CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
416 W. Congress St., Suite 100
Tucson, Arizona 85701
520-770-3500
http://www.azgs.az.gov
inquiries@azgs.az.gov

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James Doyle Sell Mining Collection

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ASARCO

Southwestern Exploration Division

January 3, 1989

R.L. Brown

Monthly Report
December 1988
M.A. Miller

Yarnell Mine - Yavapai County, AZ

Results were received from recon sampling at the Yarnell Mine area. Mineralization appears to be hosted in a low angle shear in altered silicified granodiorite. Based upon the results of the site inspection and recon sampling which indicated general agreement with the sampling done by Norgold a more detailed sampling program was completed to test the potential thickness of the mineralized zone. Results are pending from this sampling program. A site visit with J.D. Sell is planned in early January 1989.

Heddleston Leach Project, Lewis & Clark County, Montana

Progress on the leaching of the Heddleston ores has met with mixed results. A report by the bureau of mines in Salt Lake City, Utah, indicated that the ore consists of 40% chalcopyrite and 60% chalcocite, digenite and covellite. The chalcopyrite is exsolved in the pyrite thus suggesting the reason as to why visible chalcopyrite is rarely seen in the ore. Additional testing is being done with a chloride leach and one of the leach columns is being run to its 90 day completion. Once the leach testing is completed a final report will be submitted.

Field Days	Office Days	Samples Taken	Expense Acct.	Vehicle Exp.
6	10	52	$396.50	$200.00

MAM:mek

Mark A. Miller

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

JDS

January 3, 1989

J. D. Sell

Quarterly Report
4th Quarter 1988

Heddleston Project, Lewis & Clark Counties, Montana

Column leach testing was begun and completed during the quarter. A final report will be submitted once results are received.

SWED

Utah - Time was spent staking claims in the Yellow Jacket area and assisting W.D. Gay with surveying at Gold Hill.

Arizona - Time was spent evaluating and sampling Yarnell Mine area in Yavapai County, Arizona, which is presently controlled by Norgold Resources. Results are pending from most recent sampling.

A 1989 work program was written and submitted to J.D. Sell.

A gold conference was attended in November and a report detailing the meeting was written and submitted.

MAM:mek

M. A. Miller

cc: W.L. Kurtz

ASARCO

Exploration Department
Southwestern United States Division

January 16, 1989

Mrs. Sharon Gentner
P.O. Box 150
Benson, AZ 85602

Dear Sharon:

With regard to our conversation of 1/16/89, Asarco conducted exploration of ground covered by Prospecting Permit #0892123 at a cost in excess of $2,000 in 1988. The work consisted of reconnaissance geologic mapping, rock chip sampling and assaying. I hope this will suffice.

Respectfully,

Mark A. Miller
Geologist

MAM:mek

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

ASARCO

Exploration Department
Southwestern United States Division

January 16, 1989

Mr. Kevin Hanna
5036 Edie Dr.
Kingman, AZ 86401

Dear Kevin:

Thank you for the time you spent with Jim Sell and me at your Burro Creek property. Seems like you have a real engineering challenge; good luck. As we discussed, the exporation potential is what we would be interested in and will probably be in touch with Cory along these lines. Again thanks for the trip.

Respectfully,

Mark A. Miller
Geologist

MAM:mek

cc: J.D. Sell

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1150 North 7th Avenue (602) 792-3010

ASARCO

Exploration Department
Southwestern United States Division

January 16, 1989

Mr. Scott A. Petsel
Mine Geologist
Echo Bay Minerals
Congress Mine
P.O. Box 361
Congress, AZ 85332

Dear Scott:

Thank you for allowing Jim Sell and me to tour your mine. Bob was an excellent tour guide and the trip was vey informative and interesting.

Good luck in your future endeavors in the area. Maybe some day we can get together for that dinner.

Respectfully,

Mark A. Miller
Geologist

MAM:mek

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

LORENZO D. W. BARTON
P.O. BOX 405
PAYSON, AZ, 85547

Dear Mr. Sell,

Your letter of Nov. 21, 1988.

ASARCO Incorporated
JAN 23 1989
SW Exploration

I have, about 100 feet from previous point A at point B excavated, pick & shovel, to pierce the border clay-rock - in this place close to surface.

Trouble - I believe the titanium is masking the gold.

I am, myself quite sure the trace should be about 2/3 oz. of gold. I hope (I wrote letter) Az. testing lab is "testing" that situation.

I am very optomistic right now

Within my resources the best I can do now and I do not expect to be able to do much more very soon -

Lorenzo DW Barton

I find only a uniform gravel clay but it is become very hard so that the auger can no longer be used.

(?) JV

Arizona Testing Laboratories

817 West Madison Street □ Phoenix, Arizona 85007 □ 602/254-6181

For Mr. Lorenzo D. W. Barton
Post Office Box 405
Payson, Arizona 85547

Date January 20, 1989

ASSAY CERTIFICATE

LAB NO.	IDENTIFICATION	OZ. PER TON		PERCENTAGES			
		GOLD	SILVER	COPPER	TITANIUM		
3662	No Mark	trace	5.6		0.40		

Respectfully submitted,

ARIZONA TESTING LABORATORIES

Claude E. McLean, Jr.

Claude E. McLean, Jr.

Registered Assayer
CERTIFICATE NO. 6258
CLAUDE EUGENE McLEAN, JR.
Date Signed 1/20/89
ARIZONA, U.S.A.

JDS

ASARCO

Exploration Department
Southwestern United States Division

January 3, 1989

Consultant
Suite 805
13618 N. 99th Ave.
Sun City, AZ 85351

Dear Sir:

This is in reply to your ad in the Dec EMJ regarding gold and silver properties. Please send additional information about the properties.

Thank you for your time.

Respectfully,

Mark A. Miller
Geologist

MAM:mek

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 553
January 24, 1989
PROJECT NO.: COCHISE CO.
CC 1-5

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 5 Rock Chip Samples

ITEM	SAMPLE NO.	FIRE ASSAY Au* (ppm)	FIRE ASSAY Ag* (ppm)
1	CC-1	<.01	2.9
2	CC-2	.06	1.7
3	CC-3	2.00	>500.0**
4	CC-4	.04	35.0
5	CC-5	.38	90.0

*NOTE: Method of analysis by combination fire assay and atomic absorption based on a one assay-ton sample.

**NOTE: Greater than normal geochemical range. Please advise if further analysis is needed.

cc: Mr. J. D. Sell

ASARCO Incorporated
JAN 26 1989
SW Exploration

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK ARIZONA, U.S.A.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

ASARCO Southwestern Exploration Division

JDS

December 22, 1988

J. D. Sell

Mohave County et al
Field Trip
January 1989

The prospects listed below and submittals will be visited during our field trip.

SEA-Y Claims - La Paz County - missed
MNM Claims - La Paz County, South of Copperstone
Soccoro Mine - La Paz County - missed
Burro Telegraph Mine - Mohave County (Tentative)
Greenwood Pear Jasperoid - Mohave County - missed
Congress Mine - Yavapai County
Yarnell Mine - Yavapai County

Possible additions/alternatives are:

Crossman Peak Area WSA - Owens Mining District, Mohave County
Silverfield Group Claims - Owens Mining District, Mohave County) missed

MAM:mek

Mark A. Miller

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 542
November 10, 1988
RT-1 - RT-5

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 4 Rock Chip and 1 Stream Sediment Sample

ITEM	SAMPLE NO.	FIRE ASSAY Au* (ppm)	FIRE ASSAY Ag* (ppm)
1	RT-1	.045	1.6
2	RT-2	.065	2.5
3	RT-3	.075	8.9
4	RT-4	<.005	.5
5	RT-5	.005	<.2

*NOTE: Method of analysis by combination fire assay and atomic absorption based on a one assay-ton sample.

cc: Mr. J. D. Sell

JDS

ASARCO

Exploration Department
Southwestern United States Division
James D. Sell
Manager

February 14, 1989

Mr. Lorenzo Barton
P.O. Box 405
Payson, AZ 85547

Dear Mr. Barton:

Thank you for the past few notes, the latest dated February 12, 1989.

It is of interest that you have hit the "basement" of diorite which may be carrying your precious metal values.

As for an assay office which we often use and can do your assay for gold-silver by adding the silver-flux to make sure it all reports into the bead, I enclose the brochure and some shipping forms to you.

On page 6 (right hand column) note that they will use a one assay ton charge if you specify and for the Gold and Silver Fire assay they report the gold to 0.002 ounces/ton with the silver to 0.01 ounces/ton (see yellow order sheet). If you want lower values reported then I recommend the "Gold, Fire Assay/AA...." which reports to 0.01 ppm (0.0003 ounces per ton) (see cost and description in left hand column, page 6).

Until next time,

Sincerely,

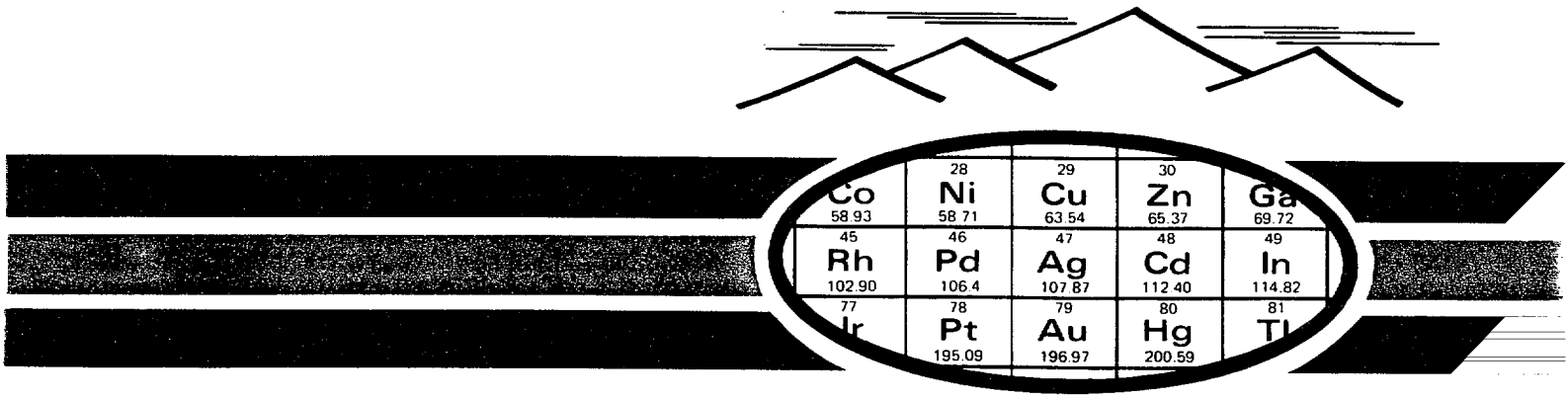
James D. Sell

James D. Sell

JDS:mek

cc: M.A. Miller

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010



1989

analytical services for the mineral industry

SKYLINE LABS, INC.

ASARCO Incorporated

JDS

FEB 1 4 1989

SW Exploration

February 12, '89

Dear Mr Sell,

Yesterday (perfect for pick shovel) I uncovered about 6 ft² of "basement" at point B (hole now deeper and larger than picture I sent).

The "basement" is diorite, covered by about 30 inches of "clay".

Indication on bed of Diorite ½ oz/ton gold
30 inches "clay" .00x oz/ton gold.

I must find an assay office (Mr Steele gone to Nevada and busy) which you will respect and which will give me silver flux fire assay (Mr. Steele charged $30 for silver flux).

By time I am vested the ground will be frozen again — but I need assay ~~now~~ next.

I saved about 30 pounds from the 6 ft² of surface — but rather wait for deeper anyway.

No reply needed (unless you could suggest assay office).

Lorenzo W Barton

Example: assay of fragments of small igneous rock

	Gold	Silver
lead flux fire assay	.18	7+
atomic absorption	NEL	trace

Mr. Miller was in possession of some of these chips

impossible to work here with anything but silver flux (or something better?)

Dear Mr. Bell,

February 9, 1989

Just a note — no reply.

Am starting (ground frozen now) to excavate, pick & shovel, points A & B. Only to let you know I am still trying.

I hope to answer some questions on assays before the Spring is over. Currently I am convinced the atomic absorption is worse than useless on this material (?)

Arizona listing Sb assay for titanium .4 %. From my limited information this is about what should be expected, so, I assume, any assay process used in Arizona should not be in trouble with titanium.

I am finding quite rock like material (like close to sandstone texture). I hope to examine the "foundation" of the one to four feet of "clay".

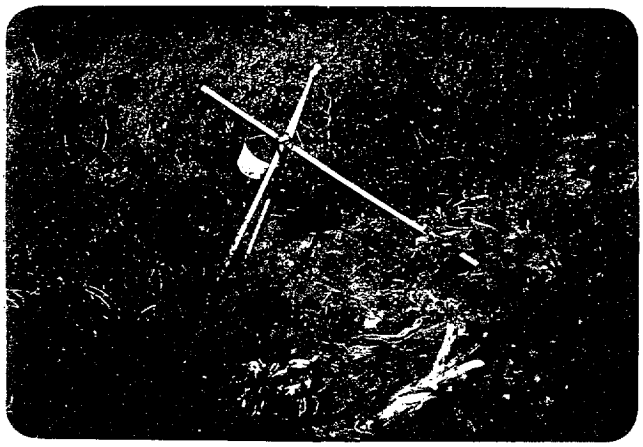
George W Barlow

ASARCO Incorporated

FEB 10 1989

SW Exploration

Lorenzo Barton
Pasion Area
Sec. 12, T 10N, R9E
Gila Co., AZ



Point B, Looking North
The Juniper shows where the "clay" bed terminated

Point B, Looking South
The tripod of PVC poles at Point A is visible

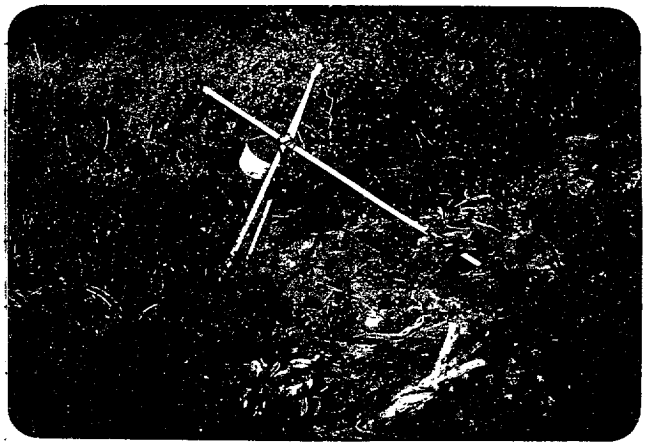
Point B, Looking South
Lower left foreground is unaltered test hole Mr. Miller excavated.
(MA Miller)

Point B, Looking South
My excavation (LBs). I hope to make it twice as deep and with corresponding width.

L. DW Barton

2/9/59

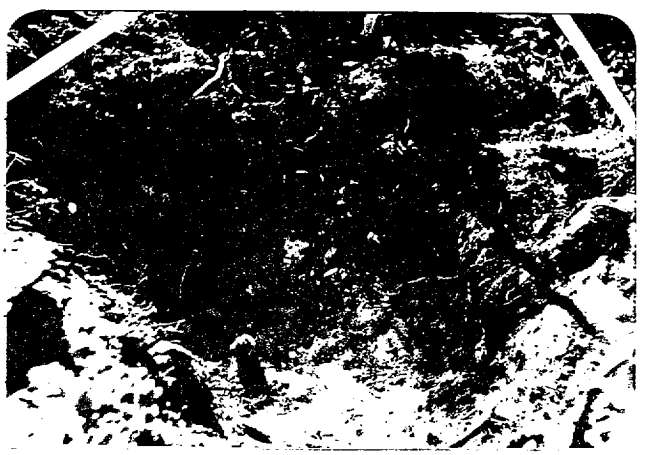
Lorenzo Barton
Payson Area
Sec. 12, T 10N, R9E
Gila Co., AZ



Point B, Looking North
The Juniper shows where the "clay" bed terminated

Point B, Looking South
The tripod of PVC poles at Point A is visible

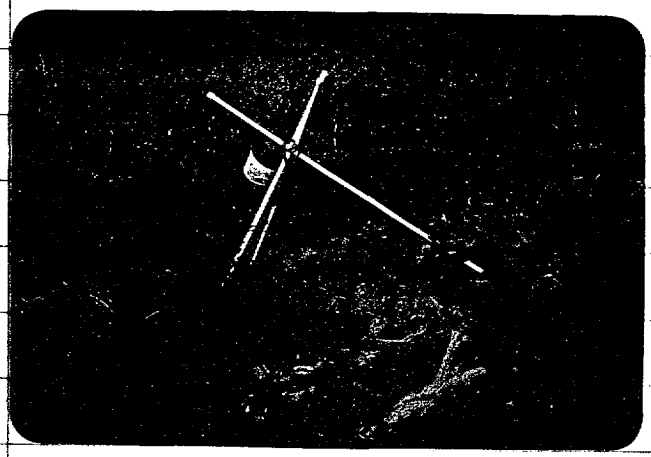
Point B, Looking South
Lower left foreground is unaltered test hole Mr. Miller excavated.
(MA Miller)



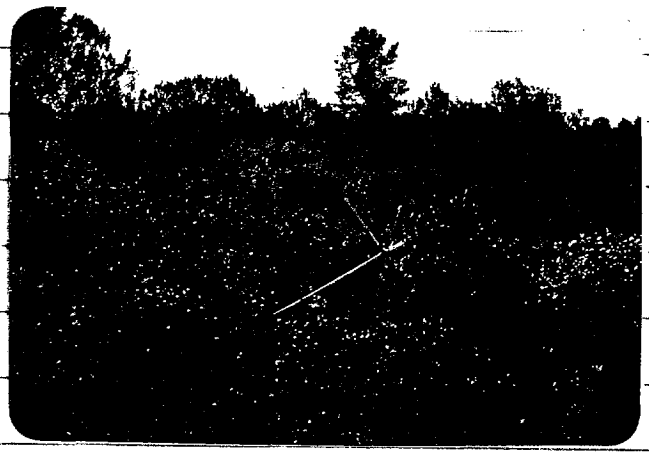
Point B, Looking South
My excavation (LBs). I hope to make it twice as deep and with corresponding width.

L. DW Barton
2/9/59

Lorenzo Barton
Paspon Qua
Sec. 12, T 10N, R9E
Gila Co., AZ



Point B, Looking North
The Juniper shows where the "clay" bed terminated



Point B, Looking South
The tripod of PVC poles at Point A is visible

Point B, Looking South
Lower left foreground is unaltered test hole Mr. Muller excavated.
(MA Muller)

Point B, Looking South
My excavation (LB's). I hope to make it twice as deep and with corresponding width.

L. DW Barton

2/9/59

ASARCO Southwestern Exploration Division

March 7, 1989

R. L. Brown

MONTHLY REPORT
M.A. Miller
February 1989

YARNELL MINE, Yavapai County, AZ

Additional sampling and mapping was completed during the month and a report with drilling recommendations was submitted to New York. Mapping and sampling indicates a +100' thick mineralized zone with grade ranging from .03-.05+ opt Au. Underground sampling suggests similar thicknesses and grade extending into the hanging wall of the mineralized fault zone. Ore potential is 4-6 mt @ .03-.05 opt of open pittable material.

Field Days	Office Days	Samples Taken	Expense Account	Vehicle Expense
18	6	50	$1,302	$300

MAM:mek

Mark A. Miller

cc: W.L. Kurtz
J.D. Sell

ASARCO

Exploration Department
Southwestern United States Division

March 15, 1989

Mr. E.V. Cohoe
5361 N. 61st Ave.
Glendale, AZ 85301

SEA-Y Claims

Dear Mr. Cohoe:

On our January field trip to the Mohave we were unable to visit your property. However, as time permits we will schedule a visit.

Thank you for considering Asarco.

Respectfully,

Mark A. Miller
Geologist

MAM:mek

cc: J.D. Sell

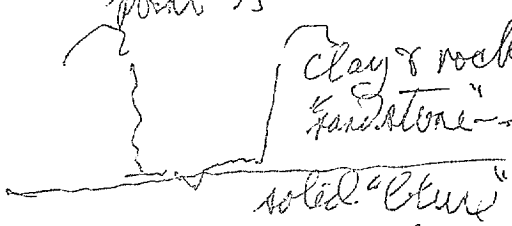
ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

March 30, 1989
JDS

Dear Mr. Sell,

Just a note — hope you remember my case — no reply indicated.

NOTE I know my opinions are only guesses!



Currently the pit has water, 2 ft, in the bottom so I can't work before Sat. or Sun. at the earliest.

So I examined the fragments I obtained a few days ago, before the rain.

(a) the fragments are solid "blue" diorite, with extensive white network.

(b) Assays (1 1/4" auger) by Mr. Steele (he is registered and has worked for major mining firms) over 1 oz. gold at this (approx) depth.

(c) Mr. Cardy Harrison (local, 12 and farther, much experience, little formal education) quote: "the gold in this area is in the calcite".

I believe now I have ore.

I will expect to obtain large chunks, etc.

George D W Barlow

MAR 31 1989

SW Exploration

Lorenzo W. Barlow
P.O. Box 405
Bayson, Ky. 85547
March 21, 1989

FILE

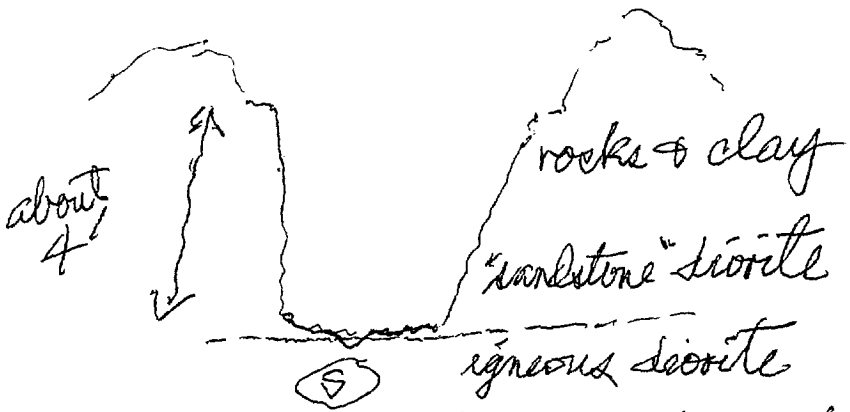
JDS

Dear Mr. Sell -

Many thanks for your letter. I have excavated in search of the auger assays at about 4 feet. 2 almost identical at vertical separation of less than 1', ~ 1/3 oz gold.

3 assays - nothing (2 more yet to return - I expect now little).

Yesterday I think I reached the correct depth and this is my opinion.



from the small samples this is a sharp demarkation. The fragments show sharply defined line -

I now suppose no use taking assay until I can obtain a sample inside the igneous diorite. This will take time (a good rain would help).

Lots of fun

Lorenzo W. Barlow

ASARCO Incorporated
MAR 22 1989
SW Exploration

ASARCO

Southwestern Exploration Division

April 3, 1989

R.L. Brown
New York

M.A. Miller
Monthly Report
March 1989

Yarnell Project, Yavapai County, AZ

The entire month was spent working on the Yarnell Project in the preparation for drilling and finally the completion of 9 drill holes. Drilling began on March 20 and ended on April 1, 1989, with 8 holes completed during the month. The last portion of the drilling is pending, but results received to date are summarized below:

Hole #	Footage	Assay Results
1	5-100	95' @ .037
2	45-200	155' @ .03
4	100-205	105' @ .011
5	195-355	160' @ .031
6	135-180	45' @ .035
7	160-230	70' @ .051

See WLK memo April 6 to show better interpretation of data

These intervals are preliminary and subject to modifications. Assays for holes 3, 8 & 9 are pending. A report will be submitted with recommendations for further work once all assays are received and some of the intervals checked.

Gold Prince Mine, Dos Cabezas District, Cochise County, AZ

One day was spent reviewing Queenstake's data on the Gold Prince Mine. They have developed approximately 50,000T at .3 opt. District potential is probably ±250,000T at an average grade of .3 opt Au, all underground. This is probably too small for Asarco and I informed Tim Pearson, Project Geologist, that we would not be interested at this time.

Field Days	Office Days	Expense Account	Vehicle Expense
14	12	$1057.84	$300

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

L. D. W. BARTON
P.O. BOX 405
PAYSON, AZ, 85547
April 15, 1989

FILE
JDS

Dear Mr. Dell,

I will "sign off" for a while. I have used my available money.

I have no good returns from assays, both Skyline and Az. testing.

I have a new formation at about 4 feet deep. I took last sample, over 5 pounds from about 5 feet deep at least a foot into the new formation. Nil, trace, less than .002, less than .02; so for the present.

Next fall I expect to continue. Some advice to me would consider the new formation as blue schist.

Thanks for your interest

Lorenzo W. Barton

ASARCO Incorporated

APR 17 1989

SW Exploration

ASARCO

Southwestern Exploration Division

February 7, 1989

R.L. Brown
New York Office

Monthly Report
January 1989

Yarnell Mine, Yavapai County, AZ

A 40 day option was signed with Norgold Resources which will expire March 6, 1989. Detailed sampling of the pit and available underground workings has been completed and results are pending. Detailed mapping will also be completed.

Other Activities

Several prospects including the Burro Creek Deposit in Mohave Co. was examined by M.A. Miller and J.D. Sell during the week of January 9-15. The Burro Creek Deposit (owned by Arizona Silver Corp.) contains approximately 1 mt presently targeted for mining at .037 opt Au, 1 opt Ag. Exploration potential for an additional 5-7 mt at ±.03 opt Au may exist. A report is being prepared.
but unmineable at present. glad

Field Days	Office Days	Samples Taken	Expense Acct.	Vehicle Expense
13	11	165	$358.30	$250.00

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

April 21, 1989

D.M. Smith
RMED

Carissa Mine
Fremont County, Wyoming

Enclosed are 3 maps of the Carissa Mine that we found sorting through Salt Lake Exploration data.

As you can see from the plans and sections, there is quite a bit of high grade gold present according to the assays. This is probably a vein, but maybe you can do something with the data.

Good luck.

Mark A. Miller

MAM:mek

cc: J.D. Sell

ASARCO

Exploration Department
Southwestern United States Division

May 15, 1989

Mr. Wm. L. Spicer
President - Managing Director
Red Bluff Mine, Incorporated
Postal Drawer 670008
Dallas, Texas 75367-0008

Dear Mr. Spicer:

Enclosed is your data package on your Red Bluff Mine. As time permits, I will visit this property.

Thank you for your interest in Asarco.

Respectfully,

Mark A. Miller
Geologist

MAM:mek
enc.

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

ASARCO

Southwestern Exploration Division

May 9, 1989

R.L. Brown
New York Office

Monthly Report
April 1989

Phase I of the Yarnell Drilling (3022') was completed at the beginning of the month. All assays have been received and a report with recommendations for a 10,000' drilling program is in the final stages of completion. A bottle roll test was done on three samples and results suggest favorable heap leach recoveries. Further work is in progress. Assay intervals for the nine completed holes are summarized below:

Hole	Footage	Interval	Au opt
1	55-125'	70'	.055
2	45-140'	95'	.018
	140-245'	105'	.042
3	130-200'	70'	.058
4	115-225'	50'	.015
	295-310'	15'	.052
5	205-285'	80'	.027
	285-355'	70'	.056
6	150-180'	30'	.041
	215-235'	20'	.023
	270-280'	10'	.090
7	165-225'	60'	.042
	225-260'	35'	.016
8	30-225'	195'	.021
	225-275'	50'	.041
9	275-290'	15'	.013
	290-315'	25'	.048

Golden Harp Project, Yuma County, AZ

14 Holes totaling 4170' of drilling were completed during the month. The lack of measurable gold in any of the samples indicate that the soil geochem and wagon drill hole results from past work do not continue to depth and the values obtained in the past may be a surface phenomenon.

Field Days	Office Days	Expense Account	Vehicle Expense
14	8	$829.79	$700.00

Mark A. Miller

MAM:mek

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

JDS

June 29, 1989

M.A. Miller

Attending AIME Gold '89
Reno, Nevada

At your request I have reviewed the meeting contents of the special gold symposium sponsored by the AIME and conclude that you would benefit from attending the meeting.

Schedule your attendance for the World Gold, '89, Nov. 5-8, Reno, NV, with lots of good notes, preprints and publications for the SWED Library.

James D. Sell

James D. Sell

JDS:mek

cc: W.L. Kurtz

ASARCO

Exploration Department
Southwestern United States Division

September 19, 1988

Mr. Lorenzo D.W. Barton
P.O. Box 405
Payson, AZ 85547

please note comment on reverse.

Dear Mr. Barton:

Enclosed are results of my limited sampling on your prospect. As you can see, my results did not duplicate yours. On this basis we will do no further work on your property, but I did appreciate the chance to examine your ground.

Thank you for your time and consideration. Good Luck.

Respectfully,

Mark A. Miller
Geologist

MAM:mek
enc.

9/23/88

JDS
This come in addressed to you from Mr Barton. The original is in your in-box. I did not show Mr Barton's comments to Mark.

Mary

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

Sept. 22, 1988

Essentially the results are duplicates for the places where the ASARCO samples were taken.

Sample (probably V-1) taken at point "A" surface assay by Jacobs Assay Office and Mr. Steele (mine) both show only trace of gold as does Mr. Miller's assay.

Whereas at 4 to 5 feet depth at the same point Mr. Steele's assay shows (in the best case) .35 oz/ton gold — in other cases very respectable figures plus indications of platinum. Jacobs also respectable at depth.

I indicated to Mr. Miller I thought nothing would be obtained from a sample from the surface taken with geological hammer and including dark humus etc.

Mr. Steele is a registered assayist and does contract work for some large companies outside Arizona. When he reports platinum residues visable and microscopic indications of crystals indicative of palladium I do not assume then by definition his assay results are wrong.

Lenze DW Barlow

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 534
September 15, 1988
V (1-5)
PAGE 1 OF 1

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, Arizona 85703

Analysis of 5 Soil and Rock Samples

ITEM	SAMPLE NO.	FIRE ASSAY/AA Au* (ppm)	Ag* (ppm)
1	V-1 (LB-5966 23	<.02	<.2
2	V-2 " " 21	<.02	<.2
3	V-3 " " 10	<.02	<.2
4	V-4 Qz/Ep Vein	<.02	<.2
5	V-5 Decomposed Granite Road Cut.	<.02	<.2

*NOTE: Method of analysis by combination fire assay and atomic absorption based on a one assay-ton sample.

cc: Mr. J. D. Sell

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK Arizona U.S.A.

William L. Lehmbeck
Manager
9/16/88

ASARCO Incorporated
SEP 19 1988
SW Exploration

Will Barlow
P.O. Box 405
Gayton, Ariz.
85547

PAYSON, AZ
FM
SEP 12
1983
85541

25 USA

Mr. James D. Sell
ASARCO
S.W. U.S. Exploration Div -
P.O. Box 547
Tucson Arizona
85703

ASARCO

Southwestern Exploration Division

September 29, 1988

R.L. Brown
New York

Monthly Report
September 1988

Rock Creek Project, Sanders County, MT

Adit #3 was bottomed at 1632'. The hole was then plugged and cemented. Approximately 400 GPM H_2O was encountered throughout the length of the hole. The inclination of the hole deviated considerably throughout its length from +2 at the collar to -35° at the bottom.

SWED

A 1989 work program was submitted to J.D. Sell. Several areas in western Arizona have been picked for additional work. These are the Van Deeman Area, Mohave County; Harquahala District, Maricopa & La Paz Counties; Mohave Wash + Crossman Peak Area, Mohave County; Rawhide District, La Paz County; Burro Mine, Yavapai County where Arizona Silver and Dominion Resources have an indicated 1.3 - 1.9 Mt at .068 opt Au. Also included is Asarco's Barnes/Gentner Prospect where mineralization appears to be related to "stacked multiple quartz veins."

Heddleston Project, Lewis & Clark Counties, MT

All assays have been received from the 1988 Heddleston Project and we are waiting to start our leaching program. We have 3/4 of the core available for our leach tests. Reconnaissance rock chip sampling was completed at Sandbar Creek Porphyry south of the Heddleston Deposit for Au. Results are pending.

Field Days	Office Days	Expense Account	Vehicle Charges
7	12	$400	≈$200

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

JDS

September 29, 1988

J.D. Sell

Quarterly Report
3rd Quarter 1988

Most of the quarter was spent working for the NWED, a summary follows:

Heddleston Project - Lewis & Clark Counties, Montana

Seven Diamond drill holes were completed for metallurgical purposes. All core was logged, split and sent to Ray Mines for assay and future leaching. Column leaching will be starting in several weeks.

Troy Type Deposits, Western Montana

Three holes were deepened for assessment reasons at our Troy type prospects and deposits. Trout Creek (TC-9) was finally bottomed at 2203'. The hole encountered weak bornite mineralization in the C-quartzite and G quartzite.

Clear Peak (CP-6) was drilled to 925'. The hole was bottomed for 1988-89 in the Lower Silty of the Upper Revett.

Adit #3 was deepened at Rock Creek and bottomed at 1632'. The hole was plugged and cemented. Approximately 400 GPM H_2O was encountered in the hole.

SWED

After returning to Tucson the remainder of the quarter (~15 days) was spent preparing a work program for 1989. Time was also spent working on Heddleston sections.

