



CONTACT INFORMATION

Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
<http://www.azgs.az.gov>
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

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PRINTED: 09/21/2001

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: INSPIRATION MINE

2 of 8

ALTERNATE NAMES:

RED HILL
JOE BUSH
THORNTON
LIVE OAK
PHELPS DODGE MIAMI OPERATIONS
MIAMI (PHELPS DODGE)
MIAMI (CYPRUS)
MIAMI SMELTER
CYPRUS MIAMI OPERATIONS
GMC LEACH FACILITY
KEYSTONE VEIN
BL LEACH FACILITY

GILA COUNTY MILS NUMBER: 136

LOCATION: TOWNSHIP 1 N RANGE 14 E SECTION 25 QUARTER NE
LATITUDE: N 33DEG 24MIN 30SEC LONGITUDE: W 110DEG 54MIN 00SEC
TOPO MAP NAME: INSPIRATION - 7.5 MIN

CURRENT STATUS: PRODUCER

COMMODITY:

COPPER SULFIDE
COPPER OXIDE
SILVER

BIBLIOGRAPHY:

ADMMR INSPIRATION MINE FILE
AZ MNG JNL, 2/1/22, P 16; 11/19, P 43
RANSOME, F.L. "GEOL GLOBE COPPER DIST" USGS
PP 12, 160-161; 1903
PETERSON, N.P. "GEOL. & ORE DPSTS GLOBE-MIAMI
DIST" USGS PP 342, P 137; 1962
AZBM BULL 145 "AZ ORE DPSTS" P 66-72; 1938
USBM IC 8154
ALSO IN SEC. 14, 26
ADMMR INSPIRATION SMELTER FILE
BL LEACH FACILITY IN SEC. 21, 22
GMC LEACH FACILITY IN SEC. 13, 14
TONTON N'TL FOREST, BLM, ARMY CORPS OF ENGRS,
1997, CYPRUS MIAMI LEACH FACILITY EXPANSION
PROJECT; DRAFT EIS, APRIL 1997, 295 P.
TONTON FS, BLM, USCOE, FINAL EIS, 6/1998

Office of State Mine Inspector

STATE MINE INSPECTOR

705 W. Wing, Capitol Building
Phoenix, Arizona 85007

NOV 15 1985

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute 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 MOUNTAIN STATES ENGINEERS

CHIEF OFFICER EDWARD S FROMLING

COMPANY ADDRESS 4370 S FREMONT AVE - TUCSON, AZ

COMPANY TELEPHONE NUMBER (602) 792-2800

MINE OR PLANT NAME INSPIRATION CONSOLIDATED COPPER CO.

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

GLOBE, ARIZONA

TYPE OF OPERATION SMELTER PRINCIPAL PRODUCT COPPER

STARTING DATE 11/13/85 CLOSING DATE 2/1/86

DURATION OF OPERATION 10 WEEKS

PERSON SENDING THIS NOTICE H. J. Mc NEIL

TITLE OF PERSON SENDING THIS NOTICE VICE PRESIDENT

DATE NOTICE SENT TO STATE MINE INSPECTOR 11/14/85

PLEASE NOTE: Any operation found operating, without having sent this notice to the Arizona State Mine Inspector, will be charged with a petty offense.

Joe
Office of State Mine Inspector

705 W. Wing, Capitol Building
Phoenix, Arizona 85007

STATE MINE INSPECTOR

NOV 13 1984

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with Arizona Revised Statute 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 V.I.P. INTERNATIONAL

CHIEF OFFICER LEE BARR

COMPANY ADDRESS 6638 Pecue Ln. BATON ROUGE LA.

COMPANY TELEPHONE NUMBER ~~504-766~~ 504-293-8576

MINE OR PLANT NAME INSPIRATION COPPER CO.

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

ICCC CLAY POOL

TYPE OF OPERATION CATALYST SCREENING PRINCIPAL PRODUCT NIYADIUM CATALYST

STARTING DATE 11/7/84 CLOSING DATE _____

DURATION OF OPERATION _____

PERSON SENDING THIS NOTICE RICHARD ARONSTEIN

TITLE OF PERSON SENDING THIS NOTICE OPERATOR

DATE NOTICE SENT TO STATE MINE INSPECTOR 11/8/84

PLEASE NOTE: Any operation found operating, without having sent this notice to the Arizona State Mine Inspector, will be charged with a petty offense.

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1991

CYPRUS COPPER COMPANY

(A subsidiary of Cyprus Minerals Company)

P. O. Box 1126, Green Valley, AZ 85622 - Phone 628-4000.

Executive Vice President James C. Compton

Vice President Technical Services Ron Kellner

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1013

- Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning
plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery -
Electrolytic refinery - 100,000 TPY continuous rod plant - The 24,000

TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen

Public Relations Director Dean Lynch

Manager, Technology Ken Larson

Manager, Mining Operations Carl Waggoner

Manager, Smelter/Rod Plant Operation Al Tittes

Manager, Plant Operations Howard Bardwell

Manager, Human Resources Chuck Rising

Manager, Administration Randy Hoffman

Superintendent, Leaching Operations & SX Gerald F. Fountain

Superintendent, Tankhouse Mark Peabody

Superintendent, Plant Services John C. Lorenzen

Superintendent, Rod Plant Luis Constandse

Superintendent, Metallurgical Control Eric Selley

Superintendent, Environmental Services Tom Larsen

Superintendent, Smelter Operations Don Nelson

Superintendent, Smelter Maintenance Scott Vandela

Superintendent, Smelter Technical Services Rex Henderson

Superintendent, Smelter Resource Recycling Larry Le Compte

Materials Management Hugo Schriewer

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(A subsidiary of Cyprus Minerals Company)

P. O. Box 1126, Green Valley, AZ 85622 - Phone 628-4000.

Executive Vice President James C. Compton

Vice President Technical Services Ron Kellner

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

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Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1989

CYPRUS METALS COMPANY
(A subsidiary of Cyprus Minerals Company)

1855 La Canada, Green Valley 85622 - Phone 628-4000.

Senior Vice President C. J. Janes

Cyprus Copper Company

Senior Vice President - Operations Jake Timmers

Cyprus Miami Mining Corp.

Miami

T1N R14E Sec. 24, 25, 26, 35

P.O. Box 1559, Claypool 85532 - Phone 473-7150 - Employees 1013 - Open pit oxide copper mine - Heap leach - Dump leach - Solvent extraction-electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery - Electrolytic refinery - 100,000 TPY continuous rod plant. The 24,000 TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen
Public Relations Director Dean Lynch
Manager, Technology Ken Larson
Manager, Mining Operations Carl Waggoner
Manager, Smelter/Rod Plant Operation Al Tittes
Manager, Technical Services Noel Gillespie
Manager, Plant Operations Howard Bardwell
Manager, Human Resources Chuck Rising
Manager, Administration Randy Hoffman
Supervisor, General Accounting Joe Bost
Superintendent, Leaching Operations Gerald F. Fountain
Superintendent, Tankhouse Mark Peabody
Superintendent, Plant Services John C. Lorenzen
Superintendent, Rod Plant Luis Constandse
Superintendent, Projects John Chism
Superintendent, Metallurgical Control Eric Selley
Superintendent, Environmental Services Tom Larsen
Superintendent, Smelter Operations Don Nelson
Superintendent, Smelter Maintenance Scott Vandela
Superintendent, Smelter Process Control Robert Tunis
Superintendent, Smelter Technical Services Larry Lee
Superintendent, Smelter Resource Recycling Larry LeCompte
Materials Management Hugo Schriewer

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Manager, Technical Services Noel Gillespie
Manager, Plant Operations Howard Bardwell
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Manager, Administration Randy Hoffman
Supervisor, General Accounting Joe Bost
Superintendent, Leaching Operations Gerald F. Fountain
Superintendent, Tankhouse Mark Peabody
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Superintendent, Projects John Chism
Superintendent, Metallurgical Control Eric Selley
Superintendent, Environmental Services Tom Larsen
Superintendent, Smelter Operations Don Nelson
Superintendent, Smelter Maintenance Scott Vandela
Superintendent, Smelter Process Control Robert Tunis
Superintendent, Smelter Technical Services Larry Lee
Superintendent, Smelter Resource Recycling Larry LeCompte
Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY 1988

CYPRUS SMELTING & REFINING

9100 E. Mineral Circle, P.O. Box 3299, Englewood, CO 80112 - Phone (303) 643-5000.

Miami

T1N R14E Sec. 25

P.O. Box 1559, Claypool 85532 - Phone 473-7150 - Employees 900 - Three open pit copper mines and 24,000 TPD concentrator which are inactive - Ferric-cure dump leach - Solvent extraction-electrowinning plant - 120,000 TPY smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant.

Manager, Technology	Al Tittes
Manager, Mining Operations	Don Prahl
Manager, Smelter/Rod Plant Operation	Kenneth Larson
Manager, Accounting	Joe Bost
Manager, Technical Services	Noel Gillespie
Manager, Plant Operations	Howard Bardwell
Superintendent, Leaching Operations	Gerald F. Fountain
Superintendent, Tankhouse.....	James Garvey
Senior Staff Project Engineer	Charles Orsen
Superintendent, Plant Services	John C. Lorenzen
Rod Plant Superintendent	Luis Constandse
Superintendent, Environmental Services	Tom Larsen
Manager, Human Resources	Chuck Rising
Manager, Human Resources	Craig Patrick
Manager, Materials Management	Hugo Schriewer

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CYPRUS COPPER COMPANY

(A subsidiary of Cyprus Minerals Company)

P. O. Box 1126, Green Valley, AZ 85622 - Phone 628-4000.

Executive Vice President James C. Compton

Vice President Technical Services Ron Kellner

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1013

- Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery -

Electrolytic refinery - 100,000 TPY continuous rod plant - The 24,000

TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen

Public Relations Director Dean Lynch

Manager, Technology Ken Larson

Manager, Mining Operations Carl Waggoner

Manager, Smelter/Rod Plant Operation Al Tittes

Manager, Plant Operations Howard Bardwell

Manager, Human Resources Chuck Rising

Manager, Administration Randy Hoffman

Superintendent, Leaching Operations & SX Gerald F. Fountain

Superintendent, Tankhouse Mark Peabody

Superintendent, Plant Services John C. Lorenzen

Superintendent, Rod Plant Luis Constandse

Superintendent, Metallurgical Control Eric Selley

Superintendent, Environmental Services Tom Larsen

Superintendent, Smelter Operations Don Nelson

Superintendent, Smelter Maintenance Scott Vandela

Superintendent, Smelter Technical Services Rex Henderson

Superintendent, Smelter Resource Recycling Larry Le Compte

Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1992

Inspiration Mine file
Lila

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1000 - Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant - 24,000 TPD concentrator is inactive.

Vice President & General Manager

Dennis Mortensen

Manager, Technology

Ken Larson

Manager, Mining Operations

John Fenn

Manager, Smelter/Rod Plant Operation

Al Tittes

Manager, Plant Operations

Howard Bardwell

Manager, Human Resources

Chuck Rising

Manager, Administration Randy Hoffman

Superintendent, Leaching Operations and Solvent Extraction

Gerald F. Fountain

Superintendent, Tankhouse

Mark Peabody

Superintendent, Plant Services

John C. Lorenzen

Superintendent, Rod Plant

Luis Constandse

Superintendent, Metallurgical Control

Eric Selley

Superintendent, Environmental Services

Bob Ressler

Superintendent, Smelter Operations

Don Nelson

Superintendent, Smelter Maintenance

Scott Vandela

Superintendent, Smelter Technical Services

Rex Henderson

Superintendent, Smelter Resource

Recycling

Larry Le Compte

Materials Management

Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1992

Inspiration File
Stila

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1000 - Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant - 24,000 TPD concentrator is inactive.

Vice President & General Manager	Dennis Mortensen
Manager, Technology	Ken Larson
Manager, Mining Operations	John Fenn
Manager, Smelter/Rod Plant Operation	Al Tittes
Manager, Plant Operations	Howard Bardwell
Manager, Human Resources	Chuck Rising
Manager, Administration	Randy Hoffman
Superintendent, Leaching Operations and Solvent Extraction	Gerald F. Fountain
Superintendent, Tankhouse	Mark Peabody
Superintendent, Plant Services	John C. Lorenzen
Superintendent, Rod Plant	Luis Constandse
Superintendent, Metallurgical Control	Eric Selley
Superintendent, Environmental Services	Bob Ressler
Superintendent, Smelter Operations	Don Nelson
Superintendent, Smelter Maintenance	Scott Vandela
Superintendent, Smelter Technical Services	Rex Henderson
Superintendent, Smelter Resource Recycling	Larry Le Compte
Materials Management	Hugo Schriewer

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Miami TIN R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1013

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Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1988

CYPRUS SMELTING & REFINING

9100 E. Mineral Circle, P.O. Box 3299, Englewood, CO 80112 - Phone (303) 643-5000.

Casa Grande

T10S R4E Sec. 25

P.O. Box C-9, Casa Grande 85222 - Phone 836-2141 - Employees 89 - In situ leach copper mine - Solvent extraction-electrowinning plant - Located 32 miles south of Casa Grande.

Manager	Ravi Medhi
Plant Superintendent	John Kline
Mine Superintendent	Kermit Behnke
Chief Metallurgist	Troy Pool
Administrative Supervisor	Joe Smith

Miami

T1N R14E Sec. 25

P.O. Box 1559, Claypool 85532 - Phone 473-7150 - Employees 900 - Three open pit copper mines and 24,000 TPD concentrator which are inactive - Ferric-cure dump leach - Solvent extraction-electrowinning plant - 120,000 TPY smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant.

Manager, Technology	Al Tittes
Manager, Mining Operations	Don Prah1
Manager, Smelter/Rod Plant Operation	Kenneth Larson
Manager, Accounting	Joe Bost
Manager, Technical Services	Noel Gillespie
Manager, Plant Operations	Howard Bardwell
Superintendent, Leaching Operations	Gerald F. Fountain
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Rod Plant Superintendent	Luis Constandse
Superintendent, Environmental Services	Tom Larsen
Manager, Human Resources	Chuck Rising
Manager, Human Resources	Craig Patrick
Manager, Materials Management	Hugo Schriewer

*24-44 - I.
File - Inspiration Cons.
Copper Co.*

April 21, 1977

Inspiration Consolidated Copper Company
Robert F. Morison,
Secretary and Treasurer
Executive Office
55 Madison Avenue
Morristown, New Jersey 07960

Dear Mr. Morison:

We would appreciate receiving a copy of your company's
10-K Report, as filed with the Securities and Exchange
Commission.

Thanking you in advance.

Sincerely,

Glenn A. Miller
Mineral Resource Specialist

bh



Inspiration Consolidated Copper Company

Suite 1870, First National Bank Plaza

100 W. Washington St.

Phoenix, Arizona 85003

(602) 258-4561

August 15, 1978

Mr. John H. Jett, Director
Department of Mineral Resources
State of Arizona
Mineral Building, Fairgrounds
Phoenix, Az. 85007

Dear John;

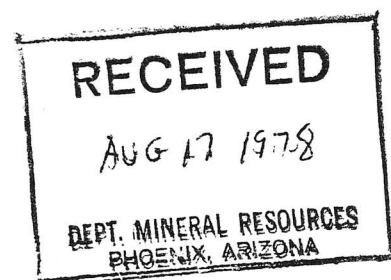
I wish to acknowledge receipt of the Board of Governors meeting notice. Again, I must excuse myself. The date, August 17, conflicts with my departure for Juneau, Alaska to attend a pre-arranged meeting on the Alaska Lands issue.

I feel there are many violations to individuals' and States' rights hidden in this distant and, seemingly, unrelated legislation. Perhaps my attendance at that meeting will have more effect, in the long run, on Arizona Mining.

Respectfully,

R. J. Pursley
Public Affairs Coordinator

RJP:jv





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

602/255-3791

To: John H. Jett, Director
From: Ken A. Phillips, Mineral Resources Engineer
Subject: Platinum and the Inspiration Copper Company Copper *(file)*
and Platinum Theft.
Date: June 27, 1980 *(file)*

The following information was obtained in a telephone conversation with R.J. (Jack) Pursley, Public Affairs Coordinator, Inspiration Consolidated Copper Company regarding the publicized platinum theft and platinum produced from their properties at Inspiration, Arizona.

1. To the company's knowledge, the only platinum stolen was 48.99 troy ounces in the form of a platinum cathode. This apparently happened sometime during the past few years. Note: The news media reports that a portion of the presently publicized theft includes 4899 troy ounces of platinum. It is quite possible that the news media has accidentally dropped the decimal point.
2. A very small amount of platinum is recovered from the anode slimes which are produced in the refining of copper. However, no anode slimes are reported as stolen. Further, at the present rate of production it would take 167 years to produce 5000 troy ounces of platinum.

