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ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: RICH HILL MINE GROUP

ALTERNATE NAMES:
SWASTIKA MINE
SWASTIKA COPPER AND SILVER

PIMA COUNTY MILS NUMBER: 238

LOCATION: TOWNSHIP 17 S RANGE 12 E SECTION 10 QUARTER C
LATITUDE: N 31DEG 57MIN 58SEC LONGITUDE: W 111DEG 06MIN 25SEC
TOPO MAP NAME: TWIN BUTTES - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:
COPPER SULFIDE
SILVER
LEAD SULFIDE
ZINC SULFIDE
GOLD LODE

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DEPARTMENT OF THE INTERIOR
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RICH HILL MINE GROUP (file) **PIMA CONTY**
By Ken Phillips, Chief Engineer, August 22, 2003

On August 21, 2003 I spoke with Bill Auby of the Tucson Field Office of the BLM regarding the theft of explosives from the University of Arizona - San Xavier Mining Laboratory. It is believed the stolen explosives were discarded by dumping them in one of the shafts of the Rich Hill Mine Group. An attempt was made to find data that would indicate the depth of the mine workings.

The State Mine Inspector and the Bureau of Alcohol, Tobacco, and Firearms are determining whether to attempt to recover the stolen explosives or to burry them in the shaft.

See also two news articles from the Tucson media regarding the theft.

Information on the Swastika Copper and Silver Mining Company, a company that at one time held the Rich Hill Mine Group, was contained in the ADMMR Swastika Copper and Silver Mining Company file and was not tied to any AZMILS location. The information in the Swastika Copper and Silver Mining Company file has been placed in the ADMMR Rich Hill Mine Group file and the Swastika Copper and Silver Mining Company file eliminated.

SWASTIKA COPPER AND SILVER MINING CO PIMA COUNTY

MG WR 1/22/82: Visited the Swastika Mine, Pima County. The two main shafts of this property are in the SESENW, Sec. 10, T17S R12E. A newer shaft, with a small head frame, is located about a quarter of a mile south-southwest of the main or original shafts. This newer shaft is in the SENESW, Sec. 10, T17S R12E. The shaft is in moderately good condition and appears to be about 100 feet deep. All of these shafts appear to be on claims controlled by a J. H. Pemberton, 4454 S. Million Rd., Tucson,AZ 85714, phone 883-1298. At present there is no activity on this property.

REPORT

on the property of

Swastika Copper and Silver Mining Company

Olive Camp, Pima County, Arizona

JOHN CARTER ANDERSON
Consulting Mining Engineer
90 North Church Street
P. O. Box 1535
TUCSON, ARIZONA

LOCATION AND HOLDINGS

The Swastika Group of 12 unpatented lode mining claims and fractions, including the Richmond, Emma E. Rich Hill, Alice, Glenn, West End, Beatrice, Horse Shoe, Republic, W. K., Flora and Gem claims, is located at Olive Camp, 21 miles southwest from Tucson, at an elevation of about 3,500 feet, and is reached by wagon roads from Tucson and from Sahuarita Station on the Tucson-Nogales Branch of the Southern Pacific, which is 8 miles east.

Olive Camp lies in relatively flat country, showing but a few low hills, with maarked structural breaks on all sides, and is that part of the Pima Mining District lying between the San Xavier-Mineral Hill District on the north and Twin Buttes on the south. It is distinguished from those camps by the fact that it is almost wholly an area of igneous rocks, while they are areas of sedimentary rocks intruded by igneous dikes and sills.

HISTORY

A correct knowledge and interpretation of the history of Olive Camp is essential to any consideration of its future possibilities.

Like many another silver camp of the old days in Arizona, an authentic recorded history of the camp is lacking, and the total of its past production can but be approximated by a siftingout of the stories told by the old-timers. Fortunately, in the case of Olive Camp, though its days of prosperity are now nearly 30 years back, there remain in Tucson a number of solid, trustworthy men, the foundations of whose fortunes were laid in Olive Camp, including Messrs. Frank and Warren Allison, J. K. and Sewarad Brown, and others, whose accounts may be accepted with confidence.

