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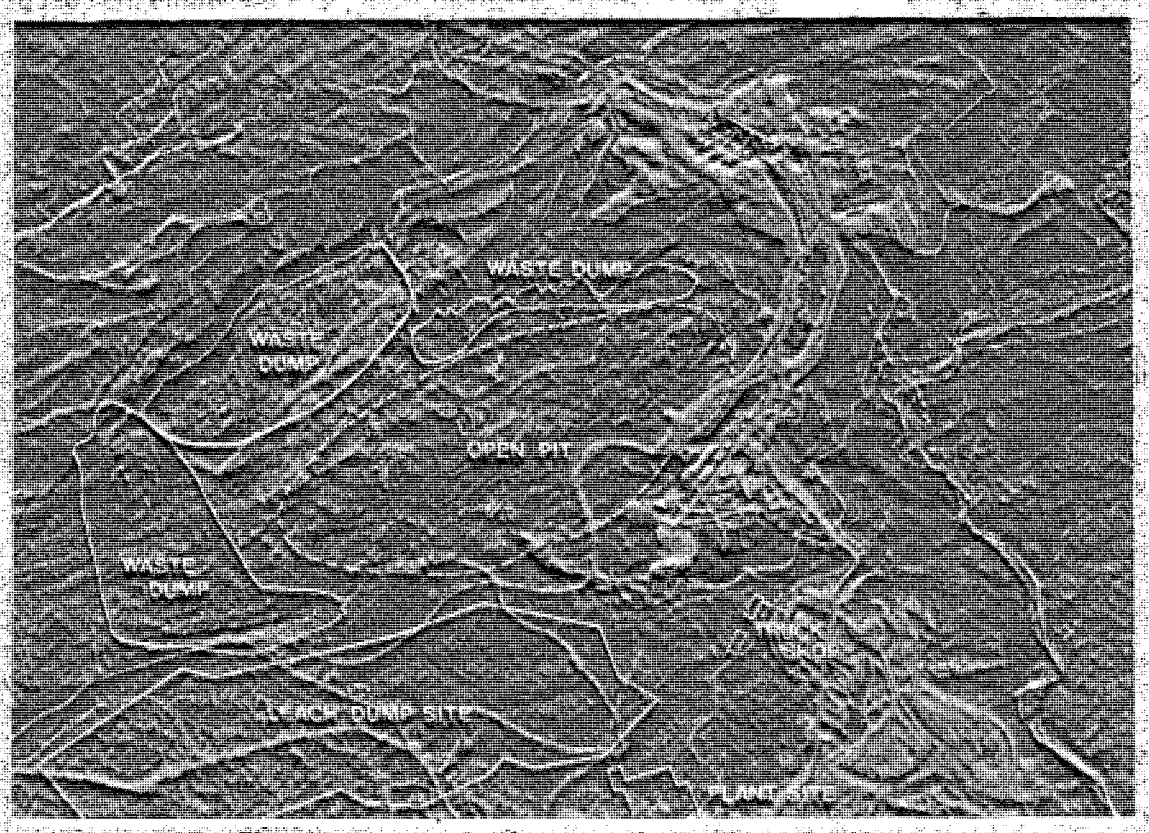
MAGMA Update

A PUBLICATION FOR MAGMA FAMILIES

VOLUME 1 NUMBER 4 San Manuel, Arizona March 1985

Oxide project brings us open pit mining



OXIDE PROJECT will occupy present mine area, but will not interfere with underground operations.

Magma Copper Company, through a newly-formed subsidiary, will build a $70 million open-pit mine and copper leaching facility at San Manuel, it was announced by Brian R. Woolfe, executive vice president.

The new plant, scheduled to begin operation in mid-1986, will use a solvent extraction - electrowinning process to produce some 20,000 tons annually in the form of low cost, high-quality copper cathodes.

Pinto Valley Copper Corporation currently produces some 12,000 tons of copper per year from a similar plant at Miami.

In announcing the project, Woolfe said, "It is imperative for Magma to reduce its costs in order to remain competitive and viable in the marketplace."

He said the company's San Manuel underground mine over the past four years has incurred pretax losses of $179 million despite deferral of development work and other cost-cutting measures and it will need significant reductions in its costs, including labor, if it is to remain in production.

Woolfe characterized the new facility as typical of open-pit installations in which less expensive mining, leaching, solvent extraction and electrowinning techniques requiring less labor will be used to treat oxide ores.

"Our new leaching-electrowinning facility will be fully capable of standing on its own and competing in world markets in the foreseeable future," Woolfe stated.

He went on to say, in addition to the open-pit mining of oxide ore, Magma is also testing deeper, partially caved portions of the oxide ore-body with even larger reserves which can be leached in place by injecting weak acid solutions through drill holes.

This method has the potential for even lower costs than the oxide project being initiated, and could lead to much larger production.

The mining will be from an open pit located along the northeast edge of the present mine subsidence area and will include the area now occupied by Red Hill and the administration mine offices.

The pit will be approximately 4,000 feet long, 2,000 feet wide, and 700 feet deep and will have a slope of 38° and 20' benches.

About 15,000 tons of ore plus 40,000 tons of waste will be removed per day on a 20 shift per week schedule. Waste ore disposal will be in existing subsidence areas.

The electrowinning plant, tank house and metallurgical installations will be located at the mine site as will support facilities such as truck and tire shops.

The operations will require relocating some present mine surface facilities and utility service lines.

Continued on page 3

Copper markets change

When Mountain Bell found the need to install 75 miles of additional cable to expand service in Tucson they chose fiber optical cable instead of copper. They saved 84% on material costs and 22% in the installation. It will cost $270 to repair an optic cable compared to $3,700 to repair a copper cable. They will be able to handle 18 times more calls with the optic and, when ready, they'll be able to transmit video images -- something that copper can't do.

The better news is that all those new buildings and homes served by the new optic cable are being built with more and more copper plumbing, air conditioning, building wire, roofing and, in many cases, copper solar systems, and fire extinguishing systems.

And, while your new car may have an aluminum radiator, it also has substantially more electrical wiring for comfort, convenience, and safety circuits.

These examples illustrate the fastest growing uses of copper and show that our markets are changing.

The new markets are highly competitive with aluminum, plastics, and steel alloys. But copper's fundamental physical properties, its abundance, and its versatility are making it the metal of choice in many new applications.

Magma participates in two copper research and development organizations which are in the forefront of seeking new products and applications.

They are the Copper Development Association (CDA) and the International Copper Research Association (INCRA).

CDA specializes in designing and building prototype systems and promoting their use. Such systems include solar houses, fire sprinkling systems, plumbing systems, electric vehicles and copper hulls for ships.

INCRA is building a science base for copper and providing basic research and development for new copper applications. Among their innovations are a radical new auto radiator, sheathing off-shore structures, copper based agricultural fungicides, fertilizers, and livestock feed, as well as therapeutic uses for human health.

These innovations are not dreams, they are reality. For example, the copper solar collector business has grown from two manufacturers using 400,000 pounds in 1980 to more than 70 using well over 20,000,000 pounds per year today.

And, the market for copper fire sprinkling systems is now 30 million pounds per year. Even the experimental electric vehicle program is using 10 million pounds this year and is a potential market of 196 million pounds per year by the '90's.

Even more startling is INCRA's estimate that a total of 70,000 tons of copper were used for agricultural purposes in 1983.

CDA's slogan is "Copper Makes the Future Work." There is a future for copper and Magma intends to be a part of it.

Superior reduced further

The Superior Division was placed on "caretaker status" March 15, with the layoff of 12 salaried and 7 hourly paid employees.

The Division now has 27 salaried and no hourly paid employees.

The Magma Arizona Railroad Company was not affected and continues to operate with one salaried and three hourly employees.

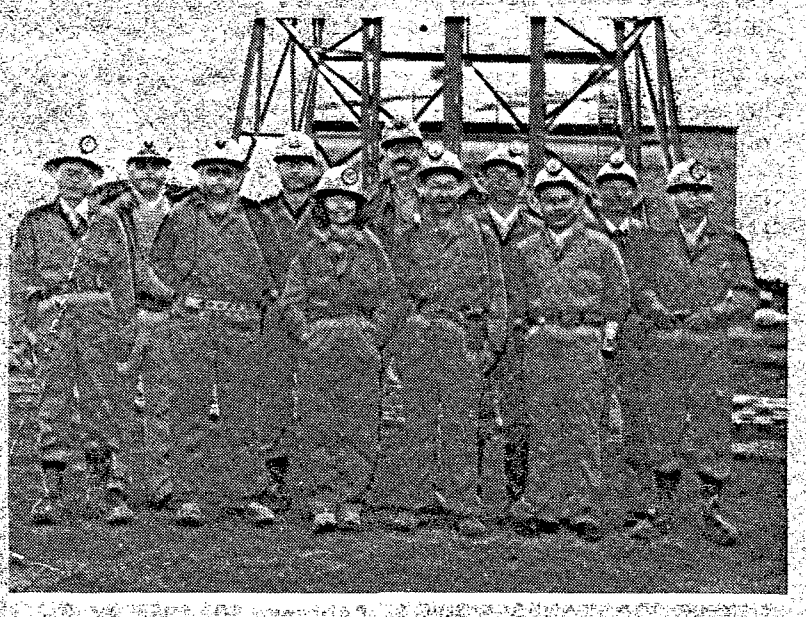
Operations at Superior are now reduced to the lowest possible level of expenditures necessary to protect the property.

Production at Superior was suspended on August 15, 1982, approximately 1250 employees were laid off, and the Division placed on an indefinite stand-by status in hopes of an improved copper market and the possibility of lowered costs.

Since that time retirements, attrition, and transfers reduced the staff to 53, but, following last week's layoffs, only 31 employees remain.

Magma Copper Company was organized at Superior in 1910 with the purchase of the Silver Queen Mine by William Boyce Thompson, who later also organized Newmont Mining Corporation.

The mine was renamed the Magma Mine and has operated continuously since that time.



Chinese visit

CHINESE MINING ENGINEERS from Hebei Metallurgical Corp., Beijing, visited the mine last month. Group included, from left, Yang Huan Wen, Nick Carter (Magma security), Mike Canty (M.M. Sundt Corp.), Chen Lin Sheng, Mary Kuo (Tucson Interpreter), Dee Durazo (asst. mine supt.), Zou Xiang Rong, Ji Qui, Wang Zong Yu, and Tang Heng.

Photo by Richard Cole

Oxide project —

Magma Update - p.3

Continued from page 1

Approximately 150 employees will be required to operate the new mine and plant but final manpower requirements have yet to be determined.

The organization or name of the new subsidiary has not yet been finalized.

Bechtel Engineering Co. is designing the plant and the Newmont Services engineering group will act as construction supervisor.

The end product from the electrowinning plant will be a 90-pound cathode of superior purity and quality which will be used to produce Magma's continuous cast copper rod.

More than 20,000 tons per year of the electrowon copper will be produced beginning in mid-1986 at a production cost estimated to be nearly one-half as much as our smelted and refined copper.

The copper is removed by leaching the core, which has been placed in a large dump, with a weak sulfuric acid and water solution.

As the solution percolates through the material it absorbs copper, is collected at the bottom, and pumped to the solvent extraction plant.

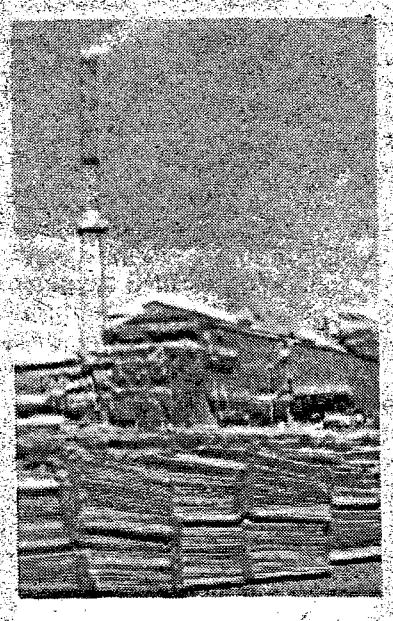
Here the copper is absorbed into a kerosene based solvent and then mixed with a stronger sulfuric acid electrolyte solution which removes the copper from the solvent and absorbs it, enriching the electrolyte.

Next, the electrolyte is pumped to the electrowinning tank house, which is similar to the Magma refinery, and acts as the copper bearing medium from which copper is electroplated onto thin stainless steel electrodes.

In the refinery, the copper from anodes is dissolved into the electrolyte and plated onto cathodes; but, in the electrowinning plant the anode is lead and the copper is all in the electrolyte.

Pinto Valley Copper Company produces 12,000 tons per year of electrowon cathode from a similar operation near Miami.

The San Manuel open pit oxide copper ore reserve contains an estimated 56.5 million tons at a grade of .46% soluble copper which will provide 11.6 years of mining at the planned rate.



FULL PLATE electrolytic cathodes, have been produced at the San Manuel refinery since 1972. Similar cathodes will be produced by mid-1986 at the new oxide project's electrowinning plant. Cathode is the basic form of copper bought and sold in international markets. When you talk about the price of copper, this is what you are talking about. We melt most of ours and convert them into continuous cast rod for sale. Electrowinning does not require the smelting and refining processes.

Photo by Grant Kempton

see back cover, p.12 →

Dear Editor:

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Dear Rayner:

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and some 300 job categories. Eventually we will be able to cover it all.

As for the wood, most of it originates as temporary supports in the mine undercuts which are blasted away to start the ore moving through the gravity flow system.

A new procedure using steel rock bolts and wire mesh support at the mine, could eliminate many of the plant's problems with wood in the ore.

Any scraps of steel bolts and wire in ore can automatically be removed by the electro-magnets installed over the conveyor belts.

The Editor

Dear Editor:

I just finished reading the February issue of Magma Update and I must say it was most informative. It also brought forth many questions which I hope you can clarify for me.

1. You broke down the wage increases for salaried and hourly employees. Could you break down salary increases of salaried employees with a break between general foreman and section foreman? I believe the results would be significant and might provide a partial explanation for poor morale among lower echelon supervision.

2. Mr. Bob Zerga moved to Chicago to take over the new wire plant. Why was it necessary to replace him with two men, Harry Smith and Tim Acton? The money what is to prevent foreign producers from simply lowering their prices by 5 to 10 cents per pound and placing us right back where we started?

I have shown these questions to many of my fellow employees and they have assured me that neither they nor their answers will ever see print. I hope you can prove them wrong.

John C. Otto
Mine electrical department

tendents to cover planning, operations and maintenance. When two of the three left, Zerga was the only mine superintendent. Assistant mine superintendents were trained to assume the additional duties and responsibilities in all three areas.

Upon Bob Zerga's promotion to manager of planning and development for all of Magma (Lee Browne manages the MCR Chicago plant), Tim Acton management, planning, research and development (to name a few).

Compliance with governmental regulations has also affected a need for increased technical personnel. Today's eleven-man environmental division did not exist in 1975.

Upper level management falls into both categories, depending whether their duties are more supervisory or technical in nature.

Although a reduction in the number of employees in the upper management level would not greatly affect these ratios, the size of that group directly corresponds to today's production level and anticipated extent of operations for tomorrow.

In all probability, a decision to reduce the size of the upper management staff would mean corresponding reductions in production levels and the overall work force.

4. The answer to this question must be deferred for now because there has not been much local consideration of the possibility of an employee stock purchase plan at reduced brokers fee. Quite frankly, we don't have the answer.

However, the feasibility of consideration and implementation of such a plan will be investigated and reported at a later date.

5. In August of 1981 the warehouse carried $240,000 in hand tools in stock. Commonly used tools were normally readily available. Currently there is $58,000 in these items on hand. Those which are out-of-stock are ordered as requested on an expedite basis. Rarely used items have been discontinued while the present stock is being depleted.

For sometime the cost of carrying excess inventory has been prohibitive, with a redirection of cash to needs of greater urgency.

6. Foreign producers cannot meet present world demand for copper. If they could, American producers would have been out of business a long time ago. So how does a labor intensive operation such as ours compete with CODELCO (Chile), where workers' daily earnings equal our hourly wages?

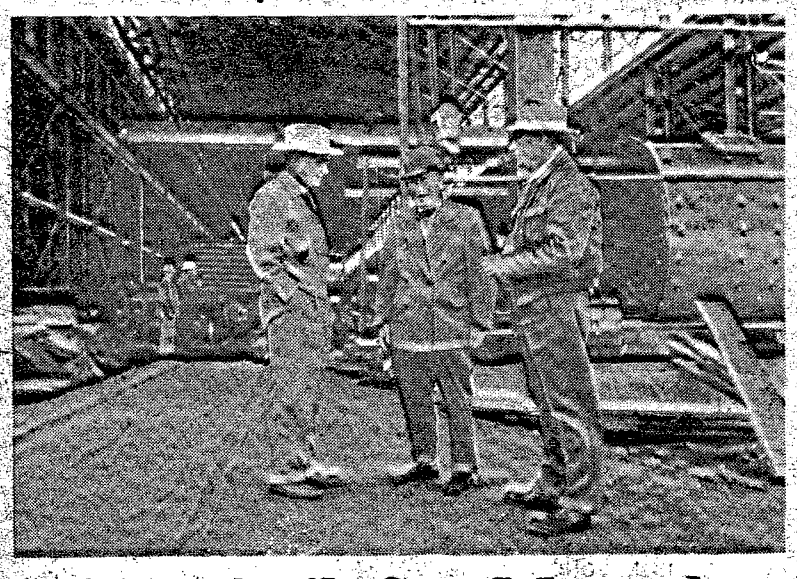
The price of copper is determined by the marginal producers' costs, with a lowering effect due to world oversupply. The short supply of cheap copper forces buyers to purchase more expensive copper with the price stabilizing between the cheapest and most expensive product available.

Presently our production costs are among the highest in the world, with all sales at a loss. The only hope for the future is downward movement on the cost scale relative to the marginal producers.

Because more than 50% of our present costs are labor-related, wage and benefit concessions alone will not place us in a competive posture. However, those coupled with cheaper techniques of producing copper, such as the oxide project represents, give hope of profit — in the distant future.

The Editor

From our scrapbook . . .



They built San Manuel

RARE VISIT to the San Manuel construction project was made February 10, 1955 by A.J. McNab, center, chairman of the board from New York, seen here with Wes Goss, right, then president of Magma, and Frank Buchella, left, vice president and general manager of the San Manuel Copper Corporation, a subsidiary formed to build the $90 million project. They are inspecting the unfinished concentrator which went into operation the following September processing development ore. McNab was a staunch advocate of Magma and pursued the San Manuel project with determination through a maze of obstacles. We won't comment on the headgear except to speculate that Wes still has that hat.

Jordan to join Magma

Tom Jordan, former general superintendent of Copper Range Co.'s White Pine, Michigan Division will join Magma April 1 as development engineer for special metallurgical projects.

Tom was superintendent of refining and casting and general superintendent at White Pine from 1981 until that plant closed in 1983.

Prior to that he held assigments with ASARCO Inc.'s Amarillo copper refinery, Tacoma smelter, and Hayden plant.

Tom is a metallurgical engineering graduate from Drexel University, Philadelphia and has held consulting assignments since 1983.

We learn automation

By TED JOHNSON

In an effort to keep up with the ever changing advances in technology, engineering and technical services makes every effort to provide training to the employees involved.

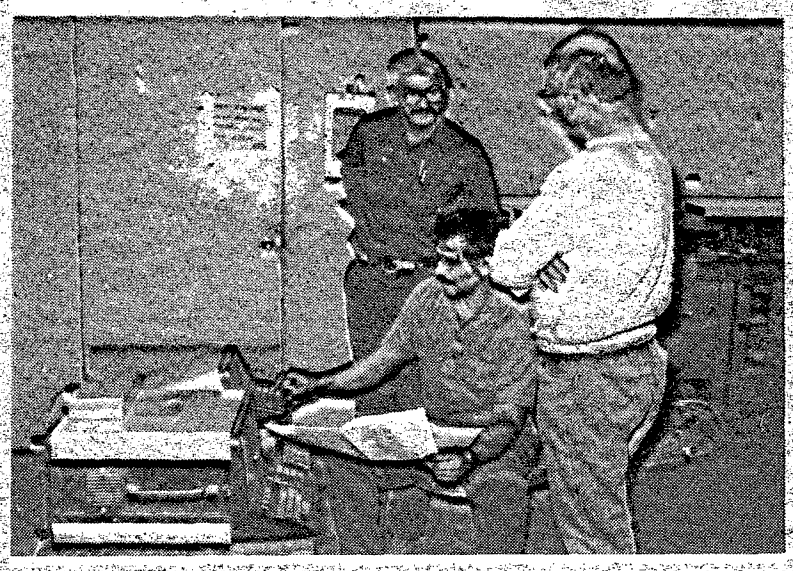
A recent example of this is the "programmable controller" training program that is being made available to all plant electrician and instrumentation journeymen.

The program consists of eight video tapes and workbooks provided by a leading manufacturer of PC's and covers topics from basic theory to troubleshooting.

Along with the video, a "hands-on" exercise is also integrated into the training, which allows students to practice various tasks discussed in the video tapes.

The overall goal of the training is two-fold.

First, to give each employee a thorough understanding of the new equipment and second, to keep employees alert as to other possible applications of programmable controllers.



LEARNING TO USE VIDEO for program controller training are, from left, BILL INMAN, ED SANCHEZ, and DARYL JONES.
Photo by Gilbert Rodriguez

SAFETY POSTER CONTEST — ENTER NOW!

Magma is sponsoring a safety poster contest. Posters should consist of subject having to do with safety (at home or at work), accident prevention, or any other subject having to do with general safety matters. There will be three classes of entrants: Adult (18 years old and over), Young Adults (13 to 17 years old), and Young Persons (12 or younger).

The posters must be 17" x 22½" if submitted by a young adult or adult. The posters submitted by a young person must be 12" x 18".

Prizes will be:

	Good (3rd Prize)	Better (2nd Prize)	Best (1st Prize)
Adults			
Adults (age 18 and over)	**$25**	**$50**	**$100**
Young Adults (age 12 to 18)	**$15**	**$30**	**$50**
Young People (under 12)	**$10**	**$15**	**$25**

Entries will be judged on:

1. Originality 2. Workmanship 3. Appropriateness

Posters must be turned in by April 29, 1985 in order to be considered. All entries will be judged by high qualified and suitable judges.

Posters should be submitted to:
Students — School
Adults — Turn in to Administration Safety Department Office or to Main Gate Guard at Plant or Mine.

All entries will become the property of Magma Copper Company.

Safety Poster Contest - Enter Now!

Tina leads aerobics

By GILBERT RODRIGUEZ

Hollywood has Jane Fonda and San Manuel has Tina Vindiola.

What do these two people have in common? They are both Aerobics instructors.

The smelter office has bragging rights for an athlete working right in their midst.

About 2½ years ago a friend invited Tina to the San Manuel High School pit for exercises.

Being a few pounds overweight (according to Tina) she went willingly.

Low and behold she became interested in aerobics.

Tina was so enthused she attended a seminar at the Desert Southwest Fitness Center, there she learned such things as proper aerobics, breathing, warm up, cool down, preventative injury; in short, just how to do everything in aerobics properly.

Tina came back and started an aerobics class which at the present time meets in the San Manuel High School gym.

Her class meets Mondays thru Fridays from 5:30 pm to 6:30 pm with about 30 participants.

Tina says her goal is to have all her students become motivated to get their bodies to work better and in return they will acquire stamina and will be more energetic.

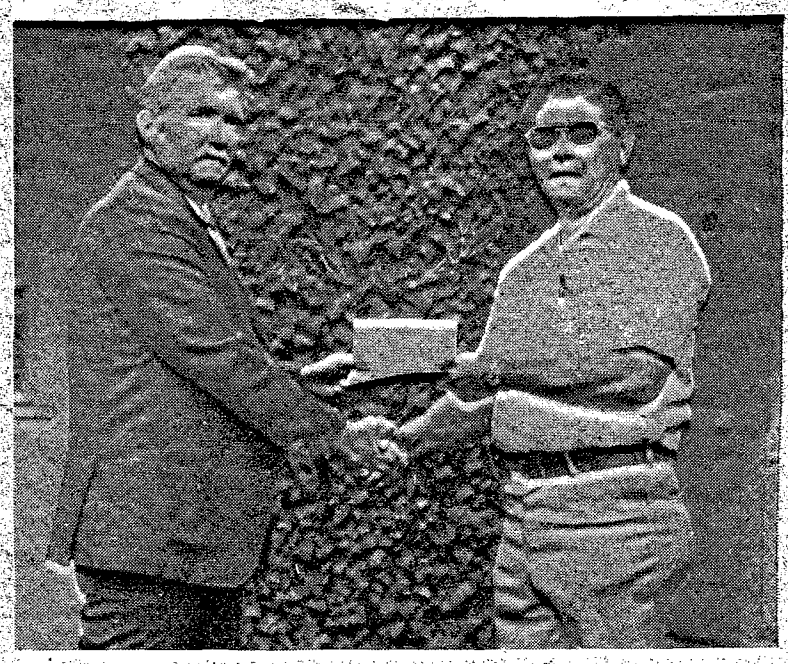
Tina told this reporter that when her student's get into shape they will feel better about who they are and what they are.

They will be able to handle more stress and prevent illness.

When asked how long she would be doing this kind of activity Tina said, "I'll be doing it forever."

TINA VINDIOLA
Photo by Gilbert Rodriguez

Check your medical bill - - you could split the pot!



REFUND from Medical Insurance error was shared with RICHARD BRACAMONTE, mine electrician, right, and presented by personnel manager BOB BURWELL.
Photo by Richard Cole

By VERONICA CELAYA
Personnel Administrator

Although Richard Bracamonte, mine electrician journeyman is pictured, it was his wife, Sylvia, who spotted the hospital billing error which netted the $52.40 reward from Newmont.

Sylvia, secretary at the San Manuel Avenue B School and a mother of two, had never paid much attention to previous hospital bills sent to Newmont for payment.

But when Newmont sent the notice explaining the 50% pay-back for correction of billing errors of $100 or more, Sylvia decided to take a close look at the charges. She noticed a two hundred dollar room charge.

She recalled a St. Joseph's attendant telling her that, because her daughter occupied a room for only six hours, the room charge would be discounted.

Sylvia called St. Joes' to ask if the charge was correct; it was not. The room charge should have been $95.20. A corrected bill was sent the next day, minus the $104.80 overcharge. The Bracamontes' share for correcting the error - $52.40.

Although Newmont has offered these rewards since October, the payment to the Bracamontes is the first. Not all hospital bills contain errors, but chances are there could have been other rewards - unclaimed and uncashed.

But diligence paid off for Sylvia:

"I had never realized what you could find! It was great to get something back. It really does pay to pay a little more attention."

"All I did was make one phone call. The hospital was very nice about it. Absolutely no hassle."

If you file a claim on hospital charges of $1,000 plus, Newmont will return the bill to you with the invitation to find and correct any errors. For corrections amounting to $100 or more, 50% of the reduction will be awarded to you. Simply ask the hospital for a corrected billing and resubmit it to the Newmont Claims office. The results can prove rewarding!

The maximum payment is $500 (you have to find errors totalling $1,000.00). No matter what the suspected errors may total, ask the hospital to check them out. Especially now, reduced costs are what it's all about.

Think of the money spent by the Claims Department as yours - never send in a bill that you think is too high. If you suspect or know that you didn't get the service charged, whether x-rays or a certain number of pills, ask about it. Cost reduction is a reward to all!

Softball winners here

By JACK GORHAM

Chadwick's softball team from San Manuel entered a class "c" softball tournament in Tucson last month and took first place with a record of five wins and one loss.

Richard Chadwick, contract maintenance, who put the team together, coached, managed and played on the team.

Players on the team were Danny First, smelter repair; Eddie Clements, Sr., Tommy Clements, mill laborer; Cruz Hernandez, mine motorman; Chuck Sloan, mine mechanic; Jim Miller, computer systems; Danny Cates; James Pacheco; Kenny Harrison, mine hoisting; Scott Fritts, and Eddie Windham, refinery laborer.

Eddie Clements, Richard Chadwick, Danny First and Cruz Hernandez made the All-Tourney Team.

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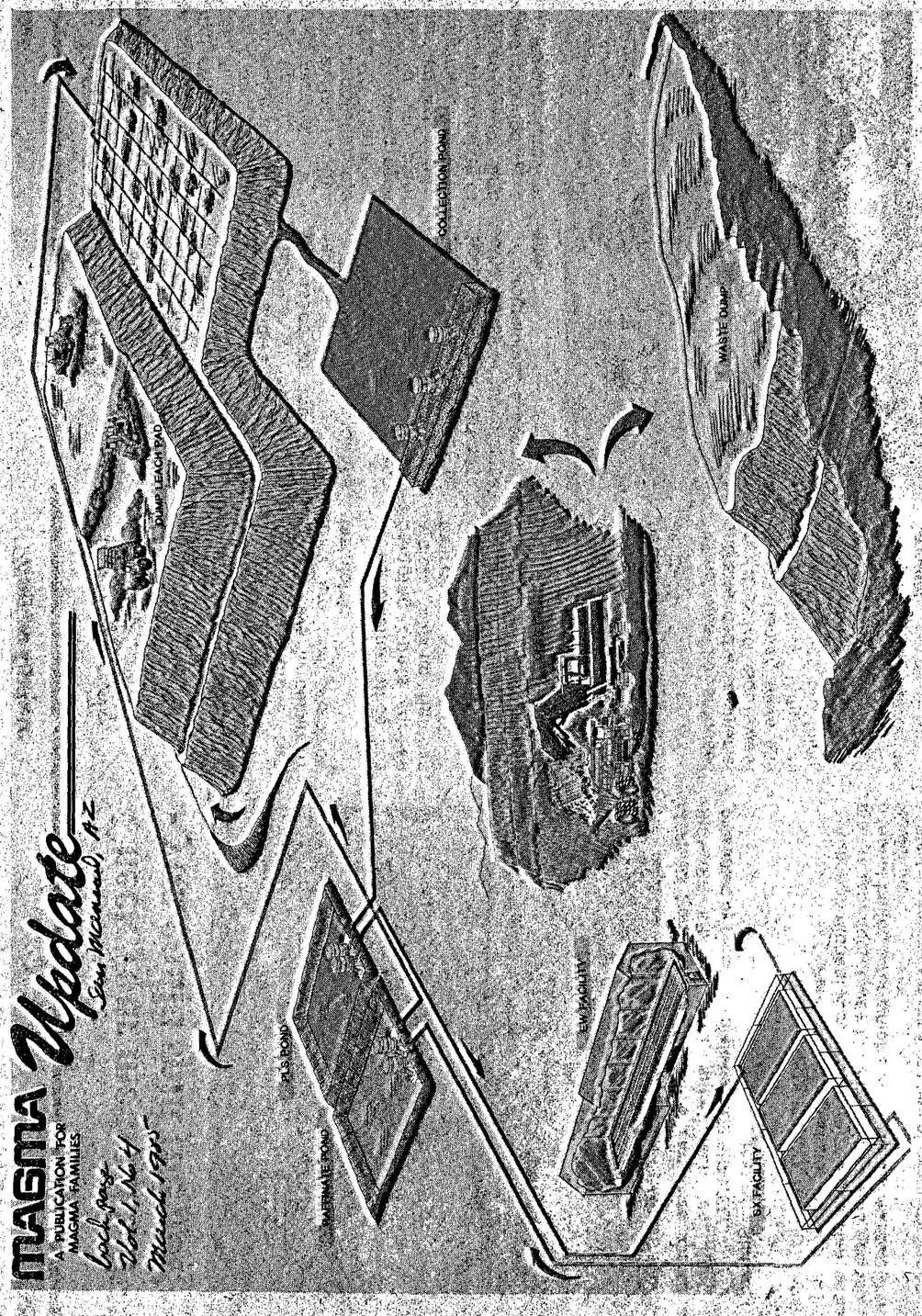
A PUBLICATION FOR MAGMA FAMILIES
San Manuel, AZ
back issue
Vol. 1, No. 4
March 1985



OXIDE PROJECT'S FACILITIES are seen in this artist's concept. From pit, 100-ton trucks will haul waste to dumps and ore to leaching pads. Collection ponds below leach pads will receive acid solution which has picked up copper as it moves through ore material.

Solution goes to pregnant leach solution, PLS, ponds for enrichment, then to solvent extraction, SX, tanks for make-up of copper rich electrolytic solution, in electrowinning, EW, facility, copper is plated out of solution onto stainless steel electrodes, then removed mechanically for shipment to rod plant.

Solutions from SX-EW facilities are contained in and recirculated within the system.

Drawing by Matt Ford

MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES

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MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES

Why we need the oxide project

A special message from Brian Woolfe, executive vice president.

There are two reasons why we need the oxide project. First, because it's there. Stewardship of our resources demands we put to beneficial use our oxide ores which are readily accessible. When San Manuel was started there was no feasible technology for processing this portion of the orebody profitably. Now, we have an inexpensive process which will yield a superior quality of copper metal for our rod plant.

Second, because it's insurance. We can and will make a profit on this project – not enough profit to make-up the loss on sulphide mining and smelting, but the oxide project will certainly improve cash flow.

Furthermore, if the underground mine and smelter are forced to shut down because of economic circumstances, the oxide project can continue to operate because it's not dependent on either.

Nor is it even dependent upon the San Manuel rod plant. MCR's rod plant in Chicago can readily use the output or it can be sold as top quality cathode or converted to rod by an independent rod mill.

No informed person in the copper business now expects any dramatic turnaround in copper prices or increased demand either on the domestic or foreign markets.

We must all face the reality that the San Manuel operation is at great risk of permanent closure unless it can be placed on a profitable basis.

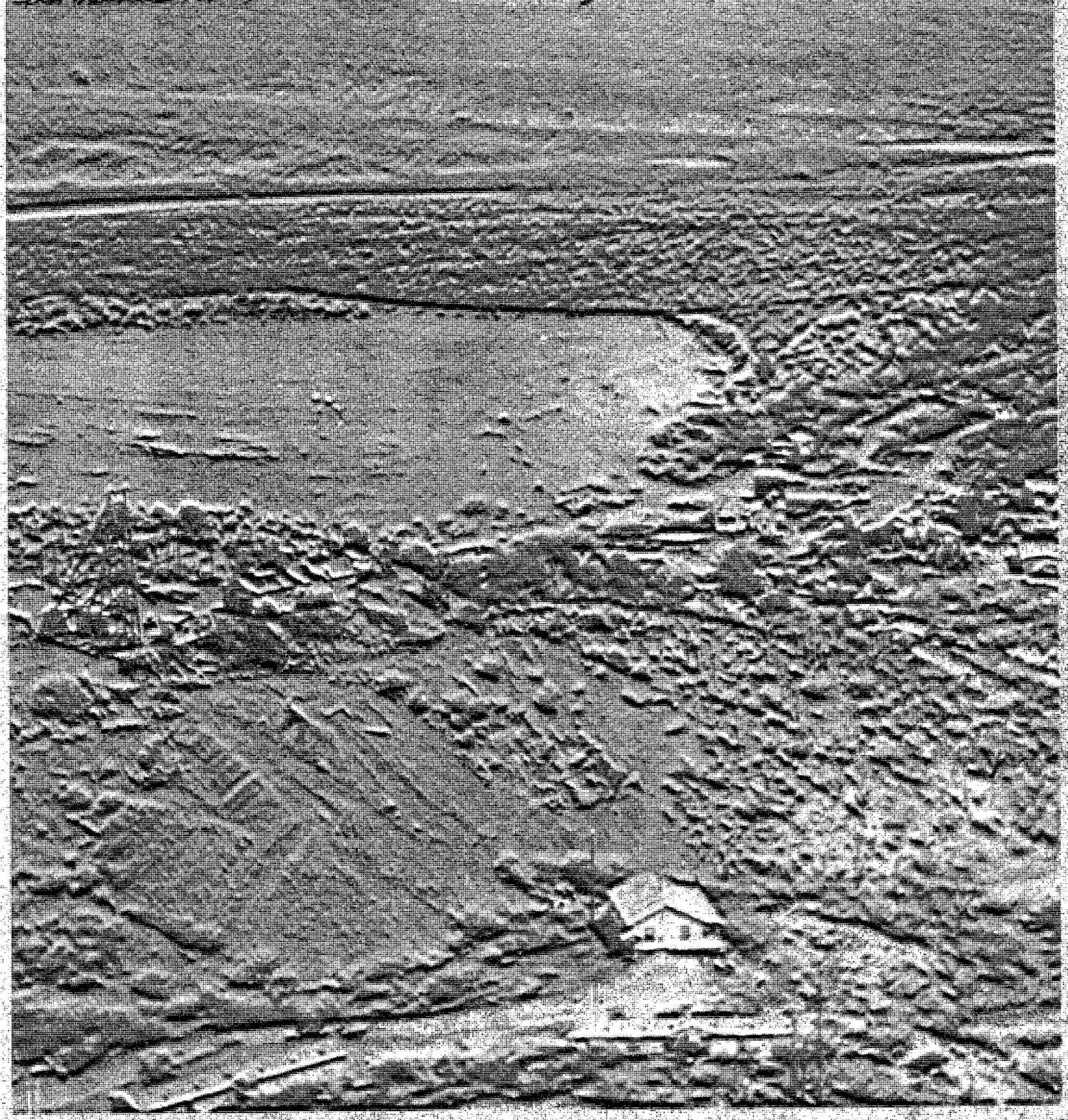
The oxide project is simply an alternative way for Magma to survive if this worst-case scenario comes to pass.

And, if the worst-case scenario can be averted by extraordinary measures, the oxide project will continue to be an important contributor to Magma's future.

MAGMA Update

A PUBLICATION FOR MAGMA FAMILIES

San Manuel, AZ, Vol. 1, No. 3, February 1985 back cover (p. 12)



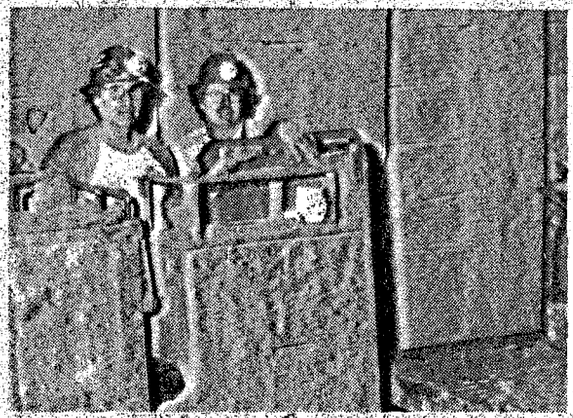
MAMMOTH-ST. ANTHONY MINE headframe, at left, dominated the skyline of Tiger, Arizona until it closed in the early 1950's. Read the history of Tiger, predecessor of San Manuel, on page 3.

At work at Magma

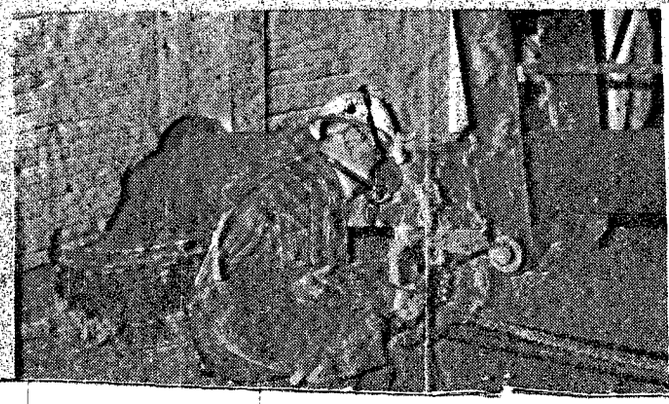
TONY MORENO, smelter laborer.
Photo by Gilbert Rodriguez

CHERYL CROWN, Inventory control
Photo by Grant Kempton

BILL MUNDA, refrigeration mechanic, Superior.
Photo by Mike McGuckin

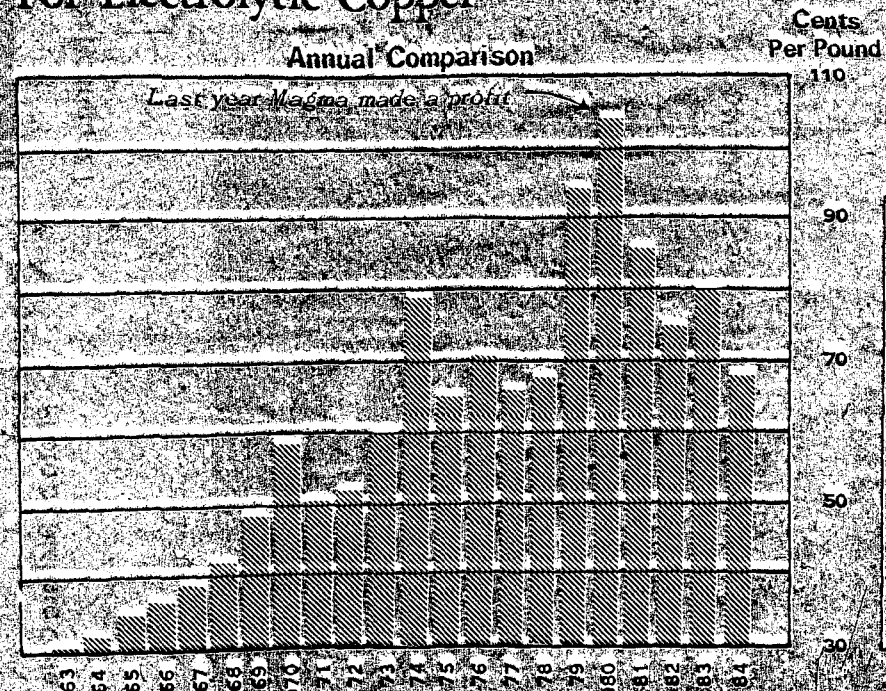


FRED MEDINA, and RON TERRAZAS, motormen.
Photo by Richard Cole



MAGMA A PUBLICATION FOR Update

Annual And Monthly Average U.S. Producer Delivered Prices For Electrolytic Copper



Cents Per Pound

	1981	1982	1983	1984
Jan	88.57	78.63	80.22	68.79
Feb	86.07	78.78	84.02	70.74
Mar	87.38	75.86	82.07	75.31
Apr	88.03	76.27	83.49	77.38
May	85.80	77.79	85.63	72.22
Jun	85.23	71.49	81.83	69.84
Jul	84.41	71.05	82.94	64.40
Aug	87.39	70.99	80.54	64.53
Sep	84.72	71.06	77.58	63.40
Oct	82.31	72.41	72.39	62.03
Nov	81.22	72.97	72.96	65.65
Dec	80.29	74.23	70.35	63.53
Yearly Avg	85.12	74.31	79.54	68.15

Source: *American Bureau of Metal Statistics*

High grading at Tiger

Tiger was site of rich and productive veins

Predecessor to the San Manuel Mine was the long lived and productive group of claims and mines in the area of Mammoth, Red Hill, and Tiger.

Frank Schultz opened a mine there as early as 1881 and designated the area The Old Hat District. As miners began to establish shacks around the mine, he opened a store in 1889. On July 27, 1896 a post office was established for Schultz, Arizona.

The St. Anthony mine, operated by the St. Anthony Mining and Development Company Ltd., had a long and varied history of development and production. The camp actually was developed as three different mines - the Mammoth, Collins, and Mohawk - New Years which were consolidated in 1934 by St. Anthony.

The first claims were located on the Collins vein by Frank Schultz in 1879, and additional claims were located in 1881 and 1882 on the Mammoth vein.

After a few years Schultz sold the Mammoth mine to George Fletcher, who blocked out gold ore and built a 30-stamp amalgamation mill on the San Pedro River a few miles to the east of the mine and, thereby, established the town of Mammoth.

In 1889 the Mammoth property was acquired by the Mammoth Gold Mines, Ltd., an English company.

The mill was enlarged, and gold was profitably extracted from ore mined from the upper levels of the Mammoth vein.

In 1893 the mine caved between the 200 and 400 levels.

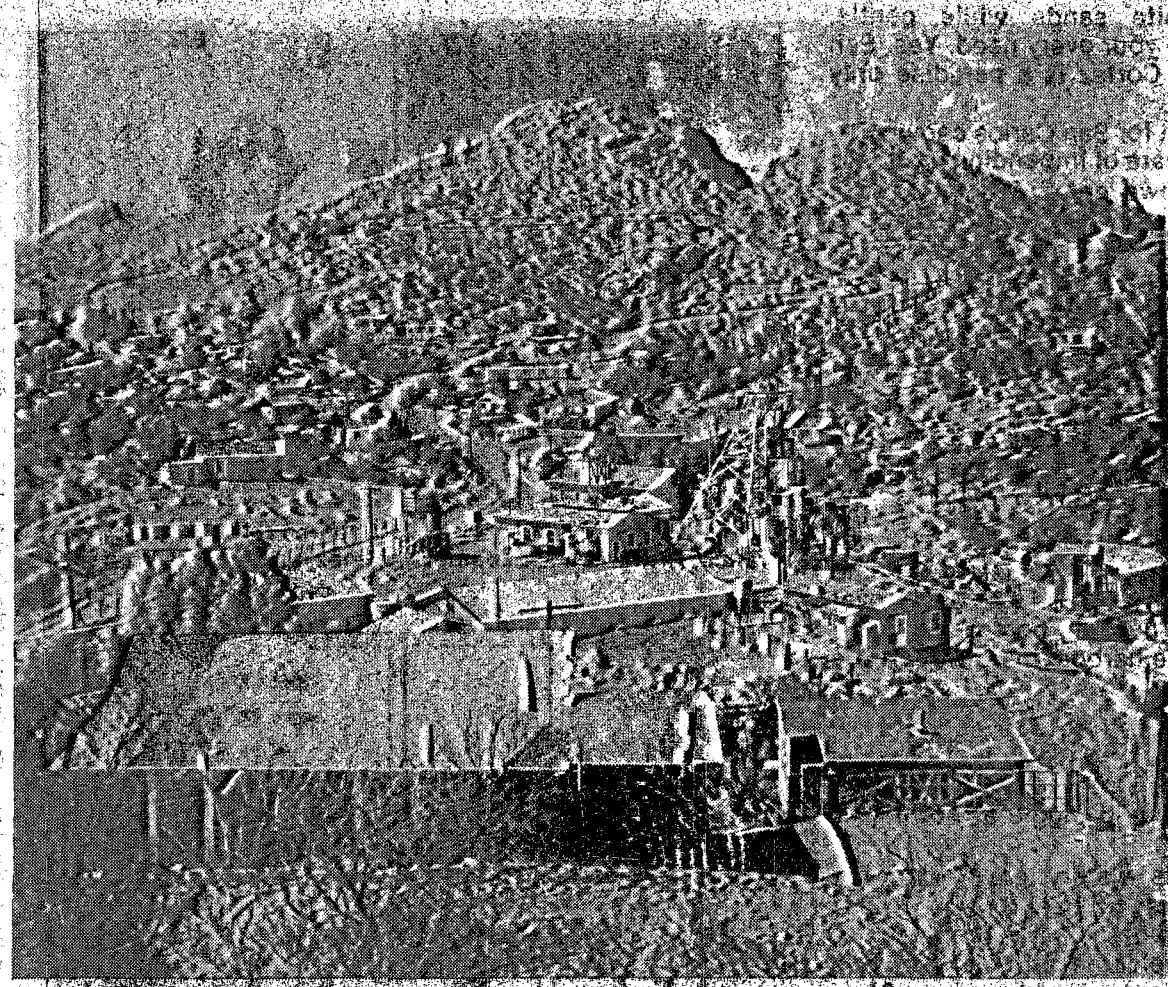
In 1896 the Mammoth Gold Mining Co. acquired the property and constructed a cyanide plant to increase the gold recovery and to rework the tailings, which still contained a good part of the original gold.

Mining continued until 1901, when the Mammoth vein again caved, this time from the 750 level to the surface. Shortly thereafter the mine was closed, and it was not reopened for 12 years.

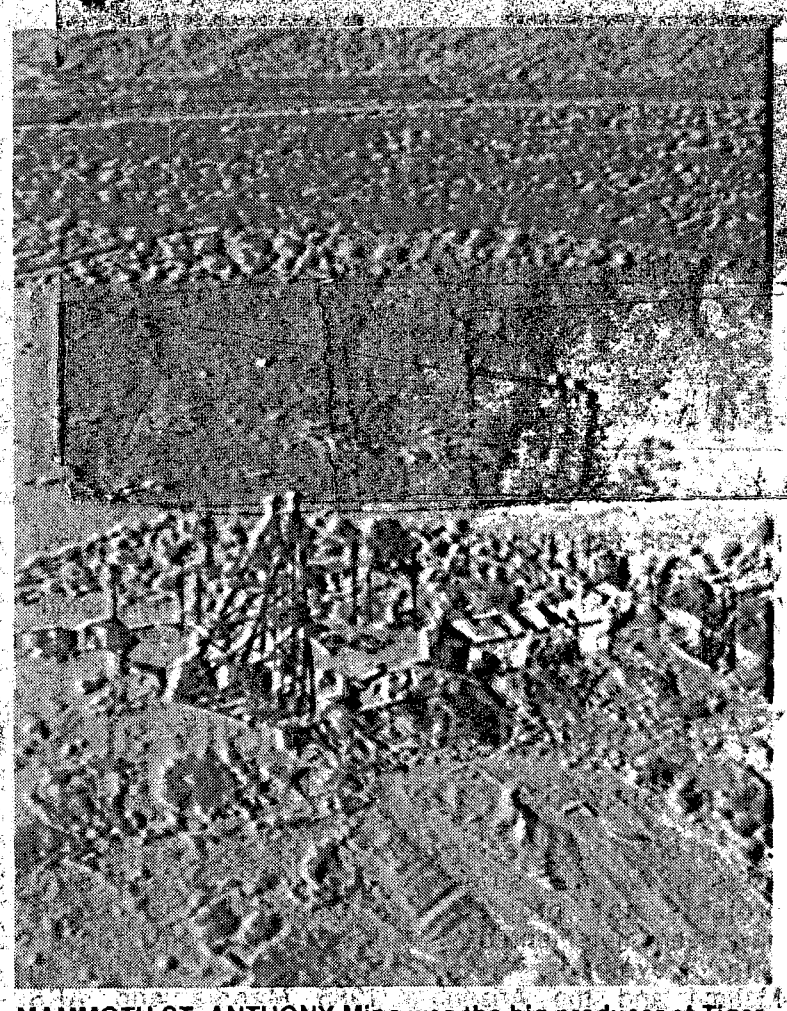
In 1913 the Great Western Copper Co. leased the property but did not operate the mine.

In 1915 the Mammoth Development Co. took over both the Mammoth and Collins mines.

During the early part of World War I, the tailings were successfully treated by the Arizona Rare Metals Mining Co. to extract wulfenite by gravity methods.



TIGER, ARIZONA, in the early 1950's before it was demolished to make room for the San Manuel Mine. Mohawk headframe in the center and adjacent warehouse are all that remains at the site today. Headframe in the upper right corner was the Mammoth-St. Anthony. The Collins Mine was located at the notch in the center hill, marking the cave-in of the workings. Identifiable in the photo are the movie house in center with nearby grocery store and at left center, the school with children lined-up at back door.



MAMMOTH-ST. ANTHONY Mine was the big producer at Tiger between 1881 and 1952.

In 1918 the St. Anthony Mining and Development Co. acquired the property and successfully mined high-grade wulfenite ore in response to the demand for molybdenum induced by World War I.

Following the armistice, the price of molybdenum fell, and mining of the wulfenite ore ceased.

In 1892 Frank Schultz sold the Mohawk Claim, which joins the Mammoth on the south, to the Mohawk Gold Mining Co., which mined and treated gold ore in a 10-ton stamp mill until 1897.

In 1906 the company was refinanced, and the stamp mill was enlarged to 30 tons. New ore bodies were found, and production continued until 1916.

Stimulated by the increase in the price of gold in 1933, the Molybdenum Gold Mining Co., a subsidiary of the Molybdenum Corp. of America, acquired the Mohawk mine and the New Year property, which lay just east of the Mohawk claim.

The company successfully developed ore bodies containing gold, lead, vanadium, and molybdenum.

The post office was re-established as Tiger on March 15, 1939 and operated until November 26, 1954, during which period an estimated 1,800 persons lived in the community.

In 1934 the Mammoth and Collins properties were obtained by Mammoth St. Anthony, Ltd., later known as St. Anthony Mining and Development Co., Ltd.

Production of gold vanadium-molybdenum ore from the oxidized parts of the veins started in 1934.

Production continued until 1943, when the decrease in reserves of these ores and the demand created by World War II for base metals stimulated the development of lead-zinc sulfide ore bodies in the unoxidized parts of the Collins vein below the 650 level; galena and sphalerite were the chief ore minerals.

With increasing depth, the lead-zinc content of the ores decreased, and in 1952 the mine was closed because the company was hard pressed by the depleted reserves and a large influx of water on the lower levels of the Collins vein.

In 1953 Magma Copper Co., owner of the San Manuel Copper Corp. acquired the St. Anthony deposit in exchange for Magma stock.

With the purchase of the claims by Magma and subsequent development of the area for block caving, the town was evacuated by the end of June, 1954 and demolished to make way for the San Manuel mine.

Production from the St. Anthony Deposit's veins totaled 1,889,375 tons of ore between 1881 and 1947 and the following metals were recovered: Gold - 386,701 ounces; silver - 983,918 ounces; copper - 3,456,121 pounds; lead - 74,730,289 pounds; zinc - 48,272,654 pounds; molybdenum - 6,314,812 pounds; and vanadium - 2,540,842 pounds.

Little remains today at Tiger. Only the headframe of the Mohawk and its shaft is kept in repair by Magma. Other buildings and houses have vanished.

The big tailings pile has been mined as a source of flux for our smelter and occasionally, groups of professional rock hounds are permitted to search the dumps for crystal specimens.

Otherwise, the desert is quietly reclaiming Tiger.

How Tiger got its name

Harvey Willeford, San Manuel, retired mine draw boss, SMARRCO conductor, and chief guard remembers how the mining camp of Tiger got that name.

Harvey recalls that in 1938, when he was working at the Mammoth - St. Anthony Mine, the company was making application to reopen the post office and needed a name.

The mine manager, Sam Fields, gave Harvey two names and asked him to survey the workers and find their preference. The names were "St. Anthony" and "Tiger."

The "St. Anthony", of course, came from the mine's name. The "Tiger" referred to an ostentatious tobacco pouch made of tiger skin, carried by a Mr. Brown, the owner from New York, who was a big game hunter.

Harvey admits he preferred Tiger and, sure enough, the vote was unanimous for Tiger.

Vacation delights elude group at beach

By MELINDA NAY

What a beautiful place for a vacation! Warm, azure seas softly break on dazzling white sands while gentle, thoughtful people eagerly serve your every need. Yes, San Carlos, Mexico, on the Sea of Cortez is a paradise only several hours from Tucson.

With much enthusiasm we left for San Carlos caravaning with several other families unaware of impending doom. By the time we reached Nogales, however, our first clues were a dead car battery, another car with failed rear brakes, and the lost tailpipe from our car.

Being intrepid travelers, we continued south while one of our party became carsick, and arrived at San Carlos only to find a wall missing in our motel room, a la "Laverne & Shirley." The motel management very courteously gave us a better room at the same price. But by that time, I had a migraine headache that lasted the entire trip.

Saturday morning we awoke to a flat tire on the boat trailer and another car in our entourage with a dead battery which was jumped at least 12 times throughout the weekend.

Sunday seemed to be better. At least until late afternoon, when the boat ran out of gas and was blown over 1½ miles out to sea. Luckily, a passing boat realized our predicament and towed us to the harbor where we left the boat overnight.

Monday dawned bright and beautiful to reveal our boat resting on the bottom of the harbor under 5 feet of water and the fan motor burned out in our car. By this time, several members of our party would giggle at nothing in particular.

Exhuming the boat from its watery grave, we then shakily started on our perilous way north to Nogales.

After narrowly averting a head-on collision, our arrival at the U.S. border was indeed welcome and we gratefully pulled over for inspection. What more could go wrong?!

Getting out of our car, we turned just in time to watch our friends behind us push their car (second dead battery car) over the border. At that point, our whole group became hysterical and laughed until the tears streamed causing the border guards some uneasy moments. Hastily explaining our abberent behavior, the guards thoughtfully waved us on with only a cursury inspection.

Like an aftershock signalling the end of an earthquake, the car with the bad brakes developed an overheated engine before we left Nogales, but with extra water, we continued and actually arrived home with no more mishaps.

The only redeeming feature of the entire trip was that it only lasted four days. Had we been there any longer, I'm sure we would still be in the local jail locked up for our own protection!

Mine groups achieve outstanding safety records

RICHARD SANTIAGO, draw foreman, right with Andres Franco, Arthur Ortiz, Ezequiel Martinez, and Dennis White.

Photos by Richard Cole

BILL WEAVER

WINNERS getting treats served by Pat Maxwell, center, are Laurence Clark and Jesse Acosta.

PIPE SHOP EMPLOYEES, left to right, seated, are Darryl Watson, Nacho Flores, Rudy Ramirez, Chuck Stamps (Supervisor), Ed Gutierrez, Jose Peralta, Joe Harrington, George Garcia; standing, Edward Felix, John Reed, Danny Quesada, Frank Diaz.

By SANDY GERDON

Several outstanding mine safety performance achievements were announced in January. Mine operating supervisor Bill Weaver was recognized for having supervised 22,258 manhours in 1984 without a single accident. In addition, Richard Santiago, a draw foreman, has supervised for two years without a single accident.

In Maintenance, pipe shop supervisor Chuck Stamps supervised 13,370 manhours in 1984 without an accident, but in addition to this effort, Chuck had finished the previous two years also without an accident.

Top safety achievements in other maintenance areas include mechanical supervisor Rudy Vindiola who supervised 14,489 hours, electrical supervisor Rip Collins supervised 16,487 hours without an accident, and construction supervisor George Hugney who supervised 7,510 hours without an accident.

Mine operating's crew 2 has achieved the distinction of going for almost three months without a single injury and the surface pipe shop has not had an accident since April, 1984.

Two invent device

By HARRY ROSSI

Jerry Kyle, journeman mechanic, designed and helped Norm McDade, journeyman welder, fabricate a "thread chaser" for the M-400 straddle carrier spindle assembly.

The chaser repairs damaged threads on wheel spindles. It is used to dress the threads that previously could not be redressed.

Once stripped of threads, the spindles formerly required complete replacement.

The spindles are expensive ($1,065 each) and time consuming to replace.

Jerry's newly developed thread chaser not only prolongs the life of the costly spindles and reduces down time, but it allows repairs to be made immediately to also eliminate further damage to the spindle and to other related components on the staddle carrier.

HOMEMADE thread chaser which keeps straddle carriers in operation was made by Jerry Kyle, left and Norm McDade.

Photo by Anker Bergh

We conserve electricity at Magma

By HARRY ROSSI

In an effort to cut energy costs at Magma, several projects and programs have been implemented.

In November, 1984, Magma and the Arizona Public Service Company entered into an "Interruptible" power contract.

The new contract has the potential to reduce Magma's purchased power costs substantially.

Under the contract, APS is allowed to curtail electrical services to designated areas at times of peak demands on their (APS) power system.

Power interruptions or curtailments will be implemented by shutting down predetermined electrical loads throughout the San Manuel site.

The power that is interruptible will be billed at substantially lower rates resulting in a cost savings.

In addition, starting in 1985 Magma and APS agreed to a "Time of Day" based energy rate contract.

Under the "Time of Day" rates, there are two energy rates for a 24 hour period.

It consists of an "On" peak energy rate for all the energy consumed between 9:00 a.m. to 10:00 p.m. (13 hours total) and a "Off" peak energy rate for the remaining 11 hours.

The "Off" peak energy rate is less than the "On" peak energy rate.

The time of day rate represents a potential to increase power cost savings by shifting as much of the electrical load as possible from daytime to nighttime.

Energy efficient 175 watt metal halide lamps were installed in the machine shop to significantly increase lighting levels while reducing energy consumption.

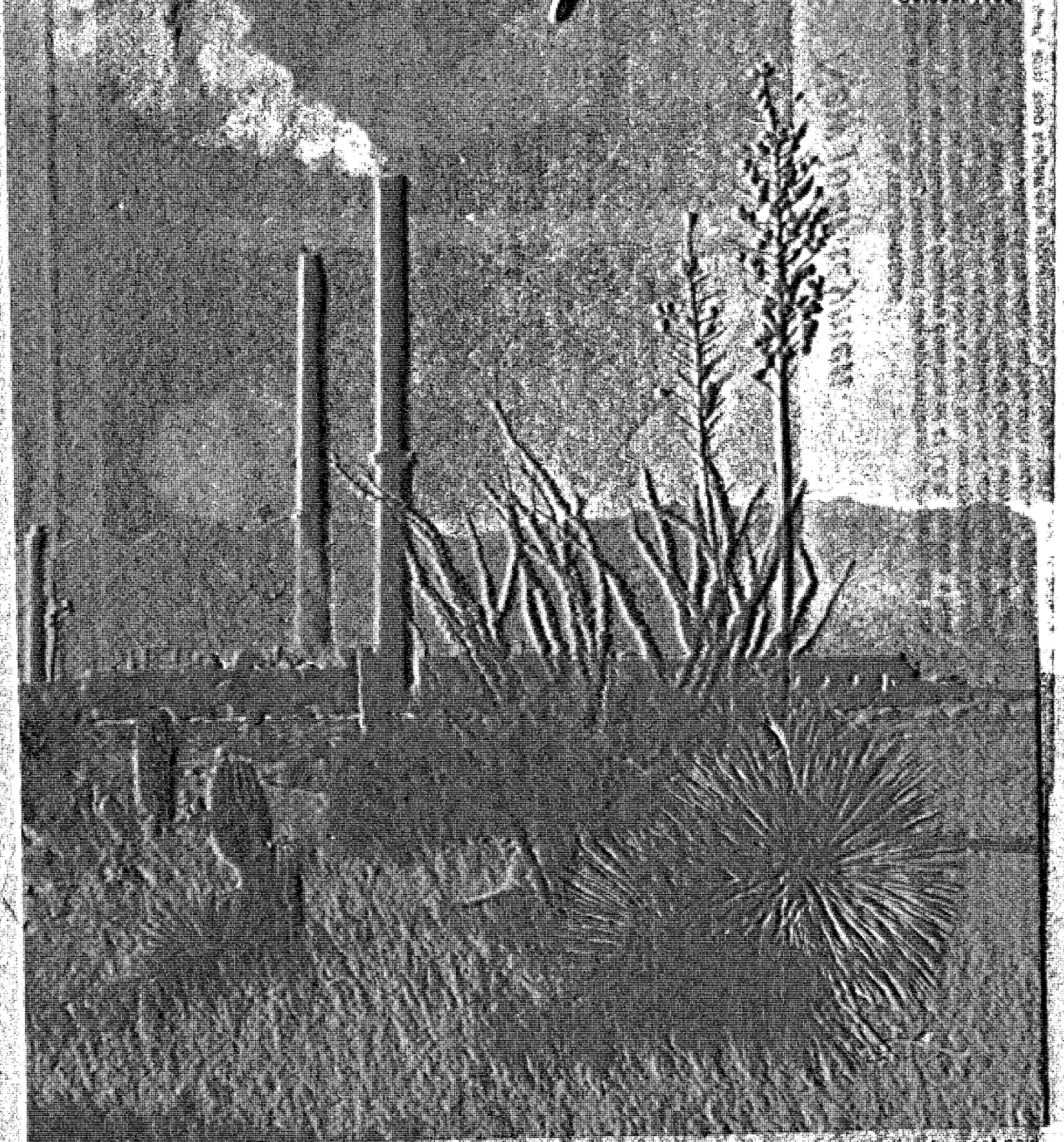
Similarly, energy efficient high pressure sodium lamps are being installed in the tankhouse, anode floor and anode chipping areas.

It is estimated that the new fixtures will save approximately 60% in electrical energy lighting costs and yet deliver significantly higher light output.

MAGMA Update

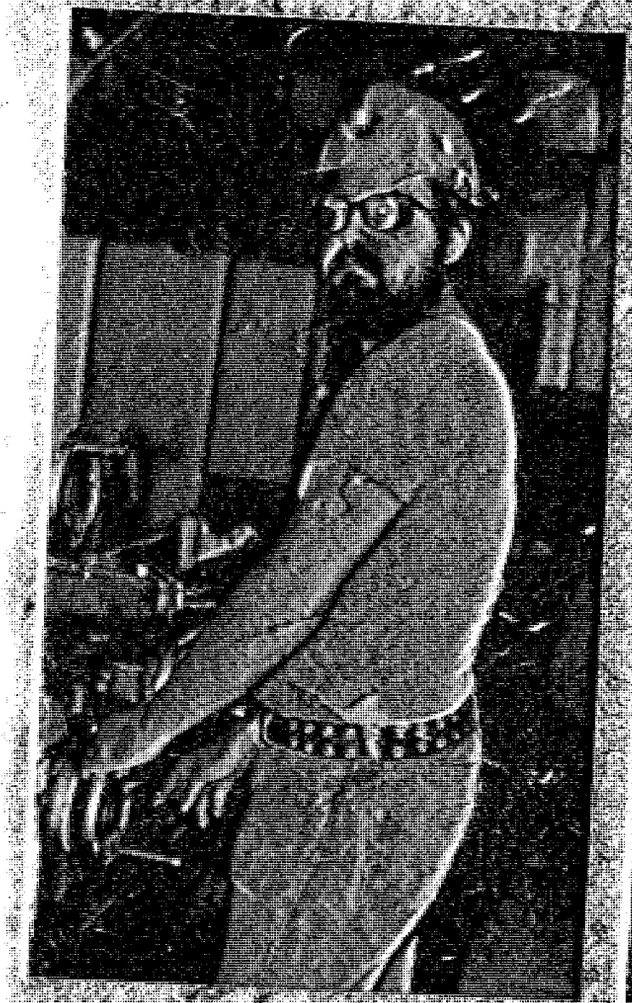
A PUBLICATION FOR MAGMA FAMILIES

October 1985



THE FATE of the San Manuel smelter remains unknown at this time as Magma faces a 1988 deadline to meet new clean air standards. Only lower operating costs at the mine appear to be the way to save the smelter. To understand why, read the lead editorial on page one.

Photo by Grant Kempton



New journeymen

By TED JOHNSON

JACK HANNA AND DAVID GARCIA recently completed their apprenticeship programs and are now journeymen machinists. The apprenticeship program consists of 47 I.C.S. lessons which must be passed with a score of 70% or better and 8,000 hours of on the job experience. David, on the left, started with Magma January 31, 1972 as an underground track laborer and began his apprenticeship February 3, 1981. David is married and lives in Oracle with his wife Anita and their two daughters Tobi and Sabrina. Jack, on the right, started with Magma in 1969 as an underground chute tapper, and also began his apprenticeship February, 1981. Jack is single and lives in Oracle.

Photos by Anker Bergh

Know your benefits

By VERONICA CELAYA, Personnel Administrator

It's OK to be healthy!

Let's divert for an issue from company benefit plans to highlight a subject near and dear to one's hearts and hips: fitness.

Why fitness?

Sometime in the not-too-distant past a real surge in fitness interest occurred amongst employers. "Wellness" programs have been adopted to varying degrees. Investments in formal programs have afforded big returns with markedly improved work attendance and decreased medical bill expenses.

Such investments seem dependent on profits and philosophy, ranging from simple encouragements in a greater awareness in the benefits of fitness to the extreme in extravagance: company pools, gyms, aerobic classes, masseurs, psychologists and acupuncture practitioners.

Silicon Valley companies sunk big bucks into such wellness perks during the height of their mercurial rise in profit-making. Now the slowdown in boomtown has stopped most of that.

It must be obvious to most of us here that more pressing concerns have occupied Magma management and money, considered, to my knowledge, in these survival times.

However, in this age of health awareness the signs of obsession with fitness are everywhere.

More and more "NO SMOKING" signs appear.

The grandfather in the crew has taken up marathoning in his spare time.

Mothers take up weightlifting, visibly removing years from their bodies.

Lots of employees here regularly attend fitness centers. Others bowl or play softball, tennis, basketball, etc.

Every evening in San Manuel you see both individuals and groups out for a daily walk up and down the rolling hills or through the desert paths.

It's a fact: daily exercise and a careful diet can prove a winning combination in improving the quality and length of your life.

For those of you who may wish for a little help in the bat-

Oxide project on schedule and looking good

By STEVE HILDEBRAND

The oxide open pit group can no longer be termed a group, it's now a proper organization.

The operational staff includes Charlie O'Coyne, assistant mine superintendent; Steve Walsh, general foreman; pit foremen George Martin, Bill Harden, Roscoe Gerdon, Frank Tapia, and shift foremen Roland Wilson and Bob Spivey.

Foremen

Bill Harden joins the oxide team from the mill crusher division, previously gaining open pit experience with Cyprus Pima.

Roland Wilson comes to Magma with 23 years of mining experience, the last ten years with Anamax at Twin Buttes.

Charlie O'Coyne and Bob Spivey come from Phelps Dodge at Bisbee, Morenci, and Ajo, bringing to Magma 28 years of mining experience between them.

Engineers

The engineering staff includes Rick Seaney, chief engineer; Fred Gronlund and Gus Valenzuela as planning engineers; Tom Johnson, geological engineer; Dan Fowler, technical aide; Dana Camino, oxide clerk; and Cecil Brandt, engineer and draftsman.

Rick spent eight years at Anamax Twin Buttes, recently joining the oxide team.

Fred Gronlund, previously with Magma Mine at Superior, was chief engineer at Pinto Valley Copper Corporation and was involved in the initial planning at that open pit.

Tom Johnson has ten years in mining, specializing in rock mechanics. He previously was with Geomines of Tucson, a consulting firm.

Dan Fowler came to the open pit team from the mine control center. Dana Camino worked in the mine absentee control center.

Jerry Ramsey is general foreman of the new truck shop.

Jerry comes from Anamax, lives in Tucson with his family, and was raised in Oracle.

The craft foreman in the new shop will be William Oetting, previously a Magma hand, who most recently comes from South America and Cyprus Pima.

New equipment

There has been a steady increase in equipment deliveries.

Granite Construction Company received the earth work contract for the leach dumps and is quickly mobilizing their crews and machines and have cleared land north of the subsidence cave area.

In addition, the oxide open pit has begun to receive its major equipment fleet.

In mid September, Unit Rig started shipping the first M-100 Lectra Haul haulage trucks to the mine.

The trucks are being assembled just south of the 3-shaft area.

At least six delivery trucks are needed for each Lectra Haul truck and one haul truck will be arriving each week.

In the last weeks of September, Empire Equipment Company delivered a Cat D9L Dozer, a 16G Grader, and a 824C Rubber Tired Dozer.

To make these deliveries, a specialized trailer (lowboy) is used with a tractor and trailer using 38 tires.

SX-EW plant

Construction of the processing plant is progressing.

Structural steel for the tankhouse has finally arrived and the tankhouse super-structure is being erected.

The tankhouse is beginning to take shape.

Approximately 4,700 yards of concrete have been poured to date.

More than 15,000 feet of pipe have been laid to date.

Work has started on the 115KV powerline.

Near completion are the fresh water, diesel fuel, and acid storage tanks.

Pumps for the PLS collection pond and raffinate ponds have arrived.

Each raffinate pump is capable of 5,300 gallon per minute flow with 400 feet of head.

An 800 horsepower motor will be required. Quite a pump!

In-situ project

At the in-situ leach project, examination of pump bids for the three underground pump stations is being completed.

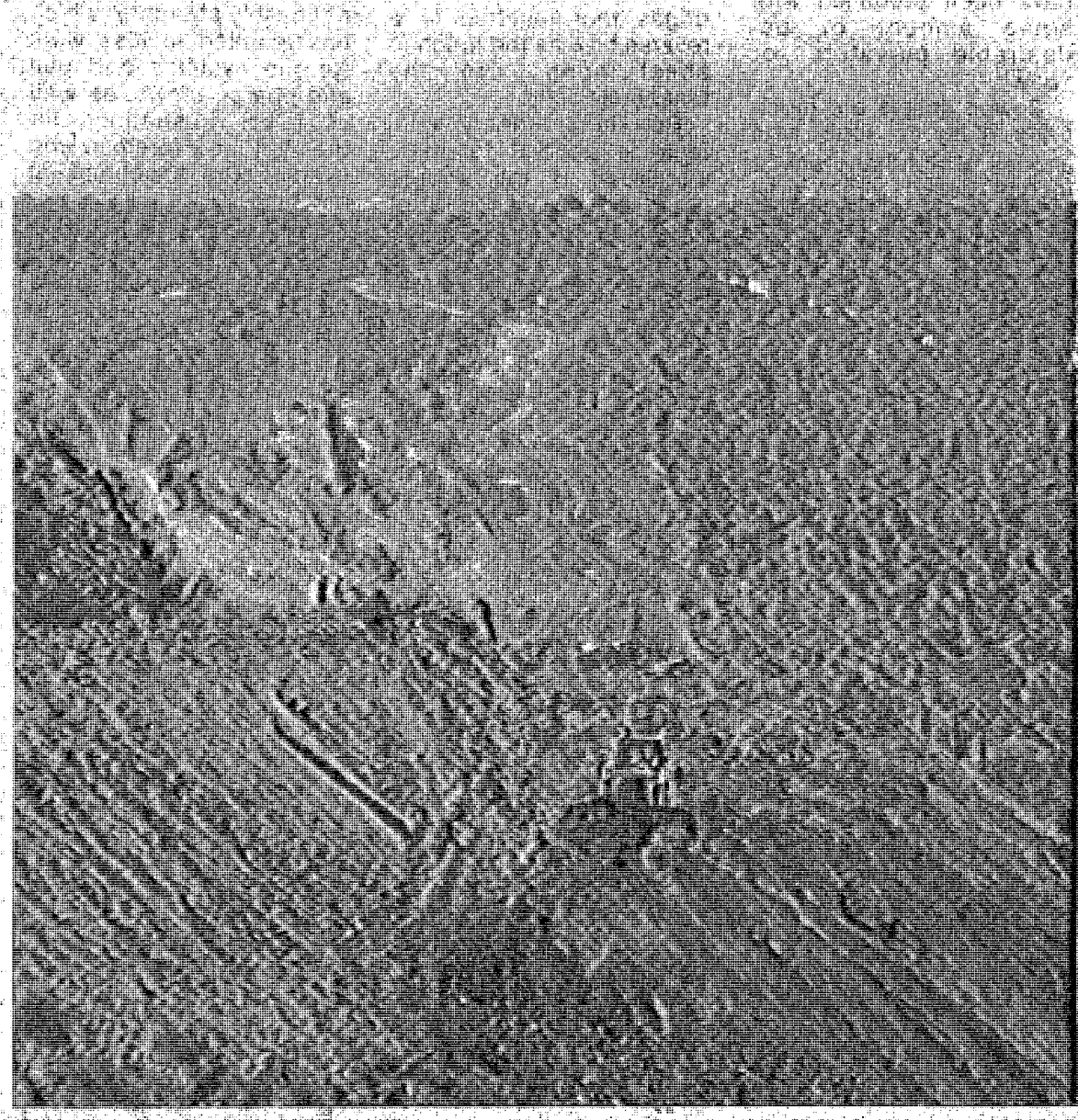
1,500 feet of 6" HDPE pipe has arrived and will be used to transfer PLS solutions collected on 2075 down to 2375 sump/pump station.

A raisebore pilot hole (9 7/8") will be used to accomplish this transfer of solutions. Chris Burt, project engineer, says the pace is picking up and the project is gaining momentum.

As most people know, the oxide project consists of an open pit and an in situ leaching operation.

The oxide project has great economic potential for Magma. This potential could not be realized without proving the technical viability of the oxide project.

For the past several years we have pursued a testing program to prove the economic feasibility of both open pit heap leaching and in situ approaches.



HARRY SMITH and GEORGE MARTIN observing Bill McKay clearing the first bench of the Open Pit with the mine's D9L.

Photo by Steve Hildebrand

OVERALL VIEW of the processing plant. Tankhouse cells are in the foreground and the SX trains further away.

Photo by Mark Vancas

Refinery foreman solves old problem

By RANDY ROBERTS

For the last 13 years, since the tankhouse has been in existence, millions of copper starter sheets have been produced with some amount of undesirable curvature, or "bow".

Bowed sheets are much more likely to touch the anodes, which hang only 2 inches away, and cause short circuits which result in a loss of plating efficiency and extra work for the tankhouse systems operators.

A starter sheet is a thin sheet of copper, weighing 12½ pounds upon which the cathode is plated in the electrolytic refining process.

They are produced by plating onto a cold-rolled copper blank and then are stripped from the blank manually.

A special machine prepares the sheet by trimming, embossing, attaching copper loops, inserting copper suspension bar, and placing the assembly in a bolster.

The starting sheets are placed between anodes in the refining cells to start the electroplating process.

About 4,000 starting sheets are used each day.

In past years the sheets were first embossed with seven ridges before passing through rollers that firmly held the sheet as the side edges were trimmed-off.

Unfortunately, the rollers induced stresses on the ridges that resulted in a reverse bow as the finished sheet hung in the tankhouse cells.

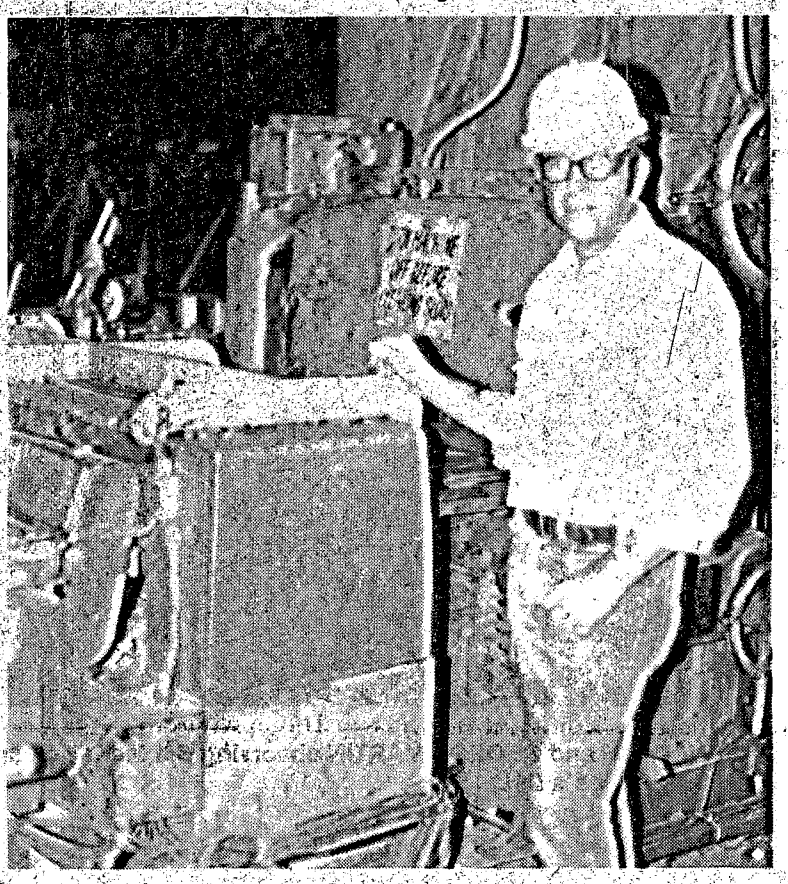
Bob Harre, refinery maintenance general foreman, wondered if the sheets could be embossed after passing through the edge slitter exit rollers.

So, Bob asked a couple of mechanics to re-position the embossing rollers to the exit side of the edge slitter exit rollers as a test of his idea.

It was soon realized that he had hit upon a large part of the reverse bow problem.

Ever since then, the sheets have been noticeably straighter which has resulted in less work for the systems and pull and charge crews, as well as fewer frustrations for the shift crew foreman who oversee the sheet-making machine.

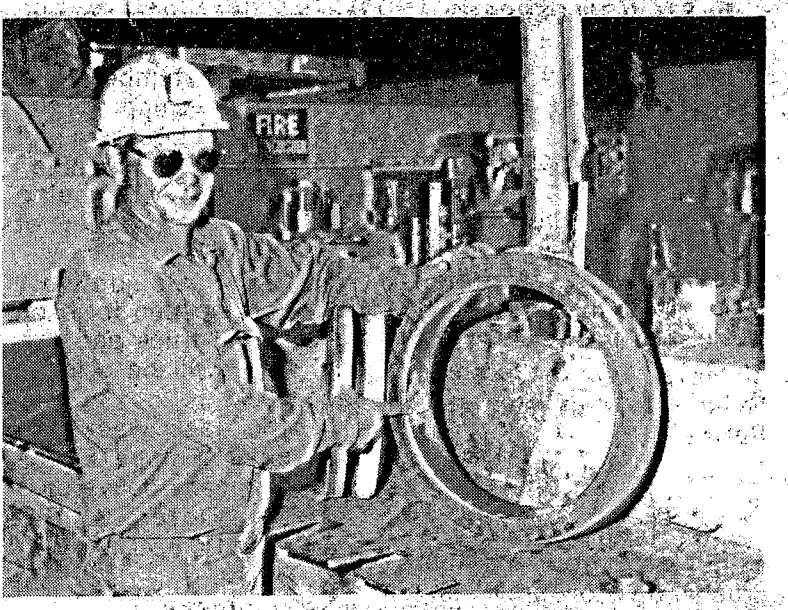
The refinery thanks Bob for helping to make life just a little bit easier for many tankhouse employees and for helping to minimize the number of short circuits which, in turn, helps keep cathode pull weights higher.



BOB HARRE at starter sheet machine.

Photo by Randy Roberts

Don Wright's idea saves big bucks at mine



DON WRIGHT points to small lug which holds ore skip tire in place.

Photo by Richard Cole

By ALAN OSHIKI

Sometimes the best solutions are the simplest.

Donald Wright, a rigger at the mine, recently solved a long-standing and costly problem.

For many years, the wheels that guide the ore skips in the shafts had to be periodically replaced. This was due to wear on the hub and retainer ridges of the wheels.

If the wear was not detected in time, the tire would slip out, hitting the shaft dividers and knocking loose the entire wheel unit.

This resulted in downtime at that particular shaft until the unit was replaced.

Many attempts were made to solve the problem, none of which worked very well.

Even the manufacturer of the units couldn't suggest an effective solution.

Then in December, 1984 Don told his foreman he had an idea.

By welding three small lugs in the center of the wheel, the hub and retainer would hold the tire in place, regardless of wear or breakage of the retainer ridges.

Shortly afterward, Don's idea was implemented - and not a single tire has fallen off since.

His idea didn't cost a penny, either, because all of the material used was already available, including scrap hubs and retainers.

And, it will be years before any have to be purchased.

Just a simple idea - but it ended a $50,000 dollar-a-year problem!

Technical Trivia

Bronzes

By MARLIN ROBINSON
Metallurgical Department

Brasses and bronzes are two of the largest groups of copper based alloys.

Broadly speaking, bronzes are copper alloys in which the major alloying element is not zinc or nickel.

Originally, "bronze" described alloys with tin as the only principal alloying element.

Today, the term is seldom used by itself in a technical sense.

For wrought alloys there are four main families of bronzes: copper-tin phosphorous alloys (phosphor bronzes); copper-tin-lead phosphorous alloys (leaded phosphor bronzes); copper-aluminum alloys (aluminum bronzes); and copper -silicon alloys (silicon bronzes).

The cast alloys have four main families of bronzes: copper-tin alloys (tin bronzes); copper-tin-lead alloys (leaded and high leaded tin bronzes); copper-tin-nickel alloys (nickel-tin-bronzes); and copper-aluminum, alloys (aluminum bronzes).

The family of alloys known as "manganese bronzes" are considered to be brasses because zinc is one of the major alloying elements.

San Manuel was Persian ambassador

Who was San Manuel? We asked this question in a recent *Magma Update* and it wasn't long before an answer came from Erik Christensen, auditor at Newmont Services in Tucson.

Erik went to the University of Arizona Library and found three sources: "The Dictionary of Catholic Biograpy," by John Delaney; "Lives of the Saints" by S. Baring-Gould; and "Enciclopydia Universal, Espana."

All three tell of the martyrdom of three brothers, Manuel, Sabiel, and Ismael in 362 A.D. on June 17.

The account in the Spanish encyclopedia says of San Manuel:

"Born in Persia of a Christian mother who gave him a religious education just like his two brothers, Sabiel and Ismael. Educated by Eunoico, a man well versed in the faith, they were sent by Alamundaro, King of Persia, to the emperor Julian, the Apostate, to finish the truce that was established by the two princes. Julian took them with him to Chalcedon and Bithynia with much honor.

"But the three brothers declined to attend the sacrifices ordered by the prince, they were first jailed, then tortured in distinctive methods, and finally decapitated the 17th of June, 362."

The encyclopedia also says:

"Another San Manuel is remembered on January 22. He was made prisoner by the Bulgarians when they conquered Adrianopolis, of which he was Metropolitan. He was killed in a general execution of prisoners in 818 A.D."

The "Lives of Saints" mentions only the three brothers but is skeptical that Julian, the Caesar, the Emperor, would have executed the Persian ambassadors.

Julian was a nephew of the Great Constantine and became Roman Emperor and Caesar in 361. He was not a Christian and set about neutralizing the efforts of his uncle to give the Roman Church status, power and privileges.

Julian revoked the privileges and ridiculed the church even though he never went so far as to persecute the believers.

Constantinople was the capital of both Rome and the Church. The neighboring Persian empire was being consolidated under the Sassanide dynasty in an attempt to reunite the ancient kingdom of Cyrus the Great.

They presented a formidable enemy and the Persian light cavalry was far superior to the Roman infantry.

In any case, war did break out and Julian was killed by an arrow in a retreat from a battle near the Tigris River in 363 A.D.

One historical story of interest to miners is the account of Julian's attempt to rebuild the Temple of Jerusalem at a different location (Mt. Moriah) for the purpose of restoring Jewish worship and disproving a prophesy of Christ.

The work was abandoned, however, when balls of fire burst out of the foundations driving away the workmen.

It was believed the occurrence was miraculous but we now know it was methane gas from ancient tunnels and cisterns beneath the site which was ignited by the workers' torches.

The name of San Manuel was given to mining claims around Red Hill which were filed at the Pinal County Court House in 1925 by Anselmo Laguna.

Laguna's benefactor was James Douglas, a saloon keeper in Superior. Douglas grubstaked the old prospector and inherited the San Manuel claims.

Magma acquired the claims from Douglas and his partners in 1944 and the name San Manuel continued to be applied to the property, the development project, and the community.

There are two other interesting aspects to this story. Firstly, it was later learned that Magma Copper Company's founder William Boyce Thompson, had actually prospected and drilled the Red Hill area in 1917 but had given it up.

Secondly, the San Manuel claims were a leached outcrop of pyrite mineralization, their only appearance within miles and miles of Gila conglomerate.

Sticking up through the conglomerate were two desk sized outcrops of oxidized copper which assayed about 1 percent.

You guessed it - it was the oxide orebody which was the once and future treasure of San Manuel!

MAGMA
A PUBLICATION FOR MAGMA FAMILIES
Update
VOLUME 1 NUMBER 11 San Manuel, Arizona October 1985

Our smelter problem

Magma's past success and profitability was always due, in part, to the fact that we had our own smelter at San Manuel.

Having our own smelter lowered overall production costs by reducing the higher smelting charges which would have been made by another company to smelt our concentrates and transporting them to a smelter located away from San Manuel. The smelter gave us a sufficient cost advantage to conduct a large scale underground mining operation which could be competitive with the open pits. Generally, underground mining is more expensive than open pit mining.

The favorable economics of such a "captive smelter" have not changed. To offset the higher costs of a low grade underground copper mine requires a low cost smelter. Now, more than ever, the existence of the underground mine depends on a smelter and, at the same time, the existence of a smelter depends on a profitable mine.

The addition of Pinto Valley concentrates has helped us by increasing our smelter throughput and has helped Pinto Valley by lowering smelting costs.

Adding to our basic problem of lowering production costs to meet competition is the need to modify our smelter to meet the requirements of the Clean Air Act. By January 1, 1988, the smelter has to be modified to meet these requirements. These requirements will cost about $130 million. If we don't make the modifications, the smelter's capacity would have to be drastically reduced which would increase costs, both at Magma and Pinto Valley.

Deadline is January 1, 1988

As the January 1, 1988, deadline for Clean Air Act compliance is approaching, we must continue to take certain steps even though we are not prepared to make a final decision at this time. We can't wait until the last minute. One of these steps was taken by the Magma Board of Directors at its September meeting. The Board approved a continuation of engineering studies. These studies are to develop possible means and to further define costs of modifications necessary to meet the requirements of the Clean Air Act.

No decision has been made

No decision to modify the smelter has been made. No decision will be made until we are certain that we will achieve profitability at the mine which would enable us to operate a new smelter efficiently. We are not currently certain that the profitability is possible.

At this time we are not certain that we can permanently lower our production costs sufficiently to justify the investment of $130 million in smelter modifications. The efforts of all of us in the past several months to reduce costs have helped but further permanent cost reductions are required.

Mining cost still too high

One thing is certain. The mine cannot be profitable under its present labor cost structure. We do not now have nor do we foresee a price of copper which would permit us to continue to allocate more than 50% of our costs to payroll and benefits.

The continuing engineering studies will focus on preliminary design and engineering of a flash smelter. We consider a flash smelter to be the best technology currently available because it meets air quality standards and is more economical to operate as it requires less fuel, has a higher recovery of copper and is less labor intensive.

But don't be misled into believing that approval of this preliminary engineering project signals the achievement of a turn-around by Magma to profitability or a guarantee of continued operations.

We must meet clean air rules

It means only that if we are to smelt, we must meet Clean Air Act regulations and if we are operating at all in 1988, we need to be prepared to operate a new smelter at efficient full production.

The decision to invest in the smelter will only be made if we can assure ourselves of a steady long-term flow of competitively priced concentrates from the mine. And the mine will depend on an inexpensive nearby smelter. It's that simple: No smelter - no mine; no mine - no smelter; high labor costs - neither mine nor smelter, and no concentrator nor refinery either.

A decision to actually build the new smelter will mean our costs are under control and our future is more secure. Obviously, it is the best interests of all of us to continue our cost reduction efforts to convince the Board that the $130 million for the smelter will be a good investment.

Employee relations manager appointed

Marsh H. Campbell, former director of industrial relations for the Duval Corporation, has joined Magma as manager of employee relations.

He will report to Bob Skiba, who has been designated director of employee relations, a new name for the department which was previously called personnel services.

Marsh was associated with Duval and Pennzoil from 1974 until the company was recently disbanded and put up for sale.

At Duval he was responsible for labor negotiations, arbitrations, and NLRB elections, as well as employee involvement programs and supervisory training.

A native of San Francisco, Marsh earned his degree, BS Industrial Management, from San Jose State University in 1962.

He also attended graduate studies in industrial relations at San Jose State, Southern Illinois University, and the Southwest Legal Foundation.

Following school and a tour of duty with the Army National Guard, Marsh held industrial relations assignments at Shell Oil Company's Martinez, California, and Wood River, Illinois refineries.

MARSH CAMPBELL
Photo by Grant Kempton

Marsh and his wife Connie have two daughters, Stacy, a sophomore at the University of Arizona, and Amy, an eighth grader.

The family lives in Tucson but plans to move closer to Magma in the future.

Marsh has been active in the Arizona Industrial Relations Association and the American Mining Congress.

He is a runner and enjoys open racing and marathons as well as water and snow skiing.

Board ok's smelter studies

Our board of directors has approved a continuation of smelter engineering studies, previously initiated to develop possible means and to further define costs of modifications required by regulations of the Clean Air Act.

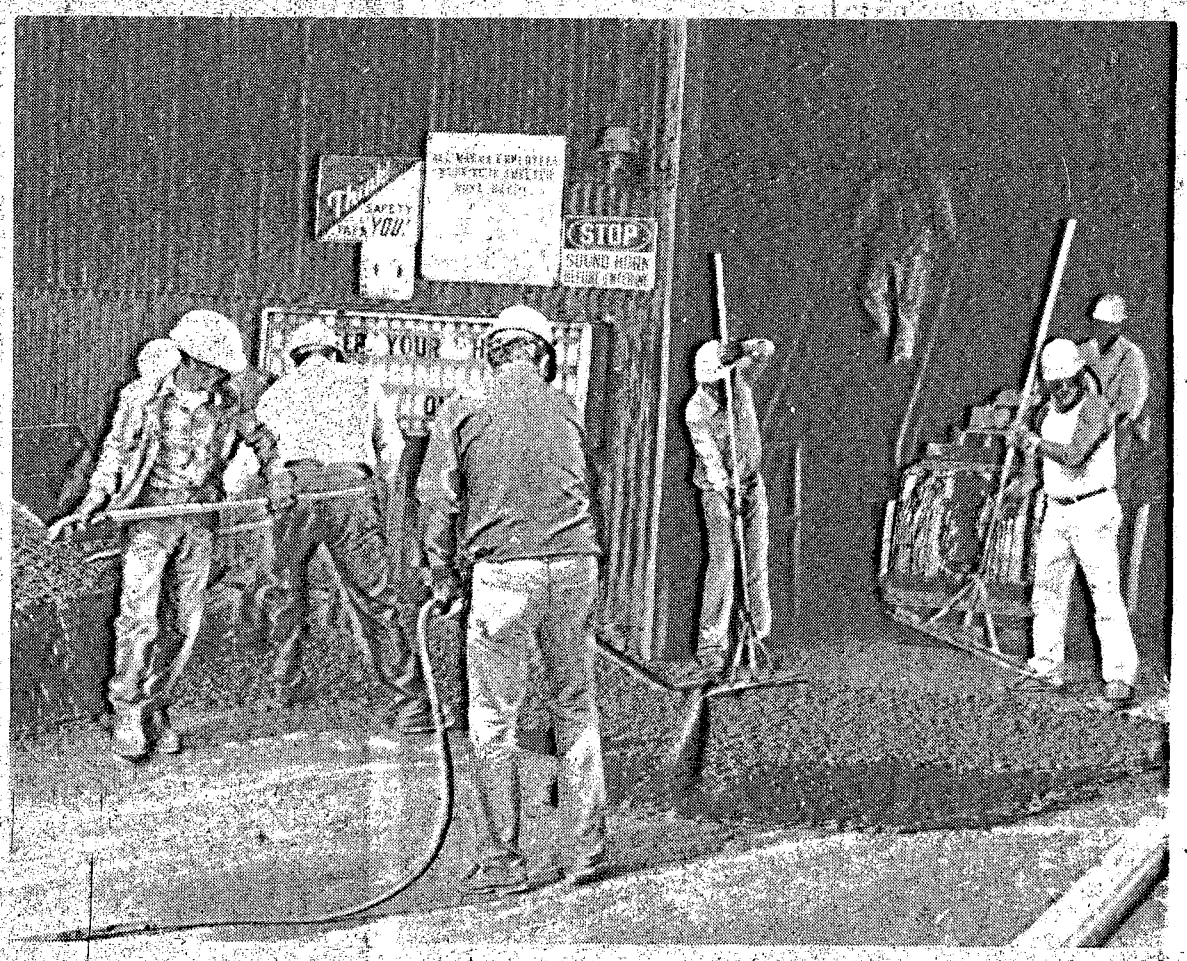
Preliminary estimates put the cost of the retrofit of the smelter at approximately $130 million, not including finance costs.

