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GEOLOGY OF THE JASPER DISTRICT IN COLORADO.

J. H. W. H. J.

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To the Honorable Trustees, President and Faculty
of the Colorado School of Mines.

I the undersigned respectfully submit this thesis
in accordance with the requirements for graduation.

J. H. Woolf Jr.

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GEOLOGY OF THE JASPER DISTRICT IN COLORADO.

CHAPTER I. INTRODUCTION.

PRELIMINARY STATEMENT.

This thesis treats of a portion of the work of the Colo. Geol. Survey under the supervision of Dr. Patton of the Colo. School of Mines. Every summer Dr. Patton has charge of one of the parties of the Colo. Geol. Survey and makes a study of an area which has never been mapped, and thoroughly studied. This especial summer it was his pleasure to make a study of the Platora district which included the towns of Platora, Summitville, Gilmore, Stunner & Jasper. This should be of special interest to everybody, because a rush was in progress at the time, and a good many prospects were being located. The interest in the district was due to the discovery of gold at grass roots near the town of Gilmore. Mr Gilmore, whom the town was named after was the discoverer.

PERSONNEL OF PARTY.

The party consisted of H.B. Patton and thirteen students of the Colo. School of Mines

OBJECT OF SURVEY.

The object of the survey is to survey and ascertain useful information of the geology and mining conditions of a little known portion of Colo. and to present the information in such form as to be useful in the development of that region.

LOCATION OF DISTRICT.

The entire district surveyed is situated in the S.W. portion of Rio Grande Co. and in the N.W. portion of Conejos Co. It lies between the towns of Summitville on the N, Jasper on the East, and Platora on the South.

The district which is discussed in this thesis lies



Nose on Cornwall Mt.



Glacial Grooves below Jasper

between the towns of Summitville on the North, Jasper on the East, and Stunner on the West. It's area is about twelve square miles. The latitude of Jasper is Thirty seven degrees-twenty five minutes North, and it's longitude is One hundred and six degrees and twenty seven minutes West.

The Denver & Rio Grande Railroad may be reached at Monta Vista. This place is thirty-four miles by road from Jasper. There is a short cut from Jasper to Del Norte, which is said to be only twenty five miles. It is merely a trail at present climbing over the high mountains North of Jasper, but at one time it was said to have been a good wagon road. Between Jasper and Stunner is a narrow, sharply walled canyon, which contains the Alamosa River and a good mountain road. Summitville is located in Wightman's Fork which empties into the Alamosa, about half way between Stunner and Jasper, that being four miles each way. A new road is being built thru this country by the county; It takes in the old road wherever feasible, and is being pushed ahead as rapidly as possible. It is thought that the state highway will pass thru here, which should be a big boost for this country. At present the new road is built as far as Wightman's Fork toward Stunner, but it has been surveyed far above this. Automobiles will find this a very good road, as it has been built with a good average grade all the way. Between this road and Summitville and running along parallel to Wightman's Fork is an old wagon road, which extends into Summitville. It is now impassible to wagons, but it makes a very good trail, except in two places, all the way up to Summitville.

HISTORY OF JASPER.

Jasper was founded in 1874-1875 about the same time that ore was discovered in Summitville. The town, part of which still exists, was started, and prospecting commenced at this time.



Jasper



Crater Lake

The Perry Mine was the first to be located. It was discovered by Andrew Johnson, whose first pardner was Alva Adams. G.G. Calkins and Pascall Craig were later taken in as pardners with the afore mentioned. Another man, Frank Moody also became interested in Jasper and formed the Jasper Townsite Company. Most of the territory around Jasper is still owned by these men, their mines including the Perry and Guadalupe. The Cornwall Mining Co is the name of their company. The Miser Mine, the only other mine of interest is owned by Frank Moody, Dr. Ross, G.W. Balentine and John Gabriel, all of whom are Denver men.

