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James Doyle Sell Mining Collection

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FILE
JDS

New York, N.Y., January 7, 1988

TO MESSRS: P. J. Bartos
D. I. Fletcher
B. J. Maher
M. A. Miller

SARCO Incorporated
JAN 15 1988
SW Exploration

Porphyry Copper Tour

At Mr. Brown's suggestion, I have arranged the following field review of porphyry copper deposits:

Friday, February 5: Arrive Tucson (cab from airport, you won't need a car). At 4:00 P.M. Spence Titley will give 1-2 hr. lecture on current research in porphyry copper geology. Evening lecture on Silver Bell. All lectures in Tucson Office

done: MAM to be used project et al.

Saturday, February 6: Silver Bell. El Tiro - Oxide pits; West Oxide and N. Silver Bell deposits; district review. Evening lecture on Patagonia Mtns.

Sunday, February 7: Patagonia Mtns. Sunnyside-Trench-Hardshell area. Ventura, Four Metals, Red Mtn. stops depending on time and direction of interest.

Monday, February 8: Mission-Pima-San Xavier S.-San Xavier N. mines; Helmet Fanlomerat; Ruby Star pluton if accessible. Evening lecture on Ray or Superior E. ~~(?)~~ *Denner at MIE + JJO's house*

Tuesday, February 9: Ray Mine; Copper Butte deposit; SXEW plant if time permits.

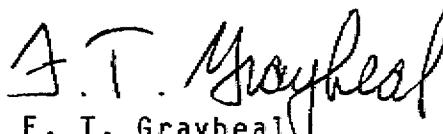
Wednesday, February 10: Short course on geochemical prospecting for gold in western USA by Ken Lovstrom. Will include biochemical techniques, post-mineral cover, and data from the Sleeper deposit in A.M. P.M. will be open discussion, arguments, other subjects. If you have specific subjects to discuss, plan to do so.

Travellers to Tucson should make their own flight arrangements, and I suggest you don't depart before 3-4:00 P.M., Wednesday, February 10. Reservations have been made for PJB, DIF, and BJM at the Best Western Executive Inn, 333 W. Drachman; confirmation #0305817KF; phone #(602) 791-7551; (pay your own bills) in your names for nights of Friday, February 5 through Tuesday, February 9. If you can't get a P.M. Wednesday,

January 7, 1988

February 10 flight home and need an additional night at the motel, advise Mary Kavanagh in Tucson. Southern Arizona weather can be warm (70s) to cold in the mountains (20s and snow).

A suggested bibliography and a few papers are attached.


F. T. Graybeal

FTG:mc
Att.

cc: W. L. Kurtz
S. A. Anzalone
J. D. Sell
D. M. Smith, Jr.
P. G. Vikre

Blind note for JDS:

Would you make the conference room available for Spence Titley lecture Friday, February 5. Also, I will need a 35 mm. slide projector for Friday and Saturday nights and can use either conference or drafting rooms. I assume Mark Miller has a key to the office for those nights and that the projector will not be locked in the conference room.

FTG

PORPHYRY COPPER TOUR REFERENCES

It is likely there are more references to porphyry copper deposits than gold deposits, although research on the former has dropped to nerarly zero since 1980. The following are my choices and ** means the reference should be read for this tour.

Conspicuous by omission is a specific reference on interpretation of limonite in leached capping. Practical studies are fragmented, long and detailed. The best discussions on the subject can be found in the unpublished Courtright reports and the Nielsen paper under GENERAL. I am sure the Locke and Blamhard references are known to you and a modern mineralogical summary by Anderson can be found in the Second Por Cu volume. Although capping interpretation is really a lost art (by 1970 any large altered zone with limonite after any sulfide was drilled) we will discuss the subject at Silver Bell.

Summaries of isotopes and fluid inclusions in porphyry copper deposits are usually included as short sections in large papers on hydrothermal deposits in general. The 1981 Titley and Beane article has many references and the 2 Barnes volumes will help if you are interested.

We will discuss mapping, drilling, the role of the mine geologist and ore reserve methodology while at the mines. Finally there is a summary paper on geochemical exploration in the Second Por Cu volume and a summary paper on geophysical technique in the First Por Cu volume, but not in the second.

"Attached manuscripts" will be forwarded by regular mail.

