AN APPRAISAL

CONTACT GROUP GOLD PROSPECT

Cambridge Mining District
Lyon County, Nevada

David LeCount Evans Sept. 28, 1966

October 7, 1966

Mr. E. M. Howard, Manager,
Nevada Engineering Consultants Division,
The Ken R. White Company,
888 East Williams,
Carson City, Nevada.

Dear Mr. Howard:

Please find attached the original and four copies of our appraisal of the Contact Group gold prospect, Cambridge mining district, Lyon County, Nevada.

Because of delays in the program, outlined in my recent letter, it has been possible to complete this report immediately following Dr. Schrumm's analyses of samples 3733 and 3734. Regretted is any consternation my position of September 29th may have caused.

Our purpose throughout this study, starting in mid-August, has been to keep you apprised of plans and progress; and I am sure that you have been aware of my interest in having Dr. Schrumm proceed with his testing of the same materials, at finer mesh size, following the Rude methods.

With Dr. Schrumm and Mr. Dietrich you have had the services of two very fine metallurgists.

Aware as I am and have been of the concern felt for this property, our negative conclusions and recommendations are submitted with misgivings.

But, on the basis of our own geological mapping, samples considered thoroughly representative and personally cut, analyses by two metallurgists of excellent repute and, finally, a method of analysis that cannot be duplicated, there is no alternative.

Satisfaction with the reliability of these results is expressed, and it is felt that any further interest will not be to the advantage of the Ken R. White Company.

This opportunity to be of service has been greatly appreciated.

Yours very truly,

David LeCount Evans.

cc: Mr. Arthur Krill,
Ken R. White Company,
Denver, Colorado

I N D E X

TEXT

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ILLUSTRATIONS

AN APPRAISAL

CONTACT GROUP GOLD PROSPECT

Cambridge Mining District
Lyon County, Nevada

FOREWORD

This appraisal has been made at the request of the Ken R. White Company of Denver, Colorado.

The writer agreed and still agrees with Mr. E. M. Howard, manager of Ken R. White Company's Carson City, Nevada, office, that a fair appraisal demands an unbiased approach. With this in mind, planned procedures were outlined for interested parties before the start of field efforts and during the progress of work.

Specifically, these have been:

1- geological field mapping, followed by sampling; and sampling based on the divisions indicated by mapping;

2- pre-analysis sample preparation by the writer;

3- and finally, multiple analyses by a competent testing laboratory and experienced metallurgist, using not only orthodox methods, but also, other techniques, favored by lessor and prospective lessee.

Results have not favored the property. The lower and realistic values from orthodox and long established methods are in line with the very fresh

appearence of rocks mapped in the field.

An explanation for the very high results obtained by Mr. Budd Rude and his method of treatment is not attempted. Following Morse Laboratories' efforts and preceeding Dr. Schrumm's final work, the writer had reached some conclusions; but the introduction of new techniques, adding to the confusion, now makes further speculation impractical.

Expressed, herewith, is complete satisfaction with the earlier results, obtained by Dr. Schrumm, a competent and careful metallurgist (April and May 1966) and later determinations by the Morse Laboratories of Sacramento in September 1966. Both have analyzed Contact Group materials, using standared and methods of assaying and the Rude method. Reference is made to our Appendix V.

This program has been geared to assemble an accurate geological picture, to reveal operating conditions and contingencies, and to faithfully ascertain metallic values, whatever they might be.

PURPOSE OF REPORT

To present a true picture should always be the purpose of any analysis. As reported, recentley, by letter the evaluation of a property has many facets. Throughout this study equal thought has been given to geology, operating conditions, existing agreements, analyses and the metallurgical treatment, such infer.

The purpose of this report has <u>not been</u> to disprove a method; but, with (1) the geology not too appealing, (2) a crual methods of analysis not recovering economic values, and (3) a serious water problem forewarning that an operation would be faced with an initial, large capital investment to get water to the property, any hope for success would be tied to the dependability of the Rude method of treatment.

ILLUSTRATIONS

A set of plan maps and cross sections accompanies this discussion. Reference to this material is urged while studying the text.

CONCLUSIONS:

It is concluded that:

(1) A lack of alteration and discernible mineralization throughout the trend, held to be ore-bearing, makes the property geologically unattractive.

(2) Assaying by the fire and standard cyanide-amalgamation methods indicates that gold and silver will not be recovered, economically, by standard milling procedures.

(3) Samples 3733 and 3734, personally taken over large areas and carefully mixed, are representative. The locations of samples, assayed by Schruum in April and May 1966, remain unknown. Values by orthodox methods for samples 3733 and 3734 appear factual.

(4) The Rude method of treatment cannot be duplicated by excellent metallurgists.

The changes requested in the Rude technique, during the course of this study, indicate that Mr. Rude has not standardized his own procedures

In general, the extremely fine grind to minus 325 mesh, the indicated large quantities of cyanide and peroxide demanded by that approach, the amount of heat required in Rude's original proposal, all question the economic possibilities of the Rude process.

(5) The property is without an assured water supply. East Walker River water rights (as indicated in Carson City) are not held by the owner, as claimed, since such are not included in Federal Decree C125 of April 4, 1936.

(6) The 1966 agreement between owner and the Ken R. White Company favors the former. The owner's controlling interest would seriously jeopardize any chance for economic operation.

RECOMMENDATIONS

On the basis of information assembled in this analysis the property cannot be recommended.

SUGGESTED:

The writer is well aware that interested parties will continue to view analytical results with perplexity, and suggests that the Ruie process be repeated by Mr. Ruie, under the supervision of Mr. Dietrich, Dr. Schruum or some other experienced metallurgist.

It is also suggested that for samples 3733 and 3734, material again be run by Dr. Schruum, using orthodox cyanide methods.

Morse Laboratories is being instructed to return the unprocessed portions of samples 3733 and 3734, so that ample material will be at hand, should further testing be contemplated.

PROCEDURES

Field:

Prior to the start of studies, a 2000 scale enlargement was made of the area of concern, using the 1958 USGS Pine Grove Hills quadrangle, a 15 minute sheet. Compiled from air photos in 1956 and 1958, the enlargement provided an accurate base map for geological mapping.

Field mapping was started on August 12 and completed on August 13. Sampling

was begun only after determining petrographic units and establishing a structural working-premise. Seven samples were then cut during the period August 14 to August 15, and were limited to petrographic units or structural position. There was no mixing.

Because of high values, reported by owner and other interested parties across great widths, wherever possible our samples repeated previous efforts.

Preparation:

Sample widths were as little as seven feet, at the fault one west of the Opal Shaft, to as much as five hundred feet, across fresh rhyolite exposures slightly northwest of the shaft.

Samples, sacked, carefully marked and tied, were cached in a compartment of the pick-up truck and later transferred to the trunk of the writer's car, where they still remain.

Samples were first crushed in the laboratory of the Nevada Division of Highways; crushing was repeated in the sample room of the Nevada Division of Mines. Primary crushed product averaged about 3/8 inches. The writer, assisting in all crushing, personally sacked all material.

For analysis, one composite sample was made from the three samples, representing 2000 feet of length and 200 feet of average width of the 'crushed' zone, shown in red on all maps. Each was run through a Jones splitter and exactly five pounds cut from each of 3726, 3731 and 3732, to make up 15 pound sample, 3733, which ultimately was delivered for assay.

Because the writer's sample 3729, across 500 feet of rhyolite, repeated the owner's sample from which $44 in gold and silver had been reported, 3729 was prepared for analysis and not mixed with sample 3727, also representing rhyolite. The 32 pounds of original sample was split to 16 pounds and sent for assay under our number 3734.

All samples were chipped from rock in place at regularly spaced, close intervals.

Analyses:

Reference is made to planned procedure #3, listed above under 'Foreword'. Final analyses, using orthodox and unorthodox methods on the same identical materials, by Morse Laboratories of Sacramento, provided results that could be compared.

Originally requested were (1) standard fire assays, (2) fire assays using tin as a collector, rather than lead, as reviewed by Beamish in Analytical Chemistry, 1961, (3) standard cyanide treatment, (4) cyanide treatment following procedures outlined by Mr. Budd Rude, Carson City chemist, and (5) analyses by amalgamation. The writer intended to ask for 200 mesh preparation, the original work-order shows that 100 mesh was the Morse Lab's understanding, and final checking indicates that the material was 65 mesh at time of treatment.

Mr. Waldemar Dietrich of the Morse Laboratories supervised all testing. Mr. Dietrich, former Professor of Metallurgy at Stanford University, recently retired from the position of Chief of the Division of Mineral Resources, U. S. Bureau of Mines, San Francisco.

Mr. Dietrich, after bringing the material to about 65 mesh with fine grinding, cut 350 grams of the fine product from each sample.

With material received from Morse Laboratories, about 100 grams per sample was delivered to Mr. Rude for testing.

The remainder, after grinding to a true 200 mesh at the Nevada Bureau of Mines, was given Dr. Franklin Schrumm, Reno metallurgical consultant, for additional checking on the Rude procedures.

Dr. Schrumm then proceeded, testing the Rude process on the basis of the typewritten outline, taken from Ken M. White Carson City files, and originally delivered to the Morse Laboratories for their instruction. This procedure followed the same steps used in his Rude method analysis of April and May 1966.

Results after completion were declared unacceptable and changes in procedure were requested by Mr. Rude and Mr. Howard, including a further reduction in particle size from 200 down to 325 mesh, treatment under low temperatures rather than the original 85°C, agitation for 48 hours but over a 5 day period, sample of ½ assay ton instead of 2½ assay tons, and other adjustments. Final testing was completed on October 5.

LOCATION

With reference to our Plat A, the property lies in section 25, Township 10 North, Range 26 East, Lyon County, Nevada. Claims fall in the Cambridge Mining District, about 17 miles south of Yerrington.

GENERAL AND LIMITING CONDITIONS

Access:

The property is reached via 18 miles of all-weather road; from Yerrington, Nevada highway #3, proceeding 8 miles south, is paved road, and highway 3-A, the remainder, is typical, gravelled desert road of even grade.

Nearest railroad is at Wabuska, 34 miles north of the property.

Power:

There is no electric power at the property. Power, servicing nearbye ranches on the East Fork of the Walker River, is probably inadequate for any future operation.

Timber:

No timber exists at the property or in the area.

Water Supply:

The property is without water or the possibility of developing substantial supply in the immediate (granitic) area.

Cambridge Mining Inc., according to Mr. Rink, president, holds water rights on the East Walker River, dating back to circa 1865. This water right, reputedly the first 'ditch' right awarded, consists of "all water from a ditch, 6 feet wide and 4 feet deep, that the ditch will carry", with purposes listed as "domestic, watering stock, power and milling". Distance from river to claims amounts to three miles.

