BAILLY ENGINEERING ENTERPRISES

1860 0042

A GEOLOGIC AND EVALUATION ENGINEERING REPORT ON THE SUGAR LOAF PEAK AREA IN MINERAL AND ESMERALDA COUNTIES, NEVADA, FOR THE DEVELOPMENT AND PRODUCTION OF MERCURY

The official records extant, indicate intermittant mercury production over many years from the district as outlined on the attached map. The "Wild Rose" and "Tip-Top" Mines, as indicated, are on the Sugar Loaf Peak, on its southwestern flank.

The "Buckskin" mine is to the southeast of Sugar Loaf Peak. The district is referred to as the Red Mountain area in the published records.

It has been reported, but no search of title has been furnished the writer, that these mines, i.e. "Wild Rose" and "Tip-Top" mining areas are now covered by unpatented claims known as the "Starlight" Nos. 1, 2, 3, and 4, either in Mineral or Esmeralda Counties, whether in both is unknown, as actual boundary descriptions of the claims have not been furnished the writer, nor have identifiable monuments been found in the field. The writer is therefore assuming that this evaluation of the area shown on the included maps and profiles actually refer to the "Starlight" claims Nos. 1, 2, 3, and 4, consisting of 86 acres.

GEOLOGY The structural geologic history of the area is complex. Field studies indicate that the principal orogeny of the mountain ranges occurred during the Laramide revolution, during which period the earth crust underwent terrific upheavals, with subsequent continued upward and

downward block movements, with horizontal displacements. The latter caused lateral tear or drag faults which created zones of weakness running in a north north-easterly direction, which permitted deep seated magmas to approach the surface as pegmatite and basaltic dikes. These have been subsequently exposed through weathering and erosion, revealing the erosion resistant dikes which mark the tear fault trends. These dikes are to the east of Sugar Loaf Peak and parallel the fracture trend through Sugar Loaf itself. These approach the vertical in attitude but have a hade to the northwest.

In the case of the Sugar Loaf itself, its shape approximates that of an elliptically elongated cone rising some 800, or more, feet above a topographic basal contour. This strongly suggests that the opaline magma, which forms the core of the elongated cone, actually reached the surface, as would lava from a volcano. Further confirmation of this is the presence of thin, fractured platy slabs of opaline on the top and down the flanks of the "cone".

GLACIAL AGE DURING MAGMATIC FLOWS The general area shows evidence of severe glaciation through the magnitude of the many "cirques", visible to the southwest of Sugar Loaf. The present positions of the "cirques" are displaced and appear unrelated, but when horizontal displacements are taken into account, these "cirques" line up from the southwest to the northeast, through Sugar Loaf Peak. It is believed, therefore, that the erruption represented by the Sugar Loaf lava cone, occurred in the trough of a glacier and that a general period of volcanism affecting the district

of Sugar Loaf caused the restriction of the peak to a silicious or opaline lava coated peak, or, a cone without a crater. Immediate cooling and heat dissipation through the melting and evaporization of the thousand or more feet of glacial ice overburden, prevented erruption and permitted a slight overflow in the form of a high viscosity fluid - opaline.

Sugar Loaf itself is then, in our considered geologic opinion, the apex of, on the axis of one of the tear faults in the north south tear fault system. These are at a 30° to 40° angle of indidence to the northwest southeast regional fault system, which approaches "fift" proportions.

The very properties of mercury, as an element, give the clue as to the geologic reasons for considering the Sugar Loaf intrusion as the one with the greatest probability of being enriched with both native mercury and its salts, of both oxygen and sulfur, and perhaps others. The numerous analyses of surface and near surface samples (See Analysis Table and location of sampling on map), show substantial mercury values supporting the opinion that the opaline had to be created under very low, perhaps -40°, environmental temperatures. Opaline is an amorphous non-crystaline silica for it contains water, or $(Si + H_2O)$, is glass-like, or a solid liquid. By the same token, the silica vapor under pressure and low temperatures would become a solid liquid, trapping water together with native mercury in its vapor form. The cinnabar (HgS_2) or mercuric sulfide visibly present was formed in the opaline magma wherever there was sufficient sulfar in its vapor form in an environment of pressure and temperature to

combine with mercury within the central opaline filled fracture as the opaline magma rose to the surface.

It is therefore, our considered opinion that both native and other salts of mercury are present in the main silicious dike passing through and forming the peak itself, and extending to the southeast and northwest normal to the axis through Sugar Loaf Peak for at least one hundred to two hundred feet, and greater at a basal contour of 8400', arbitrarily chosen for reference. The above dimensions would be greater parallel to the axis passing through Sugar Loaf Peak. See Plates II and III.

