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Item 72

Ely, Nevada
September 24, 1943

Mr. M. R. Klepper
U.S.G.S.

Dear Mr. Klepper:

I herewith hand you a Reconnaisance report on the Monte Cristo Tungsten Deposit by Joseph G. O'Brien; also a map of the claims and areal geology of the deposit.

The claims outlined in red belong to J. R. Murphy and his brother, D. B. Murphy, and are known as the Cabin Gulch Group of claims.

The sixteen claims outlined in blue are known as the Steel King Group and are under option to the writer and associates. The six claims in Sawmill Canyon, known as the Mill Canyon Group, belong to the writer and associates.

The Murphys are operating on the north end of the Cabin Gulch Group, on the north side of Cabin Gulch. Reference is made to their property on page 4, paragraph 7, of O'Brien's report. They have developed a nice body of ore and have it opened by open cuts, shallow shafts and tunnels, for a length of over 150 feet along the strike of the vein, and for a width of 12 feet. There can be estimated with a fair degree of assurance, several thousand tons of 1-1/2% to 3% scheelite.

The showings justify the writer in asking various Government agencies to visit the property with the object in view of getting the country properly mapped, possibly drilled, and perhaps asking the R. F. C. for a mine loan.

For the present the work is being confined to the Cabin Gulch Group, for the reason that it is accessible, and opened up to the extent where shipments can be started immediately. The first carload will be ready for shipment about the first of October.

I am enclosing two small samples of the ore which I trust will give you a general idea of its character.

Trusting that you will find this of interest. I will be looking forward to the first of October when I can meet you and conduct you over the property. I can be contacted by mail, at P. O. Box 388, Ely, Nevada; or, my residence is 480 Ely Street, Ely.

Yours very truly,

L. M. Phippen.

COPY

(344)
Item 40

RECONNAISSANCE REPORT
ON THE
MONTE CRISTO TUNGSTEN DEPOSIT

LOCATION -

THE MONTE CRISTO TUNGSTEN DEPOSIT lies on the west slope of White Pine Mountain (formerly designated by the G. L. O., "Pogonip Ridge"), in the White Pine Range, White Pine Mining District, White Pine County, in the east central Nevada, and with respect to the G. L. O. Survey, occurs chiefly in sections 16 - 21 and 28, Twp. 16 N., R. 57 E., M.D.S. & M.

It is approximately 52 miles airline, and 62 miles by road, west of Ely, the county seat and the center of an important mineral bearing area which, among other things, contains Nevada's most important copper mining activities. The area is served by U. S. Highways 6, 50 and 92 and by the Nevada Northern Railway, a feeder line which leaves the S. P. R. R. at Cobra, 140 miles to the north. To reach the Monte Cristo Tungsten Deposit from Ely, U. S. Highway # 50 is traveled for 45 miles in a westerly direction, and from this point fair desert roads of generally easy grades extend into the Monte Cristo section which lies about 15 miles south of U. S. Highway # 50. From the main desert road short roads extend into the canyons which dissect the deposit thus making large portions of it fairly accessible to motor vehicles.

PROPERTY -

The known portions of the deposit are covered by 34 contiguous unpatented lode mining claims of approximately 20 acres each which are owned and held as two contiguous groups of 16 and 18 claims respectively. Both of these properties, singly and/or collectively, are now available to prospective operators.

CLIMATE -

The climate is typical of the high altitudes of western Nevada, short pleasant summers followed by a brief fall season with the winter snow storms sometimes arriving as early as the middle of November. The winters are generally severe and the ground is covered with snow for at least four months of the year. The annual precipitation, chiefly snow, seldom exceeds 15 inches. The heaviest rainfall occurs during mid-summer and early fall. Sub-freezing temperature is the rule during the winter months. Occasional heavy snows during these months may be expected to interfere to some extent with mining operations.

VEGETATION -

Nearly fifty per cent of the surface of the deposit consists of bare rocky outcroppings and talus covered slopes and is barren of any vegetation. But in other parts of the deposit and in adjacent areas there is a considerable growth of stunted pinon pine, juniper and mountain mahogany trees with here and there small open grassy areas and occasionally small thickets of brush. On the lower slopes and at the base of White Pine mountain desert sage and scattered juniper trees are the principal vegetable growths. The timber growth is chiefly valuable for domestic uses but some of it is also suitable for light mining operations.