No decision to rebuild the smelter has yet been made.

We lost $44 million before taxes in 1984, and expect to lose about the same this year.

Underground mine costs remain high, with labor accounting for more than 50 percent of the cost of production.

Before the smelter will be rebuilt, the board of directors will have to be convinced that we can operate the underground mine and smelter at cost levels which will insure long-term profitability in the very competitive worldwide copper markets.



QWL idea gets results

SEAL COAT of oil was applied to both north and south smelter entrances as a result of a QWL suggestion. The paving will keep dust from blowing, help housekeeping in the reverb department, and save wear and tear on mobile equipment which uses these entrances. The crew performing the work is from the plant construction department.

Photo by Gilbert Rodriguez

Letters

Rail car identified

To the Editor:

A picture appeared on page 2 of the August issue that prompts me to write. I have additional information concerning the rail passenger car.

The car, Motor 301, was purchased from the El Paso & Southwestern R.R. in May, 1923. It has been originally placed in service by the Arizona & New Mexico R.R.

It was a gasoline powered, self-propelled, railbus, designed specifically to carry both passengers and baggage. The purchase price was $5,000. The car was ultimately retired in 1935 and probably scrapped.

I hope this information will help clarify any questions your readers might have.

Sincerely,
Les Presmyk
Mine development foreman

(Editors note: Les was assistant general mine foreman at Superior and was transferred to San Manuel when that mine was shut down.)

Poem for miners

Editor's note: The following poem was submitted by a friend of an employee following a recent underground tour for families and friends of mine employees. It expresses the feeling of many underground employees and we are pleased that she sent it to us for publication.

2315 Feet Below: San Manuel Mine

One hour from town, and
ninety-seconds down,
I taste the labor
of a bright-eyed miner
at twelve bucks an hour.

In wet, flat air, with
mud-packed rails,
powder and pressure,
cracks in concrete,
weight-aching arms pull rope,
pop ears, open air doors to
rumbling rail cars;
twisting through shafts, it
trembles coarse bodies that
bump to a stop.

White-veined beams
sweat acid on hardhats,
arms and chests fight tight
heavy air. Rock turns to
rubble; crippled it's carried
through eight-hour nights;
found only by headlights in
digging to live
for tons of ore.

The belly of this sore
old hill abscessed. She
promises pennies to
fight foreign markets,
for living and driving
an hour away,
from working the darkness
as a bright-eyed miner.

Patrice Plummer Anderson

Photos from Frank Madrid...

The historical photos this month are from the collection of Frank V. Madrid, retired mine employee living in Mammoth.

Frank was hired on October 2, 1944 as a field prospector.

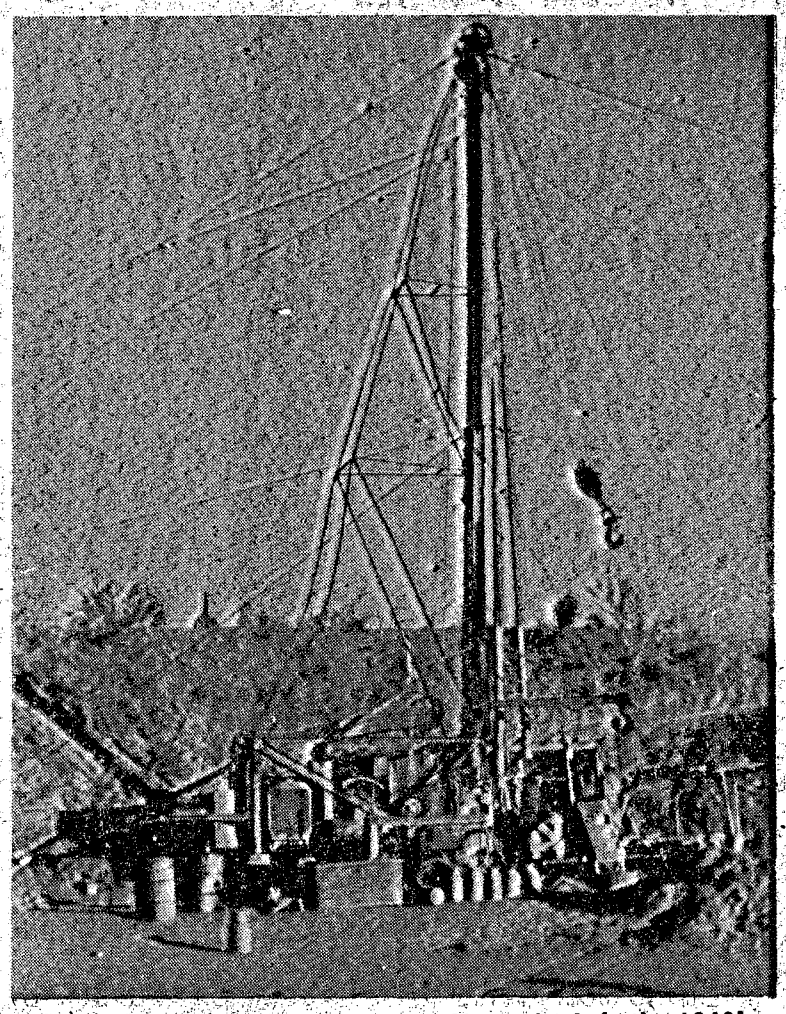
This was interrupted by a tour of duty in the U.S. Army during the Korean War.

Frank returned to Magma in 1953 and was a laborer during the early period of mine development.

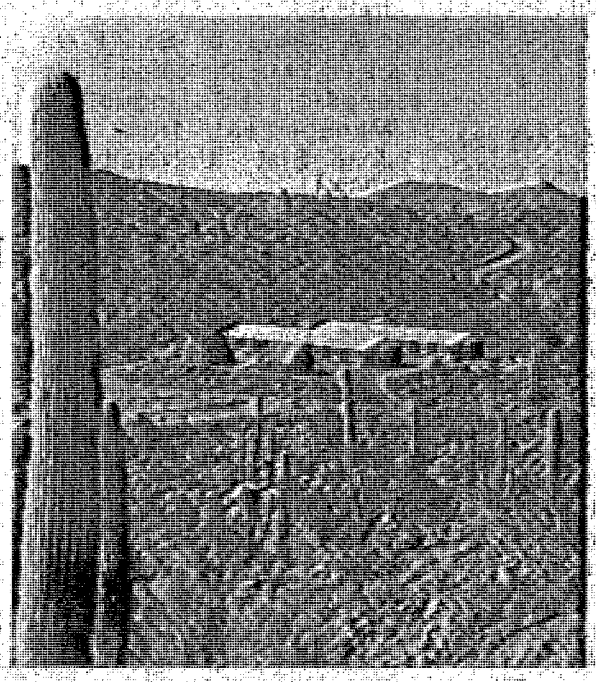
He retired as a mine handyman July 31, 1985.

We certainly appreciate Frank sharing these interesting photos of the beginnings of San Manuel.

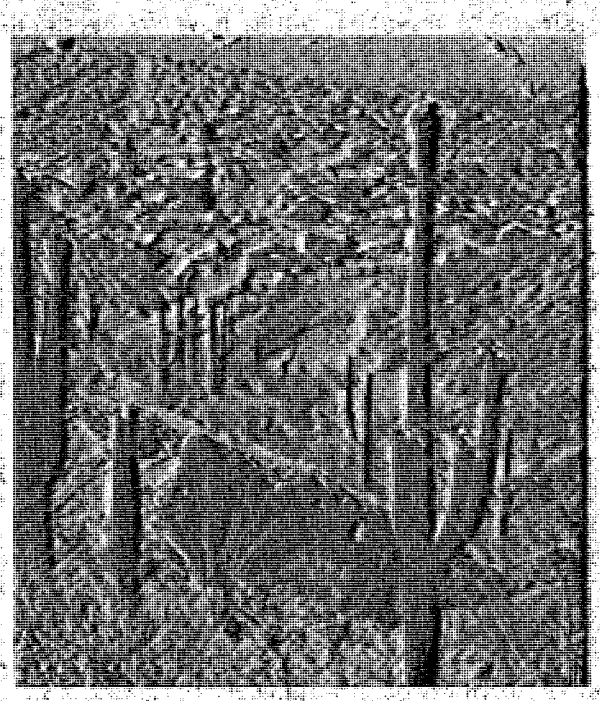
Any reader who has historical photos or interesting stories about San Manuel or Magma Copper Company is welcome to submit them to the *Magma Update*.



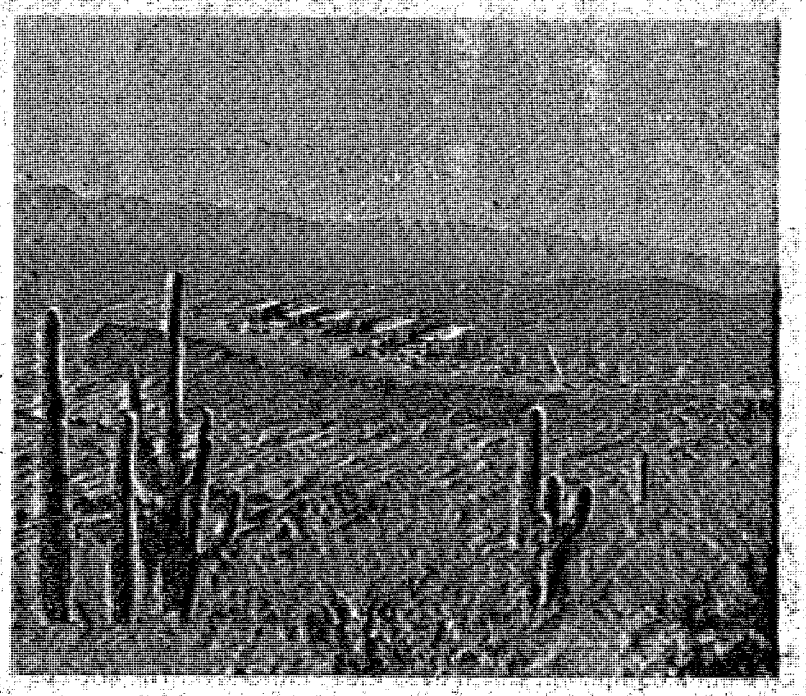
CHURN DRILL rigs were used to outline orebody in the 1940's. Milk cans were used to carry samples to assayer.



BUNKHOUSE in February, 1948. The food was good and there was plenty of it.



TIGER, ARIZONA, in September, 1947. It's part of the oxide project now.



COMPANY HOUSES at Red Hill in February, 1948. They're in the subsidence area now.

MINE HEADQUARTERS in January, 1948, seen from Red Hill.

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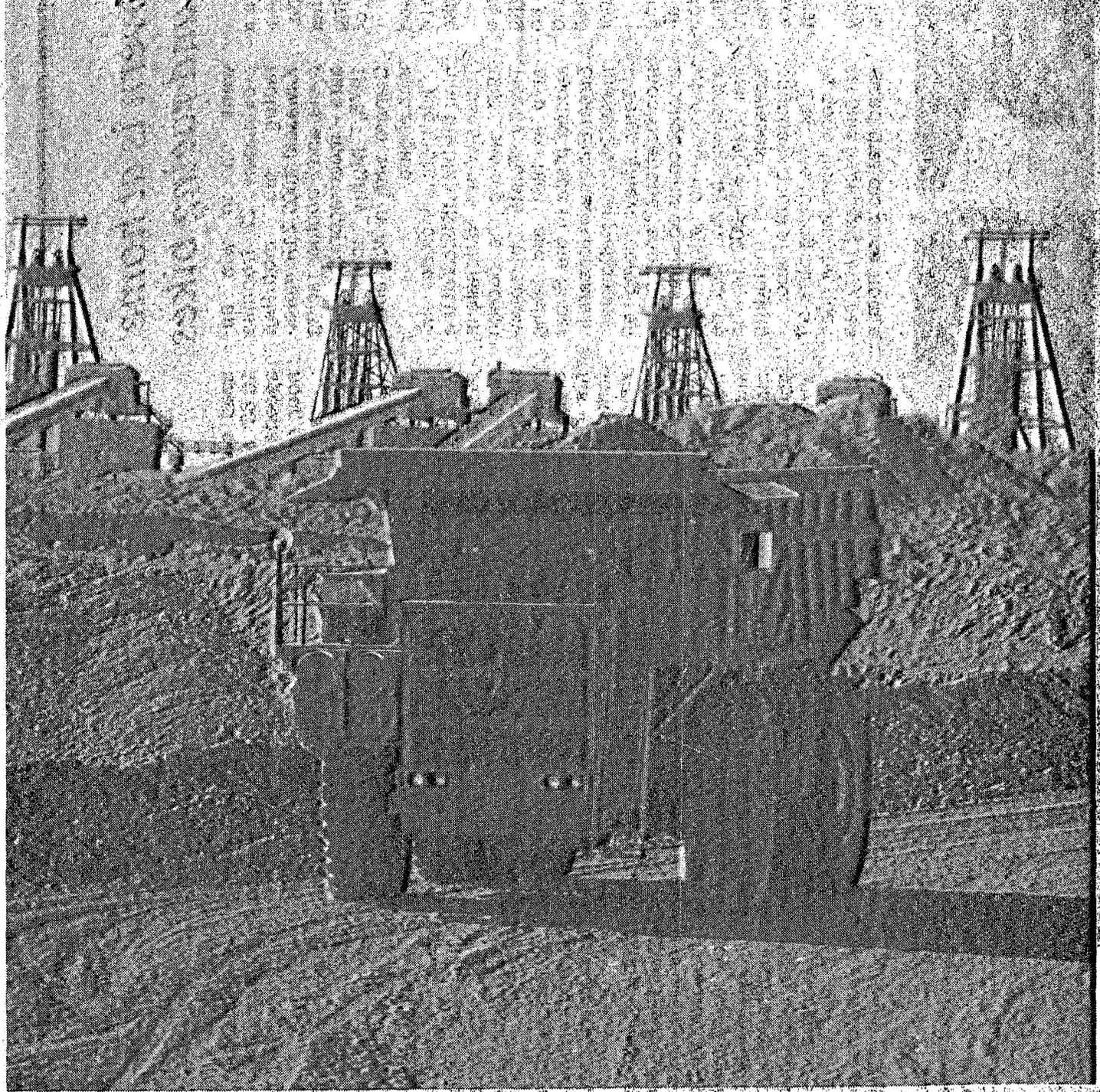


Change comes to San Manuel Mine

WORK HORSE of the open pit is the first Lectra Haul M-100 electric wheel drive truck which went into operation the week of Nov. 18, driven by Kenneth Hawkins with navigator Frank Tappin on board. The truck's rear tandem wheels are driven by electric motors. Each truck hauls 100 tons. Read the latest about the oxide project on page 3.

Photo by Steve Hildebrand

Oxide project halfway to completion

Story and Photos
By STEVE HILDEBRAND

On October 29, an oxide open pit crew set off a very large bench blast.

According to Frank Tapia and Roscoe Gerdon, both recently transferred to the open pit operations from the mine yard, 2,800 pounds of explosives were used for 98 holes.

The holes were 3 and 4 inches in diameter and 15 or 29 feet in depth.

The solvent extraction-electrowinning processing plant's tankhouse is definitely taking shape with the superstructure in place and the siding and roofing beginning.

Stainless steel flooring for the settlers in the solvent extraction process is currently being welded.

Erection of tanks in the tank farm has begun.

The organic reagent, nearly one million dollars worth, has been ordered.

To date, according to Bob Young of Bechtel Construction, 6,200 cubic yards of concrete have been poured and 22,000 liner feet of pipe placed.

Including subcontractors, Bob says average construction manpower is 250 persons.

Preparation of the first leach dump pad is rapidly advancing as Granite Construction Co. has excavated 650,000 cubic yards.

The five million gallon collection pond is under construction and early in November, the pond and leach dump liner installation will begin.

Magma's new SX-EW processing plant will be "state of the art" technology for SX-EW plants.

Also, it will be largest SX-EW plant in the state.

Computer control of the process will be extensive.

No longer will any starter sheets or starter section be needed in this tankhouse.

Copper will be plated directly onto both sides of stainless steel cathodes.

After seven days of plating, the cathodes will be removed from the cells and sent to the stripping machine.

At the machine, the copper cathode will be removed from the stainless steel sheets and the stainless steel sheets will be rewaxed and returned to the cells.

This machine will increase productivity and efficiency in the tankhouse and result in competitively produced grade one copper.

The in situ 1,000 gallon per minute test is continuing to accelerate its pace as the July 1, 1986 start-up date draws closer.

The 9 7/8" pilot hole from the 2075 level to the 2375 level is complete and a pipe has been placed in the hole.

1,100' of 6" pipe has been hung along NH2, 2375 haulage level and 4,200' of 8" HDPE pipe has been received.

According to Chris Burt, the in situ project engineer, work on the project is progressing satisfactorily.

Dave Piske, engineer in charge of the oxide process water system, has been calculating the necessary changes to the mine-mill pumping system.

Soon this process water requirements for the oxide project including the leach dumps, the open pit, and the 1,000 gallon in situ test, will be met by the mine dewatering system.

Dave says, "It's a piece of cake."

In the past, newly hired hands in the oxide open pit staff were mentioned in the Update. It seems an unintentional oversight was made in not listing Magma employees transferred to the open pit.

Steve Walsh, the general foreman of the open pit, has been with Magma for six years.

He has held numerous production positions in the underground mine.

Almost from the beginning of the oxide project, Steve has been indispensable in the initial planning and design of the open pit.

Frank Tapia, with 28 years with Magma, was previously a section foreman in the mine yard.

Frank has spent many years supervising heavy equipment at the mine.

He is an accomplished equipment operator in his own right.

During the past two years, Frank has been invaluable in the many construction projects associated with the oxide project, especially in the early work within the cave area.

Frank previously spent six years in Magma's lime pit and has owned and worked his own mine before coming to Magma.

Additionally, Frank worked 5 years hardrock underground mining for the Atheltic Mining Company of Aravaipa, Arizona.

Roscoe Gerdon, previously supervisor of the mine carpenter shop, has spent 15 years with Magma.

Roscoe has worked at the plant construction crew, townsite, underground and the mine yard and brings many valuable talents to the open pit.

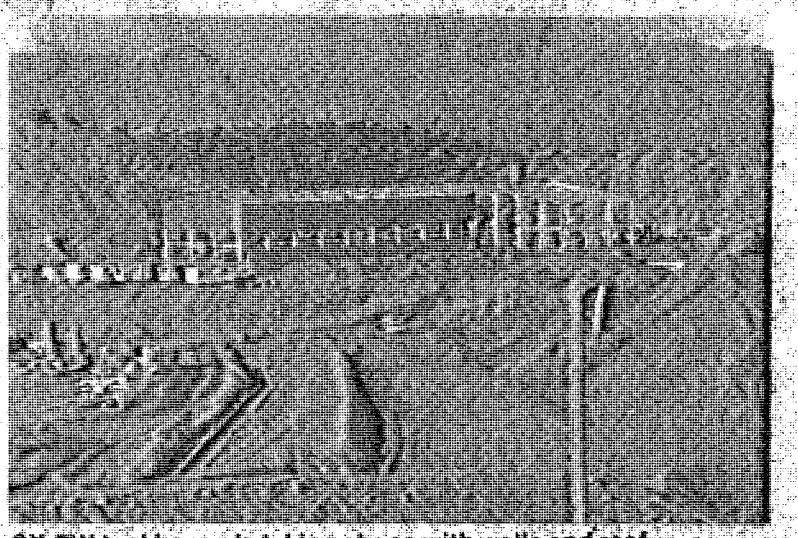
Prior to coming to Magma, Roscoe spent five years at Duval's Esperanza open pit.

George Martin, a mining engineer and graduate of the University of Arizona '83, has been involved in the oxide project since February.

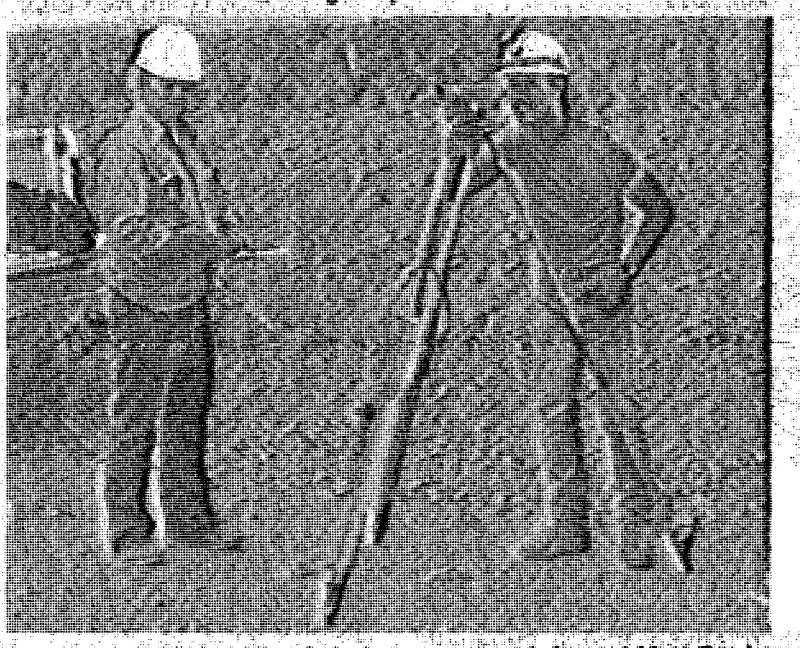
Currently, George is assigned to the operating branch of the open pit.

George has been with Magma for two years, holding various production and engineering positions at the mine.

George has five years experience in open pit mining at various mines, primarily though at the Delamar Silver Mines' Open Pit in southern Idaho.

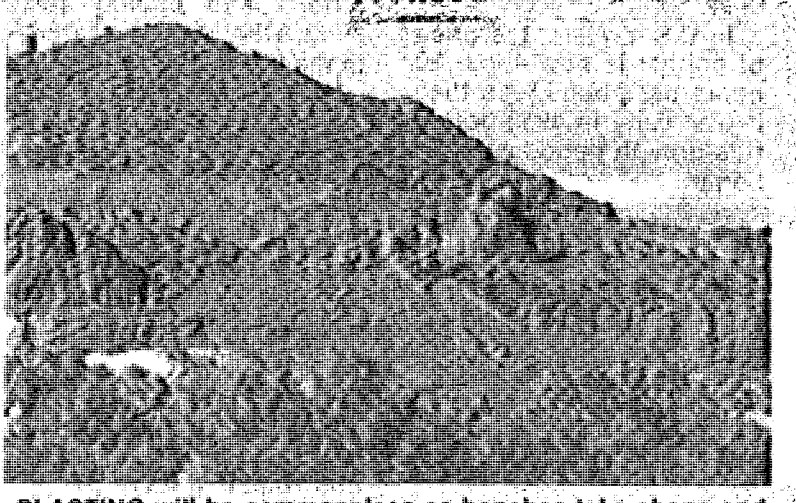


SX-EW tankhouse is taking shape with walls and roof.



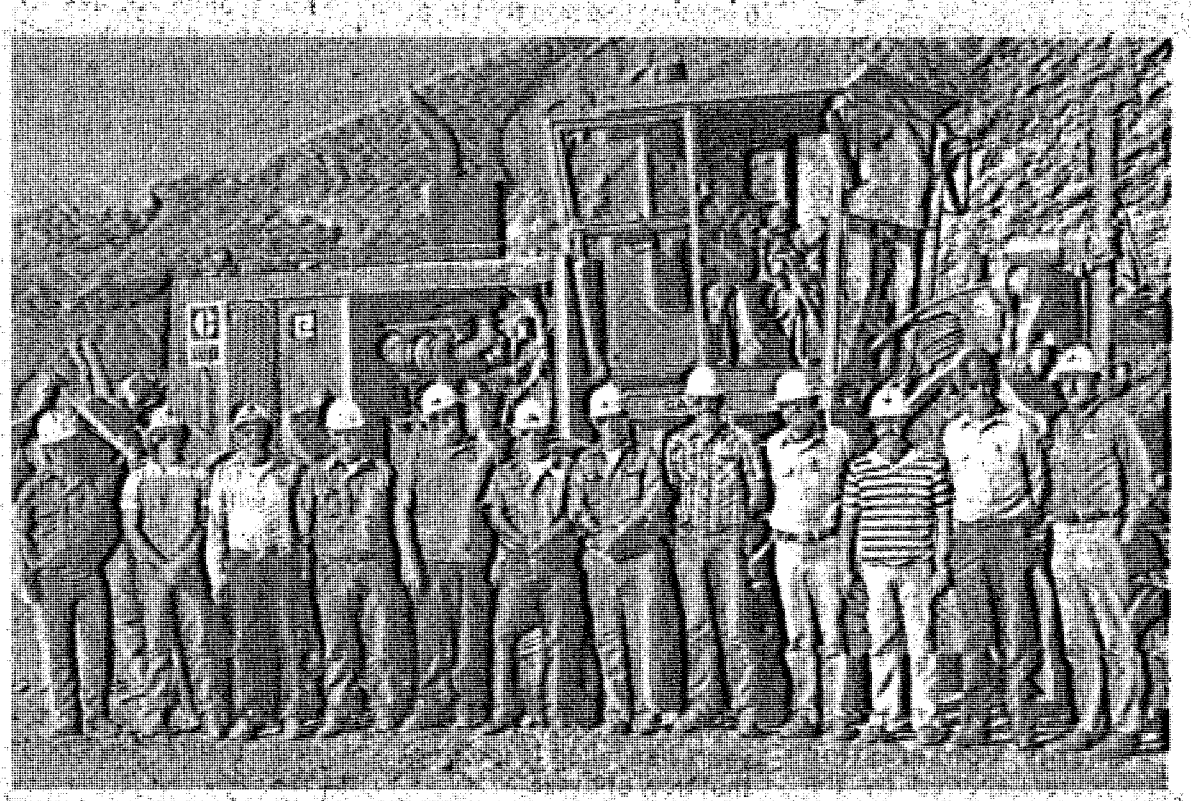
SURVEY CREW of Chet Schulte, surveyor, left, and Matt Ford, rodman.

Photo by Richard Cole



BLASTING will be commonplace as benches take shape and overburden is removed.

COLLECTION POND will hold 5,000,000 gallons draining from surrounding leach pads. Pads and pond are being lined with impermeable material to prevent damage to environment.



SOME OF OPEN PIT employees lined up in front of new grader operated by Manuel Marquez. From left, foreman Roscoe Gerdon, surveyor Darrin Ginn, foreman Frank Tapia, surveyor Chet Schulte, truck shop foreman Jerry Ramsey, shift foreman Bob Spivy, assistant superintendent Charlie O'Coyne, general foreman Steve Walsh, geological engineer Tom Johnson, planning engineer Gus Valenzuela, chief surveyor Norm Wisner, and technical aide Dan Fowler.

SURVIVAL- It requires careful, detailed planning

PLANNERS are from left, Irshad Rana, John Dorsey, and Marty Martinez. Photo by Grant Kempton

Did you know Magma no longer has budgets?

We now have "business plans" and they are made out not only for next year but also for the entire life of the mine and the life of the smelter as well -- some ten years into the future.

The whole process is called planning and development and much of the budget planning work formerly done in various operating departments is now centralized at the administration building using data input from throughout the company.

John Dorsey from the mine, Marty Martinez from accounting, and Irshad Rana from the smelter are the staff of the new planning and development group.

And, they are continuing to do the work they formerly performed in addition to the work previously handled by Bob Zerga, planning manager, who is being transferred to Newmont's Carlin Gold Mine as general manager.

No, it doesn't take three to replace Bob, it's just a grouping together for better teamwork, control, and efficiency. The basic work won't change, they'll just be doing it all together.

In one way the work will change because as the copper industry and Magma sink deeper into debt and our economic conditions stay under stress, planning work must intensify as we seek ways to survive.

John, Marty and Irshad must put together the information which gives meaningful answers to our prospects of survival.

Their chief tool is the computer which they will use for hours and hours as they analyze the multitude of variables in supplies, ore grades, technology, interest rates, inflation, metallurgy, cost of employee benefits, overhead, and payroll.

The job could not be done without computers with their ability to process large amounts of data quickly, and calculate infinite variations from changing inputs.

One important question which they are presently trying to help answer is, "Can Magma afford to build a new smelter and if not, what must we do to make it affordable or what are the alternatives for having our ore smelted somewhere else?"

John, Marty, and Irshad are working to put together the information necessary for Magma and Newmont directors who must make the best decision they can to determine the future of our operations.

Already, several versions of possible future plans for Magma have been prepared for use by Magma and Newmont management to make the decisions for allocating available funds.

COPPER PRICES- They're not going anywhere

By RONALD J. VANCE
Vice President - Sales

Worldwide inventories this year will be further reduced by 200,000 to 250,000 tons.

When consumption exceeds production the generally accepted law of supply and demand would logically lead one to conclude that copper prices must have increased over this extended period of relatively strong consumer demand.

Logic, however, has clearly not prevailed in this case.

In U.S. dollars, the price of copper is now about 20 cents per pound less than it was early in 1983 before this growth period actually began.

Copper is a commodity. As a commodity, it is traded in an auction-like manner on organized government regulated exchanges around the world.

In 1984 non-socialist world demand for copper totalled 8.66 million tons.

During that year production of copper total-consumption has exceeded production, albeit to a slightly lesser extent.

The metal exchanges

The two predominant exchanges are the London Metal Exchange in London, England, and the Commodity Exchange, Inc. in New York.

Trading on these two exchanges and the resulting price levels have become the basis on which virtually all copper business is transacted.

This system has all but destroyed the traditional producer price system under which a producer, like Magma, sells its copper.

Instead, U.S. producers have been forced to follow these markets very closely. U.S. copper producers have essentially lost any discretion they once had over the price levels at which copper can be sold.

Prices can, as we have seen, move with little or no regard to either supply and demand factors or, more painfully, true costs of production.

Why has the price of copper run so blatantly counter to market conditions and equally puzzling, what can we expect in the future?

Neither question can be answered simply.

Price behavior

However, the generally accepted explanation for the price behavior of the past two years involves (a) the broader picture of supply and demand and (b) investor psychology and its role in commodity trading.

Prior to the beginning of this recent growth period, the major worldwide economies suffered through a long and severe recession.

Activity in those manufacturing industries which account for heavy copper usage fell to levels not seen since the Great Depression of the early 1930's.

This was especially devastating as the world was still reeling from the effects of the oil crisis of 1973-74.

The years following that crisis had brief growth periods but extensive recessionary and at the same time inflationary periods.

Throughout this post-oil crisis era, the copper industry underwent various fundamental, structural changes.

Fundamental changes

State-owned copper production in Chile, Zambia, Peru and Zaire was expanded and operated at full capacity without regard to world market conditions.

Combined with reduced demands, world-wide inventories of refined copper grew to record high levels.

The dependence of these third world producers on revenues from copper sales was most critical and with high ore grades, cheap labor and very favorable financing they were, and remain, able to generate profits from copper sales to the industrial world.

Production cutbacks

At the same time, the devastating prevailing low price levels have resulted in production cutbacks or mine closures by most of the North American producers.

Low ore grades, expensive labor and expensive financing have driven some producers completely out of the business.

Others, like Magma, are continuing to operate at a loss on the hope that costs can be reduced which will allow a return to profitable operations.

On the demand side, copper's key markets came under direct attack.

Demand declines

Energy conservation measures spurred by the skyrocketing oil prices quickly led to radical reductions in electric power generation and transmission requirements and automobile design changes and downsizing.

Small cars use less copper.

Smaller homes use less copper.

The development and commercialization of optical fibre cables have reduced copper's single largest market - telecommunications cable.

Other markets have also been attacked either by substitution or outright elimination.

Concerted efforts at new market development have failed to come up with anything that remotely resembles the markets that have been lost.

Growth rate is flat

The net effect has been to reduce copper's annual demand growth rate of 5 to 6 percent to a rate that is, at best, flat.

The second facet of this explanation, "Investor psychology", has been decidely negative toward copper.

Such "speculators" seek investments that they perceive to have the greatest growth potential.

Investors seek profit

There has been a clear-cut transfer of investor funds from other investments, most noticeably commodities, into U.S. dollar money market accounts which guarantee relatively high rates of return on invested capital.

Even the very favorable fundamental picture of copper over the past two years has failed to interrupt that flow of funds.

Occasional sparks of renewed investor interest in copper have been extinguished by brokerage house newsletters which allude to massive currently curtailed production capacity that would be reactivated if prices showed any signs of recovery.

Negative publicity

These publications also quickly point out the threat of substitution like fibre optics and the negligible or even negative growth trend of copper consumption.

The future outlook for copper prices is not optimistic. State-owned production will continue full tilt and will be expanded whenever possible.

One new property in Chile, when developed, will add over 300,000 tons of new copper production per year.

Recessions ahead

The typical cycles of business activity will ultimately result in an economic slowdown or recession perhaps as early as 1986.

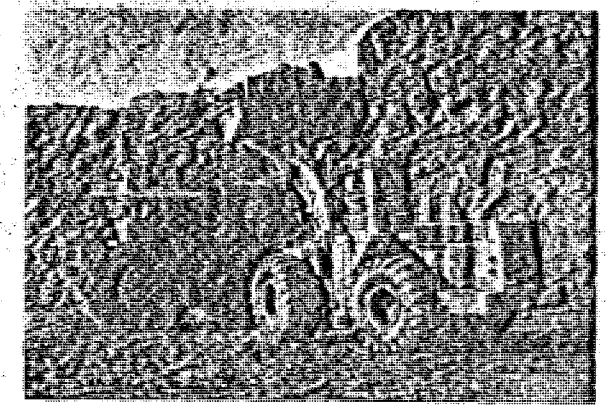
The high-tech revolution poses many serious threats to copper - consuming basic industries.

There is little likelihood that the investor's perceptions about copper will be altered. Based on these assumptions, we do not expect that on average prices will do much better than hold their current levels.

We may see occasional "spikes" of higher prices but of paramount concern must be the potential for further price declines during future economic recessions.

In the face of continued low prices, only lower production costs can keep current producers in business.

Oxide project on schedule and looking good



LOADING OVERBURDEN and waste rock into a 100 ton haul truck is a Caterpillar 992.

Story and photos
By STEVE HILDEBRAND

Through November 1985, the oxide project is 39% completed according to Bob Young, project engineer for Bechtel Corporation.

Bob also states the impermeable liner installation on the leach dumps has begun and that approximately 16 acres have been placed.

Over most of this liner, at least one foot of river sand will be placed.

Granite Construction Co. has excavated 900,000 cubic yards of material in the leach dump area and Bob reports that 8,300 cubic yards of concrete have been used to date.

Nearly 31,000 linear feet of piping and 67,000 linear feet of conduit have been used to date in the construction of the processing plant.

Employment at the construction site has reached 350 men and women.

Oxide Open Pit

Open pit operations are presently working three shifts a day, five days a week, on a preproduction waste stripping campaign.

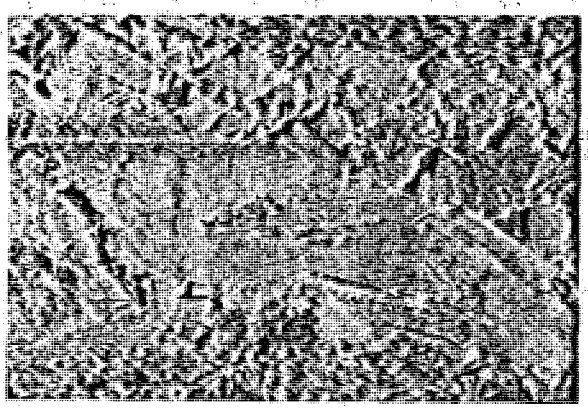
Ore production is scheduled to begin in the first week of January.

When sufficient ore has been hauled and placed on the dumps, piping for the leach distribution system can begin.

The last member of the operating open pit staff has joined the group. He's Miguel (Mike) Moreno, drill and blast foreman.

Mike and his family live in Tucson and he brings to Magma 17 years of mining experience with Duval's Sierrita operations.

Mike says the job will be exciting because of drilling and blasting in the rubblized rock mass of the open pit.



EXCAVATION OF BENCHING for in-situ test site. Leach drill field will be designated the 2730 level.

Open pit operations have 24 men and women of which nine are truck drivers and sixteen are equipment operators. All nine truck drivers were transferred from within Magma.

According to Steve Walsh, open pit general mine foreman, the three mining shifts are averaging 70 truck loads of waste per shift, with four trucks running and two front-end loaders.

It takes 6-7 buckets to load one truck and the truck cycle time is roughly ten minutes.

During the first week of December, the first of two Ingersoll-Rand T-5 mobile drill rigs arrived.

By Thursday, December 5, the drill rig was in the pit, drilling under the direction of Mike Moreno.

Process Water

One of the most important features leading to the profitability of the oxide project is the availability of process water.

The leaching at the dumps, the open pit, and the in-situ 1,000 gallon test will all use water pumped out of the mine in the mine dewatering system.

The mine pumps about 4,500 gallons per minute and the new oxide projects could use up to the three-fourths of that.

The simplification of the mine dewatering system utilizing #5 shaft pumps only to pump water to the surface, is a critical phase in obtaining sufficient process water for the oxide project.

Likewise, using the 24" dewatering pipe line from #1 shaft to #5 shaft is also required.

TANKHOUSE at SX-EW plant in the background and in front, the stainless steel bases for solvent extraction settlers. Welding the stainless steel is a very slow and exacting process.

This process water connection was very thoroughly researched and designed by Dave Piske, project engineer.

SX-EW Plant

With the installation of the overhead crane in the tankhouse, anticipation is building to see the project completed and production of copper begin.

PVC paraliners are presently being placed into the cells.

The overhead crane becomes very handy for this operation.

Some superstructure and more tanks have been added to the tank farm.

The stainless steel base and walls for the SX settlers are being welded in place.

The lining of the plant feed pond is in progress and the lining of the leach dumps is advancing rapidly.

With any liner installation, high winds and rain can make the job a mess and add delays to the project's timely completion, so hopefully the weather will stay mild.

All the liners for the ponds and leach pads will keep all the solutions in the system and prevent any environmental damage.

The In-Situ Test

With the in-situ 1,000 gallon test, excavation and benching for the leach field drill site is underway.

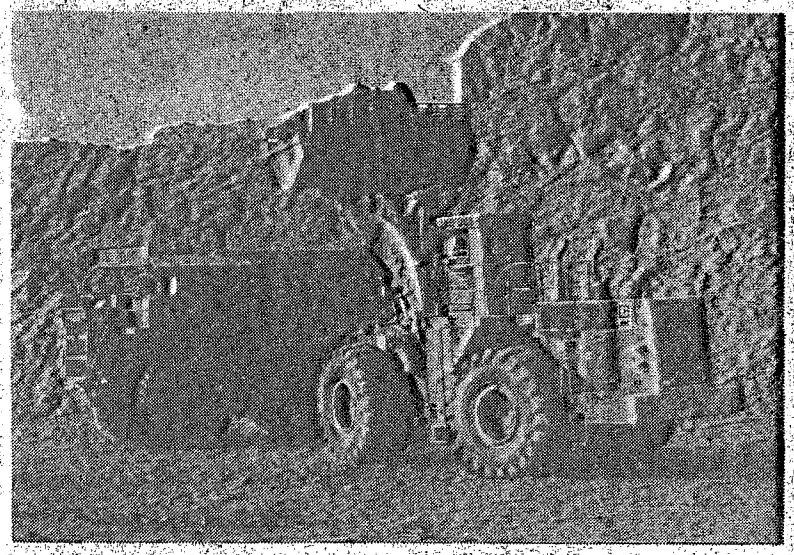
A mine construction crew under the supervision of Johnny Martinez is accomplishing this job.

Since the drill site is located in steep terrain, benching above the site is necessary to project the leach field.

Valuable assistance was provided by Rick Seaney, open pit chief engineer, in the initial design of this benching technique.

George Madrid has been assigned to mine design to help in the design and planning of the 8" stainless steel pipeline needed to convey pregnant leach solutions from underground to the surface. In February, installation of this pipeline in the shaft will begin.

Oxide project on schedule and looking good



LOADING OVERBURDEN and waste rock into a 100 ton haul truck is a Caterpillar 992.

Story and photos
By STEVE HILDEBRAND

Through November 1985, the oxide project is 39% completed according to Bob Young, project engineer for Bechtel Corporation.

Bob also states the impermeable liner installation on the leach dumps has begun and that approximately 16 acres have been placed.

Over most of this liner, at least one foot of river sand will be placed.

Granite Construction Co. has excavated 900,000 cubic yards of material in the leach dump area and Bob reports that 8,300 cubic yards of concrete have been used to date.

Nearly 31,000 linear feet of piping and 67,000 linear feet of conduit have been used to date in the construction of the processing plant.

Employment at the construction site has reached 350 men and women.

Oxide Open Pit

Open pit operations are presently working three shifts a day, five days a week, on a preproduction waste stripping campaign.

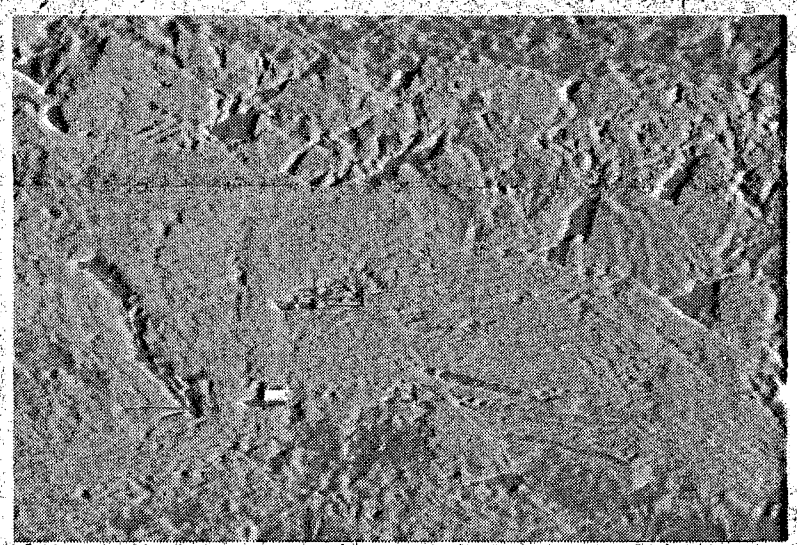
Ore production is scheduled to begin in the first week of January.

When sufficient ore has been hauled and placed on the dumps, piping for the leach distribution system can begin.

The last member of the operating open pit staff has joined the group. He's Miguel (Mike) Moreno, drill and blast foreman.

Mike and his family live in Tucson and he brings to Magma 17 years of mining experience with Duval's Sierrita operations.

Mike says the job will be exciting because of drilling and blasting in the rubblized rock mass of the open pit.



EXCAVATION OF BENCHING for in-situ test site. Leach drill field will be designated the 2730 level.

Open pit operations have 24 men and women of which nine are truck drivers and sixteen are equipment operators. All nine truck drivers were transferred from within Magma.

According to Steve Walsh, open pit general mine foreman, the three mining shifts are averaging 70 truck loads of waste per shift, with four trucks running and two front-end loaders.

It takes 6-7 buckets to load one truck and the truck cycle time is roughly ten minutes.

During the first week of December, the first of two Ingersoll-Rand T-5 mobile drill rigs arrived.

By Thursday, December 5, the drill rig was in the pit, drilling under the direction of Mike Moreno.

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Work begins in oxide open pit area

By STEVE HILDEBRAND

The open pit segment of the oxide project is in full swing with the main haulage road from the outcrop area under construction.

Charlie O'Coyne recently joined the oxide open pit group as assistant superintendent in charge of the open pit.

Previously, Charlie worked for Phelps Dodge in Ajo for 29 years where he was the general mine foreman in charge of production and maintenance.

Charlie brings much experience and working knowledge to Magma's open pit project.

During September, the open pit should receive a new Cat D9L dozer and a Cat 16G grader.

Heavy equipment for the open pit will be arriving at the mine throughout the next four months.

The in-situ project is accelerating. Plans are being finalized for using the subterranean raise bore machine for drilling a 9-7/8" hole between 2075 level, 62 turnout and 2375 north haulage 2 (near the service drift).

Plans for the leach field drilling and pumps are being made now in order to initiate the 1000 gallon test on schedule.

The SXEW processing plant is proceeding close to schedule.

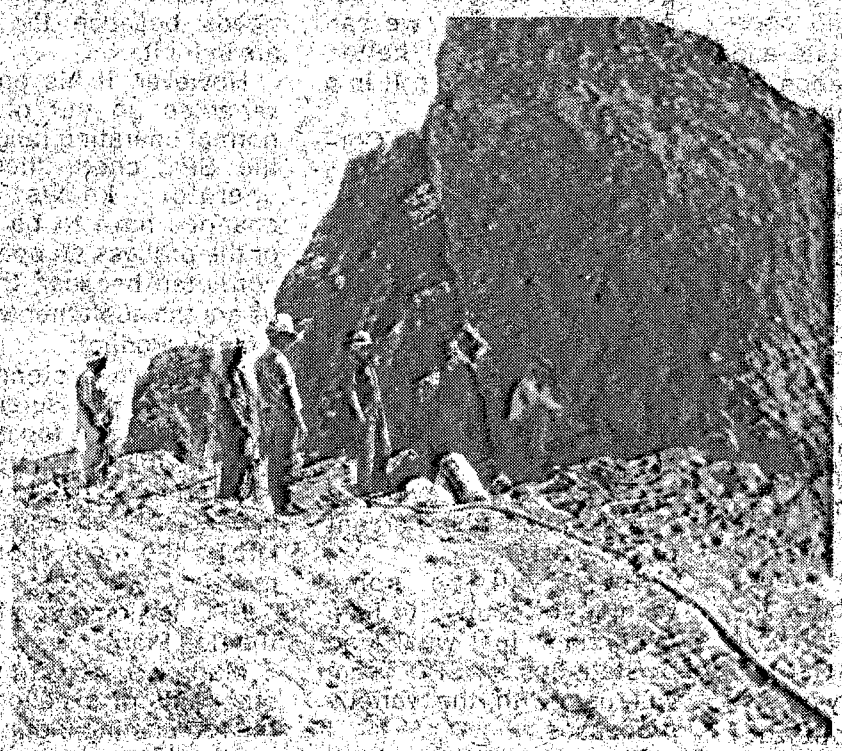
All the tankhouse cells (94) are in place and some structural steel has arrived at the site.

Through August, 2,700 yards of concrete have been poured by Fred Clark of Mammoth.

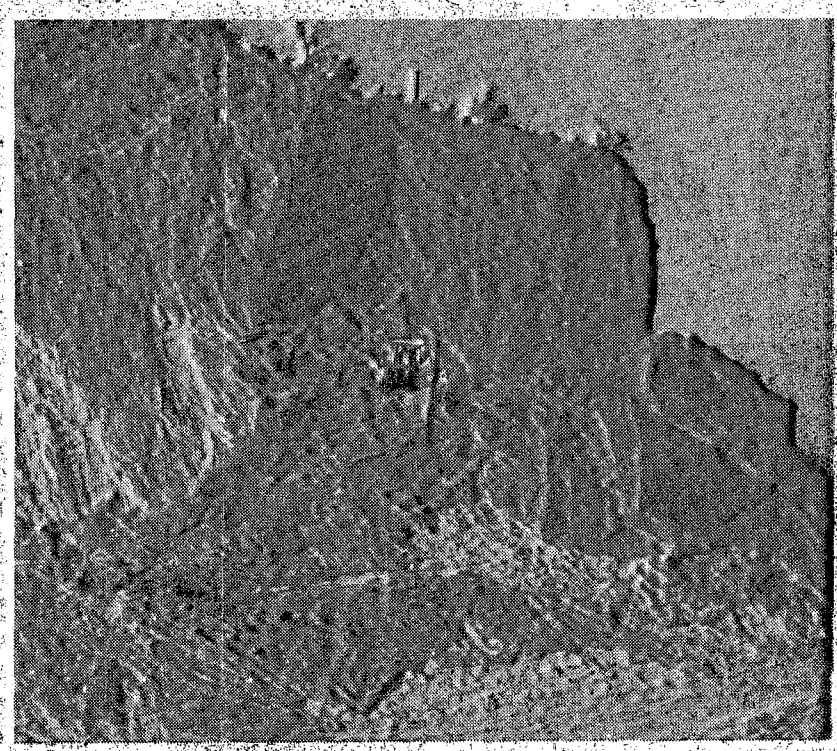
Over 44,000 feet of buried electrical conduit has been installed in the plant area.

A grubbing contract for the leach dump area has been give to Las Vegas Paving Co., which began work with a dozer on August 30.

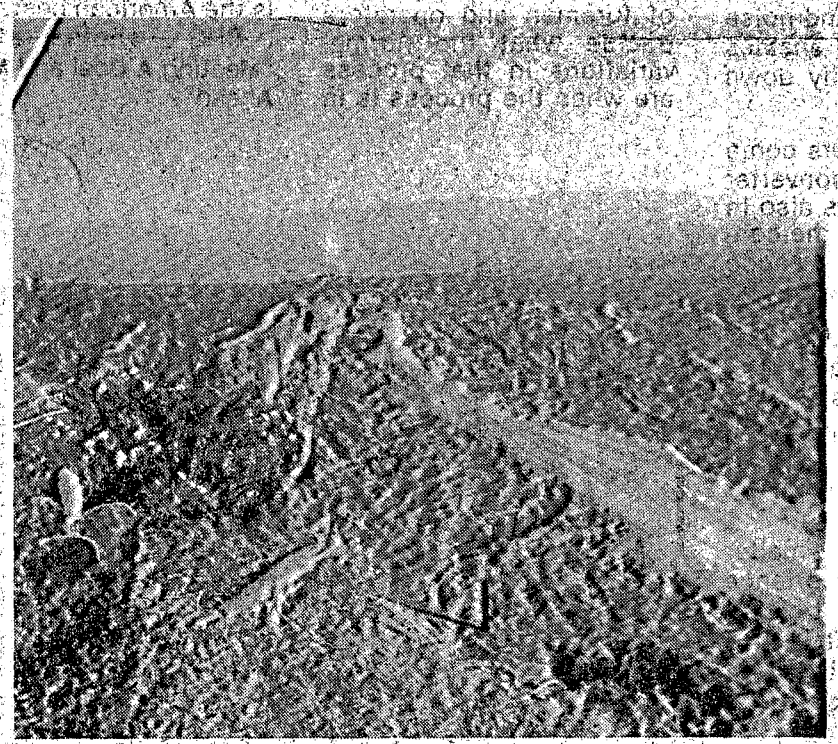
Photos by Steve Hildebrand



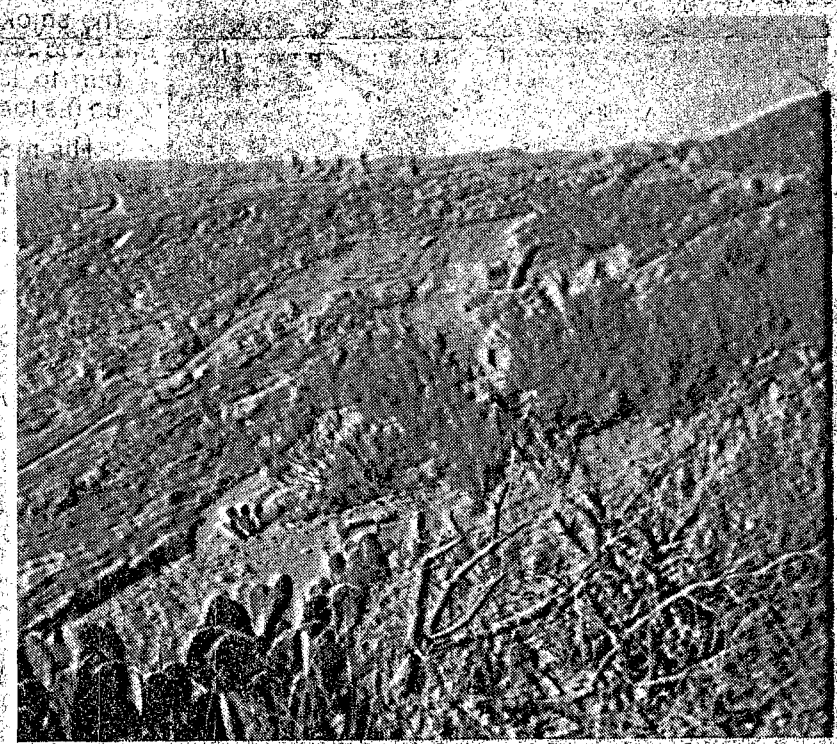
LOADING FOR blast is crew under supervision of foremen FRANK TAPIA and ROSCOE GERDON.



SCRAPING DOWN loose ground at pit road site.



MAIN HAULAGE ROAD looking east.

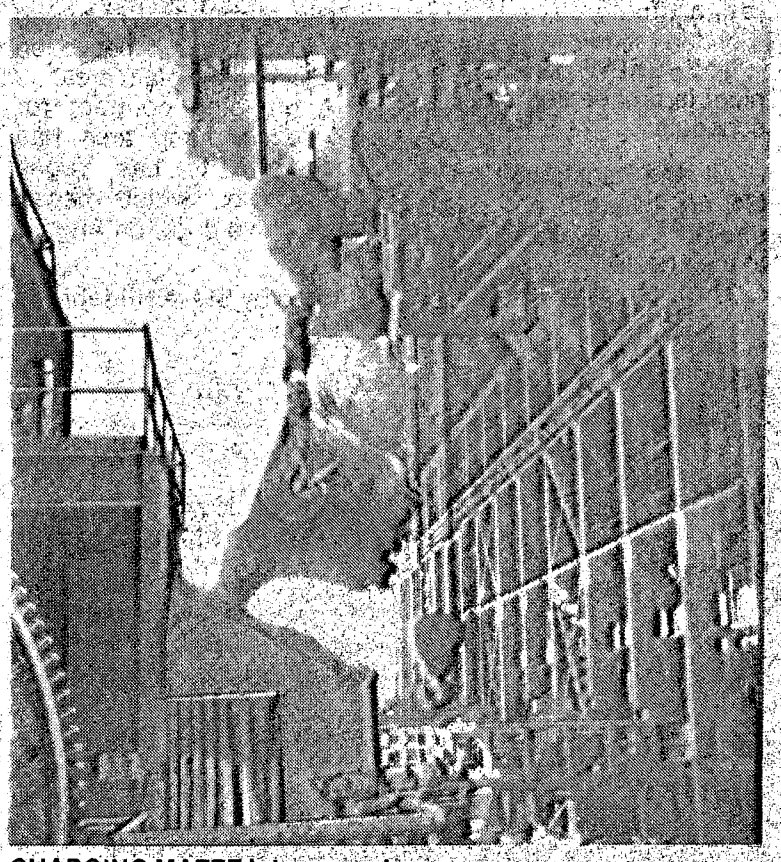


ACCESS ROAD to open pit looking west.

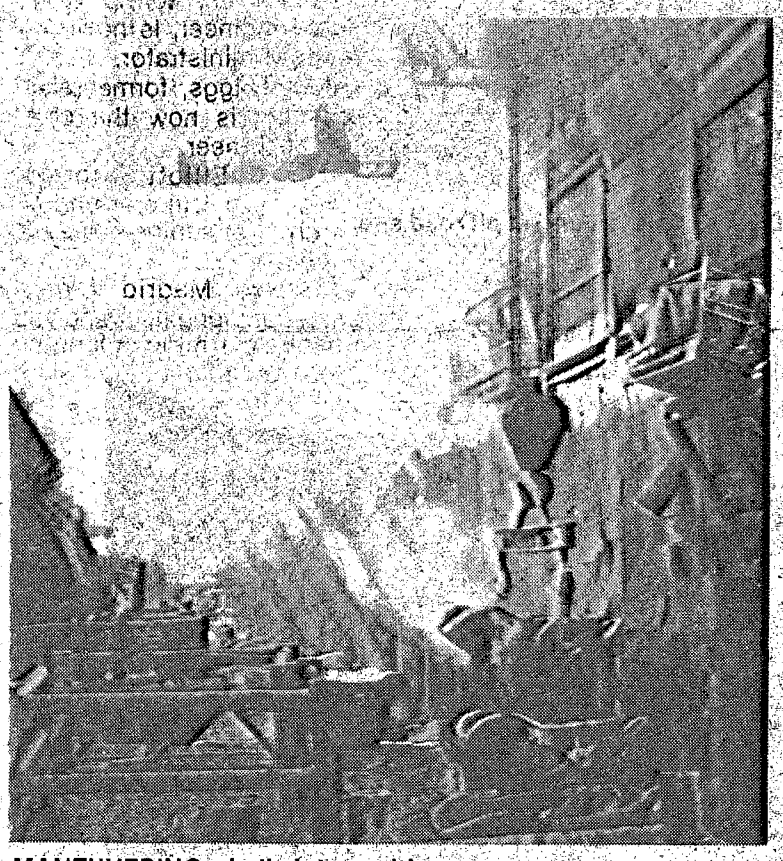
BILLY McKAY runs the scraper.

ERNEST "KITO" MIRANDA drives the D9L dozer.

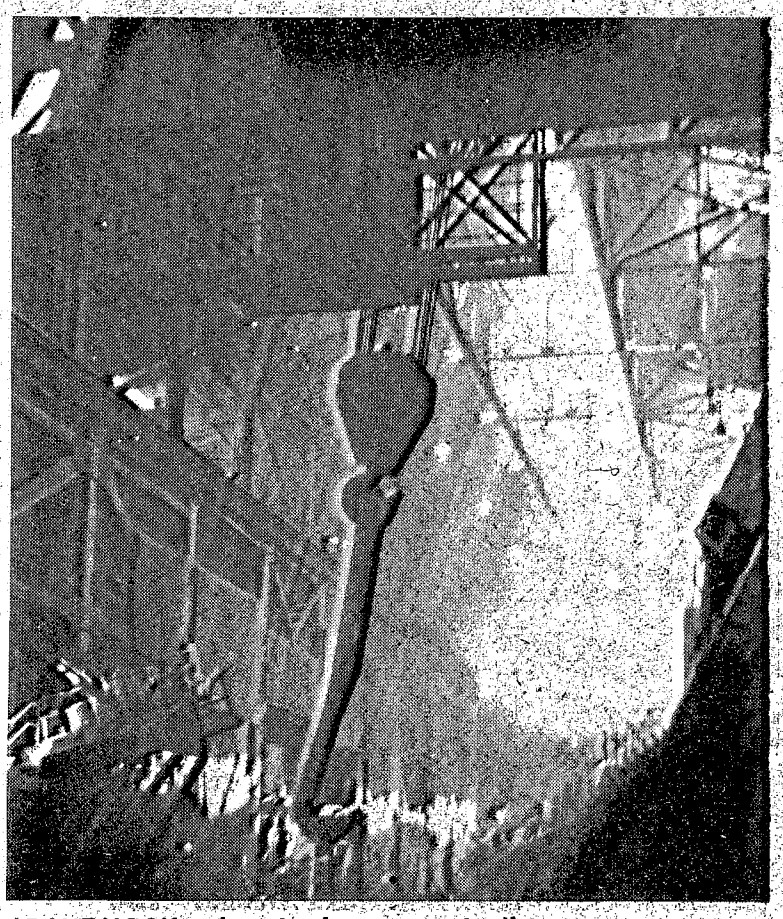
Smelter cranes require operator's light touch



CHARGING MATTE into converter.



MANEUVERING a ladle into position.



CRANE HOOK swings to clean converter lip.

Photos by Gilbert Rodriguez

By GILBERT RODRIGUEZ

At the smelter, big overhead cranes play a vital role in the transfer of hot metal from one department to another.

The crane operators must be skilled practitioners who must have the patience of Job, eyes of an eagle, the feather touch of a surgeon, eye-hand coordination of an athlete and plenty of experience to know the overall operation of the smelter.

The converter cranemen have some awesome responsibilities because one slip of the hand could cause tons of molten metal to come splashing down on people working around the converters.

One wrong move could cause thousands of dollars in damage to converters, supporting beams and equipment.

The four smelter cranes operate 60 feet above the smelter floor and each have one 60-ton main hoist and two, 20-ton auxiliary hoists.

The crane operator works on the crane in an insulated, air conditioned cab which seals him from the smoke, heat, and noise of the smelter and enables him to look directly down on his load.

His moving orders come by radio from the converter controller and he is also in radio contact with the converter skimmers and anode refiners.

His typical load is a 300-cubic foot ladle of blister copper weighing a total of 30 tons to be transferred the length of the smelter from a converter to an anode refinery vessel.

Everyone in the smelter is aware of the importance of obtaining and training employees with the necessary skills to do a professional job at crane operation.

Before an employee can even begin to train in the operation of the converter crane he has to go through a complete physical at the San Manuel Hospital.

If the individual passes the physical examination he then begins his training inside the crane cab with a supervisor with previous crane experience.

First, the future craneman is taught the fundamentals of crane controls; once he has mastered the controls, the trainee is guided through a series of manuevers such as pick up and turning of bails, simple bail-up, coupler bail-up, spotting ladle on matte car, dumping matte, slag, cold dope, copper, bail-up and dumping of boats, hookups of bails and hooks, hoisting, and trolley movement.

Customers demanding special quality controls

By SHARON YOUNG

SPC? Just another program at Magma? Another requirement of our customers?

That's what we thought when we first heard about SPC from some of our biggest rod and cathode customers, who said we have to have SPC going in a few years or they will no longer buy from us.

What is SPC? It is an opportunity to control our processes so that we can make more product, better, and at a lower cost. It is a chance to change.

Statistical Process Control is a way of determining what variations in our processes are normal when the processes are going right and what variations are not.

The statistics are fairly easy to understand, really the kind of common sense we use every day.

Like deciding whether to take a raincoat today based on the odds (the percent chance) of rain.

There will be some training, of course, to help understand just what kind of statistics an SPC Team will use with the various processes.

Then variables which control that process are selected and the SPC team of foremen and operators decide what the normal variations in that process are when the process is in control and making a good product.

Then the team gets to know the customer and his needs, and if the process capabilities and the customer's needs match up, then the operator has a normal operating range of his process which he knows will make that product right the first time.

The operator can be assured that his product will meet his customer's needs because the odds are in for it.

However, if his process variables go out of their normal operating range, off the SPC chart, then the operator knows that changes have to be made or the process stopped and corrected because the odds are the customer will get a faulty product.

SPC is an exciting new way of being assured that Magma makes a top quality product the first time with control in the hands of the operator - the employee who knows the most about the process.

SPC is going to start in the Rod Plant.

Magma's rod has set standards of excellence in the rod casting industry for nearly 15 years and SPC will help assure that every coil of rod leaving Magma is the American best.

SPC - another step in "Meeting A Goal and Moving Ahead".

MAGMA ROD loaded for delivery to AT&T wire and cable plant in Phoenix.

Photo by Randy Roberts

Who is Eddy Current?

By RICK MIKLASIEWICZ
Quality control supervisor
MCR Products, Inc.

Have you heard everyone talking about "Eddy"? Do you know who he is? Well - it's not a he. It's an it! "eddy current".

The "eddy current" is a very important application in the overall testing of copper rod because all rod production can be inspected for surface imperfections during in-line production.

While other surface flaw detection methods are available and have certain advantages such as detecting problems within the rod core, "eddy" is the most common because it can handle the desired production speeds (1,000 feet per minute), results are instantaneous, and unlike ultrasonic testing, it does not require the testing unit to come in direct contact with the copper rod surface.

The main disadvantage is that "eddy" only measures flaws or problems with the rod to around .020" (deep) from the surface - however, flaws deeper than this can be picked up depending on the amount or density of the problem.

It plays a very important role in the quality control program and is currently very helpful to the operators and allows immediate identification and correction of potential wire drawing problems. This keeps our customers happy!

MAGMA
A PUBLICATION FOR MAGMA FAMILIES

Update

VOLUME 2 NUMBER 2 San Manuel, Arizona January 1986

See inside also for Pinto Valley story

We welcome Pinto Valley readers

This issue of *Magma Update* is being mailed to all Pinto Valley employees because it contains comprehensive information about our proposal for negotiations.

This issue also contains many special stories on products and product quality which, after all, is the bottom line of everything we do at both Magma and Pinto Valley.

We welcome our Pinto Valley readers and would be pleased to hear from you about the paper and this issue.

1986 negotiations begin

Magma Copper Company and Pinto Valley Copper Corporation made proposals in Tucson Friday, January 24, to unions representing 3,000 employees at the two Arizona mines for reductions in wages averaging $4 per hour, elimination of automatic cost-of-living adjustments and some adjustments in existing benefits plans.

In making the proposals, Brian Woolfe, executive vice president of both companies, cited continuing losses and projections for continued low copper prices as the reasons for proposing lower labor costs.

In addition, to retrofit the San Manuel smelter by January 1, 1988, to meet EPA standards requires expenditures which could reach $135 million.

Woolfe made it clear that Newmont Mining Corporation is unwilling to continue to support the mines unless they reduce their production costs to less than 60¢ per pound of copper.

Woolfe added that Newmont is convinced that this cannot be done without the permanent labor cost reductions the company proposed.

Acknowledging the lower copper prices caused by foreign copper producers, Woolfe emphasized that the imports are here to stay and that Magma and Pinto Valley must reduce costs to become competitive.

He also cited the competition from lower cost domestic copper production, both that currently in production and other facilities under construction.

In noting that 1986 is the year of decision for Magma and Pinto Valley employees, Woolfe noted that,

"While cost reductions have helped us survive at this point, they are not enough to allow us to become competitive.

"Our hourly labor costs have to be reduced," Woolfe said.

Hourly labor costs are about $20.00 per hour including benefits with direct wages averaging $14.30, Woolfe said.

Actual pay rates before benefits range from $12.05 per hour to $15.61 per hour.

Even with the reductions, wage and benefit levels at Magma and Pinto Valley would still be among the highest in the southern Arizona labor market, explained Woolfe.

Although these are initial proposals they are serious proposals, Woolfe emphasized.

"We are prepared to negotiate the form of the reductions but we have to have permanent reductions of this magnitude," Woolfe said.

The full text of Brian's talk are printed in a special supplement insert in this issue.

The year of decision

A message from Brian Woolfe

In our meeting with union representatives on January 24, we emphasized that 1986 is the year of decision for Magma and Pinto Valley. Many cost savings have been accomplished with the cooperation of all hourly and salaried employees.

But, Magma and Pinto Valley had pre-tax losses of $100.5 million in 1985 and have had pre-tax losses of $330.9 million since 1981. And at the end of 1985 we were in debt to lending institutions and Newmont, which owns both Magma and Pinto Valley, a total of $304 million.

We made it clear at our meeting that Newmont has decided it is unwilling to continue to support us unless we get our production costs down to less than 60¢ a pound. Newmont is convinced that this can't be done without the level of labor costs reduction we have proposed. Newmont's other businesses are profitable but Newmont will not continue to support us unless it sees that we have a reasonable chance to reduce losses and again become profitable.

No one else can help us. It is up to us. Whether Magma Copper Company and Pinto Valley Copper Corporation survive or not depends on what we do in 1986.

We believe the proposals (which are printed on page 3 of this issue) are critical to our survival. We realize the loss in income these proposals mean to our employees but such reductions are essential if we are to continue to provide jobs. Even with the reductions, the resulting wage and benefits levels will still be among the best available in Southern Arizona.

Most of our losses are caused by low copper prices and low copper prices are likely to continue. Our efforts protesting lower cost imported copper have been futile. In addition, there are domestic producers - Phelps Dodge and Kennecott - who have made, or plan to make, changes that will enable them to better compete with lower cost foreign producers. We must make the necessary changes to give us the opportunity to better compete. Since we cannot control prices, we can only control costs.

During the last few years, to lower costs we have:

- Reduced supply and material costs;
- Reduced the number of employees, hourly and salaried;
- Involved our employees to help in operating more efficiently;
- Changed our mining plans;
- Withheld pay increases for salaried employees.

While these reductions have helped us survive to this point, they are not enough to allow us to continue to compete. Our hourly labor costs of almost $20 per hour must be reduced. Also, barriers - contract language, jurisdictional and craft lines - must be removed so that each job can be done in the most efficient and expeditious manner. These changes require us to change our work habits but will assist us in maintaining a high standard of living.

We are determined to continue to offer good paying jobs, even though we cannot guarantee any jobs in the future. We are prepared to negotiate and to consider modifications to our proposals, but permanent reductions in labor costs must be made and we must be able to operate as efficiently as possible. Our desire is to achieve signed new collective bargaining agreements with the unions before July 1.

Our present economic situation is not the fault of any single event or group but it does require the efforts of all of us to overcome its harmful economic effects. I remain optimistic that the unions will respond to these proposals in a postive manner and will join us in a cooperative effort which will enable us to continue operating.

I encourage everyone to continue to make suggestions to reduce costs and improve efficiency. There is much to be done but it can be done.

Boilermakers' QWL achieves results

PLANT MACHINE SHOP QWL members, from left, Ron Patnode and Barr Quick, both journeyman welders, made a successful presentation to management.

Photo by Anker Bergh

By TED JOHNSON

The boilermakers QWL group in the plant machine shop made an excellent presentation to management concerning the topic of material handling in and around the shop.

The group collected data for four months recording forklift availability and time spent in locating alternate lifting methods.

They also contacted the various vendors of lift trucks in order to get prices of new units that would fit their requirements.

The group consisted of Ted Walters, section foreman, Ron Patnode, Barr Quick, Charlie Hagan, Max Parisot, Gene Boswell, Harvey Robinson, Jose Olajde, Dave McQueen, Perry Sullivan, and Jerry Ham, all journeyman welders and Richard Perez, journeyman tinsmith.

As a result of the presentation, an 8,000 capacity forklift was assigned to their department, a parking area for the lift truck was designated, and a sign-up sheet requesting the lift truck was posted.

Employees set records!

Magma employees, working better and helping improve their jobs through quality circles and better communication, set production records in 1985. They did it with fewer people and at lower cost than ever before! Everyone at Magma made an effort and the following results are the easiest to measure:

	New Record, 1985	Old Record
Smelter - new copper	192,304 tons	189,284 tons (1975)
Acid plant - sulfuric acid	388,889 tons	362,767 tons (1976)
Refinery - refined copper	201,364 tons	187,432 tons (1975)
Rod plant - saleable rod	163,951 tons	160,293 tons (1984)

Meeting A Goal, Moving Ahead!

Magma financial data to be given to unions and to employees

Responding to a request from the United Steelworkers of America, Magma is making available financial data for the past five years for analysis by the union's staff.

This data will enable the union to substantiate statements by the Company as to its losses and need for labor cost savings.

Much of this data has never before been requested by a union or provided by Magma.

The material is being gathered and will be sent to Pittsburgh in late February.

The same material will be made available for all employees and copies will be placed in "reading rooms" in major departments and divisions.

None of the material can be taken home because it is too voluminous and costly to make large numbers of copies and, in order to share with all employees, the material will be kept in the reading rooms.

A list of the reading rooms will be placed on communication center boards as soon as the arrangements are made, probably in late February or early March.

Questions on proposal will be answered in future Updates

All employees should have received a copy of Magma's proposals for the next labor contract by mail, and they are also printed on page 3 of this issue.

Many employees will probably want to ask questions about specific items on the proposal.

Questions will be answered in the upcoming issues of the *Magma Update*, but similar questions will be combined for a single answer.

Questions can be asked by way of a telephone "information line" on plant extensions 195 and 439.

Questions will be recorded and employees do not need to give their names.

Written questions will also be accepted by *Magma Update* through the intercompany mail or U.S. mail, and again, no names are required.

The purpose of this information service is to inform all employees of the facts and to help employees understand company proposals.

SMARRCo gets all new ties

BY TED JOHNSON

In April, 1984, the San Manuel Arizona Railroad Company applied to the Arizona Department of Transportation for a $125,000 grant to partially fund a crosstie renewal project on the SMARRCo tracks between San Manuel and Hayden.

After several visits to SMARRCo by the ADOT staff representative, it was determined that SMARRCo did, indeed, need to replace 10,000 crossties and was a qualified common carrier.

For the next 14 months SMARRCo and Magma submitted several reports while struggling through the usual governmental red tape.

Finally, in May the tie renewal project was started and 3 months later the project was completed.

A total of 10,080 crossties were installed making the SMARRCo line one of the best in the southwest.

As a result of the change out, there are used ties available for purchase by Magma employees for landscaping, corrals, etc.

Employees interested in obtaining the used railroad ties should contact John Cassarino, plant services superintendent at extension 341.

Eldon's world . . .

By ELDON HELMER

Tech forum to meet

The San Manuel Technical Forum begins its 1986 schedule on Thursday, January 30.

Sharon Young, metallurgical director, will talk about the impact of cathode purity on rod quality.

The metallurgical and refinery tankhouse departments performed considerable research and testing during 1985 on cathode quality and Sharon has the most current results to discuss.

All employees whether hourly paid or salaried, whether technical or non-technical are invited to the monthly technical forums to increase their understanding of technology which is applied at Magma.

The January meeting will be at the San Manuel Elks Lodge with a social hour at 4:00 p.m. and the discussion at 4:45 p.m.

The meetings are usually over by 5:30 p.m.

Tax reform act would hurt Magma

If you've been looking for a reason to write your U.S. Senator, you might consider expressing your opinion on the Tax Reform Act which has passed the House and will be the subject of hearings in the Senate Finance Committee beginning this month.

The Act proposes two things which jeopardize Magma's survival.

One is the minimum income tax which would simply increase the amount of Magma's loss.

Yes, the Congress proposes Magma pay income tax with borrowed money.

Second, the Act proposes to eliminate the investment tax credit which enables Magma and Newmont to plan capital expenditures for more efficient operations and environmental controls.

Without the investment tax credit the oxide project will cost an additional $5 million and the proposed smelter retrofit an additional $12 million.

That $17 million could be plowed back into additional capital improvements such as the proposed in-situ leaching project; but, if the IRS takes it, the money won't be available for anything at San Manuel.

Magma's long term debt now reaches $280 million and our annual interest expense is now up to $16.5 million.

All we need now is higher taxes!

ARIZONA'S SENATORS

Senator Barry Goldwater
363 Senate Russell Office Bldg.
Washington, D.C. 20510
(202) 224-2235

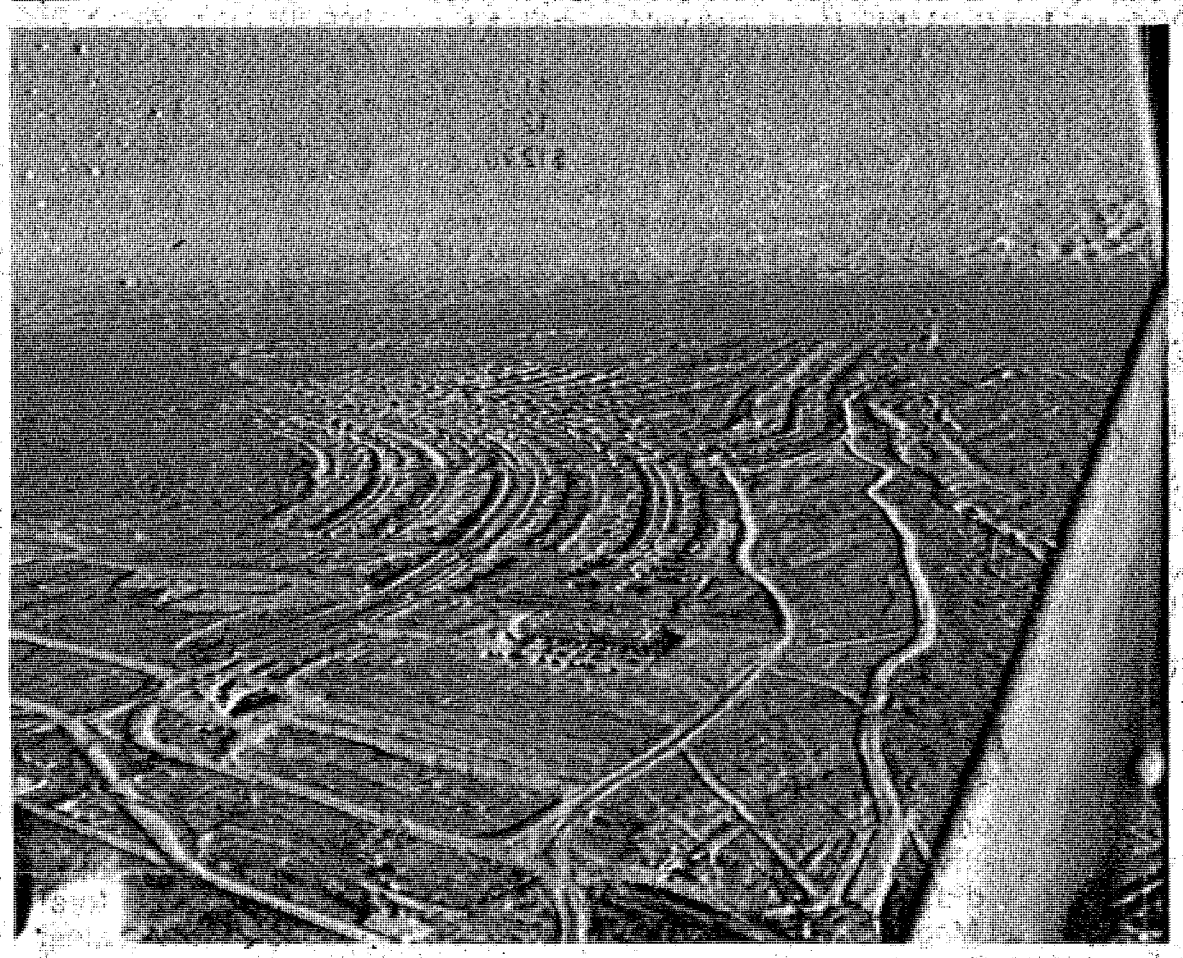
Senator Dennis DeConcini
328 Senate Hart Office Bldg.
Washington, D.C. 20510
(202) 224-4521

In Tucson
Federal Bldg., Box 7C
301 West Congress
Tucson, AZ 85701
629-6334

In Tucson
Suite 1540, Arizona Bank Bldg.
33 North Stone
Tucson, AZ 85701
629-6831

You can also send a short, special, low cost "Public Opinion Telegram" by calling Western Union at 800-325-6000. Cost is $4.25 for 20 words or less, billed to your telephone number.

From our scrapbook . . .



San Manuel - 1954

WITH A POPULATION OF 732, the first 1,000 houses in San Manuel were still under construction on January 21, 1954. But there was no post office, no paved highway, telephone lines to Tucson weren't yet completed, and high school students were riding the bus on a 142 mile round trip to Florence for classes. The community was not a company town but was a private venture of the Del E. Webb Construction Company which promoted the real estate venture far and wide and either sold or rented houses to whomever was interested. It wasn't a commercial success and Magma purchased the Webb holdings in 1955 in order to secure housing for the growing number of permanent employees.

Economic proposals for 1986 negotiations presented to Magma/Pinto Valley Unions on January 24, 1986

1. 54-month agreements to expire December 31, 1990.

2. An average $4 per hour wage reduction. The proposed new wage schedules which achieve the $4 wage reduction and still offer rates which are competitive are attached as Exhibits I (Magma) and II (Pinto Valley). We are prepared to discuss benefit reduction alternatives to offset some of the proposed wage reduction.

3. Modify all agreements, as necessary, to recognize that all production and maintenance work shall be accomplished by the most efficient, economical and expeditious methods available to the Company.

4. COLA to be eliminated from all agreements.

5. All future cost increases in Medical and Dental Plans will be paid by employees. (Any increase in per capita claims expense above level of base six months (January - June 1986) will be paid by employee payroll deduction in succeeding six months i.e. if current per capita cost is $175 per month and it increases to $185 per month, each employee would pay $10 per month.)

6. New employees hired on and after July 1, 1986, will be covered by a new Comprehensive Medical Plan (Exhibit III) and a new Comprehensive Dental Plan (Exhibit IV).

7. New MCC employees hired on and after July 1, 1986, will not participate in the Supplemental Death Benefits Plan and the Severance Pay Plan.

8. New PVCC employees hired on and after July 1, 1986, will not participate in the Sick/Severance Pay Plan and the Employee Benefits Plan.

9. New employees hired on and after July 1, 1986, will be covered by a new Pension Plan which will have no supplemental pensions (disability, 70/80, 30/60). Preretirement or post-retirement surviving spouse benefits will be provided on an actuarially reduced basis. Age 65 will be the normal retirement age. For present employees there will be no change in the Pension Plan.

10. Modify the Medical Plan for Retired Hourly-Rated Employees of Magma Copper Company to provide that coverage for those who retire on and after July 1, 1986, is only available to those age 60 and over with at least 10 years of Credited Service at the time of retirement from employment with the Company.

11. Modify the Optional Medical Plan for Retired Hourly-Rated Employees of Pinto Valley Copper Corporation to provide that coverage for those who retire on and after July 1, 1986, is only available to those age 60 and with at least 10 years of Credited Service at the time of retirement from employment with the Company. The Optional Plan would be the only plan available to retirees.

12. Modify the Life Insurance Plan to provide that post-retirement coverage is only available to those who retire on and after July 1, 1986, who are at least age 60 and have at least 10 years of Credited Service at the time of retirement from employment with the Company.

13. Modify the Severance Pay Plan of MCC to provide that payment is only made to those who retire on and after July 1, 1986, who are age 60 or over with at least 10 years of Credited Service at time of retirement from employment with the Company.

14. At PVCC reduce the annual contribution to the Sick/Severance Pay Plan from $400 to $100.

15. The companies reserve the right to amend, to modify or to add to these proposals.

EXHIBIT I

MAGMA COPPER COMPANY
PROPOSED NEW HOURLY RATES
JANUARY 24, 1986

Pay Grade	Current (1) Rate	12/31/85 Number of Incumbents	Proposed Rate	$ Reduction	% Reduction
1	$12.030	194	$ 6.80	$5.230	43.5
2	12.333	63	7.30	5.033	40.8
3	12.636	335	7.80	4.836	38.3
4	12.939	28	8.30	4.639	35.9
5	13.242	197	8.80	4.442	33.5
6	13.545	574	9.30	4.245	31.3
7	13.848	126	9.80	4.048	29.2
8	14.151	216	10.35	3.801	26.9
9	14.454	844	11.30	3.154	21.8
10	14.757	18	11.80	2.957	20.0
11	15.060	55	12.30	2.760	18.3
12	$15.363	11	$12.80	$2.563	16.7
Weighted Average	$13.66	2,661	$ 9.66	$4.00	29.3

(1) Does not include $0.14 unrolled COLA

EXHIBIT II

PINTO VALLEY COPPER CORPORATION
PROPOSED NEW HOURLY RATES
JANUARY 24, 1986

Pay Grade	Current (1) Rate	12/31/85 Number of Incumbents	Proposed Rate	$ Reduction	% Reduction
2	$11.91	9	$ 6.70	$ 5.21	43.7
3	12.19	26	7.20	4.99	40.9
4	12.50	27	7.70	4.80	38.4
5	12.81	33	8.20	4.61	36.0
6	13.13	5	8.70	4.43	33.7
7	13.45	5	9.20	4.25	31.6
8	13.78	114	9.70	4.08	29.6
9	14.25	59	10.25	4.00	28.1
10	14.54	132	11.15	3.39	23.3
11	14.85	1	11.70	3.15	21.2
12	15.16	0	12.10	3.06	20.2
13	$15.47	10	$12.70	$2.77	17.9
Weighted Average	$13.82	421	$ 9.82	$4.00	29.2

(1) Does not include $0.14 unrolled COLA

EXHIBIT III **Comprehensive Medical Plan**

1. Benefits:
   a. 90% of usual, reasonable and customary (URC) charges for out-patient surgery.
   b. 90% of URC for second opinion surgery.
   c. 90% of pre-admission testing charges.
   d. 80% of all medically necessary charges except psychiatric and elective surgery performed without concurring second opinion.
   e. 50% of (i) psychiatric care and (ii) elective surgery performed without concurring second opinion.

2. Deductible:
   $100 Per Person/$300 Per Family/Per Calendar Year.

3. Stop Loss (The maximum deductible and 10% and 20% co-payments for any covered individual would not exceed $1,000 per person, $3,000 per family per calendar year. Thereafter the plan would pay 100% of those covered medical expenses otherwise payable at 80% or 90% for the balance of the year.):

   $1,000 Per Person/$3,000 Per Family/Per Calendar Year.

4. Maximum Benefit:
   $250,000 Per Person ($10,000 annual psychiatric limitation).

EXHIBIT IV **Comprehensive Dental Plan**

1. Benefits:
   a. 100% of usual, reasonable and customary (URC) charges for routine oral examination prophylaxis. Not subject to deductible.
   b. 80% of URC for x-rays, extractions, fillings, etc. Subject to deductible.
   c. 50% of URC for bridgework, dentures, bridges, orthodontic (age 19 and under only), oral surgery.

2. Deductible:
   $50 Per Person/$150 Per Family/Per Calendar Year.

3. Maximum Benefit:
   $1,000 per plan year per person, except orthodontics
   $650 lifetime for orthodontics.

Future sales may depend on measuring how we work - not on the testing of final products

BY SAM RIECHERS

A statistical consultant was at Magma recently to train employees in the principles and use of Statistical Process Control.

Mike Johnson, senior consultant, Rieker Management Systems, was here on January 21 and 22 to conduct the training sessions with management, engineering, and training staff from the metallurgical, refinery, and engineering departments.

Born and educated in England, Mike now makes his home in Phoenix.

He will returning on February 4 and 5 to complete this round of training.

Statistical Process Control (SPC) is a technique for monitoring and controlling a process so it will make a more consistent product.

The "statistical" tools used are things like averages and probabilities -- the same kinds of numbers we use everyday when we talk about sports or the weather.

The "process" can be almost anything, from making starter sheets or melting copper to loading boxcars or even processing insurance claims; in other words, any act which produces goods or services as its output can be considered as a process.

"Control" of that process means we try to make a product which is acceptable to the user *as produced* as opposed to trying to control the *product* by reworking it or sorting out the part that is unacceptable.

The result is more consistent quality with fewer defects, less scrap, fewer mistakes -- in other words, less cost.

"Basically, there are two kinds of errors you can make in any process.

"You can fix it when it's not broken, and you can leave it alone when it is broken," said one of the participants after the training session.

"SPC techniques can tell you what your status is."

One of the results of SPC is finding out the capabilities of the process itself, independent of the specifications for the product.

If the process is not capable of consistently meeting the specifications, it is up to management to fix the process.

This makes SPC a popular tool for operators.

On the other hand, if the process is capable, it can be adjusted or "fine tuned" to make the best product more of the time.

This helps everybody and makes SPC popular with managers.

Training is scheduled to start in the rod plant in March with the new SX-EW plant to follow.

The employees who are planning the SPC approach at Magma are Sharon Young, metallurgical director, Bebe Burwell, refinery training foreman, Mary Korpi, senior quality control metallurgist, John Mikell, technical writer, Curtis Nielson, tankhouse general foreman, Sam Riechers, metallurgical engineer, Roger Rivers, refinery senior engineer, Randy Roberts, refinery engineer, Harry Rossi, industrial engineer, Mark Yancas, SX-EW assistant superintendent, Ken Watkins, rod plant general foreman, Mark Yarbro, SX-EW engineer, and Lee Browne, MCR plant manager.

TASK FORCE for implementing statistical process controls at San Manuel met with consultant Mike Johnson, standing. From left, John Mikell, Harry Rossi, Lee Browne, Mary Korpi, Curtis Nielson, Randy Roberts, and Roger Rivers.
Photo by Sam Riechers

New test tortures rod, twists it until failure

BY SAM RIECHERS

A new piece of equipment for testing our copper rod was recently installed in the cast house quality control laboratory and is presently under evaluation.

The new twist tester, made by Giuseppe Baldassarri Consulting & Engineering, twists an 8" piece of rod at 60 RPM 25 turns one way and then twists it back until it breaks.

By recording the number of turns to failure and examining the broken ends, the cast lab technician can find defects in the rod which might not otherwise be detected.

The test is being evaluated through metallurgical examination of the failed rod and by correlating the test results to drawing performance in customer's plants.

This new procedure has been added to the battery of tests already performed on a routine basis on each coil of rod.

Performing all those tests and analyzing the various solutions and lubricants used in the rod plant make for a couple of very busy people in the lab.

IVER IVERSON, cast lab technician, with new twist tester.
Photo by Sam Riechers

"The cast lab technicians give us reliable, timely testing, which not only assures a top quality rod going to our customers," says metallurgical director Sharon Young, "but also provides data to the rod plant personnel to help them in their efforts to make the best rod ever."

Simple device saves refinery time and money

By RANDY ROBERTS

The copper in solution in the tankhouse electrolyte is maintained at desired levels by plating excess copper in the electrolyte onto copper starter sheets in 16 special cells in the "liberator" area.

It's called liberator because oxygen is liberated from the electrolyte during the plating of copper.

But hydrogen is also produced which combines with the electrolyte to increase the acid content of the electrolyte at the outlet of the cells.

Copper starter sheets are suspended in the solution by two thin strips of copper called "loops" which are subject to corrosion at the electrolyte level due to the liberation of oxygen.

And, this corrosion causes the loops to break allowing the cathode to fall to the bottom of the cell.

When this happens, the plastic cell liner is damaged and cell efficiency drops (because fewer cathodes remain to be plated) resulting in a production loss.

Recently, as many as 30 of the 45 cathodes in cells suffered one or two broken loops after several days of plating.

When the plated cathodes were lifted from the cell with the cathode rack, the one remaining loop would often fail causing the cathode to pivot off of the rack and fall with a risk of serious injury or equipment damage.

Those cathodes with both loops broken had to manhandled out of the cell -- a messy and risky procedure for those involved.

Not only were broken loops a safety hazard, but they often forced the operator to "pull" the cell after only 4 or 5 days of plating instead of the normal 7 days -- a waste of time and money.

Curtis Nielson, tankhouse general foreman, suggested a possible solution to Robert Castillo, slimes/liberator foreman.

Robert and Don Boyce, liberator operator (currently a pumpman), put their heads together and came up with the concept of 1/4-inch thick stainless steel rings that could be stacked over the mouth of the overflow boxes to act as a variable weir.

This idea would allow the operator to gradually raise the electolyte level during the first day and a half of plating to plate copper onto, and thereby strengthen, the loops.

Robert and Don came up with a workable design using a tapered stainless steel cylinder with a three-legged cage, sticking-up over which up to 13 rings could be stacked to form a taller cylinder.

A prototype model was made by machinist Jim Ozias and welder John Rios for evaluation.

Based on experience and trial and error, an optimum schedule for varying the cell levels with the new overflow weir was developed.

After the initial 33 hour loop strengthening, the entire weir is pulled to lower the cell solution level several inches so that the loops can be washed clean of corrosive copper sulfate.

Plating continues at this lowest level for 12 hours until the first ring is dropped in place followed by one ring each 12 hours thereafter until the cell solution level is brought up as high as possible.

The remaining weirs were carefully fabricated by Jim and John and are now in use.

Through the ingenuity and craftsmanship of these six men the broken loop problem in the liberator has virtually disappeared.

Liberator "partial decop" cells are now averaging plating efficiencies 10 percent higher over record 8-day plating cycles," says Robert.

The efforts of Curtis, Robert, Don, Brad, Jim and John is another example of the refinery's continuing use of teamwork to solve nagging operational problems.

TANKHOUSE INNOVATORS ARE, from left, Curtis Nielson, John Rios (holding the new weir), Robert Castillo, Don Boyce, and Jim Ozias. Brad Clark missed the picture taking.
Photo by Randy Roberts

Magma Copper Company/Pinto Valley Copper Corporation

Opening 1986 Negotiations Meeting January 24, 1986

Statement of Brian Woolfe, executive vice president

Thank you for coming here today. This meeting gives me the chance to explain the problems which we are facing and how we propose to tackle those problems. In particular, I would like to welcome the delegation from Pinto Valley. Having assumed responsibility for Pinto Valley only recently, I have not had a great deal of time to get to know the people there. I hope to correct this during the next several months.

I would first like to point out to you that we, both sides of this table, have a common goal. We must never lose sight of that goal. Quoting I.W. Abel, former president of the United Steelworkers of America:

"The basic need of every company is to make a profit. Only then can it provide jobs and earnings for employees."

I believe Mr. Abel's profound statement to be the guts of the issues which we will be discussing during the coming months. We have to recognize the fact that our fundamental problem at Magma and at Pinto Valley is that we are not making a profit and have not been doing so since 1981.

How can we continue to operate while losing money? Of course, we've made money in the past. Newmont was willing to sustain these losses up until now because its other businesses have been profitable and because it was more optimistic on copper prices. Newmont wants to support us *through these tough times, but only* if it believes we can be profitable in the future. Faced with continuing depressed prices, Newmont cannot justify continuing its support of losing operations unless we are on the road to profitability by reducing our costs.

The decision, "Do we continue to operate?" has to be made soon, and at what level. If you have been in this business very long, you know that once you decide to close, you may never start up again. Once we turn off the flow of any income from copper sales, start-up costs are so great that it becomes easier - less costly - to stay closed.

So long as we and, more importantly, Newmont, our owner feel we have a basis for optimism for the future, it's better to keep operating than to close. Our losses are so great, however, that additional action on our part is necessary.

We will be providing the Steelworkers' international union with a great deal of important financial information to substantiate the extent of the losses which our two companies have suffered over this time span. Some of this is information we have never publicly disclosed before. The pre-tax losses at Magma and Pinto Valley amount to some $330.9 million over the five years. In 1985 alone Magma suffered pre-tax losses from operations of $54.1 million and Pinto Valley $6.1 million. In addition, Magma has another $40.3 million in losses connected with the Superior Division closure.

