

CONTACT INFORMATION

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

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

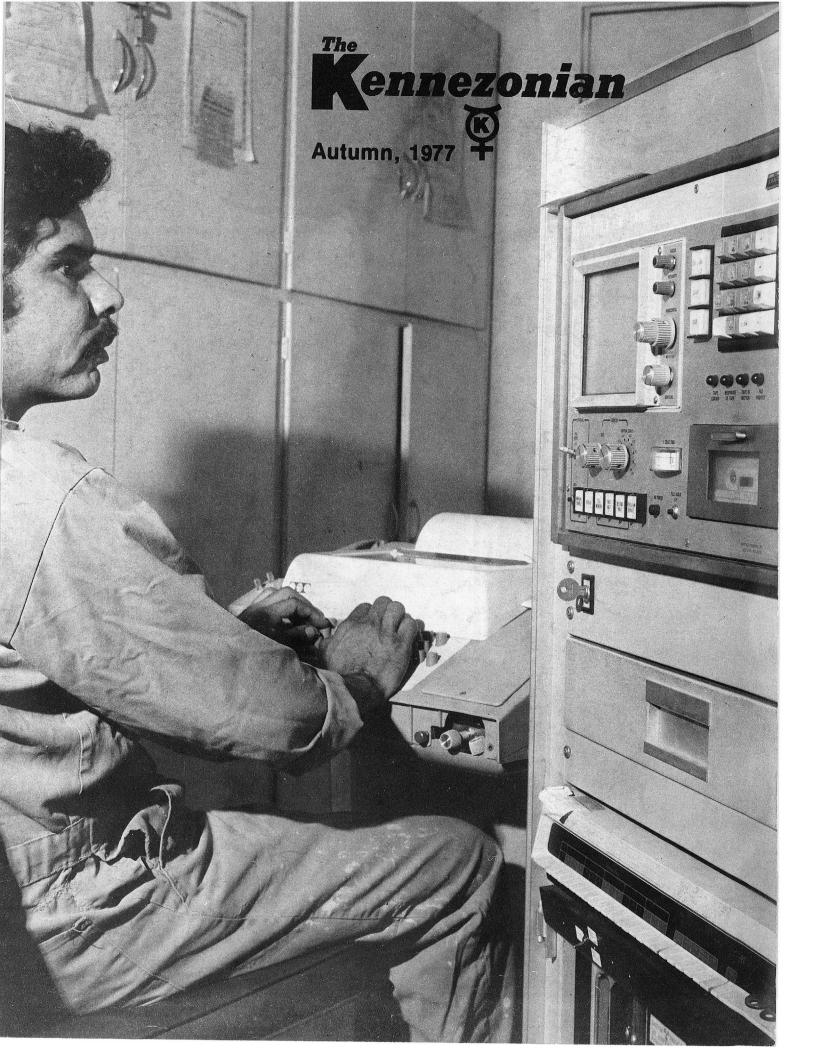
CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.



stories in BLACK and WHITE

Part I



A man looks rather insignificant beside the wheel of one of the division's new haulage trucks. Within the next four months, RMD will take delivery of six of these 3200B models of the Wabco Haulpak. This model is warranted to carry up to 250 tons and is powered with a 12-cylinder locomotive engine developing 2,475 HP. The dimensions are rather staggering: Width, 53 feet; height, 18 feet, nine inches; width, 24 feet, one inch; empty weight, 178 tons. Additional new mining equipment earmarked for RMD includes one more 120-ton truck and another 15-yard electric mining shovel.

The Second Annual Kennecott Golf League was held over a 10-week period at the Kearny Golf Club early this summer with 48 employees participating. The winning team wasn't decided until the last week showing how stiff was the competition. Members of the winning team with their trophies were, left to right: E. D. Lane, Concentrator Field Repair General Foreman; W. R. Strickland, Director of Quality Control; Abel Hinojos, RP Apprentice Maintenance Mechanic and C. V. Coffey, Division Personnel Representative.





As any of you who have been around the copper industry for any length of time know, it is a very cyclical business. Periods of rising on the crest of a wave of prosperity, followed by periods of 'bottoming-out.'

At this time, the industry, and your company, due in a great part to the glut of low priced foreign copper, as well as the general economic condition of the country, finds itself in very serious financial trouble.

This is not just something which has come about overnight. Ray Mines Division has not recovered from the serious losses suffered during the recession years which had their start in late 1974 and carried through 1976.

For example, even in those troubled years the price of copper never dropped below 60 cents a pound. At this writing the price of copper in the United States market has dropped 14 cents per pound in a four month period. In mid-May Kennecott's price for copper was 74 cents per pound. It dropped to the present 60 cents in four steps — three of them within a 37-day period. It is highly improbable that any U.S. producer of copper can sell his product at 60 cents a pound and show a profit.

Low copper prices and the great over-supply of copper world-wide are just one part of the problem.

Inflation, which has deflated the purchasing power of the dollar to an all-time low, is a major cause.

Spiralling costs, some brought on by inflation, are another major factor. As you find out every time you go shopping, the price of everything you buy is higher now than last year, or the year before, or the year before that. When Ray Mines Division goes "shopping" it faces the same problem on a much greater scale.

Wages are an important cost item to the Division. A job class 12 worker on July 1, 1974 had hourly earnings — before any overtime — of \$5.74. The cost to the Division, however, was \$7.66. The difference is in the "fringe benefits", which includes vacations, medical charges, holidays, etc. That same job class today costs the Division \$10.36 per hour, an increase in three years of just over 35 percent, while at the same time the price we receive for our copper has dropped even more dramatically.

What the future holds, no one can say. Right now, though, we must all work together to improve our productivity, minimize our losses and "keep afloat".

Remember, 10 minutes of wasted time each day, add up to more than a full week of work lost in one year.

Sincerely,

K. IJ. Watherf.

K. H. MATHESON, JR.



Published by
Kennecott Copper Corporation
Ray Mines Division
Public Relations Department
J. H. Maize, Director

CONTENTS

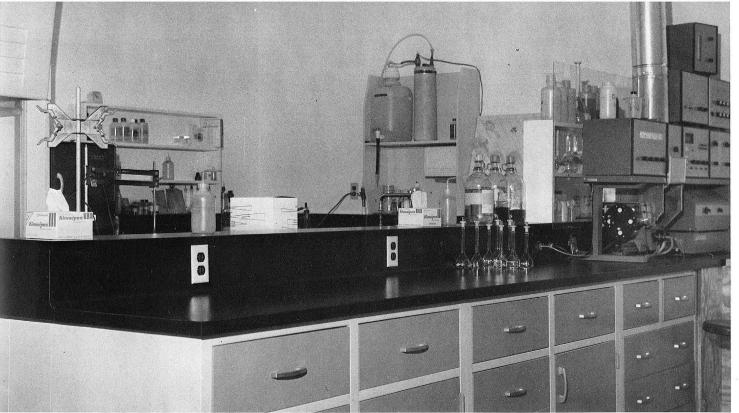
| Stories in Black and White, Part I | 2 |
|--|----|
| Quality Control Spells Service at Ray Mines Division | 4 |
| 20 Years Ago at RMD | 8 |
| 10 Years Ago in Copperland | 9 |
| Runaway Government on the Rampage | 10 |
| Stories in Black and White, Part II | 12 |
| The Martins Know What Time It Is | 13 |
| Salute to Seniority | 15 |

THE COVERS:

FRONT: Thousands of samples of Reduction Plant products are fed into this Energy Dispersion X-ray Analyzer [EDX] at the RP each month for assays. This is the computer section of the EDX with Sampler Technician Frank P. Pacheco ready to start the assay cycle with a signal from the teletype. This unit is programmable with high speed cassettes which extend its versatility and allows another department to use the computer section by remote control.

BACK: Robert D. Franklin, a Truck & Dozer Repair Shift Foreman at the Mines Plant, will soon join that elite group of active employees at the age of 65. These are our oldest employees in years, not necessarily in service. Franklin, who is now in his 18th year of service, has spent his entire RMD career in the MP Maintenance Department where he started as a Truck Mechanic. Back page photographs show him on the job with a dozer-ripper to be repaired and then at home checking a smaller piece of equipment — his pickup.

EDITOR: Norman B. Harrington



This is the new laboratory of the division's Analytical Services Department, located in the MP Administration Building. Remodeled from an office, it is a spotless new facility where testing and assaying equipment from several areas has been assembled in one convenient location.

Quality Control Spells Service at Ray Mines Division

A manager manages, a supervisor supervises, a director directs and quality control controls quality. Are all these statements true? No, only the first three: the fourth is false. Quality Control at RMD does absolutely nothing, by itself, to control quality.

RMD has a 54-man Quality Control Department headed by William R. Strickland who was asked to define the role of quality control at the division.

"There is no way you can define our activities as 'controlling quality.' Our job is to provide a series of technical services to division operations and management. One of the services we provide is the chemical analytical data to the operating people which is necessary for them to control and optimize the mining and metallurgical processes within the division. In optimizing these operations, the proper blend of maximum throughput, recovery and product chemical purity are assured. This is really quality control, and as you can see, it is physically done by the plant operators.

"From that standpoint, our department is misnamed."

Since mining, like almost every other industry, has been undergoing changes,

some radical, in the last decade, Strickland was asked if the current departmental philosophy reflected any changes from the past.

"As far as I am concerned, it should not. This should be our function. If the departmental philosophy has been other than that in the past, then yes, it is a departure.

"Our job is to provide a service to operating people and to management. When we quit doing that and start concentrating on other things, we're not doing our job."

Since Strickland has been intimately associated with metallurgy and quality control activities during his eight years at RMD, he was asked if the scope of departmental activities has changed materially in that time.

"Yes, it has. The scope of the work has changed, in that we're involved a good deal more in activities directly outside the realm of taking samples and making assays, which has historically been the function of the quality control department.

"At the present time, we're involved in assisting both plant and division managements in evaluating new processes and their application at Ray Mines Division. We provide the division representation on various corporate technical groups even though these technical areas may not be directly under the quality control department. For example, I serve on the corporate dump leaching task group and on the copper quality task group.

"Locally, we have been deeply involved in the Solvent Extraction Pilot Plant Test. We'll be involved in the Dump Leaching Solvent Extraction Pilot Plant and the Native Copper Pilot Plant when these come to pass.

"So what has happened is that division and plant management is taking more advantage of whatever technical capabilities we have in the department in terms of helping them do their job better and perhaps relieving the load from others. This only makes good sense. It's no secret that the entire copper industry is in serious trouble right now. Every possible avenue for improving our position must be explored and the talents of every individual, whether he is an operator, craftsman or metallurgist must be used to the fullest."

Strickland then voiced the opinion that "process monitoring" might be a more correct name for the quality control department. It was pointed out that some



Chief Chemist George W. Self, head of QC's Analytical Services unit, uses the division's pH and Millivolt Meter to check a water sample from some point around the mining operation. This unit with digital readout capability is used primarily to test water samples gathered from points outside the property by the Environmental Control technicians.

companies handle all such activities through a "metallurgical department."

"That's (a metallurgical · department) what we are, in part. Other companies who have this philosophy of technical service have combined all their quality control, metallurgical and division research facilities into one department. We have done this at the mines plant, where we recently combined quality control and leaching operations metallurgy into a single process control group. We still keep the concentrator and smelter metallurgy groups separate from quality control operations at the Reduction Plant. If these two groups were combined, we'd call the whole thing a metallurgy department, but I can't foresee that happening, at least not in the near future."

That statement immediately raised the possibility of duplication of efforts among the various groups concerned with metallurgy and/or quality control. Responding to such a question, the quality control director said, "There is very little duplication. Metallurgists at the reduction plant spend their time and effort in plant testing, evaluating what their plant is doing, looking at new processes, changes

in the present flow sheet — that kind of thing.

"Reduction Plant Quality Control doesn't do any of that kind of work. We assist them in their job with analytical work and other kinds of technical help where we can and when we are asked to, but we don't do any process research and development work on our own."

Now that we have a relatively detailed description of what the department does and doesn't do, let's look at the makeup of Quality Control in terms of manpower and womanpower.

There are three work centers with supervisors — Reduction Plant Quality Control, headed by H. J. Young; Mines Plant Process Control, headed by G. A. Jungenberg and Analytical Services, headed by G. W. Self.



Another invaluable tool of Quality Control is the Oxygen Analyzer at the MP. It is important to know the oxygen content of Silicate Ore Leach Plant cathodes and here's Spectroscopist Sandy Wade making such a determination. Shavings from cathodes are pelletized in sample preparation and these pellets are placed in this machine one at a time for individual assays.

Directly under these work center supervisors are four Reduction Plant quality Control supervisors and two Mines Plant Quality Control supervisors. These individuals direct the day and night activities of 39 employees, 20 of whom are daypay and 19 are salaried.

The department also utilizes the services of four other professional persons — a Spectroscopist, Anayltical Chemist, Senior Metallurgical Engineer and Systems Technician.

It is axiomatic that quality control work must always include sampling, weighing and assaving. Sampling provides the product for the laboratory, and sampling in an operation the size of RMD means lots of people power. In some cases. samples must be selected by hand, in other cases they may be collected by an automatic sampler, but each must still be collected, carefully identified and transported by people to the laboratory. In other areas, samples are collected by other people, but there are still the tasks of marking and transporting to be done. All this sample collection requires people and transportation around the clock.

Weighing is fairly well automated throughout the division from ore to anode, including molybdenite production. It still requires people to read and compile statistics from all these weighing devices and get that information to the right points.

Weighing of all products is vital to the division. It is constantly required by operating personnel and Metallurgical Accounting cannot function without it. The Comptroller's Department must have accurate reports from key points throughout the division in order to ascertain the amount and grade of all products so that income and expenses may be determined.

RP Assayer Frank Sandoval shows a tray of samples prepared for assays in the Energy Dispersion X-ray Analyser (EDX). Samples of almost all Reduction Plant products can be placed in the "lazy susan" carrier with the resulting individual assays fed to a teletype machine seconds after the machine has made the determination.





These Electro-Analyzers in the Mines Plant Quality Control Laboratory are probably the hardest working pieces of equipment at that location. Quality Control Technician Jesus G. Olmos, Jr. is shown running an assay to determine the purity of copper precipitate being shipped to the Nevada Mines Division.

Assaying of all samples taken represents a big share of the department's work load. Assaying today with modern electronic equipment cannot be compared with yesterday's method of wet assays at the bench, but it still takes time and people to keep the computerized equipment working at its fullest capacity. The determinations (assays) currently being made are surprisingly high. A total of 44,236 were completed at the Reduction Plant during the month of May. The environmental lab at the Mines Plant completed 1,572 that month and in the spectroscopy department, 11,511 separate determinations were made. Add to these totals another 30,000 from Mines Plant Quality Control and Metallurgy and the monthly total of determinations provided by the quality control department runs between 80,000 and 90,000.

In addition to all these assays, some 2,000 traditional wet assays will be done every month to provide input for the accounting department.

Sophisticated electronic equipment now in constant use at two of the division's quality control laboratories has the capability of working at about the rate of speed that a teletype machine can write out the information being sought from the sample. Samples of different material (ore, concentrate, slag) provide various assays depending on what information is being sought in the sampling procedure.

In other words, assays on as many as a dozen elements might be sought from some in-process samples, while only a half-dozen or less answers would be expected from ore.

As an example of what might be shown on an assay, the machine would show amounts of copper, iron, molybdenum, silica, insoluble material, magnitite, magnesium, calcium, aluminum, sulfur, gold and silver. The division's assaying devices are so versatile that they can be programmed to provide the operator with almost

any kind or amount of information that can be imagined or desired.

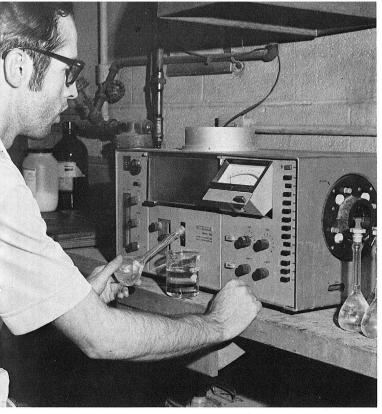
Not all of Quality Control's efforts are expended in monitoring the material flow through the plant and its various resulting products. In recent years, Quality Control's mission has been expanded to provide answers in other areas such as environmental control where the Analytical Services Group provides the determinations.