ELEVATIONS -

The elevations at the deposit range from a minimum of around 7200 feet near the north end to nearly 8,000 feet at the south end. The maximum elevation of 9,015 feet is at a point on the ridge which divides Hoppe and Littlefair canyons. The mean or average elevation of the deposit is approximately 8,000 feet.

TOPOGRAPHY -

The surface of the deposit and its immediate vicinity is extremely rugged in character and consists chiefly of a series of short

steep westerly trending canyons which head high up on the western slope of White Pine Mountain and drain into Newark Valley on the west.

The sides of the canyons are generally steep and in places are characterized by the presence of small bluff-like outcroppings which are surrounded by talus covered slopes which generally culminate in rocky bluffs forming the narrow crests of the ridges lying between the canyons. The canyons range from 500 to over 1600 feet in depth and their slopes will often exceed 45°. Their floors have, in some instances, grades in excess of 600 feet to the mile.

WATER -

No water flows in any of the canyons excepting during a period of heavy rains. Two perennial springs occur in the immediate vicinity of the deposit. One of these, lying above and about one quarter mile east of the deposit in Hoppe Canyon at an elevation of 9100 feet is reported to have a flow of 15 gallons per minute. The other spring, known as the Monte Cristo Spring, lies at the base of White Pine Mountain about one quarter mile west of the deposit at an elevation of 7300 feet. It is reported to have an average flow of over 300 gallons per minute.

Other possible sources of water supply exists at Green's Ranch and in Newark Valley. At Green's Ranch which is about six miles south of the deposit there are several large springs, the water from one of which is reported to exceed in volume that of Monte Cristo Spring. The deposit lies near the southern end of Newark Valley which covers several hundred square miles and is the natural drainage basin of several mountain ranges. Its water table lies close to the surface and there is every reason to believe that Newark Valley can be expected to be an unfailing source of water supply, when needed, for mining and milling operations of any magnitude.

HISTORY -

The Western or Monte Cristo section of White Pine Mining District, although less than six miles south west of the Hamilton section, has heretofore received little attention from geologists and mining men who have covered the Hamilton and adjoining areas. These areas were noted for their rich silver and silver-lead mines during the period of 1867 -1887 with a reported production of over $20,000,000.00 and during this period the prospecting of these areas must have been intense. But for some reason, possibly because of a difference in the rock formation, the Monte Cristo section was overlooked. Apparently the only exception to this was the mining operations carried on near the head of a gulch near Monte Cristo and which operations are reported to have produced $80,000.00 in gold from comparatively shallow workings in a quartz vein. The gulch referred to is now known as Eighty Thousand Dollar Gulch.

In 1875 - 1876 a small matte smelter was erected near Monte Cristo Spring to treat the ores of the Shermantown section which lies about six miles to the south east of Monte Cristo. This smelter apparently never operated as is indicated by the condition of the flues and the complete absence of slag in the vicinity.

There is a dearth of published geological data on the Monte Cristo section. As far as is known to the writer, none of the geologic papers listed in the bibliography of the Hamilton District have mentioned the Monte Cristo section. A brief mention of a contact-metamorphic zone at Monte Cristo is made by Francis Church Lincoln in "Mining Districts and Mineral Resources of Nevada", page 258.

The Monte Cristo Tungsten Deposit was discovered in June, 1939, and by the end of 1939, 34 lode mining claims covering all visible portions of the deposit had been located. Shortly after its discovery the writer made several visits to the deposit with a view to determining its economic possibilities.

GEOLOGY -

The country rock of the White Pine Mining District consists of Paleozoic sediments which have been intruded by quartz-monzonite and

grano-diorite in late Cretaceous or early Tertiary time. According to Larsh a geologic section of the White Pine Mining District comprises over 15,000 feet of Paleozoic rocks made up as follows:- Over 1,000 feet of Cambrian Limestones and Slates; 7,000 feet of Ordovician sediments including Upper and Lower Pogonip Limestones, Eureka Quartzite and Lone Mountain limestones; 2,000 feet of limestones of Devonian age; and 5400 feet of Carbonifferous sediments, including shale, sandstone and limestone.

Large areas of White Pine Range are underlain by a batholithic mass of quartz-monzonite or its differentiates. In the Monte Cristo section the batholith is represented by a small stock or cupola composed of a quartzose granitoid rock which is undoubtedly a differentiate of the monzonite and which occurs as a small nearly conical peak, several hundred feet high, at the western base of White Pine Mountain. The peak borders a large contact metamorphic zone on the west and its position suggests that it is the termination of a spur or finger from the main batholith which lies at some distance to the southeast. Although unexposed in other portions of the section the finger appears to trend and possibly dip to the southeast as is indicated by the degree of metamorphism of the overlying rocks and the tilted position of their strata which in some places appear as a low anticline dipping about 15° to the southeast.