OUR BOARD Checked 1st by ENGINEER Robert Dorey. Finally a week later by Roland Westergaard Chief of Division of Water Resources

On the other hand, an investigation of records at the Nevada Division of Water Resources, for sections 28 and 33, Township 10 North, Range 27 East, fails to confirm the existence of Mr. Rink's rights. Rights are listed for an Ambro Reaschi and a Mr. Silas. What remains has been applied for but remains unconfirmed.

A suit in Federal Court, the United States versus Walker River Irrigation District in 1936, produced Federal Decree C125, dated April 4, 1936. The decree listed those with approved water rights; those not on the list do not have rights. Neither Cambridge Mining, Blaisdell or heirs, or a Mr. F. E. Gignoux are mentioned. Gignoux's name is included because the plat for Section 28 shows an old proof of appropriation, dated 1862, claiming water for agriculture and milling.

Labor Supply:

Nevada, a mining state and, especially, the Yerrington area, offers skilled mining and milling labor.

Mill Sites:

Mill sites are plentiful, but the ideal location on the East Walker River appears out of the question. A long established ranching and farming economy in the river valley would contest the disposal of vast tonnages of

mill tailings in the vicinity. Certainly, the disposal of cyanide and other chemically-charged wastes into the Walker River would incite battles with local ranchers, down stream users of water and the State of Nevada.

Sites would, therefore, be limited to the slopes, adjacent to the Contact Group, with water (if rights could be acquired) pumped three miles and to 600 feet of higher elevation to the mill site; and with tailings impounded in basins, to prevent polution of the area's meagre ground water supply.

Climate:

The arid, dry climate of the high Nevada desert characterizes the region. Year round operation would be assured with only the inconvenience of one or two light winter snows, and occasional summer flash-floods.

LEGAL TITLE

With reference to Plat C, the Contact Group, consisting of ten standard mining claims (1500' by 600') is held by location and the performance of annual assessment work. Two claims, also located but not recorded, shown by dashed line, would be added to the block, bringing the total to twelve. Dates of location are circa 1961. Contact Group claims consist of:

Contact NW, Contact, Contact West, Contact West #1, Contact West #2, Contact South, Contact SW, Contact SW #1, Contact South #1 West, and Contact South.

Locator and owner is Mr. E. L. Rink, 302 E. Proctor Street, Carson City, Nevada. Mr. Rink is also president of Cambridge Mining, and owner of the Contact North block of 10 claims and the Pay Day Group of 10 claims, contiguous to (with slight gap) the Contact Group and following the contact between volcanics and granite. All three groups are shown on Plat C.

By agreement, dated March 8, 1966, Mr. Rink has retained 55% interest in the Contact Group; and the Ken R. White Company of Denver, by assuming the responsibilities of research, development and final financing of

an operation, would receive the remaining 45%.

HISTORY OF PROPERTY AND DISTRICT

As reported by Mr. Rink, a Mr. Blaisdell (an early Nevada Governor) located and operated the Cambridge mine in the 1850's; the Cambridge deposit was, apparently, on a narrow quartz vein in granite. Blaisdell sank the Cambridge shaft about 250 feet on structure, drifted about 250 feet along the vein, and stoped approximately 50% of this length to near surface. Ores were milled in a stamp mill, operated by water power, between the two ranches on the river, shown on Plat A. Blaisdell sold his interest in the mid 1860's. Assuming five feet of average width, dimensions indicate a production of about 10,000 tons; grade is unknown.

After a series of changes in ownership, finally, in 1940, an investment group, consisting of Visalia, California associates, purchased the property and formed Cambridge Mining Inc. The corporation constructed a mill at the diversion site on the Walker River to protect 1865 water rights. (Note: that this does not mesh with the indications of no water rights based on Decree C125). Mr. Rink told the writer that he was in charge of the mill when the WPB order of 1942 put an end to gold mining.

As reported, Mr. Rink in 1946, with the help of a Mr. Zedra (?) of the Nevada office of the U.S. Bureau of Mines, established excellent and unexpectedly high gold values in the Cambridge mine area. Nevertheless, and for some reason, the Visalia associates, turned all of the rights and property of the corporation over to Mr. Rink. The shaft by that time had reached 400 feet and reported width of vein was 5 to 7 feet.

Mr. Rink, continuing his prospecting of the area (perhaps for the 'opal' which characterizes the granite contact area on the west) was attracted to the contact area which shows some discoloration in the rocks adjoining the granite.

It is the writer's understanding that standard methods of analysis failed to indicate gold, silver or platinum values. Rink, However, by efforts in his own laboratory, was sufficiently encouraged to question the results from standard and orthodox methods. Working, finally, with the Nevada Analytical Service of Carson City, cyaniding at very extreme temperatures, with solution stirred for 48 hours (and aided and abetted by a constant addition of hydrogen peroxide) repeatedly, recovered high values. The first such return in Ken R. White files is dated October 12, 1961.

Rink samples for the period October 11, 1961 to March 30, 1962 (5 samples) and assayed by Nevada Analytical Service averaged $86.50 in gold and silver.

Howard samples for the period February 16, 1966 to June 17, 1966, assayed by Nevada Analytical Service, assayed $50.28 per ton for recovered gold.

Similar material, analyzed by Dr. Franklin Schrums, Consulting Reno metallurgist, on material submitted by Mr. Howard, averaged $2.62 using the Rude method and $13.12, using standard cyanide proceedure*, collecting the precious metal with lead, fire assaying the tails, and parting the button with nitric acid.

* Schrums did use Rude's excessively high temperatures during the 48 hour exposure period to CN.

A set of six samples, submitted by Mr. Howard to the Polaris Laboratories of Phoenix, Arizona, using a "special wet method for precious metals", obtained results, varying from 'trace' to $51.83 for gold and silver, with an average of $10.89.

Recovered from material submitted to him, Denver consultant, John B. O'Malley, using amalgamation, on July 11, averaged $20.47 per ton.

In short averages, prior to this analysis have varied from $86.50 to $2.62 per ton.

GEOLOGY:

Introduction:

With reference to Plat C, note that all claim groups follow the contact between granite (an intrusive rock) and rhyolite (a volcanic rock). The blue line between members denotes a line of faulting. The granite is not considered intrusive into the volcanics. Any mineralization would be controlled by the fault zone, a line of weakness and the most reasonable line for needed porosity and permeability.

Petrology:

The following members exist and have provided units, recognizable throughout the area, readily mappable and the bases for interpretation.

Igneous:

Intrusive Granite:

The area is dominated by a light gray, intrusive granite. The member is shown in brown on attached plans and sections, is persistent for the four miles of trend of this study and for several miles beyond. Average indicated width is about 1½ miles.

The granite mass is fresh, without silicification or other alteration, and weathers rapidly to granitic sand.

The unit dips gently, about 9° to the west, along a fault contact. Dip to the east, based on surface slope, appears to be about 12°.

Freshness of adjoining rocks and lack of any dike-like material in the volcanics, or conversely, the absence of any partially absorbed volcanic masses in the granite, eliminates the reasoning that granite has been intruded into the volcanics.

Volcanics:

Proceed to page 12

Rhyolite extrusives:

Shown in purple on all maps is this volcanic rock, gray in color, and characterized by lighter gray lines of flow. The rhyolite is fresh, with absolutely no loss of primary minerals, no additions, or other indications of alteration and change.

Hornblende Andesite:

Hornblende andesite, occuring in abundance just west of the dominant rhyolite area, appears to be a prominent member of the volcanic series. Characterized by prominent rod-like crystals of black hornblende the rock is, otherwise, light gray from its finely crystalline feldspar ground mass. Because of the coarser hornblende, the rock is porphyritic, but, in view of its association with rhyolite, it is considered extrusive. Except on Plat D, sampled by #3728, the unit is not shown.

Hornblende crystals are fresh, with brilliant faces, sharply outlined and without disintegration. Alteration, completely absent, has effected neither phenocrysts nor groundmass.

Derived from Igneous:

Originally of igneous origin, this mass, shown in red, has been mapped as a persistent unit, noted on maps as a "breccia zone" and occasionally referred to as "crushed zone". The unit is locally discolored to a reddish brown, carries angular boulders and slabs of rhyolite, and the finer groundmass appears characterized by softer fine, fragmented quarts and feldspar, and rather abundant fresh mica.

On the basis of two days of mapping, but well aware that there exist choices of interpretation, this report, nevertheless, considers the zone a product of moving and crushing. Reasoning is based on (1) the fragmented or brecciated appearence of the unit;

(2) the existence of exceptionally large rhyolite blocks at the very top, and (3) the discordance of attitude of flow lines in an apparently "pushed" rhyolite mass. The position of the "crushed unit" between rhyolite on top and granite beneath is considered significant.

Were values to be concentrated in a zone, this zone, geologically, with its extremes in fragment size and earthy ground mass would be the most suitable "host" for later mineralization.

Other Rock types:

No sedimentary or metamorhpic rocks exist in the area.

Structure:

Except for the narrow, oval area of granite, with short axis of 1½ miles and long axis of about 8 miles (suggesting a dome of granite along a regional line of weakness), the region of concern is cut by only one outstanding structure.

Shown on Plan Maps B, C, and D, and the sections of Plat E, by a blue line between granite and volcanics, the movement has been interpreted as 'reverse' and the fault an overthrust.

In discussing the brecciated or 'crushed' zone, above, the words "discordant" and "pushed" were employed. Now with reference to Sections A-A' through G-G', noted is the purple of the rhyolite, beyond, to the east and up dip from the red of the crushed zone. This portion of the rhyolite is characterized by flow lines in the rhyolite, dipping and trending in mixed directions; dips in the rhyolite flows, atop the red zone and on the west, even, approach the vertical.

Were (1) the flow lines of the rhyolite uniformly flat or slightly inclined and (2) the red unit evenly bedded and without transported blocks of the overlying rhyolite, these sections would suggest a perfectly normal sequence of volcanic flows and breccias, covering granite. But the attitude of rhyolite flow lines, the physical characteristics of the crushed unit

and the erratic distribution of blocks and flow lines at the fore of the unit, justify the overthrust premise.

With reference to section H-H', it is believed that erosion has wiped out the 'fore' portion of rhyolite, up dip on the projection of the fault.

And, finally, the sharp bend in the blue line, shown on all maps at the northeast corner of the Contact Block (see Plat C), is not considered the work of crossfaulting; such would be the normal surface fault trace of a flat, 9° dipping fault, crossing the lower elevations of the sharp canyon between peaks.

Alteration and Mineralization:

Neither the granite mass nor the overthrust volcanics show any alteration. Observed mineralization in the granite mass is limited to (1) narrow, white, opaque quartz ("Ball"quartz) veins which have been the locus of considerable prospecting and, by report, some gold production in the Cambridge shaft, and (2) narrow veins of thinly-banded, dark to black quartz or "opal" as referred to in the district. These veins favor the contact area, in the granite, and parallel the fault.

