

GSA RESOURCES INC.

7660 N. Business Park Drive, Tucson, AZ 85743 - Phone (520) 744-8845 - Employees: 8 (including contractors).

President Ted H. Eyde
Vice President Daniel T. Eyde
Lyles Mine T13N R6W Secs. 11, 12

Open pit clay mine located west of Kirkland - Hectorite clay - Used as viscosifier and thickener in pharmaceuticals and cosmetics.

Grace Chabazite Mine T12S R29E Secs. 1, 2, 12

Open pit mine located 13 miles north of Bowie - Chabazite - Used for cation exchange media, specialty adsorbants, deodorizers, and RAD waste treatment for adsorbing Cs¹³⁷ and Sr⁹⁰

Burro Creek Clay T14N R10W Sec. 7

Open pit clay mine located 8 miles southwest of Bagdad along Burro Creek - Saponite clay - Shipped out of state for manufacture into viscosifiers for detergents and drainage aid for treating pulp for fine white paper made from recycled paper fibers.

HARBORLITE CORPORATION

P.O. Box 960, Superior, AZ 85273 - Phone (520) 689-5723, FAX (520) 689-5720 - Employees: 12 - Perlite crushing, screening, and drying plant located 2 miles west of Superior - Two open pit perlite mines, located 2 miles southwest of Superior - Used in the manufacture of filter media for filtering pharmaceuticals, chemicals, sugar, and beverages and as an agricultural fertilizer carrier.

Plant Manager Louie Lucero
Assistant Manager Bob Farmer
Secretary - Orders & Transportation . . . Jackie Alvarez
Superior Perlite T2S R12E Sec. 9

HARLEY GRAY STONE COMPANY

P.O. Box 323, Paulden, AZ 86334 - Phone (602) 237-3831 and (520) 636-2436 - Employees: 25-35 - Quarries located 8 miles northeast of Drake - Quarries and processes Arizona flagstone into flagging, dimension stone, and tiles.

Owner Carl Gray
Office Administrator
(Phoenix phone number) Nancy McCabe
Flagstone Quarries

KESSON AND KESSON

P.O. Box 174, Globe, AZ 85502 - Phone (520) 425-8452 - Employees: 10.

Owner Stewart Kesson
Copper Hill Mine T1N R15E Sec. 15
Silica flux for Cyprus Miami copper smelter - Mine located northwest of Globe.

KILAUEA CRUSHERS INC.

P.O. Box 10606, Glendale, AZ 85318-0606 - Phone (602) 843-1888 - Fax (602) 561-1528 - Employees: 12.

President Bill Nichols
Kilauea Quarry T6N R2W Sec. 5
Quarry located 12 miles east of Morristown - Crushed rhyolite for desert landscaping.

LEVIN STONE COMPANY, INC.

P.O. Box 95, Ashfork, AZ 86320 - Phone (520) 637-2288 - Employees: 35-50 - Processing plant located on Double A Ranch Road 2 miles north of Ashfork - Quarries and processes sandstone from nine deposits - Purchases sandstone from independent quarries - Specializes in hand cut hearths, table tops, and dimensional cuts.

President Phil Levin
Manager Lyle Levin
Transportation & Maintenance Supervisor . . . Van Falls

LITTLE HILL MINES INC.

P.O. Box 332, Oracle, AZ 85623 - Phone (520) 896-2245 - Employees: 12.

President Dave McGee
General Superintendent Pete Ruiz, Jr.
Gold Hill Mine T10S R15E Sec. 5
Open pit mine - Located 6 miles southwest of Oracle - Copper bearing silica flux for Asarco's Hayden copper smelter and decorative rock for landscaping.

MADISON GRANITE

7050 Grand Avenue, Glendale, AZ 85301 - Phone (602) 931-7760 - Employees: 6.
President Stan Novak
Madison Granite T5N, R2E Sec. 24
Open pit granite quarry - Located east of Interstate 17, 4 miles south of Carefree Rd. - Crushed granite products for desert landscaping.

McKUSICK MOSAIC

Route 1, Box 35-D, Globe, AZ 85501 - Phone (520) 425-5051 or 425-8428 - Employees: 3.
Co-owner Robert & Charmion McKusick
Co-owner Kathleen Condit
Weary Lode Mine T1S R15E Sec. 22
Surface clay mine located 5 miles south of Globe - Used for tile and wind chimes, cosmetic additives, sealants, horticultural mixes, and slip glazing material.

MINERAL DEVELOPMENT, INC.

Superior Marble Division
21555 East Ocotillo, Queen Creek, AZ 85242 - Phone (602) 987-1916, Fax (602) 987-1917 - Employees: 20 - Plant located at the intersection of Rittenhouse and Ocotillo in Queen Creek - Marble crushing and screening plant -

Crushed, sized white marble used for landscape, plaster, feed supplements, and specialty aggregate. Markets in Arizona, adjacent states and Texas.

Owner Mike Smith
Owner Gary Smith
Plant Manager K.C. Marsden
Sales Rick Erman
Office Manager Linda Carter
Plant Superintendent Jim Heier
Mine Superintendent Larry Steingasser
Queen Creek Marble Quarry T1S R13E Sec. 17
Marble quarry - Primary crushing and screening plant.

MINERALS RESEARCH AND RECOVERY, INC.

Tucson Office and Plant
4620 S. Coach, Tucson, 85714 - Phone (520) 748-9362 - Employees: 54.

President Manjit Chopra
Plant Manager Michael Vick
Plant Superintendent and Sales Chris Wells
Ajo Plant and Slag Stockpile T12S R6W Sec. 23
Highway 85, Ajo, 85321 - Phone (520) 387-7682 - Processes copper smelter slag for roofing granules, abrasives, filtration media, nuclear shielding, and ship ballast.

MORTON SALT DIVISION

Morton International
13000 W. Glendale Ave., Glendale, AZ 85307 - Phone (602) 247-3000 - Employees: 38.
Facilities Manager Geron Turnquest
Environmental Coordinator/Safety Mgr. Michele Schuler
Morton Salt Mine T2N R1W Sec. 2
Solution mining via wells - Solar evaporation of brines - Produces salt for water softeners, domestic, agricultural, and industrial use.

NATIONAL GYPSUM COMPANY

Gold Bond Building Products Division
1414 E. Hadley St., Phoenix, AZ 85034 - Phone (602) 258-9321 - Employees: 58 - Wallboard plant - Wallboard joint cement plant.
Plant Manager Gary McEwen
Office Manager Wendy Self
Production Manager Wes Gross
Joint Cement Quality Control Nick Tuhus
Feldman Quarry T6S R16E Sec. 27
Star Route, Box 3990, Winkelman, AZ 85292 - Phone (520) 357-7180 - Employees: 5 - Open pit gypsum mine located 12 miles south of Winkelman - Crude gypsum shipped to Phoenix plant for manufacture of plaster board.
Quarry Superintendent David Klein

ORACLE RIDGE MINING PARTNERS

P.O. Box 70, San Manuel, AZ 85631 - Phone (520) 576-1412, Fax (520) 576-1539 - Employees: 95.

General Manager Bourigny
Superintendent rachan
Accountant lawyer
Purchasing Manager layden
Mill Scoles
Chief is Rice

Oracle Ridge Mine T11S R10E Sec. 10

Underground mine producing copper, gold, and silver - Located 25 miles northeast of Tucson - Column flotation mill - 1020 TPD - Ships concentrates to custom smelter.

OUTLAND RESOURCES INC.

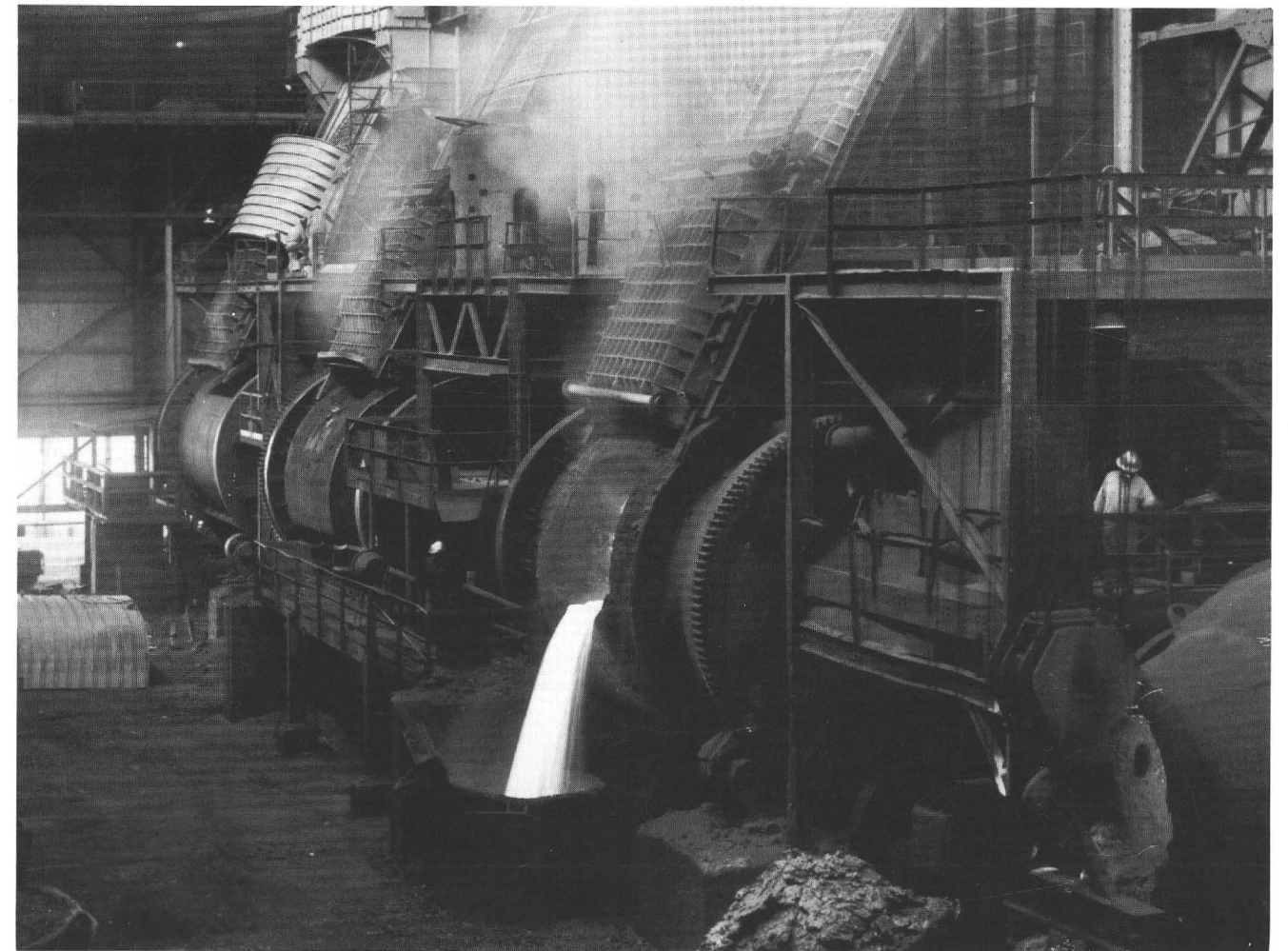
2260 E. Andy Devine, Kingman, 86401 - Phone (520) 753-1444 - Fax (520) 753-1444 (call first) - Employees: 8 (plus contracted services).

President Patti Lewis
Vice President Charlie Starkebaum
Seligman Quarry T23N R6W Sec. 32
Shipley Pit T25N R10W Sec. 28
Produces dolomite, sandstone, and natural colored aggregates for landscape and speciality aggregate.

PEABODY WESTERN COAL COMPANY

Flagstaff Office
1300 S. Yale, Flagstaff, AZ 86001 - Phone (520) 774-5253 - Employees: 66.
President W. Howard Carson
Vice President, Operations Gary L. Melvin
General Superintendent, Mines C. Scott Williams
Director, Human Resources Tony Baca
Director of Engineering Dan Cartwright
Director of Accounting Sheryl Sizler
Manager, Coal Operations Charles J. Stenftenagel
Manager, Reclamation & Local Affairs . . . Teddy Begay
Senior Mgr. Environmental Affairs . . . Brian P. Dunfee
Manager, Compliance Wayne Helgedick
Manager, Engineering Mine Doug Bolone
Black Mesa Mine T35N R18E Sec. 5
P.O. Box 605, Kayenta, AZ 86033 - Phone (520) 677-5040 - Employees: 331 - Surface coal mine - Located approximately 30 miles southwest of Kayenta.
Mine Superintendent Buck Woodward
Assistant Superintendent, 1st Shift Barry L. Grass
Assistant Superintendent, 2nd Shift . . . Douglas C. Botone
Assistant Superintendent, 3rd Shift Tim Kaszela
Safety Supervisor Keith Grass
Kayenta Mine T36N R18E Sec. 9
P.O. Box 605, Kayenta, AZ 86033 - Phone (520) 677-5008 - Employees: 511 - Surface coal mine - Located 30 miles southwest of Kayenta.
Mine Superintendent Robert D. Boone

Directory of Active Mines In Arizona 1998



Arizona Department of Mines and
Mineral Resources

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**ARIZONA DEPARTMENT OF MINES
AND MINERAL RESOURCES**

H. Mason Coggin, Director

1502 West Washington
Phoenix, Arizona 85007
(602) 255-3795
Toll-free in Arizona: 800-446-4259

Board of Governors

William J. Miller - Phoenix
Chairman

Richard Oldham - Quartzsite
Vice Chairman

Ken Bennett
Member

Sydney Hoff Hay - Phoenix
Secretary

Eric A. Nordhausen - Tucson
Member

Cover: This smelter and adjacent mine, now known by another name, first started production in 1911. Since that time it has become one of Arizona's premier mines, producing over 144 million pounds of copper in 1996. (Answers on p. 25)

Where are you?

You may enjoy testing your mine identification skills on the photographs in this year's directory. Each of the photographs is of an Arizona mine with the caption supplying clues to its identification. Some of the mines are major, some minor, some old, some new. All of the photographs are from the Department archives. No one in our office got 100 percent. Answers are on page 25.

THE ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

The objective of the Department is to promote the development of Arizona's mineral resources. This is accomplished through technical research, field investigations, compilation of information into a mineral occurrence data base, and disseminating information through publications, personal contacts, and seminars.

The Department's mining engineers and geologists assist mining and exploration companies, prospectors and others interested in Arizona's minerals with mineral processing, mineral land acquisition, exploration, mine development, financing, government regulations, and marketing.

The Department is a service agency and does not regulate, tax, or require any type of registration. The agency provides assistance that is tailored to meet the diverse needs of the public. The following is a partial list of services that the Department offers:

- Maintain a site specific data base of unpublished reports and maps that includes 4,000 mine files and indexes of 10,000 computerized Arizona mineral occurrences.
- Maintain an information bank and library of mineral and mining information including a mine map library (hard copy and microfilm), government publications, periodicals, and unpublished master and doctorate theses.
- Gather and disseminate information on commodities and markets.
- Suggest target areas for exploration activity.
- Suggest properties for acquisition and development.
- Assist individuals and companies in their dealings with regulatory agencies to facilitate their mining and exploration activity.
- Produce publications in the form of mineral reports, annual directories, technical reports, annual mineral industry surveys and information circulars. These publications include: *Laws and Regulations Governing Mineral Rights in Arizona*, *Directory of Active Mines in Arizona*, *Manual for Determination of Status and Ownership of Arizona Mineral and Water Rights*, and others. A listing of the Department publications is available upon request.
- Operate the Arizona Mining and Mineral Museum.