The intrusion of the monzonite in the Monte Cristo area uplifted and metamorphosed the overlying sediments and those at the contact with the small stock forming a contact metamorphic zone of considerable extent which owing to limited marginal exposures makes the defining of its surficial area somewhat difficult. But the zone is roughly pear-shape in plan with its small end to the north. It has a visible strike length of over 10,000 feet with its long axis striking NW-SE. At its smaller or northern end it is approximately 125 feet wide. From this point its width progressively increases toward the south until at a point about 2500 feet from its southern end it reaches a width of over 2600 feet. From this point to its southern end it narrows and is finally obscured by the overlying limestones.

Still on the west side of White Pine Mountain, to the east and north east of the contact metamorphic zone, but separated from it by a wide belt of Pogonip limestone, is a large intrusion of grano-diorite. With the exception of the stock on its western border there are no visible intrusive rocks withing close proximity to the contact metamorphic zone. But on its eastern border considerable quartz-monzonite porphyry float occurs, indicating the nearby presence of dikes or sills of this rock.

PETROLOGY -

The surface of the contact zone can roughly be divided into areas according to the color of its rocks. Beginning near its northern end and coinciding with its long axis a strong belt of garnetized rocks of irregular width extends almost to its southern end. This belt ranges in width from a few feet to over 500 feet and in color from a light rusty color to a rich dark brown, according to the degree of garnetization. On either side of the garnet belt but still within the borders of the contact zone the rocks range in color from a light gray to a deep greenish gray.

As a rule the garnet belt stands above the surrounding area in bold relief, usually as blocky bluff-like masses with talus covered bases. The rocks are strongly jointed by two systems of joint planes which strike at nearly right angles to each other. And in the best developed of these systems the joint planes coincide with the long axis of the contact zone and have a nearly vertical dip.

Excepting where completely garnetized the rocks of this belt consist chiefly of garnet, quartz, calcite and a greenish mineral resembling chlorite with scheelite apparently the only ore mineral.

The mineral constituents in the rocks of the gray areas are similar to those of the rock in the garnet belt with the exception that garnetization of these areas occurs to only a slight degree.

The garnets appear chiefly as narrow bands in the rock or in the planes of fissility where the rock has a schistose structure. The rocks have a medium to fine grain texture and in places are largely composed of quartz which occurs in granular form or as thin seams or as narrow veinlets.

The ore minerals of these areas are scheelite and powellite which apparently are the only minerals occuring in the deposit in sufficient quantities to be of economical value. At the northern end of this zone some gold is found and in various parts of the zone small amounts of malachite are seen. Iron pyrite occurs sparingly and in a few small areas.

FAULTING -

Several faults in the contact zone were observed. None of these were given a close study by the writer as they have apparently had little influence on the formation of the ore deposit within the contact zone. The principal faults are pre-mineral and their fissures are generally occupied by quartz veins of little economical value. Minor folding or contorting with some slight degree of overthrusting of the limestone strata occurs on a portion of the eastern border of the contact zone.

ORE DEPOSIT -

Extent of -- There is a strong possibility that the entire visible contact metamorphic may be an ore deposit. This belief is based on the results obtained from sampling and other investigations of various portions of the zone. These investigations, though far from covering in detail all portions of the zone, revealed the presence of scheelite and powellite over large areas. Probably a thoroughly systematic examination would reveal other areas that were sub-commercial or barren. A systematic sampling of the entire zone is beyond the means of the property owners. Over 200 samples cut by the claim owners have failed to reveal any large portion of the contact zone that was barren of scheelite and/or powellite.

Ore Minerals of -- The ore mineralization or enrichment, as in most contact metamorphic deposits where little or no secondary concentration has taken place, is erratic, and while dissemination of the ore minerals is generally local concentrations appear to be the rule. This was indicated by the use of flourescent light rather than by sampling. Through this method the enrichment was frequently shown to occur in zones of varying width and strike length.

Within these zones there is generally considerable uniformity in the distribution of the ore minerals, but occasionally the enrichment also appears as highly concentrated parallel streaks or narrow belts within the zones. Some of these belts are up to four feet wide.

