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~~MIS-2-1~~

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

November 13, 1964

Mission Peramel Ltd.

Mr. C. E. Nelson, Vice President
American Smelting and Refining Company
120 Broadway
New York, N. Y. 10005

Dear Sir:

This is a copy of the results of the molybdenum composites of the Mission ore deposit which I mentioned to you on the phone the other day.

The composites were made-up to conform to four different rock types and each one represents a sizable block of ground. The irregularity of the distribution of the moly is largely masked by the large size of each composite; however, you will note that the moly content varies from a low of .003 to a high of .081. In general it was evident in the core logging that (an occasional spot assay for moly was run) that the moly value was more uniform in the west one-half of the deposit than in the east one-half where mining is now going on.

Yours very truly,

J. H. COURTRIGHT

JHC/jk

AMERICAN SMELTING AND REFINING COMPANY
SOUTHWESTERN EXPLORATION DEPARTMENT
813 VALLEY NATIONAL BLDG., TUCSON, ARIZONA

J. H. COURTRIGHT
CHIEF GEOLOGIST
P. ENTWISTLE
ASSISTANT CHIEF GEOLOGIST

October 18, 1963

Mr. Robert Gale
School of Earth Sciences
Stanford University
Stanford, California

Dear Bob:

This will acknowledge your letter of October 6 advising of receipt of spectrographic plates. It is unfortunate that some of them were broken in transit.

In connection with your employment, I have been advised that you probably will be assigned to the Northwest Division. However, you should probably first spend about four weeks here in the Southwest studying in the field various mineral occurrences and getting better acquainted with our exploration methods. I note that the fellowship awarded to you will extend to June of next year, but that you may be able to complete your dissertation by the end of March. This should work out all right as you would then be available in the Northwest at the beginning of the summer field season.

As I understand it, the Company will pay for moving your family from Stanford to the Northwest and also your expenses for coming to Tucson and later to the Northwest.

Yours very truly,

J. H. COURTRIGHT

JHC/jk
cc: KERichard

P.S. To date, the above is only a conversational arrangement, subject to change, and should be kept confidential.

We will return your paper on Geology and Paragenesis of Mission Copper Mine by mail tomorrow.

J.H.C.

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

October 3, 1963

MEMO FOR MR. T. A. SNEDDEN:

MISSION ARGILLITE

Since the first of the year, the Mission mill averaged just over 20,000 tpd on a feed averaging about 23% argillite. As I understand it, this rate is 10-12% higher than indicated by grindability indices of around 12 for tactite-hornfels and 16 for argillite (based on a test of Pima argillite). In addition, day to day fluctuations of the argillite content --- say from zero to 75% --- have not shown corresponding fluctuations in the grinding rate, indicating that either (1) the argillite mined recently is softer than the average for the Mission, or (2) the Pima sample was harder (in terms of grindability) than the Mission average.

Mr. Kinnison and I visited the Mission pit September 30. Mr. Anzalone showed us the areas which produced most of the argillite mined in the past few months --- the south end of the 2770 bench and the southwest part of the 2890 bench. With the exception of very minor amounts of tactite and andesite dike rock, the material exposed is composed entirely of essentially typical argillite. In our opinion it is representative of 80 to 90% of the rock so classified in the Mission ore reserve; accordingly it is concluded that the difference in mill capacity between the predicted and actual is at least in part due to a somewhat higher degree of metamorphism in the Pima argillite than existing in the Mission argillite.

It is our conclusion that the past 9 months milling experience for argillite can be used in forecasting production rates --- with the reservation that something like 10% of the remaining argillite may be somewhat more difficult to grind, say equivalent to the Pima argillite with an Index of 16+.

J. H. COURTRIGHT

JHC/jk
cc: NWeiss KERichard
RBMeen JEKinnison
JDVincent

AMERICAN SMELTING AND REFINING COMPANY

MINING DEPARTMENT

ASARCO

ORE TESTING AND
ASSAY LABORATORY
TELEPHONE 532-7917
G. G. GUNTHER, SUPERINTENDENT

P. O. BOX 895
EL PASO, TEXAS 79999

Sept. 26, 1963

Mr. J. H. Courtright, Chief Geologist
American Smelting and Refining Company
813 Valley National Building
Tucson, Arizona 85701

J. H. C.
OCT 1 1963
Mission Spectro

Dear Sir:

With reference to our phone conversation a couple of days ago this will advise that I am mailing you today, by parcel post, one package containing twelve developed photographic 4" x 10" plates. Eleven of these plates show the spectra of the 153 pulps, which, about a year ago, formed the basis for the semiquantitative spectrographic analyses made and reported by us to Mr. K. E. Richard in line with the instructions in his letter of September 24, 1962. The twelfth plate, marked "Spark Test", was merely added for better support of the odd plate left over after ten of the eleven plates had been packed, back to back, in pairs in the respective slots of the box.

Relationship between plate and (El Paso) sample number is as follows:

Plate Number	Sample Number (as shown in our report)
433	1311 - 1323 incl. 1343 - 1344 - 1345 - 1346 and Fe Spectrum
434	1324 - 1325 - 1326
435	1327 - 1342 incl. and Fe Spectrum
436	1347 - 1364 incl.
437	1449 - 1463 incl.
438	1362 - 1363 - 1361 1364 - 1378 incl.
439	1379 - 1394 (Exposure #17 not part of the Mission samples)

Plate Number	Sample Number (as shown in our report)
440	1395 - 1412 (Exposure #18 not part of the Mission samples)
441	1413 - 1430 incl.
442	1431 - 1448 incl. (Exposure #19 not part of the Mission samples)
443	Eleven spectra of the rock specimens for which Mr. Richard had requested chemical analyses - our letter of 1/8/63

From the spectra on Plate 443, and on the basis of the corresponding actual chemical analyses, we prepared the standard curves which, in turn, were used for the semiquantitative evaluation of the 153 samples on Plates 433 - 442.

Should Mr. Gale wish to prepare standard curves for the Ebert instrument I understand he is working with, please advise so, as we still have on hand a small amount of pulp for the eleven samples shown on Plate 443.

All the samples analyzed by us spectrographically in connection with this Mission project a year ago, were mixed with a lithium carbonate buffer containing palladium and gallium as internal standard elements.