By mathematical extrapolation, the precious metals content of Inspiration's ores are:

Silver - 0.025 tr. oz./ton
Gold - 0.00026 tr. oz./ton
Palladium - 0.000029 tr. oz./ton
Platinum - 0.0000029 tr. oz./ton

These values have been determined by assaying the anode slimes and calculating back to head ores using known concentration ratios. That data is as follows:

June 27, 1980

- A. Anode slimes
 - Silver 4500. tr. oz./ton
 - Gold 45. tr. oz./ton
 - Palladium 5. tr. oz./ton
 - Platinum 0.5 tr. oz./ton
- B. Copper anodes
 - Anode to slime ratio 900 to 1
 - Silver 5.0 tr. oz./ton
 - Gold 0.05 tr. oz./ton
 - Palladium 0.0056 tr. oz./ton
 - Platinum 0.00056 tr. oz./ton
- C. Copper concentrate
 - Concentrate to anode ratio 3 to 1
 - Silver 1.67 tr. oz./ton
 - Gold 0.017 tr. oz./ton
 - Palladium 0.0019 tr. oz./ton
 - Platinum 0.00019 tr. oz./ton
 - Copper 33.%
- D. Copper ore
 - Copper ore to concentrate ratio 33 to 1
 - Silver 0.025 tr. oz./ton
 - Gold 0.00026 tr. oz./ton
 - Palladium 0.000029 tr. oz./ton
 - Platinum 0.0000029 tr. oz./ton
 - Copper 0.5%
- E. Average slime shipment
 - Weight 10,000 pounds
 - Contains: 22,500 troy ounces silver
 - 225 troy ounces gold
 - 25 troy ounces palladium
 - 2.5 troy ounces platinum
 - and various amounts of selenium
 - and tellurium

KP/ap.

FINAL PROGRAM & PRE-REGISTRATION INFORMATION

Please fill out this form by checking your tentative plans for participation in the Conference or Symposium so as to assist the Local Arrangements Committee in its planning. Please return this form by August 15, 1977 to:

American Water Resources Association
St. Anthony Falls Hydraulic Laboratory
Mississippi River at Third Avenue S.E.
Minneapolis, Minnesota 55414

MEMBERS OF AWRA RESIDING IN THE UNITED STATES (including Alaska, Hawaii, and territories): Please fill out Section 2 only and return this sheet.

FOREIGN MEMBERS & NON-MEMBERS OF AWRA: No final program information will be sent prior to the meeting unless this completed form is able to be returned.

SECTION 1

NAME: _____

COMPLETE MAILING ADDRESS:

_____ ZIP CODE _____

SECTION 2

CONFERENCE & SYMPOSIUM REGISTRATION:

Advance		
(prior to October 17)	\$30.00	_____
At conference	\$40.00	_____
One day	\$10.00	_____
Full time student	\$ 2.00	_____

TRIPS:

Nogales, Mexico		
(Tues. eve.)	\$ 6.00	_____
Field trip, Tucson area		
(Thurs. p.m.)	\$ 7.00	_____
Field trip, Phoenix area		
(Friday)	\$12.00	_____

MEALS:

Former U. of A. student		
luncheon (Mon. noon)	\$ 5.00	_____
Student dinner (Mon. eve.)	\$ 2.00	_____
Arizona Water Resources		
Committee luncheon		
(Tues. noon)	\$ 7.00	_____
Evening at Old Tucson		
(Wed.)	\$12.00	_____

GUESTS ATTENDING WITH YOU:

Spouse	Registration	\$20.00	_____
Children, ages	_____		
Baby sitting needed	_____		

RECEPTION (Sun. eve.):

Plan to attend _____

EMF IS BY H. MYLES JACOB
CHAIRMAN

*file: American
of National Exchange
Council*

INSPIRATION CONSOLIDATED COPPER COMPANY
AT THE NATIONAL LEGISLATIVE CONFERENCE ON MINING
PHOENIX, ARIZONA FEBRUARY 4, 1978

IT USED TO BE IN YEARS PAST THAT ONE MIGHT DEVELOP SILICOSIS WORKING IN THE MINES. BUT, THE DUST HAS SETTLED, AND THE PREVALENT OCCUPATIONAL HAZARDS ARE CYNICISM AND PESSIMISM. SO, I'LL REFER TO MY FAVORITE CYNIC, AMBROSE BIERCE, WHO IN THE EARLY PART OF THE CENTURY PUBLISHED THE "DEVIL'S DICTIONARY". INCIDENTALLY, IN 1913 HE CROSSED THE MEXICAN BORDER AND WAS NEVER HEARD OF AGAIN.

I'LL GIVE YOU A COUPLE OF HIS DEFINITIONS:

CIRCUMLOCUTION - A LITERARY TRICK WHEREBY THE SPEAKER WHO HAS NOTHING TO SAY BREAKS IT GENTLY TO HIS LISTENERS.

CONSERVATIVE - A STATESMAN WHO IS ENAMORED OF EXISTING EVILS, AS DISTINGUISHED FROM THE LIBERAL, WHO WISHES TO REPLACE THEM WITH OTHERS.

REVOLUTION - AN ABRUPT CHANGE IN MIS-GOVERNMENT.

NOT LONG AGO, WE CELEBRATED OUR AMERICAN REVOLUTION. IN THE FOLLOWING 200 YEARS, WE HAVE HAD BOTH ABRUPT AND SUBTLY GRADUAL CHANGES TOWARD MIS-GOVERNMENT. THE U.S. NEVER HAD A TOTALLY FREE ECONOMY, BUT TO THE EXTENT IT WAS FREE, THE NATION PROSPERED. CONTROLS, IN THEIR EARLIER FORM WERE APPLIED LARGELY TO THE REGULATION OF RAILROADS, PUBLIC UTILITIES, ANTI-TRUST, AND THE LIKE.

AS FAR BACK AS 1795, JAMES MADISON COMMENTED ON A PHENOMENON WHICH HE DESCRIBED AS THE OLD TRICK OF TURNING EVERY CONTINGENCY INTO A RESOURCE FOR ACCUMULATING FORCE IN THE GOVERNMENT. THAT TECHNIQUE HAS BEEN FINELY DEVELOPED. OVER THE DECADES CONTROLS HAVE INCREASED IN NUMBERS AND THE RESULTING DISTORTIONS HAVE BEEN USED TO JUSTIFY THE IMPOSITION OF STILL MORE CONTROLS.

I AM PRIMITIVE ENOUGH TO BELIEVE THAT THE SUM TOTAL OF OUR ECONOMIC ACTIVITY PAYS FOR GOVERNMENT, EDUCATION, MEDICINE, LAW, KEEPING THE PEACE, AND ALL OTHER BENEFITS OF ADVANCED SOCIETY. BUT, IT SEEMS THAT IN OUR ZEAL TO REGULATE, WE HAVE PAID SCANT ATTENTION TO THE ACTIVITIES THAT PAY THE BILLS. REGULATION, AS WE PRACTICE IT IS FANTASTICALLY EXPENSIVE. IT IS EXPENSIVE IN TERMS OF ITS MASSIVE CONTRIBUTION TO OUR GROWING ANNUAL DEFICITS AND THE INFLATION WHICH SPRINGS FROM THEM. IT IS EXPENSIVE IN TERMS OF ITS BURDEN UPON THE EFFICIENCY OF OUR PRODUCTIVE ACTIVITIES.

THE BURGEONING OF BUREAUCRACY AND REGULATION, IN PART HAS OCCURRED BECAUSE SOME LAW MAKERS AND THEIR CONSTITUENCIES SEEM TO HAVE AN INCREASING PREOCCUPATION WITH DISTRIBUTING EXISTING WEALTH, AND ALMOST DISDAIN FOR THE MECHANISM FOR CREATING NEW WEALTH. PROFIT IS A DIRTY WORD. WE SEEM TO BE FORGING AHEAD ON THE BASIS THAT DOLLARS, DEFICITS, AND CONTROLS--NOT IDEAS, CAPITAL, AND ENTERPRISE CAN SOLVE ANY PROBLEM.

I AM SUPPOSED TO TALK TO YOU ABOUT THE PROBLEMS OF THE COPPER INDUSTRY, BUT I WOULD LIKE TO POINT OUT THAT THE PROBLEMS OF THE SORT COPPER ENCOUNTERS, ARE FELT BY ALL INDUSTRIES. THE COST OF SOLVING THESE PROBLEMS, REAL OR IMAGINED, ARE PASSED ON

THROUGH INDUSTRY TO PEOPLE; PEOPLE LIKE YOU AND ME, WHO IN THE END FOOT THE ENTIRE BILL. PARENTHETICALLY, THE CONCEPT THAT ONE CAN RELIEVE PEOPLE OF TAXES BY TAXING BUSINESS, IS THE WORLD'S BIGGEST LIE.

BY THIS TIME YOU ARE PROBABLY READY TO DOZE OFF, AFTER A BUSY MORNING, A DRINK OR TWO, AND NOW A FULL STOMACH.

I WOULD LIKE TO UNSETTLE THOSE STOMACHS BY MY NEXT EXHIBIT-- AND ANY WISHING TO LEAVE THE ROOM MAY DO SO.

AS MANY OF YOU WILL RECALL, THERE WAS INTRODUCED IN THE FORD ADMINISTRATION A PROGRAM CALLED PROJECT INDEPENDENCE. YOU MAY ALSO RECALL THAT IT RESULTED FROM UNKINDNESSES VISITED ON US BY SOME FOREIGN OIL PRODUCERS. NOW, WE REALLY CAN'T BLAME THEM FOR THE WHOLE MESS--WE HAD A LITTLE HAND IN IT OURSELVES. FOR YEARS, BY REGULATION, WE HAVE FORCED THE UNDER-PRICING OF NATURAL GAS. THIS HAD SEVERAL NATURAL AND INEVITABLE RESULTS. THERE WAS NOT ENOUGH EXPLORATION EXPENDITURE TO FIND MORE GAS. TOO-CHEAP GAS DISPLACED OIL, AND THERE WAS NOT ENOUGH DRILLING DONE FOR MORE OIL. THE COAL INDUSTRY WAS NEARLY KILLED OFF. CAP THIS WITH THE FOUR YEAR DELAY CAUSED BY ENVIRONMENTAL OBSTACLES THROWN IN THE WAY OF THE ALASKA PIPELINE, AND THE WAY WAS CLEARED FOR THE OIL HOLDUP.

NOW LET'S GET BACK TO PROJECT INDEPENDENCE. THE IDEA WAS TO HASTEN THE DEVELOPMENT OF NEW SOURCES OF FUELS, ESPECIALLY OIL, GAS, AND COAL. EVERYBODY KNOWS WE HAVE BEEN WRANGLING THE PAST YEAR OVER THE PRICING OF NATURAL GAS AND OIL AND GOTTEN

NOWHERE. WHAT MANY PEOPLE DON'T KNOW IS THAT MOST UNDEVELOPED COAL IS ON FEDERAL LANDS SUBJECT TO LEASING. BUT THERE HAS BEEN A MORATORIUM ON LEASING FOR THE PAST FIVE YEARS, AND VIRTUALLY NO FEDERAL COAL HAS BEEN MADE AVAILABLE FOR DEVELOPMENT.

TO MAKE SURE THAT COAL DEVELOPMENT SHALL BE DONE IN WAYS WHICH WILL NOT BE OFFENSIVE TO THE ENVIRONMENT, AN EXTRAORDINARY BODY OF REGULATION HAS BEEN CREATED. I AM NOW GOING TO ASK SOME OF YOU FOLKS TO ASSIST IN SHOWING A CHART WHICH DEPICTS THE STEPS NECESSARY TO OBTAIN PERMISSION TO EXPLORE, TO LEASE, TO DEVELOP AND EXTRACT COAL. THIS CHART, WHICH STRETCHES OUT TO A LENGTH OF ABOUT 21 FEET DOES NOT NECESSARILY COVER ALL THE STEPS TO THIS POINT. THERE HAS BEEN MORE REGULATORY LEGISLATION SINCE IT WAS DRAWN. IN PREPARING THE CHART, INPUTS WERE HAD FROM THE FISH AND WILDLIFE SERVICE, BUREAU OF LAND MANAGEMENT, FEDERAL ENERGY ADMINISTRATION, GEOLOGICAL SURVEY, FOREST SERVICE, ENVIRONMENTAL PROTECTION AGENCY, FEDERAL REGIONAL COUNCIL, AND BUREAU OF MINES. THERE ARE A FEW OTHERS WHICH WILL BE INVOLVED ALONG THE WAY, SUCH AS FEDERAL COMMUNICATIONS COMMISSION, FEDERAL AVIATION ADMINISTRATION, INTERNAL REVENUE SERVICE, CORPS OF ENGINEERS, INTERSTATE COMMERCE COMMISSION, MINING ENFORCEMENT AND SAFETY ADMINISTRATION, AND THE BUREAU OF ALCOHOL, TOBACCO AND FIREARMS. SOME OR ALL OF THESE AGENCIES WILL BE INVOLVED IN THE PERMITTING PROCESS.

THERE ARE EIGHT DIFFERENT ROUTES DEPICTED ON THIS CHART, AND THE TIME LAPSES ARE ILLUSTRATED. GOING THE FULL ROUTE FROM PRELIMINARY EXPLORATION, LEASING AND ON THROUGH THE DEVELOPMENT

AND APPROVAL OF A MINING PLAN WOULD TAKE 11.8 YEARS. THE SHORTEST ROUTE IS THAT OF SIMPLE LEASE MODIFICATION, ASSUMING NO NEW EXPLORATION OR MINING PLAN WOULD BE REQUIRED. THAT TAKES ONE YEAR. THAT'S FOR COAL.

LET ME TELL YOU A LITTLE SOMETHING ABOUT THE LEGISLATION BEING DEBATED IN CONGRESS CONCERNING REGULATION OF GAS PRICES. IF GAS PRICES ARE DEREGULATED THEY WILL GO UP--THERE IS NO DOUBT ABOUT THAT. BUT PRICES WON'T RISE AS MUCH AS ONE WOULD THINK, BECAUSE MORE EXPENSE GOES FOR DELIVERY OF THE PRODUCT, THAN FOR ITS PRODUCTION.

THIS DEBATE IS PLAYED AGAINST A BACKGROUND OF CONTROL WHICH HAS LED US TO BELIEVE THAT HEAT PRODUCED BY GAS SHOULD COST ABOUT A QUARTER OF THAT PRODUCED BY OIL. THE AVOWED PURPOSE OF LEGISLATION IS TO KEEP CONSUMER COSTS DOWN. TO DO THIS, OUR GOVERNMENT HAS SET UP A DEPARTMENT OF ENERGY. ITS BUDGET FOR THE FIRST YEAR IS \$10.4 BILLION. THE ADMINISTRATION HAS ESTIMATED THAT DEREGULATION OF GAS WOULD COST THE CONSUMER \$10 BILLION PER YEAR. THE IMPORTANT THING IS NOT JUST THAT REGULATION COSTS MORE THAN DEREGULATION. IT'S A SHOCKING EXAMPLE OF OUR GOVERNMENT'S WILLINGNESS TO MAKE PRODUCTIVE ACTIVITIES UNPROFITABLE.

NOW, LET'S GET BACK TO WHAT HAPPENED IN COPPER. MY MEMORY GOES BACK A LONG WHILE, FOR I STARTED TO WORK FOR INSPIRATION IN 1936. WE HAD LOTS OF PROBLEMS ALONG THE WAY, INCLUDING A LEAD-OFF WITH FDR'S JAWBONING ABOUT THE PRICE OF COPPER AND OTHER INDUSTRIAL MATERIALS IN 1937. OVER THE YEARS, THE MINING COMPANIES DID REASONABLY WELL. WE WERE FINANCIALLY HEALTHY, HAD

MODEST DEBT, AND PAID DIVIDENDS ENOUGH TO KEEP INVESTOR INTEREST, EVEN IN THE FACE OF ESCALATING TAXES AND OTHER COSTS OF ALL KINDS. THEN CAME THE DAY OF THE ENVIRONMENT AND THAT GREAT ERA WHEN EVERY-ONE WHO COULD PRONOUNCE THE WORD WAS A SCIENTIST AND ALL MINERS WERE VILLAINS.

HERE IN ARIZONA IN 1970 THERE WERE ENACTED LAWS AND REGULATIONS REQUIRING SMELTERS TO ELIMINATE FROM THEIR EMISSIONS ALL BUT 10% OF SULFUR CONTAINED IN PLANT FEED. THIS WAS BASED ON A REPORT PUBLISHED BY NAPCA, THE PREDECESSOR OF THE EPA, WHICH ALLEGED THAT AN EMISSION CONTROL LEVEL OF 98.8% COULD BE REACHED IN FIVE YEARS BY THE ENTIRE NON-FERROUS METALLURGICAL INDUSTRY, INCLUDING NOT JUST COPPER, BUT ALSO THOSE SMELTERS TREATING SULPHIDE-BEARING ORES OF OTHER METALS. NAPCA ESTIMATED THAT THE INVESTMENT REQUIRED FOR THE ENTIRE INDUSTRY WOULD BE BETWEEN \$33 AND \$81 MILLION. AS A MATTER OF FACT, INSPIRATION HAD TO INVEST APPROXIMATELY \$62.5 MILLION TO ACHIEVE ABOUT 90% CONTROL OF EMISSIONS, AND WE ARE NOT COMPLETELY FINISHED YET.