COMMODITY INDEX

CEMENT/LIME

Clarkdale Quarry
Douglas Quarry
Nelson Quarry
Rillito Quarry

CINDERS

Darling Cinder Pit
Wildcat Hill

CLAY

Cheto No. 1 Mine
Cheto No. 2 Mine
Burro Creek Clay Pit
Dewey Ranch Quarry
Lyles Mine
Pantano Clay Pits
Rim Quarry
Tolleson Mine
Weary Lode Mine

COAL

Black Mesa Mine
Kayenta Mine

COPPER

Bagdad Mine
Carlota
Copper Queen Mine
Florence
Johnson Camp Mine
Miami Mine, Cyprus
Miami Mine, BPH
Mineral Park Mine
Mission Mine
Morenci Mine
Pinto Valley Mine
Ray Mine
San Manuel Mine
Sierrita Mine
Silver Bell Mine
Tohono Mine

CUSTOM MILLS

Black Canyon Mill

DIATOMITE

White Cliff Mine

FERTILIZER MINERALS

Iron King Tailings and Plant

GEMSTONES

Sleeping Beauty Mine
Mineral Park Mine
Morenci Mine

GOLD and SILVER

Bagdad Mine*
Devils Wash Placer

Gold Road Mine
Mission Mine*
Pinto Valley Mine*
Ray Mine*
Morenci Mine*
San Manuel Mine*
Sierrita Mine*
Yarnell Mine

GRANITE/DECORATIVE STONE

Aztec Quarry
Jomax Quarry
Madison Granite Quarry
Picacho Quarry
Red Mountain Quarry
Star Valley Granite Quarry
Treasure Chest Granite Quarry

GYPSUM

Feldman Quarry
Salome Gypsum Mine
Snowflake Gypsum Mine
White Cross Mine
Winkelman Gypsum
Verde Gypsum Mine

LIMESTONE/MARBLE

Andrada Marble Quarry
Davidson Marble Quarry
Queen Creek Marble Quarry
Santa Rita Quarry
Shipley Pit

MOLYBDENUM

Bagdad Mine*
Mission Mine
Morenci Mine*
Pinto Valley Mine*
San Manuel Mine*
Sierrita Mine*

PERLITE

Superior Perlite Mine

PIGMENT

Swansea Mine
Iron Chancellor Mine

PUMICE

Crown Claims
More Sand, Moon Sand Claims
White Vulcan Mine

SALT

Morton Salt Mine

SAND & GRAVEL

See listing of sand and gravel producers

SAND, INDUSTRIAL

Ajo Plant & Slag Stockpile
Houck Silica Sand

SILICA SMELTER FLUX

Camp Grant Quarry
Copper Hill Mine
Gold Hill Mine

SILVER -see Gold

SLATE

New River Slate Quarry

SMELTERS

Hayden
Miami
San Manuel

STONE, DIMENSION

Arizona Picture Rock Quarry
Arizona Gold Quarry
Black Cat Quarry
Blue Bell Schist Quarry
Brown Quarry
Buckskin Quarry
Cucamonga Quarry
Dunbar Quarries
Flagstone Quarries
Golden Buckskin Quarry
Little Rock Quarry
Lizard Canyon Quarry
M C Quarry
M C Canyon Quarry
Mayer Onyx Quarry
New River Slate Quarry
Rainbow Schist Quarry
Rattlesnake Quarry
Red Rock Quarry
Rock House Quarry
Sidewinder Quarry
Sierra Quarry
Trick Tank Quarry
Western States Stone Quarries
Yellow Wasp Quarry

ZEOLITES

Bowie Chazazite Mine
Grace Chabazite Mine
Union Pass Mordenite Mine

* Produced as a byproduct

SUPPLEMENTAL INFORMATION

Arizona State Agencies

Arizona Geological Survey
416 West Congress, Tucson, AZ 85701
Phone (520) 770-3500

Arizona Mines and Mineral Resources
1502 West Washington, Phoenix, AZ 85007
Phone (602) 255-3791

Land Department - Minerals Section
1616 West Adams, Phoenix, AZ 85007
Phone (602) 542-4628

Mine Inspector
State Capital, West Wing, Room 403, Phoenix,
AZ 85007 Phone (602) 542-5971

Federal Agencies

Bureau of Land Management
Arizona State Office, 222 North Central, Phoenix,
AZ 850004-2203 Phone (602) 417-9528

Forest Service
Arizona Zone Office - Minerals, 2324 East
McDowell Rd., Phoenix, AZ 85006
Phone (602) 225-5262

**Mine Safety and Health Administration
(MSHA)**
63 East Main #303, Mesa, AZ 85201
Phone (602) 649-5452 Fax: (602) 649-5662

U.S. Geological Survey
Minerals Information, 520 N. Park Ave. Suite
355, Tucson, AZ 85719
Phone (520) 670-5544

Use **Mines FaxBack** (703) 648-4999 to obtain mineral commodity data and state production reviews. Call from your fax machine and follow instructions to receive publication catalogues or documents via fax.

Industry Associations

Arizona Mining Association
2702 North 3rd Street, #2015, Phoenix, AZ
85004
Phone (602) 266-4416, Fax (602) 266-4418
President Charles Shipley
Administrative Assistant . . . June Castelhana
Director of Education Larry McBiles

**AMIGOS (Arizona's Mining & Industry
Gets Our Support)**
2927 North 2nd Street, Phoenix, AZ 85012,
P.O. Box 25187, Phoenix, AZ 85002
Phone (602) 279-3199, Fax (602) 230-8413
Executive Director Sydney Hoff Hay

Arizona Rock Products Association
1825 West Adams, AGC Building, Phoenix,
AZ 85007
Phone (602) 271-0346, Fax (602) 255-0363
Executive Vice President . . Ken Quartermain
Deputy Director Jim Norton

**Society For Mining, Metallurgy, and
Exploration, Inc. - National Headquarters**
P. O. Box 625002, Littleton, CO 80162-5002
Phone (303) 973-9550, Fax (303) 973-3845
Executive Director Gary Howell
Assoc. Exec. Dir. for Members . . Angie Giles
Director of Publications Joe Zullo
Editor - Mining Engineering . . . Tim O'Neil

Additional copies of the Directory of Active Mines in Arizona 1998 may be obtained for \$5.00 (\$6.50 by mail). Circulars listing mining related Federal, Arizona, and County agencies as well as mine permitting information are available. For more information or a publication list contact the Department.

Active Mines in Arizona - 1998

by K.A. Phillips, N.J. Niemuth, and D.R. Bain

Department of Mines and Mineral Resources

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State of Arizona
Jane Dee Hull, Governor

Phoenix, Arizona
November, 1997

Arizona Department of Mines & Mineral Resources
1502 West Washington, Phoenix, Arizona 85007
(602) 255-3795 Toll-free in-state 1-800-446-4259

Directory of Active Mines in Arizona

1998

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Forward

This directory was compiled in November, 1997 from field visits and information received by the Department's technical staff. For the purpose of this directory, an active mine is defined as a mine in continuous operation, either in production or under full-time development for production. Custom milling operations that are active or available on a full-time basis are also included in the directory.

It is acknowledged that there are additional mines not listed that are in an exploration, evaluation, or part-time development phase. There are others where production is on an intermittent basis that are not listed. The report is dependent on the cooperation of government agencies, private industry, and individuals who voluntarily provide information on their projects and activities.

The directory is arranged alphabetically by company name. Each listing includes corporate addresses, mine name and location, commodities, operation description, and key personnel.

Portable crushing and screening plant - Operated on a seasonal basis.

Plant 41 - Maricopa Plant

Maricopa Road and the Gila River, Maricopa - Phone (602) 220-5540 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Jim Shields

Plant 47 - Coolidge Plant

Highway 287 and Attaway Road, Coolidge, AZ - (520) 220-5454 - Sand, gravel, rock products, ready mix concrete, and ABC.

Plant Superintendent Don Wofford

Plant 48 - Sacaton Plant

Highway 93, 1 mile north of Casa Blanca Road, Sacaton, AZ - (602) 262-1453 - Sand, gravel, rock products, ready mix concrete, and ABC.

Plant Superintendent Tom Farr

Plant 49 - Casa Grande Plant

2305 S. Rooftile Rd., Casa Grande, AZ 85222 - Phone (520) 836-8705 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Will Wadkins

VALLEY CONCRETE & MATERIALS

2500 W. Cement Plant Road, Clarkdale, AZ 86324, P.O. Box 634, Cottonwood, AZ 86326 - Phone (520) 634-4250 - Employees: 45 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Manager David Heath

VALLEY ROCK & SAND CO.

10700 E. Irvington Road, P.O. Box 18469, Tucson, AZ 85731 - Phone (520) 296-1733 - Employees: 3 - Sand, gravel, and rock products.

President Martin McCann

W.A. MORRIS SAND, GRAVEL & CONCRETE INC.

US Highway 191 South, Safford, AZ 85546 - Phone (520) 428-1371 - Employees: 40 - Sand, gravel, rock products, ABC, ready mix concrete, and asphaltic concrete.

Owner Jack Gilbert

WHEELER CONSTRUCTION INC.

1310 N. 24th Street, Phoenix, AZ 85008 - Phone (602) 254-3179 - Employees: 25 - Sand, gravel, rock products, and ABC.

Executive Vice President Bob Johnson

Ashfork Pit

Located near Ashfork, AZ - Operated on an as needed basis.

Dixileta Pit

Located north of Phoenix - Captive production of rock products for construction contractors and rock products marketed by others.

WICKENBURG CONCRETE & MATERIALS

U.S. Hwy. 60, M.P. 117.5, P.O. Box 1450, Wickenburg, AZ 85358 - Phone (520) 684-3402 - Employees: 25 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

President Edwin Dillard

Vice President George Dillard

WILLCOX ROCK & SAND

1401 E. Maley, P.O. Box 156, Willcox, AZ 85644 - Phone (520) 384-2181 - Employees: 12 - Sand, gravel, rock products, ABC, and ready mix concrete.

Owners Keith, Robert, and William Gallagher

YAVAPAI MATERIALS, INC.

5899 Wilkinson Drive, P.O. Box 814, Prescott, AZ 86302 - Phone (520) 445-7305 - Employees: 17 - Sand and gravel.

President/Owner John Pemberton

Answers to WHERE ARE YOU?

Cover: Inspiration Smelter, Gila County. The operation is now called Cyprus Miami. This undated photo is of the converters. The Miami smelter processed 633,000 tons of copper concentrates in 1996.

A. p. 4 Kitty Why Group, Pinal County. This mine was staked under a variety of names including Herring Property, Herron Group, and Horace. It was a producing gold mine that was abandoned because wagon train freight costs to the mill were so high - 3 dollars per ton.

B. p. 7 Grey Horse, Pinal County. After Grey Horse was staked, and approximately 1000 feet of tunnels and 260 feet of shafts developed in 1919, the mine was left unworked until discovered by specimen collectors Andrew Clark and Gary Fleck. The spectacular vanadinite crystals they found astounded the mineral-collecting world. The Arizona Sonoran Desert Museum acquired enough crystal-covered slabs from the Grey Horse to reconstruct a pocket in their new Earth Science Center.

C. p. 10 Monument No. 2, Apache County. Take full credit is you knew this photo was on one of the vanadinite/uranium deposits in Apache County. The occurrence was discovered by Yazzie Mesa in 1942. The deposit was leased to VCA under a royalty agreement and produced approximately 489 tons of ore between 1943 and 1946.

D. p. 17 New Cornelia, Pima County. Also simply known as 'Ajo,' the New Cornelia mine has been a producer of copper for over a century. Earlier this year Phelps Dodge announced plans to resume production after a 13-year closure.

E. p. 19 Monte Cristo, Yavapai County. Various factors have inhibited production at this property over the years, including flooding, poor management, bad roads, inadequate financing, and low silver prices. Perhaps its best years are yet to come.



Do you need this information in an alternative format? Please call the Department office at 255-3791.

rock products, and ready mix concrete.

Plant Operations Manager Chris Fischer
Plant 21, El Mirage

4515 N. El Mirage Road, Glendale, AZ - Phone (602) 935-7767

West Plant 62 and 72

11701 W. Indian School Road, Phoenix, AZ 85037 - Phone (602) 877-2411

North Plant 63

21001 N 7th Street, Phoenix, AZ 85024 - Phone (602) 582-4436

Sun City Plant 67 and 77

24004 N. 107th Avenue, Sun City, AZ 85373 - Phone (602) 566-1851

Mesa Plant 61 and 71

1901 N. Alma School Road, Mesa, AZ 85201 - Phone (602) 898-8230

Tucson Division

Aggregate Plant Phone (520) 790-8074

Flagstaff Division

633 E. Brannen, Flagstaff, AZ 86001 - Phone (520) 774-0304

SUPERIOR MATERIALS OF UNITED METRO

Hayfield Draw & Cherry Pit, P.O. Box 786, Camp Verde, AZ 86322 - Phone (520) 567-2244 - Employees: 75 - Sand, gravel, rock, and ready mix.

General Manager Ed Davidson

Maintenance Supervisor Randy Austin

Foreman Jerry Piper

Ready Mix Plant Foreman Storm Phillips

SUPERSTITION CRUSHING LLC

2323 E. Hale, Mesa, AZ 85213 - Phone (602) 962-5326.

Owner Johnny Weik

Owner/Manager Myron Jones

Employees: 45 - Provides contract crushing for sand and gravel producers including: Calmat Companies, Rock Solid, Pulte Construction, etc.

Yuma Pit

Southwest intersection Avenue 3E and County 19 east of Yuma, 2755 4th Avenue #938, Yuma, AZ 85364 - Phone (520) 341-9866 - Employees: 25 - Sand, gravel, rock products, and ABC. Aggregate also supplied to company's ready mix concrete and asphaltic concrete plants at another Yuma location.

Plant Foreman Conrad Mulhauser

THE TANNER COMPANIES

2088 E. 20th Street, P.O. Box 1449, Yuma, AZ 85366 - Phone (520) 343-4100, Fax (520) 343-4190 - Employees 200.

President Gerald Janney

Plant 180 - Yuma

13 miles east of Yuma on S.R. 95 @ M.P. 37.5 - Phone (520) 343-4180 - Sand, gravel, and asphaltic concrete.

Plant Foreman Dave Brooks

Mohave Plant - Fort Mohave

1101 Aztec Road, Fort Mohave, AZ 86427 - Phone (520) 330-3330 - Aggregate and ready mix concrete

Plant Foreman Walt St. Clair

Plant 486 - Lake Havasu City

1785 Kiowa Blvd. Lake Havasu City, AZ 86403 - Office Phone (520) 855-7210, Fax (520) 855-0506 - Plant Phone (520) 764-3277 - Aggregate, ready mix concrete, and asphaltic concrete.

Plant Foreman Wallace Opie

TUCSON ROCK AND SAND

6601 N. Casa Grande Hwy., Tucson, AZ 85743, P.O. Box 36030, Tucson, AZ 85740-6030 - Phone (520) 744-3222, Fax (520) 744-4394 - Employees 150 - Two operations in the Tucson area - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

President Richard Hrubes

Sales Manager Ron Green

Operations Manager Mike Smith

UNITED METRO MATERIALS, INC.

701 North 44th Street, Phoenix, AZ 85008, P.O. Box 52140, Phoenix, AZ 85072 - Phone (602) 220-5000 - Employees: 825 - Sand, gravel, ready mix concrete, and asphalt material.

President John Fowler

Vice President Sales Bill Heeter

Chief Engineer Bill Peck

Director Safety & Labor Relations David Chavez

Plant 1 - Central Avenue Plant

2800 S. Central Ave., Phoenix, AZ 85066 - Phone (602) 243-7080 or (602) 220-5000 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Randy Patheal

Plant 2 - Mesa Plant

2830 North Beeline, Mesa, AZ 85256 - Phone (602) 990-0844 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Farron Bentley

Plant 6 - El Mirage Plant

8507 N. El Mirage Road, El Mirage, AZ 85335 - Phone (602) 935-2653 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete - Inactive.