Observed mineralization in the red or crushed zone is limited to weak iron oxide (limonite and hematite) and scattered black surface coatings, probably a veneer of manganese oxide. In the zone to the north, 600 feet north of section H-H', some disseminated galena (lead sulphide) was found in the breccia mass.

Significance:

The lack of alteration and indicated weakness of mineralization is more in line with the low values of Morse, perhaps reasonable values of Schramm, and very much out of step with the excessively high returns from Rude.

The nine degree dip of the overthrust would seriously limit the depth

expectancy of rhyolite and crushed zone to about 100 feet. The effect of this on reserve calculations is obvious.

DEVELOPMENT

Except for an occasional bull-dozed trench, at discovery monuments, and the 30 foot Opal Shaft, (about 100 feet east of the overthrust fault, following opaline material in granite) the property is without development.

EXLORATION

The property has benefitted from no serious exploration.

ORE RESERVES

"Ore" denotes mineralization which can be mined, milled and marketed at a profit. The lower values of this examination are considered factual; values have been made possible, through the use of an assay method, the use of lead acetate to collect the precious metal that does exist; there seems to be general agreement that a simple cyanide process will not be economic; the same can be said for an amalgamation process.

The Rude process with its demand for great amounts of potassium cyanide, and peroxide, and the great losses of both under such extreme temperatures, would not be economic, even though possibilities, listed below, be proved in error, and the method indicated to be sound.

In short, no profit can be seen on the basis of known treatment methods, and the property must be considered to be without ore reserves.

SAMPLES

By Description:

Seven samples were cut during the course of examination. Location per sample depended on the results of preliminary geological mapping. Samples did not overlap from zone to zone, being relegated to the "crushed" zone and "rhyolite" zone, with two other samples taken from neither in locations from which the writer had been informed good values had been recovered.

For the five critical samples cut in "crushed" and "rhyolite" zones, because of width of samples which varied from 75 to 500 feet, samples were chipped from solid outcrops and not channeled.

Using these samples as a base, the three samples from the crushed zone were quartered down to five pounds from each, employing a Jones splitter. These five pound units from numbers 3726, 3731 and 3732 make up the composite sample # 3733, the first of the two samples thoroughly tested.

The same procedure was not followed for the two rhyolite samples, numbers 3727 and 3729, due to the fact that #3729 repeated a sample taken by Mr. Rink (reported under October 12, 1961, see Appendix U, at the back of this report) for which a value of $44.33 per ton was reported by Mr. Rude, using his method of analysis. The merit of directly checking Mr. Rink's sample exceeded the wisdom of combining the two rhyolite samples in one composite.

Our sample #3734 represents 13 pounds, split from the original sample, #3729.

Samples taken during this examination are listed on page 18.

With reference to this table, the single asterisk (*) indicates material crushed to 3/8" size and in storage for future use, if required.

The double asterisk (**) denotes those samples analyzed by Mr. Waldemar Dietrich of Norse Laboratories of Sacramento, and further checked by Mr. Budd Rude and Dr. Schruma.

DAVID LE COUNT EVANS, CONSULTING GEOLOGIST

SAMPLE LIST

Contact Group

Examination of
August 12--15,1966

Sample #	Width	Weight	Oz.Au	Oz.Ag	Oz.Pt	Remarks
3726	225 '	43 lbs	*	*	*	Across crushed zone South limit of block.
3727	450 '	50 lbs	*	*	*	Continuing West from 3727, across fresh rhyolite exposures.
3728	100 '	5 lbs	*	*	*	Hornebland andesite bordering rhyolite of 3727; cut by Mr. Rink.
3729	500 '	32 lbs	*	*	*	Across rhyolite between 3726 and plane of overthrust fault.
3730	7 '	5 lbs	*	*	*	Across face of pit, 50' west of Opal Sh., crushed granitic material in fault.
3731	300 '	28 lbs	*	*	*	Across crushed zone, 1000 feet south of sample #3726.
3732	75 '	15 lbs	*	*	*	Across crushed zone, 2000' south of #3726.
3733	Mixed	15 lbs	**	**	**	Composite of samples, 3726, 3731, & 3732.
3734	500 '	13 lbs	**	**	**	Split from Sample 3729

SAMPLES

By Analysis:

Samples #3733 and #3734 received the benefit of complete analysis. Both were considered truly representative, and the added costs of analsing samples 3727, 3728 and 3730 were deemed unwarranted.

As outlined above under "Procedures", multiple testing was requested, using both orthodox and suggested new methods. Morse Laboratories of Sacramento performed all work, under the supervision of Mr. Waldemar Dietrich, metallurgist. Mr. Dietrich's reputation and qualifications were outlined for the Ken R. White Company in our letter of August 18.

Concern has been expressed over the fact that Mr. Dietrich failed to take the material down to the minus 200 mesh, considered necessary.

200 mesh had been discussed when delivering the samples, but when accepting the written 'work-order', the writer failed to note that '100 mesh' had been transcribed. It is also unfortunate that the 100 mesh finally turned out to be 65 mesh, as measured in the laboratory of the Nevada Bureau of Mines.

It is axiomatic that the finer the grind, the greater the working surface assured. It is agreed that with finer grind Morse's averages would have been higher; but it cannot be agreed that the fineness of grind could spell the difference between the $0.35 per ton by Morse, using Rude treatment and the $91 per ton by Rude using Rude treatment, both on sample # 3733.

A summary of results, for samples 3733 and 3734, listing Morse Laboratories' results, and wherever possible Schrumm and Rude returns on identical samples is tabulated on page 20.

ASSAY RESULTS

3733 Method	Morse Laboratories Gold Oz/T	Gold $/T	Silver Oz/T	Silver $/T	Plat Oz/T	Burid Rule Gold Oz/T	Burid Rule Gold $/T	Dr. Franklin Schruma Gold Oz/T	Gold $/T	Silver Oz/T	Silver $/T	Plat Oz/T	
I	0.0025	0.09	0.47	0.61	Nil								
II	0.0175	0.61	----	----	----								
III	0.02	0.70	0.79*	1.02	Nil								
IV	0.0145	0.51	0.31	0.40	N.D.								
V	0.010	0.35	----	----	----	2.60	91.00	0.02	0.70	1.00	1.29	-----	First analysis
								Nil	0.00	Nil	0.00		Second analysis

* Fire assay tails

3734													
I	0.010	0.35	0.25	0.32	Nil								
II	0.0189	0.66	----	----	----								
III	0.02	0.70	0.59	0.76	Nil								
IV	0.0145	0.51	0.44	0.57									
V	0.010	0.35				0.41	14.35	0.02	0.70	1.00	1.29		First Analysis
								Nil	0.00	Nil	0.00		Second "

Note: See page 21 for methods I through V

To summarize from the detail of page 20:

3733 Method	Morse Laboratories Au $/T	Ag $/T	Tot. $/T	Rude Tot. $/T	Franklin Schrumm Au $/T	Ag $/T	Tot. $/T
I	0.09	0.61	0.70				
II	0.61	——	0.61				
III	0.70	1.02	1.72				
IV	0.51	0.40	0.91				
V	0.35	——	0.35	91.00	0.35	0.65	1.00*
3734							
I	0.35	0.32	0.67				
II	0.66		0.66				
III	0.70	0.76	1.46				
IV	0.51	0.57	1.08				
V	0.35	——	0.35	14.35	0.35	0.65	1.00*

* Average of two analyses

Returning to page 20 and Roman Numerals under "Methods":

I represents the standard fire-assay method.

II represents the Faye-Inman fire-assay method, using tin as a collector as outlined in Analytical Chemistry by Beamish, July 1961 and Faye-Inman, December 1961.

III represents the stndard amalgamation process.

IV represents cyanidation and amalgamation by standard proceedures.

V represents cyanidation by the Budd Rude method, also referred to as the "Nevada Analytical Service method.

TREATMENT/ANALYTICAL METHODS

Samples 3733 and 3734 have been evaluated by fire, cyanide and amalgamation methods; such have covered the gamut of normal treatment, as well as adjustments to the standard approaches. Methods employed in this study are listed as follows:

A. Fire Assay

I. Standard Fire Assay

II. Faye-Isman (Beamish) variation

B. Amalgamation

III Standard Amalgamation

C. Cyanidation

IV Standard cyanidation followed by amalgamation

V Budd Rude Method (original)

VI Budd Rude Method (adjusted).

With reference to page 23, cyanide and adjusted cyanide methods are compared. The sheet includes only Rude Method 'V'. Denver Equipment's procedures, considered a very true standard, are presented for purposes of comparison.

Methods I through VI are outlined as follows:

I. Standard Fire Assay:

As the name implies, representative ore is subjected to fire treatment in a furnace where temperatures can be accurately controlled. The ore is mixed with such fluxes as will "effect complete decomposition and solution at a reasonable temperature, thus liberating the gold and silver".

The gold and silver are collected in a lead button. The lead button is developed from the reduction of litharge (PbO), a part of the original mix or charge. Part of the litharge is used for continuing fluxing purposes, and only a part is reduced; flour is often the reducing agent. For common 'acid' to neutral ores, sodium carbonate, borax glass and the excess of litharge are the fluxing agents which absorb all im-

LABORATORY TESTING METHODS COMPARED

PREPARATION	Denver Equipment Co.	Morse Lab., Dietrich	Dr. Franklin Schrumm	Rapid Rude
Grinding:	Variable: 50 to 200 mesh	65 to 100 mesh; 65 used	200 mesh	200 mesh
Sample:	Material in alkaline solution with 0.5% NaCN and aerated.	0.5 pound sample + 5 lbs saturated CaO solution + 0.015 lbs. NaCN; aerated.	Used Rude initial steps as instructed	2.5 assay tons ore; added 500 Ml H_2O + 10 grams KCN with 5 grams KOH.
Agitation:	For 72 hours, sampling solute at 24, 48 and 72 hrs; temperature 72°(F)	12 hours at 72° (F); longer period if ores are refractory.	48 hours at 65° (C) or 185° (F); following Rude, added 162 Ml H_2O_2 during agitation: Agitation followed by	Stirred 48 hours @ 85°(C) or 185° (F) (not boiling), adding 2 Ml H_2O_2 every 15" until reaction ceases. (in place of aeration)
FILTER			Filtering, and 5 minutes of boiling to strip preg. solution of peroxide.	Filter
PREGNANT SOLUTION				
Treatment:	To near boiling, and then proceed with "CHIDDY" Method: Using 10 assay tons (292 Ml) of solution, add 10 tp 20 Ml. 10% lead acetate solution (containing 40 Ml acetic acid per liter) and 5.0 gms. Zn dust; heated 20 to 20 minutes but not boiled. Add 20 Ml conc. HCL, heat 1 hour until Zn dissolved; decant off solution.	With 10 assay tons of solution, bring almost to boil; add 15 to 20 Ml saturated solution lead acetate, and 5 Ml acetic acid; also 1.5 m^2 sheet aluminum, and 10 tp 15 Ml of HCL; leave on plate until solution is clear and all lead sponge collected on Al. Decant solution; remove lead sponge from Al sheet.	With 1000 Ml solution (representing 2 A.T.), add 20 Ml of 10% lead acetate, 1 gm. of Zn dust; heat to boiling and add 90 Ml to dissolve Zn. Precipitate recovered by filter.	Add 5 grams of 20 mesh Zn and 1/1 Nitric acid. Precipitate recovered by filter.
Precipitate	Pb button cupelled and and parted to determine Au and Ag.	Add Ag to insure parting; cupel and part with HNO_3; weight of gold, and Ag is loss of weight after HNO_3. Add to Au above, gold recovered in tails.	Paper and solid reduced in crucible with flux to get button; button cupelled by standard procedures.	Ignite paper and weigh residue which is GOLD

ANALYTICAL COMPARISONS CYANIDE TREATMENT

purities. For basic ores, such are increased and a certain amount of pure silica is added.