Mark A. Miller

MAM:mek

ASARCO

Exploration Department
Southwestern United States Division

October 18, 1988

H. L. Williams, President
Ark Energy Ltd.
2020, 650 Granville St.
Vancouver, B.C.
V6B 4N7

Dear Mr. Williams:

Would you please send any information you have on your Leach property in Yavapai County, Arizona.

Thank you.

Respectfully,

Mark A. Miller
Geologist

MAM:mwk

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

ASARCO

Exploration Department
Southwestern United States Division

October 18, 1988

Mr. Walter Wellman
Rocking Chair Mining Company
4055 100E, Suite 2
Pleasant Valley, Utah 84062

Gold Hill District
Tooele County, Utah

Dear Walter:

Enclosed are copies of assays and sample locations on your property in the Gold Hill District. In order to protect both of our interests, please sign the enclosed Confidentiality Agreement and return it to me.

Thank you for your help and cooperation. Good Luck in your ventures.

Respectfully,

Mark A. Miller
Geologist

MAM:mek
encs.

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

CONFIDENTIALITY AGREEMENT

ASARCO Incorporated (collectively referred to as "EVALUATOR") wishes to evaluate data relating to certain mineral property located in Good Hill Dist, Tooele Co, UT. In order for EVALUATOR to make such evaluation, it will be necessary for Rocking Chair Mining Co. (referred to as "DISCLOSER") to disclose to EVALUATOR certain information ("Information") regarding such properties, which Information DISCLOSER considers to be confidential and proprietary. In consideration of DISCLOSER'S disclosure of such Information, EVALUATOR agrees to the following terms and conditions:

1. EVALUATOR agrees to keep all such Information furnished hereunder by DISCLOSER confidential for a period of one (1) year from the date of acceptance by EVALUATOR of this Agreement and during this period EVALUATOR shall not, directly or indirectly, disclose any Information of DISCLOSER to any third party without DISCLOSER'S written consent; provided, however, that EVALUATOR may disclose such Information to consultants under contract to EVALUATOR without DISCLOSER'S express consent if such consultants agree, prior to any such disclosure by EVALUATOR, to comply with all terms of this Agreement in the same manner as EVALUATOR. Further, EVALUATOR shall not use any of DISCLOSER'S Information furnished hereunder for its own benefit or for the benefit of others, except for the purpose of making such evaluation. The internal dissemination of such Information by EVALUATOR shall be limited to those employees of EVALUATOR whose duties justify the need to know such Information and then only on the basis of a clear understanding by those employees of their obligations to maintain the confidentiality of such Information and restrict the use of such Information.

2. EVALUATOR shall be under no obligations with respect to any of such Information (a) which EVALUATOR can demonstrate was in its possession prior to the time that it was disclosed by DISCLOSER, (b) which is or becomes available to the general public through no fault of EVALUATOR; (c) which is disclosed to EVALUATOR without restriction on disclosure by a third party who has the lawful right to disclose such Information; or (d) after five (5) years from the date of acceptance of this Agreement by EVALUATOR.

3. If, after completion of the evaluation of EVALUATOR, DISCLOSER and EVALUATOR do not enter into any agreement regarding joint exploration development, EVALUATOR shall promptly return to DISCLOSER all maps, documents, data and other tangible materials furnished to EVALUATOR by DISCLOSER hereunder, together with all copies thereof made by EVALUATOR, and shall provide DISCLOSER with a statement attesting to such complete return of the information.

4. All information given by DISCLOSER to ASARCO shall be identified in writing by ASARCO as being governed by this agreement

5. Nothing contained in this agreement or in any disclosure by DISCLOSER shall consitute a grant to ASARCO of any license or other right in or to any Information, or to any patent or patents which may have been or may hereafter be with respect to any Information.

6. DISCLOSER does not warrant or represent the accuracy, completeness or relaibility of any Information given to ASARCO. ASARCO assumes all risks associated with any use Recipient may make of any Information given to ASARCO.

7. Notwithstanding disclosure to ASARCO of any Information DISCLOSER shall retain all its proprietary rights in and to the Information.

8. ASARCO shall furnish copies of any factual Information collected on the claim group to DISCLOSER.

Dated: 5/10/88 - Information Given Sept-1987

ASARCO Incorporated

By _____

By _____

UGB ROCK SAMPLES

T8S, R18W

Sections 10, 14, 15, 22

UGB-1	Dump sample below adit in jasperoid 820' FSL x 1200' FEL, SEC. 15.
UGB-2	Chip sample of jasperoid o.c., some looks concordant. $BaSO_4$ crystals in jasperoid. Outcrop is 25-50' Tk. 820' FSL x 1200'FEL, Sec. 15.
UGB-3	Jasperoid--Dark Red Brown (Dk R/Brn), appears to be bedded variety. No Barite (Ba) seen. 1560' FNL x 700' FWL, Sec. 14.
UBG-4A	Jasperoid Bx zone? in Red/Brown and Gy Silic Ls. 2130' FSL x 500' FWL, Sec. 14.
UGB-4B	Jasperoid Dark Red/Brown (Dk R/Brn) - Good conchoidial fractures appear to be bedded and probably related to jasperoid seen on UGB-L-1, 185-200', 2060' FSL x 400' FWL, Sec. 14.
UGB-4C	Jasperoid - vertical - appears to /-cut stratigraphy. Dark Red/Brown locally $BaSO_4$ veining. 2060' FWL x 375' FWL, Sec. 14.
UGB-5	Small pit - 5' x 5' x 3' deep in jasperoid with abundant $BaSO_4$,Ba prospect? 2150' FSL x 420' FWL, Sec. 14.
UGB-6	Bedded jasperoid in limestone (ls) 10' tk loc v. abundant (abu) late stage $BaSO_4$ veining msv & xln. N20W dips shallow, $\pm 20^{\circ}$,E. (attitude of jasperoid).
UGB-7	Jasperoid AA 25-30' Tk - Attitude of limestone in vicinity of jasperoid is N15-30°W 15-20°E. 2375' FSL x 450' FWL.
UGB-8	Jasperoid as above (AA) $\pm$10'Tk. Loc. relict bedding; limestone adjacent to jasperoid weathers to lt chocolate brown color. bleaching?? 2375' FSL x 350' FWL, Sec. 14.

UGB - ROCK SAMPLES

UGB-9	Large jasperoid mass > 50' x 50' appears to be bedded. Adj ls totally silicified. Relict bedding seen. Attitude of jasperoid N50°W 45°E where seen. 2250' FSL x 20' FEL, Sec. 15.
UGB-10	Possible feeder. No bedding seen. Noticeable absence of $BaSO_4$. 2120' FSL, Sec, 15 on section line between 19 and 15.
UGB-11	Incipient jasperoid (jasp) and hematite in limestone. Seems to follow strong N20°W structure seen on hillside >S area of alteration confined to ±30' width. 2250' FNL x 400' FEL, Sec. 15.
UGB-12	Jasperoid 15' thick (tk) appears bedded; dark red/brown. 200' FSL x 1050' FSL, Sec. 15.
UGB-13	Possible vertical (vt) feeder trending N-S may be feeding into higher beds. 300' FSL x 1200' FEL Sec. 15.
UGB-14	Feeder jasperoid N50°, 80°E, 2 small shafts dug on jasperoid. 450' FSL x 1160' FEL, Sec. 15.
UGB-14A	Feeder - N15°W, 80°E feeder fault. 450 FSL x 1160' FEL, Sec. 15.
UGB-14B	Dump - $BaSO_4$ limestone on dump. 450' FSL x 1160' FEL, Sec. 15.
UGB-14C	Limestone @ H.W. N20°W, 60°E M/Rexln tk bedded. 450' FSL x 1160' FEL, Sec. 15.
UGB-15	Ls Rep. ~10' of section jasp. on H.W. not sampled. Pseudo O.C. N20-30°W 50°E. 650'FSL x 1300' FEL, Sec. 15.
UGB-16	Bx fault zone in Woodman Fm. Abu calcite (cal) veining > 6" tk. Loc res. cal stockwork 50' sample. 1200' FSL x 2299' FEL, Sec. 15.
UGB-17	AA 50' sample. Major E-W Fault Zone 150' tk. 1250' FSL x 2250' FEL, Sec. 15.
UGB-18	AA 50' sample. 1300' FSL x 2250' FEL, Sec. 15.
UGB-19	Woodman Fm (Mw) Tn bedded (bd'd) ls & black (blk) cherts x-cutting crs cal veining rep ` 25' of Section N20-30°W 60-70°E. 110' FSL x 2300' FEL, Sec. 15.

UGB - ROCK SAMPLES

UGB-20	Excellent example of bd'd jasp. Replaces bed for bed. and retains original bedding in jasperoid. Replaces Woodman ls. Rep ~10' of section.
UGB-21	Ochre Mtn (com) below jasperoid/Woodman contact. F-m recrystalline (rexln). Gy loc wk jasp. rep ~25' v. 1150' FSL x 1700' FEL, Sec. 15.
UGB-22	Jasperoid @ contact of Mw/Mom 20' zone sampled. 1150' FSL x 1775' FEL, Sec. 15.
UGB-23	Woodman Fm. Float & rock chip. 1150' FSL x 1820' FEL, Sec. 15.
UGB-24	Good o.c. of Woodman @ Mw/Mom contact. N20°W, 60°E. 1340' FSL x 1800' FEL, Sec. 15.
UGB-25	Jasperoid @ Mw/Mom contact. Tone is 50-100' tk. Appears to be Bx'd @ top and bottom contact. 1250' FSL X 1700' FEL, Sec. 15.
UGB-26	Mom below jasperoid. Variably silicified and crs crystalline (xln) sample represents (rep) 25' section. 1050' FSL X 1700' FEL, Sec. 15.
UGB-27	Shale o.c. poss. Herat?? ±5' tk. 2350' FNL x 2400' FEL, Sec. 15.
UGB-28	Jasp. N20°W ~10' tk bedded BaSo4 > 10% loc. 1450' FNL x 1000' FEL, Sec. 15.
UGB-29	Ls in jasp. F-w Mom- unaltered, unremarkable. Rep 20' section. 1440' FNL x 1200' FEL, Sec. 15.
UGB-29A	Drill Cuttings. 1400' FNL x 1150' FEL.
UGB-30	S.S. M grained (grnd) but can see sand grains slt calcareous. Strong Fe stained N35°E, 30°NW Prob. Po (Oquirrh Fm) in graben block. 2350' FNL x 1450' FEL, Sec. 15.
UGB-31	Silic ls breccia N-S > N5°E. Dips ±W 1150' FNL x 850' FEL.
UGB-32	Silic fault zone ±10' wide. Incip. jasp. Trend appears to be N10°W. 2000" FNL x 1000' FEL, Sec. 15.

UGB - ROCK SAMPLES

UGB-33	S.S. as sample #30 15' tk sample. 2700' FNL x 1450' FEL, Sec. 15.
UGB-34	Shale o.c? Residuum. No attitudes seen but surrounding rocks N-S 30° > E 20' road cut.
UGB-35	DH #E8 red maroon shale on bank. Poss cuttings. 3050' FNL x 1700 FEL, Sec. 15.
UGB-36	DH #E8 red tàn grey (gy) shale on bank above D.H. Few shale frags. 3000' FNL X 1750' FEL, Sec. 15.
UGB-37	Ls Mom - above jasperoid 20' tk section few blk sh bands in ls. 2100' FSL x 100' FEL, Sec. 15.
UGB-38	Jasperoid - appears bedded. 2100' FSL x 150' FEL, Sec. 15.
UGB-39	Jasperoid small shaft ±10' deep sunk in high Ba zone. 2100' FSL x 175' FEL, Sec. 15.
UGB-40	Ls below jasp. 20' of section. Tk bedded N10°W 30°E, strong N70°W structural fabric in rock poss. related to major fault. 3200'FNL x 150' FEL, Sec. 15.
UGB-41	Manning shale on fault N/S dip ±60°E. Shale mainly Gy Slt calc. & SS. 320' FSL x 800' FEL, Sec. 15.
UGB-41A	Same as L-5 (0-100'). Mmc. sparce o.c. mostly qtzites with siltstones. 100' FSL x 700' FEL, Sec. 15.
UGB-42	AA- float & pseudo o.c. 520' FSL x 300' FEL, Sec. 15.
UGB-43	50' Long trench N-S. Mmc residuum. V. fissle. 450' FSL X 120' FEL, Sec. 15.
UGB-44	Drill cuttings. Blk sh? 800' FSL, Sec BGT 14/15.
UGB-45	Dolomite & blk sh - Manning Canyon Fm. E-W 40°N, 5' section sampled.
UGB-46	Small pit - Mmc - 50' Com N30°W.
UGB-47	Drill Hole - Cuttings. Blk shale. 750' FEL X 175' FWL, Sec. 14.

UGB - ROCK SAMPLES

UGB-48	Small Mmc outcrop thin (tn) bedded. Qtzites. Recorded strike N60°W 15°W. 800' FSL x 350' FWL, Sec. 14.
UGB-49	Drill cuttings. Blk sh 5" D.H. 760' FSL x 350' FWL, Sec. 14.
UGB-50	Drill cuttings. Little shale 8-10" drill hole. 700' FSL x 350' FWL, Sec. 14.
UGB-51	Drill cuttings. 10-12" Drill hole located in main wash. 550' FSL x 520' FEL, Sec. 14
UGB-52	Small caved adit in Mmc.. tn ls cap. Prob ls lens in Mmc. Attitude of shale N20°W 45°W 6' section adit S30°W. 900' FSL x 500' FWL, Sec. 14.
UGB-53	Ls Tk bedded good Mom. N45°W, 50°E. 1600' FSL x 2500' FEL, Sec. 15.
UGB-54	AA- N55°W, 55°E. 2000' FSL x 2800' FEL, Sec. 15.
UGB-55	Ls good bluff - Rep ±20' of Section N40°W 35-45°E $BaSO_4$ vein in ls. Abu Ba Float. Poss > 1'tk. 2400' FSL x 2150' FWL, Sec. 15.
UGB-56	Good Mom o.c. N20°W 35°E M/tk bd'd. 2400' FNL x 1900' FWL, Sec. 15.
UGB-57	Mmc exposed in trench. Trench N50°E tk bd;d with ls. Interbeds > 6" tk. N45°E, 35°NW. 15' > 20' Section sampled.
UGB-58	AA but Hm stained - poss Ox zone 10' wide slight sericitic texture to shale E end of trench. 50' FSL x 1870' FWL, Sec. 10.
UGB-59	Ls below poss. Fa. Fetid looks like Mom. 550' FSL x 1000' FWL, Sec. 14.
UGB-60	Altered zone 1' above ls lt gy bleached and leached. 550' FSL x 1000' FWL, Sec. 14.
UGB-61	Jasp/FeOx zone above altered zone 5' tk. Poss fault. Tn((1') silic lenses. Rest of sample soft and punky.

UGB - ROCK SAMPLES

UGB-62 Shale highly deformed and contorted. Mmc. 10' sample thickness where exposed.

Samples UGB-59-62 from small adit N80°E.

UGB-63 Mmc - Residuum from road cut. 350' FSL x 1000' FWL, Sec. 14.

UGB-64 large bedded jasperoid Cds Grnd Seem almost S.S. loc. N20° 45°E. Prob. follows fault trace @ contact of Mmc and Mom massive (msv) unit. 150' FNL x 750' FEL, Sec. 22.

UGB-65 Mmc in and below fault zone from trench. Strike of Fault and Mmc N-S 60°E somewhat contorted Mmc fault breccias. Mostly siltstone frags. 400' FEL, Sec. 14/15.

UGB-66 Jasperoid on fault. Poss replacing fault breccia. 50' FSL x 800' FEL.

UGB-67 Ls lt choc. brn (or wx'd surface) Mom - Altered? Zone around jasper. (#64) ±50' lat ±10' v. 250' FNL x 850' fel, Sec. 22.

UGB-68 Ls? wht crs rexln - found near bottom of hill appears to be intimately associated (ass.) with jasp. 250' FNL x 850' FEL, Sec. 22.

UGB-69 Small traverse along top of drainage. Choc. brn ls. M/Crs Rexly. Loc Hm stained. 500' FNL x 900' FEL, Sec. 22.

UGB-70 Large jasperoid o.c. ~15' tk appears bedded abu Ba veins (vns). Both Msv and bladed xln. 400' FNL x 850' FEL, Sec. 22.

UGB-71 6' tk jasperoid ledge Msv R/Brn jasp. No Ba seen frags of silic and rexln ls w/in. 550' FNL X 850' FEL, Sec. 22.

UGB-72 Ls 15' tru tk. Stratigraphically below #70 jasp. choc. brown. 574' FNL x 800' FEL, Sec. 22.

UBG-73 Ridgeline (rock chip grain) jasperoids with abu $BaSO_4$. Poss relationship of jasp with transverse fault that was mapped by Nolan.

UGB - ROCK SAMPLES

UGB-74	Siliceous (Silic unit - sampled across +25' of true thickness. Poss. silic Mw @ Mw/Mom contact. 850' FNL x 1400' FEL, Sec. 22.
UGB-75	Mmc- @ fault contact 25' section sampled. Silty shale, siltstone and SS. N50°E 53°SE. 1750' FNL x 900 FEL, Sec. 22.
UGB-76	Prob. Woodman N40°W 45°E 20' of section. 1150' FSL x 2500' FNL, Sec. 15.
UGB-77	Ls Mom - N50°W 45°E. 1200' FSL x 2200' FWL, Sec. 15.
UGB-78	Jasperoid - strat below ls 5'tk- No $BaSO_4$, 115- FSL x 2150' FNL, Sec. 15.
UGB-79	Jasperoid - ~6' tk. 1150' FSL x 1950' FWL.
UGB-79A	Silic ls - Poss Mom N20-20°E structural grain. Attitude of bdg N10°W 70°E. Rep +25' of section. 1000' FSL x 1850' FWL, Sec. 15.
UGB-80	AA Blt more siliceous (silic) AA 850' FSL x 1950' FWL, Sec. 15.
UGB-81	Herat ? Shale 10' section. 1600' FSL x 1550' FEL, Sec. 15.
UGB-82	Drill cuttings. DDH-E-2 (Newmont Hole). 200' FSL x 1900' FEL, Sec. 15.
UGB-83	Small adit. 50' N75°E. 1950' FSL xx 250' FWL, Sec. 14. Hematite (Hm) stained ls and poss. Fa gouge? Ls or F.W. - Mom. Zone is ±20' side N10°W 45°E.
UGB-84	Drill Cuttings RDHE-3 - ls. 1750' FSL x 400' FWL, Sec. 14.
UGB-85	Poss. Fa zone 67' tk. N40°W vertical dips. Banded jasp. + $BaSO_4$. 2200' FNL x 750' FWL, Sec. 14.
UGB-86	Bd jasp/barite - 6' tk zone Ba Jas > 1" N40°W 40°E >30% $BaSO_4$. 2300' FNL x 1050; FWL, Sec. 14.

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 501
November 3, 1987
PROJECT NO.: UGB

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, Arizona 85703

ASARCO Incorporated
NOV 6 1987
SW Exploration

Analysis of 64 Rock Chip Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au** (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
1	L-1 0-25 Ls	<.01	4.	.31	90.
2	L-1 25-50 Ls, Jasp	<.01	65.	1.00	19000. .9%
3	L-1 50-75 Ls, Jasp	<.01	135.	3.20	8300.
4	L-1 75-100 Ls, Jasp	<.01	105.	1.00	110000.
5	L-1 100-125 Ls	<.01	30.	1.00	3500.
6	L-1 125-150 Ls	.01	38.	1.20	5100.
7	L-1 150-175 Ls	<.01	6.	.36	870.
8	L-1 158-162 Jasp	<.01	16.	.20	500.
9	L-1 175-185 Ls	<.01	4.	.20	340.
10	L-1 185-200 Jasp	<.01	20.	.38	3050.
11	~~L-1 175-200***~~	~~0.00~~	~~0.~~	~~0.00~~	~~0.~~
12	L-1 200-225 Ls	<.01	2.	.48	360.
13	L-1 225-250 Ls	<.01	6.	.24	570.
14	L-1 250-275	<.01	4.	.26	870.
15	L-1 275-310	<.01	<2.	.40	720.
16	L-1 330-339 Ls	<.01	<2.	.26	240.
17	L-1 339-340	<.01	50.	1.60	320.
18	L-1 370-400 Ls, Silic	<.01	16.	1.40	1100.
19	L-1 400-425 Ls, calcite	.01	<2.	.14	140.
20	L-1 500-530 Ls	<.01	6.	1.50	360.
21	L-1 530-550 Ls, Calcite	<.01	4.	.56	1100.
22	L-1 550-580	<.01	4.	.50	1650.
23	L-1 600-625 Ls	<.01	6.	.29	1050.
24	L-1 625-640	<.01	6.	.18	220.
25	L-1 665-700	<.01	10.	.20	320.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

ITEM	SAMPLE NUMBER	FIRE ASSAY Au** (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
26	L-1 700-730 Ls	<.01	10.	.64	9100.
27	L-1 730-755 Ls	<.01	16.	.24	1600.
28	L-1 755-800 Bx Ls	<.01	18.	.62	18000.
29	L-1 800-820 Ls	<.01	22.	1.40	11500.
30	L-1 820-830 Tsp	.02	270.	>5.00*	170000.
31	L-1 865-900 Ls	<.01	32.	3.20	10500.
32	L-1 900-940 Ls, Sect.	<.01	75.	>5.00*	10000.
33	L-1 940 Tsp.	.67	380.	>5.00*	4350.
34	L-1 940-1000 Ls	.02	100.	4.40	14500.
35	L-1 1530-1600 Ls Bx Co Porsfa.	.01	16.	.90	21000.
36	L-1 1630-1700 Ls	<.01	6.	.50	6250.
37	L-1 1800-1900 Ls	<.01	6.	.20	4400.
38	L-1 1900-1970 Ls	<.01	10.	.22	3600.
39	L-1 1940-1950 Tsp.	<.01	180.	.37	54000.
40	L-1 2100-2130 Ls	<.01	10.	.32	5900.
41	L-1 2130-2165 Ls	<.01	2.	.31	530.
42	L-1 2220-2230 Ls	<.01	2.	.40	430.
43	L-1 2230-2235 Ls, Sy Rem	<.01	4.	.12	560.
44	L-1 2270-2300 Ls + Tsp.	<.01	14.	.42	5000.
45	L-1 2300-2400 Ls + Tsp	<.01	4.	.14	15000.
46	L-2 0-100 Ls	<.01	8.	.15	430.
47	L-2 100-175 Ls	<.01	10.	.41	150.
48	L-2 175-230 Ls	<.01	4.	.54	170.
49	L-2 370-525 Ls	<.01	4.	.10	200.
50	L-2 525-590 Ls, Sili Fa Zo	<.01	8.	.06	1200.

-180 35%

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

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Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 501
November 3, 1987

FIRE ASSAY

ITEM	SAMPLE NUMBER	Au** (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
51	L-2 590-620 Ls	<.01	10.	.02	90.
52	L-2 650-700 Ls	<.01	10.	.59	450.
53	L-2 750-770 Large Jasp	<.01	8.	.44	1050.
54	1 Bump Sample Brown Jasp	<.01	100.	2.70	1700.
55	2 Chip of Above	<.01	175.	1.20	11000.
56	3 Jasp	<.01	12.	>5.00*	1200.
57	4A Jasp	.01	75.	>5.00*	1650.
58	4B Jasp.	<.01	175.	>5.00*	800.
59	4C Jasp	<.01	10.	.80	9150.
60	? 5 ~~Jasp~~ Pitin Jasp & Pasog	<.01	75.	1.70	880.
61	6 Bo Jasp	<.01	32.	3.80	38000.
62	7 "	<.01	130.	>5.00*	1500.
63	8 "	<.01	600.	2.70	27000.
64	9 "	<.01	500.	1.20	17500.
65	10 "	.01	240.	4.90	48000.

*NOTE: Greater than normal geochemical range.
Please advise if further assay is needed.

**NOTE: Method of analysis by combination fire assay and atomic absorption based on a one assay-ton sample.

***NOTE: Samples not received.

cc: Mr. J. D. Sell

100 ts
.5 ppm Au
5000 Ag

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ASARCO Incorporated

NOV 2 0 1987

SW Exploration

REPORT OF ANALYSIS

JOB NO. TAJ 504
November 17, 1987

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, Arizona 85703

Analysis of 60 Rock Chips and 1 Pulp Sample

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
1	UGB 53	<.01	8.	.16	2800.
2	UGB 54	<.01	10.	.24	170.
3	UGB 55	.03	6.	.15	1100.
4	UGB 56	<.01	6.	.13	50.
5	UGB 57	<.01	16.	.10	90.
6	UGB 58	<.01	16.	.26	150.
7	UGB 59	<.01	40.	.47	3900.
8	UGB 60	<.01	30.	.34	290.
9	UGB 61	<.01	195.	3.20	109000.
10	UGB 62	<.01	38.	.05	3000.
11	UGB 63	<.01	20.	.05	720.
12	UGB 64	<.01	110.	.07	570.
13	UGB 65	<.01	46.	.08	600.
14	UGB 66	<.01	60.	.02	670.
15	UGB 67	<.01	42.	.60	5650.
16	UGB 68	<.01	12.	.52	54000.
17	UGB 69	<.01	16.	.65	34000.
18	UGB 70	<.01	48.	.60	115000.
19	UGB 71	<.01	95.	>5.00*	49500.
20	UGB 72	<.01	22.	1.00	44500.
21	UGB 73	<.01	600.	4.00	62000.
22	UGB 74	<.01	18.	.62	4800.
23	UGB 75	<.01	28.	.25	560.
24	UGB 76	<.01	18.	.12	320.
25	UGB 77	<.01	12.	.27	170.

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JOB NO. TAJ 504
November 17, 1987

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
26	UGB 78	<.01	40.	4.20	2650.
27	UGB 79	<.01	255.	>5.00*	25000.
28	UGB 79A	<.01	8.	.43	260.
29	UGB 80	<.01	8.	.41	420.
30	UGB 81	<.01	65.	.56	1850.
31	UGB 82	<.01	60.	1.80	8000.
32	UGB 83	<.01	26.	4.00	280.
33	UGB 84	<.01	16.	.40	1250.
34	UGB 85	<.01	16.	>5.00*	253000.
35	UGB 86	.01	22.	1.40	109000.
36	UGB 11	<.01	50.	>5.00*	1800.
37	UGB L-2 1900-1950	<.01	6.	.36	6000.
38	UGB L-2 2000-2050	<.01	16.	.40	38500.
39	UGB L-2 2100-2150	<.01	8.	.22	1800.
40	UGB L-2 2150-2200	<.01	8.	.29	870.
41	UGB L-2 2200-2250	<.01	4.	.24	1300.
42	UGB L-2 2240-2255	<.01	60.	1.20	5000.
43	UGB L-2 2270-2275	<.01	46.	1.20	10500.
44	UGB L-2 2250-2300	<.01	12.	.50	450.
45	UGB L-2 2300-2345	<.01	8.	.15	1200.
46	UGB L-2 2345-2450	<.01	4.	.31	3850.
47	UGB L-2 770-795	<.01	14.	.46	520.
48	UGB L-2 795-810	<.01	12.	.58	340.
49	UGB L-2 850-900	<.01	8.	.47	1150.
50	UGB L-1 2300-2380	<.01	28.	1.40	5800.

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JOB NO. TAJ 504
November 17, 1987

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	As (ppm)	Hg (ppm)	Ba (ppm)
51	UGB L-1 2380-2400	<.01	105.	1.70	7300.
52	UGB L-1 2400-2480	<.01	80.	1.00	4900.
53	UGB L-3 0-50	<.01	10.	.08	170.
54	UGB L-3 50-100	<.01	8.	.09	110.
55	UGB L-3 100-150	<.01	6.	.10	70.
56	UGB L-3 150-170	<.01	6.	.04	90.
57	UGB L-4 0-60	<.01	6.	.26	80.
58	UGB L-4 575-620	<.01	14.	.07	130.
59	UGB L-4 700-750	<.01	16.	.07	120.
60	UGB L-5 0-100	<.01	28.	.24	4200.
61	UGB L-L BLACK	<.01	400.	.17	350.

*NOTE: Greater than normal geochemical range.
Please advise if further assay is needed.

cc: Asarco Incorporated
Attn.: Mr. James D. Sell
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P.O. Box 5747
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William L. Lehmbeck
Manager
11/19/87

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REPORT OF ANALYSIS

JOB NO. TAJ 505
November 18, 1987
PROJECT NO.: UGB

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, Arizona 85703

ASARCO Incorporated
NOV 23 1987
SW Exploration

Analysis of 62 Rock Chip Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	Hg (ppm)	As (ppm)	Ba (ppm)
1	UGB 12	<.01	.50	105.	3950.
2	UGB 13	<.01	.18	85.	3300.
3	UGB 14A	<.01	.28	90.	1600.
4	UGB 14B	<.01	.34	65.	118000.
5	UGB 14C	<.01	.30	10.	860.
6	UGB 15	<.01	.18	12.	3100.
7	UGB 16	<.01	.29	8.	21000.
8	UGB 17	<.01	.14	8.	39000.
9	UGB 18	<.01	.21	12.	45000.
10	UGB 19	<.01	.16	10.	680.
11	UGB 20	<.01	.40	85.	860.
12	UGB 21	<.01	.54	10.	1300.
13	UGB 22	<.01	1.20	14.	18500.
14	UGB 23	<.01	.35	12.	820.
15	UGB 24	<.01	.18	14.	7750.
16	UGB 25	<.01	4.80	260.	23500.
17	UGB 26	<.01	.50	50.	12000.
18	UGB 27	<.01	.07	85.	470.
19	UGB 28	<.01	>5.00*	360.	131000.
20	UGB 29	<.01	1.00	14.	1150.
21	UGB 29A	<.01	1.50	80.	640.
22	UGB 30	<.01	.09	10.	240.
23	UGB 31	<.01	.06	8.	230.
24	UGB 32	<.01	.16	8.	120.
25	UGB 33	<.01	.08	8.	190.

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ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	Hg (ppm)	As (ppm)	Ba (ppm)
26	UGB 34	<.01	.06	14.	310.
27	UGB 35	.02	1.30	46.	2100.
28	UGB 36	<.01	.12	46.	2250.
29	UGB 37	<.01	.42	10.	550.
30	UGB 38	<.01	1.60	880.	880.
31	UGB 39	<.01	.63	2600.	22500.
32	UGB 40	<.01	.24	26.	1100.
33	UGB 41	<.01	2.00	24.	980.
34	UGB 42	<.01	.12	20.	280.
35	UGB 43	<.01	.14	70.	930.
36	UGB 44	<.01	.40	420.	370.
37	UGB 45	<.01	.16	55.	150.
38	UGB 46	<.01	.40	46.	390.
39	UGB 47	<.01	.39	48.	920.
40	UGB 48	<.01	.09	8.	110.
41	UGB 49	.04	.52	34.	270.
42	UGB 50	<.01	1.50	38.	260.
43	UGB 51	<.01	.15	16.	2500.
44	UGB 52	<.01	.10	20.	190.
45	UGB L-2 1550-1750	<.01	.20	10.	260.
46	UGB L-2 1800-1850	<.01	.60	8.	6150.
47	UGB L-2 1850-1900	<.01	.31	4.	190.
48	UGB L-2 2400-2450	.01	>5.00*	90.	132000.
49	UGB L-2 2450-2500	<.01	1.00	18.	8750.
50	UGB L-2 2500-2550	<.01	.42	8.	10500.

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JOB NO. TAJ 505
November 18, 1987

ITEM	SAMPLE NUMBER	FIRE ASSAY Au (ppm)	Hg (ppm)	As (ppm)	Ba (ppm)
51	UGB L-2 2550-2600	<.01	.50	10.	1550.
52	UGB L-2 2600-2650	<.01	.54	6.	1700.
53	UGB L-2 2650-2675	.03	>5.00*	120.	56500.
54	UGB L-2 2700-2720	<.01	1.60	6.	7650.
55	UGB L-2 2750-2800	<.01	.32	<2.	5250.
56	UGB L-2 2800-2810	<.01	.36	10.	12000.
57	UGB L-2 2810-2820	<.01	.53	4.	3500.
58	UGB L-2 2800-2850	<.01	.53	4.	1250.
59	UGB L-2 2850-2900	<.01	.48	4.	590.
60	UGB L-2 2920-2925	<.01	2.00	34.	45000.

*NOTE: Greater than normal geochemical range.
Please advise if further assay is needed.

cc: Asarco Incorporated
Attn.: Mr. James D. Sell
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

William L. Lehmbeck
Manager
11/20/87

ASARCO

Southwestern Exploration Division

JDS

October 26, 1988

J. D. Sell

Gold Anomalies
Ragged Top WSA
Pima County, AZ

A newly released USGS Open File Report #88-587 has indicated anomalous amounts of gold in pan concentrates and rock chip samples within the Ragged Top WSA. The inference from discussion with the USGS is that gold mineralization may be associated with the formation and collapse of a cauldera during Late Cretaceous time along the trace of the Ragged Top Fault. I cannot refute this model; however, the trace elements' signature (lack of As, Sb, Hg) etc. does not suggest an epithermal system at work. The best values obtained from an argillically altered granodiorite was 9 ppb with no trace element determination. The highest rock chip gold values were obtained in a Pb, Zn vein ~6" thick, hosted in an altered granodiorite. The highest pan concentrate values (150 ppm Au) were obtained from a major drainage downstream from the Pb, Zn vein. Additional samples were taken along the vein structure and at the high pan concentrate site, and results are pending.