RECOVERABLE MERCURY FROM SUGAR LOAF An estimate of recoverable mercury, determined from analysis simulating field conditions, as presently considered standard by operators of mercury mines, give an average recovery of 8 to 11 pounds of mercury per ton of ore. See Table of Analysis and where sampled as indicated on Plates II and III. This is considered to be above the national average for the yield of mercury per ton of ore, in profitably operated mines.

However, it is the writer's considered opinion that the above estimate, though based on actual simulated furnace runs, is conservative because personal research, over the past three years, in the behaviour of mercury itself, the environments necessary to the formation of its salts and in the processes in use for the treatment of the ores themselves has caused the writer to conclude that the latter methods are, for the most part, inefficient in the recovery of mercury actually present in the ore itself when undisturbed and in place, and unless the ore itself and

the processing plant itself ~~is~~ are not properly processed and operated, the above values would be less. To confirm this a laboratory analysis made from samples taken by the laboratory representative at the entrance to an old drift of the "Wild Rose" mine, showed values up to 50#/ton.

Field examination would indicate that the basal contour of the cone is at 8400 feet, plusoor minus, and this contour has been used as the plane of reference for the estimate of ore tonnage to be stripped and processed for the mercury content estimates. The peak top is at 9180', or some 880 feet difference in elevation. The long axis (north-south) is conservatively 2000 feet long and the average mineralized zone is conservatively 1000' wide.

RECOMMENDATION Mining. The Sugar Loaf Peak is, because of its ores and their values, right at the peak downward to a minimum of 880', lends itself to open pit terrace mining from the top to the bottom and flowing the ore mined through a closed conveyor to a plant site at the base of the "cone", taking advantage of gravity.

The ore as mined would flow into the proper crushers, sizers and storage bins, all part of the closed system. The separated particle sizes would be batched by size through one large retort, indirectly heated, or a multiple of smaller capacity retorts and condensors. In order to maintain constant and continuous production the year around, the multiples of smaller capacity retort installations is preferred and could be used in tandem with a large capacity retort. It cannot be over emphasized that a completely closed system including the housing of the

entire mill itself should be considered for both maximum recovery of mercury and reduction of the hazards involved when mining and processing mercury ores.

Temperature control within the retort is important and critical depending upon the type of ore being run as well as the particle size of the ore being run.

It is therefore recommended that a relatively small retort should be obtained as a pilot installation for evaluation work on the ores as they are sought for and mined, so that their processing requirements will be known before they reach the production processing plant installation.

It must be recognized that there is no mercury processing and production industry established. If these recommendations are followed, a real mercury industry may emerge where both in mining and processing, manpower will be at a minimum. Controls for efficient recovery of mercury will be "robotic", for the necessary hardware is available, and in use in other industries.

It must be strongly emphasized that these values will not be recovered unless the entire operation is conducted with the most up to-date equipment and the application of up to-date knowledge in the field by fully qualified operators as outlined under Recommendations for mining and processing the Sugar Loaf Peak ores of Mercury.

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TABLE OF ORE ANALYSES

Sample	Location	Method	# Hg/ton	Samplers-Analysis Witness
1	Entrance Drift "Wild Rose" Mine	Laboratory Analytical	50	Stanley DiSantis and Terminal Testing staff
2	Above (1) and to South	Retort	11.8	Stanley DiSantis, sample and witness
3	Below (1) to SW surface	Retort	11	Stanley DiSantis, sample and witness
4	Below (3) SW	Retort	11.7	Stanley DiSantis, sample and witness
5	Scatter 100# samples open face	Retort	8 - 10	W. S. Coon, sampled and witnessed.

NOTE: Methods of Analysis: Laboratory analytical, vs Retort indicates and reflects degree of efficiency between methods of processing rather than variation in the ore itself though such may, and does exist. Efficient field mining and processing would have as its goal the attainment of the higher values which analytical methods indicate are present in this type ore.

ESTIMATE OF MERCURY RESERVES

Assumptions:

1. Claims known as Starlight Nos. 1, 2, 3, and 4 cover 86 acres, and cover the Sugar Loaf Peak area studied, field explored, and evaluated.

2. At least 40 acres of the 86 acres could be covered by the claims.

3. 40 acres do cover the elliptical area of the mineralized Sugar Loaf Peak area, hence this area will be used as a factor in tonnage of mercury ore to be mined and processed. From elevation profiles it appears that a thickness of 265' of ore spread over 40 acres will conservatively give the tonnage of ore.

