

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, \$123,146 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 Triassic 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 magnesia bearing gangue impregnated and coated with chrysocolla 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. Ore readily recognized in the field are: Chrysocolla, $\text{CuSiO}_3 \cdot 2\text{H}_2\text{O}$; Malachite, $\text{Cu}(\text{OH})_2 \cdot \text{CuSO}_3$; Azurite, $\text{Cu}(\text{OH})_2 \cdot 2\text{CO}_3$; some Gerargyrite, AgCl (horn-silver) was observed and at the lowest elevation sampled, one dump showed Chalcopyrite, CuFeS_2 and Bornite, Cu_5FeS_4 .

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 accessible 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 copper 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 scattered about a small 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, description 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.

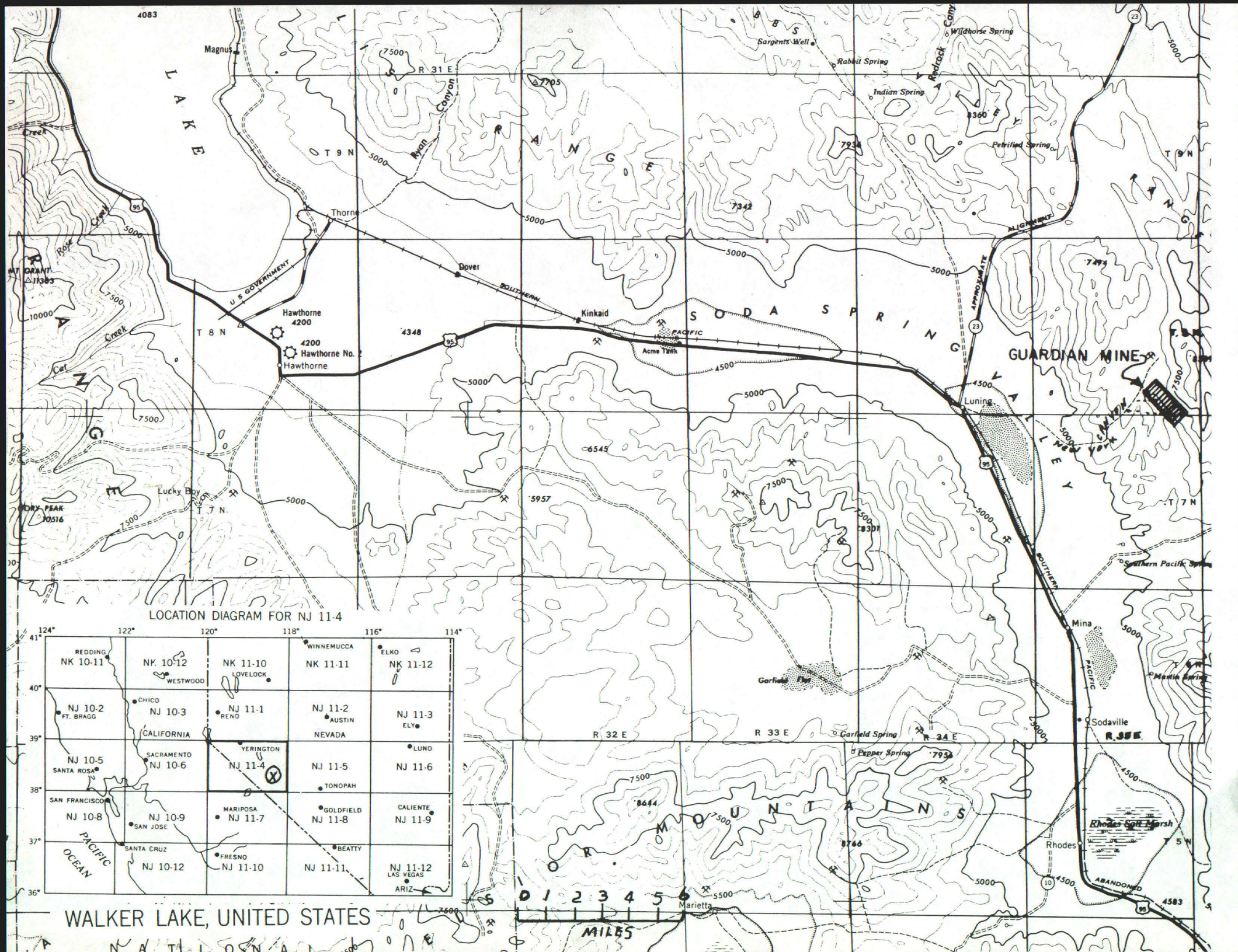
SAMPLES D-1 and D-2 are taken of the main dump at the Tip Top Galena Patent which exist as the result of mining and shipping from the main tunnel. Sample No. D-3 is from a small dump above and to the East of the main dump which resulted from shipments from an upper adit. These samples were assayed for 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.

