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ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: METCALF MINE

ALTERNATE NAMES:

GREENLEE COUNTY MILS NUMBER: 44

LOCATION: TOWNSHIP 4 S RANGE 29 E SECTION 9 QUARTER --
LATITUDE: N 33DEG 06MIN 37SEC LONGITUDE: W 109DEG 21MIN 48SEC
TOPO MAP NAME: CLIFTON - 15 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

COPPER SULFIDE
COPPER OXIDE
MOLYBDENUM SULFIDE
SILVER SULFIDE
GOLD
ZINC SULFIDE

BIBLIOGRAPHY:

TITLEY, S.R., HICKS, C.L., 1966, GEOLOGY OF
THE PORPHYRY COPPER DEPTS. SOUTHWESTERN
NORTH AMERICA
LANGTON, J.M., 2/72, ORE GENESIS IN THE
MORENCI-METACLF DIST. AIME TRANSACTIONS
VOL. 254, 9/73
COMPANY INFO (CONFIDENTIAL) 1977, (AU,AG GDS)
ADMMR METCALF MINE FILE
USBM CAPITAL & OPERATING COST ESTIMATING
SYSTEM HANDBOOK, USBM CONTACT NO. J0255026,
1978, 374 PP.
SKILLING, D.N., JR. PHELPS DODGE CORP.'S
METCALF PORPHYRY-TYPE PROJECT, SKILLINGS
MINING REVIEW, JUNE 21, 1975, P. 12-17
CLEVLAND, ROBERT, A HISTORY OF PHELPS DODGE
DUNNING, CHARLES, ROCK TO RICHES, 1959
LEWIS, F.M., & R.B. BHAPPU, ECONOMIC
EVALUATION OF AVAILABLE PROCESSES FOR
TREATING OXIDE-COPPER ORES. INTERNATIONAL
J. MINERAL PROCESSING, V. 3, 1976,
P. 133-150
USGS PP 43, 1905, LINDGREN, W., THE COPPER
DEPOSITS OF CLIFTON-MORENCI, AZ.
SEE ADMMR MORENCI MINE FILE

KAP WR 9/6/79: A visit was made to the Phelps Dodge Metcalf Mine in Greenlee County. In the company of Jim Madson, Mine Foreman, we toured the Metcalf open pit copper mining operation. The geology, mineralogy, and operations are well described in a variety of technical literature. However, a few interesting points were noted: The Metcalf crude ore storage, primary and secondary crushers and fine ore storage are linked by rail to the similar components at the Morenci Mine which facilities transfer of ore back and forth for best utilization of crushing and mill capacity. The Metcalf Mine presently consists of three separate pit operations: The Metcalf, the Shannon or Standard and the King (King Mountain). They eventually will all become one pit. The Metcalf Mine produces oxide ore, sulfide and a mixed ore. The oxide-sulfide mixed ore is first crushed, ground and treated by flotation and the flotation tailings are then leached in a special tailings leach plant. 10/15/79 mw

CJH WR 5/27/83: Canuto Sena, Deputy State Mine Inspector, reported that Sam Sorino, Safety Inspector for Phelps Dodge's Small Mines Division, told him that the division is driving an adit to the Cragg vein northwest of the Metcalf Mine out of Morenci. They are hoping to intercept good Ag values. The adit is in 115' (5/26/83). Additionally the Small Mines Division is conducting a sampling program for Ag values on the Golden Prince claims on the south flank of the Dos Cabezas Mtns., Cochise County.

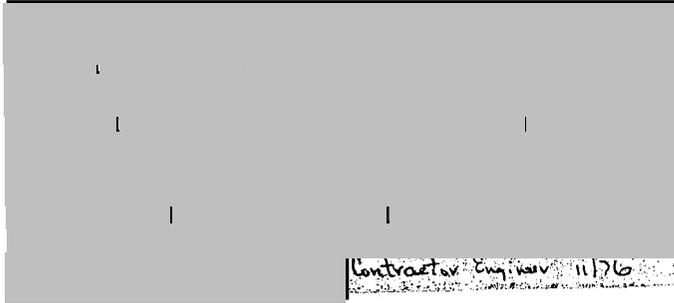
MG WR 1/20/84: Learned that the drift being driven by Phelps Dodge Small Mines Division at the Cragg mine is on the quartz vein. It is hoped that the vein will carry enough silver to warrant its development as a source of silica flux. At present the mine is working two shifts, 3 men each. The property is in Sec 20 T4S R29E (Greenlee Co.)

