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PRINTED: 01/31/2002

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: MAMMOTH TAILINGS DUMP

ALTERNATE NAMES:
TIGER TAILINGS DUMP

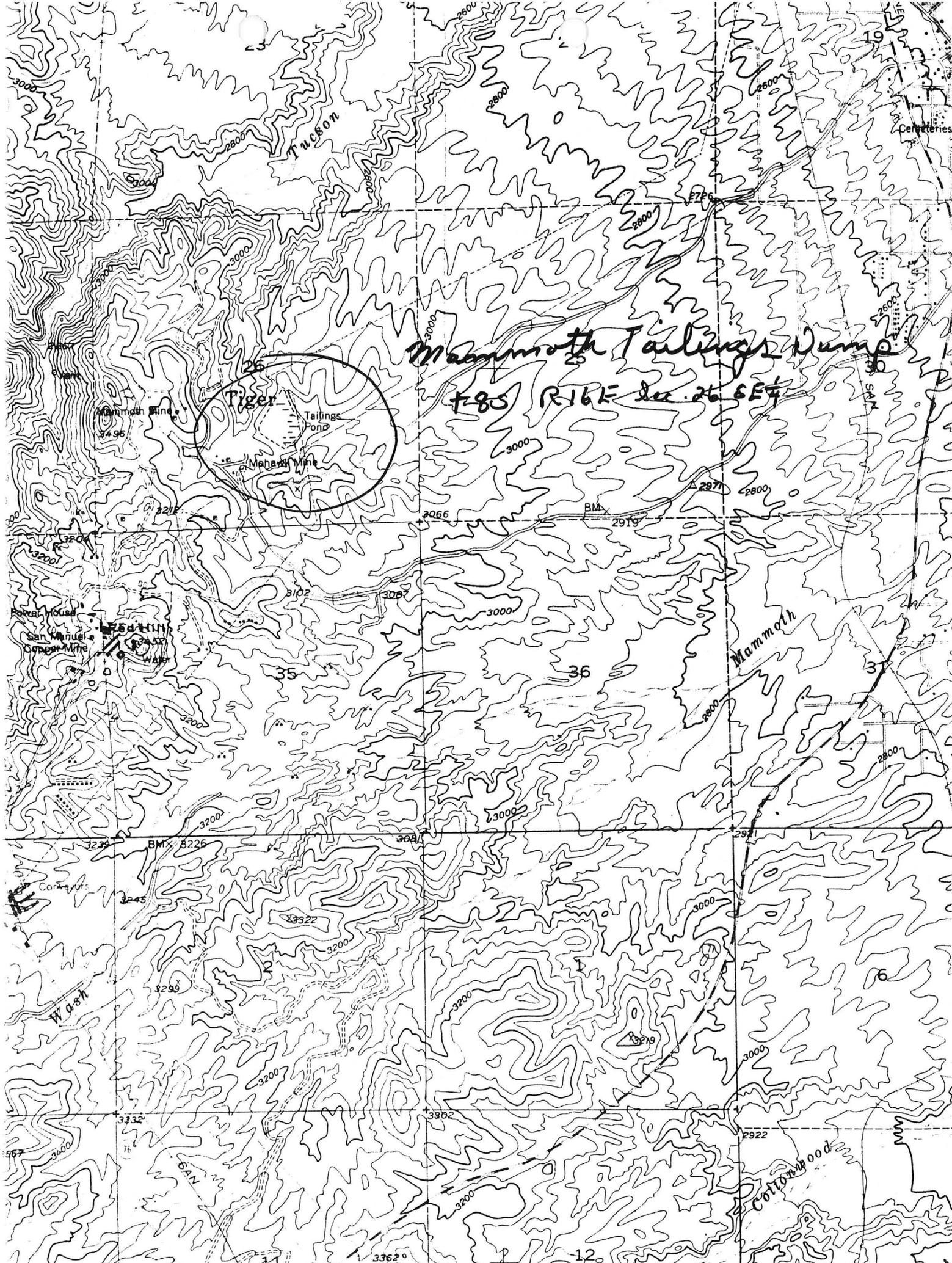
PINAL COUNTY MILS NUMBER: 570G

LOCATION: TOWNSHIP 8 S RANGE 16 E SECTION 26 QUARTER SE
LATITUDE: N 32DEG 42MIN 20SEC LONGITUDE: W 110DEG 40MIN 43SEC
TOPO MAP NAME: MAMMOTH - 7.5 MIN

