

PORTION OF A
REPORT OF GEOLOGICAL EXAMINATION
AZTEC MINE-MAXWELL LAND GRANT CO., BELEN, N.M.
BY EDWARD PERRY & AGUSTUS LOCKE-OCT. & NOV. 1918

Introductory-, The examination on which this report is based was made at the request of Mr. Chas A. Chase, consulting engineer to the Maxwell Land Grant Co., which owns the Aztec mine.

The time spent was as follows-Locke July 7 to Nov. 18, 1916; Perry, Oct. 4th to Nov. 5th and Nov. 9th to Dec. 7th, 1916.

The examination was to provide a geological basis for prospecting not only on the ground entered by the principal mine workings (i.e. those between the old Aztec tunnels and the No. 1 tunnel, an area of about 10 acres), but also in the ground outside those workings. Necessarily, therefore, the examination involved a study for some distance away from the mine workings. The country principally studied measures 10,000 by 4,000 feet, and extends from the top of Baldy Mtn. to the lower ditch, 4,000 feet south-east from the Aztec shaft, and from Ponil creek to Ute Creek.

Within this country the surface was mapped and all the accessible mine workings were examined. Outside, with the exception of the Thelma, only general studies were made.

The more important mine workings are as follows:-Tunnels Nos. 1, 2, 3, & 4, Thelma tunnel & Ross tunnel. Tunnel 250 feet east from No. 1 tunnel. Tunnel between station 5 R and 9 F. Tunnel at east face of Baldy Mtn., Tunnel at Sta. 25-D.

Information given by Mr. DeHayes has been of material assistance in carrying on the examination.

SUMMARY OF CONCLUSIONS

The ore bodies are less than a dozen in number. They are small (the maximum dimensions of the largest are 300 by 80 by 15 feet). They contain a considerable proportion of the ore carrying over a hundred dollars per ton in gold, and frequent spots carrying over a thousand dollars. They have linear extension close to N 30° West. They are mostly flat lying following rock bedding or flat faults; occasionally they are steep where the bedding or faults are steep. The ore is chiefly an alteration of shale at or close to the contacts of shale with overlying sandstone. The contacts are either of bedding or of faulting, and not infrequently ore turns without interruption from a flat bedding contact to a steeper fault contact.

The guides to ore believed to be promising are the intersections of N 20°-30° south-west, east dipping faults or rather small displacements, with flat lying shale-sandstone contacts. There are other possible guides, not yet shown to be promising, and the prospects outlined in this report are chiefly, tho not exclusively, dependent on theory of intersections mentioned.

In the general vicinity of the mine workings there are several faults known. There are, moreover, several contacts between shale and sandstone, one above the other. There are, therefore, a large number of intersections in question. Of this number several have been prospected, and have usually yielded ore, particularly in the so-called main fault, i. e., the contact at the top of the shale. There are good chances at other intersections with the main contact. No especially favorable intersections are yet known to exist below

the top of the shale.

Faults, other than those known may be confidently expected to exist in the large unexplored portion of the ground penetrated by the mine workings. When such faults are found, their intersections with contacts will be good places to prospect.

Away from the general vicinity of the mine workings contacts between the shale and the sandstone are known in certain places to exist. Faults intersecting those contacts, however, have not been definitely located, although their existence is regarded as probable. Prospecting away from the vicinity of the mine workings, therefore, will be preferably at first so as to find the desired intersections, and such prospecting must of course, have less positive promise than that in or near the mine.

On the basis outlined, the prospects proposed, 36 in number, are arranged in the following group:-1st-in the general direction of the mine workings on the main contact. 2nd-In the general vicinity of the mine workings above the main contact. 3rd.-In the general vicinity of the mine workings, below the main contact. 4th-In the ground away from the mine workings, on the main contact.

The principal positive promise is in the general vicinity of the mine workings. Here there is warrant for intensive workings. The richness, smallness, and elusiveness of the ore bodies and their evident connection with intersections between the N 20°-30° W faults and main contact, render all of these intersections worthy of careful prospecting.

Altogether, the policy indicated, as a result of the geological examination is a liberal one. The hope for important ore discoveries, and for a considerable enlargement in the scale of production,

is good.

ROCKS

L. C. Graton describes the rocks of the district as rather flat Cretaceous sandstone and shales, cut by intrusive porphyry of monzonitic character. The shales he considers to be of Montana and Colorado age, and the sandstone, which overly the shales, to be the lower sandy part of what is probably the Laramie coal measures.

The shales and coal measures are each several hundred feet thick. The ore, however, shows a striking affinity for the top contact of the shales and it is in this contact, that we are especially interested.

The shale is dark-gray in color, and, where unaltered, is soft. Well away from the ore it is thinly bedded and possessed of a fairly good slaty cleavage parallel with the bedding plane. Near the ore it is harder, often grayer and lacking in easily recognizable bedding.

The sandstone in the vicinity of the ore, is usually fine grained and often somewhat quartzitic. Sometimes it contains tiny biotites, which cause it to resemble a fine grained igneous rock. Away from the ore, it is often a grit or conglomerate.

While the shale exists with no important impurity, except porphyry, over a thickness of some hundreds of feet, the sandstone exists as beds varying between a few inches and many feet in thickness, intercalated with shale or shaly beds of somewhat smaller thickness.

The porphyry is of two kinds:-1st. Fine grained and probably dioritic and the second coarser and consisting of hornblende and

feldspar. Both porphyries exist wholly in the form of sills, so far as we know. The porphyry in the vicinity of the principal mine workings of of the fine grained variety, and this variety is now known elsewhere.

SURFACE CONDITIONS

Along the Aztec ridge, from the Aztec shaft easterly 2,100 feet to Mineral Monument No. 7, the rocks are well exposed; they consist of sandstone and altered shale of the (Laramie?) except for about 100 feet of fine grained porphyry near the shaft. The altered shale is greenish and probably contains fine grained green garnet. The porphyry belongs to a body whose form we do not know but which, for like of evidence to the contrary, we assume to be a sill.

Eastward from Mineral Monument No. 7, the rocks are hidden by debris. Westward from the Aztec shaft for about 1,300 feet the rock is consealed by debris, except for a small amount of shale near the shaft.

Thence, starting where the ridge steepens, shale and coarse grained porphyry are exposed for a distance of 2,100 feet to the main contact, above which is quartzitic sandstone belonging to the (Laramie?).

The Southerly slope of the Aztec ridge, tho carrying a large amount of sandstone debris, is shown, in numerous exposures rock in place, consists chiefly of shale. The Northerly slope of the Aztec ridge, extending down to the Ponil creek, is manteled with debris that only a few sure exposures of rock in place have been recognized. The debris in question has a variety of thickness.

The air shaft passed thru 35 feet of it; the region just east of Copper park has it to a probable depth of 300 feet. In certain spots, there are probably islands of bed rock emerging from it.

Along the base of Baldy Mtn., from the Aztec ridge to Ponil creek, the debris is unmistakable of landslide origin. It lies in rough heaps and ridges, with hollows between them, often undrained, and consists of confused mixture of all the rocks of the district. Copper park is the result of the damming of the Ponil creek by the land slide material.

East from the ditch which runs from Copper park to the Aztec shaft, the topography is smoother, and the debris is probably shallower. Here the likelihood is that the movement of the debris has proceeded, not with the violence of a landslide, but with a gentler creep. The exposures of the rock in place, North from the Aztec ridge, south from Ponil creek, and east from the front of Baldy, are as follows:

In a tunnel at station 105, east from the air shaft-sandstone with one foot shale bed, interleaved with it. Along the lower ditch line, scattered between sts. 115 and 28-D, several exposures of greenish altered shale belonging to the Laramie. At the upper mill on Ponil creek, is a tunnel dump consisting of black shale. The tunnel is unaccessable. The fact that bedrock is not deep at this place makes it seem probable that the tunnel was in solid rock. If so, the presence of shale on the dump suggests that the tunnel was below the main contact. On the upper ditch line, southwest from Copper park, at sta. 44-G quartzitic sandstone, and up the slope from here, to the top of Baldy, abundant rock in place.

UNDERGROUND CONDITIONS

In the four main tunnels, the workings are mostly at the main contact or within a short distance above it or below it. Above the main contact, in the No. 1 and No. 2 and No. 3 tunnel workings, and in the south-east part of No. 4 tunnel working, the sandstone is interbedded with shale layers. In the north-west part of the No. 4 tunnel working, the portion of the mine which is now productive, the sandstone has not been found to be so interbedded, and there is a suggestion that the shale layers, at least for a short distance above the contact, have cut out. However, the opening here above the opening here above the main contact are so meagre that proof is lacking.

A sill of fine grained porphyry, two feet thick in two exposures where its whole thickness is measureable, occurs in the Ross tunnel and in the No. 4 tunnel workings, at a distance of 40 to 60 feet below the main contact. The No. 4 tunnel workings show it as follows.

Cross-cut 136, both under and west from ore

Cross-cut 150, two places west from ore.

Cross-cut 159, near entrance

Cross-cut 204-61

Cross-cut 19-68

On the surface, the sill, between 10 and 15 feet thick, is exposed near the road, at a point 400 feet south-east from the entrance to No. 1 tunnel. This is probably exposed again on the Aztec ridge between Sta. 7-F and S-F, 900 feet west from the Aztec shaft, where abundant float appears. In the south-east part of the No. 4 tunnel

working, and in the Nos. 1, 2, and 3 tunnel workings, the porphyry sill has not been found. This means in all probability, not that the sill is here absent, but that the workings are too high to disclose it, a conclusion supported by the common occurrence within them of sandstone interbedded with shale.

The body of porphyry lying immediately east of the Aztec shaft has not been found under ground. Its form is not known and it is assumed to be a sill.

The Thelma workings are long distance stratigraphically below the main contact and are concerned with exploring the contacts of two sills of porphyry with shale. These contacts, or other contacts, have been explored in other workings in the same vicinity and nowhere have disclosed important ore bodies.

FAULTS AND FOLDS

Baldy Mountain has been relatively uplifted many hundreds of feet, thru west dipping normal faults on the Elizabethtown side, and thru east dipping normal faults on the Baldy side. The faults which we know most intimately are, of course, those in the mine workings. Of these there are several striking N 20° to 30° W about parallel with the bedding, east dipping, at angles of 25° to 75° and with normal displacements as great as 50 feet, but often less than that. Occasional grooves in the fault walls indicate a movement nearly straight up and down the dip.

It seems likely that, when the country between the old Aztec workings and the No. 1 tunnel has been thoroughly explored, it will develop that this country is cut into blocks by east-dipping faults, a moderate distance apart. It is further more likely that

the country for some distance, both to west and east, is similiary cut in blocks.

The effect of the faulting is, of course, to depress the contact eastward and to bring sandstone down against shale. The north-west part of No. 4 tunnel workings, where the dip of the bedding is westward, the faulting keeps the contact from sinking below the level in the westward crosscuts. In the south-east part of the No. 4 tunnel working, and in the working of the lower tunnels, where the bedding dips east-ward, the faulting causes the contact to sink eastward faster than the bedding would normally carry it.

On the Aztec ridge, at a point some 800 feet west of the Aztec shaft, shale and porphyry come in and continue up the main contact, a raise of 800 to 2,100 feet. The shale shows, in several places, steep westerly dips, and it is not unlikely that there is a great deal of displacement here. Perhaps as much as several hundred feet. Whether or not it is along several faults or along single faults, we do not know.

The ridge (Copper park), ridge on sheet 301, going up from Copper park towards the cabin on the east face of Baldy mountain shows much the same conditions as those above outlined, and the fault probably crossed the ridge also.

Underground, there are known occasional steep fractures of a 70° N.W. strike, of unknown and probably small displacement.

The N 20° to 30° N faults localize ore, and in places, cut off ore. They are, at least in part, older than ore. As will be later shown in greater detail, they have much importance in the planning of prospects. Mention has already been made of the

fact that the bedding dips westward in the northwest part of the No. 4 tunnel working, and eastward in the other parts of this tunnel and the lower tunnels.