Plant 11 - 19th Avenue Plant

3640 S. 19th Avenue, Phoenix, AZ 85009 - Phone (602) 262-1391 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Randy Patheal

Plant 12 - Glendale Plant

11920 W. Glendale Road, Glendale, AZ 85307 - Phone (602) 935-3562 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Plant Superintendent Norris Fish

Plant 33 - Flagstaff Plant

5200 E. Railroad Avenue, Flagstaff, AZ 86004 - Phone (520) 526-5250 - Plant site - Material shipped in from various company pits, ready mix, asphaltic concrete.

Plant Superintendent

Northern Az. Area Manager Marcene Gough

Plant 35 - Hill Pit

Hwy. 89, 12 miles north of Flagstaff - Sand and gravel pit - Portable crushing and screening plant - Operated on a seasonal basis.

Plant 36 - McCormick Pit

Highway 89 and Sunset Crater - Sand and gravel pit -

ARIZONA'S MINERAL INDUSTRY - 1998

In 1996 Arizona again set an all-time record in copper production, producing 1.3 million tons valued at over \$2.9 billion. Arizona continues leading the nation in the production of copper as well as in total non-fuel mineral production. The value of all mineral output was \$3.84 billion, a decrease from 1995 due to the decline in copper prices in 1996. In addition to copper, Arizona also leads or is among the leaders in the production of gemstones, molybdenum, silver, perlite, and sand and gravel. Excluding sand and gravel operations, there are 109 active mines in Arizona producing the above commodities plus additional metals and 18 varieties of industrial minerals. There are least 70 sand and gravel producers in the state. More than 18,000 people are directly employed by the mining industry.

COPPER

Arizona's copper producers partly offset the effect of falling copper prices in 1996 by producing 4 percent more copper than in 1995 - 1,356,000 tons with a value of \$2.93 billion. Copper represents over 85 percent of Arizona's nonfuel mineral value. Production comes primarily from 4 major companies, but strong demand for copper is encouraging other companies to pursue exploration and development in Arizona. The Western Economic Analysis Center reports that Arizona's economy received more than \$9.6 billion and nearly 73,000 Arizona residents had jobs in 1996 as a result of the direct and indirect contributions of the copper industry. The outlook for copper appears good - world demand is up and prices have been fairly stable, averaging \$1.11 per pound in the first 10 months of 1997. Producers continue to invest in new mining and milling equipment to lower costs, improve efficiency and increase capacity.

Asarco Incorporated

Asarco's world-wide copper production surpassed 1 billion pounds in 1996, establishing the company as the fourth largest copper producer in the world. Asarco's Arizona operations consist of the open-pit mines of Ray and Silver Bell, an open-pit and underground operation at Mission, the Hayden copper smelter, and the Santa Cruz experimental copper mine.

Asarco began mining the Silver Bell North deposit, part of the Silver Bell complex near Tucson, and dedicated the mine and new processing facility on July 16, 1997. The facility's new \$70 million SX-EW plant was developed as a joint venture with Mitsui & Co. U.S.A. and is expected to produce 18,000 tons of copper annually. Much of the oxide ore will come from the new pit, Silver Bell North. Rubblization and leaching of material in the El Tiro and Oxide pits will also provide solution to the SX-EW plant. Capital costs for the startup were kept down by the use of mining equipment received from the Ray and Mission mines.

Copper production at Ray mine was up from 1995 to 343 million pounds due to increased ore production as a

result of improved efficiency and access to higher grade ore following completion of a stripping program. Efficiency was increased, in part, by adding 3 new 240-ton trucks and a new 56-cubic yard shovel. Late in 1996 the mine began testing a prototype truck, the Haulpak 930E Komatsu with a capacity of 310 tons! Six smaller 170-ton trucks were freed for use at Silver Bell.

Ray is the second largest mine in Arizona. It consists of an open-pit, dump and heap leach operations, a 40,000 ton-per-year SX-EW plant at Ray, and 2 mills - a 28,000

MINERAL PRODUCTION IN ARIZONA - 1996*

COMMODITY	QUANTITY	VALUE
Clay (tons)	132,000 ¹	\$454,000
Copper (tons)	1,356,000	2,930,000,000
Gemstones		4,010,000
Gold (troy ounces)	107,800 ²	41,800,000 ²
Sand & gravel(tons)		
Construction	46,200,000	220,000,000
Industrial	366,000	3,310,000
Silver (troy ounces)	7,720,000	40,900,000
Stone-crushed(tons)	6,170,000	33,600,000
Pigments (tons)	85	62,000
Coal (tons)	12,236,000	292,000,000 ³
Other ⁴		274,000,000
TOTAL		\$4,486,877,000

* Source: US Geological Survey, US Dept. of Energy, ADMMR

1/Excludes bentonite clays whose value is included with "other."

2/ ADMMR estimate using the 67,500 troy ounces reported by USGS with the addition of 40,300 troy ounces from a producer believed to be not included by the USGS.

3/ ADMMR estimate.

4/ Cement, clays (bentonite), gypsum, lime, molybdenum, perlite, pumice, salt, dimension stone, and iron oxide pigment.

ton-per-day concentrator at Hayden and a 32,000 ton-per-day concentrator at Ray. At the end of 1996 Ray had reserves of 1-billion tons grading 0.6 percent copper.

Mission copper production increased 16 percent in 1996. Ore production was higher and average ore grade increased as the underground mine came on line supplying higher grade ores. Production totaled 261 million pounds of copper and 800,000 pounds of molybdenum. Accounting for 25 percent of Arizona's silver production, Mission was Arizona's largest silver producer with 1.96 million ounces recovered as a by-product. The Mission complex consists of the underground mine and 2 pits, Mission and the smaller, but separate, San Xavier North. Sulfide ore is treated at 2 mills, Mission and South. They have the capacity to process 63,000 tons of ore daily, resulting in an annual capacity of 124,000 tons of copper in concentrates.

Development drilling increased copper ore reserves by 7 percent to 535 million tons containing 7.4 billion pounds of copper. This drilling also identified long-term stripping requirements that led Asarco to install a conveyor system to move 58 million tons of waste a year and purchase 2 new 60 cubic-yard shovels. This allowed three 15 cubic-yard shovels to be moved to Silver Bell.

Continuous availability of the Hayden smelter, which consists of an INCO flash furnace rated at 720,000 tons of charge per year, allowed uninterrupted production throughout 1996, resulting in a record copper production of 429.8 million pounds.

President Clinton used his line item veto in October, 1997 to withdraw federal funding for the experimental in-situ leach research project at Santa Cruz. Asarco, along with joint venture partner Freeport McMoran Copper and Gold, have decided to continue the project. In 1997 copper solutions were recovered by the test well field from the undisturbed copper deposit, and copper was produced in the pilot SX-EW recovery plant. It is still too early to predict if this project's technology will be economic. It has the potential for extracting copper from deep deposits with very little surface disturbance or other impact on the environment.

BHP Copper

Magma Copper was acquired by Broken Hill Proprietary Company Ltd. (BHP) of Australia effective January, 1996. The merger made the BHP Copper the second largest copper producer in the world with 9 percent of mine production. San Manuel and Pinto Valley are the company's 2 active mining divisions in Arizona. BHP is also developing the Poston Butte deposit, an in-situ leach property that, when fully operational, will be the world's first stand-alone in-situ copper mine. BHP's Magma mine at Superior closed in June of 1996.

San Manuel is the largest underground operation in the United States and one of the largest underground copper mines in the world. San Manuel consists of a block-caving underground copper mine, a 62,000 ton-per-day concentra-

tor, in-situ leach, a 59,000 ton-per-year SX-EW plant, a 1,300,000 ton-per-year smelter with a 3,000 ton-per-day acid plant and a 345,000 ton-per-year electrolytic refinery, and a 180,000 ton-per-year rod plant. San Manuel produced 107,000 tons of copper in the fiscal year that ended May 1, 1997. BHP's San Manuel smelter accounts for about 25 percent of U.S. copper smelting capacity. The Outokumpu flash smelting furnace is the largest single furnace smelter in the industry.

1996 Copper Mine Production

Mine/Company	Production (lbs)
Morenci/Phelps Dodge	1,019,200,000
Ray/Asarco Inc.	343,400,000
Mission/Asarco Inc.	261,200,000
Sierrita/Cyprus	231,000,000
San Manuel/BHP*	214,000,000
Bagdad/Cyprus Copper Co.	222,000,000
Pinto Valley/BHP Copper*	174,000,000
Miami/Cyprus Copper Co.	144,000,000

*Period : June 1, 1996 - May 31, 1997

The Lower Kalamazoo orebody has estimated ore reserves of 2.1 billion pounds of contained copper that will add 12 years to the San Manuel underground mine. Production commenced in January, 1997 and is being phased in with the depletion of the San Manuel orebody over the next few years. San Manuel's and Lower Kalamazoo's estimated proven and probable ore reserves are 222 million tons of sulfide ore at an estimated grade of 0.62 percent copper, and 288 million tons of oxide ore at an average grade of 0.41 percent acid-soluble copper.

The Pinto Valley division includes the Pinto Valley mine and the Miami in-situ and Miami No. 2 tailings leach operations. The Pinto Valley mine consists of an open-pit mine, a 63,000-ton-per-day concentrator, dump leach, and 8,000 ton-per-year SX-EW plant. Miami's leach operations recover copper from in-situ leaching of the old Miami mine block cave area and by hydraulic mining and leaching of the Miami No. 2 Tailings pile. The resulting pregnant leach solutions are processed through Miami's 10,000 ton-per-year SX-EW plant. Pinto Valley's estimated recoverable proved and probable ore reserves are 572 million tons of sulfide ore at an average grade of 0.18 percent copper. The Miami in-situ project contains an additional 156 million tons at an average grade of 0.41 percent copper, while 10 million tons at 0.39 percent remain to be processed at the No. 2 Tailings pile.

BHP's Florence in-situ leach project has completed permitting and is scheduled to begin production in early

gravel.

Owner/Operator Cliff Freeman

PADILLA SAND, GRAVEL, & REDIMIX

409 Camino Ramanote, Rio Rico, AZ 85648 - Phone (520) 761-4998 - Employees: 10 - Sand, gravel, and ready mix concrete.

Owner Manuel Padilla

PAULDEN SAND, ROCK, & REDIMIX

Division of Dunbar Stone Co., Inc.

P.O. Box 403, Paulden, AZ 86334 - Phone (520) 636-2500 - Employees - 11 - Sand, gravel, and ready mix concrete.

Vice President Warren Dunbar

Office Manager/Sales & Orders Robin Larson

PAYSON CONCRETE & MATERIALS, INC.

1900 E. Hwy. 260, Payson, AZ 85541 - Phone (520) 474-2231 - Employees: 40 - Aggregate, sand, gravel, rock products, ready mix concrete, and asphaltic concrete.

Plant Manager George Randall

Plant Manager John Chillson

Asphalt Plant Manager Fred Randall

Sales Representative Tim Hughes

PHOENIX REDIMIX COMPANY

3635 S. 43rd Ave., Phoenix, AZ 85009 - Phone (602) 272-2637 - Employees: 200 - Operates 2 quarries - Sand, gravel, and ready mix concrete.

President Thomas M. Valente

Vice President Timothy Valente

Marketing Director Allan Ladd

Plant Manager Bob Strom

Controller Toby Ballintine

PIONEER SAND COMPANY

745 N. Gilbert #124-360, Gilbert, AZ 85234 - Phone (602) 926-8200 - Employees: 125.

Pioneer Sand #7

5901 W. Broadway Rd., Phoenix, AZ 85043 - Phone (602) 233-2971 - Sand, natural river rock, crushed rock, and ABC.

Owner Gary Schnurr

Superintendent Dave Sawyers

Office Manager Tammie MixDorf

Florence Pit

19925 East Price Road, Florence, AZ 85232 - Phone (520) 868-4616 - Natural river rock and sand.

Casa Grande Quarry

Grande Rose decorative landscape rock and boulders.

Pioneer Pit #10

335th Avenue and Indian School Road, Tonopah - Phone (602) 489-0767 - Produces natural rock, and plaster, mortar, and golf course sand.

REIDHEAD SAND & ROCK, INC.

P.O. Box 7, Paper Mill Rd., Taylor, AZ 85939 - Phone (520) 536-4519 - Employees - 35 - Sand, gravel, and ready mix concrete.

Manager Jack Zellner

RUE HALE SAND AND ROCK

611 S. Voight St., P.O. Box 221, Springerville, AZ 85938 -

Phone (520) 333-4483 - Fax (520) 333-5155 - Employees: 2 - Sand and gravel.

Owner Sonny Hale

Sales Manager Lori Hale

SALT RIVER SAND & ROCK

Dobson Road and McKellips Road, P.O. Box 728, Mesa, AZ 85211 - Phone (602) 990-1987 - Employees: 300 - Sand and gravel - Second largest sand and gravel mine in the United States.

Owner . . . Maricopa-Pima Salt River Indian Nations

Manager Wayne Hills

Sales Manager Denny Willcox

SAND SPECIALTIES, INC.

5570 N. Bush Highway, Mesa, AZ 85205 - Phone (602) 832-2120 - Employees: 4 - Aggregate products.

Manager Ernest Perkins

SAN XAVIER ROCK & MATERIALS

3895 N. Business Center Dr., Suite 11, Tucson, AZ 85705, P.O. Box 551, Cortaro, AZ 85652 - Phone (520) 293-6833 - Employees: 180 - Sand, gravel, ABC, ready mix concrete, and asphaltic concrete.

Vice President and Division Manager Al Wilcox

V.P. Sales & Marketing Benny Bingham

Nogales Plant

91 Old Ruby Road, Nogales, AZ 85621 - Phone (520)

281-9669 - Sand, gravel, ABC, and ready mix concrete.

Plant Superintendent Dave Sunderman

Tucson Plants

6200 W. Cortaro Farms Road, Tucson, AZ 85743 and 10011

E. Valencia Road, Tucson, AZ 85747 - Southwest of Tucson

International Airport - Sand, gravel, ABC, ready mix concrete, and asphaltic concrete.

Plant Superintendent Bill Wion

Green Valley Plant

24560 S. Old Nogales Highway, Green Valley, AZ 85614

- Phone (520) 625-5889.

Catalina Plant

North of Catalina at Golder Dam - Phone (520) 825-8334.

SCARBOROUGH SAND & GRAVEL

920 Stratton Dr., Safford, AZ 85546 - Phone (520) 428-3138 - Employees: 5 - Sand, gravel, and rock products.

Owner/Manager Winfred Scarborough

SMITH AND BELL CONSTRUCTION

Smith, Bell, and Findley Concrete and Materials

1711 N. 8th Avenue, Safford, AZ 85546 - Phone (520)

428-4747 - Employees: 14 - Sand, gravel, ABC, rock products, and ready mix concrete.

Owner Rick Findley

SUN STATE ROCK & MATERIAL CORP.

P.O. Box 1340, Sun City, AZ 85372 - Phone (602) 566-3000

- Employees: 40 - Sand, gravel, ABC, and rock products.

Owner Dolores Walker

SUNWARD MATERIALS

Executive Office, 2625 S. 19th Ave., Phoenix, AZ 85009 -

Phone (602) 416-2600 - Employees: 300 - Sand, gravel,

GRANITE CONSTRUCTION CO.

4115 E. Illinois, P.O. Box 27557, Tucson, AZ 85726 - Phone (520) 748-8000 - Employees: 298 - Sand, gravel, road materials, soil, ready-mix concrete, and asphaltic concrete.