Last January in Albuquerque, I reported to the Magma Unity Council on the state of our industry and our company. We reviewed our losses as an industry and as a company.

Let's look at where we are with 1985 included:

INDUSTRY LOSSES

1982	$623,000,000
1983	$400,000,000
1984	$400,000,000
1985	$500,000,000

Let's look at how these losses have caused mine closings and the loss of 25,000 jobs since 1980.

(See chart on this page.)

These numbers were increased by lay offs at Inspiration and Pinto Valley last week. Now let's look at the Magma/Pinto Valley pre-tax losses.

(See chart on this page.)

At the end of 1985, our indebtedness to Newmont and lending institutions totalled $304 million. This debt is significant as we are unlikely to get financing for additional losses unless we can show we can reduce our debt.

These figures for Magma and Pinto Valley are substantiated in the data we will be furnishing the unions.

Quite simply, the clock is running down and we have to demonstrate this year that we can reduce our costs and position ourselves to return to profitability or drastic remedies will have to be applied. 1986 is a time of decision for all of us. Newmont won't continue to support us at our current cost level. These are the most important negotiations we have ever conducted.

U.S. COPPER INDUSTRY

OPERATING PROPERTIES WORKFORCE COMPARISON 1980-85

JANUARY 21, 1986

	1980	12/1/85	Loss
Anaconda	2,525	-0-	2,525
ANAMAX	1,350	43	1,307
AMAX-Cartaret	1,808	610	1,198
ASARCO	4,616	2,365	2,251
Cyprus	1,747	514	1,233
Duval	2,933	1,103	1,830
Inspiration	2,116	1,202	914
Kennecott	10,892	1,893	8,999
Magma	6,274	3,340	2,934
Noranda	530	55	475
Phelps Dodge	6,785	3,796	2,989
Pinto Valley	847	657	190
	42,423	15,578	26,845

PRE-TAX LOSSES: 1981-1985

	Magma	Pinto Valley	Total
1981	$25,033,000	$3,479,000	$28,512,000
1982	56,548,000	34,964,000	91,512,000
1983	53,307,000	3,835,000	57,142,000
1984	44,069,000	9,129,000	53,198,000
1985	94,426,000	6,059,000	100,485,000
	$273,383,000	$57,466,000	$330,849,000

The difficult management decisions that need to be made by Newmont in 1986 will affect the future and job security of all of us - me and you. If Newmont money is directed to better investment opportunities, Magma and Pinto Valley may cease to exist in their present form. To serve its shareholders, Newmont has to invest money where it thinks it can get the best return. Its current operations in gold, coal and petroleum are all profitable. Copper is not. If we don't become profitable, our future is short.

Surviving is what we intend and are committed to do. There are many factors not under our control that affect whether or not we will survive. You should be aware of the factors which neither of us can control. You must be aware of and respond positively to the factors which we can control. We must take control of our own future.

This brings me back to where I started. Being here today gives me the opportunity to tell you about three specific areas:

1. The major problem we're facing.
2. What we have done to reduce costs in the areas where we have some control.
3. The help we need from you - and we need it as soon as possible.

Let's look at the first of these three points.

1. The major problems we're facing.

Our biggest problem is that a large part of the world's copper production has come under the control of governments like Chile, Peru, Mexico, Zambia and Zaire. Chile is by far the biggest producer with a production of 1,000,000 tons out of a world consumption of 7,000,000 tons. These countries need to sell their copper to get the dollars to pay for oil, food, and interest on their foreign debts. They also do not want the political problems that large numbers of unemployed copper miners would create. In effect, they prop up their governments with copper production.

In some cases, like Chile, their ore-bodies are rich enough and big enough that they can make money at copper prices which cause the U.S. mines to close or to operate at a loss.

Our foreign competitors, Chile, Zaire, Zambia and Peru, have many advantages over our American producers of copper. Here are several very important advantages that the foreign producers enjoy:

1. Ability to obtain low cost (or no cost) loans from world banks.
2. Ore grades ranging from 1.5% to 2% copper, two to three times our U.S. producers' grades.
3. Government subsidized operations.
4. Fewer government regulations and in particular no environmental controls which add some 15¢ per pound to the price of copper in the United States. Both Cananea and Nacozari just south of the border will shortly be operating with no environmental controls.

Continued on next page.

Brian Woolfe's statement at opening of negotiations, January 24, 1986

The result is production costs that are much lower per pound compared with the costs of the typical U.S. producer.

Our government will not protect us from foreign competition by imposing tariffs and quotas. We have tried that in a cooperative effort of both companies and unions. It didn't work. The problems are so complex in this area that this Administration - or any other Administration - will not respond in any favorable way due to the impact such a step would have in other parts of the economy. Even our copper customers - fabricators particularly - would argue that more U.S. jobs would be lost in fabrication than would be saved at U.S. copper mines, if imported copper were curtailed. We must accept the fact that we have foreign competition and that in order to survive, we will have to meet that competition in the market place. Therefore, in these talks and in reaching a settlement in 1986, we must accept that foreign competition is a factor over which we have no control. It affects us, but we cannot make it go away. We must lower our costs.

Overall, free world copper usage is forecast to increase at less than 3% annually in the next few years. There are several reasons for this.

Substitution of other materials is displacing copper and reducing its use in industry. Some of these you will remember - aluminum cable replacing copper cable; fiber optics replacing copper wire in the telecommunications industry; aluminum radiators for cars; etc.

Although we have attempted to capture new markets, the gains haven't been great tonnage-wise. Through the efforts of the Copper Development Association (CDA) and the International Copper Research Association (INCRA), the copper industry is seeking new products and applications. Together these organizations have helped develop markets in such areas as: solar heating, fire sprinkling systems, plumbing systems, electric vehicles, copper/nickel alloy hulls for ships, a radically new copper automobile radiator, sheathing offshore ocean structures, soil additives for agriculture and many other areas.

In addition to our foreign competition, we must acknowledge our domestic competitors such as Phelps Dodge, White Pine and Kennecott who either already produce or plan to produce copper at costs well below current copper prices.

You may have read about Kennecott's plans to spend $400 million in Utah for modernization of facilities. In its announcement, Kennecott said the physical improvements and expected labor cost reductions would allow it to produce copper at about 51¢ per pound. They are fortunate in having much richer ore than we have. Phelps Dodge announced a new large SX plant at Morenci to produce copper at about 30¢ per pound. This production will supplement existing low cost leach copper production at Morenci and at Tyrone. As distasteful as it may be, you cannot ignore that lower labor costs and the ability to use its labor force more efficiently are major reasons why Phelps Dodge was able to report profits in 1985 when the rest of us were reporting losses.

White Pine is coming back into production thanks to significant labor cost concessions and the ability to make more flexible and efficient use of labor. The Steelworkers and White Pine made a five year agreement with total labor costs capped at less than $12 per hour per employee from the former $20 per hour per employee labor cost figure. That gives White Pine a significant cost advantage over Magma and Pinto Valley.

In addition to the foreign and domestic competition I've outlined above, we can't forget the potential open pit production which has been put on standby in the United States and Canada and which can be brought back into production fairly rapidly. This overhanging quick additional production could meet very short term price increases. It is a long term depressant on prices.

However, the longer a mine is kept out of production the more costly and more difficult it will be to bring it back into production. Eventually some of the closed mines which are presently on care and maintenance will be permanently shut down. Superior is an example of this. In late December we had to recognize that there is no realistic way to operate the labor-intensive Superior mine with its high labor costs with the copper prices which we can foresee in the future. That's why we took a $40,300,000 additional loss in December as it is our conclusion that operations won't be resumed at Superior under Magma management. If the current negotiations to find a buyer or to lease the mine don't succeed, we will start permanent closure and clean up of Superior shortly. That was a tough decision, but this is a period filled with tough decisions.

Now let's look at another factor we cannot control but which certainly affects us, copper price.

MAGMA REALIZED COPPER PRICE

1974	74.62¢
1975	63.07¢
1976	69.22¢
1977	66.43¢
1978	65.60¢
1979	90.81¢
1980	101.88¢
1981	83.72¢
1982	72.47¢
1983	75.12¢
1984	66.34¢
1985	65.89¢

In 1983, the average price for copper was 75¢ per pound. In 1984, that price was 66¢ per pound. And in 1985, the average price was again 66¢. Future predictions - by leading experts, including Booz Allen Hamilton and Commodities Research Unit Ltd. - for the price of copper are not encouraging. A one dollar per pound copper price simply is not in sight. We have to lower costs.

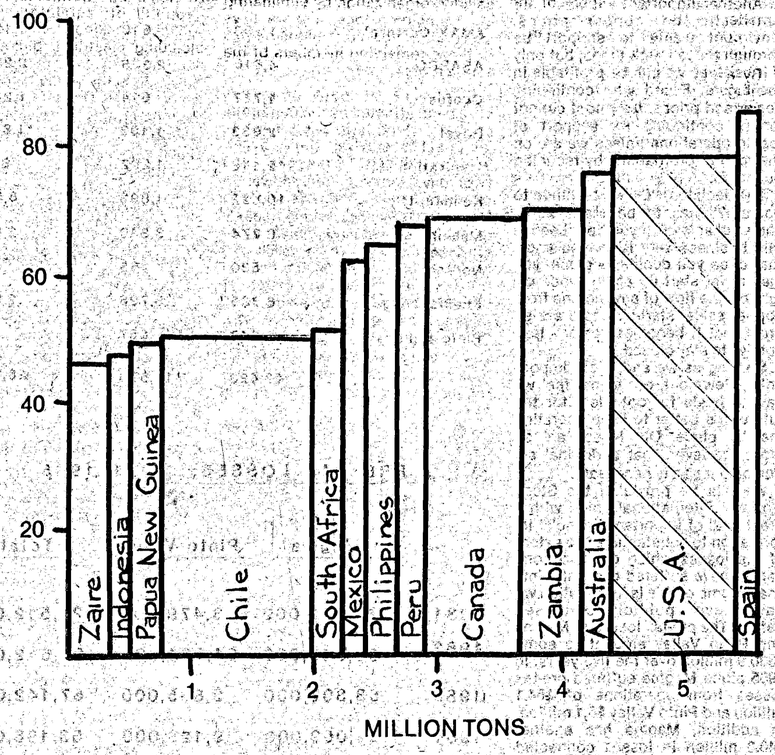
Now, those are some of the problems over which we have no control. They are not going to go away. They impact us very strongly. The message we get from studying these problems is loud and clear. If we cannot produce copper at a competitive price, a total cost of 60¢ a pound or less, we are left with no recourse except to shut down high cost operations. That's the bottom line in my message to you. Newmont does not feel we can compete and is unwilling to continue to finance us unless we can reduce our total cost of production to 60¢ per pound. I believe we can achieve the 60¢ figure by cost reductions from four principal areas (i) production of more leach copper, (ii) lower labor costs, (iii) improved mining methods and (iv) higher grade mining plans. It takes cost reductions in all four areas for us to be successful.

No one else will help us. The ball is in our court. We must help ourselves by lowering costs to compete. As part of lowering our costs, we have to remove barriers - contract language, jurisdictional and craft lines, - which impede productivity. Each of us has to be able to actually use all of his time and talents to more efficiently produce copper.

Let's look at how 60¢ will help us.

(See chart on this page.)

1984 FREE-WORLD SUPPLY CURVE



NOTES: •Supply curve based on production in 1984.
•Capacity additions/deletions are not assumed to change overall country costs.
•Cash costs exclude depreciation
•Curve expressed in current dollars.

Now, for our problems at Magma and Pinto Valley. First let me make it clear that we have to lower our costs regardless of whether or not we retrofit the smelter. If we do retrofit the smelter, it will require an investment of some 135 million dollars. Our studies to date show that a flash smelter taking 3,000 tpd day of concentrates has the lowest unit costs. However, Magma and Pinto Valley at best can only supply some 1,800 tpd of concentrate between them. The next best choice, a 2,100 tpd flash smelter, still leaves us with a short fall in concentrate feed which must come from elsewhere.

Our efforts to get another copper concentrate producer to join us in a joint venture to retrofit the smelter have so far been fruitless. The next best solution is to arrange for long term tolling contracts and/or long term contracts to purchase concentrate as high smelter throughput reduces our costs.

However, this is where we run into a "Catch 22" situation.

In order to negotiate a custom smelting or tolling contract, we have to have a price based on our estimated costs. A large part of these costs are labor costs. Our potential concentrate suppliers say they want to see definite evidence that we can reduce our costs as we predict we will, before they will consider a contract. To retrofit the smelter without assurance of the extra concentrate is extremely risky, if not impossible to justify. If we don't know our future costs for sure, we can't get a contract. We are rapidly running out of the time needed to retrofit the smelter and have it operating in 1988.

Another important aspect of the smelter question is how long we can get concentrates from the San Manuel and Pinto Valley mines.

By adopting the new high grade mining plan at San Manuel, by lowering labor costs and by increasing production from leaching, San Manuel can get its cost of production down within the target area of 60¢ per pound. However, under this plan, we will exhaust our ore reserves at San Manuel in 1993. The only area where we can get additional reserves is the Kalamazoo which will require some $60 million in development costs and this would be in addition to the $135 million mentioned for the smelter retrofit. Development of the Kalamazoo must start shortly if there is not to be a gap in production and it will require a considerable amount of money before production begins.

At Pinto Valley, with present costs, the expected life is about 11 years. With reduced costs, I believe this life expectancy could be extended. However, Pinto Valley costs cannot be reduced to the same extent as those at Magma and without a good smelting/refining contract, continuing operations may not be possible.

What can we do to solve these problems and compete successfully? There are several areas.

Making every effort to use modern technology is an area we have been working on and one which we will strenuously pursue. However, applying new technology and getting the full benefit from it, invariably requires the investment of funds and time. It takes time, as well as a lot of planning and investigation, to find and to apply new technology and, in nearly every case, money must be spent on new equipment and or plant.

An illustration of this problem is the mechanized block at the mine. We have borrowed equipment from Pinto Valley and also bought equipment. We have been limited in what could be done because the existing mine development plan did not fit a mechanized block. Really it is only in the virgin Kalamazoo ore body that a mechanized mining system could be developed to its full potential.

Now let me move to the second of my three points.

2. What we have done to reduce costs in the areas where we have some control.

For the past four years, at both Magma and Pinto Valley, we have changed the way we manage in a very serious effort to stay in business and to weather the economic storm. Some major examples of these changes include such activities as: (1) the development of quality circle groups throughout the San Manuel operations, (2) increased communications to keep all employees better informed about subjects of importance to each and every employee and his family, and (3) a revised management style, to recognize the needs of individuals in the workforce. All of these changes were designed to involve the whole work force in our efforts to overcome our problems as our work force was and is our biggest asset in problem solving.

We have renegotiated our gas, coal, utility and other supply contracts, resulting in savings of many dollars to our operations on a yearly basis. In addition, we have withheld general pay increases for salaried personnel; we have restructured the salaried organization by eliminating and combining jobs; and we have assigned increased responsibilities to those remaining members of the salaried workforce.

Employees at both properties have been affected by the numerous changes which have been made in our quest for survival. You've experienced reduced workweeks, and workdays, working with fewer co-workers, making the job go with fewer materials, or, in many cases, repairing the old equipment rather than replacing it. We have all been working under increased pressure to work smarter. And our people at both Magma and Pinto Valley have responded in a very positive way. This is a source of pride to the entire team. We are extremely thankful for their support in the past and hopeful for their continued support in the future.

In spite of the problems that we have faced in the past several years, our employees have achieved good safety records at both operations. Also during this difficult time, our union representatives have responded in many ways to our needs. We have experienced a healthy labor relations attitude in our day-to-day business dealings with union representatives at both properties. We recognize the problems created for our union representatives by the hurricane-force winds of change. We hope the spirit of cooperation which we have seen both at Magma and Pinto Valley will continue during our talks in 1986.

The common ownership and management of Pinto Valley and Magma has given us additional opportunities to cut costs. Pinto Valley and Magma have an interdependence, which, if properly exercised, can be an advantage to both. If not exercised, it could mean the individual operating costs of the two properties would be so high that their closures, independently of each other, would be inevitable in the not too distant future, if not immediately. The interdependence means Pinto Valley gains the advantage of lower cost smelting and refining. It was the high cost of smelting at Inspiration and refining at ASARCO that shut Pinto Valley down previously. By having the concentrates from Pinto Valley, Magma can increase its throughput at the smelter and refinery and thereby reduce its unit costs. This helps both properties.

We are doing joint purchasing by Pinto Valley and Magma. Placing orders together means larger orders, which in turn means better discounts. We have already achieved some success in joint purchasing of solvent extraction reagents and steel balls for the mills. But there are still areas to be exploited: rods, steel, mill reagents, tires, fuel and explosives for the pits, safety equipment, etc. Furthermore, it should be possible to reduce warehouse inventories. We will also have increased technical communication and interchange of technical expertise, eliminating duplicate facilities and personnel where possible.

There are definite advantages in working together and I intend to exploit every advantage I can to increase efficiency and to cut costs and with your help to save our jobs.

We have here at Magma and Pinto Valley and indeed throughout the United States, the best educated and best trained work force you could find anywhere. I believe we must take full advantage of this fact. At home our workforce is largely capable of servicing its own vehicles, making in-house repairs, including electrical, plumbing and painting. They have multiple talents. However, in the work place in nearly every case we restrict a person from the opportunity to develop or use talents other than those that he is specifically assigned to do. We can no longer afford the extra costs that this entails. If these work practices continue without modifications, it will mean lost jobs as operations will be forced to cut back or to shut down because these practices ensure needlessly higher costs because of lost time; lost efficiency; and a larger labor force than necessary. These are inefficiencies our foreign and, now, many of our domestic competitors do not have.

Now, to my third area. Despite efforts to reduce costs, we haven't done enough.

3. The help we need from you - and we need it as soon as possible.

In the Magma audio visual presentation of last July, we stressed the subject of change. We said, "Magma will change." And change we - Magma and Pinto Valley - must if we are to meet the needs and expectations of all who depend on our success. This includes employees who depend on wages, suppliers and vendors who depend on our purchases, local and state government agencies which depend on our tax contributions, and lastly, our investors - the stockholders - who depend on us to make a profit. We must show our parent company, Newmont, that we are the type of organization that makes continued investment worthwhile.

Labor costs are a significant proportion of our costs. Labor costs are the area where we need your help if we are going to be survivors. Let's look at what's happened to labor costs since 1973.

(See chart on this page.)

As responsible labor and management representatives, we must address the subject of labor cost reductions in a very serious, sincere and straightforward way. We cannot duck this responsibility. The welfare of all of our people, our labor organizations, and our companies is at stake. No one on this side of the table attempts to blame any one particular group for the dilemma which we find ourselves in today. Spending time blaming is nonproductive. We are in the situation we are in and we have to correct it.

Collectively, we have a common problem. Any hope for long-term profitability must include significant wage reductions and some benefits plans changes and more efficient and productive work practices. This is where you come in. Our proposal includes permanent wage reductions and is predicated on improving the way we utilize manpower. There is no other way. Again, I want to repeat the most important point in my presentation to you; if we don't get our costs down to 60¢ per pound, we have no future. We cannot lower costs sufficiently without the level of labor cost reductions we are proposing to you. More leached copper and high grade efficient mining plans won't work by themselves without lower labor costs. This is why I said earlier that 1986 is the year of decision. Newmont will make the decision, but what we do - you and I - will affect what they do about our futures at both Magma and Pinto Valley.

Continued on next page.

CHANGES IN PRICE, WAGES, CPI

1974-1985

	1974	1985	Net % Change
Price Per Pound	75c	66c	-12.0%
Average Wage	$5.585	$13.545	+143.0%
Consumer Price Index	148.0	318.2	+115.0%

Brian Woolfe's statement at opening of negotiations, January 24, 1986

WAGE SPREAD COMPARISON

1974-1985

	1974	1985
Laborer	$4.710	$12.030
Mechanic	$5.935	$14.151
	26%	17.6%

There is another area that affects costs and efficiency as far as labor costs are concerned and that is the way across-the-board raises have increased the wages of the unskilled jobs out of proportion to those of skilled jobs. If this continues, it will end up with every job, skilled or unskilled, paid the same wages. With no incentive to study and to train for more skilled work, we'll end up with a work force that will not be able to compete on any terms at all. This disparity is further confirmed by looking at what other employers in the area pay.

You will see that the non-mining labor market recognized the need to pay more for skilled than for semi-skilled jobs.

(See chart on this page.)

We must face these challenges as other companies and labor organizations have. I believe very firmly if labor and management do not change their ways and face up to the challenges from overseas and at home, we will both fail and it is the working people of the United States, not just at Magma and Pinto Valley, both salaried and hourly-rated, who will suffer. And we, both sides of the table, will properly be blamed because we lacked the courage to do what was needed. We must make changes in how we operate. We must achieve maximum efficiency and minimum costs. Even with the reductions we are proposing, we can be proud that our wage and salary structure will still be competitive in this area.

(See chart on this page.)

Let me again make our objective in these negotiations very clear to all concerned. We want signed agreements with the unions representing our employees by July 1, 1986, or sooner if at all possible. The sooner we lower our costs, the brighter our future. These agreements must include those changes -- labor cost reductions and the ability to do all work by the most efficient, economical and expeditious methods available -- which are vital and necessary to continued operations at Magma and Pinto Valley. We intend to negotiate these contracts with you, the labor unions representing our employees. Our problems and needs are peculiar to Magma and Pinto Valley. We are not concerned about other companies in our industry during these negotiations as we each have our own situations to consider. Certainly, a settlement at another company in the industry will be of interest, but only because it affects the cost of a competitor. It will not solve our problems. If it ever existed, pattern or coordinated bargaining does not exist in the copper industry in 1986. Magma and Pinto Valley must do their own thing in 1986 negotiations regardless of the other companies. It's our survival we're negotiating for, not that of ASARCO, Kennecott or Inspiration. Those companies and non-union operations are competing with us to see who will survive - us or them. We need a settlement that reflects our needs, not what's appropriate for a competitor.

If Magma cannot be "saved," Pinto Valley may not be saved. As I said before, Pinto Valley needs low-cost smelting. If the Magma smelter is not retrofitted, Pinto Valley would have to find a comparable low cost smelting and refining contract or close its sulfide production facilities. Even if it can continue to have low cost smelting and refining, Pinto Valley also needs to significantly lower its costs in order to have a better chance of surviving in the face of increased costs due to declining ore grades, increased stripping ratios and rising costs of material, equipment and supplies.

It is our intent that we, the two parties at this table, come to an early agreement on what is to be done. We want an agreement without the confrontation that seems to have marked past negotiations, or resulted elsewhere in people losing jobs and homes and dividing families. We want this, we believe our employees want this. We believe you want this also.

Now, let me say in conclusion:

First, we have several problems: foreign and domestic competition; a continuing slow growth in demand for copper; continuing low prices; a need to demonstrate our profitability in order to assure future investment funds; a requirement to lower costs.

Secondly, we've made changes in our operations to reduce costs where we can, including consolidating functions between Magma and Pinto Valley, increased mechanized mining; withholding general salary increases; reductions in the total number of employees; negotiating supply contracts with lower costs.

Thirdly, we need help from you as soon as possible. Labor costs have to be permanently reduced.

Mr. Slevwright will shortly be explaining our proposals to you. However, we are not firmly entrenched in some areas on the way these reductions, or the savings they represent, are implemented, only in the total amount of savings that are required. One reason why reductions of wage rates are important is that the cost saving is immediately effective.

Negotiated cost savings must be long term if we expect our shareholders to continue to support us and carry our losses until we can reduce our costs. Further investment or even continuing to carry us will be out of the question unless there is a definite opportunity for them to see the opportunity to make a reasonable profit on any money invested.

We asked to have this meeting early because we want you and our employees to be made fully aware of the problems we face. Also, we wanted everyone to have an opportunity to weigh the concessions asked for and to have the time to weigh all the consequences and possibilities without letting last minute emotions cloud the issues.

We are willing to discuss any proposals you may have that will give us the savings we ask for but in a different form. We can not agree to any proposals which increase our costs or reduce efficiency. We cannot guarantee jobs or continued operations. We must have labor cost savings if we are to continue operationg at our present scale.

I remind you again of our commitment to be survivors. We can and will be survivors. With your help, we believe we can survive together and continue to provide good jobs for good people.

Thank you for your patience in listening to me. If you have questions, I or one of my colleagues will attempt to answer them. Mr. Slevewright will now take over and explain the substance of the savings and improvements we are seeking.

AREA RATES

	1974	1985	Change
Janitor	$3.39	$5.26	+55.2%
Equipment Operator	$5.71	$11.28	+97.5%
Mechanic	$5.66	$10.26	+81.3%
Electrician	$6.13	$11.86	+93.5%
Welder	$5.66	$11.10	+96.1%

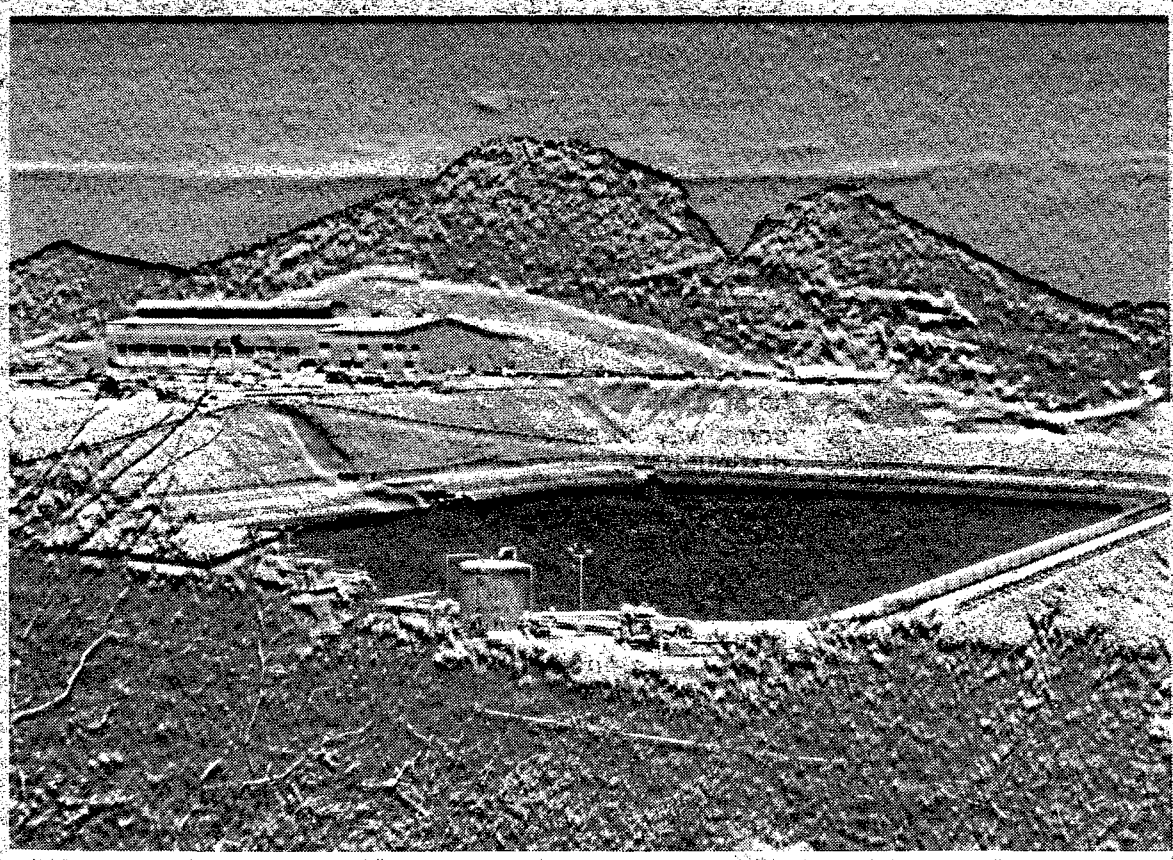
MAGMA RATES

Laborer/Janitor	$4.710	$12.030	+155.4%
Mill Operator	$5.410	$13.242	+144.8%
Miner	$5.585	$13.545	+142.5% (Avg.Rate)
Equipment Operator	$5.935	$14.151	+138.4%
Mechanic	$6.110	$14.454	+136.6%
Electrician	$6.110	$14.454	+136.6%
Welder	$6.110	$14.454	+136.6%

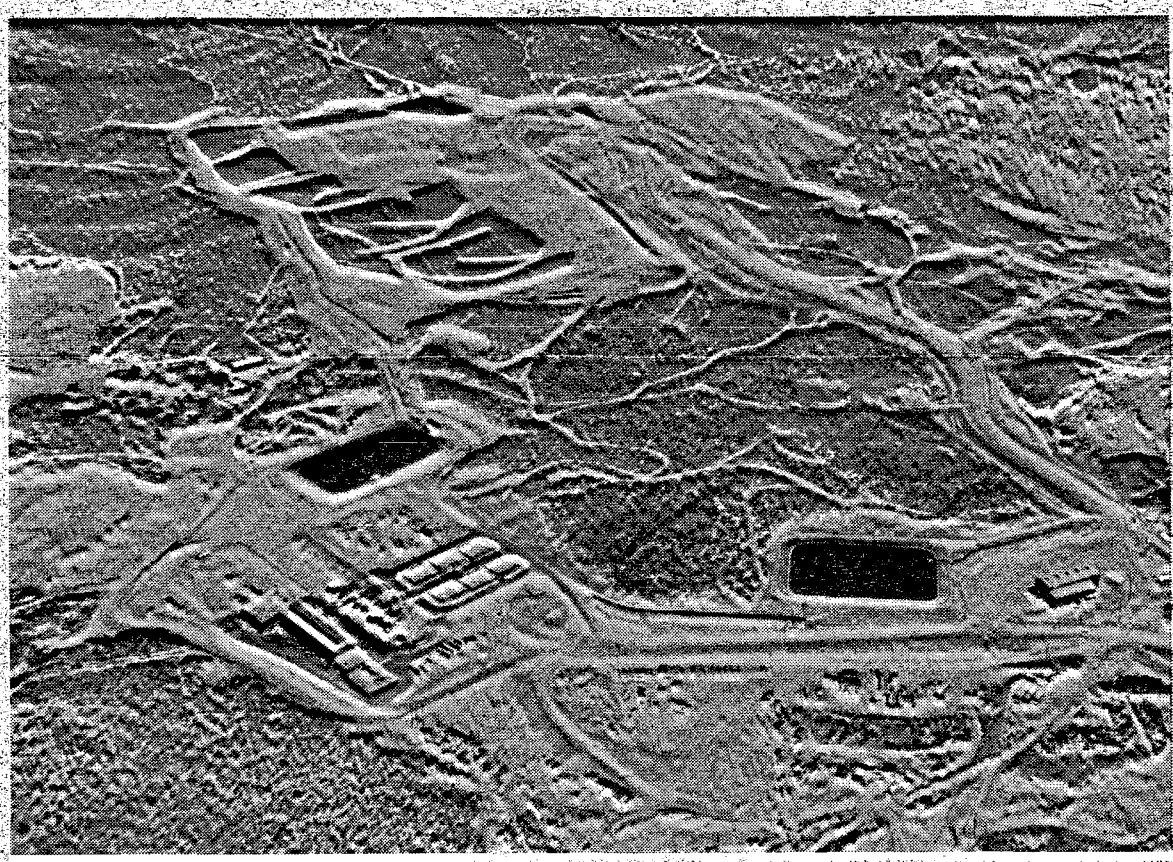
Consumer Price Index Change: 1974-1985 +115.0%

Cost of Living Adjustment (7/1/72 through 10/1/85) $6.37/hour

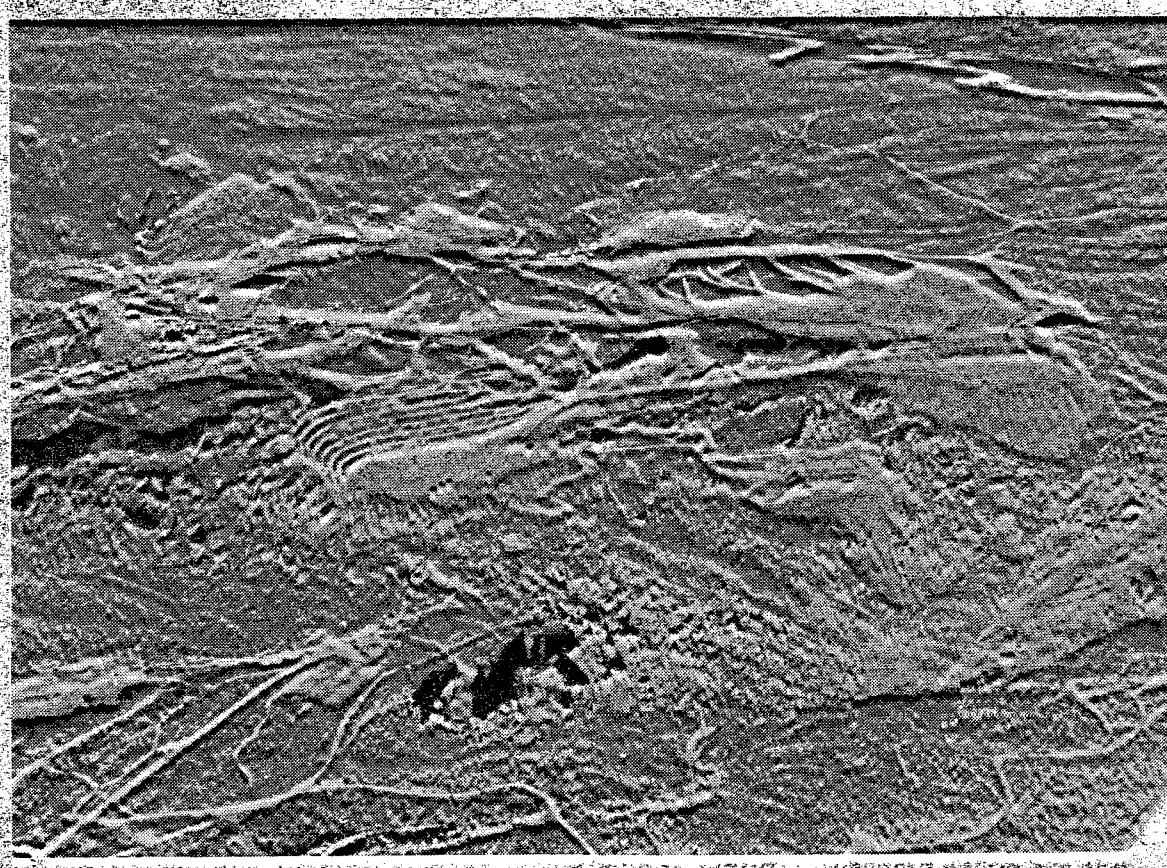
Lookin' good at the oxide project



SX-EW TANKHOUSE with raffinate pond.



SX-EW PROJECT facilities are: at top, the 83-acre, lined leach dump site and pregnant leach solution pond; at lower right are the truck shop and open pit offices and plant feed pond; at lower left are the tankhouse, raffinate pond, and solvent extraction mixer-settler trains.



OPEN PIT takes shape on north side of caving area with waste dumps at right and in-situ leach test drilling site at lower right center. Ray Manley Photos

Story and Photo By BEBE BURWELL

A commissioning team from Copper Refineries Ltd., a firm in Townsville, Australia, are here to oversee start-up of the ISA process which entails the use of stainless steel "mother" or permanent cathode blanks and an automatic stripping machine at the new SX-EW plant.

They are Jack Benson, senior maintenance foreman; Keith E. Cahill, electrical maintenance foreman; Steward McLean, senior production foreman; and John O'Kane, refining development metallurgist.

The ISA process technology has been available for electrorefining for eight years and has been used at an Australian electrowinning plant since 1984; however, that operation is less sophisticated than ours with hand stripping of cathodes.

Magma did all of our own test work, and made the decision to go with the ISA process.

Ours is the first electrowinning plant to use the cathode stripping machine in conjunction with stainless steel blanks and for this reason the entire copper industry will be closely watching our progress.

Major selling points for this system include low manpower requirements; the straightness of the plates, which produces a higher quality copper; and long life of the stainless steel blanks.

The one electrorefining plant using these blanks has had them in use for eight years and their life expectancy is 15 years if managed properly.

These four commissioning team members also supervised the manufacture of our stripping machine by MESCO, of Japan, to ensure it was made in accordance with the needs of our stainless steel blanks.

The blanks were designed and supplied through, and in accordance with, the Copper Refineries Ltd. technology.

All four visitors say they have been very impressed with the planning, cooperation, and construction by Newmont and Bechtel.

They also believe our rapid progress has been greatly influenced by the fact that a visit to the Townsville plant to study and train on similar tankhouse equipment was made by Kay Parks, refinery superintendent; Mark Vancas, assistant superintendent, SX-EW; Mark Yarbro, SX-EW engineer; and Al Metcalf, general foreman, mine electrical.

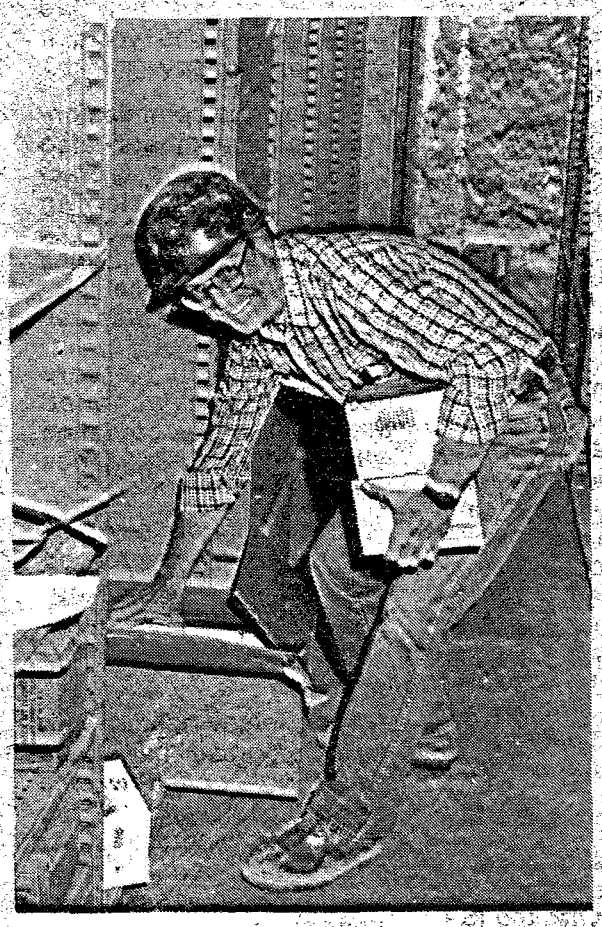
The first copper cathodes were pulled at the new SX-EW plant on May 22.

We will initially obtain approximately 100 pounds of copper per side of each stainless steel blank and once we have attained full production will be stripping five days a week.

AUSTRALIAN COMMISSIONING TEAM, from left are: Keith Cahill, John O'Kane, Stewie McLean, and Jack Benson, in front of the automatic stripping machine at the SX-EW plant.

Meet warehousemen

By CAROLYN CREELEY
Photos by Richard Cole



ALVIN CLUBB has worked for Magma 15 years and is the senior warehouseman. Alvin has five children: Jeff 23, Debra 21, Joe 19, Kenny 18, and Lisa 14. Away from work he likes to go camping and fishing.

MEL MERCADO has worked for Magma 8 years and is presently a warehouseman. Before coming to Magma, he was in the Air Force 22 years and retired as Master Sergeant. Mel is married to Elida and they have five children: Angela 26, Loretta 24, Percilla, 22, Mel, Jr. 17, and Eric 10. His outside interests include music and dancing.

GEORGE GRIFFEN has worked for Magma 11 years and is a warehouseman. Before coming to Magma, he was in the Air Force for 20 years and retired as a Tech Sergeant E6. He has a son Cory, 13. He belongs to a Van Club and likes to bowl.

PAT SHEALY has worked for Magma 9 years and is a warehouseman. He is married to Lenora and has two children: Danny 8 and Kaleena 2. When not at work, he likes to go four-wheeling, camping, fishing and hunting.

Colors reveal hidden elements in met lab

By KAY JERIN
Metallurgical department chemist

A problem that has plagued anayltical chemists throughout the ages is the separation and analysis of complex and even simple mixtures of chemical elements.

Before any element can be analyzed it must first in some way be separated or distinguished from other interfering elements.

Gas chromatography is a tool utilized by Magma chemists to separate and measure mixtures of elements.

The science term "chromatography" was coined in 1906 by a biologist named Tswett.

He learned that he could separate the different plant pigments by dissolving them in a liquid and allowing that liquid to move across a solid phase.

The solid phase consisted of a thin layer of calcium carbonate (crushed seashells).

The pigments separated on this plate formed distinct "bands" of color.

Thus the term chromatography which literally means "color writing".

Following the suggestion of Martin and Synge in a study for which they were later awarded the Nobel Prize, James and Martin modified the technique in chromatography in 1952.

They placed the solid phase in a metal tube then placed the material to be separated at one end of the tube and forced it through with a supply of gas.

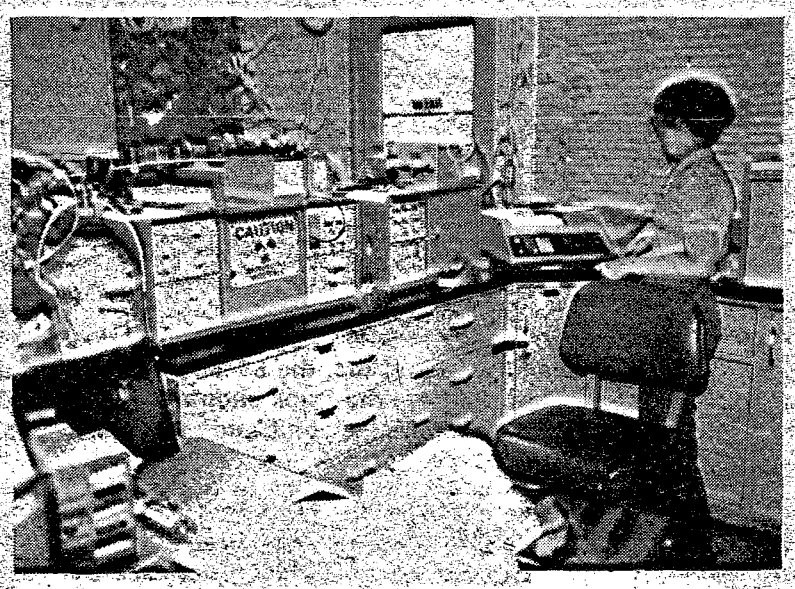
The gas chromatograph has been used extensively in studies performed in conjunction with the smelter upgrading project related to bringing our smelter into compliance by 1986.

In an effort to provide analysis with ever increasing efficiency and relability, Magma chemists are currently investigating an analogous technique to gas chromatography called liquid chromatography.

By using liquid as a carrier instead of gas, the range of elements analyzed could be extended to liquids and solids that are not readily vaporized.

This would include ions in tankhouse solutions, acids, mill solutions, and many others.

The sophisticated chromatography techniques that Magma uses are a far cry from Tswett's "color writing", but they provide our company with a state of the art technique to help us meet our goals and move ahead in a highly competitive market.



KAY JERIN operates her gas chromotograph at the met lab.
Photo by Farlow Davis

We achieve dramatic reduction in energy costs

BY VITO KONUR

The San Manuel mine and plant are one of the largest private consumers of energy in the State of Arizona. And we utilize electrical power, natural gas, coal, diesel fuel, and fuel oil.

The diversity of utilizing different energy sources makes Magma less dependent upon any one energy source, and, therefore, gives some degree of flexibility in utilizing the most economical fuel for a given process.

At San Manuel, energy costs are the second largest contributor to our high costs. In 1983 they added approximately 21¢ per pound to the cost of producing copper.

Therefore in the last several years Magma has vigorously campaigned and sought participation and ideas from employees to conserve energy and to improve operating and process efficiencies.

Furthermore, we have advocated policies at state and federal levels, and with our suppliers to lower the unit costs of energy.

The energy conservation and efficiency improvement programs were spread to all sectors of our company with ideas being generated by all employees in administration, engineering, maintenance, production and purchasing departments.

These ideas were then studied and those with the best payback period were implemented.

In the last four years, Magma has implemented such projects as:

High efficiency acid plant preheaters

Mine scrap wood utilization

Anode vessel's new tuyeres and poling process

Air preheater insulation

Power interruption procedures

Peak load control

Cooling tower controls

Waste oil utilization

High efficiency lighting

Transport gas

Coal replacement gas

Ball mill angular spiral liners and scoop feeder modification

Moly plant improvements

Rod plant furnace piping

Insulation of cells

Compressed air conservation

Improved #5 shaft pumping system and monitoring system and many other projects.

Futhermore, Magma has successfully renegotiated electrical natural gas and coal contracts to further reduce unit costs of energy.

This is a dramatic improvement, and is an unique example of how the collective efforts of all employees is making a difference.

Energy conservation efforts, improvements in operating and process efficiency, and the lowering of energy costs have reduced Magma's energy cost to 12¢ per pound in 1986 from 21¢ per pound in 1983!

JHC → 0108

R L Brown
NY Office

2/25/86

I attach a shortened version of the January 1986 Magma Update, a page sent to all the San Manuel, Pinto Valley, and Magma families, wives etc. This put consisted of the blunt words of management as to what they feel about the future of such operations as San Manuel and Pinto Valley (Magma at Superior has been closed for some time & written off).

James D Sell

Attachment
cc: T.E. Scartaccini

Magma Copper Company/Pinto Valley Copper Corporation

Opening 1986 Negotiations Meeting January 24, 1986

Statement of Brian Woolfe, executive vice president

Thank you for coming here today. This meeting gives me the chance to explain the problems which we are facing and how we propose to tackle those problems. In particular, I would like to welcome the delegation from Pinto Valley. Having assumed responsibility for Pinto Valley only recently, I have not had a great deal of time to get to know the people there. I hope to correct this during the next several months.

I would first like to point out to you that we, both sides of this table, have a common goal. We must never lose sight of that goal. Quoting I.W. Abel, former president of the United Steelworkers of America:

"The basic need of every company is to make a profit. Only then can it provide jobs and earnings for employees."

I believe Mr. Abel's profound statement to be the guts of the issues which we will be discussing during the coming months. We have to recognize the fact that our fundamental problem at Magma and at Pinto Valley is that we are not making a profit and have not been doing so since 1981.

How can we continue to operate while losing money? Of course, we've made money in the past. Newmont was willing to sustain these losses up until now because its other businesses have been profitable and because it was more optimistic on copper prices. Newmont wants to support us through these tough times, but only if it believes we can be profitable in the future. Faced with continuing depressed prices, Newmont cannot justify continuing its support of losing operations unless we are on the road to profitability by reducing our costs.

The decision, "Do we continue to operate?" has to be made soon, and at what level. If you have been in this business very long, you know that once you decide to close, you may never start up again. Once we turn off the flow of any income from copper sales, start-up costs are so great that it becomes easier - less costly - to stay closed.

So long as we and, more importantly, Newmont, our owner feel we have a basis for optimism for the future, it's better to keep operating than to close. Our losses are so great, however, that additional action on our part is necessary.

We will be providing the Steelworkers' International union with a great deal of important financial information to substantiate the extent of the losses which our two companies have suffered over this time span. Some of this is information we have never publicly disclosed before. The pre-tax losses at Magma and Pinto Valley amount to some $330.9 million over the five years. In 1985 alone Magma suffered pre-tax losses from operations of $54.1 million and Pinto Valley $6.1 million. In addition, Magma has another $40.3 million in losses connected with the Superior Division closure.

Last January in Albuquerque, I reported to the Magma Unity Council on the state of our industry and our company. We reviewed our losses as an industry and as a company.

Let's look at where we are with 1985 included:

INDUSTRY LOSSES

1982	$623,000,000
1983	$400,000,000
1984	$400,000,000
1985	$500,000,000

Let's look at how these losses have caused mine closings and the loss of 25,000 jobs since 1980.

(See chart on this page.)

These numbers were increased by lay offs at Inspiration and Pinto Valley last week. Now let's look at the Magma/Pinto Valley pre-tax losses.

(See chart on this page.)

At the end of 1985, our indebtedness to Newmont and lending institutions totalled $304 million. This debt is significant as we are unlikely to get financing for additional losses unless we can show we can reduce our debt.

These figures for Magma and Pinto Valley are substantiated in the data we will be furnishing the unions.

Quite simply, the clock is running down and we have to demonstrate this year that we can reduce our costs and position ourselves to return to profitability or drastic remedies will have to be applied. 1986 is a time of decision for all of us. Newmont won't continue to support us at our current cost level. These are the most important negotiations we have ever conducted.

U.S. COPPER INDUSTRY

OPERATING PROPERTIES WORKFORCE COMPARISON 1980-85

JANUARY 21, 1986

	1980	12/1/85	Loss
Anaconda	2,525	-0-	2,525
ANAMAX	1,350	43	1,307
AMAX-Cartaret	1,808	610	1,198
ASARCO	4,616	2,365	2,251
Cyprus	1,747	514	1,233
Duval	2,933	1,103	1,830
Inspiration	2,116	1,202	914
Kennecott	10,892	1,893	8,999
Magma	6,274	3,340	2,934
Noranda	530	55	475
Phelps Dodge	6,785	3,796	2,989
Pinto Valley	847	657	190
	42,423	15,578	26,845

PRE-TAX LOSSES: 1981-1985

	Magma	Pinto Valley	Total
1981	$25,033,000	$3,479,000	$28,512,000
1982	56,548,000	34,964,000	91,512,000
1983	53,307,000	3,835,000	57,142,000
1984	44,069,000	9,129,000	53,198,000
1985	94,426,000	6,059,000	100,485,000
	$273,383,000	$57,466,000	$330,849,000

The difficult management decisions that need to be made by Newmont in 1986 will affect the future and job security of all of us - me and you. If Newmont money is directed to better investment opportunities, Magma and Pinto Valley may cease to exist in their present form. To serve its shareholders, Newmont has to invest money where it thinks it can get the best return. Its current operations in gold, coal and petroleum are all profitable. Copper is not. If we don't become profitable, our future is short.

Surviving is what we intend and are committed to do. There are many factors not under our control that affect whether or not we will survive. You should be aware of the factors which neither of us can control. You must be aware of and respond positively to the factors which we can control. We must take control of our own future.

This brings me back to where I started. Being here today gives me the opportunity to tell you about three specific areas:

1. The major problem we're facing.
2. What we have done to reduce costs in the areas where we have some control.
3. The help we need from you - and we need it as soon as possible.

Let's look at the first of these three points.

1. The major problems we're facing.

Our biggest problem is that a large part of the world's copper production has come under the control of governments like Chile, Peru, Mexico, Zambia and Zaire. Chile is by far the biggest producer with a production of 1,000,000 tons out of a world consumption of 7,000,000 tons. These countries need to sell their copper to get the dollars to pay for oil, food, and interest on their foreign debts. They also do not want the political problems that large numbers of unemployed copper miners would create. In effect, they prop up their governments with copper production.

In some cases, like Chile, their ore-bodies are rich enough and big enough that they can make money at copper prices which cause the U.S. mines to close or to operate at a loss.

Our foreign competitors, Chile, Zaire, Zambia and Peru, have many advantages over our American producers of copper. Here are several very important advantages that the foreign producers enjoy:

1. Ability to obtain low cost (or no cost) loans from world banks.
2. Ore grades ranging from 1.5% to 2% copper, two to three times our U.S. producers' grades.
3. Government subsidized operations.
4. Fewer government regulations and in particular no environmental controls which add some 15¢ per pound to the price of copper in the United States. Both Cananea and Nacozari just south of the border will shortly be operating with no environmental controls.

Continued on next page.

Brian Woolfe's statement at openin

The result is production costs that are much lower per pound compared with the costs of the typical U.S. producer.

Our government will not protect us from foreign competition by imposing tariffs and quotas. We have tried that in a cooperative effort of both companies and unions. It didn't work. The problems are so complex in this area that this Administration - or any other Administration - will not respond in any favorable way due to the impact such a step would have in other parts of the economy. Even our copper customers - fabricators particularly - would argue that more U.S. jobs would be lost in fabrication than would be saved at U.S. copper mines, if imported copper were curtailed. We must accept the fact that we have foreign competition and that in order to survive, we will have to meet that competition in the market place. Therefore, in these talks and in reaching a settlement in 1986, we must accept that foreign competition is a factor over which we have no control. It affects us, but we cannot make it go away. We must lower our costs.

Overall, free world copper usage is forecast to increase at less than 3% annually in the next few years. There are several reasons for this.

Substitution of other materials is displacing copper and reducing its use in industry. Some of these you will remember - aluminum cable replacing copper cable; fiber optics replacing copper wire in the telecommunications industry; aluminum radiators for cars; etc.

Although we have attempted to capture new markets, the gains haven't been great tonnage-wise. Through the efforts of the Copper Development Association (CDA) and the International Copper Research Association (INCRA), the copper industry is seeking new products and applications. Together these organizations have helped develop markets in such areas as: solar heating, fire sprinkling systems, plumbing systems, electric vehicles, copper/nickel alloy hulls for ships, a radically new copper automobile radiator, sheathing offshore ocean structures, soil additives for agriculture and many other areas.

In addition to our foreign competition, we must acknowledge our domestic competitors such as Phelps Dodge, White Pine and Kennecott who either already produce or plan to produce copper at costs well below current copper prices.

You may have read about Kennecott's plans to spend $400 million in Utah for modernization of facilities. In its announcement, Kennecott said the physical improvements and expected labor cost reductions would allow it to produce copper at about 51¢ per pound. They are fortunate in having much richer ore than we have. Phelps Dodge announced a new large SX plant at Morenci to produce copper at about 30¢ per pound. This production will supplement existing low cost leach copper production at Morenci and at Tyrone. As distasteful as it may be, you cannot ignore that lower labor costs and the ability to use its labor force more efficiently are major reasons why Phelps Dodge was able to report profits in 1985 when the rest of us were reporting losses.

White Pine is coming back into production thanks to significant labor cost concessions and the ability to make more flexible and efficient use of labor. The Steelworkers and White Pine made a five year agreement with total labor costs capped at less than $12 per hour per employee from the former $20 per hour per employee labor cost figure. That gives White Pine a significant cost advantage over Magma and Pinto Valley.

In addition to the foreign and domestic competition I've outlined above, we can't forget the potential open pit production which has been put on standby in the United States and Canada and which can be brought back into production fairly rapidly. This overhanging quick additional production could meet very short term price increases. It is a long term depressant on prices.

However, the longer a mine is kept out of production the more costly and more difficult it will be to bring it back into production. Eventually some of the closed mines which are presently on care and maintenance will be permanently shut down. Superior is an example of this. In late December we had to recognize that there is no realistic way to operate the labor-intensive Superior mine with its high labor costs with the copper prices which we can foresee in the future. That's why we took a $40,300,000 additional loss in December as it is our conclusion that operations won't be resumed at Superior under Magma management. If the current negotiations to find a buyer or to lease the mine don't succeed, we will start permanent closure and clean up of Superior shortly. That was a tough decision, but this is a period filled with tough decisions.

Now let's look at another factor we cannot control but which certainly affects us, copper price.

MAGMA REALIZED COPPER PRICE

1974	74.62¢
1975	63.07¢
1976	69.22¢
1977	66.43¢
1978	65.60¢
1979	90.81¢
1980	101.88¢
1981	83.72¢
1982	72.47¢
1983	75.12¢
1984	66.34¢
1985	65.89¢

In 1983, the average price for copper was 75¢ per pound. In 1984, that price was 66¢ per pound. And in 1985, the average price was again 66¢. Future predictions - by leading experts, including Booz Allen Hamilton and Commodities Research Unit Ltd. - for the price of copper are not encouraging. A one dollar per pound copper price simply is not in sight. We have to lower costs.

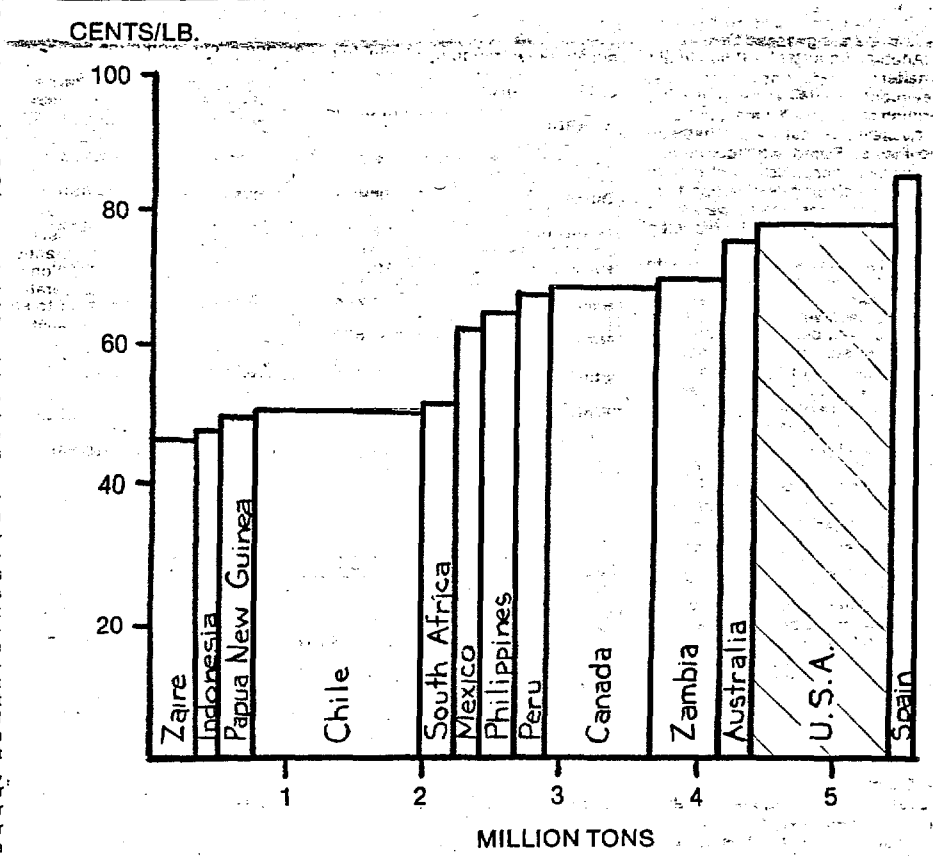
Now, those are some of the problems over which we have no control. They are not going to go away. They impact us very strongly. The message we get from studying these problems is loud and clear. If we cannot produce copper at a competitive price, a total cost of 60¢ a pound or less, we are left with no recourse except to shut down high cost operations. That's the bottom line in my message to you. Newmont does not feel we can compete and is unwilling to continue to finance us unless we can reduce our total cost of production to 60¢ per pound. I believe we can achieve the 60¢ figure by cost reductions from four principal areas (i) production of more leach copper, (ii) lower labor costs, (iii) improved mining methods and (iv) higher grade mining plans. It takes cost reductions in all four areas for us to be successful.

No one else will help us. The ball is in our court. We must help ourselves by lowering costs to compete. As part of lowering our costs, we have to remove barriers - contract language, jurisdictional and craft lines, - which impede productivity. Each of us has to be able to actually use all of his time and talents to more efficiently produce copper.

Let's look at how 60¢ will help us.

(See chart on this page.)

1984 FREE-WORLD SUPPLY CURVE



NOTES: •Supply curve based on production in 1984.
•Capacity additions/deletions are not assumed to change overall country costs.
•Cash costs exclude depreciation
•Curve expressed in current dollars.

Now, for our problems at Magma and Pinto Valley. First let me make it clear that we have to lower our costs regardless of whether or not we retrofit the smelter. If we do retrofit the smelter, it will require an investment of some 135 million dollars. Our studies to date show that a flash smelter taking 3,000 tpd day of concentrates has the lowest unit costs. However, Magma and Pinto Valley at best can only supply some 1,800 tpd of concentrate between them. The next best choice, a 2,100 tpd flash smelter, still leaves us with a short fall in concentrate feed which must come from elsewhere.

Our efforts to get another copper concentrate producer to join us in a joint venture to retrofit the smelter have so far been fruitless. The next best solution is to arrange for long term tolling contracts and/or long term contracts to purchase concentrate as high smelter throughput reduces our costs.

However, this is where we run into a "Catch 22" situation.

In order to negotiate a custom smelting or tolling contract, we have to have a price based on our estimated costs. A large part of these costs are labor costs. Our potential concentrate suppliers say they want to see definite evidence that we can reduce our costs as we predict we will, before they will consider a contract. To retrofit the smelter without assurance of the extra concentrate is extremely risky, if not impossible to justify. If we don't know our future costs for sure, we can't get a contract. We are rapidly running out of the time needed to retrofit the smelter and have it operating in 1988.

Another important aspect of the smelter question is how long we can get concentrates from the San Manuel and Pinto Valley mines.

By adopting the new high grade mining plan at San Manuel, by lowering labor costs and by increasing production from leaching, San Manuel can get its cost of production down within the target area of 60¢ per pound. However, under this plan, we will exhaust our ore reserves at San Manuel in 1993. The only area where we can get additional reserves is the Kalamazoo which will require some $60 million in development costs and this would be in addition to the $135 million mentioned for the smelter retrofit. Development of the Kalamazoo must start shortly if there is not to be a gap in production and it will require a considerable amount of money before production begins.

At Pinto Valley, with present costs, the expected life is about 11 years. With reduced costs, I believe this life expectancy could be extended. However, Pinto Valley costs cannot be reduced to the same extent as those at Magma and without a good smelting/refining contract, continuing operations may not be possible.

What can we do to solve these problems and compete successfully? There are several areas.

Making every effort to use modern technology is an area we have been working on and one which we will strenuously pursue. However, applying new technology and getting the full benefit from it, invariably requires the investment of funds and time. It takes time, as well as a lot of planning and investigation, to find and to apply new technology and, in nearly every case, money must be spent on new equipment and or plant.

An illustration of this problem is the mechanized block at the mine. We have borrowed equipment from Pinto Valley and also bought equipment. We have been limited in what could be done because the existing mine development plan did not fit a mechanized block. Really it is only in the virgin Kalamazoo ore body that a mechanized mining system could be developed to its full potential.

Now let me move to the second of my three points.

2. What we have done to reduce costs in the areas where we have some control.

For the past four years, at both Magma and Pinto Valley, we have changed the way we manage in a very serious effort to stay in business and to weather the economic storm. Some major examples of these changes include such activities as: (1) the development of quality circle groups throughout the San Manuel operations, (2) increased communications to keep all employees better informed about subjects of importance to each and every employee and his family, and (3) a revised management style to recognize the needs of individuals in the workforce. All of these changes were designed to involve the whole work force in our efforts to overcome our problems as our work force was and is our biggest asset in problem solving.

We have renegotiated our gas, coal, utility and other supply contracts, resulting in savings of many dollars to our operations on a yearly basis. In addition, we have withheld general pay increases for salaried personnel; we have restructured the salaried organization by eliminating and combining jobs; and we have assigned increased responsibilities to those remaining members of the salaried workforce.

Employees at both properties have been affected by the numerous changes which have been made in our quest for survival. You've experienced reduced workweeks, and workdays, working with fewer coworkers, making the job go with fewer materials, or, in many cases, repairing the old equipment rather than replacing it. We have all been working under increased pressure to work smarter. And our people at both Magma and Pinto Valley have responded in a very positive way. This is a source of pride to the entire team. We are extremely thankful for their support in the past and hopeful for their continued support in the future.

In spite of the problems that we have faced in the past several years, our employees have achieved good safety records at both operations. Also during this difficult time, our union representatives have responded in many ways to our needs. We have experienced a healthy labor relations attitude in our day-to-day business dealings with union representatives at both properties. We recognize the problems created for our union representatives by the hurricane-force winds of change. We hope the spirit of cooperation which we have seen both at Magma and Pinto Valley will continue during our talks in 1986.

The common ownership and management of Pinto Valley and Magma has given us additional opportunities to cut costs. Pinto Valley and Magma have an interdependence, which, if properly exercised, can be an advantage to both. If not exercised, it could mean the individual operating costs of the two properties would be so high that their closures, independently of each other, would be inevitable in the not too distant future, if not immediately. The interdependence means Pinto Valley gains the advantage of lower cost smelting and refining. It was the high cost of smelting at Inspiration and refining at ASARCO that shut Pinto Valley down previously. By having the concentrates from Pinto Valley, Magma can increase its throughput at the smelter and refinery and thereby reduce its unit costs. This helps both properties.

We are doing joint purchasing by Pinto Valley and Magma. Placing orders together means larger orders, which in turn means better discounts. We have already achieved some success in joint purchasing of solvent extraction reagents and steel balls for the mills. But there are still areas to be exploited: rods, steel, mill reagents, tires, fuel and explosives for the pits, safety equipment, etc. Furthermore, it should be possible to reduce warehouse inventories. We will also have increased technical communication and interchange of technical expertise, eliminating duplicate facilities and personnel where possible.

There are definite advantages in working together and I intend to exploit every advantage I can to increase efficiency and to cut costs and with your help to save our jobs.

We have here at Magma and Pinto Valley and indeed throughout the United States, the best educated and best trained work force you could find anywhere. I believe we must take full advantage of this fact. At home our workforce is largely capable of servicing its own vehicles, making in-house repairs, including electrical, plumbing and painting. They have multiple talents. However, in the work place in nearly every case we restrict a person from the opportunity to develop or use talents other than those that he is specifically assigned to do. We can no longer afford the extra costs that this entails. If these work practices continue without modifications, it will mean lost jobs as operations will be forced to cut back or to shut down because these practices ensure needlessly higher costs because of lost time; lost efficiency; and a larger labor force than necessary. These are inefficiencies our foreign and, now, many of our domestic competitors do not have.

Now, to my third area. Despite efforts to reduce costs, we haven't done enough.

3. The help we need from you - and we need it as soon as possible.

In the Magma audio visual presentation of last July, we stressed the subject of change. We said, "Magma will change." And change we – Magma and Pinto Valley – must if we are to meet the needs and expectations of all who depend on our success. This includes employees who depend on wages, suppliers and vendors who depend on our purchases, local and state government agencies which depend on our tax contributions, and lastly, our investors - the stockholders – who depend on us to make a profit. We must show our parent company, Newmont, that we are the type of organization that makes continued investment worthwhile.

Labor costs are a significant proportion of our costs. Labor costs are the area where we need your help if we are going to be survivors. Let's look at what's happened to labor costs since 1973.

(See chart on this page.)

As responsible labor and management representatives, we must address the subject of labor cost reductions in a very serious, sincere and straightforward way. We cannot duck this responsibility. The welfare of all of our people, our labor organizations, and our companies is at stake. No one on this side of the table attempts to blame any one particular group for the dilemma which we find ourselves in today. Spending time blaming is nonproductive. We are in the situation we are in and we have to correct it.

Collectively, we have a common problem. Any hope for long-term profitability must include significant wage reductions and some benefits plans changes and more efficient and productive work practices. This is where you come in. Our proposal includes permanent wage reductions and is predicated on improving the way we utilize manpower. There is no other way. Again, I want to repeat the most important point in my presentation to you: If we don't get our costs down to 60¢ per pound, we have no future. We cannot lower costs sufficiently without the level of labor cost reductions we are proposing to you. More leached copper and high grade efficient mining plans won't work by themselves without lower labor costs. This is why I said earlier that 1986 is the year of decision. Newmont will make the decision, but what we do - you and I - will affect what they do about our futures at both Magma and Pinto Valley.

Continued on next page.

CHANGES IN PRICE, WAGES, CPI

1974-1985

	1974	1985	Net % Change
Price Per Pound	75c	66c	-12.0%
Average Wage	$5.585	$13.545	+143.0%
Consumer Price Index	148.0	318.2	+115.0%

Brian Woolfe's statement at opening of negotiations, January 24, 1986

WAGE SPREAD COMPARISON

1974-1985

	1974	1985
Laborer	$4.710	$12.030
Mechanic	$5.935	$14.151
	26%	17.6%

There is another area that affects costs and efficiency as far as labor costs are concerned and that is the way across-the-board raises have increased the wages of the unskilled jobs out of proportion to those of skilled jobs. If this continues, it will end up with every job, skilled or unskilled, paid the same wages. With no incentive to study and to train for more skilled work, we'll end up with a work force that will not be able to compete on any terms at all. This disparity is further confirmed by looking at what other employers in the area pay.

You will see that the non-mining labor market recognized the need to pay more for skilled than for semi-skilled jobs.

(See chart on this page.)

We must face these challenges as other companies and labor organizations have. I believe very firmly if labor and management do not change their ways and face up to the challenges from overseas and at home, we will both fail and it is the working people of the United States, not just at Magma and Pinto Valley, both salaried and hourly-rated, who will suffer. And we, both sides of the table, will properly be blamed because we lacked the courage to do what was needed. We must make changes in how we operate. We must achieve maximum efficiency and minimum costs. Even with the reductions we are proposing, we can be proud that our wage and salary structure will still be competitive in this area.

(See chart on this page.).

Let me again make our objective in these negotiations very clear to all concerned. We want signed agreements with the unions representing our employees by July 1, 1986, or sooner if at all possible. The sooner we lower our costs, the brighter our future. These agreements must include those changes -- labor cost reductions and the ability to do all work by the most efficient, economical and expeditious methods available -- which are vital and necessary to continued operations at Magma and Pinto Valley. We intend to negotiate these contracts with you, the labor unions representing our employees. Our problems and needs are peculiar to Magma and Pinto Valley. We are not concerned about other companies in our industry during these negotiations as we each have our own situations to consider. Certainly, a settlement at another company in the industry will be of interest, but only because it affects the cost of a competitor. It will not solve our problems. If it ever existed, pattern or coordinated bargaining does not exist in the copper industry in 1986. Magma and Pinto Valley must do their own thing in 1986 negotiations regardless of the other companies. It's our survival we're negotiating for, not that of ASARCO, Kennecott or Inspiration. Those companies and non-union operations are competing with us to see who will survive - us or them. We need a settlement that reflects our needs, not what's appropriate for a competitor.

If Magma cannot be "saved," Pinto Valley may not be saved. As I said before, Pinto Valley needs low-cost smelting. If the Magma smelter is not retrofitted, Pinto Valley would have to find a comparable low cost smelting and refining contract or close its sulfide production facilities. Even if it can continue to have low cost smelting and refining, Pinto Valley also needs to significantly lower its costs in order to have a better chance of surviving in the face of increased costs due to declining ore grades, increased stripping ratios and rising costs of material, equipment and supplies.

It is our intent that we, the two parties at this table, come to an early agreement on what is to be done. We want an agreement without the confrontation that seems to have marked past negotiations, or resulted elsewhere in people losing jobs and homes and dividing families. We want this, we believe our employees want this. We believe you want this also.

Now, let me say in conclusion:

First, we have several problems: foreign and domestic competition; a continuing slow growth in demand for copper; continuing low prices; a need to demonstrate our profitability in order to assure future investment funds; a requirement to lower costs.

Secondly, we've made changes in our operations to reduce costs where we can, including consolidating functions between Magma and Pinto Valley, increased mechanized mining; withholding general salary increases; reductions in the total number of employees; negotiating supply contracts with lower costs.

Thirdly, we need help from you as soon as possible. Labor costs have to be permanently reduced.

Mr. Sievwright will shortly be explaining our proposals to you. However, we are not firmly entrenched in some areas on the way these reductions, or the savings they represent, are implemented, only in the total amount of savings that are required. One reason why reductions of wage rates are important is that the cost saving is immediately effective.

Negotiated cost savings must be long term if we expect our shareholders to continue to support us and carry our losses until we can reduce our costs. Further investment or even continuing to carry us will be out of the question unless there is a definite opportunity for them to see the opportunity to make a reasonable profit on any money invested.

We asked to have this meeting early because we want you and our employees to be made fully aware of the problems we face. Also, we wanted everyone to have an opportunity to weigh the concessions asked for and to have the time to weigh all the consequences and possibilities without letting last minute emotions cloud the issues.

We are willing to discuss any proposals you may have that will give us the savings we ask for but in a different form. We can not agree to any proposals which increase our costs or reduce efficiency. We cannot guarantee jobs or continued operations. We must have labor cost savings if we are to continue operationg at our present scale.

I remind you again of our commitment to be survivors. We can and will be survivors. With your help, we believe we can survive together and continue to provide good jobs for good people.

Thank you for your patience in listening to me. If you have questions, I or one of my colleagues will attempt to answer them. Mr. Sievewright will now take over and explain the substance of the savings and improvements we are seeking.

AREA RATES

	1974	1985	Change
Janitor	$3.39	$5.26	+55.2%
Equipment Operator	$5.71	$11.28	+97.5%
Mechanic	$5.66	$10.26	+81.3%
Electrician	$6.13	$11.86	+93.5%
Welder	$5.66	$11.10	+96.1%

MAGMA RATES

Laborer/Janitor	$4.710	$12.030	+155.4%
Mill Operator	$5.410	$13.242	+144.8%
Miner	$5.585	$13.545	+142.5% (Avg.Rate)
Equipment Operator	$5.935	$14.151	+138.4%
Mechanic	$6.110	$14.454	+136.6%
Electrician	$6.110	$14.454	+136.6%
Welder	$6.110	$14.454	+136.6%

Consumer Price Index Change: 1974-1985 +115.0%

Cost of Living Adjustment (7/1/72 through 10/1/85) $6.37/hour

Economic proposals for 1986 negotiations presented to Magma/Pinto Valley Unions on January 24, 1986

1. 54-month agreements to expire December 31, 1990.

2. An average $4 per hour wage reduction. The proposed new wage schedules which achieve the $4 wage reduction and still offer rates which are competitive are attached as Exhibits I (Magma) and II (Pinto Valley). We are prepared to discuss benefit reduction alternatives to offset some of the proposed wage reduction.

3. Modify all agreements, as necessary, to recognize that all production and maintenance work shall be accomplished by the most efficient, economical and expeditious methods available to the Company.

4. COLA to be eliminated from all agreements.

5. All future cost increases in Medical and Dental Plans will be paid by employees. (Any increase in per capita claims expense above level of base six months (January - June 1986) will be paid by employee payroll deduction in succeeding six months i.e. if current per capita cost is $175 per month and it increases to $185 per month, each employee would pay $10 per month.)

6. New employees hired on and after July 1, 1986, will be covered by a new Comprehensive Medical Plan (Exhibit III) and a new Comprehensive Dental Plan (Exhibit IV).

7. New MCC employees hired on and after July 1, 1986, will not participate in the Supplemental Death Benefits Plan and the Severance Pay Plan.

8. New PVCC employees hired on and after July 1, 1986, will not participate in the Sick/Severance Pay Plan and the Employee Benefits Plan.

9. New employees hired on and after July 1, 1986, will be covered by a new Pension Plan which will have no supplemental pensions (disability, 70/80, 30/60). Pre-retirement or post-retirement surviving spouse benefits will be provided on an actuarially reduced basis. Age 65 will be the normal retirement age. For present employees there will be no change in the Pension Plan.

10. Modify the Medical Plan for Retired Hourly-Rated Employees of Magma Copper Company to provide that coverage for those who retire on and after July 1, 1986, is only available to those age 60 and over with at least 10 years of Credited Service at the time of retirement from employment with the Company.

11. Modify the Optional Medical Plan for Retired Hourly-Rated Employees of Pinto Valley Copper Corporation to provide that coverage for those who retire on and after July 1, 1986, is only available to those age 60 and with at least 10 years of Credited Service at the time of retirement from employment with the Company. The Optional Plan would be the only plan available to retirees.

12. Modify the Life Insurance Plan to provide that post-retirement coverage is only available to those who retire on and after July 1, 1986, who are at least age 60 and have at least 10 years of Credited Service at the time of retirement from employment with the Company.

13. Modify the Severance Pay Plan of MCC to provide that payment is only made to those who retire on and after July 1, 1986, who are age 60 or over with at least 10 years of Credited Service at time of retirement from employment with the Company.

14. At PVCC reduce the annual contribution to the Sick/Severance Pay Plan from $400 to $100.

15. The companies reserve the right to amend, to modify or to add to these proposals.

EXHIBIT I

MAGMA COPPER COMPANY
PROPOSED NEW HOURLY RATES
JANUARY 24, 1986

Pay Grade	Current (1) Rate	12/31/85 Number of Incumbents	Proposed Rate	$ Reduction	% Reduction
1	$12.030	194	$ 6.80	$5.230	43.5
2	12.333	63	7.30	5.033	40.8
3	12.636	335	7.80	4.836	38.3
4	12.939	28	8.30	4.639	35.9
5	13.242	197	8.80	4.442	33.5
6	13.545	574	9.30	4.245	31.3
7	13.848	126	9.80	4.048	29.2
8	14.151	216	10.35	3.801	26.9
9	14.454	844	11.30	3.154	21.8
10	14.757	18	11.80	2.957	20.0
11	15.060	55	12.30	2.760	18.3
12	$15.363	11	$12.80	$2.563	16.7
Weighted Average	$13.66	2,661	$ 9.66	$4.00	29.3

(1) Does not include $0.14 unrolled COLA

EXHIBIT II

PINTO VALLEY COPPER CORPORATION
PROPOSED NEW HOURLY RATES
JANUARY 24, 1986

Pay Grade	Current (1) Rate	12/31/85 Number of Incumbents	Proposed Rate	$ Reduction	% Reduction
2	$11.91	9	$ 6.70	$ 5.21	43.7
3	12.19	26	7.20	4.99	40.9
4	12.50	27	7.70	4.80	38.4
5	12.81	33	8.20	4.61	36.0
6	13.13	5	8.70	4.43	33.7
7	13.45	5	9.20	4.25	31.6
8	13.78	114	9.70	4.08	29.6
9	14.25	59	10.25	4.00	28.1
10	14.54	132	11.15	3.39	23.3
11	14.85	1	11.70	3.15	21.2
12	15.16	0	12.10	3.06	20.2
13	$15.47	10	$12.70	$2.77	17.9
Weighted Average	$13.82	421	$ 9.82	$4.00	29.2

(1) Does not include $0.14 unrolled COLA

EXHIBIT III

Comprehensive Medical Plan

1. Benefits:
   a. 90% of usual, reasonable and customary (URC) charges for out-patient surgery.
   b. 90% of URC for second opinion surgery.
   c. 90% of pre-admission testing charges.
   d. 80% of all medically necessary charges except psychiatric and elective surgery performed without concurring second opinion.
   e. 50% of (i) psychiatric care and (ii) elective surgery performed without concurring second opinion.
2. Deductible:
   $100 Per Person/$300 Per Family/Per Calendar Year.
3. Stop Loss (The maximum deductible and 10% and 20% co-payments for any covered individual would not exceed $1,000 per person, $3,000 per family per calendar year. Thereafter the plan would pay 100% of those covered medical expenses otherwise payable at 80% or 90% for the balance of the year.):

   $1,000 Per Person/$3,000 Per Family/Per Calendar Year.
4. Maximum Benefit:
   $250,000 Per Person ($10,000 annual psychiatric limitation).

EXHIBIT IV

Comprehensive Dental Plan

1. Benefits:
   a. 100% of usual, reasonable and customary (URC) charges for routine oral examination prophylaxis. Not subject to deductible.
   b. 80% of URC for x-rays, extractions, fillings, etc. Subject to deductible.
   c. 50% of URC for bridgework, dentures, bridges, orthodontic (age 19 and under only), oral surgery.
2. Deductible:
   $50 Per Person/$150 Per Family/Per Calendar Year.
3. Maximum Benefit:
   $1,000 per plan year per person, except orthodontics
   $650 lifetime for orthodontics.

MAGMA

A PUBLICATION FOR MAGMA FAMILIES

Update

VOLUME 2 NUMBER 4 San Manuel, Arizona March 1986

Good news and bad news

Many employees have asked questions and expressed concern about Magma's financial situation and future plans. The old saying "I have good news and I have bad news" fits Magma's situation today.

The bad news is that Magma Copper Company now owes Newmont Mining Corporation $221,800,000. The debt increased by $70 million in 1985 and is growing at the rate of about $6 million dollars per month. Newmont does have a great deal of faith in the potential of San Manuel, as well as a large investment to protect, and some optimism about the future of the copper business providing we can get our costs down.

It has also had a few years of prosperity in its other lines of business, notably from energy holdings and its major gold mines, which allowed Newmont to continue to fund unprofitable operations such as Magma and Pinto Valley. In 1985, however, Newmont decided to write-off its assets in four other copper mines, a uranium operation, and some ferroalloy plants.

Said Newmont's president and chief executive Gordon Parker, "These prunings will enable Newmont to focus even more closely on its higher margin projects in the future." The simple fact -- and the bad news for us at Magma -- is that Newmont will continue to get rid of unprofitable operations so that it can direct its money toward further development of profitable operations.

The good news is that we have developed an operating plan for Magma which is designed to assure our continued operations by cutting losses and eventually becoming profitable again. The plan is the key to our survival and it will work if fully implemented.

Newmont is impressed by the progress we have made in reducing costs and we are optimistic that Newmont's Board of Directors will approve the money necessary for the continued implementation of our plan *if* we do our part and demonstrate to them that we can and will further reduce our costs.

Our five point plan

The plan has five interrelated elements. They are:

1. Newmont's approval of additional capital for retrofitting the smelter. A new smelter is needed for two reasons. The first reason is that the present smelter must be retrofitted by January 1, 1988, to meet government standards. The second reason is that the new smelter will provide us with cheap sulfuric acid needed for development of in-situ leaching and for the oxide project.

2. The development of in-situ leaching of the deeper portions of the San Manuel orebody. The lower production costs of this process along with lower cost copper from the oxide pit will allow us to offset some, but certainly not all, of our higher cost for producing sulfide copper. Sulfuric acid is essential to the in-situ leaching process and we can obviously produce it ourselves more cheaply than we can buy it from someone else.

3. Developing the upper 25% of the Kalamazoo orebody over the next four to five years, while completing the flooding of the lower portion of the Kalamazoo orebody to reduce our pumping costs. We cannot mine the lower portion at this time and still get the reduction in our production costs to a satisfactory level.

4. Obtain labor costs reductions. While our efforts to date have achieved meaningful reductions in production costs, we simply cannot reduce production costs to a level which would allow us to be profitable without reducing labor costs.

5. Pinto Valley must cut mining costs, increase mill through-put, cut overhead, and start-up a new in-situ leaching project at Miami North. Pinto Valley must also achieve a production cost of less than 60¢ per pound in order to continue to recieve assistance from Newmont.

Our survival is dependent upon lowering our cost of production to less than 60¢ per pound because Newmont is unwilling to continue to finance us unless we accomplish this goal.

The success of the plan is dependent upon all five of these elements. Without a new smelter, we cannot continue sulfide copper production at an economic level. Without lower labor costs, we cannot reduce the production costs we need in order to become profitable and survive. More importantly, without lower labor costs, Newmont is not going to be willing to provide us with the money we need.

Since we are unprofitable (and will remain unprofitable for the next couple of years even if we lower production costs to 60¢ per pound), our survival rests in the hands of the Newmont Board of Directors. We must take the steps necessary to demonstrate to Newmont that the plan will work if we can get all five parts of it together.

Leach system tests begin at Oxide Project

BY STEVE HILDEBRAND

Pre-operational testing of the SXEW plant began mid-month with filling the raffinate pond with water and sulfuric acid and starting-up the pumps and lines to the first leach pad which holds 850,000 tons of ore from the open pit.

Next, the system for distributing this leach solution over the pad was tested and actual leaching began.

Additional water and acid, about 10,000,000 gallons, was introduced in the system to fill the various ponds and fluid circuits.

The initial leaching will continue for about six weeks and culminate in a special metallurgical test in early May.

If this test shows the proper balance of copper in solutions, the SXEW plant will start up in early May and immediately begin producing high purity cathodes for the San Manuel rod plant.

Construction of the tank house for the SXEW operation is on schedule, power is installed and energized, the special cathode stripping machine is being assembled, and the central control room instruments are being wired.

With 80 employees now assigned to open pit operations, maintenance, and engineering, mining is in full production at the Oxide Project.

The first leach dump pad has been completed with 850,000 tons of ore from the 3030 level bench and the second production bench, the 3000 level, was started up this month.

This first pad represents 10% of the eventual tonnage for that dump.

Since the first of the year crews have moved over 2,350,000 tons of material, some for mining, other for roads and fill.

The production rate is now 810 tons per man shift with a clean safety record of only one first aid case since start-up.

All employees assigned to the open pit have been going through safety and operations training and supervisors have had special training sessions.

The maintenance truck shop which also contains the open pit offices is being erected and is the last major structure in the oxide project.

see p. 5. on reverse side

New mine viewpoint open to public

BY PETE READ

A viewpoint for visitors is now open at the San Manuel Mine between the hours of 9:00 a.m. and 5:00 p.m. every day.

Located at the south side of the mine site, the view point offers a panorama of the seven headframes and the subsidence area as well as the new open pit operations and the leaching pads for the SXEW process.

Visitors who are there around 3:30 p.m. on most afternoons will see the blasting of an open pit bench about one mile away.

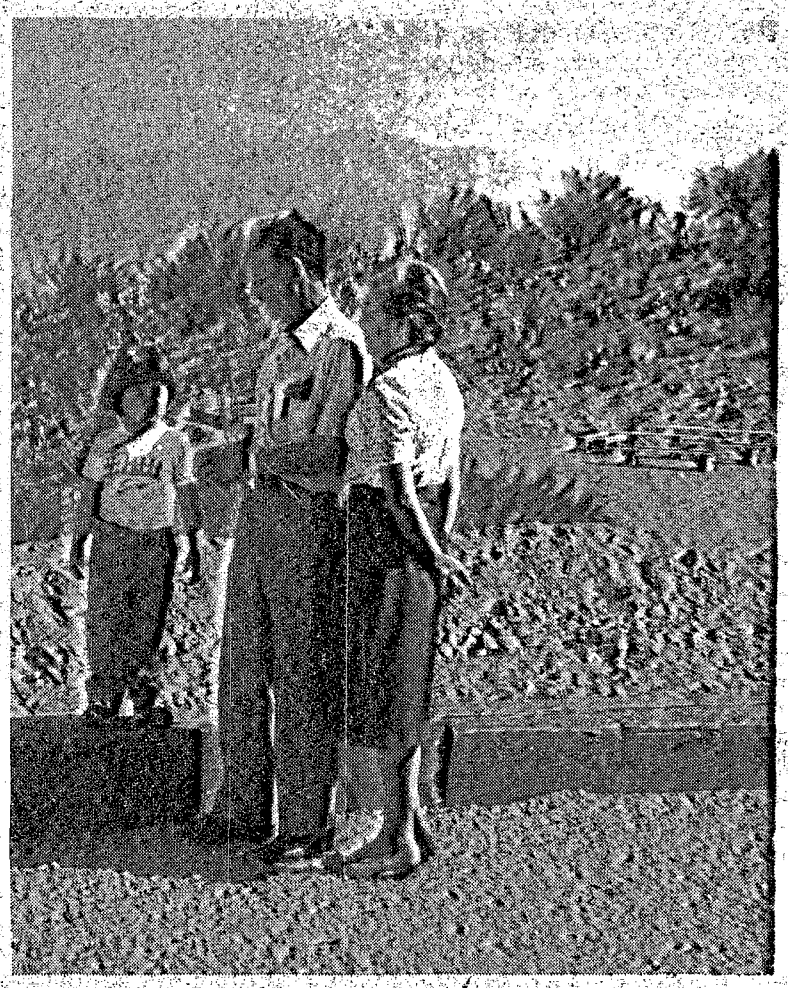
Entrance to the view point is just north of the railroad overpass on the highway to the mine.

The entrance is marked and about one mile of unpaved road leads to the viewpoint.

Picnic tables and ample parking are provided and a display prepared by Ted Rodriguez, electrician journeyman, will help visitors know what they are seeing.

Employees working on the project include Gonzalo Campas, 10-ton truck driver; Presley Hill, equipment operator; Rudy Lopez, construction miner; Toby Martinez, equipment operator; Martin Rodriguez, carpenter journeyman; and Quido Miranda, craft foreman.

see p. 6 on reverse side



VISITING NEW MINE VIEWPOINT soon after it opened was Modesto Guillen, mine truck driver, his wife Delores, and their grandson, Panchito. Photo by Richard Cole

Clinic has new number- 385-3412

BY LARRY MAJOR

The San Manuel clinic and hospital will have a new phone number on April 1.

Actually, the new number - 385-3412, is already working but the official change-over will be April 1 when the old number will be disconnected.

The new number will give callers quicker access to the hospital because it is a direct dial number and bypasses the company switchboard.

All hospital and clinic departments, including the emergency room can be reached by calling 385-3412.

The number will also reach on-duty medical employees and the hospital on nights and weekends.

In-situ leaching holds much promise

BY STEVE HILDEBRAND

Even more exciting than the oxide/SXEW project to company and corporate planners is the prospect of even lower cost copper from an "In Situ" leaching program which will be tested at the mine beginning this summer.

Construction of the in situ test installation is slightly ahead of schedule and introduction of leach solutions into the site will be early this summer.

To be leached is an area below the open pit and at the eastern edge of the orebody.

The area has been depleted of sulfide ore and is far away from panels now being undercut and drawn.

The ore here is too deep for the open pit but contains about 204,000,000 tons of ore which has been broken and rubblized through the caving process.

If the test is successful, Magma can recover about 1.1 billion pounds of copper at less than 50¢ per pound.

The copper would be recovered from leach solutions in an expanded SXEW plant but instead of leaching mined ore, the solutions would be injected into the orebody, gathered on the 2375, and pumped to the surface.

The testing will require about one year and will cost $3,900,000.

Much of those funds are now being spent at the mine in construction and fabrication by employees.

The preparation and grading of the drill site has been a special job for dozer operators Quido Miranda and Manny Flores.

A substantial amount of construction and modification is underway at the #1 shaft which will carry the main 8" stainless steel pipeline for the in situ test.

Special modifications have been made to the headframe and cage and a new hoist installed to hang the pipe. All of this work is being done by mine welders Col Boulden, Sam Chacon, Dan Deen, Ralph Ramirez and Hector Rodriguez.

In the shaft itself, pipefitter Albert Gutierrez and welder Lee Peoble are installing hanging brackets for the pipeline which will be welded in place by stainless steel welders Dan Deen and John Reed.

They'll be welding all the way from the surface collar down to the 2375-foot level.

vers to your q

employee ques- if we aren't mak- profit when we sell er to a customer?

pper is a little like the that you buy. Our is very much like er when compared y-side. A buyer may lling to pay a cent or ore a pound for a le source of quality er, but will not pay a ificant premium se there are other iers of copper, both stic and foreign with er for sale.

ere is no way Magma sell copper at a price er than what the et place will pay and at present price we are g money. On February he date this question answered, the Magma was 67½¢, virtually tical to the price of r producers. As we ntly advised the union esentatives, it costs ma 90¢-$1.00 to uce a pound of copper. today's market price, can see why we have and will continue to a substantial amount oney at Magma, unless educe our production s.

e can only lose money ong before our owner, Newmont, is no longer willing to continue to support us with their financial contributions. Without their support, we cannot

at mine and plant

Magma has provided the United Steelworkers of all employees on better and safer ways to run our operations and improving efficiency and quality.

Technical Trivia

As of January 31, the mine had hoisted 454,673,031 tons of ore since it started on Thanksgiving Day, 1955, when the first block was undercut and the ore draw was initiated.

****

The mill has been recovering an extra 715,000 pounds of copper per month from recycling smelter slag. But the ability to do this depends on the availability of good grade slag, so it isn't done all the time.

****

The refinery tankhouse has 4.12 acres of floor space under roof and 3½ miles of electrolyte supply pipes. Furthermore, there are 492 tons of copper in the tankhouse electrical system.

****

In the concentrator, ore is pulverized and ground until the particles are so small that 92% of them will pass through a screen containing 4,225 openings per square inch. The final concentrate is ground until 80% of it will pass through 106,000 openings per square inch.

****

The mine ventilation system pulls 1,165,313 cubic feet of fresh air through the mine every minute.

negotiations

would like more in- mation regarding aries paid to super- ors. Aren't Magma pervisors overpaid?

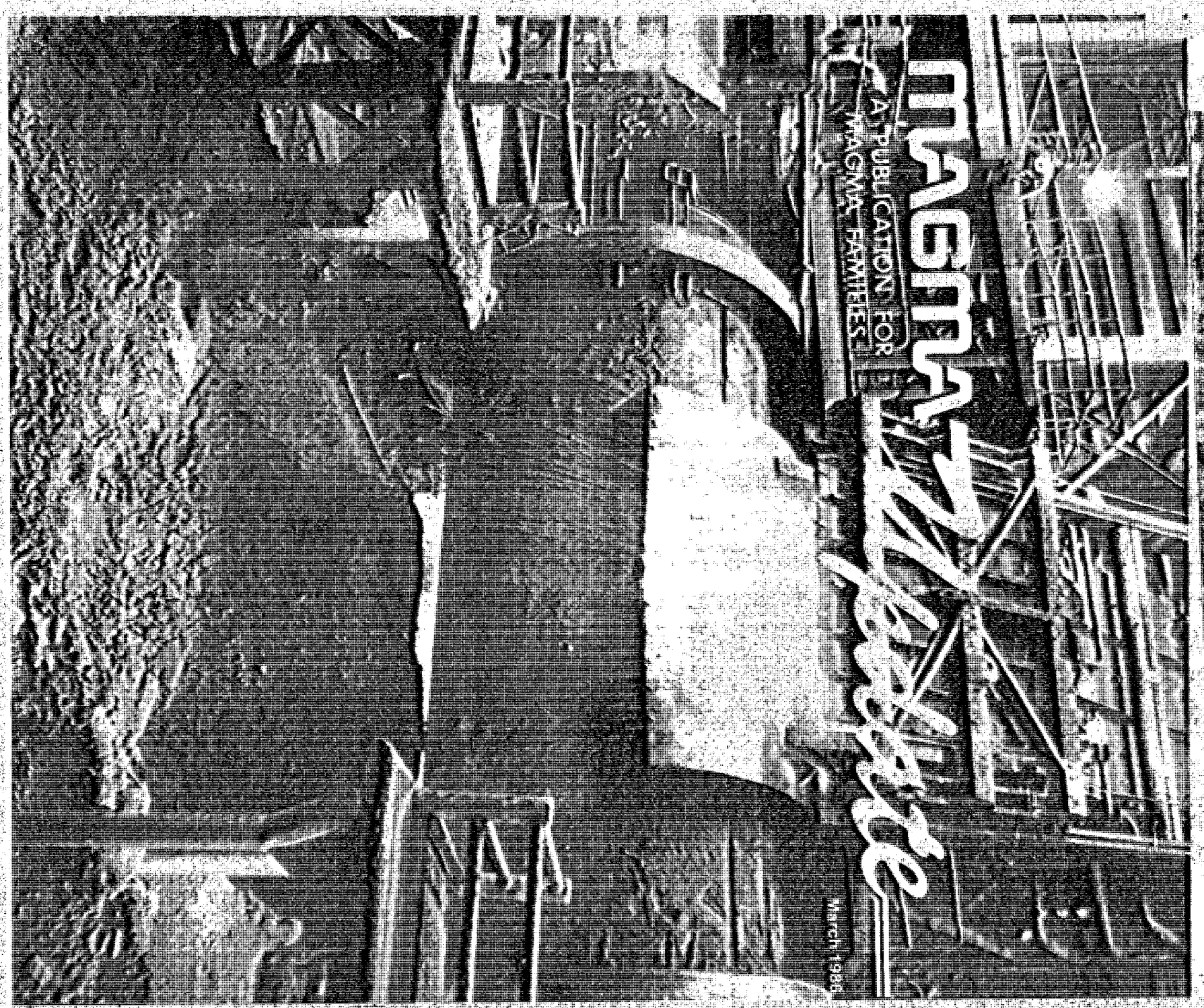
o. Our supervisor ries are in line with se paid by companies in labor market.

industry, supervisors generally paid a dif- ntial of 5-15% above highest classification employees they super- This difference reflec- e added responsibility supervisors are given heir jobs.

nce 1982, appropriate erentials for super- s at Magma have not maintained in many s and it is not unusual hourly employees ing overtime to make uch as or even more their supervisors. As tated before, salaried loyees have been ng sacrifices and this des our foremen.

ma Update is a Wouldn't it be bet- to spend Magma ey on other things?

e only cost of pro- g the *Update* is print- nd mailing. The ar- are all written by oyees who are volun- Some use their lunch hour, others write at home, some squeeze in an article or a picture between other



Making copper at San Manuel

THE COPPER CONVERTERS at the smelter remove the iron and sulfur from the molten copper matte produced in the reverberatory furnaces. A shower of sparks means this converter is in the "blowing" phase, with low pressure air being pumped through the molten charge, oxidizing the sulfur to feed the sulfuric acid plant. Read more about converters and the employees who operate them on page 3 of this issue.