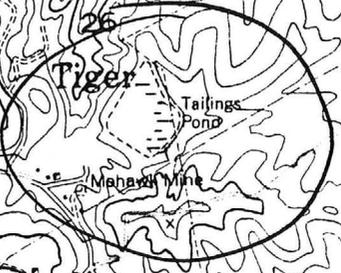
CURRENT STATUS: PAST PRODUCER

COMMODITY:
SILICON
GOLD
COPPER
SILVER

BIBLIOGRAPHY:
ADMMR MAMMOTH TAILING DUMP FILE
ADMMR TIGER TAILINGS DUMP FILE
ADMMR DIRECTORY OF ACTIVE MINES IN AZ, 1980,
P. 14
ELEVATORSKI, E.A., AZ INDUSTRIAL MINERALS
1980, P. 57



Mammoth Tailings Dump
785 R16E Sec. 26 SE 1/4



Tiger

Mammoth Mine
3496

Tailings Pond

Mehawk Mine

3066

BM

2919

297

2800

3102

3087

3000

Mammoth

35

36

37

BM

3226

3088

299

3322

3200

3200

3000

3219

3000

3332

3362

2922

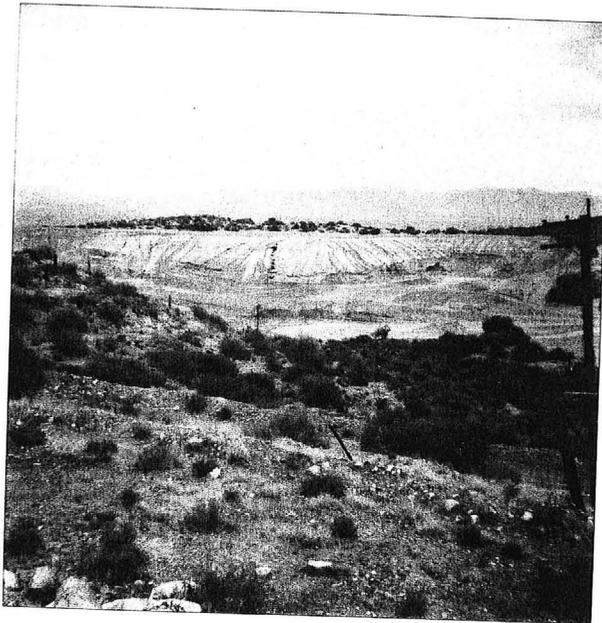
GAN

Cottonwood

3362°

12°

ORIGINAL BEING SCANNED



MAMMOTH Tailings Dump 6/1/84

DEPARTMENT OF MINERAL RESOURCES
State of Arizona
Mineral Building, Fairgrounds
PHOENIX, ARIZONA

PHOENIX, ARIZ.
APR 11
7 30 PM
1958

RECEIVED
REASON CHECKED
Unclaimed _____
Unpaid _____
Insufficient address _____
Insufficient address _____
No such office in state _____
Do not remain in this envelope

UNKNOWN AT ADDRESS 60
Mr. J. F. Dietrick
~~540 N. 7th Ave.~~
Tucson, Arizona



ARIZONA DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA

April 11, 1958

To the Owner or Operator of the Arizona Mining Property named below:

Mammoth Tailing Dump)Pinal)
(Property)

Lead Si-⁶⁰
(ore)

We have an old listing of the above property which we would like to have brought up to date.

Please fill out the enclosed Mine Owner's Report form with as complete detail as possible and attach copies of reports, maps, assay returns, shipment returns or other data which you have not sent us before and which might interest a prospective buyer in looking at the property.

Frank P. Knight

FRANK P. KNIGHT,
Director.

Enc: Mine Owner's Report

Visited Mammoth HQ for McFarland & Hullinger - 150 tpd tailings to Asarco. GWI WR 5-2-70

Mine visit - McFarland & Hullinger mill at Winkelman. GWI WR 2-1-71

The Bobbitt property is leased to McFarland & Hullinger. The silica is ground in their new silica mill south of Winkelman and the product is used in the Asarco smelter for patching. - McFarland & Hullinger are still loading and hauling tailings from Tiger near Mammoth. GWI QR 4-1-71

MG WR 2/20/81: Provided production figures on the Mammoth mine area (Pinal Co.) to Bob Crist of ASARCO. He informed me that the tails near the old townsite of Tiger (Mammoth mine in Pinal County) are owned by Magma Copper Co. The tails are sold as silica flux to ASARCO's smelter at Hayden.