Public interest in the area has been slight since the article in the local newspaper (attached). If there is any significant impact at all, I think that it would be a reassessment of the wilderness designation of the area; but the implied gold potential does not appear to be very favorable.

MAM:mek

Mark A. Miller

The Arizona Daily Star

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the article was unmerited.

The Arizona Daily Star

Vol. 147 No. 292 ★

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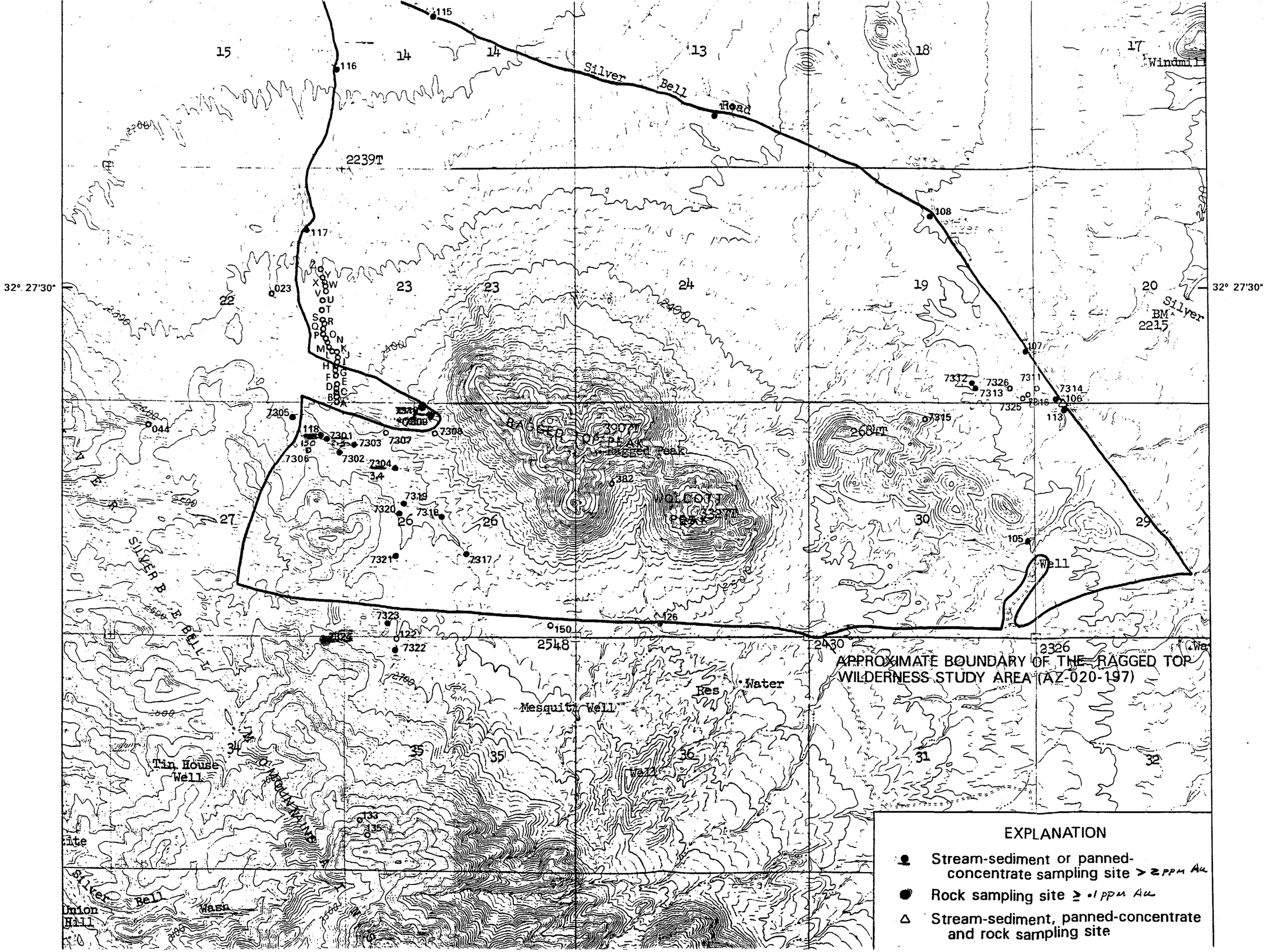
Final Edition, Tucson, Tuesday, October 18, 1988

35¢

Table 1.--Descriptions of analyzed rock samples from the Ragged Top Wilderness Study Area, Pima County, Arizona. Au, Ag (ppm)

Sample	Description
RTR130AA	Granodiorite porphyry <.001, N
RTR130BA	Granodiorite porphyry <.001 N
RTR130CA	Granodiorite porphyry, slightly altered .002 N
RTR130DA	Granodiorite porphyry, slightly altered .002, N
RTR130DB	Granodiorite porphyry, altered .004, <.5
RTR130EA	Granodiorite porphyry, altered .002, N
RTR130EB	Granodiorite porphyry, altered .002, N
RTR130FA	Granodiorite porphyry, altered .005, .5
RTR130GA	Granodiorite porphyry, highly altered, brecciated .008, 1.0
RTR130HA	Granodiorite porphyry, highly altered, brecciated .002, N
RTR130IA	Granodiorite porphyry, highly altered, brecciated .001, N
RTR130JA	Granodiorite porphyry, highly altered, brecciated .004, N
RTR130KA	Granodiorite porphyry, highly altered, .002, N
RTR130LA	Fine grained rock, highly altered .002, N
RTR130MA	Granodiorite porphyry, altered .002, N
RTR130NA	Potassium-rich rock .001, N
RTR130OA	Potassium-rich rock .003, N
RTR130PA	Granodiorite porphyry, slightly altered <.003, N
RTR130QA	Granodiorite porphyry, slightly altered <.001, N
RTR130RA	Granodiorite porphyry, slightly altered <.001, N
RTR130SA	Granodiorite porphyry <.001, N
RTR130TA	Granodiorite porphyry, slightly altered .001, N
RTR130UA	Granodiorite porphyry, slightly altered .001, N
RTR130VA	Granodiorite porphyry <.001, N
RTR130WA	Diabase <.001, N
RTR130XA	Oracle-type granite <.001, N
RTR130YA	Diabase <.001, N
RTR130ZA	Oracle-type granite <.001 N
RTR106A	Oracle-type granite from shear zone .001, N
82S-023	Granodiorite porphyry <.001, N
82S-044	Granodiorite porphyry <.001, N
82S-122	Lithic tuff <.001, N
82S-133	Rhyolite welded tuff <.001, N
82S-135	Rhyodacite porphyry <.001, N
82S-150	Rhyodacite porphyry <.001, N
82S-382	Rhyolite <.001, N
RT7306A	Barite-fluorite vein .004, .015
RT7306BA	Barite vein .002, N
RT7306BB	Altered wall rock by barite vein .007
RT7307A	Granodiorite porphyry, altered .003, <.5
RT7308A	Granodiorite porphyry, altered .015, .5
RT7309A	Sulfide minerals and calcite .7, 150
RT7309B	Granodiorite porphyry with sulfide minerals .015, 100
RT7309C	Granodiorite porphyry with sulfide minerals .090, 20.0
RT7309D	Dolomite (?) vein with sulfide minerals .02, 1.0
RT7309EA	Rhodochrosite (?) vein with sulfide minerals .08, 50
RT7309EB	Granodiorite porphyry with rhodochrosite (?) and sulfide minerals .10, 15
RT7309F	Granodiorite porphyry with sulfide minerals .009, <.5
RT7309G	Granodiorite porphyry with sulfide minerals .005, <.5
RT7310A	Granodiorite porphyry .026, .5
RT7310B	Granodiorite porphyry with calcite and sulfide minerals .38, 30
RT7311AA	Quartz vein .007, N
RT7311AB	Quartz vein .004 N
RT7315A	Quartz vein .001, N
RT7315B	Quartz vein <.001, N
RT7315CA	Quartz vein .002, N
RT7315CB	Altered granite .052, <.5
RT7316A	Diabase .006, N
RT7324A	Barite vein .023, 2
RT7324B	Barite vein .023, 3
RT7324CA	Quartz vein .021 N
RT7324CB	Quartz vein .25, 2
RT7325A	Quartz vein .004, N
RT7326A	Quartz vein with sulfide minerals .002, N


32° 27'30"
32° 27'30"
Silver Bell Road
Windmill
Silver
BM 2215
RAGGED TOP PEAK
Ragged Top
WOLCOTT PEAK
SILVER BELL
Mesquite Well
Tin House Well
Water Res
Well
Union Hill
Wash
APPROXIMATE BOUNDARY OF THE RAGGED TOP WILDERNESS STUDY AREA (AZ-020-197)
EXPLANATION
Stream-sediment or panned-concentrate sampling site ≥ 2 ppm Au
Rock sampling site ≥ .1 ppm Au
Stream-sediment, panned-concentrate and rock sampling site

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Analytical results and sample locality map for stream-sediment, panned-concentrate, and rock samples from the Ragged Top Wilderness Study Area, Pima County, Arizona

By

John B. McHugh*, Gary A. Nowlan*,
David A. Sawyer**, and John H. Bullock, Jr.*

Open-File Report 88-587

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.

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STUDIES RELATED TO WILDERNESS

Bureau of Land Management Wilderness Study Areas

The Federal Land Policy and Management Act (Public Law 94-579, October 21, 1976) requires the U.S. Geological Survey and the U.S. Bureau of Mines to conduct mineral surveys on certain areas to determine their mineral values, if any. Results must be made available to the public and be submitted to the President and the Congress. This report presents the results of a geochemical survey of the Ragged Top Wilderness Study Area (AZ-020-197), Pima County, Arizona.

INTRODUCTION

In March 1987, the U.S. Geological Survey conducted a reconnaissance geochemical survey of the Ragged Top Wilderness Study Area, Pima County, Arizona. Additional samples were collected in December 1987. The wilderness study area and nearby sampled terrain are termed the "study area."

The Ragged Top Wilderness Study Area comprises 4,460 acres (about 7 mi^2) in the north central part of Pima County, Arizona, and lies about 35 mi northwest of Tucson, Arizona (see fig. 1). Access to the study area is provided by the Silver Bell, Avra Valley, and Red Rock roads.

Topography of the study area is dominated by the rugged mass of Ragged Top Peak, elevation 3,907 ft, and a shorter subsidiary peak called Wolcott Peak which rise abruptly to a maximum of 1,700 ft above the surrounding bajada. The two peaks, which are collectively known as Ragged Top, are the northeastern peaks of the Silver Bell Mountains. Ragged Top is separated from the main mass of the Silver Bell Mountains by a mile-wide valley.

Vegetation is characteristic of the Sonoran Desert. Common species include saguaro and other cacti, paloverde, acacia, ironwood, mesquite, and creosote bush.

The southwest part of the study area lies within the Silver Bell mining district (Richard and Courtright, 1966; Graybeal, 1982). The first recorded mining activity in the district was in 1865 about 2 miles south-southwest of the wilderness study area; silver and copper were recovered from skarn. Exploitation of porphyry copper deposits at the El Tiro and Oxide pits began in 1954 and continued until 1985. The El Tiro pit is about 2 miles southwest of the wilderness study area and the Oxide pit is about 3 miles south. A third, unexploited, porphyry copper deposit, the North Silver Bell deposit, lies about 1 mile from the southwest corner of the wilderness study area. Production from the El Tiro and Oxide deposits from 1954 to 1977 totaled 75,655,000 tons averaging 0.80 percent copper, 0.07 oz/ton silver, and 0.022 percent molybdenum sulfide (Graybeal, 1982). Copper has been the predominant commodity produced in the Silver Bell district but two mines about 2 miles southwest of the wilderness study area produced about 150,000 tons of ore averaging 16 percent zinc, 1.3 percent copper, 0.6 oz/ton silver, and minor lead and gold (Keith, 1974). Total production of base and precious metals in the Silver Bell district from 1885 to 1981 amounted to 90,351,000 tons (Keith and others, 1983).

Geology of the study area is included in reports by Sawyer (1986, 1987). A major structural feature in the study area is the Ragged Top fault, a probable strike-slip fault that runs from near the southeast tip of the wilderness study area west-northwest across the wilderness study area. Precambrian Oracle-type granite predominates on the north side of the fault

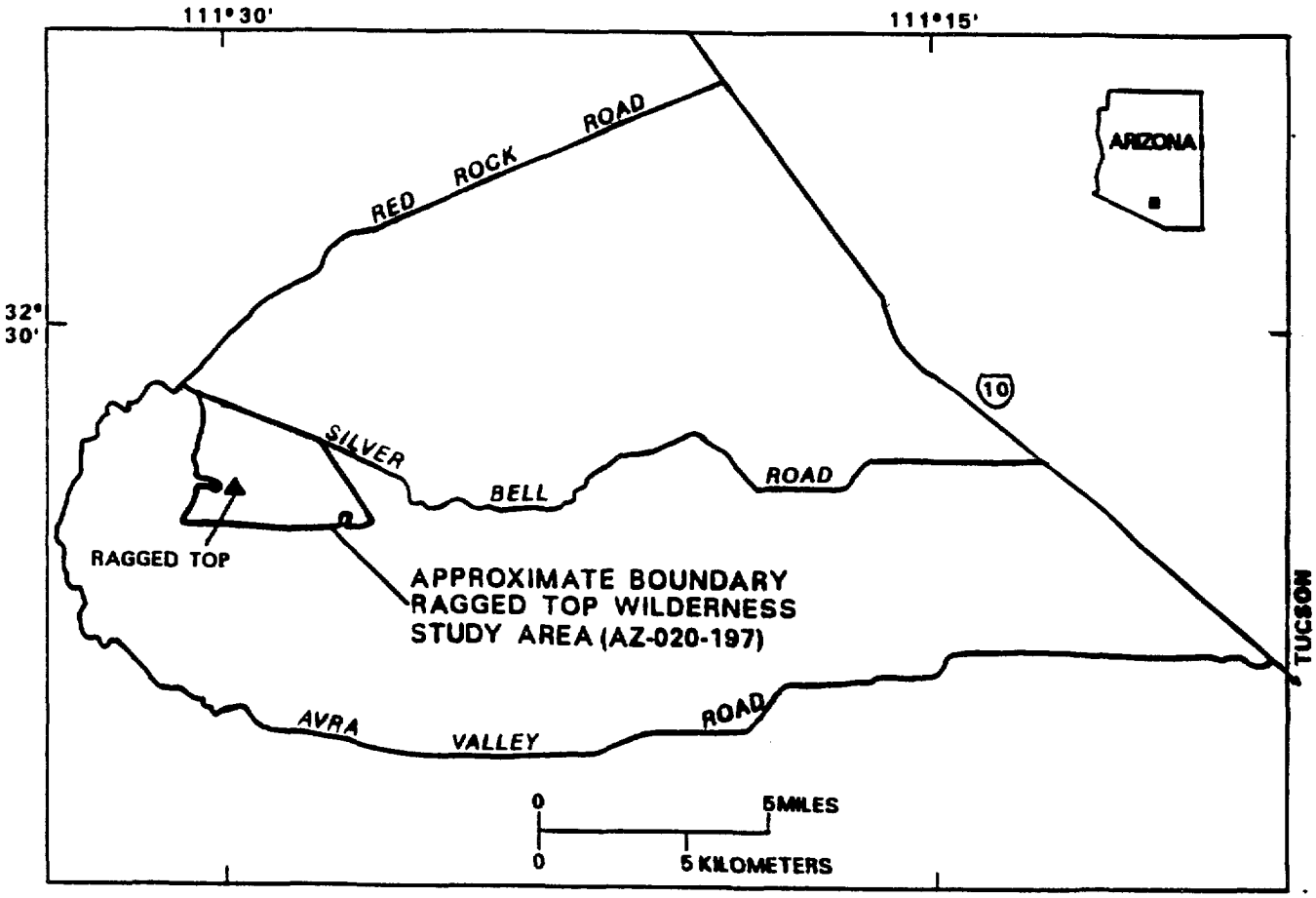

Figure 1. Index map, Ragged Top Wilderness Study Area, Pima County, Arizona.

although Middle Proterozoic Apache Group sedimentary rocks crop out east of Ragged Top. Upper Cretaceous volcanic rocks predominate south of the Ragged Top fault. The volcanic rocks consist of andesite-to-dacite extrusive rocks and rhyolite tuffs. Upper Cretaceous sedimentary rocks southwest of Ragged Top contain clasts that include Precambrian schist, Paleozoic sedimentary rocks, probable Lower Cretaceous sandstone, Cretaceous algal limestone, and volcanic rocks. An Upper Cretaceous granodiorite porphyry laccolith underlies part of the southwestern section of the wilderness study area. Ragged Top is an Oligocene rhyolite dome that was extruded along the trace of the Ragged Top fault. Quaternary sediments that are mostly unconsolidated cover the flatter sections of the study area.

Sawyer (1986, 1987) and Lipman and Sawyer (1985) present evidence to support the concept that the Upper Cretaceous sedimentary rocks, the Upper Cretaceous andesite-to-dacite extrusive rocks, and certain of the Upper Cretaceous rhyolite tuffs are the results of the formation and later collapse of a caldera during Late Cretaceous time.

METHODS OF STUDY

Sample Media

Analyses of stream-sediment samples represent the chemistry of the rock material eroded from the drainage basin upstream from each sample site. Such information is useful in identifying those basins which contain concentrations of elements that may be related to mineral deposits. Panned-concentrate samples derived from stream sediment provide information about the chemistry of certain minerals in rock material eroded from the drainage basin upstream from each sample site. The selective concentration of minerals in panned-concentrate samples, many of which may be ore related, permits determination of some elements that are not easily detected in stream-sediment samples. Analyses of unmineralized or unaltered rock samples provide background geochemical data for individual rock units. Analyses of mineralized or altered rocks may provide useful geochemical information about the major- and trace-element assemblages associated with a mineralizing system.

Sample Collection and Preparation

Sampling sites are represented on plate 1. During the initial reconnaissance sampling in March 1987, a stream-sediment sample and two panned-concentrate samples derived from stream sediment were collected at each of the 11 sites (numbers 105-108, 113-118, 126). The two panned-concentrate samples from each site were treated differently, as described below, and after preparation were respectively termed a "nonmagnetic heavy-mineral-concentrate sample" and a "raw panned-concentrate sample." Average sampling density during the reconnaissance sampling was about one sample site per 0.7 mi^2 and the drainage basins ranged from 0.2 mi^2 to 1.5 mi^2 in area. During the follow-up sampling in December 1987, nonmagnetic heavy-mineral-concentrate and raw panned-concentrate samples were collected at 15 localities (numbers 7301-7305, 7312-7314, 7317-7323) except that no nonmagnetic heavy-mineral-concentrate sample was collected at site 7321. Samples were collected by Gary A. Nowlan and David A. Sawyer.

Stream-sediment samples

The stream-sediment samples consisted of active alluvium collected primarily from first-order (unbranched) and second-order (below the junction of two first-order) streams as shown on U.S. Geological Survey topographic maps (scale = 1:24,000). The stream-sediment samples were dried, then sieved using 30-mesh (0.595-mm) stainless-steel sieves. The portion of the sediment passing through the sieve was pulverized to approximately minus-100 mesh (minus-0.15 mm) for analysis.

Nonmagnetic heavy-mineral-concentrate samples

Ten to twenty pounds of stream sediment were collected from the active alluvium. Most of the samples were panned without screening. However, samples from sites 105-108 and 113-114 were screened with a 2.0-mm (10-mesh) screen to obtain about 20 lb after removal of the coarse material. The samples were panned to remove most of the quartz, feldspar, organic matter, and clay-sized material. The resulting concentrates were estimated to weigh between 1 and 4 oz.

After drying, bromoform (specific gravity 2.8) was used to remove the remaining quartz and feldspar from the samples that had been panned. Each heavy-mineral sample was then separated into three fractions using a large electromagnet (in this case a modified Frantz Isodynamic Separator). The most magnetic material, primarily magnetite, was not analyzed. The second fraction, largely ferromagnesian silicates and iron oxides, was saved for archival storage. The third fraction (the least magnetic material which may include the nonmagnetic ore minerals, zircon, sphene, etc.) was split using a Jones splitter. One split was hand ground for spectrographic analysis; the other split was saved for mineralogical analysis. These magnetic separates are approximately the same separates that would be produced by using a Frantz Isodynamic Separator set at a slope of 15° and a tilt of 10° with a current of 0.2 ampere to remove the magnetite and ilmenite, and a current of 0.6 ampere to split the remainder of the sample into paramagnetic and nonmagnetic fractions.

Raw panned-concentrate samples

Raw panned-concentrate samples were collected and panned in the same manner as the heavy-mineral-concentrate samples except that the samples were panned to a smaller amount. The raw panned-concentrate samples were dried and then were analyzed for gold without further preparation.

Rock samples

Sixty-four samples of bedrock were collected (table 1). The 28 samples from the RTR130 series were collected from outcrops at generally 100-ft intervals along a traverse crossing an area of altered bedrock along the west side of the wilderness study area. Sample RTR106A is from a shear zone. The seven samples from the 82S series were collected in 1982 and are representative of bedrock units where mineralization is absent and alteration is slight. The 28 samples from the RT7300 series are samples of mineralized rock, altered rock, and vein material. Descriptions of the rock samples are in table 1. Rock samples were crushed and then pulverized to approximately minus-100 mesh (minus-0.15 mm) with ceramic plates.

Sample Analysis

Spectrographic method

The stream-sediment samples were analyzed for 31 elements and the nonmagnetic heavy-mineral-concentrate and rock samples for 35-37 elements using a semiquantitative, direct-current arc emission spectrographic method (Grimes and Marranzino, 1968). The elements analyzed and their lower limits of determination are listed in tables 2 and 3. Spectrographic results were obtained by visual comparison of spectra derived from the sample against spectra obtained from standards made from pure oxides and carbonates. Standard concentrations are geometrically spaced over any given order of magnitude of concentration as follows: 100, 50, 20, 10, and so forth. Samples whose concentrations are estimated to fall between those values are assigned values of 70, 30, 15, and so forth. The precision of the analytical method is approximately plus or minus one reporting interval at the 83 percent confidence level and plus or minus two reporting intervals at the 96 percent confidence level (Motooka and Grimes, 1976). Values determined for the major elements (iron, magnesium, calcium, titanium, sodium, and phosphorus) are given in weight percent; all others are given in parts per million (ppm). Emission spectrographic analyses were performed by John H. Bullock, Jr.

Other methods

Table 4 lists other methods of analysis used on samples from the Ragged Top Wilderness Study Area and lists limits of determination, precision, and references for the methods. Rock and stream-sediment samples were analyzed for gold by graphite furnace atomic absorption spectroscopy and for antimony, arsenic, bismuth, cadmium, and zinc by inductively coupled plasma emission spectrometry. Rock samples were analyzed for mercury by cold vapor atomic absorption spectroscopy, for tellurium and thallium by flame atomic absorption spectroscopy, for fluorine by ion selective electrode, and for tungsten by visible spectrophotometry. Stream-sediment samples were analyzed for uranium by ultraviolet fluorimetry. Raw panned-concentrate samples were analyzed for gold by flame atomic absorption spectroscopy. Analysts were Paul H. Briggs, Alonza H. Love, John B. McHugh, Richard M. O'Leary, Theodore A. Roemer, John D. Sharkey, and Eric P. Welsch.

Analytical results for stream-sediment, nonmagnetic heavy-mineral-concentrate, raw panned-concentrate, and rock samples are listed in tables 5, 6, 7, and 8, respectively.

DATA STORAGE SYSTEM

Upon completion of analytical work, the results were entered into a U.S. Geological Survey computer data base called PLUTO. This data base contains both descriptive geological information and analytical data. Any or all of this information may be retrieved and converted to a binary form (STATPAC) for computerized statistical analysis or publication (VanTrump and Miesch, 1977).

DESCRIPTION OF DATA TABLES

The numeric portion of each sample identification in tables 5-7 and of RT7300-series rock samples and sample RTR106A in table 8 corresponds to the site number on plate 1. However, only the last three numbers in sample identifications for 82S-series rock samples in table 8 correspond to site

numbers on plate 1. Sites A-Z on plate 1 show the sampling sites of RTR130-series rocks and correspond to the letter immediately following 130 in each sample identification in table 8.

A letter "N" in the tables indicates that a given element was looked for but not detected at the lower limit of determination. If an element determined by emission spectrography was observed but was below the lowest reporting value, a "less than" symbol (<) was entered in the tables in front of the lower limit of determination. No distinction was made between "not detected" and "less than" for samples analyzed by methods other than emission spectrography. If an element was above the highest reporting value, a "greater than" symbol (>) was entered in the tables in front of the upper limit of determination. The lower limit of determination for gold in raw panned-concentrate samples by atomic absorption spectroscopy is 0.05 ppm, based on a 10-g sample. Because the sample weight for raw panned-concentrate samples was variable, the lower limits of determination varied from 0.02 to 0.07 ppm. The weights of the raw panned-concentrate samples (table 7) are given in grams and are in the column headed by "weight".

Because of the formatting used in the computer program that produced tables 5-8, some of the elements listed in these tables (Ca, Fe, Mg, Na, P, Ti, Ag, Be, Cd-i, Au-a, Hg-a, Te-a, and Tl-a) carry one or more nonsignificant digits to the right of the significant digits. The spectrographic determinations for As, Au, Bi, Cd, Mo, Sb, Th, and W in stream-sediment samples; for As, Co, Ge, Nb, Pd, Pt, Sb, and Th in nonmagnetic heavy-mineral-concentrate samples; and for As, Au, Ge, Sb, Sn, and Th in rock samples were all below the lower limits of determinations shown in tables 2 and 3; consequently, the columns for these elements were omitted from tables 5, 6, and 8, respectively. The spectrographic determinations for Zr in nonmagnetic heavy-mineral-concentrate samples were all greater than the upper limit of determination and so that element was omitted from table 6.

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Table 1.--Descriptions of analyzed rock samples from the Ragged Top Wilderness Study Area, Pima County, Arizona. (Au, Ag ppm)

Sample	Description
RTR130AA	Granodiorite porphyry <.001, N
RTR130BA	Granodiorite porphyry <.001 N
RTR130CA	Granodiorite porphyry, slightly altered .002 N
RTR130DA	Granodiorite porphyry, slightly altered .003, N
RTR130DB	Granodiorite porphyry, altered .004, <.5
RTR130EA	Granodiorite porphyry, altered .002, N
RTR130EB	Granodiorite porphyry, altered .002, N
RTR130FA	Granodiorite porphyry, altered .005, .5
RTR130GA	Granodiorite porphyry, highly altered, brecciated .008, 1.0
RTR130HA	Granodiorite porphyry, highly altered, brecciated .002, N
RTR130IA	Granodiorite porphyry, highly altered, brecciated .001, N
RTR130JA	Granodiorite porphyry, highly altered, brecciated .004, N
RTR130KA	Granodiorite porphyry, highly altered, .002, N
RTR130LA	Fine grained rock, highly altered .002, N
RTR130MA	Granodiorite porphyry, altered .002, N
RTR130NA	Potassium-rich rock .001, N
RTR130OA	Potassium-rich rock .003, N
RTR130PA	Granodiorite porphyry, slightly altered <.003, N
RTR130QA	Granodiorite porphyry, slightly altered <.001, N
RTR130RA	Granodiorite porphyry, slightly altered <.001, N
RTR130SA	Granodiorite porphyry <.001, N
RTR130TA	Granodiorite porphyry, slightly altered .001, N
RTR130UA	Granodiorite porphyry, slightly altered .001, N
RTR130VA	Granodiorite porphyry <.001, N
RTR130WA	Diabase <.001, N
RTR130XA	Oracle-type granite <.001, N
RTR130YA	Diabase <.001, N
RTR130ZA	Oracle-type granite <.001 N
RTR106A	Oracle-type granite from shear zone .001, N
82S-023	Granodiorite porphyry <.001, N
82S-044	Granodiorite porphyry <.001, N
82S-122	Lithic tuff <.001, N
82S-133	Rhyolite welded tuff <.001, N
82S-135	Rhyodacite porphyry <.001, N
82S-150	Rhyodacite porphyry <.001, N
82S-382	Rhyolite <.001, N
RT7306A	Barite-fluorite vein .006, .015
RT7306BA	Barite vein .002, N
RT7306BB	Altered wall rock by barite vein .007
RT7307A	Granodiorite porphyry, altered .003, <.5
RT7308A	Granodiorite porphyry, altered .015, .5
RT7309A	Sulfide minerals and calcite .7, 150
RT7309B	Granodiorite porphyry with sulfide minerals .015, 100
RT7309C	Granodiorite porphyry with sulfide minerals .090, 20.0
RT7309D	Dolomite (?) vein with sulfide minerals .02, 1.0
RT7309EA	Rhodochrosite (?) vein with sulfide minerals .08, 50
RT7309EB	Granodiorite porphyry with rhodochrosite (?) and sulfide minerals .10, .15
RT7309F	Granodiorite porphyry with sulfide minerals .009, <.5
RT7309G	Granodiorite porphyry with sulfide minerals .005, <.5
RT7310A	Granodiorite porphyry .026, .5
RT7310B	Granodiorite porphyry with calcite and sulfide minerals .38, 30
RT7311AA	Quartz vein .007, N
RT7311AB	Quartz vein .044 N
RT7315A	Quartz vein .001, N
RT7315B	Quartz vein <.001, N
RT7315CA	Quartz vein .002, N
RT7315CB	Altered granite .062, <.5
RT7316A	Diabase .006, N
RT7324A	Barite vein .023, 2
RT7324B	Barite vein .023, 3
RT7324CA	Quartz vein .021 N
RT7324CB	Quartz vein .25, 2
RT7325A	Quartz vein .004, N
RT7326A	Quartz vein with sulfide minerals .002, N

TABLE 2.--Limits of determination for the spectrographic analysis of stream-sediment samples, based on a 10-mg sample

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.05	20
Magnesium (Mg)	.02	10
Calcium (Ca)	.05	20
Titanium (Ti)	.002	1
	Parts per million	
Manganese (Mn)	10	5,000
Silver (Ag)	0.5	5,000
Arsenic (As)	200	10,000
Gold (Au)	10	500
Boron (B)	10	2,000
Barium (Ba)	20	5,000
Beryllium (Be)	1	1,000
Bismuth (Bi)	10	1,000
Cadmium (Cd)	20	500
Cobalt (Co)	5	2,000
Chromium (Cr)	10	5,000
Copper (Cu)	5	20,000
Lanthanum (La)	20	1,000
Molybdenum (Mo)	5	2,000
Niobium (Nb)	20	2,000
Nickel (Ni)	5	5,000
Lead (Pb)	10	20,000
Antimony (Sb)	100	10,000
Scandium (Sc)	5	100
Tin (Sn)	10	1,000
Strontium (Sr)	100	5,000
Vanadium (V)	10	10,000
Tungsten (W)	50	10,000
Yttrium (Y)	10	2,000
Zinc (Zn)	200	10,000
Zirconium (Zr)	10	1,000
Thorium (Th)	100	2,000

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TABLE 3.--Limits of determination for the spectrographic analysis of heavy-mineral-concentrate samples based on a 5-mg sample

[The spectrographic limits of determination for rock samples are based on a 10-mg sample and are therefore two reporting intervals lower than the limits listed in this table]

Elements	Lower determination limit	Upper determination limit
	Percent	
Iron (Fe)	0.1	50
Magnesium (Mg)	.05	20
Calcium (Ca)	.1	50
Titanium (Ti)	.005	2
Sodium (Na)	.5	10
Phosphorus (P)	.5	20
	Parts per million	
Manganese (Mn)	20	10,000
Silver (Ag)	1	10,000
Arsenic (As)	500	20,000
Gold (Au)	20	1,000
Boron (B)	20	5,000
Barium (Ba)	50	10,000
Beryllium (Be)	2	2,000
Bismuth (Bi)	20	2,000
Cadmium (Cd)	50	1,000
Cobalt (Co)	20	5,000
Chromium (Cr)	20	10,000
Copper (Cu)	10	50,000
Lanthanum (La)	100	2,000
Molybdenum (Mo)	10	5,000
Niobium (Nb)	50	5,000
Nickel (Ni)	10	10,000
Lead (Pb)	20	50,000
Antimony (Sb)	200	20,000
Scandium (Sc)	10	2,000
Tin (Sn)	20	2,000
Strontium (Sr)	200	10,000
Vanadium (V)	20	20,000
Tungsten (W)	50	20,000
Yttrium (Y)	20	5,000
Zinc (Zn)	500	20,000
Zirconium (Zr)	20	2,000
Thorium (Th)	200	5,000
Gallium (Ga)	10	1,000
Germanium (Ge)	20	200
Platinum (Pt)	20	1,000
Palladium (Pd)	5	1,000

TABLE 4.--Analytical methods used other than emission spectrography

[AAC, cold vapor atomic absorption; AAF, flame atomic absorption; AAG, graphite furnace atomic absorption; F, ultraviolet fluorimetry; ICP, inductively coupled plasma spectrometry; ISE, ion selective electrode; VS, visible spectrophotometry; <, less than value shown]

Element determined	Sample type	Method	Lower limit of determination, ppm	Precision, percent relative standard deviation	References
Mercury (Hg)	rocks	AAC	0.02	<5	Crock and others, 1987.
Tellurium (Te)	rocks	AAF	0.1	4.5-7.3	Hubert and Chao, 1985.
Thallium (Tl)	rocks	AAF	0.05	1.6-12.5	Hubert and Chao, 1985.
Gold (Au)	raw panned concentrates	AAF	0.05[a]	9.3-42.5	Thompson and others, 1968; O'Leary and Meier, 1986.
Gold (Au)	rocks, stream sediments	AAG	0.001	3.7-21.1	Meier, 1980; O'Leary, and Meier, 1986.
Uranium (U)	stream sediments	F	0.1	6.9-14.2	Centanni and others, 1956; O'Leary and Meier, 1986.
Antimony (Sb)	rocks, stream sediments	ICP	2	6.4-11	Crock and others, 1987.
Arsenic (As)	rocks, stream sediments	ICP	5	3.5-20	Crock and others, 1987.
Bismuth (Bi)	rocks, stream sediments	ICP	2	2.2-11.9	Crock and others, 1987.
Cadmium (Cd)	rocks, stream sediments	ICP	0.1	2.8-8.8	Crock and others, 1987.
Zinc (Zn)	rocks, stream sediments	ICP	2	1.4-11.9	Crock and others, 1987.
Fluorine (F)	rocks	ISE[b]	100	0.98-5.51	Hopkins, 1977; O'Leary and Meier, 1986.
Tungsten (W)	rocks	VS	1	2.9-6.9	Welsch, 1983; O'Leary and Meier, 1986.