Branch Manager Ted Haworth
Office Manager Maura Noland

GRANITE MOUNTAIN MATERIALS

560 EZ Street, P.O. Box 3520, Prescott, AZ 86302 - Phone (520) 778-5553 - Employees: 6 - Crushed granite.

Owner Dorvin Jones

GUZMAN CONSTRUCTION

Bixby Road, P.O. Box 3100, Globe, AZ 85502 - Phone (520) 425-5775 - Employees: 60 - Sand, gravel, rock, road materials, ready mix concrete, and asphaltic concrete.

President Mike Guzman Jr.
Vice President Wes Bryant
Superintendent Bruce Herman

HAMILTON SAND & GRAVEL

Hamilton Rd., RR 1 Box 1350, Willcox, AZ 85643 - Phone (520) 384-2582 - Employees: 4 - Sand, gravel, and rock.

Owner David May

HATCH CONSTRUCTION & PAVING

Hwy. 77, Taylor, AZ 85939 - Phone (520) 536-7213 - Employees: 40 - Sand, gravel, road materials, and ready mix concrete.

President Jerrold L. Hatch
Secretary/Treasurer Lynn R. Hatch
Vice President Lenn B. Hatch

HUACHUCA CONCRETE, INC.

423 S. Scradar Rd., Sierra Vista, AZ 85635 - Phone (520) 456-1600 - Employees: 15 - Sand, gravel, aggregate products, ABC, leach rock, and rip rap.

General Manager Mike Berry

J.D.'S SAND & GRAVEL INC.

1512 W. Frontage Rd., P.O. Box 4435, Rio Rico, AZ 85648-4435 - Phone (520) 281-7980 - Employees: 6 - ABC, fill, and aggregate.

President Michael Williams

JIM BUSH SAND & GRAVEL

1015 N. Cameron, Ajo, AZ 85321 - Phone (520) 387-6250 - Employees: 4 - Sand, gravel, and landscaping material.

President Patti Bush
Vice President David Bush

KINGMAN REDIMIX

9985 Shipping Lane, Kingman, AZ 86401 - Phone (520) 757-7446 - Employees: 12 - Sand, gravel, and ready mix concrete.

President Pete Campbell

KOCJAN ASSOCIATES, INC.

2030 E. Frontage Rd. P.O. Box 3748, Page, AZ 86040 - Phone (520) 645-3602 - Employees: 10 - Sand, gravel, ABC, ready mix concrete, and asphaltic concrete.

President John Kocjan
Vice President Gerald Kocjan
Secretary Ted Kocjan

LINDEN PEARCE CONSTRUCTION, INC.

1020 Pearce Road, Show Low, AZ 85901 - Phone (520) 537-7454 - Employees: 28 - Rock, sand, cinders, ready mix concrete, and asphaltic concrete.

Owner/President Joy T. Pearce, Jr.
Owner Lavar Merrill
Secretary Kim Pearce

MADDUX & SONS, INC.

1927 Pan American, P.O. Box 1077, Douglas, AZ 85608 - Phone (520) 364-7564 - Employees: 40 - Sand, gravel, ready mix, and rock products.

President Leonard Maddux
Office Manager Toni Vance
Sales and Orders Roxy Maddux

MCCORMICK CONSTRUCTION

1941 Richardo Ave., P.O. Box 545, Bullhead City, AZ 86430 - Phone (520) 763-2272 - Employees: 19 - Sand, gravel, rock products, and asphaltic concrete.

President Scott Merrill
Office Manager Sharon Hartman

MESA MATERIALS, INC.

3410 N. Higley Road, P.O. Box 20040, Mesa, AZ 85277 - Phone (602) 830-1521 - Fax (602) 981-9255 Employees: 50 - Operates multiple quarries - Sand, gravel, and asphaltic concrete.

Owner Edward C. Levy
Vice President Wayne Stamper
Office Manager Bruce Erickson
Accounts Payable Belinda Beck
Operations Manager, East Side Dave Scheffler
Operations Manager, West Side Ron Ernst
Receptionist Tess Sanderlin
Safety Manager Frank Vallie

METRO MATERIALS CO.

5231 E. Buffalo Soldier Road, P.O. Box 520, Sierra Vista, AZ 85636 - Phone (520) 378-2321 - Employees: 55 - Sand, gravel, and ready mix concrete.

General Manager Tim Dillahunt

MOHAVE CONCRETE & MATERIALS INC.

4502 N. Hwy. 95, Lake Havasu City, AZ 86404 - Phone (520) 764-2226 - Employees: 30 - Sand, gravel, rock products, and ready mix concrete.

General Manager Dan Porter
Mohave Concrete S&G No. 1

Mohave Concrete S&G No. 2

1781 E. Boundary Cone Road, Mohave Valley, AZ - Phone (520) 330-3750.

Mohave Concrete S&G No. 3

2699 West Hwy. 66, Kingman, AZ - Phone (520) 753-5554.

NEW RIVER SAND & GRAVEL

58202 N. 51st Avenue, Phoenix, AZ 85027 - Phone (602) 465-7845 and (602) 465-7850 - Employees: 1 - Sand and

1998. The operation is expected to produce 35,000 tons of cathode copper per year for 15 years. The project is in a testing phase that includes a pilot in-situ leach and SX-EW plant. Oxide resources for the project are 321 million tons averaging 0.34 percent copper.

Cyprus Climax Metals Company

In 1996 the Cyprus Climax Metals division of Cyprus Amax produced 768 million pounds of copper and 56 million pounds of molybdenum, with much of the production coming from their Arizona operations. Cyprus is Arizona's second largest producer of copper and the world's largest producer of molybdenum. Cyprus Climax maintains headquarters in Tempe, Arizona and operates 4 copper mines in the State: Bagdad, Tohono, Miami, and Sierrita. In October of 1997 Cyprus sold their Mineral Park property to Equitorial Mining N.L. of Australia.

The Sierrita property consists of 3 open-pit copper-molybdenum mines, a 115,000 ton-per-day concentrator, 2 molybdenum roasting plants, a ferromolybdenum plant, a rhenium plant, a dump leaching operation, and an SX-EW plant. In 1996 Sierrita started mining a 70-million-ton oxide deposit that has led to an increase in cathode output. Construction has begun on a new in-pit crusher and conveyor system to reduce haulage costs. Sierrita is recognized as one of the most efficient mines in the world as it operates with the lowest average copper grade, 0.27 percent, of any milling operation. A major contributing factor is the mine's by-product molybdenum credit of 19 million pounds, valued at \$100 million in 1996. This figure is down from the record 24 million pounds in 1995, but still substantial. Sierrita is the largest molybdenum mine in Arizona. Sierrita contains proven and probable copper reserves to last 20 years at its present mining rate of almost 50 million tons per year.

The Bagdad mine in Yavapai County produced 222 million pounds of copper in 1996. A higher capacity shovel was added to lower mining costs, and mill output was expanded by 5 percent. Sulfide production was 10 percent higher than in 1995. The operation consists of an open-pit copper-molybdenum mine, a 85,000 ton-per-day concentrator, a dump leach operation, and an SX-EW plant. Cyprus reports that Bagdad has over a billion ton proven and probable ore reserve of 0.38 percent copper and 0.021 percent molybdenum.

The Miami mine consists of an open-pit copper mine, an SX-EW plant, a 650,000 ton-per-year capacity smelter, an acid plant, a 380 million-pound-annual capacity electrolytic refinery, and a 135,000 ton-per-year rod plant. The mine and SX-EW plant produced 144 million pounds of copper in 1996. The investments in the smelter and refinery at Miami have made Cyprus more efficient and self sufficient in domestic copper smelting and refining. The smelter processed 633,000 tons of copper concentrates in 1996, a

new record for Miami. The Miami rod plant produced 276 million pounds of copper rod.

Cyprus' Tohono operations, located on land leased from the Tohono O'Odham Nation, consists of an SX-EW plant fed by a newly developed test open pit and heap leach. In 1996 Tohono produced 39 million pounds of copper.

Phelps Dodge Corporation

Phelps Dodge's Morenci mine in Greenlee County, the largest copper mine in North America, produced over 1 billion pounds of copper in 1996. Phelps Dodge Corporation, headquartered in Phoenix, is the world's largest producer of SX-EW cathode copper. Its mining division, Phelps Dodge Mining Company, produces about one-third of the U.S.'s mined copper at its properties in southeastern Arizona and southwestern New Mexico. In Arizona, in addition to Morenci, Phelps Dodge operates the Copper Queen in Bisbee, and controls significant undeveloped copper resources throughout the state, including the New Cornelia mine at Ajo and several deposits near Safford. Phelps Dodge owns an 85 percent interest in the Morenci mine; the remaining 15 percent is owned by Sumitomo Metal Mining Company, Ltd.

Morenci alone produces 23.6 percent of the U.S. copper production and 5.1 percent of the world production. The Morenci operation consists of the Morenci, Metcalf, and Northwest Extension open-pit copper mines, the 100,000 ton-per-day Morenci concentrator with a molybdenum circuit, the 40,000 ton-per-day Metcalf concentrator, 4 dump leaches with 3 SX plants, the new Southside EW plant with a 130-million-pound capacity, and Morenci, with a capacity of 370 million pounds annually, the worlds largest EW plant.

On May 27, 1996 a world record was set at Morenci when 1,327,800 tons of material was mined in a 24-hour period. Also in 1996, the landmark smelter stacks that were built in 1942 were downed as part of the demolition of the remainder of the smelter.

Morenci's milling and leaching reserves totaled over 1.7 billion tons at the end of 1996. Additional resources include: Coronado with 480 million tons of sulfide and oxide mineralization, Western Copper with an estimated 530 million tons of milling material at a grade of 0.55 percent copper, and 500 million tons of leach material at a grade of 0.31 percent copper, and Garfield, containing 1 billion tons grading 0.27 percent copper.

The company's Copper Queen mine consists of a small dump leaching and precipitation operation at the depleted Lavender pit. No decision has been made as to when to bring the adjacent Cochise deposit, containing 210 million tons of 0.4 percent leach material, to production.

Phelps Dodge opened a district office in Safford where feasibility studies and environmental permitting were initiated in 1996 for the Lone Star, Dos Pobres, and San Juan deposits. The Dos Pobres and San Juan deposits contain 555

million tons of leachable material and 330 million tons of sulfide with a grade of 0.65 percent copper. In late 1995, the Sanchez deposit was acquired from AZCO Mining. The acquisition increased the company's open pit, leachable copper resources in the district including Lone Star to nearly 2.4 billion tons.

In 1997 Phelps Dodge announced that a \$238 million construction project is planned for the New Cornelia mine at Ajo. The project, scheduled to include a new concentrator and mining equipment, will allow resumption of mining the deposit that last operated in 1983. The sulfide resource there is 150 million tons grading 0.56 percent copper. The New Cornelia operation, which will employ about 400 people, is expected to produce 135 million pounds of copper and 25,000 ounces of gold annually, perhaps as early as 2000.

Phelps Dodge and Cominco continue a joint venture agreement on the United Verde massive sulfide deposit at Jerome. The property, one of the largest zinc resources in the U.S., contains 21 million tons grading 6.6 percent zinc, plus copper and precious metals.

Other Copper Companies

The first new major mine in Arizona in many years moved closer to reality as Carlota Copper Company, a subsidiary of Cambior U.S.A., was granted their long awaited Environmental Impact Statement and Record of Decision in July of 1997 from the Tonto National Forest. The 45-day appeal period ended on September 15 with 5 appellants. The company has not yet received approval from the Environmental Protection Agency or the Bureau of Reclamation, but approval is expected soon. The property consists of 4 oxide ore bodies, Carlota, Cactus, and North and South Eder. Mineable reserves total 96 million tons grading 0.44 percent copper. Production is planned at a rate of 30,000 tons of copper per year for the first 10 years via open-pit mining, heap leaching, and SX-EW. Capital costs are estimated at \$100 million. The project will employ 300 workers when in full operation.

Arimetco Incorporated produces cathode copper from the Johnson Camp mine located 65 miles east of Tucson. Reserves at Johnson Camp's producing Burro Pit are estimated at 10 million tons, while the undeveloped Copper Chief orebody contains reserves estimated at 17.8 million tons.

Equitorial Mining exercised their option to purchase Mineral Park from Cyprus Climax Metals Company on October 1, 1997. Mineral Park is an open-pit copper-molybdenum mine located in Mohave County. Equitorial plans to double production of the SX-EW operation that produced 5 million pounds of copper for Cyprus in 1996.

In October, 1997 AMT International Mining Corporation announced the completion of a feasibility study on their Copper Creek deposits located 45 miles northeast of Tucson. The project covering 6,000 acres, includes the Old Reliable, Child Aldwinkle, and Copper Prince mines, and

encompasses joint venture property with BHP and Phelps Dodge, as well as AMT-staked federal mining claims.

COAL

While Arizona is not generally known for its coal production, coal ranks second only to copper in economic importance in the State. In 1996 Arizona's coal production was 12,236,000 short tons, having an estimated value of \$300 million. All production is from land leased from the Navajo and Hopi Nations by Peabody Western Coal Company. Royalties from coal production total \$30 million annually. Peabody is the nation's largest coal producer and Kayenta is their largest operation.



A. This photo is for extra credit; the mine is obscure, but the photo quiet charming. The mine is in Box Canyon in Pinal County near the Superstition Mountains.

Apex Plant
11500 N. CalMat Drive, Marana, AZ 85653 - Phone (520) 629-0460 - Sand, gravel, rock products, ABC, and ready mix concrete.

District Manager Bill Mackey
Tucson Plants Manager Mike Tuck

Airport Plant
8855 S. Hughes Access Road, Tucson, AZ 85706 - Phone (520) 574-9002 - Ready mix concrete and asphaltic concrete.

Pima Mine Road Plant
13599 S. Nogales Hwy., Tucson, AZ 85706 - Phone (520) 295-1500 - Sand, gravel, rock products, ABC, and ready mix concrete.

Tangerine Plant
W. Naranja, Tucson, AZ 85704 - (520) 682-2158 - Ready mix concrete and asphaltic concrete.

Rillito Quarry
11351 Casa Grande Hwy., Tucson, AZ 85743 - Phone (520) 884-7768 - Sand, gravel, rock products, and ABC.

CAMPBELL REDI-MIX

1510 Copper Lane, Lake Havasu, AZ 86403 - Phone (520) 855-6535 - Employees: 50 - Sand, gravel, and rock products.
Owner Delbert Campbell

CENTRAL ARIZONA MATERIALS

9699 E. Hwy. 287, Coolidge, AZ 85228 - Phone (520) 723-5719 and (602) 649-0244 - Employees: 4 - Landscaping and construction materials.
Manager Russ Star

CHANDLER READY MIX

3250 E. Lehi Road, P.O. Box 928, Mesa, AZ 85211 - Corporate phone (602) 892-0501 - Quarry phone (602) 830-3464 - Employees: 30 - Sand, gravel, and ready mix concrete.
President David Hudder

CHURCHMAN SAND & GRAVEL

P. O. Box 42874, Tucson, AZ 85733 - Phone (520) 325-1611 - Employees: 4 - Sand and gravel.
President Dick Smith
Vice President Doug Smith

CKC MATERIALS DIVISION

1234 E. Airport Road, Safford, AZ 85546 - Phone (520) 428-3423 - Employees: 25 - Aggregate base, mineral base, and ready mix concrete.
President David Cluff
General Manager Carl Bryce

CSR WEST

2550 Silver Creek Wash, P.O. Box 31, Bullhead City, AZ 86430 - Phone (520) 763-3887 - Employees: 37 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.
Manager Bob Swartzman

DESERT CONSTRUCTION INC.