Above Jasper, about two and one-half miles, there is a group of old buildings and old workings called the Sanger Mine. The original entrees on this property claimed to have a mountain of "Birdseye Porphyry" here, which had an average value of \$10.00. This proved to be a big swindle, and after getting all the "suckers" money they could, they ceased working the property. The ruins of an old mill are also to be seen here. This had a big tendency toward the ruination of Jasper and ever since that event, it has been hard to get money to open up any new workings. The mountain of porphyry can easily be seen, but it assays only a portion, (fraction) of what was reported to run. This story of the swindle is all hearsay, but it can be readily believed from a look at the mine and the mill.

CLIMATE.

The climate in this district is about the same as in any mountain district in Colo. In summer there is usually a rainy season of about six weeks. This particular summer was an exception however, which only goes to prove the rule. Snow is on the ground for about seven months in the winter.

The first problem was to establish our elevation, and place suitable bench marks for triangulation purposes. The U.S. G.S. have made a traverse thru this region and established bench marks on different peaks. We took their results and thus ^{had} ~~and~~ our first elevation on North Mountain, North of Summitville. We next established our own bench marks for triangulation. Two points plainly visible from one another and about 4000' apart were measured very carefully by chain. Six or seven chainings were necessary for all our work depended on this. After being established, the elevation of either end was taken from our known elevation on North Mountain. From these two points we located and secured elevation of all points in sight, then from these points additional points were located until finally the entire district was covered.

Several traverses were also made; one from Summitville down Wightman's Fork to the Alamosa; 2nd. From Camp near Summitville around Lookout Mountain to Stunner; 3d. From Stunner to Platora; 4th. From Stunner down Alamosa to Jasper, and connecting the Summitville Wightman Fork Survey.

TOPOGRAPHICAL METHODS.

Instruments used:-

- (1) A small plane table about 10" x 16", which was mounted on a tripod from a camera. It was very light and easy to carry, and was covered with an oil cloth.
- (2) A barometer, for determining elevations.
- (3) A hand level, clinometer, compass, straight edge, scale, and protractor, all on the same instrument.
- (4) A prospector's pick and flags.
- (5) A telemeter for getting distances.

PROCEDURE.

In triangulation, flags were placed on all the easily distinguishable points so that in nearly all the district, at least one flag could be seen. Of course in dense growth of trees on parts of hills and in a few other places, these flags could not be seen, but in general they could be seen from everywhere.

The first problem was to draw contours, or lines of equal elevation, all over the district. The scale used was 2000' to the inch, and contour lines were drawn every 100'. Before leaving camp, all the triangulation points were placed on the sheet of tracing cloth, which was to be the map, and also all the traverses were plotted correctly to scale on it. In one corner of the map the distance between contours for a (5-10-15-20-25-30-35) degree slope were computed and drawn.

If working along one of the traverses the following procedure would be followed: The table would be set up at each point (if not too close together) and made level with the level bubble on the instrument. Next it would be oriented. By that is meant the process of placing the table in a true N and S position. The method used in this case would be to place the straight edge so that it lie along the line of this station and the previous station. The table would then be allowed to swing around until by glancing along the straight edge the preceeding station could be seen, and then the table would be clamped. To check this we could set the straight edge on the line of this station and the next station, and see if by glancing along the edge we could see the next station. Or if a triangulation station was in sight we could place the straight edge on this new line and see if we could see the triangulation station. The compass should give us a rough check also, and if there are no disturbing

elements will read 14 degrees, 30 minutes, to the right of true North. Having gotten our table oriented we start to draw our contours. The elevation of the point we are at is known being a traverse point, and therefore we know whether the contours will pass above or below the station, and also about where. Working up or down to the contours as the case may be with a hand level we can place ourselves directly on the contours, and we can place a dot approximately on our map where this spot is. If too far away from the table, pacing may have to be resorted to, to get this distance from the table. Now while at this point we take sights with the hand level at two points at our level and with the compass get their bearings. The distance to these points we either approximate or pace, or use a telemeter to determine, according to how skillful we think we are in judging distances. Now going back to the map, we can place dots on these two points. Between these three points of equal elevation a contour line is drawn, the way it runs between these two points being determined by the eye, which takes account of the general lay of the ground.