Towards the northern end of the deposit in an area of good exposures, an enrichment zone over 100 feet in width occurs. Sampling of this zone has revealed a WO_3 content of over 1% for the zone with one belt near the middle of the zone running from 3% to 8% WO_3.

It is noticeable that in these zones of enrichment quartz is the predominat mineral and occurs chiefly in granular form; in seams or veinlets, or in irregular masses. The scheelite appears to be associated with the quartz and the higher the quartz content in the ore the greater the scheelite content.

Scheelite - calcium tungstate, contains 80.6% tungsten trioxide and 19.4% lime. It occurs in the ore as individual crystals, crystalline aggreggtes, and in small granular masses. Its color is a pale grayish white to nearly transparent, closely resembling the quartz in this respect. The scheelite crystals are generally quite small in size, ranging from less than 1/16 inch to slightly over 1/8 inch in

diameter. Their size and color make them practically indistinguishable without the aid of flourescent light, from the granular quartz crystals.

Powellite - calcium molybdate, contains, when pure, according to its formula, $Ca\ Mo\ O_4$, 47.9% molybdenum and 52.1% lime. But powellite from many sources has been found to carry from 10% to 12% tungsten trioxide which is believed by many authorities to be present as scheelite and in a mechanical mixture rather than a chemical compound.

The powellite appears to be an oxidation product of the primary sulphide molybdenite and it occurs in the ore of the deposit as a gray-white powdery mineral occupying minute seams or as a coating of the scheelite. This mineral cannot be detected in the ore by the unaided eye but can easily be detected in the ore or concentrates through the use of flourescent light or by analysis.

The Monte Cristo contact metamorphic zone consists chiefly of limestones altered to tactite by solutions accompanying the intrusion of a granitic rock. The scheelite-powellite deposits within the zone are of the replacement type, yet, are apparently singularly free of the undesirable mineral elements ordinarily present in minerals of the contact metamorphic deposits. The ore, in consequence, does not contain serious amounts of copper or iron pyrites. No phosphorous mineral is known to be present, and molybdenum occurs in the powellite only. Some manganese oxides are found in association with the few quartz veins occuring withing the zone.

SAMPLING -

The deposit has not been systematically sampled; this task is beyond the means of the present owners who have to date cut about 200 samples in various parts of the deposit, chiefly with a view to determining the extent of the ore mineralization. And as far as is known to the writer few if any of these samples were barren of scheelite and powellite.

To date the tests of the samples taken have revealed their WO_3 content to be from .2% to over 6% WO_3, with an average of .6% for all of the samples. These figures do not include the WO_3 content of the powellite.

The sampling, although of a reconnaissance nature only, has indicated a wide spread, though erratic, distribution of the scheelite throughout the contact metamorphic zone and leads to the belief in the possibility of the existance of a huge low grade commercial ore deposit embracing most if not all of the zone. But the writer is more inclined to the belief that a thorough investigation of the deposit would result in the discovery of large areas bearing ores of a grade much higher than the average indicated for the whole contact zone. In mining these areas, selective mining would, in a sense, be employed.

MASS OR VOLUME OF THE DEPOSIT -

Until it is definitely determined by a thorough sampling and by other investigations such as core drilling or exploratory mining operations the mass or volume of the commercial ore body or bodies lying withing the contact metamorphic zone cannot be estimated, but on the assumption that the entire zone constitutes a workable low grade ore deposit its mass or volume is indicated by the following calculations:- A base line established at the lowest point in the deepest canyon dissecting the contact metamorphic zone and coinciding with the long axis of the zone has a length of over 10,000 feet. The average width of the zone exceeds 1,000 feet and the average vertical depth from the surface to the baseline exceeds 600 feet. This presents a deeply serrated figure from which is deducted two-thirds of the mass of a regular solid of similar dimensions, giving a rock mass of over 166,000,000 tons above the baseline. The ore mineralization extends to an unknown depth below the baseline but until this horizon is investigated no estimate of volume can be made.

In the above tonnage estimates only the rock mass within the tactitic areas of the contact metamorphic zone was considered. The

inclosing zone which at best is poorly defined and is thought to be barren was not included. The dimensions given for the above tonnage estimates were based on the sapling elsewhere mentioned in this report and which indicated a general though erratic scheelite enrichment within the area. Whether or not the entire rock mass is similiarly enriched remains to be seen. In this connection one interesting fact is offered, sampling the exposed rocks in the bottom of the canyons has revealed no apparent change in the grade of enrichemtn between them and the rocks of the tops of the highest ridges.