There is a probability of a flat anticline fold with its axis trending northeasterly, and passing between the airshaft and raise No. 165-52 of the No. 4 tunnel.

ORE BODIES

The ore consists of shale, and less often sandstone, carrying scattered grains of pyrite and native gold, sometimes readily visible and sometimes very fine. Here and there is a gray metallic speck which may be telluride, or possibly selenide of gold. Quartz is exceedingly meagre in amount. Rodochrosite and calcite in veinlets are not uncommon, but are seldom abundant. The shale in the ore is soft and greenish-gray; it consists chiefly of chlorite, and in the high grade material, has a peculiar granular texture, difficult to describe, but easy to recognize. The like of quartz of the same generation as the ore makes the ore an unusual one.

The grade is high, and, so far as is known, the values exist wholly as a native gold and in the gray mineral and not in the pyrite. The average now being mined is about \$35.00 per ton and spots of \$1,000.00 stuff are common. There is little low grade and the change from ore to waste is sudden. The silver values average 10 to 15% of the gold values.

Ore occurs in a number of widely scattered bodies. The bodies are small; the largest has a maximum dimension of 300 by 80 by 15 feet. All have at least a suggestion of tabular form, a linear

extension somewhat west of North. The majority are flat, and are localized either by bedding or by faults; a few are steep. Several pass from bedding to fault without losing their continuity, and where, as in the northwest part of the No. 4 tunnel working, the bedding dips west and the faults dip east, the cross section of the stope shows a roll.

It is probable that, as development proceeds, the ore bodies will grow larger and will draw nearer together.

GEOLOGICAL CONDITIONS AND ORE OCCURANCES

The geological condition of the ore occurrence in the working of the tunnels No. 1 to No. 4 are chiefly as follows:-1st. The ore bodies lie chiefly in the shale, immediately under sandstone. They favor the main contact, and, so far as is known, are absent from the great thickness of shale away from this contact.

2nd. The ore bodies have linear extention about 30° west of North. They are probably all bordered or cut by faults of this trend, and those faults are frequently ore bearing.

3rd. The sill of fine grained porphyry probably everywhere in the vicinity of the principal mine workings lies 40 to 60 feet below the main contact.

4th. The shale under the main ore of the No. 4 tunnel working shows a hardening alteration, producing a dark gray rock, which lacks in shaly texture and often carries disseminated pyrite. In the tunnels Nos. 1, 2, and 3, the country under the ore bodies is not exposed, and the presence or absence of the alteration has not been established.

5th. The flat anticlinal fold has its axis cutting thru the

productive part of the mine, and probably parallel with the long axis of the ore bodies.

The reason for the localization of the ore at the main contact is in all likelihood complex. The most plausible hypothesis is one which depends on the fact that, while the shale is somewhat plastic and does not readily maintain open spaces for the transportation of gold, the sandstone is brittle and readily does maintain such open spaces. The hypothesis depends, again, on the fact that the shale is more readily replaceable by ore minerals than sandstone. According to this hypothesis, then, the sandstone would furnish the path for the travel of gold, and the shale would furnish the hospitable matrix for its reception. Thus would be explained the confinement of the ore to the contact between the two rocks.

The east dipping faults being sandstone against shale increasing the area of the contact. Furthermore, they break the sandstone and shale. The extension of the ore bodies in a direction parallel with that of the faults is plausibly attributed to the effect of the faults in cracking the brittle sandstone and crushing the more plastic shale. It is not probable that the preference of the ore for the main contact is due to the special abundance of any favorable ingredient in the shale at that place, such as carbonaceous matter or calcium carbonate; for we have failed to find the shale at the contact to possess such ingredients in a special abundance.

The effect of the porphyry sill is undetermined. Conceivably it could have constituted the source of the gold; but whether or not this is the case, can not be definitely stated.

The alteration of the shale is undoubtedly an effect and not a cause of mineralization. The effect of the fold is undetermined.

PRIMARY AND SECONDARY GOLD

The question here involved is whether the gold is primary, or whether it is secondary (i. e., concentrated by processes connected with weathering). The importance of this question is smaller in this mine than in many other mines, because the horizon in which the ore discoveries are to be most confidently expected is flat and close to the surface. The question still has some importance, however, in regard to the possible other ore bearing horizons lower down.

In general, the secondary concentration of gold takes place by two distinct methods, mechanical and chemical. Mechanical concentration in an ore is most likely to take place residually, thru the removal by solution of the materials other than gold, and is confined to the oxidized ores.

Chemical concentration supposedly takes place exclusively thru the solution of gold by chlorine, in the oxidized region, and its reprecipitation a little lower down, and usually in the lower part of the oxidized region. For the production of chlorine, manganese dioxide (black oxide) is the most effective reagent. In the Aztec mine, the oxidized ore has probably undergone a slight residual concentration; for the iron of the pyrite has probably partly leached, and it is not unlikely that certain gangue materials have been partly leached, and it is not unlikely that certain gangue materials have been partly leached. There is no likelihood of mechanical enrichment in the sulphide ore.

As for chemical concentration, the manganese, and probably the chlorine are present. And yet this does not mean that such enrichment has taken place on any important scale. Firstly the forms of gold usually accompanying chemical enrichment, i. e., wire gold and plate gold are not at all common here. The shapes and sizes of the gold particles, and their manner of distribution, are similar to those in certain deposits of other districts known to be primary. Secondly, the hardening alteration of the shale and the presence of certain minerals, notably rhodochrosite, prove conclusively that the sulphide ore underwent at least a certain amount of primary mineralization. Thirdly, a chemical concentration in one place would require a chemical impoverishment in another. No place has been found in the Aztec mine where the abundant gold necessary for the enrichment lower down has probably been leached out, altho there is a chance for some chemical impoverishment in the oxidized ores. The evidence concerning the question, then, tends toward the conclusion that the oxidized ores have had their gold somewhat concentrated mechanically and, perhaps, somewhat impoverished, chemically; it tends also toward the conclusion that the sulphide ore is primary. The evidence, unfortunately, is not wholly conclusive.

GUIDES TO ORE

Intersections of faults with the main contact. The promising prospects are on these intersections, or close to them. As has already been stated, all such intersections, near the old Aztec mine and the four main tunnels, are worthy of thorough prospecting; away from this country, work needs to be done first to find the

intersections.

CONTACTS ABOVE THE MAIN CONTACT

These have but little ore explored. A little ore has been found on them, and, no reason is known why there should not be more. In fact the conditions which we believe to have localized ore on the main contact, i. e., shale adjacent to cracked, brittle rock, exists in the upper contacts also, particularly at intersections with faults.

PORPHYRY SILLS IN THE SHALE

On the same basis, there is a chance that contacts between shale and porphyry sills are good. Indeed, the Thelma already shows ore on porphyry shale contact. And this chance becomes more favorable, in view of the possibility that the sill in the No. 4 tunnel working may have been a source of gold. The porphyry contacts, both those below and those above the sills are worthy of a certain amount of experimental or preliminary prospecting. The confinement of the fine grained porphyry to the vicinity of the four main tunnels and the absence there of coarse grained variety, create a presumption in favor of the former. In view, however, of the coarse grained porphyry in the Thelma with ore on its contact, this presumption is weakened.

For the present the only porphyry contacts, in addition to those of the Thelma which seem worthy of immediate attention, are those on the fine grained sill that underlies the main tunnel working. Later, however, other sills may have to be considered, and, in this case, we should advise that the fact that a given

sill is coarse grained be not permitted to act as a veto on its exploration.

HARD ALTERATIONS OF SHALE

Whether or not this alteration always or usually occurs under ore, is not known. It can not at present, therefore, be used as a reliable guide, however, a working not far below the main contact, which shows shale having the hard alterations, would be a good place to raise from. And there is a possibility that, as more openings are made and more information is obtained, the hard alterations will become distinctly more useful than it is now.

CERTAIN MINERALS

Calcite and rodochrosite are fairly good indicators that ore is near by. The fact, however, that they usually do not reach any great distance away from ore, prevents them from being of any very great assistance in the scheme of prospecting.

Disseminated pyrite usually goes with the hardening alteration of the shale, and the remarks made regarding that alteration may be applied to disseminated pyrite also.

FOLD

The fold existing in the No. 4 tunnel working gives no promise at present of acting as a guide to ore.

CONDUCT OF PROSPECTING

The four groups of prospects: The prospects vary greatly in promise and aim, and we are classifying them into four groups, as

follows:

FIRST CLASS-The prospects of the first three groups are aimed to test specific intersections, faults or contacts, whose presence is known or may be properly inferred. The prospects of the last group are concerned chiefly with ground which is covered with surface debris, or about which, for some other reason, little is known, they are experimental or preliminary, and must be executed before specific prospects can be planned. Many prospects of the first three groups are, in a sense preliminary. For example, the prospects into the piece of ground immediately west from No. 4 tunnel and south of block No. 16, will find out just what intersections, if any, exist in this ground, and then will split into specific prospects exploring the intersections. Many, in fact the majority, will be guided by the facts which they themselves disclose. If a contact is followed to a fault, or a fault to a contact, without discovery of ore, the working will often be advantageously turned to follow the intersection. It is to be remembered, however, that tunnels following the main contact come close to following also the strike of the faulting, they are then, drifting tunnels, and they may, therefore, pass close to ore without discovering it. In the detailed prospecting, cross-cutting, both by horizontal cross-cuts and by raises are necessary.

GENERAL CHARACTER OF THE PROSPECTING IN THE SEVERAL PIECES OF GROUND

The only prospecting of immediate interest well may form the main contact. The main contact is terminated southward at its outcrop on the south slope of the Aztec ridge. The ground containing it may be divided for convenience of discussion into the following

pieces.

FIRST-The country between the old Aztec mine and No. 1 tunnel.

SECOND-That west from the old Aztec mine 1,300 feet along the ridge, that east of tunnel No. 1.

THIRD-That south from Ponil creek and beyond the present workings.

FOURTH-That west from No. 2 and No. 3 pieces of ground, and comprising the east face of Baldy mountain. The ground between the old Aztec working and the No. 1 tunnel and that immediately west and east from this ground, contain all the high grade prospects. For the present, the chief positive hope of the mine must lie here.

On the main contact, this ground is worthy of careful prospecting. The main contact exists throughout it; there is a high degree of probability that it carries a number of east-dipping faults, not now known. Such faults must be located, and the intersections not now known, or later to be found, will warrant an intensive search for ore bodies; none can safely be neglected.

The country between No. 1 and No. 4 tunnels can be entered by extensions by either No. 2 or No. 3 tunnels. West from No. 4, a certain amount of work can, of course, be done from No. 4 itself. Beyond this work it will be desirable to open up the old Aztec working, now inaccessible, and then plan more detailed work from them.

In prospecting the other four pieces of ground mentioned above, either of the two policies may be followed. In the first place, it would be feasible to leave this ground until the prospects from the present workings feel their way out into it. This is, of course, the conservative policy, but

it would have the disadvantage of postponing the realization of the abilities of this ground for a number of years. In the second place the ground could be attacked ahead of the present workings, by means of gentle or experimental prospects.

The policy which we favor is the second. We do not believe, however, that it should be undertaken with any great amount of boldness; for the present, the bulk of the expenditure for prospecting should be made in the vicinity of the four main tunnels.

On the basis of the second policy, the first thing to do, in the country east from No. 1 tunnel and west from the old Aztec mine working, is to attempt to obtain further information regarding the main contact close to the surface. We would advise, unless the cover of the debris proves too deep, that going southeastward from near No. 1 tunnel, and northeastward from near the upper Aztec tunnel, the contact be exposed continuously by trenching, by cuts, or by whatever means is most convenient, for a considerable distance in either direction. Where the surface debris becomes too deep for trenches, inclined underground working with frequent audits to the surface, will be necessary.

LOCATION OF THE TUNNELS-Following the contact into the hill, would be determined by the results of this exploration, however, in case ore is found in this exploration, the tunnels should be placed at convenient intravels, and not necessarily where the ore is found. Should the cover prove to keep for the method of trenching, etc., the method of tunnelling ^{is} on the contact at the outset will probably have to be adopted.