GENERAL (**means required reading)

- Anderson, 1966, Area geology southwest, First Por Cu vol., Titley ed., p. 3-16.
- Burnham and Ohmoto, 1980, Late stage process of felsic magmatism Min. Geol. Spec. Issue 8 p. 1-11. Manuscript attached. *have copy - see files*
- **Courtright, 1982-84, Some Porphyry Copper History; Asarco files. A three-part report which I believe is in the general files of each office. This is Asarco's porphyry copper exploration history from roughly 1947-1970, but includes Harold's work at Ely from 1941-1947. REQUIRED READING
- **Einaudi, 1981, Skarn deposits, Econ. Geol. 75th Anniv., p. 317-391.
- Hemley and Jones, 1964, Chemical aspects of hydrogen metasomatism, etc. Econ. Geol., p. 538-569. The first definitive lab study on porphyry copper alteration processes.
- Lowell, 1974, Regional characteristics of Por Cu in southwest U.S.; Econ. Geol., p. 601-617.
- Lowell and Gilbert, 1970, Lateral and vertical alteration etc. Econ. Geol., 373-408. This first general paper on Por Cu was largely a literature review, is way off base on vertical zoning, has nothing on paragenesis, but is the most widely cited general review.
- **Nielson, 1984, Evol. of Por Cu models, Min. Eng., p. 1634-1641. Manuscript attached.
- Perry, 1961, Signif. of mineralized bx pipes, Min. Eng., p. 367-376. Manuscript attached.
- Rose, 1970, Zonal relations -- at Por Cu; Econ. Geol., p. 920-936.
- **Titley (ed), 1982, Second Por Cu volume chapters 2-6, 9 by various authors.
- **Titley and Beane, 1981, Por Cu Deposits, Econ. Geol. 75th Anniv. Vo., p. 214-269.

SILVER BELL

- **Graybeal, 1982, El Tiro area, Second Por Cu vol., (Titley, ed), chapter 24.
- **Graybeal, 1983, Exploration History of Silver Bell; AIME book in press. Manuscript attached. *have copy. - See J.H.C. vol. 1.*
- **Richard and Courtright, 1966, Structure and mineralization First Por Cu vol., (Titley, ed), p. 157-163.

PATAGONIA MTNS.

**Corn, 1975, Alteration ... Red Mtn.; Econ. Geol., p. 1437-1447.

**Graybeal, 1984, Metal Zoning in the Patagonia Mtns., AGS Digest 15
p. 187-197.

Koutz, 1984, Hardshell, AGS Digest 15, p. 199-217. Manuscript
attached.

MISSION

Himes, 1973, Pima Mines, AIME Trans., 254, p. 166, 174. Manuscript
attached.

**Jansen, 1982, Mission, Second Por Cu vol., (Titley, ed), chapter
22.

**King, 1982, San Xavier North, Second Por Cu vol., (Titley,
ed), chapter 23.

Kinnison, 1966, Mission, First Por Cu vol., (Titley, ed).
p. 281-287.

**Titley, 1982, Pima District, Second Por Cu vol., (Titley, ed)
chapter 19, esp. p. 398-406.

RAY

Cornwall, 1982, Ray igneous rocks, Second Por Cu vol., (Titley
ed), chapter 11.

**Metz and Rose, 1966, Geol. - Ray, First Por Cu vol., (Titley
ed), p.

**Phillips, et al, 1974, Hydrothermal alt., ... Ray, Econ. Geol.,
p. 1237-1250.

Ransome, 1919, Ray & Miami, USGS Prof. Paper 115. One of the
classics.

JDS

FROM: J. D. SELL

1/14/58

TO: FT Graybeal

Poulsbo, Tu Toon

- 1) Reconfirm that Marnee & Jim will feed & water the group on Monday evening, Feb 8.
- 2) JDS will discuss the SE Project after above.

~~BT Dave Lowell is~~

JDS

(3, Dave Lowell should talk to HGS about his Chile Gold Dig. on Feb 2, Tuesday, but if it is extended to Feb 9 Tuesday, then perhaps could all enjoy going -
HGS

January 18, 1988

Bartos, P.J.

~~Dalla Vista, A., and Monika~~ *friends in, did not attend*

Fletcher, D.I.

~~Gay, W.D., and Diane~~ *did not attend (dnt)*

Graybeal, F.T.