Yours very truly,

G. G. Gunther

GGG/cb

JHCourtright-x

September 24, 1963

Mr. Robert Gale
School of Earth Sciences
Stanford University
Stanford, California

Dear Bob:

I have your letter of September 17, with questions regarding spectrograph "standards" and so forth.

I talked to Mr. Gunther by phone and learned that their spectrograph is a Bosh and Lomb dual-grating type which uses 4 x 10 glass plates. Since the results were labeled semi-quantitative, the "standards" would not be as good as those for straight quantitative determinations. He agreed to look back in the files and try to get some information on their "standards", and also to send the plates to me here for forwarding to you.

I believe that it probably can be arranged to pay for spectrographic work, say not in excess of $300, if you could provide us with a statement showing the number of determinations and the amount due along with a copy of the results.

Regards,

J. H. COURTRIGHT

JHC/jk

El Paso Ore dressing Lab.
Letter to GG Gunther on spectro
dated Sept 24, 1962.

JHC

School of Earth Sciences,
Stanford University,
Stanford, California.

September 17, 1963

Mr. J.H. Courtright,
Chief Geologist,
S.W. Exploration Dept.
ASARCO

J.H.C.
SEP 18 1963

Mission Spectro Analysis

Dear Harold:

Thank you for your letter of September 13, and also for the pulps, which arrived today in good condition. The fact that there are no pulps available from Hole 107 does not matter greatly.

Dr. Park is still away from the school and on thinking over the matter of financing the spectrographic work, it seems it might be easier to cover costs in the manner you suggested, if there would be no particular problem at your end. I wondered how the matter of billing and paying costs would be carried out? Could the School keep an account of expenses and bill you for same?

I also have some questions concerning the spectrographic work done by the El Paso lab on those Mission samples which I sent to them last year. If possible, I would like to know more about the spectrographic method of determination which was used so that I can correlate my work with theirs. Information on the "standards" which they prepared might be useful and if their data is recorded on photographic plates, I wonder if I might be able to use any of the latter. The spectrographic equipment here, a 3.4 meter Jarrell-Ash spectrograph, may be of the same general type as that used at El Paso. If there is anything you can learn relating to these questions, or if it would be possible, through you, for me to write to the El Paso lab, it might help the work here quite a bit.

Thanks again for your help. Valerie and Ann managed to make it up to Canada, for a little rest, so I'm roughing it here.

Yours truly,

Bob Gale

September 11, 1963

Mr. Robert Gale
School of Earth Sciences
Stanford University
Stanford P. O.
California

Dear Bob:

We are sending you today by insured parcel post pulp samples from the Mission as listed in your letter of August 28.

Pulps of Hole No. 107 could not be found. Hope this omission will not be serious.

Have sent your paper on Paragenesis of Mission minerals to New York with instructions to return it here for forwarding to you. It is an excellent piece of work and we would like a copy. I'm aware that producing extra copies involves time and expense, so perhaps this can be arranged for after you return to work for the company.

My best to Valerie.

Regards,

J. H. COURTRIGHT

JHC/jk

9-4-63

MISSION ASSAY PULPS FOR J.E. KINNISON - APPROX. 1 oz REMOVED FROM EACH PULP

HOLE No.	INTERVAL
24 -	530-570 AND 630-720
51 -	340-400
80 -	300-400
87 -	270-310
100 -	650-870
104 -	240-350
107 (SAMPLES NOT AVAILABLE)	430-450 & 490-540
121 -	460-550
128 -	530-640
130 -	230-400
163 -	400-600
M-17 -	265-315

HOLE 24

525.1 - 534.1

544.6 - 557.4

619.7 - 630.6

630.6 - 636.0

636.0 - 642.3

642.3 - 649.6

649.6 - 659.7

659.7 - 663.5

663.5 - 672.9

672.9 - 677.9

677.9 - 688.1

688.1 - 697.4

697.4 - 704.3

704.3 - 712.3

712.3 - 714.3

714.3 - 724.3

HOLE 51

334.7 - 344.9 - NO SAMPLE

344.9 - 357.3

357.3 - 367.7

367.7 - 378.0

378.0 - 383.8

383.8 - 389.0

389.0 - 398.0

398.0 - 408.2

HOLE 80

292.2 - 301.3
301.3 - 311.6
311.6 - 321.?
321.? - 331.9
331.9 - 341.4
341.4 - 349.?
349.? - 359.2
359.2 - 369.3
369.3 - 379.3
379.3 - 385.6
385.6 - 395.7
395.7 - 405.8

HOLE 100

649.3 - 653.8
653.8 - 661.5
661.5 - 671.7
671.7 - 685.8
685.8 - 693.6
693.6 - 702.4
702.4 - 710.5
710.5 - 717.3
717.3 - 729.0
729.0 - 738.1
738.1 - 749.3
749.3 - 755.5
755.5 - 765.8
765.8 - 776.2
776.2 - 786.4
786.4 - 796.6
796.6 - 807.3
807.3 - 817.4
817.4 - 827.6
827.6 - 837.4
837.4 - 845.6
845.6 - 855.6
855.6 - 865.6
865.6 - 875.7

HOLE 163	HOLE 130
397.9 - 403.0	292.3 - 237.0
403.0 - 412.9	237.0 - 243.0
412.9 - 419.7	243.0 - 248.3
419.7 - 427.9	248.3 - 254.1
427.9 - 434.5	254.1 - 263.7
434.5 - 450.3	263.7 - 268.7
450.3 - 460.4	268.7 - 274.7
460.4 - 470.0	274.7 - 279.3
470.0 - 477.8	279.3 - 283.5
477.8 - 489.9	283.5 - 293.8
489.9 - 499.8	293.8 - 303.9
499.8 - 509.9	303.9 - 314.0
509.9 - 520.0	314.0 - 324.0
520.0 - 529.9	324.0 - 330.7
529.9 - 537.1	330.7 - 334.7
537.1 - 547.4	334.7 - 341.7
547.4 - 557.6	341.7 - 351.7
557.6 - 565.1	351.7 - 361.9
565.1 - 575.3	361.9 - 370.2
575.3 - 585.3	370.2 - 380.3
585.3 - 595.3	380.3 - 386.5
595.3 - 605.5	386.5 - 396.6
	396.6 - 406.8