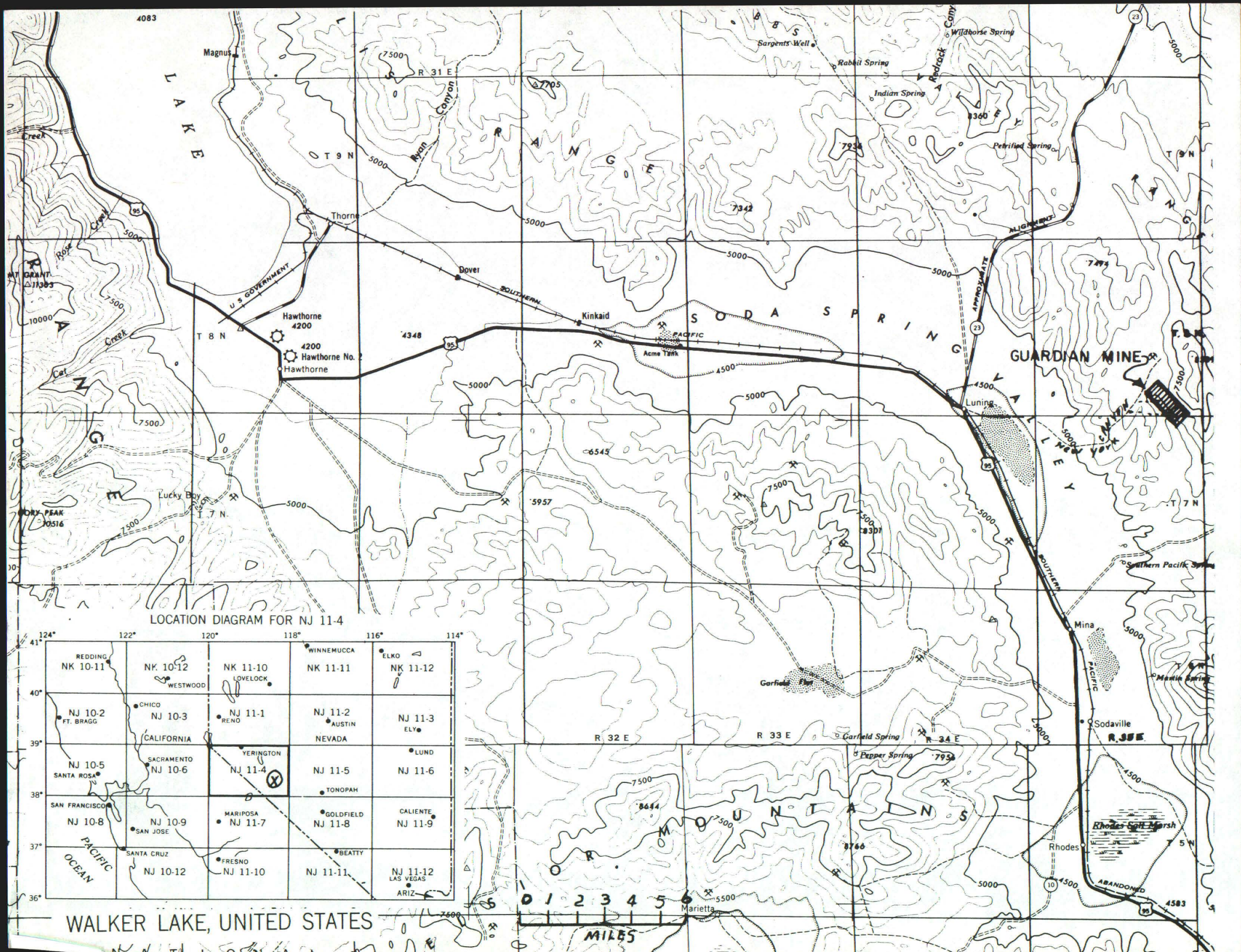
Mark:	Legend:	Description:	Tonnage	Gold	Silver	Copper
D-1	PSD	West end of main dump	2,000	Trace	0.4 oz.	1.92%
D-2	PSD	40 E. of No. D-1, main dump	2,000	Trace	0.4 oz.	1.42%
D-3	PSD	Upper dump 70 ft. E. No. D-1	400	Trace	0.3 oz.	1.72%