[a]Based on 10-g sample

[b]Hot nitric acid digestion

Table 5.--Results of analyses of stream-sediment samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona

[N, not detected; <, detected below limit of determination shown for emission spectrographic analyses, less than value shown for other methods; >, greater than value shown; ---, not determined. Methods: Au-a, atomic absorption; As-i, Bi-i, Cd-i, Sb-i, Zn-i, inductively coupled plasma spectroscopy; U-f, ultraviolet fluorimetry; others, emission spectrography. Element values in ppm except Ca, Fe, Mg, and Ti, which are weight percent]

Sample	Latitude	Longitude	Ca	Fe	Mg	Ti	Ag	Au-a	As-i	B	Ba	Be	Bi-i	Cd-i	Co
RTA105	32 26 34	111 27 28	1.5	5	1.5	.7	N	---	7	50	700	3.0	<2	.8	30
RTA106	32 27 5	111 27 18	1.0	10	1.5	.7	N	.001	6	20	300	2.0	<2	2.3	70
RTA107	32 27 16	111 27 29	1.0	7	1.0	1.0	N	<.001	<5	30	500	3.0	<2	1.4	30
RTA108	32 27 46	111 27 54	.3	15	.3	.5	N	---	7	70	300	3.0	<2	2.5	70
RTA113	32 27 2	111 27 17	.5	7	.7	1.0	N	<.001	9	70	300	2.0	<2	1.9	30
RTA114	32 28 8	111 28 50	.7	7	1.0	1.0	N	---	6	15	500	3.0	<2	1.3	15
RTA115	32 28 31	111 30 4	.7	10	1.5	.7	N	<.001	<5	30	500	3.0	<2	1.3	20
RTA116	32 28 19	111 30 30	.7	10	.7	.7	N	.002	9	50	1,500	3.0	2	1.4	30
RTA117	32 27 43	111 30 39	1.0	5	1.5	.5	.5	.005	8	50	1,000	2.0	<2	1.3	15
RTA118	32 26 57	111 30 35	.5	5	1.0	.3	N	.010	<5	10	500	1.0	<2	.7	5
RTA126	32 26 14	111 29 4	.7	7	1.0	.5	N	.001	7	10	300	1.5	<2	.8	10

Sample	Cr	Cu	La	Mn	Nb	Ni	Pb	Sb-i	Sc	Sn	Sr	U-f	V	Y	Zn	Zn-i	Zr
RTA105	30	30	30	500	<20	30	50	2	15	N	200	1.1	150	20	N	68	500
RTA106	50	70	<20	1,000	N	50	50	11	15	<10	<100	2.2	200	50	200	88	200
RTA107	30	50	20	1,500	N	20	50	<2	20	N	<100	3.0	200	70	200	71	300
RTA108	200	30	N	700	<20	50	30	<2	10	N	N	7.5	500	500	N	31	300
RTA113	30	50	<20	300	<20	30	30	14	15	<10	N	1.9	200	50	N	89	300
RTA114	20	50	70	700	<20	15	30	<2	20	<10	<100	3.7	150	100	N	75	1,000
RTA115	30	30	50	2,000	<20	15	50	<2	15	N	100	2.8	200	100	N	81	500
RTA116	50	50	50	1,000	<20	30	150	<2	20	<10	100	2.9	300	70	N	77	1,000
RTA117	30	70	30	2,000	N	20	300	<2	15	N	150	1.1	100	20	200	150	200
RTA118	20	30	<20	500	N	7	70	<2	<5	N	100	1.2	70	<10	<200	68	70
RTA126	20	20	<20	500	N	15	50	<2	5	N	100	1.1	100	10	N	80	100

Table 6.--Results of analyses of nonmagnetic heavy-mineral-concentrate samples from the Ragged Top Wilderness Study Area, Pima County, Arizona

[N, not detected; <, detected below limit of determination shown; >, greater than value shown. Analyses by emission spectrography. Element values are ppm except Ca, Fe, Mg, Na, P, and Ti, which are weight percent]

Sample	Latitude	Longitude	Ca	Fe	Mg	Na	P	Ti	Ag	Au	B	Ba	Be	Bi	Cd
RTH105	32 26 34	111 27 28	5	1.00	.30	1.5	2.0	2.0	N	N	20	>10,000	3	N	N
RTH106	32 27 5	111 27 18	3	1.50	.30	.7	2.0	2.0	N	N	20	5,000	7	50	N
RTH107	32 27 16	111 27 29	5	.70	.20	.5	5.0	1.0	N	N	30	3,000	10	70	N
RTH108	32 27 46	111 27 54	5	1.00	.20	5.0	1.5	.2	N	N	20	1,000	5	N	N
RTH113	32 27 2	111 27 17	5	1.00	.50	2.0	1.5	1.5	N	N	30	>10,000	5	N	N
RTH114	32 28 8	111 28 50	10	.50	.20	1.5	10.0	.7	N	N	<20	700	5	N	N
RTH115	32 28 31	111 30 4	10	1.00	.30	2.0	5.0	1.5	N	N	20	3,000	7	N	N
RTH116	32 28 19	111 30 30	5	.70	.30	1.0	1.0	.7	N	N	<20	>10,000	7	N	N
RTH117	32 27 43	111 30 39	10	1.50	.50	3.0	2.0	1.5	<1	N	30	>10,000	2	N	N
RTH118	32 26 57	111 30 35	2	.30	.10	1.0	1.0	.5	1,000	>1,000	N	>10,000	N	30	N
RTH126	32 26 14	111 29 4	7	.70	.15	2.0	1.5	1.5	2	N	<20	10,000	3	N	<50
RTH7301B	32 26 56	111 30 34	7	.10	.10	N	2.0	.3	2	N	N	>10,000	N	N	N
RTH7302	32 26 53	111 30 31	20	.20	.10	N	7.0	.7	2	N	N	>10,000	N	N	N
RTH7303	32 26 55	111 30 27	30	.30	.10	N	7.0	.5	<1	N	N	>10,000	N	N	N
RTH7304B	32 26 50	111 30 16	20	.20	.15	N	1.5	.5	300	N	N	>10,000	N	300	70
RTH7305B	32 27 1	111 30 43	10	.10	.07	N	.5	.1	30	N	N	>10,000	N	N	N
RTH7312	32 27 9	111 27 44	15	.70	.15	.5	2.0	1.5	N	N	20	3,000	5	30	N
RTH7313	32 27 8	111 27 43	15	.70	.30	1.0	.7	1.0	N	N	20	>10,000	3	N	N
RTH7314	32 27 5	111 27 21	20	1.50	1.00	2.0	1.0	2.0	N	N	30	10,000	2	30	N
RTH7317	32 26 31	111 29 57	20	1.00	.15	N	7.0	1.5	N	N	N	>10,000	<2	N	N
RTH7318	32 26 39	111 30 3	5	.20	.10	<.5	.7	.3	N	N	N	>10,000	<2	N	N
RTH7319B	32 26 42	111 30 13	10	.20	.10	<.5	2.0	1.0	15	70	<20	>10,000	N	N	N
RTH7320B	32 26 40	111 30 14	2	.10	.07	N	<.5	.2	N	N	N	>10,000	N	N	N
RTH7322	32 26 9	111 30 16	3	<.10	.07	N	<.5	.2	N	N	N	>10,000	N	N	N
RTH7323	32 26 15	111 30 18	3	.15	.10	N	.5	.2	1	N	N	>10,000	N	N	N

Sample	Cr	Cu	Ga	La	Mn	Mo	Ni	Pb	Sc	Sn	Sr	V	W	Y	Zn
RTH105	<20	70	20	N	300	N	<10	70	50	N	700	50	N	500	N
RTH106	20	20	15	<100	500	N	<10	1,000	200	N	N	200	N	1,500	N
RTH107	N	15	10	<100	700	N	<10	70	200	N	N	100	N	1,500	N
RTH108	N	<10	30	N	700	N	<10	50	70	N	N	50	50	1,000	N
RTH113	<20	50	70	N	700	N	<10	2,000	100	N	200	100	N	1,500	N
RTH114	N	N	15	100	1,000	N	N	70	150	N	N	50	N	1,500	N
RTH115	N	10	30	100	700	N	N	100	100	N	N	50	N	1,000	N
RTH116	N	<10	15	N	700	N	N	200	150	N	700	30	N	1,000	N
RTH117	20	50	50	150	700	<10	<10	3,000	50	N	700	100	N	500	N
RTH118	N	150	<10	<100	200	150	N	>50,000	30	N	1,500	15,000	N	150	<500
RTH126	N	<10	10	100	300	N	N	1,000	50	N	N	700	N	300	N
RTH7301B	N	70	N	100	500	10	N	15,000	20	N	>10,000	1,500	N	300	500
RTH7302	N	30	N	150	700	100	N	3,000	20	N	10,000	150	N	500	N
RTH7303	N	<10	N	300	1,000	N	N	1,500	20	N	10,000	150	N	300	N
RTH7304B	<20	1,000	N	150	1,000	500	N	>50,000	30	N	10,000	5,000	N	200	700
RTH7305B	N	20	N	<100	200	20	N	500	N	N	>10,000	500	N	70	<500
RTH7312	N	50	<10	100	1,000	N	N	50	200	N	<200	200	N	1,500	N
RTH7313	<20	10	10	100	500	N	N	<20	200	N	500	150	N	1,500	N
RTH7314	<20	20	30	100	1,000	N	N	<20	100	50	500	150	N	1,000	N
RTH7317	N	<10	N	200	1,000	N	N	30	100	N	700	300	N	700	N
RTH7318	50	50	N	N	500	N	N	50	15	N	>10,000	700	N	200	N
RTH7319B	20	20	N	150	700	<10	N	>50,000	70	N	7,000	10,000	N	700	N
RTH7320B	N	15	N	N	150	30	N	3,000	<10	N	>10,000	300	N	100	N
RTH7322	N	N	N	N	300	200	N	1,500	N	N	>10,000	50	N	70	N
RTH7323	N	<10	N	N	500	<10	N	10,000	20	N	10,000	3,000	N	150	N

Table 7.--Results of analyses of raw panned-concentrate samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona

[<, less than value shown. Au-a in ppm. Weight, grams of raw panned-concentrate sample. Analyses by atomic absorption]

Sample	Latitude	Longitude	Au-a	Weight
RTG105	32 26 34	111 27 28	<.05	11.01
RTG106	32 27 5	111 27 18	<.04	13.09
RTG107	32 27 16	111 27 29	<.05	11.02
RTG108	32 27 46	111 27 54	<.05	9.97
RTG113	32 27 2	111 27 17	<.06	7.95
RTG114	32 28 8	111 28 50	<.04	14.45
RTG115	32 28 31	111 30 4	<.05	10.04
RTG116	32 28 19	111 30 30	<.05	11.35
RTG117	32 27 43	111 30 39	<.07	6.55
RTG118	32 26 57	111 30 35	150.00	7.44
RTG126	32 26 14	111 29 4	<.05	11.55
RTG7301	32 26 56	111 30 34	2.30	21.57
RTG7302	32 26 53	111 30 31	.20	15.18
RTG7303	32 26 55	111 30 27	.03	19.68
RTG7304	32 26 50	111 30 16	3.40	13.13
RTG7305	32 27 1	111 30 43	.03	17.80
RTG7312	32 27 9	111 27 44	<.03	21.45
RTG7313	32 27 8	111 27 43	.03	19.83
RTG7314	32 27 5	111 27 21	<.03	16.69
RTG7317	32 26 31	111 29 57	.06	15.89
RTG7318	32 26 39	111 30 3	<.02	26.66
RTG7319	32 26 42	111 30 13	.11	16.62
RTG7320	32 26 40	111 30 14	.23	25.10
RTG7321	32 26 30	111 30 15	.03	18.29
RTG7322	32 26 9	111 30 16	.04	13.32
RTG7323	32 26 15	111 30 18	.99	20.00

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona

[N, not detected; <, detected below limit of determination shown for emission spectrographic analyses, less than value shown for other methods; >, greater than value shown; ---, not determined. Methods: As-i, Bi-i, Cd-i, Sb-i, Zn-i, inductively coupled spectroscopy; Au-a, Hg-a, Te-a, Tl-a, atomic absorption; W-v, visible spectrophotometry; F-is, ion selective electrode; others, emission spectrography. Values in ppm except Ca, Fe, Mg, Na, P, Ti, and F-is, which are weight percent]

Sample	Latitude	Longitude	Ca	Fe	Mg	Na	P	Ti	Ag	B	Ba	Be
RTR130AA	32 27 4	111 30 31	.70	5.0	1.0	3.0	N	.500	N	10	3,000	1.5
RTR130BA	32 27 5	111 30 31	1.00	5.0	2.0	3.0	N	.500	N	15	1,000	<1.0
RTR130CA	32 27 6	111 30 31	.30	7.0	2.0	2.0	N	.700	N	100	1,000	1.5
RTR130DA	32 27 7	111 30 31	.20	5.0	2.0	3.0	N	.500	<.5	20	1,000	1.0
RTR130DB	32 27 7	111 30 31	.20	5.0	1.5	3.0	N	.500	N	20	1,000	1.0
RTR130EA	32 27 8	111 30 30	.30	5.0	.5	1.0	N	.300	N	70	1,500	<1.0
RTR130EB	32 27 8	111 30 30	.15	3.0	.2	.5	N	.500	N	50	700	<1.0
RTR130FA	32 27 10	111 30 31	.20	3.0	1.5	3.0	N	.300	.5	30	200	1.0
RTR130GA	32 27 11	111 30 31	.07	7.0	.3	.5	N	.700	1.0	300	1,500	1.0
RTR130HA	32 27 12	111 30 31	.20	7.0	.7	1.5	<.2	.700	<.5	500	1,500	1.0
RTR130IA	32 27 13	111 30 30	.15	5.0	1.5	2.0	N	.300	N	150	1,000	1.5
RTR130JA	32 27 14	111 30 30	.20	7.0	1.5	3.0	N	.700	N	50	1,000	<1.0
RTR130KA	32 27 15	111 30 31	.30	7.0	2.0	2.0	N	.700	N	50	2,000	1.5
RTR130LA	32 27 15	111 30 32	.15	10.0	3.0	2.0	N	.700	N	300	1,000	1.5
RTR130MA	32 27 16	111 30 33	.30	3.0	1.0	<.2	N	.500	N	50	1,500	1.5
RTR130NA	32 27 17	111 30 33	.30	7.0	.7	3.0	N	.700	N	50	1,500	1.0
RTR130OA	32 27 18	111 30 34	.15	5.0	1.0	2.0	N	.700	N	100	2,000	1.0
RTR130PA	32 27 19	111 30 34	2.00	7.0	2.0	3.0	N	.700	N	70	1,500	1.5
RTR130QA	32 27 20	111 30 34	3.00	7.0	3.0	3.0	N	.700	N	10	700	<1.0
RTR130RA	32 27 21	111 30 34	2.00	7.0	3.0	2.0	N	.700	N	30	1,000	1.5
RTR130SA	32 27 22	111 30 34	1.50	7.0	3.0	3.0	N	.500	N	<10	1,000	<1.0
RTR130TA	32 27 25	111 30 35	1.00	7.0	1.5	3.0	N	.500	N	20	1,000	<1.0
RTR130UA	32 27 27	111 30 34	.30	5.0	1.5	3.0	N	.700	N	20	1,000	1.0
RTR130VA	32 27 29	111 30 33	.20	3.0	.5	3.0	N	.300	N	10	2,000	2.0
RTR130WA	32 27 30	111 30 33	3.00	10.0	3.0	2.0	.7	1.000	N	10	300	2.0
RTR130XA	32 27 31	111 30 34	.70	3.0	.7	2.0	N	.500	N	15	1,000	1.5
RTR130YA	32 27 32	111 30 34	3.00	20.0	5.0	2.0	.2	>1.000	N	15	500	2.0
RTR130ZA	32 27 34	111 30 35	.30	5.0	.3	3.0	N	.500	N	10	1,000	1.5
RTR106A	32 27 5	111 27 18	15.00	10.0	10.0	<.2	N	.200	N	<10	200	1.5
82S-023	32 27 29	111 30 48	.50	5.0	1.0	3.0	N	.200	N	<10	1,500	<1.0
82S-044	32 26 59	111 31 20	1.50	7.0	2.0	3.0	N	.500	N	10	1,000	N
82S-122	32 26 11	111 30 15	1.00	2.0	.5	2.0	N	.200	N	10	1,500	1.0
82S-133	32 25 32	111 30 25	.70	3.0	.3	3.0	N	.300	N	<10	2,000	<1.0
82S-135	32 25 29	111 30 23	1.50	5.0	1.5	3.0	N	.300	N	10	1,500	<1.0
82S-150	32 26 15	111 29 35	1.50	7.0	2.0	3.0	N	.300	N	<10	1,000	<1.0
82S-382	32 26 47	111 29 18	.30	2.0	.2	5.0	N	.200	N	N	1,000	1.5
RT7306A	32 26 54	111 30 39	2.00	3.0	.7	1.5	N	.200	.5	10	>5,000	<1.0
RT7306BA	32 26 54	111 30 39	5.00	.1	.1	N	N	.015	N	<10	>5,000	N
RT7306BB	32 26 54	111 30 39	3.00	2.0	.5	N	N	.070	N	70	>5,000	5.0
RT7307A	32 26 58	111 30 18	.50	2.0	.1	N	N	.500	<.5	20	1,000	N
RT7308A	32 26 58	111 30 5	.07	5.0	.5	3.0	N	.300	.5	<10	1,500	N
RT7309A	32 27 2	111 30 6	7.00	7.0	.3	>5.0	N	.150	150.0	10	150	N
RT7309B	32 27 2	111 30 6	1.00	5.0	1.5	2.0	N	.500	100.0	10	1,500	<1.0
RT7309C	32 27 2	111 30 6	.30	7.0	.5	1.5	N	.500	20.0	20	300	<1.0
RT7309D	32 27 2	111 30 6	20.00	5.0	1.5	.3	N	.200	1.0	30	2,000	1.0

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona--Continued

Sample	Bi	Cd	Co	Cr	Cu	Ga	La	Mn	Mo	Nb	Ni	Pb	Sc	Sr	V	W
RTR130AA	N	N	10	N	50	70	50	500	N	N	N	30	5	500	100	N
RTR130BA	N	N	20	20	30	70	<50	700	N	N	20	20	10	500	150	N
RTR130CA	N	N	15	30	70	50	50	500	N	N	20	100	15	200	200	N
RTR130DA	N	N	15	15	70	50	<50	1,500	N	N	30	200	10	300	150	N
RTR130DB	N	N	N	N	70	70	50	300	N	N	15	30	10	200	200	N
RTR130EA	<10	N	<10	10	30	70	<50	70	N	N	<5	150	7	150	150	N
RTR130EB	<10	N	N	30	30	50	<50	50	N	N	<5	500	7	100	200	N
RTR130FA	N	N	<10	15	50	70	<50	500	N	N	5	300	7	200	100	N
RTR130GA	N	N	N	30	100	50	<50	50	5	N	N	15	10	150	200	N
RTR130HA	N	N	<10	20	30	70	50	200	<5	N	<5	30	10	100	200	N
RTR130IA	N	N	10	15	50	50	<50	300	N	N	20	15	7	200	150	N
RTR130JA	N	N	10	10	50	70	<50	200	N	N	5	20	15	300	200	N
RTR130KA	N	N	50	10	70	70	<50	1,000	<5	N	30	20	10	200	150	N
RTR130LA	N	N	30	20	50	50	<50	1,000	N	N	10	15	15	100	300	N
RTR130MA	N	N	N	15	15	50	<50	100	N	N	N	150	7	100	150	N
RTR130NA	N	N	N	20	50	70	50	150	5	N	N	30	10	150	200	N
RTR130OA	N	N	N	15	30	70	<50	70	<5	N	N	50	10	100	150	N
RTR130PA	N	N	30	10	50	100	50	2,000	<5	N	15	50	10	300	200	N
RTR130QA	N	N	50	10	70	70	<50	1,500	N	N	20	10	20	500	200	N
RTR130RA	N	N	30	15	70	100	50	1,500	N	N	20	10	10	200	150	N
RTR130SA	N	N	70	10	70	70	<50	1,500	N	N	15	15	15	700	150	N
RTR130TA	N	N	100	15	70	100	N	5,000	5	N	20	15	7	500	150	N
RTR130UA	N	N	15	15	70	100	<50	1,500	<5	N	10	30	10	500	200	N
RTR130VA	N	N	N	N	5	100	70	300	<5	<20	N	100	5	200	20	N
RTR130WA	N	N	30	<10	100	100	N	2,000	N	N	<5	100	15	150	150	N
RTR130XA	N	N	15	<10	10	30	<50	500	<5	N	5	10	7	100	50	N
RTR130YA	N	N	100	50	100	100	N	3,000	N	N	100	10	30	300	300	N
RTR130ZA	N	N	<10	<10	30	70	50	300	<5	N	<5	15	10	100	70	N
RTR106A	N	N	150	N	70	20	N	3,000	N	N	100	100	20	200	500	N
82S-023	N	N	15	N	15	70	N	500	N	N	N	30	<5	200	100	---
82S-044	N	N	20	15	70	100	N	700	N	N	10	30	10	500	200	N
82S-122	N	N	10	N	<5	30	N	500	N	N	N	30	<5	150	50	---
82S-133	N	N	N	N	<5	70	70	500	N	N	N	20	5	100	20	N
82S-135	N	N	20	30	5	100	N	500	N	N	20	30	7	300	150	N
82S-150	N	N	20	20	50	100	N	500	N	N	15	15	7	200	150	N
82S-382	N	N	N	N	<5	70	50	300	N	N	N	50	N	<100	15	N
RT7306A	N	N	<10	10	30	50	N	200	N	N	7	300	<5	3,000	100	N
RT7306BA	N	N	N	N	15	10	N	200	N	N	N	300	N	>5,000	150	N
RT7306BB	N	N	N	<10	50	10	50	1,000	N	N	10	500	<5	200	200	N
RT7307A	N	N	N	<10	5	20	N	10	N	N	N	N	<5	N	100	N
RT7308A	N	N	<10	10	7	100	N	300	N	N	<5	20	<5	<100	70	N
RT7309A	15	>500	<10	N	3,000	30	N	2,000	150	N	N	>20,000	<5	N	50	N
RT7309B	N	N	20	15	200	70	N	1,500	<5	N	20	150	5	<100	100	N
RT7309C	<10	70	15	20	200	50	N	300	20	N	15	5,000	5	N	150	N
RT7309D	N	N	10	N	100	30	50	3,000	<5	N	5	200	<5	150	70	N

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona--Continued

Sample	Y	Zn	Zr	As-i	Bi-i	Cd-i	Sb-i	Zn-i	Au-a	Hg-a	Te-a	Tl-a	W-v	F-is
RTR130AA	10	N	150	---	---	---	---	---	<.001	---	---	---	---	---
RTR130BA	15	<200	100	---	---	---	---	---	<.001	---	---	---	---	---
RTR130CA	15	<200	100	---	---	---	---	---	.004	---	---	---	---	---
RTR130DA	15	<200	100	---	---	---	---	---	.002	---	---	---	---	---
RTR130DB	20	<200	200	---	---	---	---	---	.004	---	---	---	---	---
RTR130EA	15	N	500	---	---	---	---	---	.002	---	---	---	---	---
RTR130EB	10	N	200	---	---	---	---	---	.002	---	---	---	---	---
RTR130FA	15	200	100	---	---	---	---	---	.005	---	---	---	---	---
RTR130GA	10	N	150	---	---	---	---	---	.008	---	---	---	---	---
RTR130HA	15	N	200	---	---	---	---	---	.002	---	---	---	---	---
RTR130IA	10	<200	100	---	---	---	---	---	.001	---	---	---	---	---
RTR130JA	15	N	300	---	---	---	---	---	.001	---	---	---	---	---
RTR130KA	20	<200	70	---	---	---	---	---	.004	---	---	---	---	---
RTR130LA	30	N	200	---	---	---	---	---	.002	---	---	---	---	---
RTR130MA	20	N	200	---	---	---	---	---	.002	---	---	---	---	---
RTR130NA	20	N	200	---	---	---	---	---	.002	---	---	---	---	---
RTR130OA	15	N	200	---	---	---	---	---	.001	---	---	---	---	---
RTR130PA	20	N	150	---	---	---	---	---	.003	---	---	---	---	---
RTR130QA	30	<200	150	---	---	---	---	---	<.001	---	---	---	---	---
RTR130RA	30	<200	200	---	---	---	---	---	<.001	---	---	---	---	---
RTR130SA	15	<200	100	---	---	---	---	---	<.001	---	---	---	---	---
RTR130TA	50	N	200	---	---	---	---	---	.001	---	---	---	---	---
RTR130UA	15	N	150	---	---	---	---	---	.001	---	---	---	---	---
RTR130VA	30	N	200	---	---	---	---	---	<.001	---	---	---	---	---
RTR130WA	50	<200	100	---	---	---	---	---	<.001	---	---	---	---	---
RTR130XA	70	N	100	---	---	---	---	---	<.001	---	---	---	---	---
RTR130YA	50	<200	150	---	---	---	---	---	<.001	---	---	---	---	---
RTR130ZA	50	N	200	---	---	---	---	---	<.001	---	---	---	---	---
RTR106A	70	<200	20	---	---	---	---	---	.001	---	---	---	---	---
82S-023	N	N	100	11	<2	.5	25	59	<.001	<.02	<.05	.35	---	.03
82S-044	10	N	70	<5	<2	.7	3	37	<.001	.04	<.05	.40	1.2	.03
82S-122	10	N	70	<5	<2	.2	9	19	<.001	<.02	<.05	.50	---	.02
82S-133	15	N	500	<5	<2	.3	3	37	<.001	.02	<.05	.70	1.2	.03
82S-135	<10	N	100	<5	<2	.8	5	54	<.001	.02	<.05	.45	1.5	.03
82S-150	10	N	150	<5	<2	.7	3	44	<.001	.02	<.05	.30	.9	.03
82S-382	10	N	150	<5	<2	<.1	<2	29	<.001	<.02	<.05	.70	1.0	.02
RT7306A	10	2,000	50	<5	<2	.8	<2	1,600	.006	.12	<.05	.50	2.0	1.70
RT7306BA	15	<200	N	12	<2	.3	<2	130	.002	.02	<.05	<.05	.6	1.30
RT7306BB	30	500	30	23	<2	6.1	6	370	.007	.04	<.05	.25	3.3	2.40
RT7307A	N	N	20	<5	<2	.1	<2	3	.003	<.02	<.05	1.10	3.4	.02
RT7308A	N	N	50	27	<2	.4	<2	35	.015	<.02	.55	.85	2.2	.02
RT7309A	10	>10,000	15	<5	2	1,600.0	<2	>40,000	---	2.90	7.30	.50	1.6	.90
RT7309B	10	300	100	17	<2	4.7	3	610	.015	<.02	.35	1.10	2.5	.03
RT7309C	10	>10,000	100	16	6	53.0	5	6,400	.090	.20	2.00	1.60	5.4	.04
RT7309D	15	200	100	13	<2	3.5	6	580	.020	.02	.10	.50	1.4	.07

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona--Continued

Sample	Latitude	Longitude	Ca	Fe	Mg	Na	P	Ti	Ag	B	Ba	Be
RT7309EA	32 27 2	111 30 6	>20.00	10.0	.3	N	N	.002	50.0	15	1,500	N
RT7309EB	32 27 2	111 30 6	15.00	3.0	.3	N	N	.150	15.0	15	150	N
RT7309F	32 27 2	111 30 6	1.00	5.0	2.0	2.0	N	.700	<.5	10	200	<1.0
RT7309G	32 27 2	111 30 6	.70	7.0	1.5	3.0	N	.700	<.5	<10	2,000	<1.0
RT7310A	32 27 4	111 30 8	.70	5.0	1.5	1.5	N	.700	1.5	10	700	1.0
RT7310B	32 27 4	111 30 8	10.00	5.0	1.0	1.0	N	.300	30.0	10	500	<1.0
RT7311AA	32 27 8	111 27 26	20.00	7.0	3.0	.2	N	.030	N	<10	3,000	N
RT7311AB	32 27 8	111 27 26	20.00	3.0	1.0	N	N	.015	N	<10	150	N
RT7315A	32 27 1	111 27 56	5.00	5.0	2.0	<.2	N	.200	N	10	700	1.5
RT7315B	32 27 1	111 27 56	1.00	5.0	.1	N	N	.300	N	15	1,500	1.0
RT7315CA	32 27 1	111 27 56	1.50	2.0	.5	2.0	N	.200	N	10	300	N
RT7315CB	32 27 1	111 27 56	.50	5.0	.7	3.0	N	.200	<.5	10	200	N
RT7316A	32 27 7	111 27 28	7.00	10.0	5.0	3.0	N	1.000	N	<10	500	N
RT7324A	32 26 11	111 30 34	.07	1.0	.3	1.5	<.2	.100	2.0	<10	>5,000	N
RT7324B	32 26 11	111 30 34	.50	1.5	.1	N	<.2	.700	3.0	N	>5,000	N
RT7324CA	32 26 11	111 30 34	.10	.5	.1	N	N	.020	N	<10	700	<1.0
RT7324CB	32 26 11	111 30 34	.20	2.0	.2	.2	N	.100	2.0	<10	1,000	5.0
RT7325A	32 27 6	111 27 30	1.50	10.0	3.0	2.0	N	1.000	N	<10	150	<1.0
RT7326A	32 27 8	111 27 34	5.00	7.0	3.0	2.0	N	.050	N	<10	150	<1.0

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona--Continued

Sample	Bi	Cd	Co	Cr	Cu	Ga	La	Mn	Mo	Nb	Ni	Pb	Sc	Sr	V	W
RT7309EA	N	500	N	<10	15,000	30	<50	>5,000	10	N	<5	>20,000	20	500	10	N
RT7309EB	10	20	<10	<10	700	50	<50	2,000	10	N	<5	20,000	N	100	50	N
RT7309F	N	N	20	20	100	70	N	1,500	N	N	20	50	5	N	150	N
RT7309G	N	N	15	15	200	100	N	2,000	N	N	10	70	7	<100	100	N
RT7310A	N	N	20	20	70	30	N	1,500	N	N	15	50	7	<100	100	N
RT7310B	15	N	15	10	15	70	<50	2,000	<5	N	10	20,000	5	N	100	N
RT7311AA	N	N	20	30	30	N	N	3,000	N	N	30	20	15	100	50	N
RT7311AB	N	N	<10	10	10	<5	N	2,000	N	N	10	N	N	<100	30	N
RT7315A	N	N	10	N	15	30	<50	1,000	N	N	<5	10	<5	N	50	N
RT7315B	N	N	15	N	15	20	<50	700	N	<20	<5	<10	5	N	50	N
RT7315CA	N	N	N	N	7	50	<50	500	N	<20	<5	10	N	<100	30	N
RT7315CB	N	N	N	N	10	100	N	200	N	N	N	50	N	N	50	N
RT7316A	N	N	100	500	100	70	N	1,000	N	N	100	N	30	<100	300	N
RT7324A	N	N	N	N	20	15	N	200	300	N	N	1,000	N	>5,000	15	N
RT7324B	N	N	N	150	100	<5	N	100	200	N	5	500	<5	>5,000	70	<20
RT7324CA	N	N	N	N	5	10	N	300	N	N	N	N	N	N	10	N
RT7324CB	N	N	N	N	20	20	N	700	7	N	<5	30	N	N	20	N
RT7325A	N	N	70	300	50	70	N	1,500	N	N	150	50	30	N	300	N
RT7326A	N	N	70	<10	70	50	N	2,000	N	N	50	50	<5	N	150	N

Table 8.--Results of analyses of rock samples collected from the Ragged Top Wilderness Study Area, Pima County, Arizona--Continued

Sample	Y	Zn	Zr	As-i	Bi-i	Cd-i	Sb-i	Zn-i	Au-a	Hg-a	Te-a	Tl-a	W-v	F-is
RT7309EA	200	>10,000	N	<5	<2	410.0	4	34,000	.080	1.20	2.00	.10	<.5	<.01
RT7309EB	20	7,000	10	10	4	28.0	6	3,400	.100	.08	1.60	.90	2.7	.02
RT7309F	<10	<200	150	7	<2	.8	<2	110	.009	<.02	<.05	.70	2.9	.02
RT7309G	10	<200	30	8	<2	6.0	8	160	.005	<.02	<.05	.85	1.7	.02
RT7310A	<10	<200	100	13	<2	.7	<2	110	.026	<.02	.70	1.00	2.5	.03
RT7310B	15	700	30	14	9	6.4	6	770	.380	.02	4.00	.80	1.7	.03
RT7311AA	20	N	10	<5	<2	2.4	<2	36	.007	.38	<.05	.15	<.5	<.01
RT7311AB	<10	N	N	<5	<2	1.2	<2	13	.044	2.20	<.05	.15	<.5	<.01
RT7315A	50	N	100	<5	<2	1.1	3	34	.001	.40	<.05	.55	1.3	.01
RT7315B	30	N	70	<5	<2	.4	5	50	<.001	<.02	<.05	.30	1.2	.02
RT7315CA	10	N	50	<5	<2	.2	<2	23	.002	<.02	<.05	.50	.6	.01
RT7315CB	<10	N	30	<5	<2	.1	<2	26	.002	<.02	<.05	.50	.7	<.01
RT7316A	15	N	70	<5	<2	.4	<2	20	.006	.10	<.05	.10	.5	<.01
RT7324A	N	N	15	<5	<2	.2	4	69	.023	.12	<.05	.30	3.2	<.01
RT7324B	15	N	100	9	<2	.4	3	71	.023	.50	<.05	1.60	7.4	.01
RT7324CA	N	N	N	<5	<2	.3	<2	10	.021	.02	<.05	.25	.5	.04
RT7324CB	10	N	20	5	<2	1.0	3	46	.250	.02	<.05	.55	1.6	.03
RT7325A	10	300	20	<5	<2	1.8	<2	290	.004	.04	<.05	.05	4.3	.02
RT7326A	10	<200	100	<5	<2	1.6	<2	190	.002	.02	<.05	.05	.6	.01

ASARCO

Southwestern Exploration Division

October 27, 1988

R.L. Brown
New York

Monthly Report
Mark A. Miller
October 1988

Heddleston Project - Lewis & Clark County, Montana

Column leach testing was begun during the month of October on Heddleston ore. The testing consists of five columns with varying amounts of H_2SO_4 + ferric added. Three of the five columns are on a ferric cure for 15 days and will be "tapped" some time next week. After thirteen days of leaching the first two columns with no cure are at 24 and 26% recovery. Johnathan Jackson of Central Services has found out that the U.S.B.M. in Salt Lake City will do free mineralogical studies of the Heddleston ore. We will probably avail ourselves of their services.