To orient at one of the triangulation points about the same procedure was used as before, and what contours that could be drawn were mapped.

To orient at an unknown spot a different process had to be followed.

(1) When two known points as triangulation points are visible. Orient table as best you can by means of the compass. Now with straight edge sighting towards one point, draw line from this point towards where you are sitting. Do the same with the other point. The intersection between these two lines will be the point you are set on.

(2) When three points are visible you can use the three point problem which consists: of drawing from each of these three points a line on a piece of tracing cloth on top of your map. Now with the tracing cloth on top of your map revolve it until each line comes under the point it was drawn from. The intersection of the three lines will be the point you are at and by pröcking thru the tracing cloth you have the point you are at.

(3) When only one point can be seen you can orient with a compass and judge your distance from this point. This is not usually feasible.

Now to draw contours after locating yourself on the map by one of these methods.

(1) In narrow valleys or gulches we could stand at the bottom(rarely on the top) and mark direction of the gulch. Next we determine the slope of the gulch by means of the clinometer. With this slope the contours are placed all the way up to the top. Also while standing at the bottom we determine a point on either side by means of a hand level. This gives us the direction of our contour. A ridge would be contoured in the same way.

(2) In open or gently hilly country we sight from some point,points at our own level with the hand level and contours are then drawn in,the distances estimated or paced.

(3) In country covered with very much timber the contours had to be more or less guessed at,although a sort of a traverse was run on about every third contour. Care was taken so as not to overlook streams and gulches.

(4) When going down a large canyon as the Alamosa,we could set up along traverse points and take slopes on both sides. Then by observing the country the contours could be drawn in all

the way along.

(5) Near Jasper no triangulation points were to be seen, so from traverse points on the road, rough triangulation points were placed on the map and elevations calculated by the ordinary triangulation methods, except using rough tools. From these points nearly all this section was covered.

The geology of this district was studied along with the contouring.

CHAPTER III. GEOLOGY.

A review of the different publications on this district will be given first, after which the deductions of the work during the summer will be set forth.

THE ENRICHMENT OF SULPHIDE ORES

by W. H. EMMONS.

BULLETIN # 529 of U.S.G.S.

The Summit district is S.W. of Alamosa, Colo. near the Rio-Grande-Conejos county line. According to R.C. Hills the metal bearing rocks are near the middle of the Tertiary eruptions series of south and south-west Colo. The associated rocks are andesites, trachytes, rhyolites, and other eruptives; but unlike the eruptives of most tertiary districts in this province, these rocks appear to have been closely compressed, and form a series which as shown in Hill's sketches is probably isoclinal. Some features of the ore deposits are puzzling, but whatever their genesis, they illustrate very clearly the theory of enrichment-a fact which was fully recognized by Hills as long ago as 1883.

The ore bodies, so far as exposed, are rudely tabular and approximately vertical. The ore is chiefly quartz and pyrite, but contains some enargite, galena, sphalerite and other minerals.



Looking north toward Jasper



Glacial Grooves.

Although Hills mentions brown oxide in several places, he does not say they are magniferous. Raymond states that the oxides include those of purplish hue.

Placers appear to be of subordinate importance. The mineralized matter may be separated into three divisions:-