The Olive, the first mine located, now called the Olivette, was located in 1886 by Frank Allison, J. K. Brown and another, and it is said that by 1887 there were 150 men leasing in the district, and that shipments of ore were maintained continuously to the year 1893, when the falling price of lead and silver closed the mines, which, with the exception of the Richmond, have never since been worked.

The Richmond and Emma E. claims of the Swastika Group are said to have produced about $100,000.00 from shallow inclined shafts and small stopes. In 1913 the main working on the Richmond was worked by leasers, who took out a considerable but unknown quantity of ore and left the mine, as a leaser always does, with very little in sight. No

serious attempt at development has ever been made, and the greatest vertical depth reached in taking out this ore was 100 feet.

Endlining the Richmond to the east, and on the same or a related vein system, is the Annette, and next to it the Olivette. Since starting this report the writer has again talked with Mr. Seward Brown, the original owner of the Annette. He says that he took out $65,0000.00 and left good ore in a winze at the bottom and in the end of a drift to the west. He also says that his brother, Mr. J. K. Brown, and Mr. Frank Allison and leasers shipped $750,000.00 from the Olive and left ore in the bottom.

Still east of the Olivette, on what is now known as the Wedge Group, or Whitcomb Group, dump after dump shows the extent of the old work.

The Schumaker Group, adjoining the Richmond on the south, was another producer, and a third of a mile southeast is the Prosperity Group, with large dumps at several shafts, the deepest of which is said to be 310 feet on the incline. Other claims in the district also have records of production, but the principal work and the greater part of the production centers in those here named.

There is no known record of production from any of these mines that can be verified, which is not strange, owing to the manner in which the mines were worked, with a number of leasers shipping irregularly as they get out a sufficient tonnage of high-grade ore. This ore is reported as running from 100 ounces to 300 ounces silver per ton, with upward of 20% in lead. The higher silver values are said to have come, as is to be expected, with those ores carrying gray copper rather than with the heavy galena ores.

The various claims, such as the Richmond, Olive, Wedge and Prosperity, are reported as having produced from $100,000.00 to $750,000.00 or more each. Allison Brothers, who besides their own production ran a store and shipped ore for many of the leasers, claim a record of over $1,000,000.00 worth of ore shipped by them, and estimate the production of the district at around $3,000,000.00. As these statements are made by men of good standing, not now interested in the properties, it is but fair to accord them consideration in estimating the past returns from the camp. From all the evidence at hand and from the number and size of the old dumps the writer feels safe in assuming that the production for the district was in excess of the lower figure and not likely over the latter. Worked even in the careless manner in which they were, this certainly meant a good return for the amount of work done.

MINES IN ADJOINING DISTRICTS

Equally important is a knowledge of the mines in the San Xavier-Mineral Hill District to the north and Twin Buttes to the south. These

are contact and replacement bodies of base ores in limestone, but it is believed that the source of the mineralization in all three camps is related and that deeper development in Olive Camp may lead to similar deposits, which will be much larger and more permanent than the silver veins of the camp.

Chief among these mines are the following:

The Mineral Hill Consolidated, where a body of copper ore is being developed in garnet along a sill contact of granite between limestone and quartzite, which is increasingly large on each deeper level, with a body of mill ore from 100 to 200 feet wide on the 600, the deepest developed level. From the Vulcan $300,000.00 worth of copper ore was taken through two old inclines, which reached a vertical depth of about 300 feet. Increasing water, which could not be handled through the old inclines, which are now caved, shut this property down. A vertical shaft is being sunk to reopen the mine. The San Xavier, nearest of the developed mines to the Richmond, has developed a big body of lead-zinc and copper ore to a depth of several hundred feet, proving it to be increasingly larger in depth. This property is owned by the Empire Zinc Co., a subsidiary of the New Jersey Zinc Co., and will undoubtedly be equipped with reduction works and development continued when the policies of that company require further supplies of ore. These may be considered as real mines with assured futures. Other properties which have produced some ore, but which are not yet developed to the point of permanent mines, are the San Xavier Extension and the South San Xavier.

In Twin Buttes the Glance, Queen, Minnie, and Senator Morgan mines have in the past produced a total of several millions of dollars worth of copper ores from granite-limestone contact deposits, and present development on the Queen and the North Star is blocking out large bodies of primaray copper and copper-zinc ores, which promise a still bigger future for the camp.