4490 E. Hwy. 66, Kingman, AZ 86401 - Phone (520) 757-

2213 - Employees: 45 - Paving materials, ready mix concrete, and rock products.

President Tom Short
Secretary/Treasurer Jim Short

DOWNEY, L. A. & SONS INC.

11600 E. Poorman Rd., Tucson, AZ 85747 - Phone (520) 886-2315 - Employees: 9 - Sand and gravel.
President Dennis C. Downey
Vice President Darrell Downey
Secretary/Treasurer David Downey

EADS CONSTRUCTION & REDI-MIX INC.

608 Highway 92, 46 Cochise Row, Bisbee, AZ 85603 - Phone (520) 432-4121 - Employees: 7 - Sand, gravel, and ready mix concrete.
President Charles R. Eads
Vice President Sunny Quinn
Secretary/Treasurer/Owner Louise Eads

EARTH PRODUCTS

7563 E. Highway 69, Prescott Valley, AZ 86314 - Phone (520) 772-6446 - Employees: 30 - Sand and gravel, rock, leach rock, and decomposed granite.
President William H. Hyslip
Superintendent William G. Hyslip

FT. MCDOWELL SAND & GRAVEL CO.

State Route 87, P.O. Box 17150, Fountain Hills, AZ 85269 - Phone (602) 837-2358 - Employees: 80 - Sand and gravel.
Acting General Manager Delbert Hallford

FRANCIS DAY & SONS

P.O. Box 157, St. Johns, AZ 85936 - Phone (520) 337-2121 - Employees: 7 - Sand, gravel, and ready mix concrete.
Owners Francis and Marlow Day

FRED CLARK TRUCKING CO. INC.

104 Main, P.O. Box 116, Mammoth, AZ 85618 - Phone (520) 487-2232 - Employees: 18 - Sand, gravel, and ready mix concrete.
Owner Charles Clark

G & S SAND & ROCK

P.O. Box 1259, Mayer, AZ 86333 - Phone (520) 632-9359 - Employees: 4 - Aggregate materials.
Owner Susan Bennett

GENERAL ROCK & SAND

Industrial Road, P.O. Box 3049, Page, AZ 86040 - Phone (520) 645-3289 - Employees: 35 - Quarry in Utah, batch plants in Arizona - Sand, gravel, ready mix concrete, and asphaltic concrete.
President Merrill Jessop
Superintendent Donovan Stubbs

GLORY ENTERPRISE, LLC

P.O. Box 3627, Flagstaff, AZ 86003 - Phone (520) 526-5571 - Employees: 4 - Volcanic cinders, and dirty cinders/fill dirt.
Owner Bonnie and Jim Crick

SAND AND GRAVEL OPERATIONS

A & A MATERIALS

10333 E. McDowell Road, Scottsdale, AZ 85257 - Phone (602) 990-0557 - Employees: 25 - Landscape materials, granite, river rock, sand, and gravel.

President/Owner/Manager Arthur H. Adams
Co Vice President Raymond A. Adams
Co Vice President DeWayne Adams

A-ROCK INC.

P.O. Box 781, Flagstaff, 86002 - Phone (520) 527-0031 - Employees: 12 - Sand and gravel.

Manager Don Merrick

ABC SAND & ROCK

5401 N. 119th Avenue, Glendale, AZ 85307 - Phone (602) 935-1677 - Employees: 6 - River rock and sand.

Owner David Waltemath

ACE SAND & GRAVEL

1011 W. Silverlake Rd., Tucson, AZ 85713 - Phone (520) 622-1869 - Employees: 3 - Sand and gravel.

Owner Delia Gastelum

ACME SAND & GRAVEL

7707 E. 22nd Street, Tucson, AZ 85710 - Phone (520) 296-6231 - Employees: 6 - Sand and gravel, fill, and top soil.

Owner Flo Kempton

ACTION CASHWAY CONCRETE AND MATERIALS

Pioneer Concrete of Arizona

3450 N. Higley, P.O. Box 20370, Mesa, AZ 85277-0370 - Phone (602) 654-3000 - Employees: 276 - Sand and gravel products.

Regional Manager Wally Wallace

AJAX SAND & GRAVEL

5026 S. 51st Avenue, Laveen, AZ 85339 - Phone (602) 237-3232 - Employees: 2 - Landscaping rock.

Owner Bert Guinn

ALLISON ROCK & SAND CONSTRUCTION

L. Sheldon & Co.

P.O. Box 5065, Huachuca City, AZ 85616 - Phone (520) 456-1521 - Employees: 6 - ABC, sand, leach rock, and topsoil.

President Loren Sheldon

ARIZONA SAND & GRAVEL

1401 Atlantic Ave., Yuma, AZ 85365 - Phone (520) 344-5577 - Employees: 3 - Ready mix concrete and sand and gravel.

President Emie Kaznak

B & R MATERIALS

4200 S. Harrison Road, P.O. Box 18138, Tucson, AZ 85731 - Phone (520) 298-2371 - Employees: 23 - Sand and gravel.

President Roland C. Brown
Vice President Kim Schroeder

BRIMHALL SAND, ROCK, & BUILDING MATERIAL

P.O. Box 750, Snowflake, AZ 85937 - Phone (520) 536-4226 - Employees: 62 - Sand and gravel products.

President Gary Brimhall
Vice President Brian Brimhall
General Manager M. Kirk Brimhall
Secretary David Brimhall

CALMAT COMPANY OF ARIZONA

Corporate Office - 3200 San Fernando Road, Los Angeles, CA 90065 - Phone (213) 258-2777.

Concrete and Aggregate Division, Arizona and New Mexico - 1801 E. University Drive, Phoenix, AZ - Phone (602) 254-8464 - Employees: 470 - Sand, gravel, rock products, ready mix concrete, ABC, and asphaltic concrete.

Vice President/General Manager David Hass
Regional Operations Manager Dick Hrubes
Phoenix District Operations Manager Pat Kuenrer
Properties Division - Phone (602) 254-8465

Mgr. Planning and Regulatory Affairs Lee Edmonson
Deer Valley Plant

2205 W. Adobe, Phoenix AZ 85027 - Phone (602) 842-4403 - Ready mix concrete.

Manager Jack Long
Higley Plant

4000 N. Higley Road, Mesa, AZ 85215 - Phone (602) 854-2958 - Ready mix concrete and asphaltic concrete.

Manager Eddie Center
Litchfield Plant

11923 W. Indian School Road, Litchfield Park, AZ 85340 - Phone (602) 935-2323 - Sand, gravel, rock products, ABC, and ready mix concrete.

Manager Joe Flores
Mesa Plant

1900 N. Longmore, Scottsdale, AZ 85201 (on the Salt River Pima Maricopa Indian Community Reservation) - Ready mix concrete and asphaltic concrete.

Manager Eddie Center
Phoenix Plant

1801 E. University Drive, Phoenix, AZ 85034 - Sand, gravel, rock products, ABC, ready mix concrete, and asphaltic concrete.

Manager Richard McDonald
Sun City Plant

14521 N. 115th Avenue, El Mirage, AZ 85335 - Sand, gravel, rock products, ABC, ready mix concrete, and asphaltic concrete.

Manager Jack Long
West Phoenix Plant

4830 S. 43rd Avenue, Phoenix, AZ 85041 - Sand, gravel, rock products, and ABC.

Manager Joe Flores
Tucson Administrative Office

High-quality coal is strip mined from the Kayenta and Black Mesa mines in central Navajo County. The coal is subbituminous with an average quality of 11,000 Btu, 0.5 percent sulfur, and 10 percent ash. Both mines are now using 300-ton capacity tractor trailer bottom-dump trucks to transport coal from the mine to the conveyors and pipeline feed plants.

Kayenta Mine's production capacity is 8 million tons annually. The coal from the mine is carried by a conveyor system 17 miles to storage silos. From there it is transported by the electric-powered trains of the Black Mesa & Lake Powell Railroad to the Salt River Project Navajo Generating Plant 78 miles away.

Black Mesa Mine's annual capacity is 4.5 million tons. At Black Mesa the coal is powdered and mixed with water prior to transport by the world's longest coal-slurry pipeline. The 273-mile journey to the Mohave Generating Station at Laughlin, Nevada takes 3 days.

Peabody's operations at Black Mesa are model reclamation programs. Mining and reclamation proceed at the same rate of approximately 500 acres annually. As an area is mined, the topsoil is removed and stored. After mining is completed, the topsoil is returned and the surface is contoured. The resultant reclaimed land, used for grazing, is more productive than the original land.

The U.S. Department of Interior's Board of Land Appeals has decided that Peabody's Kayenta Mine permit was properly renewed and has overturned a decision made in March, 1996 that would have shut down the mine and its supply of coal to the Salt River Project Navajo Power Plant at Page, Arizona.

GOLD

Arizona's 1996 gold production exceeded 100,000 troy ounces as the Gold Road mine in Mohave County added over 40,000 ounces to the approximately 60,000 ounces of by-product production from the copper mines.

Addwest Minerals continues to operate the underground Gold Road mine and 500 ton-per-day CIP mill at Oatman. Gold Road has about 3 years of reserves remaining that total 524,000 tons grading 0.23 ounces per ton. Addwest also holds and has been conducting exploration drilling on the nearby Moss mine that contains a 7.4 million ton resource grading 0.0338 ounces per ton. Addwest Minerals Inc.'s, parent, Addwest Minerals International Ltd., became a publicly traded company in early 1997.

BEMA Gold, doing business in Arizona as Yarnell Mining Company, continued permitting efforts for its Yarnell deposit, Yavapai County, that contains 7.3 million tons of 0.037 oz. per ton Au. The draft Environmental Impact Statement is expected to be published by the Bureau of Land Management in December, 1997 and it is anticipated that the planned open pit heap leach operation will receive the final EIS and record of decision in mid-1998.

Nevada Pacific Mining has completed an Environ-

mental Assessment with the Bureau of Land Management and received their Aquifer Protection Permit from the Arizona Department of Environmental Quality, but unfortunately has not yet assembled the financing to put their Cyclopic project in Mohave County into production. Although no reserve figures have been released by the privately held New Zealand company, their permits plan for a few million ton open-pit, heap leach operation.

Last year the major copper mines produced over 60,000 ounces of gold, principally from the following mines: San Manuel, Magma, Morenci, Ray, Mission, Sierrita, Bagdad, and Pinto Valley. This amount may increase significantly in the future as Phelps Dodge announced plans to reopen the New Cornelia mine. Annual by-product gold recovery is expected to be about 25,000 ounces.

INDUSTRIAL MINERALS

Although the mining of copper and its by-products accounts for 80 percent of the State's mineral production by value, mining in Arizona continues to be a diversified activity. Coal, industrial minerals, and gold largely account for the remaining 20 percent. Sand and gravel for construction aggregates, cement, and lime for chemical and construction material uses make up the majority of industrial mineral value. In 1996 Salt River Sand & Rock, located in Maricopa County, again operated the second largest sand and gravel plant in the U.S.

Other industrial minerals mined in the state are more significant in terms of their variety than their dollar value. These include limestone and marble, bentonite, diatomite, common clays, salt, cinders, smelter slag, pumice, zeolites, crushed stone, decomposed granite, perlite, gypsum, silica flux, hematite, sandstone, dimension stone, industrial sand, and mine tailings.

Calcium carbonate is mined as limestone and marble for mineral filler and as raw material for lime and cement plants. The zeolite minerals, chabazite and mordenite, are mined for processing into molecular sieves and for waste treatment. Diatomite is produced for metallurgical process insulation. Salt is crystallized by solar evaporation from brines produced by solution mining for use in food processing, livestock feed, and chemicals. Perlite is mined for processing into filter media, fillers, and carries. Quartz and quartzite is mined for use as silica flux in copper concentrate smelting. Industrial sand is produced for use as hydrafrac sand used in petroleum production. Mill tailings from a zinc mine are processed for fertilizer. Processing is done so that the contained iron pyrite can provide available iron and sulfur and so that other trace minerals in the tailings and added nitrogen can be used by plants. Bentonite is mined for out-of-state processing into desiccants and for bleaching and clarifying of edible oils.

Common clays are mined to manufacture tile, pipe, and bricks and to provide an aluminum source for the manufacture of cement. Volcanic cinders are mined for aggregates,

landscaping, and road deicing. Slag from a copper smelter is processed for roofing granules and abrasives. Pumice is used for fabric treatment and light-weight aggregate. Stone is quarried and crushed for aggregates and landscaping. Decomposed granite is used for landscaping. Gypsum is mined and processed for wall board manufacture, cement manufacture, and agriculture. Hematite is mined for color and barrier pigments. Sandstone is quarried and worked for flagstone. Schist, limestone, marble, rhyolite, gneiss, and granite are quarried for decorative stone.

Acquisitions, mergers, and dissolutions have changed the corporate structure of Arizona's industrial mineral mining industry.

Omya (Pluess Stauffer) of Lucern Valley, California acquired the Queen Creek Limestone deposit. The deposit supplies mine-run white marble to the Mineral Development Inc. Superior Marble crushing and screening plant in Queen Creek. Omya has announced plans to construct a marble grinding mill plant near Superior in Pinal County. Minerals Development, in agreement with Omya, will continue to supply the market with crushed and screened marble products of a particle size greater than 200 mesh.

Georgia Marble acquired the Pima Operations of Specialty Minerals at their Santa Rita Quarry in Pima County under a long-term lease and announced plans to concentrate their Arizona operations at the newly leased location.

Superior Companies has sold their mineral resource assets and closed their business. Their Camp Verde Gypsum mine was sold to Phoenix Cement Company. Their Verde Valley Sand, Gravel, and Redi Mix operation, Winkelman Gypsum, and the idle St. Johns Limestone mine were purchased by United Metro. Camp Verde Gypsum supplies gypsum to the Phoenix Cement Company plant at Clarkdale and to agricultural customers. The Winkelman Gypsum operation supplies gypsum to the Arizona Portland Cement plant at Rillito and to agricultural customers. The St. Johns Limestone mine supplied limestone for flue gas desulfurization at Salt River Project's Coronado Power Plant near St. Johns.

Pioneer Concrete of America, through its Pioneer Concrete of Arizona subsidiary, acquired Cashway Concrete and Materials in Phoenix. Cashway operates 4 concrete plants, 2 sand and gravel plants, and 85 trucks as Action Cashway. Employment at Action Cashway increased by 176 to 276 employees. Pioneer of Australia is the parent of Pioneer Concrete and is reported to be the second largest sand and gravel producer in the world.

Owens Corning Fiberglass has acquired Western Fiberglass including their Eloy, Arizona fiberglass factory. The plant, which has historically used raw mineral materials imported into Arizona from other states, has expressed an interest in obtaining sources of supply within Arizona.

The Salt River Project (SRP) Navajo Power Plant at Page, Arizona began receiving limestone from Chemical Lime at a Nevada source for their newly constructed flue

gas desulfurization plant. When full capacity is reached, approximately 180,000 tons of limestone will be received annually from the Nevada mine 250 miles away via Utah. It is believed that Arizona sources were uneconomical due to restrictive highway transport regulations in Arizona. The process of flue gas desulfurization using limestone at the SRP plant produces gypsum as a waste product. Studies are underway to find uses for the gypsum in the area of southern Nevada. Markets for gypsum in that market area would make use of the empty limestone trucks on their return trip and may impact gypsum production from northwestern Arizona.

The Department of Mines and Mineral Resources has noted recent interest in deposits of numerous industrial mineral commodities. These include perlite, clays, barite, industrial sand, dolomite, mica, limestone, manganese, vermiculite, and specialty aggregates. A robust economy with an attendant high level of new residential, commercial, institutional, and industrial construction has spurred interest in developing additional sources of sand and gravel for construction aggregate.