Work in this section is principally in three areas:

- 1. Analysis of samples to monitor the environment around the division. Input includes water from all sources, air samples from the Environmental Control Department and a variety of other material.
- 2. Special process analysis at electrowinning. This includes monitoring solutions for trace elements to prevent a buildup of something that might be detrimental to the products and also monitoring cathodes and starter sheets for undesirable trace elements.
- 3. Oil samples from throughout the division. Samples of lubricating oil from haulage truck engines, pickups and other mobile equipment, crushers, etc. are carefully collected and forwarded to the laboratory. These are probed for breakdown of the oil components, leakage of fuel or water into the oil and traces of metals that indicate engine component breakdown. This program has consistently pinpointed failures of some part or component early enough to remedy the problem before a major breakdown happens.

In the Analytical Services Laboratory, sample weight is a vital part of the testing procedure in almost all cases. Utilizing this delicate and precise piece of equipment which provides an instant weight of the sample is Mary Ann Dvorsky, a Quality Control Technician at the MP.





Another invaluable tool of the Quality Control Department at both plants is the Atomic Absorption Spectrophotometer. A Quality Control Technician, like Mark S. Foster shown here, can feed samples to this machine all day and be provided with virtually instantaneous assays.



A steady stream of samples of used lubricating oil from division trucks, cars, crushers and mobile equipment pours into the Analytical Services Laboratory for examination and determination of the presence of wear metals. Spectroscopist Sandy Wade does these tests and often these determinations will provide a clue to problem areas which can be corrected before a major engine failure occurs.

In the Process Control group at the Mines Plant, the atomic absorption spectrometer is used for most of the analytical work. Samples taken and analyzed include everthing from diamond drill core used for long range mine planning to process control samples from the silicate plant which are used to make daily and even shift-by-shift decisions about plant operating strategy. This department also provides the metallurgical support for the leaching operations department, running tests to provide information on day-today plant performance, for long term planning and for process improvement. Also, this department analyses exploration drill core for the geology department from other properties which they investigate.

"Work horse" of the sampling equipment at the reduction plant is the energy dispersion X-ray (EDX) spectrometer. It can be programmed to handle almost any product and provide all desired information. The analyses it provides are not equivalent to "accounting standards" because some accuracy is sacrificed for speed and versatility. The numbers it produces are, however, perfectly adequate for process control. Its only other limitation is the time required to collect the sample, prepare it for entry into the EDX and transport it to the machine. Since all of this takes time, the EDX is not

in constant use and this situation recently provided an opportunity for the Quality Control Department to expand the services of its equipment.

An integral part of an EDX unit is a small computer and since it is not working full time there is obviously some spare computer time available. Working with Metallurgical Accounting, quality control personnel developed several programs to utilize that spare computer time for the benefit of the Comptroller's Department. Since the EDX normally provides its determinations on a teletype machine, it was decided to install a second such machine in the Metallurgical Accounting Department. This extended capability allows personnel in this area to use the computer in the spare time periods to process data, reports and other types of information. Input is made and reports are received on the teletype.

In the Analytical Services Group, a sophisticated atomic absorption spectrometer utilizing the most advanced auxiliary equipment and the direct reading emission spectrograph are used almost exclusively for routine determinations, but there's an array of smaller specialized analytical units available at that laboratory. This enables the chief chemist and his staff to handle almost any given assignment. Some samples from the Environmental Control Department are

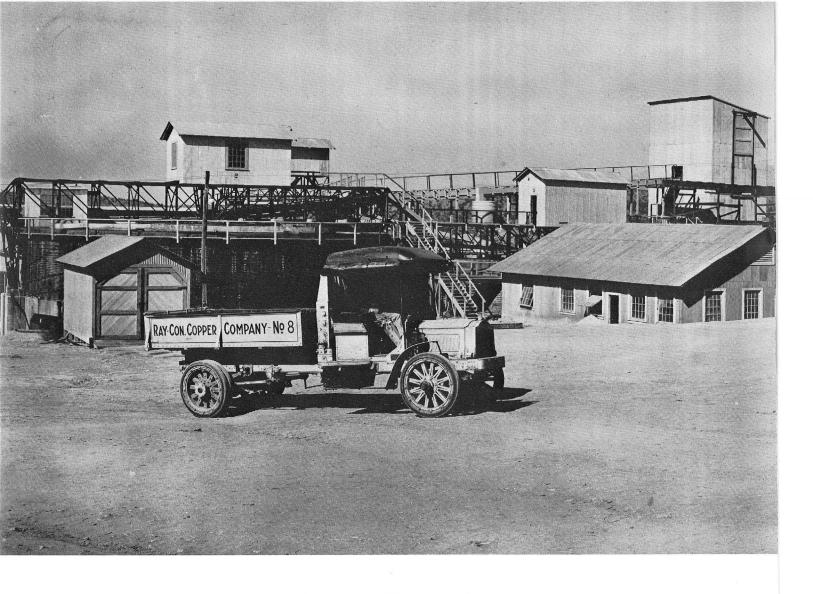
sent to the MMD Research Department at Salt Lake City for processing since the division does not have enough demand to justify the expenditure of funds for such sophisticated analytical equipment.

Recent remodeling in the mines plant administration building has provided this group with excellent new quarters large enough to house all equipment and personnel. One small laboratory is maintained in another building for the express purpose of evaluating No. 6 oil (heavy oil) utilized at the reduction plant in the smelter and power plants. A continuing program of analyzing that product is another quality control function.

Strickland has hopes of modernizing and consolidating some of the quality control areas at the reduction plant soon.

That's the story of Quality Control at Ray Mines Division. Certainly not the whole story, but some of the highlights. It's the story of 54 men and women working together to provide a service for management and operating personnel. That service consists of the most accurate information that can be provided in the required time period about every facet of this complex facility.

These men and women do not control quality, but they do monitor the process from start to finish to provide process information to those individuals who do control quality.



20 YEARS
AGO
AT RMD

A summary of events making news at Ray Mines Division 20 years ago in 1957.

Employees received a 7¢ per hour wage increase plus one-quarter cent increment increase between pay grades effective July 1 under the 1956 three-year contract.

Copper dropped to 291/4¢ per pound — numerous copper operations in the West were closing or cutting back production.

General Manager A. P. Morris was working with the Hayden Town Council on an agreement for boundaries for the newly incorporated town.

Manuel C. Martinez was named Ore Bin Foreman at Hayden and Herbert E. Dunham, former Smelter General Foreman at the White Pine Co., was named to that same job at RMD.

All RMD clerical and technical employees were placed on non-exempt salary status, effective July 1. Division officials protested the tax valuation placed on the property and the State Board of Equalization dropped the valuation by \$5 million down to \$18.5 million.

Fifty-ton Euclid haulage trucks (LLD) started arriving at the MP.

Fred Bedale, Suggestion System Administrator, was temporarily transferred to KCC Purchasing Department, New York City.

The final concrete pour on the smelter stack was made August 23 taking it to the 600-foot mark.

Frederick L. Murray, after 12 years with the Nevada Mines Division, was named Metallurgical Accountant at the Hayden Plant.

Announcement was made that mill production would be increased to 22,500 tpd, 124 100-ton ore cars would be purchased, all crushing facilities would be improved and the ore bins at Hayden would be replaced.



If some of the buildings look familiar in this World War I-era photograph, its because some of them are being used today at Ray Mines Division. That's the Mill Building on the right and those peculiar looking units in the foreground were the latest model trucks utilized by the Ray Consolidated Copper Co. Wages in those days were about \$2 per day and the five-day week hadn't been invented yet. Those trucks look mighty sturdy, but we suspect not very comfortable. Incidentally, the selling price for this 10 by 18 photograph was 75£.

10 Years

Ago In

Copperland

A summary of events making news in the Copper Basin 10 years ago in 1967. [From the Copper Basin News files.]

Richard E. Davis was named Superintendent of Schools in Hayden/Winkelman replacing the resigned A. E. Nicholson.

1,550 employees of RMD were idled by a strike on July 14.

Kearny resident C. K. Vance was named Mines Plant Superintendent to replace J. C. Van De Water, Kearny, who moved to Superintendent of Mining & Concentrating, UCD. Another Kearny resident, Earle V. Dempsey, an RMD Industrial Engineer, was named Smelter Operations Superintendent.

Marion Esquivel was named Queen of the Mexican Independence Day Fiesta with Lydia Gaitan and Raynie Bracamonte as princesses. E. J. "Ted" Callan, former assistant manager of the Litchfield Valley National Bank, was named manager of the Kearny VNB branch replacing Alex Sanchez, who resigned.

Kearny Chief of Police Jim Hepler was discharged by the Kearny Town Council.

Edward M. Laczynski, Kearny, Reduction Plant Industrial Engineer, was named Director of Industrial Engineering at RMD.

Fourteen new classrooms, an office and expanded library and cafeteria facilities were completed at Ray District Schools in Kearny.

Recall petitions against the Kearny Town Council were being circulated following the firing of Police Chief Jim Hepler.

Jacob (Jake) Mercado and William R. Duffy, Kearny residents and RMD employees, will seek one vacancy on the Ray District School Board.

Dr. James M. Walsh, Kearny, who retired from RMD in June, died at the age of 81.

RUNAWAY GOVERNME

By James Dale Davidson

"Practical politics," Henry Adams said, "consists in ignoring facts."

ERHAPS so. But politicians in Washington have been ignoring the facts about deficit spending too long. Federal fiscal policies are now based upon propositions so remote from the facts that the future of our economy is endangered.

Decisions made by the President and Congress continue to reflect the judgment that deficit spending -with its resulting inflation—is necessary or even

beneficial to the economy.

Intelligent persons might have fallen for that years ago. But not anymore. There is simply too much evidence that deficit spending is detrimental to the economy.

Here is how Labor Party Prime Minister Iames Callaghan of England put it:

"We used to think you could spend your way out of a recession . . . I tell you in all candor that that option no longer exists, and insofar as it ever did exist, it only worked by injecting bigger doses of inflation into the economy followed by higher levels of unemployment as the next step. That is the history of the past 20 years."

eral government from the day of its founding until 1924. This year's deficit may be even larger.

Not only does each deficit add substantially to the "national debt," it also generates an enormous growth in financial obligations which are not included in the official debt.

Consider these figures:

701,000,000,000.00 **National Debt Accounts Payable** 81,000,000,000.00 **Undelivered Orders** 266,000,000,000.00 13,000,000,000.00 **Long Term Contracts**

Annuity Programs (including Social Security)

Unadjudicated Claims & International Commitments

TOTAL

\$4,650,000,000,000.00

53,000,000,000.00

\$5,764,000,000,000.00

ONT CHOSE TREUS ACK SOMEDAY (Reprinted courtesy of Chicago Tribune)

This is money which you and other taxpayers will be called upon to pay. More than five and a half trillion dollars!

Where will that money come from? According to a recent estimate by the Commerce Clearing House, the total value of all property in the United States -land, houses, factories, golf balls, root beer stands . . . everything—is \$5.7 trillion.

Everyone Suffers

Deficit spending, with its resulting inflation, has hurt people at every economic level. Untold billions have been lost from the real value of stocks, pensions, annuities and insurance. The average worker's real weekly purchasing power is lower than it was five years ago. And it is only a few cents a week higher than it was a decade ago.

And instead of getting better, the situation is getting worse. The budget deficit last year alone was greater than the entire sum required to run the fed-

Mr. Davidson is chairman of the National Taxpayers Union.

The Grand Giveaway

The federal government has now promised away the entire wealth of the country-including everything you own. If government debt continues to grow, it can mean nothing but disaster. Each new deficit causes greater inflation which in turn causes still greater deficits, causing still more inflation. The Office of Management and Budget has predicted that a continuation of current trends (with no new programs added to the books) would lead to an annual deficit of \$700 billion by the end of the century.

To figure out what that means, you needn't bother to count ahead 22 years. Most of your financial assets and those of other Americans would probably be destroyed by inflation long before the deficits reached \$700 billion per year. By then, it would be too late.

NT ON THE RAMPAGE

It Must Be Stopped

This is why we must act now. The longer this situation is allowed to continue, the smaller the likelihood that it can be corrected.

The American people understand this. That is why a recent Gallup Poll revealed that 78 per cent—an

The federal government has now promised away the entire wealth of the country — including everything you own.

overwhelming majority — favor a constitutional amendment now which would force the federal government to balance the budget. Young and old, black and white, Democrat and Republican . . . all agree: we must halt the vicious cycle of deficit spending and inflation.

The National Taxpayers Union has been working to prod Congress into passing a Balance the Budget Amendment which would prohibit deficit spending—except in times of genuine national emergency as declared by three-fourths of Congress. This amendment has already been endorsed by the legislatures of 18 states. More than 100 members of the House and 26 Senators have announced support for a Balance the Budget Amendment. In the Senate, the chief sponsors are Senators Harry Byrd, Jr. (I.-Va.), Carl Curtis (R.-Nebr.), and Malcolm Wallop (R.-Wyo.). In the House, the effort is being led by Representatives Andrew Jacobs, Jr. (D.-Ind.), James Collins (R.-Tex.) and others.

As Rep. Jacobs said:

"It is not a question of whether we are to have 'liberal' or 'conservative' government. The issue is more basic than that. Without a constitutional amendment forcing a balanced budget, there is little chance we can halt the process which threatens to bury the American way of life under an avalanche of inflation and debt. Balanced budgets are a 'progressive' cause also. Without them, the poor, the weak, and the helpless suffer most. That is why I am supporting National Taxpayers Union's efforts. . . . It is a matter of common sense."

Press for Balanced Budget

Supporting the effort to balance the budget is a matter of common sense . . . and more. It is also a matter of arithmetic. There are only about 60 million real taxpayers in America. If you are one of them,

you are on the hook for an additional \$8,116 as your share of last year's increase in federal liabilities.

Each month that passes without a balanced budget generates billions in additional government debts—debts which you may have to pay.

WHAT YOU CAN DO

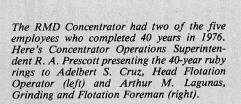
Few people realize how much influence ordinary taxpayers can have over government policies. Our political system responds to pressure. That is why the beneficiaries of government spending have been able to receive tremendous windfalls at your expense. They have been well organized and have applied pressure in the right places. Taxpayers can do the same.

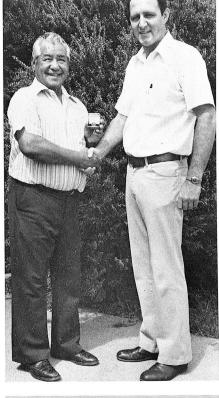
If you want to help persuade Congress to start balancing federal budgets, all you have to do is say so. And it will only cost you 13¢—the price of a stamp—the cost of sending a letter directly to your representatives in Washington.

Politicians in Washington respond to numbers, not logic. It's volume that counts. Congressmen know that each person who bothers to send a letter represents thousands of voters.

The National Taxpayers Union itself is dedicated to continuing the battle for sanity in government. NTU is a non-profit, non-partisan citizen's action organization, representing 40,000 members and hundreds of thousands of members of local and state-wide taxpayer groups. Our activities are entirely supported by membership dues and contributions. These fees help provide the funds to support the fight for the Balance the Budget Amendment as well as other important tax-saving initiatives. The more people who become involved in the fight against high taxes and Big Government, the better the chance of success.

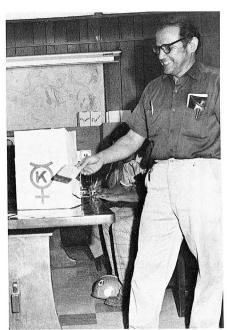




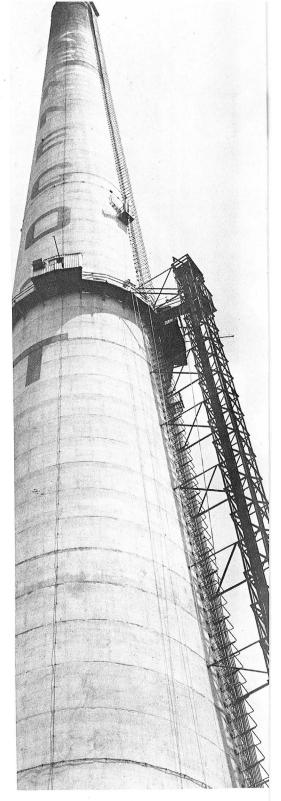


STORIES
in
BLACK
and
WHITE
Part II





Winners in the First RMD Safety Incentive Award Sweepstakes were drawn by these two employees. A member of the Mining Team, Ansurio M. Morales, Haulage Truck Driver (right) was selected to draw winning names from the Leaching Team, while W. B. Cottrill (left), Electrician and member of the Leaching Team, was selected to draw names of the Mining Team winners. Prizes included TV sets, microwave ovens and belt buckles.