GENERAL GEOLOGY OF THE OLIVE CAMP

Unlike the San Xavier-Mineral Hill and Twin Buttes districts, where large bodies of copper and zinc-lead-copper ores are found in limestone, the silver veins of Olive Camp are found in a rhyolite porphyry, which at many points resembles and has often been mistakely called quartzite. The original extent, thickness and age of this formation is unknown, but it is believed to be a part of one of the early Tertiary flows.

The extreme north line of the rhyolite follows a general N. 70 E. break through the Gray Copper claim of the South San Xavier and the West Extension of San Xavier and San Xavier claims of the San Xavier property. This contact is one of shearing rather than of a single strong

fault and the porphyry, if not forming the hanging wall of the vein of the San Xavier is not far in the hanging wall. Where seen on surface, where the road passes by the shaft on the San Xavier, the contact has a steep dip to the south the same as the Paleozoic limestones. In the underground workings of the South San Xavier the contact, where first cut, about 100 feet north of the shaft on the 150 foot level, is quite steep, but it is much flatter where it crosses the shaft between the 150 and 200 foot levels. It is believed that limestone will be found below the porphyry over the whole area of Olive Camp, but at what depth is impossible to say, as the thickness of the porphyry is unknown. South of this contact the limestone is again faulted to surface on the Ruby, Hoosier and Vienna claims. Here again the lime has a south dip and is in contact with the porphyry, which extends then unbroken, save by later igneous intrusions, for about three miles south, where limestone hills and granite flats again limit it. To the east is the uplifted limstone of Helmet Peak and the wash covered flats which extend down to the Santa Cruz river. On the west is a granite flat, the actual contact being covered by recent wash.

Throughout the rhyolite area, particularly in the neighborhood of the veins, there has been a slight dissemination of pyrite, some of which was sufficiently cuperiferous to stain the walls of old mine workings with copper salts. Pieces of the wall rock taken from any of the mines at depths below surface oxidation show a few tiny crystals of pyrite. It is the oxidation of this iron which has seamed and rusted the porphyry in surface exposures.

On the Rich Hill claim of the Swastika Group a 165 foot shaft enters intrusive granite identical in character with that responsible for the mineralization in the San Xavier-Mineral Hill and Twin Buttes Districts. Where cut in the shaft this granite has an east-west strike and a very flat dip to the south, while the main veins of the Camp dip to the north. In the shaft the contact shows some alteration of the porphyry and a little sugar quartz, but no mineralization. Lateral work from the station on the 150 foot level, following a streak of pyrite, with a little chalcopyrite and galena, having a strike of N. 70 E. and a dip to the north, is now showing veinlets and bunches of galena and copper-iron sulphides and zones of alteration in the porphyry, which seem to have taken a south dip at about the same angle as the granite. The work at this point is probably but a few feet distant from the granite cut in the shaft.

Also intruding the rhyolite, and best seen between the mines and the north line of the rhyolite are tongues of andesite porhpyry and a similar but more coarsely crystalline rock which are younger than the intrusive granite. At surface no connection can be traced between these andesite dikes and the mineralization. However, the dump at the Alpha and one

of the dumps at the Olivette, that of the shaft on the notrh-south vein which crosses the main east-west vein, show some of the adesite.

Deeper development in the district must prove the relation of these two intrusives to the mineralization, but the writer is very sure that one or both of them are responsible for the ore deposition. As the granite has been so clearly proven to be associated with the origin of the ore bodies in the adjacent limestone areas, it is to be expected that a similar relation exists here. The presence of gray copper in the ores from the Olivette and th Alpha where the andesite intrusions have been found, and the presence of galena only in the veins on the Swastika Group, where granite has been found, may indicate that both of them were mineralizers.

