side of the dump to obtain a cross-cut of the dump formation. The immediate surface material was rejected due to possible leaching or concentration action of the copped. The bulk of the sample was placed on a large heavy quartering canvas. The larger pieces of the sample were then hand crushed and the sample then quartered with two final samples of approximately 3 lbs. in weight each being sacked and marked. In a few cases where a series of smaller dumps existed

3

scattered about a mall area, which in aggregate would amount to tonnage of importance, a grab sample was taken of said dumps and so described with the summation of tonnages.

In the majority, the dumps were found to be homogeneous in nature as the result of being formed from hand sorting the ore. The material is well broken up and mixed as a result from blasting and mining. The gangue material is of medium hardness which should not result in any particular grinding problem, nor are slimes present in any great amount. Where dumps were formed as the obvious result of exploration or development in waste, no samples were taken.

The following pages contain certified copies of the samples taken with assay results, descriptions and tonnages represented by the various samples.

LEGEND: PTD—Sample pit sunk down through top of dump.
PSD—Sample pit sunk down through side of dump.
GR——Grab sample of several small dumps in an area.

Samples A-1 through A-6 from group of dumps at "Little Jimmy" located mine held by Mr. Peterson. These dumps are situated along side the main canyon road and are the first reached coming into the upper basin. They exist as the result of mining from the main tunnel of this property and an attempt was made to segregate the low-grade from pure waste by the old timers.

Mark:	Legend:	Description:	Tonnage:	% Copper
A-1	PSD	N. 25 degrees E. 37 ft. from stake "A"	500	1.87
A-2	PSD	N. 46 degrees N. 27 ft. from stake "A"	500	0.55
A-3	PSD	S. 3 degrees W. 45 ft. from stake "A"	500	1.97
A-4	PSD	S. 6 degrees E. 69 ft. from stake "A"	500	1.26
		Total tons:	2,000 at	Av. Cu. 1.41%
A-5	PSD	N. 54 degrees E. 21 ft. from stake "A" (obviously a waste dump)	1,000	0.25
A-6	PSD	N. 57 degrees E. 64 ft. up hill from "A"	500	1.21

REMARKS: Excluding A-5 which is a separated waste dump, it will be possible to excavate and ship 2,500 tons of dump with an average copper content of 1.37% from the above group.

SAMPLES B-1 through B-6 are also from the "Little Jimmy" mine but from up the canyon about 300 ft. from the lower group of dumps. There is no present road up this steep canyon; however, these dumps can be moved for loading with modern earth-moving equipment. These dumps are the result of mining a lively looking glory hole area of some 40 ft. in width with at least 20,000 tons of the same grade of ore in place and in sight.

Mark:	Legend:	Description:	Tonnage:	% Copper
B-1	PSD	S. 40 degrees W. 90 ft. from stake "B"	—	2.48
B-2	PSD	S. 41 degrees W. 64 ft. from stake "B"	—	1.57
B-3	PSD	S. 17 degrees W. 35 ft. from stake "B"	—	2.63
		Total tons:	4,000 at	2.23%
B-4	PSD	S. 47 degrees W. 20 ft. from stake "B"	—	2.42
B-5	PSD	S. 33 degrees E. 18 ft. from stake "B"	—	2.33
B-6	PSD	N. 41 degrees E. 41 ft. from stake "B"	—	1.52
		Total tons:	3,000 at	2.09%

SAMPLES C-1 through C-15 all come from dumps on the Mayflower Patent which is the second group of dumps encountered coming into the upper basin. All of these dumps are accessible by modern methods of excavation. All "C" samples are tied by survey to the North Side-Center post of the Mayflower Patent.

Mark:	Legend:	Description:	Tonnage:	% Copper
C-1	PSD	120 ft. E. of NSC post	500	1.77
C-2	PSD	160 ft. E. of NSC post	1,500	2.35
C-3	PSD	250 ft. S. of NSC post	500	2.78
C-4	PSD	300 ft. S. of NSC post (portal, Mayflower)	3,000	2.78
C-5	PSD	350 ft. S. of NSC Post (segregated dump)	1,000	1.01
C-6	PSD	380 ft. S. of NSC post	1,000	1.94

C-7	GR.	accumulatioin of many small dumps in this area which is approx. 500 ft. S. of NSC post	2,000	2.45
C-8	PSD.	525 ft. S. of NSC post segregated dump	1,000	.61
C-9	PSD.	550 ft. S. of NSC post	2,000	1.66
C-10	PSD.	600 ft. S. of NSC post near top gravity tram	2,000	2.68
C-11	GR.	300 ft. S. of NSC post second bench area	2,000	1.92
C-12	GR.	300 ft. S. of NSC post third bench area	2,000	2.93
C-13	PSD.	600 ft. W. of NSC post over top of hill	2,000	3.25
C-14	PSD.	700 ft. W. of NSC post over top of hill	1,000	2.63
C-15	PSD.	750 ft. W. of NSC post over top of hill	1,000	2.96

REMARKS: C-5 and C-8 are obviously segregated waste dumps and can be excluded easily when excavating. In the second bench area above the portal of the main tunnel of the Mayflower, there is exposed by a fifty-foot vertical cliff an ore-body in place of 20,000 tons in sight of ore comparable to the samples taken from the second-bench area.