That object on the side of the smelter stack beside the "O" in Kennecott is a "Sky Climber". It was a device used by employees of Van Dyke's Construction Co. to get to and from their work when they were working on the top of the stack during the recent vacation shutdown. The "Sky Climber" had a 500-pound capacity and required 18 minutes to make the trip each way from the sample station platform to the top. The device was electrically-powered and operated on a free-swinging cable anchored at the stack top.

The Martins Know What Time It Is

What does a heavy duty truck mechanic and an antique clock collector/rebuilder have in common? Not much. Yet, that combination is working with happy results in the Copper Basin.

The individual wearing those two hats is James A. Martin, but if you're going to talk to him on the job or at home better call him "Archie." That "James A." business is used only for legal documents and his employment records at Ray Mines Division where he repairs those huge 120-ton haulage trucks at the Mines Plant. When he takes off his hard hat and starts to work on one of his antique clocks — he's Archie.

One can get started in some hobbies practically overnight. That's not true when it comes to collecting antique clocks. It requires maximum patience sometimes to negotiate the acquisition of a family heirloom. It requires hours of prowling through antique shops — big and small — to locate a model or type you want for your collection. It requires the realization that you have stiff competition because there are thousands of antique clock collectors in the world and the supply of antique clocks is limited.

"I got started almost 20 years ago, 1959 to be exact," says Martin. "My wife, Ruth, has always been a collector of antiques and on one of our trips to an antique shop in the greater Phoenix area, I bought my first clock for \$7.50.

"It didn't run, so I took it home, overhauled it and we had an antique clock for our collection of early Americana. Before long, we attended an auction of antiques and I bought seven more clocks. By that time, I was hooked on this hobby and still am."

While all this was going on, Martin was farming in Maricopa County and devoting his spare time to rebuilding clocks and expanding his collection. He started visiting auctions regularly looking for specific models, he started getting information from other collectors and even bought some clocks sight unseen from Eastern sources. When he could spare the time, he journeyed around the state seeking clocks in attics, barns and shops off the beaten path.



Using a restored roll-top desk as a workbench, Heavy Duty Truck Mechanic James A. Martin rebuilds a motor from one of his antique clocks. Sometimes a good cleaning is all that's needed, but other times he finds a part broken, worn or missing. In this room, he's surrounded by his collection and parts to another clock can be seen on his "workbench."

During the first decade of his collecting career, he also moved around a little in his job field running a custom hay operation and being a ranch foreman. He continued to acquire clocks, sold some, traded some, repaired them all. Soon he became a member of the National Association of Watch & Clock Collectors, Inc. and a statewide organization called "The Keywinders."

By the late 60's, his collection had swelled to a point where it was taking over their home and his clock census was up to 145. He had clocks of every size, shape, description, color, make and model. In 1968, he decided to leave the farm and take his mechanical ability to industry. He had acquired that ability and skill keeping

the farm machinery going on his various jobs in the Salt River Valley. RMD offered him a job as a heavy duty truck mechanic and he and Ruth started planning to move to the Copper Basin.

Moving 145 antique clocks was too big a job to face, so they held an auction before they left and disposed of 45. The Martins brought the remaining 100 with them and today they are parked on every flat surface in every room in their home and hanging floor to ceiling on several walls.

Antique clock collecting has become so popular there are now numerous firms in the business of supplying every part imaginable including springs, hands, faces, face frames, face glass, pendulums,



A very small part of the Martin antique clock collection can be seen on this one wall. One of these, second from left, is being restored, while the others are finsihed. There were advertising clocks many years ago as the second from the right proves clearly.

gears, etc. If they can't supply from stock the part you require, they'll make it. Martin wants each of his clocks to run, so if he can't locate a missing or broken part, oftentimes he makes his own. Only two types of energy were used in antique clocks — springs or weights. Some are so complicated they require three springs. One for the time part of the clock, one for the half-hour gong and one for the hour chime.

Martin, like all dedicated clock collectors, has a grandfather's clock, but it isn't one like you see advertised today. It stands seven feet, six inches tall, was made in England and shipped over here years before Martin acquired it. There's an interesting coincidence connected with this clock. When he inspected the clock after becoming the owner, he found the word "Martin" written in chalk on the back and it had nothing to do with him. It is presumed this clock had another owner years ago with the same name.

One of his prized possessions is a clock manufactured in 1839 that has all wooden parts, except for one brass gear and the pendulum. He has a spring wound time card clock out of an early-day Kansas railroad depot. It still has the ability to stamp a time card with the correct time and date.

Another unusual item in his collection was smuggled out of Mexico by several of his "green card" Mexican farm workers when he was farming. They collected all the parts they could find and brought them to him in a sack. He has remanufactured the missing parts and has fully

The Martin antique clock collection goes on and on through every room in their home. In this room, floor to ceiling and wall to wall will be found more clocks. Most seen in this photograph are finished, but two have not been fully restored.



restored the clock smuggled into the United States from an old family home in Mexico.

Collecting, repairing and rebuilding antique clocks seems a fitting hobby for this gentle, soft spoken man of average stature. His hands reflect his years of hard work with heavy tools and parts, but he has been able to maintain that soft touch needed in his fingers to tear down an old clock with its many tiny parts and return it to a useful life.

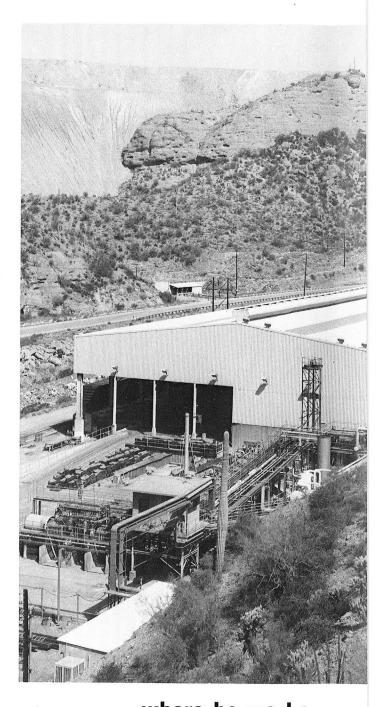


The employee. . .

On the job. . . 40

Years!

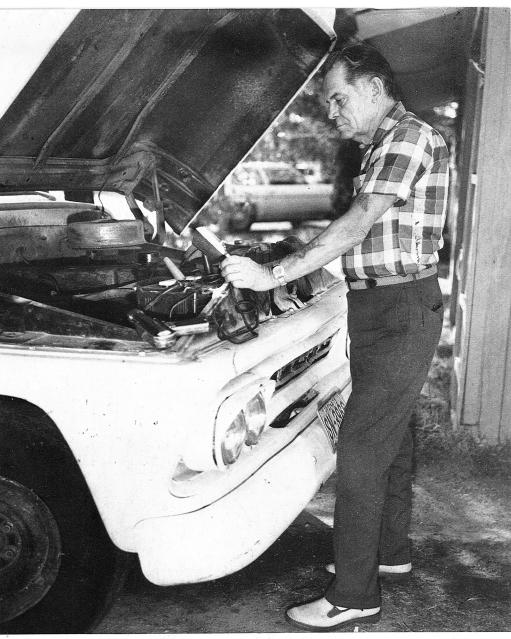
SALUTE TO S E N



.where he works.

Four currently active employees have the possibility of completing 40 years of employment at the property known today as Kennecott's Ray Mines Division. The third of these four to be featured in *THE KENNEZONIAN* this year is Max T. Gilpin of Kearny — Electrowinning Repair Foreman. He started his RMD career as a Garage Helper at the Mines Plant, April 15, 1937. Gilpin is a native of Safford and a graduate of Ray High School. Naturally, he passed his 40th anniversary earlier this year and is now working in his 41st year.



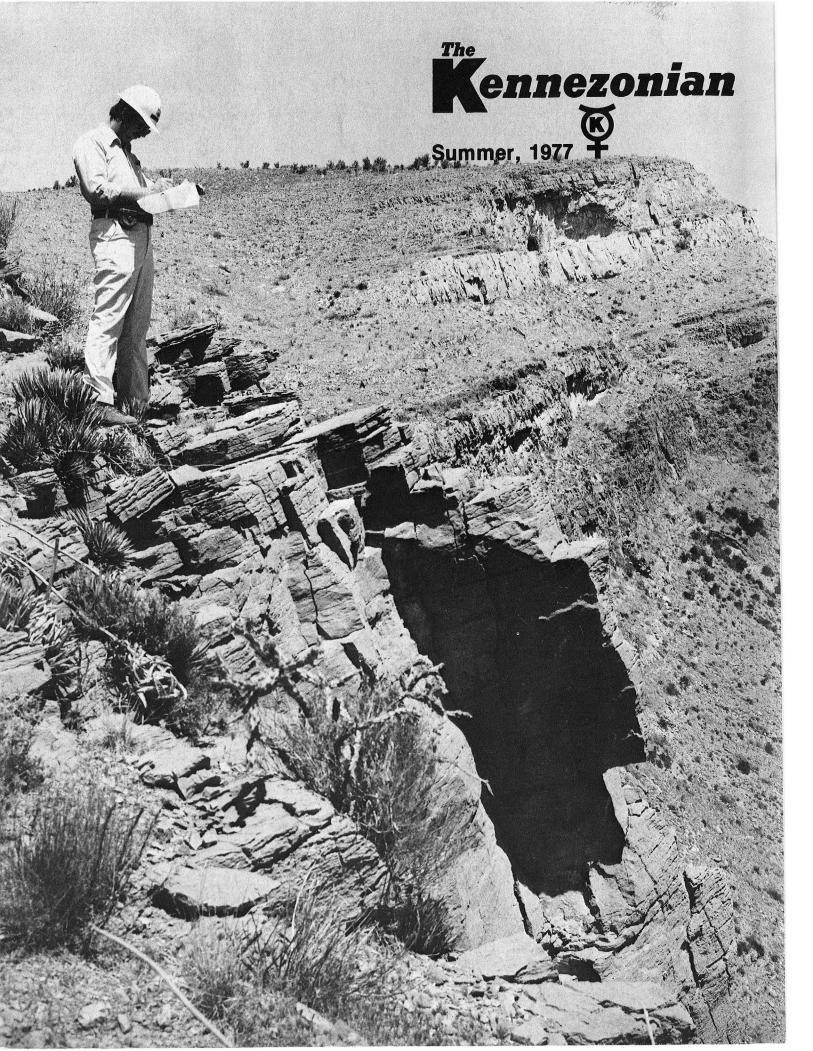


Kennecott Copper Corporation Ray Mines Division Hayden, Arizona 85235 Return Postage Guaranteed

BULK RATE U.S. Postage

PAID

Tucson, Arizona Permit No. 859





The tailings pond planting team, composed of Mill Laborers Reynaldo Gomez, Tony Lopez and Eugene Lyman, completed this year's 4,300 plantings in record time. A hole was dug at the site of each drip emitter, a plant was removed from its gallon can container and placed in the hole. Before the hole was refilled, a handful of grass seed was tossed in around the plant. What happened to the empty cans? Each was buried by the plant to enrich the surrounding soil.

Copper Basin New Photo by Dave Campbell

New Plants For Tailings; More Food For Squirrels

The planting season is over at RMD. From now until next spring, the tailings pond crew will battle the squirrels, provide the plants and grass with water and fertilizer, and be ready to repair serious erosion if we have any rains.

Within the last few weeks, a crew under the supervision of Tailing Foreman M. C. Martinez has planted 4,300 trees, shrubs and cactus on the north slope of the tailings pond. Along with these individual plants, Blue Panicgrass seed was planted with each plant to get a ground cover started around each tree, shrub or bush.

With this year's planting, it brings the total to 11,980 separate plants introduced on the tailings pond in the 53 acres being revegetated. In addition to these individual plants, there are 1,920 plots of various kinds of grass.

This year's planting project utilized 13 acres and filled in unplanted spaces within the 53 acres which stretches from the tailings workshop location to Hayden Junction. Prior to the planting, main water lines were extended into the area and smaller lines containing the drip irrigators were installed so that each plant site had a water source.

This year's selection of plants contained those varieties which have done well in the two previous planting years. Varieties include: Tobacco, Salt Cedar, Mesquite, Desert Broom, Brittle Bush, Australian Salt Bush, Hackberry and Cottonwood. In the past, many other types have been planted but they couldn't make it in that hostile climate and replanting had to be done with more hardy stock.

Last year, experimentation with the limited use of limestone as a soil additive appeared to have beneficial results so more testing will be accomplished this year to determine the validity of the experiment. One acre was given 90 tons of the additive, another was given 50% more or 135 tons, and a third has been enriched with twice as much or 180 tons. These three plots will be under close surveillance this year for any reaction.

Another experiment that will be carefully monitored this coming year will be a small section where irrigation is being withheld to see if the root systems of the older plants have developed water sources within the pond and will survive without drip irrigation.

All in all, it looks like a bright future for the north side of the tailings pond, except for those darn squirrels. They like some of the plants and that black plastic pipe as parts of their diet.

Is there an open season on squirrels?

Mill Laborer Eugene Lyman concentrates on the proper planting of one of this year's 4,300 separate plants placed on the north slope of the tailings pond. A drip emitter designed to release 1.5 gallons per hour is located at the site of each plant to supply moisture and fertilizer.

Copper Basin News Photo by Dave Campbell





The man who has been termed the guiding genius of the American automobile industry, Henry Ford, once said that "failure is the opportunity to begin again, more intelligently."

Another man, not so famous, said: "a mistake is proof that someone attempted to do something."

Recently at the Mines Plant something occurred which proved the truth of both statements: The realization that a program which had been installed would not work as had been intended and that it had been a mistake to start the program in the first place.

The program had been highly recommended at all levels of management, and based on those recommendations, it was approved for funding.

Despite the unqualified approval given to the program, it just didn't work. Since it did not, the project was termed a failure and cancelled. More importantly, the man who had originally supported the program had the wisdom to admit that a mistake in judgement had taken place.

I have a great respect for the man who will admit he made a mistake. In this instance, abandoning the project even though some money had been spent, and in a sense, wasted, just makes common sense. As the old adage puts it, "why throw good money after bad?"

I think that there are two lessons to be learned from this incident:

First, if we don't take the initiative and try to improve on current methods, we will soon find that innovators some where else are doing a better, and less costly job. If we do take the initiative and fail, then we have learned from that failure and can go a different route.

Secondly, don't be afraid to admit that a mistake has been made. When you find that something is not going as you had envisioned it, admit you goofed, pick up the pieces and start all over again, salvaging from the old all that will work in the new.

We must all be innovative if we are to succeed in our goal of turning out a top quality product at the least possible cost. If we sit back and refuse to try something new, we won't make many mistakes — in fact, just one:

The mistake of failing to try!