File photo

Flash furnace will give Magma a "state-of-the-art" smelter

By ANKER BERGH and HARRY ROSSI

Magma and Newmont have been working for the last eight years to find the most efficient means of eliminating smelter emissions and to create a "clean" smelter.

The problem has been with the concentration of sulfur dioxide (SO_2) gases from the smelter's reverb furnaces.

The SO_2 from the existing furnaces is too weak to be processed economically in a sulfuric acid acid plant, yet current quantities cannot be emitted into the atmosphere after January 1, 1988.

Feed for the acid plant is now the smelter converter gases.

A committee, made up of Dr. John Yannopoulos, Newmont vice president research and development, Peter Crescenzo, Newmont vice president - engineering, and J.D. McCain, smelter superintendent, was established to review various smelting methods.

The committee studied all viable state-of-the-art smelting technologies to find a system that would best fit the San Manuel smelter's needs.

Extensive travel was required to observe and study various alternatives.

The committee traveled to Utah, Mexico, Canada, Spain and Germany to study and observe various state-of-the-art copper smelting processes including: the Mitsubishi continuous smelting process; the Noranda process, electric furnaces; the Inco flash smelting process; and the Outokumpu flash smelting process.

After considering SO_2 offgas strengths, concentrate grades and installation requirements, it was decided that while all smelting processes studied offered varying advantages, the flash smelting process was best suited to our needs.

Further studies were made by the Davy McKee Company of San Ramon, California, working with Newmont engineer Eli Knezovich, Magma engineer Art Verdugo working in Helsinki, Finland, and Newmont engineer Eric Hamer working in Toronto, Canada.

The intent of these studies was to make an economic comparison between the Inco and Outokumpu flash smelting process.

The Outokumpu flash smelting process was chosen as the best alternative for the San Manuel application.

The Outokumpu design flash furnace will be built at the north end of the smelter where the existing No. 3 reverb is located.

The No. 3 reverb will be removed and construction of the flash furnace will begin.

Smelting will continue, using the No. 1 and No. 2 reverbs during construction.

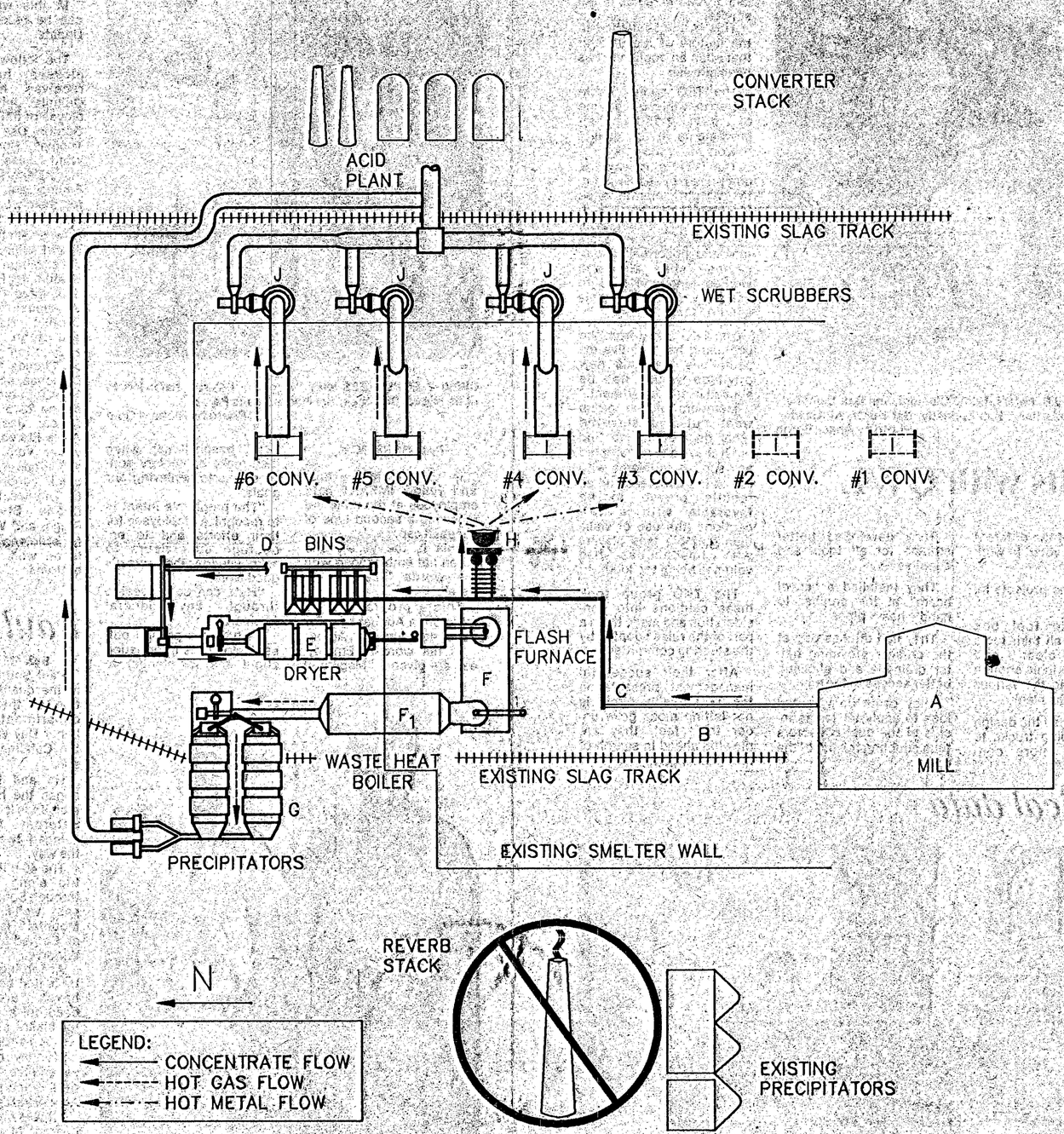
Then, these furnaces will be deactivated and eventually removed once the flash furnace becomes fully operational.

Also, the reverb stack (the west stack) will be disconnected and no longer used.

Concentrate from the mill ("A" on the drawing) will be transported to the smelter using the existing conveyor belt system (b).

It will then be carried on a new conveyor system (C) to storage bins (d) to await drying.

Additional belts will carry the concentrate to a new rotary dryer (E), where it will be dried to a moisture level below 1%.



Drawing By CHRIS DOUGLAS
with the computer assisted drafting system.

Concentrates currently average about an 8% moisture content.

Once dried, the concentrate, fluxes and 4% oxygen enriched air will be charged into the reaction shaft of the flash furnace (F), where the sulfide concentrate reacts to form molten slag and matte.

The principal advantage of the flash smelting process is that it makes use of the considerable amount of heat energy which is released in the oxidization of the sulfide concentrate, and hence little fuel is required.

The gases from the flash furnace are rich in SO_2 (31%) and the sulfur can be efficiently recovered as sulfuric acid, by acid plant processes.

Molten matte, averaging 63% copper, will be tapped into ladles and transported via overhead cranes, for charging into converters.

Only four converters will be required to process the matte, due to the greater degree of sulfur elimination in a flash furnace and converting time will be reduced.

No. 1 and 2 converters can then be used as extra holding furnaces.

The flash furnace offgases leave the furnace through an offtake tower at the opposite end of the furnace.

The offgases will then pass through a forced circulation waste heat boiler to cool the gas and generate steam.

These offgases will then pass through two electrostatic precipitators to removed entrained dust.

The dust, which contains copper, will then be recycled back to the flash furnace.

Also to be recycled is the copper rich slag which will be routinely cooled, crushed and returned to the mill for grinding and copper recovery.

As part of the smelter retrofit project, the gas handling system from the converters will be modified.

The existing system will be replaced with a new system that includes four new jet scrubbers (J).

The scrubbers will cool and remove particulate matter from converter offgases, so that clean SO_2 gas from the converters can be delivered to the acid plant, along with the gas from the flash furnace.

It should also be noted that the slurry produced by the scrubbers also contains copper; this too will be recycled through the flash furnace to further recover copper.

The acid plant will then be receiving more clean SO_2 gas than ever before.

It too is being modified to increase production.

Liquid oxygen for the operation will be supplied by a new oxygen plant to be built and operated by the Linde Division of Union Carbide Corporation.

Completion of the retrofit project will serve not only to make the San Manuel operation a "clean" smelter, but it will also increase smelting efficiencies, copper recovery, energy efficiency and acid plant efficiency.

Magma's new smelter will have a 3,000 ton per day capacity, making it the largest single furnace copper smelter in the world.

The prime contractor is Davy McKee and construction will begin in October.

Our new smelter should be in full operation in October, 1988.

Quality Circles In Action
Meeting A Goal, Moving Ahead

At the mill - Amigos QWL

By MYRNA HARRIS

The Magicians are progressing toward their management presentation on eliminating wood in the moly circuit.

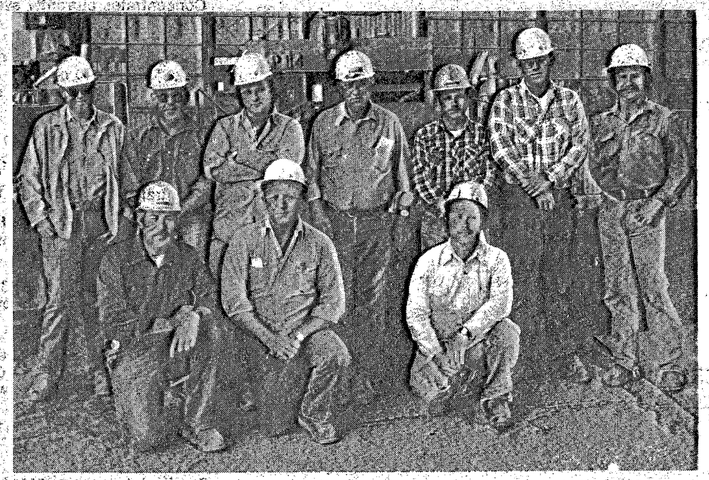
The Grinders are continuing work on their solution on the "ball mill oil line system design" and are preparing to install a trial on two ball mills while they continue with their force field analysis, implementation and management presentation. The installation of their ½ ton jib crane is now nearing completion.

The M.O.N.I.E. team continues their work on data collection and are in the process of recruiting additional members to work with them.

The Grizzlies are finishing up work on their cause identification for "metal in the crushers is a major problem". Their test rail liners continue to do well and the test of these rail liners along with rubber liners is scheduled to begin soon.

The Porphyry Pirates discovered that extensive work was already being done on their problem area, "oversize feed to the rod mills". Rather than duplicate efforts, they elected to select another problem area.

The Crushaders (#2 crew plant crusher) began meeting on August 13 and have already selected a problem area to direct their efforts toward: #9 conveyor belt cleanup. They will begin fact finding at their next meeting.



A-TEAM MEMBERS are, front row, left to right, J.R. Najera, Eddie Clement, and Dan Campbell; back row, left to right, Walt Middleton, Gibby Martinez, Bob Kennedy, Gar Kuntz, Al Amador, Wes Hule and Les Waddell. Photo by Anker Bergh

Welders get results with QWL

By TED JOHNSON

Congratulations to the A-Team plant welding crew for utilizing the QWL program!

Gar Kuntz's crew, the A-Team, is making a great deal of progress accomplishing the projects they decide on during their QWL meetings.

The group formally started, holding meetings in March, 1985 and since then have completed 99 out of 102 or 97% of the different projects they voted to work on.

Some of the projects include:

A portable tool box which keeps all their tools organized, clean and secure yet portable enough to be taken to the various jobs around the plant.

They changed the design of their welding trucks to make them more convenient for use.

They developed better storage for all tools and supplies.

They installed a "crawl beam" at the crusher to handle heavy pipes.

They had ditches dug at the crusher providing better drainage and allowing better access to the area.

They came up with the idea to apply tar to the inside of the dust collectors thus doubling the life of the covers.

Radios OK'd at smelter

By GILBERT RODRIGUEZ

On August 29th the smelter QWL steering committee approved the use of AM-FM radios in the smelter.

This is the first time in the history of the smelter that such an appliance has been allowed.

The TKO quality circle hopes that this will be one of many positive improvements in the quality of work life at the smelter.

The TKO group which is comprised of leader Scottie Wright, maintenance foreman, mechanic journeymen Terry Fisher, Randy Camron, Johnny Stanford and boilermaker journeyman Mike Moreland worked long and hard to come up with a workable solution for all.

The TKO group from the beginning had positive expectations that this new privilege would not be abused in any department.

Members of the group went out and surveyed other departments to find out if they had encountered any serious problems with radios in their areas and all results proved to be favorable with a few cautions (the use of walkman portable tape players with headphones had volumes being too loud).

The TKO group took these cautions into consideration and made them a part of the rules adopted by the steering committee.

After their successful management presentation the TKO quality circle is not letting moss grow under their feet, they are plowing ahead in search of new challenges.

Mine electricians seek electrical data

By LES PRESMYK

About eight months ago, the S.P.A.R.K.S. IMPAKT team chose to address a problem facing 80% of the electricians at the mine.

Basically, they were concerned with the lengthy electrical downtime on new machinery.

Ultimately, their solution was to ask for additional formal training on new equipment and to establish a central file holding plans and manuals on all electrical equipment.

The IMT (IMPAKT management team) council gave its approval to establish the central file.

As a result, the S.P.A.R.K.S. are looking for information.

Their quest is to gather all the electrical information possible and assemble it in one place.

The team leader is Elmer Flovin and the team members include Ed Burt, Julio Tafoya, David Lopez, Richard Cholas, and Burt Clark.

A file cabinet has been placed in the surface electric shop foreman's office.

As prints, manuals, and trouble-shooting manuals are brought in, they will be copied.

There is one locked drawer in the file cabinet and one master copy will be kept in there.

All other copies will be filed in the three unlocked drawers and will be available to anyone who needs the information.

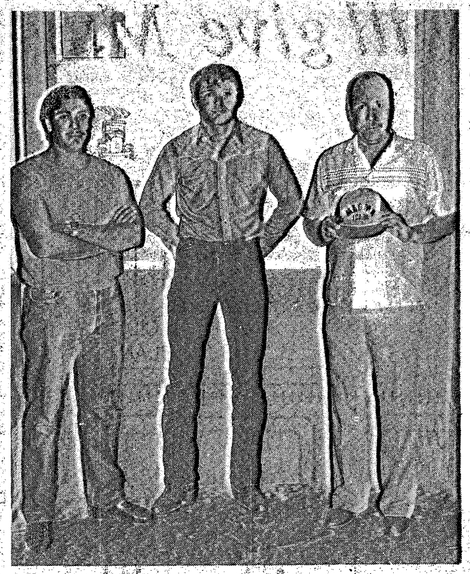
The S.P.A.R.K.S. team needs your assistance.

If you have anything you feel should go in the file, contact one of the team members or Les Presmyk at extension 463.

THE S.P.A.R.K.S. TEAM from left to right, Ed Burt, Richard Cholas, Julio Tafoya, Burt Clark and team leader, Elmer Flovin. Photo by Richard Cole

Meeting A Goal, Moving Ahead

Mine recognizes those who care — "and warehousemen, too..."



CREW 2 EMPLOYEES with "Magma - I Care" hats: left to right, Miguel Dicochea, Jim Morris, Jesus Perez. Photo by Richard Cole

By LES PRESMYK

In addition to the blue and yellow IMPAKT hats, employees at the mine are receiving a second type of baseball cap.

This is the yellow and green hat emblazoned with the words "Magma - I Care".

This program was initiated in August by mine superintendent, Tim Acton.

In his words, "Employees are given a "Magma - I Care" baseball cap when they make exemplary contributions to achieving our goals.

"The program's intent is to recognize employees for their efforts and to encourage supervisors to acknowledge their crew's good work.

"Hats can be requested through any general foreman."

As hats are passed out, send along the information about the recipient(s) to Les Presmyk at No. 3 shaft (ext. 463).

Include the person's full name and a short note about their accomplishment.

In this way, recipients can be recognized in the Update.

The following mine employees have already received hats: Carlos Quihuiz, July MTCE Employee of the Month, Sandy Gerdon, Dee Durazo, Leon Thomas, Ron Allum, and Ward Lucas; Terry Ackerman, Dennis Erwin, Brian Emling, and Anita Eccles for their work in planning efforts for 11B5 budget; Bill Howell; Richard Santiago, Juan Espinoza, Jesus Martinez, Miram Islas, Alfredo Castillo, for P8 block condition noted by Ed Thomas on August 4, 1986; Alfredo Castillo, Ray Stevenson, and John Tomerlin for suggestion on shotcrete car; James Morris, Miguel Dicochea, and Jesus Perez for P20/21 block conditions on the 2315 noted by Rick Curea; Jesus Marquez, Willie Flores, Jim Miranda, Victor Vera, Jesus Vega, and Frank Campa for P5B block condition noted by Ed Thomas; Mark Crandall; Duane Sledge, Carley Riggs, and Willie Martinez for efficiency improvements on work on ASEA car bottoms.

By CAROLYN CREELEY

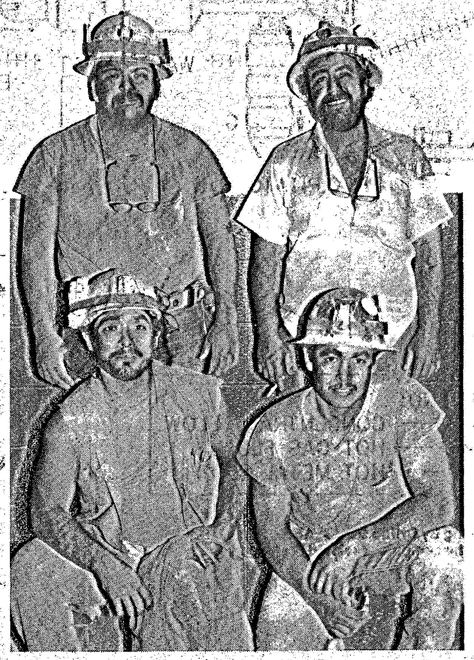
The mine recently underwent a move of production employees from number 4 shaft change room to number 5 shaft change room. To support this move for easier and quicker access to their work areas, the mine warehouse was asked to add another issuing point to be located between the change room and number 5 shaft.

The move was scheduled to take 5 days, but thanks to the entire crew at the mine warehouse who volunteered to work two shifts from 4:00 a.m. to 6:00 p.m. it only took 2 days. The new location point was ready for business by September 2.

For their dedication and assistance, the entire crew, along with their foreman, Doug Totten, was given the Magma "I CARE" award.

Congratulations to these employees for a job well done.

MINE WAREHOUSE CREW who care are, from left, Mel Mercado, Pat Shealy, George Griffen, George Chamberlain, and Alvin Clubb. Not present for photo were Chila Vitolo and Doug Totten. Photo by Ralph Ramsey



MEMBERS OF CREW 2 who received "Magma - I Care" hats; back row, left to right, Jim Miranda, Jesus Marquez; front row, left to right, Marty Vega and Victor Vera. Not pictured are Willie Flores and Frank Campa. Photo by Richard Cole

Paul takes 40 miles in stride

By SAM RIECHERS

Paul Smith, metallurgist in the quality control section of the metallurgical department, spent his Labor Day weekend hiking the Catalina trails to Tucson.

He and his two dogs began the hike from their residence in San Manuel on Saturday morning and camped two nights along the way.

The 40-mile trek took the trio along Oracle Ridge, through Summerhaven, and past well-known Catalina Mountain landmarks such as Cathedral Rock and the Window.

According to Paul, the trails just beyond Summerhaven are especially beautiful and very popular for hikers on a Sunday afternoon stroll.

Monday marked a new experience for Paul -- his first encounter with an Arizona rattlesnake.

"It was crossing the trail in front of us", said Paul, "and I was proud of the way none of us panicked but just waited for it to pass."

Paul reported that they had an encounter with a second rattler that same day.

Paul says he probably won't repeat the hike but "definitely enjoyed getting away from routine living and answering a challenge at the same time".

PAUL, JET and REG SMITH. Photo by Sam Riechers

MAGMA Update

A PUBLICATION FOR MAGMA FAMILIES

VOLUME 2 NUMBER 10 San Manuel, Arizona September 1986

Smelter flash furnace project to go ahead
Magma to be independent from Newmont

Newmont Mining Corporation announced on September 29 that Newmont has adopted a plan to recapitalize Magma Copper Company, by contributing to its capital the stock of another 100-percent-owned subsidiary, Pinto Valley Copper Corporation, and all but $200 million of intercompany debt.

This restructuring will allow Magma to raise the funds needed for a major retrofit and expansion of its smelter and expansion of its refinery, and for an anticipated in-situ oxide ore leaching project.

Newmont also announced that under the plan 80 percent of Magma's common stock would be distributed as a special dividend to Newmont shareholders after Magma has arranged the smelter-related financing.

Gordon Parker, Newmont Chairman, president, and chief executive officer expressed the hope that the precondition of such financing could be sufficiently advanced by year-end to permit registration, listing on the NASDAQ for trading over the counter, and distribution of Magma shares by late January 1987.

Gordon stated that recently completed engineering and economic studies of Newmont's Arizona copper resources have justified Magma's investing the required $130 million in a 3,000-ton-per-day smelter, so as to comply by late 1988 with federal and state air quality laws that are effective January 1 of that year.

Magma's refinery would be expanded to treat the output of the enlarged smelter, at a further capital cost of approximately $20 million.

The capacity of the new smelter and the refinery expansion are predicated, in part, on a long-term toll treatment contract recently concluded with Cyprus Minerals Company, covering a minimum of 300,000 tons of Cyprus concentrates per year.

The recapitalization of Magma also involves the exchange by Newmont of its remaining $200 million Magma debt (out of approximately $350 million) for a Magma preferred stock that would be non-voting and subordinated, would have a dividend of eight percent cumulative if earned and would also have a participation of 20 percent in Magma's future dividends to common stockholders.

The preferred stock would be exchangeable at Magma's option for an eight percent fixed interest subordinated note with similar participation rights.

Additionally, Pinto Valley, which was acquired by Newmont in 1983 at a cost of $75 million, will immediately become a Magma subsidiary.

Magma's Board of Directors, accepting the recapitalization offer from Newmont, has determined to proceed with the reconstruction of its smelter and has initiated steps to arrange the needed financing.

Magma has retained Chemical Bank as its financial advisor.

Initial indications are that fixed rate funds to sustain Magma on an independent basis from October 1, 1986, can be obtained from a variety of sources consistent with Magma's long-term operating cash flow projections.

Newmont noted that it has long stated its belief that its domestic copper operations could not expect a "quick turnaround" and that new discretionary investments by the company should be directed to other opportunities.

Newmont said its gold and energy businesses have consequently received the preponderance of both exploration and development funding in recent years.

Magma's future earning potential, Newmont added, is quite substantial at readily foreseeable copper prices primarily due to existing and potential oxide leaching projects, significant anticipated improvements in the cost structure of its underground mine and the economies of a larger smelter.

Magma produces some 100,000 tons per year of refined copper from its underground sulfide mine.

Pinto Valley, currently operating near a breakeven level, annually produces 70,000 tons of copper from open-pit sulfide mining and 12,000 tons from leaching/electrowinning of oxide ore.

Magma's new $70 million open-pit oxide ore mine and solvent extraction/electrowinning facility at San Manuel are producing at a rate approaching capacity of 25,000 tons per year.

Costs at the plant, opened in May 1986, are about half the costs of current production from underground mining.

Production of another 50,000 tons of electrowon copper, from additional oxide reserves at even lower costs, currently is under a large-scale feasibility test whose results will be available in 1987.

Labor cost reductions achieved in July 1986 are expected to lower the 1987 cash costs of Magma's underground sulfide mine production by approximately nine cents a pound of copper.

A new underground mining plan should further reduce cash costs by approximately 15 cents a pound by 1989, and the new smelter should reduce cash costs of all smelter copper a further four cents a pound – with all reductions measured from an expected 1986 average cash cost of approximately 82 cents a pound before interest charges.

The 1986 level is unusually high due to development work undertaken during the year to expand future production.

As Magma will operate at reduced levels in 1988 awaiting the availability of the new smelter, costs in that year are expected to be high.

Newmont said it would enter a service agreement with an independently managed Magma for three years to provide a transition period in which Magma can aquire services now provided by Newmont personnel.

Summary

(Subject to successful completion of financing arrangements:)

- Magma will become a separate publicly owned corporation with Newmont owning 20% of the stock.
- The Magma-Pinto Valley merger will proceed.
- The smelter retrofit will begin at once.
- Additions will be made to the refinery.
- Improvements will be made at the mill.
- In-situ leaching will come on line and the SX-EW will be doubled in size.
- Development of the "K" ore body will go ahead.

Smelter refit project

By BRIAN WOOLFE
executive vice president

At last we have some concrete plans to work to and, providing the financing is in place by the end of the year, we will be stepping out on our own early in the new year.

There is a great deal of work to be done and not much time in which to do it, but at least the waiting and uncertainty are over.

We must not only get the retrofit and expansions done on time and under budget but we must keep our operating expenses under control.

Also we must start long term planning to ensure that Magma, Pinto Valley and M.C.R. have a future extending into the next century.

The challenge and the opportunity are now in our hands and I am confident that if we all work together our efforts will be crowned with success – so let's get with it!

TV series features mining

A new television special series on mining and metals will be broadcast for seven weeks beginning Monday, October 6 on KUAT Channel 6 at 10:00 p.m.

The documentary takes viewers from the stone age to the atomic era and reviews the discovery of ores and smelting.

Episodes focus on the Iron Age, Industrial Revolution, Machine Age, Gold Mining, our modern dependence on metals, and the future of the industry.

A companion book, "The Impact of Metals on the History of Mankind," by Robert Raymond (who also produced the TV series), is published by MacMillan Co. of Australia.

LHD's are mine workhorses

FRED DON uses a 2 yd. LHD to scoop muck from a chamber in the test block on the 2315 level. Photo by Les Presmyk

By AL LIZARRAGA

The underground mining operations fleet of load, haul and dump four wheel-drive diesel loaders (LHD) is involved in all phases of the mining cycle.

Currently there are 26 LHDs involved in the drift development phase of underground mining.

Trackless drift development, made possible by the use of rubber tired mini bore drill jumbos and LHD's have increased the drift efficiency from 1.0 foot per manshift to 1.3 feet per manshift.

Advantages of using the LHD in drift development over the conventional rail mounted 40 H mucker are numerous.

To start with, no track is required, thus the LHD is not restricted to one drift in the area.

Considerably less time is involved in switching ore cars for mucking up a round.

This is due to the LHD going to the ore cars instead of the ore cars coming to the LHD.

Two scoops from an LHD with a 5 yard bucket and a 14 ton ore car is loaded.

The mobility of the LHD has helped cut the time required to muck out a drift round to almost half that required by a 40 H mucker.

The LHD is also used in clean-up and various other jobs in the drifting cycle.

Met dept. names employee of the month

By FARLOW C. DAVIS
Asst. metallurgical director

In July the metallurgical department began a program to recognize an employee of the month.

The first employee to be recognized was Lynn Feldt, senior clerk.

Lynn has been in the metallurgical department since May 1973, first as secretary, then clerk, timekeeper and finally senior clerk in 1976.

All of us know something about her job because she makes our days run more smoothly.

But we cannot appreciate all she does because only she knows.

She prepares all our typed communications flawlessly and professionally.

She sees that our data are at the right places at the right times.

She even knows what to do with contents of "OUT" baskets that we don't.

Lynn has had an exemplary safety record during her employment at Magma!

Lynn was born in Toronto, Canada, and came to San Manuel from Moab, Utah.

LYNN FELDT
Photo by Sam Riechers

She and her husband, Fritz, now live in Tucson where Fritz works with the Territorial newspaper where the *Update* is printed.

Lynn's father, Brian David, brothers, Kenny, Robert, and Ricky, sister Valerie, and sister-in-law Jodie, all work for Magma.

Our thanks to Lynn for a job well done and for helping us all to look our professional best!

Employees' fund ready to use. Any ideas?

The Employees' Fund, composed of vending machine profits, now has about $10,000 and the committee has made the following proposals for distributing the funds:

-- A second annual children's Christmas party to cost about $2,500;

-- A $3,000 scholarship, and

-- A drawing for three cash prizes; $1,500, $700, and $300. Details are yet to be worked out.

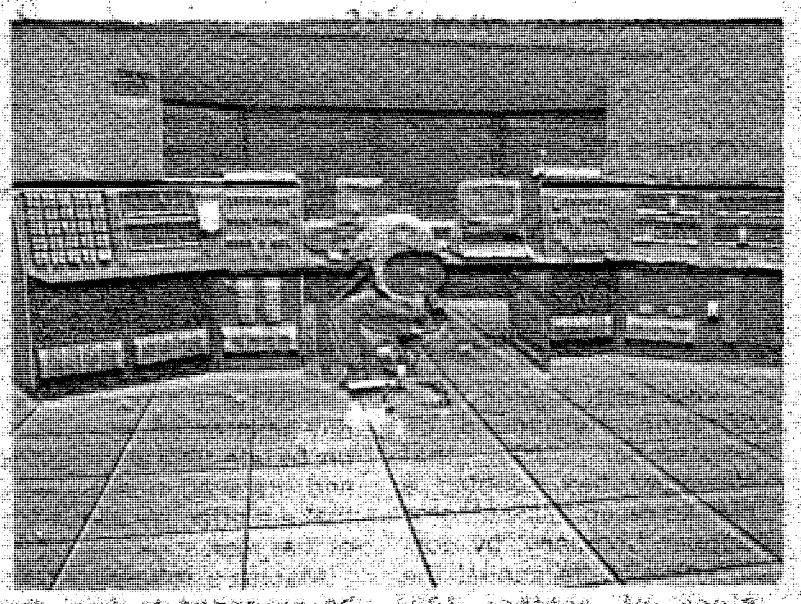
The committee would like employees' ideas on how this money can best be spent to everyone's advantage.

Employees' suggestions and comments should be made in writing and addressed to the *Magma Update* editor at the administration building.

For each can of soda sold, five cents is placed in the Employees' Fund.

The next meeting of the fund committee is scheduled for October 15 so all suggestions should be received soon enough to be considered at that time.

Hi tech controls SX-EW



MIKE EAMON, supervising technician, monitors data in SX-EW control room. A copper company? You bet! Magma ain't no dinosaur!

Photo by Bebe Burwell

Story and Photo
By BEBE BURWELL

The heart of the refinery solvent extraction-electrowinning (SX-EW) plant's control room is a state of the art computer, which works in concert with a multiplex and two Zenith units.

The multiplex gathers information from throughout the plant via a system similar to telephone lines and feeds it into the computer, while the Zenith units store and display data gathered from the computer.

The system also incorporates an uninterruptable power source, which means the computer will not go down -- even in the event of a company-wide power outage.

This aspect of the system has been called into play at least once since installation in May of this year, and proved to live up to its claims.

Should there be a computer failure, the backup system includes both a separate computer within the instrument panel and the capability of operating controls manually.

This highly sophisticated system enables one person to completely control entire plant operations, just as the Zenith units allow one person to control the vast number of instruments from keyboards, and then call up analysis and/or graphic displays.

On the day of this interview, a back wash (cleaning cycle) was underway on the sand filters, and a screen was displaying a continuous graphic update of its effect on both the electrolyte tank level and the filter feed tank.

These impressive units can instantly generate hard copy upon demand, store data on computer discs, and store data internally up to 30 days -- compared to only four days of storage capacity on a conventional chart recorder.

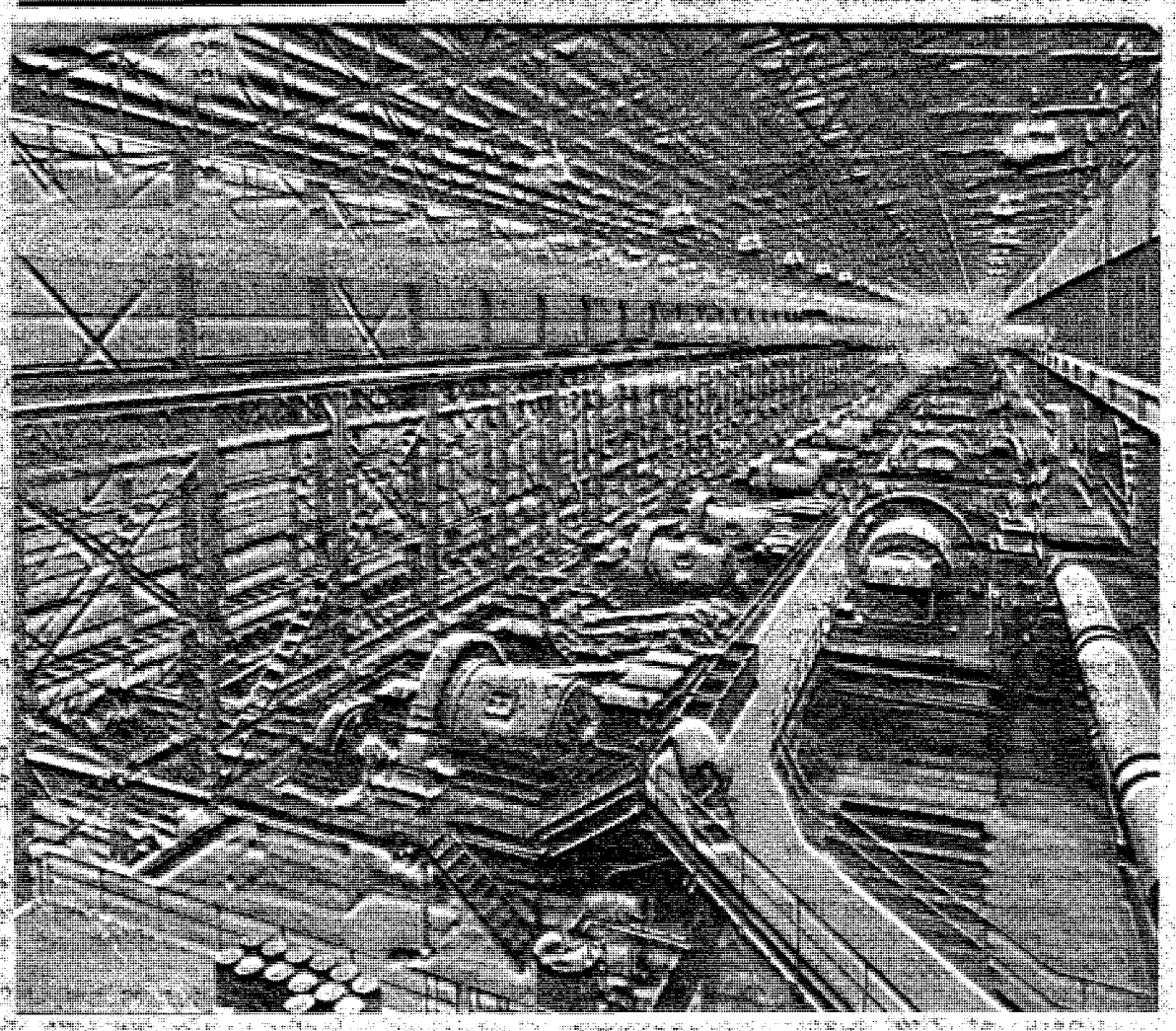
Other computer feats include the following:

In an emergency, such as a lightning strike, it will automatically shut down all valves, agitators and auxiliary mixers in the trains in less time than it takes for a person to stand up; power bumps at the pregnant leach and other ponds can be controlled and units automatically shut off from the control room; pump motor speeds at the raffinate pond can be controlled; the current in each of the cells is monitored and controlled; and much more.

With all this capability, it should be remembered that such equipment is only as good as the people who run it.

Magma is proud of the SX-EW team that operates and maintains this new "state of the art" facility.

From our scrapbook...



31 years ago at the mill

SAN MANUEL'S NEW MILL went into operation in September 1955 and began trial runs on mine development and stockpiled ore. There were eight wet grinding sections to handle 30,000 tons per day and the photo shows the view from the #1 section at the north end of the mill. The major difference which mill employees will recognize in the photo are the rake classifiers which were replaced by cyclones in 1964. Also the little compressed air trolley has been replaced by a battery model for delivering grinding balls to the ball mills. Two additional grinding sections and flotation circuits were added in the 1964 general expansion bringing mill capacity up to 40,000 tons per day and in 1971 an additional three sections brought capacity up to the present 62,000 tons per day. The first mill had 480 rougher and 144 cleaner flotation cells. In 1955 mill production was 750 tons of 28% concentrate per day.

Former employee in congressional race

Sheldon Clark, former mill boss at San Manuel and assistant mill foreman at Superior won the Republican nomination for the U.S. House of Representatives from Arizona's 2nd District in the recent primary election.

Sheldon will oppose Democratic Party Candidate Morris K. Udall in the general election of November 4.

District #2 covers a vast area reaching from Phoenix to Yuma to Nogales and includes portions of Tucson and has about 217,000 registered voters, of which only 28% are Republicans.

Sheldon, who is 37 years old and a metallurgical engineer, was a Magma employee from 1972 to 1978.

He also worked at Morenci and at Toquepala in Peru.

He is campaigning on conservative issues and an agenda to revitalize the copper industry.

In the primary election, Sheldon received 54% of the Republican vote while Udall received 72% of the Democratic vote.

Experienced miners needed

Rumors have been circulating that Magma is paying big bonuses to lure out-of-state miners to come to work at San Manuel.

Here's the truth of the matter.

Our need for skilled and experienced underground miners has become critical.

Therefore we are actively recruiting up to 100 of these specialists from areas where underground mines have recently closed.

We've learned that most of these potential employees are simply without any resources to move to San Manuel so we have offered two incentives;

-- A $500 relocation allowance for out-of-state experienced hard rock miners payable after 45 days on the job, and

-- A high priority for assignment of housing in San Manuel.

Why are these development jobs so critical to us?

The Board of Directors has determined that underground mining will continue at San Manuel and that development in both the San Manuel and Kalamazoo orebodies must be accelerated to meet future scheduled production levels.

Up to now mine development has been scheduled at a much lower level to accomodate only current production of 50,000 tons per day from the 2375 and 2675 levels.

Recent events now dictate that a more aggressive development campaign is required to meet production schedules for up to ten years in the future.

This will insure the new smelter has a steady source of feed and that adequate sulfuric acid is available for the SX-EW, in-situ project, Pinto Valley, and other customers.

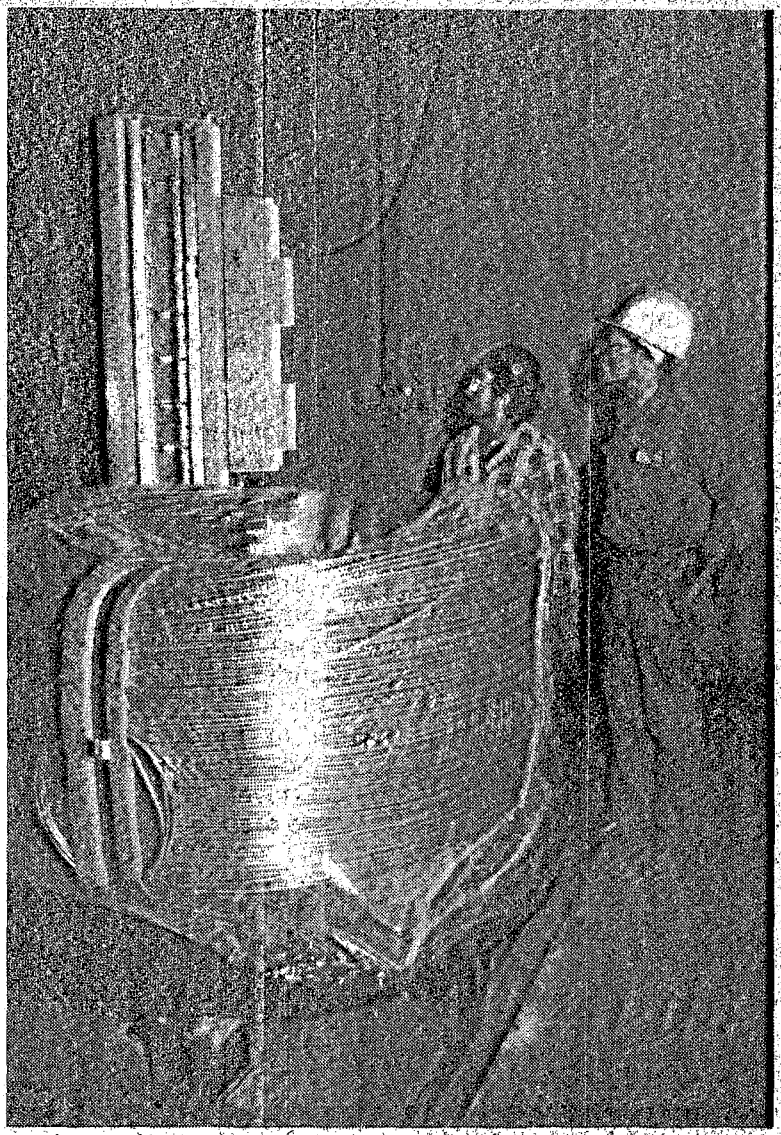
Development is currently expanding in two major areas -- the west end of the 2675 in the San Manuel orebody and the 2890 and 2950 levels in the Kalamazoo orebody.

This development work can only be done by skilled and experienced development miners.

Since we have had no major mine development work in many years, our once large development cadre has dwindled away and now must be replenished.

September 1986

New machine wraps coils in plastic film



MARIO CONDE, rod plant laborer, left, and GAYLE LINAMAN, rod plant foreman watch plastic wrapper being shrunk around coil of rod heated by

MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES
October 1986
Vol. 2, No. 11

The scoreboard

Monthly review of how we're doing

FOR SEPTEMBER 1986

	This Month	Year to Date 1986 Actual	Goal	Variance	Year to Date 1985
Tons of sulfide ore mined	1,421,586	13,272,067	13,884,000	−3.7%	13,275,378
Tons oxide ore mined	500,132	5,194,024	2,968,000	+75.0%	—
Tons ore and slag milled	1,477,008	13,721,301	13,884,000	−1.2%	13,274,098
Tons concentrate produced	31,088	259,122	258,550	+.2%	247,558
Tons molybdenite produced	278	2,219	2,303	−3.6%	2,214
Tons concentrate smelted (1)	55,363	533,169	494,552	+7.8%	490,677
Tons anode produced (1)	19,697	186,099	184,732	+.7%	182,844
Tons sulfuric acid produced	33,109	314,742	282,173	+11.5%	286,499
Pounds electrolytic copper produced (1)	35,580,690	329,617,100	299,642,000	+10.0%	297,430,000
Pounds electrowon copper produced	3,840,344	10,829,658	12,602,000	−14.1%	—
Pounds of rod produced (1) (2)	36,471,887	362,211,434	422,078,000	−14.2%	253,867,696
Average sales price of refined copper	63.26¢	66.42¢	69.27¢	−4.1%	65.98¢

(1) Includes copper belonging to companies other than Magma.
(2) Includes MCR Products

Meeting A Goal; Moving Ahead

Huber, Ralph Cortez, Steve Peraza, and Tariq Rana were given hats for providing communications to the Dosco and LHD crews throughout the mine.

B.J. Romero and Jim McDowell from Crew 1 received hats for their production efforts in Panel 6A.

Any foreman needing hats should contact Ron Allum or Leon Thomas.

In addition, make sure you send Les Presmyk a note with names and a short description of why the hats were awarded.

Promoted

RAY LOPEZ, mine general haulage foreman was recently promoted from shift foreman, bringing 21 years of experience and knowledge to the underground haulage department.

Photo by Richard Cole

In response to questions being asked as to whether or not Magma Copper Company has access to the contributions made to the new savings plan, for salaried employees, the following is the correct situation.

All savings plan contributions made by Magma salaried employees and all matching contributions made by the company are paid monthly directly to Bankers Trust Company which is Trustee of the Magma Savings Plan.

Bankers Trust has full control of the funds and these funds are not accessible to Magma Copper Company.

Bankers Trust Company is bound by a Trust Agreement which is approved by the Internal Revenue Service.

All funds must be held, invested, and distributed by Bankers Trust in the manner prescribed in the savings plan document and the trust agreement.

Confirmation of proper handling of Savings Plan funds is filed with the IRS annually, thus, there is little opportunity for funds to be mishandled.

The IRS requires that an independent public accounting firm audit the entire funding process each year and a copy of that audit must be sent to the IRS.

Arthur Andersen & Company will audit the Magma Savings Plan each year and must verify that all funds withheld from the employee's pay checks and those funds contributed by the company have been received by the trustee and deposited in the Trust Account.

The audit must also verify that the trustee is holding all deposited funds until distribution directly to the employee is permitted.

Chipped windshields on Hwy. 77

Recently the Oracle Maintenance Station of the State Department of Transportation has been making road repairs on State Highway 77 near Oracle.

A week after the rock was laid and swept, it remains a risk to vehicles' windshields and paint to travel the section with its loose gravel.

Some Magma employees have experienced severely pitted, chipped or cracked windshields, and paint "dings" on the front of their cars and trucks.

Damage claims can be filed by sending the details of your incident to the Arizona Department of Transportation, Adjustment and Claims Division, 212 B, 206 South 17th Avenue, Phoenix, Arizona 85007.

If you do not receive satisfaction, the Director of Transportation is Mr. Charles Miller, who is also located in Phoenix.

This is also an area where, as citizens and residents, you may want to contact your legislator regarding a repair procedure to take into consideration the interests of those who are paying the bill through taxes.

Open pit mining at San Manuel

FIVE SCOOPS OF ORE from our 13-yard P & H excavators fill one of the 100 ton capacity Unit Rig haul trucks at the oxide open pit. 500,131 tons were mined here in September with our two P & H units. Magma Update V. 2, N. 11 Oct. '86 Photo by P & H Corporation

Month. Working for Magma since 1973, Oscar is an electrician. His supervisor says, "He has a high regard for doing good work . . . attention to detail stands out. Offers productive suggestions . . . exercises good judgment."

Frank Parker is Mine Operating Employee of the Month. Frank has been with Magma since January, 1986 and at the present is a mechanical miner leadman. His supervisor wrote, "He has the ability to adjust to changing situations. . . . always seems to pull a bad shift up and out of the mud. Men like Frank make my job easier and he sets a good example for his co-workers."

Tom Whatton, an equipment operator in the open pit, is Oxide Employee of the Month. He has worked for Magma since 1972. His supervisor wrote, "He is determined to have the best quality work . . . to do the job right the first time... when working around others the group's safety comes first."

By BEBE BURWELL

NEAR RECORD SHIPMENT of 4,173,592 pounds of copper products were loaded and processed by material handling crews, shipping clerks, and refinery accountants on September 29. Included were 35 truck loads of 6000-pound palletized, packaged coils of our 5/16" wire rod. In photo, a loaded trailer rig prepares to pull out while coils sit ready for loading and shipping at the rod plant dock.

Retirements

Congratulations and Thanks!

OCTOBER 1, 1986

JOE B. BOST, Claypool, from manager of administration, San Manuel. Joined as superintendent of budgets and systems development, October 1, 1971.

EDDIE S. GUTIERREZ, Bullhead City, from pipefitter journeyman, San Manuel. Joined as laborer, July 13, 1956.

JACINTO R. MIRANDA, Tucson, from motorman, San Manuel. Joined as mucker, May 9, 1958.

PAUL J. WADUSKY, San Manuel, from general electric and instrumentation foreman, San Manuel. Joined as instrumentation foreman, October 2, 1972.

NOVEMBER 1, 1986

CLINTON COOPER, Queen Creek, from miner, Superior. Joined as mucker, April 30, 1963.

ARTEMIO C. DEL REAL, Mesa, from motorman, Superior. Joined as mucker, September 18, 1956.

GILBERT G. VELASQUEZ, Superior, from slusherman, Superior. Joined as mucker, February 1, 1954.

In-situ production underway at San Manuel

By STEVE HILDEBRAND

As of the end of January this year, the In-Situ Project's status was changed to that of a copper producing part of Magma.

Hence, In-Situ Project can be classified a success!

Extraction of copper from the San Manuel oxide orebody by deep well injection of acidic solutions is not only practical, but evidently economical.

During March this year, in-situ operations produced 88 tons of copper at a cost of $0.3927 per pound of copper, including SX-EW treatment charges.

This singular cost example helps to justify the in-situ expansion to 7,200 gpm leach injection system.

The expansion began in January this year and is gaining momentum.

Recently, a purchase order for eighteen shaft pumps was given to Ingersoll Rand company.

They will be stainless steel pumps and they will be installed at the two No. 4 shaft pumping stations being designed by the mine design department.

The underground pregnant leach solution (PLS) handling system will be capable of pumping at 8,000 gallons per minute flowrate.

The motors to drive these pumps will be built by Westinghouse and will range from 600 hp motors to 1,250 hp motors.

The in-situ PLS handling system is essentially a batching pump system, where the PLS will be delivered to the SX-EW plant feed pond.

During the past three months, the in-situ operations staff has been performing many hydrological leach tests to help define the operating parameters of an expanded production leach field.

In this endeavor, much assistance from two Pinto Valley employees has been made available.

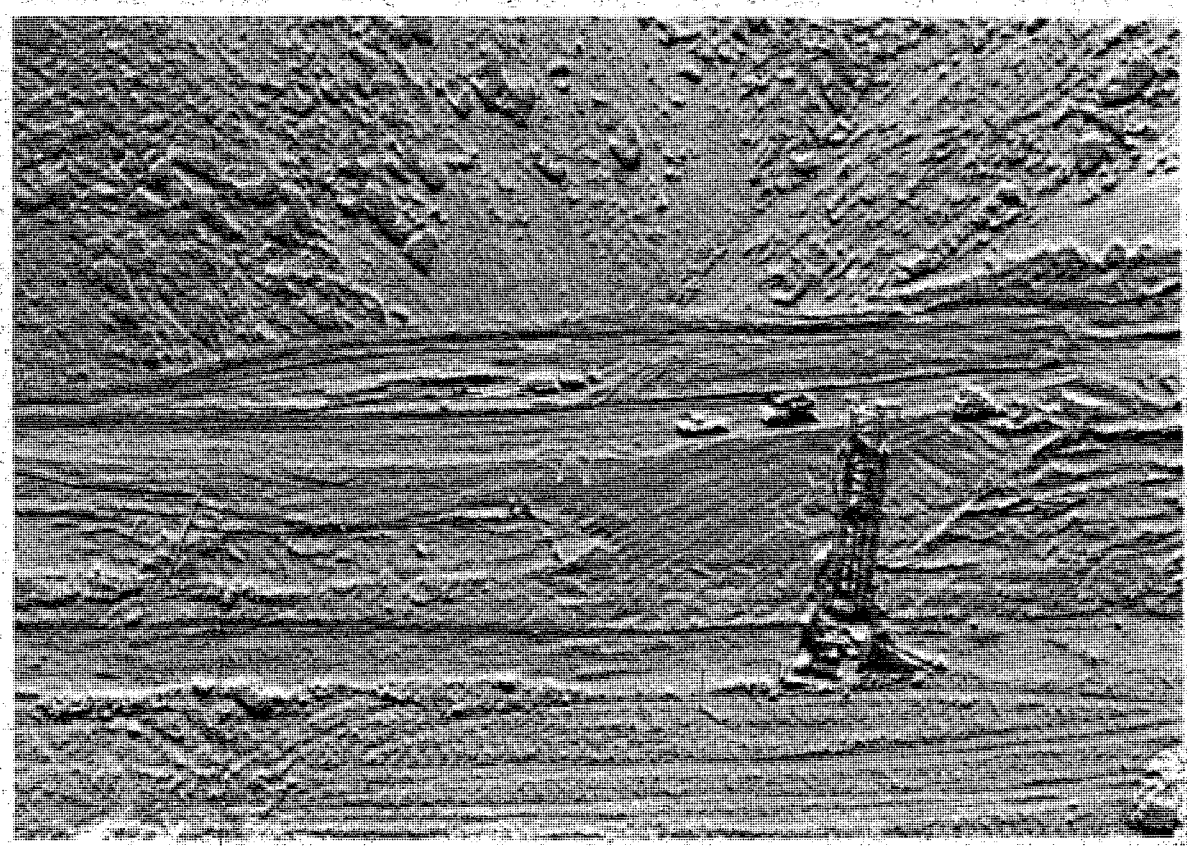
They are Chris Erskine, a ground water geologist, and Bill Fiori, manager of research and development at Pinto Valley.

Essentially, these field tests are to provide data on transmissity of the leach solution as well as porosity of the rubblized rockmass.

From the data collected, injection well spacing and flowrates to each injection well can be determined. Of course, required acid concentrations in the leach solutions will also be set.

Since January, the pace of the work being done underground for the three pump stations and the expanded collection area has been increasing.

Harvey Cooper has been put in charge of all underground in-situ construction work and is working towards completing the job on time in December, 1987.



IN-SITU leaching site at east end of open pit area where injection tests have been taking place and where new holes will be drilled for production operations. Photo by Richard Cole

SX-EW could triple in size

A two phase expansion of the in-situ operations is part of the Magma capital projects and is estimated to cost a total of $81 million.

Phase I, now underway and scheduled to be completed by mid-March, 1988 will double the size and output of the SX-EW plant from the present 25,000 tons of cathode copper per year up to 50,000 tons per year.

The larger plant will process the existing 8000 gallons per minute of leach solution from the oxide heap dumps plus the additional 7200 to 8000 gallon per minute of leach solution from the in-situ underground collection sumps.

If all goes well the Phase II would come in line in December, 1989, and an additional 7200 to 8000 gallons per minute would be pumped from in-situ collection sumps underground, and treated in a further expanded SX-EW plant.

This would result in an additional 25,000 tons per year of new copper for a total of 75,000 tons of copper per year from the oxide project.

At this time the SX-EW plant will account for approximately 20% of all the copper produced from San Manuel.

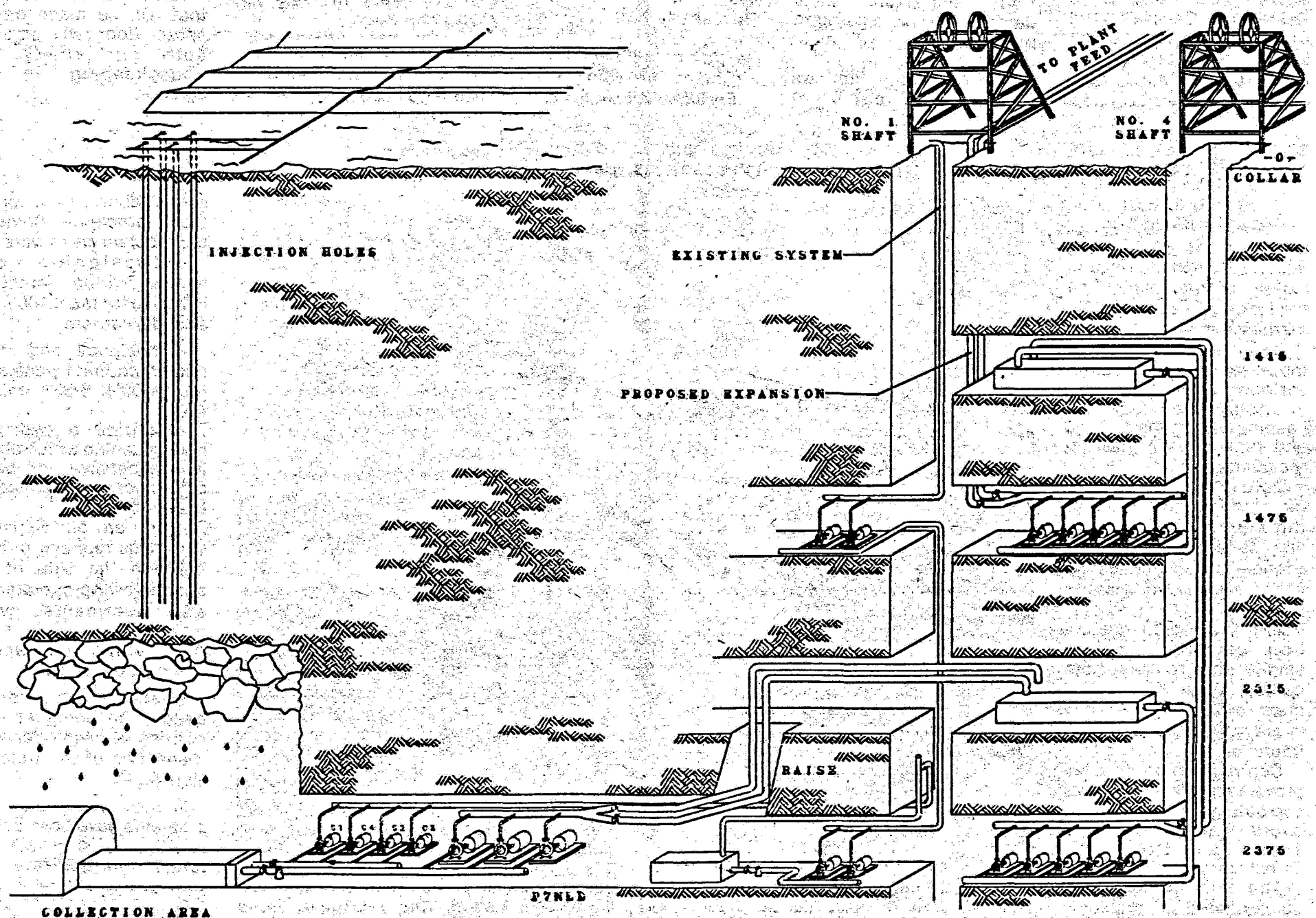


DIAGRAM of the in-situ project was designed by engineer Steve Rieffer and drawn by engineer Rick Bonner. Sulfuric acid is injected through holes, on the left, seeps through the oxide rebody absorbing copper, and is collected in sumps on the 2375 level. Leach solution is raised by a series of pumps up the #1 shaft to the surface where it is blended with leach solutions from the heap leach dumps and delivered to the SX-EW plant for recovery of the copper.

Quality Circles In Action

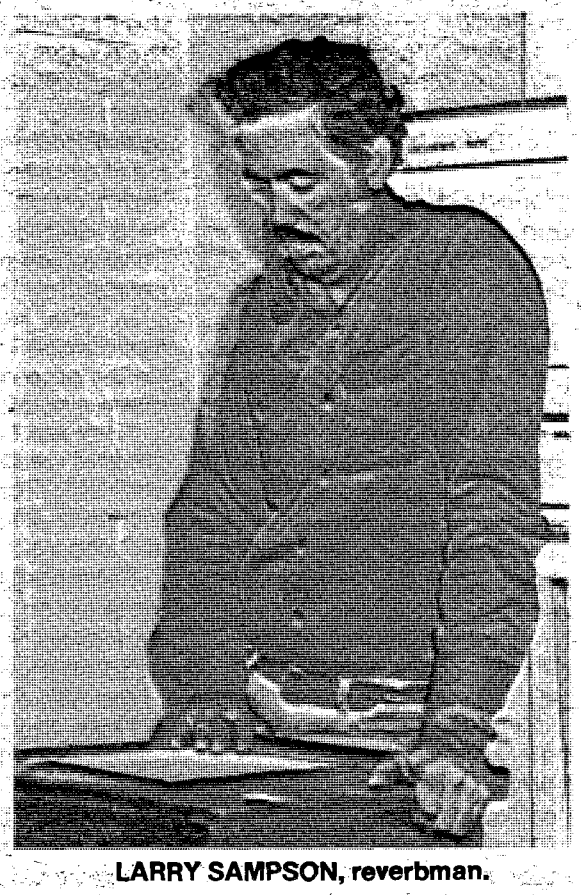
Meeting A Goal, Moving Ahead

Copper Kings at work

Story and Photos By GILBERT RODRIGUEZ

FRED HALE, supervisor.

COPPER KINGS are left to right, spoutman Sharon Van Horn, reverbman Smokey Ahumada, slag motorman Lenny Chiazzese, and spoutman Modesto Dominguez.



LARRY SAMPSON, reverbman.

The momentum is increasing for smelter quality circle presentations.

On April 20 the "Copper Kings", a reverb quality circle, made their first presentation to the smelter steering committee.

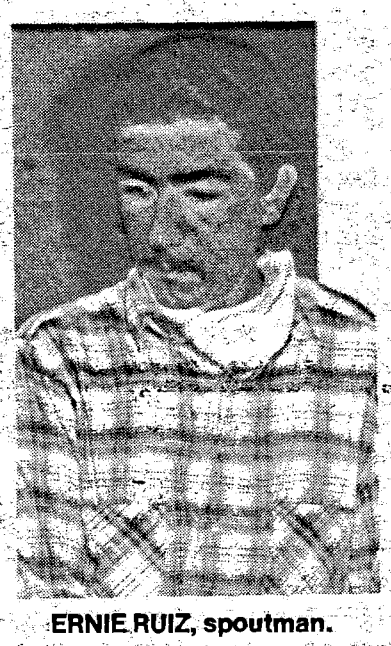
Leader, Fred Hale and members Smokey Ahumada, Larry Sampson, Sharon Van Horn, Ernie Ruiz, Lenny Chiazzese and Modesto Dominguez showed the steering committee a better spout floor design which would allow for easier cleaning and safer work area.

The Copper Kings worked hard at discovering all the causes to their problem which was "Spout Floor Build-Up".

Spoutmen, for many moons, have been faced with cleaning some pretty hefty slag build up on the spouts.

Well, the Copper Kings decided they were going to put an end to a lot of muddlers effort.

Some of the causes discovered were evident and some took hard digging.



ERNIE RUIZ, spoutman.

The Copper Kings sent a questionnaire to the cranemen to see if maybe they had overlooked something.

Lo and behold, as a result of the questionnaire, craneman Jesse Borquez gave the circle one solution to their problem, splash guards on the side of the spout to keep the slag off the spout floor.

There were other comments made by the cranemen that proved useful to the circle.

Just shows what a little communication between two work groups can do!

The circle decided that the rail on the spouts which was horizontal contributed to the problem, solution - make them vertical.

The Copper Kings also thought that grating on top of the rail would decrease tripping hazards.

All in all, the changes that will be made on the spout floor will improve both our safety and housekeeping in the smelter.

Fork truck shop has two Quality Circles

Story and Photo
By TED JOHNSON

The plant fork truck repair shop has the responsibility of maintaining all the fork trucks and straddle carriers at the plant.

Because the majority of these vehicles are used in various areas of production, the task of keeping them maintained and running is critical to the operation.

Dave Hartman, section foreman, and his crew of thirteen mechanics and one boilermaker have responded to the challenge and it seems are winning the battle.

After talking to production personnel in the smelter and refinery, both parties agree that equipment availability and the quality of maintenance has improved.

Contributing to this improvement are the shop's two quality circle, "The Liftovers" and "The Old Timers" and their leader Dave Hartman.

The two circles have concentrated on problems related to better maintenance of the material handling equipment and have used a very "common sense" approach to solving these problems. Some of the problem areas were:

FORK SHOP employees are from left, standing, journeyman mechanics Frank Atkerson, Don Dunmire, Don Thomas, Richard Webber, Greg Blatti, Sam Madrid, Tino Velasquez, Jesse Madrid, and section foreman Dave Hartman. On top of straddle carrier are journeymen mechanics Frank Borquez and Alfredo Valencia. Not available for photo were mechanic leadmen Bill Butler, mechanical journeyman Joe Mungula and boilermaker journeyman Eddie Davis.

-Redesigning and making wiring harnesses in-house for the S-100's and straddle carriers.

-Redesigned and made new instrument panels for the S-100's, S-60's and M-400's.

-Justified a hydraulic hose machine which allows less expensive and better suited hoses to be made in the shop.

-Built an oil dispenser with hose reel and outside light on the side of the shop allowing operators to add lubricants when necessary, thus eliminating unnecessary call-outs on C-shift.

-Installed a "sight-gauge" on some straddle carriers allowing for easy inspection of transmission fluid levels.

While not all the problems have been solved yet, these two groups certainly demonstrate the willingness and ability to make not only their Quality of Work Life (QWL) better but to solve the many problems that occur in an operation like theirs.

Old reverb furnace demolished

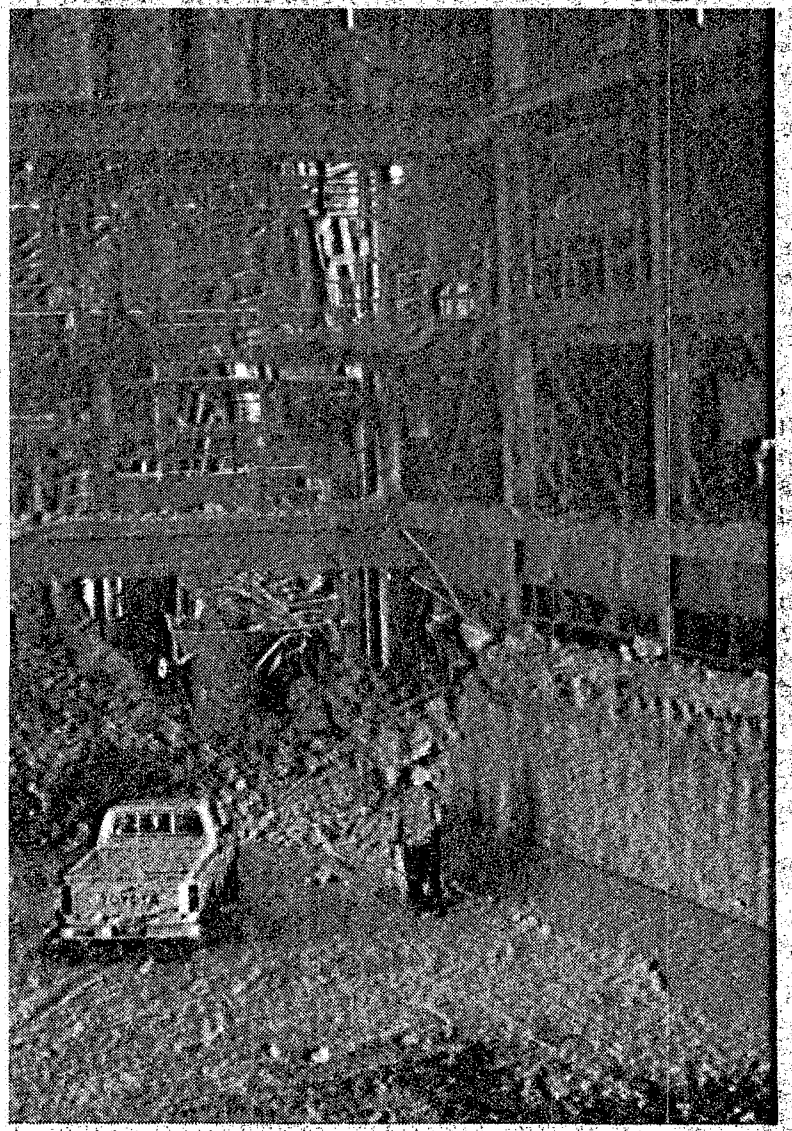
p. 1

Magnalopolis V. 22, No. 12 Nov. 1986

By GILBERT RODRIGUEZ

If you visit the smelter, you'll find an empty spot where the #3 reverb furnace used to be.

The demolition of the furnace is on schedule because of efficient work by smelter, shop, mine and contractor employees.



THE #3 reverberatory furnace bottom is reached as it's demolished to make way for new flash furnace.
Photo by Gilbert Rodriguez

The biggest task involved was drilling, blasting and mucking out the furnace bottom which is made up of slag magnetite, copper and tamped clay.

The blasting which was done at the beginning of the demolition was not your run of the mill drill and blast method with which most miners are familiar.

When a hole was drilled, temperatures as high as 1300° existed within the hole.

The dynamite bombs placed in these holes had to be specially wrapped to insulate them from the extreme heat and to prevent premature detonation.

The task was completed without injury, a credit to all employees involved.

At the present time the concrete walk and floor at the converter level are being blasted and mucked out.

When the demolition is complete the site will be ready for construction to begin on the new Outokumpu flash furnace.

We were able to reclaim about 1300 tons of copper from the old furnace bottom.

plates unless it was as near original condition as possible -- adding only options as turn signals to make it safer on the road. I parked beside a deluxe coupe (1940) the other day. I don't know what was under the hood, but the oversized wheels on the back indicated "soup"! Sorry about that, Mike!

Clyde

Dear Clyde:

Another semi-anonymous letter -- looks like Magma employees are winning the battle for modesty in communications!

Clyde, you're right! "Restore" probably wasn't the best word to use in describing Mike Brown's customized rebuild and upgrade.

Anyway we're impressed with his work and we would also be pleased to print a photo and story about the purist side of auto restoration if you'd want to send it in.

And, thanks for the compliments on Magma Update. We try.

The Editor

Write Us

Send your letters to: Editor, Magma Update, P.O. Box M, San Manuel, AZ 85631 or send through company mail.

rates to the price of copper on the New York Commodity Exchange.

The rates will fluctuate as the price of copper goes up or down and the savings will vary between 11.6% and 30.9%.

Rates will drop if the price of copper goes below 57¢ per pound and will rise if the price goes above 66¢ per pound.

Currently, Magma is saving 18.5% as compared to our standard rate when copper prices are between 57¢ and 66¢ per pound of copper.

This plan benefits all customers of APS including residential customers because by interrupting large industrial customers, APS avoids the need to purchase expensive emergency power from other regional utilities.

Electric power comprises the second largest single expense in copper production at Magma.

Therefore our energy conservation department continues to explore possible means of reducing this cost.

Mine names employees of the month

By SUSIE SHEPHERD

Five employees were selected for recognition as Mine Employee of the Month for October.

A mechanical supervisor was selected for Salary Employee of the Month. He is Butch Cline, an underground mechanical foreman who has been with Magma since 1973.

His nominator said, "Butch will make a stab at getting the job done, no matter what the job is."

Edward Wernett and Anthony Armenta are Maintenance Employees of the Month.

Edward has worked for Magma since 1985 and Anthony since 1986.

These two employees are a team in the mechanical department.

Their supervisor says, "...self motivated, respond fast and efficiently..., "...repairs wherever needed ... without complaints."

Jim Rogers is Mine Operating Employee of the Month. Jim joined Magma this year and is a chute tapper.

His supervisor wrote "...what a go getter." "...cares about quality ... believes in efficient work. "Is really serious and learning a lot about the mine."

Hugh "Doc" Docherty a mechanic in the oxide truck shop, is Oxide Employee of the Month.

Doc has worked for Magma since 1985.

His supervisor wrote, "...very knowledgeable in his job..." "...teaches fellow workers about the equipment..."

"He has leadership quality and very good communications with supervisors and peers."

Magma Digest
Nov. 1986
V. 2, No. 12
p. 3

The scoreboard

Monthly review of how we're doing

FOR OCTOBER 1986

	This Month	Year to Date 1986 Actual	Year to Date 1986 Goal	Year to Date 1986 Variance	Year to Date 1985
Tons of sulfide ore mined	1,592,861	14,964,928	15,496,000	− 3.4	14,654,238
Tons oxide ore mined	470,764	5,664,788	3,386,786	+ 32.7	--
Tons ore and slag milled	1,559,270	15,280,571	15,496,000	− 1.4	14,658,710
Tons concentrate produced	34,428	291,550	288,890	+ .9	270,969
Tons molybdenite produced	316	2,535	2,571	− 1.4	2,427
Tons concentrate smelted (1)	62,894	596,063	552,433	+ 7.9	549,151
Tons anode produced (1)	19,822	205,921	206,346	− .2	203,717
Tons sulfuric acid produced	33,723	348,465	315,198	+ 10.6	319,468
Pounds electrolytic copper produced (1)	36,622,760	366,239,860	334,666,000	+ 9.4	334,224,656
Pounds electrowon copper produced	3,520,810	14,350,468	16,848,000	− 14.8	--
Pounds of rod produced (1) (2)	43,149,000	405,360,000	172,434,000	+ 14.2	290,953,000
Average sales price of refined copper	67.69¢	70.14¢	73.30¢	− 4.3	69.84¢

(1) Includes copper belonging to companies other than Magma.
(2) Includes MCR Products

Meeting A Goal, Moving Ahead

MAGMA

A PUBLICATION FOR MAGMA FAMILIES

VOLUME 2 NUMBER 12 Nov. 1986 p.1

The ties that bind

By BRIAN R. WOOLFE
executive vice president

I hope everyone reads the article in this issue about the interdependence of San Manuel and Pinto Valley.

The resulting "synergy" is the only basis upon which Magma can hope to survive.

It's important that everyone understand these relationships and you will hear the story again and again as it is told to news media, the public, and the business and financial community.

Employees need to understand that San Manuel cannot stand alone nor can Pinto Valley make it alone over the long term without the help of San Manuel.

Cyprus Bagdad's presence as a major toll customer fills out the picture and makes the new flash furnace economically possible.

We must help each other if we are to help ourselves!

This means we must have quality throughout the system in the materials we ship back and forth and we must have the very best in cooperation and communications.

We must also be prepared to stand aside where necessary to let Pinto Valley have the advantage and we must also be prepared to take an extra effort on their behalf.

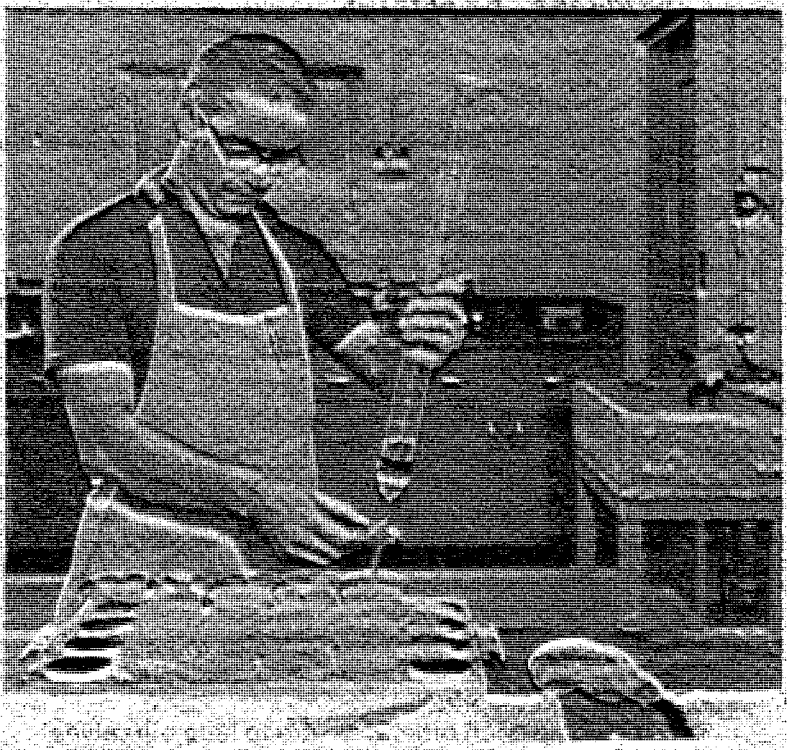
We are not in competition with Pinto Valley, and certainly not with Cyprus Bagdad both of which are now our good customers for custom smelting, refining, and acid sales.

For 30 years we have had justifiable pride for being able to be independent and self sufficient at San Manuel. Well, those days vanished with high copper prices and we're now part of a partnership with Pinto Valley.

That partnership and "synergy" of operations is the basis upon which our financing package will be drawn and it will be the chief fact which will attract investors to our common stock.

It is our only route to survival, future gains, and job security. Learn the word "synergy" – you're a part of it now.

From our scrapbook...



Met lab in 1956

THIS IS HOW the San Manuel metallurgical laboratory appeared in 1956 when we went into production. Bruce Cripe, chief chemist, who came to work there in March, 1956, identifies this employee as Manuel DeLeon, assayer, who is preparing a wet analysis for copper concentrate samples. Bruce recalls it took one hour to do this job which is now done in two minutes on our X-ray fluorescence spectrometer. Ray Manley Photo

New electric rates based on copper price

By BRAD SCHWAB

Magma has entered into a new three-year electrical power contract with Arizona Public Service which ties the electric rates to the price of copper.

Our interruptible power contract permits APS to reduce a portion of electric power to Magma for short periods when our demand peaks or is overloaded.

The new Magma has synergy

The new Magma Copper Company will be a unique blend of interdependent operations none of which could function efficiently alone.

The operations are at San Manuel and Pinto Valley; and, our toll smelting customer, the Cyprus Minerals Co. Mine at Bagdad will help the Magma units achieve greater efficiency.

Each has something the others require and when all their products are put together they create a so called "synergy" which means that when it's all put together, it creates an efficiency which otherwise would not exist.

Here's how it will work.

All three operations require a smelter and all three require sulfuric acid. In addition they all require electrolytic refining for their anode copper as well as the availability of rod casting for their customers.

The San Manuel underground mine with its sulfide ores is the main source of sulfur for the sulfuric acid plant.

So in order to meet the acid requirements of the San Manuel leach dumps, in-situ leaching, and SX-EW plant, as well as the leaching and SX-EW plants at Pinto Valley a large sulfuric acid plant is needed.

A large sulfuric acid plant requires a large smelter which in turn requires a large supply of sulfide concentrates.

Pinto Valley must operate its open pit and produce sulfide as well as oxide ore and must have reasonably priced smelting.

A large San Manuel smelter can provide reasonably priced smelting for Pinto Valley and toll smelting customers such as Cyprus.

But the smelter's capacity of 3000 tons per day must be allocated between the three mines and this fact can determine the future production levels underground at San Manuel.

When the flash furnace is in full operation, there will be a continuous inward flow of sulfide concentrates from the Pinto Valley and San Manuel concentrators, with outside concentrates from Cyprus.

At the same time there will be outbound shipments of sulfuric acid to the leaching and SX-EW plants at Pinto Valley and the San Manuel Oxide project, and there will be acid available for the regional market.

The electrowon copper from the San Manuel and Pinto Valley SX-EW plants goes directly to the San Manuel rod plant, for conversion to continuous cast rod and sale to the wire and cable industry.

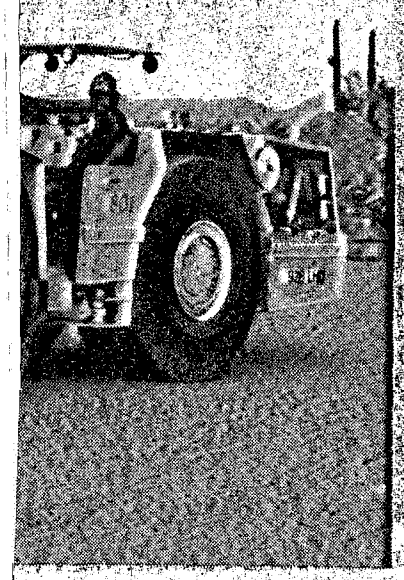
But all the copper from the smelter goes to the electrolytic refinery where cathodes are produced for San Manuel, Pinto Valley, and our major toll customer, Cyprus.

Cathodes can be sold to fabricators or converted to rod, whichever is needed on the market.

If the San Manuel rod plant has more copper than it can handle, the surplus can be sent to Magma's MCR Products rod plant in Chicago.

What this synergy accomplishes is known as the economies of scale, and Magma engineers and planners have developed the best size of smelter and acid plant which will give the most efficient performance as well as provide the best economical solutions for San Manuel and Pinto Valley.

By putting our needs together we can all have a better chance of survival, prosperity, and growth in this uncertain world of the copper industry.



W

el, holding up Les Presmyk, is
ze the mining industry in the
noval equipment, an 8 yd³, 928
Photo by Mark Crandall

Gravity moves mine ore through transfer raises

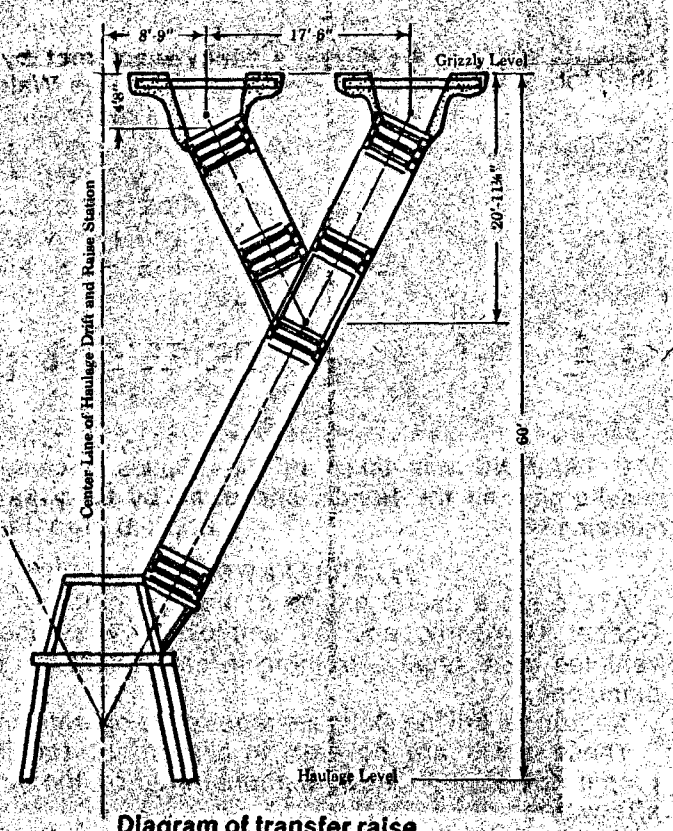


Diagram of transfer raise.

By AL LIZARRAGA

A very important part of the production cycle is to get the ore from the draw level to the haulage level.

This is accomplished through a series of lined openings connecting the draw raise with the haulage ponyset.

These are known as transfer raises.

Transfer raises are approximately 4' x 4' x 50' and will hold approximately 55 tons of ore once they are filled up by the chute tapper.

The car loader uses a door at the bottom end of the transfer raises to empty out the ore into a train.

Due to normal wear and tear, the lining inside the transfer raise will fall out of position and block the flow of ore.

The lining inside the transfer raise consists of 6" x 8" x 5' timber with a piece of angle iron attached lengthwise. This lining is known as cribbing.

A team of repair miners will now tackle the job of restoring the T-raise back to good working condition and restoring the ore flow.

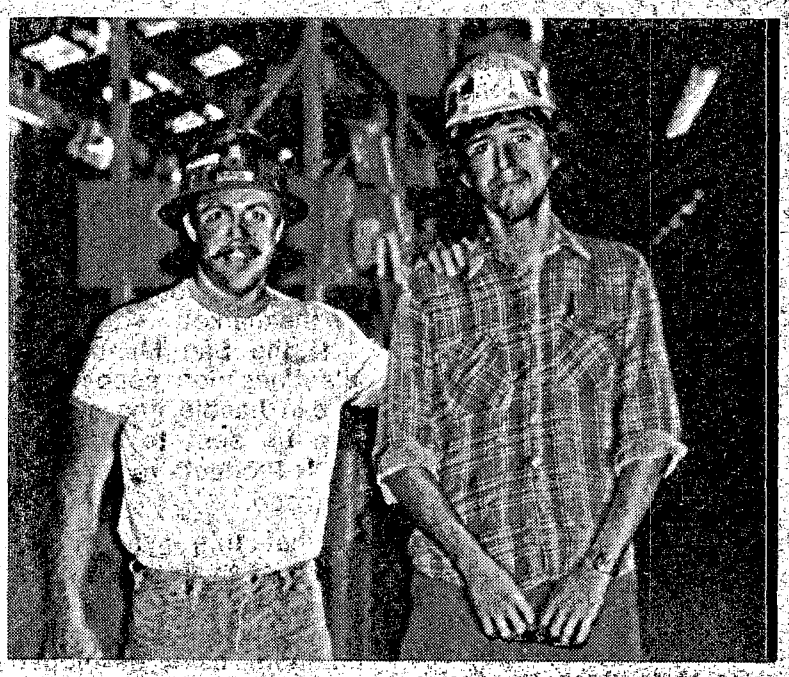
T-raises are repaired by one of two methods.

One method is to install new cribbing where needed.

The other is to prepare and pour concrete where cribbing is missing.

Most of the concrete poured is around the junction area.

Meet warehousemen



RICK HOGAN, left, and Armando Cajigas.
Photo by Bea Ortiz

By CAROLYN CREELEY

Rick Hogan has worked for Magma since April of 1980. He came to the warehouse in Sept. 1986 from refinery material handling.

His hobbies include hunting and fishing.

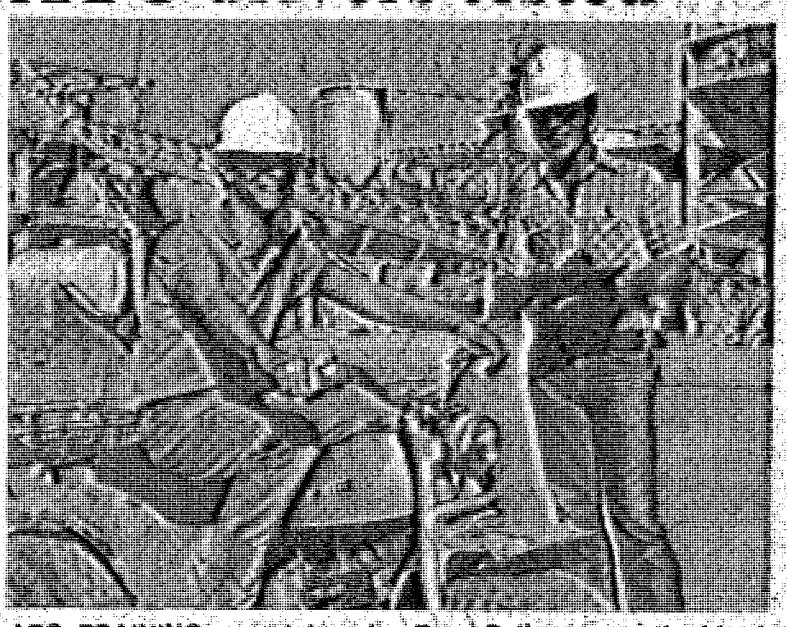
Armando Cajigas has worked at Magma for 6 years.

He began working at the warehouse in September.

His hobby is playing drums.

He and his wife Emilia have two children, 2-year-old Sylvia, and 1-year-old Claudia.

ATC drivers tested



ATC TRAINING was taken by Tom Boiles, recently hired metallurgist, on the Honda, and given by Larry Lawrence, metrologist.
Photo by Sam Riechers

By LARRY LAWRENCE

ATC's are a useful means of transportation at Magma Copper Company, and all employees who use these vehicles must receive training in safe operation prior to using one.

Additional driving skills are required to operate an ATC.

These skills are covered in classroom training and proper operation must be demonstrated by the employee afterwards.

Constant alertness is required when operating one of these vehicles and all rules should be followed.

An operator should never assume they have the right-of-way; make sure the driver of the other vehicle can see you.

Remember: Safe operation is not an accident.

Obey all speed, stop, and yield signs.

To receive ATC training, contact the Safety Department in your area.

Retirements

Congratulations and Thanks!

NOVEMBER 1, 1986

J.G.H. HUCKLE, San Manuel from senior accountant, San Manuel. Joined as sampler aid, June 11, 1949.

DECEMBER 1, 1986

ANDREW P. BESICH, Superior, from mucker, Superior. Joined as laborer, January 24, 1955.

ROY BREWER, JR., Mesa, from level boss, Superior. Joined as mucker, April 6, 1955.

ALFRED THORNE, San Carlos, from skimmer, San Manuel. Joined as laborer, June 17, 1959.

Community development studied

By GEORGE O'BRIEN
controller

There are rumors in the Tri-Community area about the possibility of Magma's sale of company houses in San Manuel. Here is the actual situation.

Included in Magma's planning for the smelter retrofit, refinery expansion, new mining plans and the reorganization of the company, is the economic development of San Manuel and vicinity.

To that end we are negotiating for the services of a professional real estate development firm to guide us in the development effort.

It is too early to tell what the economic development of San Manuel and vicinity will involve, but it might include new businesses to broaden the tax base, sale or lease of townsite property, construction of facilities and so forth.

We believe that this is a very positive step which will be beneficial to both the community and Magma.

We are pleased to acknowledge the efforts of some local merchants of opening new stores and in expanding and improving their stores.

Residents, employees, unions and local businessmen will be kept informed by means of the UPDATE and meetings as time progresses.

Electrician

Story By JIM WELCKLE, refinery electric section foreman
Photo By BEBE BURWELL

Refinery electric, a part of plant electric, is housed in the lower level

ELECTRICAL JOURNEYMEN R
Randy Rawlison, Alvis Maynard
and Jim Welckle, refinery elec
tured by one of their project
facilitate changing section swi
portable unit, which reduces
lights and tools, is strengthened
a forklift is no longer needed to

MAGMA Update

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MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES
August 1986

The scoreboard

Monthly review of how we're doing

FOR JULY 1986

	This Month	Year to Date 1986 Actual	Year to Date 1986 Goal	Year to Date 1986 Variance	Year to Date 1985
Tons of sulfide ore mined	1,443,621	10,409,937	10,764,000	-3.3%	10,526,951
Tons oxide ore mined	853,507	4,053,630	2,159,000	+87.8%	
Tons ore and slag milled	1,505,335	10,664,807	10,764,000	-.9%	10,495,108
Tons concentrate produced	29,981	197,427	199,300	-.9%	198,111
Tons molybdenite produced	277	1,659	1,758	-5.6%	1,758
Tons concentrate smelted (1)	58,455	411,417	381,987	+7.7%	378,158
Tons anode produced (1)	19,715	144,248	142,943	+.9%	143,648
Tons sulfuric acid produced	34,137	244,666	217,941	+12.3%	220,271
Pounds electrolytic refined copper produced (1)	41,659,660	258,988,340	233,488,000	+10.9%	228,905,958
Pounds electrowon refined (SX-EW) copper produced	2,627,540	3,822,512	4,246,000		
Pounds rod produced (1)	26,632,188	281,467,187	325,942,000	-13.6%	193,397,814
Pounds copper shipped (1)	44,390,905	372,283,485	476,768,000	-21.9%	282,239,978
Average sales price of refined copper	63.83¢	67.42¢	69.66¢	-3.2%	65.96¢

(1) Includes copper belonging to companies other than Magma.

quite proficient in martial arts, holding a 2nd degree black belt status in the art of Tae Kwon Do.

Keith started his martial arts training in 1965 in Agua Prieta, Mexico, when he made a lot of trips walking across the border to a small, dingy workout room behind a tortilla factory.

At this point in his training, he was learning Japanese karate, and he says Dee Durazo, general mine foreman, accompanied him on these trips.

In 1968 Keith joined an Okinawan style karate club in Douglas, and sparred with a man who has studied Korean Tae Kwon Do.

This sparring partner, who was also a black belt, Master Dong Hoon Kim, a 7th degree black belt and owner of Tucson Tae Kwon Do School.

Initially, he had trouble adapting to this Korean style of martial art, because of the emphasis on high, powerful kicking techniques. (The Japanese arts rely more on hand techniques.)

Apparently he caught on well, because in 1975 he traveled to Evansville, Indiana to test for and achieve his first degree black belt.

By 1977, Keith was able to open a Tae Kwon Do school of his own in Knoxville, Tennessee.

This was a lower income area, so he only charged one dollar per person per ranks by Master [illegible] Son, the highest 9th degree holder in the world.

Last year Keith began teaching for Flowing Wells Community School at Richardson Elementary near Ina and Thornydale in Tucson.

The school charges $13 per person per month, or $20 per family per month.

The classes meet on Tuesday, Wednesday and Thursday evenings and are available to anyone ranging in age from eight to eighty.

All instruction is done by holders of black belts and the students are tested for rank under the jurisdiction of Tucson Tae Kwon Do School.

Keith says if anyone is interested in enrolling, he can be reached at 742-4430.

fast approaching.

Since it takes up to eight weeks to build up immunity after the flu injection, the ideal time to obtain the flu vaccine is around the end of September.

One injection of flu vaccine is all that is required.

San Manuel Hospital will be offering flu vaccinations for $6.50.

Please call the hospital to make arrangements if you believe you should receive the vaccination.