Mine visit - Tiger tailings. GWI WR 2-1-71

McFarland & Hullinger are still shipping approximately 4 truckloads per day from the Tiger Tailings to the ASARCO smelter at Hayden. Their silica slurry plant just south of Winkelman is grinding about 40 tpd of slurry. The silica is obtained from the Bobbitt claims nearby. GWI QR 6-30-71

McFarland & Hullinger continue with 40 TPD reported silica production from their Winkelman slurry plant, with production from Tiger tailings remaining unchanged.

GWI QR 9/71

Mine visit at McFarland & Hullinger headquarters at Mammoth. W. D. Nelson says they are shipping Tiger tailings in addition to operating their silica plant. They will be hauling lime to the San Manuel operation soon. GWI WR 5-2-74

McFarland & Hullinger is shipping Tiger Tailings for flux. It probably has been doing so for some time - at least since the last file report in 1963. GWI Note 10-1-65

Active Mine List Oct. 1964
Active Mine List April 1965

Visited tailings of the old Tiger mine of Mammoth St. Anthony Co., McFarland and Hullinger shipping to Hayden. GWI WR 3-26-66

Active Mine List Oct. 1966 - 3 men
Active Mine List April 1967 - 3 men
Active Mine List Nov. 1967 - 3 men

McFarland & Hullinger expected to resume shipments of tailings from the Tiger Tailings to Asarco. GWI QR 4-1968

Active Mine List April 1968 - 3 men

Mine visit - McFarland & Hullinger Tiger Tailings - no one around - shipping to Asarco. GWI WR 6-30-68

McFarland & Hullinger resumed shipping Tiger Tailings to Asarco after the strike. GWI Annual Report 9-1968

Active Mine List Oct. 1968 - 3 men

McFarland & Hullinger continued hauling tailings from the Tiger tailings to Hayden. GWI QR 12-1968

McFarland & Hullinger is still shipping tailings from Tiger. GWI QR 3-1969

Active Mine List April 1969 - 3 men - W. D. Nelson, Supt.

Active Mine List Oct. 1969 - 3 men

McFarland & Hullinger still shipping tailings from Tiger. GWI QR 2-27-70

McFarland & Hullinger are shipping tailings from the Tiger mine area at Mammoth. GWI QR 4-1-70

Active Mine List May 1970 - 5 men - W. D. Nelson, Mgr.

McFarland & Hullinger continued shipping Tiger Tailings to Hayden. GWI QR 12-31-70

Active Mine List Oct. 1970 - 6 men - W. D. Nelson, Mgr.

***Tiger: A Brief Look at
Current Utilization and Potential***

***R.L. Hockett
Senior Geologist***

Introduction

The mines of Tiger, or Schultz, as it once was known, are famous. Not, perhaps, for the value of their production (other mines have exceeded them) nor for the variety of metals produced (significant production of Au, Ag, Pb, Zn, Cu, V, and Mo), but largely for the diversity and beauty of the mineral specimens found here. Many of the seventy or so minerals have been found in few other deposits. Specimens from Tiger are found in most of the major mineral collections of the world.

Tiger has a colorful history going back to 1878, when Frank Schultz staked his first claim on the Collins vein. We are not going to dwell on the history or the details of the deposit. For these, please refer to the publications listed in the bibliography.

Today's paper will dwell primarily with Magma's current utilization of the deposit, examine some of the evidence regarding its origin and geologic history, then consider its potential and future if time allows.

By the time Magma had acquired the San Manuel deposit and commenced development in the early fifties, the Mammoth-St. Anthony Company was reaching the end of economic production. The final years of operation were in the sulfide zone deep in the Collins vein. Gold and silver content was low and lead and zinc prices were not high enough to justify continued mining. Magma acquired the property in exchange for stock in the new operation.

Early utilization was restricted to using the Mohawk Shaft as a supply of potable water for the new mine. By 1959 the water table was lowered below the old workings and the pumps in the Mohawk Shaft were shut off. Efforts were made to close all access to the mine to prevent injury to the curious and persistent rock collectors.