Sincerely,

K. H. Matheson, Jr.



Published by Kennecott Copper Corporation Ray Mines Division Public Relations Department J. H. Maize, Director

CONTENTS

| New Plants for Tailings; More Food for Squirrels 2 |
|--|
| Unlocking Nature's Secrets Is The Geologist's Profession |
| 20 Years Ago at RMD8 |
| 10 Years Ago In Copperland |
| Stories In Black And White |
| 12,500 Dayswithout a lost time accident 12 |
| Salute To Seniority |

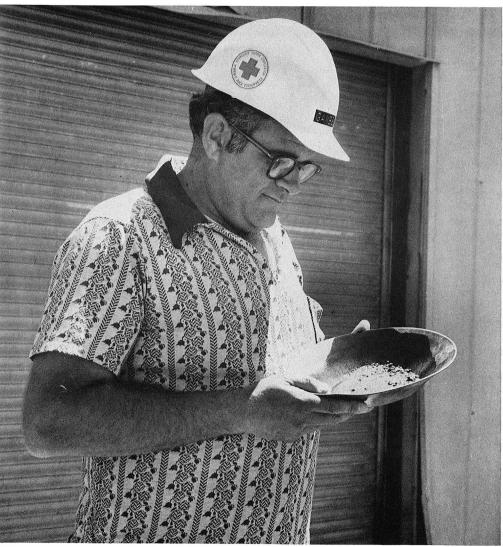
THE COVERS:

FRONT: Today, it's a hill; tomorrow, it will be a limestone quarry. That peak behind Geologist Steve A. Hoelscher is the south extension of Haleys Mountain in the Dripping Spring range, east of the pit. The Geology Department is mapping this and the surrounding area in detail because this is an island of limestone in a sea of generally barren mountains. Mapping an area like this means much walking and hard climbing for there are no roads.

REAR: Hipoloto S. Munoz, a MP Haulage Truck Driver and a resident of Superior, is one of seven active employees born in 1912 making this elite group our oldest employees in years, but not necessarily in service. Munoz, like the others will be 65 this year and has been at RMD since 1948. The back page photographs show him on the job standing by a wheel of his 120-ton truck and off the job watering a vine at his home.

EDITOR: Norman B. Harrington

Unlocking Nature's Secrets Is The Geologist's Profession



The bearded prospector and his burro are gone, but his technique remains, even in this age of automation and sophisticated equipment. Division Geologist Neil A. Gambell does a little "panning" quite often on some of the many samples collected for his department. This method of separating heavy and light material by gravity still works as good as it ever did.

Geology is, indeed, an unusual profession.

The geologist is always dealing with unknown qualities and quantities and his success or failure depends on his ability to consistently forecast fairly accurately what Nature hid in the earth as long as four billion years ago.

The average person has trouble predicting what will happen tomorrow based on a

lifetime of personal experience. Yet, day in and day out, a geologist is expected and called upon to forecast the kind of rock and grade of mineralization to be found in a certain area one, five or even 10 years in the future.

It's not all guesswork. The state of the art has developed rapidly in the last several decades. Some guesswork has been removed by perfection of techniques and

sophisticated equipment. These aids are valuable and make a geologist's life easier. But, his principal assets are and probably always will be, his knowledge of the science of his chosen field and his eyes. What he sees in a rock, coupled with his acquired knowledge of how the earth was formed, tells him an amazing amount of information.

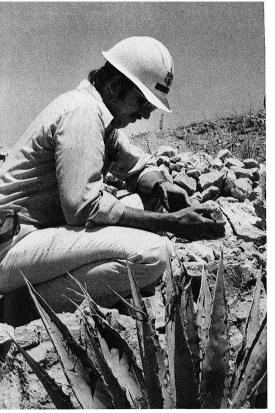
We have called geology a science and it is. Webster's definition of geology is this: "The science dealing with the structure of the earth's crust and the development of its various layers; it includes the study of rock types and fossil forms." To make the definition complete for the exploration or property geologist, probably three more words — "and ore bodies" — should be added to the definition.

Geology at Ray Mines Division and the Safford Project is in the hands of five men – four are geologists and one is an engineer-technician. Head of the department is Neil A. Gambell. Senior Geologist Don S. Fountain is assigned to the Safford Project on a full-time basis. Steve A. Hoelscher is classified as a geologist and John P. Witner carries the classification of junior geologist. The technician is George L. Tucker.

RMD's geology department is unique in at least one respect -- it wears two hats: Exploration and Property. In many companies today, the property geologist's responsibility ends at the plant's gate; everything else belongs to the exploration department. Not so at Ray. The department is responsible for both functions, although KCC has complete exploration companies as wholly-owned subsidiaries.

Responsibilities of RMD's geology department are many and varied. Some of the most important include: outlining the orebodies at Ray, Safford, Chilito, Copper Butte and Buckeye; maintaining proper land positions; supervision of assessment work and maintaining proper files on such projects; satisfying all Federal and State requirements; planning and supervision of all contract drilling. The list goes on and on.

While the department is a "loner" in some respects, it is proof again that "no man (or department) is an island." Its activities, both long- and short-range, are



Methodical checking and evaluation of limestone deposits within the division are responsibilities of the Geology Department, which is headquartered at the Mines Plant. Geologist Steve A. Hoelscher pauses to check some surface formations at this potential limestone quarry where initial blast holes were being drilled preparatory to opening a new deposit of this valuable industrial mineral.

closely tied to the Quality Control Department and Engineering. These departments, in turn, depend on geology for certain vital functions and raw information.

Geology at Ray is unique in another respect. It must provide normal services for two Limestone deposits, as well as its work with copper deposits. Limestone is classified as an industrial mineral rather than ore.

To handle all of these chores, there is shared responsibility within the department. Hoelscher's base of operations is the West Pit/Emperor Hill segment of the mine with its secondary mineralization of chalcocite and cuprite, plus native copper.

The Pearl Handle area with its primary mineralization is watched over by Witner, while the Silicate section of the open pit with its secondary mineralization of chrysocolla is the responsibility of Division Geologist Gambell. However, since the Ray Mine stands apart from most porphyry copper deposits because of the complexity of its structural geology, the department functions as a team although each member has a primary assignment.

Observation of the department personnel soon reveals there is no such thing as a "typical" or "routine" day. This is not to

imply that every day is a "new ball game," but seldom is today like yesterday. Responsibilities are too varied and there is too much to be done.

Probably the most important on-going department function is called "mapping a faced-up bench." This involves going to a bench where all loose ore or waste has been picked up by the shovels and physically walking the length of the bench. The geologist carries a map outline of the bench and makes voluminous notes on rock and mineral types, structures, and anything else associated with geology of the area. He carries a can of spray paint with him to make numbers on rocks which will coincide with information he is placing on his rough pencil map. He may also collect rock samples as he walks along to reinforce his notes.

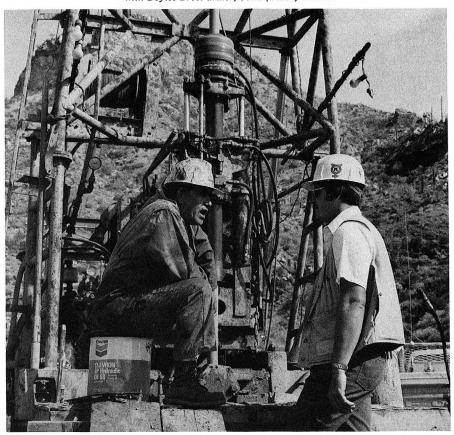
At the conclusion of this phase, the bench maps may be grouped together allowing the geologist to see how certain features in an area are related. These features include faults and bedding attitudes which may be of use in slope stability and provide a knowledge of mineral zoning patterns, which are important in solving metallurgical problems.

Once every year, the individual bench maps are utilized in the preparation of a mine geologic map. This one-inch to 200-feet scale map illustrates the rock types by different colors and the structural features by symbols.

Exploration is a major segment of the departmental assignment and is closely associated with another responsibility — maintaining a legal land postion for Federal, State and private land utilized by the company for any purpose. Today, exploration usually starts with a geophysical or geochemical anomaly. RMD has no capability to produce either and depends on the company's exploration subsidiary, Bear Creek Mining Company, for these services.

After a target is selected, geology must prepare plans for contract drillers to do the necessary exploration drilling. Development drilling is done to depths of 500 to

RMD Geology Department is responsible for exploration work in and around the division. Ore body exploration is nearly always done by contract diamond drillers. This form of drilling provides a round shaft of material from the ground and it is the duty of the department to collect, analyze and catalog these samples (cores). At a diamond drill site near Copper Butte, John P. Witner, junior geologist, right, discusses a point with Boyles Bros. driller, John (Butch) Tucker.



5,000 feet as suggested by the target size and type. At the Ray property, the next step is prospect drilling at 100-foot intervals on a grid pattern to check projections of the orebody and to make a rough determination of its size, depth, rock types, etc.

Geology also supervises prospect drilling within the operational section of the mine if the required holes must exceed the depth of three benches or are wet holes. The division can handle such tasks up to a three-bench depth.

Samples from all types of drilling are carefully collected and catalogued. Each is visually inspected by a trained geologist and his observations are meticulously charted. To verify these estimates and observations, the samples are sent to the Quality Control laboratory in the MP for a complete assay on each. These results are entered into the same log books and matched with previous determinations to provide complete step-by-step data on each drill hole.

Mapping continues on virtually everything geology does. It usually starts with a small section, which in turn becomes part of a larger map and so on. Much of the information generated in the field and through the sampling procedure is provided to engineering for entry into the Metal Mining Division computer, where it makes a significant contribution, when coupled with other information, to the computerized mining program at RMD.

All diamond drilling at the division is supervised by geology and much time and money are spent in collecting, cataloging, evaluating and storing the core samples. Technician Tucker spends much of his time collecting, cataloging and keeping records on the thousands of feet of drill core generated every year. He also handles the delicate task of splitting the cores to provide assay material, assists in field mapping and handles numerous varied assignments.

There are now over 1,000 diamond drill holes within the pit limits and these date back to the 50's when the transition from underground to open pit mining was accomplished.

Today, a geologist must be a pretty fair lawyer to keep abreast of the rapidly growing list of regulations and laws being issued by every political subdivision starting with the Federal Government. These include such diverse laws as the Federal Mining Law of 1872 (with thousands of changes), State mining laws, the Arizona Native Plant Law, the BLM Organic Act and proposed regulations to implement it, environmental impact regulations and more.

In exploration work, if a target area involves Federal land a mining claim (600

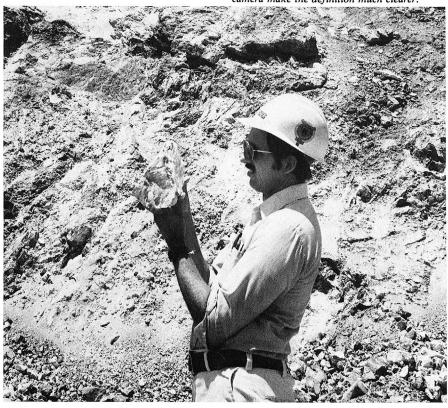


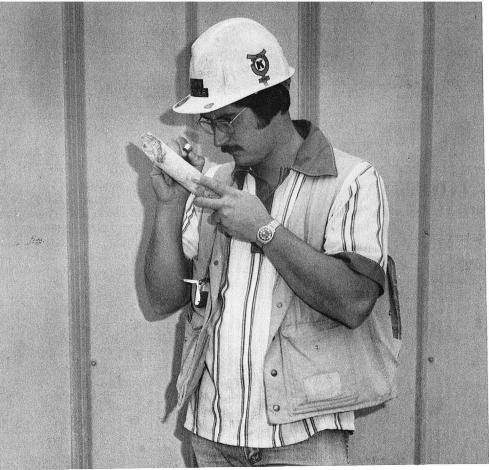
"Mapping a bench" is a routine, but important task of the Geology Department. Here, Neil A. Gambell, division geologist, with clipboard in hand and the tools of his profession attached to his belt, walks along a deserted bench in the silicate area making notes, collecting samples and leaving spray-paint numbers on the rock faces to guide the department survey crew when they return to the scene to do the final mapping.

by 1,500 feet) must be staked, then comes monumenting that claim with seven markers of definite type. This must be done within 90 days. Within 120 days the validation work (usually drilling) must be accomplished. Specific regulations apply to the footage and money involved in this validation procedure. If everything goes well and the company decides to proceed toward ownership it will require pounds of documentary material and may take as long as seven years to obtain a patent (deed), after a patent application has been filed.

On state land, the procedure is somewhat simpler, but still cumbersome. First, comes a prospecting permit, good for five years. The area must be at least 20 acres and not more than 640 acres on a single permit. Multiple permits may be sought. Assessment work in the amount of \$10 per acre must be accomplished in each of the first two years and double that in each of the last three years of the permit life. If the company decides to keep the parcel, with certain documentation it may obtain a 20-year mineral lease for a rental fee plus a royalty fee on minerals removed. Leases are renewable.

The Emperor Fault, which cuts through the Ray Pit separating the ore bodies, is only one of nearly a dozen such geological oddities now located and identified in the ore body of RMD. Behind Geologist Steve A. Hoelscher, shown examining a bench sample directly in front of the fault, this black and white photo picks up the light and dark formations associated with the Emperor Fault. The naked eye and the color camera make the definition much clearer.





Those shafts (cores) of solid rock bored and retrieved from the depths of the earth by the diamond drill are carefully examined as they come from the drill rig to the Geology Department's drill core warehouse. A magnifying glass is being used here by Junior Geologist John P. Witner to check a section of core for geologic information. To the trained eye of the geologist, a core sample reveals either good or bad news.

Under the Arizona Native Plant Law, any such activity must be spelled out for the state at least 10 days prior to the start of any activity. Maps of the target area must be prepared, showing drill sites, roads to drill sites and vegetation information. The State will then inspect the area and approve the proposed work. Any and all native plants are subject to removal for replanting.

Probably the most sophisticated instrument owned by the geology department is a seismograph. This electronic device is used to determine the depth of bedrock below the surface of the ground. It will be used during the 1977 vacation shutdown to obtain information for the location of dewatering sumps. This machine uses 12 sounding heads 50 feet apart on a cable with the recording/monitoring unit on one end and an explosive charge at the other end. When the explosive is fired, shock waves are recorded at the heads providing a profile of the bedrock beneath the testing area.

Geology is not an exact science, but it is a science. It is not a profession for the timid, since one must stick the neck out rather frequently. It is a profession where dollars

are probably the most important consideration, because if the ore forecast is wrong, there are no profit dollars. Geology's primary function, at the division level, is to determine the ultimate limits of ore grade mineralization and to keep the mining operation headed toward the best ore that can be recovered most economically.

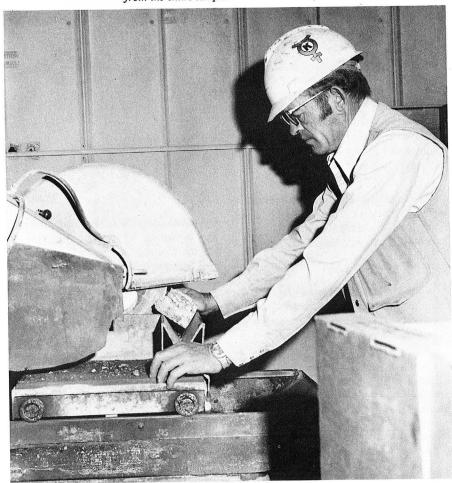
Is the day of the prospector or the pure exploration geologist over? Has today's sophisticated, scientific equipment replaced man's vision and knowledge?

"No," says Gambell. And, he cites two recent examples to back up his statement. A very large copper deposit has been located in Panama because a pilot flying over the area got to wondering about the cause of a patch of red rocks. His observations triggered a mining firm to send out an exploration unit and a major copper deposit was located.

A geologist on a flight across Alaska wondered about shiny rocks spotted from the air about 10 miles out of a town. When he had the time, he checked them out and located a new major molydenum deposit.

As long as there is mining, we'll need geologists. As long as there are geologists, we'll have mining.

A high-speed rock saw is used often in the core warehouse to split core samples for testing procedures or for additional evaluation of bench samples. Engineering Technician George L. Tucker is preparing to split a bench sample with the saw so that a more detailed assay may be obtained from the entire sample.



A summary of events making news at Ray Mines Division 20 years ago in 1957.

RMD changed from a six-day to a five-day work week since KCC is producing more copper than it is selling. Other divisions have been on the 40-hour week for some time.

The sponge iron/sulfuric acid plant was completed and placed in operation. Some sponge iron and acid were made before the plant was shut down for changes and adjustments.

Construction started on the smelter stack and by the end of the second quarter it was 300 feet high.

C. V. Coffey, Editor — Publications, attended a six-day workshop on employee publications at Oklahoma A & M College.

New Mines Plant equipment – Shovel No. 8, a seven-cubic yard P&H model and the No. 3 40-R rotary drill went into service.