GEMSTONES

Arizona is a leading state in the value of mined gemstones in the United States. Approximately \$4 million worth of commercial gemstone production is reported for Arizona annually. Turquoise, peridot, and petrified wood account for most of the value, with amethyst, chrysocolla, azurite, malachite, and fire agate making up the remainder.

Turquoise, a hydrous phosphate of aluminum and copper, is the leading gemstone produced in Arizona. Prized for its color, turquoise is the traditional gemstone used in Southwestern Native American jewelry. It is mined as a by-product by contractors at a number of Arizona porphyry copper deposits. The best quality material is sold by the piece, and the remainder sold or processed for sale by weight. By-product turquoise is produced by Yellow Hair Trading and Mining from the Sleeping Beauty Mine at Pinto Valley and by Colbaugh Processing from the Mineral Park Mine. Although long known for their turquoise, the Morenci Mine and the deposits at Bisbee are currently yielding very little.

Peridot ranks second in gemstone value in Arizona. It is the gem variety of the mineral olivine. The translucent green material comes from the Peridot Mesa area of the San Carlos Apache Reservation east of Globe. Arizona material is suitable for faceting and is the finest quality in the world. This deposit accounts for approximately 90% of the world's production.

Petrified wood, although occurring in nearly every state, is best known as an Arizona gem material. Petrified wood is a fossil in which a mineral material, usually silica, has replaced the original cellular structure of the wood. Petrified wood occurs in all Arizona counties, but that occurring in Navajo and Apache counties in the Triassic Chinle Forma-

wall board industries, agriculture, fertilizer industry, functional fillers, and water treatment.

WESTERN ORGANICS INC.

420 East Southern, Tempe, AZ 85282, P.O. Box 25406, Tempe, AZ 85285-5406 - Phone (602) 966-4442 - Plant located at 27th Avenue and Lower Buckeye Road in Phoenix - Phone (602) 269-5756, Fax (602) 269-7621 - Employees: 100.

President James Porter
Vice President/Operations Manager D. C. Porter
Sales Manager Dennis Reynolds
Office Manager Adrian Cluff
Controller David Hancock
Salome Gypsum Mine T5N R11W Sec. 30

Open-pit gypsum mine operated by contractors - Gypsum for agricultural and horticultural uses, bagged and bulk - Used directly and in blends.

WESTERN STATES STONE COMPANY

Ashfork Plant T21N R2W Sec. 3

Quarries

P.O. Box 316 - Ash Fork, AZ 86320 - Phone (520) 637-2542 - Employees: 40 - Quarries located in Coconino, La Paz, Maricopa, Mohave, and Yavapai counties - Stone processing facility in Ashfork - Commercial and decorative building stone.

Superintendent-Sales Shirley Robertson
Superintendent-Mining Howard Gray

YARNELL MINING COMPANY, INC.

P.O. Box 1182, Yarnell, AZ 85362 - Phone (520) 427-3353 - Employees: 4 - Open pit, heap leach, gold mine - Draft Environmental Impact Statement expected to be released by BLM for comment in December, 1997 - Construction may begin in late 1998 contingent upon receiving Record of Decision, and other permits.

Yarnell Mine T10N R5W Sec. 14

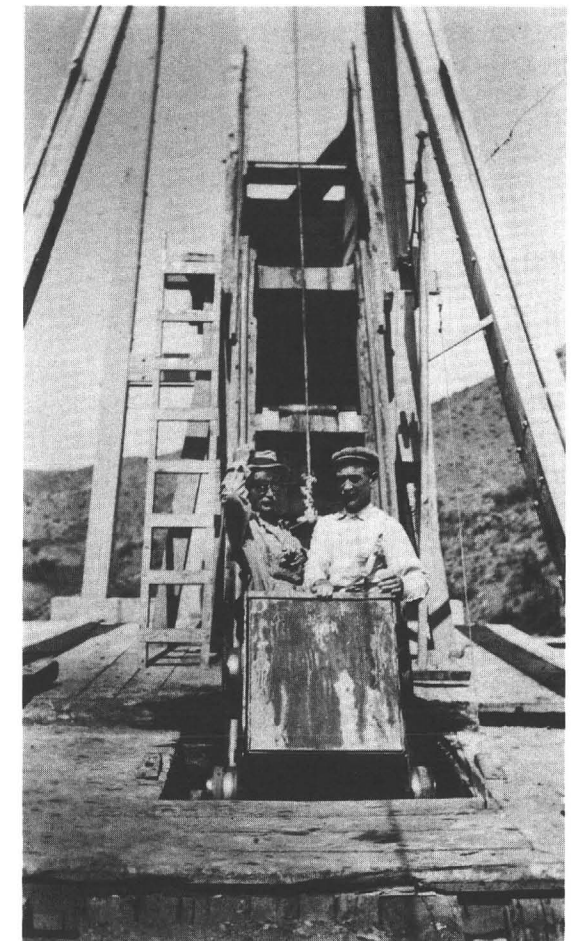
Project Manager Mark Montoya
Operations Manager David LeFevre
Project Engineer Bob Taylor

YELLOW HAIR TRADING AND MINING

P.O. Box 111, Globe, AZ 85502 - Phone (520) 425-7625 or 425-0446, Fax (520) 425-0638 - Employees: 45.

President Monty Nichols
Sales Dan Courvoisier
Sleeping Beauty Mine T1N R14E Sec. 12

Produces turquoise under contract with BHP Copper - Sorts, grades, and processes turquoise for worldwide distribution.



E. This high grade silver mine in Yavapai County was discovered before the turn of the century. This photo, taken in 1917, may include Ezra Thayer who held the mine for many years. The headframe and outbuildings were burned by vandals in 1970.

Co-owner Peter Challinor
Swansea Mine T10N R15W Sec. 32
Produces hematite, micaceous-iron-oxide variety - Used for pigment and anti-corrosion barriers.

3 WIN QUARRIES
P.O. Box 3794, Riverside, CA 92519 - Phone (909) 877-1611 - Employees: 16.
Owner/General Manager Richard Gutierrez
M C Canyon Quarries T19N R1E Sec. 23
Sandstone quarries located 8 miles northeast of Drake - Stone processing plant located at Drake - Sandstone quarried for flagstone.

T & C ENTERPRIZES
Stone Fabrication Plant
State Road 277 West, Snowflake, AZ 85937, P.O. Box 832, Taylor, 85939 - Phone (520) 536-4944 - Employees: 4 - Quarries picture sandstone - Fabricates sandstone art objects and tableware.
President Howard Thomas
Sierra Quarry T12N R20E Sec. 20

TREASURE GRANITE PIT, INC.
P.O. Box 4795, Apache Junction, AZ 85278 - Phone (602) 983-1606 - Employees: 8 - Produces "Desert Rose," Sunset Gold," and "Spanish Gold" screened decomposed granite.
General Manager P.J. Patton
Office Manager Robin Knourek
Treasure Chest Granite Quarry T1N R8E Sec. 3

TUFFLITE INC.
2432 W. Peoria, Suite 1081, Phoenix, AZ 85029 - Phone (602) 931-3681 - Glendale yard located at 6856 W. Orangewood, Glendale - Employees: 20.
President C. T. Morgan
Vice President/Mine Manager (Flagstaff) . . . Ed Morgan
Secretary/Treasurer Clay Morgan
Orders and Transportation Angelia Wigatyk
Office Manager Lisa Burns
Sales Manager Cord Angier
Crown Claims T23N R7E Sec. several
More Sand, Moon Sand T23N R7E Sec. 24
White Vulcan T23N R8E Sec. 19
Mines located 12 miles north of Flagstaff - Pozzolan pumice quarries - 10,000 yards/month - Used in making lightweight redimix and block - Large size material used in the preparation of stone washed denim and in horticultural preparations.

UOP
P.O. Box 2790, Grand Junction, CO 81502 - Phone (970) 245-7957.
Senior Mining Engineer Jim Kirchner

Bowie Chabazite T11S R28E & T11S R29E
Open pit zeolite mines operated by contract mining company - Chabazite used for specialty adsorbants - Shipped out of state for further processing.
Union Pass Mordenite T21N R20W Sec. 11
Open pit zeolite mines operated by independent contract mining company - Mordenite used for specialty adsorbants - Shipped out of state for further processing.

UNITED DESSICANTS
United Catalyst, Inc.
Corporate Headquarters - P.O. Box 32370, Louisville, KY 40232 - Phone (502) 634-7200 - Processing plant c/o United Dessicants, 101 Christine Drive, Belen, NM 87002 - Phone (505) 864-6691.
Cheto No. 1 T21N R29E Sec. 23
Employees: 6 - Located six miles southeast of Sanders in northeastern Arizona - Surface strip bentonite mine - Seasonal operation by mining contractors - Low swelling bentonite is shipped to Belen, New Mexico for the production of desiccants.
Vice President (Louisville) Bill Monin
Vice President (Belen) George Klett
Technical Director (Belen) Matthew Rix
Marketing Manager (Belen) Randall Taussig

UNITED METRO MATERIALS, INC.
dba Superior Materials
701 N. 44th Street, Phoenix, AZ 85008, P.O. Box 52140, Phoenix, AZ 85072 - Phone (602) 220-5000 - Company also operates sand and gravel quarries.
President John Fowler
Vice President Sales Bill Heeter
Chief Engineer Bill Peck
Contact (Superior Materials) Don Fischer
Director Safety & Labor Relations David Chavez
Winkelman Gypsum T6S R16E Sec. 27
P.O. Box 327, Winkelman, AZ 85292 - Phone (520) 357-7002 - Gypsum quarry - Gypsum for Arizona Portland Cement Plant at Rillito and agricultural uses.
Superintendent John Nevitt

WESTERN GYPSUM INC.
225 N. Bluff Street, Suite 5, St. George, UT 84770, P.O. Box 850, St. George, UT 84771 - Phone (801) 628-3916, Fax (801) 628-4441 - Employees: 21.
President Don Cecala
Mine Superintendent Tracy Cannon
Office Manager Matina Harward
Snowflake Gypsum Mine T41N R13W Sec. 25
Open pit gypsum mines - Primary and secondary crushing and screening plant - 100 ton-per-day Raymond Roller Mill fine grinding plant and loading terminal at Apex, Nevada - Producing gypsum for the cement, plaster products, and

tion supplies nearly all of the gem market. Commercial production comes only from private lands.

RECREATIONAL MINING

Gem material, mineral specimens, and fossils collected by the rockhound and small contractors at the mines are not generally included in the reported gemstone production. It is likely that the value of this production is higher than that officially reported for gemstone production. Some portion of rockhound-collected material goes directly into collections, however, much of it and most of the other material collected is sold privately or at gem shows. The gem show in Quartzsite, for example, is the largest in the world, drawing in excess of 100,000 visitors. The prestigious Tucson Gem And Mineral Show attracts dealers and buyers from around the world. More than 25 additional gem shows are held in the state annually and 37 organized earth science clubs are currently active.

Another important segment of recreational mining in Arizona includes gold-panners and operators of small hobby-type suction dredges. Although gold is likely recovered by nearly all who participate in this form of recreation, the recreational value is undoubtedly greater than the value of gold produced. Economic data for recreational mining is difficult to quantify, but the impact on the Arizona tourism industry is significant.



B. The gates in this undated photo belong to a mine that gained fame as a mineral collecting site in the late 1970s. The original mine was staked for vanadinite in 1912.

COMPANY LISTING

The following list is arranged alphabetically by company. To locate a specific mine use the index on page 28.

ADDWEST MINERALS INC.

P.O. Box 869, Oatman, AZ 86433 - Phone (520) 768-1600
- Employees: 120.
General Manager Kevin Shiell
Mine Superintendent Ben File
Mill Superintendent Terry Rice
Gold Road T19N R20W Sec. 11
Located at Oatman - Underground gold mine - 500 TPD CIP mill.

AMERICAN SANDSTONE

Blaser Corporation

2600 N. Highway 89, P.O. Box 1154, Chino Valley, AZ 86323 - Phone (520) 636-4454, Fax (520) 636-2780 - Employees: 50 - Quarries and processes Arizona flagstone into flagging, dimension stone and tiles.
President Donald Blaser
Vice President W. Larry Blaser
Sec./Treas. & Mgr. Operations - Orders . . Dayle Blaser
Transportation Coordination Marcia Stewart
Blaser Stoneyard T16N R2W Sec. 22
Black Cat Quarries T22N R1W Sec. 17
Yellow Wasp No. 2 T22N R1W Sec. 9
Little Rock Quarry T22N R2W Sec. 24
Lizard Canyon Quarry T20N R1E Sec. 32
Red Rock Quarry T22N R1W Sec. 20
Golden Buckskin T19N R2E Sec. 19, 20, 29, and 30
Cucamonga T22N R1W Sec. 9
Trick Tank T23N R2W Sec. 26

ANASAZI COMPANY

7486 E. Adobe Drive, Scottsdale, AZ 85255 - Phone (602) 585-9882 - Employees: 25 - Operates flagstone quarries in Coconino County and slate quarry in Maricopa County - Fabrication yard in Scottsdale - Marketed in the United States and Asia.
Co-owner & Fabrication Manager Grady Dawe
Co-owner & Mining Supervisor Neil Cowie
Anasazi Stoneyard T4N R4E Sec. 14
New River Slate Quarry T7N R3E Sec. 5
Rattlesnake Quarries T20N R1E Sec. 19
Sidewinder Quarries T23N R2W Sec. 36

APACHE STONE DIVISION

Halquist Stone Co. Inc.

22040 N. 21st Ave., Phoenix, AZ 85027 - Phone (602) 267-8658 - Employees: 9 (including contractors) - Quarries

located near Mayer - Onyx marble quarry - Schist quarries - Landscape boulders, building and dimension stone.

President Perry Halquist
Manager Wayne Evans
Mayer Onyx Quarry T12N R1E Sec. 22
Blue Bell Schist Quarry T11.5N R1E Sec. 24
Rainbow Schist Quarry T12N R1E Sec. 23

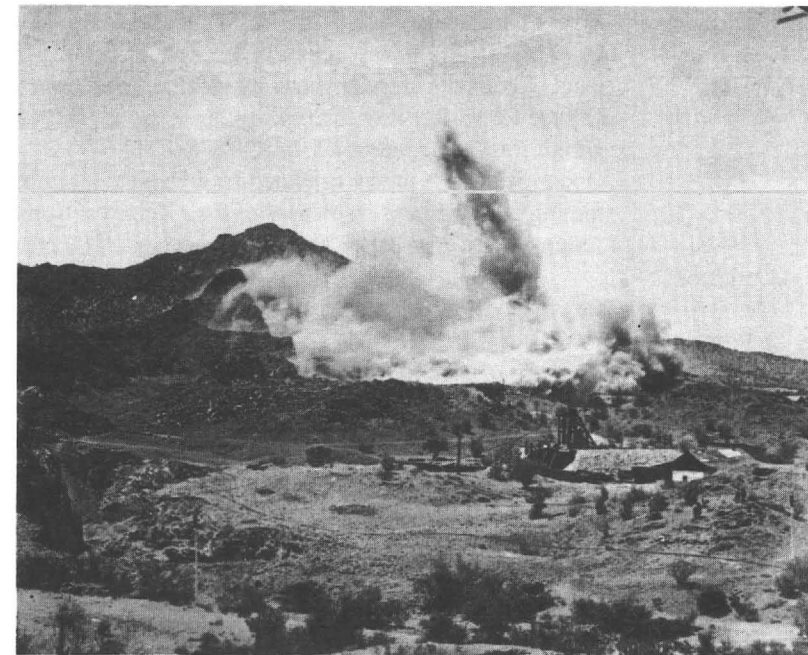
ARIMETCO INTERNATIONAL INC.

Arimetco Inc.