SAMPLES D-1 and D-2 are taken of the main dump at the Tip Top Galena patent which exist as the result of mining and shipping from the main tunnel. SAMPLE No. D-3 is from a small dump above and to the East of the main dump which resulted from shipments from an upper adit. These samples were assayed for Gold and Silver as well as Copper, as some galena and traces of cerargyrite were observed. These dumps are readily accessible by road directly to them and are the third set of dumps encountered coming into the upper basin. A few thousand tons of dumps exist on this property high up on the steep mountainside. However, they were considered as being too inaccessible to be of practical value.

Mark:	Legend:	Description:	Tonnage:	Gold:	Silver:	Copper:
D-1	PSD.	West end of main dump	2,000	Trace	0.4 oz.	1.92%
D-2	PSD.	40 E. of No. D-1 main dump	2,000	Trace	0.4 oz.	1.42%
D-3	PSD.	upper dump 70 ft. E. No. D-1	400	Trace	0.3 oz.	1.72%

REMARKS: The gold and silver values at this property seem to be of no particular value while the copper content of the dumps is an even grade.

SAMPLE D-4 was taken from the main dump at the Guardian Mine No. 1 patent. This is a property with interesting possibilities inasmuch as there is an excellent chance of developing an open pit mining operation on a large massive area of iron-gossan. It is estimated that the top of the hill at this property would produce 7,000 tons of ore comparable to that found in the dump.

D-4	PSD.	Main dump at Guardian Mine No. 1 patent	1,600 tons	Trace	0.05	2.68%

All samples of the "E" group come from the Turk patent; however, some of the dumps when hauled out of the main working tunnel were deposited upon the surface holdings of the Vacation patent. A survey shows that tonnages represented by samples No's E-1 through E-3 and E-12 through E-16 lie upon the Turk patent, samples E-4 through E-11 lie upon the surface holdings of the Vacation patent. These dumps are the fourth and upper groups of dumps encountered when coming up into the upper basin. The majority of these dumps are immediately accessible by the main road while the upper dumps can be loaded by modern machinery.

Mark:	Legend:	Description:	Tonnage:	%Copper
E-1	PSD.	N. 68 degrees E. 23 ft. from stake "E"	—	1.11
E-2	PSD.	S. 27 degrees E. 10 ft. from stake "E"	—	1.87
E-13	PSD.	N. 42 degrees W. 40 ft. from stake "E"	—	1.66
Remarks:		On Turk ground. Total tonnage this gr.	5,000 at av.	1.55% Cu.
E-3	PSD.	S. 8 deg. W. 25 ft. from "E" (segregated)	1,000	1.56
E-12	PSD.	N. 53 deg. E. 45 ft. from "E" (segregated)	1,000	0.80
Remarks:		Obvious waste dumps on Turk ground.	tons: 2,000	0.68% Cu.

E-14	PSD.	E. end upper dumps above Turk tunnel	3,000	1.26
E-15	PSD.	W. end upper dumps above Turk tunnel	3,000	2.53

Remarks: From upper workings of Turk mine. Total ton: 6,000 at av. 1.89% Cu.

E-4	PSD.	S. 13 W. 55 ft. from "E"		
E-5	PSD.	S. 45 W. 61 ft. " "E"		1.16
E-7	PSD.	S. 21 W. 100 ft. " "E"		1.99
E-8	PSD.	S. 18 W. 120 ft. " "E"		1.46
E-9	PSD.	S. 18 W. 160 ft. " "E"		1.97
E-10	PSD.	S. 10 W. 155 ft. " "E"		1.87
E-11	PSD.	S. 22 W. 195 ft. " "E"		1.72
				1.97

Remarks: Large dumps from Turk resting upon Vacation Patent.

Tonnage: 12,000 at av. 1.75% Cu.