Updated 50 scale sections for 1988 drilling were completed and are awaiting drafting. An alternative to drafting would be computer plotting by Lou Jansen Inc. I have discussed this with Lou and it can be done once we have the surveyed locations of the 1987, 88 drill holes.

Results were received from the Sandbar Creek Porphyry sampling and a short memo was sent to you and J.C. Balla. The Sandbar Creek area does not appear to have precious metal potential.

SWED

Submittals from western Arizona in Mohave and Yavapai Counties have been assembled and will be examined after returning from vacation the first week in November. Four days were spent in Reno, Nevada attending a gold conference. There was strong emphasis on computer modeling of ore reserves and the importance of integrating geology into the model.

One day was spent at Ragged Top WSA taking confirmation samples of USGS sites based upon a recently released Open File Report 88-587. A memo was written and sample results are pending. The Ragged Top WSA gold potential appears to be very slight.

Field Days	Office Days	Expense Account	Auto Expense
6	17	$852.28	$400.00

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell
J.C. Balla

Date November 7, 1988

WORK REPORT SHEET

Samples Received Date - Nov., 4, 1988

Delivered by - Mr. Barton

FILE

Lorenzo Barton Claims
Payson Area
Gila Co., AZ

Lab #	Sample I D	Au OZ PER TN	Ag OZ PER TN		Residue containing the PGM's and other
115-A	4 ft. + lead fusion	0.095	1.750		0.060
115-B	4 ft. + silver fusion	0.330	2.650		0.080

CHARLES RAY STEELE
609 S. Colcord
Payson, Arizona 85541
(602) 474-4280

To - Mr. Lorenzo Barton
PO Box 405
Payson, Az. 85547

Date - November 8, 1988

WORK REPORT SHEET

Samples Received Date -

Delivered by -

CONTINUATION OF ASSAY REPORT FROM LAB #'s 115-A & 115-B

Lab #	Sample I D	Au OZ PER TN	Ag OZ PER TN		PGM's OZ PER TON
115-C	4 ft + special prep & special fusions averages of 3	0.327	2.660		Os = 0.025 Pt = 0.008 Pd = 0.004 Ir = 0.030 Rh = 0.010 Ru = 0.015 Re = Trace Ti = 0.005% Aluminum is also present.

A small bit of pride I guess.

This is the point A where Mr. Miller found nothing (on the surface).

4 feet for gold & silver matches almost exactly with 30 inch.

I now aim at 10 feet depth since the rain has softened the material (I hope).

The material contains both ferric and ferrous — I believe of some significance as to origin — iron.

James D W Barton

ARCO Incorporated

NOV 1 8 1988

SW Exploration

ASARCO

Southwestern Exploration Division

JDS

October 28, 1988

J.D. Sell

AIME 1988 Gold Meeting
Reno, Nevada

On October 12-15, 1988 I attended the "International Meeting on Gold Exploration: Techniques, Concepts and Problems" in Reno, Nevada. As you can see by the attached technical program, the meeting was divided into several sections: regulatory processes, geochemical and geophysical exploration and concepts, new models for gold exploration, case histories, drilling and drilling problems, and ore reserves.

The first session dealt with a series of papers which covered some of the proposed regulations and changes coming "down the pike" at the local state and Federal levels. A proposal in California which is Article 7, Sub-chapter 15, considers that mine heaps are now classified as a product, not waste, and would not be treated as hazardous waste. This is one of the good points in this change. On the other side, the proposal strongly favors a clay liner not plastic for the leach pads. There is no grandfathering of the existing operations. Operating units would have to comply with the new regulations. The proposal is too vague and site specific conditions are not adequately addressed. Other rules exclusive of the California proposal are concerned with the EPA and the Federal Government involvement, in other words, the BLM. This is known as a "strawman rule." Highlights are as follows:

1. Combine "draft" regulations with the present rules thus creating a real bureaucratic gobbledygook.

2. The rule has a ten year life. After ten years, things could get worse.

3. It would expand the EPA's role and could undermine state's rights.

4. It would prohibit tailings empoundments on flood plains and wetlands.

5. The "strawman rule" could trigger revision of Federal environmental regulations.

Some new issues affecting the BLM and the U.S. Forest Service treatment of EA's, or environmental assessments, are:

1. The idea of cumulative environmental impact.

2. EIS threshold is triggered when >640 acres are affected (one square mile).

3. Greater emphasis of socio-economics. In other words, how a project will impact on an area and community.

New regulations related to the Fish and Wildlife Protection Act are mainly:

1. They will not allow any bird kills. In this regard protection over the top of pregnant ponds will be required, and this is brought to mind by the problems that Cyprus had at the Copperstone Mine where they had numerous bird kills recently.

In summary, the government, state, Feds are becoming more stringent with their regulations on mining and leaching, and it is imperative and up to the mining community to successfully lobby for "reasonable" statutes.

The next session was not very enlightening. This session dealt with the geophysical and geochemical concepts and new ideas. Highlights of the session were the various geophysical techniques used in gold exploration. Some of the techniques being presently used are CSAMT (Controlled Source Audio Frequency Magnetotellurics) which is a deep penetrating high resolution resistivity sounding technique. It can map resistivity changes in bedrock geology by alteration, silification, etc. beneath hundreds of feet of alluvial and volcanic cover (it can be used to see through pediment). Magnetics and gravity are also used extensively. Another point mentioned was that IP is good for mapping epithermal gold systems. It is important to understand the influence of topography and ground conditions, i.e., high versus low topography, wet versus dry environment. From the geochemical side, it was stressed that orientation surveys are important to determine what are significant trace elements in a particular area that relate to gold. Also, the physical properties of gold are critical to understanding gold exploration. These are, in particular, nugget effect, malleability of gold, i.e., it flattens out and is difficult to separate, and the solubility and reconcentration of gold at the B/C interface may lead to depleted values on the surface and give false negative anomalies or no anomalies when, in fact, there is something there. There was also emphasis of multielement analysis using a computer to show anomalous values. Lotus 1, 2, 3 is well designed for this type of data handling and can be used in our computer. The advantage to using the computer is to handle large amounts of data sets conveniently and easily.

In the New Models for Gold Exploration session, Larry Meinert trotted out his gold skarn talk again with no changes from the last time he gave it. J.C. Burton discussed geochemical constraints for carbon type ore deposits and emphasized porosity and permeability in host rocks in the Carlin Trend. Ore host rocks show up to 14% porosity. Barren rocks show 1-2% porosity. Antimony is a good indicator, especially in high levels of these hydrothermal systems, and can occur with or without gold. It seemed to very well mimic the gold anomaly. Fluid inclusion temperatures are in the 90-120°C range. Factors favorable for formation of ore deposits are regional structure, environment of anomalous heat flow, >200°C, one generation of ore fluids and a source lithology be it a deep intrusive, etc. or just source rocks.

In the Case History session of the meeting, the Porgera Deposit history and development was detailed. The deposit has an ore reserve of 80 million tons at .1 opt gold included in 5 million tons of .83 opt gold. They expect to produce 800,000 oz./year starting in 1990 at a production cost of $100/oz. US. Then they expect to drop down to 60,000 oz./year through the life of the mine at $160/oz. US. They have dug 40 miles of trenches and drilled 80 miles of drill core.

A.B. Wallace of Cordex Exploration Co., Reno, Nevada, gave a talk on the Marigold Deposit located in Humboldt County, Nevada. The Marigold Deposit is located north-northwest of the Fortitude Deposit. This deposit is hosted in the Antler Sequence along the Golconda Thrust zone. Reserves are 12 million tons at .055 opt gold. An interesting side note is that a Cordex Geologist on a site examination looked at the cuttings from three rotary holes that were being drilled and committed on the spot to 10,000 ft. of drilling. How's that for confidence?

Barrick's Post, Deep Post Deposit was also discussed. This deposit is hosted in the Popovich Formation. Reserves for the Deep Post are 71 million tons at .14 opt gold, or approximately 10 million oz. gold. There is a high arsenic in the lower Post possibly similar to Getchell. (Some of the core seen was very abundant in realgar and orpiment.) 30% Of the gold is associated with fine grained pyrite marcasite, 1-2% of the gold is associated with veined pyrite marcasite and the rest is associated with clay within the altered zone. The size fraction of the gold is .02 micron to .1 micron. In order to treat this ore, it will be necessary to use pressure oxidation, or possibly some of the other thoughts might be bioleaching. The jasperoid on the surface of the Deep Post Deposit ran 130 to 330 ppb gold with some anomalous trace elements. Deep Post soil geochemistry was defined by 30-100 ppb gold outline. Drilling was also based on IP surveys looking 1500 deep with line spacing 1500 ft. apart. 240 Deep holes averaging 1700 ft. deep have been drilled into the Deep Post and Betze Deposit on 200 ft. centers. Drilling costs are as follows:

Drilling	Cost/ft.	Average Depth
Core	$56.00	1503 ft.
Mud Rotary	27.42	1737
Rotary/Reverse Circulation (vertical holes)	25.67	1609
Reverse Circulation Angle	42.39	1271

The angle drilling is generally done in production areas under extreme conditions which make the cost higher. These deposit have been drilled out on 200 ft. centers for an average depth of about 1700 ft. and at a cost of $19 million over the last two years.

The next session concerned drilling and bulk sampling of mineable gold deposits, and dealt mostly with the logistics of these type deposits. E.G. Morrow from Asamera Minerals (US) Inc., stressed working with the various state and Federal agencies since they are involved in your project, i.e., if you are drilling WSA's or BLM land. If the job is a helicopter job, he recommended getting the largest machine you could afford because you would use it in the long run. He also recommended that you permit twice the amount of sites you'll need for the job and reclaim those sites when you are done. The advent of track-mounted reverse circulation drills and Canterra type drills are more acceptable to the Feds, especially in WSA areas.

Bob Coyle from Echo Bay Mining Co. discussed the Cove Deposit. This deposit is in the Augusta Sequence and specifically in the Panther Canyon Formation. The deposit exhibits strong northeast-northwest structural patterns. It was discovered by stream sediment sampling with 500 samples over an 8 square mile area. Of these 500 samples the Cove Deposit was located by several samples in the 15 to 72 ppb gold range with anomalous trace elements. A soil sampling program was initiated with a 100 x 200 ft. grid and this defined the deposit. A strong gold, silver, arsenic soil anomaly was found defined by a 20 ppb Au contour. Eight of the samples taken within the anomaly contained from 1000-2000 ppb Au. The eastern portion of the gold anomaly had a coincident silver anomaly ranging from 1 to 213 ppm gold. Arsenic ranges from up to 1000 ppm and arsenic coincides with the gold anomaly. The soil sampling revealed a concealed strongly coherent geochemical bull's-eye that was an ideal drill target. Initially, 5000 ft. of drilling was done which amounted to 25 holes. Out of these 25 holes, 23 were in the orebody. Several felsic dikes of similar age and composition to the McCoy stock cut the deposit and are altered within the ore zone. The oxide ore occurs in the Augusta Mountain limestone and consists in mineralogy of electrum and native silver, alteration consists of silicification, argillization, strong manganese flooding and iron oxide oxidation. The entire oxide zone is totally oxidized. In the sulfide zone alteration consists of silicification, argillization sulfide replacement and veining of sulfides. There are also base metals and lots of exotic minerals associated with the sulfide zone. Total reserves are 52.7 million tons of .04 opt gold and 1.9 opt silver. Indicated reserves are 2.1 million oz. of gold and 47 million oz. of silver. Geologic reserves are 2.7 million oz. of gold and 146 million oz. of silver.

The final session I attended dealt with ore reserves and measurement of ore reserves. Greg Hahn from CoCa Mines, Inc. described the Cactus Gold Mine in California. This deposit occurs near the intersection of the Garlock Fault in the San Andreas Fault zone possibly related to a ring complex structure in Tertiary volcanic rocks. Reserves are 9.4 million tons of .04 opt gold with a <2:1 waste/ore ratio, Mineralization is hosted in dilational shear couples on right lateral fault zone similar in setting to the Mesquite Deposit. What was stressed in ore reserve calculations was the importance of interpreting the orientation of the ore bearing structure so that computer modeling is

accurate. He also recommended testing high grade reserves in initial testing so there are no mining surprises. This was also mentioned in the talk by N.J. Lehrman, Homestake Mining Co., in relation to their McLaughlin Mine. Based upon the fact that they misinterpreted some of their ore reserve structures, they had to take a 25% decrease in their ore reserve in the initial phases of their mine construction and operation. This is a pretty big cut in the beginning, and can lead to a number of heads being rolled.

V. Holm from Gold Fields Mining Corp. discussed the Mesquite Deposit which occurs as a dilational zone between two strike slip faults. Mineralization is hosted along high angle fault structures. Production is 72,000 tons per day with 18,000 tons per day ore which goes to the crusher. The deposit is mined on 20 ft. benches. Pit faults are mapped after each shot as the rock preferential breaks along these faults and fractures. The deposit exhibits very strong structural control and is a poor model for polygonal blocking. The deposit has 3,360 drill holes in it. This is done to better define the ore reserve. The deposit is drilled out on 400 ft. centers for exploration, 200 ft. centers for infill drilling, and 141 ft. centers for development. The drill patterns are sufficient to show global reserve, but when it comes down to the mine planning and production planning, it is insufficient for that, and additional drilling and mapping, particularly of these fault structures, is done.

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In summary, the meeting brought forth no surprises, reiterated old ideas, reinforced some ideas, and brought forth some of the drilling conditions and problems encountered in some of the deep drilling that people are doing now in the Carlin Trend and other places. Of interest, is the fact that Newmont is currently using an oil field mud rotary drill to drill some of their deeper holes instead of using reverse circulation air rotaries. This is being done because of hole problems, i.e., the holes don't stay open, extreme pressure, water pressures, and the fact that the mud can move the cuttings a lot better. Some of the holes have been drilled as deep as 3000 ft.

The meeting was very well attended with over 1400 participants. Of particular interest to me was the strong application of geostatistics and computer modeling on all of the gold deposits discussed, and the use of geostatistics computer modeling in the exploration game, particularly in the handling of exploration data, i.e., multielement suites and outlining anomalies from these multielement suites, through the use of computer programs such as Lotus 1, 2, 3, etc.

Mark A. Miller

MAM:mek

ASARCO

Southwestern Exploration Division

JDS

November 21, 1988

F.T. Graybeal
New York

M.A. Miller
AIME 1988 Gold Meeting
Reno, Nevada

As noted, Mark attended the meeting in Reno and attached is his view of the meeting.

James D. Sell, mek

James D. Sell

JDS:mek
Att.

cc: W.L. Kurtz

WL Kurtz / FT Grove

ASARCO

Southwestern Exploration Division

October 28, 1988

J.D. Sell

AIME 1988 Gold Meeting
Reno, Nevada

On October 12-15, 1988 I attended the "International Meeting on Gold Exploration: Techniques, Concepts and Problems" in Reno, Nevada. As you can see by the attached technical program, the meeting was divided into several sections: regulatory processes, geochemical and geophysical exploration and concepts, new models for gold exploration, case histories, drilling and drilling problems, and ore reserves.

The first session dealt with a series of papers which covered some of the proposed regulations and changes coming "down the pike" at the local state and Federal levels. A proposal in California which is Article 7, Sub-chapter 15, considers that mine heaps are now classified as a product, not waste, and would not be treated as hazardous waste. This is one of the good points in this change. On the other side, the proposal strongly favors a clay liner not plastic for the leach pads. There is no grandfathering of the existing operations. Operating units would have to comply with the new regulations. The proposal is too vague and site specific conditions are not adequately addressed. Other rules exclusive of the California proposal are concerned with the EPA and the Federal Government involvement, in other words, the BLM. This is known as a "strawman rule." Highlights are as follows:

1. Combine "draft" regulations with the present rules thus creating a real bureaucratic gobbledygook.

2. The rule has a ten year life. After ten years, things could get worse.

3. It would expand the EPA's role and could undermine state's rights.

4. It would prohibit tailings empoundments on flood plains and wetlands.

5. The "strawman rule" could trigger revision of Federal environmental regulations.

Some new issues affecting the BLM and the U.S. Forest Service treatment of EA's, or environmental assessments, are:

1. The idea of cumulative environmental impact.

2. EIS threshold is triggered when >640 acres are affected (one square mile).

3. Greater emphasis of socio-economics. In other words, how a project will impact on an area and community.

New regulations related to the Fish and Wildlife Protection Act are mainly:

1. They will not allow any bird kills. In this regard protection over the top of pregnant ponds will be required, and this is brought to mind by the problems that Cyprus had at the Copperstone Mine where they had numerous bird kills recently.

In summary, the government, state, Feds are becoming more stringent with their regulations on mining and leaching, and it is imperative and up to the mining community to successfully lobby for "reasonable" statutes.

The next session was not very enlightening. This session dealt with the geophysical and geochemical concepts and new ideas. Highlights of the session were the various geophysical techniques used in gold exploration. Some of the techniques being presently used are CSAMT (Controlled Source Audio Frequency Magnetotellurics) which is a deep penetrating high resolution resistivity sounding technique. It can map resistivity changes in bedrock geology by alteration, silification, etc. beneath hundreds of feet of alluvial and volcanic cover (it can be used to see through pediment). Magnetics and gravity are also used extensively. Another point mentioned was that IP is good for mapping epithermal gold systems. It is important to understand the influence of topography and ground conditions, i.e., high versus low topography, wet versus dry environment. From the geochemical side, it was stressed that orientation surveys are important to determine what are significant trace elements in a particular area that relate to gold. Also, the physical properties of gold are critical to understanding gold exploration. These are, in particular, nugget effect, malleability of gold, i.e., it flattens out and is difficult to separate, and the solubility and reconcentration of gold at the B/C interface may lead to depleted values on the surface and give false negative anomalies or no anomalies when, in fact, there is something there. There was also emphasis of multielement analysis using a computer to show anomalous values. Lotus 1, 2, 3 is well designed for this type of data handling and can be used in our computer. The advantage to using the computer is to handle large amounts of data sets conveniently and easily.

In the New Models for Gold Exploration session, Larry Meinert trotted out his gold skarn talk again with no changes from the last time he gave it. J.C. Burton discussed geochemical constraints for carbon type ore deposits and emphasized porosity and permeability in host rocks in the Carlin Trend. Ore host rocks show up to 14% porosity. Barren rocks show 1-2% porosity. Antimony is a good indicator, especially in high levels of these hydrothermal systems, and can occur with or without gold. It seemed to very well mimic the gold anomaly. Fluid inclusion temperatures are in the 90-120°C range. Factors favorable for formation of ore deposits are regional structure, environment of anomalous heat flow, >200°C, one generation of ore fluids and a source lithology be it a deep intrusive, etc. or just source rocks.

In the Case History session of the meeting, the Porgera Deposit history and development was detailed. The deposit has an ore reserve of 80 million tons at .1 opt gold included in 5 million tons of .83 opt gold. They expect to produce 800,000 oz./year starting in 1990 at a production cost of $100/oz. US. Then they expect to drop down to 60,000 oz./year through the life of the mine at $160/oz. US. They have dug 40 miles of trenches and drilled 80 miles of drill core.

A.B. Wallace of Cordex Exploration Co., Reno, Nevada, gave a talk on the Marigold Deposit located in Humboldt County, Nevada. The Marigold Deposit is located north-northwest of the Fortitude Deposit. This deposit is hosted in the Antler Sequence along the Golconda Thrust zone. Reserves are 12 million tons at .055 opt gold. An interesting side note is that a Cordex Geologist on a site examination looked at the cuttings from three rotary holes that were being drilled and committed on the spot to 10,000 ft. of drilling. How's that for confidence?

Barrick's Post, Deep Post Deposit was also discussed. This deposit is hosted in the Popovich Formation. Reserves for the Deep Post are 71 million tons at .14 opt gold, or approximately 10 million oz. gold. There is a high arsenic in the lower Post possibly similar to Getchell. (Some of the core seen was very abundant in realgar and orpiment.) 30% Of the gold is associated with fine grained pyrite marcasite, 1-2% of the gold is associated with veined pyrite marcasite and the rest is associated with clay within the altered zone. The size fraction of the gold is .02 micron to .1 micron. In order to treat this ore, it will be necessary to use pressure oxidation, or possibly some of the other thoughts might be bioleaching. The jasperoid on the surface of the Deep Post Deposit ran 130 to 330 ppb gold with some anomalous trace elements. Deep Post soil geochemistry was defined by 30-100 ppb gold outline. Drilling was also based on IP surveys looking 1500 deep with line spacing 1500 ft. apart. 240 Deep holes averaging 1700 ft. deep have been drilled into the Deep Post and Betze Deposit on 200 ft. centers. Drilling costs are as follows:

Drilling	Cost/ft.	Average Depth
Core	$56.00	1503 ft.
Mud Rotary	27.42	1737
Rotary/Reverse Circulation (vertical holes)	25.67	1609
Reverse Circulation Angle	42.39	1271

The angle drilling is generally done in production areas under extreme conditions which make the cost higher. These deposit have been drilled out on 200 ft. centers for an average depth of about 1700 ft. and at a cost of $19 million over the last two years.

The next session concerned drilling and bulk sampling of mineable gold deposits, and dealt mostly with the logistics of these type deposits. E.G. Morrow from Asamera Minerals (US) Inc., stressed working with the various state and Federal agencies since they are involved in your project, i.e., if you are drilling WSA's or BLM land. If the job is a helicopter job, he recommended getting the largest machine you could afford because you would use it in the long run. He also recommended that you permit twice the amount of sites you'll need for the job and reclaim those sites when you are done. The advent of track-mounted reverse circulation drills and Canterra type drills are more acceptable to the Feds, especially in WSA areas.

Bob Coyle from Echo Bay Mining Co. discussed the Cove Deposit. This deposit is in the Augusta Sequence and specifically in the Panther Canyon Formation. The deposit exhibits strong northeast-northwest structural patterns. It was discovered by stream sediment sampling with 500 samples over an 8 square mile area. Of these 500 samples the Cove Deposit was located by several samples in the 15 to 72 ppb gold range with anomalous trace elements. A soil sampling program was initiated with a 100 x 200 ft. grid and this defined the deposit. A strong gold, silver, arsenic soil anomaly was found defined by a 20 ppb Au contour. Eight of the samples taken within the anomaly contained from 1000-2000 ppb Au. The eastern portion of the gold anomaly had a coincident silver anomaly ranging from 1 to 213 ppm gold. Arsenic ranges from up to 1000 ppm and arsenic coincides with the gold anomaly. The soil sampling revealed a concealed strongly coherent geochemical bull's-eye that was an ideal drill target. Initially, 5000 ft. of drilling was done which amounted to 25 holes. Out of these 25 holes, 23 were in the orebody. Several felsic dikes of similar age and composition to the McCoy stock cut the deposit and are altered within the ore zone. The oxide ore occurs in the Augusta Mountain limestone and consists in mineralogy of electrum and native silver, alteration consists of silicification, argillization, strong manganese flooding and iron oxide oxidation. The entire oxide zone is totally oxidized. In the sulfide zone alteration consists of silicification, argillization sulfide replacement and veining of sulfides. There are also base metals and lots of exotic minerals associated with the sulfide zone. Total reserves are 52.7 million tons of .04 opt gold and 1.9 opt silver. Indicated reserves are 2.1 million oz. of gold and 47 million oz. of silver. Geologic reserves are 2.7 million oz. of gold and 146 million oz. of silver.

The final session I attended dealt with ore reserves and measurement of ore reserves. Greg Hahn from CoCa Mines, Inc. described the Cactus Gold Mine in California. This deposit occurs near the intersection of the Garlock Fault in the San Andreas Fault zone possibly related to a ring complex structure in Tertiary volcanic rocks. Reserves are 9.4 million tons of .04 opt gold with a <2:1 waste/ore ratio, Mineralization is hosted in dilational shear couples on right lateral fault zone similar in setting to the Mesquite Deposit. What was stressed in ore reserve calculations was the importance of interpreting the orientation of the ore bearing structure so that computer modeling is

accurate. He also recommended testing high grade reserves in initial testing so there are no mining surprises. This was also mentioned in the talk by N.J. Lehrman, Homestake Mining Co., in relation to their McLaughlin Mine. Based upon the fact that they misinterpreted some of their ore reserve structures, they had to take a 25% decrease in their ore reserve in the initial phases of their mine construction and operation. This is a pretty big cut in the beginning, and can lead to a number of heads being rolled.

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Mark A. Miller

MAM:mek

Mark A. Miller

ASARCO

Southwestern Exploration Division

JDS

November 21, 1988

M.A. Miller

Porphyry Gold

As noted on the attached George Cross Newsletter, additional gold interest is being found in the porphyry copper areas.

This is probably especially true for the younger intrusives (South Pacific) and those in the "Diorite" model.

Please review this problem by starting with Hollister's "Geology of the Porphyry Copper Deposits of the Western Hemisphere," and the two Titley volumes (UofA Press) with an eye towards those porphyry coppers which didn't quite make the copper grade, but may have significant gold credits which may not have been evaluated. Report on those, especially Western North America, that should be reevaluated.

James D. Sell

JDS:mek
Att.

cc: W.L. Kurtz

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CC JCB, PGV

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cc JCB, PGV

ASARCO Southwestern Exploration Division

November 29, 1988

R.L. Brown
New York

Monthly Report
November 1988
M.A. Miller

Utah - Yellow Jacket Claims, Marysvale District & Gold Hill, Utah

Six days were spent staking claims in the Yellow Jacket area (Asarco's patented claim) and helping W.D. Gay survey at Gold Hill. Gay and I also met with Walter Wellman and his lawyer to discuss the claim situation in the Gold Hill District with regard to Wellman's claims and Asarco's claims. Mr. Gay has submitted a memo detailing this meeting.

Arizona - Yarnell Mine, Weaver Mining District, Yavapai County, Arizona

Several days were spent evaluating Norgold's (a junior Vancouver Company) claims at the Yarnell Mine. The general geologic setting is a low angle shear zone (or fault) in granodiorite/QM intrusives. Potential may exist for an open pit heap leach deposit in the order of 3-4 MT at .04-.05 opt Au. The property is currently at a grass roots stage of exploration and will require much additional mapping and sampling to identify potential drill targets. Norgold has verbally stated to me that they plan to spend ±$100,000 next year on the property for mapping, sampling and drilling. Significant rock chip intervals taken by Norgold are as follows: 151' @ .082 opt, 81' @ .036, 50' @ .092, 200' @ .032, and 80' @ .032. These samples have been taken over a strike length of ±3000'. I took twelve additional samples on the property and results are pending. A report detailing the property of Norgold's proposal will be prepared.

Eight days were spent for vacation and the rest of the time was spent in research and general office work.

Field Days	Office Days	Samples Taken	Expense Account	Vehicle Expense
9	10	12	$409.20	$100.00

MAM:mek

Mark A. Miller

cc: W.L. Kurtz, J.D. Sell, F.T. Graybeal

RECEIVED WLK-JDS

DEC 6 1988

EXPLORATION DEPARTMENT

1710–609 GRANVILLE ST.
P.O. BOX 10363 STOCK EXCHANGE TOWER
VANCOUVER, B.C.
V7Y 1G5
(604) 683-7265
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NO.233(1988)
DECEMBER 5, 1988

George Cross News Letter

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ASARCO

Southwestern Exploration Division

JDS

December 19, 1988

J.D. Sell

Lorenzo Barton's
Assay vs. Skyline Assay

Mr. Barton's assay of sample 5988-27 ran 0.350 opt Au by his assayer. I took the same sample and submitted it to Skyline Labs, #374014. The assay was <.005 ppm Au (attached & highlighted). I think that the only person profiting in Payson is Mr. Lorenzo's assayer.

MAM:mek

Mark Miller

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 543
December 8, 1988
PROJECT NO. YARNELL
374001 TO 374014
PAGE 1 OF 1

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 13 Rock Chip and 1 Soil Sample

ITEM		SAMPLE NO.	Au (ppm)	Ag (ppm)	As (ppm)	Sb (ppm)
Y-1	1	374001	1.200	.25	70.	<1.
Y-2, 0-25'	2	374002	2.400	.35	38.	<1.
25-50'	3	374003	.450	.20	38.	<1.
50-75'	4	374004	.120	<.05	8.	<1.
Y-3	5	374005	1.800	1.40	55.	2.
Y-4	6	374006	1.100	.25	20.	<1.
Y-5 0-25'	7	374007	.850	.40	20.	<1.
35-70'	8	374008	.130	<.05	22.	<1.
Y-6	9	374009	1.200	.20	22.	<1.
Y-7	10	374010	1.200	1.10	4.	<1.
Y-8	11	374011	.320	.50	22.	<1.
Y-9	12	374012	1.400	.10	24.	<1.
~~Sample~~	13	374013	.190	.45	34.	4.
Barton Property – Payson Proj.	14	374014	<.005	<.05	6.	<1.

NOTE: Mercury analysis to follow as TAJ543-A.

cc: Mr J. D. Sell

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

MAM → JDS

ASARCO Incorporated

NOV 28 1988

SW Exploration

LORENZO R. BARTON
P.O. BOX 405
Bayson Az. 85547
November 25, 1988

Dear Mr. Sell,

Enclosure mostly duplicate - but.

I am aware platinum is subject to questionable assay and other activities! Mr. Stuke consulted by telephone with Michael P. Thomas, Denver and told me he used Duke's method for the November 8 assay. Mr. Stuke will be on a new project in Nevada for some time but available for consultation.

Thank you!

My plans now after the first of the year, put in an access road extension (will require bulldozer) and then proceed to some excavation on the site.

Delay for several reasons -

(a) Money - I assume will require $2,000.

(b) I wrote to Arizona U. giving problems and suggesting a little research up here. I did not suggest a field trip specifically, but I certainly have hopes. I will give them a little time. Would be of value in plans for excavation.

I badly need to go deeper. I have hopes (but very little faith) rains will soften the clay so I can go deeper than current 4 feet with auger.

"Myself" I think this a pipe of some kind and vertical perhaps more important than horizontal. Need of course both.

I certainly value Mr. Miller and his (and other persons) recommendation of ASARCO. I would under no circumstances make any contract with another company without consulting you.

Wish I could spend $2,000 now but I think January a good time.

Lorenzo R. Barton

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

November 21, 1988

Mr. Lorenzo Barton
P.O. Box 405
Payson, Arizona 85547

Dear Mr. Barton:

Thank you for your note, received November 18, 1988, along with the new work report sheet assays of November 7.

I hope your lead continues to open up and confirmation assays can be made over some distance. Should you get a backhoe to open it up some more, please contact me and I'll see that someone goes up and reviews the situation.

Thanks again for keeping me informed.

Sincerely,

James D. Sell

JDS:mek

cc: M.A. Miller

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703
1150 North 7th Avenue (602) 792-3010

CHARLES RAY STEELE
609 S. Colcord
Payson, Arizona 85541
(602) 474-4280

Mr. Barton

May 12, 1988

Payson, Arizona 85541

Re: Cover letter of explanations for the attached fire assay report & also other information that may be important to you.

Dear Mr. Barton,

Your sample material, as delivered, had a tremendous amount of various clays. They are of no commercial value as such at this time. All of a calcium base.