The ground south from Ponil creek, and beyond the present workings, is an unknown country, and one in which, because of the surface debris, even the presence or absence of the main contact has not been determined. Its position, however, on the projection of the strike of the known ore bearing country, makes it worthy of attention in the near future. Prospecting here would be very much facilitated by the outlets from the present workings on the North side of the Aztec ridge. We would suggest that two such outlets, one on the level of No. 4 tunnel, and started about 500 feet ahead of the present face, would be advantageous.

With the aid of these tunnels, the present No. 1 and No. 4 workings could be rapidly driven ahead into the territory in question.

Mr. Chase recently suggested that a third tunnel, driven considerably lower than No. 1 from near the Ponil creek, would be an easy entrance into the ground below No. 1. This looks to us like good work.

The ground comprising the east face of Baldy mountain and the west part of the Aztec ridge, containing a long stretch of the main contact, ¹⁵ in large part covered with debris. This it will be remembered, has probably been faulted up from the main contact of the other pieces of ground. In this ground no intersections between faults and the main contact are known. Moreover, the porphyry is of the coarse grained variety, and no ore of consequence has yet been found. Altogether, the positive promise is extremely small.

However the tunnels, now caved which are run in close to the main contact near station F on the west part of the Aztec ridge, are worth opening up. Further work would depend on what they

would show up.

The ground in question is, for the most part, not owned by the company, and it may be well allowed to go without attention for the present.

DEGREE OF PROMISE IN THE PROSPECTS DESCRIBED

On the whole the prospecting situation is hopeful. There is a good probability that the country in the vicinity of the old Aztec and the four main tunnel workings will yield important new ore bodies and away from this country altho little information is available, the possibilities are to be regarded as good. The chances are good enough to warrant the expectation that the scale of production can be materially enlarged. The realization of these chances, however, within a reasonable amount of time, will necessitate a decided increase in the rate of prospecting. Such an increase in the rate of prospecting, we believe to be fully warranted.

East of No. 1 tunnel the ground should be prospected to explore the main contact. This work would consist of trenching unless the surface debris proved to be too thick that tunneling would be cheaper. In this vicinity two important lines of fracture are known, but not at their intersections with the main contact.

The location of these places is as follows: No. 1 in shaly sandstone is open pit north of Sta. 28-R.

No. 2 in the porphyry sill on road 100 feet south of Sta.
312.

Eaton, T. E., April 20, 1875.

Mr. Harold Hunt..

PL 2083, 76X.

Dear Harold, - Just received a letter from Matt Gorman relating that the snow was still in the timber on the north hill slope and advising that he thought within two weeks everything would be cleared enough to see all the undersurface. Fact is that in this timber and on the north slope there are no rock exposures and everything is covered with snow. And snow pack is furrowed with paths thru and ice and melting snow on the edges. That is the way it is on the Kitoon side in the timber.

Have just returned from the Randino property. I spent four days there counting the time going and coming. This property has the best showing of ore of its kind and the closest to water of sufficient quantity of any place in Colfax county except the Aztec mine. In fact the Randino creek has five times the flow that the Mte has. Water for a hundred ton mill most likely would be developed thru mining by pumping back. Forth

A demonstration mill is on the property consisting of a five foot Huntington and Wiley table but would need a flotation unit added for the fine gold that this country is noted for.

What I was most especially interested in was the northerly-southerly fault fills and spent most of my time on them as the Morano-Centennial vein speaks for itself as it is opened up at different places for over 500 feet and the old placer miners placered right up the gulch on the top of this vein. But the cross faults have been slipped on attention and while placering there myself would get as many as 50 colours to the pan. This must have been an accumulation from erosion, however, as the vein ten feet below the surface will not do that well but pans in my estimation to run around \$5.00 on a line sample of eight feet. An assay is out being made to check on this. There are three cross veins within 50 feet right by the bunk house. I took the largest one to do my demonstrating on. This one is ~~12~~¹⁷ feet across twelve feet across and I trenched it for 15 feet with the ~~conc~~ course just above the junction of the Morano vein to see if the Morano crossed thru it and as far as surface trenching demonstrates the Morano does not cross it. Show that the north-south faults are later. I especially asked Mr. Katin if Mr. Parker, who gave the report I sent you, paid any attention to the cross faults and Katin said no. So I believe he overlooked something important. Also that the outcroppings of these crosses in such proximity leads me to believe that they

and one and the same and that below a very good sized body of low grade ore exists. Now here might come in the crux of the whole thing. Is the ore body of sufficient grade to allow mining at a profit sufficient compared to the expenditure in demonstrating whether or no a large concentrating plant and a tramway say a mile and a quarter long to the Moreno creek would be allowed and yet make a profitable mining business. Counting the Red Bank and the Moreno-Centennial and the cross faults and letting the Empire, Galena and La. Play count as smaller branch fissures and depending upon finding the their junctions on mining up the gulch on the Moreno I believe there would be no question about ore quantity. Then the problem remains as to quality. Quality can not be determined without more exploration which Mr. Nathan is carrying on with one miner. From my demonstrating to him of the possibilities of the cross faults he is now engaged in drifting over to the junction of the twelve foot cross with the Moreno. The tunnel is so arranged that it did not touch this point. If these are fill faults, and I think they are, the material will stay about the same in quality. If they are not fill faults (north-south faults) and the material is a capping or a filling down so far the chances would be greater for the sulphides to come in at a less depth than in the case of water coursed veins of the Bandana and Moreno. The twelve foot vein shows some sulphides of lead and silver in the concentrates. I took a magnet and extracted the mortar iron from my pannings and took a very strong glass and examined the concentrates. The pannings from this vein show more concentrates than the Moreno vein. In trenching I found fluorine in good quantity in a line streak towards the hanging wall. I found gold in this and that is what started me taking the eight foot pannings. You may wonder why I took eight foot pannings on a twelve foot vein. The reason was that a horse appeared in the tunnel up to eight feet and I left that section out.

The ore chute that I went to see was simply a widening of the vein up to about twenty inches at the bottom and no apparent increase in values as we panned the vein in several places other than this and came out about the same. Mr. Nathan showed me assays from \$15.00 to well over a stiff \$100.00 This was returns from the vein proper and not the country rock that Mr. Parker included in his three and four feet analysis of the bottom of the tunnel. The vein now shows 68 inches at the top of the tunnel and 20 inches at the middle section and 22 inches at the bottom.

I have the ore at Paton, at Salton that came from these different points in about a twenty five pound sample. The vein consists of a quartz streak of about three to four inches wide and on either side a filling of broken quartz and shale with iron seams thru it and the whole very much oxidized much the same as the rust from within an old iron pipe; hard enough not to make mud; next to it is what they term up there a monzonite

A.

porphyry but the ground is not filled with crystals and the rock looks limey it is smothered with manganese with iron oxide all thru it and in places the rainbow colour shows. There is about three feet of this. This looks like it might make ore but I didn't pan it. Then comes the wall (foot wall) of limy shale, more lime than shale. This line accompanies the vein as far up and down the gulch as the vein can be traced. The hanging wall did look like monzonite porphy.

The shales I sifted thru a quarter mesh screen did show very good pannings in fines. This comes from the fine seams in the broken up shale on the dumps. It might be run thru a rotary screen and the fines sent to mill.

Before I write a book mill state that the Pannington could be made an overflow mill by blanking off screens and placing canvas around for slopover. This way it could be made a fine grinder for tests. A small engine for the crusher would relieve the present engine for supplementary machinery. Thus a pilot mill could be arranged very cheaply.

An enclosing a map I copied of the claims on the Grant.

The ones marked in green are mine and have about ten more tax certificates calling for claims that I do not locate but by tracing back at the Court house I will find most of them.

In case your company should become interested on the Pit town side if there are any claims they want they can have half interest in some. There is a group near the Red Bandana in Anniseta gulch that might be interesting should any interest be taken in the Bandana Group.

Cordially yours

Ernest

Raton, N. M., Jan. 6th, 1936

Mr. Harold Hunt,

El Paso, Texas

Dear Harold:

Am sure glad that I did not understand Mr. Mills about what the amount was or could be for the other half, or our half. It seemed to me naturally that asking to spend \$12,000 for half interest indicated that they would expect to buy the other half, or our half, for the same amount.

Personally, I think we would be fools not to take the proposition up as described in your last letter. That is as fair an offer as anybody should want.

I'm writing DeNise indicating that I am very much in favor of taking the play. Of course I have to concur with him. It seems to me the old boy is playing for time and that is what one does not want to do when your buyers are in the notion.

For myself, I would like to gamble with the bunch and let our half stick in for net profits as I have the idea that both claims ought to be able to produce from low grade ore alone more than I would receive thru an option offer. That, of course, is pure gamble as I have nothing to base this statement on only except faith and surrounding productive territory. It does seem cozy to be so close to production and knowing that the country we are in is identical and in one way ahead of the Aztec.

That is a broad statement. For instance; on the Ben Hur we know where our porphyry is. The Aztec has been fishing around along Nos. 1, 2, 3, & 4 also the Aztec shaft and can't find any bodies of porphyry and believe me there is going to be a big deposit somewhere in that hill lying above the porphyry.

On the Nancy Hanks there is a limestone dike running in from Copper park that the Aztec has not hit as yet. It may be near the Ponil ore as indicated by the greater amount of calcite in this ore. My idea is that this dike of lime lies just N.W. of them and they have never drifted into it yet.

From what I have found in this lime of eaten away vugs and copper carbonates makes me think this lime is the key to the situation in the Nancy and that either in the shale beneath it or in both lime and shale the values will be greatest.

This lime dike runs about 35° west of North while the claims runs 66° so you see it will stay with the claim for some distance and is found in Anderson' winze at the first level.

No geologist yet has mentioned this in their reports and I claim the discovery of it for I believe they have overlooked this. It is so much my pet that I would be willing to take half stock and half cash so as to participate on the furtherance of development. DeNise writes as tho he wanted all cash and I expect he will stick with this idea, but he may not.

I might try and get DeNise to give me an option for \$12,500 and then my part do as I pleased. Of course this option to carry thru until development had reached the stage wherein the whatever company had reached the point that purchase was wanted. I would rather have him come right out in a straight deal and I wont mention this to him only as a last resort.

This is what I am writing him:- To take this offer up and set the price at \$12,500 for his share, or 1/4 interest on option, because he has said he would take \$12,500 cash. Then the only change would be that he wait until development had been done to find out whether option was taken or not.

If this sets with him you fellows can handle me.

I am Trusting that his next letter will be more favorable,

Faithfully yours,

Ernest Ludlum

P.S. It takes a lot of money and work to organize a company and get the actual cash in the treasury - so the next argument I will use on our friend DeNise will be the trouble and time expended in forming a company of our own and what is more the Govt. has clamped down to pretty hard lines on promotion.

By E.V.L.

Raton, N. M. Dec. 22, '35.

Mr. H. F. WILLS,

Gallup, N. M.

Dear Sir, - Mr. DeNise did not answer me right away and so have put off answering your letter until now.

It seems that Mr. DeNise is not interested in selling those claims for the price offered thru the idea of first spending \$12,500.00 for search of ore and then at the option of the parties a sale of both claims for the same amount. Or in other words selling the two claims for \$12,500.00.

Mr. DeNise studied for a mining engineer and was an assayer in Idaho before he took to law. I had him up there two years ago and he went over the property pretty thoroughly. Since that time I have kept him up with the developments on adjoining ground. Thus, from his letter I gain that he has an idea of taking part in a promotion for sale after ore is actually developed on the claims.

By no means, as far as I am concerned, as negotiations cease with you and your people. I have written Harold as much and in as much as he is my agent and understands conditions much better than I do I wish him to communicate with you and you with him.

As to maps I can copy one recorded at the court house in the transfer of deeds on the Aztec and enlargement of the Aztec reserve from the old fifty survey of two claims, from which the Nancy Hawk was sold to the Aztec reserve present size. As for maps of inside workings that is not so easy. For some reason Mr. van Houten and Mr. Officer are very opposed to any information about the mine leaking out and any infringement on their wishes by employees might work a hardship on them. I do believe that a study of the maps in their office could be made.