The writer first became interested in the possibilities of Olive Camp when making a study of the geology of one of the mines in the San Xavier-Mineral Hill District. Since then he has spent much time in a study of the Camp, to determine, if possible, what chances exist for finding larger bodies of ore at depth. This study has strengthened his belief that all of the veins of Olive Camp owe their origin to the intrusion of underlying formations by granitic or porphyritic rocks related to those which mineralized the limestones in the adjacent districts. The siliceous porphyry, being more uniform in structure, harder and less yielding than the limestone, was cracked and fissured rather than penetrated by these intrusions, and in these cracks and fissures was localized the travel of the mineralizing solutions which accompanied the intrusions, and so were formed the silver veins of the camp.

Following the progression of mineralization which has been observed by the writer in his study of a large number of mines and mining districts in Southwestern Arizona, it is his belief that if these veins are followed on down below their present workings there will be a gradual change from the lead-silver ores of the past to ores containing more and more zinc and finally to copper. If these veins continue on down to an intrusive contact, as it is believed they will, they may be expected to change in strike and dip to conform with the strike and dip of the intrusive, and will then continue on down as contact veins. If in depth limestone is found under the porphyry, as it is the firm belief of the writer that there will be at some depth, there are good reasons to expect that copper deposits will have been developed on the contact with the intrusive, similar to the big contact copper deposits on either side of the camp. Herein lies, the writer believes, the real future of the district.

Unquestionably the porphyry is older than the uplift in the sediments, as it is intruded by the same granite which elsewhere in the district intruded and uplifted the limestone. While there is as yet no definite evidence to prove it, it is thought to be a part of one of the early Tertiary flows which covered the country. While the crystallization of the

component minerals, especially the quartz, is better developed than in most of the rhyolite flows, it nowhere shows the coarsely crystalline texture to be expected in a mass of plutonic rock of this extent, and on the hill-tops it shows the characteristic falsitic texture of a surface flow.

The general geological history of this part of Arizona can perhaps best be pictured by conceiving of a vast extent of sedimentary formations of Paleozoic and Mesozoic age, in places wholly or in part eroded away, then covered by a succession of andesitic and rhyolitic flows in early Tertiary time, covering the country as an ice sheet covers the northern waters in winter. Into this cover of sediments and flows was intruded in Tertiary time a batholitic mass of granite which broke them up just as in the spring break-up the thick sheet of ice is broken up and engulfed by the water. Thus you see great blocks of the older formation floating as in a sea of granite in all directions and dipping at all angles, sometimes near together, simetimes widely separated by broad stretches of granite; sometimes exposing one of the lower beds of the series on surface, and sometimes all but submerged in the granite. Subsequent faulting and erosion has carved the country into high and low relief, and filled many a broad valley with a great thickness of wash which still further obscures the correlation of the formations in one camp with those in another.

In the case of the sedimentary rocks, which on fossil and lithological evidence can be studied and named, and an age relation carried through, and rocks of the same age recognized in many widely separated exposures. Much valuable work has been done along this line by Dr. Ransome of the U. S. Geological Survey, in his paper, "Some Paleozoic Sections in Arizona and their Correlation," and by others, but no attempt has ever been made to work out the much harder problem of a correlation of the igneous flow rocks which covered these sediments. The writer has not been able to find a single exposure of the rhyolite of Olive Camp where it is in other than fault contact with the limestones which bound it on three sides, but feels quite sure that it is a part of one of these Tertiary flows, probably a thick one, and that at some depth below the present surface will be found the same series of Paleozoic sediments which abut its margins.

It has been widely believed to be the rule that the big end of an ore deposit was up and that a vein of good width and value could normally be expected to decrease in size and value with depth. However, the writer's observations and studies in Southwestern Arizona are teaching him to look for exactly the opposite under certain geological conditions.

During the period of ore deposition which followed the intrusion of the granite batholith, extensive development of great fissure veins, such as are found in other mining districts, seem to have been lacking. Instead, contact and replacement bodies were formed in the intruded rocks near the intrusive granitic rocks or their related porphyritic offshoots. Travel

of mineralizing solutions which accompanied these intrusions was confined to the contacts or to minor cracks and fissures, and not to one or more main trunk channels, such for instance as the big fault fissure gold veins in the flow rocks around Oatman.