Current Utilization

Recontrol of gold changed the economic perspective. In the mid seventies an examination suggested that there was auriferous silicification in the mineralization peripheral to the primary veins that could provide siliceous flux for the smelter with sufficient metal credits to pay the cost of mining. A shallow diamond drilling program and surface sampling was conducted.

An open pit was started over the Mammoth Mine. Through 1978, over 100,000 tons were produced and used as converter flux by the smelter. Drilling had suggested a usable zone 80 ft. wide, centered on the Mammoth vein. The procedure was to mine this zone and combine it with silicified rhyolite to yield the desired volume of material with acceptable assays. Gold assays should have approximated 0.03 opt.

The results were disappointing. It was impossible to maintain sufficiently uniform silica content and the gold values were too low-- 0.011 opt. This application was discontinued in early 1979.

Tests conducted on stockpiled vein material suggested that, by crushing and screening to +3/8-in. minus two-in. size, the gold and silica content could be upgraded. In addition, the stockpiling operation would perform a blending function to stabilize grade fluctuations. While the siliceous flux (quartzite) in use then was high silica, it must be hauled 30 miles and incurs a royalty payment to the State. The cost is on the order of \$10/ton, with no metal credits. Some of this material is still used to raise the silica content for fluxing.

In April 1983 a contractor, quarrying quartzite at our Camp Grant quarry, was invited to mine and process 20,000 tons of Tiger rock. Economics precluded extensive additional drilling, but the information available and visual examination extended the mining width for the test to 120 ft. Results were startling. The grade achieved for the minus two-in. rock was 73.7% silica and 0.044 opt. Au. Mining cost was approximately \$5 per ton and the fines are usable as reverberatory flux.

Accordingly, a contract was let to produce 100,000 tons of minus two-in. Tiger flux at \$5.45/ton. Silica content was 74.7% (75% of which is available silica) and metal credits were 0.048 opt. Au and 0.25 opt. Ag. Mining width was 250 ft. The metal content was bolstered by values contained in old dumps, stope filling, and pillars. The major advantage of this utilization is that there is no direct milling cost in recovering the gold values. They report to the slimes in the refinery.

Mining practice to date has been to drill and blast the approximate tonnage desired and make up any shortfall by ripping and dozing.

Origin and Geologic History

Probably no geologist has worked in the San Manuel area without speculating on the relationship between Tiger and the porphyry deposit. Is the spatial relationship causal in nature or coincidental? There have been many questions unanswered regarding time relationships of the various events recorded in the lithology of the area.

This year, with the known details of Tiger foremost in our thoughts because of the flux mining campaign, serendipity became an active force. Several pieces of information came to our attention in fortuitous sequence. One of the AGS sessions dealt with the mode of transport of epithermal gold. At this meeting I chanced to be seated by Jim Loghry, who logged core for Dave Lowell on the Kalamazoo project. He had some comments on gold distribution perceived in that project that were thought provoking. We happened to gain access to Weibel's thesis on the Cloudburst formation west of the mine with some pertinent age dating.

Before we proceed, let us consider a thumbnail sketch of the lithology of the two mines.

The San Manuel/Kalamazoo deposits are the faulted halves of mineralization emplaced following the intrusion of Laramide porphyry some 70 million years ago. The formerly economic mineralization created a near vertical elliptical cylinder with minor and major diameters of 2,500 and 5,000 ft. It probably had some primary tilt to the NE and was at least 8,000 ft. on the long axis. Mineralization occurs in both the porphyry and the pre-Cambrian host, Oracle granite, but is not necessarily symmetrical with regard to the intrusion. Subsequently, some sequence of faulting and tilting displaced the SW half down 8,000 ft. and laid the system over to the NE. The San Manuel fault which split the ore body also displaced the Cloudburst conglomerate and the younger Gila conglomerate. The only significant post mineral intrusion is rhyolite, which predates the fault and intrudes the Cloudburst, but not the Gila. Both the Gila and the Cloudburst units normally strike north to northwest and dip 30 to 45° to the east. Basin range faulting has offset the San Manuel fault in several places, usually down to the east, with displacements generally less than 200 ft.