Although as yet unproven, there is a bare possibility that the entire rock mass referred to constitutes an ore deposit of commercial grade and, that, although possible, the writer believes this to be unlikely, and holds to the belief previously expressed that a thorough investigation of the deposit is more likely to reveal it as consisting of a number of unconnected and erratically distributed deposits, some of which may be of large volume, surrounded by areas carrying ore of sub-commercial grade.

PLANS AND COSTS OF INVESTIGATION -

It is advisory to divide this work into two stages with the execution of the second stage contingent on the results obtained from the first stage of the investigation. The preliminary or first stage to consist of the usual checking of claim lines, titles, physical conditions, etc., followed by careful examination of the surface with fluorescent lights to determine the character, extent and grade of the scheelite mineralization; the richer zones to be indicated for later sampling. This to be followed by the sampling and assaying of the ore from these zones and the results obtained plotted on a sample map or chart. If the results obtained from this sampling were satisfactory then stage number two would natuarally follow. The cost of the first stage of the investigation would range between $3,000 and $5,000 and would consume a period of about 90 days time.

The second stage of the investigation would cover the sampling of other portions of the deposit as indicated by the fluorescent light. Areas showing satisfactory results would then be subjected to sub-surface exploration by core drilling, tunneling, cross cutting or shaft sinking as deemed expedient, followed by a thorough sampling of all exposed faces.

The cost of this stage of the investigation would approximate $100,000.00 and would consume approximately one year's time. Not all of the contact metamorphic zone could be investigated as outlined for the above amount. The subsurface investigation would naturally be confined to the most favorable areas and areas with unfavorable surface showings would largely be eliminated from this class of investigation. The writer believes that well within the cost and time limits as set forth several commercial ore bodies large enough to warrant the initiation of plans for extensive mining and milling operations would be delineated.

WORKING METHODS AND COSTS -

A large portion of the deposit is ideally situated for cheap large scale mining operations, using open pit or quarrying mining methods. If necessary mining operations could be carried on simultaneously in all of the five canyons that dissect the contact metamorphic zone. Short down grade hauls from these canyons to a mill centrally located at Monte Cristo Spring are of considerable importance in any plan of economic operations.

On the basis of a production of 500 tons daily the mining, milling and hauling costs should not exceed $3.00 per ton. With a larger daily production the cost would necessarily be lower. The costs are seggregated as follows:- Mining, $0.50 per ton; Hauling by truck, $0.25 per ton; Milling and Marketing, $2.25 per ton.

FINANCIAL ASPECTS -

The ore bodies within the tactitic area are probably large and may be expected to sustain long term mining and milling

operations. It is believed that some of these ore bodies will average as much as 1% WO_3 per ton, while other smaller bodies will run as high as 3% WO_3 per ton. But using .5% WO_3 as the minimum grade of ore that can be worked at a profit (on the basis of 500 tons per day), with reasonably efficient concentrating methods the recovery should be not less than 80% or, 8 lbs. of WO_3 per ton of ore treated.

At the present market price per unit of 20 lbs. the recovered WO_3 would have a value of $8.80. From this amount is deducted the operating costs of $3.00 per ton leaving a net of $5.80 per ton. Further deductions in the form of overhead, taxes, etc., are to be made. But in view of the rapidly changing tax structure the writer has not attempted to fix these charges.

CONCLUSION -

While the extent and quality of the Monte Cristo Tungsten deposit are as yet unknown it has the possibility of becoming the largest commercial deposit of its kind in the U. S. In size it compares favorably with any of the porphyry copper deposits or the Climax molybdenite deposit. In the event an investigation shows it to be commercial, the capital putting it over would be in a leading position in the tungsten markets of the U. S. The deposit is undoubtedly worthy of at least a good preliminary investigation.

In fixing the minimum tungsten trioxide content of the ore at .5% only the mineral scheelite was considered as the source of this. Its associated mineral powellite, through its contained tungsten trioxide and molybdenum, would add considerable to the net value of the ore.