E-6	PSD.	S. 33 W. 88 ft. from "E"	1,000	0.86
E-18	GR.	from area on top of mountain. Turk mine dumps. (could be made accessible with ½ mile rd.)	6,500 at av.	1.72

Samples of the "W" series were taken from the Wall Street patent which lies on top of the mountains at an elevation of some 7,000 ft. This mine is situated between the upper and lower basins but can only be reached on foot by a half-mile "Stone-boat" trail from the upper basin. Every pound of ore from the Wall Street patent was hand sorted at the extensive sorting bin still standing at the property. Some eight hand sorting bins and platforms were noted which resulted in these large tonnages of excellent grade copper bearing dumps. In order to make these dumps accessible a new road of about one mile in length would have to be built from the upper basin at a cost of several thousand dollars.

Marks:	Legend:	Description:	Tonnage:	% Copper:
W-1	PSD.	North-East face of lower main dump	5,500 tons	2.12
W-2	PSD.	South-East face of lower main dump	5,500 tons	2.27
			11,000 tons av.	2.20 % Cu.
W-3	PSD.	Main dump above ore sorting bin	4,000 tons at	2.22 " "
W-4	GR.	Series dumps in hoist-house area	3,000 " "	2.78 " "
W-5	PSD.	Waste dumps at upper adit	1,000 " "	0.96 " "
W-6	PSD.	Upper dumps from vein not sorted	2,000 " "	3.08 " "

Samples of the "F" series are taken from the Willie Higgins patent which was the largest operation in the lower basin. Samples F-1 through F-5 are from the main dump of the 300 ft. shaft while samples F-6 and F-7 are from the West portion of this main dump extending outward and kept separate from the main dump. It is reported that this main shaft is 300 ft. deep and was supposed to have exposed the ore 40 ft. wide on the 300 ft. level which is supposed to assay 5.22% Cu.

Marks:	Legend:	Description:	Tonnage:	% Copper:
F-1	PSD.	S. 30 E. 120 ft. from main shaft		0.80
F-2	PSD.	S. 20 E. 150 ft. " " "		0.45
F-3	PSD.	S. 10 E. 170 ft. " " "		0.60
F-4	SPD.	South 170 ft. " " "		0.71
F-5	PSD.	S. 10 W. 150 ft. " " "		0.75
Remarks:	These dumps are from shaft development.		14,000 av.	0.66
F-6	PSD.	S. 20 W. 150 ft. from main shaft	2,000	2.22
F-7	PSD.	S. 50 W. 150 ft. " " "	2,000	1.87
Remarks:	Segregated dumps from main shaft.		4,000 av.	2.07
F-8	PSD.	Dumps 500 ft. w. of shaft S.E. finger	1,000	0.04
F-9	PSD.	Dumps 500 ft. w. of shaft S.W. finger	1,000	1.21
E-10	GR.	West dumps, mine group	2,000	1.82
F-11	PSD.	West dumps, upper	2,000	1.06
E-12	PSD.	Large dump 100 ft. E. of shaft	1,500	0.70
F-13	PSD.	Large dump 200 ft. E. of shaft	2,000	0.80
F-14	GR.	Ore pile, ready for shipment	200	3.49

REMARKS: The majority of the dumps from the Willie Higgins patent are of lower grade, however, there remains about 6,000 tons of ore here, readily accessible

that will average about 1.5 Cu. B-13 is of no importance other than to give the information as to the value of the ore that was being shipped at the time the district shut down.

Samples of the "G" series are from the Copper Butte patent in the lower basin. As the first part of the main dump was hauled out of the open-pit area, it was of fair copper content, while the last part hauled out seems to be of much lower grade. In addition to the dumps, there is an excellent possibility of carrying on an open pit operation by continuing the open pit operations with modern machinery in the soft vein material which is exposed in a bank about 75 ft. high and several hundred ft. in length. This pit should produce at least 20,000 tons of copper ore comparable to sample G-7 which was taken as a grab-sample from existing piles of ore now lying in the open pit. All tonnages easily accessible.

Mark:	Legend:	Description:	Tonnage:	% Copper
G-1	PSD.	SW. end of main dump from open pit.		0.10
G-2	PSD.	W. center " " " "		0.86
G-3	PSD.	N.W. end " " " "		0.40
G-4	PSD.	N. of G-3		0.10
			4,000	0.36
G-5	PSD.	Center & 30 ft. from W. end of dump.	2,000	3.41
G-6	PSD.	Center & 100 ft. from W. end of dump.	1,000	1.16
G-7	GR.	Dumps in open pit.	2,000	1.66

****

Series "H" samples are from the Heela patent which is the lowest property in elevation in the lower basin. These dumps are right along side of the main road entering the basin. H-1 showed high in sulphides while H-2 and H-3 have both carbonates and sulphides.