The Tiger system occupies a NNW trending structural zone dipping steeply to the SW. This zone is occupied by or involves rhyolite. Much of the mineralization is along rhyolite contacts or in rhyolite breccia in the Mammoth vein portion. The vein was deeply oxidized and then faulted. The Mammoth fault strikes slightly more north than the vein, but dips steeply east, generally 75°. The originally deeper part of the faulted vein is called the Collins. It has Oracle granite in both walls, but the structure still involves rhyolite and rhyolite breccia.

The Mammoth vein was oxidized full depth to where it was intercepted by the fault between 700 and 800 ft. down. The Collins portion was almost entirely oxidized to the 600-ft. level and from the 700-ft. level down was largely sulfide, predominantly galena and sphalerite. By the time the lowest level, the 1025, was reached, pyrite and chalcopyrite seemed to be increasing.

The general concensus of workers in this area for a number of years regarding the age of the Cloudburst formation was that it was near contemporaneous with the porphyry intrusion a la Sillitoe. We now know that this is not true.

Weibel's thesis on the Cloudburst west of the mine lends several pieces of pertinent data. A rhyolitic welded tuff in the E half of section 33 near Schultz Spring was dated at 22 million years. This fits nicely as a known period of rhyolite activity.

An andesite unit striking NS through the middle of section 32, a mile west of Schultz Spring, dates at 28 million years, indicating normal sequence and position.

Imbrication studies indicate flow in the direction of dip, so there has been no reversal of dip. There are, however, any number of inferred or observed structures crossing Magma's property between Schultz Spring and Tiger. Much study is needed here.

Several working hypotheses have been developed or reinforced this year relating to local problems. Some of these are here briefly stated.

There has often been a problem in distinguishing the conglomerates of the area. It appears likely that the disconformity between the Gila and the Cloudburst was brief, but was marked by the emplacement of the closely related rhyolites and rhyodacites of the area. Conglomerate intruded by rhyolite or rhyodacite is Cloudburst, but if it contains clasts of these materials it is Gila.

Rhyodacite is marked by biotite plates, while the rhyolite is distinguished by quartz or feldspar phenocrysts. The tuif of Schultz Spring probably represents the Cloudburst surface at the time of rhyolite emplacement.

Now that Weibel's work places the Cloudburst formation in the Oligocene, it appears that there was ample time for erosion to reduce the cover over the porphyry system and allow oxidation to make the necessary ions available for redistribution of elements. The rhyolite event provided the trigger and added lead and zinc.

The rhyolites entered the area from a position that is now below the hoisting shafts. In many places in the shaft pillar we find evidence of lead-zinc mineralization spatially related to the rhyolites. The mineralogical sequence is quartz, specular hematite, galena, sphalerite, minor pyrite and chalcopyrite, and pink barite. The

sulfides are discontinuous and are enclosed in gray quartz making their precise paragenesis vague. The alteration envelope is characterized by chlorite and is usually narrow, a foot or so. Gold and silver levels are low. The volume of material available for study has never been large and these occurrences are not economic.

References other than Weibel include Creasey's comments on multiple oxidation periods, the older one being related to an old erosion surface now tilted to the north. Also, Chaffee's trace element study indicated lower than background levels of lead-zinc in the porphyry system.

Tiger's Potential and Future

It is certain that we will continue to use some 50,000 tons per year of Tiger rock for flux. This usage will be proportional to smelter throughput. There are some options available to us that can alter the economics of this application.

The most recent mining contract was for 100,000 tons. Costs can be reduced by mining and stockpiling larger tonnages through the use of larger and more efficient equipment.

If gold prices move up and hold, it is possible to heap leach the stockpile and move some of the gold values forward in the cash flow.

Even though preliminary reports suggest low recovery from a heap leach, this is no drawback when the residual values will be recovered in the smelter.

The low leaching recovery has caused another series of tests to be requested. The recovery is low because a large percentage of the gold is micron-sized and locked in or between quartz grains.

If gold prices move up as some economists predict, Tiger potentially will once again become a mine in its own right. To this end it is prudent to establish some parameters for metallurgical treatment. One procedure suggested by the gold occurrence is a quartz float. The cationic collectors used in this process should also recover the molybdates and vanadates.

