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A GENERAL GEOLOGIC AND ECONOMIC REPORT ON CERTAIN TIN BEARING DEPOSITS CONSISTING OF BOTH LODE AND PLACER CLAIMS IN CATRON COUNTY, NEW MEXICO.

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*Beaver Creek Group  
Catron Co., N. Mex.*

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NM Mine File No. 185

AREA AND LOCATION.

The Beaver Creek group of TIN mines consists of ten claims on Beaver Creek, in Township 11 s., R. 13 W. Catron County, New Mexico, near the South-Western boundary between New Mexico and Arizona.

The TIN mines are reached by good Federal and County roads, and the State has but recently expended considerable money in improving them. The nearest railroad is at Magdalena, on the Santa Fe, 76 miles away. The Continental Divide is here crossed by the highway at an altitude of 7800 feet, climbing very gradually from the plains of San Augustine across a series of undulating hills of moderate grade.

TOPOGRAPHY AND DRAINAGE.

It is a most interesting region at an elevation of from 7000 to 7500 feet above sea-level, within the confines of the TILA and DATIL national forests. It is by no means a desert country, but is covered by Spruce, Mountain Pine and Tamarack, and in the valley of Beaver Creek many Oak and BlackWalnut trees may be found.

The district resembles a great open-park country, where the moisture is sufficient to produce a heavy growth of grass, and where, perhaps, the greatest herds of deer, and antelope in the United States make their habitat.

The Mogollon Range, which here constitutes the Continental Divide to the Westward, and the Black Range lying directly eastward, also representing the Continental Divide, both rise several hundreds of feet higher than the undulating foot-hills between these ranges; the two main streams under consideration, namely, the Beaver Creek and Taylor Creek, constitute the main drainage systems of the area towards the Gila River, both uniting to form the Gila a short distance below BEAVERHEAD.

It is in this area along the above-mentioned streams that the huge Tin Deposits occur. CASSITERITE IN BOTH LODE AND STREAM DEPOSITS ARE HERE FOUND IN ABUNDANCE.

GENERAL AND STRUCTURAL GEOLOGY:

There is a vast expanse of Tertiary age rocks covering all of this region, and extending some one hundred miles to the northeastward, and southerly for a similar distance, or to the PINOS ALTOS range on the south, and far across the Mogollon range in a westerly direction. It extends beyond the Continental Divide to the northward, and is, undoubtedly, in the same formation as the rich TIN deposits of Jalisco, Mexico.

There were two very distinct Rhyolite flows which made up the geologic history, the first, or oldest, consisting of an altered rhyolite or metamorphosed rhyolite-porphry; compact, acidic, and occurring massive and containing small phenocrysts (brown) or crystals of cassiterite in varying amounts. The latter age rhyolite tuff, which now only occurs as outcropping on the higher ridges is barren of TIN content. Flow structure does not exist in this upper member, while the underlying rhyolite of older placement possesses decided flow structure, as well as

cassiterite content of variable amount, running from a few tenths of one per cent to as high as five per cent, according to the various influences of heat and pressure, or pneumatolytic action during process of metallization.

Rhyolite and rhyolite tuff with conglomerates and sandstones with occasional appearances of basalt, sometimes in columnar structure, doubtless of Quaternary age, constitute the major series present. The older rhyolite member is cryptocrystalline and contains abundant small phenocrysts of cassiterite and quartz aggregate, orthoclase felspar, with hematite and some magnetite generally present. Plainly the older rhyolite-porphyry is an immense, extrusive flow structure of undoubted deep-seated origin. I find that this older, or primary member, contains all the TIN values, while all basaltic tuff and conglomerate members of more recent age are barren of TIN.

Considerable faulting is noticeable of this older rhyolite series, which occurred previous to the deposition of the later conglomerates, tuffs, and sandstones. Much less folding took place in the eastern sector of this area than to the westward. Throughout this area of the older rhyolite within the cassiterite-bearing zone, every rock fracture appears to be mineralized with TIN, these fractures vary from an inch to six inches in width, with the rich cassiterite-hematite mixture frozen tightly to both walls, with small bunches, or vugs, of high-grade TIN ore of rather frequent occurrence, but not very persistent; although the TIN is found throughout the whole mass of the rhyolite-porphyry in varying amount; the richer portions being found closer to the veins and fractures generally.

But little silica is to be seen, silicification has not taken place to any degree in connection with the genesis of these TIN deposits. Nor are there any sulphides present.

The great primary magmatic extrusions which covered much of Townships 9 and 10 S., Ranges 10 and 11 West, is unquestionably the area wherein the batholithic core of this richer TIN-bearing formation is located; and developments to date all concur as to its exact locus being around that area having as an axis the confluence of Nugget and Hardcastle Creeks. It is in this region in one sector, and four miles further westward on Squaw Creek, a tributary of Corduroy, where both placer and lode TIN is found in commercial amounts.