The lead button, carrying gold and silver, is then cupelled, the lead being slowly absorbed in the bone-ash of the cupel. The remaining amalgam of gold-silver is then 'parted' with nitric acid, the silver being removed and the gold left behind.

The method is standard, not perfect, but of such accuracy that it is reliable. Furman's "Manual of Practical Assaying" states:

> "There is necessarily a loss of both gold and silver in fusion, scorification and cupellation. The most serious loss takes place in cupellation, the precious metals being carried into the cupel and off in fumes".

The losses are small, however, ie: less than 1% for gold and about 2% for silver, on the basis of carefully run tests.

These percentages, or even ten times the percentages, cannot be made to account for the extremes in indicated precious metal content, which invariably exist when fire assaying is held to blame.

II. Faye-Isman (Flemish) Fire Assay:

The process is described in Analytical Chemistry (July and December, 1961); a copy is affixed to the original of this report.

As reported by Morse Laboratories, the procedure uses tin as a collector, instead of lead, and is followed by a spectro-photometric determination for gold. It was developed by the Canadian Department of Mines and Technical Surveys in connection with a search for an improved method of determining gold, silver and the platinum metals in copper mattes and other materials high in copper and nickel, characteristic of the Sudbury district.

Morse found the results comparable with standard fire assaying.

III. Amalgamation :

From the attached Morse Laboratories' report we repeat:

(1) a weighed portion of the sample was mechanically rolled for two hours in water to which a few milliliters of nitric acid and a few grams of mercury had been added.

(2) the amalgam was recovered by panning, transferred to a porcelain crucible, and the mercury dissolved in nitric acid.

(3) the residue in the crucible was washed, dried, annealed and weighed as gold.

(4) the tailings after removal of the amalgam were dried and assayed for gold by the standard fire assay.

The same proceedure was used for the amalgamation of tailings from the standard cyanidation test.

IV Standard Cyanidation Morse Laboratories

Morse proceedures are reported verbatim as follows:

(1) Prepare a saturated solution of Calcium oxide (CaO). add 0.3% by weight of sodium cyanide (NaCN), and aerate to saturate the solution with oxygen.

(2) To a 0.5 pound (or other suitable weighed quantity) of ore ground to about 100 mesh, add 10 times its weight of the NaCN solution.

(3) Agitate for 12 hours. (A longer period may be used for refractory ores).

(4) Filter.

(a) save filtrate without dilution for solution assay.

(b) Wash residue with cold water until free of NaCN

(5) Residue:

Make an amalgamation test on the residue from 4(b) in accordance with the proceedure described under 'amalgamation', to recover any free gold not removed by cyanidation.

(6) Solution:

(a) Heat ten assay tons (291.6 ml.) under a hood almost to boiling.

(b) Add 15-20 ml. of a saturated solution of lead acetate, 5 ml. of acetic acid, a 1.5 inch square of sheet aluminum, and 10-15 ml of hydrochloric acid.

(c) Leave on hot plate without boiling until solution is clear and all of the lead sponge is collected on the aluminum sheet.

(d) Decant the solution and separate the lead sponge from the aluminum sheet, press excess moisture from the lead sponge and wrap it in a piece of lead foil together with enough silver to insure parting.

(e) Cupel, part, and weigh gold as in standard fire assay for gold.

IV Standard Cyanidation Dr. Franklin Schruma

Following instructions, in April 1966, Dr. Schruma carried the process through the agitation phase, using the Rude approach, and then proceeded, to completion, with his standard treatment. He reported as follows:

(1) material milled to 100 mesh.

(2) method consisted of:

2000 ml H_2O stirred with glass stirrer.
plus 40 grams KCN
plus 20 grams KOH
plus 4 A.T. (116.8 grams) of minus 100 mesh ore.

(3) Stirring continued while heating to 85° C. 162 ml of H_2O_2 was added in 8 ml increments at 15 minute intervals with hot water added periodically to make up evaporation loss. When the peroxide addition was complete, the heat was shut off and stirring continued for 48 hours.

(4) The pulp was filtered through a Whatman #42 paper, and to get a 'bright' filtrate it was passed through the cake a second time, and cake was then washed with 200 ml of a 1% KCN solution. The combined pregnant solution and wash were adjusted to 2000 ml and split to form two 1000 ml portions. (before adjustment the solution had been boiled for 5 minutes).

The one 1000 ml portion was run to completion following Rude specifications. The other was completed on a standard basis as follows:

(5) To the cool solution with stirring was added 20 ml of a 10% solution of lead acetate, followed by 1 gram of zinc dust.

(6) With continued stirring the mix was heated to boiling and 90 ml of 1/1 HCl (under hood) added slowly, to make the solution sufficiently acid to dissolve the zinc. When the zinc was completely dissolved the lead containing the values was separated on the filter and paper and solids reduced in a crucible with flux to produce a button which was cupelled.

(7) following cupellation, the bead was parted with nitric acid to determine silver and gold.

V Rudd Rude Method (original)

Minus 200 mesh material had been requested.

As dictated to Ken R. White Company and from the typewritten copy in company files, the following were Rudd Rude procedures:

> " To ½ assay ton" of ore add 500 milliliters of distilled water and 10 grams of potassium cyanide for 5 grams of potassium hydroxide "
>
> " Stir 48 hours (can be turned off at night) while heating (not boiling, adding 2 milliliters of hydrogen peroxide at 15 minute intervals until reaction ceases."
>
> "Filter-boil-add 5 grams of 20 mesh zinc and stir 4 hours".
>
> "Cool, filter, dissolve the excess zinc with one to one nitric acid. Ignite the filter paper and weigh residue of gold".
>
> * changed to 2½ assay tons, on verbal instructions from Mr. Rude, because of error in transcription during dictation.

VI Rudd Rude Method (adjusted)

With reference to Dr. Schramm's report of October 7, on his test numbers 4077 and 4078 (see Appendix X-2), the following is the procedure, prescribed by Mr. Rude on September 28, 1966.

> One half assay ton of 325 mesh ore added with stirring to a 500 ml distilled water solution of 25 gram potassium cyanide and 12½ gram potassium hydroxide.
>
> Hydrogen peroxide (30%) was added in 2 ml increments at 15 minute intervals to the warm (40° C) mix until reaction ceased. Total peroxide equaled 50 ml. Stirring of warm mix continued for 48 hours.
>
> Solids removed by filtration, cake washed with 100 ml of distilled water. Filtrate plus wash boiled for ten minutes.
>
> 2 gram of 20 mesh granulated zinc added and heat shut off. At four hours cool solution taken to filter and zinc washed well on 11 cm. #42 Whatman filter paper. Filter paper and zinc heated to near boiling in 1/1 nitric acid. Resulting filter pulp and acid solution diluted with 125 ml distilled water

and washed well on a 11cm #42 Whatman paper.

Paper plus pulp ashed in a tared porcelain crucible.

Evaluation:

Denver Equipment, Morse Laboratories and Dr. Schramm are all guilty of using the same standard procedures. The only difference is that Morse uses aluminum to precipitate the precious metal, and the other two use zinc. It is our understanding that aluminum is a safer procedure than zinc, for the reason that when treating the precipitate with hydrochloric acid to eliminate any excess zinc, the liberation of free chlorine might dissolve some of the gold.

No comments can be made regarding the Rude method, except that in competent hands the results cannot be duplicated by others.

Note, with reference to our Appendix W, "Analytical Results by Method", that Rude, using the Rude method, has averaged $68.90 per ton, Dr. Schramm has averaged $1.32 per ton and Morse $0.35 per ton.

COST ESTIMATES

Cost estimates are not to be considered, since they would be meaningless inview of this reports negative conclusions and recommendations.

METAL PRICES

The price of gold has been at $35 per ounces since 1932. There is reasonable anticipation that the price will be increased. When and how and to what levels, however, would be conjecture at this date.

Since early 1963 the domestic price of silver has been maintained at $1.293 per ounce, by the Federal government selling from reserves. The price is an improvement from the $0.9245 per ounce of 1961.

The condition of domestic stockpiles and world-wide demand far in excess of production suggests that by March or April of 1967 the government can no longer control the price. Expected is an increase to $1.38 per ounce, when the price breaks, and finally $2 per ounce or better.

PROFIT OR LOSS

A profitless operation is indicated.

RECAPITULATION

Reference is finally made to our conclusions and recommendations on pages 3 and 4, of this report.

