



CONTACT INFORMATION

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<http://www.azgs.az.gov>
inquiries@azgs.az.gov

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Arizona Department of Mines and Mineral Resources Mining Collection

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PRINTED: 09-24-2009

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: MORENCI MINE

ALTERNATE NAMES:

CAYNGA
ARIZONA CENTRAL
COPPER MOUNTAIN
EAST AND WEST YANKIE
NORTHWEST EXTENSION
DELAWARE
MONTEZUMA
MANGANESE BLUE
RYERSON
HUMBOLDT
KING
COPPER KING, ALICE WINIFRED
JAMESON, JOY, RATON
GARFIELD
METCALF
SHANNON
HORMEYER
IDA
THOMPSON
BON TON
LAS TERRAZAS
DETROIT
LIVERPOOL, CARASCO
IOLANTHE, DEAD PINE, EL MORO
FAIRPLAY
MEXICAN, COPPER QUEEN DEPOSIT
STANDARD
DARK HORSE
STARGO
OLIVETTE
NEW YORK AND ARIZONA
CANSLER
KELLY FITZGERALD MANGANESE
MOLINAR
ALASKA
ANTIETAM

CONTINUED ON NEXT PAGE

CONTINUATION OF MORENCI MILLS

BRUNSWICK
VEILED PROPHET
STELLS
GOLD BELT
FAIRBANKS
SHIRLEY
TRINIDAD
VIRGINIA
MAMMOTH, PROSPERITY
MARKEEN COPPER CO., ECLIPSE
NEW ENGLAND MINING CO.
CLIFTON CONSOLIDATED
STORM GROUP
XIV GROUP
AMERICAN CELTIC COPPER CO.
CLAY
TRILBY
OROVILLE
GRIMES COPPER CO.
PYRAMID
MANSFIELD
CORONADO
SOUTHSIDE
WESTERN COPPER

GREENLEE COUNTY MILS NUMBER: 47

LOCATION: TOWNSHIP 4 S RANGE 29 E SECTION 16 QUARTER N2
LATITUDE: N 33DEG 05MIN 25SEC LONGITUDE: W 109DEG 22MIN 00SEC
TOPO MAP NAME: CLIFTON - 15 MIN

CURRENT STATUS: PRODUCER

COMMODITY:

COPPER SULFIDE
COPPER OXIDE
COPPER NATIVE
GOLD
SILVER
SILICON
VANADIUM
CALCIUM LIMESTONE
CLAY
ABRASIVE GARNET ANDRA
GEMSTONE TURQUOISE

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COGUT & CONGER, HIST OF AZ'S MORENCI DIST.
DUNNING, CHARLES H. ROCK TO RICHES 1959
TITLEY, SPENCE, R. GEOLOGY OF THE PORPHYRY
COPPER DEPOSITS P. 221-232
ADMMR BLUE CRYSTAL CLAIMS

CONTINUED ON NEXT PAGE

ADMMR MORENCI MINE FILE
ADMMR U FILE CU1 CU3
ADMMR NEW YORK AND ARIZONA FILE
ADMMR KELLY FITZGERALD MANGANESE FILE
ADMMR STEVENS LEASE
ADMMR GOLD BELT MINE FILE
LINDGREN, WLADEMAR, THE COPPER DEPTS. OF THE
CLIFTON-MORENCI DIST. AZ. USGS PP 43, 1905
ADMMR GREENLEE CORRESPONDENCE FILE
EMMONS & HAYES CONTRIBUTIONS TO ECONOMIC
GEOLOGY USGS BULL. 213, 1902, P. 133-141
ARIZONA MINING JOURNAL APRIL 1920, P. 43 &
JUNE 15, 1922, P. 4
RAND, L.H. & STURGIS, THE MINES HANDBOOK,
VOL. XVIII, 1931, P. 253
ADMMR U FILE AG2
E.D. WILSON, AZ. LODGE GOLD MINES AND GOLD
MINING AZBM BULL. 137, 1934, P. 135-137
AZBM BULL. 180, 1969, P. 119
C.M. HARRER, RECONN. OF IRON RESOURCES IN AZ
USBM IC 8236, 1964, P. 60-62
STEVENS, HORACE J., THE COPPER HANDBOOK,
VOL. III, 1903, P. 183
MNG. & ENGR. WORLD NO. 4 V. 45, 7-22-22, P. 152
ELSING, M.J. & HEINEMAN, AZ. METAL PRODUCTION
AZBM BULL. 140, 1936, P. 93
USBM MINERALS YEARBOOK 1944, P. 227-246
DIRECTORY OF ACTIVE MINES IN AZ. ADMMR 1980,
P. 17-18
HINTON, R.J., 1000 OLD AZ. MINES 1970, P. 7,
8, 40 & 44
ELEVATORSKI, E.A., AZ. IND. MIN. 1978, P. 34
WEED, WALTER HARVEY, THE COPPER HANDBOOK,
VOL. XI, 1912-1913, 1918, P. 74-75
TRANSACTIONS OF THE AIME VOL. II, 1915,
P. 267-280
AEC PRELIM. RECONN. REPT. 1953, P. 1 (U.S.)
GREELEY, MICHAEL H., THE PRIMARY COPPER
INDUSTRY OF AZ. IN 1977-78, ADMMR 1979,
P. 20, 21, 26 & 30
ANTHONY, J.W. & OTHERS, MINEROLOGY OF AZ.
1977, P. 48
PHELPS DODGE CLAIMS INCLUDE THE MAJOR PORTION
OF T4S-R29E, IT ALSO INCLUDES SECS. 1, 2,
3-T5S-R29E, SEC. 5-8, 18, 19-T4S-R30E,
SEC. 21, 26-28, 32-35-T3S-R29E, AND
SEC. 1, 12, 13 -T4S-R28E
USDL MSHA MINE NO. 0200305 1/30/78
BLM MINING DISTRICT SHEETS 841, 840, 830,
831, 842, 839, 843, 837, 838
WILLIS, CHARLES, E. MINES OF TOMORROW NO. 10,
THE STARGO MINES CO. INC. AZ. MINING JOURNAL
AUG. 1920, P. 34
KOSCHMAN, A.H. & BERGENDAHL PRINCIPAL GOLD-
PRODUCING DIST. OF U.S. PP. 610, 1962, P. 38-9
PHOTO FILE - P1

CONTINUED ON NEXT PAGE

CONTINUATION OF MORENCI MINE

AGS 1997 FALL FIELDTRIP - MORENCI

HARDWICK, W. R. USBM LC 794

OPEN-PIT MINING METHODS MORENCI

10/28/97

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

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ALTERNATE NAMES:

CAYNGA
ARIZONA CENTRAL
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COPPER DEPOSITS P. 221-232
ADMMR BLUE CRYSTAL CLAIMS

CONTINUATION OF MORENCI MINE

AGS 1997 FALL FIELDTRIP - MORENCI

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1992

*Morenci Mine file
Greenlee County*

PHELPS DODGE CORPORATION

Corporate Headquarters

2600 N. Central Ave., Phoenix, AZ 85004-3014 - Phone 234-8100.

Chairman of the Board and President D. C. Yearley

Senior Vice President and President Phelps Dodge Mining Company J. S. Whisler

Sr. Vice President and Executive Vice President Phelps Dodge Mining P. J. Ryan

Phelps Dodge Mining Company

2600 N. Central Ave., Phoenix, AZ 85004-3014 - Phone 234-8100.

Vice President & General Manager J. L. Madson

Vice President Engineering Services R. W. Rice

Controller, Phelps Dodge Mining R. G. Peru

Director, Employee Relations S. L. Marcus

Manager, Employee Relations D. E. Brooks

Assist. Director, Materials Management C. R. Jennings

Traffic Manager J. Sheridan

Morenci Branch T4S R29E Secs. 3, 4, 5, 8, 9, 10, 15, 16, 17, 21, 22 & 23

4521 State Hwy. 666, Morenci, AZ 85540 - Phone 865-4521 - Employees: 1950-
Open pit copper mine - Two concentrators (one with molybdenum circuit) - Total
capacity 100,000 TPD - 650,000 TPY smelter with 2,400 TPD acid plant
(inactive) - 340 million pound per year solvent extraction-electrowinning
plant.

Manager J. G. Clevenger

Assistant Manager W. S. Chen

Superintendent of Mines M. J. Allen

Superintendent of Concentrators R. I. Pennington

Superintendent SX-EW A. J. Broderick, Jr.

Mechanical and Electrical Supt. J. B. McBiles

Chief Engineer A. R. Edwards

Chief Geologist F. J. Menzer

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Assistant Director of Employee Relations T.D. McWilliams

Director, Materials Management R.G. Mock

Purchasing Agent C.R. Jennings

Traffic Manager J. Sheridan

J. Sheridan

Western/US Exploration

P.O. Box 50427, Tucson, AZ 85703-1427 Phone 792-4981.

Manager, US Exploration D.E. Ranta Manager,

Western Exploration Office R. B. Ludden

Exploration and Development Group

2600 N. Central Ave., Phoenix, AZ 85004-3015 - Phone 234-8100.

Senior Vice President P.J. Ryan

P.J. Ryan

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Superintendent SX-EW A.J. Broderick, Jr.

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Chief Engineer W.S. Brack

W.S. Brack

Chief Geologist F.J. Menzer

F.J. Menzer

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Superintendent SX-EW T.R. Snider
Mechanical and Electrical Supt. J.B. McBiles
Director of Engineering and Geological
Services E.M. Schern

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Superintendent of Mines Michael Allen

Superintendent of Concentrators Randy Schneider
Superintendent SX-EW T.R. Snider
Mechanical and Electrical Supt. J.B. McBiles
Director of Engineering and Geological
Services E.M. Schern

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

<u>ARIZONA</u>			
Greenlee Co.		MM-K036	Monzonite Porphyry
		K037	" "
		K038	Quartz Monzonite Porphyry
		K039	" "
		K040	Copper Ore
		K041	Copper Ore
		K042	Copper Ore
		K043	Copper Ore
		K044	Copper Ore
		K045	Copper Ore
		K046	Copper Ore
		K047	Monzonite Porphyry
		K048	" "
		K049	" "
		K050	Copper Ore
		K051	Copper Ore
		K052	Copper Ore
		K053	Quartz Monzonite Porphyry
		K054	" "
MM M 192	Malachite	MM M 909	Quartz
M 193	"		
M 194	"		
M 195	"		
M 196	"		
M 197	"		
N 198			
M 199	Azurite		

MILS #47
57AKA'2

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA
 GREENLEE COUNTY
 MORENCI
MORENCI MINE (file)
 MILS # 47
 57-AXA²
 MMM-919 Turquoise

MM K886 Turquoise
 MM M 872 Malachite
 M 873 Azurite

 M 874 Azurite
 MM M 188 Azurite
 M 189 Copper
 M 190 Copper
 M 191 "
 M 195 Malachite
 M 042 Copper
 M 043 Copper
 M 044 Copper
 M 045 Copper
 M 046 "
 M 047 Copper
 M 048 Copper
 M 049 "
 M 050 "
 M 051 copper
 M 052
 M 918

ARIZONA
 GREENLEE COUNTY
 MORENCI (OPEN) PIT MINE

MM5571 Copper Cathode P.D.
 MM5588 Copper Ore
 mm5590 Azurite
 MM5591 Azurite
 MM5596 Azurite
 MM5602 Chalcocite
 MM5604 Brochantite
 MM5604 Brochantite
 MM5613 Copper Ore, Sulphides
 MM5614 Copper Ore Oxidized
 MM5622 Hematite
 MM 5589 Azurite "Rose"

MM-3897 Brochantite
 MM-3898 Azurite in Tenorite
 MM-3882 Azurite
 MM-3896 Brochantite
 4182 Turquoise
 4238 Chalcocite
 MM5535 Turquoise
 MM5534 Turquoise
 MM6064 Azurite
 MM-6697 Sphalerite
 6300 Azurite
 847 Tsumebite
 858 Molybdite
 1501 Turquoise
 2056 Turquoise
 4180 Turquoise (10 nuggets)
 4170 Chrysocolla
 864 Pyrite
 8521 Cyanotrichite,
 chalcoalumite
 7995 Chrysocolla, cab

MILS # 47
 57-AXA²
 MORENCI mine (file)

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA

GREENLEE CO.

MORENCI (LONGFELLOW MINE)

MILS #47

57' ALA's

MORENCI MINE (f2)

- MM 967 Azurite Spheres in
Tenorite with other
Copper Minerals
- MM 968 Azurite Spheres in
Tenorite with other
Copper Minerals
- MM 3959 Azurite & Malachite
- MM 3960 Azurite in Tenorite
and Calchocite
- MM 3961 Azurite in Tenorite
and Calchocite
- 5993 Azurite spheres
- MM 5994 Azurite spheres
- MM 6529 Azurite spheres
- 8520 Brochantite, malachite
- 5881 Chrysocolla
- 5882 Malachite

MORENCI MINE - PHELPS DODGE

ABM Bull. 125, p. 60
" " 129, p. 43
" " 180, p. 122, 131, 137, 138, 139, 141, 322, 331, 363, 390

USGS P.P. 43
" Bull. 213, p. 133

MAPS - Upstairs in the flat storage area - Third drawer

AEC 172-483

IC 7911
" 8341

Mining Statistics West of the Rocky Mountains by R.W. Raymond, 1874, p. 391 - Willis library

Economic Geology, Vol. 68, No. 2, March-April, 1973

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" " September, 1962, p. 67
" " June, 1963, p. 43

Mineralogy of Arizona p. 15, 16, 17

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" May, 1964, p. 138
" June, 1964, p. 200
" January, 1965, p. 61
" April, 1965, p. 130
" October, 1968, p. 131
" November, 1973, p. 234

MORENCI MINE - PHELPS DODGE

Mining Engineering, February, 1964, p. 124
" " February, 1966, p. 124
" " February, 1973, p. 51
" " April, 1973, p. 43, 46
" " May, 1973, p. 20
" " December, 1974, p. 65 (re: crushing plant)

Metal Mining & Processing, March, 1964, p. 22
" " April, 1964, p. 61
" " May, 1964, p. 44
" " April, 1965, p. 21

Skilling's Mining Review, April 16, 1966, p. 10
" " July 30, 1966, p. 12
" " January 6, 1973, p. 10
" " March 3, 1973, p. 10
" " May 5, 1973, p. 4
" " August 18, 1973, p. 20
" " May 4, 1974, p. 22
" " December 14, 1974, p. 23 (personnel)
" " March 1, 1975, p. 4 (cutbacks)
" " April 10, 1976, p. 9

Journal of Metals, September, 1968, p. 38

Metals Week, April 2, 1973, p. 3
" " December 3, 1973, p. 3
" " February 24, 1975, p. 7 (prod. cutbacks)

MORENCI MINE - PHELPS DODGE

Mining Congress Journal, February, 1973, p. 51
" " " April, 1973, p. 22
" " " June, 1973, p. 12

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

Arizona Mining Journal, June, 1919, p. 18
" " " December, 1918, p. 22
" " " December 1, 1922, p. 45
" " " December 15, 1922, p. 20

World Mining, June, 1966, p. 32

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

maps of the following stored in the flat file
upstairs - Drawer 7 (AZ Library and Archives)

- 5 The Detroit Copper Mining Company
of Arizona,
Set of Maps, Ryerson, Copper
Mountain, Butler, Arizona Central,
Yankie Mines and Map of all Claims.
- 6 Shannon Copper Company, Hopkins
Tract.
- 7 Shannon Copper Company,
Set of Level Maps, Shannon and
El Paso Mines.
- 8 Shannon Copper Company,
Group and Geological Maps.(set)
- 9 Shannon Copper Company,
Set of Mine Stope Plans, including
Alaska Mine.

Directory of Mining - August 1971 # 2300 men.

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

Mine visit. Phelps Dodge Morenci branch. 10/29/71

Mine visit. PD Morenci branch; Mr. Jack Langton. GWI WR 2/16/72

Mine visit. PD Morenci branch (Kinneberg & John Stock). GWI WR 2/17/72

Mine visit. PD Morenci branch. GWI WR 4/12/72

Mine visit. Morenci mine, closed for weekend. GWI WR 6/10/72

Next was a mine visit at the Phelps Dodge Corporation Morenci mine. A staff meeting was in progress while I was there so I did not get to talk to the people I wanted to but there has been very little change. GWI WR 10/11/72

Active Mine List - Oct. 1972 - Morenci, Smelter Cap. 900,000 T, 16,590,000 T Ore, 113,598 T Cu, empl. 2400

Mine visit to Phelps Dodge Morenci branch and talked with J. O'Neill, A. Kinneberg & Jack Langton as to changes, etc. GWI WR 12/20/72

Mine visit. Phelps Dodge, Morenci. GWI WR 2/21/73

On mine visit at Morenci talked to Manager, John McNeil, Asst. Mgr., J.L. Bolles, Chief Engineer, John Staich & Chief Geologist, Jack Langden. Field interview with Bryce Willis who reports that he is still mining silica for Morenci in upper Chase Creek. GWI WR 6/18/75

Mine visit at PD Morenci Mine. Chief Engineer, John Stock, is retiring. Discussed area mining activity with Jack Langton, Chief Geologist. GWI WR 5/5/76

Visited the Harmony Mine and talked with Brice Willis. They were mining and are shipping 500 to 550 TPM to the Morenci smelter. GWI WR 10/14/76

Visited the Morenci Branch; talked with J.L. Bolles, asst. mgr. and R. Boatman, geologist. GWI WR 10/14/76

MORENCI MINE & SMELTER
Phelps Dodge Morenci embarked on a \$11,000,000 expansion program for their smelter. This includes a new 600' stack, increased smelter capacity to handle Pima and Tyrone ores. A 4½ mile aerial tram from the Evans Point lime quarry. Also did assessment work on Sycamore Canyon claims. GWI QR 12/68

Work by contractor (Sundt) at Morenci mine was going ahead with a fill filling up the canyon next to the Morenci road tunnel. Material was obtained from the hill above the town. GWI QR 9-1969

Active Mine List Oct. 1969 - 2042 men - J.E. O'Neill

Morenci Branch, Phelps-Dodge Corp. The outside of the new smelter stack has been completed and the fire-brick lining started. Morenci gulch is being filled with waste from the new pit expansion. Work has started at the Metcalf mine. A new change room right along the highway has been constructed just south of the picnic area. Construction work is proceeding at the townsite, and this will probably be one of the nicest looking towns ever constructed. GWI QR 2-27-70

The 2nd stack at Morenci smelter has been completed, work is progressing on the pit expansion into the old town of Morenci. GWI QR 4-1-70

Active Mine List May 1970 - 2085 men - J.E. O'Neill, Mgr.