TO BUILD THAT NON-PRODUCTIVE INSTALLATION WE HAD TO BORROW ALMOST \$55 MILLION, JUST SLIGHTLY LESS THAN OUR NET WORTH WHEN THE PROGRAM BEGAN. TO PROVIDE OTHER FUNDS NEEDED WE HAD TO DEplete OUR CASH AND SECURITIES AND DEFER OR ABANDON THE DEVELOPMENT OF NEW JOB-MAKING VENTURES. CAPITAL COSTS ARE NOT THE ONLY COSTS; DEBT HAS TO BE SERVICED, FACILITIES HAVE TO BE MAINTAINED AND OPERATED. IT HAS BEEN ESTIMATED THAT, FOR THE INDUSTRY, THESE LATTER COSTS RUN BETWEEN 7¢ AND 15¢ PER POUND OF COPPER PRODUCED.

INSPIRATION'S STORY IS NOT UNIQUE. IT IS TYPICAL OF THE

ENTIRE INDUSTRY. FOR EXAMPLE, AT THE END OF 1964 LONG-TERM DEBT OF MAJOR COPPER PRODUCERS WAS \$252 MILLION. BY THE END OF 1976 SUCH DEBT TOTALLED \$3.2 BILLION--MUCH OF IT FOR POLLUTION CONTROLS.

THAT WAS ONE WAY THE COPPER INDUSTRY WAS WEAKENED, AND ITS ULTIMATE RESULT HAD BEEN PREDICTED IN THE PRESIDENT'S ECONOMIC FORECAST TO CONGRESS IN FEBRUARY 1971. I QUOTE:

"OUR HIGH LEVEL OF MATERIAL WEALTH HAS CAUSED US TO PLACE A HIGHER VALUE ON CLEAN AIR AND WATER THAN IN COUNTRIES WHICH HAVE LOWER INCOMES OR WHERE CLEAN AIR AND WATER MAY STILL BE ABUNDANT. AS THIS VALUE BECOMES REFLECTED IN COSTS IMPOSED ON PRODUCERS, THOSE FOR WHOM THE COSTS OF POLLUTION CONTROL ARE HIGH WILL FIND IT HARDER TO COMPETE WITH PRODUCERS IN COUNTRIES WHERE CLEAN AIR AND WATER ARE LESS VALUABLE OR WHERE POLLUTION IS LOWER. THIS RESULTING REALLOCATION OF PRODUCTION AMONG NATIONS SHOULD BENEFIT ALL NATIONS."

BENEFIT ALL NATIONS EXCEPT THE U.S., I ADD.

WE HAVE FOUND IT HARDER TO COMPETE WITH THOSE COUNTRIES, AND THE DEPRESSION IN "COPPER LAND U.S.A." STEMS FROM THAT AMONG SEVERAL PRINCIPAL REASONS. IN ADDITION TO BEING WEAKENED BY OUR POLLUTION CONTROL EXPENDITURES, OUR GOVERNMENT IN 1974, WHILE COPPER PRODUCERS WERE HELD TO A 68¢ CEILING, LIQUIDATED ITS COPPER STOCKPILE AT PRICES RANGING FROM 80¢ TO \$1.00 PER POUND. COPPER IS A CYCLICAL INDUSTRY, DEALING IN A FREELY-MOVING COMMODITY. WE NEED TO SURVIVE THE LOWS IN ORDER TO ENJOY THE HIGHS. WE WERE

DENIED THEM. THE LIQUIDATION ALSO HASTENED THE PRESENT MASSIVE OVER-SUPPLY SITUATION, WHICH HAS LEAD TO EVER LOWER PRICES. THE OVER-SUPPLY SITUATION HAS BEEN THE RESULT OF UNLIMITED PRODUCTION FROM GOVERNMENT-OWNED OR CONTROLLED MINES, MOSTLY IN LESS-DEVELOPED COUNTRIES. THESE MINES, FOR THE MOST PART ONCE SUPERBLY RUN BY PRIVATE INDUSTRY, ARE NOW RUN AS SOCIAL INSTRUMENTS. DESIRE TO HAVE MAXIMUM INTAKE OF FOREIGN EXCHANGE AND TO MAINTAIN JOBS GOVERNS MINING AND SELLING POLICIES. THE RESULT HAS BEEN IN THE RECENT YEARS OF RELATIVELY POOR BUSINESS ABROAD, THAT COPPER, WHICH UNDER NORMAL CONDITIONS WOULD HAVE BEEN SOLD OUTSIDE THE U.S., WAS DUMPED INTO THE DOMESTIC MARKET WITHOUT LIMIT. DOMESTIC CALL FOR OUR METAL WAS PRETTY GOOD IN 1976 AND 1977. OUR DOMESTIC MINES COULD HAVE SUPPLIED IT ALL. YET, 21% OF THE 1976 DEMAND FOR NEWLY-REFINED COPPER WAS FILLED FROM FOREIGN SOURCES AT PRICES BELOW OUR BREAK-EVEN AND SUBSTANTIALLY BELOW THE COST OF MOST FOREIGN PRODUCERS. VIRTUALLY THE ENTIRE BRUNT OF THE PRODUCTION CUTS DICTATED BY PRESENT CIRCUMSTANCES HAS BEEN BORNE BY THE PRIVATE ENTERPRISE SECTOR OF THE MINING INDUSTRY. PRODUCTION HAS NOT BEEN CUT ABROAD BY THE GOVERNMENT-DOMINATED MINES. UNSOLD STOCKS ARE TWICE THE NORMAL LEVEL AND BEAR HEAVILY ON PRICE.

LEST YOU THINK THAT ALL OF THESE PROBLEMS ARE OF FEDERAL ORIGIN, LET ME COMMENT ON ARIZONA MINE TAXATION. 1976 PROPERTY TAXES, PAID BY THE MINES, INCREASED BY 124% OVER THE 1970 LEVEL. ARIZONA MINES ARE ASSESSED AT 60% OF FULL CASH VALUE; COMMERCIAL INDUSTRIES AT 27%; AGRICULTURE 19%.

TO BE SPECIFIC, THE OPERATIONS OF MY EMPLOYER, INSPIRATION

COPPER, POSTED PRE-INCOME-TAX LOSSES IN 1975, 1976 AND 1977. WE PAID TAXES IN ARIZONA OF \$5,354,000 IN 1975, \$5,620,000 IN 1976, AND \$5,858,000 IN 1977. ISN'T IT TOO BAD WE CAN'T MOVE A MINE?

LET'S SUM IT UP FOR COPPER IN PARTICULAR, AND MINING IN GENERAL.

INDUSTRY COSTS HAVE RISEN TO WHERE WE CAN'T COMPETE WITH IMPORTS. WE ARE LOSING A LARGE SHARE OF OUR MARKET. PRODUCTION HAS BEEN REDUCED WITH LOSS OF AMERICAN JOBS. WE ARE IN HOCK FOR NON-PRODUCTIVE ENVIRONMENTAL "INVESTMENTS". DIVIDENDS HAVE SUFFERED--OR CEASED. OUR COMMON STOCKS SELL AT A FRACTION OF REPLACEMENT COST OF PHYSICAL PLANT ALONE.

THE POINT OF ACUTE DAMAGE TO NONFERROUS MINING HAS BEEN REACHED--AND PASSED. MORE MANDATED EXPENDITURE FOR CONTROLS AND UNNEEDED RECLAMATION, MORE ENVIRONMENTAL OBSTACLES, AND MORE TAXES, CAN LEAD ONLY TO MORE CRITICAL SHRINKAGE IN DOMESTIC PRODUCTION. IN FACT, WERE THERE A PLOT TO KILL MINING IN AMERICA, IT COULD NOT HAVE BEEN MORE EFFECTIVELY ORCHESTRATED THAN WHAT HAS BEEN DONE IN THE NAME OF REGULATION.

WE CAN GO ON AND ON AND PRODUCE HORROR STORIES LIKE THIS IN OTHER SECTORS OF OUR AMERICAN INDUSTRY.

WE HAVE LEGISLATED AND REGULATED WITHOUT ADEQUATE CONSIDERATION OF THE EFFECT UPON OUR ECONOMY. WE HAVE DEBILITATED EXISTING INDUSTRY. WE HAVE INHIBITED INVESTMENT IN NEW VENTURES. IN FACT, OUR PERCENTAGE OF GROSS NATIONAL PRODUCT INVESTED IN NEW CAPITAL

EQUIPMENT IS ABOUT THE LOWEST IN THE INDUSTRIALIZED WORLD. IT'S CLEAR THAT WE MUST CRITICALLY EXAMINE OUR PRESENT REGULATORY AND TAX SETUP, AND EVEN MORE CRITICALLY EXAMINE CHANGES PROPOSED IN THE FUTURE. WE MUST ASSESS THE VALUE OF REGULATORY BENEFITS WITH REGARD TO COSTS. THIS WILL COME SOONER OR LATER. MY ONLY HOPE IS THAT IT MAY DERIVE FROM THE ACTIVITIES OF LEGISLATORS WHO UNDERSTAND ECONOMICS, RATHER THAN AS A REVULSION AGAINST GOVERNMENT BY THE CONSUMER--THE ULTIMATE TAX-PAYER--WHEN THE TRUTH, THAT HE FOOTS THE BILL, FINALLY GETS TO HIM.

Information from MINE INSPECTOR'S OFFICE - August 15, 1957

INSPIRATION CONS. COPPER MINE, Miami, Ariz.

GILA COUNTY 1-5-57

MILL & SMELTER

Cu ore - 1,300,000 tons - 279 miners

P.D.I. Honeyman, Gen. Mgr.,
Inspiration Cons. Copper Co. &
International Smelting & Refining,
Inspiration, Arizona

L.A.S.

11/11/81 15:11 11/11/81 15:11 NOV 11 1981

Noranda Mining Inc., Denver, has also slowed development work on the Blackbird cobalt deposit in Idaho. Noranda has sought guarantees from the Government that it will purchase cobalt for the National Defense Stockpile.

AMAX Nickel, Inc., has also proposed to the Federal Emergency Management Agency that the Government guarantee the purchase of cobalt from AMAX for the National Defense Stockpile. The cobalt would be produced at the firm's Port Nickel refinery at Braithwaite, Louisiana, the only nickel refinery in the United States. Currently the plant produces about 500 tons of cobalt annually from imported nickel-copper-cobalt mattes. Reportedly, a purchase guarantee would allow the firm to expand the cobalt capacity of the Port Nickel refinery and modify it so that higher purity cobalt, meeting stringent stockpile specifications, could be produced. The firm would also seek to develop the capability of recovering byproduct cobalt from ores mined in the Missouri lead-zinc district. These measures could serve to reduce the Government stockpile goal for cobalt.

The price supports and guarantees being sought by Anschutz, Noranda, and Amax are made possible by provisions of the Defense Production Act, first passed in 1950 to encourage the production of strategic materials during the Korean War. The Act, extended to September 30, 1982, allows the Government to guarantee prices and markets for strategic materials and to offer loans or loan guarantees for domestic production.

COPPER

adjusted up.

With the continued decline in copper prices,* Phelps Dodge Corp. announced that the company's December copper production in Arizona would be cut 23%, or by 11 million pounds. Uncertain economic conditions as well as the cost of similar cutbacks were cited by observers as deterring similar reductions by other companies. Also, relatively low inventories have been reported in the copper industry during the year.

* Work on a \$15 million improvement to Inspiration Consolidated Copper Co.'s smelter near Miami, Arizona, is underway. The improvements will upgrade quality control at the smelter by installation of a newly designed and rebuilt converter, a reverts handling system, and a computerized system for process control of the acid plant and smelter. The construction which began April 1 is expected to be completed in December 1981.

Standard Oil Co., (Ohio) and its subsidiary, Kennecott Minerals Co., announced plans for a \$1 billion modernization of the Utah Copper Division operations. Projects proposed include the installation of an ore-crushing facility in the Bingham Canyon open pit, a conveyor system to haul ore out of the pit, and construction of a new concentrator to replace the Bonneville, Magna, and Arthur mills. Much of the railroad ore hauling system would be replaced by conveyor haulage. Approximately 3,000 workers would be employed at the peak of construction. Underground development of the North ore shoot, which is reported to contain 1.2% to 2% copper, would continue. If results of a 1-year feasibility study prove favorable, the construction program would commence early in 1983 and be completed in 1986.



Inspirations Consolidated Copper Company

Suite 1870, First National Bank Plaza

100 W. Washington St.

Phoenix, Arizona 85003

(602) 258-4561

November 8, 1977

Mr. John H. Jett, Director
Department of Mineral Resources
Mineral Building, Fairgrounds
Phoenix, Az. 85007

Dear John:

In response to your letter of October 31, I'll be happy to furnish you with copies of the Symposium papers you have requested. Because at the last moment my plans to attend the Symposium had to be cancelled, I do not yet have the material that was offered. However, just as soon as I have received copies, I will send you those in which you have expressed interest.

With best regards,

R. J. Pursley
Public Affairs Coordinator

RJP:jv

*Walker
(sh) Walker
Papers*

October 31, 1977

Mr. R. J. Pursley
Public Affairs Coordinator
Inspiration Consolidated Copper Company
100 West Washington
Phoenix, Arizona 85003

Dear Jack:

The Department normally has representation at the Annual Watershed Symposium. This year, we cannot make it.

I noticed that you are one of the Directors of the Arizona Water Resources Committee. If you obtain copies of the papers, could we borrow and make copies of the following?

WATER QUALITY MANAGEMENT (Monday and Tuesday)

WATER REUSE AND CONSERVATION (with AWRC) (Tuesday)

URBAN AND INDUSTRIAL WATER PROBLEMS (Tuesday)

WATER LAW (Wednesday)

WATER CONSERVATION (Wednesday)

Thank you for any help or consideration.

Best regards,

John H. Jett
Director

JHJ:pp

ARIZONA WATER RESOURCES COMMITTEE

P. O. BOX 71 A660
PHOENIX, ARIZONA 85001

PHONE: 261-2231

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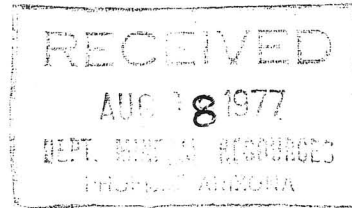
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Obed M. Lassen
R. J. McMullin
Robert E. Moore
Robert R. Stonoff

*Glen Walker -
Should you go?*



For 20 years the Arizona Water Resources Committee (in later years with the co-sponsorship of the Arizona Water Commission) has put on an annual watershed symposium. This year we are pleased to join with the American Water Resources Association as a sponsor of a National Water Resources Conference; the theme being "Assessment, Management, and Politics of Water". This conference will be held in Tucson at the Tucson Community Center and Marriott Hotel Headquarters on October 31 thru November 3.

Tuesday, November 1 will be that portion of the conference specifically sponsored by the Arizona Water Resources Committee and concerned with Water Resource Enhancement. What promises to be an outstanding program has been developed and Congressman Morris Udall will be our luncheon speaker.

You are cordially invited to register and attend all or any part of the total conference. As President of the Arizona Water Resources Committee, I particularly urge you to make every effort to attend the Tuesday session.

Registration (form included) for all or any part of the conference should be sent to the AWRA in Minneapolis as indicated on the form. Hotel reservations (form also included) should be sent to the AWRA Housing Bureau, Tucson Convention/Visitors Bureau, as indicated on the form.

I look forward to seeing you at what should be an outstanding conference on a subject of vital importance to all Arizonans.

Robert White

AMERICAN WATER RESOURCES ASSOCIATION

Tucson, Arizona

October 31-November 3, 1977

MAIL TO:

AWRA Housing Bureau
Tucson Convention/Visitors Bureau
P.O. Box 27210
Tucson, Arizona 85726
Phone: (602) 791-4768

IMPORTANT Please make all reservations through the Housing Bureau. Rates quoted will be guaranteed only through the Bureau.

	<u>Single</u>	<u>Double</u>	<u>Twin/Double</u>
* Marriott (Hdqtrs.)	\$24	\$30	\$30
Santa Rita	20	22	24
Sheraton Pueblo	18	22	22
Desert Inn	16	18	20

RESERVATIONS MUST BE RECEIVED NO LATER THAN OCTOBER 17 TO ENSURE THE QUOTED RATES. IF THE DESIRED RATE IS NOT AVAILABLE, THE NEXT AVAILABLE RATE WILL BE ASSIGNED.

Please indicate first, second and third choice of hotel:

1. _____ 2. _____ 3. _____

Type of accommodations desired: SINGLE (1 person, 1 bed) _____

DOUBLE (2 persons, 1 bed) _____ TWIN/DOUBLE (2 persons, 2 beds) _____

Name(s) of person(s) who will occupy room: _____

Address: _____

City: _____ State: _____ Zip: _____

ARRIVAL DATE: _____ TIME: _____ DEPARTURE DATE: _____

DO NOT SEND DEPOSIT. DEPOSIT INFORMATION WILL BE SENT WITH YOUR CONFIRMATION DIRECTLY FROM HOTEL.