H-1	PSD.	E. end of main dump tunnel.		1.46
H-2	PSD.	Center of main dump.		1.69
H-3	PSD.	West end of main dump.		1.87
			4,000	1.67

RECAPITULATION: The following averages of values and tonnages of the various dumps are set forth for the dumps of each property sampled, then grouped into the properties of the upper and lower basins. The Wall Street or "W" series is considered as being in the upper basin, inasmuch as it can only be reached by going through the upper basin. At the request of Mr. Beatty, any dump or group of dumps which contain an average of less than 1.50% copper are not included in this final summation.

UPPER BASIN:

LITTLE JIMMY MINE (Peterson):

Mark:	Tonnage	% Copper	Pounds of Copper Contained:
B-1 thru B-3	4,000	2.23	178,400
B-4 thru B-6	3,000	2.09	125,400
	7,000 tons	containing	303,800 lbs. Cu. at average of 2.17% Cu.

MAYFLOWER PATENT:

C-1	500	1.77	17,700
C-2	1,500	2.35	70,500
C-3	500	2.78	27,800
C-4	3,000	2.78	166,800
C-6	1,000	1.94	38,800
C-7	2,000	2.43	97,200
C-9	2,000	1.66	66,400
C-10	2,000	2.68	107,200
C-11	2,000	1.92	76,800
C-12	2,000	2.93	117,200
C-13	2,000	3.23	129,200
C-14	1,000	2.63	52,600
C-15	1,000	2.96	59,200
	20,500 tons	containing	1,027,400 lbs. Cu. at average of 2.51% Cu.

TIP TOP GALENA PATENT:

D-1	2,000	1.92	76,800
D-3	400	1.72	13,760
	2,400 tons	containing	90,560 lbs. Cu. at average of 1.88% Cu.

GUARDIAN NINE NO. 1 PATENT:

D-1 1,600 tons containing 85,760 lbs. Cu. at average of 2.68% Cu.

TURK PATENT:

Mark:	Tonnage	% Copper	Pounds of Copper Contained:
E-2, 2 & 13	5,000	1.55	155,000
E-14, 15	6,000	1.89	226,000
E-16	6,500	1.72	223,600
	17,500 tons	containing	604,600 lbs. Cu. at average of 1.73% Cu.

VACATION PATENT: (actually dumps from Turk on Vacation grounds).

E-4, 5, 7, 8, 9, 10 & 11	12,000 tons	containing	420,000 lbs. Cu. at average of 1.75% Cu.

WALL STREET PATENT:

W-1 & 2	11,000	2.20	484,000
W-3	4,000	2.22	177,600
W-4	3,000	2.78	166,800
W-6	2,000	3.08	123,200
	20,000 tons	containing	951,600 lbs. Cu. at average of 2.38% Cu.

SUMMATION DUMPS UPPER BASIN:

Property:	Tonnage:	% Copper	Pounds of Copper Contained:
LITTLE JIMMY MINE	7,000	2.17	203,800
MAYFLOWER PTENT	20,500	2.51	1,027,400
TIP TOP GALENA PATENT	2,400	1.88	90,560
GUARDIAN NO. 1 PAT.	1,600	2.68	85,760
TURK PATENT	17,500	1.73	604,600
VACATION PATENT	12,000	1.75	420,000
WALL STREET PATENT	20,000	2.38	951,600
	81,000 tons	containing	3,483,720 lbs. Cu. at average of 2.15% Cu.

LOWER BASIN:

WILLIE HIGGINS PATENT:

Mark:	Tonnage	% Copper	Pound of Copper Contained:
E-6 & 7	4,000	2.04	163,200
E-10	2,000	1.82	72,800
	6,000 tons	containing	236,000 lbs. Cu. at average of 1.95% Cu.

COPPER BUTTE PATENT:

G-5	2,000	3.44	137,600
G-7	2,000	1.66	66,400
	4,000 tons	containing	204,000 lbs. Cu. at average of 2.55% Cu.

HECLA PATENT:

H-1 thru H-3	4,000 tons	containing	133,600 lbs. Cu. at average of 1.67% Cu.

SUMMATION, LOWER BASIN:

Property:	Tonnage	% Copper	Pound of Copper Contained:
WILLIE HIGGINS PATENT	6,000	1.95	236,000
COPPER BUTTE PATENT	4,000	2.55	204,000
HECLA PAT.	4,000	1.67	133,600
	14,000 tons	containing	573,600 lbs. Cu. at average of 2.05% Cu.

TOTAL SUMMATION: BOTH BASINS:

Upper Basin:	81,000 tons	containing	3,483720 lbs. Cu. at average of 2.15% Cu.
Lower Basin:	14,000 tons	containing	573,600 lbs. Cu. at average of 2.05% Cu.
TOTAL:	95,000 tons	containing	4,057,320 lbs. Cu. at average of 2.15% Cu.