Expansion at Morenci continues as planned. GWI QR 6-30-70

Bryce Willis continues shipping 600 tons per month of silica from his claims to the Morenci Smelter. GWI QR 10-1-70

Morenci expansion continues as planned. GWI QR 10-1-70

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

Bryce Willis continued shipping 600 tpm of silica to the Morenci smelter. The mining activity in the Safford and Morenci areas have created a serious housing shortage in Safford, that may be somewhat abated by the announcement of Phelps-Dodge in regard to Morenci. Plans had been started to have a bus line from Safford to Morenci to haul mine, mine contractor and other employees. GWI QR 12-31-70

Mine visit - Phelps-Dodge Morenci mine. GWI WR 2-16-71

Morenci: Production continues at a rapid rate from Arizona's largest and most economical copper producer. 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

Mine visit - Phelps Dodge Morenci plant. GWI WR 6-14-71

At Morenci production continues. GWI QR 6-30-71

MORENCI MINE

New construction at the smelter is progressing on schedule. The new stack appeared to be about 130 feet high. It is of slip form construction. New construction within the town is being done to allow expansion of the pit into the old town area. Construction of the foundations for the towers of the $4\frac{1}{2}$ mile aerial tram to the new lime quarry has been started.

GWI Quarterly report 3/1969

Floyd Hoffman will be promoted from assistant smelter superintendent to superintendent at Morenci to replace Winkler there who has been transferred to Lavender Pit.

News Clip 4-30-69

Active Mine List April 1969 - 1980 men - J.E. O'Neill, Mgr.

MORENCI MINE

Active Mine List November 1967 - 1940 men

The important news in this county was the resumption of mining at Morenci. During the shutdown the copper leaching plant produced copper so as to prevent the loss of copper into the San Francisco River. GWI QR 4-1968

Active Mine List April 1968 - 1940 men

Morenci - All except 14 employees returned to work after the strike - less than 1% failed to show. P.D. Pres., Munroe, 5-27-68 FPK 5-1968

The capacity of the Morenci Smelter is to be increased so that a large percentage of the concentrates from Pima and Phelps Dodge, New Mexico property can be handled. This will include a custom plant to handle the sampling, etc. GWI QR 6-1968

At its Morenci mill and smelter, Phelps Dodge is starting an \$11 million program to construct a new smelter stack for converter draft improvement. The new stack will be 600 ft. high and it will be equipped with an electrostatic dust recipitator to eliminate dust emissions. A turbine will be added to the power plant to provide the necessary electricity for the added plant load. E&MJ October 1968 p. 131

Active Mine List Oct. 1968 - 2010 men

MORENCI MINE & MILL

Visited Mine - Interviewed J. Stock, Chief Engineer, R. Moolick, Gen. Supt.
and Mr. John O'Neill, Manager. The LPF plant is running below capacity probably
50%.

GWI WR 4/9/66

Active Mine List April 1967 - 1917 men

J. A. Lentz, Mgr., Morenci Branch, Phelps Dodge Corp., Morenci, Arizona

Approximately 2,350 men working Sept. 1960.

W.A. Griffith, Engr. - Research Dept.

Paul E. Link, " " "

Axel L. Johnson - Clifton Council - 5-3-60

February 1962 - 1,984 men working

October 1963 - 1,918 men working

According to C. Kuzell, the Morenci acid plant is operating but is troubled by "bugs" and not yet able to supply Apache Powder all of its H_2SO_4 . Therefore, the Apache Powder acid plant is operating meanwhile. FPK 11-22-65

Phelps Dodge Corporation (Morenci Branch)

Greenlee County

CJH/WR 10/25/79 - Mike Schern, Chief Geologist, Phelps Dodge Morenci Branch, reported the discovery of a 50' slab of Andradite Garnet at Morenci. Inquired about markets. Dave Rabb suggested he call 3-M, the Chambers of Commerce in Denver and Los Angeles and the USBM Commodities Expert in Washington D.C. Mr. Jett suggested that he call Ron Hanna as a user of abrasives. This information was relayed to Mr. Schern. He will save some Museum specimens for Ken Phillips on his next Morenci Trip.

MG WR 7/10/81: Phelps Dodge continues to mine the silver-bearing vein structure between the Shamrock and Commerce shafts in the Ash Peak area. Approximately 2,000 tons/month of fluxing ore is mining from the surface and from underground to feed the Morenci smelter.

NJN WR 1/7/83: A. L. Wilder of Bechtel Civil and Mineral Inc., Mining and Metals Division, 7975 N. Hayden Rd., Scottsdale, AZ 85258 visited. He reports Bechtel is doing solvent extraction-electrowinning (SX-EW) studies world wide. Their Scottsdale office is doing them for the Southwestern U.S. They are currently discussing a SX-EW plant for the Morenci complex of Phelps Dodge.

CJH WR 1/11/85: Canuto Sena, Deputy Mine Inspector (c) reported that PD will be shipping stockpiled concentrates (not much) and cement Cu precipitates (a lot) from Morenci to Douglas. He said that the precipitation plant will continue to operate.

NJN WR 11/23/84: It was reported that Phelps Dodge has the computer capability at Morenci to redo the mine plan in 2 days to any new set of criteria, grade, cutoffs, etc.

MORENCI MINE

NJN WR 4/11/86: Joe Langlois mining engineer with the Arizona Dept of Revenue reported that a company previously called B & G Turquoise has the contract to produce turquoise at Phelps Dodge's Morenci Mine. The new name of the company is not known.

KAP WR 8/22/86: David M. Bush of Buffo Jewelry in Thatcher reported that the Brown family no longer has the turquoise production contract with Phelps Dodge at their Morenci Mine, file, Greenlee County. She did not know who, if anyone was currently mining turquoise at Morenci.

NJN WR 8/22/86: Charles Merritt (c) reports that he has staked claims and is sampling at the Marland Mine (file) Gila County.

KAP WR 9/5/86: As a result of an inquiry about deposits of abrasives from Burke Bennett, Sales Engineer, Clemtex (c), Fred Menzer, Geologist, Morenci Mine (file) Greenlee County was contacted about their large garnet scarn deposit. He said he was sure that at least some of it had been removed to the dump, but he felt there was probably some still in place. He would check it out.

KAP WR 10/31/86: The 1985 preprint of the Lead chapter from the US Bureau of Mines' Mineral Yearbook reports that the Morenci Mine (file) Greenlee County was the 14th largest producer of lead in the United States in 1985.

KAP WR 11/7/86: Burke Bennett of Clemtex, an abrasives supplier, 248 McCarty Dr., A/C, Houston, Texas (713) 672-8251, called again to find out if we had heard from Phelps Dodge at Morenci regarding garnet. We did not. A call to Fred Menzer at Morenci revealed that Phelps Dodge does still have some of the garnet deposit intact. Mr. Menzer was given Mr. Bennett's phone number so the two could communicate directly regarding the availability of the garnet.



Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.adeq.state.az.us



Stephen A. Owens
Director

file

July 29, 2003

Morenci

Mr. Brian J. Musser
Manager Environmental Services
Phelps Dodge Morenci, Inc.
4521 U.S. Highway 191
Morenci, Arizona 85540

Re: Notification of the Final Decision to Issue an Amendment to Aquifer Protection Permit (APP) Number P - 100193

Dear Mr. Musser:

The Water Permits Section, Mining Unit of the Arizona Department of Environmental Quality (ADEQ) pursuant to Arizona Administrative Code R18-9-A201.E, is notifying Phelps Dodge Morenci, Inc. (PDMI), of their final decision to issue an amendment to APP number P-100193.

ADEQ is pleased to provide PDMI with the enclosed amendment summary, signed by the Director of the Water Quality Division. Also provided are copies of the amended permit pages. Please insert these pages in place of the outdated pages in your present permit copy.

Congratulations, and best wishes on your mining endeavor. We appreciate your efforts to protect the environment of Arizona during your project. If you have any questions, please contact me at 1-800-234-5677, extension 771-4590.

Sincerely,

Jeff Emde, Project Manager
Mining Unit, Water Permits Section

c: with enclosures

Lynne Dekarske, Administrative Assistant, WPS, ADEQ
Don Shroyer, Manager, WQDU, ADEQ
Dave Esposito, Manager, SRO, ADEQ
Larry Bogdanski, SRO, ADEQ

c: without enclosures

Eric Wilson, Manager, WPS Mining Unit, ADEQ
Mike Traubert, Section Manager, WQCS, ADEQ

MU03:0132 - Inventory number 100193

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ 86004
(928) 779-0313

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733

**Morenci Mine For Leach Update 2000 SME Hydrometallurgy Technical Meeting
Globe-Miami, AZ, May 6, 2000**

BY PATRICK GANNON

MORENCI (H. G. ROSS) (H)
TECH. PARAM.

Mine for Leach

Phelps Dodge Morenci's "Mine for Leach" expansion will increase the annual Electrowon copper cathode production by 240 million pounds. This increase in cathode copper production is obtained while maintaining a mining rate of 820k tons per day and closing down both Concentrators.

Crushing and Conveying Upgrades

The existing crushing and conveying equipment at the Metcalf Concentrator will crush sulfide ore down to 80% passing 1/2 inch. A fine ore storage facility is being built northeast of the Metcalf Concentrator. Agglomerated ores at 8% moisture will be stacked in the Stargo Canyon Stockpile System. This modified facility will feed two RACHO mobile stacking conveyors capable of placing 75k tons of material on the stockpile everyday. Two radial stackers will extend stacking capabilities into the irregular shaped areas at the perimeter of the stockpile. Originally the plan was to crush to 80% passing 1 1/2" for the first three years, this program has been accelerated to allow for agglomeration to begin immediately and size reduction to increase to 80% passing 1/2" after the first lift is completed.

Leaching Upgrades/Parameters

Pad construction will be done on a compacted three foot thick layer of the existing Stargo Stockpile. This stockpile is a 40 year old previously leached run of mine dump. Drain lines will be utilized to collect pregnant leach solution at the base of the first lift. The stackers will build the first lift out of 80% passing 1 1/2". This lift will provide stability and good drainage for the lifts to follow. Half way through construction of the first lift, air injection will be implemented into the daily operation of the system. Upon completion of the first lift the size of the material will be reduced closer to 80% passing 1/2". Further test work is still being completed to determine the optimum size reduction, based on stability, drainage, and metal recovery. Lift heights will not exceed 23 feet. A solution application rate of 0.0025 gpm/ft² will be obtained by spacing 1 gallon per hour emitters 2 feet apart and spacing emitter lines 3 feet apart. Leach cycles are designed to run 90 days, rest for 30 days, then leach for another 30 days. These cycles should provide a target pregnant leach solution grade of 4.05 grams per liter.

Solution Extraction Modifications

The existing Southwest Plant was designed to be expanded, all necessary tank nozzles and most the bases are all ready in place. One Outkumpu mixer settler will be added to the train. The new settler will become the stripper. The current stripper will be converted to a parallel extractor. The enhanced plant will include one parallel, two series extractors, one wash stage, and one stripper. The plant will process 17,240 gpm of pregnant leach solution, utilizing 4,800 gpm of lean electrolyte and 8500 gpm of organic. Coalescing media will be installed in the Raffinate tank to further minimize organic losses. No new tanks will be necessary in the Tankfarm to accommodate these modifications.

Electrowinning Design

The new Stargo Tankhouse is designed to plate the 270 million pounds at 28 amps per square foot. The location of the new Tankhouse was chosen for its close proximity to the Southwest SX plant and for ease of expandability. The floor plan is a single crane isle with two overhead power rail cranes, three cell lines of 108 cells each, and two Wenmec stripping machines, capable of processing 500 blanks per hour. Each cell line will be powered by its own pair of 22.5k rectifiers. All three cell lines will be equipped with a double contact buss bar system for the anode, the last cell line will also have a double contact buss bar system on the cathode. The Wenmec stripping machine has been modified to handle the V-grooved Mt. Isa blanks and will not require the use of wax or a bottom edge strips. The Tankhouse Tankfarm has been arranged to minimize pumping requirements and is split between three levels.

Project Update

The transition in Morenci from Concentrating to SXEW production has been done carefully to protect the employees. There are no plans for a reduction in force, all employees will be placed in the new organization. An extensive training program has been put in place, which allows employees to gain knowledge and experience in SXEW operations before the Concentrators are shutdown. With the completion of the feasibility study, the Metcalf Concentrator was shutdown in the 3rd quarter of 1999 without incident. The Morenci Concentrator is currently scheduled to be shutdown in the 1st quarter of 2001, both of these Concentrators will be mothballed with the possibility of a restart in the future.

As of today Flour Daniel and RACHO have completed 50% of the detailed engineering and Kellogg, Brown and Root (KBR) is 20% complete with construction. The Stargo system is currently on track to begin production during the 1st quarter of 2001.

Abstract from SME Annual Meeting 2002

Stegen, R.J., 2002, Geology department support of copper mining and processing operations at Morenci and Tyrone; organization, products, and value

Geology departments at Morenci and Tyrone porphyry copper deposits are organized to support open pit mining and solvent extraction processing. Geologic work is at the mine, project and exploration levels with each providing specific types of data that support planning and mining at the near, medium, and long-term life of the mine. Major work products are mineralogical, geological and alteration-based models, geotechnical-related studies, fragmentation support, and exploration. Value is added at the mine geology level by products that strongly predict and closely attain the monthly planned production. At the project level, products are the basis of yearly budget plans and addition of reserves. Exploration identifies future resources and leach stockpile locations.

Notes from talk on February 28, 2002 by Keith R. Long, Economist, Geologist, USGS – Tucson

Morenci: Mine chalcocite-dominant enriched zone. Hypogene grade is 0.16 percent copper as chalcopyrite. Total sulfides in mineralized rock average 3 weight percent and range from 4 to 7 percent. Pyrite to chalcopyrite ratio varies from 5 to 1 to 10 to 1. Ore body divided into (i) leached cap with 0.02 to 0.12 percent copper; (ii) partially leached cap with 0.12 to 0.4 percent copper; (iii) enriched zone with 0.4 to 1.0 percent copper; and (iv) hypogene zone (protore) with 0.05 to 0.30 percent copper. Material is now mine for leach, some being crushed, the rest leached as run-of-mine ore. Rock has a fracture abundance of $n > 0.3$ centimeters.

Rock, mineral, and alteration mapping and modeling is very important for leach performance. Ore is classified according to types based on mineralogy, grade, rock type, alteration, and structure. Principal types are:

Type	Description	Mineralogy
1	Leached cap	Iron oxides +/- oxide copper
2	Mixed oxide-sulfide	Chalcocite-pyrite-iron and copper oxides
3	Supergene sulfide	Chalcocite-pyrite-chalcopyrite-covellite-iron oxides
4	Hypogene sulfide	Chalcopyrite-pyrite-bornite-covellite
5	Acid soluble oxide	Malachite-chrysocolla-azurite-brochantite +/- chalcocite
6	Acid insoluble oxide	Cuprite-native copper-tenorite-copper wad-Mn/Fe wad
7	Mixed hypogene sulfide	Chalcopyrite +/- covellite > chalcocite
8	Mixed supergene sulfide	Chalcocite > covellite and chalcopyrite

Other important parameters include fragmentation measures of broken rock, clay content (can inhibit movement of leach solutions in leach pads), rock hardness (affects crusher throughput), and presence of acid-consuming minerals.

Tyrone: Hypogene grade is 0.10 percent copper. Ore is about one-half oxide copper (chrysocolla-malachite-azurite-brochantite) and one-half chalcocite. Other wise similar to Morenci. Recent exploration has made significant reserve additions at Gettysburg South, West Main, Valencia, Savanna, Little Rock, and Niagara areas.

MORENCI MINERAL RESOURCE CO.

Handwritten initials and scribbles.



2600 N. Central Avenue, Phoenix, AZ 85004-3014 • (602) 234-8100

NEWS RELEASE

RECEIVED
DEC 20 1990
DEPT. OF MINES &
MINERAL RESOURCES

FOR IMMEDIATE RELEASE
Contact: Thomas M. Foster
(602) 234-8139

PHOENIX, ARIZONA, December 19, 1990 -- Phelps Dodge Corporation today announced that the Morenci Mining venture has discovered substantial open-pit mineable copper mineralization, known as the Coronado deposit, in the Morenci District north of the Morenci, Arizona open pit mine. Morenci Mining is a venture between Phelps Dodge Morenci, Inc., a wholly-owned subsidiary of Phelps Dodge Corporation, which holds an undivided 85% interest in the venture, and Sumitomo Metal Mining Arizona, Inc., a jointly-owned subsidiary of Sumitomo Metal Mining Co., Ltd., and Sumitomo Corporation, both of Japan, which holds the remaining 15% interest.

During 1989 and 1990, sixty drill holes were completed which identified chalcocite mineralization that is continuous over the project area and averages 430 feet in thickness with a maximum thickness in excess of 800 feet. The chalcocite deposit is overlain by leachable copper oxide mineralization averaging 300 feet in thickness. Combined sulfide and oxide geological reserves in excess of 150 million tons grading 0.7% copper are indicated. Metallurgical testing demonstrates that the deposit is amenable to copper recovery by flotation and by heap leaching using solvent extraction/electrowinning.