335 N. Wilmot Rd., Suite 400, Tucson, AZ 85711 - Phone (520) 748-2600, Fax (520) 748-2494.
President, Chairman, CEO H. Roy Shipes
Senior Vice President Corporate Secretary
and Chief Financial Officer John McKinney
Controller Andrew Keating
Chief Geologist Harrison Matson
Johnson Camp T15S R22E Sec. 26
Johnson Mine Road, Dragoon, AZ 85609 - Phone (520) 586-2241. Employees: 32 - Located north of exit 322 off I-10 - Open pit copper mine - Heap leach - Solvent extraction-electrowinning plant - Capacity 45,000 lb. copper per day.
White Cliff Diatomite T9S R17E Sec. 24
P.O. Box 1049, San Manuel, AZ 85618 - Phone (520) 385-2515 - Employees: 2 - Open pit diatomaceous earth mine and processing plant. Under care and maintenance.

ARIZONA OXIDES

8250 N. El Mirage Road, El Mirage, AZ 85335 - Phone (602) 935-9350, (800) 576-1500, Fax (602) 935-9365 - Employees: 13.
President David C. Lincoln
Executive V. President & Gen. Mgr. Vincent Scott
Western Regional Sales Mgr. Jerry Spinner
Eastern Regional Sales Mgr. Bob Samuel
Plant Manager Steve Licano
Technical Director Barbara Penunuri
Processing Plant
Grinding and sizing plant reduces crude hematite to red iron oxide pigment - Used in paints, plastics, concrete products and as a mold release in castings - Marketed internationally.
Iron Chancellor Mine T20N R6W Sec. 22
Open pit and underground hematite pigment mine - Mining by contractors.



D. This photograph is of the first blast at this famous Arizona mine, perhaps the oldest mine in Arizona. It was mined by early Indians and Mexicans, and, by 1854, by Anglos hoping the area would be included in the Gadsden Purchase.

Quarry four miles north of Mammoth - Agricultural gypsum - Company delivers and applies gypsum to crop land and golf courses.

RED MOUNTAIN MINING INC.

4250 North Bush Highway, Mesa, AZ 85215 - Phone (602) 832-3390 - Employees: 28.
Owner D. Lavoy Adams
Red Mountain Quarry T2N R6E Sec. 24
Quarry located 10 miles north east of Mesa - Crushed granite for desert landscaping.

SILICA MINES INC.

P.O. Box 332, Oracle, AZ 85623 - Phone (520) 896-2245 - Employees: 12.
President Dave McGee
General Superintendent Pete Ruiz, Jr.
Gold Hill Mine T10S R15E Sec. 5
Open pit mine - Located 6 miles southwest of Oracle - Copper bearing silica flux for Asarco's Hayden copper smelter and decorative rock for landscaping.

SOUTHWESTERN STONE, INC.

18 S. Main, P.O. Box 454, Taylor, AZ 85939 - Phone (520) 536-4912 - Employees: 12 - Quarries sandstone and fabricates building and patio stone - Diamond saws tiles and decorative objects.
Owner/Operator Barbara Chartrand
Co-owner/Plant Operator Lee Chartrand
Foreman Pat Denetso

Sierra Quarry T12N R20E Sec. 20
Arizona Picture Rock Quarry T11N R14E Sec. 3
Brown Quarry T15N R19E Sec. 31
Buckskin Quarry T17N R21E Sec. 30
Arizona Gold T14N R21E Sec. 25

STAR VALLEY GRANITE & MATERIALS

Star Valley, HCR Box 43B, Payson, AZ 85541 - Phone (520) 474-9396 - Employees: 2 - Quarries and processes decomposed granite.
Owner/Operator Roy Haught
Star Valley Granite Quarry T11N R11E Sec. 31

SUPERLITE BLOCK COMPANY

4150 W. Turney, P.O. Box 23163, Phoenix, AZ 85063 - Phone (602) 269-3561.
President Norman Stout
Darling Cinder Pit T21N R9E Sec. 2
P.O. Box 30956, Flagstaff, AZ 86003-0956 - Phone (520) 526-5499 - Employees: 5 - Open pit cinder mine east of Flagstaff - Volcanic cinders used to make building block at the company's Phoenix and Mesa plants.
Mine Superintendent Terry Mitchell

SWANSEA MINERALS INC.

Office: 6360 E. Rose Circle Dr. Scottsdale, AZ 85251 - Phone (602) 994-9964, Fax (602) 941-2473 - Plant located at 1210 E. Gilbert Rd., Building H2, Tempe, AZ - Employees: 2 - Beneficiation plant.
President/General Manager John Challinor

Ariz. Business Unit Manager,
 Safety and Training William K. Bippus
 Ariz. Business Unit Manager, Training Marvin Yoyokie
 Ariz. Business Unit Controller, Charles W. Tilly
 Ariz. Business Unit Manager, D & S W. Steve Blomberg
 Ariz. Business Unit Manager,
 Maintenance Warren W. White

PHILIPS DODGE CORPORATION

Corporate Headquarters
 2600 N. Central Ave., Phoenix, AZ 85004-3014 - Phone (602) 234-8100.

Chairman, President & CEO D.C. Yearley
 Senior Vice President J.S. Whisler
 Senior Vice President M.J. Iraola
 Senior Vice President T.M. St.Clair
 Senior Vice President R.G. Peru

Phelps Dodge Mining Company

2600 N. Central Ave., Phoenix, AZ 85004-3014 - Phone (602) 234-8100.

President J. S. Whisler
 Vice President & General Manager J.L. Madson
 Vice President, Exploration A.L. Lawrence
 Vice President, Engineering Services . . . R.W. Rice
 Vice President, Arizona Operations T.R. Snider
 Vice President, New Mexico Operations . . W.S. Brack
 Vice President & Controller J.M. McCarty
 Director, Employee Relations S.L. Marcus
 Director, Strategic Supply M.F. Upton
 General Transportation Manager J.P. Sheridan

Phelps Dodge Exploration Corporation

2600 N. Central Ave., Phoenix, AZ 85004-3014 - Phone (602) 234-8100.

President A.L. Lawrence
 Vice President & Counsel S.D. Colton

Copper Queen T23S R24E Sec. 15

36 W. Highway 92, Bisbee, AZ 85603 - Phone (520) 432-3621 - Employees: 54 - Mine dump leaching - Copper precipitation plant.

Project Manager D.N. Sexton
Morenci 81 square miles, centered on T4S R29E
 4521 State Hwy. 191, Morenci, AZ 85540 - Phone (520) 865-4521 - Employees: 2,064 - Open pit copper mine - Two concentrators (one with molybdenum circuit), total capacity 125,000 TPD - Three copper solvent extraction-electrowinning plants - two electrowinning tankhouses. Operation also recovers turquoise.

President H.M. Conger
 General Manager, Operations R.H. White
 General Manager, Technical Services . . . J.C. Galassini
 Manager, Mining Operations J.G. Davis
 Manager, Concentrator Operations T.E. Perkins
 Manager, Hydrometallurgical Operations . W.J. Mitchell
 Manager, Engineering Services R.B. Kennedy

Manager, Geological Services M.S. Enders
 Director of Analytical Services

/Raw Materials D.K. Farquhar

Safford District Office

625 Main Street, Safford, AZ 85546 - Phone (520) 428-8720 - Land exchange underway.

Project Manager E.M. Schern
New Cornelia T12S R6W Secs. 23, 26, 27

P.O. Box 9, Ajijic, AZ 85321 - Phone (520) 387-7451 -

Employees: 22 - Copper mine - Permitting & development.

President A.J. Broderick

United Verde Mine T16N R2E Sec. 22

Zinc exploration joint-venture with Cominco - Located at Jerome, AZ - Phone (520) 634-2622.

Area Superintendent R.N. Mohr

PHOENIX CEMENT COMPANY

Phoenix Office

2501 W. Behrend Drive, Suite 23, Phoenix, AZ 85027, P.O. Box 43740, Phoenix, AZ 85080 - Phone (602) 264-0511 - Employees: 11.

V.P. Sales & Marketing Pete Kuehner

Bulk Cement Terminal

1941 W. Lower Buckeye Road, Phoenix, AZ 85009 - Phone (602) 258-7798.

Clarkdale Quarry & Plant T16N R2E Sec. 11

P.O. Box 428, Clarkdale, AZ 86324 - Phone (520) 634-2261 - Employees: 165 - Quarry and plant two miles northwest of Clarkdale - 630,000 TPY - Cement used for building industry.

V.P. Operations/Plant Manager John B. Conway
 Assistant Plant Manager/Maintenance . . Joe D'Avignon
 Assistant Plant Manager/Engineering . . . Jim Wells
 Manager of Logistics Cliff Ayres
 Asst. V.P. Finance Micheal La Lond
 Purchasing/Stores Bill Ayres
 Environmental Engineer Floyd Fusselman
Verde Gypsum T13N R5E Sec. 11

P.O. Box 786, Camp Verde, AZ 86322 - Phone (520) 567-3854 - Gypsum and clay quarry five miles east of Camp Verde on State Highway 260 - Supplies gypsum to plant at Clarkdale - Agricultural and horticultural uses - Clay for pond, ditch, and liner uses.

Foreman Bruce McDonald

PINAL HARVEST

dba PINAL GYPSUM COMPANY

P.O. Box 99, Coolidge, AZ 85228 - Phone (520) 723-3131, Fax (520) 723-9711 - Employees: 10.

President and General Manager James Bechtel
 Orders and Transportation Kirke Anderson

Office Manager Patricia Gerkin

White Cross Mine T7S R17E Sec. 31

ARIZONA PORTLAND CEMENT COMPANY

State Sales Office

2400 N. Central, Suite 308, Phoenix, AZ 85004 - Phone (602) 271-0069.

Executive Vice President and

General Manager Vaughn S. Corley
 Vice President, Sales Craig Starkey

Rillito Plant & Quarry T12S R11E Sec. 26

P.O. Box 338, Rillito, AZ 85654 - Phone (520) 682-2221 - Employees: 144 - Twin Peaks limestone quarry 5 miles west of plant - Cement plant - Capacity 1,100,000 TPY.

Plant Manager Dave Bittel

Quality Control Superintendent John Bartolucci

Quality Control Supervisor Bill Phillips

Plant Engineer Russell Hawks

Personnel Manager Mardi Nagy

Quarry Supervisor Chuck Hansen

Purchasing Agent Tom Follett

ARIZONA SILICA SAND COMPANY

P.O. Box 108, Houck, AZ 86506 - Phone (520) 688-2602, Fax (520) 688-2607 - Employees: 18 - Plant south of Houck - Hydrafrac sand for oil well treatment - Abrasives and mold sand - Markets in Arizona, California, and New Mexico - Bagged and bulk products available.

President Robert D. Fisher

General Manager James Burkewitz

Foreman Ralph Nelson

Evening Foreman Robert Castillo

Houck Silica Sand T22N R29E Sec. 29

Open pit hydrafrac sand mine.

ASARCO INCORPORATED

Tucson Office

1150 N. 7th Avenue, Tucson, AZ 85705, P.O. Box 5747, Tucson, AZ 85703 - Phone (520) 798-7500, Fax (520) 798-7781.

Asarco Copper Operations

Executive Vice President F. R. McAllister
 Assistant to the

Executive Vice President T. E. Scartaccini
 Manager Development,

Projects & Services D. C. Dixon, Jr.

Financial Coordinator O. Ho

Divisional Environmental Mgr. D. M. Yantorno

Director, Material Services L. G. Widugiris

Chief Geologist S. A. Anzalone

Santa Cruz and

Special Projects Manager D. F. Skidmore

Mineral Discovery Center Manager . . R.W. Vugteveen

Specialty Products Group

Commercial Director G. P. Gillen

Governmental Affairs

Director, State Legislative Affairs R. E. Quick

Tucson Information Services

Manager T. Fedoruk
Mission Mine T16S R12E Sec. 36

Box 111, Sahuarita, AZ 85629 - West Pima Mine Road - Phone (520) 648-250,0 Fax (520) 648-0802 - Employees: 975 - Open pit copper mine - Two concentrators: Mission and South with a total rated capacity of 63,000 TPD.

General Manager John D. Low

Operations Manager J. B. Lichtenhan

Mine Manager S. L. Lakosky

Chief Engineer B. M. Williams

Senior Geologist R. B. Cummings

Maintenance Manager H. E. Hughes

Mill Manager, Mission D. Lawrence

Mill Manager, South D.E. Fisbeck

Financial Manager D. J. Hoffman

Industrial Relations Manager J. F. Coxon

Electrical Manager J. B. Barton

Safety Administrator R. E. Jordan

Sr. Environmental Engineer A. T. Cooper

Technical Services Manager C.A. Carroll

Ray Operations T3S R13E Sec. 10

Hayden Operations & Smelter T5S R15E Sec. 11

Ray Complex, P.O. Box 8, Hayden, AZ 85235 - Phone (520) 356-7811, Fax (520) 356-3802 - Employees: 1,621 - Open pit copper mine - Dump leach - Heap leach - Solvent extraction-electrowinning plant with a capacity of 40,000 TPY - Two concentrators: Ray rated at 32,000 TPD and Hayden rated at 28,000 TPD - Smelter capacity 720,000 TPY and 1,600 TPD acid plant.

General Manager T.E. Erskine

Manager, Ray Operations B.P. Boylan

Manager, Hayden Operations J.A. Wilhelm

Technical Support Manager R.E. Thompson

Mine Manager J.A. Bowsher

SX-EW Manager G.R. Burns

Environmental Services Manager N. A. Gambell

Ray Concentrator Manager S. A. McGhee

Hayden Concentrator Manager G. L. Lubers

Electrical Manager, Ray J. L. Weller

Electrical Manager, Hayden G. T. Coryell

Maintenance Manager, Ray R.D. Thompson

Maintenance Manager, Hayden Hugh Alexander

Support Manager J. W. Murphy

Financial Manager D.K. Hiemstra

Human Resources Director W. E. Burrell

Materials Manager K. C. Newnam

Engineering Manager R.S. Rhoades

Safety Manager T.C. Heyn

Senior Geologist Greg Nickel

Silver Bell T12S R8E Sec. 11

25000 W. Avra Valley Rd., Marana, AZ 85653 - Phone (520) 682-2420, Fax (520) 682-2347 - Employees: 110 - Open-pit copper mine - Solvent extraction-electrowinning

plant, 36 million lbs per year capacity - Silver Bell North pit.

Operations Manager D. J. Duncan
 Mine Manager T.H. Phillips
 SX-EW Manager R.V. Washnook
 General Mine Supervisor J.A. Stalcup
 Chief Engineer H.T. Richins
 General Electrical Supervisor R.E. Ruoho
 General Maintenance Supervisor D.A. Rosette
 Safety Engineer R.W. Edgell

Santa Cruz T6S R4E, Sec. 13

P.O. Box 11226, Casa Grande, AZ 85230-1226 - Phone (520) 421-3363 Fax (520) 836-0179 - Experimental in-situ leach research project with joint venture partner Freeport McMoran - Copper recovery by SX-EW plant.

Santa Cruz Manager D.F. Skidmore*
 Site Manager H.G. Kreis**

* At Tucson Office - Phone (520) 798-7766 Fax (520) 798-7783

** At Tucson Office - Phone (520) 798-7717 Fax (520) 798-7783

ASHTON COMPANY

2727 S. Country Club, Tucson, AZ 85251 - Phone (520) 624-5500 - Employees: 7 (at Camp Grant Quarry).

Camp Grant Quarry T7S R16E Sec. 5

Quartzite quarry - 480,000 tpy capacity crushing and screening plant for silica flux for BHP's San Manuel copper smelter.