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%
-----	-----	--	---------------	-------	------	-------





APPENDIX — SAMPLE DESCRIPTIONS

[illegible]

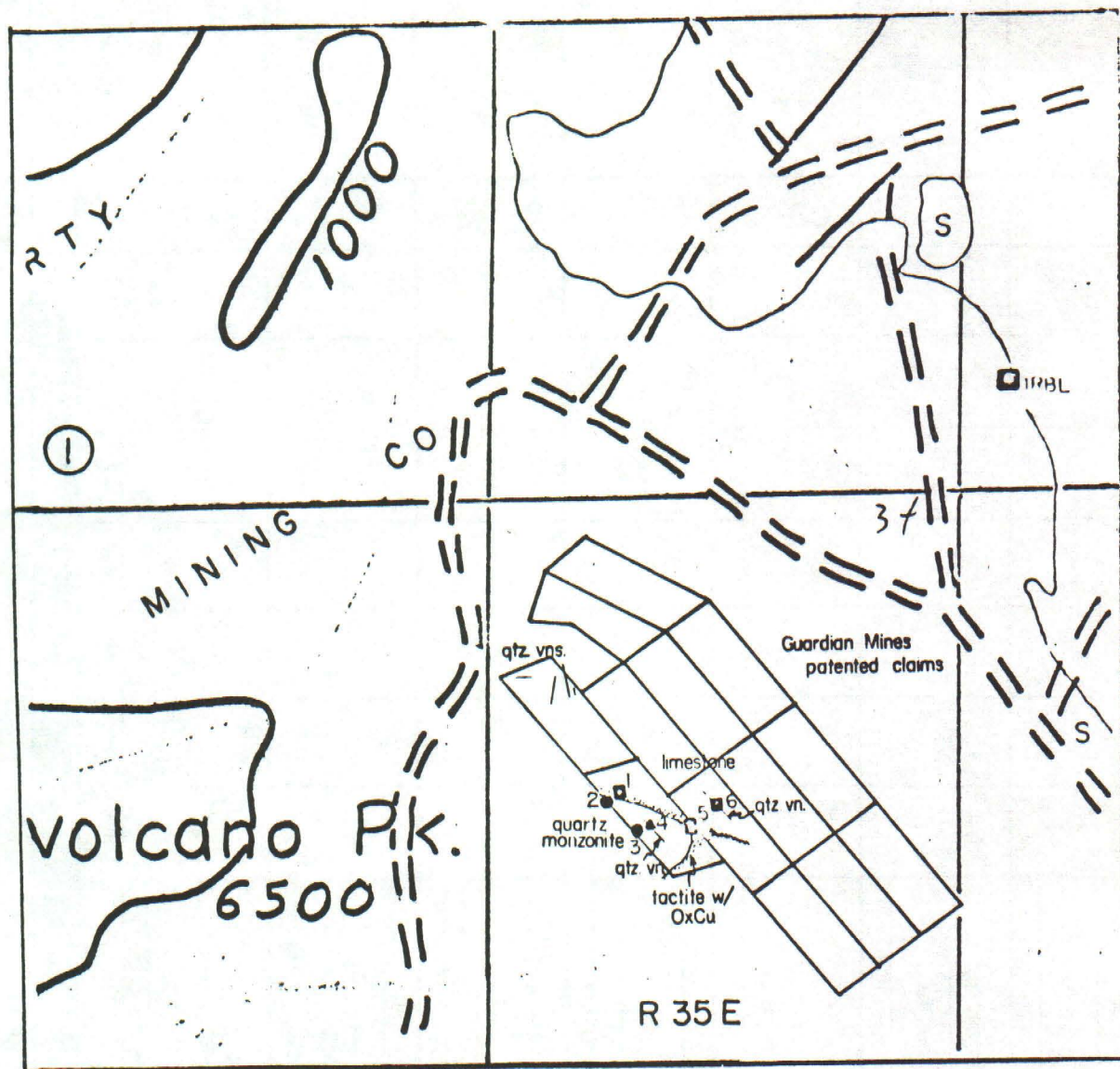
F = Field (Hand Lens) Description

B = Binocular Microscope

P = Thin Section (Petrographic)

ND = Not Detected





- = Less Than



Base Map: Luning S $\frac{1}{2}$ (319) Quadrangle

GEOLOGY MAP

Guardian Mines Prospect
Scale: 1"=2000' March 1973

- | | |
|--|--|
|  Quartz Monzonite |  Tactite |
|  Limestone |  Mineralized Quartz Vein |