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

Insp. file
"C" Alpha

August 19, 1976

Mr. R.C. Cole, Vice President
Inspiration Consolidated Copper Company
First National Bank Plaza
100 West Washington
Phoenix, Arizona 85003

Dear Mr. Cole:

The Department of Mineral Resources is compiling data for its annual report on the copper industry. This year's report will contain a narrative section on Arizona copper companies. The discussion section will include a brief review of existing facilities, their rated capacities and other information.

As per our telephone conversation on August 19, I would appreciate it if you could supply me with the following information: (1) the rated capacity of the Inspiration concentrator and (2) the rated capacity of the Christmas concentrator.

Thank you very much.

Sincerely,

Glenn A. Miller,
Mineral Resources Specialist

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

July 20, 1976

C
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Y

Mr. R. R. Hyde
President and Chief
Operating Officer
Inspiration Consolidated
Copper Company
Inspiration, Arizona 85537

Dear Mr. Hyde:

Thank you very much for furnishing the Department of Mineral Resources with the 1975 production data for your Arizona mining operations.

Enclosed is a copy of the completed 1974-1975 tabulations for all large Arizona copper producers.

If the Department, or I, can be of assistance to you at any time, please contact us.

Sincerely,

Glenn A. Miller
Mineral Resources Specialist

Enclosure

GAM:pp

File: Inspiration Consolidated, Pink Reading,
Alpha "I", Copper Report, GAM File

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

April 21, 1976

C
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P
Y

Mr. R. R. Hyde
President and Chief
Operating Officer
Inspiration Consolidated
Copper Company
Inspiration, Arizona 85537

Dear Mr. Hyde:

The Department of Mineral Resources is compiling data for its annual report on the copper industry, "The Copper Industry Statistics for 1975 Compared With Other Years - Arizona, The United States and The World." We would appreciate having your 1975 production figures for: (1) tons of ore mined, (2) pounds of recoverable copper, and (3) pounds of recoverable molybdenum. Please insert the data in the space provided in the attached tabulation sheet.

Similar requests are being sent to all large Arizona copper producers, and a copy of the completed 1974-1975 tabulations will be returned to you.

Also, we would appreciate having the data in the enclosed chart extended for 1975, as supplied by Mr. R. F. Morison on May 20, 1973.

The data we obtained from your company last year included figures for ore treated by flotation and ore treated by vat leaching. If possible, could you furnish us with like information for 1975.

Thank you very much.

Sincerely,

Glenn A. Miller
Mineral Resources Specialist

Enclosures

GAM:pp

Pink - Reading
Alpha - H
✓ Subject - Inspiration Cons.
Copper Report
Copy - GM

April 22, 1977

Mr. R. R. Hyde
President and Chief
Operating Officer
Inspiration Consolidated
Copper Company
Inspiration AZ 85537

Dear Mr. Hyde:

The Department of Mineral Resources is compiling data for its annual report on the copper industry, A PROFILE OF ARIZONA'S PRIMARY COPPER INDUSTRY FOR 1976, VOLUME I. We would appreciate having your 1976 production figures for: (1) tons of ore mined, (2) pounds of recoverable copper, and (3) pounds of recoverable molybdenum. Please insert the data in the space provided on the attached tabulation sheet. Also, we would appreciate having the data on the enclosed chart extended for 1976, as supplied by Mr. R. F. Morison in May of 1973.

The data we obtained last year included figures for ore treated by flotation and ore treated by vat leaching. If possible, could you furnish us with like information for 1976?

Similar requests are being sent to all Arizona copper producers and a copy of the completed 1976 tabulations will be returned to you.

Thank you very much.

Sincerely,

Glenn A. Miller
Mineral Resources Specialist

GAM:klg

enclosures

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine Inspiration Copper Co. Pit Date May 21, 1962
District Miami District, Gila County Engineer Lewis A. Smith
Subject: Interview with Bert Reed, Johnson and Carroll Weed and pit visit 5-18-62.

Inspiration has excavated a deep canyon and erected a large earth fill below a high dump, averaging 0.4 percent copper. A concrete wall above the earth dam will contain the pregnant solution obtained from heap leaching of the dump. The dump contains some millions of tons. The pregnant solution will be bumed to the present precipitation plant.

In the main pit, a wide area, on the westside, was inspected to determine by oxidized capping if the area warranted drilling. It is felt that the north part of the area might warrant a hole or two, but that the ore, if present in sufficient grade, would be relatively deep. The south half was somewhat more lean. On the north side of the pit, the benches have been pushed back, on a steep slope, close to the leach plant. This face, according to Johnson, has around 200 feet of ore, which appears to extend northward under the plant. Holes north of the plant also showed ore.

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine : Inspiration Mine

Date November 22, 1961

District Miami District, Gila County

Engineer Lewis A. Smith

Subject: Interview

Bert Reed, Chief Geologist of Inspiration Copper Co., stated that the recent drilling on Red Hill had come up with a good addition to their reserves. However, around 40,000,000 tons of waste stripping will be eventually necessary to clear the ore. For the disposal of this waste they had wanted to acquire the Blue Bird to the southwest. They had made an offer to the Carrows but were turned down. The Blue Bird property was recently drilled to some extent by Al Stovall who has an option on the claims. The Red Hill drilling disclosed two enrichment zones in the better primary area and none of the holes reached strictly primary material, some enrichment being present all the way down the holes. The two enrichment zones are now believed to be essentially pre-Whitetail Conglomerate in age with some addition during the Gila Conglomerate deposition. A possible third, but deeper enrichment zone was indicated in a deep hole north of the leaching plant, but this is as yet not proven. Apparently enriched ore was leached between the present zones and above the top one. This similar situation occurs at Toquepala in southwest Peru, (at Cartwright) and at Morenci. It was suggested that in another district the zones were believed affiliated with the two bottom horizons of the Gila formation. Bert felt that this could be true but deeper drilling locally would be required to prove it.

MEMO

INSPIRATION PIT

9-22-61

MIAMI DIST., GILA CO.

LEWIS A. SMITH

A brief visit and interview with Mr. Johnson of the Geological Staff of Inspiration Copper Co. The area visited lies north of the leaching plant. Some iron gossan and fracturing were observed. The results of the observation are still confidential.

INSPIRATION CONS. COPPER CO.

GILA COUNTY

Interviewed Tate at Yucca. He reported that Inspiration was relinquishing the LEVIATHAN property and that Allison would probably take over at the end of May.

TRAVIS P. LANE - Weekly Report - 5-23-59

H. CARROLL WEED of Inspiration, Arizona, has been elected a director and Vice President of Inspiration Consolidated Copper Co. He will continue as General Mgr. of the company. H. Myles Jacobs has been elected president of Inspiration at its New York, N. Y. headquarters. He succeeds Pharric D. I. Honeyman, MINING WORLD'S 1957 Man of the Year, who is retiring.

MINING WORLD, March, 1960 - p 55.

COPPER PRODUCTION COSTS AT THREE LARGE ARIZONA MINES

Source: Companies' Annual Reports to Stockholders for Years 1951 and 1956

Note: These copper producers have no fabricating plants to affect their actual costs of copper production.

✓ I N S P I R A T I O N:

	<u>1951</u>	<u>1956</u>
Sales of Metals	\$ 19,157,566	\$ 29,654,403
Pounds copper and copper equivalent.	78,238,000	70,380,000
Costs--All except federal income taxes, depreciation and depletion.	\$ 11,490,535	\$ 15,627,155
Cost per lb. of copper before depreciation, depletion and federal income taxes.	\$.14687	\$.22204
% Increase 1951 to 1956		51.18%

M I A M I:

Sales of Metals.	\$ 24,345,106	\$ 39,824,863
Pounds copper and copper equivalent.	100,600,000	95,234,000
Costs--All except federal income taxes, depreciation and depletion.	\$ 16,868,850	\$ 23,651,238
Cost per lb. of copper before depreciation, depletion and federal income taxes.	\$.16766	\$.24835
% Increase 1951 to 1956		48.11%

E A G M A:

Sales of Metals.	\$ 11,922,198	\$ 13,838,580
Pounds copper and copper equivalent.	49,265,000	104,833,000
Costs--All except federal income taxes, depreciation and depletion.	\$ 9,375,620	\$ 28,451,057
Cost per lb. of copper before depreciation, depletion and federal income taxes.	\$.19031	\$.27110
% Increase 1951 to 1956		42.61%

TURBOCHARGERS
AT
INSPIRATION CONSOLIDATED COPPER COMPANY

BY
R. V. Bamerio
Inspiration Consolidated Copper Company
Inspiration, Arizona

ARIZONA SECTION AIME
OPEN PIT DIVISION

PIMA MINING COMPANY
Tucson, Arizona

April 25, 1958

TURBOCHARGERS

It is our intent to relate to you some of the results experienced with turbochargers at the Inspiration Consolidated Copper Company. Generally speaking a turbocharger is a device driven by the engine exhaust gases to supply an increased amount of air to the engine, so that additional power is obtained. The turbocharger is not a new or recent development. It is new in its adaptation to off-the-highway truck engines.

At the present time Inspiration has 19 of 24 trucks turbocharged, for a total of 30 turbochargers in operation. With the exception of the two new Euclid 10FFD's, which had turbochargers as original equipment, all turbos were installed at the Inspiration Open Pit Shops.

The first truck to be turbocharged was a Model 250 Dart. Then in succession came our Model 300 Darts and the Euclid 4FFD's. Only one Model 250 Dart Truck was converted, so no comparison will be made on this model truck. No comparison will be attempted on the Model 300 Darts, because of the different engines involved. We have seven of these trucks turbocharged. It might be mentioned that one of these 300 Darts is equipped with an experimental Cummins V-8 engine with a top mount turbocharger.

The last group of trucks to be converted was our 9 Euclid 4FFD's. For purposes of comparison we will use this group, hereafter called Fleet 4. Turbocharging, for Fleet 4, started in June of 1956, and each truck was converted as it came due for engine overhaul. This fleet gave a good comparison in costs, speed, power, etc., as the

engines involved were the same, except for a few modifications to accommodate the turbocharger.

The turbocharger now used at Inspiration is the Cummins Model T-590. Both a top and side mount turbocharger is used. Inspiration also used two Elliot turbochargers before the Cummins T-590 became available.

The time taken for the conversion varied for each truck. Time was taken to check other truck components while the truck was down. Also there were times when mechanics were temporarily pulled away and put on some pressing work. The average time was between two to three weeks. The total cost for conversion was approximately \$6,000.00 per truck. The turbo installation is about 50% of the cost. This includes the engine modifications mentioned below, the turbocharger and miscellaneous hardware. The other 50% of the cost is in the overhaul of the engine. The engines installed were not new, but reconditioned. The engines removed were sent out to be rebuilt and adapted for turbochargers.

Although the engines did not require any drastic modification for turbo-installation, the following changes were made:

1. Stellite exhaust valves were installed.
2. Different exhaust and intake manifolds.

On the trucks themselves, very little modification was necessary. On Fleet 4, the front end of the engine hood had to be raised approximately 6 inches to accommodate the top mount turbocharger. It was thought for a time that the visibility would be impaired, but this did not prove to be the case.

All the engine modifications were done when the engine was

being overhauled, while any truck modification was done by the Open Pit Shops. In the majority of the conversions little or no difficulties were experienced.

It was reasoned that if the engine could produce additional horsepower more truck speed could be obtained. If this were true, fewer truck shifts per shovel shift might be required on our uphill hauls. This would lessen the possibility of purchasing new equipment, except in the case of replacement. Tests showed that an approximate 20 to 30% increase in horsepower and about a 20% increase in truck speed resulted from the installation of turbochargers.

In general the performance of the trucks improved as mentioned in the preceding paragraph. The truck speed went up about 20%. The Fleet 4 trucks now average about 8.5 miles per hour. The loaded truck is checked over a measured 300 foot course with a 6.9% grade. With this increase in truck speed it was thought that less truck shifts per shovel shift would be required, but this was not the case because of changed conditions. Three or four shovels were moved about this time, and all our hauls, with one exception, increased about 0.5 mile each. The larger part of this increase was up grade. As a result of this we did not use less trucks per shovel shift and did not show any appreciable gain in truck shifts. It is quite possible that turbocharging saved adding additional trucks to our fleet. This is indicated by the following table:

<u>Year</u>	<u>Truck Shifts Per Shovel Shift</u>	<u>Ave. Haul (RT)</u>
1954	4.5	1.5 Mi.
1955	4.4 Ave. 4.5	1.5 "
1956 - 1st 6 months	4.6	1.5 "

	Before Conversion -	
	After Conversion	
2nd 6 months	4.7	2.0 "
	Ave. 4.75	
1957 - Thru Oct.	4.8	2.0 "

The fuel consumption showed some increase, but this was expected. Before the turbocharger installation Fleet 4 averaged about 8.6 gallons per hour. After conversion this figure went up to 9.3 gallons per hour. Not all of this increase can be attributed to the turbocharger, because as our hauls lengthened much of the extra length was up-grade. The truck then had to be driven at full throttle for longer periods of time. This could contribute to the increase in fuel consumption.

At the beginning, the hours of service obtained from the turbochargers was not high, probably due to inexperience and faulty turbos. The first turbo used was a side mount. Since then, 26 side mount turbochargers have been changed, for an average of 863 hours per turbo. This turbo is used in conjunction with the Cummins NRT0-335 engine on our Model 250 and 300 Darts. The top mount turbo is used on Fleet 4 Euclids and the Cummins NT-250 engines. Thus far 19 of these turbos have been changed for an average of 2,251 hours per turbocharger. Both of these turbochargers have a warranty of 3,600 hours. The hours of service have been steadily rising during the first part of this year,

and as more experience is gained it is expected that the hours per turbo will equal or exceed 3,600 hours. Recently turbos with 5,815, 5,575 and 5,375 hours have been removed. Also we have a turbo that has in excess of 7,200 hours still in operation. The approximate cost thus far for all turbochargers, the original cost and two turbos that went over 3,600 hours, is \$0.56 per hour.

We have found several reasons for turbocharger failure. We have had oil seal failure and bearing failure. These failures are the most common and can occur singly or together. Another type of failure has recently been encountered, and that is a crack developing in the turbocharger housing. So far we have found no "surefire" method of stopping these failures. We have found that by letting the engine idle for three or four minutes before shutting it down helps a little. The idling allows the water cooling the turbo to carry off the excess heat, and keeps from ruining the oil seals. Several other things can be done and these are: check all the turbo connections and make certain they are tight; all hoses and gaskets are in good condition, and by removing any undue stress on the turbo itself. No major turbocharger repairs are done in the Pit Shops. In the event of any oil seal and bearing failures or cracking, the turbocharger is removed and sent in for reconditioning.

It was wondered if turbochargers had any ill effects on engine life. To date, nothing conclusive has been reached. The average length of time before turbos for a frame overhaul was 3,865 hours. A frame overhaul is an engine overhaul done without removing the engine

from the truck. The average hours per overhaul after turbocharging was 2,194, or a difference of 1,671 hours. Engine changes due to premature failures were not included. The engine blocks had averaged between 14,000 and 16,000 hours before conversion. The period of time considered was not equal. The length of time before conversion was 3 years, and after conversion, about 16 months. The cost for labor and parts went up about 70% as compared with the cost before turbocharging. The largest part of this increase was in labor costs.

One of the modifications, mentioned previously, to the engine was the addition of different intake and exhaust manifolds. The intake manifold had to be altered to fit to the turbocharger. The chief difference in the exhaust manifold was in the material used in its construction. The exhaust manifolds receive severe treatment due to the large amount of contraction and expansion. The difference in exhaust temperature is quite high. The average difference over the same course between loaded uphill and empty downhill trips is approximately 600 degrees. The exhaust manifolds, thus far, have averaged 1,287 hours each, and as in the case of the turbochargers, they are covered by warranty to 3,600 hours. During the last few months, a new type of exhaust manifold has appeared. The essential difference being that it is of heavier construction.

The effect of turbochargers on other truck components was also examined. First came the springs. The cost of spring repair for Fleet 4 did not change, even though the speed of the truck increased. What spring trouble that did occur was normal wear and tear. Another item

carefully checked was tires. It was thought that the increase in speed would effect the tire life. Instead tire costs and mileages improved; however, this was due to other factors. It goes without saying that special emphasis was placed on keeping the roads clean, otherwise serious tire injuries could result. As far as can be determined, turbocharging has had no adverse effects on the trucks.

Finally the question "Does turbocharging pay off". A qualified answer is yes, although it is yet too early for us to make a thorough comparison. In regard to our problem, we have arrived at the following conclusions:

1. We do not think turbochargers are needed on level hauls.
2. We believe that the use of turbos on our long uphill hauls has saved adding additional equipment.
3. We do not believe that turbochargers have had adverse effects on engine life or truck components.
4. We feel confident that new developments in turbochargers will lengthen the life of the turbo and reduce its cost.