Dikes and sills of porphyry reached far higher in the intruded rocks than the main contact, and thus opened a way of escape for the solutions. Owing to the quick cooling of these dikes and sills, however, the upper, thinner portions were not open to the circulation of mineralizing solutions long enough for any large deposit to form on their contacts, nor was the force of the intrusion at its upper limit great enough to open big fractures in the intruded rocks. Some solutions carrying the lower temperature minerals might, however, reach this high before their passage was sealed off, and branching off through such minor fractures as were developed, form small lead-silver veins. At greater depth and under slower cooling conditions, where the channels to the main magmatic mass below remained open a longer time, there was a long continued ore deposition, in favorable formations the solutions spreading farther and farther from the contact at greater depth.

The resultant ore deposit may never have reached to the present surface, or may be represented by surface outcrops almost insignificant in appearance and value. The outcrops of this type of deposit will vary in attractive appearance in proportion to the depth to which erosion has uncovered them. But at any point between the smallest stringer of ore and the main contact below, if the structural conditions and enclosing wall rocks are favorable to the deposition of ores, it is probable that the big end of the deposit is down. A good illustration of this type of deposit is found at the Mineral Hill Consolidated, where an intrusive sill of granite between quartzite and lime has formed a contact deposit of copper in the limestone which is much bigger and more continuous on each deeper level. On surface there are scattering outcrops of copper carbonates, below which shoots of carbonate ore were worked out to the 300 foot level without finding any big or continuous shoot of ore. On the 300 foot level large bodies of garnet-chalcopyrite ore were found on top of the granite sill, and on the 600 foot level the garnet zone is still bigger. A cross-section of the ore deposit would show two inverted wedges—one of granite, tapering out thinner and thinner as it approaches surface, and a similar one of ore.

MINERALIZATION

The ores of the district as so far developed are of two classes: Those silver-lead ores carrying their silver values in association with galena, and those in which the silver values are associated with gray copper. This second class of ore carries the higher silver values, shipments running up

to 300 ounces of silver per ton being reported. The straight galena ores are not known to have carried higher than 100 ounces of silver per ton. The galena ores may be expected to carry less silver in depth, while the silver values in the veins carrying gray copper may persist to somewhat greater depths. Zinc blende is beginning to show in the ore from the bottom of the Richmond, as is also a little chalcopyrite or cuperiferous pyrite; and, according to Mr. Seward Brown, the bottom of the Annette and Olive veins was showing some zinc.

The zonal arrangements of the different metals in veins has been noted by a number of students of ore deposits in different regions, and the observations of the writer are continually adding proof to the zonal theory of the deposition of metals in Southwestern Arizona. Of the commonly mined metals in Arizona the main contacts show, as a rule, clean copper-iron ores. At some distance above the contact the admixture with zinc begins, and still higher the ore will likely contain lead-zinc-copper, then lead-zinc, and in the more superficial veins lead-silver. The vertical extent of these zones is variable, and there is usually a considerable overlapping of one zone with the next higher, which has given rise to the complex ores which are characteristic of many districts in this region.. However, with few exceptions, it is safe to predict that the superficial lead-silver veins, from which the old timers took greater or less amounts of shipping ore, will have a limited vertical range, and that deeper development will find first zincy lead ores and finally copper ores. These ores will be lower in grade than the surface ores, but the increase in size of the deposit may far mor than offset the lowering o fthe grade.

The mines that are paying the great dividends in these days are the mines with large bodies of low grade ores, and in the opinion of the writer the posisibilities of silver veins like those of Olive Camp should not be considered as dependent on the finding of more and larger bodies of the silver ores that the old timers took, but as to whether or not they are leaders to a larger deposit of base metal ores. It is of course possible for properly directed lateral work beyond the limited old workings to find additional shoots of the same silver ores, and once a working shaft is connected with the bottom of the old workings on the Richmond, drifts should be run as long as there is a vein to follow, even though the ore streak is very small, for the old timers found their ore by fololwing the vein, though it pinched down to but a half inch of ore.