HOLE M-17

265.1 - 269.7
269.7 - 278.0
278.0 - 288.6
288.6 - 294.0
294.0 - 301.0
301.0 - 311.0
311.0 - 315.3

HOLE 87

267.7 - 272.9
272.9 - 283.7
283.7 - 294.0
294.0 - 299.7
299.7 - 305.1
305.1 - 315.2

HOLE 106

263.2 - 271.9
271.9 - 278.8
278.8 - 285.8
285.8 - 295.8
296.8 - 305.8
305.8 - 315.8
315.8 - 325.8
325.8 - 333.8
333.8 - 339.7
339.7 - 349.1
349.1 - 359.1

HOLE 128

526.9 - 537.0
537.0 - 547.0
547.0 - 557.0
557.0 - 567.5
567.5 - 576.9
576.9 - 586.9
586.9 - 597.1
597.1 - 607.3
607.3 - 610.8
610.8 - 620.4
620.4 - 630.5

HOLE 121

458.0 - 464.1
464.1 - 469.9
469.9 - 481.3
481.3 - 488.2
488.2 - 495.1
495.1 - 502.7
502.7 - 512.8
512.8 - 518.3
518.3 - 528.4
528.4 - 533.5
533.5 - 543.6
543.6 - 558.4

Completed 9-10-63
Bruce Collins

1171 Noel Drive,
Menlo Park, Calif.

Aug. 28.1963

Mr. J.H. Courtright,
202- Suffolk Drive,
Tucson, Arizona.

Mission Mineralogic Research

Dear Harold,

I hope you wont mind me writing to you with some questions concerning my work here at Stanford. I thought it best to write to you because we heard that you were slated to become Chief Geologist.

I've managed to keep busy without doing any spectrographic work, so I did'nt put in any more requests for those core-pulp rejects from the Mission core lab. Because time is lacking and spectrographic work is more expensive than I imagined, I've greatly reduced the number of samples that I would like to run. I'll list these below in hopes that there still may be a possibility of obtaining a small sample of each pulp in the intervals. This would be between 150 and 200 samples.

Hole No.	Interval
24	530-570 and 630-720
51	340-400
80	300-400
87	270-310
100	650-870
106	240-350
107	430-450 and 490-540
121	460-550
128	530-640
130	230-400
163	400-600
M-17	265-315

I'm sending under separate cover a report which I prepared for a course given by Dr. Park. It was to be prepared in a manner pointing out exploration possibilities so I included some highly theoretical targets for this reason. I wanted to know if there would be any objection to turning in this report to Dr. Park for him to keep on file with similar student reports, as this is what he requests us to do for the course.

On the subject of what is permissable, if I should be requested to give a lecture on Mission geology before the school geology club, would it be okay if I gave a talk similar to that presented at the A.I.M.E. meeting last year?

Finally, Harold, I wonder if you can hazard an outlook on what the job possibilities with the company will be around the end of the year. I'm going to be pretty eager to go

to work when I finish here, or I may even have to break off before finishing if things get too lean financially.

Thanks for any help you can give on these questions Harold. I trust everything is going well with you and the family.

Yours truly,

Bob Gale

K. RICHARD
ROOM 509

April 1, 1963

Mr. Bob Gale
1171 Noel Drive
Menlo Park, California

Dear Bob:

Paul Elmon handed me your note requesting certain thin sections. None of us here knows where these sections are if you do not have them. They may be here somewhere and will turn up eventually. In this case I would forward them to you.

The next time I am at Mission I will see if anyone there knows about these sections.

We have not yet had time to sort out the pulp samples mentioned in your letter of January 27, but we will try to select these pulps sometime in the near future.

I trust your studies are proceeding satisfactorily.

Yours very truly,

KENYON RICHARD

KR/kw
cc: JEKinnison

1171 Noel Drive,
Menlo Park, Calif.

January 27, 1963.

J.H.C.

K. R. JAN 29 1963

JAN 29 1963

Mr. Kenyon Richard,
Chief Geologist,
Southwestern Exploration Dept.,
ASARCO.

Dear Ken:

Thankyou for your letter of January 21, and the thermo-fax copies of the analyses. As it happens , Mission did send a copy on to me also.

I would like to obtain more pulp samples in order to carry on the spectrographic line of investigation, if it is possible. I picked out 23 holes, in addition to the 4 which were analysed by El Paso, which I felt would give a fairly even coverage of the main part of the orebody. These are as follows: 77, 100, 98, 55, 102, 97, 88, CDH 1, M-43, M-22 163, M-39, M-17, 92, 158, 87, 107, 119, 80, 121, 123, 129, 150. It would involve quite a bit of work to take a small portion(an ounce) from each assay run down to the basal, barren marble, which is what I did for 24, 106, 51 and 130, the holes sent to El Paso. It's probable the information would be just as good if only every other run were picked out. Possibly even this would take more time than you have available.