Crusher Superintendent Bob Bishop

BHP COPPER

Tucson Office

7400 N. Oracle Road, Tucson, AZ 85704 - Phone (520) 575-5600, Fax (520) 575-5663.

San Francisco Office

550 California Street, 5th Floor
 San Francisco, CA 94104 - Phone (415) 774-2545, Fax (415) 774-2530.

Executive General Manager Jim E. Lewis

San Manuel T8S R16E Sec. 34, 35

P.O. Box M, San Manuel, AZ 85631 - Phone (520) 385-3100 - Employees: 1,850 - San Manuel and Kalamazoo underground copper-molybdenum mine - 62,000 TPD concentrator - In-situ leach - Solvent extraction-electrowinning plant - Capacity 120 million lb. copper per year.

Vice President & Gen. Manager Doug McGregor

Manager Sulfide Mining Ron Allum

Superintendent Concentrator Gerald R. Brunskill

Superintendent In-situ Dan Ramey

Superintendent SX-EW Joel Witt

BHP Copper Metals

San Manuel Smelter T9S R17E Sec. 32

P.O. Box M, San Manuel, AZ 85631 - Phone (520) 385-3100 - Employees: 1,060 - 1,300,000 TPY flash smelter - 1,150,000 TPY acid plant - 345,000 TPY electrolytic refinery - 180,000 TPY continuous cast rod plant.

Senior Vice President & Group

General Manager Craig Steinke

Vice President Operations Larry Dyer

Vice President Finance John Perry

Pinto Valley Operations T1N R14E Sec. 20

Miami T1N R15E Sec. 19

Plant located at the intersection of Rittenhouse and Ocotillo in Queen Creek - Marble crushing and screening plant - Crushed, sized white marble used for landscape, plaster, feed supplements, and specialty aggregate. Markets in the Southwest.

Owner Mike Smith

Owner Gary Smith

Plant Manager Jim Heier

Sales Rick Erman

Office Manager Linda Carter

MINERALS RESEARCH AND RECOVERY, INC.

Tucson Office and Plant

4620 S. Coach, Tucson, AZ 85714 - Phone (520) 748-9362 - Employees: 54.

President Michael Vick

Plant Superintendent Frank Phillippeck

V.P. Sales Steve Melhman

Ajo Plant and Slag Stockpile T12S R6W Sec. 23

Highway 85, Ajo, 85321 - Phone (520) 387-7682 - Processes copper smelter slag for roofing granules and abrasives - Sells copper smelter slag to out-of-state processors for manufacturer of filtration media, nuclear shielding, and ship ballast.

MORTON SALT DIVISION

Morton International

13000 W. Glendale Ave., Glendale, AZ 85307 - Phone (602) 247-3000 - Employees: 38.

Facilities Manager Geron Turnquest

Environmental Coord/Safety Mgr. . . . Michele Schuler

Morton Salt Mine T2N R1W Sec. 2

Solution mining via wells - Solar evaporation of brines - Produces salt for water softeners, domestic, agricultural, and industrial use.

NATIONAL GYPSUM COMPANY

Gold Bond Building Products Division

1414 E. Hadley St., Phoenix, AZ 85034 - Phone (602) 258-9321 - Employees: 58 - Wallboard plant - Wallboard joint cement plant.

Plant Manager Gary McEwen

Office Manager Wendy Self

Production Manager Robert Piercy

Joint Cement Quality Control Nick Tuhus

Feldman Quarry T6S R16E Sec. 27

1103 South 77 Highway, Winkelman, AZ 85292 - Phone (520) 357-7180 - Employees: 5 - Open pit gypsum mine located 12 miles south of Winkelman - Crude gypsum shipped to Phoenix plant for manufacture of plaster board.

Quarry Superintendent Robert Foster

OMYA (ARIZONA), INC.

P.O. Box 825, Lucern Valley, CA 92356 -

Plant Manager (Arizona) Manfred Keil

Queen Creek Marble Quarry T1S R13E Sec. 17

Employees: 5 - Marble quarry - Primary crushing and screening plant.

OUTLAND RESOURCES INC.

2260 E. Andy Devine, Kingman, AZ 86401 - Phone (520) 753-1444 Fax (520) 757-4972 - Employees: 8 (plus contracted services).

President Patti Lewis

Vice President Charlie Starkebaum

Seligman Quarry T23N R6W Sec. 32

Shipley Pit T25N R10W Sec. 28

Produces dolomite, sandstone, and natural colored aggregates for landscape and specialty aggregate.

PEABODY WESTERN COAL COMPANY

Flagstaff Office

1300 S. Yale, Flagstaff, AZ 86001 - Phone (520) 774-5253 - Employees: 66.

President W. Howard Carson

Vice President, Operations Gary L. Melvin

Director, Human Resources J. Anthony Baca

Director of Engineering Daniel P. Cartwright

Director of Accounting Mathew T. Lewis

Director, Operations Support D. Scott Pearson

Senior Mgr. Environmental Affairs . . . Brian P. Dunfee

Arizona Business Unit

P.O.Box 605, Kayenta, AZ 86033 - Phone (520) 677-3201

Manager, Coal Operations . . . Charles J. Stenftenagel

Manager, Reclamation & Local Affairs . . Teddy Begay

General Manager C. Scott Williams

Manager, Compliance Wayne E. Helgedick

Manager, Engineering Mine Douglas G. Botone

Black Mesa Mine T35N R18E Sec. 5

P.O. Box 605, Kayenta, AZ 86033 - Phone (520) 677-5040 - Employees: 331 - Surface coal mine - Located approximately 30 miles southwest of Kayenta.

Mine Superintendent Buck R. Woodward

Assistant Superintendent, 1st Shift . . . Barry L. Grass

Assistant Superintendent, 2nd Shift . . Paul C. Yazzie

Assistant Superintendent, 3rd Shift . . . Tim Kozela

Safety Supervisor Keith Grass

Kayenta Mine T36N R18E Sec. 9

P.O. Box 605, Kayenta, AZ 86033 - Phone (520) 677-5008 - Employees: 511 - Surface coal mine - Located 30 miles southwest of Kayenta.

Mine Superintendent Robert D. Boone

Assistant Superintendent, 1st Shift . . Randall L. Hendrix

Assistant Superintendent, 2nd Shift . . Tony G. Bryant

Assistant Superintendent, 3rd Shift . . . Jonas Grass

Safety Supervisor Daniel Ashike

C. This Arizona mine is located in Monument Valley on the Navajo Nation.



Lyles Mine T13N R6W Secs. 11, 12
Open pit clay mine located west of Kirkland - Hectorite clay - Used as viscosifier and thickener in pharmaceuticals and cosmetics.
Grace Chabazite Mine T12S R29E Secs. 1, 2, 12
Open pit mine located 13 miles north of Bowie - Chabazite - Used for cation exchange media, specialty adsorbants, deodorizers, and RAD waste treatment for adsorbing Cs¹³⁷ and Sr⁹⁰
Burro Creek Clay T14N R10W Sec. 7
Open pit clay mine located 8 miles southwest of Bagdad along Burro Creek - Saponite clay - Shipped out of state for manufacture into viscosifiers for detergents and drainage aid for treating pulp for fine white paper made from recycled paper fibers.

HARBORLITE CORPORATION
P.O. Box 960, Superior, AZ 85273 - Phone (520) 689-5723, Fax (520) 689-2362 - Employees: 13 - Perlite crushing, screening, and drying plant located 2 miles west of Superior - Two open pit perlite mines, located 2 miles southwest of Superior - Used in the manufacture of filter media for filtering pharmaceuticals, chemicals, sugar, and beverages and as an agricultural fertilizer carrier.
Plant Manager Louie Lucero
Assistant Manager Mike Putz
Secretary - Orders & Transportation . . Jackie Alvarez
Superior Perlite T2S R12E Sec. 9

HARLEY GRAY STONE COMPANY
P.O. Box 323, Paulden, AZ 86334 - Phone (602) 237-3831 or (520) 636-2436 - Employees: 25-35 - Quarries located 8 miles northeast of Drake - Quarries and processes Arizona flagstone into flagging, dimension stone, and tiles.
Owner Carl Gray
Office Administrator
(Phoenix phone number) Nancy McCabe
Flagstone Quarries

IRONITE PRODUCTS COMPANY
Scottsdale Office
8700 E. Via De Ventura, Suite 280, Scottsdale, AZ 85258 - Phone (602) 991-9804, Fax (602) 991-1727 - Employees: 45.
President Heinz Brungs
Executive Vice President Robert Morgan
Iron King Tailings T13N R1E Sec. 15
Iron King Road, Humboldt, AZ, P.O. Box 218, Humboldt, AZ 86329 - Phone (520) 632-7214, Fax (520) 632-5747 - Reclaims zinc mine tailings - Activation, pelletization, and packaging plant - Produces fertilizer-soil supplement which provides available iron, zinc, trace elements, and nutrients.
Plant Manager Hans Schmucher

KESSON AND KESSON
P.O. Box 174, Globe, AZ 85502 - Phone (520) 425-8452 - Employees: 10.
Owner Stewart Kesson
Copper Hill Mine T1N R15E Sec. 15
Silica flux for Cyprus Miami copper smelter - Mine located northwest of Globe.

KILAUEA CRUSHERS INC.
P.O. Box 10606, Glendale, AZ 85318-0606 - Phone (602) 843-1888, Fax (602) 561-1528 - Employees: 12.
President Bill Nichols
Picacho Quarry T6N R2W Sec. 5
Quarry located 12 miles east of Morristown - Crushed rhyolite for desert landscaping.
Jomax Quarry T5N R1W Sec. 34
Quarry located 135th Avenue and Jomax Road - Crushed rhyolite for desert landscaping.

LEVIN STONE COMPANY, INC.
P.O. Box 95, Ashfork, AZ 86320 - Phone (520) 637-2288 - Employees: 35-50 - Processing plant located on Double A Ranch Road 2 miles north of Ashfork - Quarries and processes sandstone from nine deposits - Purchases sandstone from independent quarries - Specializes in hand cut hearths, table tops, and dimensional cuts.
President Phil Levin
Manager Lyle Levin
Transportation & Maint. Supr. Ilene Harrison

MADISON GRANITE
7050 Grand Avenue, Glendale, AZ 85301 - Phone (602) 931-7760 - Employees: 6.
President Stan Novak
Madison Granite T5N, R2E Sec. 24
Open pit granite quarry - Located east of Interstate 17, 4 miles south of Carefree Rd. - Crushed granite products for desert landscaping.

McKUSICK MOSAIC
Route 1, Box 35-D, Globe, AZ 85501 - Phone (520) 425-5051 or 425-8428, Fax (520) 425-7471 - Employees: 3.
Co-owner Robert & Charmion McKusick
Co-owner Kathleen Condit
Weary Lode Mine T1S R15E Sec. 22
Surface clay mine located 5 miles south of Globe - Used for tile and wind chimes, cosmetic additives, sealants, horticultural mixes, and slip glazing material.

MINERAL DEVELOPMENT, INC.
Superior Marble Division
21555 East Ocotillo, Queen Creek, AZ 85242 - Phone (602) 987-1916, Fax (602) 987-1917 - Employees: 20.
Queen Creek Marble Processing Plant

P.O. Box 100, Miami, AZ 85539 - Phone (520) 473-6200 - Employees: 630 - Open pit copper-molybdenum mine - 63,000 TPD concentrator - Dump leach - Solvent extraction-electrowinning plant - Miami in-situ leach - Miami No. 2 tailings reclaim leach - solvent extraction-electrowinning plant.
Vice President/General Manager Dee Durazo
Manager Mining Operations Dale Pierce
Manager of Concentrator
Operations Jack D. Conklin
Manager Human Resources David L. Palmer
Florence
14605 East Hunt Highway, Florence, AZ 85232 - Phone (520) 868-5094 - Employees: 18 - Fully permitted in situ copper mine project in pilot testing phase - Test includes an in-situ leach and solvent extraction-electrowinning plant.
Project Manager John Kline

BLACK CANYON MILLING
P.O. Box 33638, Phoenix, AZ 85067 - Phone (602) 374-5547.
Owner/Manager Bill Schleisman
Black Canyon Mill T8N R2E Sec. 15
Mill located one half mile south of Rock Springs, west of Interstate 17 - 3-ton-per-hour gravity mill consisting of crushing, grinding, magnetic separation, and table and cone concentration.

BUILDING PRODUCTS COMPANY
Phoenix Plant
4850 W. Buckeye Road, Phoenix, AZ 85043 - Phone (602) 272-5576 - Employees: 2-3 (involved in clay mining) - Plant consumes clay to produce extruded vitreous clay permanent sewer pipe.
Plant Manager and Mining Supervisor . . Jon Humphreys
Rim Quarry T11N R19E Sec. 30
Clay mine located 10 miles southwest of Clay Springs.
New River Slate Quarry T7N R3E Sec. 5
Slate quarry located approximately 6 miles northeast of New River.
Dewey Ranch #2 T14N R1E Sec. 15
Clay mine located approximately 6 miles north of Dewey.

CARLOTA COPPER COMPANY
subsidiary of Cambior USA Inc.
P.O. Box 1009, Miami, AZ, 85539 - Phone (520) 473-3518 - Employees: 21.
General Manager Bob Walsh
Mine Manager George Bell
Human Resource Manager Kevin Webster
Carlota T1N R13E Sec. 36
Located 8 miles east of Miami - Anticipated employment: 300 - Open pit copper mine - Heap leach - Solvent extrac-

tion-electrowinning plant - Capacity 60 million lb. cathode copper per year - Record of Decision and Environmental Impact Statement received and published in mid-1997 - Construction anticipated to begin early 1998.

CHEMICAL LIME
Scottsdale Office - Gainey Office (Sales)
8777 N. Gainey Center Drive, Suite 280, Scottsdale, AZ 85258 - Phone (602) 443-6980, (800) 288-9676 - Fax (602) 948-4293.
Vice President, Industrial Sales Bob Plains
Account Representative Brett Tanner
Account Representative Darren Fry
Scottsdale Office - Forum Office
6263 N. Scottsdale Road, Suite 280, Scottsdale, AZ 85250 - Phone (602) 368-4200, (800) 978-0325 - Fax (602) 368-4220.
President, Western Division Bob Derks
Director New Business Development . . David Fleming
Manager, Technical Services Starr Curtis
Distribution Manager John McMullan
Transportation Coordinator Jim Kenney
Nelson Quarries & Plant T25N R10W Sec. 25
P.O. Box 370, Peach Springs, AZ 86434 - Phone (520) 769-2271, Fax (520) 769-2305 - Employees: 72 - Limestone quarry - Lime plant with two rotary kilns rated at 1800 TPD lime - Markets include lime for flue gas desulfurization, water treatment, soil stabilization, and alkalinity control for copper ore beneficiation and gold leaching - By-product calcium hydrate used for filler in asphaltic products.
Plant Manager William Schoof
Maintenance Superintendent Mark Phillips
Quarry Superintendent Jim Blackwell
Plant Buyer Currently Vacant
Shipping/Transportation Coordinator . . Currently Vacant
Senior Process Control Engineer Gerald Findley
Quality Control Technician Perry Curley
Douglas Quarry & Plant T24S R26E Sec. 7
4753 West Paul Spur Road, Douglas, AZ 85607 - Phone (520) 364-2429, Fax (520) 364-2706 - Employees: 60 - Limestone quarry and plant located at Paul Spur - 3 lime kilns - Plant capacity rated at 1,000 TPD lime - Markets include lime for alkalinity control for copper ore beneficiation, lime for soil stabilization, and crude crushed limestone for flue gas desulfurization.
Plant Manager Jerry Young
Maintenance Superintendent Richard Anderson
Quarry Superintendent Don Russell
Production Services Superintendent Robert Kline
Process Engineer Pat Morgen
Quality Control Technician Louis Roqueni