VEIN SYSTEM

The original vein of the Richmond has a nearly east-west strike and a dip of 35 to 50 degrees to the north, flattening somewhat in depth. This or a parallel vein or veins continues east and west through the end-lining claims for a distance of perhaps a mile, and several different ore shoots

has been worked on the different claims. In the main incline shaft of the Richmond it has well marked walls from 2 to 6 feet apart, with a vein filling of crushed country rock through which runs streaks and veinlets of galena ore. The widest of these streaks now to be seen in the mine , in an east drift on the 90 foot level, is but 4 inches wide, but it is reported, and is indicated by the old filled stopes, that these streaks would open out to as much as three feet in width. This seems to have been characteristic of the ore shoots in all of the old mines. A similar and probably related vein is opened on the Emma E. claim, end-lining the Richmond on the west, by a number of small inclines, which from the dump must have followed one of these ore shoots.

In the main incline on the Richmond this east-west vein is cut by branching fractures of varying strike and dip, some of which show some galena. It appears that there may be a series of small branching and intersecting fissures, any of which may contain ore. On the bottom level, about 80 feet northwest of the shaft, is a 50 foot winze. Above this is an old partly filled stope about 40 feet long and extending at least that far above the level. It is here that the leaser in 1913 is said to have taken out the ore he shipped. The vein in the stope was quite flat, and where the winze was sunk is crossed by another break dipping about 55 degrees, which is the one followed by the winze. The main vein dips off in the hanging wall of the winze. Small stringers of galena show in both veins, but at this point are not of workable size.

Early in this year the winze was sunk to 50 feet below the level, and 38 feet below the level a flat slip with a slight dip to the southwest crossed the winze, cutting off the slips in which it was sunk. Below this all four sides of the winze showed low grade ore. The writer saw this showing when the winze was about 18 inches below the slip, and at that time noted with great interest the change and the manner in which the descending slips seemed to be cut off. Above the slip is the north-dipping vein with a little quartz and galena; below it is largely quartz with some galena. The winze continued in this ore for about 12 feet, cutting off in the bottom on another flat slip. All sides of the winze were in ore and some very good pieces of galena were taken out, but with the lower slip water came into the shaft, rising nearly to the upper slip. This shut down the work, as there was no way to handle water.

The writer regrets very much that he did not have an opportunity to see the bottom of the winze before it was flooded, and note exactly the change that came in below the ore, for this is apparently a flat vein, probably conforming in strike and dip with the underlying porphyry intrusion. This would have done much to furnish the information which is essential to a proper location of any new work. While the ore is not of shipping grade, it is mill ore, and apparently a much stronger vein than those originally worked. Its encounter greatly increased the writer's

opinion of the future possibilities of the property, and confirmed his belief that the property warrants the expenditure of the amount necessary to prove it. It strengthens his theory as to the manner of formation of these veins, as does in a fuller measure the finding of the intrusive granite in the bottom of the Rich Hill shaft.

About 230 feet northwest of this incline is a vertical shaft 65 feet deep, 4 feet by 6 feet in the clear, and partly timbered, which was sunk as a prospect shaft by leasers. A little above the bottom it cuts an east-west vein showing a little manganese-stained quartz and some lead-silver values. This is probably a parallel vein in the hanging wall of the one in the incline, and like it may open out to workable size and value at some points. It appears to be widening fast in the few feet in which it is exposed. None of the veins of Olive Camp have a strong outcrop, and while a number of ore shoots have been opened along a certain general strike, one cannot on surface follow on the vein from one to the other, but it is believed that at depth they will all be found to be in some manner conected.

On the Rich Hill claim several old cuts and shallow shafts open a well marked fault, with a strike of about N. 70 E., and a dip to the north, showing some quartz and mineralization. The same break is opened again on the Alice claim to the east by a shaft originally 70 feet deep, with small stope drifts at about 40 feet and at bottom. This work shows some quartz and a little mineralization, but the vein is faulted just below 70 feet by a fault with a flat dip to the west. The present owners have sunk this inclined shaft to 165 feet, cutting intrusive granite at 155 feet. In the shaft the upper conttact of the granite has a flat dip to the south and a nearly east-west strike. On the 150 foot level they have crosscut north and south in badly shattered rhyolite, with tiny seams of pyrite and occasionally of galena through it. About 40 feet south of the shaft a drift turns N. 70 E., following a north-dipipng seam of pyrite beyond which small bunches and seams of pyrite and galena, with a little chalco-pyrite, apparently dipping to the south, are coming in. Some of these bunches of galena are very solid and heavy and of high grade. Zones of alteration in the rhyolite have a flat dip to the south, about like that of the granite in the shaft, and probably in sympathy with it. The granite contact cannot be far distant, and it appears as though the mineralization was turning south to follow the contact. A winze is being started at this point, and its progress will be watched with great interest.