As for Anderson's cabin it is open to us at any time.

Wishing you and family a merry Xmas. and a Happy New Year,

I am

Very respectfully yours
Ernest V. Lindburn

OIL AND GAS
1240 Acres Dry Lake Dome,
Moffat County, Colorado.
Gasoline Valley, Raton, N. M.
500 Acres Oil and
Gas Leases

E. V. LUDLUM

MINERAL MINES
Sulphide
West Murren Mining District
Elizabethtown, N. M.

Raton, N. M.

Nov. 24, 1935.

MR. W. F. HILLS,
P. O. Box 929,
Gallup, N. M.

Dear Sir, - Received a letter yesterday from Mr. Rush L. Denise of Rock Springs, Wyo. (My partner) and quoting the paragraph from his epistle as follows: - "I take it from your letter that the \$12,500.00 will be cash, and for that amount we will convey to them an undivided one-half interest in and to both claims; and their syndicate, when organized, would probably lease the other one-half interest from us, on some basis."

"This sort of a deal would be satisfactory with me. I would not be interested in taking stock in the syndicate as payment for the property."

I suppose this is in line with our conversation in Balay. On my suggestion that that Mr. Denise come to Raton and meet you, at sometime when you are to be up this way, was accepted with the proviso that reasonable notice be given and that it be after Dec. 2nd, because he is an attorney-at-law and will be in court until that time.

Just came to Raton this evening. Since you have been gone from Balay have struck a lime wall in the shaft running as it should and forms ore on its edge and running back to perfectly white lime with tree trunks thru it. This is on the N.W. edge of the shaft. Against this is a grained mica lime of a very blue black colour, obtained no doubt from the shale below, with shale seams striking thru from below. These shale seams pan. The lime is slipping back and upon lowering the shaft a few feet will allow drifting back under the lime on the shale. The character of the ore is from yellow to very red oxidized splotches thruout the shale. The lime-shale is coffee brown and resembles rotten wood about the same as the samples I gave you, only darker, and slightly

OIL AND GAS
1210 Acres Dry Lakes Dome,
Moffat County, Colorado.
Gasoline Valley, Eaton, N. M.
500 Acres Oil and
Gas Leases

E. V. LUDLUM

MINERAL MINES
Sulphide
West Moreno Mining District,
Elizabethtown, N. M.

curled.

On some of your future visits you must meet Mr. Joaquin Archuleta. He is the oracle or mystic ore finder for the Baldy or Aztec mine. And it is no joke the man has really done wonders in furnishing the Baldy mill with ore. This fellow told me last night that he could trace Ponil No. 1 ore thru into the Den Hur. How true this is I don't know. He will give him a chance to do this stunt and look-see.

I find that Mr. Anderson, in the two years I have been absent from Baldy, has struck the Aztec fault further up in his tunnel than we went. I wish I had known this when you were there. This puts an entirely different face on the map in that area as he got out of the fill area and into solid makeup. Anderson told me we could use their tunnel in operating. I asked him again.

I will be in Eaton from now on but if you wish me to accompany you to Baldy at anytime will be glad to do so,

Very respectfully yours,

Ernest V. Ludlum.

Notes on Aztec Mine, Baldy District
Colfax County, N.M.
Nov. 17, 1935.

Mr. George Kingdon, Gen. Mgr.,
U.V.X. Mining Company
Jerome Arizona.

Dear Mr. Kingdon:-

I spent several hours underground in what is one of the most interesting gold mine I have seen and which may become an important producer. At present the mine is held under lease by Mr. Van Houten and Mr. Matt Gorman from the Holland stockholders of the Maxwell Land Grant Company. Recent work is uncovering a number of minerallized fissures and bedding planes, shipments to the El Paso smelter running about \$100 per ton, and development suck for the mill about \$20.00

Ute Park is on the road from Cimmaron to Thermal, and the Aztec Mine is ten miles north of Ute Park, the property covering a ridge or flank which extends down to the S-E from Mt. Baldy. The lease covers about 3000 feet square.

The original Aztec Mine produced two millions in high grade gold ores, treatment being by stamps and amalgamation. As oxide ores gave way to sulfides at depth, mill recovery of course went bad. While the old workings are not accessible, it is apparent that mining was done in a pronounced fault fissure known as the Aztec Fault, and in favorable beddings in the hanging wall, following down by irregular slopes from the south side of the ridge. An air connection was made by driving in from the north side, known as the Ponil Creek basin and a little mining done from the #2 tunnel.

This Ponil tunnel is cut by fissures striking about N60W at intervals which average 50 feet. The formations consist of sandstones and black calcareous shales. It appears that where these fissures cut the black shales then minerallization occurs and an area of several hundred feet in length by 20 feet or so wide is full of small quartz and calcite stringers parallel to the fissure with impregnations of sulfide all thru the shale. There are some bedding faults and the ore under these faults is more extensive. In other places the ore follows up the fissures for 50 feet or more. In addition to the bedding faults there are a few minor N-S faults. A new tunnel 130 feet lower and now 700 feet long shows the same conditions. It appears probable that the entire hanging wall side of the Aztec faults is a big shear area and will contain a network of ore some of which runs several hundred dollars per ton. I am sending down three samples of ores of different nature found in the present workings.

The mill is being changed to handle 100 tons per day.
Present equipment consists of

- 2 crushers in series
- 2 4 x 6 ball mills discharging to
- 2 Denver unit cells " "
- 1 36" Aikens classifier overflow from which
- 6 Fahrenwald cells.
- 1 Oliver filter.

The ore is fairly heavy in pyrite and chalcopryite and

the gold values are associated with the chalcopyrite. Attempts to amalgamate the concentrates have not been successful, and due to the copper treatment by cyanide is not satisfactory.

At present ores from the Ponil side are trucked $1\frac{1}{2}$ miles around the nose of the ridge to the mill

Harold Hunt's cousin owns two claims in fee simple, one, the Ben Hur east of the Aztec lease, and the Nancy Hanks to the west. A tunnel on the Anderson claim to the south of the Nancy Hanks is in to within about 100 feet of the Nancy Hanks vertical side line, and if extended would have three hundred feet of cover. The surface over the Nancy Hanks, and the formations in the Anderson tunnel are heavily oxidized, the tunnel showing a number of fractures paralleling the Aztec fault. Matt Gorman said that leasers on the "Blacksmith" tunnel of the Aztec had mined a nice stringer of ore up to the end line. A half interest can be had in both these claims by putting probably \$2,000 work and equipment on them. If the mineralization showing on the Ponil side extends as far west as the Nancy Hanks the claim would be a bargain. The finding of ore of course is a pure gamble.

Yours very truly,

H. J. Hunt

Copy by E. V. Loomis

portion of a

REPORT OF GEOLOGICAL EXAMINATION

AZTEC NINE-MAXWELL LAND GRANT CO. BALDY M.T.

By Barbara Perry & Augustus Louis, Oct. 1 to Nov. 1918

Introductory- The examination on which this report is based was made at the request of Mr. J. C. Chase, a consulting engineer to the Maxwell Land Grant Co which owns the Aztec mine.

The time spent was as follows- From July 7 to Nov 13 1918. Perry Oct 1st to Nov 5th & Nov 9th to Dec 7th, 1918.

The examination was to provide a geological basis for prospecting not only on the ground entered by the principal mine workings i.e. those between the old Aztec tunnels and the No. 1 tunnel, an area of about 10 acres, but also in the ground outside those workings. Necessarily, therefore, the examination involved a study for some distance away from the mine workings. The country principally studied measures 10,000 by 4,000 feet and extends from the top of Baldy Mt. to the lower ditch, 4,000 feet south-east from the Aztec shaft and from a small creek to the creek.

Within this country the surface was mapped and all the accessible mine workings were examined. Outside, with the exception of the Thelma, only general studies were made.

The more important mine workings are as follows- tunnels Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100. Tunnel between station 5 B and 9 B. Tunnel at east face of Baldy Mt. Tunnel at Sta.

Information for the examination has been of material assistance in carrying on the examination.

SUMMARY OF CONCLUSIONS.

The ore bodies are less than a dozen in number. They are small (the maximum dimensions of the largest are 300 by 80 by 15 feet). They contain a considerable proportion of the ore carrying over a hundred dollars per ton in gold and frequent spots carrying over a thousand dollars. They have a linear extension close to N. 20° West. They are mostly flat lying following rock bedding or flat faults; occasionally they are steep where the bedding or faults are steep and one is chiefly an alteration of scale at or close to the contacts of shale with overlying sandstone. The contacts are either bedding or of faulting, and not infrequently one turns without interruption from a flat bedding contact to a steep fault contact.

The guides to ore believed to be promising are the intersections of $N. 20^{\circ} - 30^{\circ}$ South-west, east dipping faults or rather small displacements, with flat lying shale-sandstone contacts. There are other possible guides, not yet shown to be promising and the prospects outlined in this report are chiefly, tho not exclusively, dependent on theory of intersections mentioned.

In the general vicinity of the mine workings there are several faults known. There are, moreover, several contacts between shale and sandstone, one above the other. There are, therefore, a large number of intersections in question. Of this number several have been prospected, and have usually yielded ore, particularly in the so-called main fault, i. e. the contact at the top of the shale. There are good chances at other intersections with the main contact. No especially favorable intersections are yet known to exist below the top of the shale.

Faults, other than those known, may be expected to exist in the large unexplored portion of the ground penetrated by the mine workings. When such faults are found, their intersections with contacts will be good places to prospect.

Away from the general vicinity of the mine workings contacts between the shale and the sandstone are known in certain places to exist. Faults intersecting those contacts, however, have not been definitely located, altho their existence is regarded as probable. Prospecting away from the vicinity of the mine workings, therefore, will be preferably at first so as to find the desired intersections, and such prospecting, of course, have less positive promise than that in or near the mine.

On the basis outlined, the prospects proposed, 33 in number, are arranged in the following group: - 1st. In the general direction of the mine workings, 27 prospects, 11 on the main contact. 2nd. In the general vicinity of the mine workings, above the main contact. 3rd. In the general vicinity of the mine workings, below the main contact. 4th. In the ground away from the mine workings, on the main contact.

The principal positive promise is in the general vicinity of the mine workings. Here there is warrant for intensive workings. The richness, smallness and elusiveness of the ore bodies and their evident connection with intersections between the $N. 20^{\circ} - 30^{\circ}$ faults and main contact, render all of these intersections worthy of the most careful prospecting.

Altogether, the policy indicated, as a result of the geological examination, is a liberal one. The hope for important ore discoveries, and for a considerable enlargement in the scale of production, is good.

ROCKS.

L. G. Gruen describes the rocks of the district as rather flat Cretaceous sandstone and shales, cut by intrusive porphyry of monzonitic character. The shales he considers to be of Mancos and Colorado age, and the sandstone, which overlies the shales, to be the lower sandy part of what is probably the Tertiary coal measures.

The shales and coal measures are each several hundred feet thick. The ore, however, shows a striking affinity for the top contact of the shales, and it is in this contact that we are especially interested.

The shale is dark gray in colour, and, when unaltered, is soft. Well away from the ore it is thinly bedded and possesses of a fairly good fracture. As it approaches the ore it is harder, often grayer and lacking in easily recognizable bedding.

The sandstone in the vicinity of the ore, is usually fine grained and often somewhat quartzitic. Sometimes it contains tiny biotites, which cause it to resemble a fine grained igneous rock. Away from the ore, it is often a grit or conglomerate.

While the shale exists with no important impurity, except porphyry, over a thickness of some 1000 feet, the sandstone exists as beds varying between a few inches and many feet in thickness, intercalated with shale or shaly beds of somewhat smaller thickness.

The porphyry is of two kinds. - 1st. Fine grained and probably dioritic and the second coarser and consisting of hornblende and feldspar. Both porphyries exist wholly in the form of sills, so far as we know. The porphyry in the vicinity of the principal mine workings is of the fine grained variety, and this variety is not known elsewhere.