Gift shop opens

By SANDY PAYNE

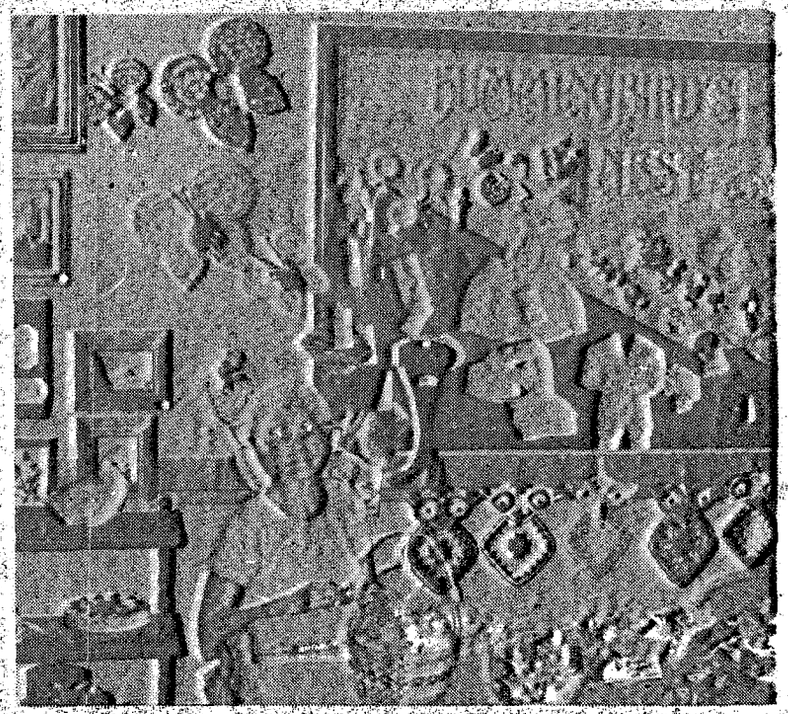
If you haven't visited the San Manuel Hospital recently, you're missing a real treat!

The Hummingbird's Nest, a gift shop of handcrafted items created by local area residents, is now open for business in the hospital lobby.

The shop is run by ladies from the local Stitchery group - on a strictly volunteer basis.

The hours are from 10:00 a.m. to 12:00 noon and from 1:00 p.m. to 3:00 p.m.

Anyone interested in putting handcrafted items in the shop for sale should stop in during shop hours to talk to one of the ladies.



PICTURED in the Hummingbird's Nest is Jo Routt - amid many of her own creations.

Photo by Grant Kempton

Newmont *will* match your donations

Newmont Mining Corporation will match an employee's contribution to qualified educational, cultural, or charitable organizations.

The limit per employee is up to an aggregate maximum of $2,500 per calendar year to educational organizations or an aggregate maximum of $1,000 per year to cultural or charitable organizations.

The minimum donation is $25 to an organization.

Full time employees of Magma, Pinto Valley, the San Manuel Arizona Railroad Company and the Magma Arizona Railroad Company, are eligible to participate in the plan which is paid for entirely by Newmont.

Some organizations are not eligible for matching gifts and these include:

Umbrella fund raisers such as United Way. (However, most agencies in the United Way organization are eligible for matching direct donations.)

--Organizations whose primary purpose is to influence legislation.

--Fraternal, professional, social, and veterans groups.

--Political parties or political groups.

--Any group in the "religious" category.

--Any group which practices "confrontational" or adversarial tactics.

--Any group which discriminates against anything for any purpose.

Organizations which are eligible for matching donations must be legitimate, incorporated, professionally staffed, accredited where appropriate, and qualified as tax exempt by the Internal Revenue Service.

Applications and detailed information on the Newmont Matching Contributions plan is available in the employee relations office in the administration building.

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The scoreboard

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FOR JUNE 1986

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Tons sulfide ore mined	1,392,000	8,966,000	9,204,000	−2.5%	9,117,000
Tons oxide ore mined	745,000	3,195,000	1,754,000	+82%	
Tons ore and slag milled	1,487,000	9,159,000	9,204,000	−.04%	9,068,000
Tons concentrate produced	29,507	167,446	170,002	−1½%	172,721
Tons molybdenite produced	301	1,516	1,634	−7%	1,642
Tons concentrate smelted (1)	53,893	352,962	325,952	+8%	324,662
Tons anode produced (1)	19,834	124,533	121,876	+2%	122,041
Tons sulfuric acid produced	32,364	210,529	185,974	+13%	188,215
Pounds electrolytic refined copper produced (1)	40,846,000	217,329,000	198,464,000	+9%	194,702,000
Pounds electrowon refined (SX-EW) copper produced	1,195,000	1,195,000		+100%	
Pounds rod produced (1)	46,808,000	254,835,000	280,852,000	−9%	161,240,000
Pounds copper shipped (1)	38,593,000	240,642,000	215,712,000	+11.5%	212,719,000
Average sales price of refined copper	66.73¢	68.02¢	70.00¢	−2.8%	65.89¢

(1) Includes copper belonging to companies other than Magma.

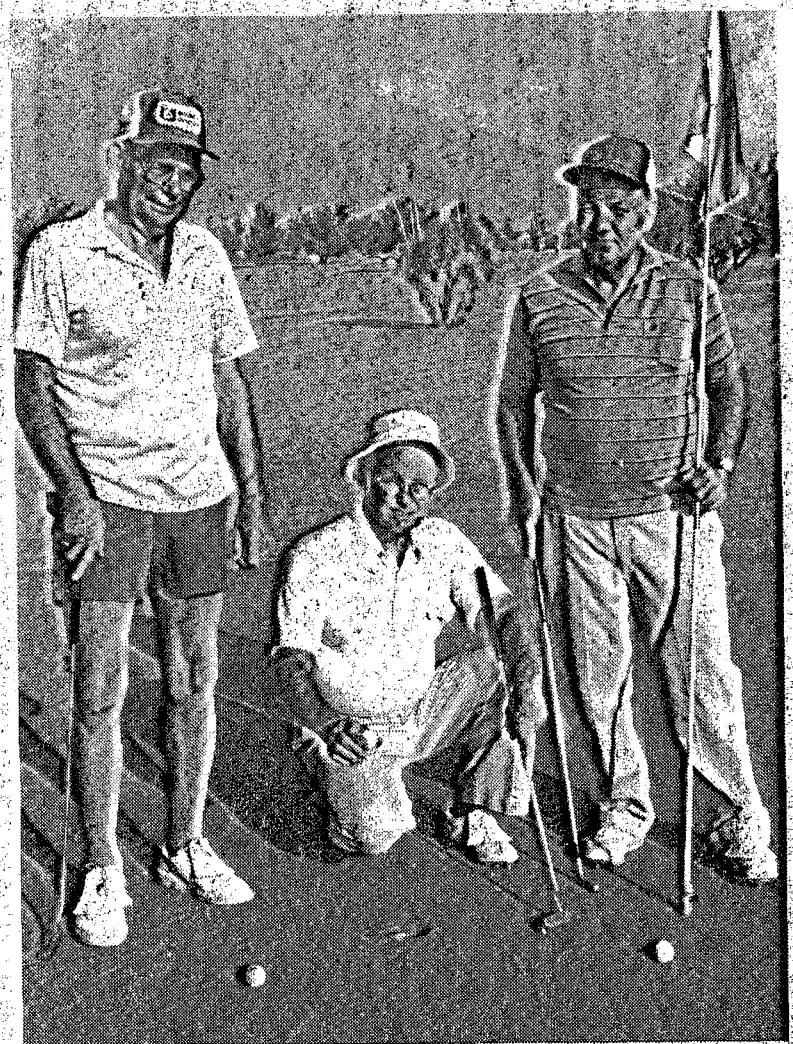
Meeting A Goal, Moving Ahead

While locating his ball, Jim happened by the cup, only to spot Vin's ball in the hole.

There is a local tradition that a person who makes a hole-in-one must treat everyone on the course to a drink in the clubhouse.

Fortunately for Vin, other normally round out a foursome; however, Harold Cassell, past general smelter foreman, and Owen Walker, retired shift foreman at the mill, were not present on this occasion.

You can bet they got a blow by blow description of what they missed!



HAROLD CASSELL, left, Vin Coxon, and Jim Allen on the 13th green - sight of Vin's recent hole-in-one. Owen Walker was not available for the photograph.

Photo by Bebe Burwell

conscientious worker...has great knowledge about his job, and very safety minded. Is a great example of quality,..." writes his supervisor.

Mike Schaffner, "...is a hard working individual, very knowledgeable in all of the work he performs...gets the job done as fast and safe as possible."

Mike, the oxide employee of the month, is a mechanic journeyman who has been at Magma since 1984.

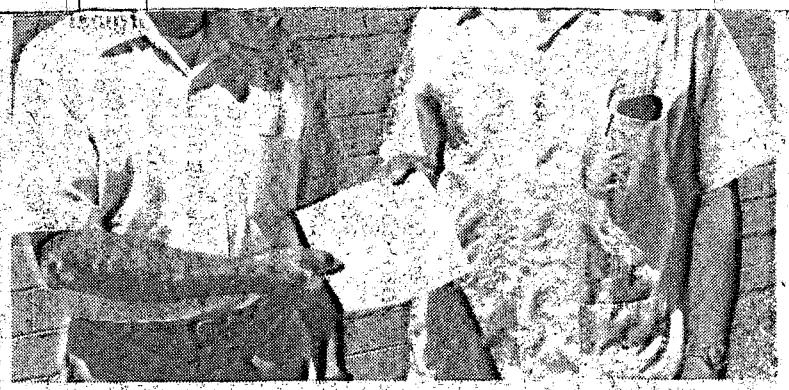
Gene Kitterman is a mechanical craft foreman who came to Magma on October 10, 1957 and "...has a positive safety attitude, sets a good example by following company policies and procedures and expects those around him to do the same.

"His dedication to his job and to the achievement of our goals has earned him the right to be named Foreman of the Month."

Daniel Sanchez is a trolley motorman who's been with Magma since August 12, 1985.

His supervisor describes his contribution to meeting Magma's goals: "He is very consistent in his efforts...strives to do the best job possible...constantly on the lookout for problems and usually has solutions or suggestions to correct these problems."

Congratulations to the four employees recognized for their efforts and the other mine employees who were nominated!



Receives refund

By ARNIE SOTELO

RAFAEL G. GALLEGO, recently retired after thirty and one-half years of service with Magma, was presented a check for $52.50 by Arnie Sotelo, benefits administrator. Rafael personally went to St. Mary's Hospital and questioned several items on his hospital bill. The refund check for $52.50 represents one-half of the correction made to his bill.

Photo by Grant Kempton

Hospital commends professionalism of ambulance service and fire dept.

By SANDY PAYNE

The San Manuel Hospital staff would like to extend a special thank-you to members of the San Manuel Fire Department for the excellent communication and cooperation maintained throughout a recent accident in which four injured persons were stabilized at our hospital before transporting to Tucson hospitals.

Not only was the hospital staff kept fully informed of the situation, but upon arrival at the hospital, members of the Fire Department were extremely helpful to the hospital staff in the emergency room.

The hospital staff would also like to commend the Golder Ranch Ambulance Service for their rapid response with two ambulances, and their professional conduct while the patients were prepared for transport.

The cooperation and professionalism demonstrated by the Fire Department and the Golder Ranch Ambulance Service are an example of the quality of emergency care the hospital, Fire Department and Ambulance Service are all striving to provide.

MAGMA Update

Vol. 3, No. 2
Jan. 1987
back page

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by Magma Copper Company,
P.O. Box M, San Manuel, Arizona 85631
Telephone 385-3256.

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MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES
January 1987

The Scoreboard

Monthly review of how we're doing

FOR DECEMBER 1986

	This Month	Year to Date 1986 Actual	Year to Date 1986 Goal	Year to Date 1986 Variance	Year to Date 1985
SAN MANUEL DIVISION					
Tons of sulfide ore mined	1,186,084	17,554,928	18,512,000	−5.2	17,398,269
Tons oxide ore mined	549,766	6,727,359	4,155,944	+61.9	20,965
Tons ore and slag milled	1,307,510	18,007,956	18,512,000	−2.7	17,493,143
Tons concentrate produced	25,510	345,277	346,220	− .3	321,409
Tons molybdenite produced	233	3,050	3,071	− .7	2,835
Tons concentrate smelted (1)	69,114	720,723	660,439	+9.1	660,702
Tons anode produced (1)	23,344	248,815	246,141	+1.1	245,468
Tons sulfuric acid produced	42,495	425,495	376,823	+12.9	388,889
Pounds electrolytic copper produced (1)	38,483,080	438,979,986	395,642,000	+11.0	402,728,716
Pounds electrowon copper produced	3,492,500	21,923,434	25,000,000	−12.3	—
Pounds of rod produced (1) (2)	57,784,555	509,557,606	563,996,000	−9.7	368,279,000
Average sales price of refined copper	62.43¢	65.39¢	69.46¢	−5.9	65.89¢
PINTO VALLEY DIVISION					
Tons of ore mined:					
To mill	2,351,770	22,091,750	19,971,600	+10.6	20,142,020
To leach dumps	2,628,950	26,620,810	28,957,000	− 8.1	20,316,870
Tons of ore milled	2,318,000	22,236,000	19,580,000	+13.6	19,578,000
Tons of concentrates produced	25,469	277,797	250,743	+10.8	263,152
Tons of molybdenite produced	123	1,556	1,401	+11.1	1,453
Pounds of electrowon copper produced	2,112,000	22,252,000	24,150,000	− 7.9	23,947,000

(1) Includes copper belonging to companies other than Magma.
(2) Includes MCR Products

# of month

By SUSIE SHEPHERD

Three employees were selected for recognition as Mine Employee of the Month for December.

An MOD supervisor was chosen for Salary Employee of the Month.

This is Mike Widrup, who has been with Magma since 1979, and a supervisor since June, 1986.

His nominator said "... very aggressive. . . cares very much about doing a good job . . . he set high standards . . . successful in keeping himself and his crew motivated. . ."

Doug McDade, Maintenance Employee of the Month, has worked for Magma since 1979 and is a repairman in the underground mechanical department.

His nominator said, "... has saved this company countless dollars...using his ingenuity...caring attitude...by constant praise of all supervisors he comes in contact with."

Manual Alvarado, MOD Employee of the Month, has been with Magma since 1977.

His supervisor wrote "... best all around concrete miner...best all around hard rock miner...always one step ahead of everybody in his thinking process... and always ready to lend a hand ...to keep the wheels moving."

Congratulations to these employees and the other nominees for their efforts!

geology, as he received his geology degree at the University of Redlands in California.

Most of Gary's collections are from around the Southern Arizona area, especially around Tucson and San Manuel.

Although, some of his collectings came from around the world (such places as Spain, Italy, Africa, South America, Mexico and Canada).

Though Gary specializes in thumbnails (3" x 3") and small miniatures (2" x 2"), he does also collect cabinet specimens.

Gary says that "the cabinet size specimens take up too much space" and therefore would rather

Gary is currently involved in a couple of clubs, Tucson Gem and Mineral Society and the Arizona Geological Society.

Gary also worked on a mineral show put together by Rocky Mountain Gem and Mineral which consisted of different minerals from around the Western United States.

This show was held in Phoenix in November.

Gary's participation in the show included minerals from the San Manuel mine.

Anyone interested in starting a mineral collection and you don't know how to get started contact Gary Alexander at the mine geology department.

Retirements

Congratulations and Thanks!

JANUARY 1, 1987

WILLIAM J. CARMODY, Palm Bay, FL, from data control supervisor, San Manuel. Joined as refinery clerk, July 17, 1972.

GILBERT M. CARNES, Mammoth, from laborer, San Manuel. Joined as laborer, June 13, 1963.

FEBRUARY 1, 1987

MAURICE J. GILITIUK, Mesa, from repair foreman, Superior. Joined as mucker jigger June 29, 1964.

JOE C. RUIZ, Oracle, from utilityman, San Manuel. Joined as laborer September 20, 1955.

ARTHUR B. SHORT, Redwood City, CA, from assistant mine superintendent. Superior. Joined as miner June 1, 1949.

MANUEL L. TRUJILLO, Oracle, from general foreman, San Manuel. Joined as helper, September 19, 1953.

satisfactory progress in a full curriculum. During the freshman and sophomore years, the award value is $800 annually. The amount increases to $1,000 annually during the scholar's junior and senior years.

Applications are availble through Ruth Chaffin at the San Manuel High School office.

Magma Employee Fund Scholarship

Generated from monies collected from soft drink vending machines and established by the Employee Fund Committee, this renewable four-year scholarship will be awarded to the outstanding, qualifying applicant;

A parent must be a full-time, regular Magma San Manuel Division employee with at least one complete year of such service. (Children of the Selection Committee are not eligible.)

Applicants must show acceptance at any four-year university.

The scholarship will be awarded based upon academic achievement with high school grade point average, pre-admission college test scores, honors, awards and pertinent extra-curricular activities considered.

The scholarship's annual value is $750, renewable over four years if continuance requirements are met.

Applications will be available from Veronica Celaya at the employee relations department.

Note: The Newmont Mining Corporation Scholarship is no longer available.

Call Review Plus

By MIKE McGUCKIN

The Review Plus program is designed to help you avoid unnecessary hospitalization or surgery, and will aid you in making informed decisions concerning the medical care that you receive.

For non-emergency hospitalization or surgery you must call Review Plus ten days before hospital admission or surgery. For emergency hospitalization, call within 24 hours.

If you do not call Review Plus and follow the recommendations, you may not receive the full benefit of the Magma Copper Company Medical Plan.

Anytime you or an eligible dependent require non-emergency hospitalization or surgery, it is necessary for you to contact Review Plus at 1-800-336-1969 to receive the full benefit of your Magma Copper Company Medical Plan. It's a free call that will help you save money.

1-800-336-1969

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any news to employees.
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ure is back down to normal
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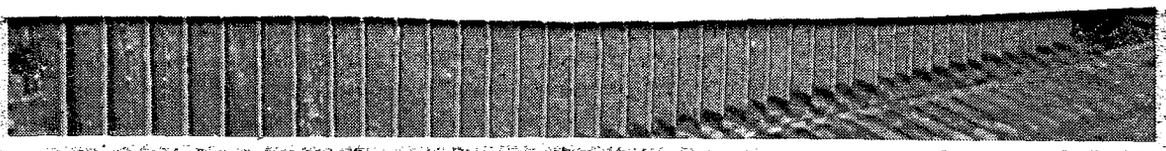
Photo by Les Presmyk



KEITH EGGMAN, sub operator, watches as a load of cathodes is removed from a refinery tankhouse cell.
Photo by Bebe Burwell

London exchange rates Magma copper "Grade A"

By SAM H. RIECHERS

A major quality goal was reached at year end: formal certification of Magma's copper cathode as LME Quality Grade A.

The certification was made by the London Metal Exchange (LME), which is an international marketplace for nonferrous and precious metals.

Magma actually sells our copper directly to customers through our marketing department, and is not likely to use the LME to move our cathode.

In fact, most of our cathode is converted to rod.

"The LME certification is a message to our customers that Magma rod is made from the best grade of cathode, and can be depended on to have the excellent metallurgical properties which result," according to Sharon Young, metallurgical director.

The certification itself is the result of years of effort aimed at improving quality.

Long hours of basic research, experiments and changes in the tankhouse and smelter, and countless meetings, tests, and process evaluations went into this achievement.

The project began in 1981 when LME began designating some of the world's best copper as a higher grade.

Magma's rod enjoyed an excellent reputation with a wide range of U.S. customers, and our rod was made entirely from Magma cathode; therefore, with great confidence, a test lot of 200 metric tons was shipped to Prescot, England, for testing.

But the cathode failed the test due to the impurity, selenium.

Once Magma had made all the necessary changes to reduce the selenium to its present very low levels, the cathode had to be tested again in England.

During 1986, six cathode lots of 200 metric tons each were sent to two different rod producers in England.

The cathode performed very well in both plants, enabling them to make their best product while using Magma cathode.

The tests were completed last September, and on December 29, we received notice from the London Metal Exchange that Magma "brand of Copper Cathodes Grade 'A' has been listed and will constitute good delivery with immediate effect."

Each and every one of the many Magma employees involved in this project should be proud of their achievement.

Magma Update, San Manuel AZ Vol. 3, No. 2, Jan-1987, Front Page.

Production up at San Manuel

1986 year

Production at San Manuel during 1986 was right on target with new records established by the smelter and refinery.

The smelter's 1986 production of new copper was 206,200 tons, an increase of 7% over 1985.

Total anodes cast, including recycled material was 248,815 tons.

Also a part of the smelter department, the sulfuric acid plant set a new production record of 425,495 tons, an increase of 9% over 1985.

At the electrolytic refinery, refined copper production increased 9% for a record tonnage of 219,490 tons in 1986.

An additional 11,000 tons of cathode was produced at the oxide project's solvent extraction, electrowinning plant which went into operation in May.

Put together, the two refineries produced a total of 230,490 tons of copper in 1986.

The mine and mill exceeded 1985 production.

At the mine 17,554,928 tons of sulfide ore were mined, an increase of 1%, an excellent showing considering the many changes underway at the mine.

The mill increased production 3% with 1,307,510 tons of ore and slag milled.

Concentrate production was 345,277 tons, an increase of 7% over 1985.

All this effort was ignored by the market place which dropped the average price of copper ½¢ per pound during 1986, and our average sales price was 65.39 cents per pound compared to the 65.89 cents per pound in 1985.

Magma selling price on December 31 was 63¼ cents per pound.

or new-like.

In fact, my "Webster" an abbreviated "household" model defines "restore" as: "give back or return; recover from ruin or decay; repair, renew or reinstate; to heal, revive or cure". Now, Ralph, that's only the transitive verb form, but let's consider a definition for the noun form of restore, to-wit: restoration, is defined by Random House College Dictionary (I have a 1984 model) as: "A return of something to a former, original, normal, or unimpaired condition." I expect that 'something' in

cere apology to him.

But to Ralph, "Get to work on those 'semantics'!"

Though it was implied in the November issue I was perhaps an anonymous employee, I'm not. Just a 62 year old fan of the 1940 Ford who wants to submit the Magma Update as the finest 'company' newspapers I've seen; it's very nicely done; informative, too!

Clyde E. Bennett

(You see, I am a "Clyde". My crippled hands make for poor writing.)

These never saw success other than their faith in their labor and their goal for copper which really was their ultimate and pride.

Today people are working together in San Manuel for this same purpose, they are also sustaining life for themselves and upholding a lifestyle that is much better than those of yesteryear when the mine was first started.

In 1955 I was privileged to join the work force at San Manuel in the electric shop.

Electricity was my

and determination to p
sue betterment of t
human race.

Thanks to San Manuel.

Stanley Girdner
Arizona Pioneers' Ho
Prescott, AZ 86303

Tim praises

To the editor:

In addition to the list
items mentioned as co
pany progress in th
December Update, the
are seveal important thing
accomplished by mine e
ployees which I'd like
mention.

They include develo
ment and application of
remotely controlle
haulage train, increas
application of shotcre
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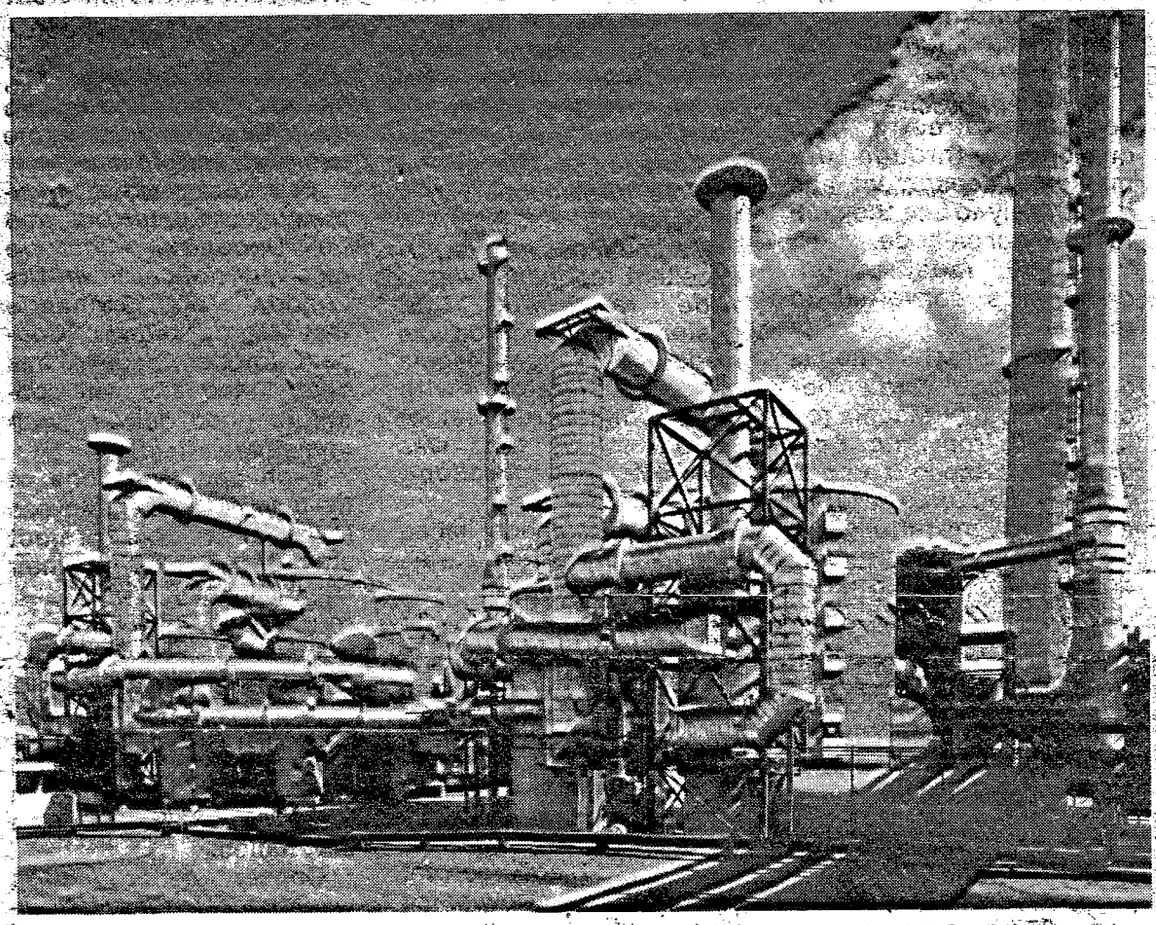
equipment, continu
testing of new mini
methods, further reducti
in the use of compress
air, continued involveme
of supervision in colle
credit classes, and o
10% involvement of min
in IMPAKT groups, to na
a few.

Perhaps our great
achievement at the min
1986 however, was
return the mine to a 52,
TPD sustainable prod
tion rate in October a
good copper grade.

This was done af
many months of strug

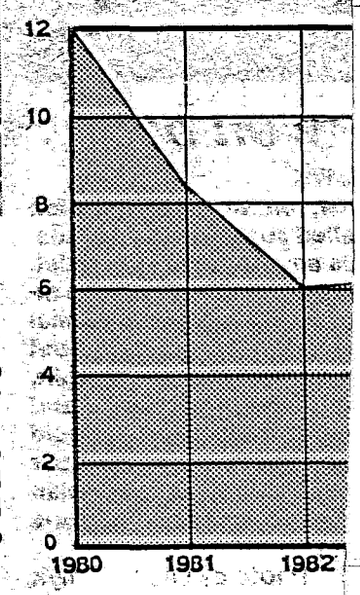
From our scrapbook . . .



Air pollution control - 1974

OUR BRAND NEW SULFURIC ACID PLANT went into production September 14, 1974. It cost $28 million; and another $2 million was spent on the network of air monitoring stations around the tri-community area plus a new electrostatic precipitator on the reverb stack and some other air pollution control projects. Since then it has turned millions of tons of sulfur dioxide into a high quality sulfuric acid and reduced our overall smelter emissions around 70%. Since its start up we've produced more than 3 million tons of acid, more tonnage than the copper we produced over the same period. The acid plant will be upgraded as part of the smelter retrofit project and will furnish a steady supply of acid for leaching at the San Manuel Oxide Project and Pinto Valley.

Mill's safety imp



Oxide crews are proud of their excavator

Magma Update April 1987
Vol 3 No. 5 p.3

By BILL OETTING

Pictured is Magma's first P&H hydraulic excavator with part of the mine maintenance crew.

The excavator and mine employees celebrated its first birthday at Magma in January.

In the first year of production, this P&H has helped mine over 6,674,679 tons of material out of the open pit.

The excavator (SM0041) is a 1200 series, crawler mounted, diesel hydraulic shovel.

It's powered by two 650 HP Cummins diesel engines, consuming a half a dozen filters and 30 gallons of oil per change.

It uses 22 gallons of fuel per hour from a 485 gallon tank.

The overall length from rear bumper to extended bucket tip is 42 feet.

The top of the "house" (name of the structure that covers the engines and hydraulic pumps) reaches 21 feet 6 inches and contains the same floor space as a small apartment.

The boom arcs upward to a height of 44 feet 7 inches, utilizing hydraulic pressures in excess of 4500 PSI.

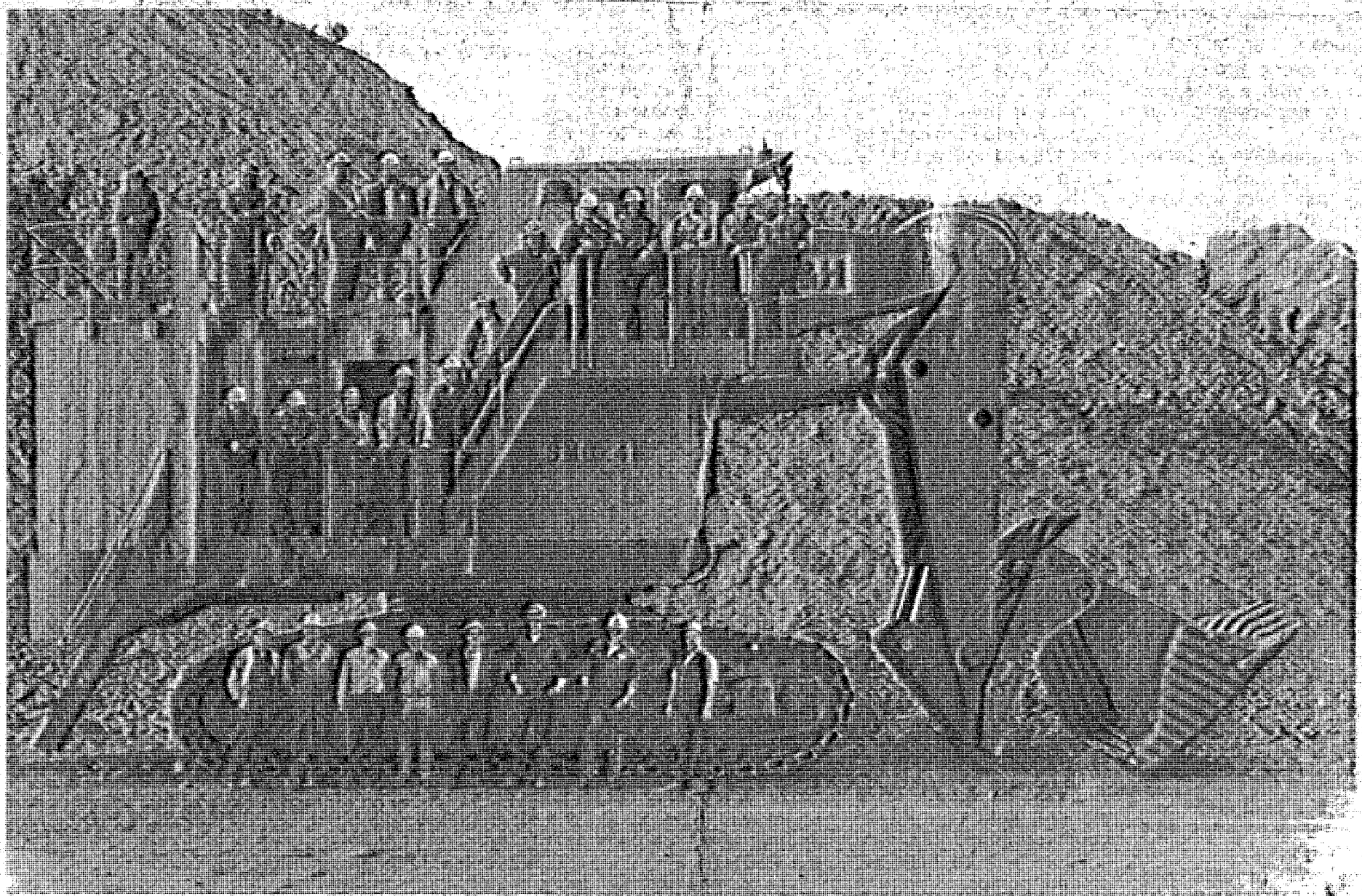
A total 760 gallons of hydraulic oil flows through its array of tubes and hoses, supplying the muscle that hoists 13 cubic yds. of material from the bank and readily deposits it into a 100 ton haul truck.

Only five passes and the rock is on its way to either the leaching dump and processing by the SX-EW plant or out to a waste dump opening new deposits for mining.

The operator sits aloft 19 feet 6 inches, comfortably controlling the action with state-of-the-art technology.

The controls are electro-hydraulic and manipulation of the joy stick easily hoists, swings or propels this 383,500 pound marvel.

Pictured are some of the people at the mine that continue to make equipment like this function and routinely demonstrate the "I CARE" attitude of all Magma employees.



MINE OXIDE employees with our original hydraulic excavator are, from left, at top left, Willie Martinez, "Snake" Schaffner, Tony Escalante, Bill Whitehurst and Dave Shepherd. On the steps are Charlie Burchett, Jack Hayes, Candy Barragan, "Killer" Hudson, Pat Ramos, Dennis McClintock, "Gonzi" Gonzales, Virgil Damron, Pat Benavidez, Lonnie Wilson, John Van Haren, and Bill Shaffer. In front are, Jessie Pena, Joe Escalante, "Doc" Docherty, John Deen, Frank Perez, "Bigfoot" Brigham, Cliff Davis, and Bill Oetting.

Photo by Mark Crandall

the 2950 loading station at 3D shaft will be dropped to the 3440 level.

It will then be mucked up and transported to #5 shaft and dumped into our existing loading station facilities and will then be hoisted from the 3530 level loading pocket.

In order to dewater #5 shaft to the 3650 level four new Byron-Jackson submersible pumps were purchased, two 6 stage and two 8 stage.

We will use our existing 450 H.P. motors on these pumps.

After several meetings with all the different departments involved with this pumpdown our maintenance planning group has come up with a schedule that all departments can live with.

The pumpdown will consist of two phases.

The first phase will take us to the 3530 level.

To accomplish this, journeymen must first change out one of the existing pumps and replace it with an 8-stage pump.

The pumpmen, with the assistance of the Grove operator, assemble these pumps on a rack outside the 5 shaft hoist house, then transport them to 5 rock hoist collar for transportation underground.

During transportation these pumps cannot be tilted more than 10° off vertical, so great care must be exercised to prevent this from happening.

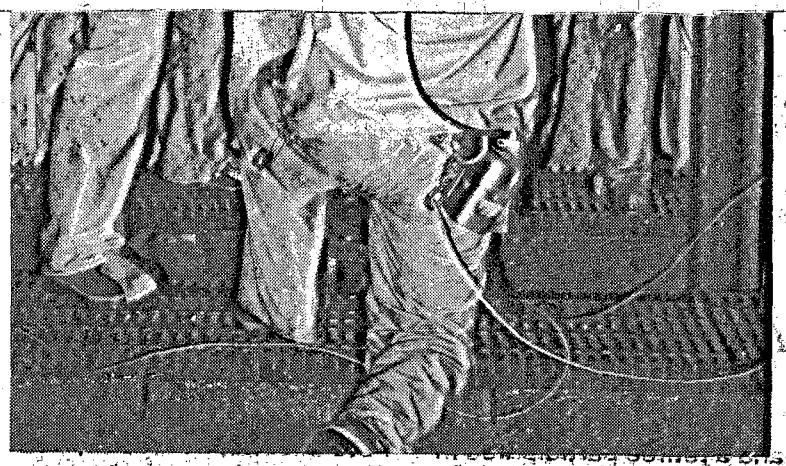
The next step in the operation will be to install 400' of 8" pipe and 400' of electrical cable.

This is a joint effort between the pipefitters and electricians.

The 400' of pipe and cable will be installed at the 2890 level.

The pipe will be attached to the 5 rock hoist.

The sections are 20' long.



PUMPMEN working in the #5 shaft are, from left, Fred Medina, Larry Mares, and Jim Orton.

Photo by Oscar Armenta

As each section is attached the hoist will pull up the pipe and cable until 400' of pipe and cable is hanging under the cage.

We will then lower the column of pipe and cable to the 3176 and connect to the pump.

The cable will be connected to the pump, and we will start to lower the entire pump and column 400' underwater to the 3570 level.

The pump will be started.

The same procedure just described will be applied to the second pump.

At this point we will have two pumps on 400' columns of pipe supported from the 3176 platform that will be used for pumping down the shaft.

These two columns of pipe with pumps will weigh approximately 20 tons.

In order to insure that we would be able to support this load, our mine engineering department spent considerable time in designing a platform in the limited space we have available.

Two additional pumps will also be on the 3176 platform with only 40' of column attached.

These will be used for standby pumps.

Once this has been accomplished and the water is pumped down, the ventilation department and mine operating division will establish ventilation and do whatever work is necessary on the 3440 level.

When this task is accomplished the next task will be to establish ventilation to the 3530 level.

This will be done by the mechanical department installing vent pipe in the shaft from the 3440 level to the 3530 level.

Once ventilation is established at the 3530, the mechanical department will have to build a pump platform in the shaft to accommodate four pumps.

In order to install the two pumps that were left on the 3176 level the rigging department will have to build a sling 450' long out of non-rotating cable to allow us to reach the platform on the 3530.

We will then be ready to start phase 2 of our dewatering program.

The second phase of our dewatering system requires that pipefitter and electrical departments add enough column to two of our pumps to reach the 3690 level.

We will then dewater the shaft to this level.

The mechanical department will have to build another pump platform at the 3650 level.

The pumps will be installed on this platform with 40' columns on each pump.

This is as far as we are going to dewater at this time.

His interest in these particular rifles has made him a bit of a historian on the subject, and he reports that Samuel Hawkin first designed and built firearms for the famous "mountain men" in the "new territory."

Phil prefers to make flint lock, flint ignition (fires from flint sparks) 54-caliber rifles.

The barrel length of his historically precise replicas range from 32 to 36 inches, as compared to a conventional 20 to 24-inch barrel.

Each gun is custom made and requires untold hours of work.

Parts originate from virtually all parts of the United

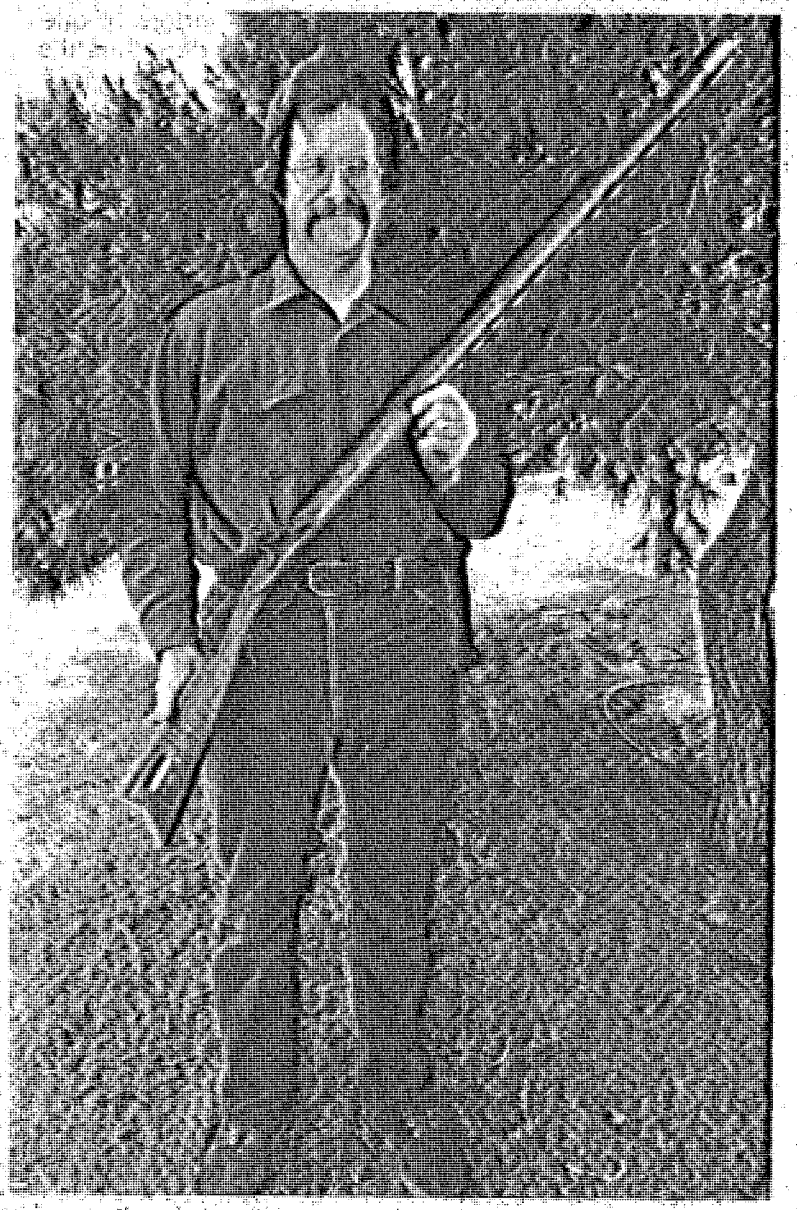
game.

His oldest daughter Cathy recently joined her father on a hunt and also used one of his handmade guns.

Of course, someone with Phil's skills as a welder inevitably gets requests from friends to do some work for them in his home shop -- something he never seems to be able to say no to.

Therefore, he also spends a considerable amount of time at this activity.

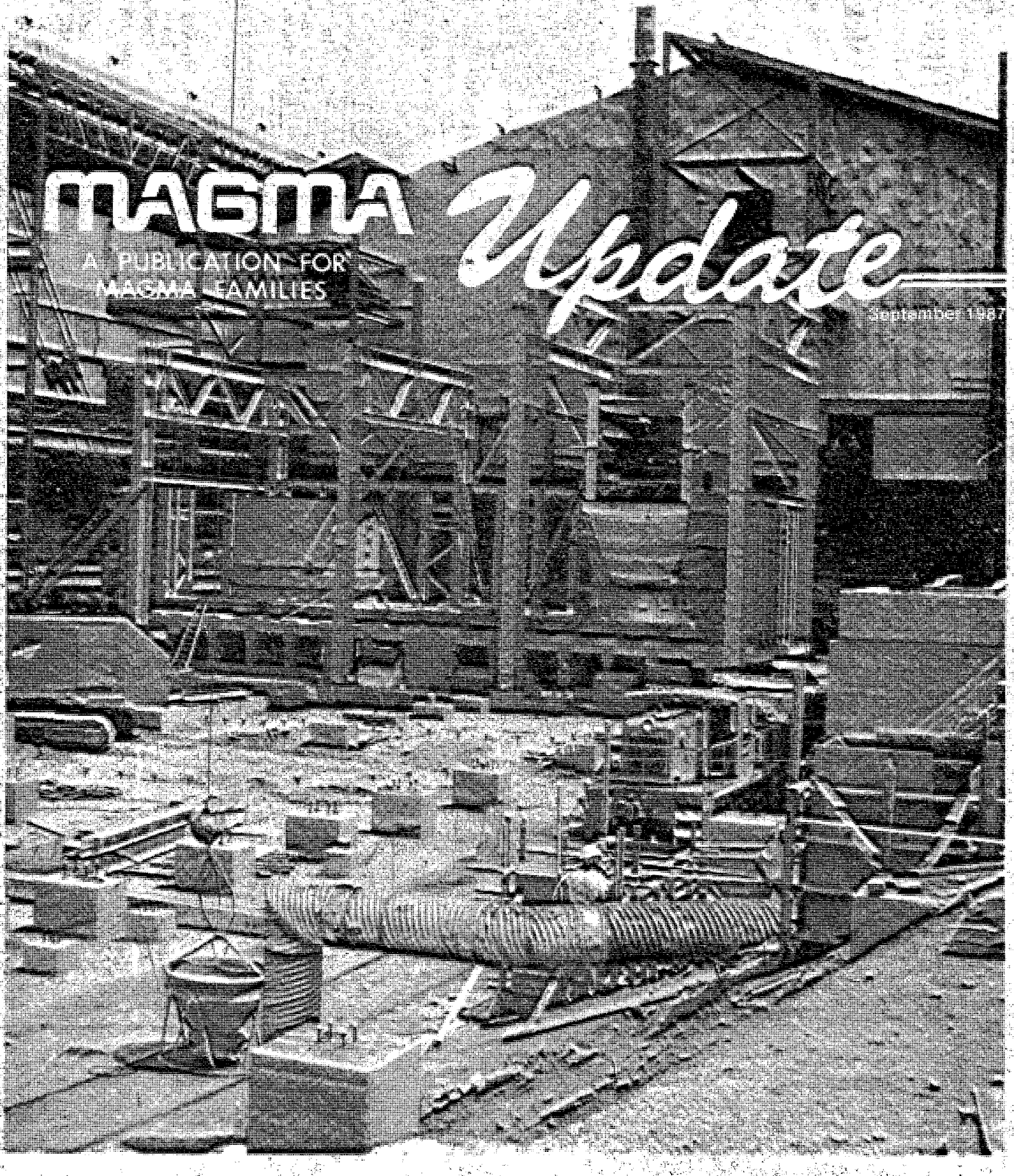
As far as his job is concerned, this employee says he enjoys being allowed to get involved with project engineering and contribute ideas on a project he then fabricates.



PHIL TUROSKI with replica of 150-year-old Hawkin 54 caliber rifle.

Photo by Bebe Burwell

Vol 3, No. 10, back page cover, Sept. 1987



Smelter retrofit on schedule

OVERALL VIEW of the flash furnace construction project shows furnace shafts in background and foundations for waste heat boiler and electrostatic precipitator in front. Concentrate handling system is at the left. The entire project is on schedule and within budget. Read more about the retrofit project on page 3.

see.

Photo by Gilbert Rodriguez

Equity fund grows 11.34%

By MARSH CAMPBELL

Those employees who joined the Employee Savings Plan and who elected to place their contributions in the Equities Fund have watched that investment make a healthy gain as the stock market raced ahead in 1987.

Employees can choose between three investment vehicles - (1) a short term Money Market Fund, (2) a Fixed Income Fund, and (3) an Equities Fund (stocks).

The Equities Fund is managed by Capital Guardian Trust Company, an investment firm with a staff of 105 professionals.

Capital's investment philosophy is to seek out stocks with solid value based on research as to their fundamental worth and future prospects.

Its holdings are diversified to reduce risk and seek a solid return over the ups and downs of the market.

Capital seeks out stocks for a long term investment.

Along with Magma and Newmont, Capital assists clients such as ALCOA, Coca Cola, Ford Motor, Mobil, ITT and many others.

Drawing for tickets

HOLD THE APPLAUSE, please! The announcement of the winners of the UofA football season tickets was met with cheers at the San Manuel Cafe. Brian Woolfe drew the names. Veronica Celaya made the announcement.

Photo by Bebe Burwell

Looking good for bonus

By MARSH CAMPBELL
director employee relations

On September 10 the COMEX (New York Commodity Exchange) price of copper reached its highest level since 1981, 81.65¢

If the average COMEX price of copper for the July-September quarter exceeds 73¢ per pound as adjusted by the September Producer Price Index, a bonus will be paid to all Magma employees at San Manuel and Pinto Valley.

Through September 7, the average COMEX price for the 3rd quarter was 76.91¢ per pound.

We must meet a production minimum and so far, even with production below budget, we are still above the minimum.

—Know your benefits—

By VERONICA CELAYA, employee relations representative

Two employees win football tickets

The Employee Fund Committee awarded two pair of UofA football season tickets by a random drawing on August 28 at the San Manuel Cafe.

Plant employees Orren Parsons and Bill Leffler had their lucky numbers drawn by Brian Woolfe, Magma's chief executive officer.

The Committee held a drawing for cash prizes last Christmas. Dan Pierce took the $1500 top prize. Ruben Garcia cashed in at $700; Tom Van Haren received $300.

The recent football ticket drawing is a sneak preview to another Christma give-away. Again, all Magma employees will automatically be entered to win one of several prizes.

The Employee Fund monies are generated from the Company's share of profits generated by the soda machines on the property. The profits are split between the Fire Department and the Fund at no cost to the Company and employees.

The machines cost us nothing, they are furnished free by Pepsi Cola, and they do generate a small profit for each soda purchased. The profits add up over time and it is the Employee Fund Committee's job to spend the Company's share on behalf of Magma employees.

The Committee has established a scholarship program for children of Magma employees. The first awards were made from this year to two outstanding students, each to receive $3,000 from the Fund, payable over four years. The Company pitched in another $1,000 for the scholars. The total value of their scholarships is $4,000.

The Committee also has funded the Christmas party for San Manuel children and made substantial contributions to 4th of July celebrations.

The Committee members serve the interests of all Magma employees. By their own rules, they have made themselves ineligible to receive any of the Committee awards. Their children are also not eligible for Fund scholarships.

The Committee consists of Chairman Jack Tinnin and members Hank Seaney, JD McCain, Bob Lee and Marsh Campbell.

Stay tuned for more on the upcoming Christmas drawing. It should prove to be another winner.

New flash furnace will be "state of the art"

By DALE RODOLFF
Outokumpu engineer,
former smelter supt.

In conjunction with Magma Copper Company's smelter modernization and air pollution abatement project, an Outokumpu flash smelting furnace is now under construction at the company's San Manuel smelter.

This will be the largest single unit smelting furnace in the non-ferrous industry in terms of metal production.

The design capacity is 3,000 tons per day of concentrates which will produce about 860 tons per day or at least 300,000 tons per year of copper based on predicted feed grade.

The flash furnace at San Manuel will incorporate the latest "state of the art" design features and process technology.

This contributes to the large production capability with a furnace which is considerably smaller in physical dimensions than the two or three other flash furnaces operating at similar concentrate smelting capacities.

Altogether Outokumpu has licensed 34 flash furnaces including three of their own.

Of these, four are under construction, plus one in Zaire which was never completed due to lack of funding, four older plants have been shut down and 25 are operating today.

Contracts between Magma and Outokumpu were signed in October 28, 1986, following a long period of studies to evaluate and select the smelting process and careful consideration of final justification to proceed with the project.

The entire project is on a "fast track" schedule, with start-up planned for August, 1988.

This will be the fastest flash furnace project ever and it is the first Outokumpu retrofit flash furnace in an existing smelter building.

Retrofitting the flash smelting system within an operating smelter will add numerous scheduling problems.

Outokumpu Engineering, a Division of Outokumpu Oy, Helsinki, Finland, was awarded the contract covering the flash smelting portion of the smelter modernization program.

This portion of the project includes concentrate drying, a flash smelting furnace and related ancillary equipment including the feeding systems, flue dust handling, etc., as well as gas cleaning and handling systems.

Outokumpu was contracted to provide all basic engineering, all detail engineering for the flash furnace and all process equipment.

In addition, Outokumpu will provide construction supervision, training of operating, maintenance and technical personnel and start-up supervision.

The total Outokumpu participation in the project totals approximately $20 million.

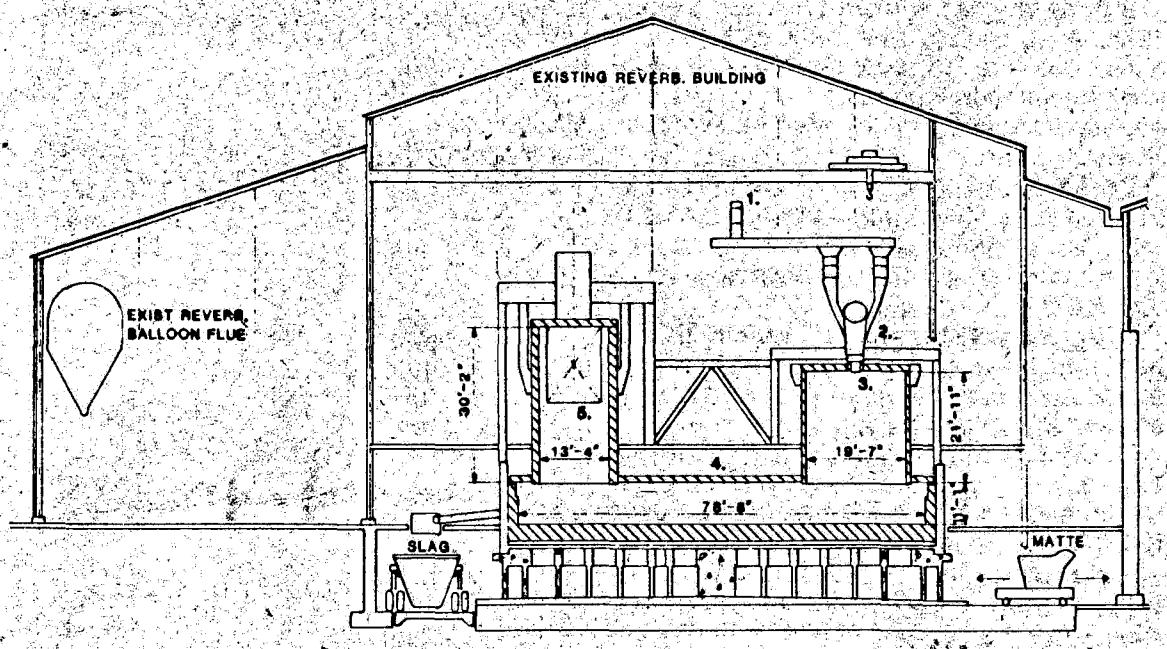
Most of the equipment to be supplied for the flash smelting project is from U.S. domestic sources.

Only a few specialized or proprietary items are being supplied from Europe.

The domestic purchasing is being accomplished by an Outokumpu-Magma Project team consisting of 2 to 3 Outokumpu engineers from Finland and a local purchasing agent in Lakewood, Colorado.

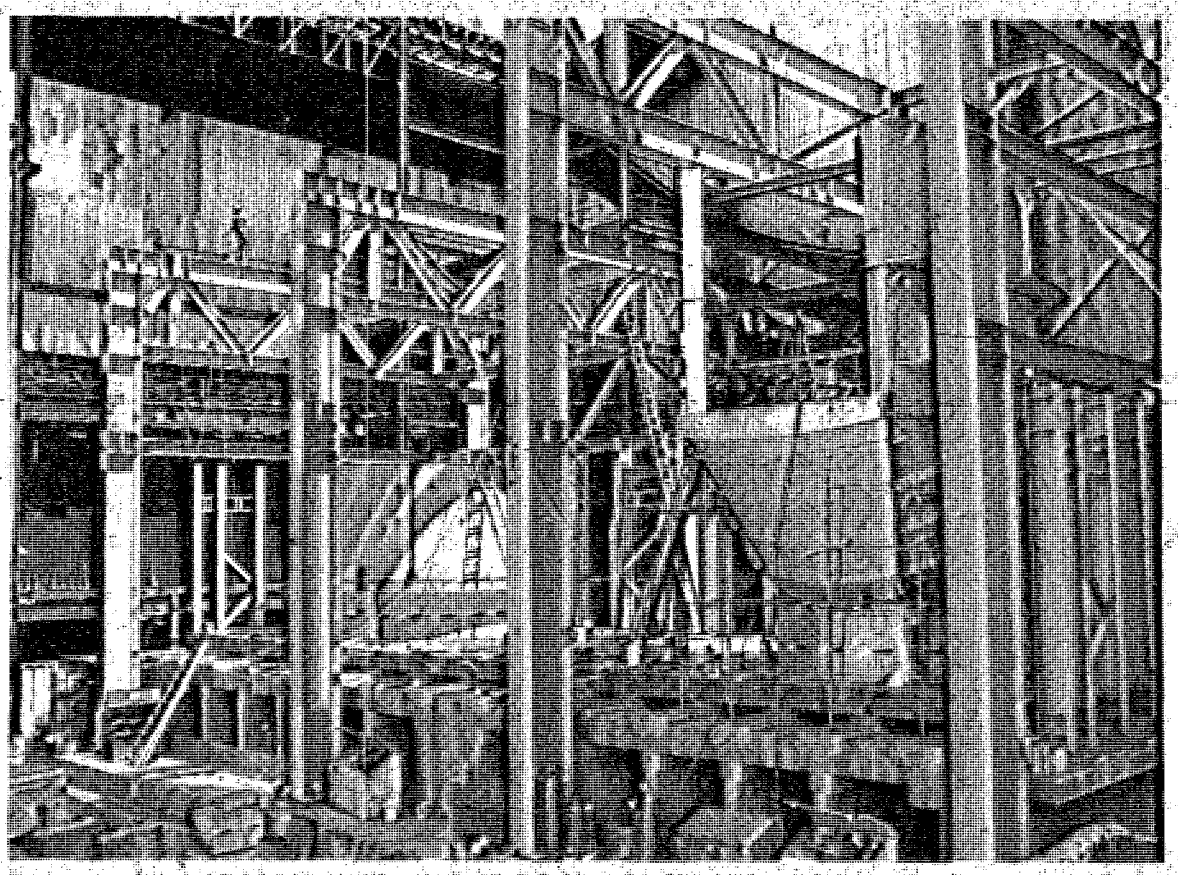
Davy McKee Corporation in San Ramon, California is the general contractor for the overall project.

Other major contracts were awarded to Lurgi for converter gas handling, Monsanto for the acid plant and Liquid Air for the oxygen plant.



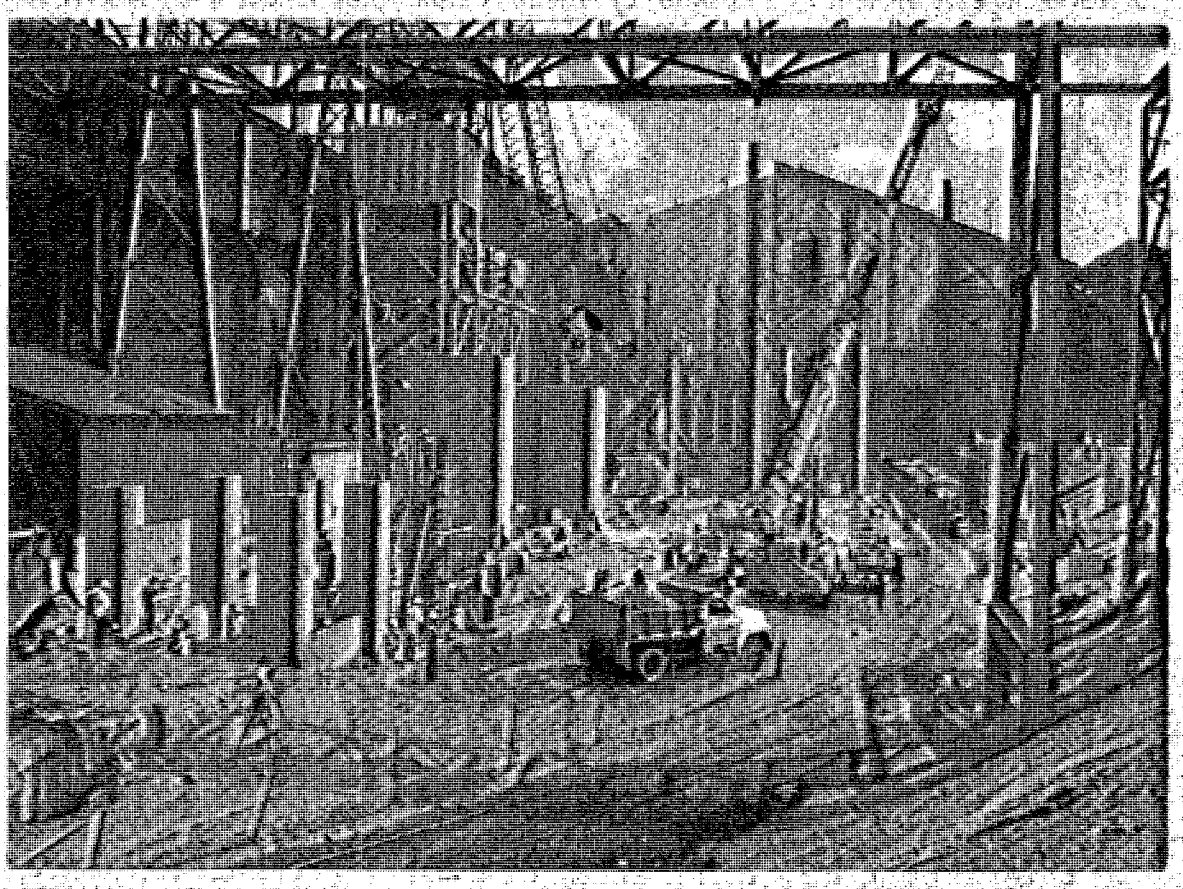
OUTOKUMPU FLASH FURNACE RETROFIT IN MAGMA REVERB. BUILDING

1. FEED SYSTEM
2. CONCENTRATE BURNER
3. REACTION SHAFT
4. FLASH FURNACE SETTLER
5. OFF-GAS UPTAKE



FLASH FURNACE structures are the reaction shaft on the left and off gas uptake on the right.
Photo by Gilbert Rodriguez

FURNACE CONTROL BUILDING will house hi-tech computer controls for the flash furnace.
Photo by Gilbert Rodriguez



BUSY CONSTRUCTION SITE with piers for concentrate dryer on the left, waste heat boiler in the center, and electrostatic precipitators on the right.
Photo by Gilbert Rodriguez

Management profile - Bill Mewha

By CAROLYN CREELEY

Bill Mewha has worked for Magma since 1974. As Magma's materials director, his objectives are to consolidate bulk purchasing and combine contract services and supplies between all of Magma's properties.

Says Bill, "the combined requirements of off-road tires, diesel fuel, and lubricants at Pinto Valley and San Manuel demonstrated the substantial economic savings that are attainable.

"The grinding balls used in the mills and bearings used company wide, when consolidated, also demonstrated a favorable economic impact to Magma."

Currently, Bill is studying steel liners, bulk oxygen, strapping steel and machine maintenance with the MCR plant in Chicago to lower our overall costs.

Bill said that in the near future there will be numerous supplies like reagents, burning fuels, water treatment chemicals and explosives that will require detailed evaluation to allow us to meet the competitive prices of producing copper today.

Bill was born in Belfast, Ireland and immigrated to Canada with his parents when he was 5 years old.

He served three years active service with the Canadian Infantry Corps in WW II.

Using his GI Equivalent, he graduated from the Provincial Institute in Mining, Haileybury, Ontario, and is certified by the Ontario Association of Professional Engineers in Engineering Technology.

He holds a Bachelors of Science in Business Administration and a Masters Degree in Management.

He also knows three languages - French, Spanish and English.

After graduation, twelve years were spent in a senior staff position in mining operations.

The first six years he gained underground experience in block caving with Kennecott and the second six years were at the world's largest open pit mine in Chuquicamata.

Bill met his wife Carmen in Nassau, The Bahamas, while on vacation from his Kennecott assignment with Braden Copper Company in Chile.

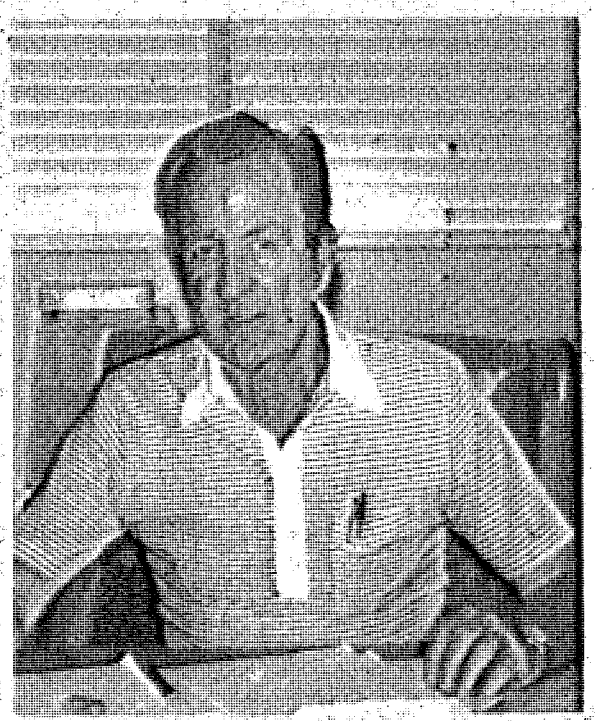
They have one daughter, Jeannie, who lives in Concepcion, Chile and is married to a pediatric surgeon.

Bill met his wife Carment in Nassau, the and new Years in Chile with their three grandchildren, William John, Charles and Maria Francesca.

pointed a Consul of Chile in 1975, an honorary diplomatic position he still holds, with power of attorney to legalize Chilean official documents.

Bill joined Magma in 1974 from Anaconda Mining Company.

He spent 22 years in Chile and was ap-



BILL MEWHA

Volume brings savings

By BILL MEWHA

Consolidating material and supply needs for all Magma properties can develop larger volumes which lend themselves to better quantity discounts.

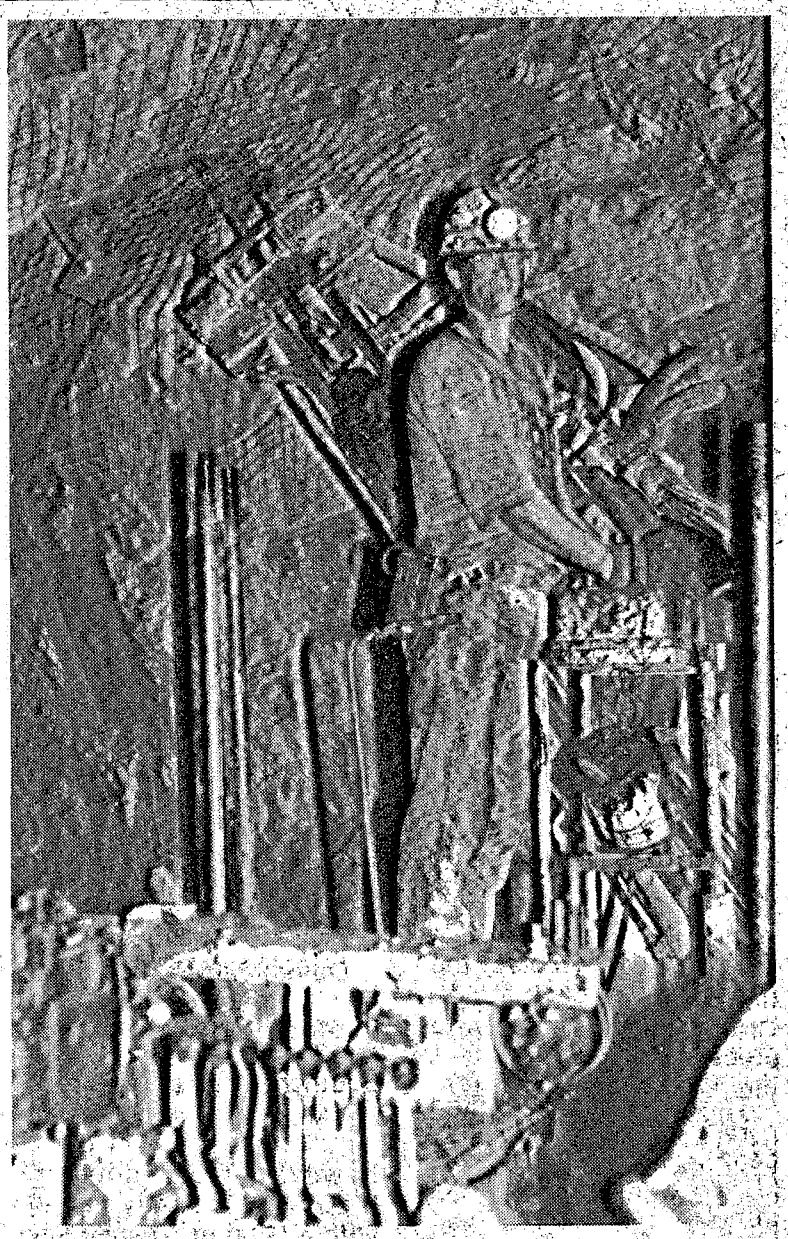
The combined requirements in today's market produce the negotiating strengths which give Magma the opportunity to lower material costs.

These goals are met when operators at both using sources can agree to a common source.

The presentation to the department heads, on of my most important tasks, must clarify material quality, supplier service, delivery and emergency handling.

The detailing of the options available, showing the favorable economic impact to Magma, has to date produced the right decisions.

The main objectives of lowering operating costs are not ignored by operations in our combined presentations.



Long hole ring drill

RING DRILL RIG in LHD block is operated by Alan Ohmert, drift crosscut stope miner. Ring drills are used to drill long holes upward into the rock. The holes are loaded with powder and shot. This creates a void in the rock which initiates caving action in the trench drifts of the mechanized mining blocks. It's an alternative to the traditional drill and blast undercut system.

Photo and Story By Mark Crandall

How company houses are sold

By GEORGE O'BRIEN
director
of real estate development

The Century 21 agents were given certain guidelines which they were to use in selling the houses.

They had sold individual homes before but they had never encountered a situation like they found in San Manuel.

Some of these guidelines are as follows:

1. $1,000 discount in the price for a cash sale.

2. On a sale involving a mortgage, Magma will pick up many of the customary closing costs instead of splitting them with the buyer.

3. If you did not have the necessary down payment funds Magma will defer your closing date until you do have the funds - within reasonable limits, of course. We have all learned a lot about house sales.

As of September 1, 152 houses (and one vacant lot) have been sold at prices which range from $30,000 to $65,000.

Some of these sales were for cash, some were financed by conventional mortgage lenders, some are to be insured by FHA or the VA and a few will be financed by the Farmers Home Loan Administration.

In order to make these various financing arrangements attractive and also equitable, the company has agreed to accept a second mortgage on conventional loans.

These mortgages are at 8% and have a 5 year term.

Century 21 has been assisting all buyers to select the mortgage company best suited to the buyers needs.

We have a "super market" of mortgage companies which has forced them to be very competitive to everyone's advantage.

As soon as a sales contract is written, the house is considered sold and we must act quickly to have the house repaired to meet any standards required by the lender and FHA/VA so that the escrow can be closed and the buyer can take possession of the house.

So when a house is bought it is in good shape.

As a minimum, the homes meet FHA standards and in addition we will paint the outside of the homes and redo the front lawn in either grass or gravel.

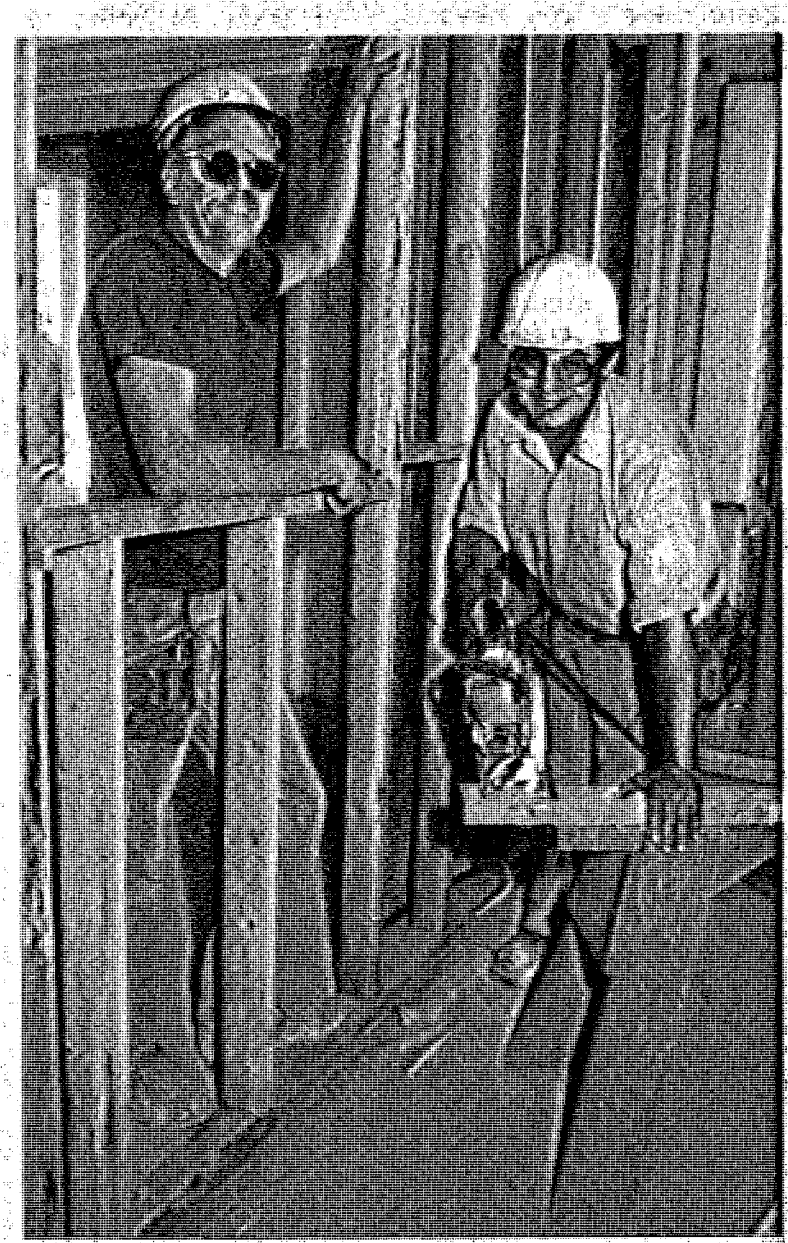
You might be interested in how the houses were priced.

In the spring of 1987, Magma hired an appraisal company to appraise nine representative homes.

From these "bench mark" appraisals, the sales value of each individual home was determined.

House sales have been booked at a rate of 1½ sales per calendar day since we started the sales program on May 27.

If this rate continues, all houses will be sold in a little over two years.



New training room

TWO OF MANY EMPLOYEES working on a new training room at the refinery this month are, left to right, plant journeyman carpenters Ron Butler and Emilio Lopez. The new room is near the tankhouse office and the employees lunch room.

Photo by Bebe Burwell

Converter retrofit project is now half completed

Magna Update Vol. 3, No. 10, p. 9 Sept. 1987.

By GILBERT RODRIGUEZ

The newly configured No. 6 converter was commissioned August 26 on schedule leaving only two more converters to be modified.

The start-up was performed by Ron Palmer, smelter shift foreman, Tommy Gonzales, converter foreman; Tim Hawthorne, assistant project manager-Davy McKee; Ray Remilong, instrumentation supervisor-Davy McKee; and John Sedlak, process engineer-Davy McKee.

Electrical support was provided by Paul Dionne, smelter electric foreman.

The start-up took approximately three days compared to thirty days for No. 5 converter with only minor problems experienced which were immediately taken care of.

Operations are in the process of balancing the flow for the acid plant.

Both Lurgi systems are operating well.

The hoods are clean with fugitives being virtually non-existent.

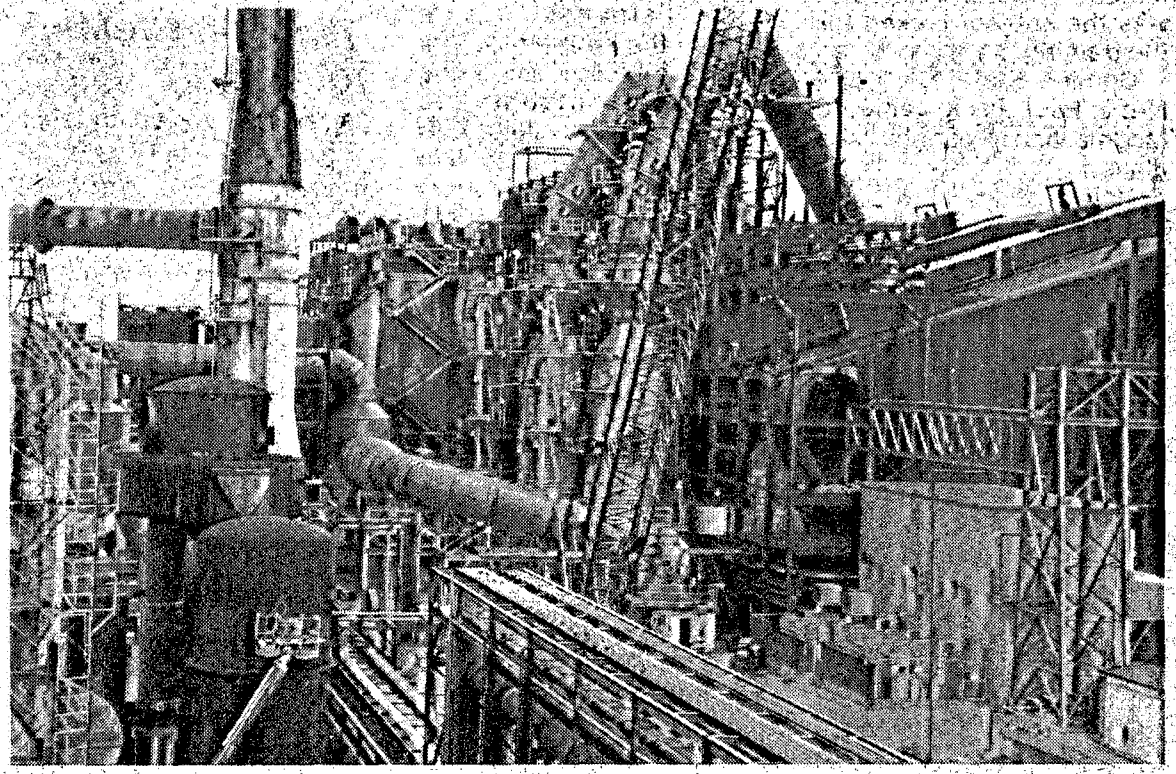
Prior to commissioning No. 6 converter, all piping and pumps were reviewed.

The pumps, fans, and instrumentation were operated with vendor representatives on-site.

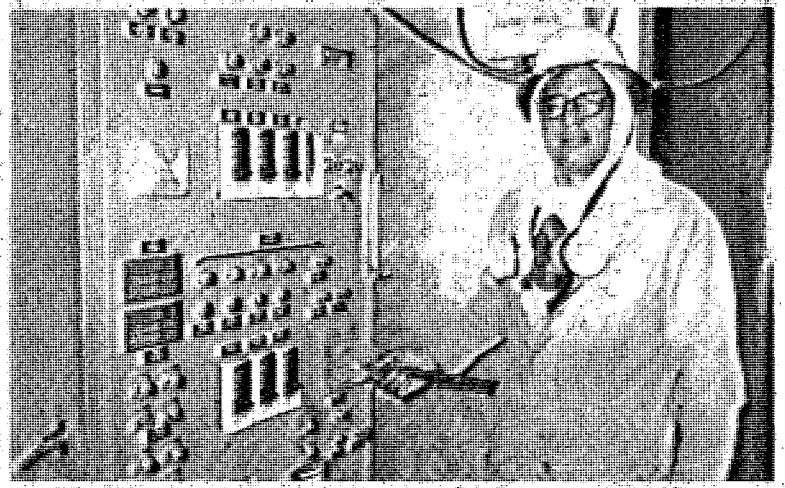
No. 3 converter scrubber installation will begin mid-September.

The converter will be shut down the latter part of November for hood cooling modifications and will be commissioned in late December.

No. 4 converter will be modified sometime after June, 1988.



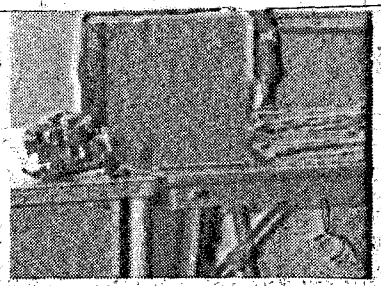
"GRASSHOPPER LEGS" astride smelter roof bring converter gases to their individual scrubbing units for cleaning before entering sulfuric acid plant. These two are in operation and two more will be built.



NEW CONTROLS are part of the converter retrofit, too, and skimmer Pedro Diaz is one of the first to operate the new fully enclosed converters. Photos by Gilbert Rodriguez

this method as an expert visible emissions evaluator, one must attend a four hour classroom session every two years and qualify via the smoke generator every six months.

In order to qualify for the latter one must read 25 different reading of black



DARRELL PARSON

Ed Navarro and Rubio Cruz, mechanic Dick Kay and tin smiths Ed Bonner and Bud Lummus.

This special in-situ project was the design and fabrication of the in-situ survey trailer, an on-site facility to provide accurate and continuous injection hole data.

made to buy or construct a survey trailer.

No survey trailer at a reasonable price was available.

Needing the survey trailer by early May, it was also decided to skip the delays associated with formal design work and go

expectations.

Dick Kay also acted as the intermediate between in-situ staff and builders.

Dick's efforts and concern for building the best possible survey trailer were indispensable.

To Dick, in-situ is extremely grateful.

Shotcrete is new ground support method

By MARK CRANDALL

What is shotcrete?

Shotcrete is a concrete-like material which is used to help support the drifts in the underground mine.

Concrete is pushed by compressed air through a six-inch diameter pipe into forms and allowed to set up for a few days.

Shotcrete on the other hand, is pumped by a machine (known in the mine as a ThomKat), through a hose to where it is sprayed by an employee onto the rock.

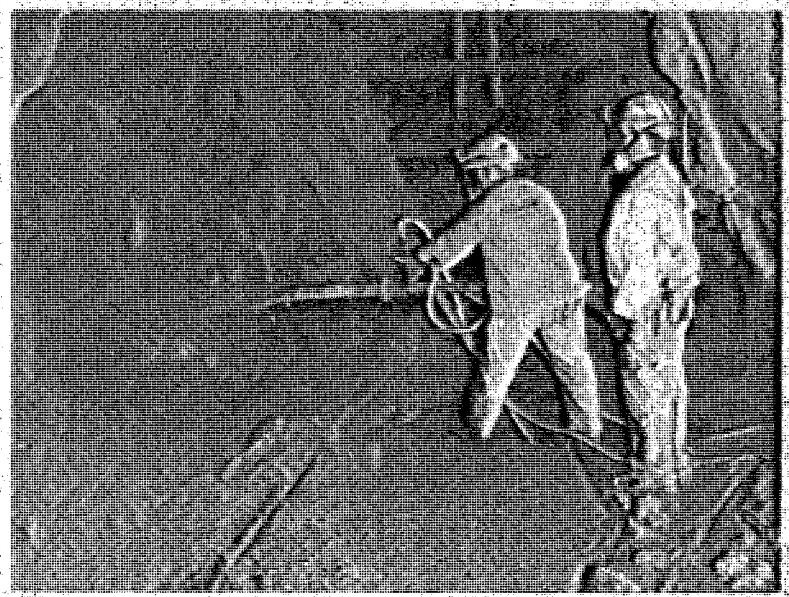
The shotcrete adheres to the rock and sets up in a matter of minutes.

Shotcrete is used in conjunction with grouted rebar bolts.

The support for the drift comes from the rebar bolts.

After the bolts have been put in place, 4-6 inches of shotcrete is applied to the rock.

This entire system of bolts and shotcrete is an active means of ground support.



SANTIAGO ARDITO, left and Louie Denogeon apply shotcrete. Photo by Mark Crandall

In other words, energy is applied to the rock by way of the bolts and thus strengthens the rock surrounding the drift.

This forms an arch in the rock which supports the rock above.

Concrete is a passive means of ground support which means the concrete must bear the weight of the rock above it.

The advantages of shotcrete are: it's cheaper than concrete, in that there is less material used and it does not require forming and it can be applied faster, since it is sprayed on the rock instead of being poured behind a form.

The use of shotcrete is one way the mine is cutting its costs and moving ahead!

Three in Finland for furnace school

By GILBERT RODRIGUEZ

Bob Malanga, smelter maintenance general foreman and Joe Crocl, smelter brickmason foreman left for Finland on August 27th for approximately three weeks.

They will be observing as well as assisting in the brick repair on Outokumpu Oy's flash furnace.

This will help prepare both Bob and Joe for routine repair work that will be required when our flash furnace is in and operating one year from now.

Several employees will be sent to an actual flash furnace location for training prior to commissioning our flash furnace.

Good luck Bob and Joe and hurry back soon!

MAGMA
A PUBLICATION FOR MAGMA FAMILIES

Update

VOLUME 3 NUMBER 10 San Manuel, Arizona page 1. September 1987

Here are my answers

By BRIAN WOOLFE

Before writing this column I thought it would be a good idea to find out what people wanted me to write about rather than think up a subject myself. So this is a response to the feedback I received.

"Tell us more about how we are doing; production, costs, customers' contracts, etc." I have to point out that the "Update" has quite a large circulation outside the Magma workforce. "Paydirt" magazine, which reports mining news in the western states, frequently prints whole sections right out of "Update". I don't have any objection to this and I guess the editor and staff should be pleased. However, this does mean everything printed is readily available to our competitors, so it would not be prudent to give you information about customers and contracts for instance. In fact trying to keep everyone fully informed could do us harm.

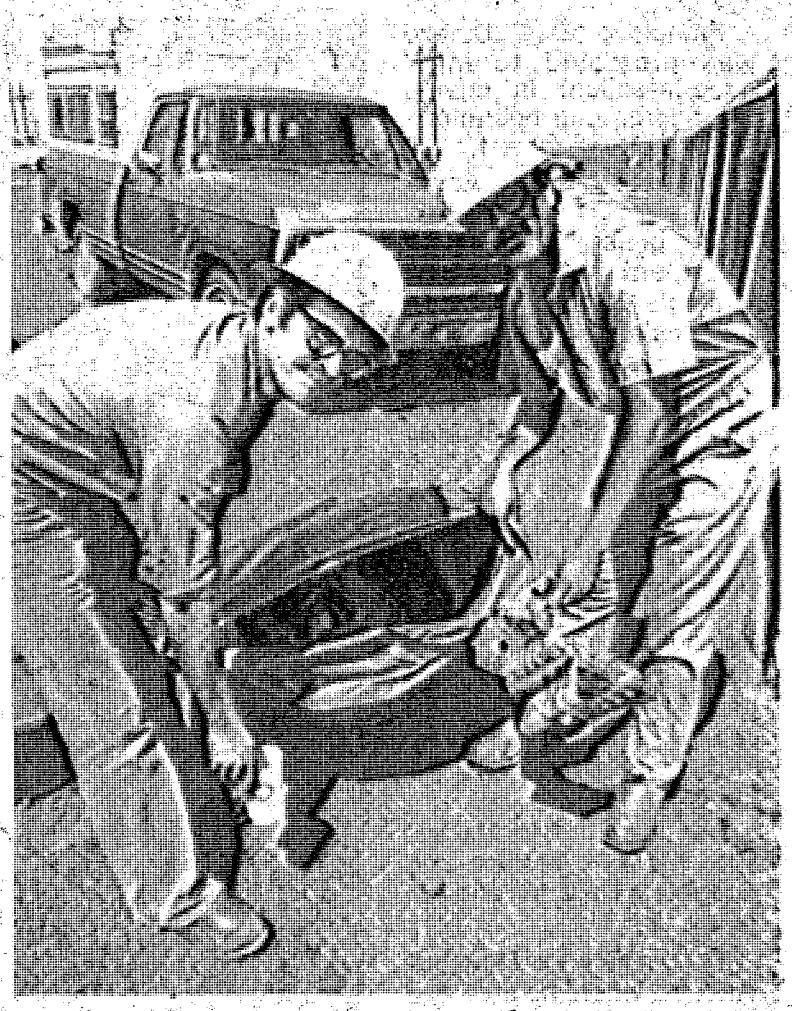
Sufficient to say that our program is either on or under budget and on or ahead of schedule. Production is doing OK but can always do with improvement and the same can be said of costs. The better copper prices are certainly a big help!

"How do we hold people accountable?" Every department has a budget and performance targets which are compared with actual results every month. If there is a variance I want to know why. This includes the non-operating departments, i.e., accounting, warehouse, etc. Their performance is harder to gauge but they have objectives which they are expected to make.

"Aren't we overdoing the recognition of individuals with Update articles, jackets, caps, certificates, etc.? Why not concentrate on more serious subjects?" This comment requires thought. We do want to make sure that everyone is appreciated for their work and extra contributions but are we really overdoing it?

As you know we decided to change to a more open management style a few years ago and to make sure everyone realized we were serious about changing, we have emphasized individual recognition. We think employees will always deserve recognition but maybe we should change our emphasis. What do you think? Let your training/communications representative know how you feel about this or drop the editor a line.

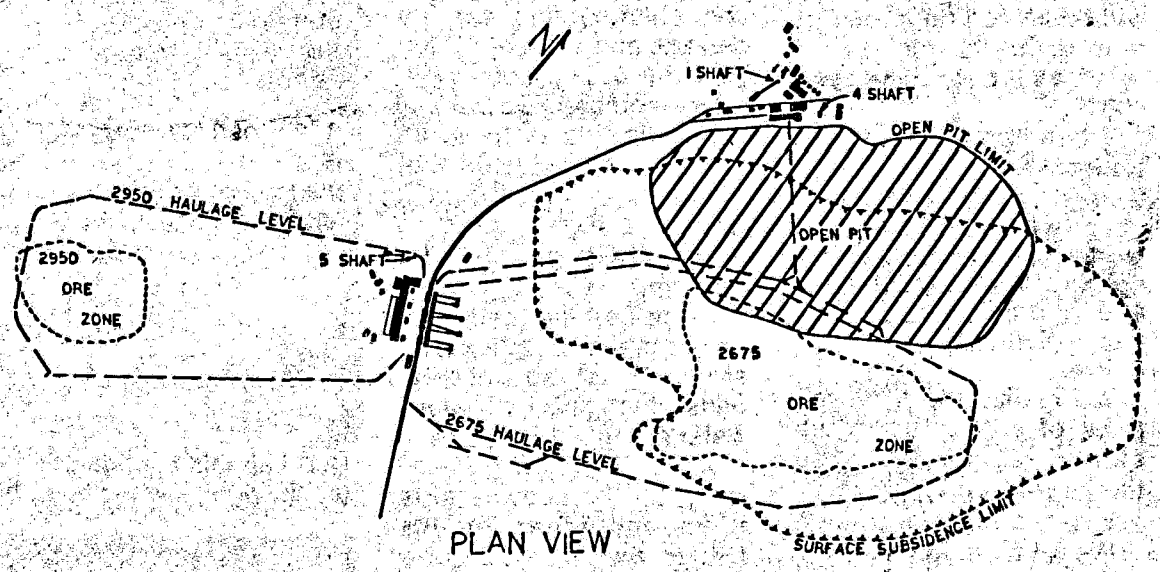
Feedback is one thing we never have enough of!



Keeping us clean

PICKING UP LITTER in one of the plant parking lots are plant carpenter shop janitors Charles Windham, left, and Gabriel Tovarez. We're puzzled about where the trash could have come from since Magma employees wouldn't thoughtlessly litter their parking lots. Photo by Bebe Burwell

Development of "K" orebody now underway at San Manuel



"K" OREBODY lies west of the San Manuel orebody. The "K" stands for Kalamazoo, the name it was given by its former owners, Quintana Mineral Company. It contains about the same amount and grade of ore as in the San Manuel. Drawing by Mark Crandall

By LLOYD THOMAS
Drawings by Mark Crandall

The San Manuel and Kalamazoo orebodies were originally one continuous orebody.

Today they are separate orebodies and both are being developed and mined by Magma as part of a long range mining project.

Orebody separation occurred because the original system was faulted into two parts along the San Manuel fault.

The drawing shows the relative position of the two underground ore zones plus the oxide open pit and surface facilities at the mine.

For reader orientation from the position of the #3 shaft to the eastern end of the San Manuel side is about 7500'.

Displacement along the San Manuel fault is about 8000'

Magma's current 10 year mine plan calls for 44.5 million tons to be mined from Kalamazoo 2890 level from a total ore reserve of 254 million tons.

In comparison, 476 million tons have been mined from the San Manuel orebody since 1956 with 182 million tons of remaining ore reserves.

Currently, there are 7 headings being driven by drift crews on the Kalamazoo 2890/2950 levels.

Construction of a pocket and loading section at 3D shaft from which the ore for these levels is to be hoisted is currently underway.

A diamond drilling program has also been started to specifically define the limits of the Kalamazoo ore zone, and mine planners are looking into the feasibility of future mining from the 3440 and 4040 levels which contain the balance of the Kalamazoo ore reserves.

Production is scheduled to begin from the 2890/2950 levels during the first quarter of 1989.

We sell garbage business

Magma Copper Company has sold its two garbage trucks and 410 garbage containers to Hambickl Brothers, Inc., who are starting this month to collect and dispose of rubbish in San Manuel.

And, Magma is donating the local landfill and 160 acres of surrounding land south of town to Pinal County for its use as a sanitary landfill.

The company hopes Pinal County will take over soon and begin operating the landfill as the county does in Oracle and other places.

HBI Brothers, Inc., will maintain the twice weekly collection schedule and will contract directly with individual home owners, mobile manor residents, and commercial customers.

For renters of Magma houses, the company will continue to collect the fees and will pay HBI for their houses.

HBI has garbage collection services in both Tucson and Phoenix.

Cover

Employee dies in accident

Willie J. Cox, raise blaster, died in an underground train collision at the mine on August 25.

Willie was operating a battery powered locomotive which collided with a moving ore train on the 2675' level of the mine.

He died instantly in the crash which occurred at approximately 10:50 p.m. Tuesday, August 25.

The accident is being investigated by the Federal Mine Safety and Health Administration, the State Mine Inspector, and the Pinal County Sheriff's Office.

Willie had worked in the mine since 1974 and was performing a routine job when the accident occurred.

He is survived by his wife Verna of San Manuel and their 6-year old son, Jesse.

Willie was born July 19, 1942 in Sims, Arkansas, attended school in Prescott, Arizona, and worked in Flagstaff, Globe and Miami.

He joined Magma in 1974 as a mine chute tapper but was in the 1975 reduction in force.

Recalled to work in 1975, Willie worked in all phases of mine operations including mucker, car loader, supply trammer, battery motorman, trolley motorman and raise blaster.

—Letters—

Dear Editor:

I would like to know how the Magma Real Estate Office can state that we at the mobile manor have not had a rate increase.

We have seen our lot rents increase from $11.00 to $45.00 which included trash pick up. We have now been told that our new trash rate is $9.66 which will be an add on to our lot rent. If this is true our lot rents will have increased 400%.

When we bought our trailers from Magma we were promised a "5 Star" park which included a laundry room, pool, better lighting, recreational area, and uniform landscaping. None of these items were delivered.

We realize that with the price of copper being unstable, some of these things were unrealistic.