Respectfully submitted,

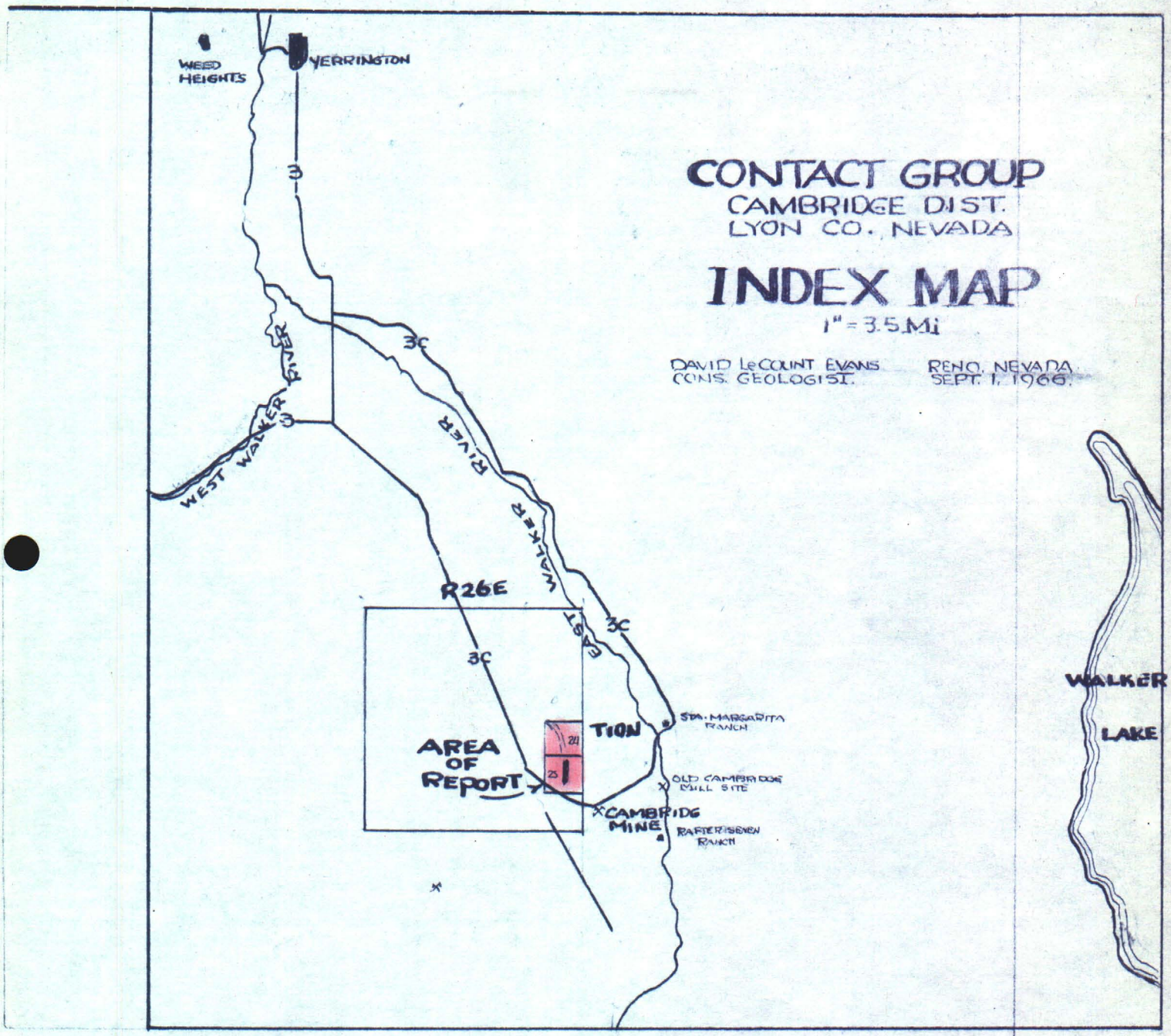
David InCourt Evans

Consulting Geologist

1700 Royal Drive.
Reno, Nevada.

October 7, 1966.

A



CONTACT GROUP
CAMBRIDGE DIST.
LYON CO., NEVADA

INDEX MAP
1" = 3.5 Mi

DAVID LeCOUNT EVANS
CONS. GEOLOGIST.

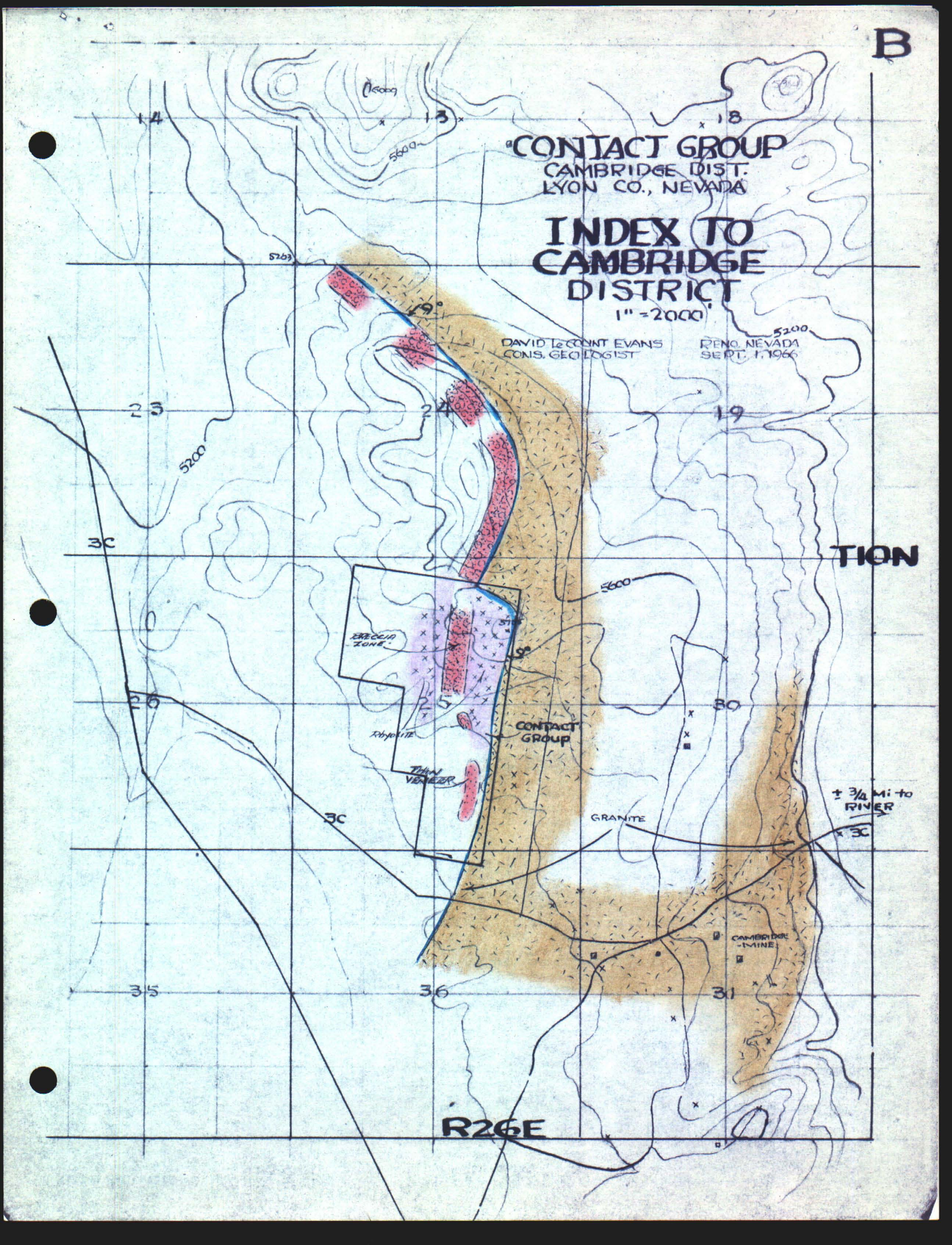
RENO, NEVADA
SEPT. 1, 1966.

B

CONTACT GROUP
CAMBRIDGE DIST.
LYON CO., NEVADA

INDEX TO CAMBRIDGE DISTRICT
1" = 2000'

DAVID LeCOUNT EVANS
CONS. GEOLOGIST
RENO, NEVADA
SEPT. 1, 1966



C

R26E CONTACT GROUP
CAMBRIDGE DIST.
LYON CO., NEVADA

CLAIMS AND MAJOR TREND TO NORTH

1"=1000'

DAVID Le COUNT EVANS
CONS GEOLOGIST

RENO, NEVADA
SEPT. 1, 1966

RINK COVERAGE
PAY DAY GROUP
10

RINK COVERAGE
CONTACT NORTH
GROUP - 10

GRANITE

5600

5360

5440

5520

24

25

H H'

TION

NOT RECORDED

CONTACT WEST #2

CONTACT WEST #1

S 3728

S 3726

S 3727

S 3729

S 3731

S 3730

S 3732

Andesite

Rhyolite "Flows" Erratic Blocks

Conglom or "Breccia" Boulders of Rhyolite in Crushed Granite

TALUS

OPAL SH.