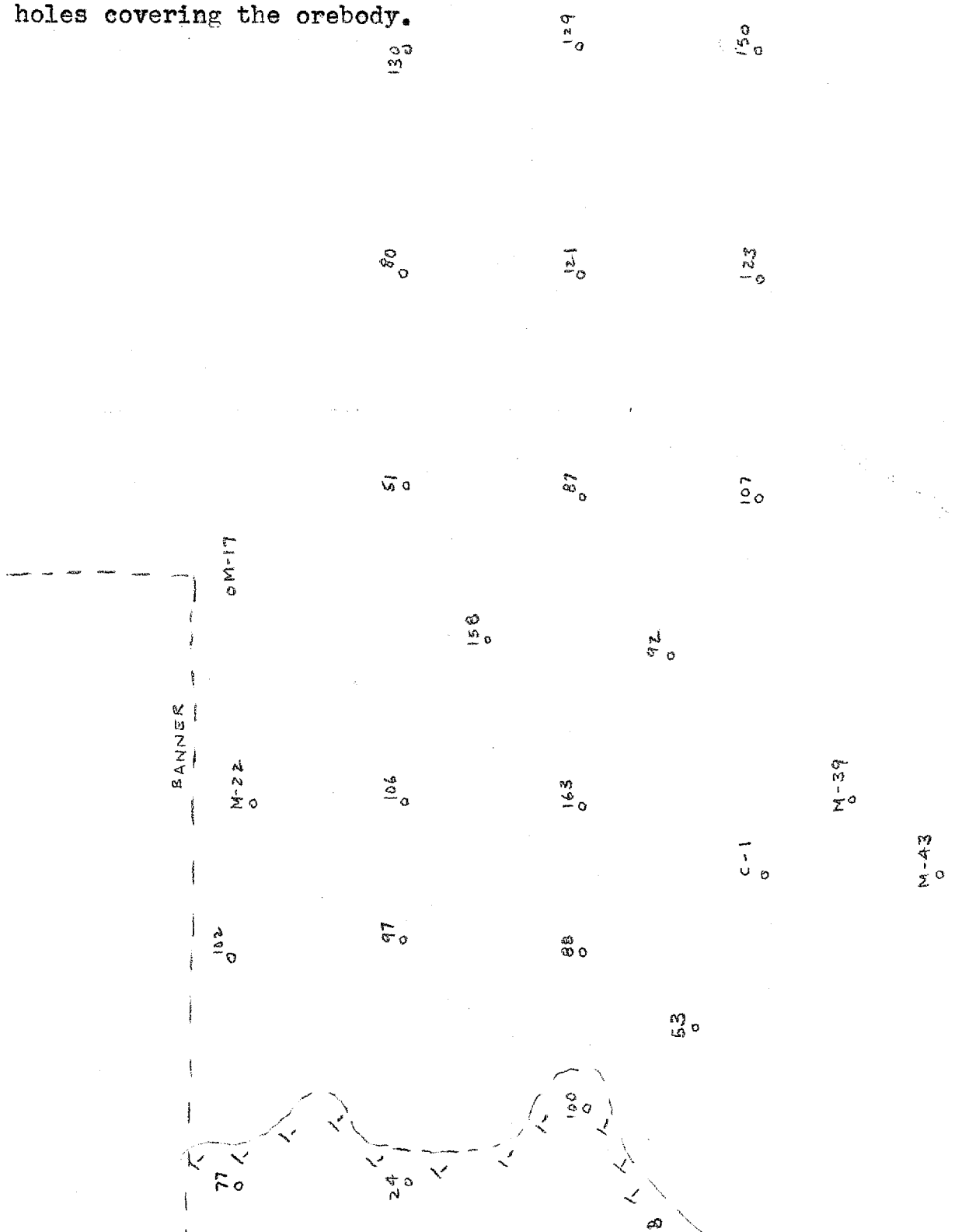
Thanks again for obtaining the spectrographic and chemical analyses from El Paso. I hope I can really start to work on this material soon, I'm still in kind of an organization period right now.

I hope everything is going well for you. Please give my regards to Harold and everyone else.

Yours truly

Bob Hale

This is a sketch showing what I had in mind for drill-holes covering the orebody.



January 21, 1963

Mr. Bob Gale
1171 Noel Drive
Menlo Park, California

MISSION ANALYSES

Dear Bob:

I am sorry that I missed talking to you again before you left.

Enclosed are thermofax copies of the final analyses from our El Paso lab. You are marked for a copy, but I have in mind that your copy may not ever get out of Mission.

Harold mentioned that you wanted some additional pulp samples to carry on spectrographic work at Stanford. We will probably have a man available within the next couple of weeks to check into the matter of pulps and core rejects in the Mission lab. If you could give me a list of the pulp samples you will be interested in, we can probably get such material sorted out at that time. Therefore, I would appreciate having this list from you promptly. If this is not feasible for you, we will just have to wait until some later date.

Best regards, and good luck in your forthcoming work.

Yours very truly,

KENYON RICHARD

KR/kw
Enclosures

AMERICAN SMELTING AND REFINING COMPANY

MINING DEPARTMENT

ASARCO

ORE TESTING AND
ASSAY LABORATORY
TELEPHONE 532-7917

G. G. GUNTHER, SUPERINTENDENT

MR. Dec 10/62 H.E.K.

READ AND RE

J. H. C.

DEC 7 1962

K. R.

DEC 5 1962

P. O. BOX 895
EL PASO, TEXAS
zone 45

Dec. 3, 1962

Mr. K. E. Richard, Chief Geologist
Tucson Office

MISSION ANALYSES

Dear Sir:

With reference to your letter of September 24, 1962, I am enclosing the report of our Chief Chemist, Mr. H. B. Nicholas, covering the 153 pulps from the Mission deposit, submitted by you for semiquantitative spectrographic analyses.

In line with your instructions principal elements reported on are: Ag, Pb, Cu, Fe, Zn, Mo, Ca, K and Mg. Additional elements of possible value or interest as noted during the evaluation of the photographic plates, are mentioned under "remarks". All assay values shown in the report are believed to be correct within a range of ±50% of the respective amounts present.

The chemical analyses of the second group of samples are all but completed and will be reported within a week or so.

Copies of Mr. Nicholas' report are being mailed to the persons shown as receiving copies of this letter.

Yours very truly,

G. G. Gunther

GGG/cb

CPPollock
DJPope
RBMeen
RGale

MISSION DEPOSIT
SPECTROGRAPHIC ANALYSIS REPORT
SEMIQUANTITATIVE RESULTS

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1311	24	240-249	.2	2	.55	2	6	.3	.035	.003	nil	
1312	24	249-257	.22	3	.75	2.4	4	.3	.036	<.001	nil	
1313	24	257-268	.14	2	.17	1.9	4	.3	.055	nil	nil	
1314	24	268-278	.1	1.5	.23	2	2	.3	.070	nil	nil	
1315	24	278-287	.15	2	.38	2	2	.4	.05	nil	nil	
1316	24	287-297	.0	2	.13	1.3	6	.4	.08	nil	nil	
1317	24	297-306	.0	2	.23	1.7	6	.4	.08	nil	nil	
1318	24	306-318	.12	8	.33	3.5	6	.4	.056	nil	nil	
1319	24	318-326	.3	3.5	4	7	<.1	.4	.1	nil	nil	
1320	24	326-335	.2	12	.17	1.7	.1	1	.040	<.001	nil	
1321	24	335-345	.12	20	.17	2	<.1	1	.040	nil	nil	
1322	24	345-354	.1	16	.55	2.3	.1	1	.070	<.001	nil	
1323	24	354-362	.12	14	.15	1.9	<.1	1.5	.070	.1	nil	
1324	24	362-372	.0	25	.07	.6	<.1	.3	.045	<.001	nil	
1325	24	372-380	.13	12	.09	1.5	.1	.3	.05	<.001	nil	
1326	24	380-391	.24	8	.34	3	1	.2	.08	<.001	nil	
1327	24	391-402	.15	5	.4	2.9	.1	.4	.065	nil	nil	
1328	24	402-410	.0	2	.15	3	2	.3	.14	<.001	nil	