#### LODE DEPOSITS - ORIGIN.

It is a case of extrusive mass deposits, of granite parentage, wherein the percolating waters/ ~~of~~ through pneumatolytic action, due to high pressures and critical temperatures has produced by eruptive after-action means, these veinlets of cassiterite throughout this rhyolite-porphyry flow within this area, metasomatic action has doubtless been the genetic process, involved here, wherein this TIN is formed. As TIN is readily transported by underground waters as a nitrate, chloride, or even as a sulphide, or rather sulphate, these vehicles are singly sufficient ~~to~~ under the proper temperature and pressure for stannic acid to be precipitated from stannic solutions by any alkaline carbonate. Simply a transference from the original granitic mass to the present adjacent rock series under the dominant conditions of thermal metamorphism.

#### CASSITERITE OCCURRENCE.

There is a large flow of unknown depth or thickness appearing between Hardcastle Creek and Nugget Gulch, which seems to constitute the original vent of this great extrusive igneous mass of stanniferous material. Nugget Gulch had cut most deeply into it, although Hardcastle Creek or any other of the creeks of the district has eroded the mass to any great depth. The main batholith, or "core" as so far defined by means of numerous short shafts and tunnels, as well as numerous cross-cuts, approximates 750 feet in width, by at least 1500 feet in ~~width~~ length. The depth so far is undetermined beyond 200 feet, at which point some most excellent values were encountered. It is my opinion that a

deep shaft, placed somewhere near the central part of this extrusion, would reveal some wonderful values in cassiterite content.

### PLACER TIN DEPOSITS.

The stream tin, or placer deposits of this area are of the first importance insofar as richness of ore, dependability, extent and immediate profit are concerned. The estimated yardage of commercial gravel as located on Hardcastle, Squaw, and Nugget Creeks, is approximately:

Squaw Creek yardage	-----	880,000	cubic yards
Nuggett Gulch	-----	150,000	" "
Hardcastle Creek	-----	550,000	" "
Total cubic yardage available		<u>1,580,000</u>	
Six pounds of tin per cub. yd. x		6	
		<u>9,480,000</u>	pounds

70% of pure tin in this concentrate	6,636,000	pounds
Present price of tin per pound	.50	
	<u>\$ 3,318,000.00</u>	

The writer panned five pounds of 70% concentrates ore out of this gravel from the surface in fifteen minutes; and a number of single pans which produced three pounds. One nugget of pure tin ore was brought from Nugget Gulch which weighed over 100 pounds, and is now on exhibition in the mining exchange in San Francisco, California. Over 100 shafts have been put down, many not reaching bed-rock, and not a single one but contained appreciable quantities of 70% cassiterite ( $\text{SnO}_2$ ). It is believed that the above approximation is really ultra-conservative in both yardage and content.

It is one of the very few mining properties within the writer's experience wherein both lode and placer properties are combined, and and with the placer so far proven ~~that~~ in valuation, as to preclude the possibility of failure, taken as a whole, employing the profits which run excessively high to open up the lode claims, in which the possibilities of developing one of the greatest tin-deposits in the world are very bright.

### ECONOMICS.

While most of the streams of the region are dry for the greater portion of the year, there is nearly always a good flow in Hardcastle Creek, as there is a never-failing spring located about 3000 feet from the junction of Nugget and Hardcastle, which will be the locus of first development in opening the work on these gravels. There is a large gathering water-shed and most of the streams carry flood-loads at different seasons of the year. Dams can be constructed at but slight cost for conservation of a water-supply. The water table appears to range here from 10 to 15 feet in depth. Snowfall is from 3 to 6 feet during the winter season. The climate is very mild and work can be carried on with interruption during the whole year. There is no excessive heat or cold here.

From the State of New Mexico's Engineer's reports for three years, 1914, pp 31; 1915, page 43, 1916, page 48, taken 45 miles northeast of Silver City, on the Upper Gila river, at the gauging station at the confluence of Beaver Creek and Taylor Creek (18 miles south of the Township line), are the following figures giving the total run-off acre-feet (as may be seen by reference to the accompanying regional map).

For the year 1913, total run-off acre-feet,	150,000
For the year 1915, total run-off acre-feet	244,000
For the year 1916, total run-off acre-feet	171,000

all run-off records from June 30, 1912, to December 31st., 1917, are available.

Timber covers much of these Beaver

Timber covers much of these Beaver Creek Claims, some of which is of sufficient size and ~~quantity~~ quality for sawing, and mine purposes. There is a very good saw-mill in operation near the junction of Beaver Creek and Taylor Creek, producing fair lumber at a fair price. There is an abundance of competent and skilled labor available, ~~at~~ especially at the present writing, since all the great copper mines of the southwest are out of production, thereby releasing thousands of trained miners and other help.

Transportation, formerly the great drawback in the development of this district, is now an easy problem to solve. The motor-truck can now, thanks to improved highways, go directly to the mines, and as the winters are very mild and little snow falls, the transportation question does not now arise. Loads of as much as ten tons of concentrates may now be hauled by motor-truck to the rail-head at Magdalena, thence by rail to Galveston, Texas, (with a quoted rate of \$8.00 per ton) from whence a steamer rate of \$5.00 per long ton to Continental ports has been quoted by the North German Lloyd Lines. Since the present price of high cassiterite ores is around \$660.00 per ton, a very handsome profit is indicated. The reason these rates to foreign ports are quoted is because it is only in Europe that TIN is successfully smelted.