The annual Dons' Club tour attracted 400 persons to the Ray/Hayden area where they witnessed a large blast, toured the mine, mill and the ASARCO, Inc. Hayden Smelter.

Employees of the ASARCO, Inc. Hayden Smelter, where RMD concentrate is smelted, walked out for five days to protest the appointment of the chief electrician to Master Mechanic. Mechanical Maintenance employees walked out for two days prior to this strike.

Personnel changes at the Mines Plant included: Manuel Carillo, Boilershop Foreman; John R. Chambers, Shovel Foreman and Dick Dalton, Assistant Drilling & Blasting Foreman.

Waste from West Pit is being placed on a new alignment of State Route 177 west of the mine; this assistance by the company is saving the state considerable money.

Charles Davis and George DeGraff, Jr. of Hayden High School and Ronnie Mann and Darrell Smith of Ray High School were awarded the KCC high school scholarships.

A \$477,000 contract was awarded by the state for another 5½ miles of the new Ray to Hayden highway and that was good news for RMD workers.

Concrete work at the new smelter is on schedule with steel erection scheduled to start immediately. Over 500 construction workers are on the job.

The division's Industrial and Labor Relations Department was completely reorganized into the Industrial Relations Department.

Bids were requested on preparation of the new shop site at the Mines Plant. The job includes straightening 4,000 feet of Mineral Creek channel, rip rap and concrete protection for the banks and 130,000 yards of fill material.

20 YEARS
AGO
AT RMD

A national news release said that KCC was giving up its original home – the Chitina Copper District in Alaska. This property has been thoroughly checked by exploration personnel who have found that any existing ore bodies are too costly to look for. Existing buildings were sold for \$1,000. This closes the door completely, the story said, on one of Kennecott's most colorful eras.

The third in the 1957 Kennecott Lecture Series at the University of Arizona featured Barbara Ward (Lady Jackson), assistant editor of the London Economist, speaking on "America in the Changing World Balance of Power." Chester Bowles, former ambassador to India, will deliver the final lecture of this year's series on "The Relationship of the U.S. to Africa and the Near East."

Superintendent Ray Dugdale of the Anaconda Co. is assisting with problems at the sponge iron/sulfuric acid plant and has been given full charge of the plant. I. G. Pickering and Russell Beck of WMD are assisting Dugdale with metallurgical and mechancial problems of Bruckner furnace operations.

Shuffling sheets of paper has increased in the Message Center. Don Miller, communications center operator, reports the recent installation of a new collator (a machine to assemble pages). According to Miller, the machine will compile a set of 16 pages in one operation reducing the time of assembling by 50%.

Twenty-nine employees received 20- and 30-year awards at the fifth annual meeting of the 20-30 Year Service Award Club. The meeting and banquet were held at the Ray Con Club.

First award checks of the recently-inaugurated Kennecott Suggestion Award System were presented to seven employees. System Administrator Fred Bedale said that awards totalling \$260 were made for six suggestions.

Authorization has been received for an aerial survey of the area between Ray and Hayden. Since Ray and Hayden were previously surveyed, the new project will give complete map coverage from the mine to the reduction plant.

Approximately 125 employees of Western-Knapp Engineering Co., the new smelter contractor, were stricken with food poisoning. They were treated at hospitals and clinics in Globe, Phoenix, Tucson, the Hayden/Winkelman American Legion Hall and at some homes.

Joe Fenton, secretary to the general manager, was transferred to the Industrial Relations Department and assigned to the Publications Section. Shortly afterwards, Beulah P. Miller, was promoted to the post of secretary to the general manager.

A summary of events making news in the Copper Basin 10 years ago in 1967. [From the Copper Basin News files.]

The 8th annual Kearny Pioneer Days had Secretary of State Wesley Bolin as parade grand marshall, the Luke Air Force Base band was a special attraction, the new plaza band shell was dedicated and Judy Elliott was named queen.

RMD's annual open house at the Mines Plant attracted 411 visitors.

Ray High School's graduate Mark Fluharty, now attending Dartmouth College, starred on the freshman basketball team which had a 19 and 2 season.

Shirley Billingsley of Kearny was named president of the new Beta Pi chapter of Beta Sigma Phi; other officers: Emily Booker, Beth Weamer, Rita Chambers, Carol Justesen and Betty Jenkin.

More than 100 persons attended at farewell dinner for George R. Roberts, Kearny businessman and community leader.

One of Kearny's first businesses, Postel's Rexall Drug Store, founded in 1961, was sold to Pratt & Davis, Inc.

Snow fell in the Copper Basin on April 12.

Ofelia Nunez, a RHS student from Dudleyville, was offered four-year scholarships at the University of Chicago and Chapman College.

RMD's 15th Annual Service Award Party was held at the General Kearny Inn and the school cafetorium with 160 in attendance with 45 people recognized for 20 and 30 years of service.

Dorothy Piggot was elected president of the Kearny Womans Club; other officers elected: Leora Grigsby, Eva Morales and Elaine Vaughn.

By a two to one majority, Pinal County voters approved a \$2 million bond issue to build a junior college in the Coolidge-Casa Grande area.

A farewell dinner was held in Hayden honoring A. E. Nicholson, superintendent of the Copper Belt School District, who was leaving to take a position in the Phoenix school system.

Copper Basin area students presented several concerts of "Sing Out '66."

University of Arizona head football coach Darrell Mudra was the featured speaker at the annual Hayden High School athletic banquet.

Ray High School's tennis, track and baseball teams captured the state Class B Championships.

Bob Henderson, son of Mr. and Mrs. Robert R. Henderson of Kearny, earned a football letter at Eastern Arizona College.

10 Years

Ago In

Copperland

At graduation time, Cecil Ash and Lilia Dorame were honored as the top students in Hayden High School; Randolph A. Bartlett and Ofelia Nunez were valedictorian and salutatorian, respectively, at Ray High School.

Dr. Don P. Pence, president of Central Oregon Community College in Bend, Oregon, was named president of the new Central Arizona Junior College.

Toastmasters International, District 3, held its annual conference in Phoenix; representing the Copper Basin Chapter were Hyatt Holt, Arthur Pomeroy and Jay Shelley.

Jay F. Shelley, Jr., son of Mr. and Mrs. Jay F. Shelley of Kearny, returned home after serving four years as a radioman in the U.S. Navy.

Andy Guzman of Hayden won the annual Pioneer Day Golf Tournament in Kearny.

Mr. and Mrs. John I. Nix and Mr. and Mrs. Hal Harris represented the Rotary Club of Kearny at the annual convention of Rotary International's District 549 in Nogales.

A Phoenix builder started 10 new homes in Kearny on Greenwich and Hartford bringing the total of new homes this year to 30

Bishop Francis J. Green officiated at the dedication mass and program for the Infant Jesus of Prague Catholic Church in Kearny. The church was moved from Sonora to Kearny earlier along with a rectory.

Dr. James Malcomb Walsh, 81, retired as assistant surgeon at the division hospital in Kearny after serving 14 years with Kennecott.

Dr. L. E. Linsley, member of the RMD medical staff, resigned his post.

J. C. Van de Water, mines plant superintendent for 15 years, has been named superintendent of mining and concentrating at Utah Copper Division.

Construction has started on the Silicate Ore Leach Plant.

The John W. Galbreath Development Co. has completed a second water well above the highway to provide more water for the growing community of Kearny.

George J. Mortimer, son of Kearny Mayor and Mrs. Joseph T. Mortimer, reported to the U.S. Naval Academy following graduation from Ray High School.

The Rev. J. T. Weeks, pastor to the Kearny First Baptist Church for eight years, resigned to take over a church assignment at the Prescott Pines Baptist Camp.



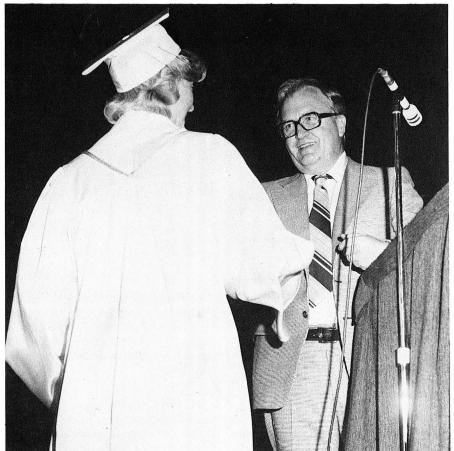
STORIES

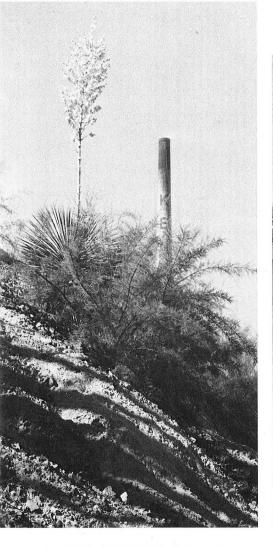
in
BLACK

and
WHITE

A \$500 Kennecott scholarship was presented to Queta O. Chavez, class valedictorian, at the 1977 Commencement Exercises of Hayden High School. W. B. Stump, RMD Comptroller, made the scholarship presentation at the May 23rd graduation ceremony. Miss Chavez is the daughter of the late RMD retiree Antonio R. and Mrs. Chavez of Hayden.

Ray High School's 1977 Commencement Valedictorian, Miss Wendy Gleave, accepts a \$500 Kennecott Scholarship from J. Stuart Nebeker, RMD reduction plant superintendent. Miss Gleave, daughter of Converter Craneman and Mrs. Wendell V. Gleave of Dudleyville, earned one of three Kennecott Scholarships awarded to Ray High School seniors. She plans to study Interior Design at Brigham Young University in Provo, Utah.









(Top Left)
"A what is growing where?" That was the response of
the KENNEZONIAN editor recently when an employee phoned the Public Relations office to report a yucca was growing on the side of the Tailing Thickner and was in bloom. Sure enough, the desert plant is doing well in this strange environment and the only unanswered questions are: How did the seed get there in the first place? A bird? The wind?

(10p Right)
Mrs. Dale (Glenda) Huddleston, a resident of Kearny
whose husband is an employee of the Hayden Smelter of
ASARCO, Inc., received a scholarship at the Arizona
College of Technology during the May 12th commence-Couege of technology during the May 12th commencement. RMD General Manager Kenneth H. Matheson, Jr., a director of the Central Arizona College Foundation, Inc., (left) made the foundation scholar-ship presentation. Mrs. Huddleston earned the award for having the highest grade point average in the freshman class.

(Bottom)

Kennecott's Ray Mines Division has three new journeyman Maintenance Mechanics who have com-pleted their apprenticeship training. E. D. Lane, concentrator field repair general foreman and chairman of the division's IAM joint apprenticeship committee, of the artiston's TAM Joint apprenticeship Committee (right) holds three certificates for presentation to the new journeymen. They are, left to right, Conrad S. Gonzales, Hayden; David F. Nelson, Winkelman; and Abraham F. Guzman, Hayden. Completion of an apprenticeship requires four years and 8,000 hours of work and classroom study.

(Continued on Page 14)

12,500 DAYS . . . without a lost time accident

1943 – that was 34 years ago. It was the second year of World War II, Franklin Delano Roosevelt was president of the United States and vast numbers of ablebodied men and women were engaged in vital war production work or serving in the armed services.

On February 6 of that memorable year, the Precipitation Plant of Ray Mines Division recorded a disabling injury. To this date - 12,500 days later - that's the last one on the records for that department.

A 34-year safety record has been established by this one department - AND THE RECORD IS CONTINUING! That is an unbelievable accomplishment. It is unequalled at Ray Mines Division and probably unequalled at any mining property.

As of April 30, 1977, the total days worked since the last lost-time accident in the Precipitation Department climbed to 12,493. In terms of accident-free manhours, the total as of that date was 1,333,818. Some larger division departments roll up that many man-hours in a year or two, but at the Precipitation Plant the hours accumulate rather slowly at the rate of about 6,000 monthly.

Currently, the department has 40 workers. Twenty-three are plant operators, ten are dozer operators, truck drivers or

loader operators. Seven employees make up the departmental supervision team.

The Precipitation Plant has not established this amazing safety record because it is lacking in potential hazards. Like any other industrial operation using power machinery, millions of gallons of water, high working areas and deep sumps, it has plenty of hazards day or night.

It is also interesting to note that this outstanding safety accomplishment has continued through eight different general foremen during the 34-year period, including the current one — Franklin F. Jones, Leaching & Precipitation General Foreman. These general foremen are reluctant to take any credit for the department's incredible safety performance.

"The men are responsible for the record," said one former general foreman and Jones agrees with that comment. Jones added that much of the credit for the accident-free years should be given to his predecessors. It was their leadership, dedication and inspiration that guided the department employees down through the years to establish the pattern being followed today.

"The pattern for working safely at the Precip Plant in very simple," says Jones, "it consists of setting safety goals, programs to support them, weekly safety

talks/discussions, an occasional film and just lots of plain conversation about the plant."

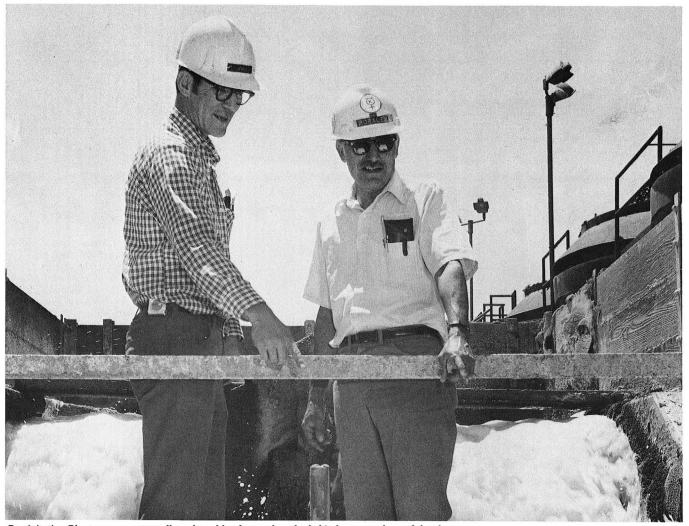
"Our safety communications work both ways. Not only do I pass along my comments, but they come right back with their comments and suggestions. Before the discussion ends, all of us have a clear picture of the department's safety program for the week or weeks ahead."

Workers coming on shift often check in early so they can discuss plant operation or problems with the men they are relieving. This kind of one-to-one communication maintains a good awareness of safety on the part of the people who are doing the actual work in the plant.

It might be argued that the safety record is so excellent because both the main Precip Plant and the Mini-Plant have less hazards than the old open-vat plant in the No. 2 yard on the banks of Mineral Creek.

"Not so," says Jones and Leaching & Precipitation Foreman A. C. (Ray) Morales, who has been at the plant since the year before the last disabling injury.

Each admits the old plant with its constant use of high pressure hoses, few handrails and other hazards did have a high accident potential not found in the present plant. However, new hazards will be found in the plant to balance out those left



Precipitation Plant process water rolls and tumbles down a launder behind two members of the plant management team as they discuss an operational matter. Franklin F. Jones (left), is the Leaching and Precipitation General Foreman and A. C. (Ray) Morales is the senior supervisor. Jones has been in his present post two years, while Morales has worked in the Precipitation Plant continuously since 1942—the year before the plant's last disabling injury.

behind. Hazards such as numerous conveyor belts, added heights, greater water danger, etc. What it really amounts to is that the work is hazardous, but it is being done safely.

Jones points out, "This is an area that requires a high degree of safety awareness. That awareness must last for eight hours every day the man is on duty, not just now and then. These men work safely because they know the equipment, they know the plant, they know the danger spots and they watch out for each other."

Records show that employee turn-over in the Precip Plant is lower than most departments. This provides a close-knit group with respect for each fellow employee and an interest in his safety.

When asked how the Precip Plant managed to build up such an outstanding safety record, Morales, who has been a supervisor since 1968, explained it this way:

"When a new employee comes in, the supervisors and older workers point out the department's safety record and take the time to point out the hazards. New employees are thoroughly indoctrinated by the older workers and a new man is never left alone on a job until the experienced men are fully convinced he can handle it alone — safely."

Morales made an additional comment about the Precip Plant workers, "These guys will warn anybody in the plant if they see him doing something dangerous. Mr. Matheson would get hollered at if one of our workers saw him doing something considered dangerous."