CONTACT GROUP

CONTACT SW #1

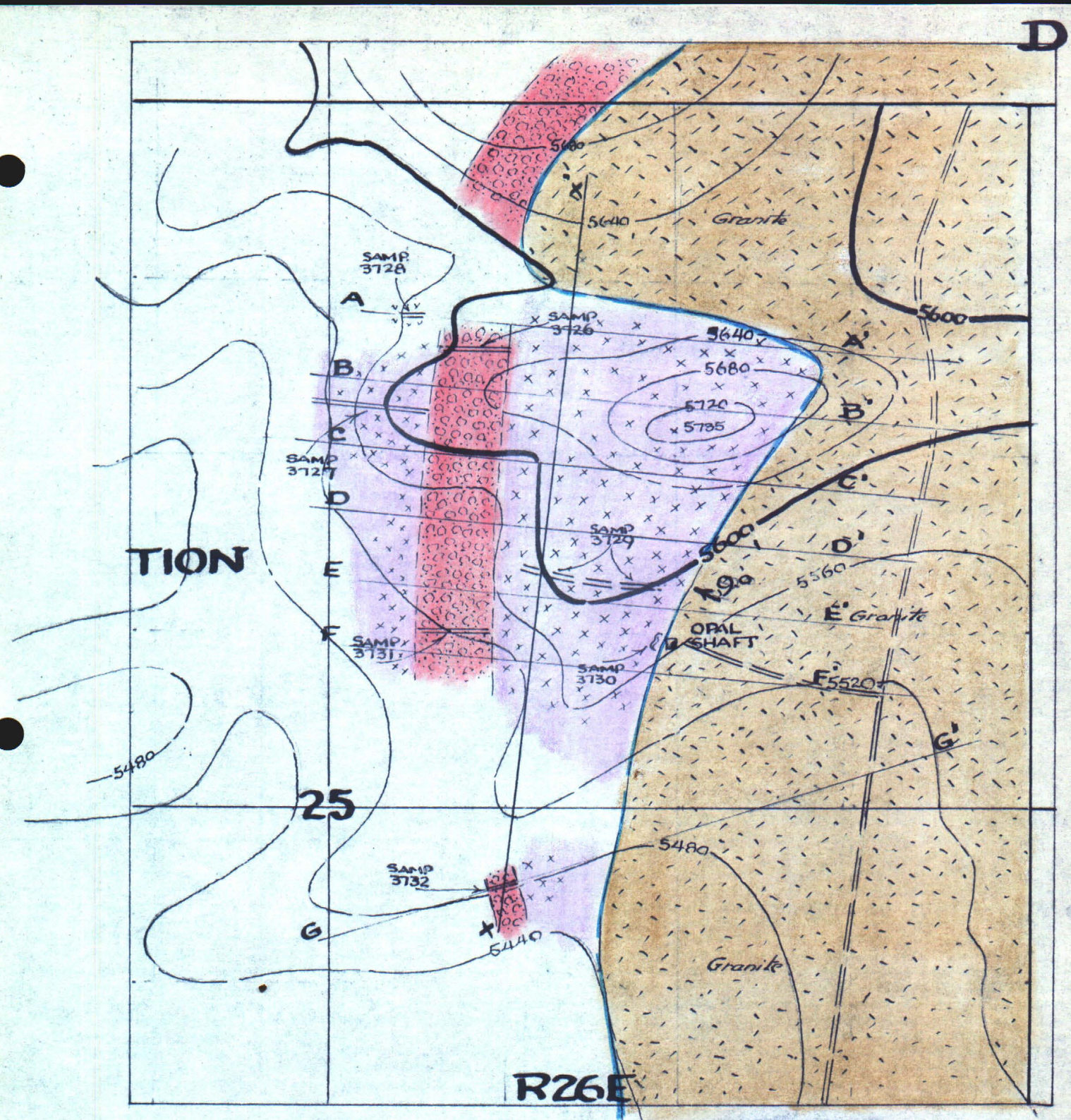
CONTACT SW

CONTACT SOUTH

CONTACT SOUTH #1 WEST

Thin Veneer of Non-Ferruginous

CONTACT SOUTH #1



CONTACT GROUP

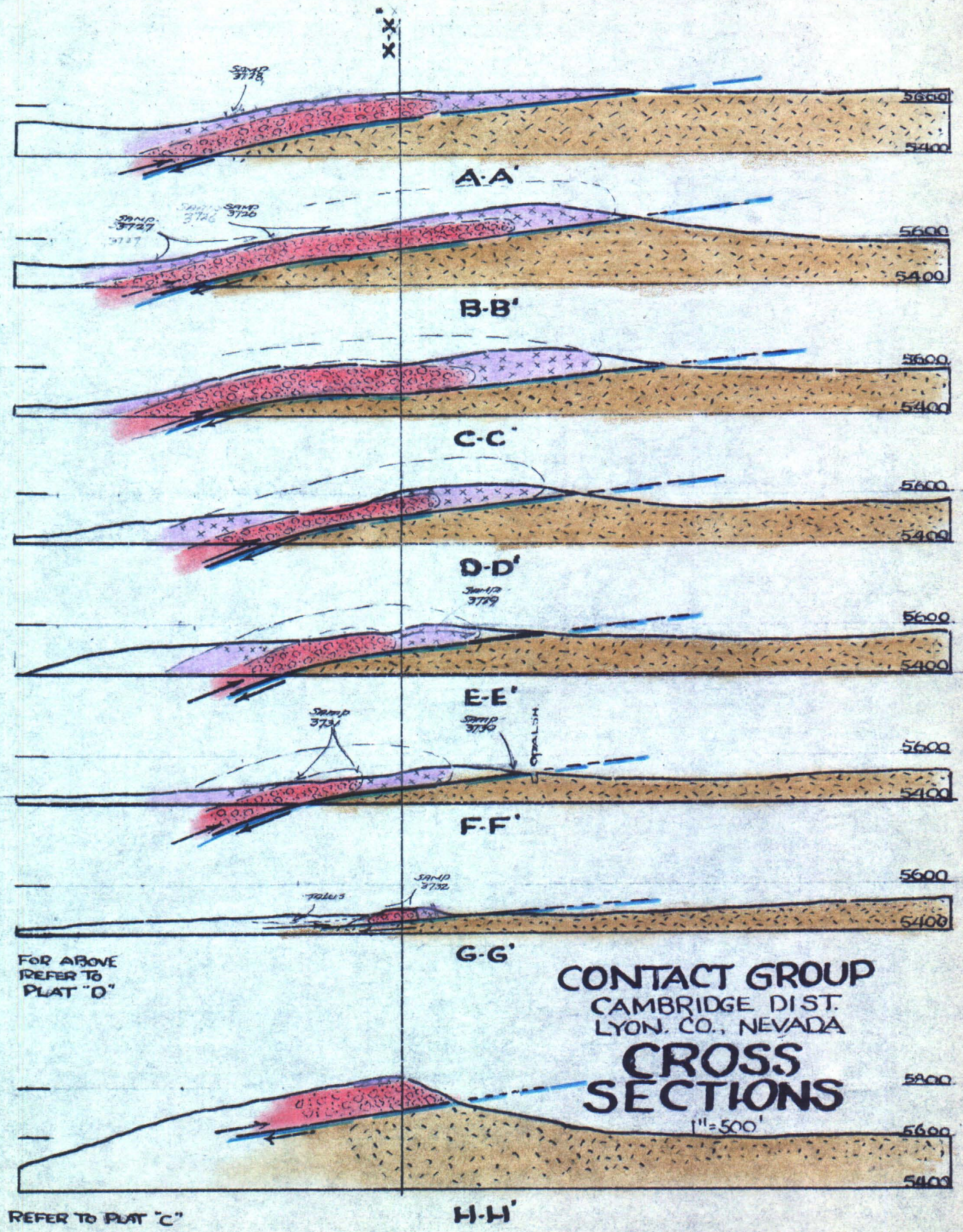
CAMBRIDGE DIST.
LYON CO., NEVADA

SAMPLES & REC. GEOLOGY

1"=500'

DAVID LE COUNT EVANS CONS. GEOLOGIST
RENO, NEVADA
SEPT. 1, 1966

E



FOR ABOVE REFER TO PLAT "D"

REFER TO PLAT "C"

CONTACT GROUP
CAMBRIDGE DIST.
LYON. CO., NEVADA

CROSS SECTIONS

1"=500'

DAVID LeCOUNT EVANS
CONS. GEOLOGIST
RENO, NEVADA
SEPT. 1, 1966

Sample Summery by date, sampler, location and analyst.

Date	Sampler	Description	Analyst
10-12-61	Rink	500' cut from hill NW of shaft; see Evans 3729&3744	R
2-17-62	Rink	Fault at Opal Shaft; see Evans 3730.	R
5- 7-62	Rink	Contact West; No. 1, Pit.	R
7-30-62	Rink	Unidentified	R
3-30-62	Rink	Unidentified	R
2-16-66	Howard	Opal Area	R
2-16-66	Howard	East Cambridge	R
4-28-66	Howard	4051-A; Opal #1	S
4-28-66	Howard	4051-B; Opal #1	S
5-16-66	Howard	Opal #II; 4052&4054; run in dulicate from same samp	S
5-16 -66	Howard	Opal II; using Rude method	S
5-16-66	Howard	Opal II: using Rude method	S
6-21-66	Howard	These six samples are from property but without identification or descritpion	P
6-10-66	Howard		P
6-20-66	Howard		P
6-20-66	Howard		P
7-12-66	Howard		P
7-12-66	Howard		P
7-31-66	Howard	Opal Area	O
7-31-66	Howard	Opal Area	O
Sept.66	Evans	3733; 'Crushed'zone; this report.	M-S-R
Sept.66	Evans	3734; Fresh rhyolite; this report	M-S-R

Analysts: "R" Nevada Analytical Service; Budd Rude.

"S" Dr. Franklin Schrumm, Metallurgist, Reno.

"P" Polaris Laboratories of Phoenix, Arizona.

"O" John B. O'Malley, Metallurgist, Denver.

"M" Morse Laboratory, Sacramento, California.

All Analyses
"Rink" and "Howard" from K.R.W. files;
"Evans" added through this analysis.

Analyst and Date	Sampled By & Value			Comments
	Rink	Howard	Evans	
R; 10-11-61	$ 44.33*			
R; 2-17-62	132.07*			
R; 5-7 -62	54.60*			
R; 3-30-62	84.63*			
R; 3-30-62	117.20*			
R; 2-16-66	77.	$ 77.35**		
R; 6-17-66		10.50**		
R; 6-17-66		63.00**		
S; 4-28-66		12.25*		Using Standard CN
S; 4-28-66		Nil**		Using Rude CN
S; 5-16-66		14.00*		Using Standard CN
S; 5-16-66		1.75**		Using Rude CN
S; 5-16-66		3.50**		Using Rude CN
P; 6-21-66		0.74*		Using "special wet chemical method for precious metals."
P; 6-10-66		1.80*		dto
P; 6-20-66		1.80*		dto
P; 6-20-66		Trace		dto
P; 7-12-66		51.83*		
P; 7-12-66		10.21*		
O; 7-31-66		21.21**		Probable Pan Amalgamation, preceeded by cleaning.
O; 7-31-66		19.74**		
M; Sept. '66			$ 0.91*	Using Standard CN
M; Sept. '66			0.35**	Using Rude CN
M; Sept. '66			1.08*	Using Standard CN
M; Sept. '66			0.35**	Using Rude CN
R; Sept. '66			91.00**	Using Rude CN
R; Sept. '66			14.35**	Using Rude CN
S; Sept. '66			1.99*	Using Rude Cn
S; Sept. '66			1.99*	Using Rude CN
S; Sept. '66			Nil *	Using Rude CN
S; Sept. '66			Nil *	Using Rude C N

* Indicates values reported in gold and silver
** Indicates only gold values reported.

All Analyses
Grouped by Method

A. BUDD RUDS METHOD ; By Rude and Others:

Date of Sample	Values in Dollars by Rude 200 Mesh	Schrup 200 and 325 Mesh	Morse 65 Mesh	Comments
10-11-61	44.33			
2-17-62	132.07			
5- 7-62	54.60			
3-30-62	84.63			
3-30-62	117.20			
2-10-66	77.35			
6-17-66	10.50			
6-17-66	63.00			
4-28-66		Nil		
5-16-66		1.75		
5-16-66		2.50		
9-16-66		1.99		200 mesh and original instructions
9-16-66		1.99		
9-16-66		Nil		325 mesh and adjusted instructions
9-16-66		Nil		
9-16-66			0.35	
9-16-66			0.35	
Average Values	$ 68.90	$ 1.32	$ 0.35	

B. STANDARD CYANIDE TREATMENT

4-28-66		12.25		
5-16-66		14.00		In duplicate
9-16-66	(3733)		0.91	
9-16-66			1.08	
Average Values		$ 13.12	$ 1.00	

C. OTHER TREATMENT

	Morse Laboratories Standard Fire	Faye-Inman Fire	Amalga Mation	Polaris Wet Treatment	O'Malley Amalgamation
6-21-66				0.74	
6-10-66				1.80	
6-20-66				1.80	
6-20-66				Trace	
7-12-66				51.83	
7-12-66				10.21	
7-31-66					21.21
7-31-66					19.74
9-16-66	(3733) 0.70	1.22*	1.72		
9-16-66	(3734) 0.67	0.98	1.46		
Average	0.69	1.10	1.59	10.89	20.47

* Silver not run; have assumed same Ag as in standard.