#### CONCLUSIONS.

The writer has spent about eight months in the district under discussion for the purpose of making a complete geological survey of the area, and particularly to locate, if possible, the "throat" of the extrusion of the Tertiary rhyolite flow. All in vain was the effort to find this "throat", for it was realized that if this "throat" could be located, then the richest deposits of cassiterite would be found. It was, at first, believed that Black Mountain, a prominent peak about six miles distant, was the center from which the rhyolite flowed, but no one to the writer's knowledge has been able to show that this is true. There is no doubt that it was from this center that the basalt flowed, and it may well be that the quaternary rhyolite came from this center, but both were subsequent to the rhyolite which carried the TIN, and apparently these later flows obliterated ~~the~~ all trace of the center of the Tertiary rhyolite flow. Three months ago Mr. Clyde Corder, E.M. came into my office bringing the information that the "throat" of the Tertiary rhyolite had actually been found. This was wonderful news, of course, but the writer was sceptical and insisted he was "from Missouri" and had to be shown.

In company with Mr. Corder, the writer hastened down into New Mexico to verify the news, and is most happy to acknowledge that at last the long sought "throat" has been found, and surveyed, also photographed, as the accompanying pictures testify. *missing cgm*

A close study of the photographs will show the almost vertical laminations of the Tertiary rhyolite flow which is so rich in cassiterite and aluminum. From this "throat" the rhyolite flowed, covering an area roughly of 500 square miles. The laminations here shown prove conclusively that it was from this center the flow came, since here the laminations are nearly vertical, while upon the tops of the surrounding mountains the laminations are horizontal. To prove that this was not a faulting effect, a tunnel was driven into the rhyolite and the evidence thus secured proved beyond all doubt that here was the true center of the Tertiary rhyolite flow.

Having at last established the center of the flows, it only remains to exploit the find, for here, undoubtedly, will be the center of an enormous industry destined to free the United States from economic dependence upon foreign TIN producers.

Examination of the assays taken over the entire area discloses a percentage of above 3% SN, and, in addition, a percentage of higher than 13 of A L.

Under ordinary conservative development this project cannot fail to produce enormous financial returns. By working it according to modern "quantity production methods", with highest standards of mechanical efficiency, this property should very shortly assume a pre-eminence all its own, and pay handsome dividends. ITS TONNAGE ABOVE GROUND IS NOT LESS THAN 250,000,000. The percentage of TIN is almost double the CORNWALL TIN MINES, THE VALUE OF ITS ALUMINUM CONTENT MAKES IT THE GREATEST SOURCE OF ALUMINUM IN AMERICA.

The writer can with confidence recommend this property to those who understand the mining, milling, recovery and marketing of cassiterite ores and concentrates, as well as the smelting of TIN ores, and to those who may appreciate the probability of the United States soon becoming self-sufficient in the matter of TIN production; right in the midst of the world's chief market for the finished product (from \$58,000,000 to \$78,000,000 annually now being imported from foreign sources to supply the American demand for TIN, not a single ton of TIN being produced by America).

The writer wishes to emphasize that the opportunity now exists to a pronounced degree of making this project into one of the country's major industries and with the employment of surprisingly small capital in the inauguration of commercial production: the returns from which could be used to improve and enlarge the plant to 10,000 tons daily capacity, or more, and erect an AMERICAN smelter turning out AMERICAN tin of the highest quality. There are at this writing, in Arizona and New Mexico, a dozen or more "cold" copper smelters, which are idle and may be purchased for a small sum. These can be revamped and changed into TIN smelters, and at no great cost. WE HAVE THE WORLD'S LARGEST AND RICHEST TIN DEPOSITS, but we have left the important TIN industry to the foreign operators. Aside from the economic aspect of it all, we should awaken to the fact that in the event of a war with a power able to shut off our supplies of TIN, we should be sitting in a "hot spot".

Respectfully submitted,

Major William Gillisland Vance, EM  
1760 Pennsylvania St.,  
Denver, Colorado  
November 1st, 1935.

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BUREAU OF MINES  
DENVER, COLO.

COPY OF ASSAYS

Form 12 M. 7-28 M.P. & P.Co.

INTERNATIONAL SMELTING COMPANY

ASSAY CERTIFICATE

Name W. J. Porter for Stoddard

Class      Lot      Mine Beaver Creek TIN deposit. Date August 6, 1933

Smelter lot

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	Sn. %
#1	a trace
#2	6.2
#3	6.2
#4	6.2
#5	2.2
#6	1.7
#7	0.17
8	0.17
9	0.20
10	18.0
11	0.29
12	0.88
Dump	7.50

Average.. Sn..10%

(Signed) F. G. Hanley, Chief Chemist

(COPY)

After visiting the Beaver Creek tin deposits in New Mexico making photographs of the "throat" sampling over the entire area, I unhesitatingly declare this to be the world's greatest deposit of Cassiterite.

W. G. Vance