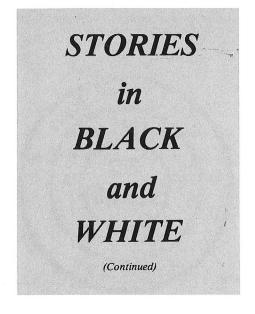
RMD's Precipitation Plant has been operating since January 20, 1937 and it has operated without a lost-time accident since February 6, 1943. The primary concern of the men at that plant is to make as much precipitate copper as they can — safely. They have proved that men can work safely making precipitate copper — they've been doing it for 34 years and intend to keep right on doing it.

Four years ago, Precipitation Plant management celebrated 30 years of accident-free work by having this hard hat decal prepared and issued to employees of that plant. A visit to the plant today finds many of these decals decorating employees' hard hats as they proudly call attention to their safe work record.





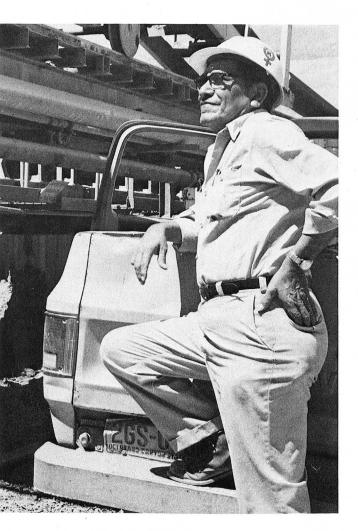
Miss Christine D. Olmos, who was graduated May 26th from Ray High School, received a \$500 Kennecott Scholarship during the school's 1977 Commencement. She is the daughter of MP Quality Control Technician and Mrs. Jesus G. Olmos, Jr. of Kearny and will attend Arizona State University to major in Computer Science. RMD Reduction Plant Superintendent J. Stuart Nebeker presented the Kennecott Scholarship druing the school's 56th Annual Commencement.





Ray High School's 1977 Salutatorian, Brett K. Matheson, turned unexpectedly after accepting his \$500 Kennecott Scholarship from J. Stuart Nebeker, RMD reduction plant superintendent. However, the KENNEZONIAN camera caught him delivering his commencement address and the smaller photo above shows this scholarship winner, the son of RMD General Manager and Mrs. Kenneth H. Matheson, Jr. of Kearny, who plans to study medicine at Brigham Young University in Provo, Utah.





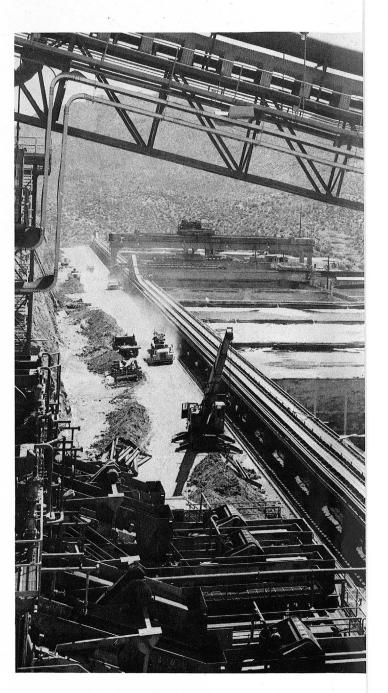
The employee. .

On the job. . .

40

Years!





.where he works.

Four currently active employees have the possibility of completing 40 years of employment at the property known today as Ray Mines Division. The second one of these four to be featured this year in THE KENNEZONIAN is Manuel E. Carrillo of Kearny — a Vat Leaching Field Repair Foreman. He started his KCC career in the Ray underground mine, but was soon transferred into the maintenance department where he has worked in a variety of jobs. Incidentally, he passed his 40th anniversary earlier this year and is now working in his 41st year.

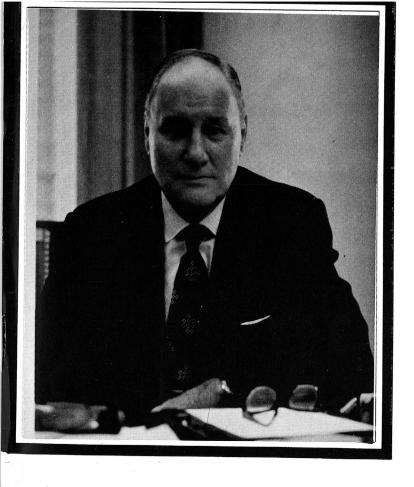


Kennecott Copper Corporation Ray Mines Division Hayden, Arizona 85235 Return Postage Guaranteed



BULK RATE
U.S. Postage
PAID
Tucson, Arizona
Permit No. 859





IN MEMORIAM C. D. (MIKE) MICHAELSON 1911-1977

Charles Donald (Mike) Michaelson, regarded in domestic and international mining circles as a "Miner's Miner," died February 9 in a Phoenix hospital following a brief illness. Mr. Michaelson, former president of the Metal Mining Division of Kennecott Copper Corporation, retired June 1, 1976 after almost 30 years with the company and a lifetime in the mining industry.

A graduate of the Colorado School of Mines in 1932, Mr. Michaelson served with various mining companies in the United States, Cuba, Mexico and Boliva before joining KCC in 1948 at its Chilean subsidiary, Braden Copper Co., as Superintendent of Operations. He soon was named General Manager, Vice-President and a Director of Braden.

In 1955, Mr. Michaelson was appointed General Manager of Kennecott's Western Mining Divisions with headquarters at Salt Lake City.

He was advanced to corporate Vice-President - Mining in 1960, transferring to New York City. He was elected to KCC's Board of Directors in 1964 and became the first president of MMD, April 10, 1968.

Mr. Michaleson spent more than two decades as a mining engineer and manager in Mexico, Latin America and South America. He was employed by such companies as Patino Mines & Enterprises Consolidated in Boliva, Nicaro Nickel Co. in Cuba, Fresnillo Co. in Zacatecas, Mexico, and Braden. He also worked at the Old Smuggler-Union Mine at Telluride, Colo. and for the U. S. Gypsum Co. at Midland, Calif.

At the Colorado School of Mines, he played tackle and served as Captain of the football team during his senior year. His first job, at age 15, was for a paving and contracting firm in Illinois.

Born at Sycamore, Ill., June 28, 1911, of Norwegian, Irish and German par-

ents, Mr. Michaelson received his early education in the public schools of DeKalb County. On Nov. 29, 1937, he married the former Barbara Hemenway. That marriage ended with her death in New York City on Aug. 13, 1965. They had no children. On Nov. 21, 1967, Mr. Michaelson married the former Olive Gray and the couple had two children, Sean Donald, age 7 years, and Carol Ann age 5 years.

Mr. Michaelson was a member of the Mining Club of New York and the American Institute of Mining, Metallurgical and Petroleum Engineers. He held an achievement award, equivalent to an honorary degree, from the Colorado School of Mines, and an honorary degree of Doctor of Engineering from Utah State University at Logan. He was active in charitable, civic and community affairs.

Following his retirement, the family maintained residences in Paradise Valley and Rostrevor, Ireland.



GM MESSAGE -

In each of my messages in the past two issues of the Kennezonian, I have touched briefly on the need to cut costs while maintaining goal — or better — production. By doing this, we, as a Division of Kennecott can, hopefully, show a profit in 1977.

More and more we read of the bad feelings many people have over the word profit. Surveys of otherwise well informed people indicate that many of them believe that some companies keep as much as 25 cents of every dollar they take in. The truth is, that according to the latest business statistics, the average firm shows a profit of just under 5 cents for every dollar in sales. As a matter of record, Kennecott during the year 1976 earned less than one cent for every dollar of income, after the inclusion of income from Peabody Coal Company. Before the inclusion of that money, Kennecott had shown a loss for the year. And, because of the agreement to sell Peabody, Kennecott will not be able to count on money from the coal business if the sale is approved by the Federal Trade Commission.

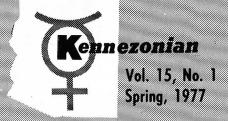
On a profit of less than one cent for every dollar of income . . . or even a loss . . . no company can afford to spend large amounts of money for new equipment or plants, unless that money will be returned through better production at a lower cost.

You can make a good comparison in your personal life. Say you earn about \$12,000 a year and manage to "show a profit" in the form of savings at the end of the year after all bills and taxes are paid. Using the figures I've given for Kennecott, if you saved 'less than one cent of each dollar of the money you earned,' you would have about \$100 in your account at the end of the year. Not even enough for the down payment on that new car you want.

If we all think about these things and make a conscious effort to conserve time, energy and materials — to get the most for every dollar — perhaps at this time next year we can report that Kennecott showed a normal profit — and so did you.

Sincerely.

K. H. Matheson, Jr.



Published by
Kennecott Copper Corporation
Ray Mines Division
Public Relations Department
J. H. Maize, Director

CONTENTS

| | Page |
|-----------------------------------|-----------|
| The "Ore Drag" Is The RMD Life | Line 4 |
| Employees are teachers and s | tudents 7 |
| 20 Years Ago At RMD | 8 |
| 10 Years Ago in Copperland | 9 |
| Those Flashing Red Lights | 10 |
| Solvent Extraction (SX) Could Add | |
| Dimension To The Silicate Ore Lea | |
| Salute To Seniority | 15 |

THE COVERS:

FRONT: "Wow! It's big!" That's the general comment around the Mines Plant as the division's newest equipment acquisition begins to take shape. It is a 25-cubic yard electric mining shovel and the first of its size at RMD. It is being assembled by Mines Plant employees and P&H engineers. Completion time will be around May 1.

REAR: John P. Dougan, an RP machinist and a resident of Kearny, is one of seven active emloyees born in 1912 making this elite group our oldest employees in years, not necessarily in service. He, like the others, will be 65 this year and has been at RMD since 1970. The back page photographs show him on the job and off the job enjoying his favorite leisure activity — golf.

EDITOR: Norman B. Harrington



The "ore drag" starts at the loading tunnels under the open air stockpile at the primary crusher in the Mines Plant. Half of the 55-to 60-car train has been loaded from the tunnel on the right and on the left the RMD locomotive is slowly pulling the second half of the train through the loading tunnel. When all cars are loaded, the train will start its journey to Ray Junction.

The "Ore Drag" Is The RMD Life Line

Moving more than 11 million pounds of copper ore on each of an average five trips every 24 hours for a single roundtrip distance of 40 miles requires the fullest cooperation between The Southern Pacific Company and Ray Mines Division to keep both parties happy.

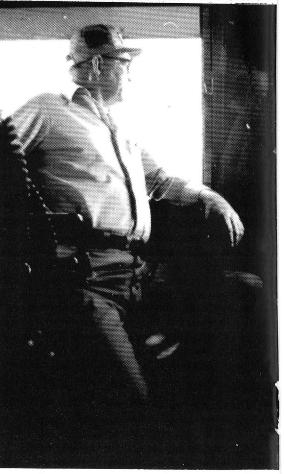
In addition to the cooperation, and there is plenty of it, it requires a minimum of seven highly trained individuals to run the two trains involved in each of the round trips, plus a total of five locomotives, a caboose and many other individuals at each end of the 20-mile run and in between.

Costwise, the capital investment required by both companies to satisfy the insatiable appetite of the Hayden Plant for the ores of Ray is a staggering amount. This amount is bloated by the cost of locomotives, trackage, right-of-way, ore cars, signals, loading facilities, dumping facilities, maintenance on everything, wages, taxes, crossing protection, communications equipment and on and on.

As one non-railroad type individual spends a day riding these two trains he is immediately indelibly impressed

with the fact that every man involved with rail ore haulage at Ray Mines Division never makes a move without reviewing in his own mind how to do that move safely. For the experienced trainman, safety is automatic, but not routine; for the trainee, he does his jobs over and over, under the watchful eyes of skilled men, until doing a task safely becomes second nature.

Each man in each crew has specific jobs to be performed and he does them without fail because other members of his crew are depending on him with

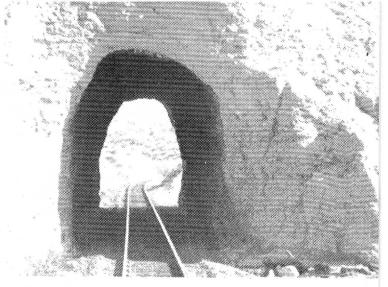


Guy Stephens, who is qualified as an engineer, brakeman or conductor, is at the locomotive controls as he slowly pulls the string of empty 100-ton cars through the loading procedure. He is leaning out of the cab window watching the signal lights for his instructions.

their lives, literally. The interdependence of each man on a train crew with other members of that crew is the finest example of trust in your fellow man and respect for his integrity and honesty that one could ever find. It has to be that way — their lives and their jobs depend on it.

Every ore drag — that seems to be the common expression among the railroad men for the five-per-day runs from the mine to Hayden — naturally starts with loading the 55-plus car strings. RMD's train crewmen routinely move the cars around on two loading tracks under the ore stockpile so that about half of the cars are loaded from one side of the towering stockpile and the other half from the other side.

Breaking up the ore train into two equal sections and loading on the two tracks is done to expedite ore loading. A 55- to 60-car train that is loaded on one track would require much more time due to the static build-up of ore on one side of the open-air stockpile. The active available tonnage that can be pulled from the stock pile when it is filled to capacity is only about 4,500 tons or 45 cars providing the train is separated and ore drawn on both tracks. If only one side is drawn, only



There are three tunnels on the railroad line between Ray and Hayden Junctions. This is what one looks like to the engineer as the ore train heads for Hayden Junction with four red and black SP engines and crew.

approximately half this amount can be pulled. A full ore bin plus steady dumping into the crusher is required to load a 55-plus-car train with a minimum of delays.

On day shift, the strings of empty ore cars are checked with meticulous care by the RMD car inspector at Ray Junction before each is returned to the mine. This procedure is necessary to make sure dumping doors are tightly closed and other parts of each car appear normal. A piece of ore, even a small one, caught in a dumping door will prevent the door from closing properly and could cause a multi-ton mess in the loading tunnel. On the dark shifts, empty cars are checked by the car toppers.

When the RMD train crew reports for duty at the start of each of the day's three shifts, the first order of business is to load the ore train. If the crew on the preceeding shift had the time and ore available, the cars will be loaded and ready to make the downhill run to Ray Junction. Loading the ore train is a slow process as the locomotive inches along pulling the empties through the tunnel so the skilled car toppers can do their job filling each car with the maximum amount of ore and a minimum amount of spillage.

Finally, the loading is completed and preparations are made to head for Ray Junction.

The train doesn't start immediately; crewmen must perform some safety chores first. Air pressure must be built to a certain poundage before the trip starts to make sure the locomotive with more than 11 million pounds of ore plus the weight of the cars behind it can be safely controlled on the downhill run to Ray Junction—about five miles away.

Next, the brakeman releases the cinched-up hand brakes on the first four or five cars next to the engine.

This "ore drag" is just about to end as the train slowly approaches the Track Hopper at Hayden where the cars will be unloaded. At this point, the train is moving along the tailings pond and SP crewmen are getting into position to cut off the caboose and start the ore dumping.





This is a typical scene at the deserted area known as Ray Junction. In the foreground, the usual four SP locomotives have been connected to a loaded ore train and the crew of four is getting ready to leave for Hayden. The RMD crew and locomotive that brought the full train to this point will take an empty train back to the Mines Plant for another load.

They were applied good and hard when the loading started to help the locomotive hold back the train with its ever increasing load. With the hand brakes off and a sufficient amount of air pressure built up, its "All Aboard" for Ray Junction.

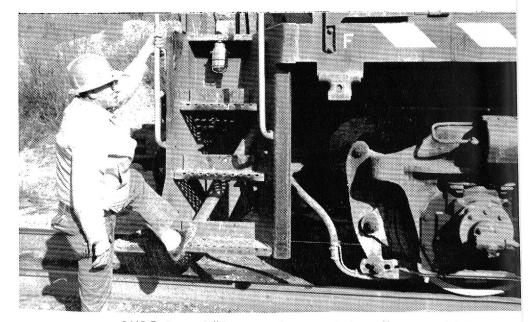
This is a slow trip. Running at an average 10 miles an hour it takes 25 minutes. Dynamic braking — a built-in feature of a modern diesel-electric locomotive — holds the loaded train at the proper safe speed for part of the distance, but it soon becomes necessary for the engineer to start using the air brakes. It takes plenty of air to keep that train at a safe speed as the elevation starts dropping from the mine to the junction.