RECOMMENDATIONS FOR DEVELOPMENT

It is out of question to carry on new development through the old incline. It would entail an added cost of mining that would soon exceed the cost of sinking a working shaft.

The 65 foot vertical shaft might be continued, but it is 190 feet west of the bottom of the winze, and for a connection would take 100 feet of sinking and 190 feet of crosscutting. It would probably encounter the vein before going that distance, but our present knowledge of the way the vein is going is so limited that it might easily miss it until driven to a connection. And it is very probable that it would then be found to be so located with respect to the ore that it would require excessively long crosscuts on lower levels. If this shaft were deepened it would have to be stripped and retimbered to make it 4 feet by 7 feet in the clear, as, with water to be handled, it is too small for the work to be done.

The few feet of sinking in the winze which was done last winter did more to predict a future for the property than all the work ever done in Olive Camp, and a few more feet of work there may easily do as much good in guiding the real work of development.

When the further development of this property is undertaken, it will be necessary to make provision for the handling of the water, for it is certain that water must be handled in sinking. The amount of water met in any of the old mines was small, and can be easily handled in a vertical shaft with modern equipment. The greatest flow known in the camp is that met by Mr. Charles Taylor on the 200 foot level of the Bonanza, the claim just north of the Richmond. In his recent work on that claim he has had to handle a flow of about 40 gallons a minute from 200 feet. A small gas engine driven generator to furnish power for electric pumping will be the least expensive and most efficient provision for pumping water.

If, at that time, this equipment be utilized to get the water out of the winze to permit the doing of a little more work there with a windlass, or preferably by raising out to surface above the winze and then doing a little more work on the vein, the cost should be saved times over by determining the correct location of the new shaft. Not over 70 feet of raising will be necessary to conect this winze with the surface, and it could be done without any stops for hoisting by letting the muck fill up the winze and the old stope and drifts on the bottom level. Then the winze could be cleaned out rapidly, using the 8 H. P. gasoline hoist belonging to the property, the raise timbered up and used as a working shaft until enough was learned to show where the new shaft should be sunk.

As soon as a little additional work in the bottom of the winze has determined the question of the strike and dip of the vein there discovered, and whether or not the north-dipping veins end on that vein or continue below it, a new shaft should be started to develop this ore showing at depth. At the present stage of development, a one and one-half compartment shaft, 4 feet by 7 feet in the clear and timbered with 6-inch by

6-inch timbers is amply large enough to test the ground with the least expense, and it is big enough to handle any high-grade ore that may be found in extending the old workings. It should be located, planned and equipped to go at least 500 feet, with connections with the vein at 100 foot levels. On the correct location of the shaft will depend the distance to be crosscut on the several levels, and a poorly located shaft may easily entail excessive expense in crosscutting.

Co-incidentally with the deeper development of the property, as soon as a connection is made with the bottom of the old workings, drifts should be started to find other shoots of high-grade ore, which might easily pay very well for the work done.

CONCLUSIONS

As with everything else which is under development in this region, the possibilities of the Swastika property cannot be judged nor measured by the size or value of the ore exposures left by old leasers who worked the mines for the high-grade silver ores. There is the possibility of finding other ore shoots than those formerly worked, by well directed development, and in a property like the Swastika, where so small a proportion of the length of the veins have been prospected, and where the continuation of this vein system on adjoining properties yielded such large returns, the chances for finding profitable shoots of high-grade ore well warrant their development.

The real future of the property lies in finding in depth of larger and more permanent bodies of bas eores. The writer has made a long study of the geological conditions governing the formation of such deposits in Southwestern Arizona, and has tried in this report to clearly set forth his reasons for believing that the lead-silver veins of this property lead down to them. He believes, therefore, that the deep development of this property is a good mining speculation, with possibilities of profit more than warranting the risk of development.

Faithfully submitted, JOHN CARTER ANDERSON.

Tucson, Arizona.