Gold production at Tiger was listed by Creasey as 397,201 ounces through 1947. How much gold remains? A gross calculation involving the Mammoth vein alone gives a clue. Known length is 2,000 ft. Minimum depth is 700 ft. Using a 100-ft. width for the zone, we have a volume of 140 million cu.ft. Using a bulk density of 14 cu.ft. per ton to allow for mine openings and filled stopes would indicate 10 million tons. At 0.04 ounces per ton, there is a suggested potential of 400,000 ounces, or something equivalent to past production.

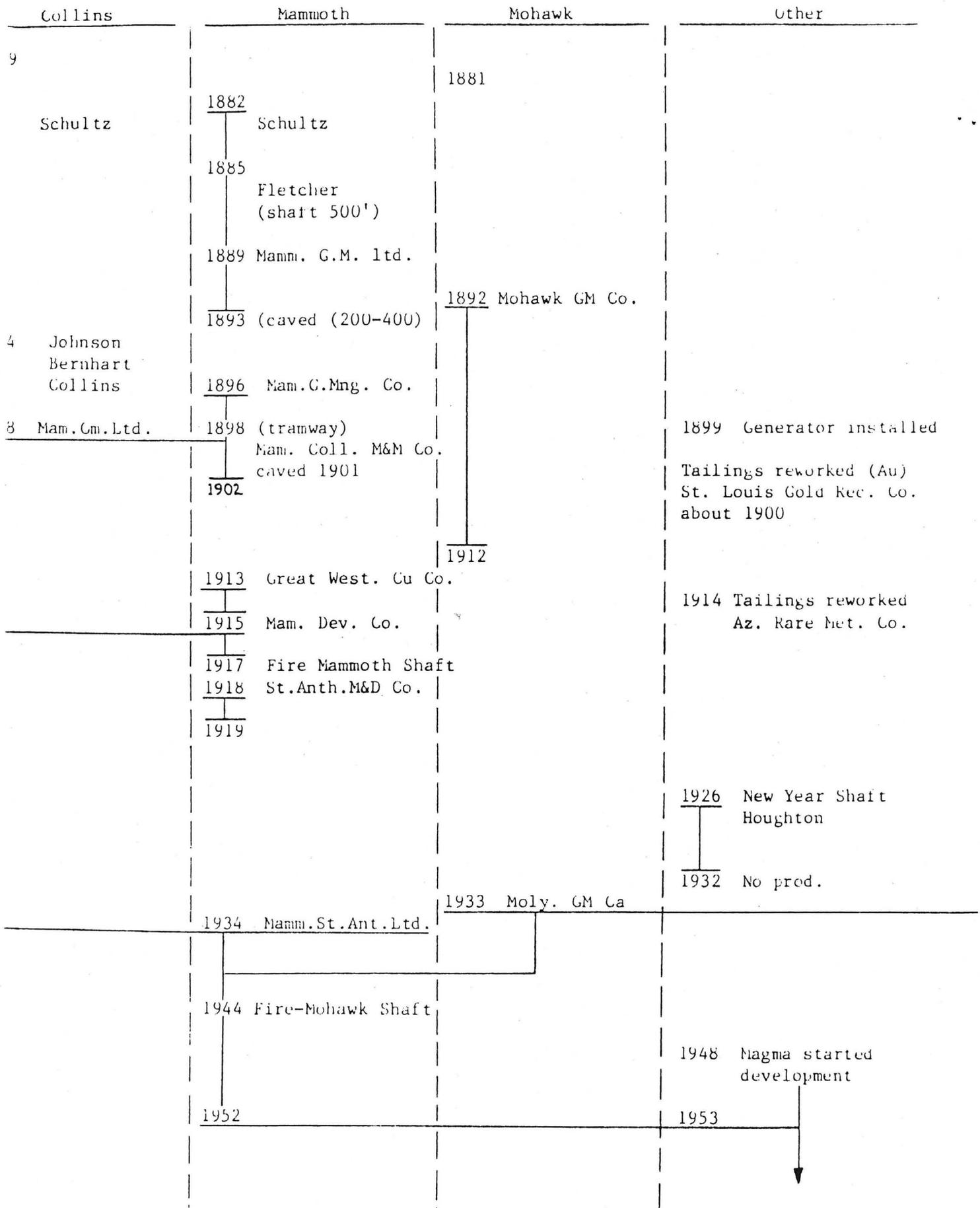
The current pit was designed to provide siliceous flux with no stripping. Planned depth is to 3,100 ft. elevation, or just below the

old 100-ft. level. This will allow recovery of the pillars and sills. Gold cutoff grade is mining cost, or 0.015 ounces per ton. Internal waste is processed. It usually is higher than average in silica. What would have been waste in the high NE wall was also processed because of a high silica content. Planned gold content was 0.04 ounces per ton, but this has been persistently bettered. There are 700,000 tons remaining, but this is open ended to the SE.