Drilling of the area continues to define additional mineralization and will continue during 1991.

Phelps Dodge is the world's second largest producer of copper. The company is also the world's second largest producer of carbon blacks, the leading North American fabricator of wheels and rims for medium and heavy trucks, a major manufacturer of magnet wire and specialty conductors, and has operations and investments overseas in mines and wire and cable manufacturing facilities. The company's operations are located throughout the United States and in twenty-two other countries.

#

MORENCI (F)
COMPLETE AND MAIL TO: STATE MINE INSPECTOR
STATE MINE INSPECTOR
1616 WEST ADAMS, SUITE 411 JUN 14 1989
PHOENIX, ARIZONA 85007-2627

FOR OFFICE USE ONLY
START-UP NUMBER 93933155
STATE NUMBER 061150
DEPUTY NUMBER _____
NEW MOVE

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with the Arizona Revised Statute, we are submitting this written notice to the Arizona State Mine Inspector of our intent to start , stop _____, move _____ an operation.

Please check the appropriate boxes: Contractor , Owner , Operator , Open Pit Mine ,
Underground Mine , Mill , Quarry , Aggregate Plant , Hot Plant , Batch Plant ,
Smelter , Leach Plant .

If this is a move, please show last location: _____
If you have not operated a previously in Arizona, please check here: _____ If you want the
Education and Training Division to assist with your mine safety training, please check here: _____
If this operation will use Cyanide for leaching, please check here: _____

COMPANY NAME: DRILLING SERVICES CO. - DIVISION OF LAYNE-WESTERN CO., INC.

DIVISION: DRILLING SERVICES CO.

MINE OR PLANT NAME: PHELPS DODGE - MORENCI TELEPHONE: 602-865-4521

CHIEF OFFICER: FRED MENZER - MANAGER OF GEOLOGY DIVISION

COMPANY ADDRESS: P.O. BOX 187, MORENCI, AZ 85540

CITY: MORENCI STATE: AZ ZIP CODE: _____

MINE OR PLANT LOCATION: (Include county and nearest town, as well as directions
for locating property by vehicle: PHELPS DODGE MORENCI MINE SITE,
GREENLEE COUNTY, MORENCI, ARIZONA

TYPE OF OPERATION: DRILLING PRINCIPAL PRODUCT: COPPER

STARTING DATE: 6-12-89 CLOSING DATE: 6-30-89

PERSON COMPLETING NOTICE: MARK J. MADISON TITLE: SALES ENGINEER



FIFE SYMINGTON, GOVERNOR
EDWARD Z. FOX, DIRECTOR

MORENCI MINE (File) Greenle

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

JOINT NOTICE OF PROPOSED ACTION

by the

U.S. Environmental Protection Agency
Region IX, W-5
75 Hawthorne Street
San Francisco, CA 94105

Telephone: (415) 744-1905

State of Arizona
Dept. of Environmental Quality
P. O. Box 600
Phoenix, AZ 85001-0600

Telephone: (602) 207-4665

On Application for National
Pollutant Discharge Elimination
System (NPDES) Permit to Discharge
Pollutants to Waters of the
United States

On Application for Certification
for Compliance with Applicable
Effluent Limitations and
Appropriate Requirements of the
State of Arizona

The Environmental Protection Agency (EPA), Region IX, San Francisco, California, and the Arizona Department of Environmental Quality (ADEQ) are jointly issuing the following notice of proposed action under the Clean Water Act (CWA).

The Environmental Protection Agency, Region IX, San Francisco, California, has received a complete application for a National Pollutant Discharge Elimination System (NPDES) permit and has prepared tentative determinations regarding the permit.

On the basis of preliminary review of the requirements of the Clean Water Act, as amended, the implementing regulations, the Regional Administrator, Region IX, Environmental Protection Agency, proposes to issue an NPDES permit to discharge to the following applicant, subject to certain effluent limitations and special conditions:

Public Notice No. 7-92-AZ

May 12, 1992

Phelps Dodge Morenci, Inc.
Morenci Mining
4521 Highway 666
Morenci, Arizona 85540
NPDES Permit No. AZ0022705

The Department of Environmental Quality is An Equal Opportunity Affirmative Action Employer.

Post Office Box 600

Phoenix, Arizona 85001-0600

Recycled Paper

The applicant operates the Morenci Mine located on Highway 666 near Morenci in Greenlee County. Their discharge consists of stormwater overflow from their flood water control facilities. They have two discharge points: No. 001, at latitude 33° 04' 37" N, longitude 109° 19' 49" W, is to Chase Creek tributary to the San Francisco River and No. 002, at latitude 33° 04' 53" N, longitude 109° 23' 35" W is to Gold Gulch tributary to Eagle Creek. Chase Creek has protected uses of Aquatic and Wildlife (warm water fishery), Partial Body Contact and Agriculture Livestock Watering. Eagle Creek has protected uses of Aquatic and Wildlife (cold water fishery), Full Body Contact, Domestic Water Source, Fish Consumption, Agriculture Irrigation and Agriculture Livestock Watering. The proposed permit requires containment of all process water and the runoff from a 25 year, 24 hour precipitation event. Discharges from this containment facility are limited for Cadmium, Copper, Lead, Mercury, Settleable Solids, Sulfides, Suspended Solids, Zinc and pH. The permit will expire approximately five years after it becomes effective.

The State of Arizona is considering a request to certify the discharge described above, pursuant to Section 401 of the Clean Water Act. The certification will set forth any limitations and monitoring requirements necessary to assure compliance with water quality standards under Section 303, areawide waste treatment management plans under Section 208(e), effluent limitations under Sections 301 and 302, standards of performance under Section 306, or prohibitions, effluent standards or pretreatment standards under Section 307 of the CWA, and any other appropriate requirement of State law.

The State may certify a draft permit and specify conditions which are more stringent than those in the original draft permit, where the State finds such conditions necessary to meet the requirements of the CWA. For each more stringent condition, the certifying State agency shall cite the CWA or State law references upon which that condition is based. Review of appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State.

The Administrative Record, which includes the application, draft permit conditions and other relevant documents, is available for public review Monday through Friday from 9:00 a.m. to 4:00 pm. at the EPA address below. A copy of the draft permit and other pertinent documents may be obtained by calling or writing to the addresses below.

Persons wishing to comment upon or object to the proposed determinations or request a public hearing pursuant to 40 CFR 124.12 should submit their comments or request in writing within 30 days from the date of this notice, either in person or by mail to:

U.S. Environmental Protection Agency
Region IX, W-5
Attn: Terry Oda
75 Hawthorne Street
San Francisco, CA 94105

State of Arizona
Dept. of Environmental Quality
Attn: Wayne H. Palsma
P. O. Box 600
Phoenix, AZ 85001-0600

Telephone: (415) 744-1905

Telephone: (602) 207-4665

All comments or objections submitted within 30 days from the date of this notice will be considered in the formulation of the final determinations regarding the application. If the response to this notice indicates a significant degree of public desire for a public hearing, the Regional Administrator shall hold one in accordance with 40 CFR 124.12. A public notice of such hearing will be issued at least 30 days prior to the hearing. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

The permit will become effective 33 days following the date of mailing by the EPA of the final permit. If no comments request a change in the draft permit, the permit will become effective three (3) days from the date of mailing.

A request for an evidentiary hearing may be submitted to the Permits Record Coordinator, W-5, within 33 days following the mailing of the final determination, in accordance with 40 CFR 124.74. If granted, applicable provisions of the permit will be stayed pending the hearing.

Please bring the foregoing notice to the attention of all persons you know would be interested in this matter.



2600 N. Central Avenue, Phoenix, AZ 85004-3014 • (602) 234-8100

ORIC

NEWS RELEASE

FOR IMMEDIATE RELEASE
Contact: Thomas M. Foster
(602) 234-8139

PHELPS DODGE MORENCI MINE WINS NATION'S HIGHEST
MINE SAFETY AWARD

Phoenix, Arizona, June 30, 1993 -- Phelps Dodge Mining Company, a division of Phelps Dodge Corporation, today announced that its Morenci Branch mine in Morenci, Arizona has been named the safest open pit mine in the country and will receive the Sentinels of Safety Award, this nation's most prestigious mine safety award.

Sentinels of Safety Awards have been presented each year since 1925 to the safest mine in each of eight categories with at least 30,000 employee hours with no lost-time injuries. The Phelps Dodge mine in Tyrone, New Mexico was first runner-up in the award competition and the nation's second safest mine in the open pit category with 409,021 hours. Employees at the Morenci operations worked nearly two million hours in 1992 without a single lost-time injury, nearly 10 times more hours than recorded in any of the other eight mine categories.

"These outstanding achievements reflect the commitment to safety and team spirit of our employees at Morenci and Tyrone operations," said J. Steven Whisler, President of Phelps Dodge Mining Company. "We are extremely proud that their actions have set the standard for safety throughout the industry. At all of the Phelps Dodge Mining Company properties, we are committed to safe production."

The award is cosponsored by the U.S. Department of Labor Mine Safety and Health Administration (MSHA) and the American Mining Congress (AMC), the U.S. mining industry's trade association.

-more-

In a separate press release, Robert B. Reich, U.S. Secretary of Labor, said that the industry's safety record in 1992 is unsurpassed. "This year's recipients of the prestigious awards have shown the way in making 1992 the safest year in U.S. mining history," he said.

Phelps Dodge Corporation is the world's second largest producer of copper. The company is also one of the world's largest producers of carbon black, the leading North American fabricator of wheels and rims for medium and heavy trucks, a major manufacturer of magnet wire and specialty conductors, and has operations and investments abroad in mines and wire and cable manufacturing facilities. The company's operations are located throughout the United States and in 24 other countries.

###

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

1. Information from: Chief Geologist & Personal visit
 Address: _____
2. Mine: Phelps Dodge 3. No. of Claims - Patented _____
MORENCI BRANCH Unpatented _____
4. Location: _____
5. Sec _____ Tp _____ Range _____ 6. Mining District Morenci
7. Owner: P. D. Corp
8. Address: Morenci
9. Operating Co.: P. D. Corp
10. Address: Morenci
11. President: _____ 12. Gen. Mgr.: J. O'Neill
13. Principal Metals: Copper 14. No. Employed: _____
15. Mill, Type & Capacity: _____
16. Present Operations: (a) Down (b) Assessment work (c) Exploration
 (d) Production (e) Rate _____ tpd.
17. New Work Planned: Pit Expansion & New Metcalf
Mine

18. Misc. Notes: ~~Work~~ Construction of Tram towers to
Evans point Lime Quarry proceeding on schedule
New Smelter stack (nearing completion, will
have inside lined with Firebrick after concrete work
finished, will take smoke from converter & other
operations around smelter

QW Quarterly Report 2/1960 -- Work by contractor (Gundt) at Morenci mine was/ahead with a
 fill, filling up the canyon next to the Morenci road tunnel. Material was obtained from the
 hill above the town.

Date: 6-4-69 G. H. Ivers (Field Engineer)
 (Signature)

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

1. Information from: Mr. O'Neill & Durek
Address: Morenci, Arizona 85540
2. Mine: Morenci 3. No. of Claims - Patented _____
Unpatented _____
4. Location: Morenci, Arizona
5. Sec _____ Tp _____ Range _____ 6. Mining District: Copper King Mt.
Copper Mt. & Metcalf.
7. Owner: Phelps-Dodge Corp.
8. Address: Morenci Arizona
9. Operating Co.: Phelps-Dodge Corp.
10. Address: Morenci Arizona
11. President: _____ 12. Gen. Mgr.: Walter Lawson
13. Principal Metals: Copper 14. No. Employed: 2010
15. Mill, Type & Capacity: Flotation, 70,000 TPD
16. Present Operations: (a) Down (b) Assessment work (c) Exploration
(d) Production (e) Rate 70,000 tpd.
17. New Work Planned: The pit is being expanded and will take in the old
Morenci townsite .
18. Misc. Notes: Expansion of the smelter will be done so as to accommodate
custom material and concentrates from the New Mexico operations at Tyrone.
A new limestone quarry is being opened at North Nob. A tram will probably
be constructed from the Evans point quarry.

Date: 12-4-68

G.W. Swann
(Signature)

(Field Engineer)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Phelps-Dodge, Morenci Date June 7, 1967
District Copper Mountain Engineer G. W. Irvin
Subject: Mine visit. Information from J. Durek.

The Mine The pit is rapidly being advanced to the south west. The site of the old engineering, geological offices, main mine shaft, and the upper townsite are either being removed or covered with waste.

A new road to the old pit visitors view point has been built, so that an excellent view of the operations can be obtained.

The dump along Chase Creek is advancing toward the highway. The collection system for the copper leaching plant can be observed. At the junction of the Chase Creek, Morenci highway, the final collection vat, pumping system and pipes leading to the mill can be seen.

Mining rate is reported at between 60,000 to 70,000 tpd.

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



Tucson Chamber of Commerce

Annual Mines Dinner - Pioneer Hotel

January 7, 1966

C
Mr. Joe Brenan of the Chamber of Commerce introduced Tucson Mayor Davis, John Haugh and Arthur Hall at the speakers' table.

O
After the preliminaries Mr. Brenan introduced Arthur Hall of American Smelting and Refining Company who introduced the speakers and visiting mining company representatives in the following order.

P
Mr. Knaebel of Anaconda and employees present.
Mr. T.A. Snedden of ASARCO and employees present.
Mr. Bowman of Banner Mining Co. and employees present.
Mr. George Atwood of Duval Corporation and employees present.
Mr. - , Purchasing Agent for Inspiration present.
Mr. Pickering of Kennecott and employees present.
Mr. Augustadt of Magma Copper Co. and employees present.
Mr. Friedman of Pima Mining Co. and employees present.
Mr. Coil of Miami Copper Company and employees present.

Y
Mr. Ben Coil talked about mining and the community paying tribute to the industry and people of the state for their ambition. He related how the mines brought the railroads, natural gas and other beneficial services. After 90 years of labor over 8 billion dollars worth of metals had been sent to market. That 32% came from the Tucson area in 1964.

That 58,000 people were directly dependent on mining for a living within the state. This included employees and services required.

→ The next speaker was Mr. Dick Moolich, ^{Also} Morenci Branch Supt. of Phelps Dodge, who summarized the Morenci water development. He described the location and size of Morenci which is No. 1 in Arizona and 3rd in the world. The largest single concentrating plant in the world. The water for this huge operation was developed by the company in cooperation with the State of Arizona, water being obtained from the Black river to and down Eagle Creek to within 5 miles of Morenci. Negotiations led to the construction of Horseshoe dam. Phelps Dodge wanted 250,000 acre feet. The Showlow dam was started in 1953, and went from 0 to 6000 acre feet by 1965.

During the last year East Clear Creek with the Blue Ridge Dam allowed the discharging of Little Colorado floodwater into the Salt River for exchange of Black River water.

One gallon of fresh water is required for each 12 pounds of copper produced.

Cost of water development for the Morenci Branch is approximately \$40,000,000.

The next speaker was Ernest G. Stebbens, purchasing agent for Kennecott operations at Ray.

The Ray division has 38,000 items on hand worth approximately \$4,000,000.

Production is 24,000 tons per day of ore and 48,000 tons of waste. The separate warehouse items are carried on 8½ x 11 cards. Every 17 days IBM inventory control is run. About 1000 purchase orders per month are issued. Special purchase orders are issued for 1 time purchases. Like items are carried on one purchase order. Most buying is on bids, more than three bidders is usual. Price is not only consideration, but dependability of the vendor for quality, speed of delivery and reliability are taken into consideration. All prices are kept confidential. The N.Y. office of the corporation buys much in Arizona. Purchasing may be: -

- (1) Blanket orders for a set time
- (2) Delayed delivery for large quantities
- (3) Contract buying

The vendor requirements are reliability and integrity. At Ray locomotives, trucks, tractors and related parts are a large part of the orders. At Hayden mill and smelter equipment. At the lime quarry the usual items for a small mine. The general offices, paper. At Kearny, the hospital. A wide range of activity except airplanes and airplane photos. The Buyer-Seller relationship is a two way street.

Mr. Doug Muller, Anaconda Purchasing Agent. Local buying procedures and mechanics of buying very important to the company and the community. Anaconda strives to be a part of the community. If properly done, the company can operate with a smaller inventory. The big problem is availability. The local supplier must be competitive. The questions for the company are: -

- (1) What do we need?
- (2) How much we need?
- (3) When do we need it?
- (4) Where shall we buy it?

The company likes to maintain a low inventory if possible. Many vendors may have the same or like items. The purchasing department should be kept informed of the local supplies available by the vendors. The local vendors are rated:

- A - competitive
- B - same as A but not as complete a selection
- C - rely on manufacturer to fill orders as received (for common stock items)

On large items a formal quotation is required.

G Kenyo - of the Duval Corporation. The purchasing is responsible for locating reliable suppliers and expects them to be

- (1) competitive
- (2) quality
- (3) service - the most difficult quality to measure.

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA 85003

Tucson Chamber of Commerce - Annual Mines Dinner - page 3

The handling of the purchase order, the delivery, following of instructions, packing, shipping etc. The service should be accurate and the billing prompt. Quick response to complaints and interest in product performance. Service is not a 1 man job. Each representative of a selling organization is a salesman. The man on the telephone desk is probably not recognized. Tucson has very good telephone men at desk, however it was not always thus. To relate an experience of 7 or 8 years ago. A piece of vital equipment broke down and the maintenance men with greasy hands and coveralls walked into the office. The long parts numbers on greasy paper were related to the suppliers desk man. After relating all of this the desk man replied, "I guess that I should get a piece of paper and write these numbers down."

Joe Brennan thanked every one concerned for the help in making the program a success. Thanked Jack Redman of the C of C for the mechanics of the invitations.

Introduced the purchasing agents of the Hughes Company and Davis Monathan, General & aid in charge of procurement.