SURFACE CONDITIONS

Along the Aztec ridge, from the Aztec shaft easterly 2100 feet to Mineral Monument No. 7, the rocks are well exposed; they consist of sandstone and altered shale of the (Mancos?) except for about 100 feet of fine grained porphyry near the shaft. The altered shale is greenish and probably contains fine grained green garnet. The porphyry belongs to a body whose form we do not know but which, for lack of evidence to the contrary, we assume to be a sill.

Westward from Mineral Monument No. 7, the rocks are hidden by debris. Westward from the Aztec shaft for about 1300 feet the rock is concealed by debris, except for a small amount of shale near the shaft.

Thence starting where the ridge steepens, shale and coarse grained porphyry are exposed for a distance of 2100 feet to the main contact,

above which is quartzitic sandstone belonging to the (Garamis?).

The southerly slope of the Aztec ridge, the carrying a large amount of sandstone debris, is shown, in numerous exposures rock in place consists chiefly of shale. The northerly slope of the Aztec ridge, extending down to the Ponil creek, is mantled with debris that only a few sure exposures of rock in place have been seen. The debris is of a variety of thickness. The air shaft passed thru 35 feet of it; the top of the just west of Cooper mine was to a probable depth of 30 feet. In certain spots there are probably islands of bed rock emerging from the debris.

Along the base of Baldy Mt. from the Aztec ridge to Ponil creek the debris is unaltered. It is in places in rough heaps and ridges, with hollows between them, often undisturbed and consists of sandstone and shale. The debris of the Aztec ridge, upper part is the result of the damming of the Ponil creek by the Landslide material.

East from the ditch which runs from Cooper mine to the Aztec shaft, the topography is even, the debris is probably alluvial. There is a likelihood is that the movement of the debris was produced, not with the violence of a landslide, but with a gentler creep. The exposures of the rock in place, north from the Aztec ridge, south from Ponil creek, and east from the ditch, are all alike.

In a tunnel at station 105, east from the air shaft - sandstone with thin foot shale bed, interbedded with it. Along the lower ditch line, south from station 115, are several exposures of sandstone altered and white staining as the kaolins. At the upper mill on Ponil creek, is a large dump consisting of waste shale. The tunnel is unobscured. The fact that bedrock is not seen at this place makes it seem probable that the tunnel was in solid rock. If so the presence of shale on the dump suggests that the tunnel was below the main contact. On the upper ditch line, south-west from Cooper mine, at sta. 34-3 quartzitic sandstone, and up the slope from here, to the top of Baldy, abundant rock in place.

WYD33370778 CORRECTIONS-

In the four main tunnels, the workings are mostly in the main contact, or within a short distance above or below it. Above the main contact, in the Vol. 1, No. 2 and No. 3 tunnels, workings, but in the south-west part of No. 1 tunnel workings, the sandstone is interbedded with shale layers. In the north-west part of the Vol. 1 tunnel workings, the portion of the mine which is now productive, the sandstone has not been found to be so interbedded, and there is a suggestion that the shale layers, at least for a short distance above the contact, have cut out. However, open -

Now openings here above the main contact are so scarce that prior to 1905

A sill of fine grained porphyry, two feet thick in the exposures where it
thickness is measurable occurs in the Ross tunnel and in the
Vol. 1 tunnel workings, at a distance 40 to 60 feet from the main contact.
The Vol. 1 tunnel workings show it as follows.

Cross-cut 188, both under and west from ore.

Cross-cut 187, near entrance

Cross-cut 17-32

On surface the sill is seen in 5 places. It is exposed in the
Vol. 1, at a point 450 feet south of the entrance to the tunnel.
It is probably exposed again on the Aztec ridge between Sta. 7-P and 8-P,
900 feet west from the Aztec shaft where abundant float appears. In the
south-east part of the Vol. 1 tunnel workings and in the Vol. 1, 2 and 3 tunnel
workings, the porphyry sill has not been found. This means in all probability
that the sill is more extensive than the workings have been able to reach.

stone interbedded with shale.

The body of porphyry lying immediately east of the Aztec shaft has not
been found under ground. Its form is not known and it is assumed to be a
sill.

The Vol. 1 workings are long since stratigraphically below the main
contact and are concerned with exploring the contacts of two sills of por-
phyry with shale. These contacts, or other contacts have been explored in
other workings in the same vicinity and nowhere have disclosed important
new routes.

Faults and Folds

Vol. 1 mountain has been relatively uplifted many hundreds of feet, thru
west dipping normal faults on the Elizabethtown side, and thru east dip-
ping normal faults on the Vol. 1 side. The faults which we know most in-
completely are those encountered in the north of the Vol. 1 tunnel.
They strike at 20° to 30° E. about parallel with the bedding, east dip-
ping, at angles of 25° to 75° and with normal displacements as great as
100 feet, but often less than that. Occasional curves in the fault walls
indicate a movement nearly straight up and down the dip.

It seems likely that, when the country between the old Aztec workings
and the Vol. 1 tunnel has been thoroughly explored, it will develop that
this country is cut into blocks by east-dipping faults, a moderate dis-
tance apart. It is further more likely that the country for some dis-
tance, both to west and east, is similarly cut in blocks.

The effect of the faulting is, of course, to depress the contact eastward and to bring sandstone down against shale. The north-west part of No. 4 tunnel workings, where the dip of the bedding is westward, the faulting keeps the contact from sinking below the level in the westward crosscuts. In the south-east part of the No. 4 tunnel, and in the workings of the lower tunnels, where the bedding dips eastward, the faulting causes the contact to sink eastward faster than the bedding would normally carry it.

On the Aztec ridge, at a point some 800 feet west of the Aztec shaft, the shale and porphyry come in and continue up the main collection raise of 800 to 2100 feet. This shale shows in several places steep westerly dips, and it is not unlikely that there is a great deal of displacement here. Perhaps as much as several hundred feet. Whether or not it is alone sufficient to explain the dip of the faulting is not known.

The ridge (Copper park), ridge on sheet 301, going up from Copper park towards the cabin on the east face of Baldy mountain shows much the same conditions as those above described. The fault probably crossed the ridge also.

Underground, there are known occasional steep fractures of a 77° N. strike of unknown and probably small displacement.

The 20° to 30° faults described are, at least in part, older than ore. As will be later shown in greater detail, they have much importance in the planning of prospects. Mention has already been made of the fact that the bedding dips westward in the northwest part of the No. 4 tunnel workings, and eastward in the other parts of this tunnel and the lower tunnels.

There is a probability of a flat anticline fold with its axis trending north westerly, and passing between the airshaft and raises No. 185-52 of the No. 4 tunnel.

ORE BODIES

The ore consists of shale, and less often sandstone, carrying scattered grains of pyrite and native gold, sometimes readily visible and sometimes very fine. Here and there is a gray metallic speck which may be telluride, or possibly selenide of gold. Quartz is excessively meagre in amount. Biotite, chlorite and calcite in veins are not uncommon, but are seldom abundant. The shale in the ore is soft and greenish-gray; it consists chiefly of chlorite, and in the high grade material, has a peculiar granular texture difficult to describe, but easy to recognize. The lime of quartz of the same generation as the ore makes the ore an unusual one.

The grade is high, and, so far as is known, the values exist wholly as a native gold and in the gray mineral and not in the pyrite. The average now being mined is about \$35.00 per ton and spots of \$100.00 stuff are common.

There is little low grade and the change from ore to waste is sudden. The silver values average 10 to 15% of the gold values.

Ore occurs in a number of widely scattered bodies. The bodies are small; the largest has a maximum dimension of 300 by 80 by 15 feet. All have at least a suggestion of similar form. A linear extension somewhat west of Martin. The majority are flat, and are localized either by bedding or by faults; a few are steep. Several pass from bedding to fault without losing their continuity and some, as in the northwest part of the No. 1 tunnel workings, the bedding dips west and the faults dip east, the cross section of the zone shows a roll.

It is probable that, as development proceeds, the ore bodies will grow larger and still more numerous.

GEOLOGICAL CONDITIONS AND ORE OCCURRENCES

The geological condition of the ore occurrences in the workings of the mine is as follows: 1. The ore bodies lie chiefly in the shale, immediately under sandstone. They follow the main contact, and, so far as is known, are absent from the great thickness of shale away from this contact.

2. The ore bodies are probably all bordered or cut by faults of this trend, and those faults are frequently ore bearing.

3rd. The sill of fine grained porphyry probably everywhere in the vicinity of the principal mine workings lies 40 to 60 feet below the main contact.

4th. The shale under the main ore of the No. 1 tunnel workings shows a bordering alteration, producing a more gray rock, which lacks in shaly texture and often carries disseminated pyrite. In the tunnels Nos. 192 and 193, the country under the ore bodies is not exposed, and the presence or absence of the alteration has not been established.

5th. The flat anticlinal fold has its axis cutting thru the productive part of the mine, and probably parallel with the long axis of the ore bodies.

The reason for the localization of the ore at the main contact is in all likelihood complex. The most plausible hypothesis is one which depends on the fact that, while the shale is somewhat plastic and does not readily maintain open spaces for the transportation of gold, the sandstone is brittle and readily does maintain such open spaces. The hypothesis depends, again, on the fact that the shale is more readily replaceable by ore minerals than sandstone. According to this hypothesis, then, the sandstone would maintain the path for the travel of gold, and the shale would furnish the matrix for its reception. This would be explained the confinement of it

the ore to the contact between the two rocks.

The east dipping faults bring sandstone against shale increasing the area of the contact. Furthermore, they break the sandstone and shale. The extension of the ore bodies in a direction parallel with that of the faults is plausibly attributed to the effect of the faults in causing the ore to migrate. It is not probable that the preference of the ore for the main contact is due to the special conditions of an favorable environment. The shale at that place, such as carbonaceous matter or calcareous carbonate for we have failed to find the ore is in contact to massive and irregularities in special abundance.

The alteration of the shale is undoubtedly an effect and not a cause of mineralization. The effect of the fold is undetermined.

The alteration of the shale is undoubtedly an effect and not a cause of mineralization. The effect of the fold is undetermined.

The question here involved is whether the ore is primary, or whether it is secondary. The ore is not primary because it is not associated with a primary igneous rock. It is secondary because it is associated with a secondary igneous rock.

The most confidently expected is flat and close to the surface. The question still has some importance however, in regard to the possible other ore bearing horizons lower down.

In general, the secondary concentration of gold takes place by leaching of gold from the primary ore. The gold is then carried by a solution of gold, or chlorine, in the oxidized region, and its reprecipitation a little lower down, and usually in the lower part of the oxidized region. For the production of chlorine, manganese dioxide (black oxide) is the most effective reagent. In the later mine, the oxidized ore has probably been leached, and it is not unlikely that certain gangue materials have been partly leached. There is no likelihood of mechanical enrichment in the salinized ore.

Chemical concentration supposedly takes place exclusively near the solution of gold, or chlorine, in the oxidized region, and its reprecipitation a little lower down, and usually in the lower part of the oxidized region. For the production of chlorine, manganese dioxide (black oxide) is the most effective reagent. In the later mine, the oxidized ore has probably been leached, and it is not unlikely that certain gangue materials have been partly leached. There is no likelihood of mechanical enrichment in the salinized ore.

As for chemical concentration, the main mass of the ore is probably the chlorine ore present, and yet this does not mean that some enrichment has taken place on any important scale. Firstly the force of gold is not so strong as chemical enrichment, i.e., silver, gold and base, and are not at all

common here. The shapes and sizes of the gold particles, and their manner of distribution, are similar to those in certain deposits of other districts known to be primary. Secondly, the hardening alteration of the shale and the presence of certain minerals, notably rhodochrosite, prove conclusively that the sulphide ore underwent at least a certain amount of primary mineralization. Thirdly, a chemical concentration in one place would require a chemical impoverishment in another. No place has been found in the Aztec mine where the abundant gold necessary for the enrichment lower down has probably been leached out, although there is a chance for some chemical impoverishment in the oxidized ores. The evidence concerning the question whether the gold in the oxidized ores has been enriched mechanically and, perhaps, somewhat impoverished, chemically; is also also toward the conclusion that the sulphide ore is primary. The evidence, unfortunately, is ^{not} wholly conclusive.