Where do we stand now? We want straight talk!

Dore De Madona
Journeyman painter
plant construction

Dear Dore:

Thanks for your letter but we'll have to debate with you on a couple of points.

First of all Magma didn't operate Mobile Manor when it opened in 1974, we weren't involved in mobile home sales, and it was the park operator, not Magma, who promised a "5 Star" park.

He had good intentions but in 1975 the bottom went out of the copper market, we had lay-offs, and the mobile home park company went out of business - and that's when Magma inherited the San Manuel Mobile Manor.

The first thing we did was lower the rent from $58 down to $45 per month.

Later on we stopped charging rent altogether and charged only for the sewage and garbage which was the $11.00 per month you remember.

We did this to try to attract more residents but the income from the park was never high enough to go ahead with the full 5 Star program.

Even so, the park has paved streets, sidewalks, street lights and concrete pads which give it at least a 4 star rating.

As for the new garbage rate, all homeowners in town including mobile home owners are now responsible for paying directly to the garbage company because Magma is out of the garbage business (we hope forever)!

Frankly, Mobile Manor has been a drain on company resources which we cannot allow to continue.

And, that's about as "straight talk" as I can get.

The Editor

P.S. No, we probably won't sell the individual Mobile Manor lots and yes, we are willing to talk to anyone who wants to buy the whole thing.

Mill modernization underway

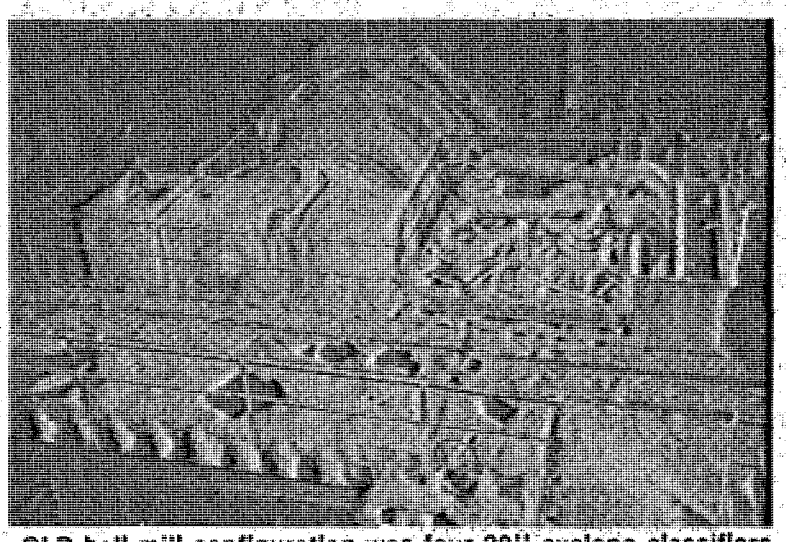
By DAVE WERNKE
mill section foreman

In 1980, studies were conducted to ascertain any benefits of removing scoop feeders from our Marcy ball mills in the concentrator.

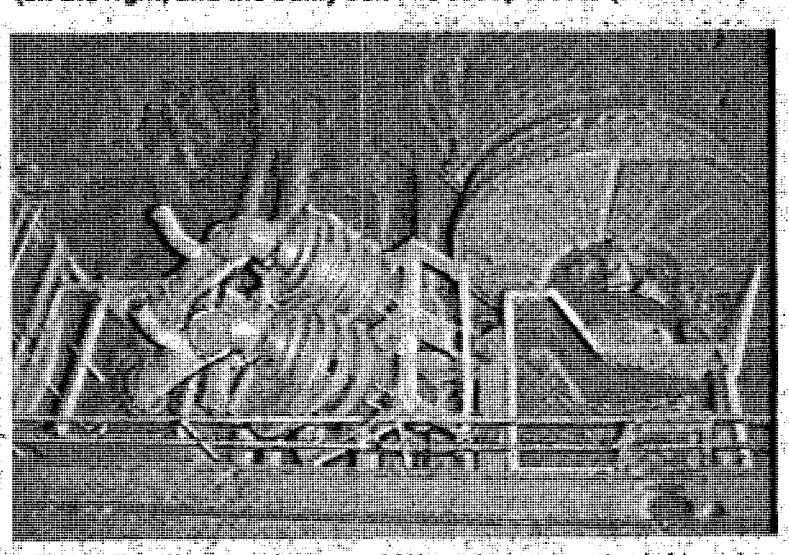
Initial results indicated a 6% reduction in mill horsepower draw as well as considerable cost savings related to scoop feeder maintenance.

Removal of the scoop feeders would also allow for change over to 26" cyclones from 20" cyclones as part of the overall project.

A hydrocyclone separates coarse sand from fine sand in the slurry.



OLD ball mill configuration was four 20" cyclone classifiers (on the right) and the bulky box-like scoop feeder (on the left).



NEW ball mill set up has two 26" cyclones (on the left) and a direct feed system (on the right). Photos by Dave Wernke

The coarse sands are sent to the ball mill for further grinding while the finer sands are sent to flotation.

Cyclones are an integral part of the process for metallurgical control with regard to maintaining the optimum particle size in the slurry going to flotation.

By converting to larger capacity cyclones, the total number of cyclones used in the grinding circuit would be reduced from 116 to 58.

All design work for the conversions was done by plant engineering.

Fabrication and all construction was performed by plant service shops along with mill maintenance employees.

A summary of annual cost savings for all 13 grinding sections is:

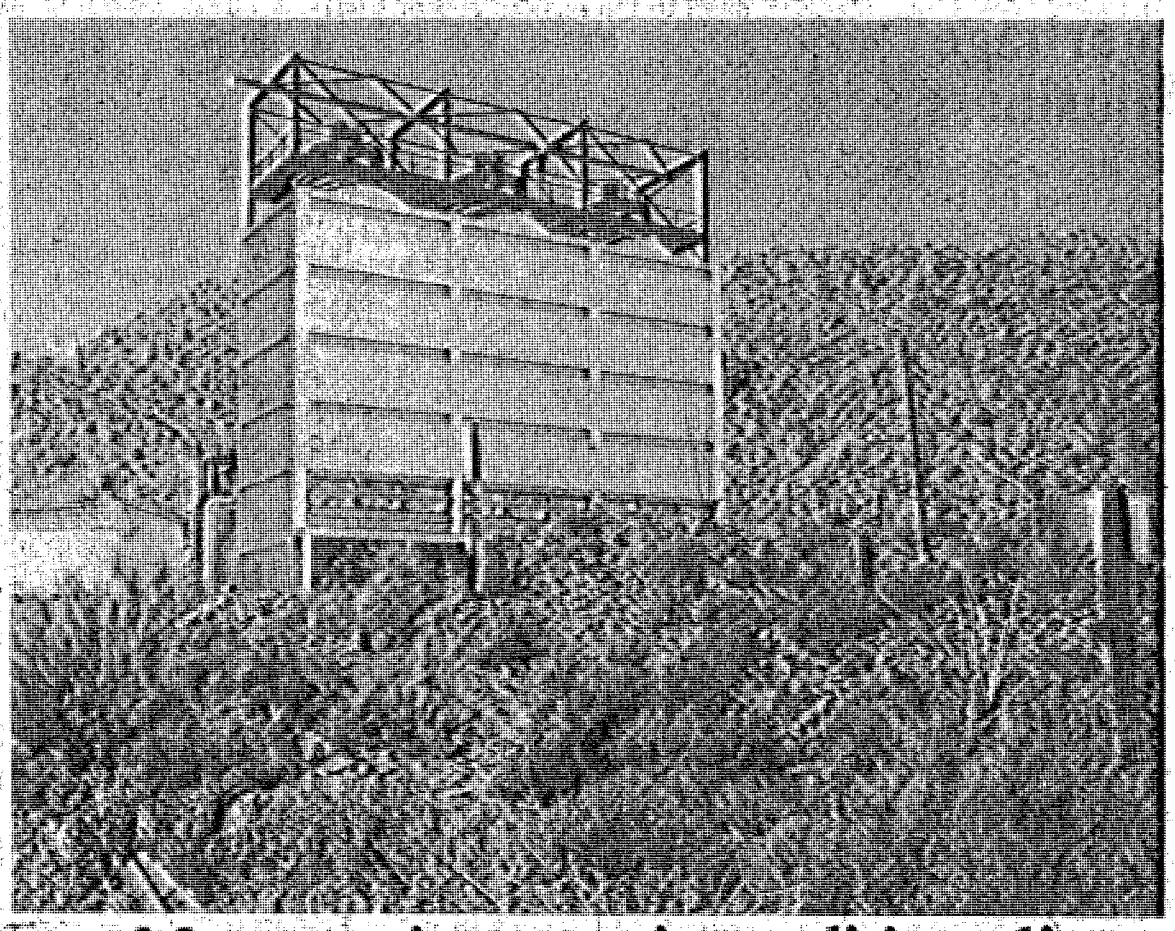
1. Energy-Power	$243,000
2. Scoop Maintenance	101,000
3. Scoop Direction Change	8,000
4. Cyclone Repair Parts	84,000
5. Cyclone Repair Labor	62,000
Total Savings	$498,000

The concentrator currently has eight of 13 grinding sections modified.

This is a major part of Magma's plan for modernization in the concentrator.

The modified sections have shown no problems during start-ups or long term operation and have been an unqualified success from a cost reduction stand point.

From our scrapbook . . .



Magma mine was air conditioned!

COOLING TOWER for the underground air conditioning system in the Magma mine at Superior was built in the 1940's to provide additional condensing water for the underground chillers which were first installed in 1937. Cooling coils were placed on the 3400 and 3600 levels. They were fed from two chiller units which each could cool 350 gallons of water per minute down to 60°F from 95°F. Total pipe installed for the system was 9,579 feet. The system brought the temperature in the stopes down from 101°F to 80°F. By 1941 a total of six units with a total cooling capacity of 840 tons were operating enabling the mine to proceed with development projects without waiting months for newly opened ground to cool. It was the first and only air conditioned mine in North America and because of this, the Magma mine was designated a National Historic Mechanical Engineering landmark by the American Society of Mechanical Engineering in 1976.

Dee Durazo named mine superintendent

Francisco "Dee" Durazo was promoted to mine superintendent in charge of underground operations effective September 1.

Dee replaces Tim Acton who is reporting to a new job as general mine superintendent at Freeport Minerals Ertsberg Mine in Indonesia.

Dee joined Magma in 1975 after completing his mining engineering degree at the University of Arizona College of Mines.

He has worked as an engineer trainee, mine planning engineer as well as foreman of draw, haulage and repair.

He was promoted to general mine foreman in June, 1985 and to assistant mine superintendent in February, 1987.

Dee lives in San Manuel with his wife Monica and daughters Roxanne and Anjelica.

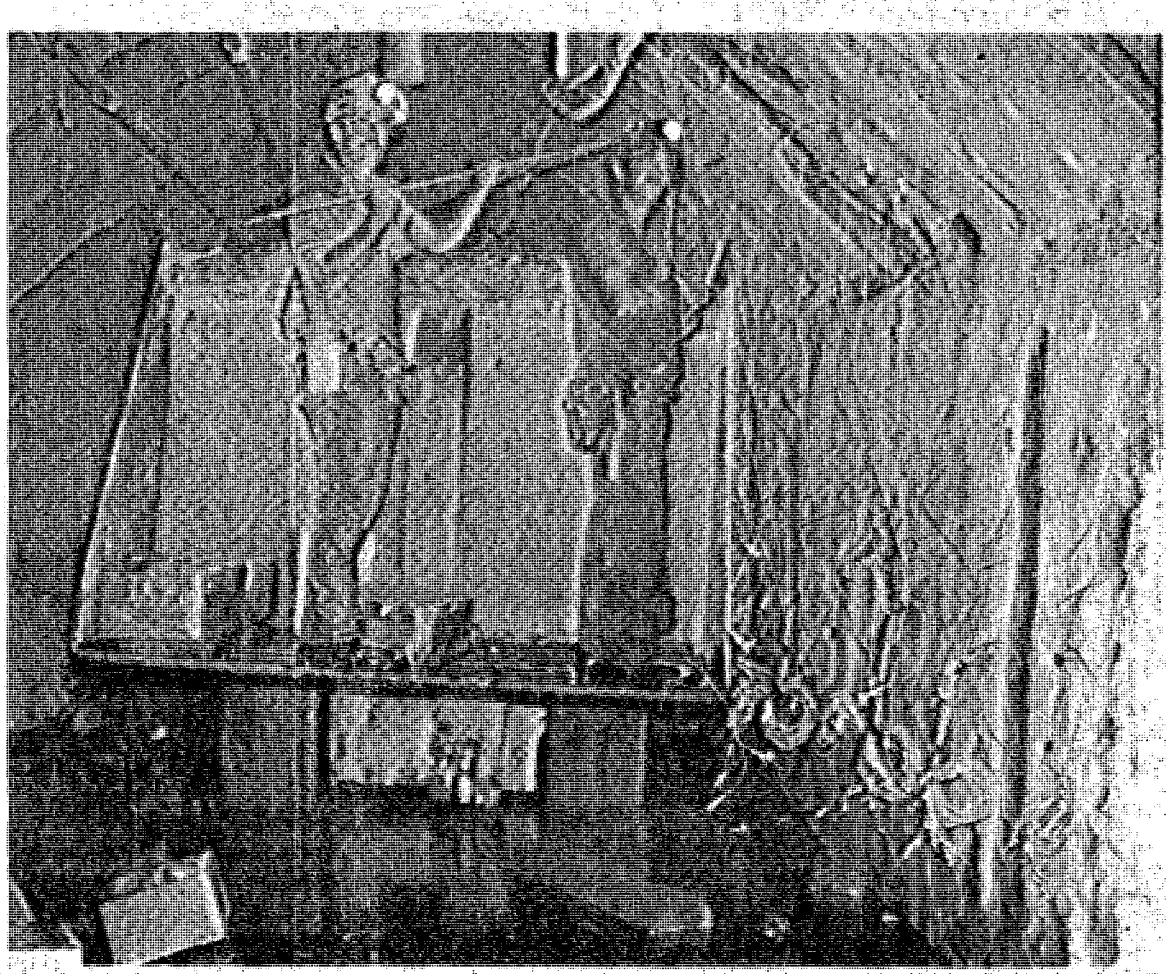
He is a native of Douglas, Arizona, where he attended high school and Cochise College.

Dee is an active member of the Society of Mining Engineers and is vice president of the San Manuel Golf Club.

DEE DURAZO
Photo by Mark Crandall

over

First large scale LHD block in production



LOADING BLASTING HOLES to begin a new draw chamber at the mine are drift crosscut miners, from left, Mike Martin and Matt Kannegaard. This entry round contains over 150 blasting caps. They are delay caps which go off at different intervals. The heavily loaded holes in the center fire first followed by the next ring of holes around the center. Then consecutive rings fire until the outer ring goes. The outer ring is loaded in a special way to give the opening a smooth surface. Tony Cook, the third member of their crew, is on the LHD making sure Matt and Mike can work safely in the bucket.

Story, Photos and Drawings By MARK CRANDALL

After two years of development work, the new panel 3 on the 2615 mine level was brought into production early in July.

Now, two months later, production has become fairly routine and smooth.

Panel 3 is the first large-scale production with mechanized mining underground at San Manuel.

Mechanized mining uses large front end loaders or LHDs (load, haul, dump) machines to draw caving ore from a chamber and tram it to an ore pass.

Ore is loaded from the ore passes onto trains on the haulage level 60 feet below.

The reduction in the number of haulage drifts is one of the many advantages of mechanized mining.

Panel 3 covers the area of panels 1, 2 and 3 under the conventional mining system.

By conventional methods, panels 1A, 1B, 2A, 2B, 3A and 3B would have been driven on the 2675 haulage level.

With mechanized mining, only 3A and 3B were required.

This eliminated over 5000 feet of haulage drift development.

There is also the "people" aspect of mechanized mining.

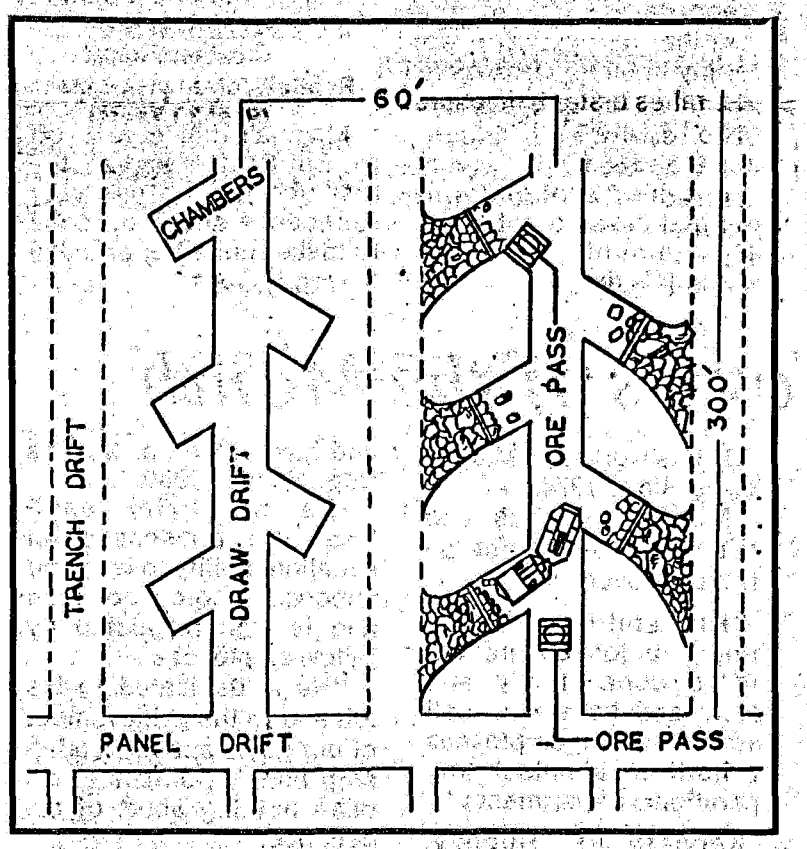
This was expressed by former operations superintendent Tim Acton when he said, "Even if the costs are the same, I would rather have employees driving machines than breaking boulders with large hammers."

The production rate for panel 3 is approximately 3500 tons per day from 23 chambers.

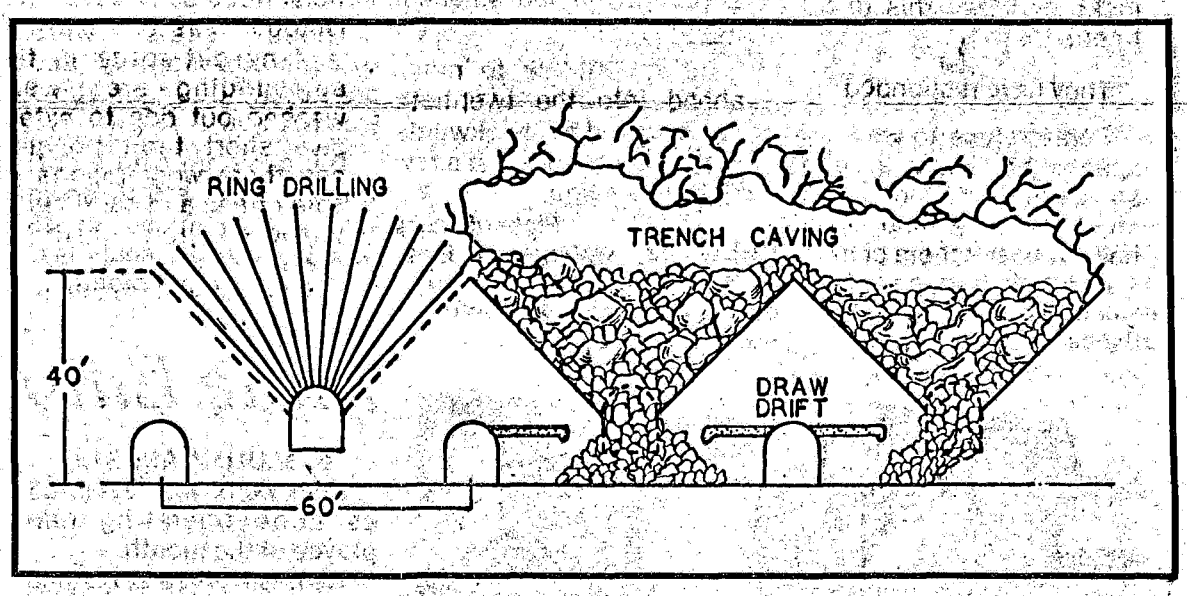
By mid-1988, production from the block is budgeted to reach 15,000 tpd.

To date, all chambers that have been undercut or "caved" are in production.

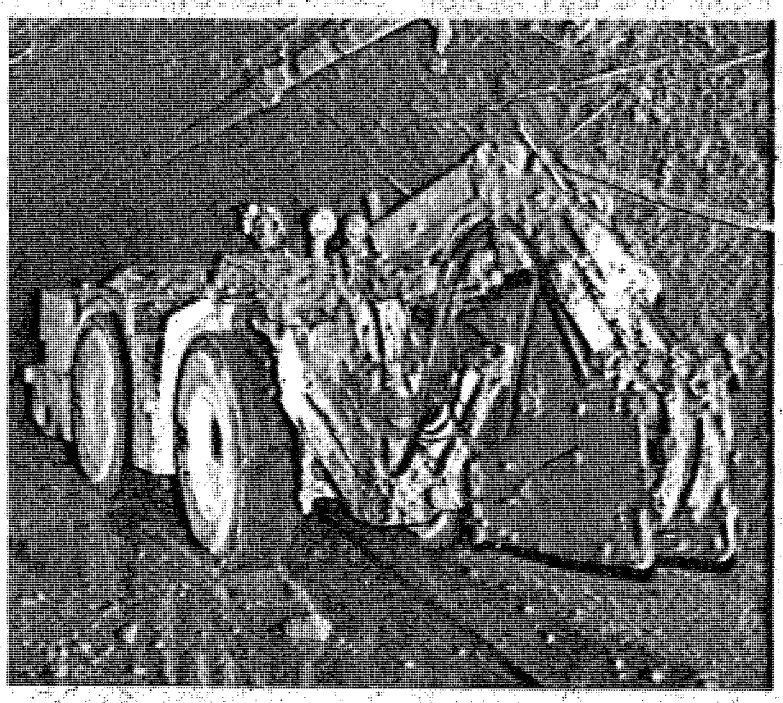
Mechanized mining is doing well in panel 3 on the 2615 level and is one of the mine's 12 goals for moving ahead.



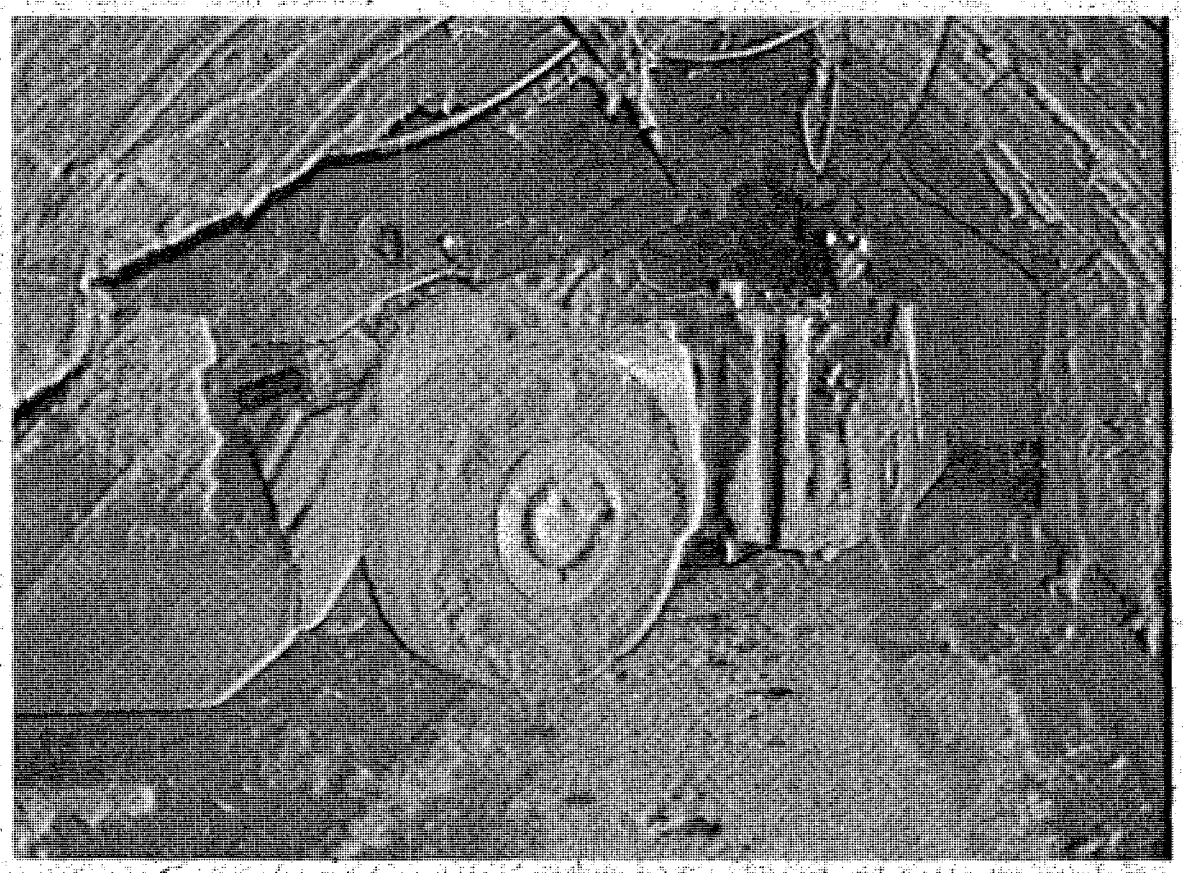
PLAN VIEW of LHD TRENCH DRIFTS.



TYPICAL SECTION VIEW OF MECHANIZED MINING SYSTEM.



LHD OPERATOR DONNY BOYD moves a rockbreaker from one draw drift to another draw drift.



LHD OPERATOR and August Employee of the Month David O'Dell guides six cubic yard LHD into a chamber for another load of muck.

Lime & flux crews move from mill to smelter

By BILL SARRETT & JOE KANE mill foremen

On October 1 the lime and flux department was transferred from the mill division to the smelter division.

As stated in last month's issue, this is being done in an effort to streamline production of smelter flux material.

We in the mill division would like to take this opportunity to thank the 13 employees of the lime and flux for their work efforts for the mill.

They have maintained one of the finest safety records in the division and in the company.

They have shown that the safety program is important to them and that it can be integrated into production.

Many production gains have been made at lime and flux in the past few years.

A lot of input from these employees was needed to make some of these programs work.

Many projects truly exemplified the Quality of Work Life philosophy of joint ownership of an idea which led to a solution to make a project workable.

These people have accumulated nearly 150 years of experience among them.

We are sure they will continue to ply their trades as well for the smelter division as they have for the mill division.

Gentlemen, thank you for a job well done and best of luck to you in the future.

We are proud to have worked with you and **YOU WILL BE MISSED!**

CREW #1, operator Bret Ells. Not pictured: lead operator Glenn Myers, operator Ralph Pallanes.

CREW #2, operator Alex Majalca. Not pictured: lead operator Richard Colvin, operator Don Myers.

CREW #3, from left, lead operator Tom Collins, operator Don Bussell, and operator Emiliano Torres.

CREW #4, from left, relief operator Richard Sanchez, operator Ken Woods, lime and flux foreman Joe Kane, lead operator Don "Mac" McKimmey. Not pictured: operator Ricardo Pulg.

Photos by Myrna Harris

Big savings from Bill's idea

By BILL OETTING general foreman, oxide maintenance

Cost savings come in all forms.

Each month there are different employees from all areas who show their expertise in one form or another.

As the pit progressed each and every one added to the operation in one form or another.

Bill Shaffer is one of these.

Bill is a conscientious mechanic who works in the open-pit maintenance shop.

Bill saw a need for a more cost effective seal on the rotary head of the drills.

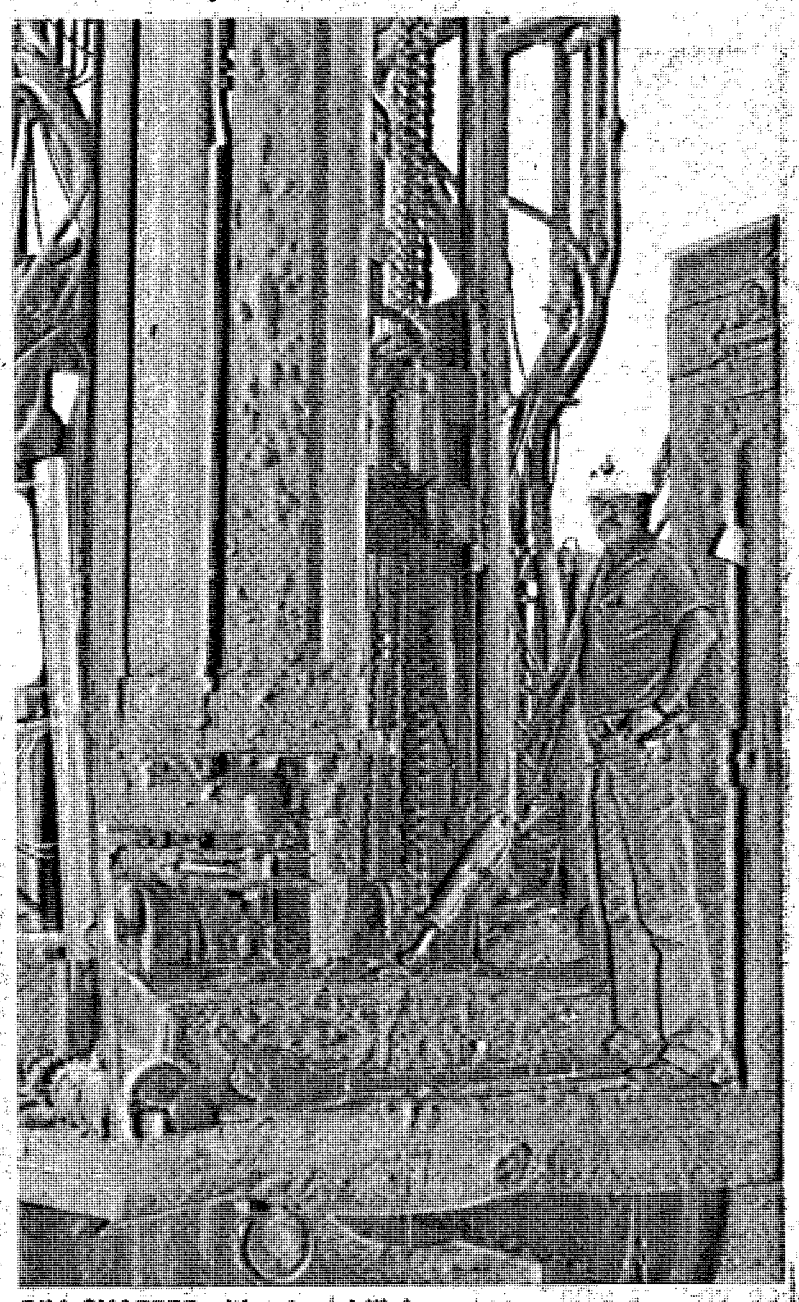
This seal is used to eliminate leakage when the water is forced through the drill steel.

Bill saw that we had a high rate of failures from this seal so using his experience and knowledge of material available at the mine he proceeded to fabricate a Magma Seal.

The factory seals cost $60.00 a set plus a shim set of $36.00.

These seals were replaced bi-monthly and normal replacement time was two hours.

Bill came up with a seal total cost was $15.18, down time was reduced to 45 minutes and the seals last an average of four months.



BILL SHAFFER with rotary drill rig.

Photo by Al Lizarraga

The savings is much more than $86.00.

We gained a lot of down time and saved a substantial amount of the mechanic's time.

Magma's hat comes off for Bill Shaffer and all the rest of you who use your experience and knowledge to make this a better place to work!

Mine Employees of the Month

By MARTHA ACOSTA

Walt Felix was selected as mine operating employee of the month.

He has worked at Magma Copper since 1973 and the person who nominated Walt considers him to be one of the most willing workers he's had that is a safe worker and is always willing to take time to help his partner.

Michael Gorham was selected as maintenance employee of the month.

He has worked at Magma Copper since 1974.

"Mike's ambitious and caring attitude reflect an ideal employee.

"His ability to think through a job ensure the job is done timely and safely and he works well with all fellow employees in both mechanical and operational departments."

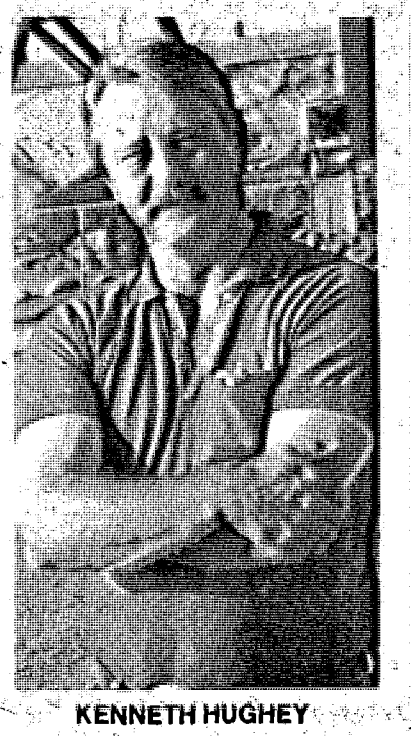
Kenneth D. Hughey, salary employee of the month, is a craft foreman and has worked at Magma Copper since 1980.

His nominator said, "Kenneth possesses an excellent ability to lead and supervise a group of men and is well respected by fellow employees.

"He is dedicated to his job and to the achievement of our goals and his leadership and performance has been nothing short of excellence."

CONGRATULATIONS TO THESE EMPLOYEES!

WALT FELIX

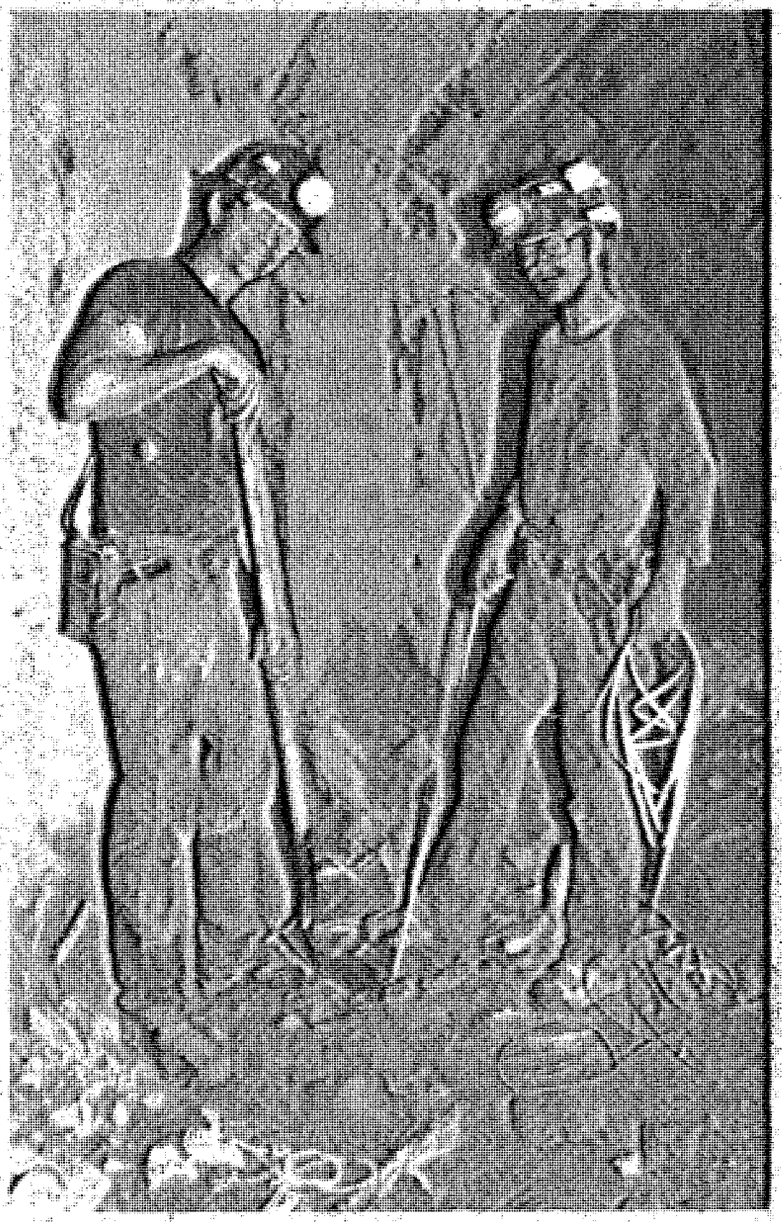


KENNETH HUGHEY

MICHAEL GORHAM

Photos by Al Lizarraga

Long hole drills simplify ore pass development



MINERS Kent Bowman, left and Richie Nickles, right, load blast holes for a new ore pass. Photo by Mark Crandall

By MARK CRANDALL

The mining system used underground at San Manuel requires ore to be moved from the draw or production level to the haulage level by way of vertical openings, called ore passes.

Conventional mining mandates the development of numerous ore passes, or transfer raises.

Miners on the haulage level begin by drilling upward into the rock and then the round is blasted and muck removed.

The blasted section is lined with armor-plated timbers up to the face.

After these timbers are blocked into place, the cycle of drilling, blasting and timbering is repeated until the raise reaches the draw level.

But in mechanized mining fewer and larger ore-passes are used.

Instead a technique of long-hole drilling and blasting is used to develop ore-passes.

Here, the holes are drilled downward from the draw level to the haulage level.

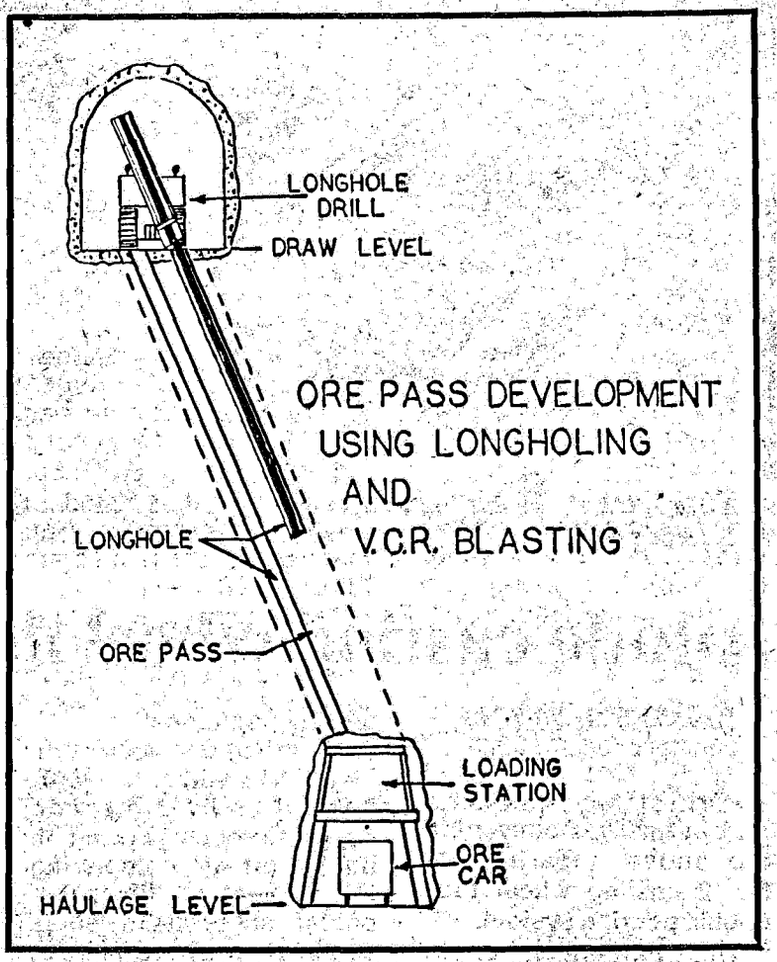
After the bottom ends of the holes are plugged, 2-3 feet of explosives are loaded into the holes and detonated.

This blast advances the ore pass upward 6-8 ft.

The cycle is then repeated until the ore pass is opened to the draw level.

A grizzly is then set and concreted into place.

Longholing and vertical cave retreat (VCR) blasting is one way the mine is cutting costs and helping Magma meet a goal and move ahead.



PROFILE of orepass at the mine. Drawing by Mark Crandall

OUR ORIGINAL anode casting wheel undergoes modifications to enable it to pour two castings. Wheel was previously modified to provide computer controlled precision casting.
Photo by Gilbert Rodriguez

Anode casting wheel modified

By JACKSON JENKINS
smelter anode foreman

Part of the smelter's retrofit involves converting the anode department's No. 2 casting wheel to a double pouring system.

This will enable us to keep up with the future production requirements.

Demolition on No. 2 in early September.

Modifications were completed November 3, 1987. Several individuals and support groups gave an all out effort in completing this project on time: carpenter shop, paint shop, central maintenance, smelter maintenance, engineering, and the anode department.

was poured on the new No. 2 casting wheel on November 4.

As expected, there are still a few bugs to work out of the new system.

Due to the quality of people working on the start up of No. 2 wheel, it shouldn't take very long before we are pouring quality copper at twice

Your name may be drawn for great vacation trips

The next Employee Fund drawing will be held Tuesday, November 24 at 5 p.m. at the San Manuel Golf Club.

Free refreshments will be served.

There will be two grand prizes, a 7-day raft trip FOR TWO down the Colorado River and a trip to the 1988 Rose Bowl FOR TWO including air fare, three nights, reserved seating for the Rose Parade, float making tour, tickets to the game and transportation.

There also will be four first place winners and each will receive a free trip FOR TWO to San Francisco, San Diego, Disneyland or Las Vegas.

All trips include air fare and hotel accomodations for a minimum of two nights.

Be sure and attend the drawing at the Golf Club.

As in the past, Employee Fund Committee members are not eligible for the drawing.

ENGLISH TEACHERS, are, from left, Lori Haro, Jerrilee Carter, Joan McCurry, Harcourt Huckle, Rosemary McCollum, and John Sablich.
Photo by Eldon Helmer

Volunteers teach English

By ELDON HELMER

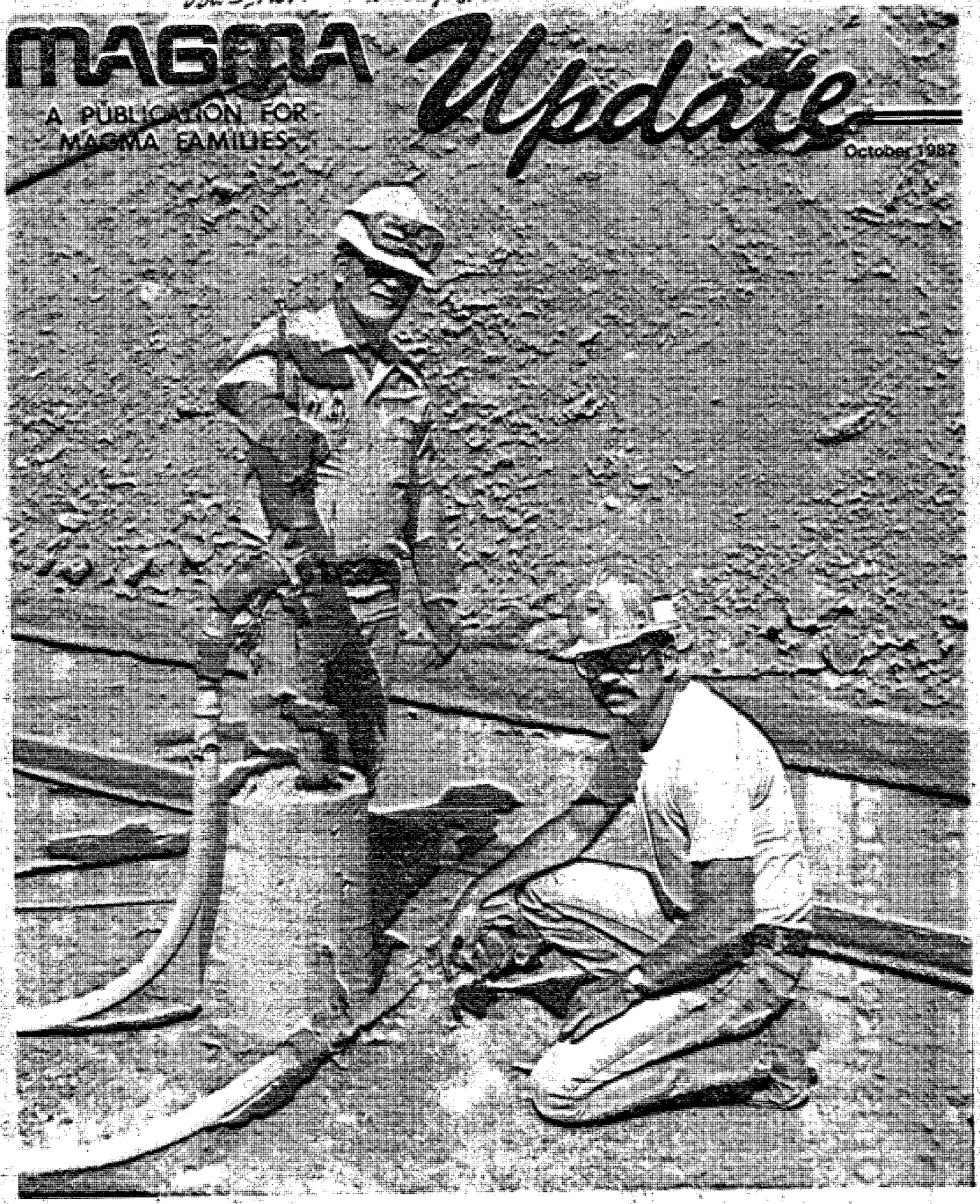
program is also open to those who live in Tucson as

Vol 3, No. 11 back pos com.

MAGMA Update

A PUBLICATION FOR MAGMA FAMILIES

October 1982



Calibrating an in-situ injection well

IN-SITU CREW MEMBERS Darrell Michalski, electrician journeyman, left, and Marvin Miller, in-situ engineer, probe to find depth and to calibrate an in-situ injection well. Hose carries leaching solution into the 1,000-feet-deep hole for release into the ore zone. Solution will filter through the copper oxide ore, dissolving and absorbing the copper, to be collected in sumps on the 2375 level for pumping to the surface where it will be blended with leach solution from the surface heap leach dumps for processing in the SX-EW plant.

Photo by Mark Crandall

Surveyor is also a sharpshooter

By JOSE TAPETILLO
mine survey

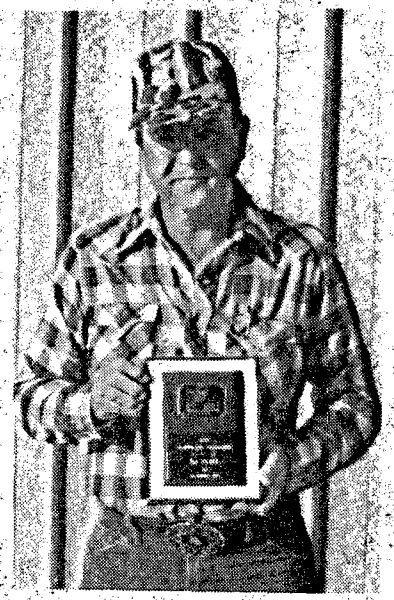
Eagle-eye surveyor, "Steady Freddy", exhibits excellence on and off the job.

Fred Gillette, transitman in the mine survey department, won first place, the "Iron Silhouette challenge A.A." held on September 26 and 27 of this year by the Arizona State Rifle and Pistol Association at the Tonto Rim Sport Club in Payson, Arizona.

Fred used a Cold Phyton .357 Magnum (large bore) to achieve the above accomplishment.

He had a combined score of 50 points (kills), out of a possible 80 round over the two days.

The second place winner ended with a score of 47 points.



FRED GILLETTE
Photo by Mark Crandall

This year's competition attracted a field of over 50 contestants from around the state.

Fred is also a member of the National Rifle Association (N.R.A.)

He won first place in the small bore (.22 caliber), and second place in the large bore (at least .30 caliber) center fire in the N.R.A. pistol competition held in Tombstone, Arizona in 1982.

There is no need to mention any more of Fred's many more accomplishments but, his reputation is also spreading at the mine as being one of our best catfish fishermen with his 20-pound catches.

Keep up the all-around excellent effort Fred.

There's a new reverb lunch room

By BUTCH NORTON
smelter reverb foreman

Dust and dirt, here and there, do we want it everywhere? Not in our lunch room we don'tl

The smelter reverb department is in the process of upgrading their lunch room.

In the course of a day, it is used by all three crews

people in and out of the lunch room several times a day, it has been a constant struggle to keep the room clean of scraps and dirt.

This room is also used for taking breaks which compounds the dust and dirt problem.

An entry way will be built to help stop the dust and gas from entering the lunch room as people are en-

is being divided into two rooms, one room for eating lunch and the other room for removing and storing protective safety equipment.

The second room will be equipped with a sink for washing up and cleaning respirators.

New ceiling tiles have been installed and both rooms have been sealed to

—Know your benefits—

By VERONICA CELAYA, employee relations representative

PROTECT YOUR BENEFITS - REPORT INJURIES

It's your judgment call. It's not your supervisor's and not your co-workers': only you can decide what to report and what to ignore. You must sort out the significant from the insignificant.

A slight scratch on a deeply calloused hand draws no blood. Dusty work areas leave some with goopy eyes every morning, but it washes away easily.

But are these injuries? Perhaps.

Do they require any medical treatment? Usually not.

Should such minor injuries be reported to supervision?

The Safe Workmanship and Personnel Instruction booklet states:

"If you are injured on the job, no matter how slightly, **IMMEDIATELY REPORT IT TO YOUR SUPERVISOR.**"

So why not tell your supervisor? Don't wait till the next shift -- an injury must be reported by the end of shift on which the injury occurred.

If nothing comes of the scratch, fine. But if it turns out a metal chip is imbedded and an infection occurs, you will have protected your benefits.

Report injuries if there is any doubt in your mind that you may need to see a physician. Let your supervisor know about it during that shift and, if you need to see a physician later on, the documentation is there.

Protect your industrial coverage.

1) Report the injury to your supervisor on the date of occurence.

2) Seek treatment at the dispensary or the San Manuel Healthcare Center for on-the-job injuries requiring medical care.

Do not put off necessary medical treatment until you get home to Tucson. Treatment must be rendered at the San Manuel Healthcare Center, or otherwise it is unauthorized, not payable by the Industrial Claims Office nor by the Benefit Plan.

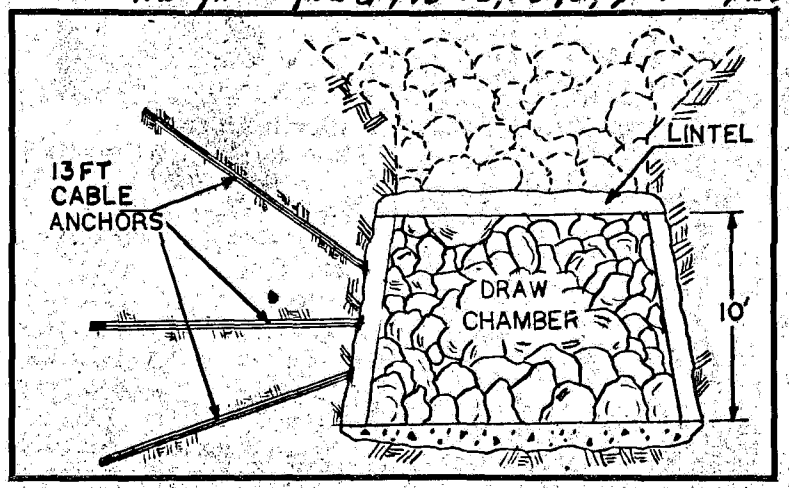
The workman's compensation benefits are there for you when you need them -- help yourself by following through with these requirements.

ENHANCE YOUR SKILLS & UPDATE YOUR RECORDS

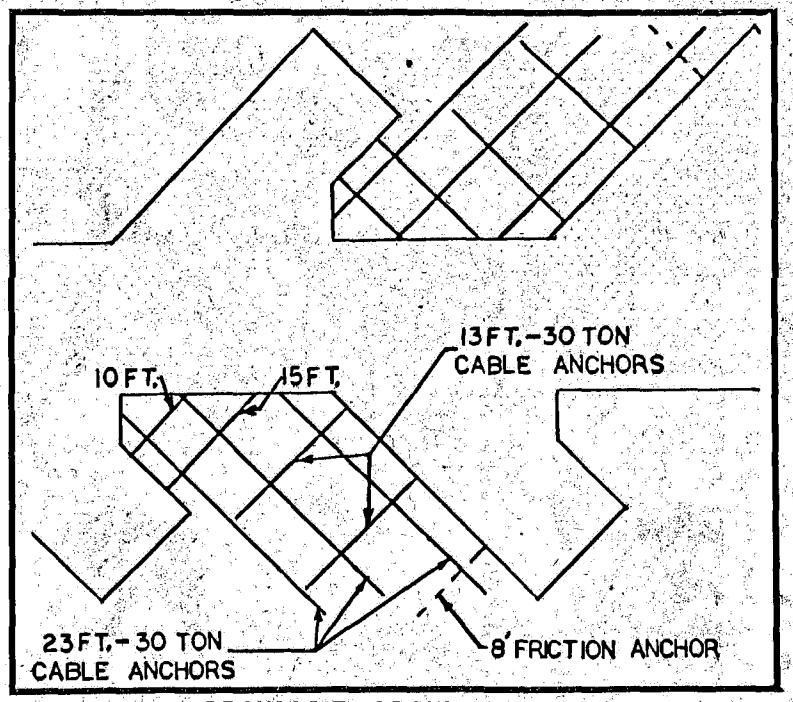
Recent craft openings have generated quite a bit of in-

Cables support and strengthen rock underground

Magma Update, Vol. 3, No. 12, p. 5 Nov. 1987



FULLY TENSIONED AND GROUTED CABLE ANCHORS



DRAW DRIFT GROUND SUPPORT (PLAN VIEW)

Story and Drawings
By MARK CRANDALL

One of the engineering obstacles which was overcome when the mine switched to LHD mining was to support the large drifts that the LHD's drive through.

After the miners have driven a draw drift or a chamber, cable anchors or bolts are installed to maintain the rocks' integrity in the support pillars.

Holes are drilled into the rock surrounding the chambers as shown.

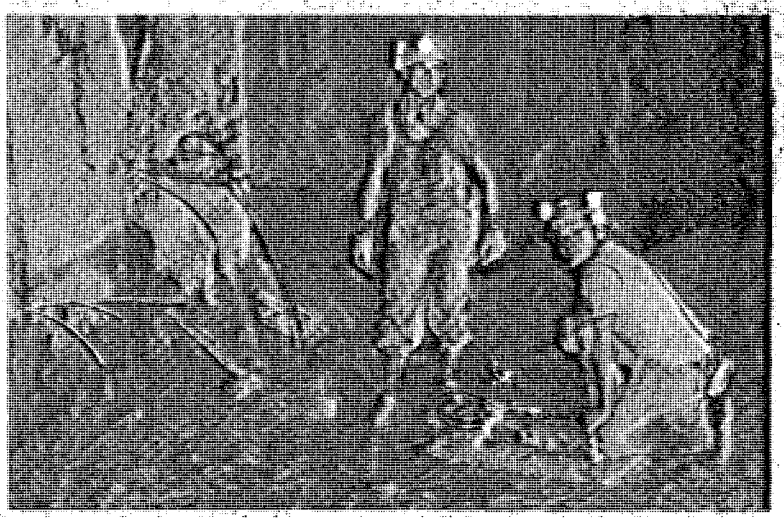
Long cables are slipped into the hole and anchored into place.

After the cables are placed, they are tensioned and a textured cement called grout is injected into the holes around the cables.

The overall effect of the cable bolts is to support the rock much like steel trusses support the roof of a building.

Each cable bolt acts as a member of a "truss" in the rock.

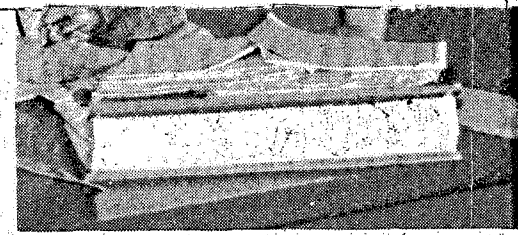
Cable bolts are helping to make LHD mining possible at San Manuel and is one way the mine is Meeting A Goal and Moving Ahead.



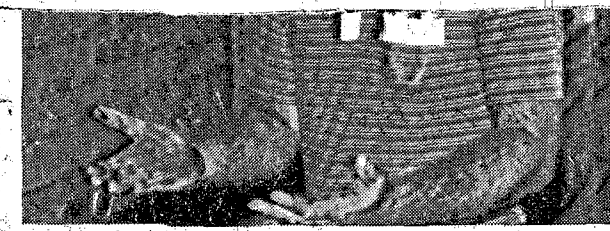
STOPE MINERS Joe Barella, left, and Johnnie Silvas prepare to tension a cable bolt.

DRIFT AND CROSSCUT MINERS, Ronald Decker, left, and Raul Duarte drill holes for cable bolts. Photos by Mark Crandall

MYRNA HARRIS, mill training foreman.
Anonymous



KATHY SIMMONS, payroll clerk.
Photo by Bebe Burwell



PAUL DIONNE, plant electrical foreman.
Photo by Carolyn Creeley

PAUL MONTANO, left, and DAVID ELVIRA, refinery material handling laborers.
Photo by Bebe Burwell

YOLANDA SANCHEZ, smelter anode spoon maker.
Photo by Gilbert Rodriguez

EFRAIN BATRIZ, mine truck driver.
Photo by Mark Crandall

In accordance with the Price Related Bonus Plan(s) all Magma employees who worked during the 3rd calendar quarter will receive a bonus in their last paycheck in November.

Until mid-October, when the Producer Price Index is published, we cannot

employees.

If a rise in the Producer Price Index raises the "trigger" price from 73¢ to 74¢, the bonus will be $260.

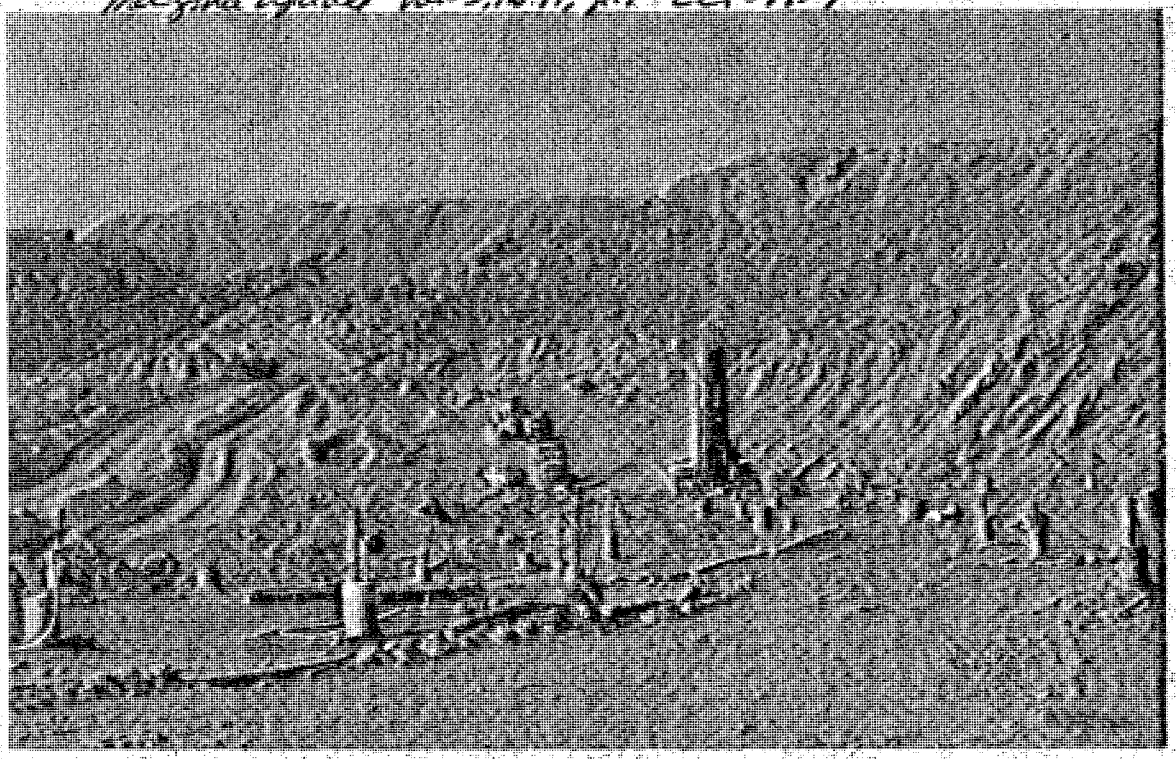
Individual bonuses will vary; for example, certain non-paid absences do not count in the bonus calculation.

November 1, 1988.

Nearly all the provisions of the Consent Decree were effective as of February when it was lodged with the court.

Magma's only noncompliance so far was an exceedance of the six-minute peak sulfur dioxide concentration limit which oc-

Magma Update Vol. 3, No. 11, p.1 Oct. 1987



In-situ wells at work

IN-SITU LEACHING WELL FIELD is seen looking west toward oxide open pit benches. The field presently has 30 injection holes delivering a total of 1,000 gallons per minute of leaching solution into the deep oxide orebody under the open pit. The drill rig is an Ingersol Rand TH100 reverse circulation unit which drills the 1,000-feet-deep holes. Present operation is a continuation of testing and present plans are to begin increasing activity in December and build up to full scale operation by next May.

Photo by Mark Crandall

over

CONVERTER GAS SCRUBBING UNIT is part of our $133 million smelter retrofit program which will enable us to meet requirements of the consent decree.

Photo by Gilbert Rodriguez

Child safety car seats are free at Healthcenter

By JUANITA McLENNAN
San Manuel Healthcare Center

Child car safety seats save lives and they are available at the San Manuel Healthcare Center on a loaner basis, free of charge.

Did you know, in the last ten years, over 10,000 children under the age of five lost their lives as passengers in automobile accidents?

Here are some of the facts:

In a 30 mph crash, a 15 pound baby will be thrown forward with a force of 450 pounds which is like falling from a three story building.

YOUR CAR STOPS, YOUR CHILD DOESN'T.

Tests conducted by Highway Safety Research Institute show that fatal injuries to children can be reduced by 90% and injuries reduced by 80% by use of approved child restraint devices.

In 1980, approximately 60,000 children under the age of five were injured in motor vehicle accidents in the United States.

By Arizona State Law, since July 28, 1983, all child passengers under four years of age and weighing under 40 pounds must be secured in a car safety seat.

There is a $50 fine for the violation of this child safety law.

The loaner program offered by the Healthcare Center requires a security deposit of $25 for infant seat and $35 for toddler seats.

This deposit is refunded when the safety seat is returned in satisfactory condition.

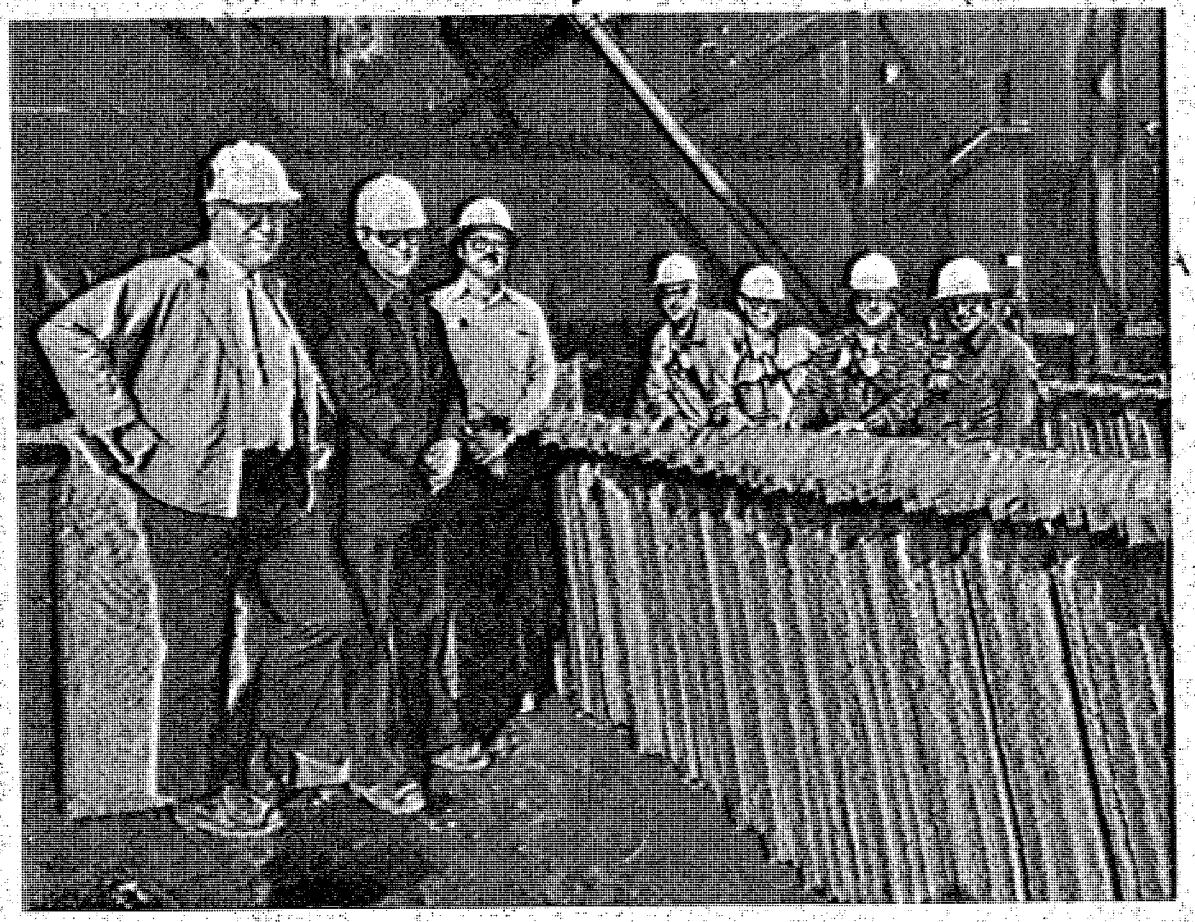
These restraint systems conform to all applicable federal motor vehicle standards.

Remember, your child depends on you. What your child hits is your decision.

For more information contact Stacy Hockett at the San Manuel Healthcare Center, 385-3412.

From our scrapbook . . .

pg 2



Anode Production Record - 1977

A RECORD PRODUCTION OF ANODE copper was achieved by the smelter on November 30, 1977, with 1,032 tons produced in a 24 hour period. Average production that month was 616 tons per day and production for the month was also a record at 18,168 tons. This record has since been surpassed and the current record of 1,211 tons was set March 20, 1985. Today the smelter produces an average of 691 tons per day with its two reverb and five converter operation. The retrofitted smelter, using one flash furnace and four converters is projected to produce approximately 980 tons of anodes per day. Shown here with anodes is the 1977 smelter staff, from left, manager of plant production John McIver, smelter superintendent Dale Rodolff, assistant superintendent JD McCain and foremen Ron Palmer, Wayne Evans, Dale Ridgeway and Butch Norton.

Attorney joins Magma

Andrew A. Brodkey has been named legal counsel for Magma at our corporate headquarters in San Manuel.

Andy was formerly associated with the law firm of Gorsuch, Kirgis, Campbell, Walker and Grover in Denver.

He was graduated from the University of Arizona College of Mines in 1979 where he received his B.S. in Mining Engineering, with distinction, and then continued his law studies at Creighton University, Omaha, where he graduated cum laude and obtained his J.D. degree in 1982.

He is a member of Tau Beta Phi, Phi Alpha Delta, and the Society of Mining Engineers.

Andy and his wife, Leslie C. Greenberg-Brodkey will make their home in Tucson.

ANDY BRODKEY

Retirements

Congratulations and Thanks!

SEPTEMBER 1, 1987

STEVEN M. FLORES, Tucson, AZ from lead miner. Joined as chute tapper September 29, 1956.

ANTONIO G. HERNANDEZ, Mesa, AZ joined as mechanical helper April 15, 1969.

OCTOBER 1, 1987

WILLIAM A. TAYLOR, Eden, AZ from blacksmith journeyman. Joined as helper on October 31, 1957.

over

From our scrapbook . . . Magma Update Vol 3, No. 12, Nov. 1987 p. 2.

World hoisting record . . . 1977

WE HOISTED the 300 millionth ton of ore from the San Manuel mine on December 3, 1977, which was 22 years after the first ore was hoisted on November 21, 1955. On hand at the 3D shaft to witness the event were, from left, chairman of the board Wesley Goss, executive vice president Warren Parks, general manager John Goss, and mine manager Hank Seaney. As of October 31, 1987, the total hoisted tonnage stood at 484,201,766 million tons, still a world's record for hoisting from an underground mine. Is there any ore left? Well, we'll hoist that much more from the San Manuel and Kalamazoo orebodies by 1997 and then, we estimate, there will be that much more ore remaining. Whether or not it can be extracted will depend on the price of copper and mining technology 10 years from now.

MAGMA Update

A PUBLICATION FOR MAGMA FAMILIES

VOLUME 4 NUMBER 10 San Manuel, Arizona September 1988

Winter named president

BURGESS WINTER

James Burgess Winter has been named president and chief executive officer of Magma Copper Company and has also been elected to the board of directors.

Formerly vice president, operations of the Minerals Group of BP Minerals America, Salt Lake City, Burgess assumed his duties with Magma on August 30.

That day he spent touring the Pinto Valley Division and the following day arrived in San Manuel to meet managers, superintendents, department heads and staff.

Prior to joining BP Minerals America, Burgess was vice president and general manager of Inspiration Consolidated Copper Company, Miami, 1976 to 1983.

For the first 24 years of his career Burgess held various technical and management positions with Anglo American Corporation in Northern Rhodesia (now Zambia), Botswana, Swaziland, and South Africa.

He has worked in the copper, iron, cobalt, lead, zinc, gold and diamond mineral industries.

Burgess was born in Carrickfergus, Ireland in 1933 and earned his degree in chemistry from Belfast College of Technology in 1956.

He and his wife Isobel will be moving from Salt Lake City to Tucson during the next few months.

The Winters have two grown children, Susan McDonald of Salt Lake City and Paul Winter of Phoenix.

He replaces the interim management team of board chairman Don Donahue, who has served as chief executive officer and director Jack Parry who has served as president and chief operating officer.

They were selected by the board of directors following the death of Brian Woolfe last April.

Said Don Donahue, "Magma is extremely fortunate to have as its new head a man of Burgess' stature and competence.

"He is the right person to continue the current program of modernization and cost-reduction to enable Magma to operate as a fully competitive domestic copper producer."

Burgess will be visiting all Magma operations as his schedule permits and is looking forward to the challenge.

Hello. . .

By BURGESS WINTER
president and chief executive officer

I will not, in this my first communication to you, try to convey more knowledge than I presently have acquired, or specific answers to the problems that face us. That will come, and soon.

Meanwhile, let this be my assurance to you that I believe in the attitude of openness in communication that has been your inheritance from the days of Brian Woolfe. If anything, I hope we will find ways to enlarge on it as time goes by.

Before he left San Manuel, I talked at length with Jack Parry about his recent experiences at Magma. As a result, I asked him to put these ideas in writing, and I think Jack has made some thoughtful and penetrating comments.

Let me assure you, I am not in the habit of associating myself with lost causes, and don't propose to start now. I have taken this assignment because, together, I believe we can continue to turn things around. The goal of cost reduction and production improvement must be realized. It will involve hard work, smart work and difficult decisions, but it is a job that must be done and it is in all our interests to do it well.

. . .and goodbye

By JACK PARRY
past president and chief operating officer

Although I have now returned to my duties in New York with Newmont, I did not want to leave without letting you know how much I appreciate the help all of you were to me in an awkward assignment. I also want to leave with you some of my thoughts about Magma's future.

I know that the past several months have been a difficult period for Magma and its employees. Brian Woolfe was an inspirational leader whose knowledge and determination brought about many additudinal "can do" changes in the organization, and his untimely and tragic death was a major setback to the momentum he had created in the Company.

If I have been impressed by anything in my months here, it is that this attitude is still very much alive; it is reflected in the ways in which you deal with adversity, and the atmosphere of openness and cooperation with which you conduct your activities. This is not an easy attitude to sustain under the circumstances, where doubt and uncertainty about the future of the Company are your daily concerns.

I have assured Burgess Winter, based on my own experience, that he will be working with highly qualified people, strongly motivated by the challenges they face, and eager to work with him to bring about the demanding objectives we have set for this company. In the process of having come to know him, I feel I can assure you that he is a leader who will inspire your confidence and cooperation and will help you to achieve our goals.

In the course of its first 18 months as an independent company, Magma has been very fortunate to have enjoyed favorable copper prices. In the last half of 1987, for example, we saw the highest copper price since 1980 - $1.46 a pound. Although copper prices have fallen from that peak, they remain high, having averaged approximately a dollar a pound so far this year, remaining at this level even during the summer, a time when price weakness normally sets in.

During these periods of strong copper prices, we must constantly remind ourselves of the cyclical nature of copper prices - what goes up does come down. High prices for any commodity, copper included, attract additional production into the market place, with the inevitable consequence that surplus production results and lower copper prices follow somewhat later. Compounding the problem in 1988 is the fact that most copper producers achieved significant cost reductions earlier in this decade. That achievement has set the stage for copper prices to possibly fall to lower levels in the next downturn than they did in the last downturn.

Consequently, the company must find ways to reduce its cost of production even further, a task which will not be easy, as you know. It has already required personal sacrifice on your part, and it has required a commensurate corporate investment to the tune of nearly a quarter of a billion dollars in borrowed capital to increase efficiency and expand production to achieve lower costs.

Continued on page 5

Newmont offers us its Magma stock

Newmont Mining Corporation has granted Magma an option to purchase the 5,713,500 shares of Magma common stock and $200 million face amount of Magma preferred stock held by Newmont for $160 million in cash, plus either $40 million face amount of new Magma senior preferred stock or an additional $30 million cash payment.

The option expires on November 30, 1988 and provides for a closing, if the option is exercised, prior to December 31, 1988.

The 90-day option period will give Burgess Winter, our new president and chief executive officer, the opportunity to provide direction for an updated operating plan on the basis of which we and our investment bankers will arrange financing for the cash portion of the option exercise price.

The senior preferred stock, which Newmont may elect to receive, would carry a 9.2% cumulative dividend, payable quarterly if earned and would be subject to mandatory redemption on January 1, 1999.

Magma would have the right to call the senior preferred stock at prices ranging from 76.3% to 100% of face amount over the 10-year life of the issue.

In connection with any exercise of the option, Newmont and Magma would also settle certain outstanding tax disputes arising out of Newmont's 1987 spin-off of the majority of Magma's common stock.

In connection with the purchase option, the company has obtained the commitment of Warburg, Pincus Capital Company, L.P. under which Warburg, Pincus would purchase $70 million of Magma convertible preferred stock.

Should Magma also offer to purchase the common shares held by Consolidated Goldfields PLC, a 17% shareholder, Warburg, Pincus would purchase up to an additional $30 million of preferred stock.

The preferred shares issued to Warburg, Pincus would be convertible into common stock at $7 per share and bear a coupon of 10% payable for the first five years partially in shares of common stock assigned a minimum value of $7 per share and the balance in zero coupon notes.

Each preferred share would have a stated value of $1,000 and would entitle the holder to 10 seven-year warrants to purchase common shares at $7 per share.

Magma would have the right to redeem this preferred stock beginning in the sixth year from date of issuance at a price of 105% of face amount declining ratably to 100% in the tenth year.

This preferred stock would entitle Warburg, Pincus to nominate three Magma directors (one in each class).

The remainder of the board of directors would be composed of two management directors and not less than four independent directors.

Warburg, Pincus would agree not to acquire more than 49% of Magma's outstanding common equity without the approval of a majority of the company's independent directors, and would agree not to transfer any Magma voting securities except by means of a public offering designed to achieve a widespread distribution or in connection with a sale of the entire company endorsed by the independent directors.

Warburg, Pincus Capital Company, L.P. is an affiliate of E.M. Warburg, Pincus & Co., Inc. which, with a record of over twenty years in venture banking and with venture capital equity under its discretion of more than $1.5 billion, is a major factor in special equity and venture capital finance.

MAGMA Update

Published for employees and their families
by Magma Copper Company,
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Smelter - Jack Gorham, 259; George Price, 312; Gilbert Rodriguez & Deborah Lawrence, 403.
Refinery - Bebe Burwell, 394; Randy Roberts, 307.
Engineering Service - Ted Johnson & Bud Zook, 276.
Metallurgical - Lynn Feldt, 398; Sam Riechers, 311.
Safety - Grant Kempton, 240; Doug Nelson, 126.
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Warehouse - Carolyn Creeley, 327.
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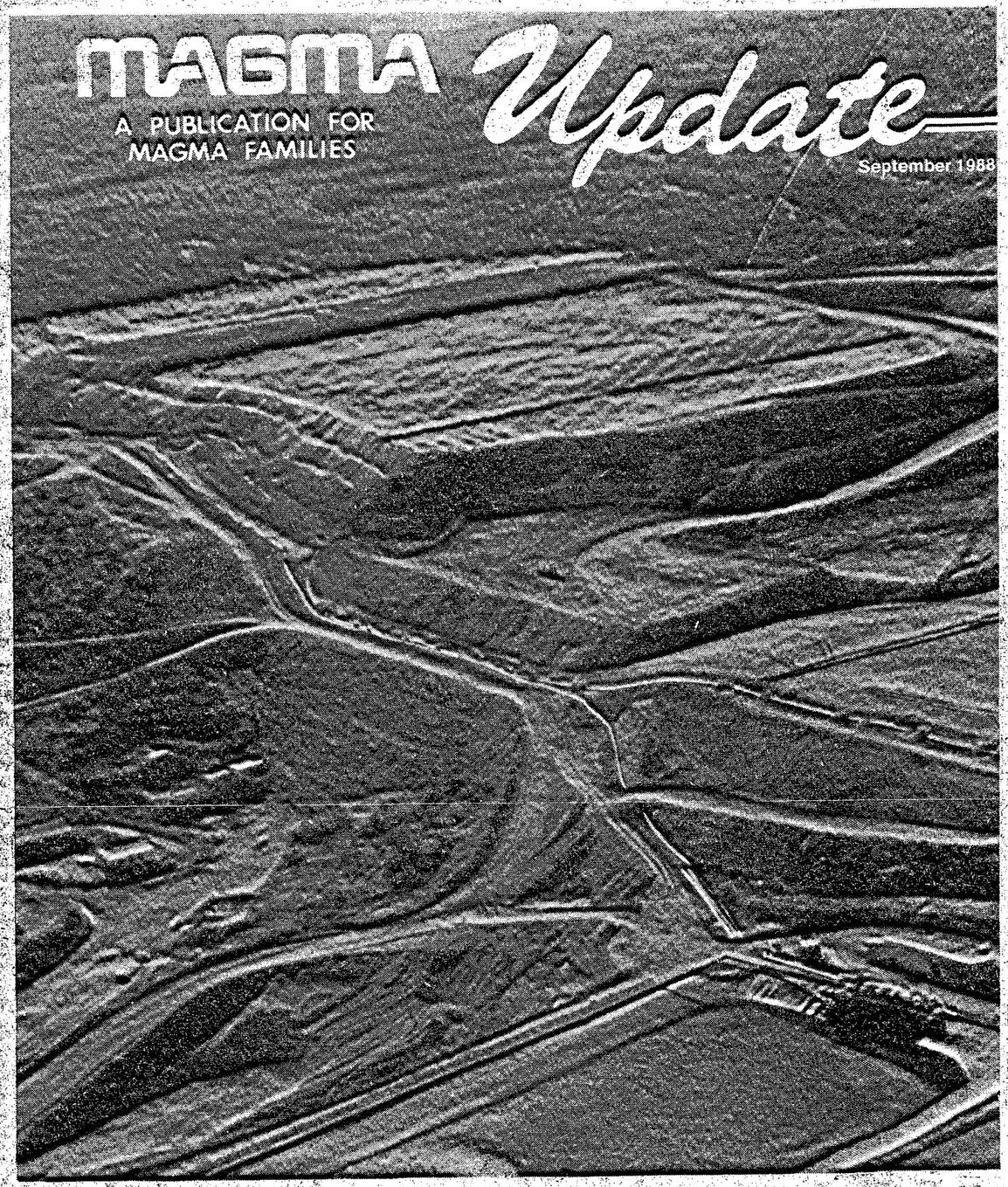
Shaft furnace is rebuilt

COILER OPERATORS George Ramirez, foreground, and Rudy Camacho apply a thin coat of mortar to newly laid fire bricks in the rod plant holding furnace as part of the shaft furnace rebuild. Read more about this project on page 10 of this issue.
Photo by Bebe Burwell



The 100th leach dump completed

YOU'RE LOOKING AT 19,230,000 tons of copper oxide ore from the San Manuel open pit mine. It has been placed in a system of leaching dumps of which the 100th was placed in service on August 20. At the lower right is the raffinate pond where the leaching solution of weak sulfuric acid is made-up for pumping to the top of the dumps where it will be sprayed over the ore. Read more about the open pit and leach dump operation on pages 6 and 7 of this issue.
Photo by Richard Cole

Retiree gets a refund

ALVIN BROWN, left, receives a refund from the medical plan from Walt Raub, benefits administrator.
Photo by Grant Kempton

By WALT RAUB

Alvin F. Brown, salaried retiree, received a check in the amount of $67.50 for an overcharge on his hospital billing.

Alvin stated he was checking the hospital billing and discovered that there were items listed which he had not received.

He had heard of others whose itemized statements were in error and "I paid close attention to mine," he said.

Alvin received his corrected billing and turned it in to Magma's medical claims department.

According to the Employee Audit Program of Magma an employee is expected to review the bills submitted on behalf of himself or his dependent.

If the employee identifies charges which are incorrect by $50.00 or more, the Plan pays the employee 50% of the amount saved.

Alvin's overcharge was $135.00 and he was refunded half of that, or $67.50.

"Magma has taken good care of me over the past 38 years, and now I wanted to look after Magma," said Alvin.

Blood donors needed

Want to do something really good for humanity?

All you have to do is offer to donate a pint of blood to the Southern Arizona Red Cross Bloodmobile Wednesday, September 21, at the San Manuel High School.

To ease the process you can even make a reservation by calling San Manuel's bloodmobile chairwoman Mable Sablich at 385-2837.

Or, you can just show up at the high school auditorium between noon and 6:00 p.m. on September 21 or December 7.

The ladies who will take your name and start the simple paperwork are among 37 local volunteers, mostly wives of Magma employees or retirees.

Heading committees in addition to working at the bloodmobile are Mable (Mrs. John) Sablich, Mary (Mrs. Floyd) Rodgers, JoAnn (Mrs. Bob) Collins, Daisy (Mrs. Harvey) Willeford, MaryAnn (Mrs. Tom) Hearon, and Marion (Mrs. Bill) Wood.

Vice president John Goss is an advisor to the Southern Arizona Red Cross Bloodmobile program.

Needless to say, the Red Cross Bloodmobile is the major source of blood for our region's medical centers and hundreds of Magma employees and their families have been helped by this program.

Raj Patel, metallurgist, gave a pint at a recent bloodmobile.
Photo by Richard Cole

We help kids

By BILL JOHNSON

On August 27, 1988 Magma Copper Company participated in Arizona Families For Children's (AFFC) First Annual Celebrity Bowling Tournament.

The event was held at the Territorial Lanes Bowling Alley in Tucson.

Among the local celebrities bowling in the event were the Mayor of Tucson, Tom Volgy, Pima County Sheriff Clarence Dupnik, city council members, local sports figures and T.V and radio personalities.

Magma was one of 66 companies which sponsored a lane and IMPACT facilitators Bill Johnson and Chuck Thompson along with stope miner Jessie Hernandez represented the company.

Chuck, Jess, and Bill are all adoptive fathers who have worked for Magma a number of years.

All three agreed that the event was not only enjoyable, but also was for a very good cause.

AFFC is a child advocacy group composed of adoptive parents and has been based in Tucson for 17 years.

AFFC is responsible for many programs.

One of these programs is the Waiting Child series on Channel 9.

AFFC also operates the Adoption Information Center at 1011 N. Craycroft in Tucson.

The purpose of the center is to help locate families for "Special Needs Kids".

"Special Needs Kids" are children who fall into any one of the following categories: older children, minorities, sibling groups, or children with physical, mental, or emotional handicaps.

The center has been responsible for locating homes for 17 Special Needs Kids in the past 60 days alone, reports Kay Buckler, co-chairperson for AFFC.

Kay further stated that the fund-raising event raised $17,000.

This money will enable AFFC to continue to locate homes for Special Needs Kids.

AFFC would like to thank Magma Copper Company for its support and participation.

DRINKING, DRUGS AND MINING

DON'T MIX

Know your benefits

By VERONICA CELAYA
senior employee relations representative

Some haven't paid their bills

Magma Copper Company employees and their dependents currently owe the San Manuel Healthcare Center $139,700. Of that amount nearly 80% is more than 90 days overdue. Approximately $40,000 of that amount is still owed to Magma from the time that Magma was the provider of services through the San Manuel Hospital.

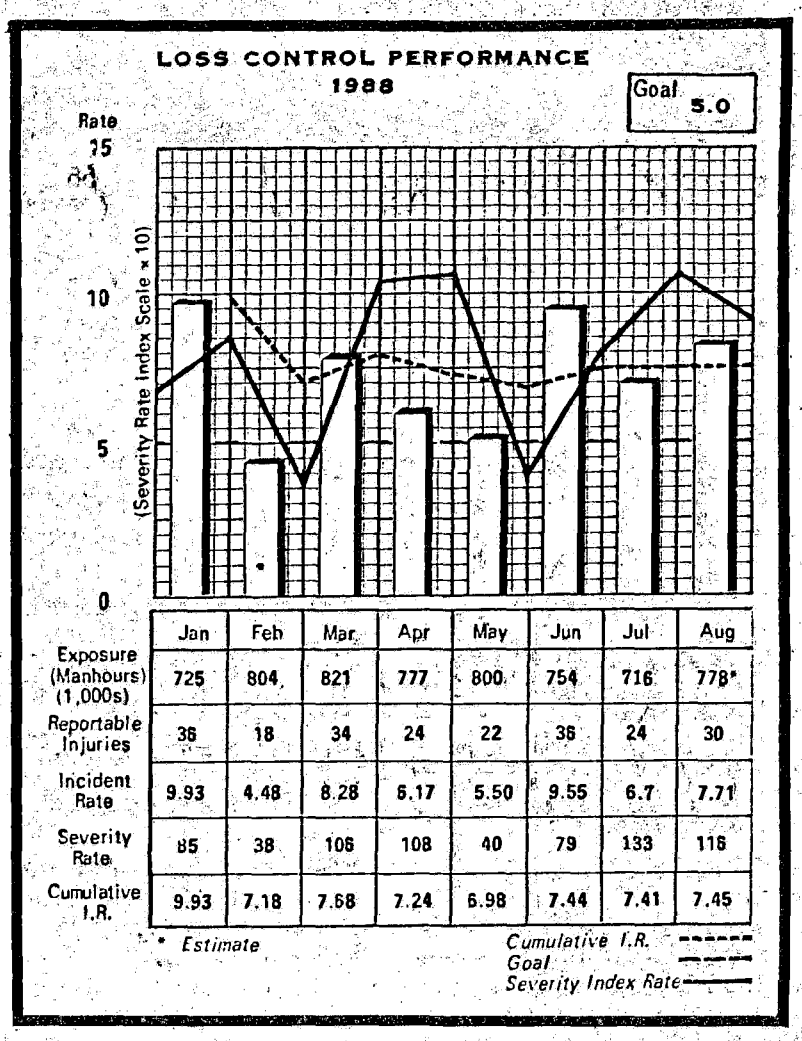
It is in the interest of Magma Copper Company and Magma employees that a quality provider such as Tucson Medical Center continues to operate the Healthcare Center. All of us, as purchasers of services from the Healthcare Center, have an obligation to pay for those services. TMC simply cannot allow those kind of debts to continue uncollected, and will have to take steps to make sure the services they have rendered are being paid for.

We urge all employees to do their part in keeping their bills current at the San Manuel Healthcare Center, which is an integral and important part of our communities in both San Manuel and Tucson.

Loan applications due

By ARNIE SOTELO

If you are anticipating withdrawing funds from your after-tax savings plan account or obtaining a loan from your before tax savings plan account for the Christmas holidays, you must make an application prior to September 22, 1988. It takes between 60 to 90 days from date of application to receive a withdrawal or loan distribution. Contact Walt Raub at employee benefits department, telephone number 385-3103, or extension 103, if you have any questions.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Exposure (Manhours) (1,000s)	725	804	821	777	800	754	716	778*
Reportable Injuries	36	18	34	24	22	36	24	30
Incident Rate	9.93	4.48	8.28	6.17	5.50	9.55	6.7	7.71
Severity Rate	85	38	106	108	40	79	133	116
Cumulative I.R.	9.93	7.18	7.68	7.24	6.98	7.44	7.41	7.45

* Estimate

Safety performance is behind goal

By BILL WOOD
manager of loss control

Magma has four months in which to improve our 1988 vs 1987 safety performance. The talent, the skills, the knowledge is all here. We have a great work force in our favor. The task is for each of us to apply those abilities and make them pay off for ourselves individually.

Nobody benefits more than the individual employee from Safe Production. Supervisors can enjoy a deep gratification of knowing they helped those in their charge perform without something going wrong - injuring a person or losing a piece of equipment as a result of an accident. Managers can feel good about their operations because a safe operation is a productive operation. Magma saves the bucks that go down the drain with every accident. Those dollars produce not a pound more of copper nor do they enhance the produce that pays our wages.

Focus on learning from the accidents of others (our losses); make safe practices habitual; and size up any new job first (not after something goes wrong).

We can do better than last year. The ability is here. Apply it for your benefit and that of your fellow employees.

Ron wins Gold Medal in national weightlifting

Story and Photo
By CAROLYN CREELEY

Ron Parrish, shipping clerk, won the National Championship at the 1988 American Weightlifting Association National Championships. He won a gold medal in the 165 lb. weight class and 35-39 age group.

There is a lift called the snatch, which is lifting the weight from the floor over your head in one continuous motion while squatting or splitting.

In the snatch, Ron lifted 182 lbs.

In another lift called the clean and jerk, which is lifting the weight from the floor to your shoulders and then using your legs to jerk the weight over your head, Ron lifted 248 lbs.

Ron started weight training in 1965 at age 15 and went into powerlifting competition in 1971.

He switched to Olympic style competition in 1972. Annual weightlifting meets include state and regional championships, invitationals, and open meets.

Weightlifting consists of two governing bodies; one is the U.S. Weightlifting Federation and the other is the American Weightlifting Association.

Ron now ranks in the top 100 (no age grouping) in the U.S. Weightlifting Federation, number 2 (age grouping) and number 5 (no age grouping) in the American Weightlifting Association.

RON PARRISH

Ron's most outstanding lifts were in 1979 at 209 lbs. in the snatch and 271 lbs. in the clean and jerk.

In 1987, he broke six American Weightlifting Association national records including a 204 lb. snatch and a 259 lb. clean and jerk.

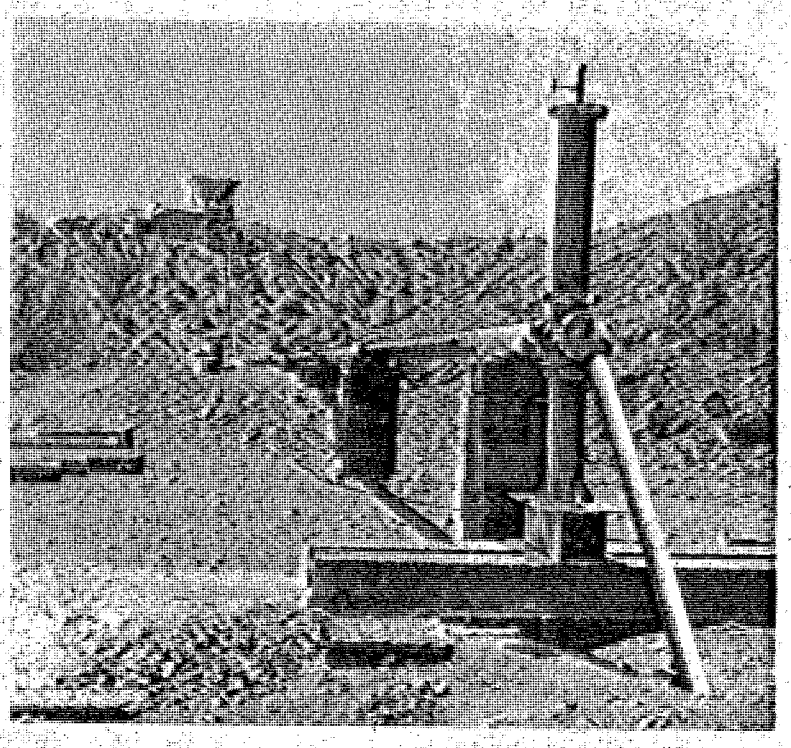
Ron has worked in Product Shipping and Inventory Control for 11 years.