NUMBER 136	FILE F	CONT 0	CONT1 Y	PRNAME INSPIRATION MINE				
ALTNAME1 RED HILL				ALTNAME2 JOE BUSH				
ALTNAME3 THORNTON				ALTNAME4 LIVE OAK				
ALTNAME5 PHELPS DODGE MIAMI OPERATIONS				ALTNAME6 MIAMI (PHELPS DODGE)				
CURSTAT				MNAME		NLATDEG		NLATMIN
PRODUCER				INSPIRATION - 7.5 MIN		33		24
NLATSEC	WLONGDEG	WLONGMIN	WLONGSEC	TOWN	RANGE	SECTION	QUARTER	COM1
30	110	54	00	1 N	14 E	25	NE	CU
MOD1	COM2	MOD2	COM3	MOD3	COM4	MOD4		
SULFIDE	CU	OXIDE	AG					
COM5	MOD5	COM6	MOD6	COM7	MOD7			
BIB1								
ADMMR INSPIRATION MINE FILE								
BIB2								
AZ MNG JNL, 2/1/22, P 16; 11/19, P 43								
BIB3								
RANSOME, F.L. "GEOL GLOBE COPPER DIST" USGS								
BIB4								



Inspiration Line
14, 25, 26



QUADRANGLE LOCATION

- ROAD CLASSIFICATION
- Primary highway hard surface
 - Secondary highway hard surface
 - Light-duty road, hard or improved surface
 - Unimproved road
 - Interstate Route
 - U. S. Route
 - State Route

INSPIRATION, ARIZ.
N3322.5—W11052.5/7.5

1945
PHOTOREVISED 1982
DMA 3850 IV NW—SERIES V898

Revisions shown in purple compiled from aerial photographs taken 1978 and other source data. This information not field checked. Map edited 1982

INSPIRATION CONSOLIDATED COPPER MINE

REFERENCES

GILA COUNTY

(this should be page 2)

MAPS - Upstairs in the flat storage area - Third drawer

MAPS - Upstairs in the flat file - Drawer 7 - Miami and Globe Mining District
(AZ Library and Archives maps)



AMERICAN MINING CONGRESS

1100 RING BUILDING

• WASHINGTON, D. C. 20036

• TELEPHONE 202/331-8900
TWX 710-822-0126

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J. ALLEN OVERTON, JR., President

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INSPIRATION'S COPPER SMELTER FACILITIES

by

Richard C. Cole, Vice President
Inspiration Consolidated Copper Company
Phoenix, Arizona

File

Presented at the 1974 Mining Convention/Exposition of the American Mining Congress, Las Vegas, Nevada, October 7-10

Inspiration Consolidated Copper Company was formed in 1911, before Arizona became a state. Principal operations are in the Globe-Miami area, about 80 miles East of Phoenix.

The history of the company is rich with contributions to primary copper technology. Many of these are in the field of extractive metallurgy. Some of the original work in flotation took place as the mill was being designed in 1913. Subsequent development of the ore bodies indicated that about half of the copper was present as oxide minerals. Attention turned in 1918 to experimentation into hydrometallurgical treatment of those ores. The vat leaching plant installed in 1925 still serves as a model for similar operations around the world. Both flotation and leaching, often in combination, have been used successfully in the intervening years.

In 1960 the smelter of International Smelting and Refining was acquired. In subsequent expansion modernization the Great Falls converters were replaced by Peirce-Smith units. A large, new reverberator with a suspended arch and an air-cooled bottom was built, and its capacity was substantially increased by the addition of a pre-heater for combustion air in 1969. The plant was then quite adequate for smelting of Inspiration's own mine productions and the custom tonnages then under contract.

Nonetheless, when unrealistic and arbitrary air pollution regulations were established by the State of Arizona in 1971, requiring a 90 percent reduction in sulfur emissions, it became necessary to virtually abandon most of the existing smelting facilities. All U.S. copper smelters had made studies to determine the technical and economic feasibility of treating low-grade (SO_2 content) gas, as made in typical smelting and converting, in some kind of sulfur recovery system. These exercises all showed that the volume of gas to be handled was so great, and the grade

3. Gas-cleaning facilities that would meet particulate regulations and deliver a clean, dry gas stream to the acid plant.
4. A recovery system capable of converting at least 90 percent of the intake sulfur into sulfuric acid.
5. Auxiliary facilities to tie these systems together.

Size has a direct bearing on capital costs in such installations. The original studies were based on a plant capacity reduced to 1,000 tons per day of copper concentrates, which was the contemplated future feed at that time. Later, with the development of the Pinto Valley Project by Citites Service Company, the scope was revised to include smelting of that production. The final flowsheet was designed for a capacity of 1,500 tons per day of concentrates, and all other facilities were sized accordingly.

The flowsheet selected contained many features that were new to U.S. smelting practice. In fact, although each of the major components had been well demonstrated in smelters abroad, these were all brought together for the first time in the plant to be built at Inspiration. Since no U.S. engineering and construction firm offered prior experience with all of the systems involved, Inspiration acted as its own prime contractor. General engineering was furnished by Treadwell Corporation and field construction was provided by Davy Powergas for the smelter proper, but the selection of vendors was handled internally. Design, engineering and construction of the cold gas-cleaning and acid plant were assigned to American Lurgi under a lump sum contract.

Looking at the selection of these basic components the following details are of interest:

Smelting Furnace:

The alternative processes that were considered to replace the reverberatory furnace included:

- (a) Electric furnace smelting of raw charge.
- (b) Fluid-bed roasting (partial) of the charge, followed by electric furnace smelting of the calcine.
- (c) Flash-smelting.
- (d) Other processes, including oxygen-enriched firing of the existing reverberatory.

high-amperage electric current through it. Solidified copper smelting furnace slag is a very poor conductor of electricity. However, as the slag melts, the molecules dissociate into ions and the liquid slag becomes a relatively good conductor of electricity, by electronic conduction, as in the case of a copper wire, or by ionic conduction, as in the case of copper refinery electrolyte.

The next electric furnace for copper smelting was installed in 1936 at the Imatra, Finland plant of Outokumpu, Oy. Like the Norwegian unit, it smelted unroasted copper concentrates. Circular in plan, it was 30 feet in diameter with three 55-inch Soderberg electrodes, and had a transformer capacity of 9,000 KVA.

In 1942, the Boliden Company installed at their Ronnskar works in Sweden, a 4,000 KVA rectangular furnace with three electrodes in line for smelting roasted copper concentrates. This unit was replaced in 1949 by a 12,000 KVA unit at Boliden. This furnace still in operation, is a rectangular vessel, with six electrodes actuated by the Wisdom mechanical system.

Before the Boliden furnace went into operation, the first two 12,000 KVA matting furnaces were designed for copper-nickel electrode in-line matting furnaces to be built, and the equipment was ready for shipment from England in 1939 when war broke out. The furnaces were never delivered, but Finnish and German engineers built electric furnaces at Petsamo to those original designs. Petsamo was in Finnish territory, ceded to the Russians after World War II, and it is known that those furnaces at Petsamo are still being operated, although they have been enlarged to 22,000 KVA each.

Petsamo had been an International Nickel Company property and partly due to the success of those furnaces, INCO installed electric smelting at their Thompson, Manitoba smelter (nickel-copper) in the early 1960's. Three 18,000 KVA units were originally installed, and two 30,000 KVA furnaces were added in 1967-68.

The then largest electric copper matting furnace in the world was installed at Mufulira, Zambia in 1972. This unit is a 36,000 KVA, six electrode in-line furnace.

a temperature profile through the length of the unit, such that by the time the solids become dry, the gas temperature has dropped below the ignition point of the solids.

Wet feed to the dryer passes through a scalping screen for removal of tramp over-size material. To protect the furnace charging system, dryer product passes through a hammermill for disintegration of any agglomerates, before moving to the two 700-ton dry storage bins above the furnace at the slag end. An emergency chute from the dryer discharge to the ground is provided to permit by-passing the bins during start-up and short duration upset conditions during operation.

The electric furnace, which was designed for a transformer capacity of 51,000 KVA, has a number of unique features. It is the largest such unit in existence at this time -- outside dimensions are 38 feet wide x 126 feet long. The bottom consists of two concentric inverted brick arches, resting on heavy steel plates and I-beams, which in turn are supported on concrete piers. With an electric furnace, the heat is concentrated in the bath, and care must be taken to avoid local hot spots that might burn through the bottom. Thermocouples are positioned at 24 locations to continuously record temperatures. If a high reading occurs, the electrode nearest that area is automatically retracted. The bottom is cooled by approximately 236,000 cfm of outside air, which is blown through the bottom structure. Sidewalls are air-cooled by a separate ventilation system. End-walls and electrode contact clamps are cooled by approximately 1,200 gallons per minute of water, which is returned to the steam plant for cooling before being recirculated. Approximately 300 gallons of water per minute cool the electrode pressure rings.

There are two converter slag return launders. Matte is tapped on the end nearest the converter aisle into 300 cubic foot ladles for transfer to the converters. Dump slag is skimmed from the other end of the furnace into 600 cubic foot pots that are carried to the dump by Kress diesel-powered, slag-haulers. The six carbon electrodes

that dip into the liquid slag layer are of the self-baking Soderberg type. The tips of these are slowly corroded away by the liquid slag. When smelting at the rate of 1,500 tons per day of concentrates, about 7,500 pounds of electrode paste carbon and pitch will be used per day, or at an average rate of 5 inches per electrode per day. With 12 feet of electrode between the top of the molten slag layer and the lower surface of the roof arch, about a month elapses between the time a point on an electrode column enters the furnace and the time it sinks below the slag surface.

Electrodes are 71 inches in diameter with a welded-steel jacket with internal fins which act as stiffeners and distribute the current into the carbon. As the electrodes project into the furnace, the pitch is volatilized and the carbon bakes to a solid member. Jacket additions are welded in 4 foot sections on the electrode makeup floor - paste is added in one-ton blocks. Hydraulic positioning of the electrodes is automatically controlled by predetermined settings programmed from smelting rates and temperature restrictions.

Furnace charge, consisting of dryer product, together with dusts collected in the dryer cyclones and baghouse and the electric furnace cyclones and cottrells, is fed from the 700-ton storage bins by a conveying system to thirty charge-ports in the furnace roof. This system permits charging on a cycle of variable frequency, and the distribution to any charge port is also variable. From each of the storage bins an 18 inch screw feeder delivers charge at a rate varying from 10-80 tons per hour to variable-speed Buhler drag conveyors along each side of the furnace feeding the drop-holes in the arch. It is important to keep the bath covered by a layer of solid charge at all times in order to maximize heat transfer. It is equally important to drop charge at a high rate, while actually charging, in order to minimize the amount of solids swept out by entrainment of charge into the off-gases. Slag circulation occurs in the electric furnace because of electrodynamic forces, convection currents, and gas evolution at the electrodes, stirring the charge into the slag, and promoting the smelting process.

one cyclone will be in operation when the electric furnace smelting rate is below about 1,200 TPD of solids. If both cyclones are in operation at low gas flow rates, the pressure drop across the cyclones will be low and collection efficiency will be low.

Second stage hot cleaning of the furnace gases is done by electrostatic precipitation. Leaving the cyclones, the hot furnace gases enter a Western Precipitation (Joy Mfg.) hot cottrell. The operating temperature range of this unit is 600°F - 750°F. Below 600°F the dust being collected on the precipitator electrodes is a non-conductor, (it is, in effect, a reasonably good di-electric), so cottrell efficiency would be poor because any non-conducting dust coating the electrodes would inhibit proper electrostatic field propagation in the unit.

After hot-cleaning, furnace gases join the converter gases. Further treatment is described later.

Converters:

Alternatives considered for improving the SO₂ content of converter gases to bring it into the range needed for sulfuric acid production were:

- (a) Installation of tight hoods and flues on the existing Peirce-Smith converters to minimize air infiltration.
- (b) Installation of new siphon-converters, which operate at a balanced draft, and deliver a richer SO₂ gas than similar Peirce-Smith units.
- (c) Use of an oxygen-enriched blast to minimize dilution of the off-gases by nitrogen.

Items (a) and (c) were considered individually and in combination. Use of oxygen was finally eliminated because of insufficient knowledge about its reliability for this purpose, and the desire to stay with well proved technology.

Gas temperatures leaving the mouth of a Peirce-Smith converter during a slag blow or a copper blow will range between 1900°F - 2400°F. If the steel hold that encloses the converter mouth is not water-cooled, the hood will soon burn and warp unless enough extraneous air is allowed to infiltrate to quickly cool the gases to below 900°F.

these are the first large units installed at any smelter in the world, certain operating data, such as the percentage of the oxygen in the air blast required for matte conversion was not available. The basic operating principles, however, except for the system for removing the converter off-gases is much the same for a siphon-type and for a Peirce-Smith converter. Accordingly, it was felt that Inspiration was not departing significantly from conventional practice.

One unique design feature was incorporated, however. Five 83-foot converter units, end-to-end, would require a building well over 400 feet in length, and crane travel would occasion undesirable delays in the handling of matte and slag. It was decided to install the Hoboken units in a different configuration than normal, placing them at an angle of 37.5° to the converter aisle, with only the mount end actually extending under the craneway, resulting in a much more compact layout.

The converters at Inspiration are massive units, with a capacity of 330 tons each. For normal use a 125 Hp electric drive is provided, with 125 Hp air motor serving as a standby in event of power failure. Converter blast air comes from two existing 45,000 cfm Ingersoll Rand Centrifugal blowers driven by Murray steam turbines. Pressure can be varied up to 20 Psig. Each converter has fifty-two 1-1/2 inch tuyeres arranged so as to be in punching position when the tuyere-line is 30 inches below the centerline of the converter. Gaspe'-type pneumatic punching machines are installed on each unit. Flux and "cold-dope" move by belt feeders from individual bins at each converter to a chute that discharges directly into the mouth.

Elaborate control and indicator systems have been incorporated in the design to enable most efficient coordination of converter operations for the production of both copper and sulfuric acid. Since there is no visible flame on a siphon-converter, progress of the blow is followed by punch-rod sampling.

A pair of P&H cranes, with two 75 ton hooks each, handle the 300 cubic foot ladles. Supporting these are the existing 40 ton cranes. A by-pass hoist was provided when extending the old craneway, to enable interchange of crane positions.

Detailed description of the siphon construction is restricted by the licensing agreement. However, in general terms, an air-cooled wall in the siphon end of the converter serves as a dam to contain the molten bath. Hot converter gases are drawn over this wall and through an inverted "U" flue, which is equipped with a rotary joint to permit rotation of the converter, into a large dust chamber. Since temperatures range around 2,000°F, this assembly is refractory-lined. The dust chamber has double doors to admit a front-end loader for removal of dust and accretions. To clear converter gases without carrying an excessively high draft, the siphon and connecting flues must be kept relatively clean. Special attention must be given to these operating procedures.

Since copper converting is a batch operation, it is important to follow certain scheduling procedures when using the off-gases for acid production. At least one converter should always be blowing in order to deliver consistent volume and quality of gas to the acid plant, and to maintain temperatures above the dew-point in the hot gas handling and cleaning system. Leakage of cold extraneous air into the gas streams must be avoided for the same reasons.

Before the exit gases from the dust chamber can be handled in an unprotected steel flue, they must be cooled, and the cooling system must be able to function reliably in handling very dirty gases with a high dew-point temperature. This is done in two stages. First, the hot gases enter a vertical water-wall radiation cooler, where they are cooled to below 1175°F. High pressure hot water circulates through the walls of the cooler and the heat recovered is used to generate steam in the power plant. Radiation surfaces are designed to be self-cleaning, but provision has been made for the use of soot blowers, if necessary.

Leaving the radiation cooling section, the hot gases from each individual converter enter a shot-cleaned convection gas cooler, where the temperature is further reduced to below 975°F, before passing through a hot cyclone for removal of coarse

600°F for efficient collection by electrostatic precipitation, but the precipitator itself can be damaged by gas temperatures above 750°F. Therefore, the gas cooling systems must be operated in such a manner as to maintain the gas temperature at the cottrells in the range of 600-750°F.

Exit gases from the precipitators join the hot, clean electric furnace gases in a common flue leading to the cold-gas cleaning system.

Cold-Gas Cleaning and Acid Plant:

These two operations are interlocked in many ways with respect to flow of both gas and solutions, as illustrated in Figure 3. Unfortunately, the licensing agreement with American-Lurgi for the acid plant restricts detailed description of the process and circuitry in that section. This sulfur recovery system is a double-absorption acid plant, using the Bayer process, and the plant, which is warranted to meet air pollution control regulations, is the best available unit for Inspiration's needs.

Electric-furnace and converter gases are combined after passing through the electrostatic precipitators, and move by way of a high-velocity 90 inch diameter flue to two hot gas fans, furnished by Green Fuel Economizer. These are double-inlet centrifugal fans, rated at 70,000 SCFM @ 32.5 inches S.P. each, with 1,250 Hp drives, providing draft for the total system, as well as pressure for driving the gas through the cold gas cleaning section and the acid plant.

Depending on many variables, such as tonnage and analysis of material smelted, grade of matte, number of converters operating, etc., the quantity and quality of the gas stream going into cold-gas cleaning will range as follows:

	Minimum	Average	Peak
Total Gas Flow-SCM	45,000	97,000	129,000
Inlet Temperature-°F	500	550	575
SO ₂ - Percent by Volume	4.0	7.0	8.3
Mono-hydrate Acid Production-T/D	110*	1,330	2,080
Particulate Matter-T/D	N/A	N/A	1.50

*Duration of minimum conditions can be for as long as 8 hours.