Soon the junction is in sight and if all calculations between the mine, the reduction plant and Southern Pacific are on target, there's a string of empties waiting to be taken back to the mine and a quartet of giant black and red SP locomotives waiting for the loaded train that just arrived. RMD's brilliantly painted black and yellow locomotive is uncoupled, hand brakes are set on the train and the four SP locomotives move smartly into position to provide the motive power to take that 11 million pounds of ore to Hayden, dump it and return the empties to Ray Junction.

The highly-skilled train crew of SP has one more man than the RMD crew has — he's an extra brakeman.

train is barely out of Ray Junciton when it goes through three short tunnels and then its non-stop to Hayden Junction on a track that winds along low land that makes up the bank of the Gila River. It's not a scenic route; it was not designed to be. It is the shortest distance between two points. Crewmen seldom take their eyes off the track ahead as the train picks up speed and they carefully watch the electric signals along the track. These are designed to warn them of any problems ahead — another of the seemingly endless safety procedures that are followed without deviation.

As the Kearny corrals come in sight, speed is sharply reduced to go through Kearny and as the golf course slides by the speed is gradually increased. Before long, the RMD tailings pond looms ahead and now its time to start slowing



RMD Trainman Bill Rogers, acting as conductor on this run, watches some switching activity on the other end of the locomotive and prepares to swing aboard the unit as it makes another move at Ray Junction.

There's one at the head of the train and one at the rear, plus the conductor and the engineer. These men automatically go through their prescribed safety procedures and moments later our train slowly starts toward Hayden.

Hayden Junction lies 11.7 miles ahead and the RMD track hopper is a mile beyond that point. Top speed on this run is 30 miles an hour in places and much slower in other places. It's generally uphill, but those four black and red locomotives seemingly make the pull with little or no effort. The

again to go through Hayden Junction. That area is soon behind and now preparations are made to dump the load into the track hopper so the 5,500 tons of ore just brought from the mines plant can start its four-day trip through the reduction plant.

SP crewmen, capable and proud of their job knowledge, leave the train at strategic points to handle the necessary switches as the caboose is dropped off the ore train and parked to await the return trip. The SP crew is now ready to ease more than a

quarter-mile long string of loaded ore cars through the track hopper for dumping. About half of the cars will be dumped in one side of the hopper and the remainder in the other side. The eingineer keeps a watchful eye on the traffic signal-style lights on each end of the track hopper for information on the dumping speed and hopper space availibility.

Dumping is not a long process, providing the secondary crusher can take the full train load. Sometimes, the crusher can't assimilate a complete train load of ore, so when this happens Southern Pacific sits and waits. When loading is slow at the mine, the Southern Pacific crew may have to sit and wait depending on dumping conditions. The converse would apply when dumping is slow.

Some of this wasteful sitting and waiting could probably be minimized with a communications system linking Southern Pacific with RMD. This project is now under study. Both parties have excellent in-house communications, but nothing linking the two except telephones and while this is better than nothing it leaves much to be desired.

RMD draws its three daily haulage crews and one switching crew from the division's own 13-member local of the United Transportation Union. Crew members for the ore drag of Southern Pacific are drawn from area residents and the "extra board" in Phoenix. SP crews work a 12-hour shift, while their RMD counterparts work the usual eight-hours.

Rail ore haulage is an unusual project with two separate companies working closely together for a single purpose—to allow the division to meet its goals on ore production, which in turn allows the reduction plant to meet its goal on copper production. Actually. RMD has the ore production goals and Southern Pacific is standing shoulder to shoulder with the division to do its part. Each party to this project has a separate job to do and when the two parts are placed end to end the job is accomplished.

And, the most impressive part of the whole job to an observer is the top-of-the-list priority given to safety by every man. That's the way it should be because his life and maybe the lives of others depend on doing every job, no matter how small, absolutely safely.

EMPLOYEES are students and teachers

Back in the 60's, there was growing interest on the part of RMD management and many employees in finding a way to make additional educational opportunities available in the area.

The Copper Basin area was at least two hours from any college campus, so taking classes on campus was not the answer. People wanted a chance to increase their knowledge at or near their homes. At infrequent intervals, RMD arranged for a professor from one of the state colleges or the university to visit the area weekly and conduct a class.

This was not the answer, but about this time something happened within Pinal County that has helped to fill that educational void.

In late 1961, formation of the Pinal County Community College District was approved by the electorate. Six years later, that electorate approved a bond issue to buy land and construct a community college in western Pinal County. It was named Central Arizona College (CAC), a name chosen by the district board in January, 1963.

Two years later — 1969 — CAC administrators were setting up adult education classes in Copper Basin area high schools. In other words, they were taking education to the people instead of asking people to come to education.

It was a modest beginning, perhaps even primitive by some standards, but it was an instant success. Men, women and high school students enrolled in the starting classes to satisfy their thirst for more knowledge. The CAC adult education schedule was flexible—a class would be offered in almost anything—if as few as 15 people were interested in the subject.

While the adult education phase continued to grow around the county, so did CAC. In 1971, another bond issue was approved by the electorate to expand the primary campus and start a satellite campus in the eastern part of Pinal County. A site was selected on Aravaipa Road, just off Highway 77, and construction of the facility known today as the Arizona College of Tech-

Back in the 60's, there was growing nology (ACT) was underway and stuterest on the part of RMD manageent and many employees in finding a the fall of 1974.

Today, ACT has completed two and one-half full scholastic years with a steadily climbing enrollment. It has a full-time staff of 20 faculty members and administrators, with about 50 others as part-time professors for both on- and off-campus classes.

These part-timers are the backbone of the adult education program and are selected for their expertise in various fields. They come from all parts of Pinal County industries, schools, businesses and various governmental agencies. Generally, these men and women are on their jobs or in their homes during the day, but at night you'll find them teaching classes on campus or in community school rooms from Oracle to Superior and every community in between

Ray Mines Division has provided many of these instructors since the adult education program started eight years ago. During the past school year, employees who instructed part time included. Joseph T. Mortimer, safety and environmental control director, Gilbert Ruiz, mines plant heavy duty truck mechanic, James T. Hogg, mines plant electrician and Erwin R. Wolfe, reduction plant industrial relations representative.

While one can enumerate last year's employee-instructors on one hand, it is not that easy to count up the employee-students. A spot check reveals that between six and eight percent of the RMD employees were enrolled during one or both of the last two semesters. Add to this figure the hundreds of RMD dependents taking classes and one can begin to see the impact of ACT in the Copper Basin.

Since CAC started the adult education program, which has been taken over by ACT, literally thousands of individuals of all ages from all over Pinal County have attended classes. Some were looking for training to get a job, some were looking for training to advance in their job, some were starting out to get a four-year degree and many were going back to school for the sheer pleasure of learning.

A summary of events making news at Ray Mines Division 20 years ago in 1957.

The price of copper dropped again as 1956 ended and the selling price was 36¢ per pound when 1957 arrived.

Ivan H. Stewart was promoted to Assistant Surface Foreman and W. B. Stump was named Chief Clerk, Hayden Plant Accounting Office.

Nevada Mines Division Assistant Accountant Orville H. Abernathy was selected as resident auditor on the smelter construction project and Frank Woodruff, NMD Reduction Plant Superintendent, was named project manager for the smelter construction.

Hayden ceased being a company town when it became incorporated just before the new year started. The sale of Hayden houses and lots started. The sale of Hayden houses and lots started with prices ranging from \$1,018 to \$5,768.

At the Mines Plant, Robert O. Giroux was named drilling and blasting supervisor, with John Chambers as the assistant drilling and blasting boss.

Engineering studies were underway to establish a limestone quarry on a hill north of the proposed new smelter location.

The state announced that the realignment of Highway 177 was starting and the RMD had agreed to furnish some mine waste for fill material.

A major production expansion costing almost \$2 million was announced to bring ore production to 22,500 tpd with the addition of a new 6-yard shovel, 12 50-ton haulage trucks and other pit equipment.

Promotions announced at the Mines Plant: Robert Haugh, Jr. and James D. Trimm, truck shop foremen, and James W. Toon, transitman.

The 1956 annual report revealed it was a record year with 5,860,000 tons

of ore mined and 113,500,000 pounds of copper produced with the average ore grade at 0.91% — lowest to date.

Western-Knapp Engineering Co., the smelter contractor, announced plans to construct dormitory facilities for 100 men and mess facilities for 200 men in Winkelman just across the Gila River.

A joint announcement by RMD and ASARCO, Inc. said the smelting contract would be terminated Sept. 30, 1958, when the new RMD Smelter is finished.

The price of copper dropped another 2* per pound on Feb. 1 and dropped another 2* later in the month, making it 32* per pound.

20 YEARS AGO AT RMD

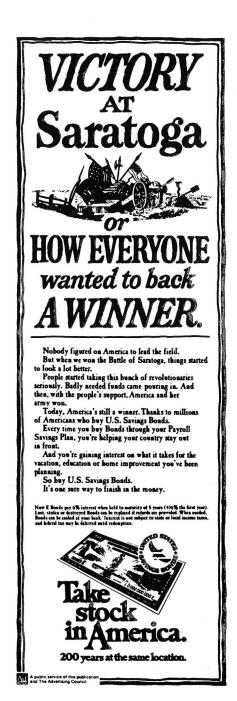
Max Shake of the IR Department received the Boy Scouts of America Silver Beaver Award and Richard Dalton was named pit relief foreman.

Guy Hurd and members of a rotary drill crew at the mine set a new one-shift record of drilling 1,274 feet — over 200 feet more than the previous record.

The Sponge Iron & Acid Plant started three-shift operation and WMD Design Engineer Ivor G. Pickering was in Hayden studying production problems at the facility.

The Salt River Power District completed a new sub-station at Hayden and a new line from Ray.

A new access road (Kennecott Ave.) was contructed to the smelter site to relieve congestion in Hayden traffic and soil samples from the Ray golf course were being tested to see if the site could be used for a new shop site.



A summary of events making news in the Copper Basin 10 years ago in 1967. (From the Copper Basin News files).

RMD announced a \$35 million expansion program to provide a Silicate Ore Leach Plant and a 750-tpd sulfuric acid plant.

A Kearny resident, RMD Public Relations Director James H. Maize, received a five-month fellowship at the Brooking Institution in Washington, D. C.

The Ray School District had almost \$1.5 million of construction underway including classrooms, gym and auditorium.

Kearny resident John I. Nix was reelected president of the Pinal County Junior College Board.

Parents of the first baby born in 1967 were Mr. and Mrs. Bert Slater of Kearny and they named her Carla Jean.

Lilia Dorame of Hayden was named Gila County Junior Miss and the International Union of Mine, Mill and Smelter workers merged with the United Steelworkers of America.

It was announced that Kearny had 644 housing units with 10 more under construction and the D&B Building Supply opened in the Kearny Industrial Park.

RMD announced that a San Francisco firm, Holmes & Narver, had been awarded the contract to construct the Silicate and Acid plants.

A. E. Nicholson resigned the Hayden School superintendency after 10 years to take a post in Phoenix.

Elected to the Hayden Town Council were: Jane Sewell, John W. Upshaw, Florentino Pulido, E. G. Stebbins, Richard Haskell, Ysabel T. Martinez and Melesio R. Chavez.

The Circle K opened in Kearny.

Terry Quinn was named president of the Kearny Chamber of Commerce with Dick Beauford as Vicepresident and Emily Booker, secretary.

It was announced that the Southwest District of the Arizona Federation of Women's Clubs would hold its annual convention in Kearny.

The Rotary Club of Kearny sponsored its third annual Ray Relays with 15 schools participating, and RMD was making plans for its Open House at the mines plant on April 1.

Kennecott Copper Corp. announced that it had purchased Peabody Coal Co. and the Phoenix Dons Club brought 300 visitors in cars and buses to tour RMD.

10 Years Ago In Copperland

John I. Nix was elected president of Kearny Rotary, Bob Piggot was elected president of the Copper Basin Lions Club and Hyatt Holt was selected president of the Copper Basin Chapter of Toastmasters, International.

Hayden Deputy Town Clerk Carmen Hart resigned her post after 10 years to accept a position with ASARCO, Inc.

Kelly Haddad and Dick Beauford were named co-chairmen for the 8th Annual Kearny Pioneer Days, while officials of the Pinal County Junior College Board were holding public meetings on the proposed \$2 million bond issue to construct a junior college near Coolidge. Thirty-five telephone subscribers in the Ray-Sonora area, including the RMD Mines Plant, were given new phone numbers with the 363 prefix.

Ray High School announced that Girl's State delegates would be Tammy Weeks and Anita Butteweg with Linda Williams as alternate; Boy's Staters would be Danny Luera and Bruce Dale with Jim Lavelle and Tony Bueno as alternates.

Growth doesn't stop at maturity.

Everyone knows U.S. Savings Bonds reach full maturity in just five years.

But they don't stop there.
Bonds keep accumulating interest year after year after year after year.
So if you're enrolled in a Payroll

So it you're enrolled in a Payroll Savings Plan at work (or the Bond-A-Month Plan where you save), you don't have to rush out and cash your Bonds at maturity.

at maturity.
You can sit back and watch them keep growing.
The older they get, the better they look.

Series E Bonds pay 6% interest when held to maturity of 5 years (4½% the first year). Interest is not subject to state or local income taxes, and federal tax may be deferred until redemption.



A public service of this publication and The Advertising Council.

Those Flashing Red Lights

All is well with the No. 6 oil circuit as long as those red lights keep flashing.

Most of you are wondering what "the No. 6 oil circuit" is and what those "red lights" have to do with it? In fact, many readers are wondering just what is "No. 6 oil?"

No. 6 oil is the fuel being used at the mill power house, it has been used to heat the reverberatory furnace; it will be used again and in the near future it will replace other fuels now being used at the Reduction Plant. A common term for describing No. 6 oil is "heavy oil" and that's what we'll call it in this story.

Heavy oil and Ray Mines Division were complete strangers prior to mid-1973. The usual fuels used by the division were No. 2 diesel, natural gas and gasoline. About this time, information started to filter down to the division that a fuel crunch was coming and RMD had better start making

plans to select a substitute fuel for all natural gas uses, except space heating, and provide at least a 90-day storage capability for the substitute fuel.

Engineering studies revealed that heavy oil was the answer and plans were started in motion to build storage and distribution facilities for an unfamiliar fuel. These studies also brought out the fact that heavy oil had an unpleasant characteristic — when its temperature drops below 115 degrees F. it becoms as solid as a chunk of tar or wax. This meant that the division not only had to construct heated storage facilities, but additional fuel had to be used to keep the heavy oil hot enough to be moved from place to place — winter and summer.

A four-million gallon tank was constructed at Hayden to hold a supply of the heavy oil. At the same time, construction was started on unloading stations, pipelines to move oil from the storage area to where it would be used,

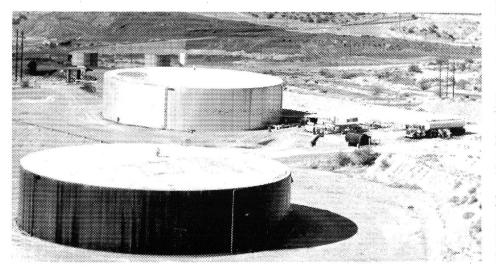
Here's one of those flashing red lights. As long as it flashes, all is well; when it quits, there is trouble with the heat tracing system.

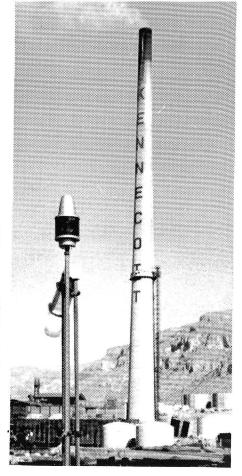
holding tanks at the point of use and pre-heaters before the fuel reached the burners.

All of this was accomplished in record time and before too many months passed by, another four-million gallon tank was being installed along side the first one. A special diesel-fired heating plant was constructed close to the tanks to keep the oil hot in the tanks so it would flow to the point of use. Now, a way had to be found to keep the distribution lines warm enough to allow the heavy oil to be pumped from one point to another.