~~Kavanagh, M.E., and Matt~~ *friends, dnt*~~Koutz, F.B., and Jeanne~~ *went to NV, dnt.*~~Kreis, H.G., and Jan~~ *in field, dnt*~~Kurtz, W.L., and Ellie~~ *dnt*

Maher, B.J.

~~Melhado, D.A., and Carole~~ *dnt*

Miller, M.A., and Penny

PCT Dinner - Lecture
February 8, 1988
Tucson, AZ

We invite you to have dinner with us (beans, chile, tortilla's, et al) following a day's touring by some of the above. This dinner is for the evening of Monday, February 8, 1988.

Hello's from 6 PM, dinner at 7, slide show-lecture on the Superior East Project at 8, and lights out, find your way home (or hotel) at 9 as the visiting geologists have another field day starting early Tuesday.

Please RSVP to 883-4684 (home) or 792-3010 (office). Mary will be glad to keep tally.

Cheers,



Jim, Marnee, Mark, &
Margaret Smith

JDS:mek

Street map attached.

ASARCO

med comm for
DA Maltrullo
HG Kreis
MA Miller
T Waller Vito
WD Gary
& me

FILE
JDS

med:
can have reserved
the room
& when we the
projection
material
shall local material
ready to go.

Correct?
yes, done

January 7, 1988

Exploration Department
Frederick T. Graybeal
Chief Geologist

ASARCO Incorporated

JAN 13 1988

SW Exploration

Mr. Kenneth A. Lovstrom
1628 South Lee Street
Lakewood, Colorado 80226

Short Course on Geochemical Prospecting

Dear Ken,

This confirms our phone call of today that you will give us a one-half day review of new developments in geochemical prospecting for gold in the western USA. Our interests include prospecting on post-mineral cover, biogeochemical techniques, state-of-the-art aspects of soil, drainage and rock sampling, the use of pathfinder elements, work on pediments, and computer treatment of data, some or all of which might be included in your review. Up to ten Asarco geologists might attend and most are familiar with geochemical techniques.

We will make the afternoon available for review of specific projects we are working on, specific problems we have, and in-house debates and I will alert our troops in that regard. We will meet at our Tucson Office, 1150 N. 7th Avenue, Phone # (602) 792-3010 at 8:00 A.M. on Wednesday, February 10, 1988. I will have a blackboard and 35 mm. projector available.

I will make a reservation in your name at the Best Western Executive Inn, 333 W. Drachman; confirmation #0305817KF; phone #(602) 791-7551 for Tuesday, February 9 and Wednesday, February 10 guaranteed for late arrival on February 9. A group of us will be staying there, and I suggest we meet for breakfast in the restaurant at the motel about 6:30 A.M. Wednesday.

Your fee should be sent to my New York office address.

Very truly yours,

F. T. Graybeal

FTG:mc

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

January 7, 1988

Blind note to JDS:

Could you arrange for us to have the drafting room that day--or the conference room, and provide a blackboard if we use the drafting room. We also will need a 35 mm. projector. This is being timed to include Paul Bartos, Darby Fletcher and Brian Maher who will be in town for the porphyry copper tour. I suggest you, Bill and your staff also attend and I'll invite Sal Anzalone. Ken Lovstrom was a staff geochemist, later chief geochemist for AMAX in the U.S. He is now active in Nevada as a consultant and seems to have a practical approach. He will also discuss work he has done at Sleeper which AMAX has allowed him to give at presentations of this type.

FTG

1/7/88 Reservations made at: Best Western Executive Inn
333 W. Drachman
Tucson, AZ Phone: 602-791-7551

Single Rooms at \$72.00 plus tax per night, guaranteed for late arrival.

Confirmation No. 0305817KF (Confirmed by Cathy)

F.T. Graybeal Arrival Thurs., Feb. 4 - thru Wed., Feb. 10 -
leaving Thurs., Feb. 11 (7 nights)

Brian Maher Arrival Friday, Feb. 5 - thru Tues., Feb. 9 -
leaving Wed., Feb. 10 (5 nights)

Paul Bartos Same as Brian Maher

Darby Fletcher Same as Brian Maher

Ken Lovstrom Arrival Tues., Feb. 9 - thru Wed., Feb. 10 -
leaving Thurs., Feb. 11 (2 nights)

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