Respectfully submitted,

Jos. G. O'Brien

Mining Engineer

Box 968, Ely, Nevada

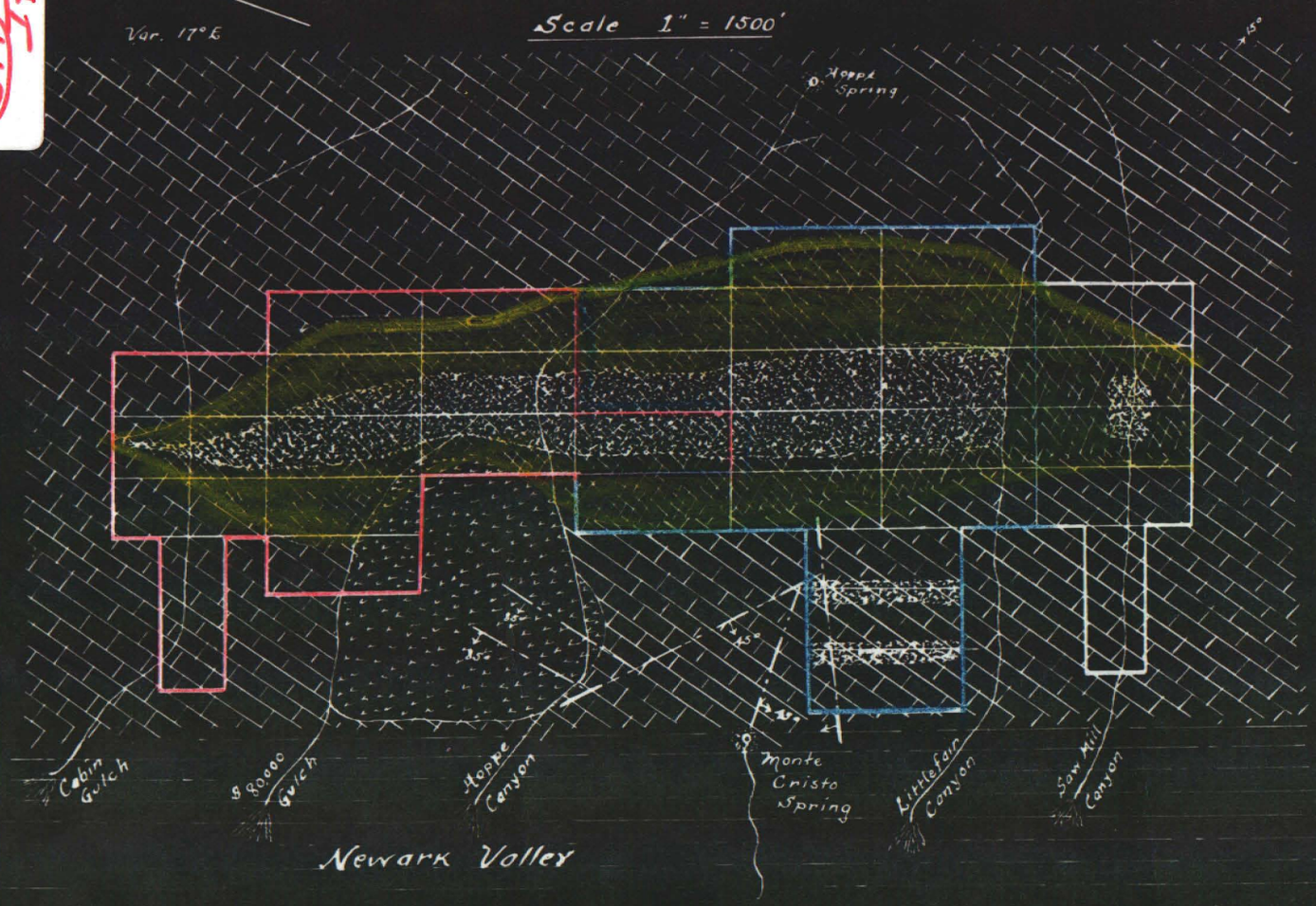
September 15, 1941.

Item 40

MONTE CRISTO TUNGSTEN DEPOSIT

CLAIM MAP AND AREAL GEOLOGY -

Scale 1" = 1500'



GEOLOGY -

Cambrian Limestones and slates -

Contact Metamorphic zone - consisting chiefly of lime silicates - calcite and quartz and carrying Scheelite and Powellite in commercial quantities -

Garnetized belts - contain some of the best Scheelite values.

Intrusive stock of quartzose granitoid rock - probably a monzonite differentiate. Late Cretaceous or Early Tertiary -

Detrital Material - Pleistocene -

LEGEND -

Property consists of 34 unpatented lode mining claims - aggregating approximately 680 Acres - Claims defined by solid black lines - Location of gulches, canyons and springs indicated -

Brunton Survey - Areal Geology approximate -

Survey And Map by Jos. G. O'Brien, Mining Engineer - Ely, Nevada - May 21, 1941 -