The first step in cold-gas cleaning is to pass the gases through a pair of low-pressure venturi scrubbers in parallel in which the gas is cooled to its saturation temperature. The flow is from top to bottom concurrent to the injected washing acid, which is recirculated from a sump. A bleed-stream is taken off for removal of solids. The gas stream next is directed to two packed washing and cooling towers arranged in parallel, the weak acid (1 - 5 percent) used for washing is also recirculated. Cooling of the acid takes place by indirect graphite coolers of tube and shell design.

Following scrubbing and cooling, the gases are passed on to the wet precipitators for de-misting and separation of the sublimated solids, fume and particulates. Gas flow through the primary and secondary cleaning fields is downward. Each precipitator has one field which mainly consists of the discharge electrodes arranged opposite the collecting electrodes. By means of the corona discharge, mist particles in the gas stream are charged and migrate through the electric field to the grounded collecting tubes. Condensate runs down the tubes and is collected at the bottom to be sent to the washing and cooling section.

On leaving the wet precipitators, the gases have been cleaned to optical clarity as observed against a 40 watt bulb in a 15 foot long gas main, which corresponds to an efficiency of more than 99 percent. This gas then passes through a counter-current stream of sulfuric acid in a drying tower for removal of moisture before entering the double catalysis unit for conversion to sulfuric acid.

Acid circulating pumps are KSB Chemical Process units for concentrated sulfuric acid. The acid coolers are Crane AX-Sections, irrigation type, made of great cast iron. All 98 percent acid not used directly by Inspiration is discharged to either of two 340,000 gallon storage tanks. These may be filled and discharged separately

scarcity of skilled electricians. The traditional industry strike in labor negotiations also served to extend the start-up exercises. Barring problems unforeseen at the time of this writing (7-15-74), the plant should be operating in full compliance with air pollution control regulations when this paper is delivered at the American Mining Congress in October, 1974.

INSPIRATION CONSOLIDATED COPPER COMPANY

ELECTROLYTIC TANK HOUSE

HISTORY

From the previous papers you have heard, it may be said that instead of referring to us as the Inspiration Copper Company, it should be "An Inspiration in Copper". Over the years, Inspiration has gone from straight sulphide concentration to oxide-sulphide leaching with ferric sulphate solutions; from underground to open pit mining; and now from 9,000 to 15,000 tons of ore per day by means of the leach and concentrate Dual-process.

What effect does all this have on the electrolytic recovery plant? It means that the original electrolysis installation that produced 59,000,000 pounds of copper annually is now producing 90,000,000 pounds. How was this 52 per cent increase in production accomplished?

In 1915 sulphide ore was concentrated at a newly built concentrator. As mining progressed, too much oxide ore meant the conception of the leaching plant in the latter part of 1926. The copper was dissolved from the ore and sent to the tank house for removal from solution by electrolysis.

The secret of this process was the generation of ferric sulphate in electrolysis to dissolve the sulphide copper in the ore. (Oxide copper is soluble in sulphuric acid.)

Of the 140 electrolytic tanks available, 120 were required to recover the leached copper. The remaining 20 were used to make starter sheets for collecting the copper from the leach solution. Iron was supplied to the solutions by means of the Iron Launderers used to remove copper from the wash waters. This kind of electrolysis is referred to as electrowinning. The flow of electrons will cause the

deposition of the copper on to the starter sheets. The water in the solution will disassociate into hydrogen and oxygen. The hydrogen forms sulphuric acid, and the oxygen evolves as a gas which will oxidize the iron in the solution to the ferric state. Metallic copper is soluble in a ferric sulphate solution. The speed of reaction is slower than the rate that the copper is precipitated on to the starter sheets. This dissolution of copper will reduce the effective precipitating power of the electricity, causing the original cathode efficiency to be only 65 per cent.

The Dual-Process started in January of 1957. Sixty per cent of the sulphide copper would be sent to the concentrator instead of through electrowinning. Now begins the increase from the 59 to 90 million pounds of production in the tank house. It is obvious that 24 per cent of the electrolytic process has been released; but, before we use this figure, let us inject the afore mentioned phrase "An Inspiration in Copper." The metallurgical managers at Inspiration are inspired and say, "Why the 65 per cent cathode efficiency?" There are two things that may help: One is to reduce the iron content of the solution; the other is to shorten the time the starter sheets are left in electrolysis.

The lower the ferric iron content of the solution, the smaller will be the amount of copper dissolved from the precipitated cathode. Therefore, the heavier the cathode, the greater the efficiency. The iron content was reduced from 20 to 7 grams per liter. It is now maintained at this level by careful control of solution discard from the leaching circuit.

Shortening the precipitating life of a starter sheet is the same as taking advantage of the law of probabilities. You are shortening the probability that the cathode will develop electrical drains that will lower efficiency. The precipitation time was decreased from 168 to 120 hours.

The combinations of the lower ferric iron, shorter life cathodes, and careful

solution control raised the cathode efficiency of electrowinning to plus 80 per cent. Therefore, reducing available copper for electrowinning by 24 per cent and increasing the plating efficiency to 80 per cent has released 35 per cent of the tank house capacity.

The second and final phase of the increase in production from 59 million to 90 million pounds of copper annually involves this 35 per cent of the tank house released from electrowinning. Forty-two electrolytic cells are theoretically now standing idle. But what about the cement copper and the concentrates sent to the Smelter! Why send this copper to the East for refining when it could be refined at Inspiration at approximately half the cost?

After extensive test work in the early part of 1957, the conversion of the electrowinning cells to electro-refining cells began and was completed by the middle of the year. At the same time a new semi-automatic, ten-mold, anode-casting wheel was installed by Inspiration at the International Smelter, some two and one-half miles away. Cement Copper and concentrates are sent to the Smelter, fire-refined, cast into 1,250-pound anodes, and returned to Inspiration for electrowinning. There is now enough capacity to treat all copper made at Inspiration.

These forty-two cells that originally were 65 per cent efficient when on electrowinning, are now 95 per cent efficient on electrorefining. Each of the 42 cells can now make 640 more pounds of copper per day.

Along with any volume increase goes mechanization and labor re-evaluation. Mechanization of course is the easier of the two. Finished cathodes were unloaded from the overhead crane to a pallet. The pallet was weighed and set into a box car where the copper was stacked by hand. Now, cathodes are unloaded on to a tilting mechanism and transported by one man on a fork lift truck into the box car. This released the loading men so that they could apply more time towards cell efficiency.

The added production left very little free time for the crane, so it was necessary to add a three-man graveyard crew for tank washing, lead anode cleaning and any job the other shifts cannot handle. Anodes are changed in the refinery tanks about every 33 days on afternoon shift. This crew used to do what the graveyard group now does.

GENERAL ELECTRICAL DATA

The generating equipment has a capacity of 36,000 amperes at 320 volts. There are three units, each having two DC generators centrally driven by a 5450-HP, 500-RPM 25-cycle synchronous motor. At the present time the ampereage is held at 34,000 and 220 volts.

STARTING SHEET DIVISION

Starting Sheets are made by plating copper on a cold-rolled copper blank. Every 24 hours this plated copper is peeled off to be later used as starter cathodes in the electrowinning or electro-refining sections. New blanks are pre-treated by first sanding smooth with varying grades of emery paper. They are then amalgamated with mercuric nitrate and coated with an extra heavy film of nabob oil. From then on as each starter sheet is removed, the blank is retouched with amalgam where the steel stripping tool may have caused scratches. The blank is then coated with a thin film of nabob oil with felt swabs and returned to the cell for replating of another 24 hour sheet.

Approximately 10 per cent of the starter sheets made are used to make supporting loops. Each sheet is punched with two heat-annealed copper strips, four inches wide, twenty inches long, and folded transversely to the long dimension.

Solution circulation through the cells is maintained of 15 gallons per minute at 55 degrees C. Copper and sulphuric acid in the electrolyte are held at 40 and 160 grams per liter respectively.

Inspiration is blessed with a very pure copper anode. All impurities in the electrolyte are kept to a minimum simply by keeping the copper content level at 40 grams per liter. This is accomplished by discarding electrolyte to the electrowinning division.

A thirteen-pound sheet is made for electrowinning starter, and a seventeen-pound sheet is made for electro-refining starters. Blanks are on a five and one-half, center-to-center spacing. Plating efficiency will average 97 per cent.

ELECTROWINNING

Starting sheets are punched with two loops, threaded with a supporting contact bar and flattened by hand with wooden paddles before being loaded into the cells. In each cell there are 98 lead anodes and 96 starting sheets at four-inch, cathode-to-cathode spacing. Leaching solution from the ore is pumped through the cells at plus 100 gallons per minute. The solution leaving the tank house is heated from 38 degrees C to 55 degrees C before going back over the ore.

The cathodes are straightened after 24 hours of plating and pulled for shipment after 120 hours. Each cathode is hand-metered daily for shorts. The final cathode will weigh 100 pounds.

ELECTRO-REFINING

Starting sheets are handled in the same manner as for electrowinning. The anodes are of fire-refined copper and weigh 1250 pounds. Cathodes are on a six-inch center-to-center spacing and are pulled for shipment every 168 hours.

Copper in the electrolyte is maintained between 50 and 55 grams per liter. Sulphuric acid is kept at 180 grams per liter. Electrolyte flow per cell is 20 gallons per minute and is heated to 70 degrees C. We expect cathode efficiency to be maintained at 95 per cent. Voltage per cell is 0.33 volts.

Animal glue is added as spout reducer at the rate of one pound per thousand pounds of copper.

Anodes are replaced after approximately 33 days. Anode slimes are washed to a lower level collecting system when the anodes are changed. The slimes are filtered, dried, and placed into fiber barrels for later shipment.

Here again electrolyte impurity level is maintained by keeping the copper content below 55 grams per liter through discards to electrowinning.

FUTURE

Inspiration has increased its own electrolytic capacity from 59 to 90 million pounds of copper annually. This was done without enlarging the original facilities.

There is a market for copper anodes than can be used by custom electroplaters. Inspiration is now investigating the possibilities of entering this market by producing one-inch thick, 700-pound electro-refined cathodes that can be sheared to size and used as anodes by electroplaters. In order to achieve the physical surface conditions required, it was necessary to connect cells in parallel. This reduced the current load on the cathodes to one-half of normal. Cathode life had to be increased from a normal of 7 to 42 days. The results were excellent.

Inspiration's new Christmas property will be in production in the very near future. Several things are being done to accomodate this. First is the purchase of the International Smelter from Anaconda. Second is the construction of an 80-cell electro-refining plant. Excavation for this plant is now under way.

Paul Musgrove
Tank House Foreman

TANK HOUSE DATA - 1960

	<u>Electrowining</u>	<u>Electrorefining</u>	<u>Starting Sheets</u>
Electrolyte - "IN"			
Specific Gravity	1.10	1.20	1.19
G/L - Cu	25 - 28	50 - 55	40.0
H ₂ SO ₄	1.0	180	160
Total Iron	7.0	0.75	0.40
Ferric Iron	0.8	-	-
Cl	-	0.050	0.02
As	-	0.045	0.03
Sb	-	0.151	0.12
Co+Ni	-	2.060	1.75
Mo	-	Tr.	Tr.
Al ₂ O ₃	6.19	-	-
CaO	7.00	-	-
MgO	0.995	-	-
Mn	0.040	-	-
Temp - Degrees C	37	65	55
Circulation Gal/Min	2606	800	240
Circulation Aparatus	Centrifugal-Lead	Centrifugal-Lead	Centrifugal-Lead
Circulation Gal/Min/Tank	120	20	15
Current			
Amperes	34000	34000	34000
Amps. Per Sq. Ft.	14.0	20.7	18.0
Volts Per Tank	2.62	0.33	0.30
Generating Equipment	3 AC Motors - 5450 HP, 6600 V. - 500 RPM 6 DC Generators - 1920 KW, 320 V. - 6000 Amp.		
Current Efficiency, %	80.00	95.00	97.00
KWH-AC/Lb. Cu	1.300	0.147	0.128
Lbs. Per KW Day Ac	20	168	187
AC to DC Conversion	92%	92%	92%
Anodes			
Per Cent Copper	-	99.75	99.75
Mode of Suspension	Copper Bar	Cast Lugs	Cast Lugs
Spacing, in.	4	6	5-1/2
Life, Days	Infinite	33	31
% Scrap	-	18	22
Length, Width, Thickness	44 x 42 x 1/2	46 x 42-3/4 x 2-1/8	46 x 42-3/4 x 2-1/8
% Lead	-	-	-
Cathodes			
Size, in. Width x Length	42 x 44	42 x 44	43 x 44
Weight, Lbs. of Starter Sheet	15	17	-
Mode of Suspension	2 Small Loops	2 Small Loops	-
Replaced after - days	5	7	1
Final Weight, Lbs.	100	225	-
Manipulation of electrodes	Two Overhead Five-Ton Cranes		
Deposition Tanks			
Number of Tanks	78	46	16
Materials	Precast concrete lined with 8% antimonial lead.		
Length x width x depth	34-1/2' x 4' x 4'	34-1/2' x 4' x 4'	35-1/2' x 4' x 4'1"
No. of Anodes and Cathodes	98, 96	66, 64	11 @ 75, 72; 4 @ 69, 66
Anode Mud			
% of Anode		0.23	0.20
Au, Oz. Per Ton		12.0	12.0
Ag, Oz. Per Ton		1200.00	1200.0
% Cu		35.0	35.0
Removed After - Days		33	31

THE STORY OF THE MIAMI - INSPIRATION COPPER DISTRICT

The Miami-Inspiration Copper District attained a production of 181 million pounds of copper in 1951. Three large mines were responsible for practically all of it. They are the Inspiration, the Miami and the Castle Dome. The latter is a wholly owned subsidiary of the Miami Copper Company, and altho the Castle Dome ore-body is located miles away from the Inspiration-Miami ore system, its mineralization is related to that of the other low-grade copper deposits in the area, the generally accepted theory being that the older formations were intruded by the Schultze granite, providing an avenue for secondary enrichment along the contact.

History *

The major developments in the Miami-Inspiration district have all happened in the twentieth century. At the beginning of the century, chrysocolla, a blue-green copper silicate mineral containing when pure about 36 percent copper, had been mined at the Keystone Mine, and soon after, a vein of chrysocolla was stoped at the Live Oak. Both of the veins were in granite porphyry and did not extend into the schist. Several years later the Woodson tunnel was driven in the north side of Inspiration Ridge. This tunnel cut disseminated chalcocite, a black-grey copper sulphide mineral containing when pure about 80 percent copper, and some crude ore was mined from a zone of stringers in the schist. In 1906 the General Development Company sank a shaft on the Captain claim and another on the Red Rock, the latter striking ore at a depth of 220 feet. The Miami Copper Company was organized in November of that year and development work was actively undertaken. By 1909 the railroad had been extended to Miami from Globe, and in 1911 the first concentrates were produced after an intensive construction period which saw the completion of a mill, power plant, and other surface equipment.

During this period the Inspiration Copper Company and the Live Oak Development Company were also engaged in development work. At Inspiration active development by shafts, drifts, and crosscuts, as well as churn drilling, was begun in 1909. Two years later, 21,000,000 tons of ore had been outlined. The Live Oak had by 1912 developed 15 million tons of ore despite the fact that much of the ore body lies deeper than at either Miami or Inspiration and is covered by porphyry and Gila conglomerate. The Live Oak and Inspiration merged in January, 1912 as the Inspiration Consolidated Copper Company with ore reserves of 45,300,000 tons averaging 2 percent copper.

Further developments and refinements in mining and milling methods have greatly increased the ore reserves of both major companies.

Between 1906, when J. Parke Channing examined the deposits at Miami and exploratory shafts were started, and 1911, when the Miami Copper Company began to produce concentrates, almost ten million dollars had been expended in the preparation for production.

Development of the Inspiration ore-bodies began in 1909 and about fifteen millions had been spent before the production of copper in 1915. In 1915 the International Smelting Company erected a three million dollar smelter at Miami.

* From a paper presented by G. R. Rubley to the A.I.M. & M.E. at Tucson, Nov. 1938.

The third big producer, the Castle Dome mine, is located about nine miles by highway west of Miami and some three miles north of Pinto Creek. The first systematic exploration work was initiated in the early twenties by the Pinto Valley Mining Company. Jackson Hoagland has written a good description of the Castle Dome operations and much of this history of the Castle Dome area has been taken from his description, written in 1946. The churn drilling conducted from 1924 until 1931 proved the existence of the deposit - and provided valuable information as to its size and grade. Subsequent mining operations by Castle Dome Mining Company have verified the accuracy of the earlier determination.

Miami Copper first became interested in the region when it acquired the Continental group of claims adjoining the Castle Dome group through its purchase of the Old Dominion Company. Because the surface geology indicated the possibility of copper values underlying a considerable area, an option was acquired on the Pinto Valley Mining Company holdings and extensive surveys and churn drilling were undertaken to determine the extent and grade of the deposit.