SMELTER RETURNS

On Ores Shipped from the Mines of the Swastika Copper & Silver Mining Company

	Total Value		Total Value
114.4 oz. silver 13. % lead	100.88	32.4 oz. silver 11.4 % lead	40.92
109.5 oz. silver 54. % lead	163.05	72.2 oz. silver 22.7 % lead	95.94
92.2 oz. silver 31.8 % lead	128.14	29.8 oz. silver 42.5 % lead	105.86
40.2 oz. silver 46.2 % lead	102.06	87.2 oz. silver 35.4 % lead	117.68
28. oz. silver 45.4 % lead	110.10	64.9 oz. silver 46.4 % lead	119.67
59.7 oz. silver 44.2 % lead 1.28 % copper 5.4 % iron	116.15	60.6 oz. silver 58.1 % lead 1.1 % copper 1.7 % iron	135.38
61. oz. silver 49.8 % lead	122.34	57.9 oz. silver 42.4 % lead	108.37

Returns on last shipment of ore from the Swastika Copper and Silver Mining Co., prior to printing of this report:

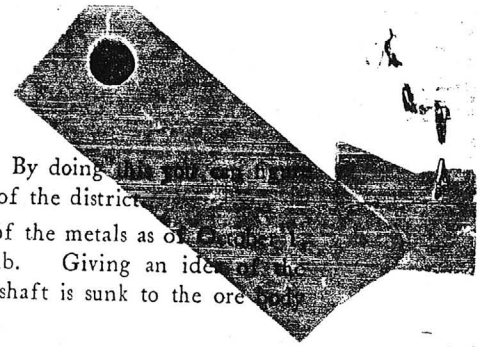
Shipment made October 12th, 1924, Car St. L. S. F.-146696.

Complete analysis: Lot No. 2845—Gold, trace; Silver, 26.1 oz.; Lead, 38.1%; Copper, .22%; Insoluble, 45%; Iron, 1.4%; Manganese, 1.1%; Silica, .2%; Zinc, 1.4%; Sulphur, 3.2%.

New York Metal Quotations date received smelter—Silver, .71125 per oz.; Lead, 8 cts. per lb. Net received from smelter, after deducting all freight, smelter and other incidental charges, was $53.43 per ton. The labor cost of production on this shipment was $8.75 per ton.

The above is a fair average of the returns that may be expected when we have done one hundred feet more of vertical sinking and tap the twelve foot vein of ore that has been discovered by working down through the old incline.

In studying the maps next attached, and the relation of our property to the various rich properties mentioned in this report, bear always in mind that each standard claim shown is SIX HUNDRED FEET wide



and FIFTEEN HUNDRED FEET long. By doing [illegible] the distance we are from the big producers of the district.

Values shown are figured at posted price of the metals as of October 1, 1924. Silver 70c per oz; lead 8c per lb. Giving an idea of the returns that can be expected when vertical shaft is sunk to the ore body in winze opened up through the old incline.

ASSAYS

Swastika Copper and Silver Mining Company

Gold oz.	Silver oz.	Lead %	Copper %	Values
	114.4	13		$100.88
	32.4	11.4		40.92
	109.5	54		163.05
	72.2	22.7		95.94
	92.2	31.8		128.14
	29.8	42.5		105.86
	40.2	46.2		102.06
	87.2	35.4		117.68
	28	45.2		110.10
	140	40	2.5	168.30
.04	99.8	36		135.46
	96.8	46		141.36
.03	29	45.7		118.00
	26.8	58		111.56
	18	64		115.00
.04	28.8	45.6	.5	119.36
.05	87.2	36.5	1.5	133.34
	77.6	16.4	3.1	88.62
	144.6	28.2	3.1	154.40
.04	16.7		3.5	28.79
	403.9	22.4	4.2	329.51
.04	17	31		69.50
	59.7	44.2	1.4	116.15
	60.6	58.1	1.1	135.38
	64.9	46.4		119.67
.06	61	49.8		122.34
.02	50.6	55.2		123.74
	43.6	36.5		88.92

Values shown are figured at posted price of the metals as of October 1, 1924. Silver 70c per oz.; lead 8c a pound, and copper at 13c.