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1329	24	410-418	.0	5	.17	3	5	.3	.085	nil	nil	
1330	24	418-427	.15	2	.34	2.5	7	.2	.085	<.001	nil	
1331	24	427-433	.14	1.5	.23	1.1	7	.2	.1	<.001	nil	
1332	24	433-439	.13	2	.22	1.9	7	.2	.16	nil	nil	
1333	24	439-451	.0	3	.2	1.2	5	.3	.065	nil	nil	
1334	24	451-460	.0	1.5	.21	2	7	.2	.085	nil	nil	
1335	24	460-468	.0	1.2	.16	1.5	6	.2	.070	nil	nil	
1336	24	468-477	.0	.5	.17	1.2	5	.2	.18	nil	nil	
1337	24	477-487	.0	4	.27	1.9	6	.3	.055	nil	nil	
1338	24	487-495	.0	3	.28	1.5	4	.2	.085	nil	nil	
1339	24	495-508	.0	2.5	.23	1.6	4	.3	.053	<.001	nil	
1340	24	508-516	.1	.9	.06	.85	<.1	.1	.045	<.001	nil	
1341	24	516-525	.0	5	.025	2	nil	.3	.06	nil	nil	
1342	24	525-534	.1	4	nil	1.6	nil	.4	.045	nil	nil	
1343	24	544-557	.1	5	.76	2.7	.1	3	.035	nil	nil	
1344	24	578-584	.0	7	.28	.38	.5	.4	.2	nil	nil	
1345	24	584-591	.0	1.5	nil	2	.5	.3	.06	nil	nil	
1346	24	591-600	.0	2	nil	1.2	.1	.3	.035	nil	nil	
1347	24	600-609	.2	4	.4	3	.1	.4	.06	.001	nil	
1348	24	609-615	.0	14	.13	1.3	.1	.5	.035	<.001	nil	

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1349	24	615-619	.2	20	.6	4.1	.2	.5	.035	nil	nil	
1350	24	619-630	.0	3	.22	1.6	<.1	.3	.05	nil	nil	
1351	24	630-636	.0	7	.18	1.7	nil	.7	.035	nil	nil	
1352	24	636-642	.2	9	.6	7.5	nil	.4	.035	nil	nil	
1353	24	642-649	.22	12	.9	5.9	.3	3	.026	nil	nil	
1354	24	649-659	.3	14	.76	7.8	nil	2	.022	nil	nil	
1355	24	659-663	.2	6	.75	7.8	nil	.5	.018	nil	nil	
1356	24	663-672	.1	6	.15	2.7	nil	.4	.014	nil	nil	
1357	24	672-677	.18	9	.25	5.4	nil	2	.024	nil	nil	
1358	24	677-688	.3	8	.55	3.5	nil	.3	.020	<.001	nil	
1359	24	688-697	.4	25	1.6	7.5	<.1	.9	.060	nil	nil	
1360	24	697-704	.7	40	1.5	1.3	nil	.4	.018	.06	nil	
1361	24	704-712	.2	35	.13	1	.2	.7	.018	.1	.6	
1362	24	712-714	1	25	4	4.6	nil	.5	.018	.001	>10*	Cd, Co, Bi detected
1363	24	714-724	.25	20	.25	2	<.1	.5	.060	<.001	.6	
1364	24	724-729	.0	20	nil	1.8	nil	2	.3	nil	nil	W detected
1365	24	729-738	.0	2.5	nil	1.7	.1	.4	.040	.002	nil	
1366	24	738-750	.1	10	nil	2.1	.1	.4	.026	.002	nil	
1367	24	750-756	.1	1.5	nil	1.7	.1	.3	.018	.003	nil	
1368	24	756-766	.0	1.5	nil	1	<.1	.16	.017	.001	nil	

*Chemical Analysis Result: 11.7

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1369	24	766-775	.1	1	nil	1.3	<.1	.2	.022	.004	nil	
1370	24	775-781	.0	10	nil	1.5	nil	.4	.025	.001	nil	
1371	24	781-792	.0	1.6	nil	1.5	nil	.2	.022	.002	nil	
1372	24	792-799	.0	4	nil	1.9	nil	.3	.021	.002	nil	
1373	51	221-230	.1	5	.16	2.7	3	.3	.025	.001	nil	
1374	51	230-237	.1	2	.5	1.6	5	.3	.020	.001	nil	
1375	51	237-243	.0	>10	.04	1.5	5	.4	.018	.003	nil	
1376	51	243-251	.0	3	.07	4	3	.4	.019	nil	nil	
1377	51	251-259	.0	3	.16	3.5	7	.4	.022	.001	nil	
1378	51	259-270	.1	4	.09	2.3	3	.4	.021	.001	nil	
1379	51	270-278	.15	1.2	.09	2.1	3	.5	.020	.001	nil	
1380	51	278-287	.10	4	nil	.19	5	.4	.020	<.001	nil	
1381	51	287-297	.0	1.5	.08	1.5	7	.5	.035	<.001	nil	
1382	51	297-306	.0	1.2	.09	3	3	.4	.022	<.001	nil	
1383	51	306-315	.0	3	.2	1.3	3	.4	.022	<.001	nil	
1384	51	315-325	.0	1	.09	3.5	3	.4	.022	<.001	nil	
1385	51	325-334	.15	2.5	.15	1.5	5	.4	.018	<.001	nil	
1386	51	334-344	.6	4.5	.7	3.7	8	.5	.3	.11	.4	Bi, W, Zr detected
1387	51	344-351	.1	22	nil	12	nil	.8	.4	.02	nil	Sn, Zr detected