Computations:

40 acres = 1,742,400 sq. ft.

$$\frac{A_c ft \times d'}{27} = \frac{1,742,400 \times 265'}{27} = 17,013,333 \text{ cu. yds.}$$

Density of opaline assumed as 2.2 - 2.5 hence one cu. yd. has a weight of approximately 2 tons.

Total tonnage = 34,027,000 tons.

Assuming a conservative inefficient recovery of mercury of 10 lbs. per ton, there are 340,270,000 lbs. of mercury to be recovered, or in flasks at 76 lbs. per flask, approximately 4,500,000 flasks of mercury.

Steven O'Reilly
MAINE, Eng.

PLATE III

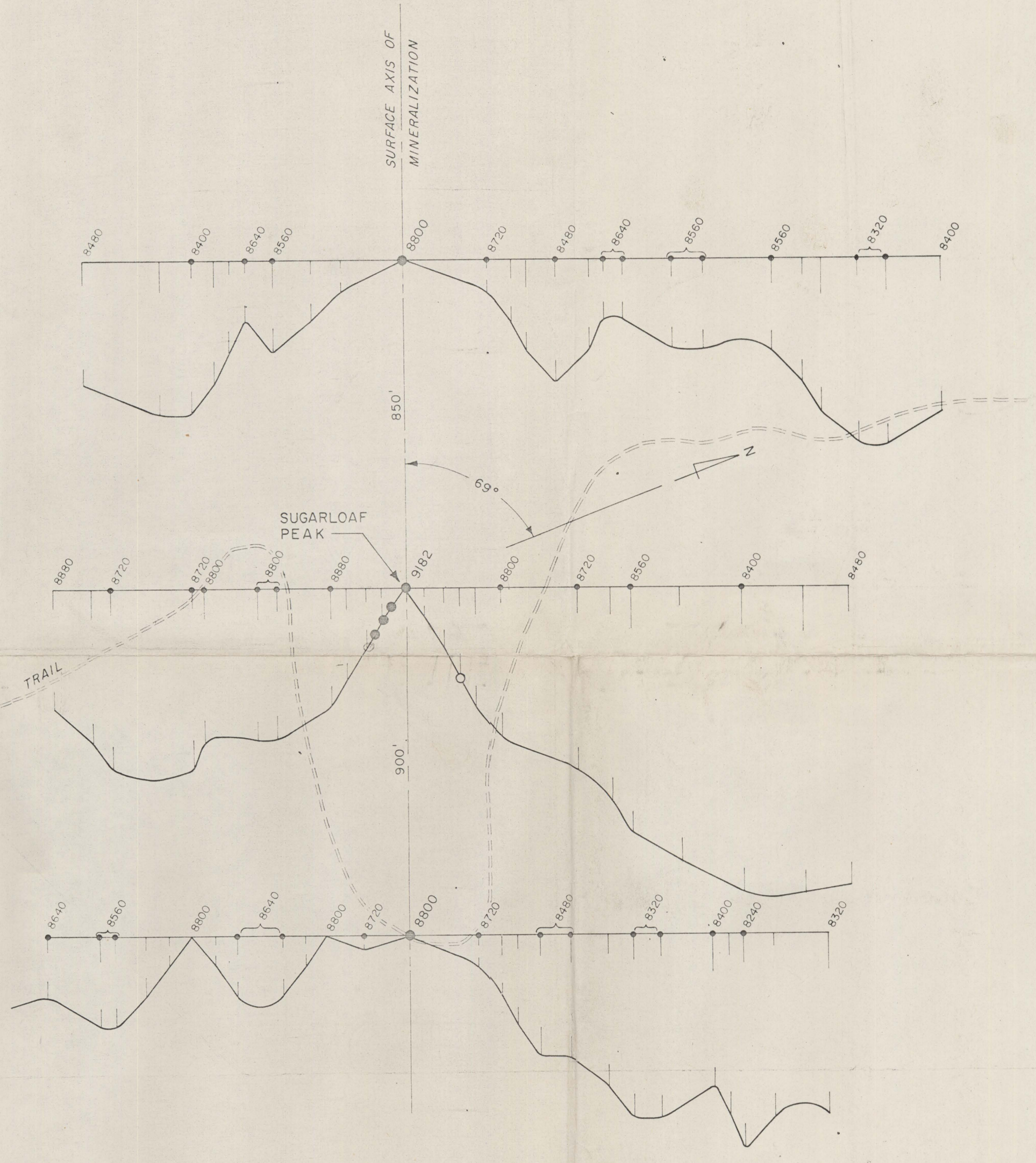

PLATE III

LEGEND

● — SAMPLES ANALIZED

○ — SAMPLED ONLY

CONTOUR INTERVAL = 80'