Miami Copper had considered the property as a possible future reserve, but about that time the government became vitally interested in increasing copper output. Consequently, arrangements were completed for the RFC subsidiary, Defense Plant Corporation, to provide the funds necessary to equip the property, and, late in 1941, Miami Copper exercised its option on the Pinto Valley holdings. These claims, together with the Continental group, were then deeded to Castle Dome Copper Company.

One of the most remarkable achievements of the entire operation was the speed with which the property was brought into production once the decision to go ahead was reached. The project was granted top priority by the government and the W. A. Bechtel Company commenced preliminary work early in January of 1942 as engineer-contractor. Seventeen months later copper concentrates started moving from the company's mill to the International smelter at Miami.

Castle Dome took the mine over from the contractor on April 19, 1943, and accepted the concentrator on June 10 of that same year. By this time the Bechtel Company had stripped the orebody of nearly 14,000,000 tons of waste, stockpiled 473,000 tons of ore, constructed a 10,000-ton flotation plant and built a $4\frac{1}{2}$ -mile paved highway to the property.

To provide the necessary water, a 16" combination steel and wood stave pipe line was laid a distance of over 11 miles from the Old Dominion mine at Globe to Castle Dome and a 3,563,000-gallon reservoir was built. A power line was erected to connect the property with the Salt River Valley Water Users Association system.

The most remarkable achievement of this operation has been the fact that though the ore mined has contained only twelve to sixteen pounds of copper per ton, the Castle Dome Mining Company has paid in rental to the Defense Corporation a total of approximately sixteen million dollars, and has had net earnings of almost ten million dollars before depreciation and depletion.

Geology of the Miami-Inspiration District

The Pinal Range, which covers an area about 16 miles long and 12 miles wide, is made up largely of Pinal schist with considerable irregularly intruded quartz diorite and granite and also a younger intrusive, the Schultze granite. The disseminated copper deposits of Miami occur in the northeast corner of this area.

Probably the most important rock associated with the copper deposits of Inspiration, Miami and Castle Dome is the Schultze granite. This has been minutely fissured and the cracks have been filled with quartz and to a less extent with sulphides. The result is a very brittle and fragile mass that, with the crumbly character of the Pinal schist, is so essential to successful block-caving methods of mining.

The Miami district contains numerous faults¹ which have played an important part in the mineralization of the district. The metallic minerals of interest are native copper, native silver, molybdenite, galena², chalcocite³, covellite⁴, chalcopyrite⁵, pyrite⁶, cuprite⁷, malachite⁸, azurite⁹, and chrysocolla¹⁰.

The bodies of disseminated copper ore of Miami, Castle Dome and Inspiration may be characterized generally as undulating, flat-lying masses of irregular horizontal outline and variable thickness. As a rule these masses lack definite boundaries. Closely placed sampling and assays indicate a gradational passage from ore to country rock. The depth to the ore ranges greatly from place to place, as in many places the leached rock itself is overlain by dacite or Gila conglomerate.

In a general way the Miami ore-body is chiefly in schist, although a granite-porphphy dike cutting the schist has likewise been metallized. The Inspiration ore-body is also mainly in the schist, although in places this schist occurs beneath an intrusive sheet of the porphyry. The predominant feature of the Castle Dome orebody is the Dome or Turtleback fault which divides it into two parts. To the east of this fault the ore is largely of a soft nature with chalcocite the predominant copper-bearing mineral. To the west is a harder ore in which chalcopyrite is the principal source of copper.

Operations at Miami

The Miami Copper Company's property has been an underground mining operation with a block-caving system of mining to take out the ore. When the 6,000 ton mill was ready to start in 1911, gravity concentration was standard practice, and the mill was equipped with chilean mills for fine-crushing, and tables for concentration. The chilean mills were soon replaced by Hardinge ball and pebble mills, and a short time later steel balls replaced the pebbles. These

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1. Fault - a fracture in the earth's crust accompanied by displacement of one side of the fracture with reference to the other.
 2. Galena - Lead sulphide - 87% lead, 13% sulphur.
 3. Chalcocite - Copper sulphide - 80% copper, 20% sulphur.
 4. Covellite - Copper sulphide - 66.5% copper, 33.5% sulphur.
 5. Chalcopyrite - Copper Iron Sulphide - 35% copper, 30% iron, 35% sulphur.
 6. Pyrite - Iron Sulphide - 47% iron; 53% sulphur.
 7. Cuprite - Copper Oxide - 89% copper, 11% oxygen
 8. Malachite - Copper Carbonate - Green - 57.5% copper.
 9. Azurite - Copper Carbonate - Blue - 55.0% copper.
 10. Chrysocolla - Copper Silicate - Green - 36.2% copper.

technical improvements continued with the adoption of flotation. Indeed, the Miami Copper Company, like the other big copper companies, was continually spending money to enable it to profitably treat a gradually lowering grade of ore. In recent years it is now possible to make money in the treatment of ore containing as low as .75% copper (15 lbs. per ton). When the grade of ore dropped below 1 percent, milling capacity was increased to 17,500 tons per day.

It was necessary to do this or suspend operations entirely. A plan of mining operations was worked out on paper by Mr. MacLennan and his associates. They showed the directors of the Miami Company that it would be possible to mine this low-grade ore at a cost well below 50 cents per ton, and the directors authorized the expenditure of almost four million dollars to effect the expansion in plant capacity from 6600 to 17,500 tons daily.

The production of copper at a cost of 10 cents per pound from an ore giving a net yield of only 10.55 lbs per ton had never been achieved before. Economies effected both in mining and in concentrating as between 1923 and the later dates are due in part to the increased tonnage, but improved efficiency in many directions likewise is a factor. It is difficult to refrain from using extravagant adjectives to describe such figures as 35.7 cents per ton for mining and 24.9 cents for concentrating. The tailings discarded from the concentrator during the first three years of operation averaged 14.52 lb. of copper per ton. In November, 1930, the ore as mined and treated contained less copper than the ton of tailing rejected 15 years earlier.

The Miami ores contain very little gold and silver but since 1938, commercial quantities of molybdenum have been recovered from the copper ores, and have been a factor in keeping the mine in the profitable class. Leaching of the oxidized portion of the mixed ores produced by the mine, has also been employed by the Company in attaining the economic success of its operations. The Miami Copper Company has been a shining example of how a combination of capital, progressive business acumen and technical brains has converted common rock into useful metal.

Up to January 1, 1952, the Miami mine has produced over 140 million tons of ore from which have been recovered over 2100 million pounds of copper, which together with small values of gold, silver and molybdenum had an estimated total value of \$330,000,000.

Operations at Inspiration

The Inspiration Consolidated Copper Company's plant at Miami, Arizona, was designed and built to make possible the profitable working of a low grade, finely disseminated copper deposit containing 100 million tons of ore averaging 1.54% copper.

From the beginning it was evident that the plant could not be kept integral but that a break would have to be made somewhere in the flow-sheet, removing at least the concentrator to a site more suitable than any available near the mine. It was finally decided to do the coarse crushing at the mine, to store the crushed rock in a bin from which it could be loaded into railroad cars and to haul it to the concentrator, an excellent site for which was available about 1-3/4 miles from the mine.

The original intention was to equip a plant to treat 7500 tons of ore per day, but through the acquisition and proving up of additional ore reserves, the introduction of the Ohio caving system, and the excellent results in the test mill (which made it possible to treat a lower-grade ore than had been thought possible) it was evident that a plant of much greater capacity should be

Castle-Dome Operations

~~Castle Dome Copper~~ Company mines and mills over 12,000 tons of ore daily. The mine is a typical open-pit operation with the latest and most modern equipment known to the industry. Electric churn drills, electric shovels, and diesel trucks are used. The concentrator is also one of the most modern and efficient in the industry. Its simplicity of design and operation has ~~permitted the use of women as operators~~, which is one reason why this property was not as seriously affected as others by the labor shortage problems during the war. Automatic feed control, first conceived by F. W. MacLennan, and worked out by Miami and Castle Dome ~~staffs together with Westinghouse Electric and Mfg., Co.~~, has increased the plant's efficiency both as to tonnage and metallurgy. Tied in with the feed control is a water control which adjusts the flow of water into the mill, maintaining a constant density. The importance of this control to an operation like Castle Dome becomes apparent when it is realized that no attempt is made to control the hardness and grindability of the ore mined and delivered to the concentrator for treatment. The ore is dumped into the coarse ore pocket as it best suits the mining operation. At times it may carry 1 percent copper and others 0.4 per cent. Moreover, on one day it may come from the eastern portion of the ore body where the ore is softer, and the next from the western side where it is harder.

By January 1, 1952, the Castle Dome mine had produced over 33 million tons of ore from which had been recovered over 420 million pounds of copper, over five hundred thousand ounces of silver and over eight thousand ounces of gold, with an estimated value of 66 million dollars.

The Castle Dome mine is approaching exhaustion of its orebody, but the owners are already making preparations to open up a new mine in the Miami area. The Miami Copper Co's wholly owned subsidiary "The Copper Cities Mining Co", will utilize the mining and milling equipment of the Castle Dome Copper Co. when the latter has ended its operation.

Conclusion

The above facts tell the story of how intelligent observation and scientific reasoning can be brought to bear even on the exploratory phase of mining which has seemed usually so haphazard. In the case of the Miami mine the sum of \$400,000 was risked to ascertain whether there was enough ore to constitute a profitable mine; after that point was passed, the further development underground served merely to emphasize the bigness of the orebody and the consequent need of making financial provisions for operations on a big scale. The story of the Miami and the Inspiration suggests also that the successful exploitation of an orebody may involve operations on a scale so big as to require the expenditure of sums of money that make the original purchase of the bare ground seem very cheap; it indicates that a mining claim without the intelligent use of capital is only second-rate scenery.

In connection with the early development of the Miami-Inspiration district, the names of "Black Jack Newman", F. C. Alsdorf and F. J. Elliott, the latter a Phoenix attorney, should be mentioned as responsible for Mr. Channing becoming interested in the Miami property. Henry Krumb, W. B. Thompson and Dr. Ricketts were the men chiefly responsible for the development of the Inspiration. Needless to say the managers and staffs of the two companies furnished the brains which brought about the success of both ventures.

The three mines have been the producers of over 300 million tons of ore, from which have been recovered a total of 5 billion pounds of copper with a value of over 800 million dollars. A result far beyond the dreams of Parke Channing and Henry Krumb!

Most of the eight hundred million dollars benefitted the State of Arizona in the form of wages for its citizens, education for its children, a market for its farmers, and a higher standard of living for everyone. It has been determined that "for every man engaged in mining and allied industries, 2-1/3 jobs were created in service industries and (on the basis of average family size) a total of 12 local persons are thereby supported." Every miner, every millman and every smelter man who has taken part in this creation of wealth may take just pride in his share of such constructive work.

Arizona Department of Mineral Resources

March, 1952

INSPIRATION CONSOLIDATED COPPER COMPANY

Inspiration
Consolidated Copper Company

Suite 1870, First National Bank Plaza 100 W. Washington St.,
Phoenix, Arizona 85003

Esperanza Sanchez (file)
Black Mountain Project (file)
Econ. Geology Vol. 66 #8 1168-1175
IC 8341
ABM Bull. 125, p. 24-38
ABM Bull. 129, p. 22-29
ABM Bull. 180, p. 320, 359
USGS P.P. 12, p. 161 (Live Oak)

Arizona Mining Journal, May, 1918, p. 19

Mining World, Jan., 1963, p. 38
" " April, 1963, p. 77
" " June, 1963, p. 43

Metal Mining & Processing, Feb., 1964, p. 15
" " " May, 1964, p. 60
" " " June, 1964, p. 23
" " " July, 1964, p. 44
" " " Oct., 1964, p. 39
" " " Feb., 1965, p. 39
" " " March, 1965, p. 33
" " " April, 1965, p. 21, 41

World Mining, July, 1964, p. 66
" " (catalog), 1964, p. 163
" " (catalog), 1965, June, p. 147

E/MJ, January, 1964, p.	E/MJ, Aug., 1974, p. 45 (strike) p. 63-69 (gen. info.) p. 73
" Sept., 1964, p. 134	(CMCR plant) p. 98 (personnel) p. 63, 64
" Oct., 1964, p. 118	(Joe Bush prop.) p. 65 (Thornton pit)
" Dec., 1964, p.	(Live Oak) (Red Hill)
" Jan., 1965, p. 61, 99	" September, 1974, p. 231 (env. scholarships)
" Oct., 1965, p. 134	" November, 1974, p. 198 (pollution curbs, diversity)
" Dec., 1965, p. 123	" January, 1975, p. 78
" Nov., 1965, p. 108	" February, 1975, p. 117 (ext. of oper. permit)
" Sept., 1965, p. 167	
" Oct., 1965, p. 114, 134	
" Jan., 1966, p.	
" April, 1966, p. 25	
" March, 1967, p. 136	
" May, 1969, p.	
" March, 1970, p.	
" June, 1972, p. 173	
" January, 1973, p.	
" April, 1973, p. 43, 44	
" May, 1973, p. 124	
" June, 1973, p. 188	
" December, 1973, p. 117	
" January, 1974, p. 113	
" April, 1974, p. 23	
" May, 1974, p. 37, 73	
" June, 1974, p. 85-95 (air poll. abatement)	

Mining Congress Journal, Sept., 1964, p. 13

"	"	"	Sept., 1965, p. 11
"	"	"	Sept., 1967, p. 24
"	"	"	Nov., 1966, p. 5
"	"	"	Feb., 1973, p. 50
"	"	"	May, 1973, p. 14
"	"	"	June, 1973, p. 13
"	"	"	November, 1973, p. 12
"	"	"	January, 1974, p. 13
"	"	"	March, 1974, p. 16
"	"	"	June, 1974, p. 15 (litigation over collapse of bridge in 1966) p. 19
			(personnel) p. 85-95 (air poll. abatement)
"	"	"	October, 1974, p. 22-32 (gen. info.)

Mining Magazine, May, 1966, p. 349

"	"	July, 1973, p. 59
"	"	December, 1973, p. 541

Skillings Mining Review, July 30, 1966, p. 12
 " " " Aug. 19, 1967, p. 10
 " " " Jan. 20, 1968, p. 18
 " " " March 22, 1969, p. 6
 " " " May 6, 1972, p. 14
 " " " Sept. 23, 1972, p.
 " " " Nov. 4, 1972, p.
 " " " March 24, 1973, p.
 " " " April 14, 1973, p. 12, 23
 " " " April 22, 1973, p. 21
 " " " May 5, 1973, p. 9
 " " " May 12, 1973, p. 6
 " " " June 16, 1973, p. 6
 " " " Aug. 18, 1973, p. 18
 " " " Oct. 13, 1973, p. 25
 " " " Nov. 10, 1973, p. 21
 " " " December, 22, 1973, p. 19
 " " " January 5, 1974, p. 17
 " " " November, 24, 1973, p. 12, 18
 " " " December 29, 1973, p. 21
 " " " February 16, 1974, p. 26
 " " " February 23, 1974, p. 28
 " " " April 27, 1974, p. 1, 10, 23
 " " " April 6, 1974, p. 12
 " " " May 4, 1974, p. 21

Skillings Mining Rev., May 25, 1974, p. 12
 " " " May 18, 1974, p. 26
 " " " June 15, 1974, p. 12, 14
 " " " Aug. 3, 1974, p. 21 (personnel)
 " " " Aug. 17, 1974, p. 21 (personnel)
 " " " July 27, 1974, p. 21 (personnel)
 " " " June 29, 1974, (force majeure)
 " " " Aug. 24, 1974, p. 17 (personnel)
 " " " Aug. 31, 1974, p. 16 (strike settlement)
 " " " Oct. 12, 1974, p. 23 (personnel)
 " " " Nov. 16, 1974, p. 21 (personnel)
 " " " Nov. 30, 1974, p. 1 (personnel)
 " " " Oct. 26, 1974, p. 1 (personnel)
 " " " Sept. 28, 1974, p. 1 (personnel)
 " " " Sept. 21, 1974, p. 1 (personnel)

Metals Week, Nov. 6, 1972, p.
 " " Dec. 18, 1972, p. 9
 " " February 4, 1974, p. 3
 " " July 8, 1974, p. 1
 " " June 28, 1974, p. 527
 " " July 29, 1974, p. 1 (strike)
 " " July 22, 1974, p. 2 (strike)

Metals Week, July 15, 1974, p. 2 (strike)
 " " Aug. 19, 1974, p. 2 (strike)
 " " Sept. 23, 1974, p. 1 (cu prices)
 " " November 4, 1974, p. 2 (cu prod.)
 " " February 3, 1975, p. 1, (reduc. of copper price and Prod.)
 " " March 10, 1975, p. 2 (opposition of takeover by CraneCo)

Mining Journal, July 7, 1971, p. 13
 " " August 10, 1973, p. 117
 " " July 19, 1974, p. 51 (strike)
 " " Aug. 16, 1974, p. 135 (strike)
 " " December 20, 1974, p. 526 (force majeure)
 " " February 21, 1975, p. 140 (ends force majeure)

Mining Journal, February 7, 1975, p. 107 (proc cutback)
 " " January 24, 1975, p. 71 (force majeure)
 " " 3/21/75, p. 222 (income)
 " " 4/18/75, p. 303

Mining Engineering, June, 1973, p. 68
 " " January, 1974, p. 49
 " " December, 1973, p. 6
 " " May, 1974, p. 55

Contractor & Engineer, June, 1973, p. 18, 19
 " " November, 1973, p. 18

INSPIRATION

Skellings Mining Review, October 5, 1974, p. 25 (personnel)
" " " September 28, 1974, p. 10 (cu price reduction)
" " " November 9, 1974, p. 19 (personnel)
" " " November 2, 1974, p. 17 (personnel)
" " " January 25, 1975, p. 16 (partial force majeure)
" " " February 8, 1975, p. 21 (reduce cu price)
" " " March 1, 1975, p. 14 (Crane Co. plans to acquire Insp.)
" " " March 15, 1975, p. 14 (drilling done on a property in Graham Co.)
" " " March 29, 1975, p. 28 (Crane Co. delays offer for shares of Insp.)
" " " April 12, 1975, p. 17, 24 (personnel)
" " " May 24, 1975, p. 16 (re: private sale of common stocks)
" " " July 5, 1975, p. 14 (re: plant to issue shares)
" " " Aug. 21, 1976, p. 4 (personnel)

California Mining Journal, 12/74, p. 23 (net loss from strike)
" " " 2/76, p. 23 (re: donation of chrysocolla by J.R. Watts)

Mining Annual Review 1974, p. 303 (gen. info.)