GUIDES TO ORE

Intersections of faults with the main contact. The promising prospects are on these intersections, or close to them. As has already been stated, all such intersections, near the old Aztec mine and the four main tunnels, are worthy of thorough prospecting; away from this country, work needs to be done first to find the intersections.

CONTACTS ABOVE THE MAIN CONTACT

These have but little ore explored. A little ore has been found on them, and, no reason is known why there should not be more. In fact, the conditions which we believe to have localized ore on the main contact, i.e., shale adjacent to cracked, brittle rock, exists in the upper contacts also, particularly at intersections with faults.

PORPHYRY SILLS IN THE SHALE

In the same series, there is a chance that contacts between shale and porphyry sills are good. Indeed, the Thelma already shows ore on porphyry shale contact. And this chance becomes more favorable, in view of the possibility that the sill in the No. 1 tunnel working may have been a source of gold. The porphyry contacts, both those below and those above the sills are worthy of a certain amount of experimental or preliminary prospecting. The confinement of the fine grained porphyry to the vicinity of the four main tunnels and the absence there of coarse grained variety, create a presumption in favor of the former. In view, however, of the coarse grained porphyry in the Thelma with ore on its contact, this presumption is weakened.

For the present the only porphyry contacts, in addition to those of the Thelma, which seem worthy of immediate attention, are those on the fine grained sill that underlies the main tunnel working. Later, however, other sills may have to be considered, and, in this case, we should advise that

the fact that a given sill is coarse grained be not permitted to act as a veto on its exploration.

HARD ALTERATIONS OF SHALE

Whether or not this alteration always or usually occurs under ore, is as yet not known. It can not at present, therefore, be used as a reliable guide. However, a working not far below the main contact, which shows shale having the hard alterations, would be a good place to raise from. And there is a possibility that, as more openings are made and more information is obtained, the hard alterations will become distinctly more useful than it is now.

SERENITY MINERALS

Calcite and romaneosite are fairly good indicators that ore is near by. The fact, however, that they usually do not reach any great distance away from ore, prevents them from being of any very great assistance in the early stages of exploration.

Disseminated pyrite usually goes with the hardening alteration of the shale, and the remarks made regarding that alteration may be applied to disseminated pyrite also.

FOOD

The fold existing in the No. 4 tunnel working gives no promise as regards its acting as a guide to ore.

CONDUCT OF PROSPECTING

The four groups of prospects—the prospects vary greatly in promise and aim, and we are classifying them into four groups, as follows:

FIRST CLASS—The prospects of the first three groups are aimed to test specific intersections, faults or contacts, whose presence is known or may be properly inferred. The prospects of the last group are concerned chiefly with ground which is covered with surface debris, or about which, for some other reason, little is known, they are experimental or preliminary, and must be executed before specific prospects can be planned. Many prospects of the first three groups are, in a sense preliminary. For example, the prospects into the piece of ground immediately west from No. 4 tunnel and south of block No. 16, will find out just what intersections, if any, exist in this ground, and then will split into specific prospects exploring the intersections. The prospects of the last group, will be guided by the facts which they themselves disclose. If a contact is followed to a fault, or a fault to a contact, without discovery of ore, the working will often be advantageously turned to follow the intersection. It is to be remembered, however, that tunnels following the main contact come close to following also the strike of the faulting, they are then, drifting tunnels, and they may, therefore, pass close to ore without discovering it. In the detailed prospecting, cross-cutting, done by horizontal

cuts and by raise (if necessary).

GENERAL CHARACTER OF THE PROSPECTING IN THE SEVERAL PIECES OF GROUND

The only prospecting of immediate interest will may form the main contact. The main contact is terminated southward at its outcrop on the south slope of the little ridge. The ground is divided for convenience of discussion into the following pieces. -

SECOND-That west from the old mine (No. 1) feet along the ridge. That is

THIRD-That south from Conil creek and beyond the present workings. This piece of ground is bounded by the old mine workings on the east and by the old mine workings on the west. The ground is divided into two parts by the old mine workings. The ground is divided into two parts by the old mine workings. The ground is divided into two parts by the old mine workings.

On the main contact, this ground is covered by barehail prospecting. The main contact exists throughout it; there is a high degree of probability that it carries. Such faults must be located, and the intersections not now known, or later to be found, will warrant an intensive search for ore bodies; these can easily be located.

by either No. 2 or No. 3 channels. West from No. 2, a certain amount of work can, of course, be done from No. 1 itself. Beyond this work it will be desirable to open up the old mine workings, and then plan more detailed work from there.

In prospecting the other four pieces of ground mentioned above either of the two policies may be followed. In the first place, it would be feasible to leave this ground until the processes from the present workings feel their way out into it. This is, of course, the conservative policy but it would have the disadvantage of postponing the realization of the possibilities of this ground for a number of years. In the second place the ground could be attacked ahead of the present workings, by means of gentle or experimental prospects.

The policy which we favor as the second, is to do not believe, however, that it should be undertaken with any great amount of boldness; for the present, the bulk of the expenditure for prospecting should be made in the vicinity of the four main channels.

On the basis of the second policy, the first thing to do, in the country east from No. 1 channel and west from the old mine workings, is to attempt to obtain further information regarding the main contact close to the surface. It would be wise to make the effort if the results prove to

deep, that going southeastward from near No. 1 tunnel, and northwestward from near the upper Aztec tunnel the contact be exposed continuously by trenching, by cuts or by whatever means is most convenient. For a considerable distance in either direction where the surface debris becomes too deep for trenches inclined at right angles to the surface, will be necessary.

LOCATION OF THE TUNNELS Following the contact into the hill, would be determined by the results of this exploration, however, in case ore is found in this exploration, the tunnels should be placed at convenient intervals, but not necessarily where ore is found. The cover above the deep for the reason of trenching, and the reason of tunnelling is on the west side of the contact. The tunnels should be placed at intervals of 100 feet.

The ground south of Baldy mountain and north of the present workings is an unknown country, and one in which, because of the surface debris, even the presence or absence of the main contact has not been determined. Its position, however, on the projection of the strike of the known ore bearing country, makes it worthy of attention in the near future. Prospecting here would be very rich. Vicinity of the contact from the present workings to the south side of the hill, where the contact is known to be, there are three tunnels, one on the level of the No. 1 tunnel, and another about 100 feet above the present face, and an other on the level of No. 2 tunnel, and start about 100 feet ahead of the present face would be advantageous.

With the aid of these tunnels, the present No. 1 and No. 2 workings could be rapidly driven ahead into the territory in question.

Mr. Chase recently suggested that a third tunnel, driven considerably lower than No. 1 from near the Bonil creek, would be an easy entrance into the ground below No. 1. This looks to us like good work.

The ground comprising the east face of Baldy mountain and the West part of the Aztec ridge, containing a long stretch of the main contact, in large part covered with debris. This it will be remembered, has probably been faulted up from the main contact of the other pieces of ground. This in this ground no intersections between faults and the main contact are no longer found. The ground is, however, of considerable importance, and of consequence has yet been found. Altogether, the positive promise is extremely small.

However the tunnels, now sunk which are run in close to the main contact near station X, on the west part of the Aztec ridge, are worth opening up. Further, the ground on the west side of the hill, where the contact is known to be, there are three tunnels, one on the level of the No. 1 tunnel, and another about 100 feet above the present face, and an other on the level of No. 2 tunnel, and start about 100 feet ahead of the present face would be advantageous.

The ground in question is, for the most part, not owned by the company, and it may be well allowed to go without attention for the present.

(13)

REMARKS ON PROMISE IN THE PROSPECTS DESCRIBED

On the whole the prospecting situation is hopeful. There is a good probability that the country in the vicinity of the old adit and the four main tunnel workings will yield important new ore bodies, and away from this country altho little information is available, the possibilities are to be regarded as good. The chances are good enough to warrant the expectation that the scale of production can be materially enlarged. The realization of these chances however, within a reasonable amount of time, will necessitate a decided increase in the rate of prospecting. Such an increase in the rate of prospecting, we believe to be fully warranted.

West of No. 1 tunnel the ground should be prospected to explore the main contact. This work would consist of trenching unless the surface debris proved to be too thick that tunneling would be cheaper. In this vicinity two important lines of fracture are known but not at their intersections with the main contact.

The location of these places is as follows: - No. 1 In shaly sandstone in open pit north of No. 1.

No. 2 In the surface debris on the west side of No. 1.

Explanation of the copying of the above report by Ernest T. Ludlum:—About the time this report came out I had a lease on three claims adjoining the Astec mine my leased ground being covered by the geologists and reported on it was naturally to my interest to study what it contained as applied to my holdings. It was copied in the early part of 1917. In 1918 Mr. Perry was killed in the World War and a fine geologist was lost on account of European drama foolishness. Mr. Locke still carries on his profession thru his New York office.

Since this report was made for the Grant two of the claims I had leased have been purchased by the Double Eagle Co., under the management of Mr. Chas. Anderson they have struck some ore and have done several hundred feet of tunneling. They have also located the Astec fault along the end of their main tunnel. They have done very well striking the main fault here and this should lead to new incentive toward prospecting it further.

The Maxwell Land Grant Co. thru their ownership of the Astec mine, have advanced in great strides since this report was made, their mine has been very profitable and as far as I can tell they have followed this report in their major workings.

Thru the lust for gold the above named companies have steadily de-

developed the Yancy Hanks mining claim without entering its boundaries. This happy circumstance with the surface prospecting in trenching and shallow shafts to prove intersecting faults running to the main fault has given the Yancy Hanks a present better than Abraham Lincoln ever gave his mother. The Yancy Hanks mining claim is owned by Mr. Rush L. Devise, of Rock Springs, Wyo. and Ernest V. Lucile of Jackson W. Y. and is located on the west end of the old Astor mining claim No. 59 or in other words its south end and line is a thousand feet northwest of the center of the old Astor shaft and from there runs 85° west of North. Another happy circumstance is that on this claim there exists a junction of the outcrop of a ledge of lead entering from Copper Creek, or north west, with the main contact. This ledge has never been mentioned in any geological report I have ever seen. In this case the line is well marked and the ledge is well exposed. The ledge carries good gold values especially where it converges with the main contact.

These people have mined up to 200 feet and this to a depth of 500 feet and have commercial ore in the breast. In a raise of the Double Eagle people a raise exposes commercial ore. This raise is in the main tunnel and is so close to our south west side line that there isn't any fun in it. At this time the Yancy Hanks is virgin ground and has never been married to any vulgar mining man, but it is natural with her age and outside influences controlling her movements, such as the price of gold and the advances miners in courting her borders that "virginia" it is due time that she be married.

The Ben Hur mining claim, belonging to the same parties as does the Yancy Hanks, is southeast of the old Astor claim 50 feet and is 2000 feet long. From the old Astor claim it runs to the south of east, and crosses the main contact, as usual. The old timers knew their stuff in locating claims and had nothing to go by but surface indications, and now about noon, say someone is going to ride Ben Hur's chariot into the mine. The up on that claim the other day and was smelling gold. The ground, however, is not of any use. The people of Copper Creek were vibrant when the road was built there for over 20 years and days and has never set foot only on one end of that claim. It goes to show what a fellow can miss by not sticking around a bit. That claim has two ledges of quartzite, light and top, with scale underneath. Saw a number of porcupine signs on top of it and some of the right side shows with beds of those quartzite ledges about this side, say it got broken. When we further a vein of ore intersecting the 200 feet of north and running into the main contact, the quartzite was with contact and was not the quartzite. The quartzite was with contact and was not the quartzite.

for the shale bows down into a perfect arc and believe me that main fault is there somewhere for the vein to intersect. It has never failed yet. There is a chance for some man or group of men to exercise some common sense, a little capital and very little chance, the way gold is and do something.