MORSE LABORATORIES
RESEARCH, ENGINEERING, ANALYTICAL

ASSAYS AND TESTS FOR PRECIOUS METALS ON SAMPLES NO. 3733 and 3734

for

David Le Count Evans
1700 Royal Drive
Reno, Nevada

by

Morse Laboratories
316 Sixteenth Street
Sacramento, California

Laboratory No. 64061
Date September 16, 1966

G. H. Morse

CONCLUSIONS

Neither sample No. 3733 or 3734 contains more than $0.70 of gold per ton, more than 0.8 ounce (about $1.03) of silver per ton, or more than a trace of platinum.

The Faye-Inman tin-collection fire-assay method for gold is far more complex than the standard fire assaying method and the two methods gave essentially the same results on the two samples.

The Nevada Analytical Service cyanide test for gold gave results that were comparable to those obtained by routine procedures.

ASSAYS AND EXTRACTION TESTS ON TWO PRECIOUS METAL ORE SAMPLES

INTRODUCTION

Two ore samples, designated as 3733 and 3734 were submitted to Morse Laboratories by David Le Count Evans for assaying and extraction tests by standard procedures and by special methods that had been used by other laboratories.

The assays and tests were began on August 23, 1966, and completed on September 16, 1966.

PROCEDURES

Sample preparation:

The samples as received weighed about 10 pounds each, and had been crushed to about 3/8-inch maximum diameter. After reducing to about 1/4 - inch in a laboratory jaw crusher, about 1200 grams was sampled by riffling and ground to 100-mesh in a disk pulverizer. After mixing, two portions of 350 grams each were sampled by riffling and forwarded to Mr. Evans. The remaining 100-mesh portion was saved for the Morse Laboratories tests.

Standard Assay Procedure:

Gold, silver and platinum were determined by standard fire assaying methods as described in various textbooks 1/.

1/ Shepard, O.C., and W. F. Dietrich, Fire Assaying. Mc Graw-Hill Book Co., 1940

Bugbee, E. E., A Textbook of Fire Assaying, John Wiley and Sons. 2nd edition, 1938.

Tin collection assay method for gold:

In addition to the standard fire assay prodecure on the head samples, and on the amalgamation and cyanidation tailings, the head samples were also assayed by the Faye and Inman fire assay method for gold, using tin as a collector, followed by spectrophotometric determination of gold 2/.

The Faye-Inman method was developed by the Canadian Department of Mines and Technical Surveys in connection with the search for an improved method of determining gold, silver and the platinum metals in copper-nickel mattes and other materials high in copper and nickel that are characteristic of the Sudbury District in Ontario. The method for gold was compared by the authors to standard fire assaying and the results were closely comparable.

2/ Faye, G. H. and Inman, W. R., New Fire Assay Method for the Determination of Gold. Anal. Chem. 33, No. 13, Dec. 1961 pp. 1914-1916.

See also Beamish, F. E., A Critical Review of Colorimetric and Spectrographic Methods for Gold. Anal. Chem. 33, No. 8, July, 1961 pp. 1059-1066.

Amalgamation test:

Amalgamation (free gold) tests were made on the two samples by the following procedure.

(1) A weighed portion of the sample was mechanically rolled for two hours in water to which a few milliliters of nitric acid and few grams of mercury had been added.

(2) The amalgam was recovered by panning, transferred to a procelain crucible, and the mercury dissolved in nitric acid.

(3) The residue in the crucible was washed, dried, annealed, and weighed as gold.

(4) The tailings after removal of the amalgam were dried and assayed for gold by the standard fire assay.

The same procedure was used for the amalgamation of tailings from the standard cyanidation test.

Standard cyanidation test:

The standard cyanidation test used at Morse Laboratories was applied to each of the samples, followed by amalgamation of the cyanidation tailings. The procedure is as follows:

(1) Prepare a saturated solution of calcium oxide (CaO), add 0.3 percent by weight of sodium cyanide (NaCN), and aerate to saturate the solution with oxygen.

(2) To a 0.5 pound (or other suitable weighed quantity) of ore ground to about 100-mesh, add 10 times its weight of the NaCN solution.

(3) Agitate for 12 hours. (A longer period may be used on refractory ores).

(4) Filter.

(a) Save filtrate without dilution for solution assay.

(b) Wash residue with cold water until free of cyanide.

(5) Residue: Make an amalgamation test on the residue from (4b) in accordance with the procedure described in a previous section, to recover any free gold not removed by cyanidation.

(6) Solution: Assay the filtrate from (4a) as follows:

(a) Heat 10 assay tons (291.6 ml.) under a hood almost to boiling.

(b) Add 15-20 ml. of a saturated solution of lead acetate, 5 ml. of acetic acid, a 1.5 inch square of sheet aluminum, and 10-15 ml. of hydrochloric acid (HCl).

(c) Leave on hot plate without boiling until solution is clear and all of the lead sponge is collected on the aluminum sheet.

(d) Decant the solution and separate the lead sponge from the aluminum sheet, press excess moisture from the lead sponge and wrap it in a piece of lead foil together with enough silver to insure parting.

(e) Cupel, part, and weigh gold as in standard fire assay for gold.

Nevada Analytical Service Cyanidation Procedure:

The Nevada Analytical Service Cyanidation procedure for gold as described by Budd F. Rude, Nevada Analytical Service, 400 W. Second Street, Carson City, Nevada is as follows:

"To 2.5 assay tons of ore - add 500 milliliters of distilled water and 10 grams of potassium cyanide for 5 grams of potassium hydroxide.

Stir 48 hours (can be turned off at night) while heating (not boiling) adding 2 milliliters of hydrogen peroxide at 15 minutes intervals until reaction ceases.

Filter - boil - add 5 grams of 20 mesh zinc with one to one nitric acid.

Ignite the filter paper and weigh residue as gold."

Each of the two samples were subjected to the above procedure. During the agitation period the temperature was

MORSE LABORATORIES
RESEARCH, ENGINEERING, ANALYTICAL

maintanined at about 85° C.

RESULTS OF TESTS

The results of the assays and tests are given in table 1.

DISCUSSION

The results of the assays and tests by Morse Laboratories show that neither of the samples submitted under the designations 3733 and 3734 contain gold, silver or the platinum group metals in commercially recoverable quantities.

The variance of results by the various procedures used are not of significance, and are within customary limits of routine laboratory techniques. Better reconciliation probably would have been obtained by finer grinding of the pulps, longer periods of treatment in the amalgamation and cyanidation procedures, the use of larger sample portions for assaying, and the averaging of 3 or more duplicate determinations. These refinements were not justified in view of the very low precious metal content of the samples.

The Nevada Analytical Service cyanidation procedure appears to be acceptable in place of the more common procedure used by Morse Laboratories. The Nevada Analytical Service method is more expensive, is not as amenable to making a multiplicity of tests on the same or different ores, and is not as comparable to commercial cyanidation practice as the Morse Laboratories method. With either technique the determination of the optimum flow sheet to achieve maximum recovery at minimum cost would require a series of tests at different ore particle sizes, cyanide and lime strength, time of agitation and other parameters affecting recovery.

Table I. Results of Assays and Tests on Samples No. 3733 and 3734.

	Sample No. 3733				Sample No. 3734			
	Gold oz/ton	Gold $/ton	Silver oz/ton	Platinum Group oz/ton	Gold oz/ton	Gold $/ton	Silver oz/ton	Platinum Group oz/ton
I. Head Sample								
Standard fire assay	0.0025	$0.09	0.47	Nil	0.010	$0.35	0.25	Nil
Fáye and Inman method	0.0175	$0.61	-	-	0.0189	$0.66	-	-
II. Amalgamation - standard method								
Amalgam	0.02	$0.70	-	-	0.02	$0.70	-	-
Tailings	Nil	Nil	0.79	Nil	Nil	Nil	0.59	Nil
Total	0.02	$0.70	-	-	0.02	$0.70	-	-
III. Cyanidation and amalgamation - standard method								
Cyanidation	0.005	$0.17	Nil	-	0.005	$0.17	Nil	-
Amalgamation	0.007	0.25	-	-	0.007	0.25	-	-
Tailings	0.0025	0.09	0.31	n.d.	0.0025	0.09	0.44	n.d.
Total	0.0145	$0.51	-	-	0.0145	$0.51	-	-
IV. Cyanidation - Nevada Analytical Service method								
Cyanidation	0.010	$0.35	-	-	0.010	$0.35	-	-
Tailings (not assayed)	-	-	-	-	-	-	-	-

October 7, 1966

In Re Samples
3733 minus 200 mesh
3734 " " "

Nevada Engineering Consultants Inc.,
888 East Williams
Carson City, Nevada

Attention; Mr. E. M. Howard:

Dear Mr. Howard:

This is a formal report of tests on your ore samples No. 3733 and No. 3744 Which were ground to minus 200 mesh.

The method used was the latest reported by Mr. Rude prior to September 28, 1966. Except that since no gold was found on earlier tests by his reported method of precipitation. Recovery was effected by the lead/zinc/HCl method I previously reported.

To 2½ assay ton of ore was added 500 ml distilled water containing 10 gram of potassium cyanide and 5 gram of potassium hydroxide. The mix was stirred for 48 hours and maintained at approximately 85 C. Two ml of 30 % hydrogen peroxide was added at 15 minute intervals untill reaction ceased.

The cooled mix was filtered and cake washed untill cyanide free, Boiled and the values collected by the lead/zinc/HCl method as previously outlined.

Sample	Test	Gold/Oz ton	Silver/Oz ton
3733	4075	0.02	1.00
3744	4076	0.02	1.00

J. Franklin Schrumn

October 7, 1966

In Re Samples
3733 Minus 325 mesh
3744 " " "

Nevada Engineering Consultants Inc.,
888 East Williams
Carson City, Nevada

Attention: Mr. E. M. Howars:

Dear Mr. Howard:

This will confirm my telephone report of 10/6/66 on your minus 325 mesh samples 3733 and 3744.

The method used was precisely as given to me by telephone by Mr. Rude on 9/28/66.

One half assay ton of 325 mesh ore added with stirring to a 500 ml distilled water solution of 25 gram potassium cyanide and 12½ gram potassium hydroxide.
Hydrogen peroxide (30 %) was added in 2 ml increments at fifteen m minute intervals to the warm (40 C.) mix untill reaction ceased.
Total peroxide equaled 50 ml.
Stirring of warm mix continued for 48 hours.
Solids removed by filtration, cake washed with 100 ml distilled water.
Filtrate plus wash boiled for ten minutes.
2 gram of 20 mesh granulated zinc added and heat shut off.
at four hours cool solution taken to filter and zinc washed well on 11 cm. #42 Whatman filter paper. Filter paper and zinc heated to near boiling in 1/1 nitric acid. Resulting filter pulp and acid solution diluted with 125 ml distilled water and washed well on a 11cm #42 Whatman paper.
Paper plus pulp ashed in a tared porcelain crucible.