(1):- The impoverished zone near the apex. (2):- The zone of rich and partly oxidized ore, and (3):- The zone of low grade sulphides. The zone of impoverishment includes the outcrops of all but two of the lodes and it extends downward to a depth of 50' or more. The zone of incompletely oxidized ore extends to a depth varying from a few feet to 300 feet. In this zone the Quartz is colored dark brown by oxides and the more highly auriferous material is characterized by an abundance of brown oxide. The gold in this ore carries about 0.025 oz. of silver per ton. According to Hills all the bonanzas were confined to this zone. In some placers, gold appears in a disseminated form, in innumerable small grains so aggregated as to resemble a continuous sheet of metal. Locally the grains unite and form flat nuggets, one ounce or more in weight. According to Hills the occurrence of this rich material is confined to the immediate vicinity of a central channel, which has been filled with an earthy material, fragments of rock, and iron oxides. Some of the rich seams of gold powder have been introduced into fractures which cut barite. Below the rich and partly oxidized zone, the primary sulphides appear to have been unworkable under conditions existing then. There is however in three mines a concentration of silver at greater depths than that of the gold bonanzas. Hills ascribes the two rich outcropping ore bodies, which are exceptional in this district, to intense kaolinization on either side of them, causing the country rock to be much more easily

eroded than the extremely hard quartz. This consequently remained considerable above the ground surface, forming a precipitous ridge that was, as he explains, protected from solution, which went on more vigorously below, in the places where snow and water accumulated.

Mr. A.C. Hills, who was referred to in the above, quoted article by Mr. Emmons, published a report on the Summit district in Colo. The above article of Mr. Emmons is practically a resume of Mr. Hills report. Mr Hills report is found in the Proceedings of the Colo. Scientific Society, Vol. I, Page 20. It is titled, Ore Deposits, Summit District, Rio Grande County, Colorado. By R.C. Hills.

This article by Emmons refers to the district closely associated with Summitville, where the ore occurs in honey combed quartz in South Mountain. This locality would therefore include only the N.W. portion of the Jasper district, but many of the statements would hold for the district near Jasper, as well as those close to Summitville.

In the report of the Hayden Survey for 1875, page 172, is a short article on the Summit district. This report concerns chiefly with Summitville and vicinity, and is of particular value in this thesis.

No reports could be found on Jasper, or of the immediate vicinity, and the rest of this chapter will deal with conditions as observed by Dr. Patton and the writer during the summer mentioned.

Five different kinds of rocks were observed in places, and their respective areas will be shown on the geological map. They were andesite, diorite, diorite porphyry, rhyolite, and basalt. The andesite covered by far the largest area, the other occurring

in small patches or dikes in various localities. All of these rocks are tertiary eruptions, and therefore owe their origin to this fact.

ANDESITE.

The andesites on Cornwall Mountain across from Jasper, are very characteristic of the entire region. They are grayish to grayish pink in color, with abundant biotite more or less chlorotized, and finely porphyritic. They contain numerous small fragments, porphyritic in texture, some fine grained, some coarse grained, more coarse grained than the inclosed rock. These angular inclosed fragments are the most ready means for distinguishing the andesite from the fine grained diorite porphyry to be seen on the same mountain, near the Guadalupe Mine.

DIORITE.

Diorite has been found in several places in this district, but two places are of special interest. The largest outcrop of diorite occurs down Wightman's Fork, about three miles from Summitville. It is fine grained in texture, very hard, and very dark in color. It has no quartz in it, and is a true diorite in every sense. It occurs as a large boss or dike and extends on both sides of the valley. The source, however, appears to be on the north side of the gulch, where the diorite lies in large precipitous cliffs without vegetation. On the other side a heavy vegetation prevents one from examining the boundaries of the diorite very closely.

The other locality for diorite is between the Guadalupe and Miser mines. This is a coarse grained rock and also lighter in color. It merges into diorite porphyry on one side, and andesite on the other. It appears to be a thin sheet and just a local outcrop.

DIORITE PORPHYRY.

Diorite porphyry occurs in only one place in the district although closer to Stunner there are several places where large outcrops of diorite porphyry occur. The principle place of occurrence is at the Guadalupe Mine. It merges into diorite on one side, and andesite on the other. The boundary between the andesite and diorite porphyry is not very well defined, the distinction being made as before specified.

RHYOLITE.