When Perry & Locke examined the mine all work was being done in the shale underneath the quartzite and their obsevrance there was as true a statement as man ever made, but on Page 3 of this copy paragraph 2 where it states "especially interested in the contact" it must not lead one to pay attention only to such contact. The old Aztec shaft paid heavily in both quartzite and porphyry.

Page 3 Phä reminds me that the porphyry in the winze in Anderson's tunnel should be examined closely. I believe that some of it is spule from porphyry. It is almost transparent and has biotite in it.

Now paragraph one page 4, Here is something that requires special thought and examination. Here is where I spent the greater part of my money digging into a landslide with the supposition that I was going thru a wash and that the hill ahead would be solid ground, but the blooming hill was also landslide. Mr. Chas. Chase chased me out of there down to the lower tunnel. Perry & Locke state that copper Park is filled with this slide to a depth of 300 feet. I believe it much deeper from the width of the park and the slope of the mountain sides. I believe that the breast of Andersons lower tunnel is below the landslide area. If that is so the Nancy Hanks claim has around three hundred feet of slide material covering its surface for half of it area. I believe the slide will be more shallow close to the ridge. Everything has its drawbacks and this is one for the Nancy Hanks. At the same time, below the slide the groujd may have been made more productiove on its account. The porphyry comes in large blocks as big as a house and not only the edges are decomposed but the entire structure is lost. It is as soft as dough. The shale is alsodecomposed with oxidized edges and the large pieces not over an inch in area, some black and other bunches right alongside almost white, and all unconsolidated. Where did the minerals in the porphyry and shale go and was it on ascending or descending solutions?

Page 4, pp 4, station 105 is a tunnel and this tunnel came near being the undoing of the grant. This tunnel missed a big bunch of high grade by 50 feet, 50 ft. further would have given the old timers 2 millions in high grade.

Along the lower ditch line is down on the Ponil Sta 115 E28II The Ponil Creek affords a shallow tunnel near an old 3-stamp mill of Leopold Biddles, called the Garilla. This tunnel as ays \$7-\$8.00 even tho it was below the main contact. Biddle ran it thru his mill. The Maxwell has this now.

Sta. 44G is the island they speak of south of copper park which affords a shoulder or ridge to the top of Baldy and a fine contact of copper gold ore. Page 5 ppl- The Ross tunnel connects with the old Aztec shaft and its portal is along the road to our claim. It has a dump of mica shale and talc with much wire gold. We shall come to this wire gold business later.

Paragraph 2- P 4 fine grained porphyry 300 ft. of Aztec shaft. I can show fine grained porphyry where I was digging 1300 ft. W of the Aztec shaft.

Page 5- paragraph 4 It was lack of knowledge of the territory and was out, like the Thelma. The Black Horse mine was a fissure between two coarse porphyry walls. This fissure cut thru opposite the Thelma and is a strong vein, opened for almost a mile, and at the junction of the Thelma vein system and the Blackhorse, in an oxidized limonite and hematite, \$25,000 was taken out. As only plates were used much gold was lost. The writer put up a rag plant and retrieved some of the gold.

The termination of the Aztec contact is below the Ben Hur and ends in what they call the French Henry flats along the road below Baldy.

I figure that No. 1 tunnel runs thru the Ben Hur. This will have to be determined by a survey if the tunnel which is caved at the entrance. This tunnel would save many dollars of work in operating the Ben Hur.

1000

1000

1000

1000

1000

1000

1000

1000

Old Light 10-1

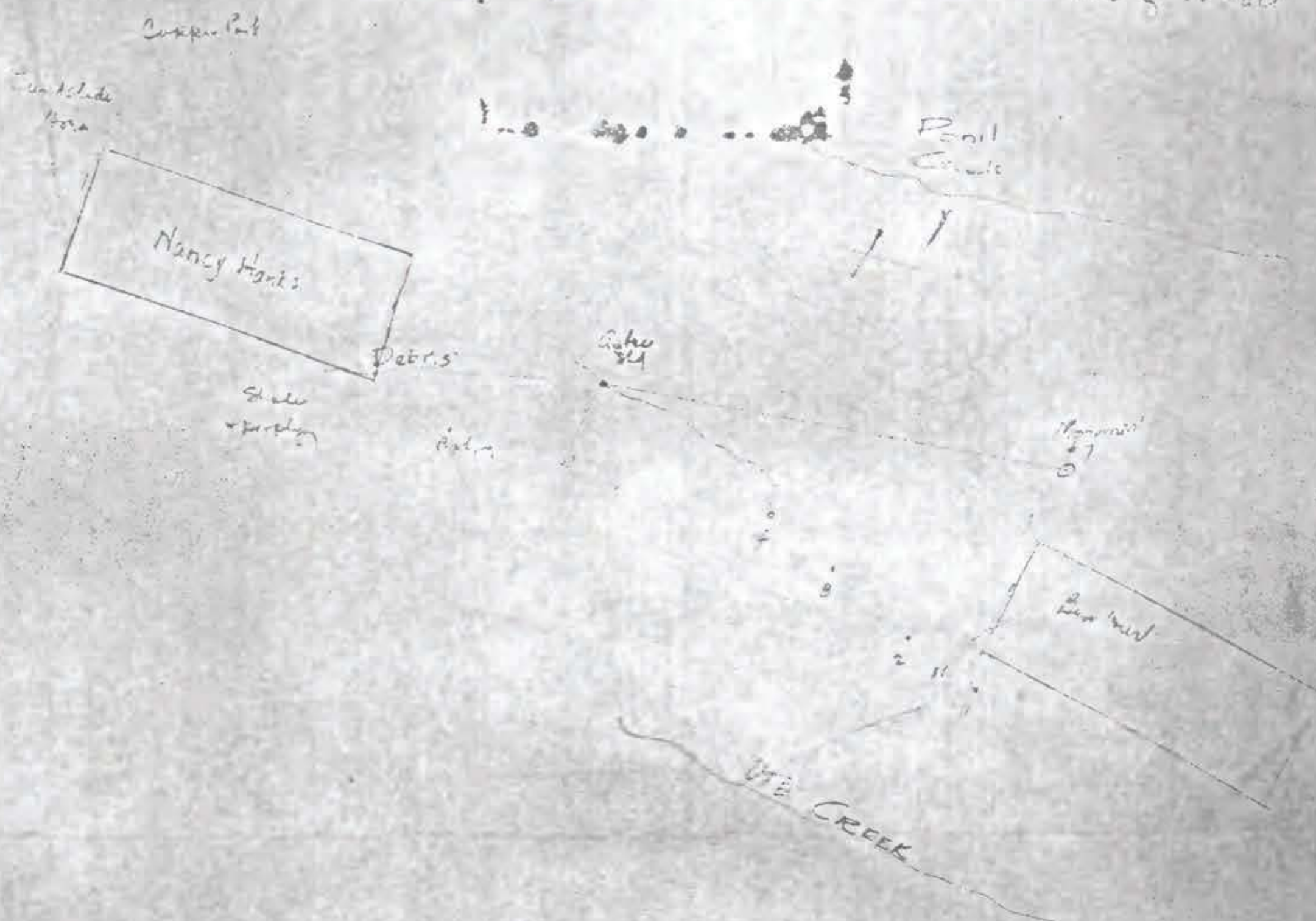
Shady 1000 x 1000

High slope

On fence N 30° W by P & L

Scale 1:1000

On fence in Point North
a line of contact



THE MAXWELL LAND GRANT COMPANY GOLD PRODUCTION IN :

[illegible]

TABLE 4. TESTS DRILLED FOR OIL IN COLFAX COUNTY

Company	Well No.	Lease	Location		Date Completed	Elevation	Top Dakota	Top Wingate	Top Chinle	Top Permian	Total Depth	Formation at Total Depth		Anticline	Remarks
			$\frac{1}{4}$ - $\frac{1}{4}$ - $\frac{1}{4}$	Sec.-Twp.N.-Rge.E.											
The California Co.	1	Floersheim	SW-SW-SW	15-23-24	1-22-25	5,888	30	485	705	1,395	2,556	Pre-Cambrian	Jaritas		500 MCFGPD, 67% CO ₂ , @ 2,509 ft. D. & A.
Frontier Oil Co.	1	Chico	NW-NW	6-24-25	1927	6,200 ^{a/}	190				1,326	Pre-Cambrian	Chico		D. & A.
Winston Marks	1	State	C-SE-NW	5-25-24	1940	6,109	420	950 ±	1,050 ±		1,650	Triassic	Rito del Plano		P. & A.
W. D. Weathers, et al.	1	?	SE-SW	7-25-24	6-25-27	6,050 ^{a/}	431				1,097	?	Rito del Plano		D. & A.
American Mfg. Co.	1	W. S. Ranch	SE-NW-NE	1-26-20	5-23- 26 ⁴	6,300 ^{a/}	2,230	2,790	2,880	3,450 ±	3,825	Pre-Cambrian			P. & A.
York Denton	1	Tex-Mex	NW-NW	2-26-24	12-6-41	6,264	435	485	1,185		1,600	Triassic	Rito del Plano		150 MCFGPD, 99.8% CO ₂ , @ 1,515 ft. Shut in.
Texwell Corp.	1-A	Sauble	SE-SE-SW	35-27-24	3-22-45	6,254	460	980	1,030	1,560?	2,520	Pre-Cambrian			P. & A.
Red Feather Oil Co.	1	Moore	NW-SW	10-28-26	10-24-26	7,200 ^{a/}	435				975	?	Capulin		D. & A.
Eureka Oil Corp.	1	Moore	NW-NW-SW	10-29-24	12-6-27	6,250 ^{a/}	1,378				4,083	?			Numerous oil and gas shows. D. & A.
Union Oil Co. of Calif.	1	Bartlett	C - N line	23-31-18	2-10-26	7,500 ^{a/}					4,411	Intrusion ?	Vermejo Park		Gray shale to 3,210, igneous rock to T.D. D. & A.
Union Oil Co. of Calif.	2	Bartlett	NW-SW-SW	23-31-18	9-4-26	7,500 ^{a/}					3,265	Intrusion ?	Vermejo Park		Gray shale to 3,215, igneous rock to T.D. D. & A.
(Bartlett well)	1	?	NE-NE-SE	25-31-18	Before 1908	7,350 ^{a/}					2,535	Upper Cret.	Vermejo Park		Gray shale to T. D. D. & A.

^{a/} Estimated from state topographic map.

TABLE 1. CLASSIFICATION, THICKNESS, AND CHARACTER OF THE ROCKS OF COLFAX COUNTY

AGE	FORMATION	THICKNESS (Feet)	DESCRIPTION
RECENT	Alluvium	0-500	Loose rock and soil; slides; stream deposits; glacial debris.
PLEISTOCENE	Gravels	0-50	Veneers on plains and mesas; locally indurated.
	Lavas	0-200	Basalt and andesite.
PLIOCENE	Ogallala	0-500	Sands and gravels; probably equivalent in age to the Eagle Nest formation of Ray and Smith (1941) in the Moreno Valley.
	Lavas	0-200	Basalt and andesite.
MIOCENE	Picuris (?)	?	Coarse soft red sandstone; red and green shale; conglomerate. Reported by Ray and Smith (1941) in the Moreno Valley.
OLIGOCENE	Intrusives		Andesite; trachyte, monzonite.
Eocene	Raton	0-1600	Shale, sandstone, and coal. In middle part is a yellow-brown cliff-making sandstone 300 to 600 feet thick. Basal conglomerate generally well marked.
UPPER CRETACEOUS	Vermejo	0-425	Sandstone, shale, and coal.
	Trinidad	0-150	Light yellow cliff-making sandstone.
	Pierre	0-2500	Black and dark gray fissile shale, sandy toward top and limy toward base.
	Apishapa	0-500	Black and dark gray shale; locally carries concretions of calcium carbonate and iron oxide.
	Fort Hays	0-60	Dark gray to black thin-bedded sandy limestone.
	Carlile	100-350	Dark gray and black sandy shale with biscuit-shaped concretions. Codell sandstone member at or near top.
	Greenhorn	30-300	Bluish gray to black limestone, weathering light gray to buff. In places, thin limestones interbedded with black shale.
	Graneros	40-350	Dark gray to black shale, generally with thin bentonite bed at top. Sandy beds locally present.
	Dakota	80-200	Gray hard coarse massive sandstone.
LOWER CRETACEOUS	Purgatoire	60-200	Gray calcareous sandstone and shale.
JURASSIC	Morrison	50-190	Yellow-gray, buff and red sandstone and shale. Thin gypsum bed present locally at base.
	Wingate	0-250	Buff to pink or white sandstone, moderately hard; forms cliffs.
TRIASSIC	Chinle	0-700	Dark red, purplish brown, and gray sandstone and shale; some conglomerate.
	Santa Rosa	40-100	Coarse gray conglomeratic sandstone.
	Tecovas	0-275	Dark red and purple shale and sandstone.
PERMIAN	San Andres	0-20	Gray to buff limestone, partly sandy.
	Glorieta	60-200	White, gray, buff, and yellow hard sandstone.
	Yeso	100+	Light red shale and soft sandstone.
	Abo	0-1000	Dark red shale and sandstone, nonmarine.
	Sangre de Cristo	0-2000	Chiefly arkose. A coarse clastic facies that grades laterally into Madera, Abo, and lower Yeso formations.
PENNSYLVANIAN	Madera	0-4000	Dark gray and red shale and sandstone; thin beds of limestone and conglomerate.
PRE-CAMBRIAN			Granite, gneiss, schist, and quartzite. Local pegmatite.