Sample	Test	Gold/oz ton
3733	4077	nil
3734	4078	nil

J. Franklin Schrumn

CORRESPONDENCE.

We admit, unendorsed, opinions of correspondents.—Eds

1880

Columbus Mining District, Nevada.—No. 2.

[From our Traveling Correspondent.]

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Continues to gladden so many hearts and homes with her regular monthly dividends. Nor is this all. Other mines promise soon to be put on a paying basis.

The Mount Diablo

In particular may be mentioned as a star of the first magnitude, just now beginning to appear above the horizon. The mine is very favorably located south of the dyke previously alluded to, immediately above Metallic City, and a mile from Candelaria. It ranks next to Northern Belle in bullion production. A very considerable amount was extracted years ago, one excavation, near the surface, yielding as much as $498,000. The present depth of double compartment shaft is 365 ft. Levels are opened at the 150, 250 and 350-ft. stations. Now drifting and stoping on the first and second levels—the first producing about 45 tons per day. A very fine body of ore is understood to have been struck not long since on the second level. The third level has been run 120 ft., and has yet to make about 40 ft. more before cutting the lode. The entire width of ore and ledge matter together is fully 250 ft.

The best pay ore on the 150-ft. level is from 2 to 10 ft. wide, averaging $100 per ton. The best, if assorted, would yield as much as $700. On this level there are hundreds, if not thousands of tons, of lower grade ore that can be made to pay a profit with cheaper mining and milling facilities. The company is now shipping at the rate of 60 tons per day to one of the Northern Belle mines, the result of which will probably soon be heard from.

Anticipations as to the future of the mine are at present running high. Many supposed to be well posted, are of the opinion that she is destined at no very distant day to rival, if not eclipse, her dividend-paying neighbor to which allusion has more than once been made. So mote it be.

The East Mount Diablo,

Adjoining the above, has had little development on the surface. Lying between the Mount Diablo on one hand and the Gen. Jackson on the other the character of the ground will soon be determined by the explorations now going on in these mines. The Mount Diablo on one of her levels is now within 120 ft. of the line, and said to have at this point a good strong vein.

The Gen. Jackson's Shaft

Is also within 150 ft. of the east line of the East Mount Diablo's ground, and as both properties belong to the same company, prospecting will be carried on simultaneously.

The Jackson incline shaft is now down 155 ft., following the vein.

About 35 tons of ore, looked upon as first-class have been taken out, estimated to mill $100 per ton, and the mine is considered a fine prospect.

ablo, has recently struck very fair ore. Shaft, 80 ft. deep and drift on lode, 130 ft.

The Mountain Girl,

The property of Messrs. Sutherland, Murphy, and McLane; is situated due east of the Mount Diablo hoisting works. It is the first extension of the Denero or the famous Mountain Boy lode. Shaft now down 230 ft., and work rapidly pushed with two shifts.

The owners are very sanguine as to results.

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North of the Jackson, some years ago extracted ore that milled as high as $300 per ton. Very good ore is said to have been found at the depth of 160 ft., the shaft on the way down, cutting veins from 8 to 10 inches wide, the ore giving assays from $20 up to $300 per ton.

The Saratoga,

Near the Windsor, is at present taking out ore worth $300 per ton, assay value. Preparations are making to erect machinery.

The Eastern Belle,

Running parallel with the Windsor, has a shaft 150 ft., a north drift 150 ft., and one south 170 ft., both through vein matter, but neither cutting the lode. An incline on the vein struck ore at the depth of 50 ft., that assays from $20 to $40.

The New England,

Some distance further east, comprises several claims, being 1,500 ft. long by 1,400 ft. wide. It has been opened by shaft 120 ft., by incline, tunnel, winze and drifts, developing ore bodies in different parts of the claim. The ore, as to character, is classed as chloride and manganese. About $6,000 worth was extracted at one point, working from $250 to $300 per ton. The mine is now being worked through a shaft and incline aggregating a depth of 130 ft., from which level an east drift has cut a body of ore, the extent and value of which are not yet known, two assays going respectively $113 and $212 per ton.

On the Columbus side of the mountain, W. J. Sutherland, Esq., has recently had some claims incorporated under the name of

The Highland Chief.

The ore is represented to be rich and the prospects unusually flattering.

The Tilden,

One mile from the town of Columbus, was discovered as early as 1869, and yielded soon after a very considerable amount of bullion. It lies in the granite, and the rock is understood to be more than ordinarily rich. It has been relocated, and the work is expected to be vigorously prosecuted. On account of the water to be handled, hoisting works will be required.

Having now given a brief sketch of most of the principal mines of this great mineralized zone, it way be well to give some account of

The Two Great Drawbacks

To successful operations in the district, more particularly at the west end. Wood and water are both scarce and dear. Water sells at from 5 to 6 cents per gallon—is hauled from Belleville and Columbus, the distance of from 8 to 10 miles. When it is remembered that there are thousands upon thousands of tons of low-grade ore here, which could be made to pay with mills on the ground and cheap power for hoisting purposes, the magnitude of these drawbacks must be at once apparent.

Proposed Remedy.

It is understood that a franchise has been granted to a company to supply Candelaria with water. The source of supply is from springs about 10 miles distant. The company claims to be able to furnish 15 times the amount now used—a sufficiency not only for family use, but for all milling and mining purposes. The water has been tapped by a tunnel 1,000 ft. in length. The estimated cost is put somewhere from $40,000 to $50,000. It is understood, also, that an abundant supply of water can be obtained from another source, if needed. It will cost something more, the distance being greater. Scarcity of wood will be remedied as soon as the narrow-gauge railroad reaches Candelaria, and much of the ore can be shipped to Carson river or other points to be worked, if a sufficient number of mills are not in the meantime constructed for the purpose on the ground.

A. C. K.

MOUNT GRANT.—All that region of mountainous country, on and about Mt. Grant, Esmeralda county, Nev., bears the same name as the mountain peak, and still there is a vast difference in the mineral character of the country within the space of a very few miles. For instance, on and about Mt. Grant proper, as well as about Squaw creek, a short distance from it, all the gold and silver-bearing ores are more or less mixed with baser metals, while between the two lies a belt of free gold ore. On this middle belt, six miles south of the foot of Walker lake, and seven miles south of the proposed town of Milbrae, which is to be the shipping point for Bodie from the Carson and Colorado railroad, is located the Golden Eagle mine, owned, in part, by Bodieites, and near this is the somewhat famous Big Indian mine, both containing large quantities of free gold ore of high grade. The Big Indian people have sent to the Comstock to purchase a mill, having an abundance of ore in sight. The Golden Eagle has also a large quantity of high-grade ore in sight, and several other claims on the "free belt" have fine prospects.—*Bodie Standard-News.*

Revival of Operations in Old Camps.

A representative of the Bodie *Free Press* spent last week in the northern portion of Esmeralda county, Nevada, about 50 miles north of Bodie, and about 60 miles south of Virginia City, visiting Cambridge, Rockland, Pine Grove and other points.

The most extensive mining operations now in progress in northern Esmeralda are at Cambridge, at which point is situated two or three series of ledges and a 10-stamp mill. Most of the mines and the mill are the property of ex-Gov. H. G. Blasdel, and are under the immediate personal supervision of Col. S. W. Blasdel. The mines are located in a low range of granite hills, running northerly and southerly, which rise up from the plain between the range of mountains in which is situated Pine Grove and Rockland to the west, and the range of which Mount Grant is the principal peak to the east. The Cambridge mines have been worked to some extent for 15 or 20 years past, their discovery dating prior to that of the Comstock lode. Numerous shafts have been sunk to a depth of from 100 to 150 ft., and the Wheeler Bros., who owned largely in the district years ago, when it was known as the Salt River district, erected a small mill on the banks of the East Walker river and worked the ores with more or less success. The ores are, except those taken from the Blackhorse mine, low grade and somewhat difficult to treat successfully. They contain copper, galena and iron in carbonate and other forms. In the precious metals gold largely predominates over silver.

A little over a year ago Gov. Blasdel purchased the mines, which comprised the Williams, Blasdel, Walker River, Black Horse and El Dorado, together with a ranch of bottom land on Walker river, about a mile distant from the mines. He replaced the old Wheeler affair with a 10-stamp mill of the modern sort, fully appointed with all the latest appliances, and a model of convenience and economy in working. It is run by water power, supplied by a large race from the Walker river, about three-quarters of a mile in length, from which, also, water is supplied to irrigate the ranch. In connection with the mill are two large boilers, used merely to supply steam for the pans, an office, assay office, retort room and manager's residence.

The mines are on three parallel ledges, about 1,000 or 1,500 ft. apart, and are each 600x1,500 ft. Each of the ledges shows separate and distinct characteristics, the Williams ledge showing the greatest tendency to baseness, and the Black Horse being the nearest free milling. The latter vein contains very rich ore, which is found in successive kidney-shaped chimneys. Its color is usually a reddish brown, and free gold can be seen on nearly every piece. The ledges are traceable on the surface for a mile, or even a greater distance. The granite formation is of a highly silicious character, and is filled with mica. The mines are easily worked, and there being a steady grade thence to the mill, ore is transported for reduction at a very light expense. The mill was completed last year, but, with the exception of a few experimental runs, has not been put to work regularly until this season. Some difficulty has been experienced in securing the services of an amalgamator competent to work the ores, containing as they do bases of various kinds. Dr. Matthews, who has a very extensive fund of scientific knowledge, is now attending to this work, and is meeting with considerable success.

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The situation of the mill and ranch is very pleasant to the eye. Shut in on every side with low granite hills, the mountains further away forming a dark background, the willow-banked river running through the green meadows impart to the place the character of an oasis in the desert. It is 2,000 or 3,000 ft. lower than Bodie, and the climate is correspondingly mild, snow in the winter time seldom remaining on the ground more than an hour or two. Altogether Cambridge, while being a peculiarly pleasant place of residence, gives promise of becoming a profitable bullion-producing region.

Rockland.

About eight miles to the west of Cambridge, in the same range of mountains in which is situated Pine Grove, is Rockland, a camp which years ago was a lively one, as its little graveyard, in which 8 or 10 were buried with their boots on, fully attests. The principal mine in this district is the Dolores, from which has been produced about $200,000. This mine was purchased by Gov. Blasdel four or five years ago, and a 10-stamp mill was erected by him. The fact that no snow fell for two or three years, caused such a drouth that sufficient water could not be obtained to run the mill. As a consequence, operations have been almost suspended in the district since that time, with the exception, perhaps, of a little prospecting. Work has been resumed on the Dolores mine this summer, and Col. Blasdel has taken out some ore and shipped it to the Cambridge mill for reduction. The mine has been developed by six different tunnels in the mountain about 100 ft. apart, all of which, except the last, was run on the ledge. The last was run in at right angles with the ledge, and intersected it at a distance from its mouth of about 750 ft. The

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1880

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