For the fire assay program - I studied the material with a microscope and did several preliminary acid tests to decide upon the basic flux needed and also be able to balance the blend with the ore pulp. The balance used for the initial tests was as follows -

Ore dried pulp (-100 mesh)	=	29.16 grams
Borax	=	30.00 grams
Soda Ash	=	40.00 grams
Silica	=	12.00 grams
Red Litharge	=	45.00 grams
Flour (carbon)	=	6.30 grams
Lime (CaO)	=	2.00 grams

This blend was fired in the normal manner to 2100°F = 1¼ hrs., cupelled and the bead was split or parted - just normal lab procedures. I used this method for the assay #'s 5988-18 thru and including 5988-26. I observed quite an increase in # 5988-26 at the time. At this time I decided to do a Duke's Standard Borax Bead Test on the material represented on assay # 5988-26 to see if possibly there was some interferring element violatizing the Au & Ag during the firing. The borax bead test showed Titanium possibly in the rutile form. That alone will violatize your values. Also the following was observed at this time in the borax bead test -

Ca, Cu & Fe
Traces of Ti, Ni, Cr, Co, As, Se & Sb
Traces of Ga, Ge & Re
Very minute amounts of Pd, Pt, Os, Ir, Rh & Ru

After determining the problem elements as represented above, I decided to do a SILVER FUSION on the higher result from # 5988-26. The results of this fusion are listed as # 5988-27 To do the SILVER FUSION, I used the flux as described above along with the following additional material -

Varian 99.999% Certified Pure Silver	=	2.50 grams	(crystal form)
Flourspar	=	2.00 grams	
Hydroquinone	=	2.50 grams	
Potassium Carbonate	=	1.50 grams	

This blend was fired, cupelled and parted as above, with the exception, of at the time just prior to parting, all of the silver added during the fusion was substracted from the bead weight - so we could determine the amount of silver recovered in the fusion. The results are as recorded.

This cost was over $200

CHARLES RAY STEELE
609 S. Colcord
Payson, Arizona 85541
(602) 474-4280

To - Mr. Barton

Payson, Az. 85541

Date - May 11, 1988

WORK REPORT SHEET

Samples Received Date - April 29, 1988

Delivered by - Mr. Barton

Lab #	Sample I D	Au OZ PER TN	Ag OZ PER TN	
5988-18	March 6 18" Deep White Bag (clayey)	0.050	Trace	Miscellaneous near surface
5988-19	March 15 (C) Jar Sandy Clay	0.040	Trace	
5988-20	March 18 (A) Jar Clay	0.030	Trace	
5988-21	March 18 (A) Can Clay	0.040	Trace	
5988-22	April 4 (A) 2' Jar Clay	0.040	Trace	
5988-23	(B) Can Sandy	0.030	1.05	
5988-24	(B) Sandy-Clay Jar	0.030	Trace	
5988-25	Plastic Can (1g) Sandy-Clay	0.020	Trace	
5988-26	April 25 30" Deep Jar Gravely-Clay	0.090	1.800	This is Sample point A at 2½ feet deep approximate
5988-27	April 25 30" Deep Jar Gravely-Clay SILVER FUSION !!!	0.350	2.100	Note:

NOTE: ELEMENTS SHOWN, ARE IN THE VALUES INDICATED, AND ARE PRESENT IN THE SAMPLE IN AN UN-COMBINED STATE, OR IN PHYSICAL COMBINATION WITH OTHER MATERIAL, OR IN A COMPOUND WITH OTHER ELEMENTS. SUCH ELEMENTS MAY OR MAY NOT BE RECOVERABLE IN QUANTITIES INDICATED. THESE READINGS ARE TEST RESULTS AND FOR THAT PURPOSE ONLY.

RESPECTFULLY SUBMITTED,

Ray Steele

CHARLES RAY STEELE

Date - November 7, 1988

WORK REPORT SHEET

Samples Received Date - Nov., 4, 1988

Delivered by - Mr. Barton

Lab #	Sample I D	Au OZ PER TN	Ag OZ PER TN		Residue containing the PGM's and other
115-A	4 ft. + lead fusion	0.095	1.750		0.060
115-B	4 ft. + silver fusion	0.330	2.650		0.080

CHARLES RAY STEELE
609 S. Colcord
Payson, Arizona 85541
(602) 474-4280

To - Mr. Lorenzo Barton
PO Box 405
Payson, Az. 85547

(this is sample point "A" at 4x feet deep cost $100 but I convince Mr. Steele charged it partly as research I assume $2,000 more reasonable)

Date - November 8, 1988

WORK REPORT SHEET

Samples Received Date -

Delivered by -

CONTINUATION OF ASSAY REPORT FROM LAB #'s 115-A & 115-B

Lab #	Sample I D	Au OZ PER TN	Ag OZ PER TN		PGM's OZ PER TON
115-C	4 ft + special prep & special fusions averages of 3	0.327	2.660		Os = 0.025 Pt = 0.008 Pd = 0.004 Ir = 0.030 Rh = 0.010 Ru = 0.015 Re = Trace Ti = 0.005%

Aluminum is also Present

ASARCO

Exploration Department
Southwestern United States Division

December 21, 1988

Mr. Tim Pierson
Queenstake Resources
241 S. Haskell, Suite 102
Wilcox, AZ 85644

Dear Tim:

It was good talking with you today. Sounds Like the more you learn, the more you need to learn. I talked to Dave Skidmore and he said costs are running $19-21/ft. without assay costs for comparable depths. However, as you well know, every job is bid separately. In order to accommodate all costs--assaying, site preparation, etc., probably $25.00/ft. would be a reasonable estimate. Dave also said to remind you about your permit to drill "Notice of Intent" (attached). These need to be filed and approved prior to drilling. I have a friend at the Dept. of Water Resources, Bill Hollingshead. I think you may have met him. He can probably expedite your permits.

Looking forward to visiting with you. Regards and Happy Holidays to you and your family.

Respectfully,

Mark A. Miller
Geologist

MAM:mek
att.

cc: J.D. Sell

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

cc: VCMartz; Silver Bell; File - Mailed w/check 8/15/88 mck

EXPLORATION WELL(S)

DEPARTMENT OF WATER RESOURCES (DWR)
NOTICE OF INTENTION TO DRILL
EXPLORATION WELL(S)

OFS
EXPLORATION WELL(S)

FILING FEE $10.00

Section 45-596, Arizona Revised Statutes and Rule R12-15-817 provide: Prior to drilling one or more exploration wells, the well owner, lessee or exploration firm shall file a Notice of Intention to Drill on a form provided by the Department.

D.F.S.
AUG 26 1988

WELL/LAND LOCATION

1. Township 11 N/S
Range 8 E/W
Section 33

In the case of a single well, list 10-acre subdivision

____ ¼, ____ ¼, ____ ¼

2. County Pima

3. Applicant:
ASARCO Incorporated
Name
PO Box 5747
Address
Tucson, AZ 85703
City State Zip

4. V. C. Martz
NAME OF CONTACT PERSON
Phone (602) 792 3010

5. Owner of well:
ASARCO Incorporated
Name
P O Box 5747
Address
Tucson, AZ 85703
City State Zip

6. Purpose of well(s) drilled pursuant to this Notice:

Mineral Exploration X
Geotechnical ____
Cathodic Protection ____
Grounding ____

7. Number of wells 50
(See Condition 3 on reverse)

8. Owner of land:
ASARCO Incorporated
Name
P O Box 5747
Address
Tucson, AZ 85703
City State Zip

9. DESCRIPTION OF WELL:
Diameter 5 inches
Depth 150-300 feet
Type of casing None
(If none, so state)

10. Construction will start:
September 6 1988
Month Day Year

DO NOT WRITE IN THIS SPACE
OFFICE RECORD

File No. ____
Filed ____ By ____
Input ____ By ____
Duplicate Mailed ____ By ____
Registration ____
AMA/INA ____
W/S ____ S/B ____

11. Drilling firm:
GOLDEN EAGLE DRILLING CORPORATION
Name
PO Box 475
Address
Frisco, CO 80443
City State Zip
329
DWR License Number

12. Period well will remain in use 1 months.

13. Proposed method of abandonment of well(s) after project is completed:
Pursuant to R12-15-816

14. Is the proposed wellsite within 100 feet of a septic tank system, sewage disposal area, landfill, hazardous waste facility or storage area of hazardous materials? Yes ____ No X

If yes, a request for a variance must accompany this application pursuant to R12-15-820.

GENERAL INSTRUCTIONS

1. Fill out this form in duplicate and mail to Department of Water Resources, Suite 100, 99 East Virginia, Phoenix, Arizona 85004.
2. Proper filing fee of $10.00 must accompany Notice.

I state that this Notice is filed in compliance with Rule R12-15-809 and is complete and correct to the best of my knowledge and belief and that I understand the conditions set forth on the reverse side of this form.

DATE 8/15/88

T. E. Scattaccini

MAM

FIELD PROGRESS RECORD FORMS

a reminder to update, if necessary thru Dec 31, 1988

Record Title (Geologist)

Wilkes Mining Area (MAM), Georgia

UGB BASIN - Gold Hill, Utah (MAM)

Alum, NV (FRK)

Black Canyon, NV (TDV)

Camp Douglas, NV (FRK)

Gilbert East, NV (FRK)

Orocopia, CA (JDS)

Black Butte Claims, CA (MAM/TDV)

Bull Canyon, NV (TDV)

Fish Lake Valley, NV (FRK)

Gold Hill Project EA-0413, UT (JDS)

North Marietta, NV (FRK)

Ochre Springs Project EA-0412, Utah (JDS)

Gold Bullion, CA (HGK)

Mesquite East, CA (HGK)

No Update Necessary

Mark

JDS

ASARCO

Southwestern Exploration Division

July 18, 1989

copy FTG ✓
sent 7/18/89 mek

W.L. Kurtz

Porphyry Gold

As you pointed out, the article on "Explorationists give porphyry deposits another look" -- The Northern Miner, Vol. 75, No. 18, July 10, 1989 (attached), I think those types may well be present in the Northwest as well as Baja California where the diorite-alkaline types of porphyries are found.

good for JDS

I requested M.A. Miller (dated Nov. 21, 1988) to review some data, but the Yarnell work has since precluded any research or report.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: M.A. Miller

cc: F.T. Graybeal
7/19/89

ASARCO

Southwestern Exploration Division

JDS

July 18, 1989

W.L. Kurtz

Porphyry Gold

As you pointed out, the article on "Explorationists give porphyry deposits another look" -- The Northern Miner, Vol. 75, No. 18, July 10, 1989 (attached), I think those types may well be present in the Northwest as well as Baja California where the diorite-alkaline types of porphyries are found.

I requested M.A. Miller (dated Nov. 21, 1988) to review some data, but the Yarnell work has since precluded any research or report.

James D. Sell

James D. Sell

JDS:mek
Att.

cc: M.A. Miller

Northern Miner July 10, 1989

Explorationists give porphyry deposits another look

by Vivian Danielson

JDS

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

July 18, 1989

Mr. Lorenzo D.W. Barton
P.O. Box 405
Payson, AZ 85547

Dear Sir:

Your letter and spec analysis results arrived this past week.

Yes, it appears that gold-silver is lacking in the material you submitted.

I believe that the "titanium" you mentioned in your letter (Tl, <.5) in the multiple element suite, was misread. Tl is Thallium whereas Ti is Titanium.

Do note that Ti is 3000 ppm as shown in your letter and in the spectrographic analysis as shown, but this is common in most basic rocks as you have in the area.

Best of luck in future prospecting as you uncover the rock full of gold that you are looking for.

Sincerely,

James D. Sell

James D. Sell

JDS:mek

cc: W.L. Kurtz

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

FILE
JDS

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

July 12, 1989

Mr. James D. Sell
ASARCO INCORPORATED
P.O. Box 5747
Tucson, AZ 85703

Dear Mr. Sell,

Per Mr. Bartons' request we are sending you the enclosed analysis results.

Sincerely,

Dianne Rogers
SKYLINE LABS, INC.

JUL 14 1989
SW Exploration

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF SPECTROGRAPHIC ANALYSIS

JOB NO. VOQ 004
July 5, 1989
#1

MR. LORENZO D.W. BARTON
P.O. Box 405
Payson, AZ 85547

The attached pages comprise this report of analysis. Values are reported in parts per million (ppm), except where otherwise noted, to the nearest number in the series 1, 1.5, 2, 3, 5, 7, 10, etc. within each order of magnitude. These numbers represent the approximate boundaries and midpoints of arbitrary ranges of concentration differing by the reciprocal of the cube root of ten. The 'accepted' value is considered to be within + or - 1 step of the range reported at the 68 % confidence level and within + or - 2 steps at the 95 % confidence level.

William L. Lehmbeck
Manager

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. VOQ 004
PAGE 2

ITEM NO.	SAMPLE NO.
1	#1

ITEM	1
ELEMENT	
Fe	5%
Ca	3%
Mg	1%
Ag	<1
As	<200
B	20
Ba	200
Be	<2
Bi	<10
Cd	<50
Co	30
Cr	150
Cu	150
Ga	10
Ge	<20
La	20
Mn	1000
Mo	2
Nb	<20
Ni	30
Pb	<10
Sb	<100
Sc	20
Sn	<10
Sr	500
Ti	3000
V	200
W	<50
Y	10
Zn	<200
Zr	20

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. VOQ 004
July 5, 1989
#1

MR. LORENZO D.W. BARTON
P.O. Box 405
Payson, AZ 85547

Analysis of 1 Rock Chip Sample.

ITEM	SAMPLE NO.	Au (ppm)	Ag (ppm)	As (ppm)	Sb (ppm)
1	#1	<.05	.10	4.0	.2

ITEM	SAMPLE NO.	Cu (ppm)	Pb (ppm)	Zn (ppm)	Mo (ppm)
1	#1	190.	8.	42.	<2.

Charles E. Thompson
Arizona Registered Assayer No. 9427

William L. Lehmbeck
Arizona Registered Assayer No. 9425

James A. Martin
Arizona Registered Assayer No. 11122

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. VOQ 004
July 5, 1989

ITEM	SAMPLE NO.	Co (ppm)	Ni (ppm)	Bi (ppm)	Cd (ppm)
1	#1	16.	18.	<.1	<.1

ITEM	SAMPLE NO.	Te (ppm)	Tl (ppm)	Pt (oz/t)	Pd (oz/t)
1	#1	<.1	<.5	<.002	<.002

June 24 FILE

I have receipt from Skyline for 5# sample and ISO check for:
page 3 platinum & palladium
7 all 14 elements
10 " 31 "

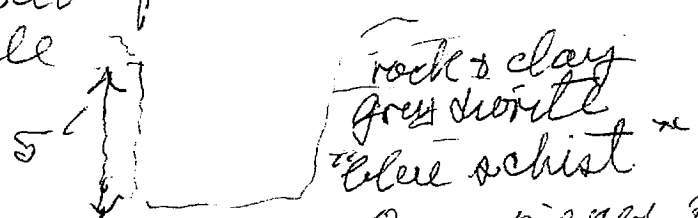
JUN 2 6 1989

I have no results yet and if you wish use this as authorization to obtain any information about this test from Skyline.

I have "out of the blue" notification that a geologist from another company will come to look and requesting more information (which of course I will furnish).

I assume this means some gossip perhaps only that some one is shooting the works on a test.

The more I learn about the Bayron area the worse it looks - but my sample is not "far fetched" from Colorado. It is a genuine sample



The sample is random pieces from the "blue schist" the blue schist looks like a coarse horizontal pie crust. Purple floor and wavy orange layer.

The sides of the excavation stand up vertically and the material is very uniform and for me and my pick quite hard.

I cannot hope to go deeper but I have three other samples, waiting for these results. Hope to use some "pointers" perhaps arsenic, mercury, antimony, ???

Lorenzo Del Barlow

ASARCO

Exploration Department
Southwestern United States Division

James D. Sell
Manager

February 14, 1989

Mr. Lorenzo Barton
P.O. Box 405
Payson, AZ 85547

Dear Mr. Barton:

Thank you for the past few notes, the latest dated February 12, 1989.

It is of interest that you have hit the "basement" of diorite which may be carrying your precious metal values.

As for an assay office which we often use and can do your assay for gold-silver by adding the silver-flux to make sure it all reports into the bead, I enclose the brochure and some shipping forms to you.

On page 6 (right hand column) note that they will use a one assay ton charge if you specify and for the Gold and Silver Fire assay they report the gold to 0.002 ounces/ton with the silver to 0.01 ounces/ton (see yellow order sheet). If you want lower values reported then I recommend the "Gold, Fire Assay/AA...." which reports to 0.01 ppm (0.0003 ounces per ton) (see cost and description in left hand column, page 6).

Until next time,

Sincerely,

James D. Sell

JDS:mek

cc: M.A. Miller

ASARCO Incorporated P. O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

[illegible] has about $[illegible] of redundant assets 2,000,000 units at 25¢ each to Calystane Capital Corpora-

ASARCO Southwestern Exploration Division

JDS

August 9, 1989

R.L. Brown
New York Office

Monthly Report
July 1989
Yarnell Project

Drilling

Phase 2 drilling was completed through Hole 36. All assays were sent to Tucson and put in a format for the computer services and engineering dept. An additional nine holes (37 - 45) were drilled to test "problem areas" within the mineralized zone. Preliminary results are tabulated below along with the rest of the holes. Collar locations and elevations of all drill holes have been surveyed and transmitted to Tucson. All holes have been marked with a numbered marker cemented into the hole collar. The topographic mapping which was flown on July 7, 1989 is expected by the week of August 14th, but perhaps sooner per Western Air Maps in Kansas.

Surveying

As stated above, all drill hole surveying is completed. Claim surveying is approximately 75% complete. The remaining 25% are old claims and we are having difficulty locating the original corners due to topography, ground cover, and inaccurate descriptions of the claims on the notices vs. their physical ground location.

Open Cut Sampling for Metallurgical Sample

Bulk sampling of the open cut and underground was completed on 8/4/89. Approximately 3 tons were collected from the underground for the low grade sample (±.02 opt Au) and 10-12 tons were collected from the open cut of ore grade material (±.05 opt Au). Also included were two drums of gouge. The ore was loaded on a truck and left Yarnell on 8/5/89 to be shipped to McClelland Labs in Sparks, Nevada.

A report with recommendations was submitted for a Phase 3 drilling program. Total estimated costs are $243,000 and are detailed in the report. Estimated expenditures to date for Phase 2 drilling are $218,000 and cumulative drill footage to date for Phases 1 & 2 is 13,157'.

Geologic Mapping

Geologic mapping is ongoing, but slow. The basin area south of the lower road on the Pennsylvania unpatented claim has been mapped and sampled, and results are pending. Additionally, a small adit in the basin has been chip sampled. This adit may expose the SW extension of the YFZ. The rock in

Did that have map Aug / drawing w/ it?

the adit is strongly oxidized and altered with argillic alteration present. Several other small cuts and prospect trenches have been sampled in the immediate area and results are pending. The road cut on the Mina/Stanton road was sampled for 1000' along the roadcut. Predominant geology is decomposed granite with a few thin zones of more siliceous rock. Alteration throughtout the area sampled is rather weak. The results of the sampling indicated that the mineralized zone is not present at this point. This area is probably too far down into the footwall of the zone. I took several reconn walks in the areas south and southeast of Yarnell Hill. Predominant rock type is fresh granite with occasional thin quartz veins, some auriferous as I have seen visible gold in them in the past. The north side of Yarnell Hill has been mapped from the drill road cuts. A preliminary observation is that there is a strong E-W structural component that is present within the mineralized zone. The importance of this, however, is not known at this time.

Forecast

Geologic mapping will continue with particular emphasis on looking at the structure. The rest of the claim block will be surveyed along with the surveying of any additional drill holes.

Mark A. Miller

MAM:mek
Att.

cc: W.L. Kurtz
J.D. Sell

TABLE 1 - YARNELL PROJECT
TABULATION OF DRILL HOLES

HOLE NO.	ELEVATION	(F/T) INTERVAL	THICKNESS	(opt) GRADE
1	5079'	5-55	50'	.024
		55-125	70'	.055
2	5063	45-140	95'	.018
		140-200	60'	.051
		200-240 stope	40'	stope
		240-245	5'	.027
3	5011	130-200	70'	.058
4	5052	170-220	50'	.015
		295-310	15'	.052
5	5042	205-285	80'	.027
		285-335	70'	.056
6	4949	150-180	30'	.041
		215-235	20'	.023
		270-280	10'	.090
7	4987	165-225	60'	.042
		225-260	35'	.016
8	4958	30-225	195'	.021
		225-275	50'	.041
9	4930	275-290	15'	.013
		290-315	25'	.048
10	4894	135-225	90'	.024
11	4874	175-190	15'	.017
		190-240	50'	.058
12	5074	115-240	125'	.030*
13	4810	180-210	30'	.022
14	5052	15-60	45'	.021
		60-90	30'	.069
		150-160	10'	.037
15	5037	140-295	155'	.034
16	5057	0-40	40'	.017
		40-80	40'	.034

17	5017	240-285	45'	.018
		285-325	40'	.077
18	4991	30-100	70'	.017
		100-140	40'	.078
19	4974	10-85	75'	.014
		205-235	30'	.058
20	5075	0-35	35'	.070
21	4806	25-55	30'	.019
		215-225	10'	.035
22	4884	215-225	10'	.035
		270-285	15'	.025
23	4860	40-125	85'	.047
24	4893	75-115	40'	.092
25	4947	55-95	40'	.062
26	4911	200-290	90'	.054
		290-320	30'	.016
27	4835	60-95	35'	.018
		235-265	30'	.019
		300-315	15'	.033
28	4817	95-215	120'	.023
		225-245	20'	.042
29	4859	220-230	10'	.032
30	4894	215-250	35'	.032
31	4918	365-385	20'	.054
32	4920	120-200	80'	.014
33	4969	15-55	40'	.016
		275-365	90'	.051
34	4672	110-130	20'	.013
35	4730	35-40	5'	.016
36	4705	115-140	25'	.026
37	4925	120-180	60'	.034
38	4984	185-240	55'	.023

39	5011	0-35	35'	.029
		145-155	10'	.024
		205-215	10'	.024
		300-360	60'	.035
		285-360	75'	.032*
40	5024	275-375	100'	.064
41	4978	295-335	40'	.045
42	4909	75-85	10'	.024
		110-125	15'	.024
		165-175	10'	.014
43	4907	65-85	20'	.072
44	4910	115-155	40'	.022
		155-165	10'	.008
		165-190	25'	.051
		190-235	45'	.016
		235-265	30'	.099
45	4980	60-75	15'	.084

*Bottomed in Ore.

8/8/89 - MAM

JDS

ASARCO

Southwestern Exploration Division

September 5, 1989

J.D. Sell

Penny Claims & Gentner Claims
Dos Cabezas District,
Cochise County, Arizona

I have verbally notified Roy Gentner that we will not be doing any work on their claim block. I talked to Roy on August 23, 1989, and he had already told his brother of our intentions.

Mark A. Miller

MAM:mek

cc: R. Gentner

ASARCO

Exploration Department
Southwestern United States Division

January 17, 1990

Mr. George Riddle
P.O. Box 34
Congress, AZ 85332

Leviathan Mine

Dear Mr. Riddle:

We have completed preliminary sampling at the Leviathan Mine and results are pending. It would be a great help to us to have the data that you showed us last year to aid in our evaluation.

Please call me either in Tucson (602-792-3010) or in Yarnell (602-427-3848) as I may be in either place; or, if possible, drop the data in the mail to:

Mark A. Miller
ASARCO Incorporated
P.O. Box 921
Yarnell, AZ 85362

Thank you.

Respectfully,

Mark A. Miller,

Mark A. Miller mek
Project Geologist

MAM:mek

cc: J.D. Sell

BULK ASSAY REPORT

TRIAD MINERALS CO.
ASSAYING & CONSULTING
P.O. Box 2754 - Mile Post 115, Hwy. 89
Wickenburg, Arizona 85358
602-684-3816

Octave
Yavapai Co, AZ

DATE 3-19-90

RECEIVED
MAR 19 1990
EXPLORATION DEPARTMENT

COMPANY ASARCO, INC. LAB #031790-6

ROCK CHIP

Sample Description	Ounces per ton AU (gold)	Ounces per ton AG (silver)	Remarks
OCT - 1	.023		MAM

Certified Assays When Signed And Dated
3-19-90 [signature]
DATE SIGNATURE

TRIAD MINERALS CO.

Assaying & Consulting

TO: ASARCO

ATN J. O. SELL

RECEIVED

MAR 19 1990

EXPLORATION DEPARTMENT

TOTAL NUMBER OF PAGES INCLUDING THIS PAGE: 2

FAX #: 292-3934

DATE: 3-19-90

TIME: 12:50

COMMENTS: THANK YOU

Tony

COREY B. EDDINGTON
METALLURGIST

MILE POST 115 HWY. 89 P.O. BOX 2754 WICKENBURG, AZ 85358
(602) 684-3816 FAX (602) 684-3013

ASARCO

Southwestern Exploration Division

February 12, 1990

R.L. Brown
New York Office

Monthly Report
M.A. Miller
January 1990

Yarnell Project, Yavapai County, AZ

Twenty-two days were spent on both field and office work on the Yarnell Project. The 100 scale detail mapping was completed, drafted, and submitted with a geologic report. The 200 scale map of Sections 14 & 23 is still in progress, but has been hampered by the weather (snow). No obvious targets have been identified to date; however, all alteration/ mineralization has been sampled. A small scale magnetometer survey was completed over the property (with main emphasis over the deposit) by John Malusa. Preliminary indications are that there appears to be lower gamma values across altered rock (moderate alteration), probably due to magnetic destruction of the ferro-mag minerals.

An orientation soil survey consisting of 4 lines across the deposit was completed by J.D. Rasmussen. Preliminary indications are that Ag, As, Cu are anomalous along with gold. Further work is being done to statistically reduce the data.

A proposal for additional drilling at Yarnell along the NE and SW extensions was submitted. The potential is for ±800-1mt at similar grade to the present mineral inventory with a 2-3:1 w/o ratio.

General Reconnaissance

Two days were spent at the Leviathan Mine located on the SW slope of the Weaver Mountains. The Leviathan consists of two intersecting quartz veins in metasediments and granite. First pass assay values are anomalous, but the downdip extension is under cover. The H.W. is altered and weakly mineralized suggesting a wider zone than is evident. Further sampling and possibly some soil sampling are planned. One day was spent reevaluating the Octave Mine for bulk tonnage potential. There appear to be possibilities of mineralization extending into the H.W. of the structure (2" + quartz vein @ .3 opt Au). Further work is planned. Access to the underground is good for sampling.

Field Days	Office Days	Expense Account	Vehicle Expense
11	13	$899.83	$300.00

Mark A. Miller

MAM:mek

cc: J.D. Sell, W.L. Kurtz

ASARCO

Exploration Department
Southwestern United States Division

February 17, 1990

Mr. Robert H. Merrill
890 Reed Court
Lakewood, Colorado 80215

Dear Bob:

Thank you for your recent data on your prospects located in the Little Maria's. Your consultant's ideas are interesting and confirm some of our observations. At present we will not be examining your property as time and priorities are dedicated elsewhere. However, please keep us informed of your progress. If I am in the area, I will certainly stop for a visit.

Respectfully,

Mark A. Miller
Geologist

MAM:mek
Enc. (Rpt. on Merrill Prop.)

cc: J.D. Sell

ASARCO Incorporated P.O. Box 5747 Tucson, Az 85703-0747
1150 North 7th Avenue (602) 792-3010

MINE SYSTEMS
MINE DESIGN
PROPERTY EVALUATION - FEASIBILITY

ROBERT H. MERRILL
Professional Engineer
890 Reed Court
Lakewood, Colorado 80215
(303) 237-5691

DESIGN AND CONTROL
OF SURFACE & SUBSURFACE
OPENINGS FOR MINING
& CIVIL ENGINEERING

December 22, 1989

Mark A. Miller
Geologist
Southwestern Exploration Div
ASARCO Inc
P.O. Box 5747
Tucson, AZ 85703

Dear Mark;

Some time ago you examined mining claims I have located near Blythe, California, and the purpose to this letter is to brief you regarding new developements and to let you know that the claims are no longer under lease. Last January Harris Resources and East West Minerals (basically Australian Companies with some US interests) leased the claims; however, although their lease is not up until January 15, they will not satisfy their work commitment and I have notified their lawyer, without objection, that I consider their lease to be in default.

Dr. Thomas L. Robyn made a survey of the property that you have seen, plus a property that is about 5 miles north that is new to you. The new claims, called the High Hopes Claims, are in a highly mineralized detachment fault terrian near Mojave Tank. I have also enclosed a map of the Mojave Tank area. This is an exciting area that you may wish to visit; also, you may wish to re-examine the Patton Hills since I have now sampled all of the streams from the Hills and have found evidence of gold in every one!

I plan to depart for Blythe January 7, 1989 90, and will be at my address in Blythe soon thereafter. My address in Blythe is Rte 1, Box 187-W, Blythe, CA 92225, telephone 619-922-2385. In the event that you would develope an interest in the property, my basic interests remain the same, that is, a modest lease bonus with the large part of the money "going into the ground".

Let me know if you have an interest in the property; however if you find that you do not have an interest at this time, I would appreciate it were you to return the enclosures so that I could give them to another party. Thanks!

Sincerely,

Bob -

Robert H. Merrill

REPORT ON THE MERRILL PROPERTY

T.4S., R20E. and T.4S., R21E.

RIVERSIDE COUNTY, CALIFORNIA

for

HARRIS RESOURCES

and

EAST WEST MINERALS

by

Thomas L. Robyn, Ph.D
6934 S. Garfield Way
Littleton, CO 80122
303/770-4646

February 13, 1989

REPORT ON THE MERRILL PROPERTY
RIVERSIDE COUNTY, CALIFORNIA

Introduction: The Merrill property is located in Riverside County at the extreme southeastern end of the Little Maria Mountains. The northern edges of the property have been extensively mined for gypsum, although activity declined sharply during the 1940's.

Gold was discovered on the property during 1983, and Mr. Robert Merrill subsequently staked an extensive amount of land. The property was visited by Thomas L. Robyn during January 28-February 1, 1989, and broad reconnaissance mapping and rock chip sampling was done. The intent of the mapping was only to understand the rock relationships and controls on known mineralization. Sampling was done to determine potential for an economic gold deposit on the property.

Rock identification was done by visual examination in the field, without the benefit of petrographic examination or chemical analysis.

Geology: The oldest rock unit seen in the area is a light gray, equigranular and holocrystalline granodiorite comprised of approximately equal proportions of quartz and plagioclase, with variable amounts of biotite. This unit disconformably underlies the oldest observed sedimentary unit, the basal quartzite.

The basal quartzite is exposed in place just north of Skarn Ridge, and is seen underlying limestone in the large xenolithic blocks of the Cactus Flower area. The quartzite is fine-grained, with the grains being well-rounded and equigranular. Float of a pebbly quartzite conglomerate was observed below the granodiorite/limestone contact north of Red Truck Canyon, but the conglomerate was not seen in place. The thickness of the quartzite unit is not known, but it has been observed to vary from zero to over 100 meters.

The limestone unit appears to lie conformably on the quartzite, and ranges in thickness to over 180 meters. In the vicinity of the K-spar quartz monzonite (see below), the limestone is altered by contact metamorphism to marble, and variably silicified, brecciated and altered to hornfels or gabbro. Minerals observed in the hornfels include diopside, actinolite, epidote, magnetite and quartz. The gabbro contains biotite and amphibole, and appears to be the result of contact metamorphism of limestone under hydrous conditions.

The limestone grades upward to gypsum, which is well exposed in the quarry north of Cactus Flower.

The youngest rock seen in the bedrock sequence is a K-feldspar quartz monzonite. K-feldspar crystals are up to 2 cm in length. This rock intrudes and alters the older rocks, especially the limestone. Contact relationships, alteration, and veins of the monzonite within the limestone attest to the intrusive relationship. The monzonite forms bold, rounded hills except where it is adjacent to major xenoliths, as at Cactus Flower. In this case, the monzonite weathers easily and forms low areas of "rotted rock".

Mineralization: Three general types of mineralization were observed. All types are hosted by limestone or its metamorphic equivalents. The first type is that seen at Skarn Ridge and Gold Hill, and to a lesser degree at Cactus Flower. At Skarn Ridge, copper oxide (probably chrysocolla) occurs in vertical fractures and sub-horizontal lenses parallel to bedding(?). At Gold Hill, a well-developed copper oxide-bearing quartz vein about 1.3 meters wide is hosted in a biotite/hornblende gabbroic xenolith. The vein pinches out rapidly along strike, in a distance of about 5 meters either side of its maximum width. Free gold was panned from crushed vein material. At Cactus Flower, fracture-controlled veining similar to that at Skarn Ridge is seen in the monzonite adjacent to xenoliths of quartzite and within the quartzite.

The second type of mineralization was seen only in the Cactus Flower area, and appears to be replacement mineralization. Gossanous outcrops with remnant pyrrhotite were observed near Nellie's Nipples. At Tim's Hill, gossanous zones have been trenched and are exposed over an area of about 12 by 50 meters. Across the canyon on Cactus Flower, another prospect pit exposes gossanous material. Both the Tim's Hill and Cactus Flower exposures contain a white, powdery material. Sulfides were not seen at either place.