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X-SECTIONS

PARALLEL TO MINERALIZED TREND

ENGINEER	DRAWN	DATE	SCALE
Thomas H Bailly	I.D.S.	7-15-69	HORIZ – 1" = 1000' VERT – 1" = 200'

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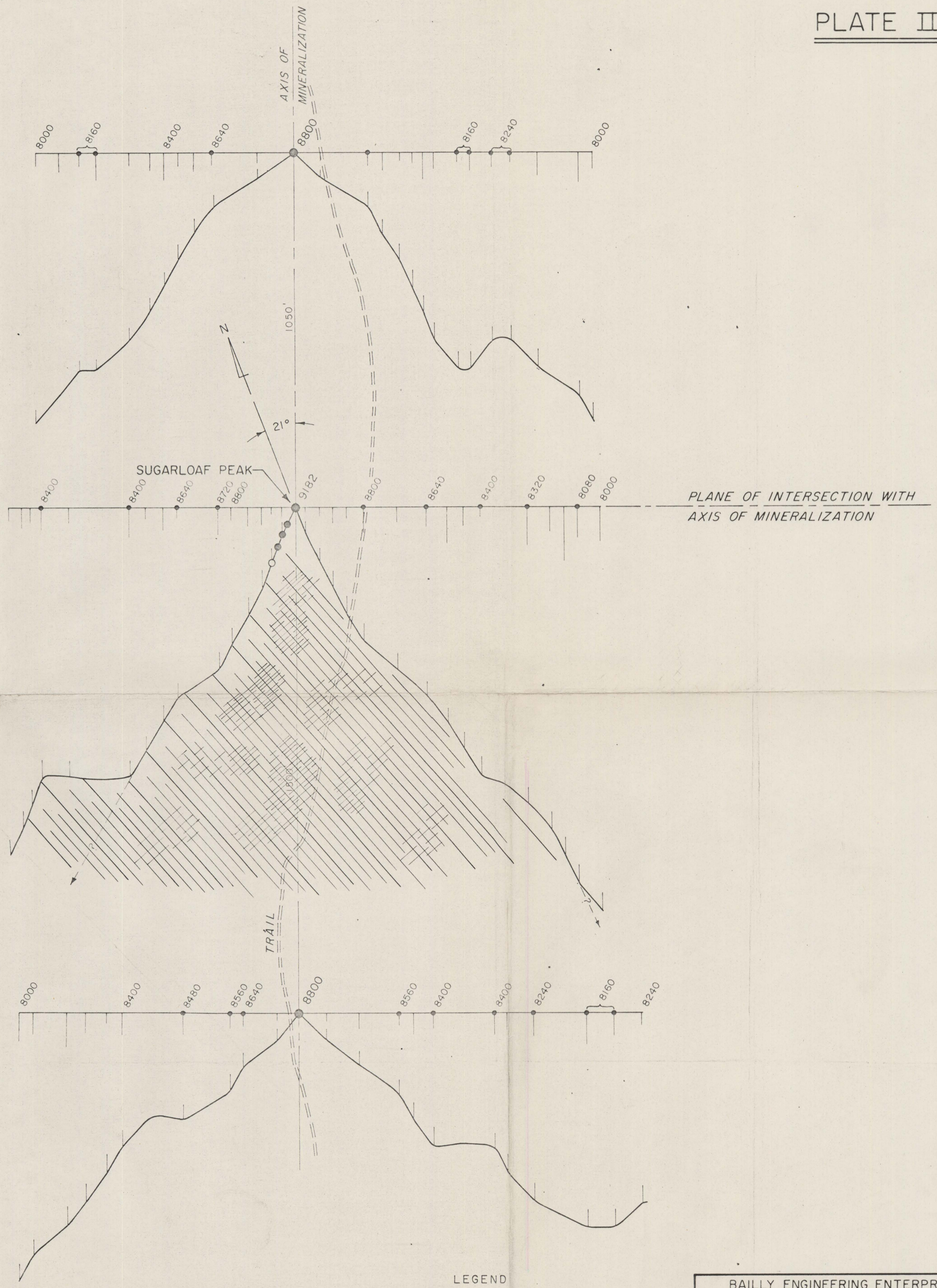
PLATE II



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X-SECTIONS
NORMAL TO MINERALIZED TREND
THRU SUGARLOAF PEAK

ENGINEER	DRAWN	DATE	SCALE
Thomas H. Bailly	I.D.S.	7-15-69	HORIZ - 1" = 100' VERT - 1" = 200'

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