G.W. Irvin - Field Engineer - 1-19-66



STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX 7, ARIZONA



Tucson, Arizona,
Nov. 5, 1963

MEMORANDUM

To: Frank P. Knight, Director
From: Axel L. Johnson, Field Engineer
Re: Proposed construction of an LPF Project at Morenci Branch of Phelps Dodge.

The following information was received from Matt Danenhauer on Oct. 8, 1963:

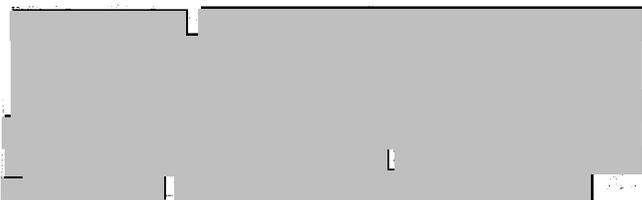
Parsons-Jurden Corporation of New York City has the contract to build a new LPF plant for the Phelps Dodge Corp. at Morenci.

A few men, associated with the technical staff of the contractors, are already working on the project, doing preliminary planning and surveys. Construction work is just about ready to get under way. It is reported that 300 construction workers will be employed by Parsons-Jurden Corp. for from 12 to 18 months, during construction of the plant.

Engineer will visit the project and contact Dick Moolick, Chief Engineer of the project for Phelps Dodge on his next visit to the Clifton-Morenci area in December.

References: Pay Dirt for May 17, 1963, on page 5.

Mining Engineering - February 1964



P.D. file

STORY OF COOPERATION BY FARMERS AND
MINERS TOLD TO WATER RESOURCES GROUP

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

ANOTHER SOURCE

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

Taken from ARIZONA NEWS - Friday, September 29, 1961, p 3



STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX 7, ARIZONA



February 18, 1965

MEMORANDUM

To: Frank P. Knight, Director
From: Axel L. Johnson, Field Engineer

Subject: Phelps Dodge operations in the Morenci District.

Following information was received on Feb. 3, 1965 from Joseph J. Durek, Chief Geologist, Phelps Dodge Corp.

- (1) The construction work on the new LPF plant is approaching the advanced stage. This work is done on contract to the Parsons-Jurden Corp. A few preliminary trial runs have been made on the acid plant and a few corrections made. The plant is expected to be ready for operation next June or July.
- (2) The old Christie Exploration Project, a long adit just east of Highway 666, the Coronado Trail road was shut down on Nov. 5, 1964.
- (3) Diamond drilling is being done by Joy Manufacturing Co. drilling division with 2 rigs on the east edge of the Morenci pit to obtain additional information on the outline of the Morenci ore body.
- (4) Diamond drilling is being done by Joy Manufacturing Co. drilling division with 1 rig on the Safford Project north of Safford for the purposes of discovery and assessment work.

DEPARTMENT OF MINERAL RESOURCES

STATE OF ARIZONA
FIELD ENGINEERS REPORT

Phelps-Dodge

Mine Stargo Mines

Date June 14, 1960

District Copper Mountain, Greenlee County

Engineer Lewis A. Smith

Subject: Studied in November 1938.

Present Owner: Phelps Dodge Corporation, Morenci, Arizona

The veins are in a series of intersecting fault fissures cutting Paleozoic sedimentary limestone series and Coronado quartzite with attendant replacement along favorable bedding planes. In most cases, replacements have extended out along favorable beds of quartzite, the most favorable ore horizon in this particular property, but some limestone has been locally replaced.

The Stargo has been idle for some time due to the failure of the last operators to develop sufficient ore reserves to maintain constant operations in their cyanide quartz mill. The best assays were obtained at or near the surface (outcrop), decreasing materially at a fairly shallow depth of approximately 150 to 170 feet. The distribution of the ore shoots and the erratic character of the values and shallowness of ore in them would indicate that the condition here is similar to that in some other properties throughout the southwest.

The gangue is composed of quartz and other siliceous materials similar to chalcedony.

Three definite sets of faults predominate. The Stargo system runs nearly N. - S.; the "X" system strikes about N. 45° E.; and the third prominent set strikes N. 45° W. As is usually the case where a system of faults of this nature have been developed, it is natural that there should be conjugate fracturing as slips, and jointing, numerous ^{examples} of which are present underground. All of the larger faults systems are accompanied by considerable brecciation, which, in this particular case, is partly replaced by vein material. In the shaley members, healing is gone to such a extent that it is difficult to trace the line of even the larger faults. In some cases the breccia has been completely replaced, but in other cases, it has only been cemented by gangue material. Apparently in many cases, and perhaps in most cases, replacement has occurred at the expense of the matrix before the fragments were attacked. The ore shoots appear to have been localized by structural dams such as fault intersections and change of formation, etc.

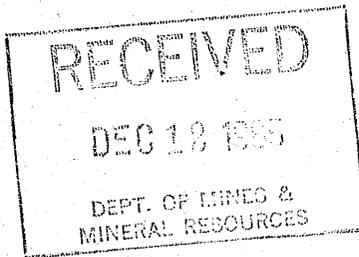
The Craig Vein runs N. - S. and parallels the Stargo Vein, and it lies from 1800-2000 feet west of the Stargo. Block-faulting is commonly seen near the crest of the range and apparently has affected all of the formations below the Cretaceous. "X" vein as developed lies wholly in the Longfellow Limestone at the surface and parallels a down-drop segment of the Morenci Shale, at about 20-50 feet northwest of the fault-escarpment. Rarely do these faults appear in the Morenci Shale, some being outlined only by the disarrangement of blocks. Segments of the Modoc Limestone (K) have been dropped down in places into the earlier formations. The Longfellow formation has been severely block cut and either was raised up into the younger formations or else the younger formations have been dropped down around it. From the general structure of the region, it is more than likely that the former condition is true. From all indications available, it would appear that the N. - S. fault system is pre-Modoc and that the other two systems are post-Modoc. Certain indications tend toward the theory that much of the Stargo mineralization came in along cross-faults (post-Modoc) from a porphyritic intrusion (probably monzonite porphyry) which is close at hand.



Phelps Dodge Corporation

Western General Offices, Office of the General Manager
Phelps Dodge Tower, 2600 N. Central Avenue, Phoenix, AZ 85004-3015 • (602) 234-8100

NEWS RELEASE



FOR IMMEDIATE RELEASE

CONTACT: R. W. Pendleton, Jr.
(212) 940-6462

CONTACT: M. P. Scanlon
(602) 234-8113

NEW YORK, NEW YORK, December 11, 1985 -- Phelps Dodge Corporation, currently the country's largest producer of copper, today announced a \$90 million project to expand the capacity of its Morenci, Arizona copper operations by 35,000 tons of copper annually beginning in mid-1987, increasing to 45,000 annual tons by the end of the decade. The company will produce about 400,000 tons of copper in 1985, mostly from its operations at Morenci and at Tyrone, New Mexico.

The major portion of the expansion project will be the construction of a solvent extraction/electrowinning plant similar to the company's SX/EW plant at Tyrone. The \$35 million Tyrone plant came on stream in April, 1984 with a production capacity of about 15,000 tons of copper per year; a \$15 million expansion that doubled the plant's capacity went into operation on December 1, 1985. The Tyrone plant produces electrowon copper at a cost of less than 30 cents per pound, a performance that is expected to be duplicated by the new Morenci facility.

Phelps Dodge has previously announced its plans to joint venture the Morenci operations with Sumitomo Metal Mining Co. In this transaction, which is expected to close shortly, Sumitomo will purchase a 15% interest in the operations. The SX/EW plant and related facilities will be included in the joint venture, with each party sharing pro rata in its costs and resulting production.

GRAHAM COUNTY

1903 Graham Co.

The works of the Arizona Copper Company are situated on the San Francisco River, at Clifton, and the mines are from 4 to 9 miles distant. An elaborate system of mining tramways and gravity inclines connect the mines with the metallurgical plant, three locomotives being constantly employed in feeding the plant with raw ores and transporting the coke, merchandise, and copper of the Detroit-Copper Company. The principal mines are the Longfellow, Detroit, Joy, and Metcalf. Of these, the Longfellow is the most famous, having been a steady producer for over eighteen years. The more profitable ores occur in a lime and porphyry contact. This company gives employment to 600 men. It pays out in wages over \$400,000 annually. It treats 170 tons of ore per day and is producing 340 tons of copper per month; it pays about one-fifth of the entire taxes of the county, \$12,000 a year. Two years ago, this company added to its plant for the treatment of its low-grade ores a sulphuric acid works, with a capacity of ten tons of strongest sulphuric acid per day, this being the first of its kind in the country. A leaching plant, equipped with lead-lined pipes and tanks and the latest improvements, with a capacity of 100 tons low-grade ore per day, is also in successful operation and yielding 120 tons of copper per month.

The Arizona and New Mexico Railroad belongs to the same company, and runs from Clifton to Lordsburg, on the Southern Pacific Railroad, a distance of 71 miles, 41 miles being in Graham County. It is a narrow gauge, and is used exclusively in the work of the copper camp. It gives employment to 70 men. Without this road it would be impossible for the copper mines to continue operations.

The Detroit Copper Company has a plant consisting of four blast furnaces, with a capacity of 220 tons per day; also a concentrating mill of 100 tons capacity. The plant and pipes are all located at Morenci. The water supply is pumped from the Gila River, a distance of 7 miles. The Detroit Copper Company has been a steady producer for ten or twelve years.

THE ARIZONA COPPER CO.

(Morenci)

1897

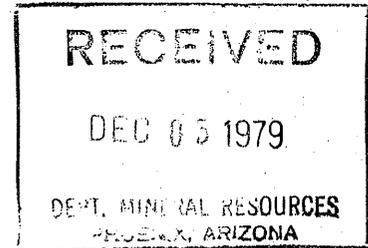
The present plan of the Arizona Copper Company consists of four smelting furnaces, having a capacity of 400 tons per day; one sulphuric acid plant, capacity 8 tons per day; one siliceous ore concentrating plant, capacity 180 tons per day, and one sulphide ore concentrating plant with a capacity of 150 tons per day. The output of this company five years ago was equal to about 6,000,000 pounds of copper per year; in 1895 it had almost doubled, amounting to 11,500,000 pounds, and last year topped all of its previous records by producing 13,000,000 pounds. At this time over half the output is made from concentrating and leaching ores. The original owners could not treat anything less than 20 per cent ore. Today ores as low as 3 per cent in copper are treated with profit. With the assistance of the Bessemer plant, now being put in position, a slightly larger output may be expected. The mines, however, are not being strained by immense daily outputs, the owners, like the owners of other Arizona copper mines, preferring that the mines should be treated as permanent and enduring enterprises, to the end that time may be given for development of the large undeveloped territories tributary to them.



Morenci Branch, Morenci, Arizona 85540

Morenci Mine (file)

December 4, 1979



Arizona Department of Mineral Resources
Mineral Building - State Fairgrounds
McDowell & 19th Aves.
Phoenix, Arizona 85007

Dear Sir:

This letter is intended as a request for information regarding the mineral commodity potential of massive andradite garnet. The Phelps Dodge open pit copper mine at Morenci contains considerable quantities of massive andradite garnet which runs over 95% in purity and contains no significant copper mineralization. The material is currently being shipped to the waste dumps. Since it would appear that this material has some potential as an abrasive, we have recently launched a mineral commodity evaluation of it. Since we have very little data available on this subject, any information which your organization can supply would be of great assistance.

Thank you for your time and trouble.

Very truly yours,

J. W. Reynolds

J. W. Reynolds
Geologist

JWR:tlw
c: JWR
Geology

*1975 Mineral Fact & Problem
1978*

RECEIVED

AUG 5 1983

DEPT. HUMAN RESOURCES

PHOENIX, ARIZONA

Ken Bennett
Executive Assistant

**phelps
dodge**
Corporation

Office of the General Manager
Phelps Dodge Tower, 2600 N. Central Avenue
Phoenix, AZ 85004-3015 • (602) 234-8100

Attached for your information
is the latest letter sent to all
union-represented employees and
laid-off employees of Phelps
Dodge who remain on strike at Morenci,
Ajo and Douglas.

on
KAPPS

August 2, 1983

TO EACH EMPLOYEE WHO IS STILL ON STRIKE, AND EACH LAID-OFF EMPLOYEE WHO HAS NOT YET RETURNED TO WORK:

Negotiations with the unions have broken off, and no further meetings are scheduled. It looks like there will not be a negotiated settlement for a long time.

Nearly 700 of your fellow employees and laid-off employees have returned to work in our Arizona operations. This means that almost 700 permanent jobs now belong to them.

About 2,250 strikers and laid-off employees have not yet returned to work, and it looks like the Company has about 1,500 more permanent jobs to be filled. So it is obvious that after we have filled all of the remaining permanent jobs, several hundred of the people who receive this letter, possibly including you, will not have a job with Phelps Dodge.

Too many people for too few jobs is like a game of musical chairs. Have you thought about what it means to you and your family if you don't have a chair when the music stops?

- . As was stated in an earlier letter to you, the Company would be required to put your name on a "preferential reinstatement list." But, as was also stated in that letter, nobody knows at this time whether you would ever get back on a Phelps Dodge payroll, or if you did, how long it would take.
- . You would have almost no chance of finding another job as good as the one you had with Phelps Dodge. Thousands of miners are already laid off from the other mines in the state, and with unemployment as high as it is in Arizona and all over the country, what do you think your chances would be of finding a job in some other industry that provides the same kinds of wages and benefits you had at Phelps Dodge?
- . Even if you could find some low-wage, low-benefit job, it probably would require you to move to some other town. This means that you would have to find somewhere else to live; you would have to pay all of the expenses of moving your furniture and other household goods; and if you have children at home, they would have to give up their friends and classmates and suffer the disruptions of moving to a new neighborhood and a new school.

August 2, 1983

- . You would have to start from zero in building a pension with your new employer.
- . You would start with zero vacation service with any new employer, so you would either be eligible for no vacation or the minimum.
- . Even if your new employer provided hospitalization and insurance plans (and many employers do not), you might have to stay on the payroll for a certain length of time before you and your family would be eligible for benefits. In addition, you might have to serve a probationary period during which you could be fired by your new employer without appeal.
- . If there was a seniority list for your new job, you would be at the bottom of it; you would be the last to be promoted and the first to be laid off.

The time has come for you to do what is best for you and your family. Remember, when all of this is over, someone is going to have each one of those 1,500 jobs. If it isn't you, it will be someone else - it might as well be you.

P.D. MORENCI F.W.



Office of State Mine Inspector

705 West Wing, Capitol Building
Phoenix, Arizona 85007
602-255-5971

STATE MINE INSPECTOR

OCT 14 1983

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303* we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start/stop (please circle one) a mining operation.

COMPANY NAME Phelps Dodge Corporation

CHIEF OFFICER S. C. Holmes

COMPANY ADDRESS P. O. Box 151

COMPANY TELEPHONE NUMBER 428-6900

MINE OR PLANT NAME Cragg Vein

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

Located on the Morenci Mine property, Morenci, Arizona

TYPE OF OPERATION Development PRINCIPAL PRODUCT Silver-Silica

STARTING DATE Oct. 3, 1983 CLOSING DATE DNA

DURATION OF OPERATION DNA

PERSON SENDING THIS NOTICE S. Soriano

TITLE OF PERSON SENDING THIS NOTICE Safety Inspector

DATE NOTICE SENT TO STATE MINE INSPECTOR 9-30-83

*A.R.S. Section 27-303 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.



RECEIVED
JAN 30 1985
DEPT. MINERAL RESOURCES
PHOENIX, ARIZONA

NEWS RELEASE

Morenci mine (A)

CONTACT

Richard W. Pendleton, Jr.
(212) 940-6462

NEW YORK, January 28, 1985 -- Phelps Dodge Corporation today announced that it has entered into a letter of intent with the Sumitomo Metal Mining Co., Ltd. and Sumitomo Corporation for the possible sale of a significant minority interest in Phelps Dodge's copper mining properties and facilities in Morenci, Arizona, including the Morenci and Metcalf open pit mines and concentrators. The Morenci smelter, which was temporarily closed at the end of 1984, will not be included in the sale.

In announcing the letter of intent, G. R. Durham, President of Phelps Dodge, noted: "We are pleased to report this development. The Sumitomo companies have earned a fine reputation throughout the world. We have been business partners in Latin America and the Far East for many years and work comfortably with each other. The joint venture of our Morenci copper operations with Sumitomo should be a good fit for, and benefit, both parties."

The transaction is scheduled to close by the middle of this year. Phelps Dodge will remain the operator of the properties, which can produce more than 200,000 tons of copper annually.

The sale is contingent on the purchasers' satisfaction with the results of their investigation of the properties and facilities, the negotiation of a mutually satisfactory price and definitive contract, and approvals by the board of directors of each party and by relevant governmental authorities.



Corporation Safford Branch, P.O. Box 151, Safford, Arizona 85546

STATE MINE INSPECTOR

SEP 04 1984

August 31, 1984

Stop

Mr. James H. McCutchan
State Mine Inspector
State of Arizona
705 Capitol Building, West Wing
Phoenix, AZ 85006

Dear James:

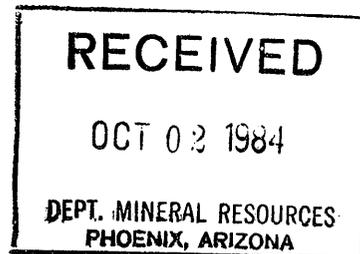
The Small Mines Division of Phelps Dodge Corporation suspended exploration operations at the Cragg Vein legal I.D. No. 02-00024-B1F, on August 24, 1984. There are no current plans for resuming operations in the near future.

Yours truly,

A. Soriano

S. Soriano
Safety Inspector

SS:lw



P. D. MORENO (F)

Morenci

P.D. Morenci (P)

STATE MINE INSPECTOR



SEP 01 1984

Office of State Mine Inspector

705 West Wing, Capitol Building
Phoenix, Arizona 85007
602-255-5971

Stop

RECEIVED
OCT 02 1984
DEPT. MINERAL RESOURCES
PHOENIX, ARIZONA

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303, we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start/stop (please circle one) a mining operation.