MG WR 9/28/84: Development activities at the Cragg property (Greenlee Co) by the Phelps Dodge Corp. have been temporarily suspended.

METCALF MINE

GREENLEE

Ron Boatman, Morenci, stated that PD did haul ore by rail from the Metcalf project. **GWI WR 2/6/76**



Metcalf Mine starting a 40,000 ton operation and mill will be constructed. Work on a large change room had started by the end of the period.

GWI Quarterly 9/1969

A new change room has been completed for the Metcalf mine, and work on the roads and benches started during this quarter. GWI Quarterly Report 4/1/70

Visited the Metcalf Mine, one shovel on the job, stripping and preparation preceeding. GWI WR 6/13/70

Work at the Phelps-Dodge Metcalf mine continues with Sundt Construction Company doing the preliminary work. A new road is being constructed by the company around the operations in the Chase Creek area. This is a temporary measure as the State Highway Department expects to finish the new highway up the San Francisco River by passing Chase Creek. GWI Quarterly Report 6-30-70

As reported last quarter, work at the Metcalf mine is being pushed, the work at the site and design of the new Metcalf mill is going ahead on schedule. GWI Quarterly Report 10-1-70

The announcement of Phelps-Dodge that force work on the Metcalf project would be slowed or shelved and additional production obtained from Tyrone has taken off the pressure on housing in Greenlee and Graham counties. Whether the decision was in part due to Arizona's tax structure and pollution laws, or other economic reasons remains to be seen. GWI Quarterly Report 12-31-70

Active Mine List Oct. 1970 - 2280 men - J.E. O'Neill, Mgr. Morenci Branch

The announced slowdown at Metcalf will probably only result in a later target date, as development continues but not under previous pressure. GWI QR 4-1-71

During this period it was announced that R. B. Nichols would be Supt. of the Metcalf mine and that the company would continue getting it ready for operations. GWI QR 6-30-71

Mine visit. Metcalf Mine. GWI WR 10/20/71

Phelps-Dodge continues development work at both the Morenci mine and their new Metcalf mine. GWI QR Oct-Dec '71

The progress at the Metcalf mine is continuing as scheduled. GWI WR 10/11/72

Phelps Dodge have completed their staking on the Blue Range, Stray Horse Canyon, etc. PD development of the Metcalf project continues. GWI QR Jan-March '72

PD is continuing development of the Metcalf project. GWI 4 $\frac{1}{2}$ '72

Date Printed: 08/23/94

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

Information from: **Field Trip With Glenn Miller**

Company:

Address:

City, State ZIP:

Phone:

MINE: **Metcalf Concentrator**

ADMMR Mine File: **Metcalf Mine file**

County: **Greenlee**

AzMILS Number: **44**

SUMMARY

The following two pages contain notes from the Arizona Mining Association's Minerals In Society course and field trip in Morenci.

Ken A. Phillips, Chief Engineer Date: **August 9, 1994**

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA

GREENLEE COUNTY

METCALF MINE

MILS # 44

METCALF MINE (26)

O-AAA's

MM 4181 Malachite
4199 Azurite on Matrix
4200 Azurite
397 Hematite
5290 Brochanite and Azurite
MM5578 Native Copper Crystals
MM5594 Tenorite
MM5595 Tenorite
MM-5894 Azurite and Malachite
MM-5895 Azurite and Malachite
MM-5896 Azurite
MM-5897 Azurite and Malachite
MM-6698 Chalcocite
5877 Azurite
5878 Quartz
5880 Malachite
6698 Chalcocite
MM K 865 Azurite rosettes on malachite

Metcalf Mine

USGS P.P. 43, p. 320

Skillings Mining Review, March 3, 1973, p. 10
" " " March 9, 1974, p. 27
" " " December 14, 1974, p. 23 (personnel)
" " " Jan. 4, 1975, p. 17 (personnel)
" " " March 1, 1975, p. 4 (cutbacks)
" " " June 28, 1975, p. 1, 12-17 (gen. info., pictures)

E/MJ March, 1973, p. 87
" May, 1974, p. 37
" January, 1975, p. 78 (mine & plant exp.)

