



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](mailto:inquiries@azgs.az.gov)

The following file is part of the  
James Doyle Sell Mining Collection

### **ACCESS STATEMENT**

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

### **CONSTRAINTS STATEMENT**

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

### **QUALITY STATEMENT**

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

ASARCO

cm for WLK  
JHC

WJR - file

Southwestern Exploration Division

May 25, 1976

F. T. G.  
MAY 25 1976

File Copper Butte  
Arizona

TO: F. T. Graybeal

FROM: J. D. Sell

Notes on the Meeting  
Rocky Mountain Section  
Geological Society of America  
May 20-21, 1976  
Albuquerque, New Mexico

Attached is the Abstract Booklet with Program.

The meeting was one of the largest held by the Rocky Mountain Section of GSA. Most in attendance were USGS and University, with only about two dozen explorationists known to me.

Two symposiums were held that pulled most of the people: 1) Regional Tectonics and Mineral Resources of Southwestern North America, and 2) Ash-Flow Tuffs.

All 14 papers in the Regional Tectonics Symposium (Abstract booklet p. 541 and pp. 543-544) plus an additional 14 papers are published in the New Mexico Geological Society Special Publication No. 6 (Asarco Library). Several of the additional papers published were discussed under slightly modified titles and contents.

Of specific interest is Charlie Phillips' paper on Copper Butte west of Ray (Abstract page 618, Paper page 174). In his paper he reports the size of the copper bearing occurrences is across several square miles and the content to exceed one million tons of copper metal, estimate of 50-100 million tons of ore grade with the estimated ore grade of 0.7% average for potential ore and ranging up to several percent. In his talk he quoted 100 million tons of 0.4% for both the Copper Butte and Buckeye deposits containing 3 million tons of available copper metal. ]

The Copper Butte zone lies under the south half of Copper Butte Mtn. (SW1/4, Sec. 19, T3S, R13E) and is in a N-S syncline form 2000 feet N-S by 1500 feet E-W and from 75 to 200 feet thick. It probably contains 40 to 60 million tons and is the best of the zones.

The Buckeye zone (N1/2, Sec. 35, T3S, R12E) is two miles to the southwest of Copper Butte and the drill pattern suggests it is some 2000 by 2000 feet in extent. A quick figure of 15 million tons of 0.6% was expressed and the context suggests it was in the Buckeye zone. The area contains more copper in limestone clasts than does Copper Butte, which is primarily in a mixed clast suite.

As shown on his Figure 5 (p. 179), the Copper Butte-Buckeye zones are contained within an exotic limonite band which trends N50°-60°E and extends several miles further southwest with scattered pods of exotic copper mineralization. ]

Of the five exotic copper deposits which he compares, only the Copper Butte zone does not have an identified hypogene sulfide source deposit.

David Giles of Earth Sciences (p. 127) compiled and presented a very good paper on the "Precambrian Mineralization in the Southern Rocky Mountains." He classified the deposits by environmental occurrences.

Tommy Thompson reported (p. 192) on his work for Asarco at Leadville in the "Down-Dropped Block." He will apparently continue the work this summer with an additional field hand.

A number of long-standing workers in volcanics phenomena such as R. L. Smith, R. A. Bailey, R. L. Christiansen, R. V. Fisher, P. W. Lipman, et al, as well as Wolfgang Elston, Charlie Chapin, and Rudy Epis, and Don Noble were in attendance and presented papers and/or discussions.

Robert L. Smith (pp. 633-634) points out the essentially straight line relationship between Caldera Area (Log area,  $\text{Km}^2$ ) vs. the Ash Flow Volume of erupted material ( $\text{Km}^3$ ).

He further points out his thoughts that, to have an ash-flow ejection, the material must be above a "Viscosity Barrier", which he believes is around 55%  $\text{SiO}_2$  (basalt-andesite transition). Thus the compositional change and periodicity of ash-flow ejections.

A later paper (Hay, R.L, p. 589) suggested that his material in Kenya must have erupted thru Smith's viscosity barrier as the  $\text{SiO}_2$  content was lower.