COMPANY NAME Phelps Dodge Corporation

CHIEF OFFICER S. C. Holmes

COMPANY ADDRESS P.O. Box 151, Safford, AZ 85548-0151

COMPANY TELEPHONE NUMBER 428-6900

MINE OR PLANT NAME Cragg Vein

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

.Located on Morenci Mine property.

TYPE OF OPERATION Underground PRINCIPAL PRODUCT Exploration

STARTING DATE 9/26/83 CLOSING DATE 8/24/84

DURATION OF OPERATION _____

PERSON SENDING THIS NOTICE S. Soriano

TITLE OF PERSON SENDING THIS NOTICE Safety Inspector

DATE NOTICE SENT TO STATE MINE INSPECTOR 8/28/84

*A.R.S. Section 27-303 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.



NEWS RELEASE

RMS

Western General Offices, Office of the General Manager
Phelps Dodge Tower, 2600 N. Central Avenue, Phoenix, AZ 85004-3015 • (602) 234-8100

For release

9:00 a.m.

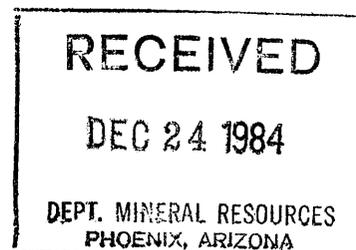
Saturday, December 22, 1984

PHOENIX, December 22, 1984 - Phelps Dodge Corporation's Morenci copper smelter at Morenci, Arizona will be temporarily shut down on December 31, 1984. Smelter employees will continue to work beyond that date for periods ranging from a few days to several weeks, mothballing smelter equipment in order to permit the facility to be started up efficiently when the price of copper improves.

The shutdown is attributable to present and projected costs for air pollution control measures mandated by state and federal environmental regulations. The costs of operating the air pollution control facilities the company has been required to install, and the inefficiencies of operating the smelter at the substantially curtailed production rates required to meet air quality standards, are so great that the plant cannot be run at a profit at today's copper prices. In addition, significant capital expenditures for additional air pollution control equipment would be required to permit the smelter to continue operating in 1985.

About 450 employees will be affected. Some will be absorbed in other divisions at Morenci or will be transferred to other Phelps Dodge operations in Arizona or New Mexico, others will take early retirement, and the remainder will be placed on indefinite layoff. The company cannot predict at this time when or at what copper price the smelter would be reopened.

#





Morenci (F)
DS
C

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Governor Jane Dee Hull

Jacqueline E. Schafer, Director

NOTICE OF PRELIMINARY DECISION TO ISSUE AN AREA WIDE AQUIFER PROTECTION PERMIT NUMBER P-100193

**Public Notice No. 80-00 APP published on Wednesday, July 26, 2000
in The Tribune, Eastern Arizona Courier and the Copper ERA**

Pursuant to Arizona Administrative Code, Title 18, Chapter 9, Article 1, the Director of the Arizona Department of Environmental Quality is issuing an area wide Aquifer Protection Permit Number P-100193 to the following applicant;

Phelps Dodge Incorporated
Morenci District
4521 U.S. Highway 191
Morenci, AZ 85540

Phelps Dodge Morenci, Incorporated is located in Greenlee County, Arizona, near the towns of Clifton and Morenci. The site is located over the Morenci Groundwater Basin as described below using the Gila and Salt River Baseline and Meridian:

Township 3 South, Range 29 East, Sections 21, 22, 23, 26, 27, 28, and 32 - 35
Township 4 South, Range 29 East, Sections 1 - 36
Township 5 South, Range 29 East, Sections 1 - 12, and 14 - 17
Latitude 33° 05' 15"N
Longitude 109° 22' 00"W

The Morenci District is authorized by Aquifer Protection Permit No. P-100193 to conduct mining operations within the open pit, various development rock and leach stockpiles, numerous pregnant leach solution and raffinate ponds, non-stormwater and stormwater impoundments, tailing impoundments, concentrators, solvent extraction/electrowinning (SX/EW) facilities, a waste water treatment plant and other ancillary facilities associated with copper mining. The Morenci District produces copper concentrate and cathode copper through mining, milling and SX/EW processes. Molybdenum concentrate and minor amounts of gold and silver are produced as by-products.

With 24-hour notice the permit and associated technical documents are available at two locations. The documents may be viewed at the Morenci Library located in the Morenci Plaza, Morenci, AZ 85540, Monday through Friday from 10:00 a.m. to 2:00 p.m. and then again from 3:00 p.m. to 7:00 p.m. Please call 520-865-2775 to schedule an appointment to review the documents. In addition, the documents can be viewed at the Arizona Department of Environmental Quality (ADEQ), 3033 N. Central Ave., Records Management Center, Lower Level, Phoenix AZ. 85012-2809. Please call 602-207-4378, to schedule an appointment to

review the file.

Persons may submit comments on the proposed actions, in writing, within thirty (30) days from the date of this published notice. The written comments must be submitted to ADEQ, 3033 N. Central Ave., M0401A, Phoenix AZ 85012-2809, Attention: Julie Riemenschneider.

NOTICE OF PUBLIC HEARING

ADEQ will hold concurrently a public workshop and public hearing on August 28, 2000, from 2:30 p.m. to 8:00 p.m., at the Morenci Club, located in the Morenci Plaza, Morenci AZ 85540.

Any person may appear at the public hearing and may present their views orally or in writing. Written comments may also be sent to ADEQ at the above referenced address. We anticipate that a decision will be made on this permit within a maximum of thirty (30) days.

No Rele. (F) 6/22/98

HMC

12



NEWS RELEASE

2600 N. Central Avenue, Phoenix, AZ 85004-3014 • [602] 234-8100

For Immediate Release
Contact: Thomas M. Foster
(602) 234-8139

PHELPS DODGE MORENCI REPORTS CONVEYOR FAILURE

PHOENIX, Arizona – December 26, 1997 – Phelps Dodge Corporation today reported the failure of a section of the ore conveyor system at its Morenci, Arizona, copper mining and processing facility on December 23, 1997. No injuries occurred as a result of this incident. Alternate ore transport systems are currently being made operational. Repair and reconstruction activities have begun and currently are estimated to be completed within 30 to 45 days. The conveyor shutdown is expected to reduce Morenci's concentrate production by 20 million to 30 million pounds of contained copper, and production costs will increase until necessary repairs to the conveyor system are completed. There will be no impact on Morenci's solution extraction/electrowinning cathode production, which accounts for more than 50 percent of the operation's output. The cause of the failure is not yet known.

The conveyor system, which delivers ore from the mine to the Morenci and Metcalf concentrators, travels approximately 2 ½ miles across the facility to deliver 8"-diameter broken copper ore to the intermediate ore stockpile. At approximately 7:30 a.m. (MST) on December 23, a 185-foot section of the conveyor system collapsed at the point at which it crosses Arizona Highway 191.

Phelps Dodge Corporation is among the world's largest producers of copper, operating mining and manufacturing facilities that employ more than 16,000 people in 26 countries.

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Update: Phelps Dodge Morenci Land Exchange

August 1996

Summary:

Phelps Dodge Corporation, a mining company, has proposed the Morenci Land Exchange in which Phelps Dodge would acquire approximately 3,770 acres of public lands (selected land) adjacent to their existing Morenci Copper Mine in Greenlee County, Arizona. In exchange, the BLM Safford District would acquire approximately 1,040 acres of privately held land (offered land) occurring in four parcels located in Greenlee, Graham, Cochise and Pima counties.

Background:

Phelps Dodge Mining Company, the mining and metals division of Phelps Dodge Corporation, is one of the world's largest producers of copper and continuous-cast rod. The Morenci Mine produced 874 million pounds of copper in 1995, about 20 percent of the nation's total domestic copper production.

Phelps Dodge is seeking to consolidate its land holdings within and adjacent to areas of ongoing mineral development at the Morenci Mine. The company intends to use a portion of the selected land to support and expand current mining-related operations, with the remainder used for site security and environmental buffers. In exchange, BLM has the opportunity to acquire lands containing important natural resources and other values.

The Proposed Action is consistent with BLM's Safford District Resource Management Plan (RMP), which identifies the selected lands for potential disposal. The offered lands are located within three Long-Term Management Areas (LTMA's) identified by the RMP. Criteria for lands to be acquired within LTMA's include: lands with riparian habitat; lands within watersheds of important riparian areas; land with high value wildlife habitat; land for administrative sites, developed recreation sites; lands with significant cultural and paleontological properties; and lands within special management areas.

Current Status:

Four public open house meetings were held during December 1994, in Safford, Clifton, Phoenix, and Tucson to provide information to the public concerning the proposed exchange. A Draft Environmental Impact Statement (EIS) was published in December 1995. Currently, the Final EIS is being prepared and will be distributed to the public on October 1, 1996. A Record of Decision will be published in December 1996.

BLM Position:

BLM has authority to complete the exchange under Section 206 of the Federal Land Policy Management Act of 1976, after considering whether the exchange will 1) provide the opportunity to achieve better management of federal lands; 2) meet the needs of state and local residents and their economies; and 3) secure important objectives, including but not limited to, protection of fish and wildlife habitats, cultural resources, watersheds, and wilderness and aesthetic values. After careful analysis and consideration, which includes the preparation of an EIS, BLM will be in a position to finalize its decision.

Contact:

Carol Kershaw, BLM Arizona State Office
602/650-0235

Denise Meridith, BLM Arizona State Director
602/650-0500

STATE MINE INSPECTOR

NOV 13 1986

MORENCI mine (A) Gary
FOR OFFICE USE ONLY
START-UP NUMBER 63911183
STATE NUMBER _____
MSHA NUMBER _____

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303, we are submitting this written notice to the Arizona State Mine Inspector of our intent to start stop _____ move _____ (please check one) a mining operation.

If this is a move, please show last location: _____
If you have not operated a mine previously in Arizona, please check here: If you want the Education & Training Division to assist with your mine safety training, please check here: _____ If this operation will use Cyanide for leaching, please check here: _____

COMPANY NAME: Drilling Services Company

DIVISION: _____

MINE OR PLANT NAME: Morenci Mining TELEPHONE: (602) 865-4521

CHIEF OFFICER: James L. Witt

COMPANY ADDRESS: 9002 S Hardy Dr.

CITY: Tempe STATE: AZ ZIP CODE: 85284

MINE OR PLANT LOCATION: (Include county and nearest town, as well as directions for locating property by vehicle) _____

Morenci, Greenlee Co., Arizona

Morenci Mine

TYPE OF OPERATION: Exploration Drilling PRINCIPAL PRODUCT: Rock Samples
approximately *approximately*

STARTING DATE: 11-1-86 CLOSING DATE: 11-20-86 DURATION: 3 weeks

PERSON COMPLETING NOTICE: Jon Clark TITLE: Sales Engineer

DATE NOTICE MAILED TO STATE MINE INSPECTOR: 11-7-86



ARIZONA DEPARTMENT OF HEALTH SERVICES

Handwritten initials

BRUCE BABBITT, Governor
BOYD DOVER, Acting Director

JOINT NOTICE OF PROPOSED ACTION

by the

RECEIVED
NOV 04 1986
DEPT. OF MINES &
MINERAL RESOURCES

U. S. Environmental Protection Agency
Region 9 (W-5-1)
215 Fremont Street
San Francisco, CA 94105

State of Arizona
Department of Health Services
2005 North Central Avenue-Room 300
Phoenix, AZ 85004

Telephone: (415) 974-8105

Telephone: (602) 257-2270

On Application for National Pollutant
Discharge Elimination System (NPDES)
Permit to Discharge Pollutants to
Waters of the United States

On Application for Certification
for Compliance with Applicable
Effluent Limitations and
Appropriate Requirements of the
State of Arizona

The Environmental Protection Agency (EPA), Region 9, San Francisco, California, and the Arizona Department of Health Services (ADHS) are jointly issuing the following notice of proposed action under the Clean Water Act (CWA).

The Environmental Protection Agency, Region 9, San Francisco, California, has received a complete application for a National Pollutant Discharge Elimination System (NPDES) permit and has prepared tentative determinations regarding the permit.

On the basis of preliminary review of the requirements of the Clean Water Act, as amended, the implementing regulations, the Regional Administrator, Region 9 Environmental Protection Agency, proposes to issue an NPDES permit to discharge to the following applicant, subject to certain effluent limitations and special conditions.

Public Notice No. 42-86-AZ

November 5, 1986

Phelps Dodge Morenci, Inc.
c/o Phelps Dodge Corporation
~~Morenci Branch~~
Morenci, Arizona 85540
NPDES Permit No. AZ0022705

The Department of Health Services is An Equal Opportunity Affirmative Action Employer

Central Palm Plaza Building

2005 North Central Avenue

Phoenix, Arizona 85004

The applicant operates the Morenci Mine in Greenlee County, Arizona. The proposed discharge will consist of storm water overflow and Chase Creek Diversion water. There are three discharge points. They are located at the following coordinates: No. 001 - latitude 33° 04' 07" N, longitude 109° 19' 49" W; No. 002 - latitude 33° 04' 53" N, longitude 109° 23' 35" W; and, No. 003 - latitude 33° 03' 20" N, longitude 109° 18' 36" W. The receiving waters are Chase Creek and Gold Gulch, tributary to the San Francisco River. The San Francisco River has protected uses of Aquatic and Wildlife, Domestic Water Source, Full Body Contact, Agriculture Irrigation and Agriculture Livestock Watering. The proposed permit contains effluent limits for Cadmium, Copper, Lead, Mercury, Zinc and pH. The permit, as proposed, will expire five years after the effective date of the permit.

The State of Arizona is considering a request to certify the discharge described above, pursuant to Section 401 of the Clean Water Act. The certification will set forth any limitations and monitoring requirements necessary to assure compliance with water quality standards under Section 303, areawide waste treatment management plans under Section 208(e), effluent limitations under Sections 301 and 302, standards of performance under Section 306, or prohibitions, effluent standards or pretreatment standards under Section 307 of the CWA, and any other appropriate requirement of State law.

The State may certify a draft permit and specify conditions which are more stringent than those in the original draft permit, where the State finds such conditions necessary to meet the requirements of the CWA. For each more stringent condition, the certifying State agency shall cite the CWA or State law references upon which that condition is based. Review of appeals of limitations and conditions attributable to State certification shall be made through the applicable procedures of the State.

The Administrative Record, which includes the application, draft permit conditions and other relevant documents, is available for public review Monday through Friday from 9:00 a.m. to 4:00 p.m. at the EPA address below. A copy of the draft permit and other pertinent documents may be obtained by calling or writing to the addresses below.

Persons wishing to comment upon or object to the proposed determinations or request a public hearing pursuant to 40 CFR 124.12 should submit their comments or request in writing within thirty (30) days from the date of this notice, either in person or by mail to:

U. S. Environmental Protection Agency
Region 9 (W-5-1)
Attn: Andrew Lincoff
215 Fremont Street
San Francisco, CA 94105

State of Arizona
Department of Health Services
Attn: Wayne H. Palsma - Room 300
2005 North Central Avenue
Phoenix, AZ 85004

Telephone: (415) 974-8284

Telephone: (602) 257-2270

All comments or objections submitted within thirty (30) days from the date of this notice will be considered in the formulation of the final determinations regarding the application. If the response to this notice indicates a significant degree of public desire for a public hearing, the Regional Administrator shall hold one in accordance with 40 CFR 124.12. A public

notice of such hearing will be issued at least thirty (30) days prior to the hearing. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

The permit will become effective thirty-three (33) days following the date of mailing by the EPA of the final permit. If no comments request a change in the draft permit, the permit will become effective three (3) days from the date of mailing.

A request for an evidentiary hearing may be submitted to the Permits Record Coordinator, (W-5-1), within thirty-three (33) days following the mailing of the final determination, in accordance with 40 CFR 124.74. If granted, applicable provisions of the permit will be stayed pending the hearing.

Please bring the foregoing notice to the attention of all persons you know would be interested in this matter.

Greenled

TAKEN FROM THE REPORT OF THE GOVERNOR 1897

MORENCI, AND THE DETROIT COPPER COMPANY

The town or mining camp of Morenci is one of the most picturesque in the Territory. It is located 7 miles from Clifton in the hills, being some 1,500 feet higher. The town is built on a series of sloping hills. The population is largely Mexican, that class of labor predominating in the mines there. The town is built on the "catch-as-you-can" plan, and houses of all shapes and sizes built of adobe, mud, lumber, rocks, barrel staves, canvas, etc., are to be seen clinging to the steep hillsides, one above the other, covering a space of probably half a mile square.

Morenci is the home of the Detroit Mining Company, who have a magnificent reduction plant, consisting of a large concentrator, several huge smelting furnaces, and a Bessemer converter plant, the latter having been put in successful operation last year and being the first operated in the Clifton district. The output of this plant was greatly increased by the addition of the converter process, and may now be estimated at near 750,000 pounds of copper monthly.

Moranci

May 12, 1952

Mr. Warren E. Penzi, General Superintendent:

Herewith is a report on the partly leached area recently uncovered in the Humboldt Cave area.