Rhyolite occurs in many small dikes thruout the territory as shown in the geological map. In one place however, there is quite a mass of rhyolite, namely on Elephant mountain. The rhyolite is very scoriaticous, has a good deal of quartz, and the fresh sanadine can be seen very clearly. In every case of rhyolite outcrop, andesite can be found on all sides of it. It is about 10' wide and extends in a straight line for several miles between Stunner and Wighmans Fork on the southern side of the Alamosa. It is about 1000' above the river. Nothing valuable has ever been found in this rhyolite, or any other rhyolites of the district

BASALT.

On the top of Cornwall, is a considerable patch of true basalt. It is dark in color, and very scoriaticous. It occurs in a very thin sheet, probably not more than 50' in depth at any place. It is a remnant of erosion, that is, at one time the basalt must have covered a large area, but has been eroded away untill only a thin sheet remains. There is another patch of basalt on a mountain S.E. of Cornwall, which shows that the basalt must have covered all the intervening territory at one time.

GLACIATION.

Glaciation has occurred in nearly every part of the territory, as shown by the lateral moraines and glacial cirques, which are to be seen. The most ready signs of glaciation

however, are rounded diorite boulders, which are carried along with the glacier, rounded and left stranded. There is practically no part of the territory where these cannot be found, and we traced the glaciation nearly to the edge of the mountains on the way out. A large glacial cirque can be seen just east of the very top of Cornwall Mountain. In the bottom of the cirques is a body of water, which appears to be very deep. This small lake was known as Crater Lake, and several people have claimed to have sounded it, and tried to find bottom but could not. This summer Mr. C.E. Smith, one of the instructors of the party, built a small raft, and sounded it, with a plumb bob and string. The deepest place he could find in the lake was 18' which justified ~~Dr.~~^{Dr.} Patton's statement that it was only a glacial cirque.

The only place where there are no signs of glaciation is on the top of Cornwall Mountain. This seems to have been a small local center for the ice, which spread in all directions. One small glacier from this center, would be shown by the glacial cirque previously mentioned.

Two distinct glaciers have occurred in this territory: One which moved down the Conejos Valley, and one which moved down the Alamosa Valley. A tributary glacier to the Alamosa Glacier started at the ridge comprising South Mountain, Cropsy Peak, and Rhyolite Peak. North Mountain was also a source of a part of this tributary glacier. This glacier passed over Elephant Mountain, and toward Cornwall Mountain, but never reached the top. It joined the Alamosa Glacier between Cornwall Mountain and Elephant Mountain and passed on down the Alamosa Valley. The direction of this glacier was shown by scratches on the top of Elephant Mountain.

One of the largest lateral moraines, which was found was at an elevation of 10,850! This moraine was on the western side of the Wightman Fork Canyon. It represents a resting point of the receding ice sheet, which at one time completely filled the canyon. This would show that the ice at this point was about 800' thick, as the bottom of the canyon had an elevation of 10,000! At one time however, the ice must have been very much thicker, as it passed over the mountain on which the moraine was found.

LANDSLIDES.

Several landslides have been found in this territory. The largest one is near Gilmore, but has never been examined by the writer, as it lies outside of this particular district. In this district two distinct slides are to be seen, one on the north side of the ridge of Cornwall Mountain, and the other, on Cornwall Mountain across from Jasper, about 2000 feet above the town. These landslides are told from the very nature of them, that is the mountain appears to have slipped down, or a part of it fallen off. A great deal of broken rock will also be seen which distinguished a slide from a lateral moraine, as the rocks on a moraine will be more or less rounded.

ALLUVIUM.

In many places there are deposits of alluvium, which are covered with grass and are usually swampy. They have been deposited since the glacier. The largest area covered by alluvium that was seen during the survey, is about 600 feet below the top of Cornwall Mountain, on the western side. It is more than one square mile in area and has narrow branches leading from it in all directions. Its edge just touches this particular district.

CHAPTER IV.

MINES AND MILLS.

PERRY MINE.

The Perry Mine is located directly across the Alamosa River, from the town of Jasper. It is about 800 feet vertical above the river bottom. Andrew Johnson was the man who discovered this mine about the year 1874. It is owned at present by the Cornwall Mining Co. the same company owning many other promising mines around Jasper.