LOCATION	OPERATOR	LEASE NO.	1938	1939	1940	1941
Astec Mine	Company	-	95,345.29	84,608.33		
	Astec Gold Min. Co.	114				
	Ute Creek Mill. Co.	148				
Astec Mine Dump and Tailings	Company	-			1,761.06	
	Peacock & Drysdale	?				
	Keely	174	1,495.16			
Rebel Chief	W. Elrick	{ 151 176	1,266.61			
	J. Archuleta	179	266.48	42.20		
Monteruma	Mooney & Pippert	{ 153 161				
	Pippert	175	14,497.94	5,333.92		
Iron Mountain	Empire Mining Co.	187			1,535.67	
Black Copper Trail	R. Alvis	172	111.41			
Gold Dollar	J. Eagle	177		24.50		
Ute Creek Placer	Baldy Mtn. Pl. Co.	113				
	Ute Creek Gold Pl. Co.	124				
	Great Western Min. Co.	154	also Lady Jo Mines			
	Alger	180		658.20		
	Reimer & Terrel	186	also Peerless Min. Co.		160.28	(Up to)
				229.64	90.15	7,040.45 (Sept.)
Lower Willow Creek	Brown Volchogin & Co. Lund & Neal	140				
	Cetch	185			201.63	
Upper Willow Creek	Partisan Habiger	155				
Big Nigger Gulch	Lowrey	?				
	McGityre & Ringer	117				
	Hill	160				
Humbug Gulch	Lowrey	1038 ?				
	Dazzo	169				
	Roger & Albo	184			37.44	
	Fullroe	190				
South Ponil	Weber	{ 120 134				
	Benfield	163				
	Chaffee	165				
Upper Mills Gulch	Herburger	173				
Lower Mills Gulch	Herburger	149				
Grouse Gulch	Fullroe	189				
Total			\$110,982.89	\$90,667.15	\$3,696.08	\$7,040.45

VERD & COY
MADE LINEN TRACINGS
WHEN ORIGINAL PLACED

TOPOGRAPHICAL MAP
OF THE EAST FLANK OF
BALDY MOUNTAIN

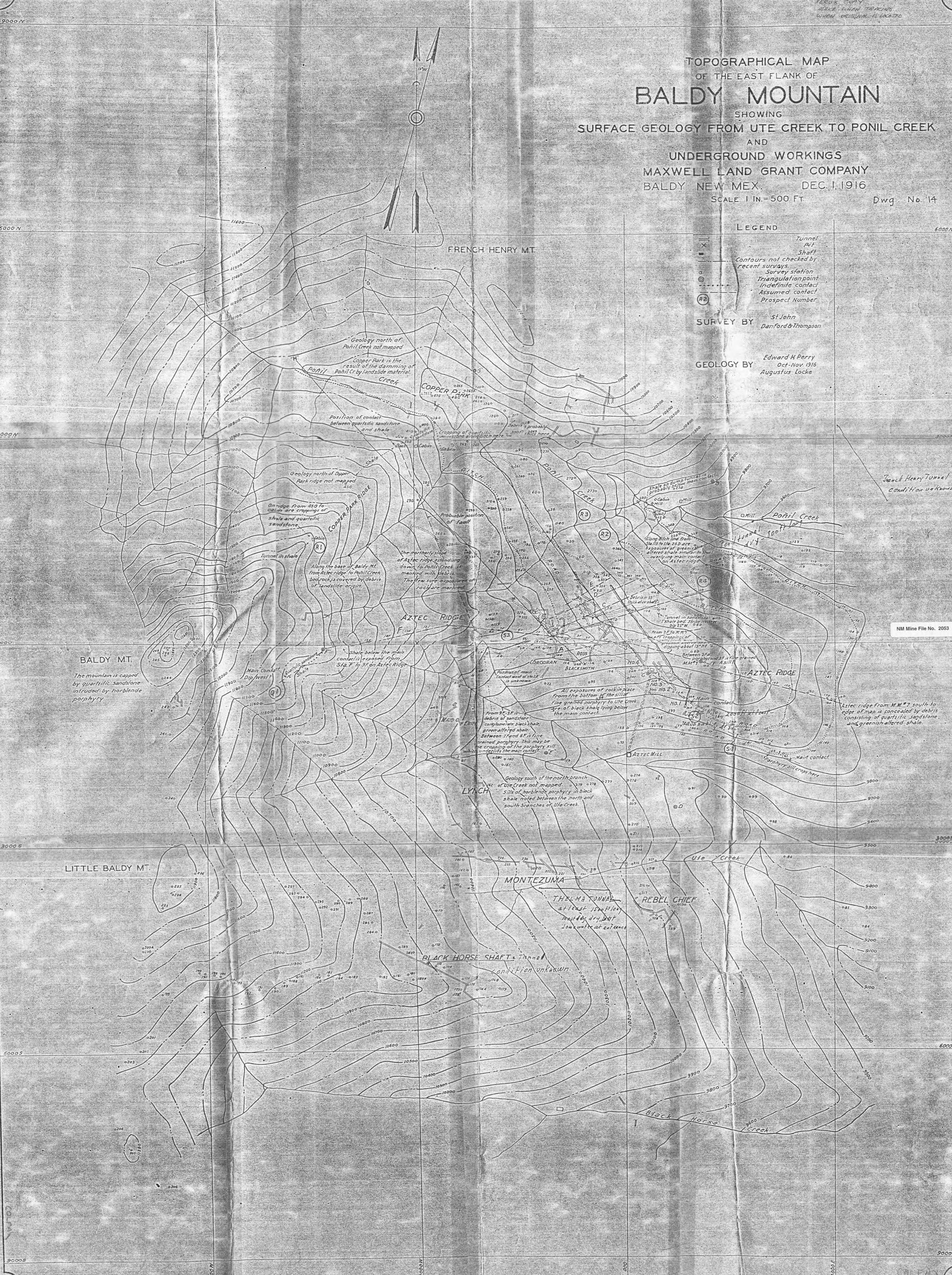
SHOWING
SURFACE GEOLOGY FROM UTE CREEK TO PONIL CREEK
AND
UNDERGROUND WORKINGS
MAXWELL LAND GRANT COMPANY
BALDY NEW MEX. DEC. 1, 1916
SCALE 1 IN. = 500 FT. Dwg. No. 14

LEGEND

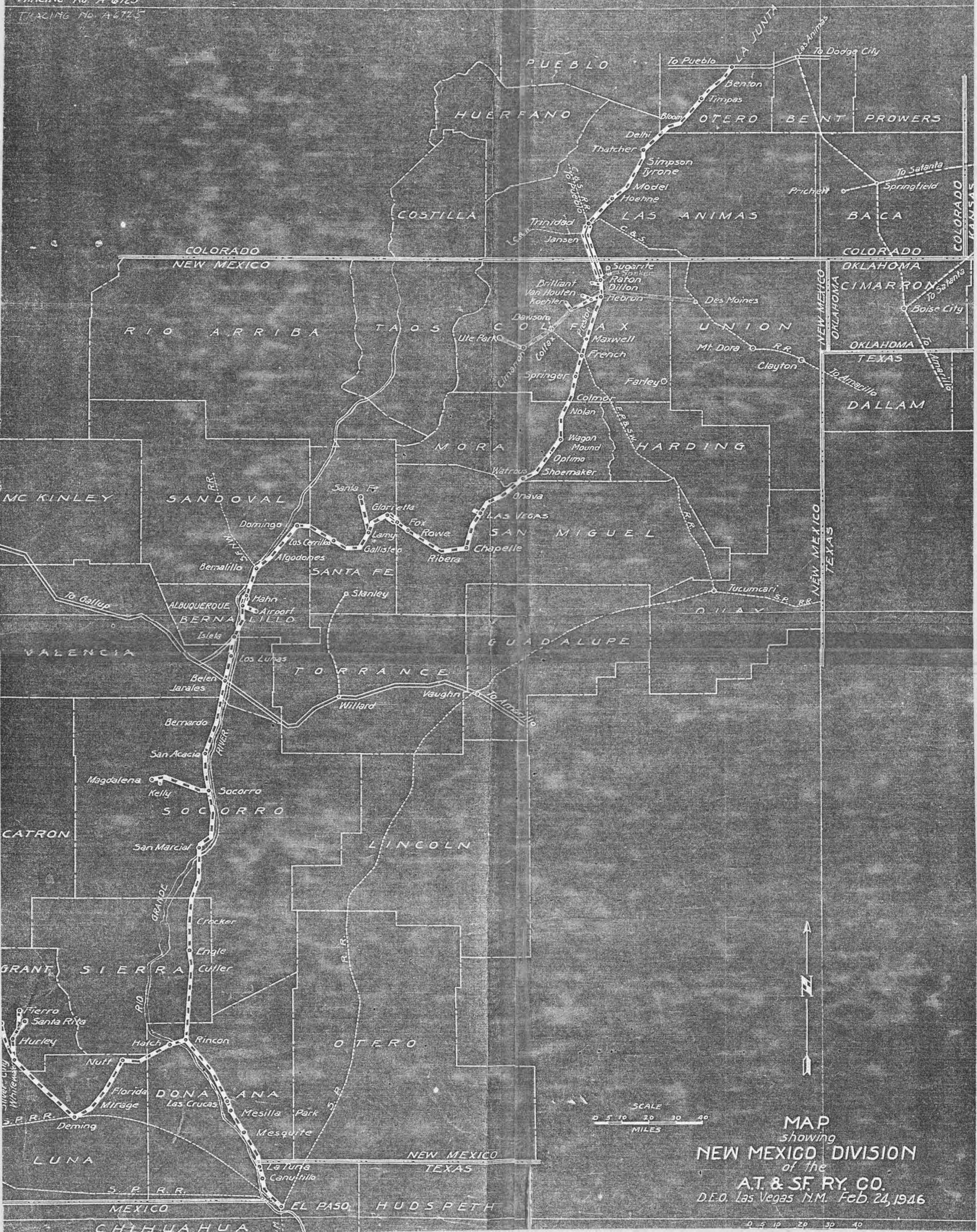
- Tunnel
- Shaft
- Contours not checked by recent surveys
- Survey station
- Triangulation point
- Indefinite contact
- Assumed contact
- Prospect Number

SURVEY BY St John Danford & Thompson

GEOLOGY BY Edward H Perry Oct-Nov. 1916 Augustus Locke



NM Mine File No. 2053



MAP
showing
NEW MEXICO DIVISION
of the
A.T. & S.F. RY. CO.
D.E.O. Las Vegas N.M. Feb. 24, 1946