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1388	51	351-367	.0	20	.06	20	nil	.3	.030	.003	nil	Sn,W, Zr detected
1389	51	367-375	.1	25	.3	20	nil	.4	.040	<.001	nil	Sn, W detected
1390	51	375-383	.3	20	1.5	19	nil	.4	.022	.001	.1	Sn, W detected
1391	51	383-389	.4	25	2	20	nil	.4	.040	.02	nil	Sn, W detected
1392	51	389-398	.7	25	>3	15	.3	.4	.021	.12	.2	Bi, Sn detected
1393	51	398-408	.1	35	.05	.1	nil	1.8	.018	.04	nil	
1394	51	408-418	.2	35	.05	.1	nil	1.1	.014	.04	nil	
1395	51	418-432	.25	35	.04	.1	nil	.4	.016	.2	nil	
1396	106	200-209	.4	1	.2	2.9	3	.5	.060	.3	nil	
1397	106	209-220	.2	1.8	.1	1.2	6	.5	.040	.02	nil	
1398	106	220-232	.2	1.8	.4	1.5	8	.4	.030	.007	nil	
1399	106	232-241	.7	1.2	>4	5.9	2	1.5	.040	.001	nil	
1400	106	241-253	.3	5	2	7.8	.1	2	.060	.001	nil	
1401	106	253-263	.25	6	1	6.5	<.1	2	.015	.001	nil	
1402	106	263-271	.4	6	>3	9	nil	3	.026	.003	nil	
1403	106	271-278	.25	16	2	13	nil	2	.028	.015	nil	
1404	106	278-285	.3	16	.6	13	nil	.9	.030	.007	nil	
1405	106	285-295	.2	18	.4	10	nil	1	.070	.002	nil	
1406	106	295-305	.4	10	>4	8	<.1	3	.12	.001	nil	

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1407	106	305-315	.25	10	1.1	8	<.1	3	.060	.001	nil	
1408	106	315-325	.3	20	1	19	nil	.4	.060	.002	nil	
1409	106	325-333	.2	25	.6	15	.1	.4	.2	.001	nil	
1410	106	333-339	.2	15	.35	13	<.1	.9	.025	<.001	nil	
1411	106	339-349	.1	20	.02	4	<.1	.2	.02	.002	nil	
1412	106	349-359	.7	30	.2	1.8	.3	.4	.020	.4	nil	
1413	106	359-363	.25	25	.5	3	.3	.5	.020	.08	nil	
1414	106	363-372	.2	25	.06	9	.1	.4	.020	.02	nil	
1415	106	372-380	.15	30	.1	20	.2	.4	.055	.007	5	
1416	106	380-390	.17	30	>5	11	.8	.7	.018	.03	nil	
1417	106	390-400	nil	35	.04	.5	nil	.4	.020	.05	nil	
1418	106	400-410	nil	40	.02	.4	nil	.4	.020	.001	nil	
1419	106	410-421	.2	40	.05	nil	nil	.4	.020	2	5	
1420	106	421-431	nil	40	.04	nil	nil	.4	.016	.004	nil	
1421	106	431-437	nil	40	.02	nil	nil	.4	.018	.002	nil	
1422	106	437-447	nil	45	.05	nil	nil	.4	.018	.001	nil	
1423	106	447-457	nil	45	.04	nil	nil	.35	.016	.001	nil	
1424	130	190-200	.4	25	1	14	.6	.4	.16	.03	.3	
1425	130	200-206	.16	30	.8	18	.3	.4	.055	.03	.2	

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1426	130	206-216	.2	25	.7	18	<.1	.35	.050	.005	nil	
1427	130	216-224	.25	20	1.7	10	<.1	.35	.050	.01	nil	
1428	130	224-229	.4	25	1	20	.8	.35	.035	.1	nil	
1429	130	229-239	.25	20	1	14	<.1	.4	.16	.005	nil	Sn detected
1430	130	239-243	.2	22	.4	10	<.1	.35	.045	.001	nil	Sn detected
1431	130	243-248	.2	10	.35	10	nil	.35	.030	<.001	nil	
1432	130	248-254	.15	14	.2	6	nil	.2	.025	.001	nil	
1433	130	254-263	.22	25	1	20	.4	.35	.045	.001	nil	
1434	130	263-268	.3	30	2	22	nil	.4	.14	.002	nil	
1435	130	268-274	.25	20	1	14	.4	.3	.030	.001	nil	
1436	130	274-279	.21	20	.3	14	nil	.35	.03	.01	nil	
1437	130	279-283	.22	7	1.2	10	nil	.3	.035	.001	nil	
1438	130	283-293	.3	25	2	10	nil	.4	.07	.001	nil	
1439	130	293-303	.25	16	1	12	.4	.3	.065	.001	nil	
1440	130	303-314	.3	25	1.2	10	nil	.7	.07	.001	nil	
1441	130	314-324	.3	16	>4	5	nil	1.4	.12	<.001	nil	
1442	130	324-330	.5	.8	>4	10	3	.6	.10	<.001	nil	Sn detected
1443	130	330-334	.4	6	>4	13	1	.5	.14	<.001	nil	Sn detected
1444	130	334-341	.5	6	>4	5	2	.5	.03	<.001	.1	Sn Detected
1445	130	341-351	>2	8	>4	18	.2	.4	.026	<.001	nil	

Lab No.	DH	Depth	ELEMENTS Ag-Oz	Ca %	Cu %	Fe %	K %	Mg %	Mo %	Pb %	Zn %	Remarks
1446	130	351-361	.22	16	1.2	10	<.1	.3	.06	<.001	nil	
1447	130	361-370	>2	14	>4	22	3	.35	.06	nil	nil	
1448	130	370-380	.3	8	1.2	7	nil	.3	.12	.001	nil	
1449	130	380-386	.5	16	>4	13	nil	.6	.04	.004	.1	
1450	130	386-396	>2	5	>4	15	nil	.16	.3	.001	nil	W detected
1451	130	396-406	>2	1	>4	14	7	.2	.2	<.001	nil	W detected
1452	130	406-412	.0	2	.18	2	8	1	.022	<.001	nil	
1453	130	412-420	.0	2.5	.04	3	>10	.4	.026	nil	nil	
1454	130	420-427	.1	3	nil	2.5	7	.4	.024	nil	nil	
1455	130	427-439	.8	2	nil	1.5	10	.4	.024	<.001	nil	
1456	130	439-446	.3	1	3.5	10	6	.6	.03	.004	nil	
1457	130	446-455	.10	2	nil	2.7	8	.4	.022	nil	nil	
1458	130	455-460	.2	1.5	nil	3.5	10	.4	.022	nil	nil	
1459	130	460-468	.10	3	.07	2.5	8	.5	.022	nil	nil	
1460	130	468-474	.0	2.5	nil	2.5	6	.4	.024	nil	nil	
1461	130	474-481	.0	2	nil	4	5	.4	.020	.001	nil	
1462	130	481-486	.0	2	nil	3	4	.4	.022	nil	nil	
1463	130	486-495	.0	.7	nil	2.5	5	.5	.020	nil	nil	