The rock is a dense, fine-grained, monzonite porphyry containing numerous small disseminated specks of pyrite coated by chalcocite (altering to covellite). The absence of notable veinlets of sulphides distinguishes this local area from the main Copper Mountain Dike and the Pit area to the north. The fracturing is less intimate on the average. The micas, in this material, are relatively less altered than in the other areas. There appears to be much less kaolinization, from secondary causes, except in a thin halo adjacent to the fractures. This rock probably represents a borderline "shell" facies, of the main Copper Mountain Dike, which has cooled more rapidly and is therefore denser, finer-grained, and consequently more resistant to oxidizing solutions. For these reasons it was partly preserved. See figure 1:

Main Dike Coarse
Monzonite Por-
phyry

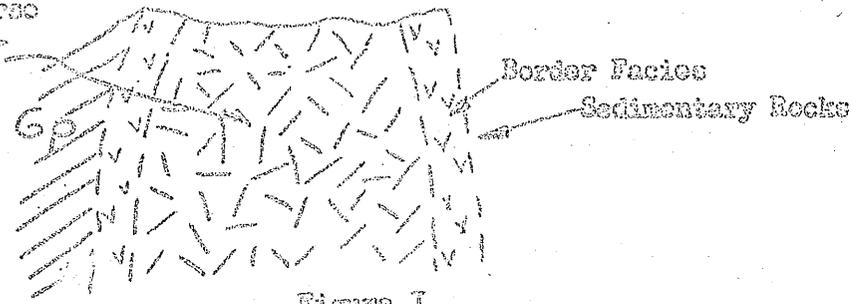


Figure 1

The denseness, or "tightness" of the rock is the main reason that Scott's solutions were relatively ineffective in this area.

The sulphides in the more leached material are composed of pyrite coated by spongy covellite together with considerable later molybdenite. The pyrite is becoming pitted by oxidation and the rock is heavily stained by limonite. Chalcantite, and some brochantite and malachite, represent the main copper oxidation products. They are present because of some reactivity in the area. The spongy covellite is probably more leachable than the denser, blue, thin-coated covellite, from Medler and Colorado orebodies. The latter was formed from solutions in which the copper concentration was too weak to form chalcocite, rather than having been derived from the oxidation of chalcocite.

Since the tested material can possibly be typical of much material along the west border of the Copper Mountain Dike, it is well worth testing in the Leach Test Plant. Due to its resistance to leaching in place, it is apt to be the bulk of the material preserved above the bottom of the cave, or along the sides (Drag). No information as to the thickness of the border facies is now available because of the

May 12, 1952

cave. Therefore no volume determinations can be made. The following diagram shows the probable distribution of Leach Material.

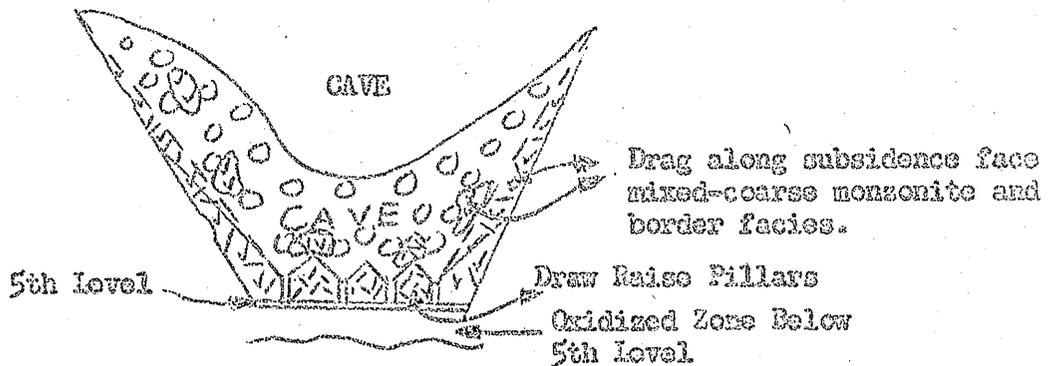


Figure II

However, it is not unreasonable to suppose that this type of material could be typical of the Butler area.

The fine dissemination, but for the larger veins, would indicate that fine ($\frac{1}{4}$ to $\frac{1}{8}$ "") crushing would be desirable in the tests, in order to obtain satisfactory extraction.

Due to the presence of notable molybdenite and relatively light oxidation of the copper in much of the material coupled with the necessity of relatively fine crushing, it is probable that part of this material would be more suitable for concentration than for leaching.

Later, it is believed advisable to obtain samples of the oxidized pillars and sub-cave material for comparison with the previously described material.

Lewis A. Smith

Lewis A. Smith,
Ore Control Engineer



Morenci Branch, Morenci, Arizona 85540

RECEIVED
DEC 27 1979
DEPT. MINERAL RESOURCES
PHOENIX, ARIZONA

December 26, 1979

Mr. Ken Phillips
Mineral Resources Specialist
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Arizona 85007

Dear Mr. Phillips:

As discussed during your visit to Morenci on December 18, 1979, the Morenci Branch is interested in determining the present market conditions for a quantity of zinc bearing material which has been stockpiled at Morenci.

Approximately 40,000 tons of material had an average grade of 5.28% Zn, 0.27% Cu, and 0.17 oz/ton Ag and has been stockpiled in longitudinal rows parralleling a railroad track. The stockpiled material consist of the mineral sphalerite, pyrite, magnetite, calcite, minor chalcopryrite, siderite, quartz and tremolite, all in a gangue of limestone. This sphalerite is iron rich marmatite. The material consists of mostly +4 inch size with very little fine material. Selected grab samples of the zinc bearing ore material (high grade) revealed the following values (%):

<u>Cu</u>	<u>Cd</u>	<u>SiO₂</u>	<u>Fe</u>	<u>MoS₂</u>	<u>Zn</u>	<u>S</u>	<u>Ag</u>	<u>Au</u>
0.11	0.07	2.1	32.7	0.028	23.66	34.36	0.184	0.002
							oz/ton	oz/ton

The grab samples contained small amounts of other elements as listed below, all of which will be determined by spectrographic analysis (%):

<u>As</u>	<u>Ng</u>	<u>Te</u>	<u>Fe</u>	<u>Sn</u>	<u>Pb</u>	<u>Ni</u>
0.43	0.12	0.073	2.89	47 ppm	0.44	20 ppm

Any assistance in determining a market for this material will be appreciated.

Best Regards,

E. M. Schern
Chief Geologist

copy 1



STATE MINE INSPECTOR

APR 25 1984

Office of State Mine Inspector

705 West Wing, Capitol Building
Phoenix, Arizona 85007
602-255-5971

P.D. Morenci

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute Section 27-303*, we are submitting this written notice to the Arizona State Mine Inspector (705 West Wing, Capitol Building, Phoenix, Arizona 85007) of our intent to start stop (please circle one) a mining operation.

COMPANY NAME Power Master, Inc.

CHIEF OFFICER Bob D. Landreth

COMPANY ADDRESS 803 E. Holt Blvd. Ontario, Calif.

COMPANY TELEPHONE NUMBER 714-983-2676

MINE OR PLANT NAME Phelps Dodge - Morenci Plant

MINE OR PLANT LOCATION (including county and nearest town, as well as directions for locating by vehicle)

Morenci, Arizona

TYPE OF OPERATION Service PRINCIPAL PRODUCT Catalyst Screening

STARTING DATE April 24, 1984 CLOSING DATE April 30, 1984 App.

DURATION OF OPERATION Approximately 7 days

PERSON SENDING THIS NOTICE Bob D. Landreth

TITLE OF PERSON SENDING THIS NOTICE President

DATE NOTICE SENT TO STATE MINE INSPECTOR April 20, 1984

*A.R.S. Section 27-303 NOTIFICATION TO INSPECTOR OF BEGINNING OR SUSPENDING OPERATIONS: When mining operations are commenced in any mine or when operations therein are permanently suspended, the operator shall give written notice to the inspector at his office prior to commencement or suspension of operations.



Phelps Dodge More
Active Mine file

NEWS RELEASE

an R

300 Park Avenue, New York, N.Y. 10022 • (212) 940-6400

Mr. M.P. Scanlon - Phoenix

___	LRJ	___
___	AEH	___
___	MPS	___
<i>XC</i>	NSB	___
<i>XC</i>	KCB	___
<i>XC</i>	BKC	___
<i>XC</i>	JHL	___
<i>XC</i>	RGM	___
<i>XC</i>	RWR	___
<i>XC</i>	RCH	___
<i>XC</i>	<i>Keen-Whitaker</i>	___
<i>XC</i>	<i>CPH: J.T.</i>	___
File 60 or	___	___

FOR IMMEDIATE RELEASE
Contact: Richard W. Pendleton, Jr.
(212) 940-6462

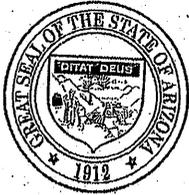
*Stinks
Allen
SCH
Ludden
Terry
J.B. Coy, Haggard, Amick, SWP,
Pursley, Muller, Steaming, Jett,
Collins,*

NEW YORK, November 5, 1985 - Phelps Dodge Corporation today announced that it has entered into a heads of agreement with Sumitomo Metal Mining Co., Ltd. for the sale of a 15% interest in Phelps Dodge's copper mining properties and facilities in Morenci, Arizona. The purchase price is \$75 million.

The transaction is expected to close in December.

Phelps Dodge will remain the operator of the properties, which can produce more than 200,000 tons of copper annually. As previously announced, a letter of intent covering this transaction was signed last January. The sale remains subject to the negotiation and execution of definitive agreements, to the approvals of the Boards of Directors of the companies and various governmental approvals.

RECEIVED
NOV 07 1985
DEPT. OF MINES &
MINERAL RESOURCES



Jane Dee Hull
Governor

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

3033 North Central Avenue • Phoenix, Arizona 85012-2809
(602) 207-2300 • www.adeq.state.az.us



Jacqueline E. Schafer
Director

Fyt

February 11, 2002

Mr. Brian J. Musser
Manager Environmental Services
Phelps Dodge Morenci, Inc.
4521 U.S. Highway 191
Morenci, Arizona 85540

File

NO REPLY (P) GREENLEE CO.

Re: Notification of the Final Decision to Issue an Amendment to Aquifer Protection Permit (APP) Number P - 100193.

Dear Mr. Musser:

The Water Permits Section, Mining Unit of the Arizona Department of Environmental Quality (ADEQ) pursuant to Arizona Administrative Code R18-9-A201.E, is notifying Phelps Dodge Morenci, Inc. (PDMI), of their final decision to issue an amendment to APP number P-100193.

ADEQ is pleased to provide PDMI with the enclosed amendment summary, signed by the Director of the Water Quality Division. Also provided is a complete copy of the amended permit.

Congratulations, and best wishes on your mining endeavor. We appreciate your efforts to protect the environment of Arizona during your project. If you have any questions, please contact me at 1-800-234-5677, extension 4590.

Sincerely,

Jeff Emde, Project Manager
Water Permits Section, Mining Unit

c: with enclosures

- Lynne Dekarske, Administrative Assistant, WPS, ADEQ
- Don Shroyer, Manager, WQDU, ADEQ
- Dave Esposito, Manager, SRO, ADEQ
- Larry Bogdanski, SRO, ADEQ

c: without enclosures

- Eric Wilson, Manager, WPS Mining Unit, ADEQ
- Mike Traubert, Section Manager, WQCS, ADEQ

MU02:0010 - Inventory number 100193

Northern Regional Office
1515 East Cedar Avenue • Suite F • Flagstaff, AZ 86004
(928) 779-0313

Southern Regional Office
400 West Congress Street • Suite 433 • Tucson, AZ 85701
(520) 628-6733



MORENCI (P) GREENLEE
TECH.
REPS.

Information Summary

Mine: Morenci
County: Greenlee

Date: May 19, 2001
Engineer: Nyal Niemuth

Summary of information provided at the SME Geology field trip to Morenci May 19, 2001 by Dave Travis, Manager Resource Management and Ralph Stegen, Chief Geologist and others. This information supplements the handout provided. Copy added to ADMMR's Morenci mine file.

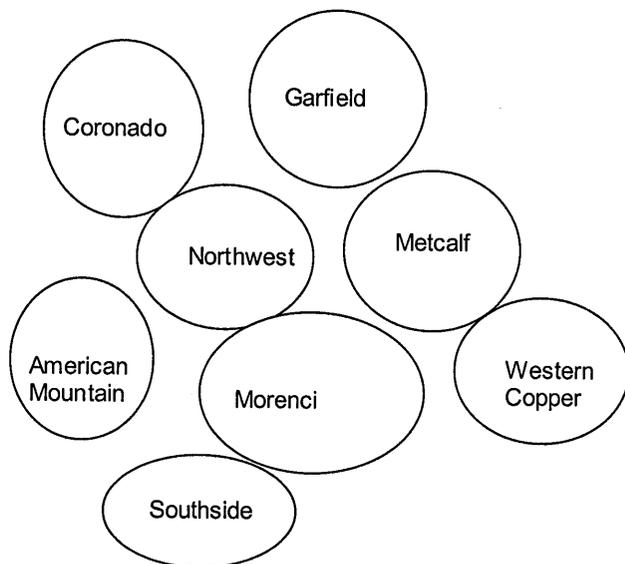
Brooks Hunt reports that Morenci is the 5th largest copper mine in the world. Past production combined with known future reserves and resources total 7.5 billion tons at 0.43% Cu or 62 billion pounds of copper! To relate to these large numbers consider that this is 10¹⁴ copper pennies or enough copper for 220 million US homes.

The deposit is unlike all others in that it is almost all supergene chalcocite mineralization. This has now let PD change it to an all leach operation. The Morenci concentrator closed at the end of February after having operated continuously since February of 1942.

Dave Travis, Manager Resource Management – General presentation and overview of Morenci operations

Run of mine dump leach material is stacked in 20 to 30 foot lifts that produce 580 m lb. per year. An additional 30% will come from the new crushing operation supplying the Stargo leach field. The mine's production is limited by the capacity of the EW tank houses. The best 75,000 tons per day is crushed, 0.65 % type material, some as high as .89%. The base layer and is 1.5" size. Later layers will be 0.5" crush size. Break even of crush leach operation is about 0.4%, so will try to increase it. Crush leach recovery at 1.5 inch is 70% and at 0.5 inch is 80%. but it still takes 3 years to get that percentage recovery. Run of mine leach material's grade is .3%. The dump leach recovers about 50% in 3 years. No oxide material is crushed. There may be 50 m tons of oxide material left in the district. Morenci recently obtained a Title Five air permit. This may be the first such permit for a mine in the state and will facilitate operations. The Morenci pit was mined out in 1994. The current area of active mining and leach dumps/stockpiles is 5 x 8 miles. The total mine area occupied is about 82 square miles.

Sketch showing generalized positions of the various deposits/pits of the Morenci district.



Mining equipment and practices

Morenci has a fleet of 15 rotary drills. Fragmentation size averages 10 inches, a figure greatly improved from 15 inches by using GPS to accurately position the drill rigs. Recovery improved from 48 to 52% due to improved fragmentation. The mine uses 800,000 lb explosives per day. The shovel fleet of 13 includes 5 P&H 2800's, and 8 P&H 4100's, a 70(?) truck fleet that includes mainly Cat 240-ton 793's equipped with light-weight throw-away beds, 30 Komatsu 320-ton 930E's that are being converted to light-weight, disposable beds, and 3 Cat 797's built to carry 400 tons, but as tires are still a problem, limited to only 360 ton loads. The block size used for mine modeling is 20' x 20' x 50'. The mine is producing about 800,000 tons per day. The two agglomerators used in the leach crushing circuit are identical to those at El Abra in Chile. Raffinate is applied 5 to 8% moisture, that will increase to 10% on the half inch material. Air, heat, and bacterial action gives leaching a fast start. Two 2,000 feet long radial arm stackers construct 22.5' foot lift and then advances on new material at the high grade Stargo leach stockpile.

The MLT - Morenci Leach Test is supplemented by test columns of two sizes, 20 ft x 1 ft and large columns, 30 x 6 ft. Leach solution is applied at the rate of .003 gallon per minute per sq ft. Four SX plants process 80,000 gal per minute leach solution. The SX plants are located close to the heaps to minimize pumping to the 3 tank houses. Morenci has 3 tank houses: Central with a capacity of 400 million lb per year, Southside built in 1996 with a 150 million lb per year capacity and the newest, Stargo built in 2000 with a 240 m lb. per year. A current density of 28 amps per sq ft. is used. The EW could operate at up to 31amps if the quality could be controlled. That would result in a 10 percent increase to 900,000 lb per year. Most of the cathodes produced go to the rod mill in El Paso. Water use is 13,000-gpm clean water imported, there is lots of water reuse. Power normally costs 3 to 5 cents per kilowatt, now it is costing 6 to 7 cents per kilowatt. Some crushing is deferred during the day till night when rates are cheaper since there is a surplus crushing capacity. The leach cycle for the high-grade stockpiles is 90 days on, 30 days off, and then 30 on. This creates synthetic covellite and then the bacteria gets going as the temperature gets hot, the last acid also acts as a rinse. 1 percent pyrite generates some acid, so don't need to add a lot to the dumps and stockpiles. Most acid consumption occurs in the tank houses.

Ralph Stegen – Chief Geologist – Geologic Overview, 520-865-6959 rstegen@phelpsdodge.com

(I requested the general presentation as either print outs or as a Power Point presentation)

Steve Enders, VP, - Mine Site Exploration, just finished his PhD thesis on the Morenci district (rumored he has it on CD-ROM).

Coronado, Garfield, and Western Copper deposits are hosted in Precambrian granites that have low acid consumption. Others deposits are hosted mainly in Paleozoic and Cretaceous sediments. Some limestone skarns are high acid consumers. Early skarns are anhydrous with diopside and garnet, late skarns are hydrous with actinolite, tremolite, and epidote. Without supergene mineralization Morenci would be a copper occurrence, not a mine. The highest hypogene grades average 0.35%. Ten ore types are recognized today, 3 of them, types 2, 3 and 10 go to the leach crushing circuit. Formation of the supergene blanket occurred at ages of 13, dominantly 10 – 7, and 5 to 4 million years ago. The keys to its formation were proto ore character, pyrite to chalcopyrite ratio that varied from 4:1 – 10:1, the episodic structural history, and environmental factors including water table and erosion rate.

The district's hypogene mineralization averages 0.16% copper. For the life of the mine reserve, chalcocite is the dominant copper mineral. Covellite may be important in the future. For 2001, copper production should total about 780 million pounds. By September the switch will be made to half inch crushing for the Stargo leach stockpile.