Mining Engineering, February, 1973, p. 51
" " April, 1973, p. 46

Per SUD
12-25-74

Mining Annual Review, July, 1973, p. 297
" " " 1974, p. 307

Metals Week, July 5, 1974, p. 2
" " February 24, 1975, p. 7 (prod. cutbacks)

Mining Journal, Nov. 29, 1974, p. 471 (increase of work force)
" " January 24, 1975, p. 57 (work week reduced)

These maps are stored in the Flat File Upstairs - Drawer 7
originally AZ Library and Archives Maps

1. The Arizona Copper Company, Ltd.,
Set of Level Maps for Petaluma
Yavapai, Clay, Longfellow, Humboldt Mines
2. The Arizona Copper Company, Ltd.,
Set of Level Maps for Coronado mine,
Horseshoe and Pyramid Mines
3. The Arizona Copper Company, Ltd.,
Set of Level maps, Metcalf, Mammoth,
Mines and Brunswick Group.

Notes from Minerals In Society at Morenci

From Bill Conger's History talk

- 1865 Calton made first recorded discovery
- 1870 First prospectors entered area in full force
- 1872 Long Fellow Copper Company shipped to Silver City (grade averaged over 20 % Cu for a 2 year period)
- 1879 Smelter built at bottom of Long Fellow incline
- 1879 First rail road built
- 1880 Little Emma rail road built
- 1881 Phelps Dodge Mercantile got into the mining business by purchasing into the Detroit Copper Company
- 1889-1923 Years of the Coronado Copper Company operation
- 1889 3 rail roads were operating in St. Luis Canyon and on Cave Creek
- 1932 All underground mining ceased in the Morenci District

Notes about the mine

- In pit crushers crush to -8" and feed conveyors which transport sulfide ore to the Metcalf and Morenci mills
- Leach rock is hauled by truck to leach dumps
- A significant portion of the haulage train rolling stock and loading and unloading facilities are maintained in case of conveyor shut downs of longer than 72 hours
- Metcalf crushed ore is conveyed 3500' down hill to a coarse ore storage/surge pile. The down hill run generates enough electricity to power the remainder of the coarse ore conveyors.
- Total conveyor length is 3.5 miles
- Conveyor widths are 50", 60", and 72"
- The Morenci mine will be mined out in late 1995 or early 1996 after which it will be used for leach ore leaching
- The Morenci pit is planned to be completely filled with leach ore to the top bench on the west wall by 2025
- The Morenci north west expansion will continue for about 10 more years.
- Metcalf has 10-20 more years of production
- Coronado has 170 million tons of ore
- Leach ore is stacked in 20-50 foot lifts, then scarified with a crawler-ripper. the leach cycle is 60-90 days, but the next lift is placed on top of the one leached
- Trucks, (Cat 240 ton), cost \$1.6 million each, shovels cost \$6.5 million
- Starting wage for truck drivers is \$12.80 per hour, average is \$14.85
- Truck tires cost \$16,000 and last the equivalent of 16,000 miles. New tires start on the front axle and are rotated to the back after significant wear. They are run on the back until the wear out or blow out.
- Maximum truck speed (when under control) is 32 miles per hour
- A loaded 240 ton truck weighs 420,000 tons
- Sulfide ore is almost all chalcocite mineralization
- Cutoff for sulfide to the mill is 0.45 % Cu

- Cutoff for leach ore is 0.1%, but rock containing as little as 0.05% Cu is often more economically hauled to a leach site than to a barren waste dump
- About 650,000 tons of rock are handled daily. Within 1½ years the rate will be up to 840,000 tons per day
- Blast holes are 12¼" inches in diameter and are drilled to a depth of 65 feet to prepare for 50 foot benches
- Twelve to 20 holes are drilled per drill per shift
- A blast consist of 30 to 180 holes
- Drill bits are good for 3000 fee
- ANFO is the primary blasting agent
- Approximately 300,000 pounds of ANFO are used daily
- Blasting is done two to four times a day
- Dozers are primarily Cat D-11s
- There are 55 haul trucks are running per shift
- Fifteen P & H shovels are in use; most have a 44 cubic yard bucket capacity; 6 have 22 cubic yard buckets
- New P & H shovels being delivered and assembled have a 56 cubic yard bucket capacity
- Shovels typically load 250 truck loads per shift
- The mine has 4 operating crews of 100 employees