The third type of mineralization is best developed at Patton Hill. Here, brecciated and silicified limestone is cut by veinlets of dark quartz vein material which contains magnetite, goethite, and rare pseudomorphs after sulfide. The hill zone is extensively cut by the dark quartz veinlets as well as reddish quartz veinlets. Float of very heavy, magnetite-rich quartz material occurs on the hill. A minor occurrence of this quartz material can be inferred from the float seen in the low saddle on the west side of Cactus Flower, and also on the northeast side of Nellie's Nipples. The silicified and brecciated limestone at Patton Hill is dark, chocolate brown to black, with manganese staining along fractures.

Structure: Mapping was not sufficient to define the area's structure. Only two faults are inferred from the mapping, both in the Skarn Ridge area. A minor north-trending fault appears to be down on the east side, dropping limestone breccia adjacent to the underlying granodiorite. Also, Red Truck Canyon appears to follow an east-trending fault which appears to be down on the south. However, both of these relationships could also be explained by extreme relief on the erosional surface of the granodiorite.

If the relationships are due to faulting, then Patton Hill is over the section of the area which has been down-faulted the most.

Additionally, the extensive brecciation, alteration and veining seen in Patton Hill is similar to that in the upper plates of detachment faults. In this case, it is not known if the limestone is brecciated and altered due to faulting, or because it is just above the intrusive contact of the limestone with the monzonite. If due to detachment faulting, gold deposition may have occurred in or above the fault and

under Patton Hill. If due to contact relationships, a replacement ore body may underlie Patton Hill.

Mojave Tank Area: A brief visit was made to the Mojave Tank area to examine prospect pits in limestone, as at Red Ochre, and in low hills to the east. The first prospect pit is along the north face of a ridge which displays an iron-stained and somewhat gossanous zone that separates a lower, buff-colored limestone from an upper, silicified and iron-stained limestone. The iron-stained zone appears to be a low-angle fault zone.

The Red Ochre pit exposes mineralization in limestone, which is of limited extent.

Near Mojave Tank, a bold, dark-brown hill of chloritic schist interbedded with limestone is cut by porphyritic gneiss. About 200 meters to the south low knolls of phylitte are exposed. Higher hills to the southeast are underlain by quartzite with minor phyllite. This area was not mapped due to the small scale of the map available.

Sampling Results: A total of 23 rock chip samples was collected on the Merrill Property and in the Mojave Tank area. Sample descriptions are given in Table 1, and the assay results are listed in Table 2.

The exposures of minor mineralization on the Merrill Property were sampled in order to determine trace metal associations with gold. Samples MP/GH-1 and MP/SR-1 are taken from such areas. The assays show that gold correlates well with arsenic (As), copper (Cu), somewhat with zinc (Zn), and weakly with silver (Ag). Note that the Patton Hill samples contain anomalous amounts of gold, copper, arsenic, silver and barium (Ba). The Patton Hill area is characterized by extensive brecciation and silicification, and appears geologically attractive. The geochemical data support this observation.

The Mojave Tank area has several prospects, and weak gold mineralization. More important, it has significant arsenic and weak mercury (Hg) anomalies. Based on the geologic interpretation and these anomalies, the Mojave Tank area is also worth examining more extensively.

Recommendations: Several areas deserve additional work which would be directed at selecting drill sites. These areas are:

Patton Hill: The geochemical anomalies combined with the extensive brecciation and veining present on the hill indicate the potential for economic mineralization. Detailed geologic mapping within a radius of about two kilometers of the hill may provide important structural information. Follow-up geochemical sampling by detailed, grid rock-chip sampling and biogeochemical sampling may define a drill target related to gold mineralization. Geophysical surveying by VLF and/or IP methods and possibly ground magnetic surveys may define a geophysical target related to replacement mineralization.

Mojave Tank: This area needs to be mapped. The presence of phyllites and other "basement" type rocks adjacent to a bold, chocolate-brown hill may be indicative of a detachment fault. The arsenic and weak mercury anomalies in the area indicate movement of low-temperature fluids. After a detailed geologic map is completed, geochemical sampling on a grid basis, both soil and bedrock, could be utilized to define drill targets.

Cactus Flower: The presence of gossanous zones within the xenoliths and the occurrence of pyrrhotite indicate that geophysical methods could be used to determine zones of sulfide concentration. VLF and/or IP could be tried. VLF is quite inexpensive and should be employed first. The area to be tested is quite focused, and the target zone would be along or near the keels of the xenoliths. The depth to some of the keels could be significant.

Gold Hill: The Gold Hill occurrence is in a xenolith of limited areal extent. The easily-eroded gabbroic xenolith is preserved because it is between exposures of the monzonite. If larger areal extensions of the gabbroic xenolith occur beneath the alluvium in the adjacent flats, a significant gold ore body could occur there. Because of the lack of exposure, this potential is best tested by deep soil sampling. If no clear target is defined, drilling of holes into bedrock a short distance on a grid pattern would test the potential.

Conclusions: Minor amounts of gold and associated copper, arsenic and silver mineralization occur on the property. Extensive brecciation in various areas indicate structural preparation of host zones.

The Merrill Property represents an attractive grass-roots exploration play. However, the property is essentially untested. Approximately $100,000 would be required to complete a first-phase estimate of the property's potential. As with most other grass-roots plays, there is a significant amount of risk in the expenditure.

I recommend that the property be leased on very soft terms, with adequate back-out clauses, and that a minimum of $50,000 be expended on the property in an effort to delineate drill targets. If drill targets are not defined at the end of this phase, either dropping the property or drilling semi-blindly would have to be considered.

Thomas L. Robyn, Ph.D.
Denver, Colorado
February 13, 1989

TABLE 1

SAMPLE DESCRIPTIONS
MERRILL PROPERTY

All samples are of approximately 2 kg. Sample locations are shown on the sketch geologic map, except for samples from the Mojave tank area.

MP/DH-1: Rock chip sample of altered limestone at top of ridge at Dave's Hill.
MP/DH-2: Rock chip sample of brecciated and altered limestone from northeast face of Dave's Hill, near top.
MP/DH-3: Rock chip sample from brecciated and altered limestone from south side of Dave's Hill, about half way down.
MP/GH-1: Rock chip sample from prospect pit at Gold Hill which exposes quartz vein containing CuOx and visible gold.
MP/GH-2: Rock chip sample from trench below GH-1. Minor veining in gabbroic xenolith.
MP/PH-1 to 6: Rock chip samples of brecciated and veined skarn from various locations on Patton Hill.
MP/SR-1: Rock chip sample of CuOx-bearing vein and country rock from prospect pit at end of road on north side of Skarn Ridge.
MP/TH-1: Rock chip sample from banded skarn xenolith across canyon to southeast of Nellie's Nipples.
MP/TH-2: Rock chip sample from gossanous outcrop on southeast side of Nellie's Nipples. Remnant pyrrhotite.
MP/TH-3: Rock chip sample from prospect pit on Tim's Hill. Gossanous zone in limestone.
MP/TH-4: Sample from muck pile below prospect adit in gossanous zone on northeastern edge of Tim's Hill. Hydrozincite?
MP/TH-5: Chip sample from prospect pit in gossanous zone on eastern portion of Cactus Flower xenolith. Hydrozincite?
MP/TH-6: Chip sample from rusty and mildly gossanous zone exposed in stream bed in western portion of Cactus Flower. Zone is about 1 m in true thickness, and covered laterally with slope wash.
MP/TH-7: Sample of floaters of magnetite-rich quartz skarn rock taken from saddle area about 30 m southeast of TH-6.

Mojave Tank Area

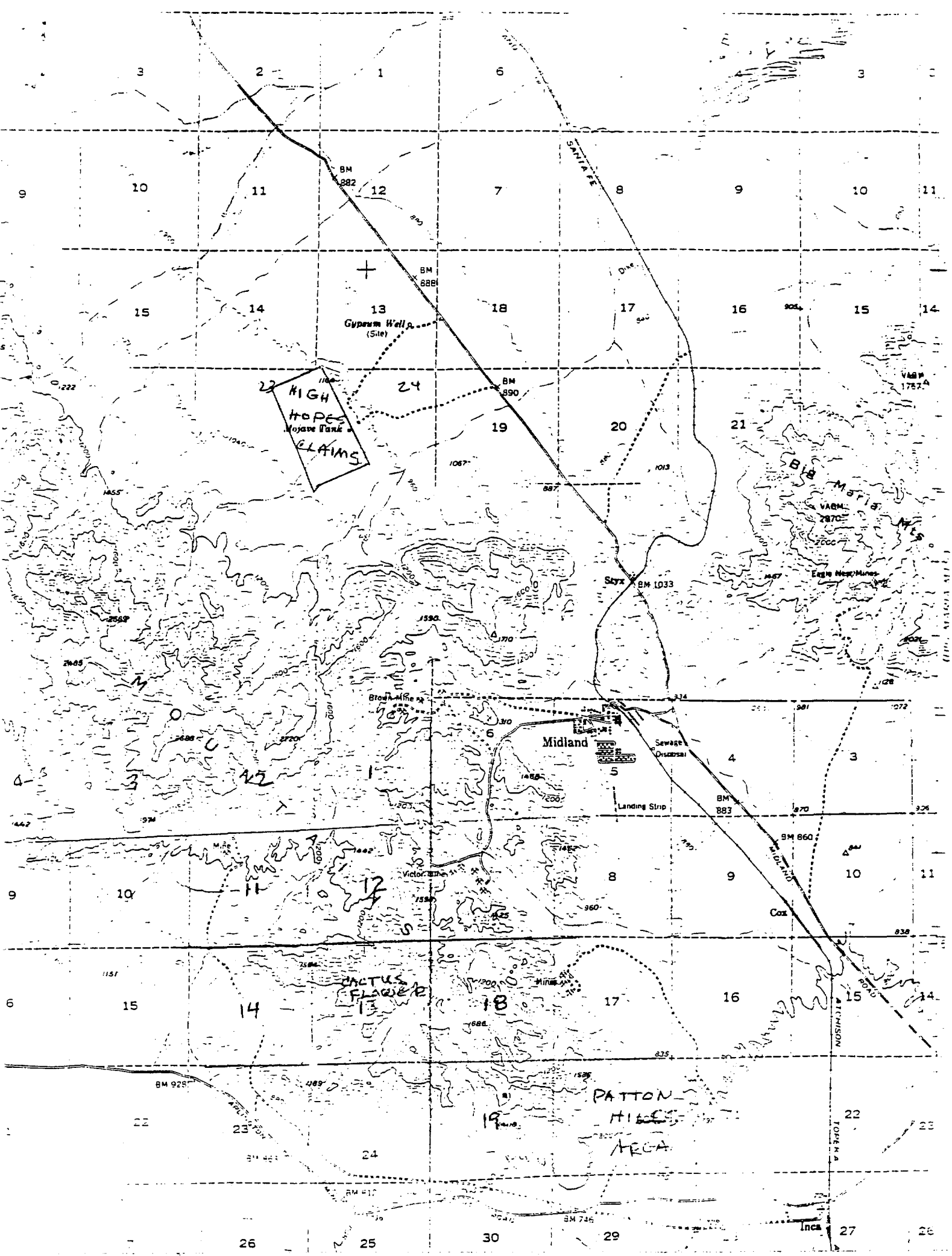
MP/RO-1: Rock chip sample from prospect adit and shaft area in brecciated, iron-stained and somewhat gossanous zone below an apparent low-angle fault. Mineralization includes chrysocolla, sericite and FeOx in silica. In unsurveyed section 35, R.20E., T.3S.
MP/RO-2: Rock chip sample from Red Ochre prospect pit located about 1 mile NNW of RO-1. Mineralization is of chrysocolla, sericite, FeOx, epidote and silica in skarn after limestone.
MP/RO-3: Grab sample from muck pile at town site. Material apparently derived from RO-1 location.
MP/MT-1: Grab sample from prospect pits at bold hill near Mojave Tank. Possible upper plate of detachment fault.

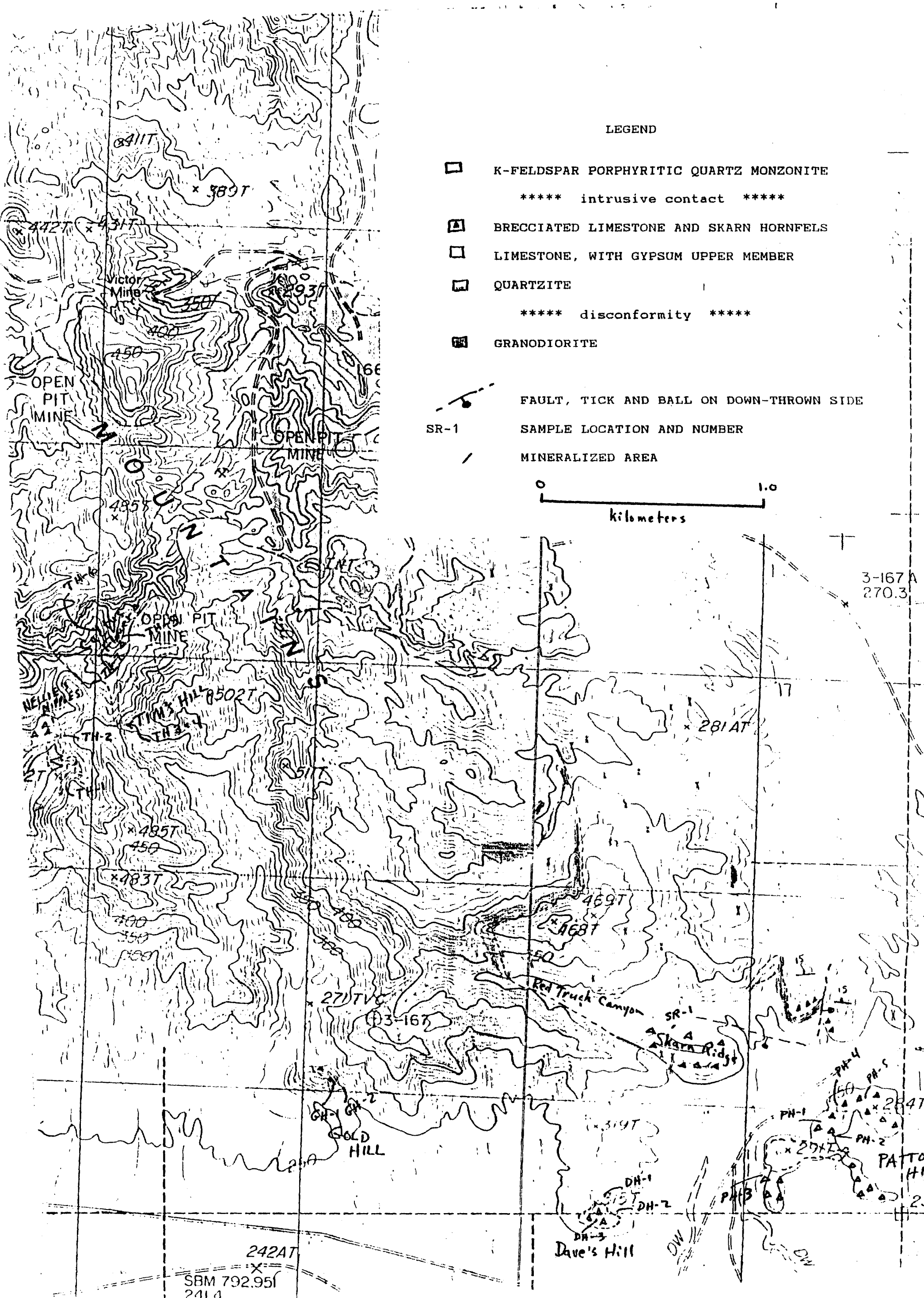
TABLE 2

SAMPLE ASSAY RESULTS
MERRILL PROPERTY

The samples were assayed at Jacobs Assay Office, Tucson, by AA method. All values are in ppm.

Sample #	Au	Ag	Pb	Cu	Zn	Ba	Hg	As
MP/GH-1	2.98	<2	<1	38,800	<1	20	<.05	18
-2	<.03	<2	<1	1,220	<1	210	<.05	<5
MP/PH-1	<.03	<2	<1	620	<1	5	<.05	16
-2	<.03	<2	<1	200	<1	510	<.05	27
-3	0.07	<2	3	100	<1	220	<.05	<5
-4	<.03	<2	<1	440	<1	230	<.05	<5
-5	<.03	<2	<1	240	<1	10	<.05	12
-6	<.03	2	<1	100	<1	5	<.05	<5
MP/SR-1	0.17	2	5	24,600	27,000	20	<.05	106
MP/TH-1	<.03	<2	<1	420	2	20	<.05	<5
-2	<.03	<2	<1	240	<1	20	40	<5
-3	0.14	<2	<1	12,800	<1	5	0.11	38
-4	<.03	<2	2	300	<1	5	<.05	<5
-5	0.07	<2	<1	1,120	<1	<5	<.05	<5
-6	0.04	2	<1	460	<1	<5	<.05	<5
-7	<.03	<2	<1	220	<1	<5	0.28	<5
MP/DH-1	<.03	<2	<1	140	<1	20	<.05	<5
-2	<.03	<2	<1	20	<1	30	<.05	12
-3	<.03	<2	<1	20	<1	35	<.05	<5
MOJAVE TANK AREA								
MP/RO-1	<.03	<2	3	26,000	4,800	<5	0.40	26
-2	0.14	<2	2	2,460	<1	5	<.05	57
-3	<.03	<2	<1	4,620	4,640	5	0.05	10
MP/MT-1	0.69	2	<1	280	<1	10,740	0.05	<5


SANTA FE
BM 882
BM 888
Gypsum Well
(Site)
HIGH HOPES CLAIMS
Mojave Tank
BM 890
Big Maria Mts
Styx
BM 1033
Eagle Nest Mines
Brown Mine
Midland
Sewage Disposal
Landing Strip
BM 883
BM 860
Victor Mine
Cox
CACTUS FLAGER
Mines
PATTON HILLS AREA
BM 925
Inca
MIDLAND ROAD
ATCHISON
TOPEKA


LEGEND
K-FELDSPAR PORPHYRITIC QUARTZ MONZONITE
***** intrusive contact *****
BRECCIATED LIMESTONE AND SKARN HORNFELS
LIMESTONE, WITH GYPSUM UPPER MEMBER
QUARTZITE
***** disconformity *****
GRANODIORITE
FAULT, TICK AND BALL ON DOWN-THROWN SIDE
SR-1
SAMPLE LOCATION AND NUMBER
MINERALIZED AREA
0
1.0
kilometers
Victor Mine
OPEN PIT MINE
OPEN PIT MINE
OPEN PIT MINE
MOUNTAIN
NELLIE MINES
TIM'S HILL
Red Truck Canyon
Skarn Ridge
GOLD HILL
Dave's Hill
PATTON HILL
3-167
270.3
SBM 792.95
242AT
281AT
271TVC
3-167
SR-1
GH-1
GH-2
DH-1
DH-2
DH-3
PH-1
PH-2
PH-3
PH-4
PH-5
TH-1
TH-2
TH-3
TH-4
TH-6
17

ASARCO EXPLORATION RECORD

[X] FIELD EXAMINATION [ ] LITERATURE SEARCH [ ] ASARCO FILE [ ] Submittal

Section I General Indexing

① Name(s) of Property or Area	② Country	③ State or Province
Robert Merrill Prospect Little Maria Mtns.	USA	Riverside Co.,CA

④ USGS Quad.	⑤ File or Gore No.
Inca Siding 7.5'	

⑥ Latitude	⑦ Longitude	⑧ AMS Sheet	Township	Range	Section	⑨ Examined by	⑩ Date
		Salton Sea	4S	21E		MAM, HGK	2/17-20/88
						⑪ Office: Tucson	⑫ Field Days

Section II Sources of Information

Date Typed 3/10/88

⑬ References

Author	Date	Title	Publications	Vol. No.
Submittal - Various Consultant's Reports - Attached.				

Section III Appraisal

⑭ Recommendations
- [ ] Action Now
- [ ] Too Low Grade
- [ ] Too Small
- [ ] Ownership Problem
- [ ] Access Problem
- [X] Low Priority

⑮
- [ ] Post Producer
- [ ] Producer
- [ ] Mineral Deposit
- [X] Prospect
- [ ]
- [ ]
- [ ] Geologic Concept
- [ ] Geochem Anomaly
- [ ] Geophy Anomaly
- [ ]

⑯ Production

Commodity	Tons	Grade

⑰ Reserves [ ] Measured [ ] Estimated

Commodity	Tons	Grade

⑱ Num. Drill Holes _____ Approx Total Footage _____

⑲ Excavations Several v. sat small pits.

⑳ [ ] Spectro. Analysis Attached

㉑ [ ] Assays Attached

㉒ [X] Geochem Results Attached ALL VALUES IN PPM'S

Section IV Geologic Data

㉓ Commodity or Contained Metals: Au

㉔ Ore Minerals-Major: Au Minor: CuOx

㉕ Host Rocks-Major: Granites, Limestone (Marble) Minor:

㉖ Age of Host Rocks: Mesozoic, Paleozoic

㉗ Nature of Exposures: Abundant outcrop >15% on hillsides and ridges.

㉘ Alteration: Extensive limestone altered to marble-epidote, calcite, some magnetite adjacent to contact.

㉙ Total Extent → 100' from intrusive

㉚ Structure: Poss. low angle fault on S. range front dipping → S., but majority of area is contact skarn related to the granite intrusives.

㉛ Ore Occurrence: Intrusive ? - shear zones (?) in Gold Hill Area assoc. with CuOx, but main target would be under pediment in low angle fault breccia-possible Copperstone

㉜ Age of Mineralization

㉝ Conclusions & Recommendations: Contact skarn is very abundant; however, it has been extensively sampled & shows only very erratic very low grade Au Min. Poor trace element response. I did not sample around Gold Hill as this area has also been sampled; however, a possible target may exist under pediment and Gold Hill showings may be leakage veins. Vein structures go under pediment within several hundred feet of exposure on hillside.

(For additional space use extra sheets)

LITTLE MARIA MOUNTAINS
Robert Merril Submittal
LMM-88 Prefix

ALL VALUES IN PPM'S

LMM-88

1 South face pt. rexln, the bedded limestone --> marble slt pinkish color @ southern end of sample estimate ~1% remnant sulfides (lim after py) 10' true thickness. N10°W 55°N.
Au .015, Ag .05, As 10, Sb <1, Hg .14.

2 & 3 Strong limonite gossan ~35' of section samples.
LMM-88-2 - Au .015, Ag .20, As 90, Sb 7, Hg .20.
LMM-88-3 - Au .010, Ag .65, As 18, Sb <1, Hg .15.

4 AA but poss. chlorite or altered amphibolite semi consolidated sand.
Au .005, Ag .25, As 20, Sb 1, Hg .10.

5 Carbonate not marble but bleached limestone north contact with gossan. High angle contact mod. broken and sheared.

6 Epidote, calcite zone in skarn ~4' thick where sampled hm spots in epidote.
Au <.005, Ag <.05, As 8, Sb 2, Hg .10.

7 Tm <1' silk zone. Appears to cross-cut granite slt sericite abu fig blk biotite N40°W.
Au .010, Ag .35, As <2, Sb <1, Hg .06.

8 Small pit CuOx present (4x6') along fracturs. Epidote along fractures and in shear zones N40°E 50°N. small skarn?? Sample represents 4-5' thickness. Occ. quartz veins within bedding minor limonites, possible jarosite.
Au .060, Ag .85, As 4, Sb 2, Hg .28.

9 Silic quartz limonite zone. Possible fault zone; along extension of 88-8 pit abundant limonite or goethite.
Au .010, Ag .65, As 6, Sb <1, Hg >5.00.

10 Adit. py poss. cpy in alt limestone (now marble) some minor epidote also calcite veinlets parallel to bedding located at edge of intrusive mass. Probably related to gossan @ 88-2-4.
Au .010, Ag .85, As 12, Sb <1, Hg .16.

LMM-88

11 Limestone @ edge of intrusive completely altered to marble. Sample represents ~15' section little Fe staining.
Au <.005, Ag <.05, As 10, Sb <1, Hg .06.

12 Felsic? VFG dike within granite intrusive. Light green VFG adjacent to B-88-13.
Au <.005, Ag .20, As 8, Sb 3, Hg .04.

13 Strong limonite/gossan zone with quartz stringers and veins.
Au .005, Ag .10, As 90, Sb 14, Hg .04.

14 Unit within massive limestone N70°E 10°N. North side of Cactus Flower area. Red colored limestone at intrusive contact, loc. siliceous.
Au .010, Ag <.05, As 6, Sb 1, Hg .03.

15 Random chip of limestone on ridge.
Au <.005, Ag .15, As 6, Sb <1, Hg .02.

16 Jasperoid? Magnetite zone within limestone skarn related? Zone is 25' wide.
Au .005, Ag .15, As <2, Sb <1, Hg .04.

17 Biotite granite <1% magnetite as xls- feldspar vein slightly alt-->clay?? Some Fe stain but only on surface fracturing N30°W.
Au <.005, Ag .20, As <2, Sb <1, Hg <.01.

18 Fe stained partly silic limestone float on prominent but subdued ridge ~ surrounded by granite on both sides.
Au <.005, Ag .15, As 12, Sb <1, Hg .02.

19 Patton Hills - silic limestone heavy Fe stained on surfaces. Desert Varnish? Sample represents ~25' thick section N60°W 18°SW. Debris flow overlies silic limestone on south side.
Au <.005, Ag .25, As 46, Sb 1, Hg .04.

20 Limestone chip rep ~200' of outcrop. Limestone is buff color. Local red Hm staining stratigraphically above silic limestone. Unit is 100-150' thick Msv bedded.
Au <.005, Ag .20, As 12, Sb 2, Hg <.01.

21 Contact between limestone and granite but granit is sampled. Dramatic decrease in epidote up section away from contact. Rep. 30-' vertically.
Au <.005, Ag .20, As 4, Sb <1, Hg <.01.

LMM-88

22 Quartz vein at contact. Appears brecciated ~2' thick. Formed or "occurs" at intrusive contact.
Au <.005, Ag .20, As 2, Sb <1, Hg <.01.

23 Limestone below contact of 21, 22. Siliceous; mod -->strong but still fizzes. Rep. ~15' of section.
Au .005, Ag .25, As 8, Sb <1, Hg .04.

24 Prospect Pit 8"x8" Cu Ox with Hm in limestone, grab chip.
Au .050, Ag 1.10, As 125, Sb <1, Hg .06.

25 AA but epidote only fault contact with CuOx.
Au <.005, Ag .40, As 40, Sb 2, Hg <.01.

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

REPORT OF ANALYSIS

JOB NO. TAJ 514
March 3, 1988

ASARCO INCORPORATED
Attn: Mr. Mark Miller
Southwestern Exploration
P.O. Box 5747
Tucson, AZ 85703

Analysis of 14 Rock Chip Samples

ITEM	SAMPLE NUMBER	FIRE ASSAY Au* (ppm)	Ag (ppm)	As (ppm)	Sb (ppm)	Hg (ppm)
1	LMM-88 1	.015	.05	10.	<1.	.14
2	LMM-88 2	.015	.20	90.	7.	.20
3	LMM-88 3	.010	.65	18.	<1.	.15
4	LMM-88 4	.005	.25	20.	1.	.10
5	LMM-88 6	<.005	<.05	8.	2.	.10
6	LMM-88 7	.010	.35	<2.	<1.	.06
7	LMM-88 8	.060	.85	4.	2.	.28
8	LMM-88 9	.010	.65	6.	<1.	>5.00**
9	LMM-88 10	.010	.85	12.	<1.	.16
10	LMM-88 11	<.005	<.05	10.	<1.	.06
11	LMM-88 12	<.005	.20	8.	3.	.04
12	LMM-88 13	.005	.10	90.	14.	.04
13	LMM-88 14	.010	<.05	6.	1.	.03
14	LMM-88 15	<.005	.15	6.	<1.	.02
15	CMM 88-16	.005	.15	<2.	<1.	.04
16	CMM-88 17	<.005	.20	<2.	<1.	<.01
17	CMM-88 18	<.005	.15	12.	<1.	.02
18	CMM-88 19	<.005	.25	46.	1.	.04
19	CMM-88 20	<.005	.20	12.	2.	<.01
20	CMM-88 21	<.005	.20	4.	<1.	<.01

SKYLINE LABS, INC.
1775 W. Sahuaro Dr. • P.O. Box 50106
Tucson, Arizona 85703
(602) 622-4836

JOB NO. TAJ 514
March 3, 1988

ITEM	SAMPLE NUMBER	FIRE ASSAY Au* (ppm)	Ag (ppm)	As (ppm)	Sb (ppm)	Hg (ppm)
21	CMM-88 22	<.005	.20	2.	<1.	<.01
22	CMM-88 23	<.005	.25	8.	<1.	.04
23	CMM-88 24	.050	1.10	125.	<1.	.06
24	CMM-88 25	<.005	.40	40.	2.	<.01
25	PA-1	.140	4.50	155.	40.	1.20

*NOTE: Method of analysis by combination fire assay and atomic absorption based on a one assay-ton sample.

**NOTE: Greater than normal geochemical range. Please advise if additional analysis is needed.

cc: Mr. J. D. Sell

REGISTERED ASSAYER CERTIFICATE NO. 9425 WILLIAM L. LEHMBECK STATE OF ARIZONA U.S.A.

William L. Lehmbeck
Manager

JDS

ASARCO

Southwestern Exploration Division

March 2, 1990

R.L. Brown
New York Office

M.A. Miller
Monthly Report
February 1990

Yarnell Project, Yavapai County, AZ

Most of the month was spent working on the Yarnell Final Report. Time was also spent in a recalculation of the J.D. Sell ore reserve using assigned values for the stoped areas. The new recalculated tonnage and grade is 4,131,505T @ .055 opt Au compared to 4,111,005T @ .051 opt Au (225,928 oz. vs. 211,162 oz.). A proposal was submitted for Airborne EM Survey in the Greater Yarnell Area.

Diamond drill holes YDDH 2, 3, & 4 are being sawed for assay. This will continue into March.

General Exploration

One day was spent at Octave Mine. Possibilities may exist for bulk tonnage targets. The Octave is a quartz vein +2' in thickness; However, there appears to be altered rock away from the vein. Additional work is planned.

An Airborne EM Proposal was submitted for the Newsboy Area in Maricopa County, Arizona. The area of interest includes the Newsboy Mine, a volcanic-hosted epithermal deposit, the Vulture Mine and the General Grant, a possible low angle fault target currently under control of Norgold Resources.

MAM:mek

Mark A. Miller

cc: W.L. Kurtz
J.D. Sell

ASARCO Southwestern Exploration Division

JDS

April 12, 1990

R.L. Brown
New York Office

Monthly Report
March 1990
Mark A. Miller

Yarnell Project, Yavapai County, AZ

Mapping was completed in Sections 14 and 23 at 1"=200'. No additional mineralization has been found; however, there are areas of weak to moderate alteration that have been located. The final compilation of the mapping is in progress, but has been delayed by other projects. A revised EM airborne survey for the Yarnell area was resubmitted at J.D. Sell's request. All drill core has been sawed and submitted to Triad Minerals for assay. Results have been received and a report will be forthcoming. Preliminary results from the assay of the ore sections only only seems to indicate that the variance in the assay results from reverse circulation and diamond drilling is balanced. (There does not appear to be a skewing of the data in one direction or another.) This suggests that the reverse circulation drilling is reporting accurate results assuming that the diamond drilling is most accurate (this is an assumption).

General Reconnaissance, Yavapai County

Two days were spent looking for other interesting prospects in Yavapai County. These prospects will be examined, hopefully in the next month. The Oro Grande Mine was examined. This is a submittal which has been in the files for some time. The deposit?? is presumably hosted in altered granites and associated diorites. Six rock chip samples were taken across a quartz hematite breccia, but they did not show any gold. The prospect is being promoted as a very large PGM/gold deposit. No further work is planned.

Yarnell Ore Reserves

Several days were spent and will extend into the next month on the computer generated ore reserves. It appears that we can show more continuity in grade and tonnage than the computer has shown. These changes when approved by the committee (which has been set up by J.D. Sell) will be incorporated in the reserve and a new economic model will be run.

R.L. Brown

April 12, 1990

Reno Gold Meeting. March 28-April 5, 1990

Three days were spent at the end of the month attending a field trip in concert to the meeting in Reno. The field trip was to the volcanic hosted deposit of Southern California and Western Nevada. Stops on the trip included the Bond Gold Bullfrog Mine, GEXA's Motherlode Mine, Viceroy's Castle Mountain Mine, BMR/Fisher Watt American Mine, Billiton's Standard Hill Mine and CoCa's Cactus Mine.

	Field Days	Office Days	Expense Account	Vehicle Expense
Month	14	12	$ 372.48	$ 200.00
YTD	35	39	$1,407.00	$1,783.00

MAM:mek

Mark A. Miller

cc: W.L. Kurtz
J.D. Sell

JDS

ASARCO

Southwestern Exploration Division

April 17, 1990

J.D. Sell

1st Quarter 1990
Quarterly Report

EXPLORATION AUTHORIZATIONS

Yarnell Project, Yavapai County, AZ - EA-0444

Seventy-two days were spent on field and office work at Yarnell. Mapping on 100 & 200' scale was completed; magnetometer and soil sampling was also completed. The geological ore reserve was recalculated and work was started on the ECS computer reserve. The final report is near completion.

GENERAL EXPLORATION

Octave Mine, Yavapai County, AZ

One day was spent at Octave. There may be possibilities for bulk tonnage potential associated with the H.G. quartz vein. One sample taken in a carbonate breccia stockwork ran .034 opt Au. Additional work is planned.