In a question period at the close of the total Symposium on Ash Flows, an unidentified individual noted that in Smith's diagrams it could be shown that ".....) regardless of caldera size, about 1 Km of vertical material is tapped and blown out in any ash flow tuff explosion...." Smith just shook his head in an affirmative manner but made no comment. The suggestion was not discussed further.

Several papers, including Bailey (Roy A., p. 567), noted the close relationship (100,000 years or less) between the close of caldera collapse and the start of resurgent doming. No agreement was noted by the various papers on either the mechanism, cause, or why of resurgent doming.

Wolfgang Elston (p. 585) made an interesting comment that the  $\text{K}_2\text{O}$  variation in the calc-alkalic suite may represent a crustal thickness rather than a depth to the Benioff zone (of a subducted slab). He did not dispute a subducted slab, per se, but indicated that the areas far inland (as Colorado-New Mexico) may not require a second slab (a la Lipman) or a flatter slab (a la Heidrick and others) to account for the suite found.

McKee (pp. 610-611) noted that ash-flow sheets are poor places to look for ore deposits. He also showed one slide which indicated for western Nevada (except Carlin-type gold) that the gold productive host rock was andesite (98%), rhyolite (2%), and non-volcanic (0.3%). Of course, he was jumped on for his statement that caldera structures were not ore controls, and he

defended it in the light of "at the time of formation" mode and said he would not be responsible if the "ore fluids" wished to use the structure, units, etc. at a later period.

Rytuba (James J., p. 625) presented an interesting paper. He reports the McDermitt mine has reserves of 3 million tons containing 10 pounds of mercury per ton. His abstract does not mention it, but his talk and slides suggested an earlier caldera development on the southwest side of the present caldera. This noting of nested and superimposed caldera structures was repeated time and again throughout the meeting.

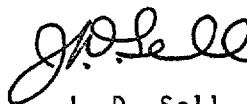
T. A. Steven (pp. 635-636) ran through the San Juan volcanic field and suggested the underlying batholith is expressed within the gravity low exhibited in the area. He mentions that the Platoro caldera is the earliest found with the Summittville caldera being nested inside the Platoro complex and represents a small volume, high level emplacement prior to the large batholith emplacement. As noted, the Platoro-Summittville is outside the gravity low boundaries. He noted that the Platoro-Summittville is mineralized, as are the very latest Creede-Silverton sectors. No comment was solicited on why the intervening caldera developments have very slight (apparent) associated mineralization.

At lunch, Harold Bonham, all four SAGE people, Charles Phillips, and I were involved in the total question of caldera development, et al, and mineralization, and the question again was raised: Why some are mineralized; why do some have resurgent centers; etc. Bonham's comment was that he felt that sufficient time had to transpire, ground preparation necessary (multiple events), a source area, and collecting (entrapment, precipitation) area available similar to that of productive porphyry copper system. The point was brought up that several speakers had suggested 1-2 million years for productive mineralization event whereas similar or less time for the cycle of volcanic activity, ash-fall, caldron collapse, resurgent doming, rhyolite dome emplacement to completion.

The question was asked: Does the mineralization event actually go on concurrently throughout the cycle but, being constantly interrupted by the cycle, it is unable to manifest itself into a productive deposit, and hence post all caldera events the mineralization had the time to occupy the sites without further mishap? (i.e., Could you test the ash-flows, etc. for trace amounts and predict if a productive deposit might be associated?) Bonham's comment was "No." Work to date does not suggest a continuum of mineralization from early volcanism to post caldera ring dike development.

Don Peterson (p. 618) gave a very good talk on the subject of flattening ratios and pointed out the concept, use, etc. He said that all groups have not been successful in applying it (no names), but that Magma Copper had used it and, through the use of a cartoon, showed that Magma's geologist had reached the conclusion of a ratio of 1.673 equals 1788 feet, but that the shaft found the base at 1775 feet below collar for #9 Shaft.

The New Mexico Geological Society released Special Publication No. 5, Cenozoic Volcanism in Southwestern New Mexico (151 pages) (copy in Library), which puts in print in one volume much of the work accomplished in the last few years of updated previous material.



J. D. Sell

JDS:1b