Notes from the tour

400 m tons of 0.5% Cu, largely as chalcopyrite, was left in the bottom of the Morenci pit. Leach dumps now unfortunately cover that mineralized material. Phelps dodge is still shipping stockpiled concentrate; about 1 month's amount remains. Current focus of all mining is chalcocite mineralization. Characterization of ore types is to maximize economic leach production. At present the chalcocite crushed leach cut-off grade is 0.6%. Current average grade of material being fed to the crushing plant and Stargo stockpile is 0.8%.



ARIZONA DEPARTMENT OF HEALTH SERVICES

BRUCE BABBITT, Governor
LLOYD F. NOVICK, M.D., M.P.H., Director

LOCATION OF PUBLIC HEARING CHANGED
NOTICE OF PUBLIC HEARING AND INTENT TO ISSUE
A GROUNDWATER QUALITY PROTECTION PERMIT

Pursuant to Arizona Compilation of Rules and Regulations, Title 9, Chapter 20, Article 2, the Director of the Arizona Department of Health Services intends to issue a Groundwater Quality Protection Permit to the following applicant, subject to certain special and general conditions. A public hearing will be held to solicit public comment and recommendations prior to final action by the Director.

Public Notice No. 74-86-AZGW

Phelps Dodge-Chase Creek Drainage Control/Dump Leach System

T. 3 S., R. 29 E., Sections: 33; 34; and 35, SW 1/4;

T. 4 S., R. 29 E., Sections 3; 4; 5; 6, E 1/2; 7, E 1/2; 8; 9; 10; 11, W 1/2; 14, W 1/2; 15, 16; 17, NW 1/4 and NE 1/4 and SE 1/4; 20, NE 1/4; 21, NW 1/2; 22, N 1/2; and 23, N 1/2;

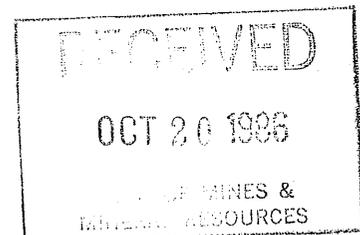
Near Morenci, Arizona

Groundwater Quality Protection Permit No. G-0001-06

This system was initially designed to abate surface water discharges in Chase Creek which violated Surface Water Quality Standards. By creating impoundments as part of the abatement plan, a Groundwater Quality Protection Permit is required. The leaching portion of the system consists of two solvent extraction plants with one electrowinning plant, and lined impoundments for containment of pregnant leach solutions. The drainage control system is designed to contain the runoff from the 100 year 24 hour rainfall event, and has the ability to contain runoff in excess of this in an existing tailings pond. Groundwater monitoring will be required, and surface water quality monitoring will be required through an NPDES Permit to be issued by EPA. No drinking water uses presently exist downgradient from the site in the Gila Conglomerate aquifer.

The Administrative Record, which includes the application, draft permit conditions and other relevant documents, is available for public review Monday through Friday from 8:00 a.m. to 5:00 p.m. at Arizona Department of Health Services, Environmental Health Services, Water Permits Unit, 2005 North Central Avenue, Phoenix, Arizona 85004 (telephone:257-2270).

Persons may submit comments on the proposed action, in writing, to Arizona Department of Health Services at the above address within thirty (30) days from the date of this Notice. The public hearing will be held on October 28, 1986 at 7:00 p.m. at CLIFTON SCHOOL CAFETERIA, 111 HILL STREET, CLIFTON, ARIZONA 85533.



The Department of Health Services is An Equal Opportunity Affirmative Action Employer.

Central Palm Plaza Building

2005 North Central Avenue

Phoenix, Arizona 85004



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ARIZONA DEPARTMENT OF HEALTH SERVICES

BRUCE BABBITT, Governor
LLOYD F. NOVICK, M.D., M.P.H., Director

NOTICE OF PUBLIC HEARING AND INTENT TO ISSUE
A GROUNDWATER QUALITY PROTECTION PERMIT

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Public Notice No. 74-86-AZGW

September 22, 1986

Phelps Dodge-Chase Creek Drainage Control/Dump Leach System

T. 3 S., R. 29 E., Sections: 33; 34; and 35, SW 1/4;

T. 4 S., R. 29 E., Sections 3; 4; 5; 6, E 1/2; 7, E 1/2; 8; 9;
10; 11, W 1/2; 14, W 1/2; 15, 16; 17, NW 1/4 and NE 1/4 and SE
1/4; 20, NE 1/4; 21, NW 1/2; 22, N 1/2; and 23, N 1/2;

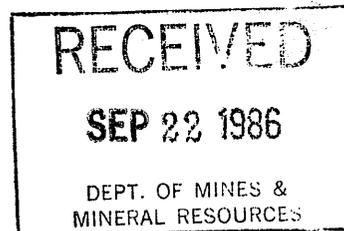
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Persons may submit comments on the proposed action, in writing, to Arizona Department of Health Services at the above address within thirty (30) days from the date of this Notice. The public hearing will be held on October 28, 1986 at 7:00 p.m. at Greenlee County Board of Supervisors, Conference Room, 5th Svenue & Leonard, Clifton, Arizona 85533.



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2005 North Central Avenue

Phoenix, Arizona 85004



STATE OF ARIZONA

DEPARTMENT OF MINES AND MINERAL RESOURCES

Mineral Building • State Fairgrounds • Phoenix, Arizona 85007

(602) 255-3791

Phelps Dodge Morenci Copper Mine AIME Spring Hydrometallurgy Field Trip May 15, 1990

Information from Phelps Dodge Engineering Staff

Introduction

In 1937 stripping began on the Morenci copper deposit. The first ore from the open pit reached the mill in 1942. Metcalf was constructed in 1975. In 1985 the mines produced about 200,000 tons per day (TPD). During February of 1989 the in pit crusher and conveyors began operation. Conveyor P1, which goes through the tunnel to the mill, is 5,500' in length. It is now fed by conveyor P6 which is 4,000' long and comes from the first location of the Morenci in pit crusher. Soon the 400,000 TPD level will be passed and when the present expansion is complete production will hit 550,000 TPD. At present the mine fleet consists of 15 shovels - 15, 22, and 35 yards in size, while there are 46 trucks of 170 and 190 ton sizes. Material mined with a grade of .4% Cu and better goes to the concentrators, below that grade goes to the leach dumps.

Northwest Extension

Economic modeling of the Northwest Extension deposit was done using a 25,000 ton block model. Factors assigned to each block include \$/ton value, total copper, oxide copper, % molybdenum, % pyrite, rock type, and ore type. A floating cone algorithm was used where each block must pay to be mined. After this determination the data is smoothed. The upper two thirds of the deposit is oxide with brochantite, chrysocolla and other oxide minerals while the lower third shows strong supergene chalcocite mineralization. To gain access to the deposit required the relocation of power lines and 2 miles of highway U. S. 666. The highway was temporarily relocated in late 1989 to the east within the pit. It will eventually be located to the west and north of the its present location. The mine is estimated to have a 14 year life. Ore reserves are calculated to be 76 million tons of .66% Cu from the figures reported in the 1988 and 1990 Phelps Dodge annual reports. Initially the oxide material will be put in the Coronado leach dump, then the Chase Creek leach dump, and later dumped and leached in the mined out portions of the Morenci pit. In addition to allowing the expansion of leaching it will also supplement mill feed. When mined out it will provide a place for dumping and leaching material from Metcalf. It is estimated it will add 144 million lb. of cathode copper per year to SX-EW production.

Solvent Extraction Electrowinning Operations

1. Coronado/Upper Chase Creek Dumps. These dumps feed the Metcalf area SX plant which is connected to the central and only electrowinning plant via a 7 mile pipeline. The Coronado dumps have turned out to be an important source of copper for the SX-EW operation. Leach solution is distributed by 4" laterals to rainbirds. New leach areas use wobblers. Solution is supplied by 5 - 4,000 gal/min pumps from the sump.

2. Lower Chase Creek Dumps. Sumps are dug into the Gila Conglomerate then lined with concrete and 80 mill HDPE. The central SX plant is located adjacent to the electrowinning facility and has a capacity of 12,000 gal/min. The storage pond is below Chase Creek Dam so the leak detection system is monitored daily.

3. Southwest SX Plant. This plant uses Krebs mixer settlers rather than the low profile mixer settlers. They were operated at 6,000 gal/min when first started and at 10,000 gal/min for a period of two months when restarted later and then shut down until EW plant was expanded. The Krebs are now back on line. The main advantage of this type of unit is that it requires much less space.

Chase Creek Reservoir System. This system was established as part of a consent decree with the EPA and DEQ. It diverts Chase Creek entirely around the mining operation. It consists of an upper dam, a 12 mile pump line good for 6,000 gal per minute, in pit sump and storage if needed for 100 year 24 hour maximum storm event and the lower dam.

All leach plants use LIX 984 now. Clay and Organic precipitation is very important to controlling gunk formation in the raffinate. Typical leach solution is 1.6 to 1.8 Ph going onto the dumps and 2.2 coming off. The pregnant leach solution (PLS) from the Metcalf area dumps contain 1.8 to 2.2 gr/l, the Southwest PLS contains .3 to .35 gr/l (these dumps have been leached for 15 years). Evaporation from the leach solutions where rainbirds are used is estimated at 5-7% and less where wobblers are used.

Low lift leaching is used to integrate the SX-EW operation into the mining operation. 50' lifts are constructed, cross ripped and then leached. The future will see more leach dumps constructed in the pits where ultimate pit limits have been reached. At some point in the future leach dumps will be higher than the Morenci vista point!!

Electrowinning Tank House Operations

376 EW cells are currently in use. They are arranged in 4 groups of 94 cells. Initial current density was 25 amp/sq. ft. and 30 after the rectifier expansion. Copper starter sheets weighing 17 lb. from the El Paso refinery are used. Hangers and bars are fabricated and attached at the tankhouse. This is now done with automated equipment. After the first 48 hours the sheets are pulled and pressed to straighten them. 3 - 3/4" PVC pipe are bent to form insulators over the anodes. Acid mist suppression is now 3/4" polypropylene spheres. 1/8" spheres have been used and do a better job but they can cling to the cathodes and must be removed manually. Morenci SX_EW has a quality assurance program in place. Samples are cut from each cathode group, assayed and tracked through shipment. Cathodes are shipped daily to the El Paso and Connecticut Phelps Dodge rod mills and to customers. Cathodes are on a 7 day pull cycle with finished cathodes weighing 200 to 220 lb. Current efficiency is 90%. All anodes are now roll plate for higher current efficiency and less warpage over cast anodes. Their composition is a Pb-Sn alloy. The Pb-Ca alloy is no longer used. Pb content of the cathodes is less than 2 PPM.

Compiled by ADMMR engineers Dick Beard and Nyal Niemuth.



- The population of Morenci is about 4,700.
- There are 1,171 Company owned houses in Morenci, 1,121 are occupied.
- There are approximately 1,250 students in the Morenci Schools, 71 high school seniors (1993-1994 school year).
- 1991 Phelps Dodge Morenci received the National Safety Council's First Responder Award for having the top First Emergency Responder Team in the State and for their dedication to community emergency training in Greenlee and Graham County.
- The first mineral discoveries in Morenci were made in 1865 by volunteer Union soldiers from California.
- Between 1872 and 1882, ore mined by the Longfellow Copper Company was 20% copper. (We now mine ore that is less than 1% copper.)
- Phelps Dodge entered the Morenci mining picture in 1881 when it purchased an interest in the Detroit Mining Company.
- The first railroad in the District was built in 1879, it ran along Chase Creek from Clifton to the Longfellow incline in the area of the present open pit. Mules were used to pull the cars.
- The first locomotive was put into use in 1880.
- Phelps Dodge became the sole operator in the District in 1921.
- All mining, which was then by underground methods, stopped in 1932.
- Morenci has received the James Douglas Memorial Safety Trophy for the lowest lost-time accident frequency in Phelps Dodge Mining five (5) times in the last seven (7) years.
- Development of the open pit began in 1937.
- Since that time, 3 billion tons of ore and other rock material have been removed.
- In 1989 Phelps Dodge Morenci received the Chairman's Award for having the safest property in Phelps Dodge Corporation.
- Mining of copper ore for production in the open pit began in 1939.
- A record 790,480 tons of material was mined in one day in 1993.



-2-
MORENCI FACT SHEET
(Revised January, 1994)

- Morenci Mine has received the State Mine Inspector's Award for having the safest Mine in the State (498 mines total) in 1988, 1989, 1990, 1992 and is the leading contender for the award for 1993.
- The present smelter was built in 1942. It has been shut down since December 31, 1984.
- In 1989 the Mine Safety and Health Administration presented Morenci with an Outstanding Safety Award for working 1 million consecutive hours without a lost-time accident.
- Approximately 2,200 employees are employed in the Morenci operations (07/01/93).
- In 1990 Morenci employees received the Howard Pyle Safety Award presented by the National Safety Council for Arizona's Foremost Safety Example of all companies in Arizona.
- Phelps Dodge has approximately 50,000 acres in its Morenci (1 pit) operations. (81 square miles total mining operation - 3 pits.)
- The Morenci concentrator began producing copper concentrate in 1942, the Metcalf Concentrator in 1974.
- The two concentrators set a combined record of 148,139 tons of ore processed in one day (08/28/90).
- Together, the two concentrators produce about 450 million pounds of copper per year.
- The concentrators produce a concentrate that is about 30% copper from ore that was less than 1% copper.
- The Concentrator Division, both Morenci and Metcalf Concentrators, has received the State Mine Inspector Award for having the safest concentrators in the State in 1986, 1987, 1988, 1989, 1990, 1991 and 1992 and is the leading contender for the award for 1993.
- In 1994 the Concentrator Division completed over 3 million employee hours worked without experiencing a lost-time accident while producing 1.5 billion pounds of copper, a record that started in November of 1990.
- The SX/EW plant began operating in 1987 and was expanded in 1990 and 1992.
- The SX/EW plant presently produces 340 million pounds of copper per year.

-3-
MORENCI FACT SHEET
(Revised January, 1994)

- Since its start-up in 1987 the Morenci SX/EW has received the State Mine Inspector's Award for having the safest SX/EW in the State for the years 1987, 1988, 1989, 1990, 1991 and 1992 and is the leading contender for the award for 1993. In addition, they have worked over 1,200,000 employee hours and/or over five years without experiencing a lost-time accident while producing over 1.3 billion pounds of copper.
- The in-pit crushing and conveying system (IPCC) began delivering ore on February 20, 1989.
- It uses 60" and 72" wide conveyor belts.
- The system includes a total of six major conveyors, delivering ore from both the Morenci and Metcalf Mines.
- One belt is hung from the ceiling of the tunnel on rock bolts, providing easy access underneath for maintenance.
- The conveyors run at speeds of about 10 mph and a design rate of 9,000 tph.
- The mine has 14 drills, 18 shovels (three 15 yard, six 22 yard, seven 34 yard and two 40 yard), and 65 haulage trucks (seven 170 ton, fifty-one 190 ton and nine 240 ton).
- The Morenci Open Pit is 1.8 miles long, this is equivalent to 27 football fields placed end-to-end.
- Mine Safety and Health Administration presented a Outstanding Safety Award to Phelps Dodge Morenci for working 3.8 million consecutive employee hours without a lost-time accident.
- The average automobile contains 50 pounds of copper.
- 1991/1993 Morenci employees worked over 5.8 million consecutive employee hours without experiencing a lost-time accident.
- A 1,700 sq. ft. house contains approximately 400 pounds of copper.
- About 480 football fields could be placed on the West Tailing Pond, or about 5,930 basketball courts.
- For the last seven years Phelps Dodge employees have worked over a million employee hours each year without experiencing a lost-time accident.

MORENCI FACT SHEET
(Revised January, 1994)

- The workers in the copper industry are the highest paid of any industry in the state. (Average \$14.50/hr. without bonuses.)
- 35% of U.S. copper production is produced by Phelps Dodge Corporation, about 18% is produced at Morenci.
- In 1993 received the "SENTINELS OF SAFETY" Award for having the safest open pit mine in the U.S.A.

ARIZONA DEPARTMENT OF MINES & MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

ENGINEER: Nyal Niemuth

DATE: April 16, 1987

Information from: Tim Snider

Attended an A.I.M.E. meeting where Tim Snider, Phelps Dodge's hydrometallurgical superintendent at Morenci Mine (file) Greenlee County provided a program on the construction of their new solvent extraction and electrowinning facility. The facility will be unique in that it is the first installation to have multiple solvent extraction plants feeding a central electrowinning tank house.

The three SX stripper/mixer/settlers will be situated at the Metcalf dumps, at the south end of the Morenci Chase Creek dumps and the southwestern Morenci dumps. The electrowinning tank house will be located south of the Chase Creek dumps. This construction project is expected to be completed by the end of '87. The facility was designed with EPA and the State Health Department in mind and in conjunction with the two new dam facilities on Chase Creek. The upper dam keeps surface water out of the mine area by diverting it to a pipe line, whereas the lower dam will collect solutions which can be processed and have the copper removed from them. Eventually, the new SXEW facility will supplant all cementation operations.

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: **Morenci Mine**

ADMMR Mine File: **Morenci Mine**

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**

Notes from Minerals 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 leaching is 0.05, 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 feet
- 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 classifier 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



Arizona Department of Mines and Mineral Resources

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Summary from a talk given by **Harry "Red" Conger, President Phelps Dodge Morenci** to the AMIGOS luncheon March 10, 2000, Phoenix, AZ by Nyal J. Niemuth, ADMMR Mining Engineer

At present Morenci has 2,550 employees. Everyone, workers and management, is going to benefit equalization, team performance based merit pay, and new work rules. The Metcalf concentrator shut down in August 1999. Prior to the shut down Morenci was mining 840,000 tons/day, now 780,000 tons/day. Tire life is now up to 35,000 miles. The use of the Geographic Positioning System (GPS) on the shovels has greatly reduced misdirected ore i.e. leach rock to mill and vice versa. The new corporate goal is to maximize value in everything they do. Contract labor and supply inventory are being reduced. The key to expanding/changing the Morenci operation is the recently completed land exchange in the northern part of the property that allows expansion of the leach stockpiles.