Additional open pit mining would involve considerable stripping. There is one other feasibility study that needs to be conducted that was suggested by an event in 1901. The early stopes were supported by square sets and were not filled. On the night of April 15, 1901, the stopes north of the Mammoth Shaft caved from the 750 level to the surface. No one was injured nor was the surface plant or shaft damaged. The cave followed the vein to the surface where there was 25 ft. or more of subsidence.

Should economics suggest that maximum production were desirable, the action of that cave suggests that a slot caving procedure could be successful. It may be some time before we let go of the Tiger's tail.

Tiger Mines' Chronology



ARizona DEPARTMENT OF MINERAL RESOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona

1. Information from: K. Erickson
Address: _____
2. Mine: Tiger Tailings 3. No. of Claims - Patented _____
Unpatented _____
4. Location: Mammoth Az.
5. Sec _____ Tp _____ Range _____ 6. Mining District OLD HAT
7. Owner: Magma Copper Co.
8. Address: _____
9. Operating Co.: McFarland & Hullinger
10. Address: _____
11. President: _____ 12. Gen. Mgr.: _____
13. Principal Metals: Silica & minor precious metals 14. No. Employed: 4
15. Mill, Type & Capacity: _____
16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate _____ tpd.
17. New Work Planned: _____

18. Miscl. Notes: Usually 2 men & 150 T.P.D.
At Present 4 men & 300 T.P.D. to Hayden.

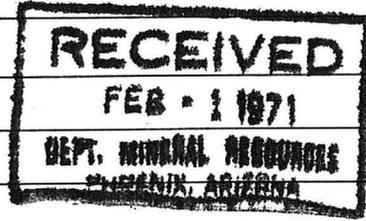
Date: 4-29-71

[Signature]
(Signature)

(Field Engineer)

ARIZONA DEPARTMENT OF MINER RESOURCES
Mineral Building, Fairgrounds
Phoenix, Arizona

- 1. Information from: Visit
- Address: _____
- 2. Mine: _____ 3. No. of Claims - Patented _____
Unpatented _____
- 4. Location: Tiger
- 5. Sec 26 Tp 8 S Range 16 E 6. Mining District Old Hat
- 7. Owner: Sau Manuel Caffe Co.
- 8. Address: _____
- 9. Operating Co.: McFarland & Hullinger
- 10. Address: _____
- 11. President: _____ 12. ^{Sup.} Gen. Mgr.: W. D. Nelson
- 13. Principal Metals: _____ 14. No. Employed: 4
- 15. Mill, Type & Capacity: None
- 16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate _____ tpd.
- 17. New Work Planned: 4 men loading & hauling rockings to Hayden
- 18. Miscl. Notes: _____



Date: 1-28-71

GWI
(Signature) (Field Engineer)

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Tiger Tailings Dump Date September 26, 1963
District Mammoth District - Pinal County Engineer Axel L. Johnson
Subject: Field Engineer's Report. Information from W. D. Nelson

Location: Near San Manuel mine, and near the old townsite of Tiger.

Owners: Magma Copper Co., San Manuel Division, Box "M", San Manuel, Arizona.

Lessees: McFarland & Hullinger, Box 811, Tucson
W. D. Nelson, Supt.

Principal Minerals: Mill tailings, containing about 85% silica, with a very small amount of gold.

Present Mining Activity: Loading in trucks and hauling to the AS&R smelter at Hayden, Arizona, for use as silica flux, in the reverberatory furnaces. 1 man loading and hauling. Production about 100 tons per day. Contract with AS&R Co. calls for shipment of 20,000 tons per year.

Ore Available: Dump is estimated to contain 1,000,000 tons.

Regarding other operations: Mammoth Tailings Dump is not operated now, the Tiger Tailings Dump meeting the same requirements.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Mammoth Tailings Dump

Date August 30, 1962

District Mammoth District, Pinal Co.

Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from W.D. Nelson.