INSPIRATION CONSOLIDATED COPPER COMPANY

GILA COUNTY

- Mining World, Dec. 1958, p. 58
 " " , June, 1960, p. 60
 " " , July, 1962, p. 41
 " " , Sept. 1962, p. 67
 " " , Nov. 1963, p. 22
- See: ¹¹ Arizona Mining Journal Dec. 1, 1921 p.1
 Jan. 1, 1922 p. 24, Feb. 1, 1922 p. 16
 April 1, 1922. 27, May 1, 1922 p. 13, 46
- World Mining (catalog), June, p. 147
- Metal Mining & Processing, April, 1965, p. 41
- American Metal Market, 6/27/72
- Mining Magazine, May, 1966, Vol. 114, No. 5, P. 349
- Mining Engineering, Oct. 1967, p. 41
 " " , June, 1969, p. 14 (rod mill)
- ABM Bull. 125, p. 28-33
 " " 129, p. 22-29
 " " 180, p. 320, 359
- USGS P.P. 342, p. 135-137
 " " 115, p. 94-96
- Mining Congress Journal, May 1966, p. 17
 " " " , Sept. 1968, p. 16 (Ox Hide & Live Oak)
 " " " , July 1972, p. 6
- Skillings Mining Review, July 30, 1966, p. 12
 " " " , May 1967, p. 25
 " " " , August 19, 1967, p. 10
 " " " , November 11, 1967, p. 21
 " " " , April 22, 1972, p. 21
 " " " , May 6, 1972, p. 14
- E/MJ, January 1964
 " , December 1964
 " , January 1965
 " , Vol. 166, No. 10, October 1965, p. 114, 134
 " , Vol. 166, No. 11, November 1965, p. 108
 " , Vol. 166, No. 12, December 1965, p. 123
 " , January 1966
 " , Vol. 167, No. 4, April 1966, p. 25
 " , March 1967
 " , Vol. 168, September 1967, p. 164
 " , November 1967
 " , September 1968
 " , April 1969
 " , May 1969
 " , February 1970
 " , March 1970
 " , April 1970
 " , January 1972

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA
GILA COUNTY
INSPIRATION MINE MILS #136
127 MIAMI 5-AKA
INSPIRATION CONSOLIDATED
COPPER COMPANY
Inspiration mine (file)

Card # 1

MM 402 Malachite & Chrysocolla
MM 403 Malachite
MM 404 Malachite
MM 559 Cuprite
MM 560 Chrysocolla, Malachite, Qtz.
MM 561 Quartz, Malachite, Chryso.
MM 562 Malachite ps after Azurite
w/quartz coating
MM 563 Quartz (dryzy) w/malachite
MM 564 Chalcedony, Malachite &
chrysocolla
MM 565 Azurite, Malachite
MM 566 Lindgrenite
MM 567 Malachite, Chrysocolla &
chalcedony
MM 568 Azurite & Malachite
MM 569 Azurite & Malachite
MM 570 Boob ends -Malachite, etc.
MM 571 Quartz in Chrysocolla &
Malachite
MM 572 Copper, Native
MM 573 Chalcocite
MM 574 Chrysocolla

ARIZONA
GILA COUNTY
INSPIRATION MINE
127 MIAMI
INSPIRATION CONSOLIDATED
COPPER COMPANY

Card # 2

MM 575 Chalcopyrite on quartz
MM 576 Chalcocite in Quartz
MM 577 Quartz on Malachite
MM 578 Chrysocolla Malachite
MM 579 Chrysocolla: large slab
MM 580 Chrysocolla, Malachite,
Tenorite, Chalcedony
MM 581 Chrysocolla, Malachite,
Chalcedony, Quartz
MM 582 Chrysocolla & Chalcedony
MM 1447 Lindgrenite
MM 1719 Libethenite
MM 2082 Malachite ps after Azurite
MM 2937 Chrysocolla
MM 2951 Chrysocolla
MM 3376 Chrysocolla
MM 3670 Libethenite & Lindgrenite
MM 3671 Libethenite & Lindgrenite
MM 4321 Chalcocite
MM 5271 Chrysocolla

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

	Card # 3	
ARIZONA	MM 5494	Chrysocolla
GILA COUNTY	MM 5495	Quartz (druzy) over Chrysocolla
<u>INSPIRATION MINE</u>		
# 127 MIAMI	MM 5496	Druzy Quartz over Chrysocolla & Malachite
INSPIRATION CONSOLIDATED	MM 5497	Malachite & Quartz
COPPER COMPANY	MM 5498	Quartz (botryoidal) over chrysocolla
	MM 5499	Quartz (druzy) over chrysocolla and malachite
	MM 5500	Quartz (druzy over chrysocolla
	MM 5501	Quartz (druzy) over Malachite
	MM 5502	Quartz (drusy) over Malachite & Chrysocolla
	MM 5503	Quartz (drusy) over Malachite
	MM 5504	Quartz (druzy) over Chrysocolla
	MM 5505	Quartz (druzy) over Malachite (Geode)

	Card # 4	
ARIZONA	MM 5506	Quartz (Botryoidal) over copper silicate over malachite
GILA COUNTY		
<u>INSPIRATION MINE</u>	MM 5507	Quartz (druzy) over Chrysocolla
#127 MIAMI	MM 5508	Quartz (drusy) over Chrysocolla
INSPIRATION CONSOLIDATED	MM 5509	Malachite on druzy quartz on Chrysocolla
COPPER COMPANY	MM 5510	Quartz (druzy) over copper silicate
	MM 5511	Quartz (druzy) over Malachite crystals
	MM 5512	Quartz (druzy) over Malachite
	MM 5513	Quartz (druzy) over Malachite
	MM 5514	Quartz (druzy) over Malachite crystals
	MM 5515	Quartz (druzy) over Malachite
	MM 5516	Quartz (druzy) over Malachite rosette & Chrysocolla
	MM 5517	Quartz (druzy) over Malachite
	MM 5518	Quartz (druzy) over Malachite
	MM 5519	Azurite and Malachite

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA		Card # 5
GILA COUNTY		MM 6986 Turquoise
INSPIRATION MINE		MM 8381 Chrysocolla & Malachite
#127 MIAMI		MM 8384 Malachite
INSPIRATION CONSOLIDATED		MM 8727 Chrysocolla & Malachite
COPPER COMPANY		MM 8806 Calcite (rhombs)
		MM 9814 Chrysocolla (gem)
MM M 737 Chrysocolla	K595	Quartz var Agate
M 104 Malachite	K596	Quartz var agate
M 105 Malachite	MM K852	Chrysocolla w/ malachite
M 106 Malachite	MM K853	Chrysocolla & Malachite
M 137 Malachite	MM K854	Quartz Var. Chalcedony
	MM K855	Quartz on chrysocolla
	MM K856	Chalcedony on chrysocolla
	MM K888	Quartz var. gem silica
	MM K889	Malachite, quartz, chrysocolla
	MM K892	Quartz var gem silica
	K773	Malachite, quartz, chrysocolla
	MM L534	Quartz xls on Chrysocolla
	MM L535	Quartz xls on Chrysocolla

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA

Gila Co.

MM-K417

Lindgrenite

MM-K795

Chrysocolla

MM L219

Chrysocolla, malachite, quartz

Inspiration Mine ^{CARD} #6

Live Oak Pit MILS #136

Inspiration mine (Gila)

(f) 2000-01-01

SECRET

JUL 08 1988

OR OFFICE USE ONLY

RT-UP NUMBER 83022101

STATE NUMBER _____

MSHA NUMBER _____

NOTICE TO ARIZONA STATE MINE INSPECTOR

In compliance with the Arizona Revised Statute Section 27-303, we are submitting this written notice to the Arizona State Mine Inspector of our intent to start X 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 and Training Division to assist with your mine safety training, please check here: _____

If this operation will use Cyanide for leaching, please check here:

e. Smelter-10183100

Red Plant - 10183000

Electro-Refining - 101 83900

$$X = E(W) = 10182700$$

8x-2w = 10183200

N/A

TELEPHONE: 473-7100

Jacob Timmers, Vice President and General Manager

P. O. Box 4444

Claypool

STATE: ArizonaZIP CODE: 85532

MINE OR PLANT LOCATION: (Include county and nearest town, as well as directions for locating property by vehicle: Approximately one mile north of Miami, Arizona

Smelter, Rod Plant, Electro-refining

TYPE OF OPERATION: Smelter, Rod Plant, Electro-refining
Open Pit, SX-EW PRINCIPAL PRODUCT: Refined Copper

7/1/88

N/A

DURATION: N/A

Keith Adams

Safety Director

7/5/88

FORM 101-106 REV. 08/86

* Cyprus Minerals Company purchased Inspiration Consolidated Copper Company's assets on July 1, 1988.

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1992

Inspiration Rod Fabricating Mill
Lili Lili City.

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1000 - Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant - 24,000 TPD concentrator is inactive.

Vice President & General Manager	Dennis Mortensen
Manager, Technology	Ken Larson
Manager, Mining Operations	John Fenn
Manager, Smelter/Rod Plant Operation	Al Tittes
Manager, Plant Operations	Howard Bardwell
Manager, Human Resources	Chuck Rising
Manager, Administration	Randy Hoffman
Superintendent, Leaching Operations and Solvent Extraction	Gerald F. Fountain
Superintendent, Tankhouse	Mark Peabody
Superintendent, Plant Services	John C. Lorenzen
Superintendent, Rod Plant	Luis Constandse
Superintendent, Metallurgical Control	Eric Selley
Superintendent, Environmental Services	Bob Ressler
Superintendent, Smelter Operations	Don Nelson
Superintendent, Smelter Maintenance	Scott Vandela
Superintendent, Smelter Technical Services	Rex Henderson
Superintendent, Smelter Resource	
Recycling	Larry Le Compte
Materials Management	Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY, 1991

CYPRUS COPPER COMPANY

(A subsidiary of Cyprus Minerals Company)

P. O. Box 1126, Green Valley, AZ 85622 - Phone 628-4000.

Executive Vice President James C. Compton

Vice President Technical Services Ron Kellner

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1013

- Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery -

Electrolytic refinery - 100,000 TPY continuous rod plant - The 24,000 TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen

Public Relations Director Dean Lynch

Manager, Technology Ken Larson

Manager, Mining Operations Carl Waggoner

Manager, Smelter/Rod Plant Operation Al Tittes

Manager, Plant Operations Howard Bardwell

Manager, Human Resources Chuck Rising

Manager, Administration Randy Hoffman

Superintendent, Leaching Operations & SX Gerald F. Fountain

Superintendent, Tankhouse Mark Peabody

Superintendent, Plant Services John C. Lorenzen

Superintendent, Rod Plant Luis Constandse

Superintendent, Metallurgical Control Eric Selley

Superintendent, Environmental Services Tom Larsen

Superintendent, Smelter Operations Don Nelson

Superintendent, Smelter Maintenance Scott Vandela

Superintendent, Smelter Technical Services Rex Henderson

Superintendent, Smelter Resource Recycling Larry Le Compte

Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY 1990

CYPRUS COPPER COMPANY

(A subsidiary of Cyprus Minerals Company)

P. O. Box 1126, Green Valley, AZ 85622 - Phone 628-4000.

Executive Vice President James C. Compton

Vice President Technical Services Ron Kellner

Cyprus Miami Mining Corp.

Miami T1N R14E Sec. 24, 25, 26, 35

P.O. Box 4444, Claypool, AZ 85532 - Phone 473-7150 - Employees: 1013

- Open pit oxide copper mine - Dump leach - Solvent extraction - electrowinning
plant - 120,000 TPY Smelter - Acid plant - Electrolytic refinery -
Electrolytic refinery - 100,000 TPY continuous rod plant - The 24,000

TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen

Public Relations Director Dean Lynch

Manager, Technology Ken Larson

Manager, Mining Operations Carl Waggoner

Manager, Smelter/Rod Plant Operation Al Tittes

Manager, Plant Operations Howard Bardwell

Manager, Human Resources Chuck Rising

Manager, Administration Randy Hoffman

Superintendent, Leaching Operations & SX Gerald F. Fountain

Superintendent, Tankhouse Mark Peabody

Superintendent, Plant Services John C. Lorenzen

Superintendent, Rod Plant Luis Constandse

Superintendent, Metallurgical Control Eric Selley

Superintendent, Environmental Services Tom Larsen

Superintendent, Smelter Operations Don Nelson

Superintendent, Smelter Maintenance Scott Vandela

Superintendent, Smelter Technical Services R. R. Rex Henderson

Superintendent, Smelter Resource Recycling Larry Le Compte

Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES 1989

CYPRUS METALS COMPANY
(A subsidiary of Cyprus Minerals Company)

1855 La Canada, Green Valley 85622 - Phone 628-4000.

Senior Vice President C. J. Janes

Cyprus Copper Company

Senior Vice President - Operations Jake Timmers

Cyprus Miami Mining Corp.

Miami

TIN R14E Sec. 24, 25, 26, 35
P.O. Box 1559, Claypool 85532 - Phone 473-7150 - Employees 1013 - Open pit
oxide copper mine - Heap leach - Dump leach - Solvent extraction-
electrowinning plant - 120,000 TPY Smelter - Acid plant - Electrolytic
refinery - Electrolytic refinery - 100,000 TPY continuous rod plant. The
24,000 TPD concentrator is inactive.

Vice President & General Manager Dennis Mortensen
Public Relations Director Dean Lynch
Manager, Technology Ken Larson
Manager, Mining Operations Carl Waggoner
Manager, Smelter/Rod Plant Operation Al Tittes
Manager, Technical Services Noel Gillespie
Manager, Plant Operations Howard Bardwell
Manager, Human Resources Chuck Rising
Manager, Administration Randy Hoffman
Supervisor, General Accounting Joe Bost
Superintendent, Leaching Operations Gerald F. Fountain
Superintendent, Tankhouse Mark Peabody
Superintendent, Plant Services John C. Lorenzen
Superintendent, Rod Plant Luis Constandse
Superintendent, Projects John Chism
Superintendent, Metallurgical Control Eric Selley
Superintendent, Environmental Services Tom Larsen
Superintendent, Smelter Operations Don Nelson
Superintendent, Smelter Maintenance Scott Vandela
Superintendent, Smelter Process Control Robert Tunis
Superintendent, Smelter Technical Services Larry Lee
Superintendent, Smelter Resource Recycling Larry LeCompte
Materials Management Hugo Schriewer

ABSTRACTED FROM ADMMR ACTIVE MINES DIRECTORY 1988

CYPRUS SMELTING & REFINING

9100 E. Mineral Circle, P.O. Box 3299, Englewood, CO 80112 - Phone (303) 643-5000.

Miami

T1N R14E Sec. 25

P.O. Box 1559, Claypool 85532 - Phone 473-7150 - Employees 900 - Three open pit copper mines and 24,000 TPD concentrator which are inactive - Ferric-cure dump leach - Solvent extraction-electrowinning plant - 120,000 TPY smelter - Acid plant - Electrolytic refinery - 100,000 TPY continuous rod plant.

Manager, Technology	Al Tittes
Manager, Mining Operations	Don Prah1
Manager, Smelter/Rod Plant Operation	Kenneth Larson
Manager, Accounting	Joe Bost
Manager, Technical Services	Noel Gillespie
Manager, Plant Operations	Howard Bardwell
Superintendent, Leaching Operations	Gerald F. Fountain
Superintendent, Tankhouse.....	James Garvey
Senior Staff Project Engineer	Charles Orsen
Superintendent, Plant Services	John C. Lorenzen
Rod Plant Superintendent	Luis Constandse
Superintendent, Environmental Services	Tom Larsen
Manager, Human Resources	Chuck Rising
Manager, Human Resources	Craig Patrick
Manager, Materials Management	Hugo Schriewer