This mine has not been worked for a number of years. Some very rich ore has been taken out however, assays running as high as 1200 oz. of silver to the ton, and 2.20 oz. of gold to the ton being not uncommon. In order to get the ore down to the river level, where there was a road, a unique feature in engineering was accomplished, the remains of which are still to be seen. It consisted of a wooden inclined railway supported on rocks and wooden trestles, and working on a balanced system. The angle of inclination was as high as 32 degrees. Considering the year in which this was built, the inclination on which it was built, and that remains are still to be seen this is truly remarkable. From what I learned however the car jumped the track on the second trip, and it was never used again.

Up at the mine itself there was a shaft and tunnel, the shaft being about 150 feet vertical up the hill above the tunnel. The shaft and tunnel were at one time connected, but so much caving has resulted that it was impossible to get into the shaft. The mine was originally worked thru the shaft, the shaft being inclined along the vein. Going into the tunnel itself another specimen of Colorado Mining met our eyes. It was a wooden car supported on wooden rails, and in such good shape that the names of the owners were plainly visible on the battered sides. The entire length of the tunnel was 225 feet.

Within a few feet of the vein however there is another cave in so that it cannot be seen. The vein was reported to be about 12 feet wide. Within the tunnel there are three fault slips with a soft clay gangue. The following strikes and dips were taken which might reasonably be expected to be the general dip and strike of the main vein.

(1)- 150 feet to portal strike. N 35 degrees W, dips 50 degrees S.W.

(2)- 180 feet to portal strike. N 60 degrees W, dips 50 degrees S.W.

(3)- 220 feet to portal strike. N 35 degrees W, dips 50 degrees S.W.

The country rock around the Perry Mine is andesite. The ore itself was contained in a quartz replacement vein with a soft clay gangue on either side. This could be told by samples taken from the vein which were lying around. Some very rich specimens have been shown and even now it is not uncommon to find rich silver nuggets in the Perry dump pile.

MISER MINE.

Probably the most notorious mine in this district is the Miser Mine, which is located about 1/2 mile above Jasper and across the Alamosa. It is nearly at the level of the river, the dump extending into the river itself.

This mine was discovered over 30 years ago, and it was at that time that most of its present workings were built. It is owned chiefly by Frank Moody, Dr. Ross, G.W. Balentine, and John Gabriel, all of them residing in Denver.

The tip top vein, one of the many veins, which have been discovered on Cornwall Mountain, across the river from Jasper was the original vein of the Miser property. On this account

the property contains about 300 feet of the Perry Mine vein, which strikes across the lower part of the property.

In the development of this ground, a cross cut tunnel has been driven. It starts about 20 feet vertically above the river, and runs directly into the mountain. The tunnel is 700 feet long, and cuts the vein at 350 feet from the portal. This is the Perry vein which was cut, and about 50 feet of drift work has been done on the vein. The rest of the tunnel was extended in to try and reach the tip-top vein or any other veins which might be struck between the two. Nothing was however struck, and so this end of the property has been neglected. This work was carried on 30 years ago, and has not been touched until quite recently. In the early days this mine was very rich, and very rich ore has been reported to have been taken out. Specimens estimated to run \$52,000.00 to the ton in gold have been taken out, according to hearsay. There was very little however of this very rich ore, and most of it was given away as specimens. Mrs. G.M. Hook of Jasper told the writer of the specimens, belonging to her uncle, Frank Moody, which she had seen, with the gold in stringers all thru the rock. The writer was shown one specimen from the mine, which had been found in recent years, and which was very rich in gold. The lowest assay ever taken from the mine was 30 cents in gold.