Notes about the mill

- The Metcalf Concentrator has a capacity of 55,000 tons per day
- The Morenci Concentrator has a capacity of 80,000 tons per day
- In pit crushers crush mine run ore to -8"
- - 8" ore is conveyed to coarse ore stockpiles which have a capacity sufficient for 72 hours of milling
- Each in pit crusher (there are 2) is shut down two consecutive days a week for maintenance
- Coarse ore is bottom fed from the stock pile to secondary gyratory crushers
- Ore from the crushers crushed to 95% -0.5" is fed to ball mills
- The ball mill grind to ore to 30% -65 mesh
- The Morenci mill contains 31 10 foot diameter ball mills in closed circuit with screw classifiers
- The Metcalf mill contains 16 14 foot diameter ball mills in closed circuit with cyclone classifiers
- About 40% of ball volume is 3" steel grinding balls
- Ball mill liners are replaced every 300-350 days
- Ball mills with classifiers in closed circuit discharge to rougher flotation cells
- Rougher concentrate is about 10% copper
- Final concentrate is 30-35% copper
- Mill recovery is 75-80%
- Flotation plant discharge is 30% solids
- Daily concentrate production is 2200 tons
- Concentrates are thickened and filtered to less than 10% moisture with ceramic leaf filters
- Flotation plant tailings thickened to 60% solid and pumped to tailings impoundment's
- Tailing discharge to the ponds through a classified to separate the sand fraction from the fines
- The sand fraction of the tailing is used to construct the impoundment
- The fine fraction is discharged to the middle of the ponds
- Water is decanted from the tailings and returned for reuse
- Leach production is approximately 1,000,000 pounds of copper per day

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

July 2, 1976

John A. Lentz
Senior Vice President
Phelps Dodge Corporation
Douglas, Arizona 85607

Dear Mr. Lentz:

On April 21, of this year I wrote you regarding production figures for Phelps Dodge's Arizona copper mines. Because of an oversight, on my part, the Metcalf mine was not included on the tabulation sheet, which accompanied my original letter.

I am enclosing a copy of my original letter, along with the tabulation sheet your firm returned to me. If you will insert the Metcalf mine data in the space under "Totals", I will recalculate the total Phelps Dodge production.

Thank you for your assistance in this matter.

Sincerely,

Glenn A. Miller
Mineral Resources Specialist.

Enc: 2

C
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P
Y



STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85007

602/255-3791

September 11, 1979

Mr. James L. Madson
General Mine Foreman
Phelps Dodge Corp
Morenci, Arizona 85540

Dear Jim:

Please accept Ken Phillips and my sincerest thanks for the very enjoyable tour of the Metcalf Mine, Thursday, September 6. It is certainly an impressive operation and a major addition to Arizona's stature as a major base metal producer. Again, congratulations on the fine housekeeping job.

Best regards,

Clifford J. Hicks
Field Engineer

CJH:mw

cc: John L. Bolles, Manager
Phelps Dodge Corp.
Morenci Branch
Box 187
Morenci, Arizona 85540

Galen Clevenger, Research Director
Phelps Dodge Corp.
Morenci Branch
Morenci, Arizona 85540

MEMORANDUM

To: John H. Jett, Director
From: Ken A. Phillips, Mineral Resources Engineer *KAP*
Subject: Meeting With Mike Schern, Chief Geologist, Morenci Branch
Phelps Dodge Corporation, September 6, 1979

Exploration activities and mining property submittals were discussed with Mike Schern, Chief Geologist, Morenci Branch, Phelps Dodge Corporation, on September 6, 1979. Mr. Schern is in charge of the branch geology office. The office is involved in a number of Phelps Dodge company-wide projects but not in Morenci branch ore grade control.

The geology office is involved in regional (approximately 50 mile radius) exploration targets, evaluating prospector and claim owner submittals and research into Morenci District mineralization. Exploration targets include possible copper-molybdenum porphyry deposits and molybdenum deposits. They are interested in submittals on properties of potential gold-silver-copper silica fluxing ore. These submittals are evaluated to determine potential to provide a steady supply of fluxing ore and an attempt may be made to acquire acceptable properties. The Morenci Smelter does not accept custom fluxing ores. They are also interested in submittals on potential copper and molybdenum deposits.

KAP:mw

cc: DMR Tucson