References: Report of June 13, 1962.

Present Activity: Loading the material into truck with an end loader and hauling to A.S. & R. at Hayden, Arizona. 1 man working. Production is reported as 100 tons per day.

Principal Minerals: Silica flux containing a small amount of gold.

Ore Values: Gold is reported to assay 0.06 ounces per ton with 85% silica content.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Mammoth Tailings Dump

Date June 13, 1962

District Mammoth District, Pinal Co.

Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from Bill Forman

References: Report of Jan. 11 - Feb. 14, 1962.

Present Activity: Loading the material in the truck with end loader and hauling to the A.S. & R. smelter at Hayden. 1 man working. Production now reported as 75 to 100 tons per day.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA

FIELD ENGINEERS REPORT

Mine Mammoth Tailings Dump

Date Jan. 11, 1962, and Feb. 14, 1962

District Mammoth District, Pinal Co.

Engineer Axel L. Johnson

Subject: Field Engineers Report. Information from W. D. Nelson & Personal visit.

Location Between Old Mammoth and New Mammoth, between Hwy # 77 and the river, and about 0.3 miles south of the Sierra Vista Motel.

Owners McFarland and Hullinger, Box 238, Tooele, Utah., and Box 811, Tucson
W. D. Nelson, Supt.

The property was purchased recently by McFarland & Hullinger from a private party.

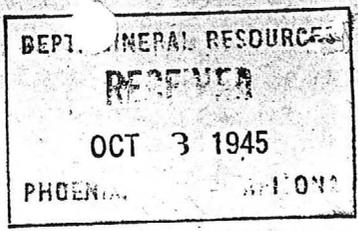
Principal Minerals Silica flux, containing a small amount of gold.

Present Mining Activity Loading the material in trucks and hauling same to the A. S. R. Hayden smelter for use as high silica flux. Production about 200 tons per day, when operating. A. S. & R. Co. is reported as paying a straight fee of so much per ton for this material. Mr. Nelson estimated that the estimated tonnage of the dump was about 100,000 tons.

Field engineer visited the property on Feb. 14, and found no one working. One truck was standing by idle, but there was no loading equipment in sight. The property is evidently being worked intermittently.

Memo.

10/2/45



To. Mr Dunning.

Saw McClintock and Houghton both of whom are familiar with Mammoth dump. (1) It is completely oxidized & represents work on moly & vanadium sections of mine. No sulfides were mined. (2) It has been worked by gravity method several times. Low values.

Saw Books re World's Fair. Property again in difficulty. Creditors want receivership abolished. No deal can be made until this is done shortly after Jan 1. Bid of Eagle Peck for \$90,000 rejected owing to changed status in past 3 months. Roseware making his report to you.

GB

DEPARTMENT OF MINERAL RESOURCES

REPORT TO OPA ON ACTIVE MINING PROJECT

Date 1/13/45
 Name of Mine Mammoth Tailing Dump
 Owner or Operator J. F. Dietrich
 Address 540 N 7th Street
 Mine Location Mammoth

Filing Information

File System.....
 File No.....
 This chart to be used for gallons of gasoline required per month.

PRESENT OPERATIONS: (check X)

Production ; Development.....; Financing.....; Sale of mine.....;
 Experimental (sampling).....; Owner's occasional trip.....;
 Other (specify).....

PRODUCTION: Past and Future.

Tons

Approx. tons last 3 months.....
 Approx. present rate per 3 months.....
 Anticipated rate next 3 months 50 tons per day
 If in distant future check (X) here.....

EQUIPMENT OPERATED:

Type	Quantity or Horse Power	Miles or Hours Per Month	Gallons Required Per Month
Personal Cars	<u>Willys 32</u>	<u>1000</u>	<u>67</u>
Light or Service Trucks	.....	.....	.....
Ore Hauling Trucks	.....	.....	.....
Compressors	.....	.....	.....
Other Mine or Mill Eqpt.	<u>3 gas engines for concentrator</u>	.....	<u>1500</u>

PRODUCT PRODUCED OR CONTEMPLATED: Name metals or minerals.

REMARKS:

This operator is commencing an operation to concentrate lead minerals on waste tailing dump. Due to critical nature of lead this activity is recommended.

ARIZONA DEPARTMENT OF MINERAL RESOURCES

By George J. Baker