On the first day of November, 1912, Mr. G.M. Hook, John E Field, Charles W. Foster, and H.L. Morrison took a bond and lease on the Miser property and also the Guadalupe Mine. They worked in the Miser Mine during the following spring, but about the first of July changed over to the Guadalupe and commenced operations. While in the Miser they sank a small shaft on the vein, and found a few rich specimens, but had to cease on account of too much water. They also did some stoping, but did not find

any ore worth mining here. The mine is in very good condition at the present time, and mining could be commenced very easily.

The strike of the vein on the drift, about 350 feet from the portal is S 40 degrees E. The dip is uncertain and could not be determined accurately. It is a quartz vein, several feet in width, but not very well exposed. There has been considerable faulting along the vein. A clay gangue is found along with the vein and can be seen on either side. Above the tunnel level is an intermediate level where the dip could be determined and was found to be N.E 70 degrees. At the entrance to the tunnel, there are several small buildings, of which were a blacksmith shop, a dry or change room, and a small engine room, containing a gasoline engine.

GUADALOUPE MINE.

Another interesting property which is situated across the Alamosa from Jasper on Cornwall mountain. It is about 400 yards east of the Miser tunnel, and is just above the river. It is the only property that is being worked at present, and seems to be a very promising project.

This mine is owned chiefly by Alva Adams and others. It is supposed to contain the same vein as the Perry Mine, that is the Perry vein. It was first patented in 1882, and the apex and the discovery tunnel are still able to be examined. The apparent strike of this vein at the apex is S 70 degrees E. and dips S.W. 70 degrees. The vein is about 6 feet wide, and looks as though it may widen out further in. It is poorly exposed, and very hard to measure accurately. It is a quartz vein, the quartz being mostly a replacement of the country rock. The country rock is diorite porphyry, fairly coarse grained, and not flinty.

It contains some cavities and quartz vugs. These vugs show sphalerite, galena and pyrite which may or may not contain values.

The tunnel which is being worked on now is about 400 feet vertically below this apex or discovery tunnel. As stated a bond and lease was given the 4 men on this property. So far their work has been cleaning up this old tunnel, which has not been worked for more than 30 years. They commenced operations about the first of July, 1913, and have been going steadily ever since. Six men have been working, three on a day shift, and three on anight shift. The tunnel was originally built to cut the Perry vein, but for some unknown reason, after driving the tunnel for 295 feet, they ceased to work. So far the work has been in lowering the floor of the original tunnel, as it had too much of a grade. The old wooden tracks are being replaced with steel ones, and a ditch is cut along the side of the track so that the water can run out. At 226 feet, they encountered a small vein, and one shift is drifting on this while the other shift is continuing straight in. Min⁷⁹~~ing~~ is very tedious in this tunnel, as the rock is very hard. The strike of this vein is N. 65 degrees W. and it dips N.E. 72 degrees. It is 2-3 feet wide. It is only exposed for about 15 feet. There are parallel stringers of quartz from a few inches down to practically nothing. The vein is of quartz in rotted country rock, namely diorite porphyry. The character of the vein seems to be partly a replacement vein and partly a true fissure vein, but it is not very clear. A good many sulphides can be seen in the quartz. A great deal of water is coming down at the breast of the Guadalupe tunnel. The rock here is very hard and flinty, and will require a great deal of work to drive in. There seems to be a contact here or perhaps a fault, but it is not opened up enough to be certain.

The men have the mine in very good condition as far as

the work has been done. They have a steel car and all the necessary tools for mining. A small blacksmith shop is situated at the entrance, and all the steel used is sharpened here. Mr. G.M. Hook is looking after the mine, and stock is being sold at present, so as to keep running until the Perry vein is reached.

Mr. Geo. Schneider, a mining engineer examined this property, along with a great many other properties in this district. He is said to have reported this mine to be one of the two prospects in this region that showed any promise at all, and from all appearances it looks very promising indeed.

OTHER PROSPECTS AROUND JASPER.

There are a great many more prospects around Jasper, but most of them are all small tunnels, 20 to 50 feet in length, and so caved in that no examination could be made of them. Nearly all the ground on Cornwall, across from Jasper is patented and there is also some patented land on the same side of the river as Jasper^{sp}, although not as much.