H. B. NICHOLAS
CHIEF CHEMIST

AMERICAN SMELTING AND REFINING COMPANY
Tucson Arizona

September 24, 1962

Mr. G. G. Gunther
El Paso Assay & Ore Dressing Laboratory
American Smelting and Refining Company
P. O. Box 895
El Paso, Texas

MISSION ANALYSES

Dear Sir:

In regard to our recent telephone conversation, we are sending you by railway express on September 24 or 25 one box containing pulps and samples from the Mission deposit for analysis.

One box contains 125 pulps from which we would like to have semi-quantitative spectrographic analyses made. As I understand it, in most cases you will be able to report metal values in percentage units of .01, .1, 1.0, etc.

Another group of 9 samples, labeled J 101, J 103, J 105, K 11, K 12, 88-418, 88-427, 88-748, and 88-753, is to be chemically analyzed for the following elements and compounds:

Ag, Pb, Cu, Zn, Sb, As, Al_2O_3, CaO, CO_2, F_2, FeO, Fe_2O_3, MnO, MgO, Mo, TiO_2, SiO_2, S, K_2O, Na_2O, P_2O_5, H_2O-110°C, H_2O+110°C

A third group of two samples, labeled 81-430, and 100-472, should be analyzed for the following:

Cu, Al_2O_3, CaO, FeO, Fe_2O_3, MnO, MgO, Mo, TiO_2, SiO_2, S, K_2O, Na_2O, H_2O-110°C, H_2O+110°C

The samples for chemical analysis will be compared with thin sections which we already have. Some of these samples are rather small, the smallest being about 1/2 lb. in weight. You have explained that this will be sufficient material for you to work with. If this proves not to be the case in some instances, we will try to obtain larger samples of the same material for you to work with.

Please send the results to my attention and charge the cost of the work to the Exploration Department here.

cost $62.50
12/14/62

Yours very truly,

KENYON RICHARD

KR/kw
cc: CPPollock
DJPope
RBMeen
Bob Gale

Blind note on all copies:

Bob Gale is gathering data for a Stanford Ph. D. thesis on the distribution of elements and minerals in the Mission deposit. Appropriately, he will be doing this work on his own time. This is the kind of research which we would prefer to have accomplished during the exploration phase of the Mission project. However, we did not then have the time nor personnel to devote to it. The work planned by Gale will be of value principally in teaching us more about the detailed mineralogy and geology of this kind of deposit; it may not be of much direct benefit to the mining operation itself. For this reason, I believe we should regard this as an exploration department research project, and charge the costs of these analyses and a few thin sections to exploration rather than to the Mission Unit.

KR

Chemical Analyses

Quartz Monzonite

Sample No.

81 - 430 Probable intrusive
100 - 472 Possible altered argillite - recrystallization

Analyse for SiO2, TiO2, Al2O3, Fe2O3, FeO, MnO, MgO, CaO, Na2O, K2O, H2O+110° C, H2O-110° C, Cu, Mo, S

Quartzite - Calcareous Argillite - Diopside Hornfels Possible Gradational Sequence

J 101 Quartzite
J 103 Calcareous argillite
J 105 Hornfels

K11
K12

Argillite - Hornfels-Tactite, and Tactite-Marble

88-418 Argillite)
88-427 Tactite - Hornfels) apparent gradation
88-748 Tactite
88-753 Marble

Analyse for SiO2, TiO2, Al2O3, Fe2O3, FeO, MnO, MgO, CaO, Na2O, K2O, H2O+110° C, H2O-110° C, P2O5, F2, S, CO2, Cu, Mo, Zn Pb, Ag, As, Sb.

Spectrographic Analyses

Assay pulp rejects for four holes along east-west line 4350N - aaproximately 125 samples

Hole No.

24	240.6	to	642.3	
	557.4	to	577.0)	missing
	534.1	to	544.6)	
106	200	to	457.5	
51	221.1	to	432.2	
130	190.7	to	495.6	

Would like to determine feasibility of quantitative or semi-quantitative spectrographic analyses to determine percentages or relative amounts of important elements, especially Cu, Fe, Ag, Pb, Zn, Mo, K, Ca, Mg.

Study by spectrographic method may show a systematic variation of certain elements vertically, and, or laterally through the orebody.

125 samples pulps

semi-quant.

$50

Lapthan $100

---

2 x 13 – 26

21 x 7 – 147

173

$400

$500

100

RR Express Freight

1/2#

Semi-quant.

HAWLEY & HAWLEY
ASSAYERS AND CHEMISTS, INC.
1802 WEST GRANT ROAD - TELEPHONE MAIN 2-4836 - POST OFFICE BOX 5934
TUCSON, ARIZONA
Registered Assayers

August 29, 1962
Our 49th Year

K. R.
AUG 30 1962

Mr. Kenyon Richard
Southwestern Exploration Department
American Smelting and Refining Company
813 Valley National Building
Tucson, Arizona

Dear Mr. Richard:

In response to your letter of August 28, 1962, we list below our standard analysis charges for the elements you requested, and we quote a discount of 23% from the gross charges.