Regarding the acquisition of Cyprus-Amax. The integration of the two companies is going smoothly, but in itself that generates no benefits to the merged companies. Benefits will come from managing all the mines' equipment as one fleet (the Cyprus GEM idea), for example some of the North American properties recently sent under-utilized mining equipment to Candelaria in Chile. Improvements in sourcing will be important including both purchasing and sharing inventory among nearby mines.

Morenci is being operated to minimize cost once again, as in the late 80's, not maximize production as in early 1990's. Production is targeted to be 780 million pounds this year, not the 1.1 billion pounds of the mid 1990's.

The change to all leaching at Morenci is going forward. The Metcalf mill's crushing plant is still being used, now for crushing leach material, sending 75,000 ton per day to the south leach stockpile. High-grade ore will be leached in 20' lifts. All leach will eliminate the capital and operating costs of many process steps. The goal is lower process costs. In 8 to 9 years the mine will have a large amount of chalcopryrite ore rather than chalcocite so milling will again need to be evaluated.

During the period 1999 through 2001, about \$~~220~~220 million will be invested. Mechanical stackers will be installed. Fine crush leach expertise was gained from the staff at (the formerly Cyprus) El Abra mine in Chile where they worked with mechanical stackers and agglomeration. Morenci hopes to aggressively implement their knowledge into the all leach operation, avoiding problems and accelerate recovery by copying El Abra's success. Agglomeration technology will be incorporated now rather than implementing it later.

Ore will be crushed to 1.5" on permanent lifts to achieve a 70% recovery. If a 0.5" crushed is used an 80% recovery can be obtained. Recovery will occur over a period of 2.5 years from three lifts. It will take 8 months to build a lift and leaching will have 2 cycles per lift. The plan is to achieve a 9-cent per pound reduction in costs. Phelps Dodge like many copper producers is researching to be able leach concentrates. May be able to do some day but not yet. Acid supply will be in near balance with Morenci but will be in shortage when Safford goes on line. Will then make or buy acid.

High fuel costs are hurting operations at present. The mine uses 2.5 million gallons of diesel fuel per month.

Other Arizona Operations

Safford Safford continues to be pushed forward. Sometime in 2000 the EIS for the new mine an open pit and heap leach operation should be final. Startup will be dependant on the completion of the land exchange. It took about 5 to 6 years to complete the exchange for Morenci. It is necessary to have a long time frame to successfully plan a new major operation such as Safford.

New Cornelia at Ajo New Cornelia may be a future swing operation, operated when copper prices are high. At the present low copper prices (low 80cents/pound) the project is stopped.

Phelps Dodge: Morenci

RECLAMATION PLAN

MORENCI (H) GREENLBERG CO.

Site Description

Phelps Dodge Morenci is located near the towns of Clifton and Morenci. The mining facility is located on lands owned by Phelps Dodge, lands being acquired by Phelps Dodge through a land exchange with BLM and lands being acquired from the State of Arizona. Current land use within the mining boundary consists of milling, mining, and hydrometallurgical processes; residential and commercial uses; industrial uses; wildlife habitat; and limited livestock grazing.

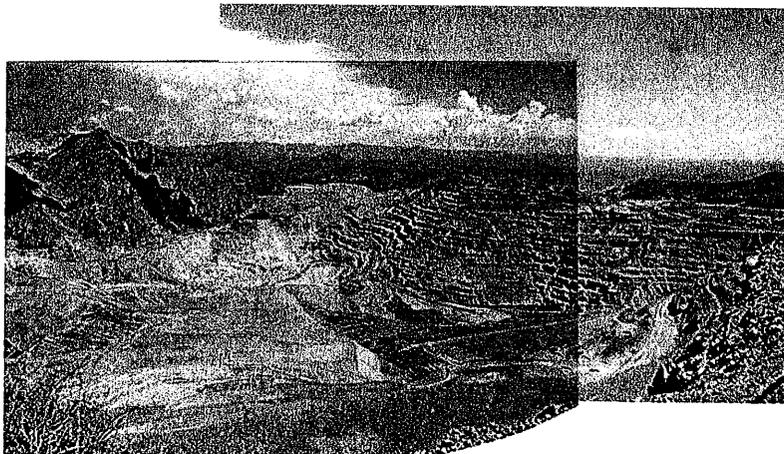
Facilities which are inactive and not covered by this reclamation plan include: a steam power plant; Producer development stockpiles; fabricating facilities; the Morenci townsite; lime plant; concrete batch plant; sand and gravel plant; and mobile screening plants.

The climate at the mine is that of the typical arid southeastern Arizona desert. Average annual rainfall is 12.6 inches, with half occurring in the winter and half during the summer monsoons.

Elevations in the mining district range from 3,400 feet to 6,900 feet above sea level. The northern portion is characterized by rugged mountainous terrain; the southern portion is located at the base of the steep mountains.

The district is partially surrounded by the Gila River, the San Francisco River, and Eagle Creek. Ephemeral streams, such as Chase Creek, Gold Gulch, and Rocky Gulch, also drain the area. Perennial surface waters are protected from impact by the mine with a storm water management system. Upper Chase Creek flows are diverted around mining operations.

Five upland biotic communities and four riparian habitat types have been identified within the district. Big game species known to occur in the area include: mule deer, white tail deer, javelina, black bear, and mountain lion. Rocky Mountain Big Horn Sheep are also known to occur within and adjacent to the mine.



Post-Mining Conditions

The current mine plan supports open pit mining and leaching activities through 2026, and crushing and flotation operations through 2024. Expansions are expected to extend the life of the mine well beyond the current mine plan. Current open pits will be augmented by the development of the American Mountain, the Gap, Coronado, Garfield, Shannon, and Western Copper pits. The surface areas of the Southwest, Silver Basin, and West tailings impoundments will continue to expand. The West impoundment will expand to join the Silver Basin, Southwest and the currently inactive East dams. Leach rock stockpiles will continue to increase in acreage and in-pit leach piles will also continue to expand, and new leach rock stockpiles will be developed outside of open pit mining areas. Development rock stockpiles will also continue to expand.

Post-Mining Land Use Objectives

Portions of the mine district are well-suited for reclamation as wildlife habitat and limited grazing. These areas have stable surfaces and slopes, are near available growth media, and meet public safety requirements. The goal of the revegetation plan is to provide a diverse vegetative cover to provide habitat for native wildlife.

Opportunities for recreation, education, and tourism also exist at the mine. To achieve these post-mining goals, wildlife habitat, residential and commercial uses, and industrial uses will be promoted. In addition, access for public viewing of historical and educational areas, and continued access to the Coronado Trail, will be provided. Specific areas to be retained for educational and tourism PMLUs include the mill facilities, SX/EW facilities, and areas where active mining occurred.

Locations suitable for residential and commercial development consist of areas adjacent to existing residential and commercial areas. Mining facilities adjacent to residential and commercial areas will be stabilized and fences, berms, and signs will be erected.

The current mine infrastructure is suitable for the development of future industrial sites. To achieve this PMLU goal, selected buildings, roads, and other infrastructure elements will be preserved and maintained.

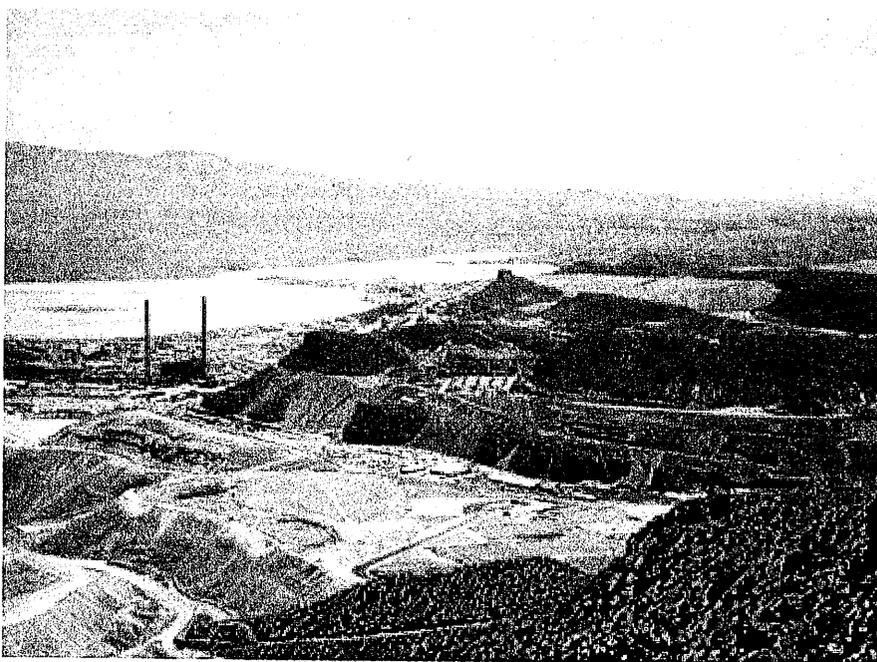
Some areas (tailing impoundments, leach rock stockpiles, open pits) of the PD property provide for future mineral exploration and development. These areas will be made stable and fences, berms, and signs will be erected to maintain public and physical safety.

The tailing impoundments and leach stockpiles will also be managed for wildlife habitat and limited grazing.

Public Safety

Standard three- or four-strand barbed wire fences will be constructed around most of the perimeter of the open pits. Six-foot high chain link fencing will be placed at those areas accessible to the public, including public viewpoints. Warning signs will also be posted as needed. Buildings to remain for a specific PMLU will be maintained and access will be restricted by security gates. Other buildings will be salvaged.

Trash, wood, scrap metal, and other debris will be disposed of properly.



Erosion Control, Stability, and Topographic Contouring

Tailings Facilities

The tailings facilities will cover ~4,275 acres at closure. The tailing impoundment areas will be closed in accordance with APP requirements and the slopes will be closed in accordance with the Reclamation Act. The tailing slopes will be graded during final deposition. The top surfaces will be sloped to promote drainage toward central designated areas. The final configuration, erosionally and geotechnically stable under both seismic and static conditions, will promote surface drainage to stormwater retention dams and will minimize erosion. Stormwater run-on will be diverted around the tailings. A 6-12 inch cap of Gila conglomerate will be placed on the tailing slopes. The tailings facilities will be revegetated to achieve the PMLUs of wildlife habitat and limited grazing.

Leach Rock Stockpiles

Leach rock stockpiles will occupy ~7,361 acres at closure. To achieve the PMLUs of wildlife habitat, limited grazing, and education and tourism, the following measures will be carried out: stormwater run-on will be diverted around the stockpiles; the top surfaces will be graded so that surface flows will be directed to the center of the stockpile; these ponding areas will be compacted and/or capped to minimize infiltration; slopes will be crown chained; 20% of the surface area of the top of the Southwest leach stockpiles and in-pit stockpiles will be revegetated. These surfaces will be capped with 6-12 inches of Gila conglomerate and seeded. Also, the upper portions of the Southwest stockpile slopes, down to ~75 feet from the crest, will be broadcast seeded, hydroseeded, or hydromulched. The final configurations of the leach facilities will be both geotechnically and

erosional, stable.

Development Rock Stockpiles

Development rock stockpile areas will cover ~1,532 acres at closure. To achieve the PMLUs of wildlife habitat, limited grazing, and education and tourism, the following measures will be undertaken: stormwater run-on will be diverted around the stockpiles; the top surfaces will be regraded to direct surface flows to stabilized drainages; the top portions of the slopes will be crown chained; 20% of the surface area of the top of each dump will be capped with 6-12 inches of Gila conglomerate and revegetated; the upper portions of the stockpile slopes, down to ~75 feet from the crest, will be broadcast seeded, hydroseeded, or hydromulched. The final configurations of the stockpiles will be both geotechnically and erosionally stable.

Open Pits

The current open pit area covers ~3,055 acres. Under the current mine plan, the total mined area will cover ~4,683 acres. Upon closure, 2,487 acres of open pit area and 2,196 acres of in-pit stockpiles will exist. The final open pit area will be minimized by the development of in-pit leach stockpiles. The open pit areas remaining upon closure will be managed in accordance with the PMLUs of future mineral exploration and development, and education and tourism.

Pit walls are designed to be stable during and following mining activities. Some raveling will occur, making the pit walls increasingly stable over time. The pit will not be connected to surface waters, so erosion will not impact surrounding surface waters.

Public access to the pit will be allowed only under controlled circumstances related to education and tourism. Visitor information centers will be developed to support tourism and educational awareness of mining and the history of the area.

Roads and Traffic

Upon closure, certain roads will be maintained for specific PMLUs, environmental management and monitoring, access to security control points, and maintenance of public safety features. Haul roads will be reduced in width, ripped and regraded.

Diversion channels designed to control the 100 year 24 hour storm event will be constructed. Channels will intercept run-off from reclaimed areas and divert run-on from the tailings facilities. The channels will follow natural contours wherever possible.

The only bridge that exists at the site is part of Highway 191 and will remain. Some sections of railroad track will remain to facilitate industrial development. Culverts necessary for PMLUs will be armored with riprap to control erosion.

Most of the 40 acres of access and 340 acres of haul roads will be reclaimed.

Access roads will be reclaimed in the following manner:

- paved roads will remain, with the slopes on both sides being regraded to match the surrounding terrain
- roads will be contoured, graded, ripped and scarified to a depth of 1-2 feet; seeding will follow.
- earth berms, boulders, or gates will prevent public access; warning signs will be placed at all remaining roads.

Haul roads will be reclaimed in the following manner:

- haul roads to remain will be reduced in width; the reclaimed portions will be contoured and graded
- after contouring and grading, the surfaces will be ripped and scarified to a depth of 1-2 feet to reduce compaction and allow for natural revegetation.

Revegetation

The revegetation of disturbed areas will provide means to control erosion, promote wildlife habitat and limited grazing, and improve aesthetics to support industrial, education, and tourism PMLUs. Seed application methods, either broadcasting or hydromulching, will be based on test plots. Areas to be revegetated will be capped with Gila conglomerate.

Revegetation for wildlife habitat and limited grazing will occur on tailings and the South stockpile facilities. Habitat for mule deer, javelina, and other native species will be encouraged. Broadcast seeding and hydromulching methods will be used. A cap of 6-12 inches of Gila conglomerate will be placed and, after grading and contouring, compacted areas will be ripped to a depth of 6 inches to two feet.

Seeding will occur during May and June to take advantage of optimum growing conditions. A seed mix developed by PDMI, the Natural Resources Conservation Service, and the University of Arizona will be used. In addition, native species will be added to the seed mix or plants transplanted. Straw mulch will be added at a rate of one ton per acre in areas of low intensity revegetation. In areas of high intensity revegetation, specifically the erosive areas adjacent to ripped drainage sections, a hydromulch of wood or other organic material will be combined with seeding. Irrigation and fertilizer are not expected to be needed.

Soil

Gila conglomerate is available in sufficient quantities for use as a growth medium. No soil stockpiles will be developed. Approximately 10,151,700 tons of Gila conglomerate will be excavated from on-site borrow areas to the south and southwest of the tailing facilities and redistributed on the slopes of the tailings embankments and on the tops of the Southwest stockpiles. An additional 1,000 acres of disturbance will be created. The borrow areas will be revegetated to meet PMLU objectives.

Reclamation Schedule

Based on the current mine plan, reclamation activities will begin in 2027 and continue through 2031. When possible, the reclamation program will be implemented with on-going mining activities, including reclamation of tailing impoundments and leach stockpiles in areas where future mining will not occur. Implementation of the final reclamation program is not expected to occur until well after 2027, as mine life is expected to extend well into the 21st century.

Future development of orebodies will consist of Coronado (1999), Western Copper (2001), Garfield (2001), Shannon (2012), American Mountain (2016), and the Gap (2016).

[Graham-Greenlee County Map](#)

[State Map](#)

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Kelly Fitzgerald ✓

Date July 9, 1956

District Morenci District, Greenlee Co.

Engineer Axel L. Johnson

Subject: Present Status.

Location On the Coronado trail, a short distance north of Morenci.

Owner Assessment work not done by previous owner. Reported to be open for location.

Operator None. Property is idle.

Principal Minerals No minerals reported. Reported as not containing manganese in any appreciable quantities. ✓

Present Status. Claims reported to be open for location.

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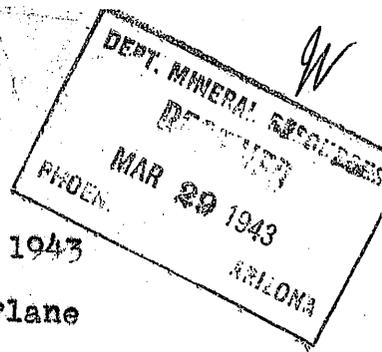
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DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT



Mine ✓ Kelly Fitzgerald
District ✓ Manganese, Morenci.

Date March 27th, 1943

Engineer A. Macfarlane

Subject:

Mr W.B. Kelly
Safford, Arizona.

attention Mrs Willis

Dear Mr Kelly;

I again suggest you have your man who works on the County roads, who went with me to show the Manganese cut by the Coronado Trail, dig a glory hole on the manganese cropping, as he and I decided there on the ground.

This work calls for an expenditure of \$25. or there-about and has a good chance of exposing a manganese vein and a cut on same, where clean samples might be obtained and an opinion arrived at, looking towards further prospecting of the manganese showing.

Will return to that locality and take such samples as would be needed, on your men opening up the recommended cropping cut.

Yours very truly.

A. Macfarlane
A. Macfarlane
Box 506 Globe, Arizona.

Only for the past 2 days have I got a little the best of my illness:

Have 5 loan applications dumped on our door step here all call for reports & sketches.
yours A. Macfarlane

Special meeting tonight