WATROUS CLAIMS.

About 3 miles below Stunner and across the Alamosa, we come to the Watrous Claims. There are several tunnels and one shaft on this property. Mr Watrous is owner of the entire group of workings.

EMMA TUNNEL AND SHAFT.

The Emma tunnel was the original or discovery point on these claims. It was commenced in 1881. The tunnel was driven for 375 feet, and had a cross cut drift at 60 feet from the breast. This cross cut drift was about 50 feet in length. The tunnel is connected with a shaft, which is 350 feet vertically above the tunnel level. The shaft was started in 1895. Some gray copper and some tellurides make up the principal ore. A little ore has

has been shipped from here, but not enough to pay for the production. No work is being done on either property at present, and examination could not be ~~per~~^{er}formed, as the shaft and tunnel were too badly caved to enter.

MOLLY TUNNEL.

Another one of Mr. Watrous' prospects is the Molly tunnel at an elevation of 9500 feet. It has been driven about 200 feet, but was caved in at 100 feet from the portal. This tunnel was driven in hopes of cutting veins above but nothing valuable has ever been taken out.

APEX TUNNEL.

The latest of his projects is the Apex tunnel. It has about 150 feet of workings, and was driven to cut a large quartz vein, which can be seen cutting across Acme gulch, which contains both the tunnel and the vein. Some very pretty Stibnite crystals were to be found in this tunnel.

SUMMARY.

At present Mr. Watrous is building a road up this Acme gulch to the Apex tunnel. In this way he is doing the assessment work on 3 claims. He has an erasta for grinding ore, and uses the water from Acme gulch for the power to run this machine. He expects to treat a little ore with cyanide after grinding with the erasta.

OTHER PROSPECTS.

Although a great many prospects were found all over this district, none but these mentioned are more than mere scratches, most of them having just enough work on, to file on. Up Wightman's Fork, there was one property that looked as though it might have amounted to something at one time. It was locked however, so that nothing could be told about it. This entire region has

had practically no mining work on it for nearly 30 years, or at the time that Summitville was at it's zenith. Recently, because of the strike and rush into Platora and vicinity, the ground is again being carefully prospected and several rich mines may result. A great many notices are to be seen all thru the region, and many more will surely follow.

CHAP. V.

ASSAYING.

The following were taken from some typical assays made at Jasper, and no care was taken in choosing the samples. Mr. C.W. Foster of Monte Vista was the assayer. Most of the assays made were from ore, which was taken from the Miser mine at Jasper:-

Number.		Ounces of gold.
1.	High grade 1/4 assat ton	3.68
2	Ore in 6 sacks 1/4 assay ton.	.68
3	White quartz before concentration.	.24
4	Rpugh gray quartz 1/2 assay ton.	.08
5	1 st grade quartz in 1/2" streak mineral in with quartz.	1.92
6	Hanging wall 1/4 assay ton.	trace.
7	18" streak, white curley quartz.	.30
8	2d grade, curley rock quartz.	6.20
9	Rejects.	.09
10	Concentrates, white quartz.	.60
11	" " curley quartz.	8.50
12	Rock from vein or streak.	1.84

CHAP. VI.

CONCLUSION.

This is practically a new country, and has hardly been scratched. However old methods have taken out all of the richest ore, so that now the ore to be found, will be of low values, and therefore the modern methods of extraction will have to be used. Until a railroad comes into this country, there is little chance of extensive development. Several miles have been erected, but so

far all of them have been failures. As one prospector puts it:-
"It is a rich man's country, and a great deal of money will have to be spent in order to get all the values. We were told that the Denver & Rio Grande Railroad were contemplating building into Jasper, but from all probability it is not likely, that is in the near future.

There is an abundance of water power. At one place on Wightman's Fork, near where it empties into the Alamosa, there is a natural falls of about 75 feet in height. This could be very easily turned into power without the expenditure of very much money.

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