Leviathan Mine, Weaver District, Yavapai County, AZ

Two days were spent at this propsect. First pass assays are anomalous in gold; however, the potential appears limited. Additional sampling and possible soil sampling may be done to follow the zone under cover.

Oro Grande Mine, Maricopa County, AZ

One day was spent at this prospect. This is a fault zone? in altered diorite and granites. A detailed sampling of a quartz/hematite breccia did not show any gold. This prospect is being promoted as a very large PGM/gold deposit. No further work is planned.

GSN Meeting, Reno, Nevada

Part of the GSN meeting included a field trip for 4 days to the volcanic hosted deposits in southern Nevada and southern California. Mines visited were the Bullfrog Mine of Bond Gold, Mother Lode of GEXA Minerals, Castle Mountains Deposit of Viceroy Res., Standard Hill Mine, Billiton Minerals, American Mine BRM/Fischer-Watt and Cactus Mines, CoCa Minerals.

Mark A. Miller

MAM:mek

Mark A. Miller

ASARCO

Southwestern Exploration Division

April 27, 1990

R.L. Brown
New York Office

Monthly Report
April 1990
Mark A. Miller

Yarnell Project, Yavapai County, AZ

Most of the month was spent working on the computer ore reserves for the Yarnell gold deposit. The block reserves are being modified to reflect the geology and continuity that the mineralization shows. The computer is not using any geologic criteria in the determination of how far the ore blocks will project; therefore, some of the ore blocks do not project far enough between drill hole intercepts. This is the basis of the modification. Conversely, the computer also puts ore where we are reasonably sure that none exists. Once the modifications are accepted, the changes will be made on the computer and a new economic study will be run.

General Grant Gold/Base Metal Prospect, Maricopa County, AZ

Several days were spent looking at this prospect. The occurrence is a flat (10-15°) fault structure dipping to the north. The zone separates mafic volcanics (basaltic in nature) from more felsic rhyolitic volcanics. The fault zone is strongly argillically altered with alteration extending into the footwall rocks. The hanging wall shows some brecciation and fracturing with abundant opal and some quartz veining evident. There are several small hills on a northerly trend from the General Grant that show similar alteration and silification. Mineralization appears to be confined to the footwall volcanics with gold values in trenches up to .04 opt Au and zinc values up to 8% locally. The gold and zinc anomaly appear to be coincident. The property is under the control of Norgold Resources, and they will be sending us a data package. This is probably a covered target as the zone disappears under the pediment on strike and downdip. As mineralization appears to be located in the footwall of the structure, soil sampling is probably of questionable value. The prospect might best be evaluated by drilling.

GSN Gold Meeting, Reno, Nevada

The first week of the month was spent attending the GSN meeting.

	Field Days	Office Days	Expenses	Vehicle Expense
Mo.	8	14	$1588.42	$ 300.00
YTD	43	53	$2995.42	$2083.00

Mark A. Miller

MAM:mek

cc: W.L. Kurtz, J.D. Sell

ASARCO

Southwestern Exploration Division

June 12, 1990

R.L. Brown
New York Office

M.A. Miller
Monthly Report
May 1990

Yarnell Project, Yavapai County, AZ

Reserve changes were made in the Mining Department's block model reserve based upon the observed and interpreted geology. These changes were reviewed by a committee consisting of J.D. Sell, M.A. Miller, L.J. Jansen, S.L. Lakosky and S.A. Anzalone prior to initiation. The activity continued through the end of the month. Expected completion is the early part of June. A portion of the month was spent on the final geologic report on Yarnell. All of the maps, etc. concerning the report are in their final drafting stages. The 200 scale map of Sections 23 and 14 has been completed and awaits drafting.

Other Activities

One day was spent touring Cyprus' Gold Copperstone Mine. A memo describing the visit is forthcoming.

Office Days		Field Days	Expense Account	Vehicle Expense
May	12	1	$ --	$509.92
YTD	55	54	$2,995.83	$4,102.75

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

ASARCO Southwestern Exploration Division

June 26, 1990

R.L. Brown
New York Office

Monthly Report
June 1990
M.A. Miller

Yarnell Project, Yavapai County, Arizona

Revision of ECS compute block reserves was completed and is awaiting a new economic study. A memo describing the changes and techniques was submitted to J.D. Sell. A final report and map was completed on Sections 14 and 23 mapping and was submitted to the Drafting Department. Discovery samples were taken on BD-3 and YAR 43. Assays are pending.

General Exploration

Octave Mine, Yavapai County, Arizona

A follow up on a sample taken from the hanging wall of the Octave Structure was done. The follow up confirmed the single sample, but failed to enlarge the potential mineralized zone over 10'. Additional work is planned in the Weaver District, including the Octave Mine.

Sinoski Mine, Yavapai County, Arizona

Four rock chip samples were taken on a mineralized low angle structure with a NE strike NW dip. This is located approximately 6 air miles SE of Yarnell. Samples were taken from a sericitized silicified zone in PC granites. A potential zone based upon color anomalies could be >2000' long x 75-100' wide.

Field Days		Office Days	Expense Acct.	Vehicle Expense
June	2	21	$146.25	$200.00
YTD	57	75	$3,142.08	$4,302.75

Mark A. Miller

MAM:mek

cc: W.L.Kurtz
J.D. Sell

JDS

ASARCO

Southwestern Exploration Division

June 26, 1990

J.D. Sell

2nd Quarter 1990
Quarterly Report
M.A. Miller

YARNELL PROJECT, Yavapai County, Arizona - EA-0444

Fifty days were spent in office and field work at Yarnell. Revisions to the ECS reserve were completed and entered into the computer. The final report on Yarnell was completed and is awaiting the completion of drafting of Figures and maps.

GENERAL EXPLORATION

General Grant Gold/Base Metal Prospect, Maricopa County, Arizona - Three field and office days were spent on this Norgold Prospect. Norgold was offering this property for JV, but has since changed its mined. The area could be evaluated for volcanic/structure hosted deposits.

Sinoski Mine, Octave Mine, Weaver District, Yavapai Count, Arizona - Four days were spent looking at prospects in this district. Results are pending on the Sinoski Mine. Additional sampling at the Octave Mine confirmed earlier results, but failed to expand zone.

MEETINGS/FIELD TRIP

Two days were spent on an AIME trip to the Copperstone Mine of Cyprus Corp.

MAM:mek

Mark A. Miller

cc: W.L. Kurtz

ASARCO

Southwestern Exploration Division

August 7, 1990

R.L. Brown
New York Office

Mark A. Miller
Monthly Report
July 1990

Yarnell Project, Yavapai County, AZ

The Yarnell Final Geologic Report is nearing completion. There are still some minor revisions to the plates and attachments.

A regional geologic map was prepared for Carl Windels to aid in his interpretation of the Yarnell EM anomalies. One day was spent with Stuart Bengson, Asarco Agronomist, at the project reviewing the potential reclamation. Bengson estimates reclamation will cost between $2-4 million. The report on the geologic mapping of Sections 14 & 23 has been completed and the maps are being colored. Results from last month's discovery samples were only trace gold on BD-3 and YAR 43. A meeting was held with BLM geologists from Phoenix to apprise them of our plans to patent the Pennsylvania claim. W.D. Gay has written a memo concerning the meeting.

Other Projects/General Exploration

Commonwealth Mine, Cochise Co., AZ

A review of all the available assay data from the Commonwealth Mine was completed and a report was written and submitted to J.D. Sell. DRX reports a "geologic inventory" of ~1 mt @ .04 opt Au, .97 opt Ag. There appears to be a reasonable chance for 3-5 mt of similar grade within the immediate inventory area. There are also other exploration areas which would require additional sampling and, hopefully, drilling.

Field Days		Office Days	Expense Account	Vehicle Expense
July	2	22	$226.86	$1,149.50
YTD	59	97	$3,368.94	$5,964.53

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

JDS

ASARCO Southwestern Exploration Division

September 6, 1990

R.L. Brown
New York Office

M.A. Miller
Monthly Report
August 1990

YARNELL PROJECT, Yavapai County, Arizona

One day was spent at Yarnell with Norgold Resources. The purpose of the trip was for Norgold to review the surface geology to gain familiarity of the deposit relative to the calculation of their ore reserves. Several days were also spent in the office working on revisions of the final report. A compilation of data (for Norgold Resources) as requested by J.D. Sell was completed and submitted.

GENERAL EXPLORATION

Sinoski Mine, Yavapai County, Arizona

Samples taken at the Sinoski Mine indicated weakly anomalous gold mineralization associated with a low angle fault structure. This area is a low priority target at present and would be included in a district study.

Harquahala Mine, La Paz County, Arizona

Harqpro, a small promotional mining company has announced a reserve potential of 16 mt at .05 opt Au (this is not a drill indicated reserve). Three days were spent reviewing available data on the project and reconnaissance sampling on some of the structures seen. Mineralization is hosted in the Bolsa Quartzite which has been complexly folded and faulted. Mineralization is also associated with thin low angle southerly dipping structures in the underlying granite. Assays received indicate significant gold mineralization, but alteration is limited to the structure and does not appear to be pervasive to suggest a wide zone of mineralization. Based upon the available data the geologic potential is closer to 2-3 mt at .05 opt Au hosted in the Golden Eagle structure with a high (3-5/1) w/o ratio. This 2-3 mt potential is also undrilled.

Bennet Mine (Buffalo Au Group) Maricopa County, Arizona

Two days were spent examining the Bennet Mine area. This property was

located from a file review and indicated gold grades to .1 opt Au in a potential open pittable configuration. Thirteen samples were taken within the area. The described geology and the observed geology are markedly different, but there is a distinct red color anomaly which is hosted in Tertiary volcanics. Results from the sampling, however, indicate little to no gold. No further work is recommended on the property.

BVO - Yuma County, Arizona

Three RC holes were completed for a total of 1420'. Assays are pending on the project. Two of the three holes intersected significant argillic alteration which may be related to gold mineralization; however, little silifiction was seen.

	Field Days	Office Days	Expense Acct.	Vehicle Exp.
Mo.	14	13	$ 378.22	$ 600.00
YTD	73	110	$3,747.16	$6,564.53

MAM:mek

Mark A. Miller

cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

September 24, 1990

R.L. Brown

M.A. Miller
Monthly Report
September 1990

BVO Project, Yuma County, AZ - EA-0472

Results received from the three holes drilled in August indicate no gold mineralization. Thirty-eight claims were staked over the EM anomalies and a ground mapping reconnaissance was started over the anomalies in an attempt to identify the possible cause of the EM responses. This mapping will be continued into next month.

Cyprus Minerals acquired the BVO proper area (Homestake Mining's reserve of 177,000T @ approx. .25 opt Au) with plans to mine the deposit and send the ore to their Copperstone Mill.

	Field Days	Office Days	Expense Acct.	Vehicle Expense
Month	14	11	$1,006.30	$ 250.00
YTD	87	121	$4,753.46	$6,814.53

MAM:mek

Mark A. Miller

cc: J.D. Sell
W.L. Kurtz

JDS

ASARCO

Southwestern Exploration Division

September 25, 1990

J.D. Sell

M.A. Miller
3rd Quarter 1990
Quarterly Report

AUTHORIZED PROJECTS

Yarnell Project, Yavapai County, Arizona - Gold - EA-0444

Fifteen days were spent on the project. The Final Report on Yarnell is still awaiting final revision and drafting of the plates and figures. However, since Asarco has pulled out of the joint venture, this report will be for the record only.

BVO Project, Yuma County, Arizona - Gold - EA-0472

Twenty days were spent on this project. Three drill holes were completed for assessment purposes on Asarco's claims. No gold mineralization was encountered in weak to moderately altered volcanics. An additional 38 claims were staked to cover the Airborne Geophysical Anomalies.

GENERAL EXPLORATION

Commonwealth Mine, Cochise County, Arizona

Three days were spent on this property. A review of data from DRX was completed with the conclusion that a 3-5 mt geologic reserve at .04 opt Au could exist on the property.

Sinoski Mine, Yavapai County, Arizona

Two days were spent on this property. Samples taken on a low angle structure similar to the Yarnell structure indicated weakly anomalous gold. This might be re-examined in a district evaluation.

Bennet Mine, Maricopa County, Arizona

Two days were spent examining this prospect. Of the thirteen samples taken within a hematitic zone in T. volcanics, only one showed anomalous gold and base metals. No follow-up is recommended.

Harquahala Mine, La Paz County, Arizona

Eight days were spent on this property. Harqpro, a small American/Canadian Mining/Promotional company reported 15 mt at .05 opt Au. Examination of the property and various and sundry data do not support this reserve figure. The property has not been ruled out as a possible 3-5 mt at .05 opt Au target with open pit potential.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz

ASARCO

Southwestern Exploration Division

October 26, 1990

R.L. Brown
New York Office

Monthly Report
M.A. Miller
October 1990

-10 days field work

BVO Project, Yuma County, AZ

Most of the month was spent mapping at BVO. The claim group is being mapped at 1" = 500' to locate additional areas of mineralization and to ground check the AEM anomalies. I have identified a felsic volcanic pile consisting of ash fall and ash flow tuffs that appear to have erupted into an andesite valley. Mineralization at BVO, however, is restricted to the andesites and particularly to a low angle structure in the andesites with possible high angle high grade feeders. Sampling has been completed on a possible extension of this low angle silicified breccia zone. Results are pending and mapping is still in progress.

Yarnell Project, Yavapai County, AZ

I am preparing a field trip guide and talk for the Arizona Geological Society which will be presented during the first week of December.

Field Days	Office Days	Expense Account	Vehicle Exp.
14	11	$522.99	$610.00
101	132	$4306.45	$7424.53

Mark A. Miller

MAM:mek

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

November 26, 1990

R.L. Brown
New York Office

M.A. Miller
Monthly Report
November 1990

Yarnell Project, Yavapai County, AZ

The field trip guide and talk have been completed and will be presented in early December for the Arizona Geological Society. The Yarnell Final Geologic Report was completed and submitted for distribution.

BVO Project, Yuma County, AZ

Results received from sampling last month on a silicified breccia indicate weakly anomalous gold, but no ore grade mineralization. This is probably not an extension of BVO mineralization. Mapping will continue and be completed in December/January.

General Exploration

Granite Mountains Prospect Bond Gold/REDCO mining Company, Yavapai Co., Arizona.

One day was spent examining this very controversial (environmentally) project. The prospect appears to be a sulfide rich (pyrite) quartz vein from 2' to +30' in thickness, striking N30°+E and +80°NW. The quartz vein appears to follow a fault zone in metasedimentary rocks (phyllites, schists). Alteration extends into the phyllites up to 20' on either side of the vein. The strike length of the structure is +1 mile with the possibility of other subsidiary vein structures. Six rock chip and dump samples were taken. Results are pending.

Field Days		Office Days	Expense Acct.	Vehicle Expense
Month	4	17	$162.51	$224.71
YTD	105	149	$4468.96	$7649.24

Mark A. Miller

MAM:mek

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

January 2, 1991

R.L. Brown

M.A. Miller
Monthly Report
December 1990

BVO Project, Yuma County, AZ

Mapping is ongoing on the claim block. It appears that the surface geophysical anomalies (surface resistors) located from the AEM surveys may be due to lithology. There are several rhyolite or felsic domes within the vicinity of the anomalies and these may be responsible for the surface response. Several low angle faults have been mapped and sampled. Results are pending. One small altered dike/sill was sampled on the west side of the claim block. Results are pending.

Mapping on the Asarco claim block will continue; however, the majority of the remaining unmapped portion is covered by basalt flows or valley alluvium. Cyprus has initiated a detailed mapping program on their claims and plans to conduct additional drilling in 1991.

General Exploration

Part of the month was spent in preparation for the Yarnell geologic talk and field trip.

Field Days		Office Days	Expense Acct.	Vehicle Expense
Month	13	4	$703.65	$800.00
YTD	118	153	$5,172.61	$8,449.24

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

JDS

ASARCO

Southwestern Exploration Division

January 2, 1991

J.D. Sell

M.A. Miller
4th Quarter 1990
Report

AUTHORIZED PROJECTS

BVO Project, Yuma County, AZ - Gold - EA-0472

Twenty days have been spent on this project. Mapping at 1" = 500' of the claim block is ongoing. It appears that some of the AEM results may be lithologically influenced.

Yarnell Project, Yavapai County, AZ - EA-0444

Twenty days were spent on this project. The Yarnell Project Final Report was published. In addition, a field trip guide for the Arizona Geological Society was completed and a talk was given at the AGS meeting on Yarnell.

GENERAL EXPLORATION

Granite Mountains Prospect - Yavapai Co., AZ

One day was spent examining this prospect. This property consists of a vertical quartz vein(s) in metasediments. Several samples of quartz only were >.1 opt Au. This property is located in a very controversial (environmentally) area and no further work is contemplated.

Harquahala Mine, La Paz County, AZ

Harqpro is currently drilling 5+ holes and will furnish Asarco assay results upon completion. The geology has been reinterpreted and remapped suggesting additional targets than those previously recognized.

MAM:mek

Mark A. Miller

cc: W.L. Kurtz

ASARCO

Southwestern Exploration Division

February 5, 1991

R.L. Brown
New York Office

Monthly Report
M.A. Miller
January 1991

Gold Basin, Mohave County, Arizona

Two days were spent with J.D. Sell and Russ Corn on a field trip to the Gold Basin area with the purpose of orientation and education prior to beginning a district study. My involvement in this project has been deferred until the Mexico study is completed.

Mexico File Review

"Pick" Pickard and I are reviewing and organizing the Mexican files under the direction of Herb Jacobson. Review of the files will begin once organization has been completed. During our compilation/organization process, we have identified several areas that appear to have good potential for Asarco. These have been sent to Herb and are as follows:

Ocampo District, Chihuahua - Hi Grade Bonanza, Gold, Silver

Cia El Fenix de Campo Morado, Guerrero - Massive Sulfide

Parroquia Mine, Michoacan - Copper Porphyry

Carmen Mine, Mexcala Area, Guerrero - Gold Skarn

Santa Fe, Chiapas - Roof Pendant - Possible Skarn

Santa Maria de Moris, Chihuahua - Epithermal Vein in Sediments.

	Field Days	Office Days	Expense Acct.	Vehicle Exp.
Mo. & YTD	3	18	$196.56	$217.17

Mark A. Miller

MAM:mek

cc: J.D. Sell
W.L. Kurtz

JDS

ASARCO

Southwestern Exploration Division

April 2, 1991

J.D. Sell

M.A. Miller
1st Quarter 1991
Quarterly Report

GENERAL EXPLORATION

Forty-one days have been spent organizing and reading Mexican files. We have reviewed a number of files in Baja, Sinaloa, Nayarit, and have sent recommendations for further work to H.S. Jacobson in Denver.

Gold Basin, Mohave County, AZ

Two days were spent in an orientation of the district. I was pulled off the project for the Mexico File Review.

Ray-Kelvin Area, Pinal County, AZ

Three field days and 4 office days were spent sampling an altered zone on patented claims south of Ray Mine in follow up to an old Kennecott drill hole which showed a considerable thickness of +.1 opt Au. No significant mineralization which might relate to this drill hole was encountered. A report was written and no further work was recommended.

Crystal Hill, Yavapai County, AZ

One day was spent sampling altered zone in granitic rock being promoted as a porphyry Cu, Au, Mo Target. No further work is recommended.

Red Bluff Mine, Yavapai County, AZ

One day was spent sampling an Au altered, hematized zone in light of +.1 opt assays reported by the owners. The best section was a fault zone which ran 18' @ .16 opt Au. The zone does not appear to continue along strike. No further work is recommended.

Hart Mountain, Yuma, AZ

One day was spent sampling a supposed detachment zone environment. No further work is recommended.

Mark A. Miller

MAM:mek

cc: W.L. Kurtz

ASARCO

Southwestern Exploration Division

This memo is sent of the staff being of no interest
Kurt
4/3/91

April 2, 1991

I verbally told MAM prior to his writing this, that I was not satisfied with his sampling and thought he should do more. See my note to him
JDS

R.L. Brown
New York Office

Mark A. Miller
Monthly Report
March 1991

Mexico File Review

Baja California, Sinaloa and Nayarit have been reviewed and a number of prospects were recommended. These were listed in the March Monthly Report to H.S. Jacobson.

GENERAL EXPLORATION

Crystal Hill Prospect, Yavapai County, AZ

This submittal was promoted as a porphyry Cu/Au/Mo target. Five samples taken within the altered zone showed only trace gold. The submittal was rejected and the owners were notified.

Red Bluff Mining Company, Yavapai County, AZ

The prospect consists of "altered" hematite zones in rhyolites and granites. The property was of particular interest in that many of the reported assays were >0.1 opt Au. Six samples were taken on the property; the best being 18' (true thickness) of 0.16 opt Au in a fault zone. While this is a significant assay the orientation and exposure suggests limited potential. No further work is recommended on the property.

Field Days		Office Days	Expense Account	Vehicle Account
March	4	19	$23.00	$133.51
YTD	13	44	$563.46	$610.68

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

April 2, 1991

R.L. Brown
New York Office

Mark A. Miller
Monthly Report
March 1991

Mexico File Review

Baja California, Sinaloa and Nayarit have been reviewed and a number of prospects were recommended. These were listed in the March Monthly Report to H.S. Jacobson.

GENERAL EXPLORATION

Crystal Hill Prospect, Yavapai County, AZ

This submittal was promoted as a porphyry Cu/Au/Mo target. Five samples taken within the altered zone showed only trace gold. The submittal was rejected and the owners were notified.

Red Bluff Mining Company, Yavapai County, AZ

The prospect consists of "altered" hematite zones in rhyolites and granites. The property was of particular interest in that many of the reported assays were >0.1 opt Au. Six samples were taken on the property; the best being 18' (true thickness) of 0.16 opt Au in a fault zone. While this is a significant assay the orientation and exposure suggests limited potential. No further work is recommended on the property.

Field Days		Office Days	Expense Account	Vehicle Account
March	4	19	$23.00	$133.51
YTD	13	44	$563.46	$610.68

Mark A. Miller

MAM:mek

cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

June 4, 1991

R.L. Brown
New York Office

M.A. Miller
Monthly Report
May 1991

Mexico File Review

A monthly report was sent to H.S. Jacobson detailing our progress. We reviewed the states of Durango, Guanajuato, Guerrero, and Zacatacas. A copy of the report is attached.

Arizona Reconnaissance

Several days were spent following up AEM anomalies in the Stanton/ Weaver Creek area. The area is dominated by low to medium angle fault zones and quartz veins in a granitic pluton known as the Rich Hill Granite (of similar age to the Yarnell Granite). Preliminary indications are that the mineralized zones are too narrow and discontinuous to be of interest. Assays are pending.

One day was spent following up several anomalous and one ore grade sample at the Red Bluff Property, Yavapai County. The ore grade sample was taken along a low angle fault zone and ran 18' at 0.16 opt Au. Further examination along strike has revealed that the zone appears to widen to the south up to +60'. The mineralized zone consists of a silicified hematitic shear/breccia with abundant specular hematite up to 5-6% in places. It was sampled and results are pending. A potential strike length of +1500' may be possible with a favorable stripping ratio. It appears that the ground is already staked according to the BLM microfiche.

Mark A. Miller

MAM:mek
Att.

cc: J.D. Sell
W.L. Kurtz

ASARCO

Southwestern Exploration Division

June 21, 1991

R.L. Brown
New York Office

M.A. Miller
Monthly Report
June 1991

Mexico File Review

We have completed Oaxaca, and Puebla in the file review and have sent a monthly report to H.S. Jacobson detailing our progress. A copy of the report is attached.

Red Bluff Mine, Yavapai County, AZ

Assay results have been received from the sampling on the property and a report has been written describing the results. Of twelve samples taken in the altered zone the best assays are 20' (true thickness) at .139 opt Au. The distance between the best samples is approximately 1200'. It is not yet clear as to the full mineralized width of the zone and additional detailed sampling will be done to determine this. The property is composed of both patented and unpatented claims and appears to be divided among many owners.

Stanton Area, Yavapai County, AZ

Results have been received from the follow-up sampling of the AEM anomalies. Sampling has indicated some very high grade values in thin (1.5") quartz veins; however, the wall rock is averaging <0.5 ppm Au. The quartz veins are not continuous and, therefore, have a very short strike length. Also, the configuration and orientation of the altered zones is not amenable to open pittable mining. The AEM anomaly can probably be explained by either lithologic reason: that being a mass of metavolcanics within the granite pluton, or by the occurrence of a northwest trending vein and altered zone. No further work is recommended on the prospect.

Mark A. Miller

MAM:mek
Att.
cc: W.L. Kurtz
J.D. Sell

ASARCO

Southwestern Exploration Division

June 20, 1991

H.S. Jacobson

Monthly Report
June 1991
Mexico File Review

The following properties have been reviewed during the month of June; principally in Oaxaca. Most of these were either sent to you in Denver or you picked them up during your visit to Tucson last week. We will soon be starting on either Sonora or Chihuahua; the last of the file review.

OAXACA

Angustias Group - Reserves stated at 300,000T at 18 gpt Au from English company in 1909 report. Occurrence is thin vein and mantos localized along vertical dikes. LOW/MEDIUM PRIORITY

Carmen Natividad - Parallel vein systems with high grade gold values. Veins .5 to 1.0 m in width. Little work has been done in the district on other similar occurrences. Area is very remote. LOW PRIORITY

Eliza B. - Four to twelve foot wide quartz veins with variable gold assays up to 11 gpt Au. This district is close to the Angustias group and should be examined in conjunction. LOW PRIORITY

Natividad - High grade gold vein system examined by Pickard in 1966. No work done by company after that date. Grade and tonnage at that time in reserve was 100,000T at 8.1 gpt Au, 289 gpt Ag. HIGH PRIORITY

Resurreccion Group - Small tonnage but very high grade ore shoots assay almost 50-60 gpt Au. Workings on vein extend for over 2000' to a depth of 100'. There appears to be abundant exploration possibilities. MEDIUM TO HIGH PRIORITY

Soledad Mine - A 1931 estimate based upon 40 underground samples is 700,000T at 10 gpt Au, 280 gpt Ag. Vein ranges in thickness from 3m to >50m dipping 35 degrees, although average width is 10m. Potential looks good for medium tonnage open pit deposit. HIGH PRIORITY

Zavaleta Mine - A 1931 report describes two parallel veins which pinch and swell from inches to 4-5' in width. The results of 1200 samples indicate a grade of 16 gpt Au, 80 gpt Ag; very accessible. LOW PRIORITY

Mark Miller G.W. Pickard

MAM/GWP:mek

Mark Miller & G.W. Pickard

cc: W.L. Kurtz

JDS

ASARCO

Southwestern Exploration Division

October 1, 1991

H.S. Jacobson

M.A. Miller/G.W. Pickard
Progress Report
Mexico File Review

We are continuing to review the files in the state of Sonora. Prospects of interest are listed below in order of priority.

High Priority

Cerro Prieto Mine - Mine is within area of helicopter identified color anomalies. Reports estimate 400,000 T at 0.3 opt Au remaining in pillars and stope muck. Best potential appears to be the southerly extension of the mineralized zone which has not been explored.

Los Magos - Report describing property is promotional; however, somewhat factual. Thickness of mineralized zone is reported to be 20 - 30 m. Zone is associated with a fractured and faulted quartz porphyry dike. Mineral association suggests an epithermal environment. Estimated resource in all categories is 7 million tons at 7.9 gm Au, 88 gm Ag (positive, probable, possible). Area deserves an examination. Close to Santa Elena.

La Viruela Group (Tayopita) - Low angle structure with associated disseminated gold in the hanging wall. Information very sketchy, but could be favorable for open pit configuration. Mine is easily accessible and deserves an examination. Located 40 km SW of Mulatos.

Medium Priority

Santa Rosalia - (Helicopter target 70-1) - Areas of color anomalies; moderate to strong silification and moderate kaolinization. Described as high grade streaks in low grade stringer or breccia zone. Mine produced over two million dollars in gold prior to 1846. Deserves an examination.

Low Priority

La Chispa Mine - (Helicopter color target SO-15-HT-48) - 20 km SE of the Santa Rosalia Mine. Should be examined at same time. Prospect occurs within area of color anomalies and one rock sample taken within the color anomaly assayed 0.01 opt Au, 1.49 opt Ag.

Guadalupe Mine - Three steeply dipping parallel veins 2-6' thick are associated with rhyolite dikes. Possibilities may exist for a bulk tonnage target. Forty-two samples taken in the vein system averaged 0.66 opt Au, 522 opt Ag over a 2.6' width. Mine deserves further study.

El Tigre and Pilares - Report by B.N. Watson in 1967 indicated the possibility of large tonnage of 0.01-0.02 opt Au west of the El Tigre Mine.

Adios,

M.A. Miller/G.W. Pickard

MAM/GWP:mek

cc: W.L. Kurtz
J.D. Sell

JD 5

ASARCO

Southwestern Exploration Division

May 4, 1992

J.D. Sell

M.A. Miller
Monthly Report
March & April 1992

This monthly report covers March and April 1992.

Mexico File Index

Final touches were done to the Mexican Exploration File Index, and then the index was distributed, 2 copies to Denver with diskettes, and one copy to Tucson. The data was loaded on the computer. Additional work was done to put the file index into a database. Reflex 2.0 was chosen; all Word Perfect 5.1 files were converted to Reflex and then set up in the Reflex database. Copies of Reflex 2.0, data and documentation were sent to Denver office for their use. The system is operational on the Exploration 286 computer.

General Exploration

Copperopolis Cu, Au Prospect, Yavapai County, Arizona

One week was spent mapping and sampling the Copperopolis prospect. The geology is either an altered shear zone at the contact between volcanics and a granitic intrusive or a contact zone. Mineralization and alteration consist of abundant hematite-specularite with some oxide copper. The zone which is linear and strikes to the northwest attains thickness up to 200'. Twenty-five samples were taken along the strike length with the best sample assaying .04 opt Au over 25' of thickness. No further work is recommended on this prospect.

GF Claims, Maricopa County, Arizona

Two days were spent sampling and examining a "Porphyry Copper Target" in andesitic volcanics and PЄ? metasediments hosted in a low angle "detachment zone." Copper mineralization as Cu Oxides (malachite, azurite) occur along fractures and low angle shears. Ten samples were taken in addition to the samples taken by the property owner. No further work is recommended.

Mark A. Miller

MAM:mek

ASARCO

Southwestern Exploration Division

December 1, 1992

G.D. Van Voorhis
New York Office

M.A. Miller
Monthly Report
November 1992

SEMO DATA BASE DRILL HOLE COMPILATION

Drill hole compilation continues on the Sweetwater Mine area with approximately 300 holes entered into the data base.

GENERAL EXPLORATION

Several interesting submittals have been received on copper prospects. One prospect, a pediment play, is located approximately 40 miles N.W. of Tucson near the Pima - Pinal County line, and approximately 13 miles N.W. of Silverbell. The prospect is described by the prospector as "a series of N.E. trending veins within an altered granite." Reconn mapping of the area by company geologist in the past indicates the granite to be pre-mineral in age, probably related to the Oracle granite equivalent. Several samples brought to the office show high grade oxide Cu in veins with possible disseminated chalcocite. The prospect is located exclusively on State Lands and is covered by prospecting permits. Plans are to visit the area in early December.

Mark A. Miller

MAM:mek

cc: J.D. Sell
W.L. Kurtz
D.D. Harper

JDS

ASARCO

Southwestern Exploration Division

November 6, 1992

J.D. Sell

September-October 1992
Monthly Report
SEMO Southeast Missouri
Data Compilation
Sweetwater Mine Area
Reynolds County, MO

Data input of the Sweetwater drill holes is on-going with approximately 200 holes currently entered into the data base.

All the CP prefix holes (Cedar Point) have been entered and the data has been sent to Carl Windels for inclusion into the TECHBASE.

In addition to the CP holes, drill holes with the LC prefix which were located around drill hole LC-785 (the most recent exploration hole drilled this year) were compiled and sent to Carl for inclusion into the TECHBASE.

We are now compiling drill hole data east of the main orebody for inclusion into the data base per Del Harper's suggestion.

I attended an Arizona Geological Society field trip which included stops in the Patagonia Mountains looking at replacement and vein deposits; to the Bisbee area to look at PD's Cochise copper deposit, to the Courtland-Gleeson and the Pearce areas, and to the Arimeteo's Johnson Camp mine. Industry involvement was minor with representative from Cyprus, Asarco, and a new appearance in the area, BHP Minerals in attendance, along with academia, consultants and survey people.

Mark A. Miller

MAM:mek

cc: G.D. Van Voorhis (via FAX)
W.L. Kurtz
D.D. Harper

ASARCO

Southwestern Exploration Division

January 5, 1993

G.D. Van Voorhis
New York Office

M.A. Miller
Monthly Report
December 1992

SEMO Data Base Drill Hole Computation

Compilation continues with all St. Joe Drill Holes east of the main orebody entered into the data base. In addition, A.C. holes,(Adair Creek NE of the orebody) Bud Walkers Target Area I will be completed by week's end. We have set up a series of checking mechanisms within the inputting procedure that have substantially improved the quality and control of the data input and have eliminated errors inherent to large scale data entry.

General Exploration

A pediment play in Pima County was examined. The "play" was described as "a series of Cu Oxide veins in an altered granite." Upon examination only one CuOx vein was found, although there were a series of quartz ± limonite veins present. Alteration was restricted to the vein margins/ contacts. No further work will be done on the property.

Mark A. Miller

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W.L. Kurtz
D.D. Harper