7 samples - price each		2 samples - price each	
Ag	$ 2.75		
Pb	3.00		
Cu	2.50	Cu	$ 2.50
Zn	3.50		
Sb	7.50		
As	7.50		
Al_2O_3	7.50	Al_2O_3	7.50
CaO	7.50	CaO	7.50
CO_2	7.50		
F_2	9.00		
FeO	4.00	FeO	4.00
Fe_2O_3	4.00	Fe_2O_3	4.00
MnO	4.00	MnO	4.00
MgO	9.00	MgO	9.00
Mo	6.00	Mo	6.00
TiO_2	15.00	TiO_2	15.00
SiO_2	7.50	SiO_2	7.50
S	4.50	S	4.50

7 samples - price each	
K_2O	$10.00
Na_2O	10.00
P_2O_5	7.50
H_2O-110°C	2.00
H_2O+110°C	2.00
Preparation	.75
Total per sample	$144.50

2 samples - price each	
K_2O	$10.00
Na_2O	10.00
H_2O-110°C	2.00
H_2O+110°C	2.00
Preparation	.75
Total per sample	$96.25

$144.50 x 7 samples =	$1,011.50
$ 96.25 x 2 samples =	192.50
Gross charges	1,204.00
Less 23% discount	276.92
Net charges	$ 927.08

For this work we suggest that you furnish as large a sample as possible, preferably over five pounds.

Should you have any questions please do not hesitate to call me, or Mr. Platt. Thank you for the opportunity of being of service to you.

Sincerely,

HAWLEY & HAWLEY, INC.

Harold E. Richard

Harold E. Richard
President

cc: Laboratory Manager

August 28, 1962

Mr. Harold Richard
Hawley and Hawley
Box 5934
1802 W. Grant Road
Tucson, Arizona

CHEMICAL ANALYSES

Dear Sir:

In accordance with our conversation of a few days ago, we would like to have you give us a quotation on standard analyses of two groups of carefully selected rock specimens. These specimens have not been pulped.

2 Samples

Analyze for SiO_2, TiO_2, Al_2O_3, Fe_2O_3, FeO
MnO, MgO, CaO, Na_2O, K_2O,
H_2O+110°C, H_2O-110°C, Cu, Mo, S

7 Samples

Analyze for SiO_2, TiO_2, Al_2O_3, Fe_2O_3, FeO, MnO,
MgO, CaO, Na_2O, K_2O, H_2O+110°C,
H_2O-110°C, P_2O_5, F_2, S, CO_2, Cu, Mo,
Zn, Pb, Ag, As, Sb

Yours very truly,

KENYON RICHARD

KR/kw

208 Avenida Carolina,
Tucson, Arizona.

J. H. C.

K. R.
JUL 30 1962

AUG 16 1962

Mr. Kenyon Richard,
813 Valley National Bldg.
Tucson, Arizona.

I talked to Ron Burton concerning the specimens for chemical analysis. He suggested, as you had, that the smaller samples might be too small. I will obtain larger samples of some of the rocks. Burton said that he could determine most of the desired elements, except K_2O, Na_2O and CO_2 and these also if he had some other materials. The only real drawback would be time to run the analyses.

As far as spectrographic determination of the rock compositions is concerned, I think determinations to the nearest percent of the major constituents, SiO_2, Al_2O_3, Fe_2O_3, FeO (if possible to distinguish from Fe_2O_3) and CaO, would be suitable. Determinations to the nearest percent for MgO, Na_2O and K_2O would be possible in some of the rocks. In others, the latter elements would be present in amount less than one percent, so that determination to the nearest tenth of a percent would be necessary to be significant. The latter condition would probably also apply to MnO, TiO_2, P_2O_5, F_2, S, Cu, Mo, Ag Pb, Zn, Sb, As, in all the samples. Im not sure that CO_2 can be determined spectrographically.

Chemical analyses would of course be more valuable than spectrographic work. Possibly a less detailed chemical analysis would be relatively inexpensive and more acceptable. Such an analysis would include SiO_2, Al_2O_3, Fe_2O_3, (FeO ?), CaO, MgO, MnO, K_2O, Na_2O CO_2 and Cu.

I will run some tests to see if the assay pulp rejects which I took from drillhole samples are representative and then I hope there will be a possibility of having some spectrographic work done on these samples as a start on work which I can continue at Mission and /or university.

Yours truly,

Bob Gale

Gold
Comp.
30

July 25, 1962

Mr. Fred Roberts
Petrographic Section Service
1300 South Monterey Pass Road
Monterey Park, California

Dear Sir:

We are sending you by railway express two boxes of specimens. One box contains 10 specimens from which we want thin sections cut; the other box contains 17 specimens from which we want polished surfaces.

Those specimens with a black line around them should have the thin section or polished surface cut approximately on the line. Those specimens with a circle on the face indicate that the cut should be parallel that face.

The specimens for thin sections are numbered as follows:

H3
H4
J6
J16
J29
J31
J32
J34
J200
L1

The polished surface specimens are numbered as follows:

H4	
20H	
H24	
H29	
J5	(2 specimens, one cut from each)
J16	
J22	
J25	
J29	(one specimen, 2 cuts)
J31	
J33	
J35	
K1	(2 specimens, one cut from each)
L2	
P100	

You will notice that some of the sample numbers are duplicated. This will require that you keep the specimens in the two boxes separated so that you can determine which require thin sections and which require polished surfaces.

Please return the specimens.

Yours very truly,

KENYON RICHARD

KR/kw

Thin Sections (10 sections)

Specimen No.

H3	Breccia Dike
H4	Breccia Dike
J6	Garnetized Pre-Mineral Breccia
J16	Calc silicate - Quartzite contact
J29	Marble - Calc silicate contact
J31	Potash feldspar - carbonate alteration
J32	Calc silicate - quartzite contact
J34	Potash feldspar veinlet
J200	Breccia Dike
L1	Banded Calc silicates

Polished Sections (18 sections)

Specimen No.

H4	Breccia Dike with galena-sphalerite - pyrite-tennantite
H20	Disseminated molybdenite-chalcopyrite in tactite
H24	Pre mineral breccia with chalcopyrite
H29	Sphalerite - tennantite veinlet
J5	Sphalerite - chalcopyrite veinlet (2 specimens)
J16	Disseminated Chalcopyrite - quartzite - calc silicate contact
J22	Hematite - chlorite - pyrite - chalcopyrite veinlet
J25	Tennantite - quartz - pyrite veinlets in tactite
J29	Bornite - sphalerite veinlet (2 sections of same specimen)
J31	Carbonate with sphalerite - chalcopyrite - tennantite
J33	Chalcopyrite - disseminated molybdenite in tactite
J35	Quartzite -chalcopyrite - sphalerite tennantite
K1	Bornite - pyrite - tennantite - (2 specimens)
L2	Quartz feldspar - molybdenite
P100	Magnetite - chalcopyrite - pyrite