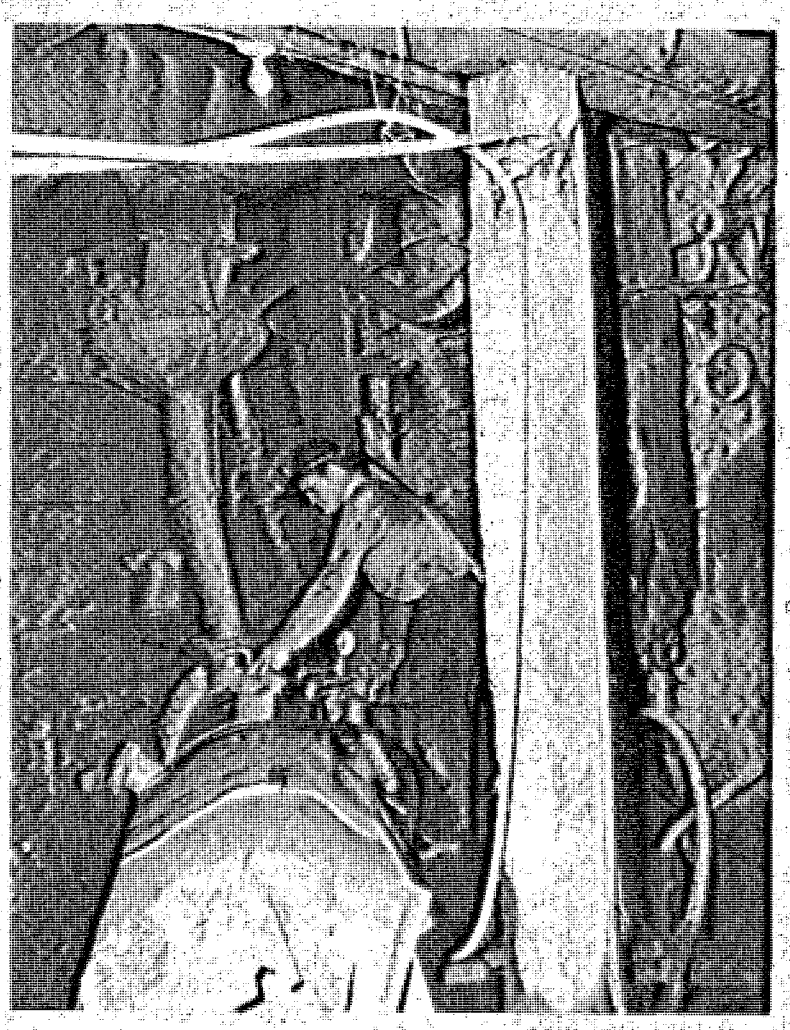
Ron resides in Tucson with his wife, Karlyne, and children, Natalie, age 7, and Andrea, age 5.

Ron wants to invite everyone to a weightlifting meet in Tucson on September 24, 1988 at the downtown YMCA.

We congratulate Ron on his outstanding weightlifting accomplishments!

From our scrapbook . . .





Mine Concrete, 1956

THIS IS HOW WE DELIVERED concrete at the mine while developing the 1415 level in July, 1956. The top photo shows the 1¼ ton surface batch plant and pipes to drop the mix down an existing churn drill hole, originally sunk to assay and define the orebody. The bottom photo shows shift foreman Nick Mirich (now retired in Oracle) adjusting a valve on the pneumatic air screw feed placer which pumped the remixed concrete up to 2000 feet away and into forms. It was a stationary system using lightweight 6" pipe which was extended along with the drift advance. The drop pipe from the surface was subject to severe corrosion so it consisted of one pipe inside another with water circulating between. When water appeared in the concrete the crews knew their pipe was broken. To avoid this, the pipe stem was rotated 90° and dropped 30 feet each week with the underground end being sawed off. Soon fter this, to no one's regret, the present day system was intalled. The location of these photos is the south grizzly fringe rift, 1475 level.

Miami tailings leach job goes ahead

The Miami tailings leaching project at the Pinto Valley Division is now going full speed ahead since full and final financing for the $16 million project has been finalized.

The funds were made available through additional term loans from the four banks holding our master credit agreement - Chemical Bank, Continental Illinois National Bank, Barclay's Bank and National Westminister Bank.

The engineering firm of Mountain States Mineral Enterprises, Tucson, is designing and building the facilities at the big tailings deposit which covers 220 acres along US Highway 60 just east of the city of Miami, Arizona.

The project includes installing the hydraulic mining system, reconditioning existing tailing thickeners, expanding the Miami unit SX-EW plant and installing a pipe line to dispose of the processed material in a nearby abandoned open pit.

The deposit contains 35 million tons of material containing .331% total copper.

Pinto Valley will mine 12,000 tons per day for eight years and recover about 54% of the contained copper in the form of electrowon cathode at the rate of 15,695,000 pounds per year.

We estimate the electrowon copper can be produced at a cost of approximately 30 cents per pound and repay the investment within three years.

Start up of leaching operations is now estimated to be April 3 according to project manager Tom McWaters.

39 safe years at Magma

Story and Photo By WARD LUCAS

Editor's note: If we're not mistaken, Cip Haro has the distinction of having the longest tenure of any employee at Magma; so, we're pleased to be able to print this profile of a "Magma original".

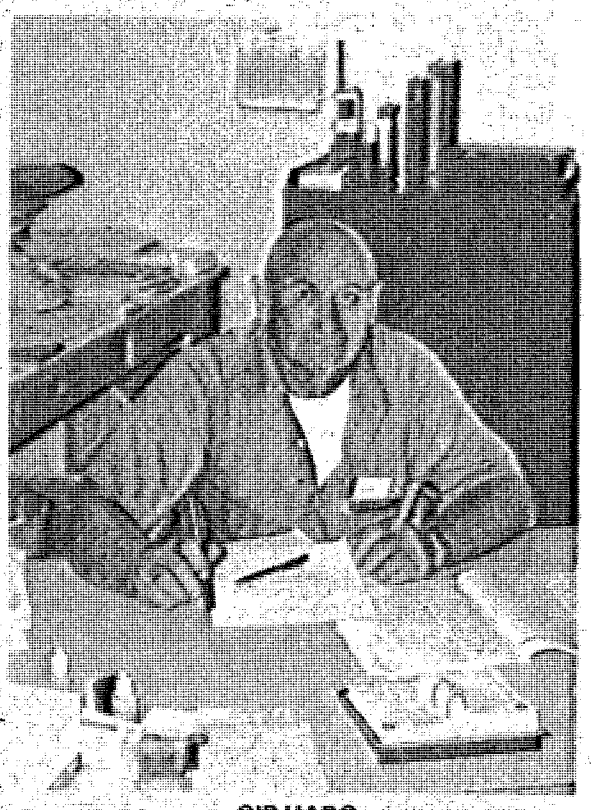
In his 39 years at Magma Copper Company, Cipriano G. "Cip" Haro has seen quite a few accidents, many of them very serious. Most of them, he says, are caused by people not keeping their mind on the task at hand, and not keeping their work area safe.

Cip has a strong sense of safety, or as he puts it, "a safety consciousness," ever since he left the service following World War II. Cip says safety applies to everyone, just like learning the 3 R's in school, you must read and learn the safety regulations, procedures, and policies and then, to the best of your ability, live by them. As he stated, "once you have read the rules, they will always be in the back of your head for recall."

Cip Haro has worked for Magma Copper Company since 1949. He hired out at Superior and worked there for four years before transferring to San Manuel. He began his career as an underground mucker and then advanced to miner, surveyor, development foreman, concrete foreman, bonus administrator, and is presently general mine foreman. Cip has worked 39 years without a lost time injury.

Cip also served on the Magma Mine Rescue team for approximately 20 years. He was involved with fighting the mine fires at Superior, Lakeshore and of course, our fire in 1980.

Cip has many hobbies and interests, three of which stand out above all others - hunting, auto mechanics, and golf. When talking with Cip, one quickly decides that he would rather play golf than eat. He presently carries a 15 handicap and boasts that he has played on 55 of Arizona's golf courses and is always open to try another.



CIP HARO

Cip is married to Lorie and has four sons and two daughters. The youngest, Kristie, is attending San Manuel High School and is the last one still at home.

He and Lorie have seen many changes in San Manuel since 1953 when they moved into one of the first homes built on 6th Avenue. Now they continue to enjoy watching the changes that never seem to stop as San Manuel grows older.

Jack Parry's advice. . . continued from page 1

Our initial goal was to increase processing efficiency through modifications to the smelter and the mill, to expand the refinery, and to add low-cost copper production by developing the oxide orebody at San Manuel. Today, our goals are to reduce the cost of underground mine production at San Manuel and to increase in-situ SX-EW copper production.

If the company is to survive in the crucial years ahead, we must achieve these goals quickly. It is the only defense against the possibility - even probability - of lower prices. For now, the company must use the revenues generated by high copper prices to pay down its very heavy debt load, and to invest selectively in areas that will permit it to produce at even lower costs.

Lastly, I want you to know that the past four and a half months at Magma have been a challenging and rewarding experience for me. I want you to know too I have every confidence, based on my time with you, that, under the guidance of Burgess Winter, you will achieve the future we all believe is possible.

My thanks to you all.

BEA ORTIZ, warehousing Employee of the Month.

Bea earns employee honor

Story and Photo
By CAROLYN CREELEY

A warehouse employee has been selected as August's Employee of the Month, a program designed to recognize outstanding contributions toward the achievement of warehouse goals.

Salary employee, Bea Ortiz, is August's Employee of the Month and has the distinction of being the first employee to be selected as Employee of the Month twice since the program began in 1986.

Bea's continual dedication to her work and her extra attention to special projects to which she is assigned were the deciding factors.

She has had a tremendous work load and still maintained a pleasant attitude toward other people and her job.

Compliments have been received by warehousing supervision from other San Manuel department supervision and from MCR employees concerning Bea's work and pleasant attitude.

Bea lives in San Manuel with her husband, Mike.

Her favorite hobby is spending time with her nephews, Roy Arthur, age 8, and Anthony, age 4.

Bea is doing an outstanding job and certainly does more than her required duties.

Retirements

Congratulations and Thanks!

AUGUST 1, 1988

WILLIAM JOHNSON, Superior, from journeyman in the smelter mechanical department. Joined as helper, October 18, 1951.

SEPTEMBER 1, 1988

ADOLPH G. DELGADO, Oracle, from miner in the mine operating department. Joined as mucker, May 2, 1958.

EVERETT C. RINGLER, Tucson, from journeyman in mine mechanical department. Joined as helper, January 3, 1956.

OCTOBER 1, 1988

BRIAN BOOTH, Tucson, from journeyman in the plant mechanical department. Joined as helper, September 18, 1958.

WILLIAM H. GOSS, Tucson, from carry lift operator in the mine construction department. Joined as chute tapper, April 12, 1956.

MATTHEW O. HAGGBERG, Superior, from cager in the mine operating department. Joined as laborer in the smelter, August 20, 1957.

Esquibels coach softball

By GILBERT RODRIGUEZ

Softball. Coaching and teaching this sport does require some talent especially when you come up with a winning team.

Here, at the Magma smelter, we have two who are considered the best in the west for coaching women's fastpitch softball.

Gus Esquibel, smelter clerk, and Edward Esquibel, smelter sub-operator, recently coached their women's softball team, the Tucson "Sparkettes", to national recognition in the recent Women's Amateur Softball Association of America's national finals in Stockton, California.

They placed sixth in the nation and the only team outside the state of California to place so high.

The tournament was a double elimination affair with 35 teams from throughout the nation looking for a national title.

Over 1200 teams participated in metro, state, regional and national qualifiers and were champions in any of these tournaments to be eligible to obtain a berth in the national tournament.

During the regular season, three members of the Sparkettes were offered and accepted softball scholarships to junior colleges and universities as a direct result of participating in these ASA sponsored tournaments.

Two members of the Sparkettes were placed in the All-American Team at the national tournament.

THE ESQUIBEL family, left to right, Gus and his wife Cora and brother Edward are proud of their team's trophy.
Photo by Gilbert Rodriguez

Their team motto "A group becomes a team when each member is sure enough of herself and her contributions to praise the skills of others" is practiced everyday whether on scheduled league play or tournament play.

With this in mind, it takes a tremendous amount of time, energy, and dedication to reach and be able to obtain a berth in this prestigious national tournament.

We congratulate both Gus and Edward on their exceptional accomplishment this past season and wish them well in the future.

Painters "Size It Up For Safety"

By BUD ZOOK
Industrial engineer

"Stop for Safety" . . . "Size It Up" . . . are more than just slogans, even more than sound advice.

For everyone here at Magma they've become a way of life -- in more ways than one.

The plant maintenance painters are prime examples of this.

Everyday they find themselves in situations where safety training and awareness are put to the test.

In many cases, a careless act or a momentary lapse can result in injury.

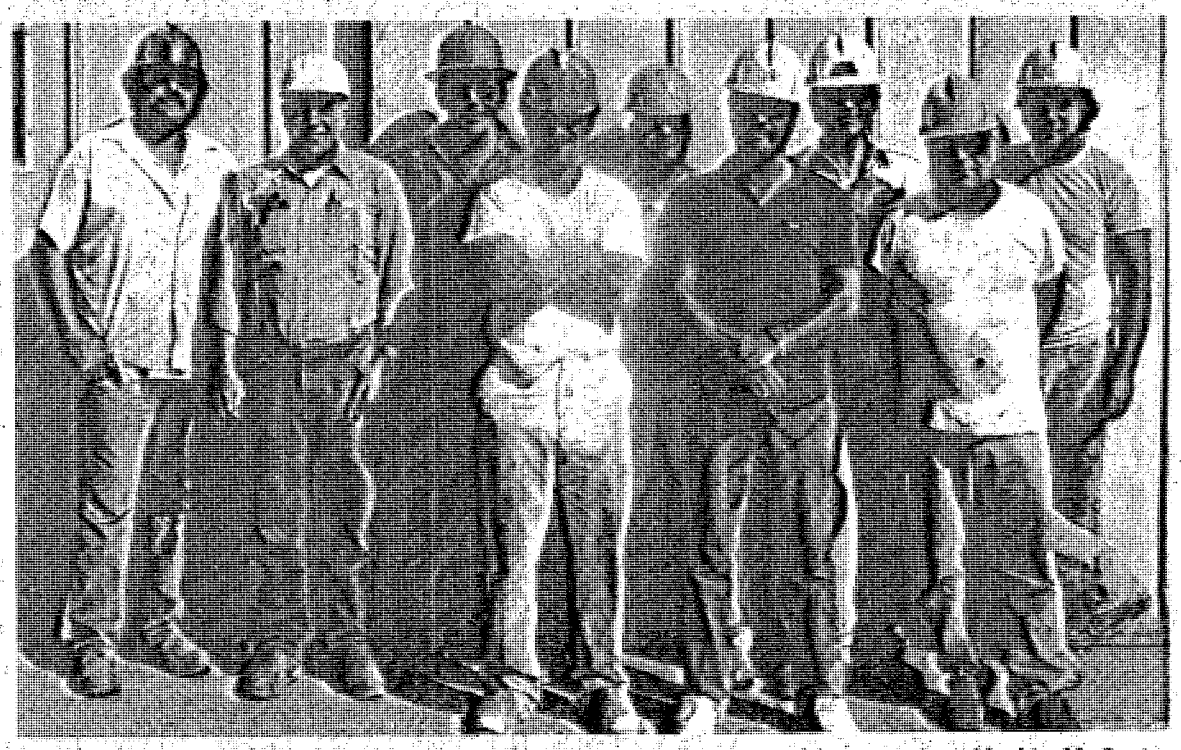
How have the painters stacked up?

Since March, 1982, the department has worked approximately 85,000 hours without a lost time accident.

Size it up? You bet they do!

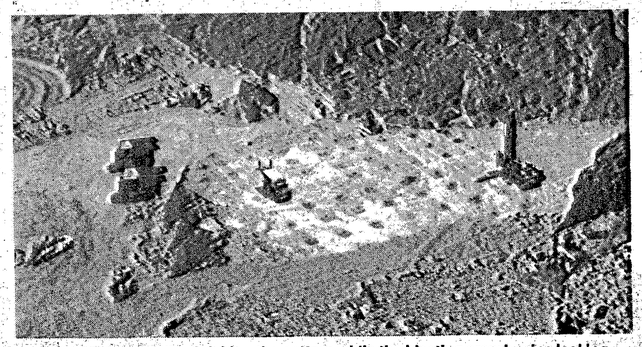
This department under general foreman Jim Huerta and craft foreman Marion McCarty believe in making safety equal to quality, production, cost and morale.

Congratulations painters, and thanks for your continued success!

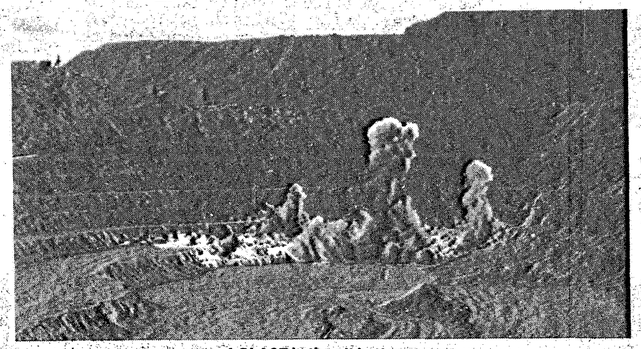


JOURNEYMAN PAINTERS are, left to right, back row, Frank Madrid, supervisor Marion McCarty, Art Monagaan, Mike Listiak, leadman Jamie Ochoa and Tony Rittica. Front row, Ernie Kubley, Joe Galindo, and Dore De Madona.
Photo by Ted Johnson

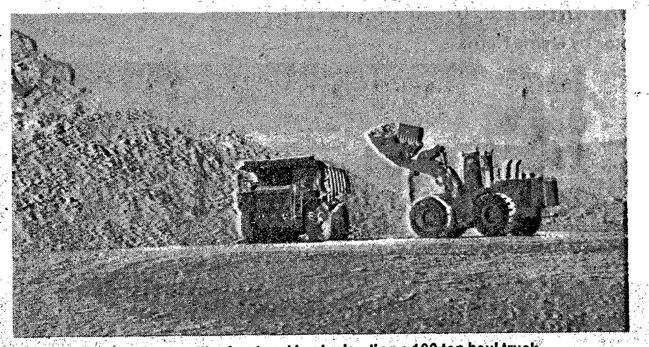
Leach dump #100 completed after 34 months of mining from open pit



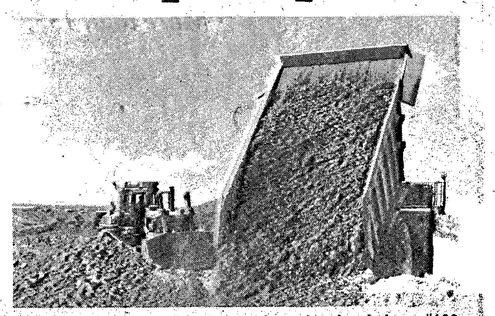
A BLASTHOLE DRILL finishing the pattern while the blasting crew begins looking.



A BLAST in the pit bottom.



A 99ZC caterpillar front end loader loading a 100 ton haul truck.



A 100 TON haul truck dumping oxide ore into leach dump #100.

By RICK SEANEY,
open pit general foreman
and
BILL McKAY, pit foreman
Photos by RICHARD COLE,
AL LIZARRAGA,
and GEORGE HALL

On August 20, 1988, employees of the San Manuel oxide open pit completed dumping oxide copper ore into leach dump #100.

Within a few days, on August 23, the 120,000 tons of ore within leach dump #100 began to be wetted by leach solution.

This milestone was reached over the past 34 months by:

1) Mining approximately 62,310,000 tons of rock; which contained 19,230,000 tons of oxide ore with an average copper grade of 0.56%.

The remaining 43,080,000 tons was waste rock that had an oxide copper grade of less than 0.10%.

2) Installing and removing approximately 12 miles of 10 inch diameter pipe, 114 miles of 4 inch diameter pipe, and 20,000 sprinkler heads.

The success of the oxide open pit project has been due to the dedication and hard work of many Magma employees.

The pit operations crews who move the muck 24 hours a day, seven days a week; the leach dump crew who installs the leaching pipelines on the ore dumps; the maintenance crews who see that the mining equipment is up and running; the engineering crew who provides the designs and control necessary to mine efficiently; the SX-EW plant crew who recover the copper from the leach solution; and the many service departments, purchasing, warehouse, inventory control, surface shops, assay lab, etc.; who provide the support necessary to get the job done.

The open pit mining cycle, drill-blast-load-haul, is similar to the more familiar underground mining cycle excluding the ground support or timbering phase.

The area to be mined is drilled out by vertically drilling a 37 foot deep, 10 inch diameter blasthole on a 25 foot spacing or square pattern.

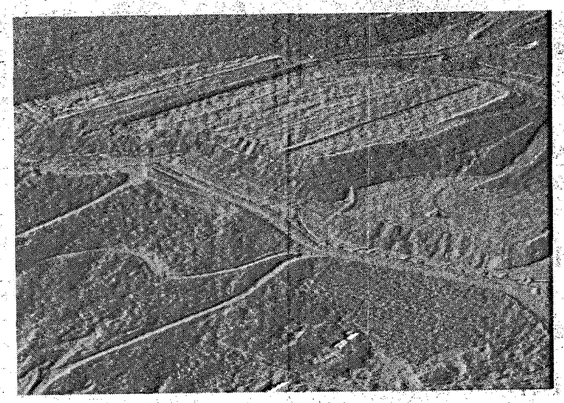
The blasthole rock cuttings pile is sampled and sent to the metallurgical department so a copper assay can be determined.

After a group, or shot, of 30 to 120 blastholes have been drilled, a blast design is decided upon and preparing or loading the shot begins.

Each blasthole is taped or measured for actual depth; a 3/4 lb. cast primer is lowered into the hole with a blasting cap and primer cord; 300 to 700 lbs. of ANFO, a blasting agent consisting of ammonium nitrate and fuel oil, is pumped into each hole; the cuttings pile is pushed into the remaining hole to stem the ANFO; the shot is then connected, or tied-in with a surface trunk line of primer cord; two safety fuse and blasting caps are then used to detonate the shot after the pit area has been cleared.

Pit blasting usually occurs between 3:00 to 3:30 p.m. and can be seen from the visitors viewpoint on the southside of the cave.

After the area has been blasted and the blasthole assays received from the metallurgical department, the material is determined to be either waste or ore depending upon the amount of copper contained in the rock.



Leach dumps at San Manuel.

At today's copper prices, 2000 lbs. of rock needs to contain only 2 lbs. of copper to be economical to haul to the leach dump.

A front-end loader or hydraulic excavator is used to dig the rock from a 30 foot tall bank, or bench, and load it onto a 100 ton haul truck.

The haul truck then hauls the rock to its proper destination, the waste or leach dump, where the 100 ton payload is dumped.

The haul truck then returns for another load.

A dozer then pushes the material to smooth the dump area for the next truck load.

The waste rock is hauled to and dumped in several locations, with the primary area being the cave, south of the pit limits.

The cave, will be eventually filled in with waste and will be hardly recognized as a large subsidence zone.

The ore is hauled to and dumped in an area northwest of the pit, where 120 acres have been grubbed, stripped, and contoured to drain to a large collection pond of 9,000,000 gallon capacity.

An impermeable plastic liner covers this area protecting the environment from any leach solution.

The liner is covered with 18 inches of sand and gravel to protect the plastic from any damage due to dumping the 100 ton truck loads.

After the last truck has dumped onto the 130,000 square foot, and 110,000 ton typical leach dump, a track dozer is used to cross-rip (two directions) the leach dump to a depth of 7 feet.

This is done to increase the permeability of the top layer of the dump because the 100 ton trucks have compacted it.

When the dump is ripped, a pipefitter crew installs a feeder system of 10 inch diameter HDPE pipe with 4 inch tees at 25 foot intervals.

A leach dump crew installs 400 to 700 foot lengths of 4 inch diameter HDPE, or yellow mine pipe across the dump.

A sprinkler head, wobbler or rainbird, is installed every 40 feet along the 40 inch pipe.

The entire 130,000 square foot dump surface is wetted by alternating wobbler locations and installing rainbirds along the dump edge to wet the dump slopes.

After the piping is flushed, to wash out debris, and pressure-tested, the dump is released to SX-EW crews for leaching.

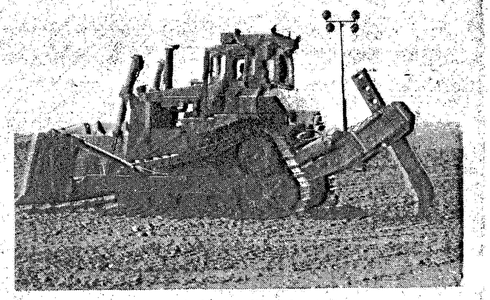
During the 8-10 weeks a dump is being leached, or wetted, the crew repairs plugged or stuck wobblers and rainbirds once or twice a week.

At the end of the leaching period the piping is removed from the dump, the surface is ripped, and a new dump of new oxide ore is dumped on top of the old dump.

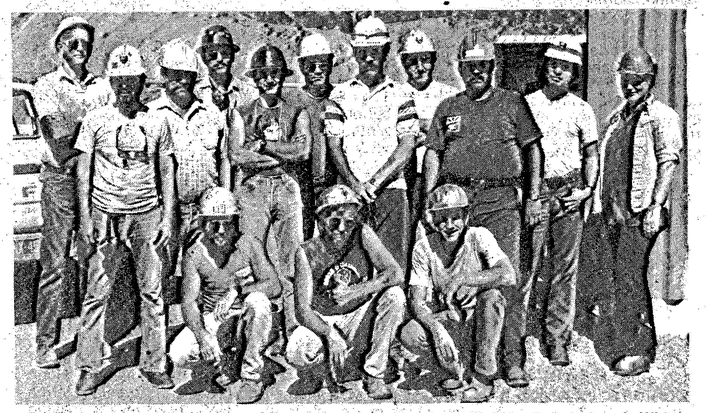
The 11 to 14 leach dumps under production are supplying 12,000 to 15,000 gpm of copper rich solution to the SX-EW plant, 24 hours a day, 7 days a week.

This results in approximately 5,500,000 lbs. of copper per month being produced at a unit cost of less than $0.40 per lb.

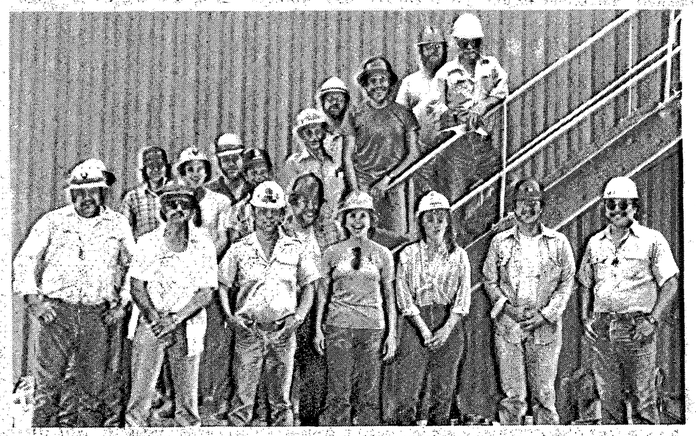
The oxide project stands forth as an example of MAGMA - Meeting A Goal, Moving Ahead.



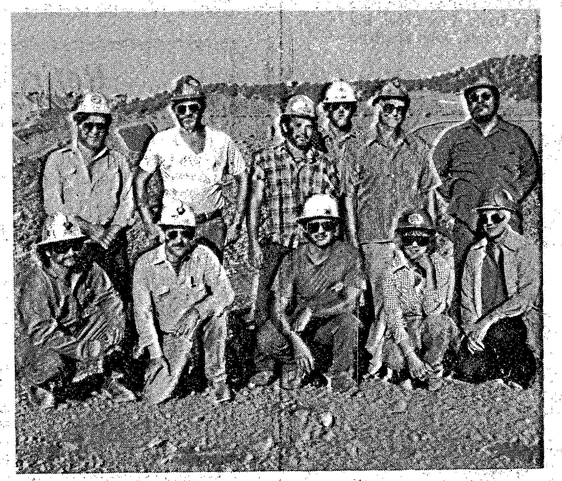
A D8L track dozer with a deep ripper.



PIT OPERATIONS CREW #6 - left to right - kneeling: Allen Reid, Walt Westbrook, Dennis White. Standing; Cass Wilson, Joe Atrian, Rito Garcia, John Spaulding, Allen Bushey, Sam Hughes, Paul LaValley, Tony Carrasco, Roy Quintero, Ben Villalobos, Darlene Baker. Not pictured: Mike McGough, Mando Sandoval, Lester Miller, Jim Hall, Marvin Schifferns, Fred Don, Henry Portugal, Mark Cordero, Terry Clinton, Gary Smalling.



PIT OPERATIONS CREW #5 - front row - left to right: David Medina, Bob Franco, Bob Spivey, Victor Simental, Karen Mullendore, Debbie Rowlands, Pete Turrubiartes, Richard Salazar. Back row - left to right: Steve Blattner, Dean Schifferns, Bob Hockett, Gil Linsenbach, Ron Flora, Mo Guillen, Jim Moore, Ruben Andazola, Jim Hubbard, Joe Robles. Not pictured: Mike Flynn, Gary Boedcher, Joe Villegas, Fred Ybarra.



LEACH DUMP OPERATIONS CREW: left to right - kneeling: Joe Beltran, Bill McKay, Ben Urquijo, Gwen Banning, Darlene Baker. Left to right - standing: Frank Estrada, Phil Cantrell, Jesse Rodriguez, Tom Whatton, Dick Fessenden, Presley Hill. Not pictured: Manny Marquez, Bob Neely, Gary Smith, Victor Gutierrez, Martin Davis, Kelly Moeur, Mike Moreno.

PIT OPERATIONS CREW #7 - left to right: Bill Harden, Ken Harmon, Dwain Chatfield, Walt Dobbs, Albert Kin, Jerry Cienfuegos, Danny Warner, Dave Perez, Susie Mann, Joe Munoz, Greg Diaz, Tony Altamirano, Dave Riggs, Bob Garza, Justin Lewis, George Postin. Not pictured: Gilbert Miranda, Bob Burgos, Charlie Fitts, Jimmy Sedillos, Candy Barragan, Nick Martinez.

PIT OPERATIONS CREW #8 - left to right - kneeling: Andy Franco, Ron Schwartz, Trenay Aguilar, Tim Toporski. Standing: Roscoe Gerdon, Frank Torrez, Joe Atrian, Carol Lopez, Espinoza, Tom Van Haren, Bill Smith, Jim Cordoza, Fred Peterson, Tony Moreno, Fred Na Conrad Duarte, Rudy Salaiz, Fred Borunda, Ted Behner, Mike Gattin, Ted Alvarado. N tured: Bob Garcia, Dexter Nelson, Glen Best, Jerry Kyle.

Ore transportation has four accident free years

More than 135,000 manhours without an accident

Photos by Myrna Harris

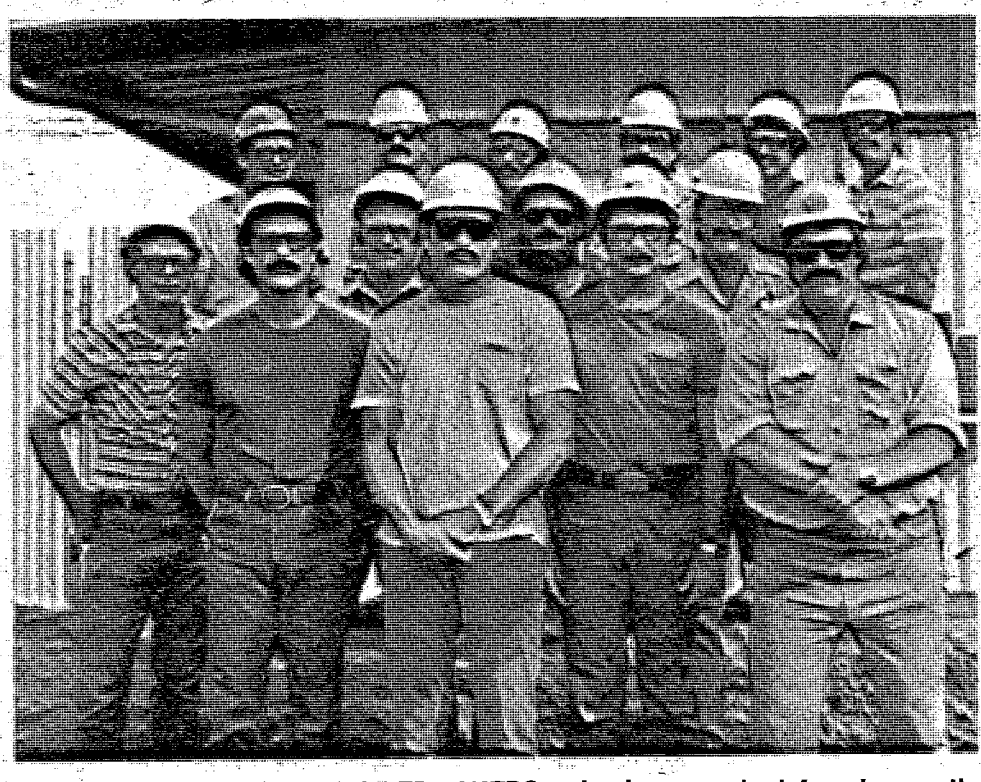
ORE TRANSPORTATION CREWS #2 and 3, left to right, Roy Windham, Don Hudson, K.J. Johnson, John Maxson, Jim Beeks, Zola Johnson, George Robles, Bill Sarrett and Benny Archunde. Absent were Joe Gomez and Sammy Juarez.

ORE TRANSPORTATION CREWS #1 and 4, left to right, front row, Bill Simon, Jim Beeks, Chuck Gomez, Duane Winger, Clell Reed and Denny Randall. Back row, Bill Sarrett, Joe Gentry, Marcelino Martinez and Frank Ramirez.

Photo by Gerald Brunskill

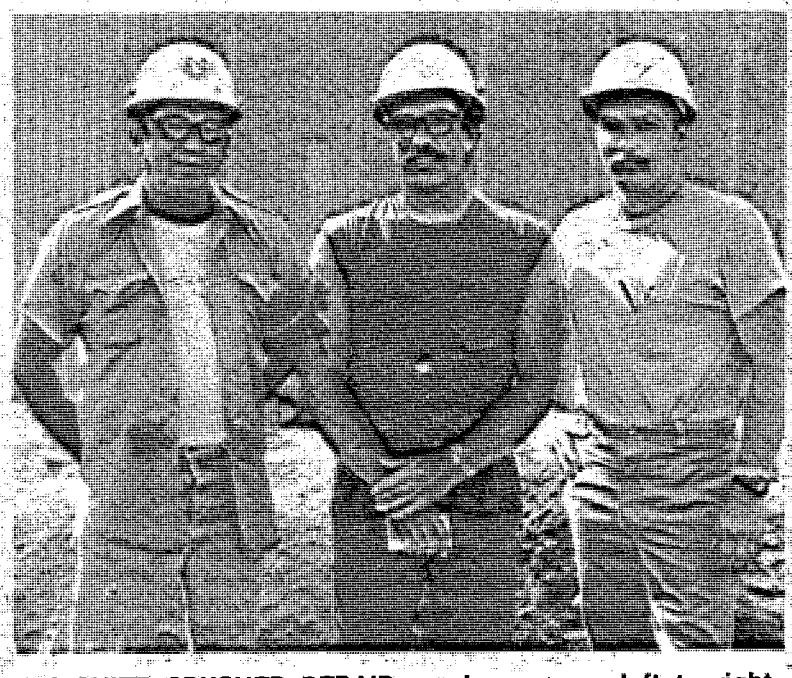
Mill crews getting on to safety performance

First six months are accident free



MILL PIPEFITTERS AND BOILERMAKERS, who have worked for six months without injury are, back row, left to right, Tom Mitchell, Paul Albrecht, Ben Jacinto, Raul Rodriguez, Guillermo Rodriguez and Danny Maldonado. Middle row, Jimmy Spurgeon, Carl Ausdemore and Al Guerrero. Front row, Mike Gorden, Art Renteria, Pedro Martinez, Robert Power and Jerry McCutcheon. Absent were Bob Maxwell, Gilbert Corona, Joe Simental and Ventura Maldonado.

PLANT CRUSHER CREW #4, which has had six months of injury free work are, back row, left to right, Jorge Jacquez, Max Chavez, Wallace Garner, Alejandro Meranza, Robert Gopp, Brian Bandrowski and Audrey Davis. Front row, Bill Sarrett, Chad Allen, Don Smith, Manuel Gaona, Don Reynolds, John Montano and Bill Simon.



'B' SHIFT CRUSHER REPAIR employees are, left to right, Jaime Romo, Terry Lewis and Larry Kotopoulous.

DAY SHIFT CRUSHER REPAIR employees are, left to right, back row, Scotty Atkinson, Danny Renteria, Louis Aceves, Ramon Amparano, Larry Marquez, Dave Sanders and Ruben Anaya. Middle row, Mike Gorden, Charlie Scroggins, Cesar Gonzalez, Jimmy Spurgeon, Ken McGrew, Steve Rohrer and Frank Martinez. Front row, Jesse Garcia, Tony Madrid, Cyril Boulier, Francis Hydock, Ray Navarro, Tom Wilson and Bob Baker.

Students welcome at mine

By GEORGE HALL

Magma has hired some help from summer college students for a variety of jobs around the company.

At the mine we have students working underground as chute tappers, carloaders, timber rustlers, electrical helpers, engineer technical aides.

Also we have students working in the pit as technical aides, oxide engineering, and at the mine construction yard.

Last, but not least, we have a clerk in the training center.

These summer helpers work in the different departments mentioned and are doing an excellent job.

The students will be returning to school in the fall and the money they earn will help them with their schooling.

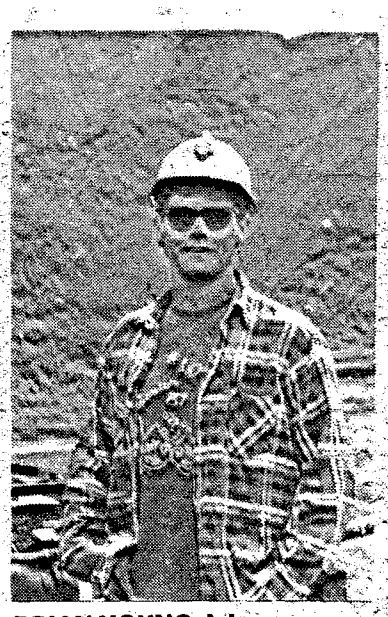
Working underground are Keith Miller, chute tapper; Daniel Campa, chute tapper; Louis Bayardo, chute tapper; Richard Encinas, chute tapper; Tim Celaya, chute tapper; Jeff Cole, timber rustler; Richard Collins, electrician helper; Mario Pina, electrican helper; and Tom Jordan, engineering technical aide.

Working for the oxide project are Mary O'Coyne, engineering tech. aide and, Carolee Kuhlman, engineering tech. aide.

In mine construction are laborers Brian Young, Mike Sandoval, Victor Barboa, Lisa Armenta, and Leonor Berumen.

Clerk at the training center is Nancy Valenzuela.

Thank you students for the help you have given us!



BRIAN YOUNG, laborer.

LEANOR BERUMEN, laborer.

NANCY VALENZUELA, clerk.

MIKE SANDOVAL, laborer.

LOUIS BAYARDO, chute tapper.

RICHARD ENCINAS, chute tapper.

JEFF COLE, chute tapper.

Photos by George Hall

—Know your benefits—

By VERONICA CELAYA
senior employee relations representative

The Bonus Plan - What will the 3rd qtr. bring?

Through August 5, 1988 the third quarter average COMEX price of cathode copper was $.9733/lb. Recently the price has been down -- the August 10 morning open was $.9156/lb.

Of course, the average through the close of the quarter on September 30 is a key factor in determining the price-related bonus payable to all eligible employees by November 30, 1988.

The Bonus Plan became effective on January 1, 1987. During the first two quarters of 1987 copper prices did not reach the minimum required to trigger a bonus payment.

At the close of the first quarter 1987, the $.62 average fell short of the $.72 trigger. The second quarter 1987 average of $.66 again failed to generate a bonus. The adjusted schedule then required at least a $.73 average.

Since the third quarter of 1987, bonus news has been good news for Magma employees. The average COMEX price of copper has been $.78 - 3rd quarter 1987, $1.04 - 4th quarter 1987, $1.08 - 1st quarter 1988, and $1.02 - 2nd quarter 1988. Respectively, the average payments for each of these quarters has been $312, $2,600, $2,860 and most recently $2,730.

For 1988 alone the bonus has paid $5,590 on the average to each eligible employee -- with only half the year gone. For the San Manuel Division alone, the total bonus cost has exceeded $22,000,000 in 1988.

Important reasons to call ReviewPLUS

By ARNIE SOTELO

Maternity Charges - If you have the Magma health benefits plan call ReviewPLUS as soon as you begin to receive regular maternity care, but no later than six weeks before your anticipated delivery date. Then, you must call again within 24 hours after the baby is born.

If the baby stays in the hospital after the mother goes home, call ReviewPLUS so the baby's stay can be reviewed.

Coordinaton of Benefits - If Magma is your secondary carrier and if you will be submitting a claim to Magma, you must call ReviewPLUS the same as you would if Magma was your primary carrier.

Transfer from one hospital to another - Magma hospitalization benefits plan holders; if after being hospitalized, and after having called ReviewPLUS, and it becomes medically necessary to be transferred to another hospital, you must call ReviewPLUS again and give them name, address and phone number of the hospital you have been transferred to.

Your choice - vacation or hospital bed

Summer and the warm weather is encouraging outdoor activities. The lakes are just right for water skiing, and boating, or just relaxing in the sun. The White Mountains are just a few hours away and the fish are biting pretty good. Imagine, laying on the bank of Big Lake, sipping on a cool one waiting for the big one to get one your line. The evenings are cool and the mountain air smells so fresh and clean. Cooking on an open camp fire and then relaxing, talking about the big one that got away.

Yes, summer and all the fun is here. But wait! You can't go; you had an accident on the job. A stupid, careless accident! And because of that accident you are layed up in the hospital with a broken back. If only you had taken the time to folow safe work procedures and sized up the job.

Most on the job accidents are caused by unsafe acts, in fact 96% of all accidents are caused by unsafe acts. What this means, is that we have a choice either to have an accident or not to have an accident.

As employees, it is our responsibility to work safely. To not commit an unsafe act is the best way to not have an accident. A few simple rules to follow are:

#1. Always follow safe job procedures

Safe job procedures were written to perform a task without having an accident. If you take short cuts or disregard safe job procedures, then you have made the choice to risk an accident.

#2. Always take the time to size up the job

Before you start working, take a few minutes to observe the work area. Plan your move, and look for the unexpected. If you just start working without planning or organizing your self, then you made the decision to risk having an accident.

#3. Always ask questions if you are not sure of job assignment

When you are given a job assignment, and you are not exactly sure of how to do the job, ask your supervisor for more details and further instructions. By trying to perform a job without knowing how to do it, or why you are doing it, is again a poor choice and you put yourself at risk of having an accident.

The decision to commit an unsafe act and have an accident, or to do the job safely, is a decision that each and everyone of us must make several times during the day.

So don't get left out of the summer fun -- make the right choice. **STOP UNSAFE ACTS!**

MAGMA Update

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by Magma Copper Company,
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MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES
August 1988
Vol. 4 No. 9

We did a lot of work in the first six months

Production for the first six months of 1988 compared with 1987.
Includes toll processing where applicable

		First 6 Months 1988	1987
SAN MANUEL			
Underground	tons of ore hoisted	8,300,000	8,157,000
Open Pit	tons of ore mined	3,673,000	3,477,000
	tons of waste mined	9,480,000	8,871,000
	tons of sulfide ore mined	14,000	
Mill	tons of ore milled	8,342,000	8,109,000
	tons of slag milled	764,000	850,000
	pounds of moly produced	1,687,000	1,691,000
Smelter	tons of concentrate smelted	347,522	371,591
	tons of new copper	107,191	106,029
	tons of sulfuric acid	231,339	218,907
SX-EW	pounds of copper from heap leaching	28,765,000	24,412,000
	pounds of copper from in-situ	1,149,000	829,000
	pounds of copper from refinery leachate	1,208,000	
Refinery	pounds of copper produced	212,722,000	218,288,000
Rod Plants	San Manuel, pounds of rod	174,328,000	156,423,000
	MCR, pounds of rod	124,270,000	111,981,000
PINTO VALLEY			
Open Pit	tons of ore mined	11,034,000	10,792,000
	tons of waste mined	13,829,000	14,179,000
Mill	tons of ore milled	11,250,000	11,110,000
	pounds of moly produced	463,000	452,000
SX-EW	Pinto Valley unit, pounds copper	7,768,000	5,997,000
	Miami unit, pounds copper	4,730,000	4,414,000

MAGMA Update
A PUBLICATION FOR MAGMA FAMILIES
JUN 1988

SX-EW expansion completed

THE BECHTEL CORPORATION LEFT SAN MANUEL August 4 following a successful phase II SX-EW construction project which came in $2.5 million under Bechtel's budget and two months ahead of schedule on March 4. Total cost of the Phase II was $47 million compared to the cost of $51 million for the original plant which came on line June 9, 1986. Together with the open pit, and in-situ installations, Magma has now invested $115 million in low cost SX-EW copper production designed to yield 100,000,000 pounds of high purity copper per year for the San Manuel rod plant. The original plant is nearest to the bottom of the photo with the expanded plant added on. From the left are the tank houses, tank farm, and solvent extraction mixing and settling tanks. At top of the photo is the raffinate pond where leach liquor is recycled back to the leach dumps.

Photo by Richard Cole

ASARCO

Southwestern Exploration Division

JDS

December 11, 1987

FILE NOTE

Tiger Gold
Cyprus-Magma
Pinal County, AZ

At the AZ Conference of AIME, Dec. 7, 1987, I talked with Bob Hockett, special projects geologist for Magma. He stated that his boss told him to get into money making projects without spending any money.

At the Tiger portion of San Manuel, Magma had been mining the silicious capping for smelter flux as it had some gold in it. He had estimated that the veins and splits and gouge zones in the capping might contain 500,000 ounces of gold.

With the new San Manuel smelter going in, this type of silicious flux needs to be upgraded to a higher silica content and thus they were willing to take on a partner to mine the higher grade portions.

Cyprus Minerals has signed on to spend $2 million in exploration. They are going underground from the Mohawk shaft to define the possible tonnage-grade.

Bob said they have some zones up to 50' wide which carry 0.8 ounces per ton gold. They also have gouge zones which run 4-7 opt gold over six inches to two feet.

James D. Sell

JDS:mek

James D. Sell

cc: W.L. Kurtz

MAGMA Update

Published for employees and their families
by Magma Copper Company,
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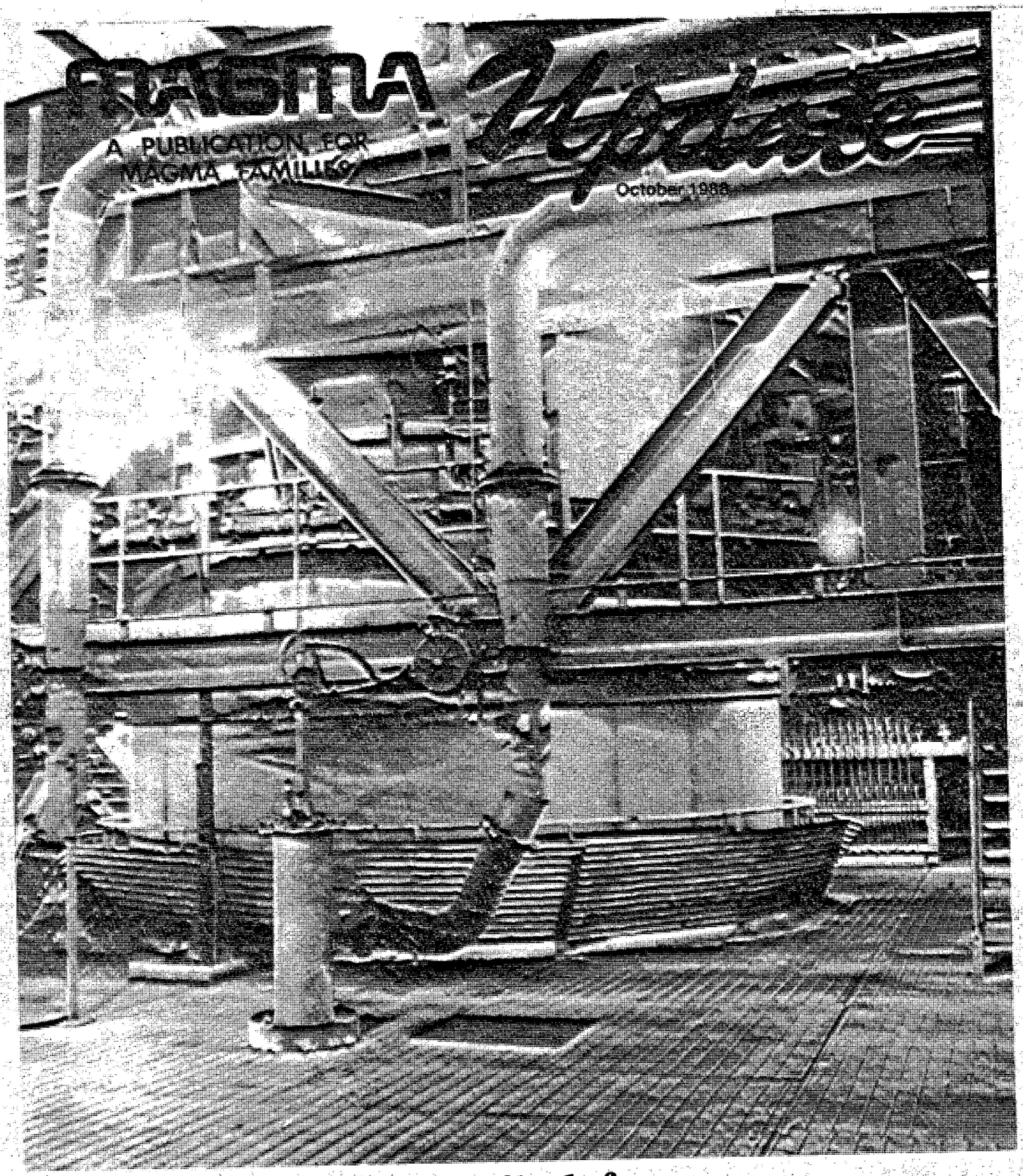
October 1988

ELECTION DAY '88

Tuesday, November 8

MAGMA Magazine
A PUBLICATION FOR MAGMA FAMILIES
October 1988



✓ *Our new flash furnace*

GLEAMING CARBON STEEL reaction shaft of the new San Manuel flash smelting furnace is 23 feet high and 20 feet in diameter. Pouring down and around the shaft is a curtain of water keeping the skin cool and helping to prevent expansion of the steel. Concentrates are blown in at the top of the furnace through a single burner and into an atmosphere of 44% oxygen. Sulfur in the concentrate ignites when it contacts the oxygen and this "flash" reaction gives off enough heat to liquify the other concentrate ingredients - iron and copper which rain down into the settling chamber below. Read about the furnace dedication on page 1 and about our continued environmental responsibilities on page 8 of this issue.

MAGMA
A PUBLICATION FOR MAGMA FAMILIES

Update

VOLUME 4 NUMBER 11 San Manuel, Arizona October 1988

✓ Our costs are still too high

By BURGESS WINTER
president

Magma Copper Company is in a very difficult position compared to most of the U.S. copper industry. Our main source of concentrates for the smelter is from a low grade, high cost underground mine, our production costs are high and we have a great burden of debt. We are in the process of refinancing the purchase of the Newmont and Consolidated Gold Fields interest in Magma and, if successful, will be faced with very tough debt repayment schedules.

The basis for our agreements with the various lending institutions is in the operating plan which has been recently developed and which shows clearly that our costs of production must be reduced dramatically.

The current high copper price is fortuitous and may continue for another six or even nine months, but it is inevitable that the price will revert to very low levels due to a large increase in worldwide production of copper over the next three years, from projects either in progress or being constructed. If a recession occurs in the U.S. in 1990 as forecast, the price of copper will be affected even more.

We are reviewing all of our operations with a view to making them more productive and efficient and also to save money and reduce costs. Magma Copper Company must quickly become a lean, efficient producer to weather the difficult times ahead.

Our major competitors have all taken the steps to reduce their production costs. They have modernized their plants, introduced new technologies, merged with others to take advantage of synergy, trimmed their workforces, etc., and generally positioned themselves well to face the spectre of low copper costs.

We will share with you our plans as they develop and ask you to participate fully in them and to do your utmost to increase your personal efficiency, reduce waste, and work safely.

Our modernization program is nearly complete with the exception of the new tailings leach project at Miami and the increase in flotation capacity at Pinto Valley. These projects are proceeding and will help the productivity, efficiency, and costs of the Pinto Valley operations. The San Manuel modernization is complete. Now we must take full advantage of the potential of these efficient operations by achieving overall large increases in our productivity and reduction in our costs.

From here on out it is not so much a matter of more technology, modernization or capital improvements, but rather how we manage our business that will ensure our future.

Safety comes before production

I have heard rumors and comments that some employees may think Magma is promoting production over safety. I want to make it absolutely clear that this is not our policy and I won't tolerate that attitude from management, supervisors, or employees.

Yes, we do want production; but, no, we do not want production at the price of accidents.

It makes sense to approach work with the idea "Size It Up", to use the daily safety check, and to follow the established procedures.

Our accident rate is far too high and constitutes a major expense -- one which we want to reduce along with all our other costs.

There is another expense which only the accident victim and family can bear and that is the pain, suffering, and possible loss of work and wages.

Let's meet our safety goals and move ahead.

✓ Is the Kalamazoo shut down?

The Kalamazoo orebody development is being deferred for at least one year because our skilled miners are needed in the on-going development projects in the San Manuel orebody and because of the high cost of capital required in the "K" project.

Pumps will be left in place in the "K" orebody and repairs will be made as necessary to preserve our ability to resume a development program whenever circumstances warrant.

However, no future production from the "K" has been included in the long range plan under which we are presently operating.

Nonetheless the Kalamazoo remains a significant orebody to which we will have access through our present shaft system, and if economics and/or technical considerations change then the Kalamzoo orebody could still play a major role in the Magma underground mining program.

Bonus will be paid

A copper price related bonus of $4.75 per hour or an average of $2470, will be paid in late November to all employees who worked during the third quarter.

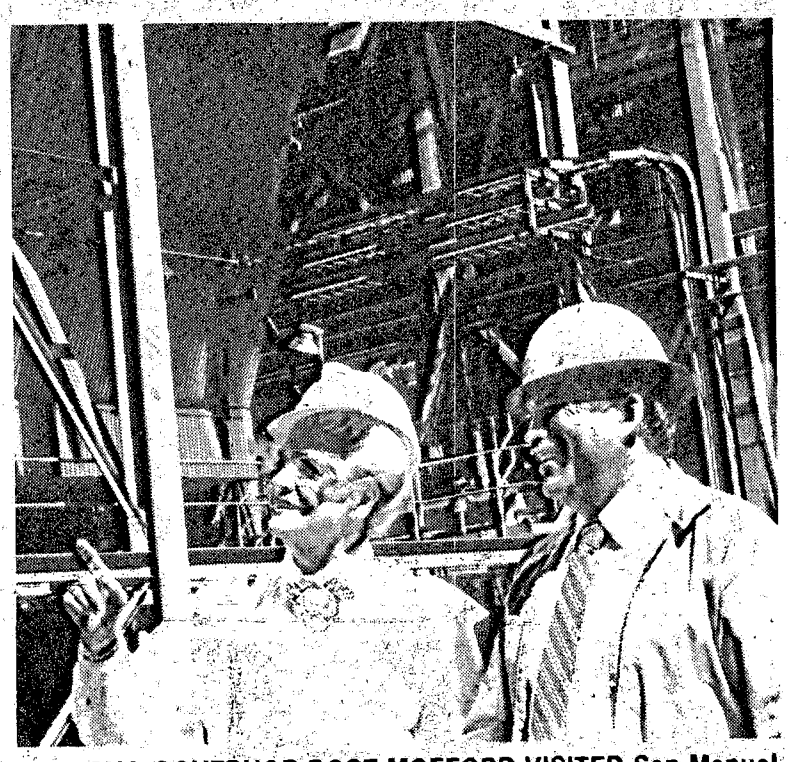
The average price of copper for the quarter was $1.01.

Final production figures have been calculated and the Producer Price Index factors have been entered into the formula for the price related bonus payments.

The Price Related Bonus Plan requires that Magma produce and sell 95,056,800 pounds of copper during each quarter in 1988.

We produced the required pounds of copper by a narrow margin.

Significant shortfalls in SX-EW copper related to in-situ production, combined with normal smelter start-up problems hampered production.



ARIZONA GOVERNOR ROSE MOFFORD VISITED San Manuel as part of the flash furnace dedication ceremony, October 1, and had a tour with smelter superintendent JD McCain.
Photo by Dean Prichard Courtesy San Manuel Miner

Governor visits smelter

Arizona Governor, Rose Mofford, and her staff were among the 300 guests who helped dedicate the new San Manuel flash furnace Saturday, October 1.

Customers, bankers, environmentalists and area business people joined the construction managers, suppliers, contractors, and the Magma board of directors for the ceremonies.

They included visitors from Austria, Canada, England, Finland, and Mexico as well as Colorado, Connecticut, New York, California, Ohio, Illinois, Missouri, Texas, New Mexico and Washington, D.C.

Governor Mofford arrived after the formal ceremonies but mingled with the guests and had a special tour of the smelter with smelter superintendent JD McCain.

Representing Congressman Jim Kolbe was his Washington assistant, Rowdy Yeates and standing in for Senator John McCain was his Phoenix assistant, Bill Frazier.

Acting as master of ceremonies, Magma's chairman Don Donahue said "... we take the environment seriously.

"I need hardly tell you that we intend to operate properly and within state and federal clean air standards."

Magma's director of environmental affairs Eldon Helmer outlined those clean air standards and reviewed the efforts Magma has made since 1970 to keep up with the many changes in state and federal laws, rules, and standards.

President Burgess Winter described the smelter retrofit project and reviewed overall company operations and concluded his talk by quoting the Magma slogan, "Meeting A Goal, Moving Ahead."

Burgess then dedicated the smelter to the memory of Brian Woolfe, to the employees, and to our stockholders and friends.

Guided tours of the smelter, mill, refinery, rod plant and mine surface were offered and they were followed by a buffet luncheon at the San Manuel Golf Club.

For the record, it was a warm sunny day with no breeze and no smoke.

Lay offs announced

Magma announced on October 13 that we are reducing employment by about 7% at the San Manuel division and laying off approximately 200 hourly rated employees plus a yet to be determined but proportionate number of salaried employees.

The affected hourly rated employees were notified immediately and the affected salaried employees will be notified as soon as possible prior to November 1.

President Burgess Winter said "we are evaluating all our operations and overhead units with a view to making them more productive and efficient."

The reduction in force is across the board with the major layoffs coming from the underground mine.

Production in the San Manuel is being reduced from 44,000 to 40,000 tons per day of ore.

The lost underground production will be made up with increased lower cost production from the open pit and leach dumps.

The Kalamazoo project, a major underground orebody development is being put on hold for at least one year to permit utilization of skilled miners in other development projects and to postpone high capital outlays required for the "K" property.

Eligible laid-off hourly rated employees will qualify for State Unemployment benefits plus a supplemental unemployment benefit from a Magma Trust Fund which provides a weekly benefit of $50.00 per week for up to 26 weeks.

On a voluntary basis, Magma will pay a supplement to affected hourly employees with two or more years services of an additional $100 per week and, for employees with less than two years service at time of layoff, $50 per week for up to $26 weeks.

These voluntary payments will end when the company has paid out an amount equal to the amount contained in the Unemployment Benefit Trust as of October 15, 1988.

In addition, eligible employees, both hourly and salaried, will receive payments from Magma's Price Related Bonus Plan.

Laid-off workers will also receive any earned bonus for time worked during the fourth quarter in 1988 in accordance with the Price Related Bonus Plan.

The information line -

Many employees have been asking why they have not received earnings statements from the savings plan for the past two quarters. Here's the answer:

By MARSH CAMPBELL

First Wachovia Bank and Trust, trustee and recordkeeper for the savings plan(s) has informed us they are continuing to have difficulties in producing the savings plan statements for the second quarter of 1988.

At the beginning of 1988 the Company transferred funds from Bankers Trust, the former trustee, to Wachovia and also transferred to Wachovia the recordkeeping function.

The amount of dollars actually transferred to Wachovia did not exactly match the records being kept by the old recordkeeper and required reconciliation which is still ongoing.

In addition, the Company implemented a new option, the conversion of Price Related Bonus dollars to Company Stock inside the Savings Plan.

This has necessitated substantial programming changes and entails substantial work on the part of Wachovia to accomplish this recordkeeping function.

Magma has contacted Wachovia on a number of occasions and has informed them that the statements must be sent to employees as quickly as possible if they are to retain our business.

While we believe Wachovia is generally performing satisfactorily, if they continue to be tardy Magma will look to another provider for its trustee and recordkeeping services.

Magma originally moved to Wachovia based on our belief that Wachovia could provide improved service at less cost to the Company.

We regret any inconvenience that the lack of second quarter statements has caused to you, and have been assured by Wachovia that this situation will not arise again in the future.

Write Us

Send your letters to: Editor, Magma Update, P.O. Box M, San Manuel, AZ 85631 or send through company mail.

Say goodbye to reverbs

By GILBERT RODRIGUEZ

Reverb furnace demolition began September 26 and is continuing.

The demolition project began with the furnace uptakes which were removed first so that the boilers could be direct fired.

The first stage of the demolition will be complete within 7-10 days.

Slick Petty and his crew are involved in the blasting and sorting of material taken out of the uptake.

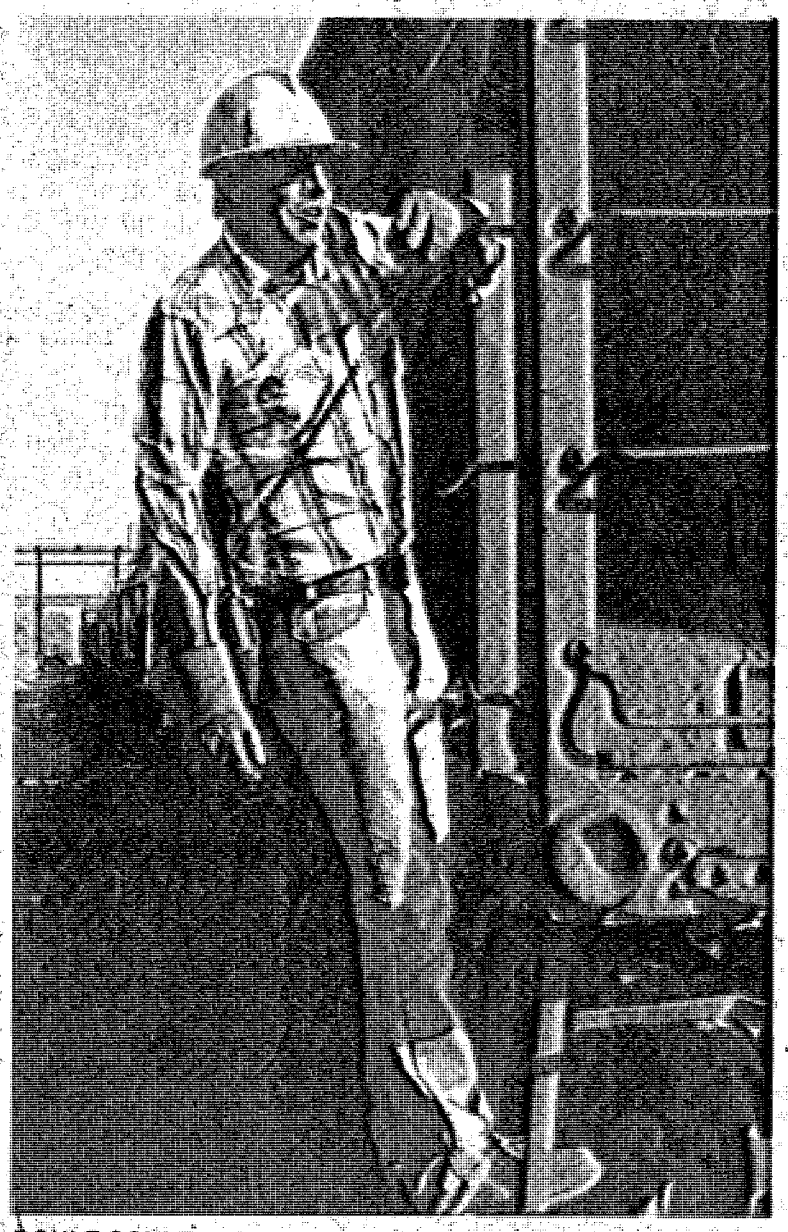
The material from the uptake contains copper and will be run back through the milling and smelting process.

Chief engineer, Vito Konur and engineer Chris Douglas from engineering and technical services are supervising the uptake demolition.

The main body of #1 reverb furnace will be demolished next, then #2 reverb furnaces will follow and the whole project will probably take approximately three months to complete.

There are many tons of copper remaining in the bottoms of the cold furnaces.

The slag and copper reclaimed from the furnaces will be crushed and sent back to the mill for special processing.



DOYLE COYLE makes up a train.

Photo by Ted Johnson

Meet our yardmaster

By TED JOHNSON

As you go about your daily routine in and around the plant, you often see the smiling face of our industrious rail yardmaster, Doyle Cole.

He has been "riding the rails" at Magma since 1972 when he joined the SMARRCo staff.

Of course, if you observe him for even a short while, you soon discover that his job is more than just riding the rails.

Although Doyle always finds time for a friendly wave, his is an extremely busy job.

Doyle came to San Manuel in 1960.

Talk to him for a few minutes and it's not too difficult to guess where he came from.

Born in Deport, Texas... that's THE DEPORT, TEXAS... in 1934 Doyle went to school in Plainview.

Even his youth was spent in hard work as he did everything from working on the railroad, working at the grain elevator, and working with the Texas Highway Department.

All that began to prepare him for his first job at Magma, a smelter puncher.

In 1969 Doyle joined the engineering services division as a part of the survey crew.

But, through it all, it seems he was destined for the railroad and here he is!

Doyle's family includes his wife, Davia, and children; Doyle, Jr.; 31, David, 26; Tisha, 17; and Uriah, 14.

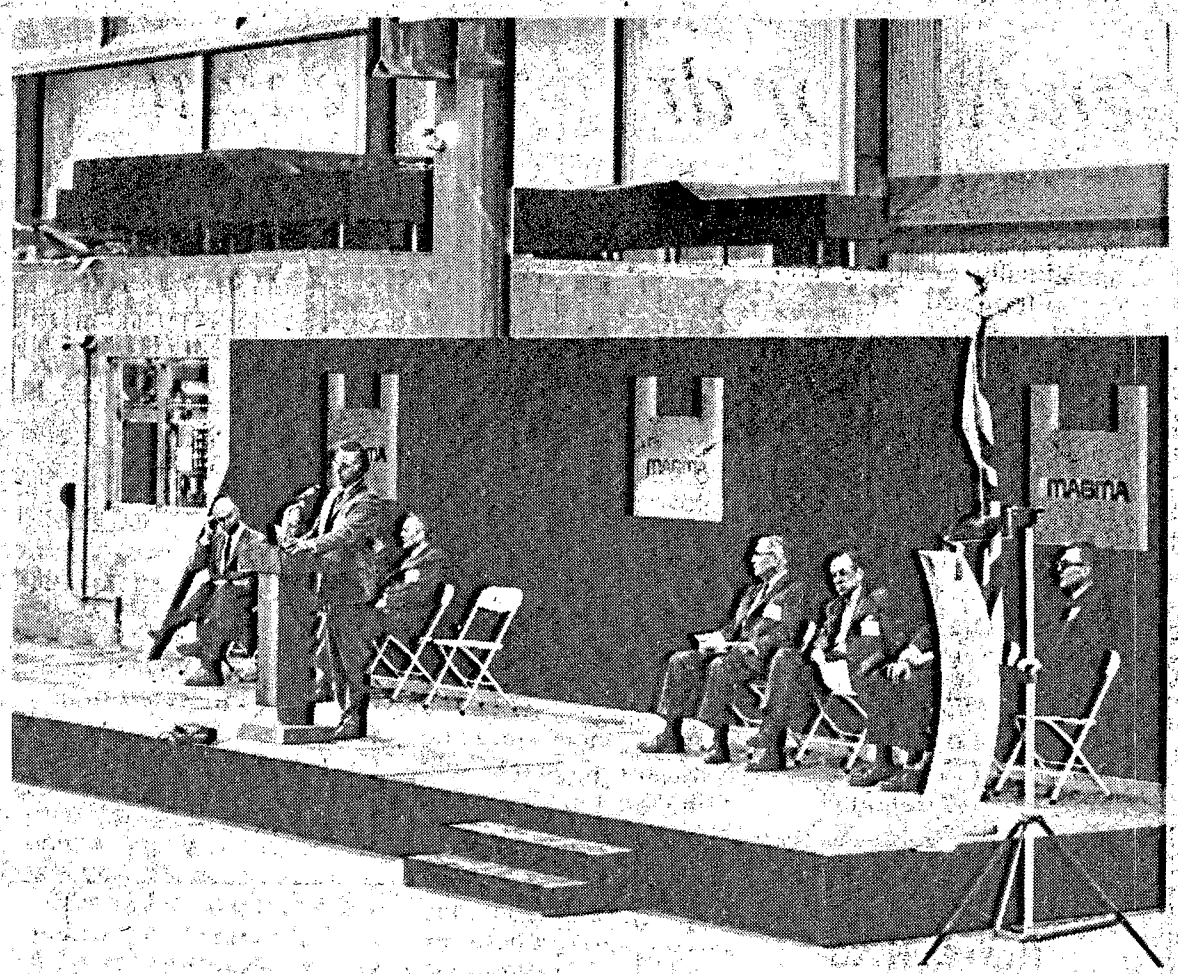
He enjoys his family very much and is proud of all of them.

When away from the railroad he enjoys automobiles.

Fond memories for him include his seven years in the Texas National Guard where he served as a crew chief over a 105 howitzer crew.

The next time you see Doyle on one of his trains, smile and wave back.

From our scrapbook . . .



Dedicating the Refinery - 1972

IT WAS A BIG STEP FORWARD when the new $34 million electrolytic refinery and rod plant went into operation at San Manuel in 1972. The tankhouse was, and is, a marvel with its six acres of stainless steel ceiling and a ventilation system which provides a complete change of air every four minutes. The new plant enabled us to serve our largest rod customer, the Phoenix AT&T cable plant and develop other markets in the southwest. It also gave us control over quality and large savings by avoiding toll refining and shipping costs. The dedication ceremony was held January 29, 1972 and the photo shows president Wayne Burt addressing the guests. Approximately 200 civic leaders attended but most of the invited politicians were away at the funeral of Arizona senator Carl Hayden. The plant carpenter shop set up the platform in the center aisle of the tankhouse and a catered buffet lunch was set up in the south bay. Faces in the photo are, seated from left, Bechtel Corporation executive vice president John Kiely, San Manuel general manager John Wise, Newmont president Jack Thompson, Magma chairman Wesley Goss, Newmont chairman Plato Malozemoff and pharmacist Carl Pratt who represented the community and offered the invocation.

Retirements

Congratulations and Thanks!

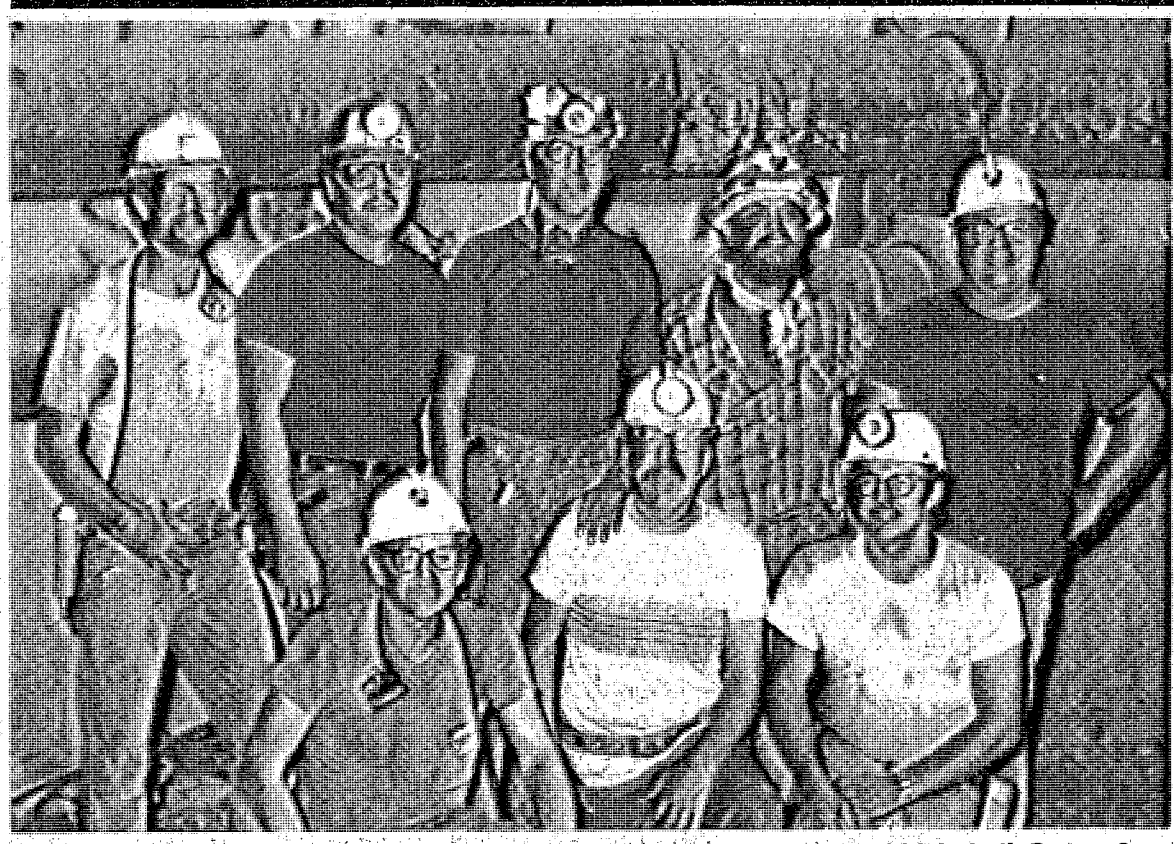
OCTOBER 1, 1988

LEROY E. McCRANEY, Tucson, from journeyman in plant electrical. Joined as journeyman, August 4, 1959.

NOVEMBER 1, 1988

JESSE W. CRAWFORD, Tucson, from senior foreman in the smelter operating division. Joined as laborer, June 20, 1972.

JOSEPH W. SOBEY, Superior, from compressor house operator in the mine mechanical division. Joined as mechanic on October 10, 1958.



PIPEFITTERS are, from left, standing, Kenny Seery, Fidel Martinez, David Mitchell, Benny Sanchez and Nat Mejia; kneeling are supervisor Al Vega, Benny Encinas, and Augustin Avechuco. Not pictured are Mark Gotcher, Richard Lopez, Victor Valdez and Larry Nelson.

Mine pipefitters meet goals

Story By AL VEGA, craft foreman
Photo By GEORGE HALL

The underground pipefitters fused and installed two lines totalling 7,000 feet of 12-inch drisco pipe from the 2375 level panel #7 north pump station to the 2315 level #4 shaft access pump.

To hold up those lines, 332 brackets were installed, one every 10 feet on timber posts or welded on steel posts.

Congratulations to the 2315 and 2375 levels pipefitters for completing this project safely and on schedule and for proving once again that teamwork, safety, production and quality are never an accident; they are always the result of intelligent efforts.

Joey's going on the road

By RICHARD COLE

Mine electrician Joe Starman is participating in The Best Dam Bike-A-Thon in The State, a 160 mile ride from Phoenix to Parker Dam benefiting the Multiple Sclerosis Society.

Geared for cycling enthusiasts of all abilities, this fully-catered tour will bring together two groups of riders - one from Phoenix, the other from Las Vegas - at Parker Dam on November 5-6.

Joey will leave from Grand Avenue, Phoenix, Saturday morning and pedal along a flat route until the short climb into Wickenburg, where he will stop and enjoy a hearty lunch.

Then it's on to Salome and Wenden, where he'll spend the night, more than halfway to Parker.

Then it's rise and shine on Sunday and a long breathtaking descent begins the second day of the ride!

He'll roll past fragrant sage and over gently rolling hills as he pedals his way to Parker for the get-together with riders from Las Vegas.

There they will all enjoy an All-American barbecue and beach party.

This Bike-A-Thon is a fully-catered tour.

This means Joey and all the riders will receive outstanding support during the entire weekend, including rest stops stocked with cool water, fresh fruit and high-energy snacks every 10 to 12 miles.

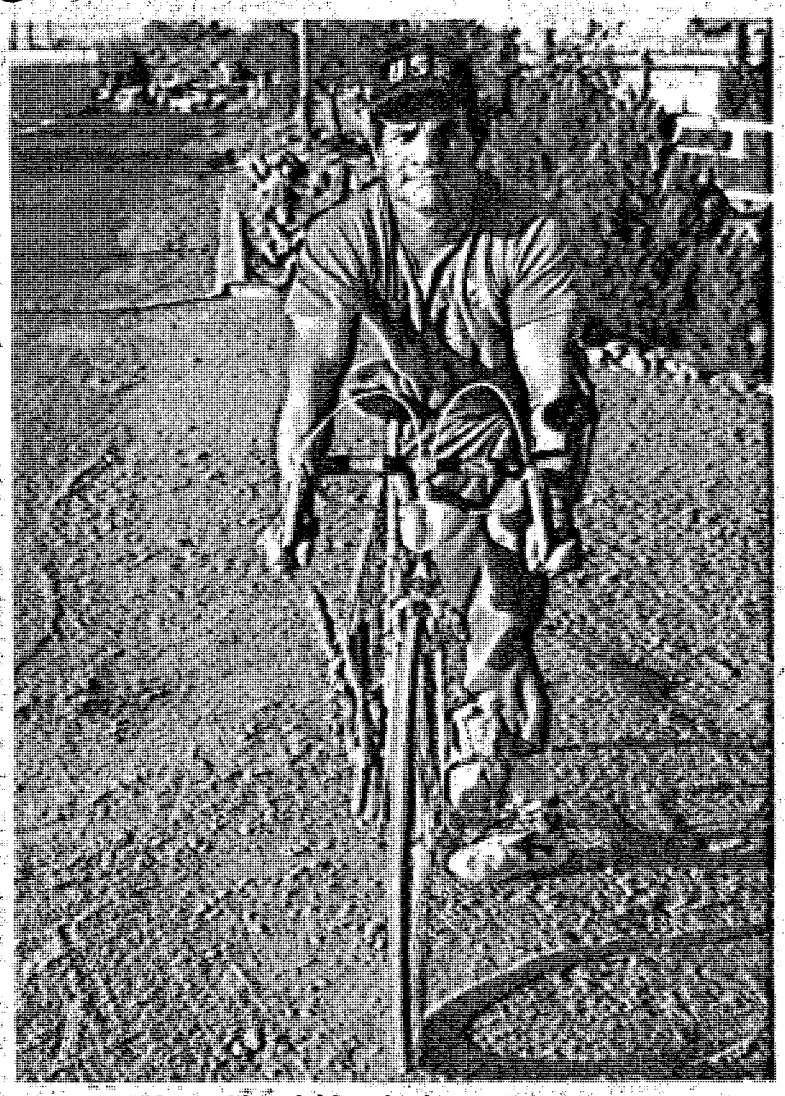
Transportation of overnight gear, professional bicycle mechanics, communications support and transportation back to Phoenix will be provided.

60% of the proceeds will provide services for Multiple Sclerosis patients throughout Arizona and Southern Nevada and the remainder of the proceeds will aid research efforts seeking the cause and cure of M.S.

Joey invites employees to help in this fight against M.S. by pledging any amount per mile he rides or just a single pledge.

Call Joe Starman Sr., 896-2755 or drop by his house at 8 Walnut Street, Oracle or pick up a pledge sheet at any of the following locations:

Huntington Chiropractic Health Center, State Farm Insurance, La Casita, Waldo's Gym, Tri-Community Behavioral Health Center, and Oak Tree Video.



JOE STARMAN will pedal for charity.

Photo by Richard Cole

Know your benefits

By VERONICA CELAYA
senior employee relations representative

Medical plan enrollment opens soon

There will be an open enrollment for all medical and dental HMOs during the period of October 24 - November 25, 1988.

During the annual open enrollment period, any eligible employee may enroll with an HMO, transfer from one HMO to another, or withdraw from an HMO and return to Magma Medical/Dental Plan(s). This may be accomplished as follows:

1. To enroll with an HMO, you must complete and turn in an enrollment form of the applicable HMO. That will automatically remove you from the Magma Medical/Dental Plan(s) beginning January 1, 1989.

2. To withdraw from one HMO and enroll with another HMO, you must complete a termination form from the HMO you are withdrawing from and an enrollment form of the new HMO. Both forms must be submitted together.

3. To withdraw from an HMO and return to Magma Medical/Dental Plan(s), simply complete a termination form from the applicable HMO. You will automatically be reinstated with the Magma Medical/Dental Plan(s).

4. If you are satisfied with your present Medical/Dental coverage, whether HMO or Magma Medical/Dental Plan(s), no action is required.

Any new HMO enrollment, withdrawals or terminations must be received by the Benefits Office on or before Friday, November 25, 1988. The effective date of your election will be January 1, 1989 or the date that you complete 520 hours of actual work if you are a recently hired hourly paid employee, and may not be changed until the next annual open enrollment period in November, 1989.

All of the HMOs have indicated their intent to provide information by mail to all employees. Enrollment and withdrawal forms are also available through the Benefits Office, from your Department and Mine Time Office. HMO representatives will set up booths at the following locations on dates indicated:

Tuesday, October 25, 1988 from 2:00-8:00 p.m. Pima Savings Community Room, 7981 N. Oracle Road, Tucson, Arizona.

Wednesday, November 2, 1988 from 2:00-8:00 p.m. Gardner Middle School Gym, San Manuel, Arizona.

An eligible employee who enrolls in a Medical HMO plan must pay by payroll deduction the difference in the monthly premium between the HMO cost and the cost of the Company Medical Plan. Premiums must be paid in advance; therefore, payroll deductions will begin in December, 1988. The HMO rates are as follows:

1989 HMO RATE STRUCTURE

	SINGLE	FAMILY
Partners	$ 78.95	$289.95
Company Contribution	58.00	167.00
Net Monthly Payment by Employee	$ 20.95	$122.95
Maxi-Care (Health America)	$ 98.76	$334.97
Company Contribution	58.00	167.00
Net Monthly Payment by Employee	$ 40.76	$167.97
Intergroup	$ 79.90	$282.60
Company Contribution	58.00	167.00
Net Monthly Payment by Employee	$ 21.90	$115.60
Cigna	$ 94.07	$313.78
Company Contribution	58.00	167.00
Net Monthly Payment by Employee	$ 36.07	$146.78
Equicor	$ 95.04	$285.11
Company Contribution	58.00	167.00
Net Monthly Payment by Employee	$ 37.04	$118.11

If you are currently covered by an HMO and wish to remain with that HMO, please note that your premium payments will increase for 1989.

Used company sedans for sale by bid

Three used company sedans will be sold to the highest bidder this month.

The sedans have no warranty whatsoever, have well over 100,000 miles of hard use, and will be sold on an "as is" basis.

They include two 1973 Ford sedans and one 1976 Mercury sedan and can be seen by contacting warehouse general foreman Ralph Ramsey at plant extension 118 or 385-3118.

To bid on the cars, submit a sealed bid to Fred Hays, purchasing manager, by either mail or in person no later than 4:00 p.m., October 31.

Bids must include the number on the car, and the bidder's name, address and telephone number.

Bids may be mailed to Fred Hays, Purchasing Manager, Magma Copper Company, P.O. Box M, San Manuel, Arizona 85631.

In-situ expansion is completed and pumping

By STEVE HILDEBRAND
In-situ engineer

The in-situ expansion, initiated in January, 1987, has completed the construction phase.

Presently the solution handling system for this 8,000 gallon per minute system is completing extensive pre-op testing.

The major components of the new system are the 1475 pump station with seven Ingersoll-Rand pumps and drivers, the 2375 pump station with seven Ingersoll-Rand pumps and drivers, and the 7NLD pump station with five Durco pumps and motors.

Two 12 inch stainless steel pipelines were installed in #4 shaft between 2375 level and the 1415 level.

The 2375 pump station will deliver PLS (pregnant leach solution) to the 1415 level sump which feeds the 1475 pump station, located at #4 shaft.

The 1475 pump station will pump PLS to the surface.

PLS crosses 1475 level to #1 shaft, up #1 shaft to the surface, and eventually to the SX-EW plant feed pond.

Again, two 12 inch stainless steel pipelines were installed in #1 shaft.

Across 2375 level, two 12 inch HDPE pipelines were installed.

The 7 NLD pump station delivers PLS to the 2315 sump, which feeds the 2375 pump station.

All pumps and pipelines were installed by the Magma pump and pipe department in a most timely and professional manner.

Bob Kelly's crew did a very credible and vital job during this in-situ expansion.

In fact, due to a manufacturer's faulty design, the HDPE lines across 2375 level had to be installed twice.

The pipe crew also hung the shaft piping in both #1 shaft and #4 shaft.

All pump station preparation prior to the installation of the pumps and pipelines had to be performed by other skilled Magma underground employees.

Harvey Cooper's skilled in-situ underground construction crew was responsible for all excavation.

This included all new dams, collection sump crossovers, pump stations, transformer stations, and motor control centers.

The main PLS collection sump located on the east end of the 2375 level involved extensive raise station preparation throughout the haulage drift.

Of course, the underground surveyors, under Cip Haro, had to mark the way.

Likewise, once the excavation was complete, surveyors again prepared the way for the concrete crew, which without fail, accomplished every difficult pour with professionalism and dedication.

Max Mikels and his concrete miners were instrumental in their support on the in-situ needs and always had means of solving even the most complex requests.

In order to run these pump stations, major electrical installations both on the surface and underground had to be constructed.

Two major transformer stations, 2315 north side and 1415 south side of #4 shaft stations were constructed.

Each pump station has an associated motor control center.

And finally a major electrical power substation was built next to #1 shaft, where the 115 KVA and 46 KVA transmission line service the power needs of in-situ.

Down #1 shaft and #4 shaft 13.8 KVA electrical cables have been hung.

All electrical installation was accomplished jointly by Magma and Bechtel crews.

Kent Billhartz's electrical crews were instrumental in the design and installation of these facilities.

Once the construction and installation was completed pre-op testing began.

Pipelines were statically tested.

Each motor was energized and run for short periods of time.

Electrical gear and cables checked out.

Finally instrumentation had to be calibrated.

During July, the PLS handling system was ready for initial pump tests; it was time to move some PLS.

Several of the five Durco 16A pumps at the 7NLD pump station were tested.

The PLS from the 2375 collection sump was pumped to the 2315 sump at #4 shaft.

Only minor startup problems occurred, which are being addressed.

In a manual mode, these pumps worked well.

Later in July at 1000 gpm pump on the 2375 pump station, using a 600 horsepower motor, was also tested in a manual mode.

PLS was successfully pumped up #4 shaft to the 1415 sump.

Finally, one 1000 gpm pump with a 800 hp motor was tested on 1475 pump station.

It also performed successfully and the first in-situ PLS was delivered to the SX-EW feed pond using the new PLS pumping system.

In August, the automatic controls for the whole pumping system were tested successfully.

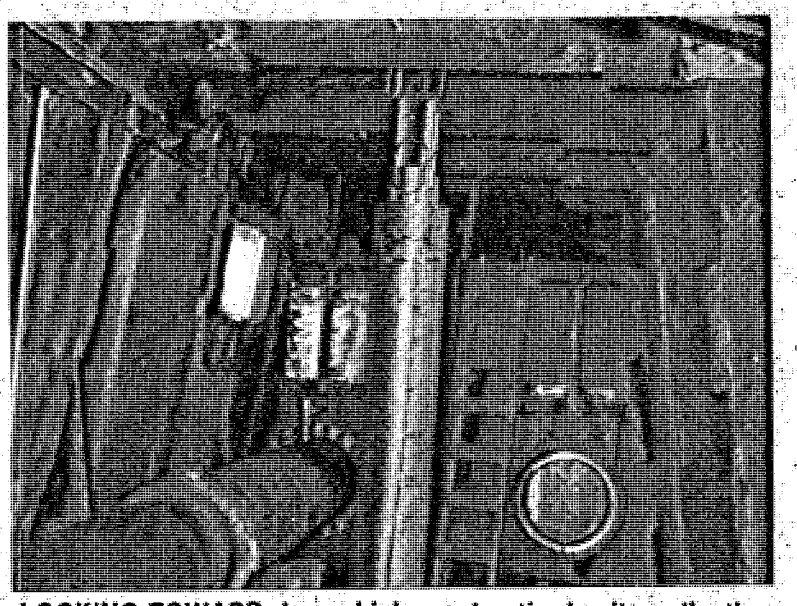
The success of these pumping tests cannot be over emphasized for as in-situ PLS production continues to increase steadily each month, it will not be long before these pump stations will be run continuously.

PLS production will exceed the capacity of the 1000 gpm large scale pumping system currently handling PLS production.

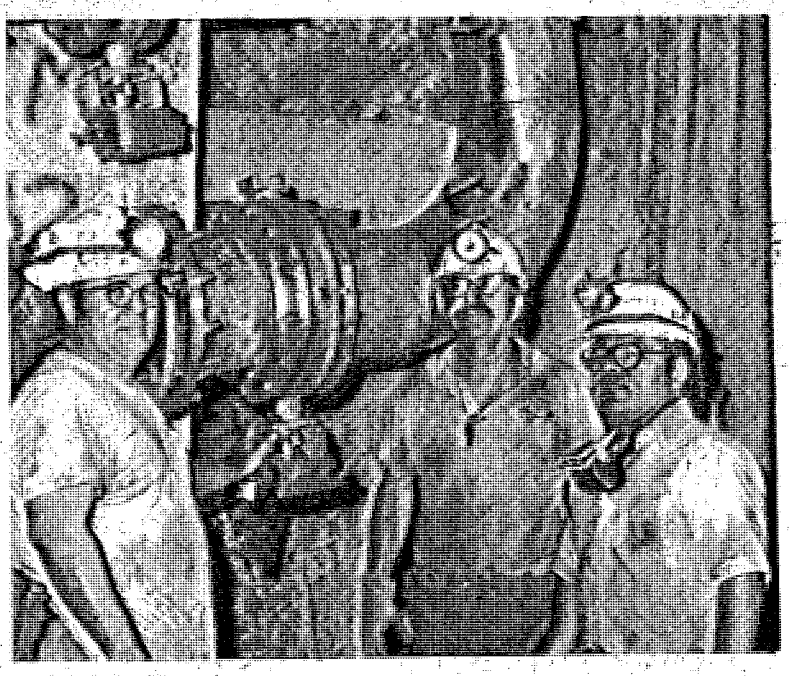
Much appreciation to all hands who participated in the design, fabrication, excavation, construction, and installation of this in-situ PLS pumping system.

Unfortunately, it is not possible to list all the Magma employees involved with the project.

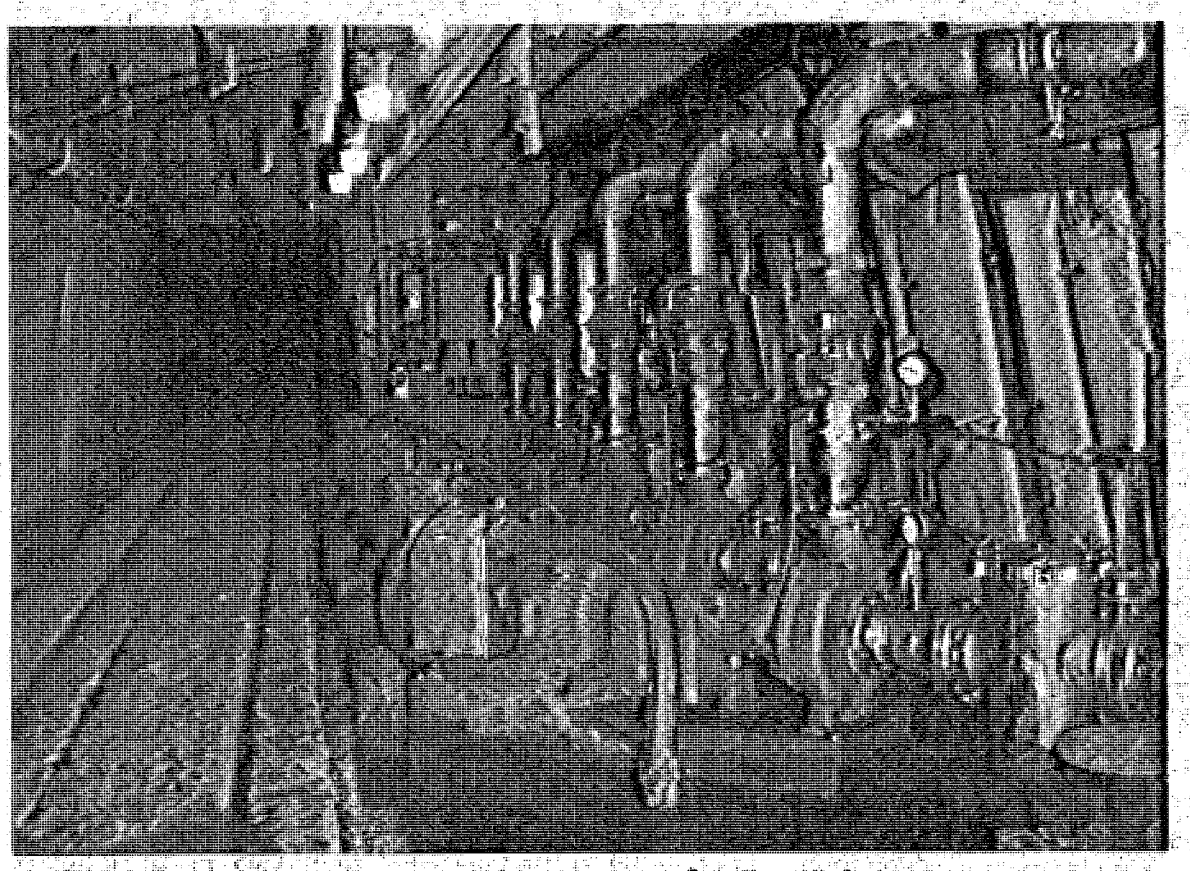
However, it was an essential element to the future of in-situ copper production and Magma's future profitability and could not have been accomplished without the high level of interest, enthusiasm, and initiative of all involved.



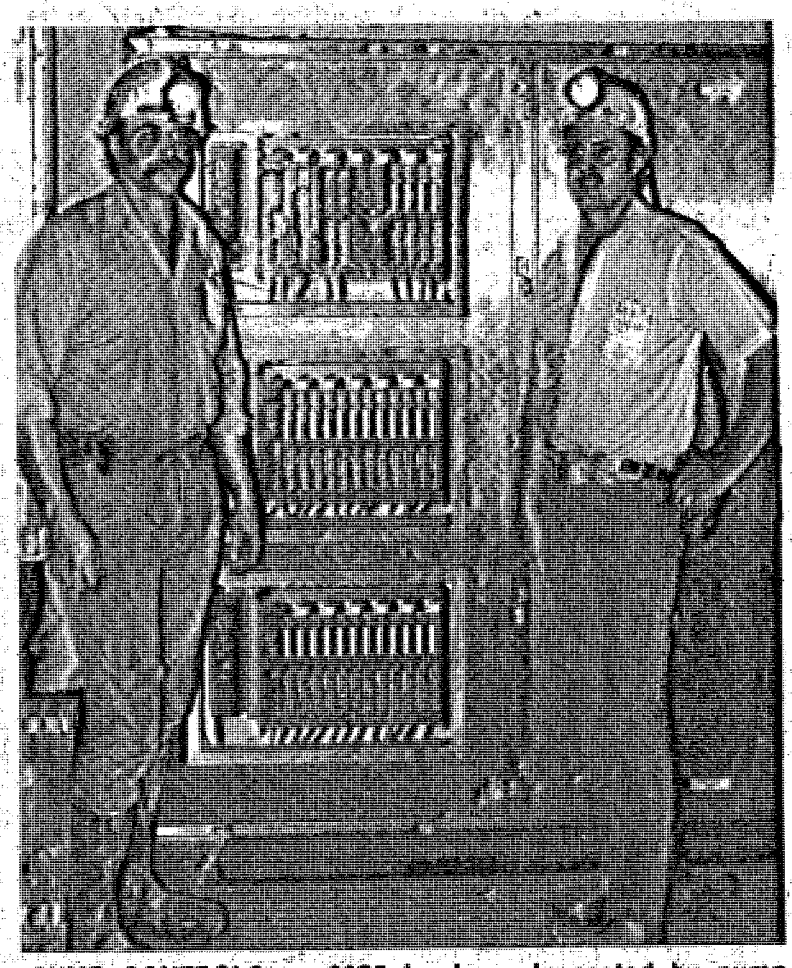
LOOKING TOWARD dam which creates the in-situ collection sump on the 2315 level.



PIPE CREW at 2375 level pump station are, from left, pipefitter journeymen Nat Mejia and Benny Encinas and pipefitter helper Miguel Garcia. The pipe is 12" stainless steel.



ARRAY of pumps on 2375 level will lift 2000 gallons per minute of leach solution from the 2375 to the 1475 level.



PUMP CONTROLS on 2375 level are inspected by pump foremen Bill Crown, left, and electrician Jim Watkins.

Photos by Richard Cole

Mill takes on a variety of new assignments

By DAVE WERNKE
mill section foreman

In this ever-changing world of producing copper, we find ourselves facing many challenges.

Being able to adapt to changing conditions can mean the difference between profit or loss.

When I first came to Magma early in 1980, the moly plant process had just undergone a radical circuit change in order to continue producing a molybdenite concentrate.

These concentrates provide an important source of cash flow to the company.

During the mine fire in 1980, the mill division processed copper-bearing slag to help keep copper production at a reasonable level.

Since 1985, an additional 3,376,591 dry tons of slag have been processed through the mill -- again, to assure a high level of copper production.

Those 3,376,591 dry tons have translated into 54,850,890 pounds of copper!

Since modernization began at Magma, many new challenges have developed.

For instance, during the retrofit to the flash furnace, the smelter needed a means to reduce emissions but keep copper production up.

To meet this goal, the mill produced a separate concentrate, from slag, that was lower in sulfur.

Another project the mill has recently undertaken is the neutralization of excess sulfuric acid.

To do this, the mill crushed and ground limestone into a slurry, which, when combined with mill tailings, neutralized the sulfuric acid.

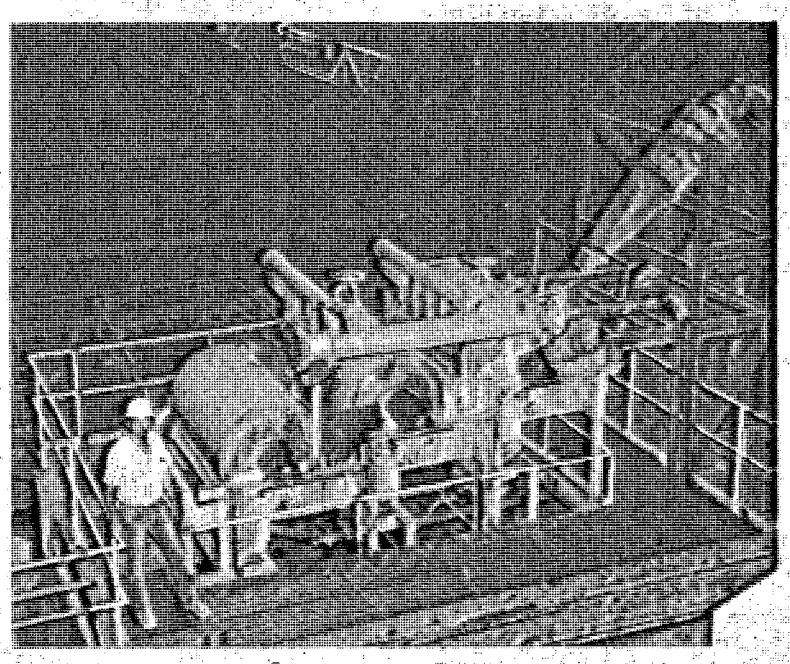
Presently, the mill has designed several slag processing circuits to process the different types of slag being made, as well as a circuit to process the furnace bottoms when the old reverb furnaces are demolished.

Only slight modifications are necessary to switch from one product to another.

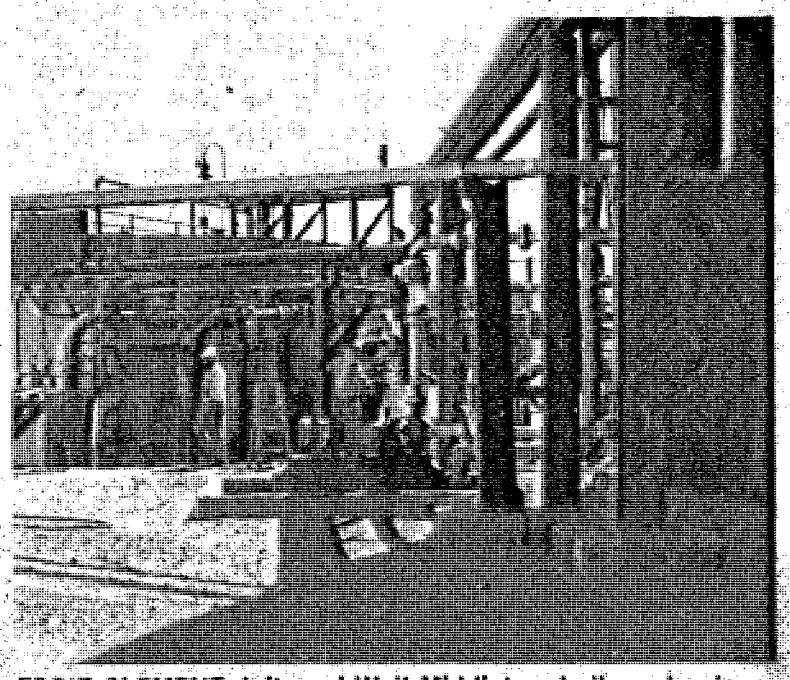
Since the reverb furnaces are no longer available for clean-up concentrate, the mill was given the responsibility of developing a means of handling concentrates cleaned up from around the plant site.

To do this, a concrete dump pad has been installed just north of the filter plant whereby the concentrate will be washed into the concentrate thickeners and then filtered with the other concentrate produced by the mill.

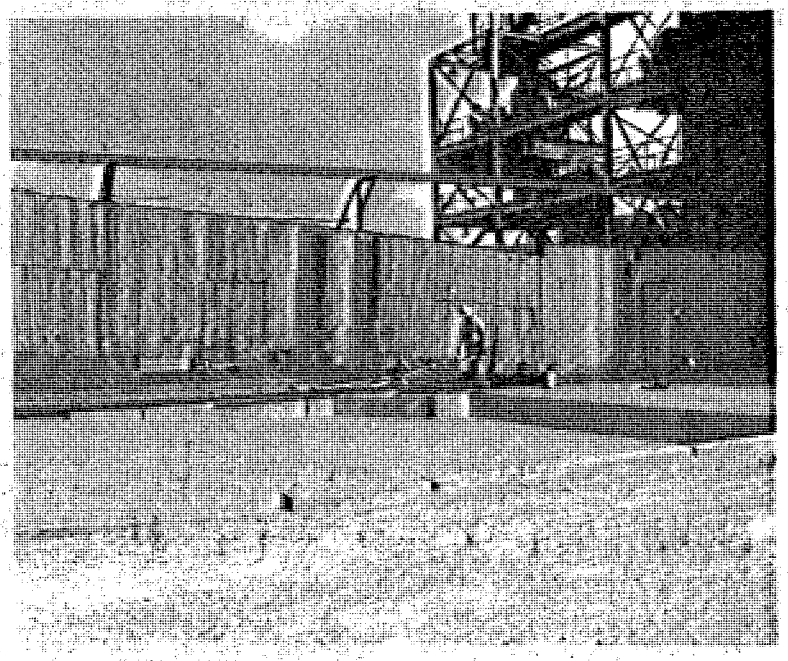
Adapting to and making needed changes has become the rule, rather than the exception, throughout Magma and the mill will continue to contribute as needed.



FRANK MARTINEZ, mill repair craft foreman, stands to the left of the magnetic separator which will be used as part of the circuit to process high grade flash furnace slag with high metallic content.



EDDIE CLEMENT, left, and Walt Middleton, boilermaker journeymen, preparing to do some repairs on mill acid neutralization tank lines.



CARLOS TORRES, filter plant operator, checking status on pump installation for concrete dump pad for mill cleanup concentrate handling.

Magma will issue notes to buy back our stock

Magma has filed registration statements with the Securities and Exchange Commission relating to a proposed offering of four issues of subordinated notes with an aggregate principal amount of approximately $210 million.

Drexel Burnham Lambert Inc. will underwrite the offerings.

Net proceeds from the sale of the notes would be used in connection with a recapitalization plan announced September 6 in which Magma has the option to repurchase the 15% of its common stock (5.7 million shares) and $200 million face amount of its Class A Preferred Stock held by Newmont Mining Corporation.

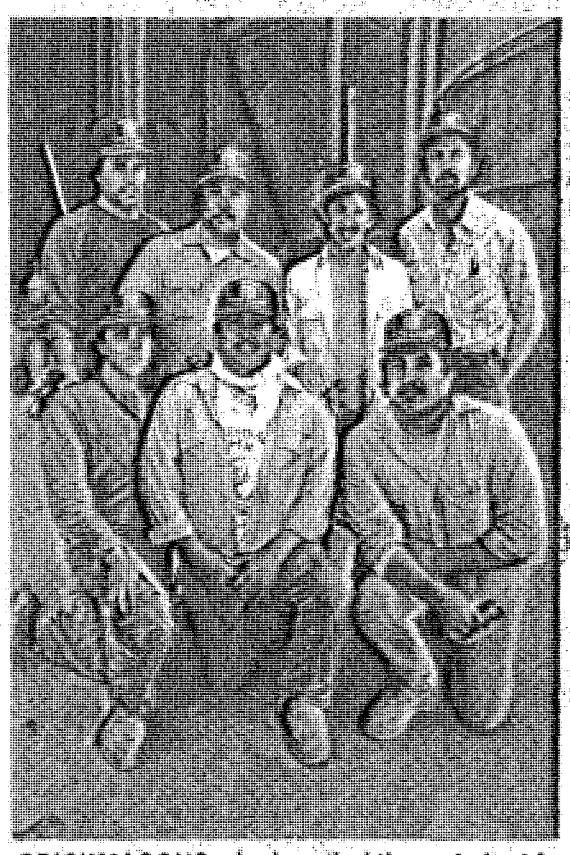
The option to repurchase Newmont's holdings is exercisable through November 30, 1988 and provides for a closing, if the option is exercised, prior to December 31, 1988.

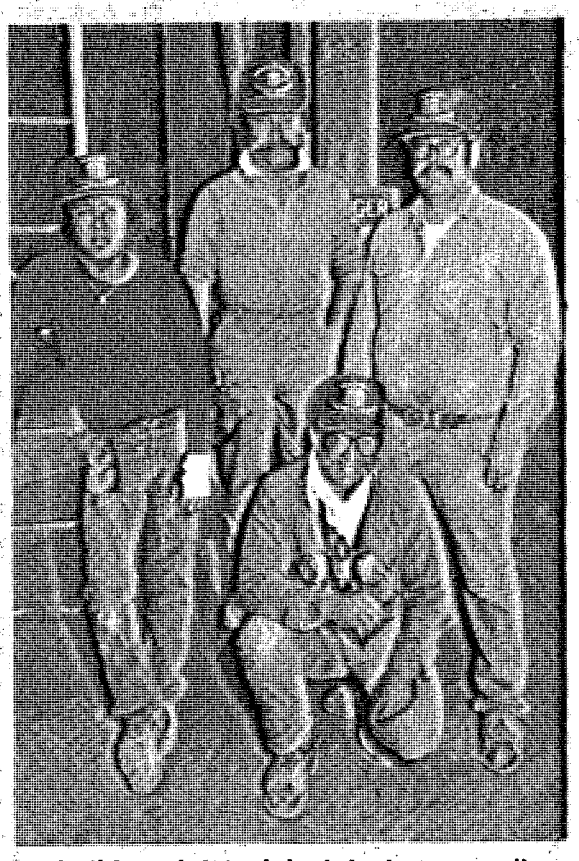
In addition, upon exercise of its option to purchase Newmont's holdings, Magma would also repurchase between 4.4 and 5.2 million of the Magma common shares owned by Consolidated Goldfields PLC, now a 17% shareholder.

Through the recapitalization plan, Magma would eliminate existing debt covenants, which hamper operational decisions, and the Series A Preferred, which participates substantially in Magma's earnings, thereby enhancing operational flexibility and placing its remaining common shareholders in a better position to realize the benefits of the Company's future operating performance.

The subordinated notes include $60 million principal amount of Senior Subordinated Discount Reset Notes due 1998, which will be issued at a discount from principal amount, and $50 million principal amount each of copper indexed, silver indexed, and gold indexed Senior Subordinated Notes due 1998.

Application will be made to list the notes on the American Stock Exchange.





BRICKMASONS who handled the rod plant furnace rebuild are, left to right, left photo, standing, Dave Vindiola, Richard Munoz, Bobby Savedra, and foreman Joe Croci; kneeling are Ray Rodriguez, Rudy Romo and Joe Espinoza. In right photo are, standing, Mike Saiz, Ed Tinsley and Bill Martinez; kneeling is Anastacio Pacheo. John Kerrigan also worked on the job.

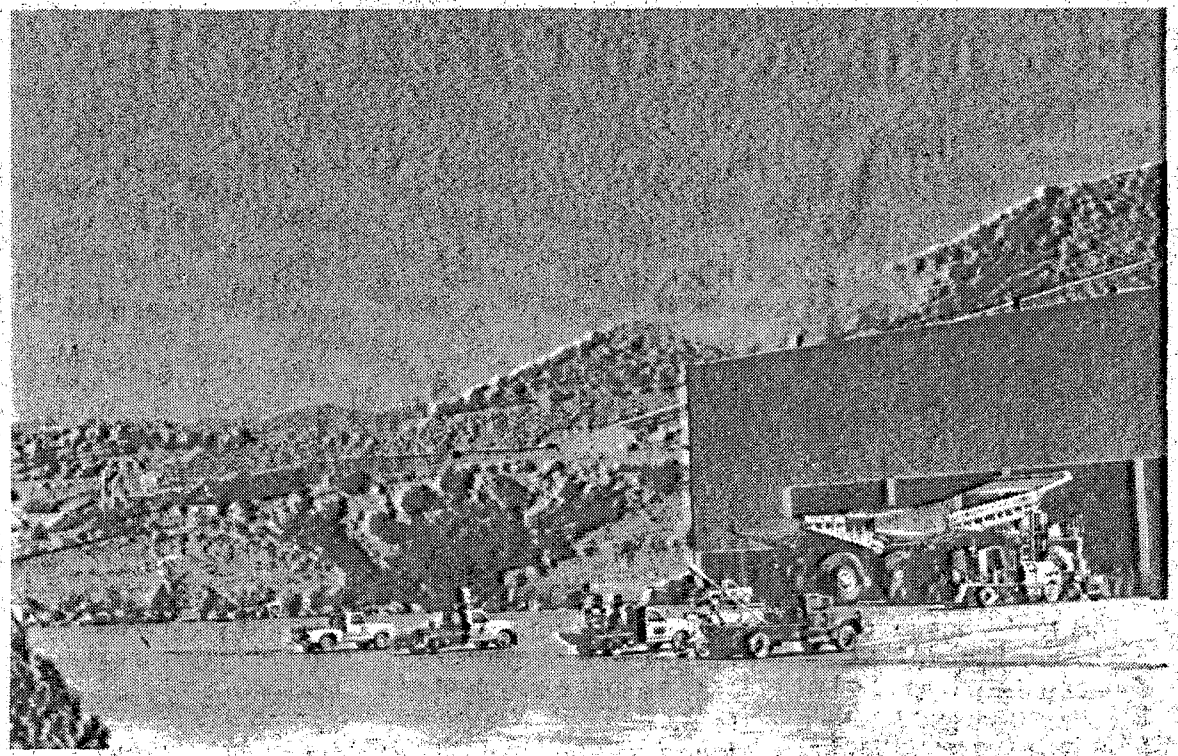
Smelter Brickmasons help rod plant

Story and Photos By
BEBE BURWELL

There are times when one wants to do more than simply say "thank you for a job well done" and that was recently the case when the refinery issued its special caps to the smelter brickmasons.

This token of appreciation was in recognition of the outstanding job they did on the rod plant furnace rebuild - a job that was also completed in record setting time.

As Ralph Juvera, refinery and rod plant superintendent said in his letter of commendation, "That's a hard combination to beat!"



✓ Pinto Valley's Red Hill

EVER GROWING, THE PINTO VALLEY OPEN PIT takes in the surrounding countryside. This photo shows stripping activities at Red Hill, a local landmark behind the mine's truck shop. Stripping production averages 46,200 tons per day with two shovels at work. Just about every mine site in the world has a "Red Hill," including both San Manuel and Pinto Valley.

Photo by Rachel Butler

Good housekeeping reflects safety habits

By GILBERT RODRIGUEZ

As I was walking through the smelter looking for something to write about (and help me break a common problem to all Update staff, "writer's block") one obvious fact stared me in the face, the anode department looked outstanding.

At first I couldn't quite put my finger on it.

I stood there watching the crews work and then I wondered to myself: what is it about this work area that is appealing?

Isn't it strange how the obvious many times seems to escape us?

What I was looking at was a work area which was orderly and clean, the foundation for good safety performance.

Frank Rodriguez, anode supervisor, informed me that during periods when they are waiting for copper every employee has an assigned area to clean.

It wasn't difficult to see the anode employees had completed their assignments in excellent fashion -- tools and equipment were not thrown about.

Good housekeeping improves an employee's ability to work safely and also improves morale.

Often employees ask themselves, what can I do to improve safety?

The anode department provides us with a clear answer and that is to clean up all areas and make it a daily task to make work areas clean and orderly.

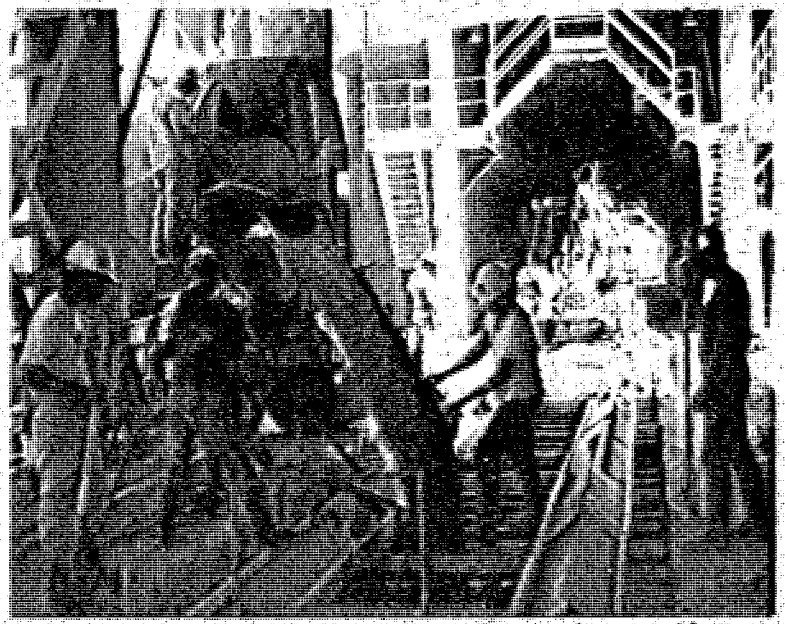
Not only does housekeeping improve safety but also improves production, something we are all concerned about

Cooperation applied to replace ore haul rails

By PETER READ
mine general construction foreman
Photos By RICHARD COLE

A multi-departmental project is underway at the mine.

Two sets of tracks are used for loading ore from the bins at the four production shafts (3A, 3B, 3C and 3D).



POURING NEW ROADBED, are left to right, carpenter journeyman Paul Yslas and helper Rick Flores, carpenter journeyman, Nando Villa and helper Steve Madrid. Foreman Cip Haro is up on the track watching the pot.

The #1 track is used almost exclusively because of its spur to #5 shaft ore bin.

Because of this extensive use over 33 years the rail way under the bins was in need of total replacement.

The 136 pound rail is set on 8"x8" steel beam ties and this is set in high strength concrete.

Due to the impact of the ore being loaded into the cars and the stop-and-go of the locomotives the rails have been pushed down, into the steel ties.

The entire track, approximately 700 feet, has to be replaced.

The departments involved include the mill, plant maintenance, SMARRCo, plant material handling, ore transportation, National Railroad (a track repair company), mine construction, plant engineering, mine engineering and mine supply.

The concerted efforts of these groups plus assistance from other individuals have led to a critical job being performed with no hitches and very few "surprises."

The project requires several groups working together in a sequence of tasks so that a segment of track can be replaced quickly.

This is required so that in the event the #2 track becomes unusable, #1 can be reconnected and put into service.

The first task is to remove grout which is on both sides of both rails

Once the rail bed has been cleared of track, ties and concrete and National Railroad has placed the new ties and rail, mine construction carpenters then build forms along the rails.

This area which is approximately 6" wide on either side of each rail is grouted so that rails can be more easily replaced if necessary.

The carpenters also place and finish the concrete.

The concrete contains admixtures so maximum strength can be obtained in a minimum of time.

The entire project involves approximately 700 feet of track, almost 400 ties and 350 yards of concrete removed and replaced.

It also required and

Ore hoisting is automated at San Manuel

By MARK CRANDALL

When looking at the mine site from highway 77, the most obvious features of the mine are the four headframes that are situated parallel to one another.

There are a total of seven headframes at the mine.

Each one services one shaft.

The headframe is the steel structure that supports the cable that ties the cage or skip to the hoist.

There are 13 hoists servicing the underground.

The four parallel shafts are the production shafts, where the ore is hoisted from the underground mine to the surface.

Each hoist raises and lowers two buckets or skips full of ore.

The two skips operate in tandem.

That is, when a loaded skip is dumping on the surface, the other skip is loading underground.

The weight of the empty skip helps pull the loaded skip up the shaft.

Ore from the mine is carried to the shaft area by trains where it is dumped into a pocket.

Each pocket holds enough ore to provide up to two hours of production time for the hoist.

Underneath the pocket the ore travels down a large chute called the raise.

At the bottom of the raise are two doors known as the back doors, below these doors are the baskets.

At the bottom, are front doors.

The basket is a chute that is the exact same size as an ore skip and therefore measures enough ore to load one skip.

The skip loading sequence is as follows:

The back door opens allowing the ore to fill the basket and then closes again.

When the skip comes down the shaft and stops in the loading position, the front door opens and allows the ore to flow into the skip.

At the same time, the other skip is dumping on the surface.

The loaded skip is hoisted to the surface and the empty skip comes down the shaft and into the loading position in front of the second basket.

The empty basket is refilled while the skips are in transit.

There are two baskets - one for each skip.

The entire operation of loading, hoisting and dumping ore is completely automated.

A series of proximity switches and timed relays control each component of the cycle.

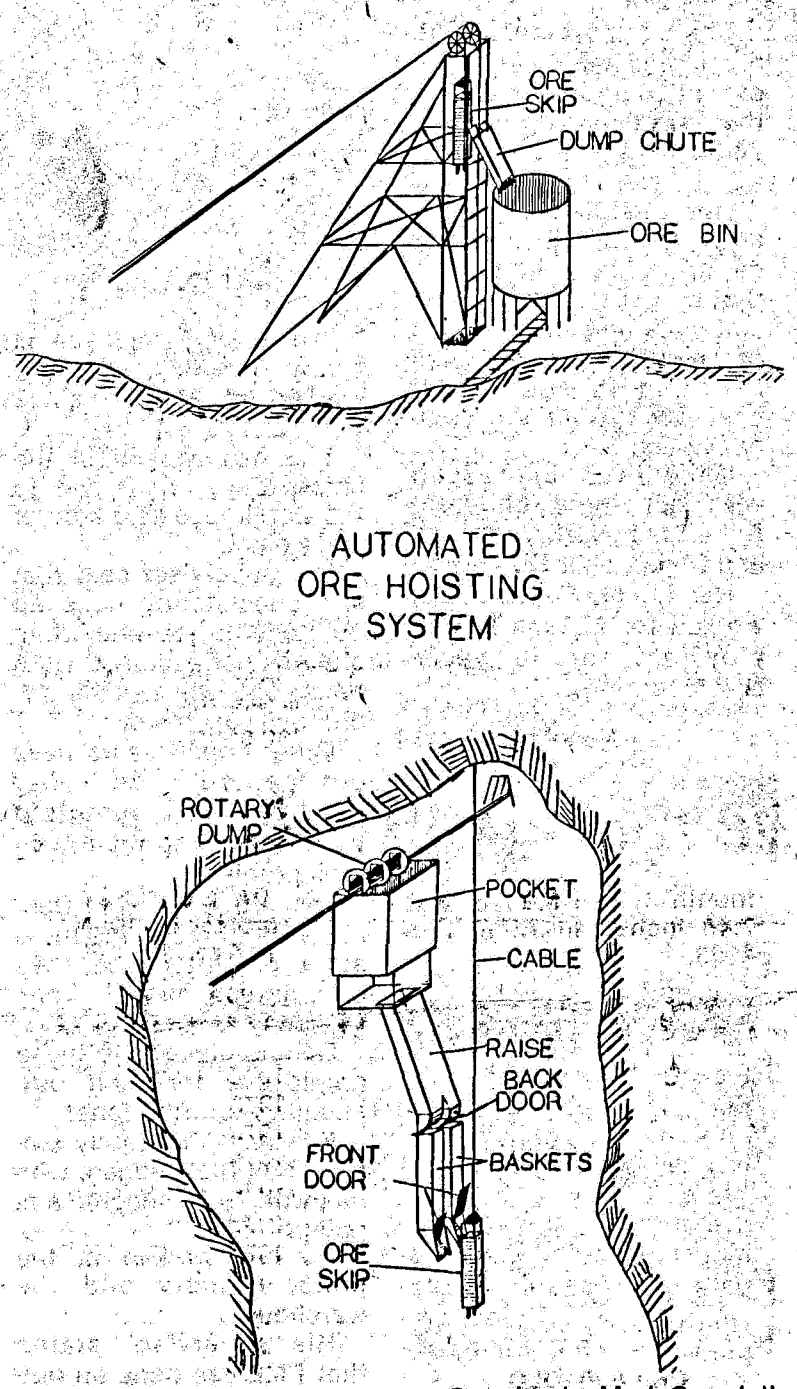
The control consoles for the loading stations are located in the 2075 dispatch shack underground where they are watched by the dispatcher.

The loading station is a six story steel structure which will be 42 ft. high, 28 ft. wide and 28 ft. deep.

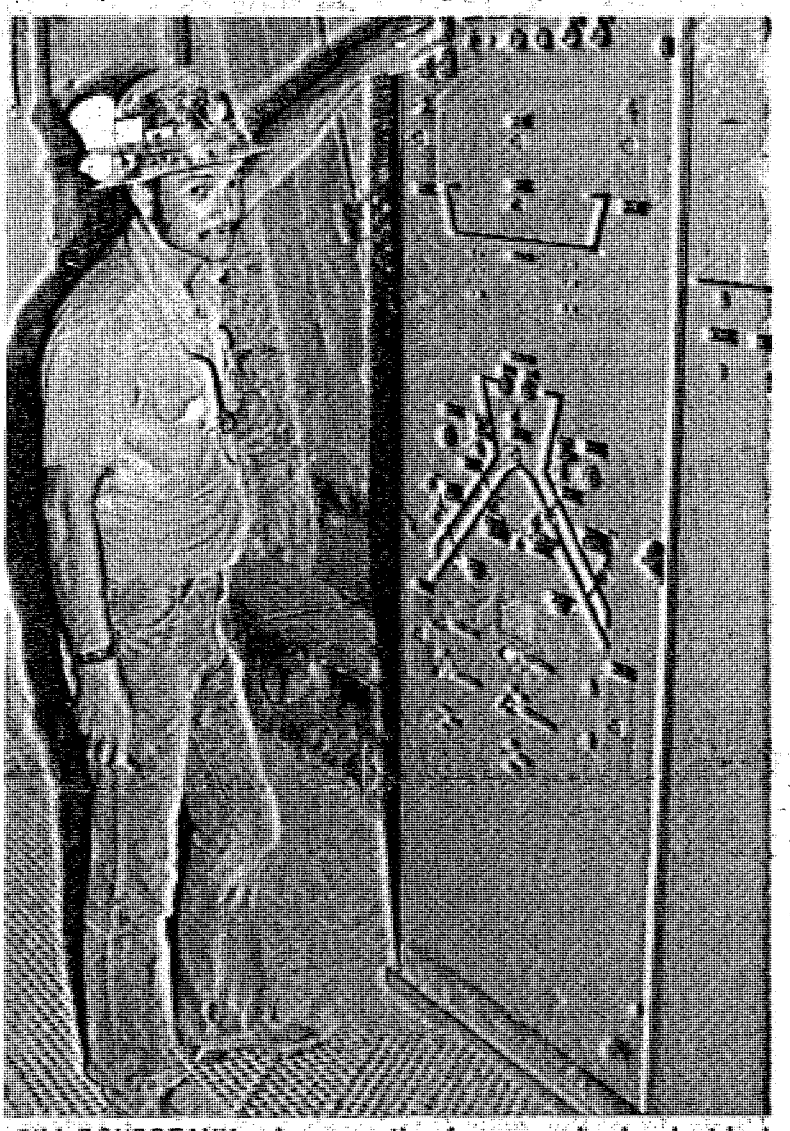
Two hoistmen monitor the hoists on the surface while the skip/dump operators stand by underground to take care of any problems at the dumps and skip loading stations.

3A and 3B hoists have skips that hold approximately 21 tons of muck while 3C and 3D hold approximately 28 tons.

Each hoist will hoist approximately 32 skips an hour.



Drawing by Mark Crandall



BILL BOUDREAUX, mine operating foreman, checks electrical panel which controls loading of ore skips underground.
Photo by Mark Crandall

Shaft miners prepare for K orebody production

By MARK CRANDALL

A major project in the development of a mining level underground is the construction of the ore handling facilities required to move the ore from underground to the surface.

During the month of May, miners began construction of a pocket and loading station at 3D shaft on the 2950 level of the Kalamazoo orebody.

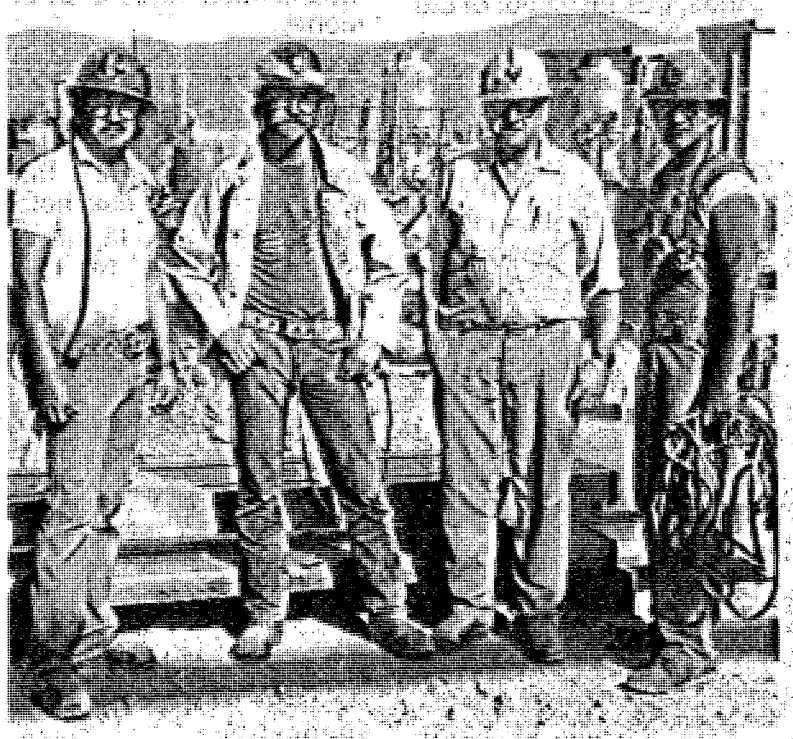
Phase I of the project is building a bulkhead across the shaft on the 3440 level to catch spillage muck from the skip loading process.

Rigger crews lowered 7 I beams which are 25 ft. long and weigh 3,600 pounds each.

Miners then set the beams in place across the 20 ft. in diameter shaft.

The next step was to construct a floor made of two layers of 12"x12" timber.

Spill muck from the 2950 level will fall onto this bulkhead where it can be mucked up instead of allowing it to fill the 300 ft. of shaft below the 3440 level.



SHAFT MINERS are, from left, Rick Guerrero, Dave Evans, George Mathews and John Alvarez.
Photo by Mark Crandall

Phase II of the project is to drill and blast clearance in the side of the shaft to allow room for the construction of the loading station.

The loading station is a 6 story steel structure which will be 42 ft. high, 28 ft. wide and 28 ft. deep.

This steel structure supports the chutes and machinery necessary for loading the ore into the skips.

Phase III is the excavating and lining of the ASEA pocket for the 2950 level.

General foreman George Matthews is the project coordinator.

Currently there are two crews working on the project including crew members Ricardo Guerrero, Earl Swiney, David Evans, Frank Parker, Melvin "Moon" Edwards and Martin Stark.

(Personal note: I would like to share with you the respect I gained for the crews working on this project.

On a picture taking trip to the 3440 level I found dedicated men working in far less than ideal conditions over 100 ft. below sea level.

The area is comparable to being in a summer rainstorm with the air temperatures in excess of 100° water temp at 102° and the humidity over 95°

And of course, being at the bottom of a 3440 ft. shaft, it's dark except for the light provided by your caplamp.

This article is but a small tribute to all the men who work at the bottom of the mine.)

Card system meets test

By CHUCK THOMPSON

The Compoist IMPAKT team, composed of Cliff Staggs, Jerry Miller, Frank Robles, Don Graham, and Val Hudson, addressed the problem of inadequate vehicle maintenance back in February 1986.

In March of that year they presented their solution to this problem to management and by July had 20 vehicles outfitted with their Vehicle Check Cards and brackets to hold them.

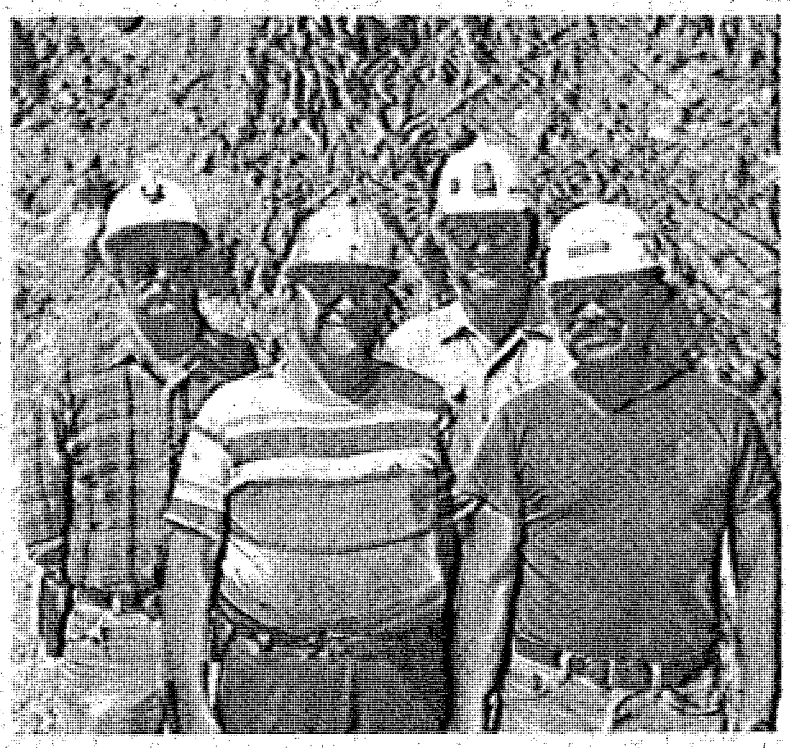
According to their memo, this card is "a vehicle check -- not a daily inspection card -- to be used by light vehicle drivers to report non-critical maintenance to the truck shop."

Test vehicles were forklifts and pickups.

In March of this year, Tom Young, truck shop foreman, reported to the group that the card system was working great.

This April, the Compoist team made their follow-up presentation to management and approval was received to install the holders and cards into all mine light vehicles.

The work order was submitted and an advertising campaign for the project is underway.



COMPOIST members are from left, Jerry Miller, Cliff Staggs, Don Graham and Frank Robles. Photo by Chuck Thompson

Facilitators get advanced training

By BUD ZOOK

On May 26 and 27, Dennice Kercher, Ph.D., from Mountain States Employer's Council presented a workshop for QWL facilitators to provide additional training in the area of "Facilitating The Effective Meeting".

Participating in the workshop were Tim Acton, Sandy Gerdon, Ron Allum, Dee Durazo, Mark Crandall, Peter Read, Bob Kelly and Chuck Thompson from the mine: Ted Johnson, Bud Zook and Bill Chapman from Plant Engineering; Ben Clingan and Myrna Harris from the mill; Gil Rodriquez, Al Moussa and Jim Hawke from the smelter; Elaine Newlin from purchasing; John Dean, Bebe Burwell and Carleton Peltz from the refinery; Curtis Nielson from SX-EW; Al Liguori and Jim Sherman from the metallurgical lab; and Doug Nelson from safety.

The QWL facilitator is a person who is able to get a group to produce an outcome.

He/she must possess (1) adequate understanding and acceptance of the functions of leadership; (2) diagnostic skills to understand individual and group behavior; (3) skills for assisting group members and the group as a whole to become self regulatory and self-developing.

Sixteen hours of intensive training were spent in the workshop developing and fine tuning these skills.

The approach of the workshop emphasized the Quality Circle Meeting.

Group meetings such as these are very much like the proverbial iceberg with the visible results only a small portion of the overall system.

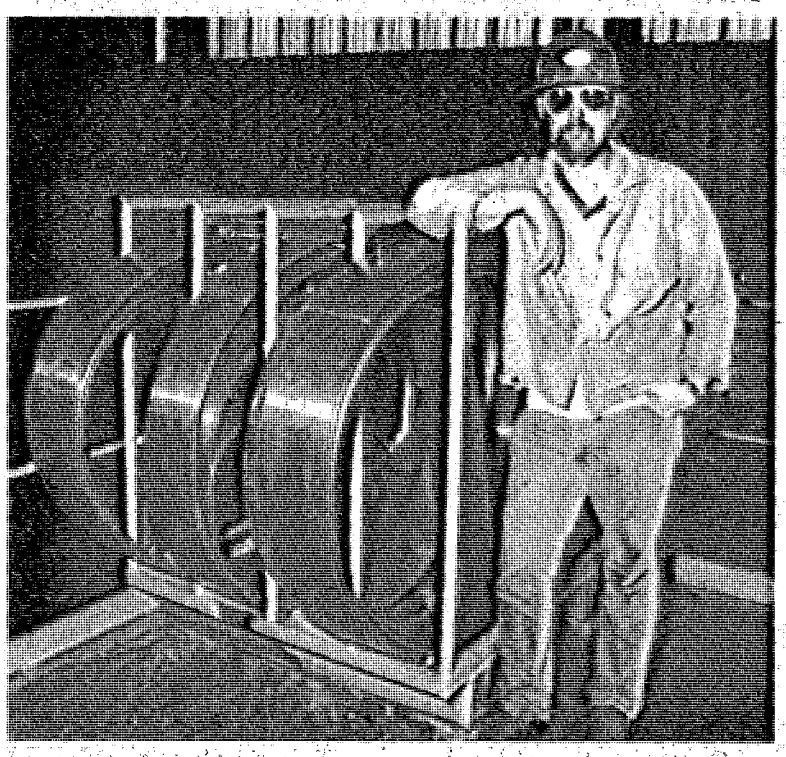
Successful meetings feature agenda controlled structures with definite preset goals.

They are facilitated by people who are aware of all the interaction that's necessary for positive results.

New band rack saves rod plant down time

Story and Photo
By BEBE BURWELL

Randy Mooney, rod plant cast machineman, has come up with another great idea to improve operations in his area of responsibility - this time in the form of an improved rack for cast wheel bands.



RANDY MOONEY, cast machineman, stands beside the band rack he designed, which is shown in place on the rod plant mill deck.

The old rack, which held only two of the up to 119-foot-long, 7-inch-wide steel bands, was made out of old wooden pallets.

It was far less stable and had to be chained to a nearby rail to hold it in place.

The cast wheel band has a major impact upon both production and quality; therefore, when installing one it is important to use only a band that is just right.

There have been times when employees have had to go beyond the two bands traditionally stored on the deck before getting back into production, which would mean a delay while the replacement was transported overhead.

Each minute of downtime is estimated to cost over $1,000 in lost production, so you can see that by now having four replacement bands close at hand, it is only a matter of time before this modification saves a lot of money.

Randy's streamlined design called for a metal rack that would be solid enough to eliminate the need for chains, would hold four bands neatly in place, and would allow for fast and easy access.

He drew up the plans, which were used by plant maintenance personnel to make the unit.

Randy and co-worker Jim Nielsen, coiler operator, positioned the new rack on the mill deck near the bar prep area on the first day of May -- marking the implementation of yet another of Randy's suggestions to make changes for the better in the rod plant.

Warehouse names Employees of the Month

Warehouse employees have been selected as April's Employees of the Month, a program designed to recognize outstanding contributions toward the achievement of warehouse goals.

The hourly employee is Chila Vitolo, a Magma employee since August, 1978 who has worked at the refinery and the warehouse.

The supervisor who nominated her stressed the exceptional job she did on the rewarehousing of rows 74-84 at the mine warehouse.

Her attention to detail and working with other departments resulted in the consolidation of like materials and the deletion of several stock numbers resulting in substantial cost savings for the company.

Chila lives in Tucson with her three children, Robert III age 21, Yvette 20, and Christopher 17.

Her father, Paul Powell, worked for Magma in employment for 10 years before retiring.

CHILA VITOLO

JENNY HENDRICK

The salary employee is Jenny Hendrick, who has worked at Magma since February, 1976.

She has worked in the safety department and in the warehouse as a laborer and a clerk.

Her supervisor said that she consistently does an outstanding job and when she has her assigned work done, she will ask for additional work to do.

Other departments have commented on her thorough and complete ways of helping them with their problems.

Jenny is married to Dennis, who works at the mine as a pipefitter and they have three children, Tony 14, Jenny 13, and Kathy 6.

Congratulations to these employees for their outstanding contributions!

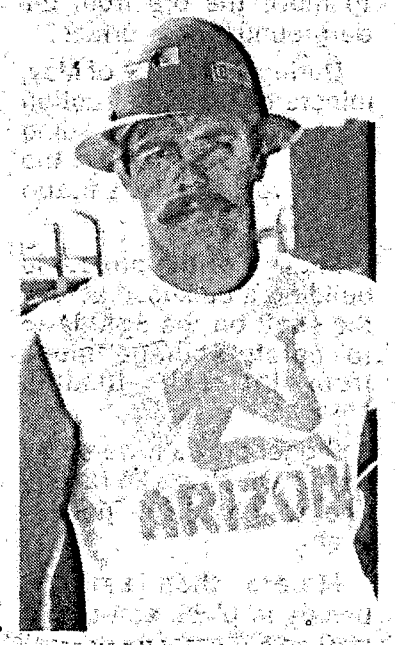
For May, the hourly employee is Rick Hogan, who has worked for Magma since April, 1980.

He has worked at the mine, refinery and the warehouse.

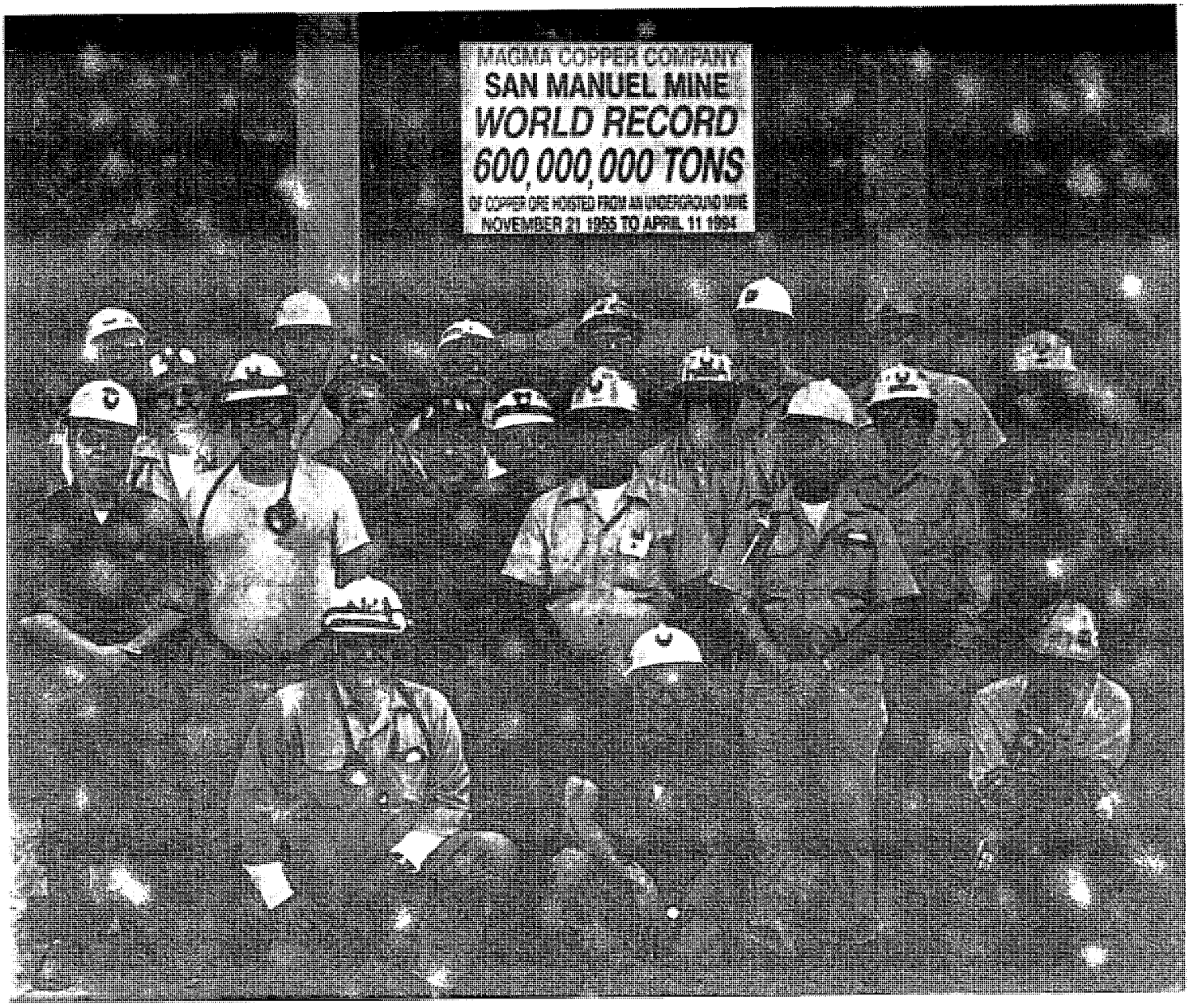
His supervisor stated that Rick has done an outstanding job with the delivery service even though new services have been added.

His attitude toward solving the delivery problem and toward serving the customers is excellent.

Congratulations to Rick for his outstanding contributions!



RICK HOGAN



Long-time mine employees who participated in hoisting 600 million tons over the last 38 years are: (standing in rear, from left) Rudy Lopez, Clifford Staggs, Lino Sanchez, Jesus Peralta, Jim Mork and Bill Whithurst; (standing, center) Victor Borboa, Angel Sanchez, Tommy Benavidez, Earl Clinton, Jimmy Molina and Mario Piña; (standing, front) Caleb Hardy, Joey Tamayo, Art Canales, Rudolpho Miranda and Angel Arriaga; (kneeling) John Bianes, Cecil Tafoya and Tobie Martinez. (Photo by Jim Norby, courtesy of Magma Copper Company.)

San Manuel shafts hoist 600 millionth ton of ore since 1955

(The following 3 articles are reprinted from the May 1994 issue of "Magma Update," a newletter for Magma Copper Company's San Manuel Mining Division employees.)

By Kenny Lawhon
SMMD mine tonnage technician
Brian Emling
planning director and
Jim Norby
Communications

Magma Copper Company's San Manuel underground mine achieved a production milestone during night shift April 11, 1994, when crews hoisted a full skip of ore up No. 3B shaft, putting the mine over the 600-million-ton mark.

In production since November 21, 1955 (38 years, 5 months), the San Manuel underground mine has long held the record for underground hardrock ore hoisted through vertical shafts.

For the 14,011 days of production between November 21, 1955 and April 11, 1994, we averaged 42,824 tons per day, 365 days per year.

We hoisted 197 million tons up No. 3A shaft since 1956, 178 million tons up No. 3B since 1955, 123 million tons up No. 3C since 1971, 101 million tons up No. 3D since 1975 and 1 million tons up our chippy hoists since 1956.

During this time, we have hoisted ore from 6 levels.

We produced from the 1415 level for 6 years 8 months till September 1962, from the 1715 level for 5 years 8 months till August 1974, from the 2015 level for 27 years 6 months till October 1989 and from the 2315 level for 18 years 1 month till October 1992.

600 million . . .

Currently we are producing from the 2615 level, since March 1979, and from the 2890 Upper Kalamzaoo level since August 1990.

The 600 million tons of hoisted ore, with an average grade of 0.674 percent, has yielded over 7 billion pounds of salable coper.

If we were to have loaded 1 continuous train of 100-ton cars, that train would stretch 34,091 miles, circling the earth 1.3 times.

By Burgess Winter, President
Magma Copper Company

Over 7,000,000,000 (that's billion) pounds of copper have been made from ore produced and hoisted by San Manuel mine employees from the underground mine since they began in 1955.

All together, they've produced and hoisted over 600 million tons of ore. That's an incredible amount of ore and copper and represents hard steady work in a difficult environment over the past 38 years.

An interesting thing to consider is when production began in 1955, the mine had reserves of 300 million tons of sulphide ore. Today, having hoisted 600 million tons, the mine still has 285 million tons of sulphide reserves plus another 267 million tons of mineralized rock which market conditions and technology someday could transform into mineable reserves.

Ore production from each level

Production Levels	Total Dry Tons
1415	69,983,665
1715	31,092,864
2015	205,554,864
2315	102,838,566
2615	150,273,907
2890	14,281,450
Development and Misc.	25,983,420
Total Mine To Date	600,008,735

We are now involved in inventing our future, but this is an occasion to consider the past and marvel at the accomplishments of the thousands of people who have worked underground at San Manuel at one time or another.

Some were there for the long haul, many more simply came for the grubstake. All contributed to the building of the local economy and incalculable tax revenues to the state and nation.

We're here today because of the foundation they laid. In doing their job well, they made it possible for Magma to be a viable company today and for us to have jobs.

So, as we invent our future, let's not forget that continuity and the basis for our future — good orebodies, intelligently planned, responsibly operated and team-based safe and efficient work.

By Dee Durazo
Vice President and
General Manager, SMMD

Early in April, the underground mine passed another production milestone when we hoisted the 600 millionth ton of ore from the San Manuel mine.

This adds to our previously established world record for ore hoisted through vertical shafts and again highlights the San Manuel underground mine as one of the largest underground mines in the world.

We are, in fact, the second-largest underground copper mine in the world in terms of annual production, behind Codelco's huge El Teniente mine in Chile.

We can all be extremely proud of this achievement, and I congratulate and thank

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Common sense went out the window on Grand Canyon smog

Commentary
By Bill Epler
Staff Reporter

Ain't politics great — or at the least, selective?

For years people have been protesting about the haze that cuts visibility in the Grand Canyon, sometimes drastically.

For years, experts — as well as common sense — knew where that haze is coming from, but have been stymied about what to do about it.

The obvious source — southern California's millions of people and their vehicle-jammed freeways. Studies have shown the canyon gets its air movement primarily from 2 directions — from the northwest in fall and winter, from the southwest in spring and summer, when canyon air pollution is particularly severe.

Air flow from the northwest is from Oregon across hundreds of miles of mountains and deserts with little or no population. Air flow from the southwest is across only 250 miles of desert from the southern California megapolis that stretches from Los Angeles southeastward to San Diego.

That scenario was proposed and demonstrated in 1990 by Warren White, an air pollution expert, and fellow chemist Edward Macias, both at Washington University in St. Louis.

Proponents in the Environmental Protection Agency and the National Park Service, thinking on a properly and politically correct grandiose scale, thought they might be able to preserve a route for clean polar air to reach the canyon.

That plan, however, would limit development and pollution along a wide corridor from Oregon and northern California across Nevada and part of Oregon. It takes little imagination to guess what the response of those states would be.

But an analysis released in late May by White, who continues to research the haze problem at the canyon, shows that in the summer, when the haze is at its worst, the prevailing wind brings smog from southern California. And, allowing a day or 2 for traveling time, intensity of the pollution parallels the peaks and valleys of air pollution readings in that segment of California.

Limiting pollution in the southwest corridor would be much more difficult, and that's bad news for the West's most popular national park.

A symbol of Western problems

"At one mile deep and several miles across, the Grand Canyon holds a big enough chunk of air that it seems like you're looking at the sky," White said. "Just like the Statue of Liberty is a symbol of our immigration policy, the Grand Canyon is a symbol of the problems of visibility in the West."

The haze does more than spoil the view for tourists, White said.

"We're looking at trouble for the soul of the West," he said. And if the problem is bad now, "How are we going to deal with the expected population increase?"

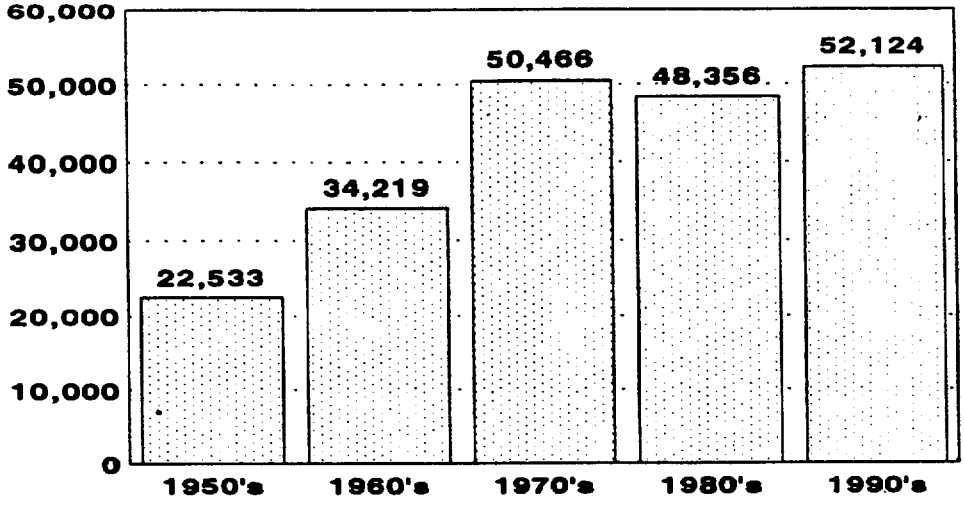
Despite the obvious, bureaucrats and environmentalists went hunting for someone else on whom to blame the smog, guilty or not, to make the electorate think they were doing "something." The ideal solution, to their way of thinking, was to find a group with few in number and deep pockets.

Bingo! They found an ideal victim — Arizona Public Service Company and a group of other utilities that own the coal-fired generating plant at Page, a hundred miles or so upstream on the Colorado River from the canyon. They had lots of money to cut air emissions and could recover it from their customers.

Not being very well informed and always willing to believe anything derogatory about those "big, bad, customer-screwing" utilities, the power consumers would blame them for "gouging" rate increases. That sort of arrangement is always the regulator's and taxman's dream.

So in 1990, as part of a devious scheme, the National Park Service (NPS) prevailed upon Arizona Public Service, as managing part-

Average tons per day hoisted



600 million . . .

all the employees whos efforts helped achieve this new record.

Achieving this kind of production truly is a team effort. All phases of our operation, underground mine and concentrator operations, maintenance, planning, engineering and safety, are integral parts of producing copper safely and efficiently at a competitive cost.

The fact that the San Manuel electrolytic operation is still a viable part of Magma Copper Company is testimony to the hard work and achievements of employees in improving performance.

In addition to increasing our tonnage record, this improved performance has resulted in a year-to-date cash mining cost of $3.46 per ton.

This places us among the lowest-cost-per-ton underground mines in the world, a significant achievement itself.

I acknowledge the efforts and contributions of all employees and look forward to continuing our record-setting achievements.

Production over the last 38-plus years represents a long history of tenacious determination which began in 1944 when Magma Copper Company exercised the purchase option on the San Manuel orebody and other adjoining claims.

When production began in 1955, I'm sure everyone was excited and anticipating the opportunity for many years of employment. In fact, we have 68 employees currently working at the mine-site who began their careers at the San Manuel mine in the 1950s.

One of the reasons I'm exciting about the achievement of 600 million tons is because our joint union-management efforts have made continued operation of underground mining at Magma possible.

A tribute to these JUMC efforts is that just like in the 1950s, we can today be excited and anticipate our opportunity for many years of employment.

NEWS RELEASE

from: MANNING, SELVAGE & LEE, INC.
Sixth Floor 666 Fifth Avenue, New York, N.Y. 10019
(212) JU 6-2600
Contact: Molly Fosburgh

for:

SMELTER CONTROL RESEARCH ASSOCIATION, INC.

Contact: Robert H. Ramsey
Newmont Mining Corporation
300 Park Avenue
New York, N. Y. 10022
(212) PL 3-4800

FOR IMMEDIATE RELEASE

NEW YORK, March 19, 1974 -- The Smelter Control Research Association, Inc. (SCRA) today announced plans to conduct a pilot-plant investigation of the ammonia double-alkali process for removal of sulfur dioxide from copper reverberatory furnace gas. The plant will be constructed on the property of Magma Copper Company in San Manuel, Arizona. (Magma is a wholly owned subsidiary of Newmont Mining Corporation.)

This will be the second pilot-plant investigation of sulfur dioxide control processes undertaken by the association. Designed specifically to test the ammonia double-alkali process, with modifications, the pilot plant also will be capable of testing other soluble scrubbing systems for control of sulfur dioxide in stack gas emissions of copper smelters.

Stearns-Roger Incorporated, of Denver, Colorado, has been awarded the contract for construction, which is scheduled for completion in the first quarter of 1975.

(more)

The association's initial investigation was on the wet-limestone scrubbing process. After intensive pilot-plant testing, SCRA concluded that, at its present state of development, wet-limestone scrubbing is not a reliable method for removal of sulfur dioxide and that it would be more productive to devote the association's efforts to other processes that offer promise of greater reliability and improved sulfur dioxide recoveries.

In developing programs for further pilot studies, processes based on ammonia scrubbing were given priority because they had been used in smelter gas control and were known to provide high sulfur dioxide removal efficiencies. Ammonia scrubbing processes used to date, however, produce large tonnages of soluble ammonium salts that cannot be discarded and for which markets, particularly in the Western States, are severely limited.

Preliminary testing of the ammonia double-alkali process by the association at its wet-limestone pilot plant in McGill, Nevada, indicated that the process offered a possible means of utilizing ammonia scrubbing technology without production of large quantities of environmentally unacceptable by-products.

In the ammonia double-alkali process, according to Dr. Ivor Campbell of Clyde Williams and Company, Columbus, Ohio, technical director of SCRA, limestone is added to regenerate the scrubbing solution and produce a disposable product similar to that produced by the wet-limestone process.

(more)

Dr. Campbell said that the ammonia double-alkali process incorporates the major advantages of wet-limestone scrubbing but, because the limestone regeneration step takes place outside the scrubbing, many of the operating and mechanical problems associated with the latter process are avoided.

SCRA, a non-profit association, was founded in February 1971 by a group of U. S. copper companies to conduct research, sponsor investigations and studies, and engage in pilot-plant testing of processes for the removal of sulfur dioxide, particulate matter and other emissions from the stack gas of metal smelters. Its efforts supplement extensive research on control of smelter stack emissions by individual member firms and others concerned with environmental problems associated with these emissions.

The member companies are American Smelting and Refining Company, Cities Service Company, Copper Range Company, Inspiration Consolidated Copper Company, Kennecott Copper Corporation, Newmont Mining Corporation and Phelps Dodge Corporation.

Copies of SCRA's report, "The Removal of Sulfur Dioxide from Copper Reverberatory Furnace Gas by Wet-Limestone Scrubbing," can be obtained by sending a check for $5 to: Smelter Control Research Association, Inc., Sixth Floor, 666 Fifth Avenue, New York, N. Y. 10019.

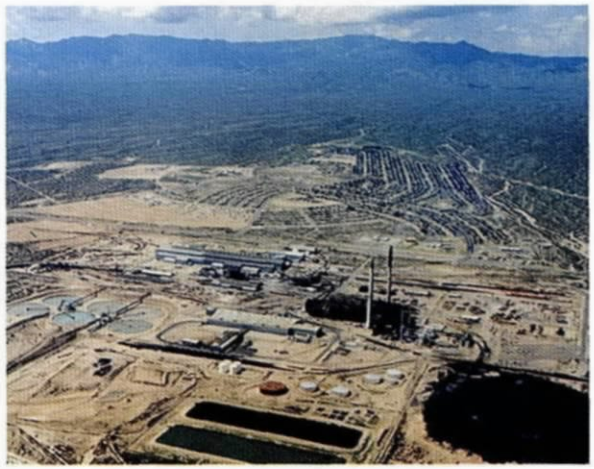
# # #

MAGMA COPPER

MAGMA COPPER COMPANY
A Subsidiary of Newmont Mining Corporation
San Manuel, Arizona 85631

The San Manuel Division

The San Manuel Division of Magma Copper Company is a place of superlatives. There are perhaps larger mines, concentrators, smelters, or refineries elsewhere in the world. But, putting them altogether at one location along with ancillary operations, creates a unique large-scale yet highly efficient industrial plant. Here are some vital statistics:



Ore Reserves: Over one billion tons at average grade of .7% (Approximately 14 billion pounds of copper!).

Ore Production: Hoisting over 60,000 (expanding to 75,000) tons per day.

Concentrator: 13 grinding sections (expanding to 15) processing over 60,000 tons per day.

Smelter: Annual capacity of 900,000 tons per year of concentrate.

Acid Plant: Production, 1500 tons per day; Capacity, 2000 tons per day.

Refinery: 200,000 tons per year; copper 99.98% pure.

Rod Plant: 125,000 tons per year 5/16" continuous cast rod (A second rod plant is included in our expansion).

Employes: Over 4600.

The Mine

The San Manuel Mine is an outstanding example of deep level block caving of a disseminated porphyry copper deposit. Since initial production in 1956 (through 1974), over 200,000,000 tons of ore have been mined and hoisted from levels as deep as 2675 feet underground.

The mine has four production shafts and three supply shafts that service the vast underground network of drifts outlining ore panels on three production levels.

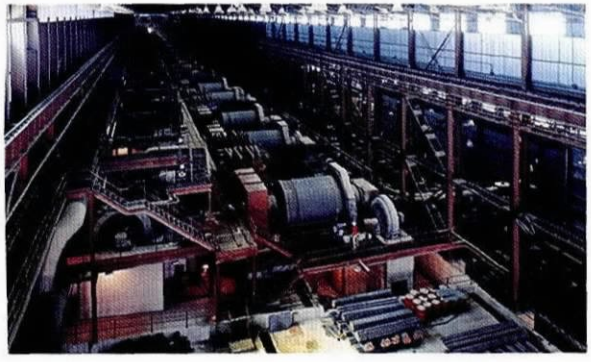
Engineering objectives at the mine include coordination between production, development, maintenance, and service operations; improved performance of mine ventilation and air conditioning systems; continuous improvement of equipment; development of more efficient mining techniques; and to take advantage of every opportunity to mechanize and/or automate a standard operation.

The Concentrator

The hoisted ore receives primary crushing at the mine site and is hauled over a seven-mile railroad for secondary and tertiary crushing at the plant site.

The crushed ore is fed to thirteen grinding sections followed by eight flotation sections. Rougher concentrates are reground and cleaned twice. The recleaned concentrate is subjected to a copper sulphide—molybdenum sulphide separation. Gold and silver are leached from the molybdenum sulphide concentrate.

Copper concentrates are sent to the smelter and molybdenum concentrates are sold directly to consumers.



Concentrator tailing is contained in dams, using cyclone classifiers to build retaining berms. Concentrator water is reclaimed and recycled at 28,000 gpm.

The concentrator responsibilities also include preparation of flux for the smelter, any required neutralization of acid produced by the smelter, calcining limestone for process needs, domestic water systems, and divisional maintenance.

Concentrator supervisors are constantly striving to improve metallurgical, mechanical, and labor efficiencies.

The Smelter

Three green-feed reverberatory furnaces have capacity for treatment of up to nine hundred thousand tons of concentrate per year. Copper matte is converted to blister copper in six Pierce-Smith converters. The converters are equipped with watercooled hoods and totally closed gas collection systems.

These collected gases are processed in a contact sulfuric acid plant where the SO_2 in the gases is converted to sulfuric acid.

Blister copper is refined and cast into anodes using four anode furnaces and two casting wheels with a capacity of 60 tons per hour.

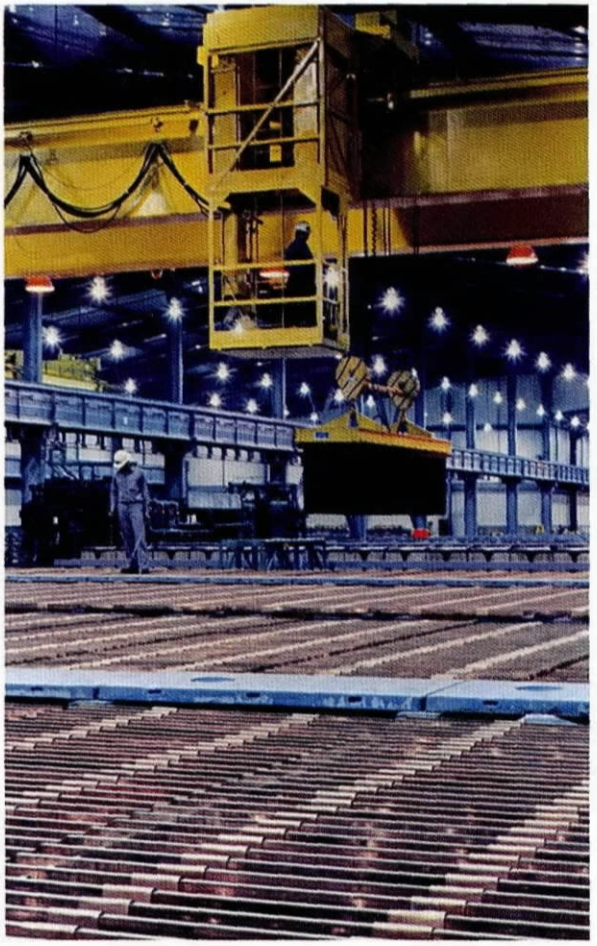
Waste heat is utilized to generate up to 20% of the Division's electric power requirements for both operating and emergency use.

Close integration of operations with the electrolytic refinery and sulfuric acid plant are necessary at this modern copper smelter, and, here metallurgists and engineers are constantly seeking improved metallurgical controls and operations efficiencies.

Electrolytic Refinery

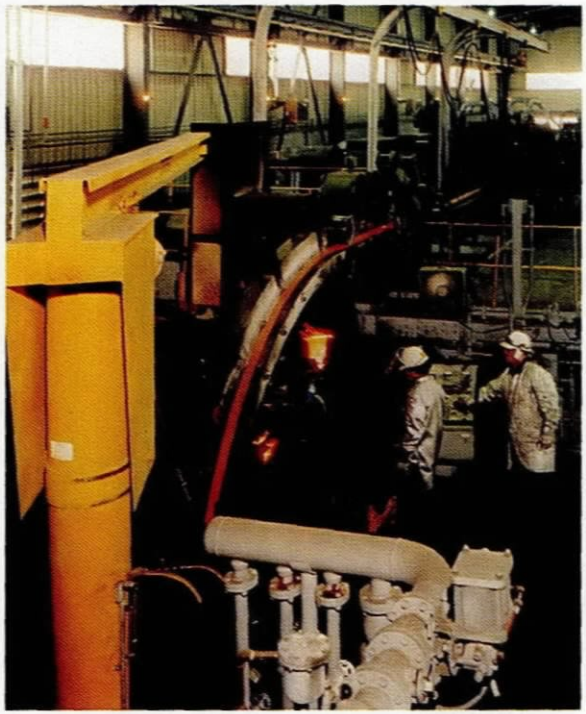
The San Manuel electrolytic refinery is the latest addition to the highly integrated operations at Magma Copper Company. Design of the refinery incorporates many features directed to attainment of high operating efficiency and exceptional product quality.

Automation and mechanization simplify operations and material handling. Extensive use of stainless steel, polyvinyl chloride, and a controlled environment are features of this modern tankhouse.



Continuous Rod Casting

Modern technology has provided the continuous casting and rolling process to produce the high purity redraw rod—the raw material for the wire and cable industry.



Melted cathodes are cast into a 5-square inch bar which is drawn through a 12-stand rolling mill at rates up to 35 tons per hour. The 5/16″ diameter finished rod spins through the coiler at 4500 feet per minute.

Two basic coils are produced—a 16,000-pound laid coil for truck transport and an 8,000-pound packaged coil for rail shipment.

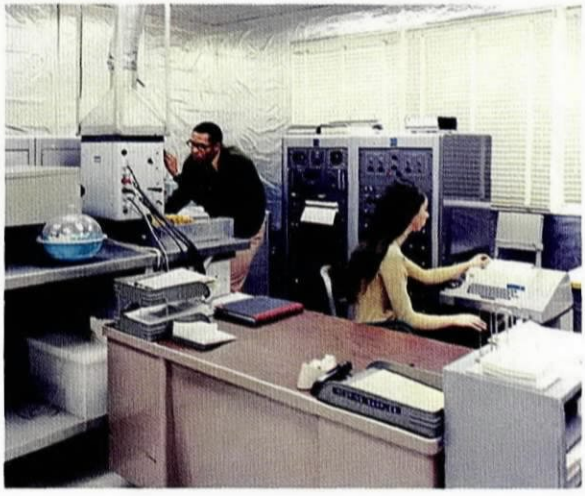
At Magma, engineers have achieved world records in operating the casting equipment while maintaining the Company's well-established record of high quality.

Metallurgy

Three well-equipped metallurgical laboratories support San Manuel operating divisions.

A production assay laboratory performs up to 75,000 determinations each month with x-ray fluorescence spectrography backed up by atomic absorption.

A Quality Control testing lab is located at the rod casting plant. Here technicians examine each coil for tensile strength, malleability, conductivity and for oxygen and sulfur content.



A larger QC lab contains an emission spectrograph, electron microscopes, gas chromatographs, and wet lab facilities.

Laboratory functions are computerized and data is reported at production control sites.

While most metallurgical operations are production-oriented, a continuing program of applied research is required and encouraged.

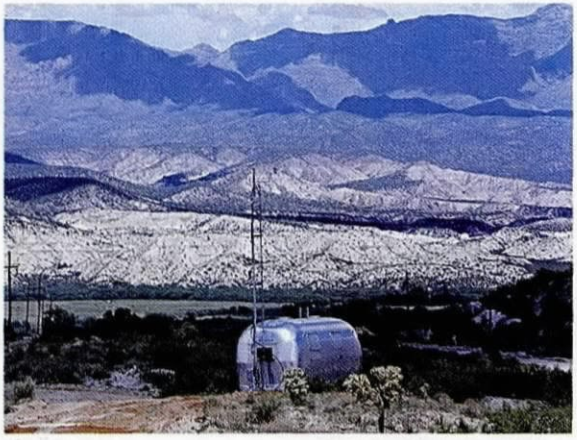
Environmental Control

Air quality is a major concern at San Manuel and a two-phase control program consists of a sulfuric acid plant and an air monitoring system.

The sulfuric acid plant treats converter gases, containing sulfur dioxide. The gases are scrubbed and dried, converted to sulfur trioxide and absorbed by strong acid. Capable of producing 2000 tons per day of acid, the plant achieves up to 96% control over converter gas for an overall smelter control of up to 70%—well within existing state and federal ambient air standards. New electrostatic precipitators meet particulate standards.

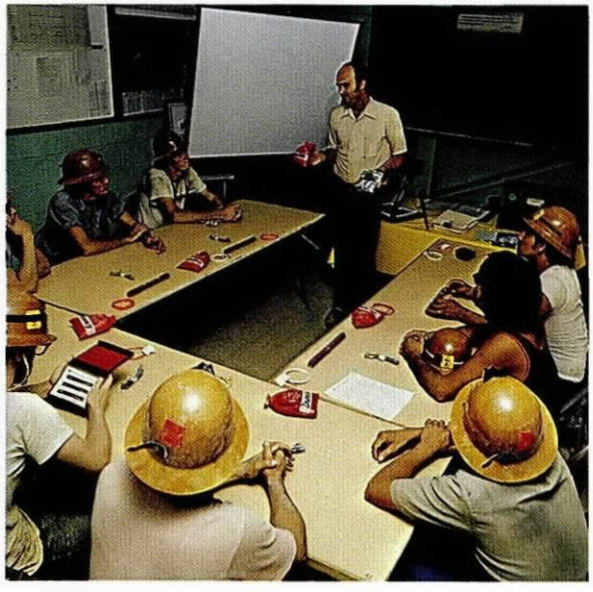
Even so, ambient air quality in the smelter's area of influence is continuously monitored by eight remote sensing stations which report every three minutes by radio the local weather and sulfur dioxide concentrations.

Should air quality conditions begin to deteriorate, action can be taken to curtail gas producing smelter operations to prevent violations of ambient air standards.



Safety Program

An aggressive program to prevent injuries through safety training and enforcement of safe practices is conducted by a growing, professional level, staff. The Plant is constantly being monitored for opportunities to engineer-out avoidable risk.

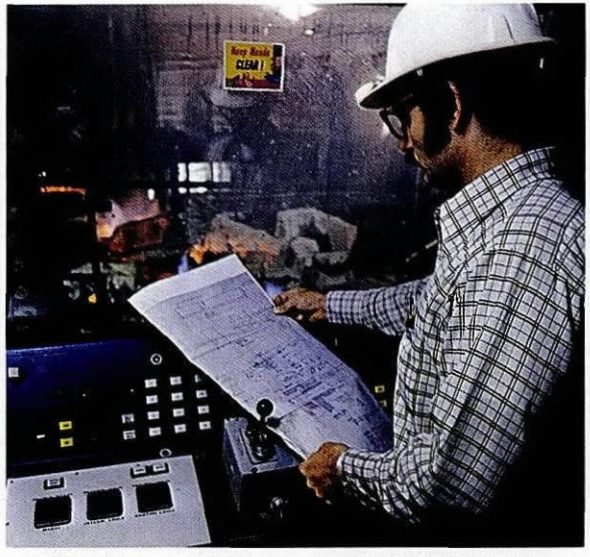


Engineering Services

The Engineering and Technical Services Department provides technical support to sustain the production operations of the mine, plant, and ancillary facilities.

This function requires expertise in the areas of plant design, equipment design, material handling systems, maintenance and economic feasibility study. The mechanical, electrical, civil, structural mine and industrial engineering disciplines are utilized extensively to accomplish technical support.

All contractors on construction projects are under control of the Engineering and Technical Services Department.



San Manuel Townsite

The Magma-owned and operated community of San Manuel is a unique and outstanding example of the company-town concept. By insisting upon the highest standards of planning, residential construction, and commercial development, San Manuel has matured into a pleasant residential community ideal for family living.

Schools, churches, parks, athletic fields, tennis courts, swimming pools, and a golf course are available here for recreation. In addition, boating, hunting, fishing, camping, skiing and other outdoor activities all can be found throughout Arizona and cultural activities are as close as Tucson and Phoenix.

Medical Care

Medical care at the San Manuel hospital is free for resident employes and their families. Specialized treatment at Tucson hospitals as well as medical care for non-resident employes is provided by a generous insurance plan provided at no cost to all employes.

The company-owned San Manuel hospital is a fully-accredited, modern general hospital with a full staff of doctors and nurses. In-patient, out-patient, and emergency services are provided for the community.

Other Employe Benefits

Life Insurance... Free coverage.

Retirement... Free and non-contributory.

Vacations... Paid vacations of two weeks are given after the first year. Nine paid holidays are taken yearly.

Industrial Insurance... Workmen's Compensation insurance covers on-the-job injuries and provides extended salary protection and other benefits.

Tuition Assistance... Employes may qualify for refunds of costs of college-level studies which add to their skills in their specific job assignment.

The Superior Division

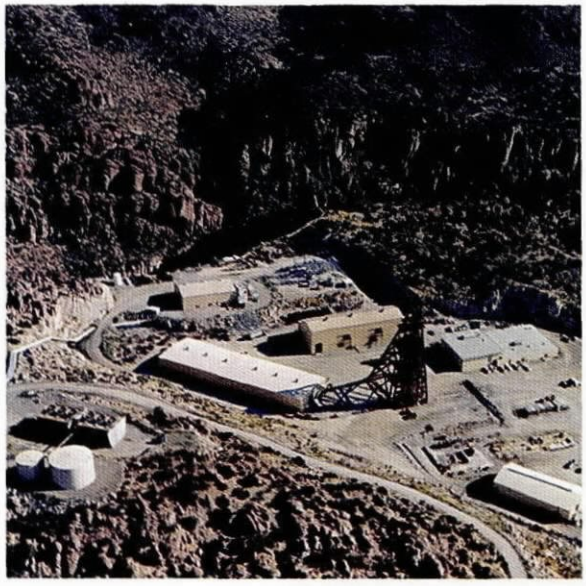
Located 60 miles east of Phoenix, Magma's Superior Division completed a new shaft, plant, and concentrator in 1973, bringing new life to this historic mining district.

The Magma mine, started here in 1910, is one of the few "high grade" copper mines remaining in the United States today and has current reserves of 10,000,000 tons at an average grade of 4% copper.

The new facilities include a 22-foot diameter concrete-lined shaft 4860 feet deep, a new mine yard and shops, a two mile-long haulage tunnel and an expanded and modernized concentrator.

At Superior, now producing 3000 tons of ore per day and programmed to increase, the engineering challenges include the mining techniques involved in extracting pods of enriched sulfide ore from limestone replacement beds, the use of refrigerated air conditioning in stopes, the continuous refinement of mining equipment, and an endless search for new ore.

With approximately 1100 employes, Magma's Superior Division offers closely-knit relationships, and the opportunity to work in a classical underground situation with veteran miners.



The Superior Concentrator

A closed circuit crushing plant consisting of primary, secondary and tertiary crushers handles run of mine ore and crushes it to a size suitable for ball mill feed.

Four, wet, single-stage grinding sections, and one froth flotation circuit treat mine production on a daily basis. Final tailings are classified through cyclones; the coarse fraction is mixed with cement and used underground for sandfill and the fine portion is deposited in tailing dams. Concentrates, after filtering, are sent to the San Manuel Division Smelter for further processing.

Challenges to Metallurgists and Engineers exist in areas of mechanization and automation, preventive maintenance and equipment, and achieving the highest possible mineral recovery.

Engineer Training

At Magma Divisions at both San Manuel and Superior, the engineer training programs give opportunity to gain invaluable work experience in any or all phases of mining or metallurgical operations, or in a selected engineering field.

GEOLOGY OF THE SAN MANUEL MINE

ROCKS

The San Manuel orebody is a disseminated copper deposit in quartz monzonite, monzonite porphyry, and diabase.

Quartz monzonite, which is Pre-Cambrian[1] in age, is exposed in an area including No. 1 and No. 4 shafts and extending about 2,400 feet southeast from No. 1 shaft. It is also exposed in the bottom of No. 2 shaft and in a zone roughly 500 to 1,200 feet southeast of No. 2 shaft having its long dimension along a northeast-southwest axis. Churn drilling has shown all these exposures to be parts of a contiguous mass of quartz monzonite lying within and beneath the ore zone.

Late Cretaceous[2] monzonite porphyry comprises the bulk of the remaining rock encountered below the conglomerate. In general, the porphyry occurs in two large masses that are separated by a projection of quartz monzonite south of No. 2 shaft. The porphyry masses converge to the east. The north area of porphyry is a sheet-like[3] mass lying above quartz monzonite. The south area has not been bottomed by any drilling south of the orebody and may be a stock.[4] Monzonite porphyry also occurs as dikes cutting quartz monzonite. These dikes become more numerous with proximity to the larger masses of porphyry and generally trend northeast-southwest.

Several diabase dikes, intrusive into quartz monzonite and monzonite porphyry, have been exposed in the mine openings. All the diabase dikes are mineralized similarly to the rocks they intrude.

---

[1] References and notes appear at the end of the paper.

Andesite porphyry dikes have been noted in a few instances. Some of these dikes are unmineralized while others are lightly mineralized with pyrite. The mineralization and hydrothermal alteration in all cases are of a different character than that of the intruded rock. Andesite porphyry is probably, as Schwartz[5] suggests, the intrusive equivalent of the lava flows of the Cloudburst formation, the mineralization being of a later age than the ore mineralization.

The Cloudburst formation was cut by No. 3A and No. 3B shafts and by drifting on the westernmost part of the 1475 Level. This formation contains two members. The upper member is a conglomerate made up mainly of quartz monzonite fragments but containing some fragments of all the older rocks in the area. The matrix tends to be arkosic, but granitic sand and gravel are not uncommon. The conglomerate is poorly cemented but relatively well sorted compared with the overlying Gila(?) conglomerate, having beds of sand and gravel alternating with beds of larger boulders. Slickensides are frequently seen on bedding planes. Tuff beds are found in the conglomerate and in the underlying member which is composed of interbedded flows, flow breccias, and conglomerate. Where not distorted by drag adjacent to the San Manuel fault, the average strike of the conglomerate is N 5° W and the average dip is 30° to the east.

The contact of the Cloudburst formation with the overlying Gila(?) conglomerate in No. 3A shaft was an unconformity. In No. 3B shaft the contact was marked by an irregular tuff bed but here, and in the exposures of this contact on the 1475 Level, the bedding of the two formations is parallel or very nearly parallel and, in the 1475 Level exposures, it was not possible to pin-point the exact contact due to the similarity of the two formations.

A small tuff bed near the bottom of 3A shaft was mineralized with pyrite and a trace of chalcopyrite. This mineralization is later in age than the ore mineralization since the Cloudburst formation is not mineralized where it is seen in depositional contact with mineralized porphyry on the surface.

Rhyolite dikes were intersected in several places on all the levels of the mine. Rhyolite is not mineralized by hypogene copper minerals but is occasionally stained by migratory chrysocholla where the dike is in, or close to, the zone of oxidation. Chlorite was noted coating joint faces of several rhyolite dikes. Rhyolite dikes are known from surface exposures to intrude the Cloudburst formation but do not intrude Gila(?) conglomerate.

Gila(?) conglomerate was cut in the upper parts of shafts Nos. 2, 3A, and 3B, and on the 1475 Level southwest of No. 2 shaft. Fragments composing the upper portion are derived mainly from basic flow rocks while the lower beds are derived from granitic rocks. The Gila(?) conglomerate contains no hypogene mineralization or alteration. The average strike is N 50° W and the average dip is 35° to the northeast.

STRUCTURE

The oldest of the important post-mineral faults is the San Manuel fault. In its underground exposures, this fault has an average strike of N 66° W and an average dip of 26° to the southwest.

Typically, there are from one to three feet of red gouge and slickensides on the fault surface. On the footwall side, immediately beneath the red slickensides, are from five to fifteen feet of gray gouge

with irregular slick faces aligned more or less parallel to the fault and sometimes containing harder fragments with slightly rounded edges. Beneath the gouge, the underlying rock is badly fractured and grades into less fractured, normal rock about 50 to 100 feet below the fault surface.

The conglomerate found in the hanging wall in exposures east of the Hangover fault is not badly disturbed but contains a few small slips close to the fault surface. West of the Hangover fault, besides showing small slips adjacent to the San Manuel fault, the Gila(?) and Cloudburst conglomerates show considerable drag for a distance of 300 feet above the plane of the San Manuel fault.

There are a number of faults which strike N 20° W to N 25° W and dip steeply to the east. These faults exhibit varying amounts of normal fault movement and are younger in age than the San Manuel fault. The most important of these are known as the East fault, the West fault, and the Hangover fault, the latter being in reality a zone of faulting.

A large reverse fault lying between the north and south limbs of ore was intersected by drifting on the 1475 and 1415 Levels. This fault, which is known as the Vent Raise fault, strikes N 59° E and has a dip which varies from vertical to about 70° to the southeast. On the 1475 Level, the Vent Raise fault cut the East fault or a branch of the East fault and is therefor considered to be younger than the northwesterly striking, easterly dipping system of faults.

MINERALIZATION AND HYDROTHERMAL ALTERATION

The ore lies within a mineralized zone having a width on the

order of 8,000 to 9,000 feet and a known length in excess of 9,300 feet. To define ore, an arbitrary assay cut-off of 0.50% copper is used.

The upper and western portions of the orebody are separated into two branches by an area of lean, weakly altered hanging wall rock. These two branches converge at depth so that, in cross section, they may be likened to a "U" or "V" leaning to the northwest. The northwesterly limb of ore is referred to as the North orebody and the southeasterly limb as the South orebody.

The North orebody has a strike of about N 60° E and dips approximately 50° to the southeast. The western portion of the South orebody has a strike very nearly parallel with that of the North orebody, or N 60° E, which gradually swings about to the east where the strike is approximately N 45° E. The dip of the South orebody is variable, the upper portions dipping southeast, and the lower portions arching under to the northwest and joining the North orebody. To the east, the central area of lean material gradually diminishes to a core and then disappears as the two limbs join to form a single mass of ore.

The main primary minerals are chalcopyrite, pyrite, and quartz, with minor amounts of molybdenite. These minerals are distributed quantitatively into three zones which are known as the ore zone, the hanging wall zone, which lies between the North and South orebodies, and the footwall zone, which surrounds the ore and hanging wall zones.

The ore zone, which averages approximately 0.80% copper, contains most of the chalcopyrite, quartz veinlets, and molybdenite. Pyrite is present in about equal proportions to chalcopyrite. The yellow sulfides are finely disseminated through the rock but also appear as veinlets or, more often, scattered on fractures. Molybdenite usually forms a

slick coating on fractures or accompanies quartz veinlets and is present in sufficient quantity to be recovered metallurgically. The ore zone is altered by a "sericite-pyrite-chalcopyrite"[6] type alteration which is recognized in underground exposures by the moderate gray color of the rock, the presence of altered but easily recognizable biotite, and the presence of pyrite and chalcopyrite in moderate quantities.

The hanging wall zone is simply a lean version of the ore zone with lesser amounts of all the primary minerals. This zone is gradational with the ore zone and the amount of mineralization is dependent on the distance from the ore zone. Alteration here is classed as "marginal biotite"[6] type and is recognized by the dark gray appearance of the rock, fresh-looking biotite, and weak pyrite-chalcopyrite mineralization.

The footwall zone is radically different from the ore zone except for the area where it grades into ore. Pyrite is the chief mineral here and occurs in much greater quantities than in the ore zone. The strongest pyrite is found south of the ore zone where it composes about 10% to 20% of the rock by weight. North of the ore zone the pyrite content is somewhat less and gradually diminishes to a very small amount about 1,500 feet north of the ore zone. Chalcopyrite is rarely seen in the footwall zone, and then usually as a tarnish on pyrite. Quartz veinlets are very rare and molybdenite does not occur in visible quantities. The footwall zone is altered by "hydromica-pyrite"[6] type alteration which is characterized by the light gray appearance of the rock, absence of recognizable biotite, and the abundance of pyrite.

A distinctive chlorite[7] alteration occupies an irregular zone within the South orebody, having its long dimension in a northeast-southwest direction, parallel to the long dimension of the South orebody,

The chlorite is found chiefly as a coating on fracture surfaces which is locally very strong, and, in a few places, permeates the rock.

It was originally thought that a close relationship existed between chlorite alteration and the better grade of copper mineralization. A comparison of this zone of chlorite alteration with the better than average grade ore shows many broad similarities, though not always in detail. Due to the fact that chlorite also alters post-mineral rhyolite, it is believed that any similarities that exist are due to a mutual structural control rather than a mutual source of mineralization.

Ore occurs similarly in quartz monzonite, monzonite porphyry, and diabase, in a zone which is roughly coincident with the contact of the large sheet-like mass of monzonite porphyry with the intruded quartz monzonite. This relationship does not hold true at the eastern end of the orebody but here the ore is diminishing in cross-section. It is difficult to relate the ore directly with the intrusion of porphyry since it shows no preference for either rock and does not occur similarly where the large mass of porphyry to the south intrudes quartz monzonite. It may be theorized that the similarity in shape of the sheet-like mass of porphyry and the ore zone, as well as the later chlorite alteration, may be due to a mutual, though unknown, structural control.

OXIDATION AND SECONDARY ENRICHMENT

The upper portions of the orebody, with the exception of the western end, and much of the central lean hanging wall zone have been oxidized or partially oxidized.

The chief minerals resulting from oxidation and enrichment are

chrysocolla, chalcocite, and various iron oxides. Cuprite, native copper, and black copper oxides are frequently seen where the oxidized zone grades into the chalcocite zone. Copper carbonates are very rare, only one small specimen of malachite having been recognized in all the drifting that has been done.

In order to better understand the overall oxidation pattern of the area, as mine openings and diamond drilling make more data available considerable thought has been directed toward separating and classifying stages and types of oxidation.

It is possible to separate oxidized rock into two general types depending upon the color that the iron oxides impart to the rock.

The first type, identified by a deep red or reddish-brown color, is seen at the surface, in the upper parts of shafts No. 1 and No. 4, and in diamond drill holes extending above the top of the sulfide ore at the east end of the South orebody.

This type of oxidation which comprises much of the oxidized ore zone, with the chief ore mineral being chrysocolla, is characterized by complete or nearly complete oxidation of the copper minerals and a relatively sharp line of demarcation between the oxide ore and the underlying sulfide. The absence of leaching and migration of copper from the oxidized zone to form an appreciable enriched chalcocite zone is quite marked in the San Manuel orebody. Thus, the chalcocite zone with variable amounts of oxidation and local enrichment is not important tonnage-wise so that, metallurgically speaking, the ore can be mined as clean sulfide with a minimum of mixed sulfide-oxide ore.

Oxidation of this type occurred in at least three stages: first, during the erosional cycle preceding deposition of the Cloudburst

formation; second, during the erosional cycle preceding deposition of the Gila(?) conglomerate; and, third, during the present erosional cycle. Much of the oxidized ore explored by churn drilling in the central and eastern portions of the mine is probably "red" type oxidation.

The second type of oxidation is characterized by the yellow to tan color of the rock which is probably due to a lack of hematite and the presence of limonite and goethite[8] and is typical of all the oxidized ground encountered in the deeper mine openings. Oxidation of the sulfides is not always complete and many rather large areas of primary sulfide rock or partially oxidized rock are surrounded or nearly surrounded by "yellow" type oxidation. The outer margins of this oxidation generally contain chalcocite as well as primary sulfides and much iron oxide stain, but very few oxide copper minerals. Enrichment is very slight, if any. The copper content is usually not increased to any marked degree and occasionally is less than that of the primary ore. Chalcocite, and sometimes native copper and cuprite, occur along the top and sides of deep tongues of this "yellow" oxidation in about the same quantities in which they are found beneath them so that there is often an inversion of the normal sequence of oxidation with primary ore lying above secondary ore which in turn overlies oxidized ore.

Deep tongues of "yellow" oxidation are known to follow rhyolite dikes, the San Manuel fault, and other northwesterly-trending post-mineral faults. In some cases no structural control is evident but it may be surmised that the path of oxidation was controlled by local differences in permeability of the rock.

This type of oxidation invades the sulfide ore locally along certain faults and in some fringe areas, but has not been found to be of

particular economic importance. The intensity of oxidation of ore minerals and the volume of such material relative to the volume of sulfide ore is so limited that it does not affect stope layout or draw. The distinctive coloration and mineralogical characteristics do, in fact, provide a marker and guide for the stope engineers in evaluating their draw data in some instances.

"Yellow" oxidation extended much deeper between the two limbs of ore than in the ore itself and extended deeper than previous oxidations so that, in cross-section, the oxidized zone has the shape of a trough with its sides impinging on the two limbs of ore.

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J. D. Palletier
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