Heat tracing was decided on as the method to keep the pipe temperature high enough for proper oil movement. This meant that nearly a mile of four-inch steel pipe and some six-inch was wrapped with electric heating elements to maintain a temperature of 150 degrees F. To make sure the pipelines stayed hot — primary and secondary heat tracing circuits were provided so if the primary failed for any reason, the back-up system would take over.

On a small hill behind the RMD Smelter, stands two four million gallon tanks equipped to store heavy oil and keep it hot enough to move to points of demand. In the area between and slightly to the right can be seen a tanker unloading heavy oil into the storage

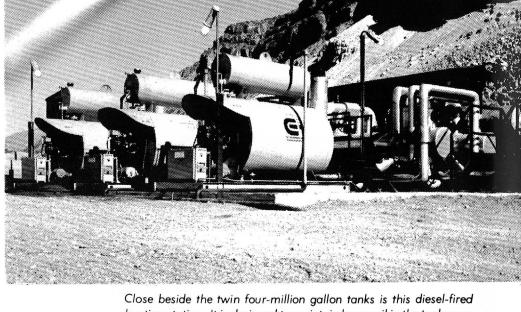




At this point, the flashing red lights enter the picture. These lights — much like those on top of emergency vehicles — indicate all is well with the pipeline electric blanket. When the lights go out — so does the maintenance crew, immediately. The heavy oil is maintained in the storage tanks at a temperature hot enough to allow it to flow like water. Those heat traced pipelines allow it to be moved to where it is used and "day tanks" at the point of usage must be heated to maintain the fluidity of the fuel.

Before the heavy oil ever gets to the burner in the power house, smelter or any other place, it must go through a pre-heater to raise the oil temperature to 190 degrees F. and then it is ready for use.

If heavy oil "freezes" solid below 115 degrees F., how is it transported to the division? That's simple. At the point of shipment, it is heated to about 180 degrees F. as it is loaded into the tanker truck and the insulated tank holds the heat until the truck arrives at Hayden and the oil is pumped into the storage tank. In case of a nationwide truck strike or some other catastrophe, the division maintains unloading facilities for railroad tank cars. These could be activated within a short time in case of an emergency.



Close beside the twin four-million gallon tanks is this diesel-fired heating station. It is designed to maintain heavy oil in the tanks as a temperature where it will move freely on demand. This station is automatic in operation and contains regular and stand-by units.

Heavy oil is a residual product of refineries, usually. It could be classified as a waste product from the refining of gasoline, diesel, kerosene and other popular petroleum products. In some cases, it is the only product of a small refinery. Heavy oil actually weighs more than other fuels, but it provides more BTU's per gallon than other fuels. It is not as economical as natural gas, but since there is no more natural

gas for industry it really doesn't matter. Heavy oil is more economical than regular fuel oil (No. 2 diesel).

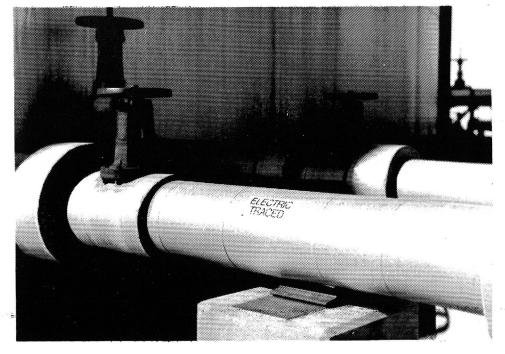
Today, the choice of heavy oil as a substitute for natural gas at RMD appears to be working well. Electricity and coal were among the other substitutes considered, but discarded. Electricity will probably be the furnace fuel of tomorrow, but certainly for now coal is out of the running because of the tremendous capital cost of converting everything over to accept that fuel.

There is no apparent shortage of heavy oil in sight. As long as refineries keep turning crude oil into gasoline and other popular fuels — there will be heavy oil. A new type of heavy oil with a lower pour point is now being used at the division on a test basis. If it proves satisfactory, it will probably become the standard fuel but will still require the same treatment as the original heavy oil with the higher pour point.

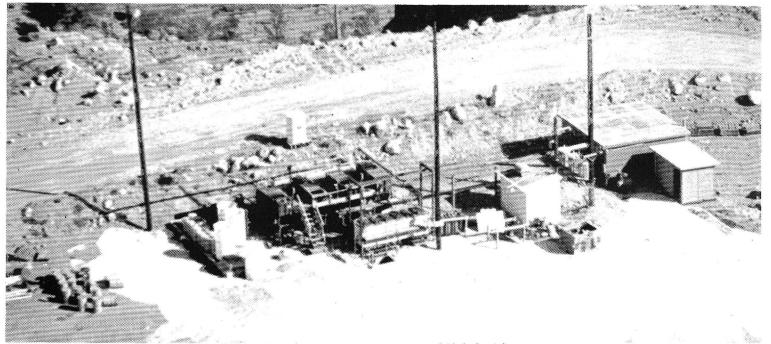
The division is solidly committed to the use of heavy oil as a fuel for smelting, steam generation and associated high-heat requirements. It has made a substantial investment in storage capacity of eight-million gallons, a large oil heating plant, electrically-heated pipe lines, heated "day tanks" and pre-heaters.

As long as those revolving red lights keep flashing on the east side of the Reduction Plant, you can be assured the heavy oil is flowing like water to the points where it is needed.

Heavy oil from the storage area to the point of use must travel in pipelines covered with "electric blankets." The heating units under the covering and around the pipe automatically maintain the proper temperature for all-weather movement of the fuel. Without this heat tracing, even in an Arizona summer, the oil will not move.



Solvent Extraction (SX) Could Add A New Dimension To The Silicate Ore Leach Plant



The SX pilot plant is hidden away inside the Mines Plant on a small level spot behind the main gate. Although the plant is small, it is expected to provide answers that could make a big change at the Silicate Ore Leach Plant.

Process industries, like Ray Mines Division, are always seeking improvements for a variety of reasons, but the main reason for the current SX pilot plant experiment at the Mines Plant is to find a way to produce cathode copper of electrolytic quality.

The fact that the Silicate Ore Leach Plant (SOLP) has never been able to produce salable electrolytic copper cathodes has always been a source of disappointment to Kennecott and RMD's management. Refining techniques employed in the SOLP have been the subject of constant experimentation in an effort to make a product for direct sale, without additional refining.

This never ending search for a better way just may be around the corner. At least, a number of engineers and scientists have a "gut" feeling that solvent extraction could be the answer RMD has sought in vain since the plant was dedicated May 23, 1970.

The technique of solvent extraction is not new, it has been used successfully for a number of years by copper producers in this and other states. A continuing study of adopting the technique at RMD has been underway for years, but the proper organic element to accomplish the job was simply not available for the unique SOLP solutions.

In the past few years, at least three of these organic elements have been available commercially and one has been successfully utilized by several other copper producers. Extensive testing of each with RMD leach solutions revealed none would give the desired results. Some were discarded for economic reasons; some for technical reasons. And, the search continued.

Not too long ago, scientists in England concocted a formula for an organic reagent that showed promise in bench tests. Scientists at the Metal Mining Division's Research Center

worked with the new element and it was finally decided to give it a pilot plant test at RMD. The new element showed such promise that other copper producers established testing programs concurrent with the one at RMD.

This newest element in the solvent extraction field was called Acorga by its English inventors and the small shipment needed for the RMD pilot plant test was airlifted by jet across the Atlantic to its Arizona destination.

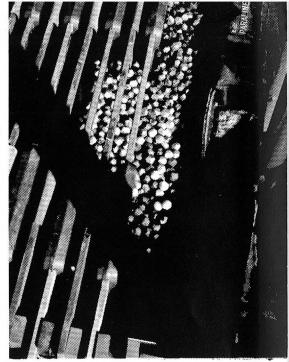
While the pilot plant was being constructed on a small hill behind the main gate at the Mines Plant, a staff of operators was being assembled from Salt Lake City and RMD by the project managers, J. R. Rawling of the MMD Research Center, and RMD Quality Control Director W. R. Strickland. The pilot plant became operational last Nov. 30th, and will be operated until about May 1 to gather complete data on the feasibility of incorporating the SX process into the SOLP circuits.

To a layman, the plant looks unusually simple. There are four mixersettler units, an electrolyte tank, a storage tank for the SX solution and an electrowinning cell. Physicially, the plant is simple; technically it is not. However, the SX process so far has worked remarkably well with a minimum of problems and this has created great expectations.

Raw material for the SX pilot plant is a combination of all leaching solutions from the SOLP in the proportion of their generation. In other words, the feed includes a mixture of copper bearing leach solutions from the Pachuca leach tanks and the leach vats. This solution reaches the plant at the rate of 20 gallons per minute. An equal amount of barren solution leaves the plant and returns to the SOLP's waste water circuit.

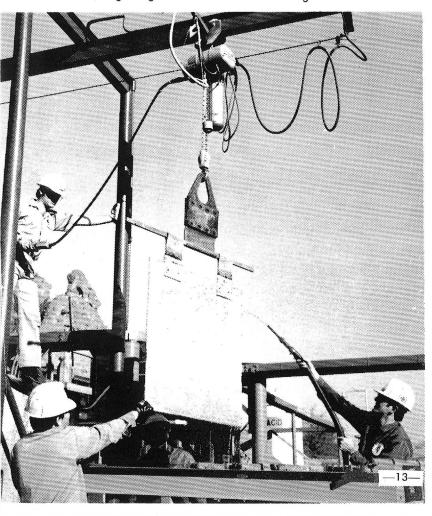
The SX solution is made up of 10% Acorga and 90% special high purity kerosene. This kerosene acts as a carrier or diluent for the Acorga but plays no role in the actual chemistry of the copper removal.

In the first stage of the process, the SX solution and the copper bearing leach solutions are combined in the mixing chamber of a mixer-settler unit. Vigorous agitation in the mixing chamber causes the solutions to become intimately mixed. During this contact, copper is transferred from the leach solution to the organic solution. The two solutions are then allowed to separate in the settler unit, using the ancient principal of oil floating on water. Two of these extraction stages are used in the pilot plant. After the leach solution has journeyed through both it is now barren or free of



This is what the pilot plant electrowinning cell looks like from the top. Those bars with the knobs are lead anodes and the bars between them are supporting starting sheets which will be turned into cathodes in a week. The small round objects are polypropylene balls to supress acid mist from the cell.

Cathodes made in the single electrowinning cell at the SX pilot plant are pulled once a week to provide data on the experiment. Participating in this operation are two members of the pilot plant team, Gary Snow, operating the crane, and Scott Norby, with the water hose. Electrowinning General Foreman Neil J. Nebeker, with his back to the camera, is guiding the cathode into the holding rack.



copper, and is removed from the circuit and returned for reuse in the SOLP.

The SX solution, now loaded with copper, moves to the two stripping cells where it is mixed with a high acid solution from electrowinning and is forced to unload its copper in that solution. Acid molecules replace the copper molecules in the organic and the organic returns to the SX solution holding tank ready to make another trip through the circuit and collect another load of copper. The high acid, copper enriched solution is routed to the electrlyte tank.

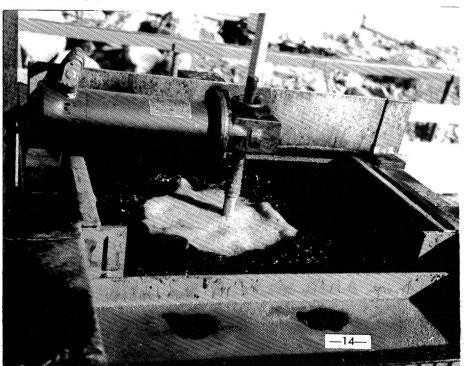
Loss of the Acorga in its closed circuit route is negligible; it is simply on a merry go round collecting copper in half the circuit and releasing it in the other half.

The electrolyte solution also goes round and round. It is pumped from the storage tank into the electrowinning cell where the copper is made into cathodes by electricity which forces it to build up on a thin starter sheet of pure copper. Tail water from elec-



RMD Quality Control Director W. R. Strickland, left, and Tom Hudson, member of the pilot plant team, carefully inspect one of the cathodes just taken from the electrowinning cell at the plant.

Here's the action in the mixer-settler cells as the copper bearing leach solution meets the SX solution. This blending of the two solutions creates a climate where the organic material in the SX solution can load up with copper from the leach solution.



trowinning returns to the stripping cells for more enrichment and another trip through the electrowinning stage.

As was said earlier, the physical aspects of the pilot plant are disarmingly simple, but the process is highly complicated and complex. Yet, because of the natural laws of chemistry utilized it is almost a fool-proof process after adjustments and varibles have been firmed up and finalized with in-depth pilot plant experimentation.

So far, the results of the process evaluation are very promising, but the pilot plant run is far from concluded and there'll be no celebration until all the returns are in, checked and double checked and some kind of a statement placed on the bottom line of the evaluation report. The real key is whether or not salable electrowon cathodes can be made. The standards are high because the copper industry is one of the most competitive of the basic metal industries, but the optimism of the project team is great.

There is a good possibility this functional pilot plant will not be mothballed after the testing period of the SOLP solutions. It just may get a new assignment in the future to evaluate the SX process on copper bearing solutions from dump leaching.



The employee

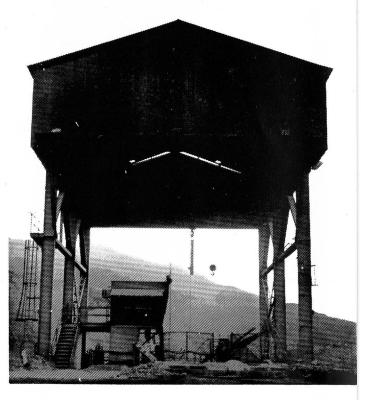
On the job . . .

40 Years!

SALUTE

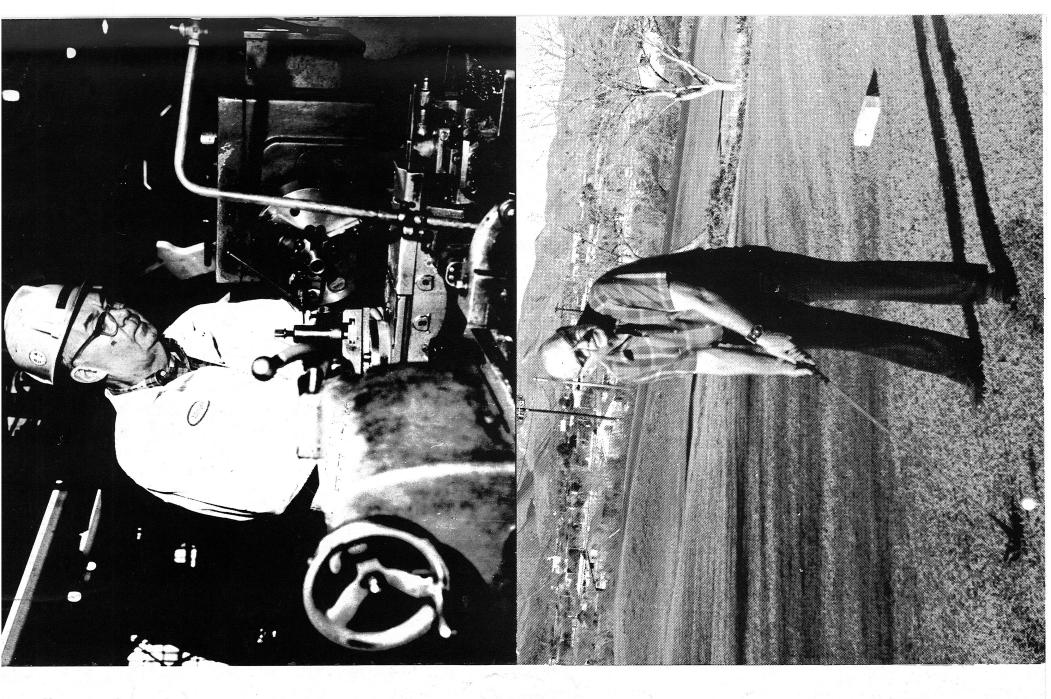
TO

SENIORITY



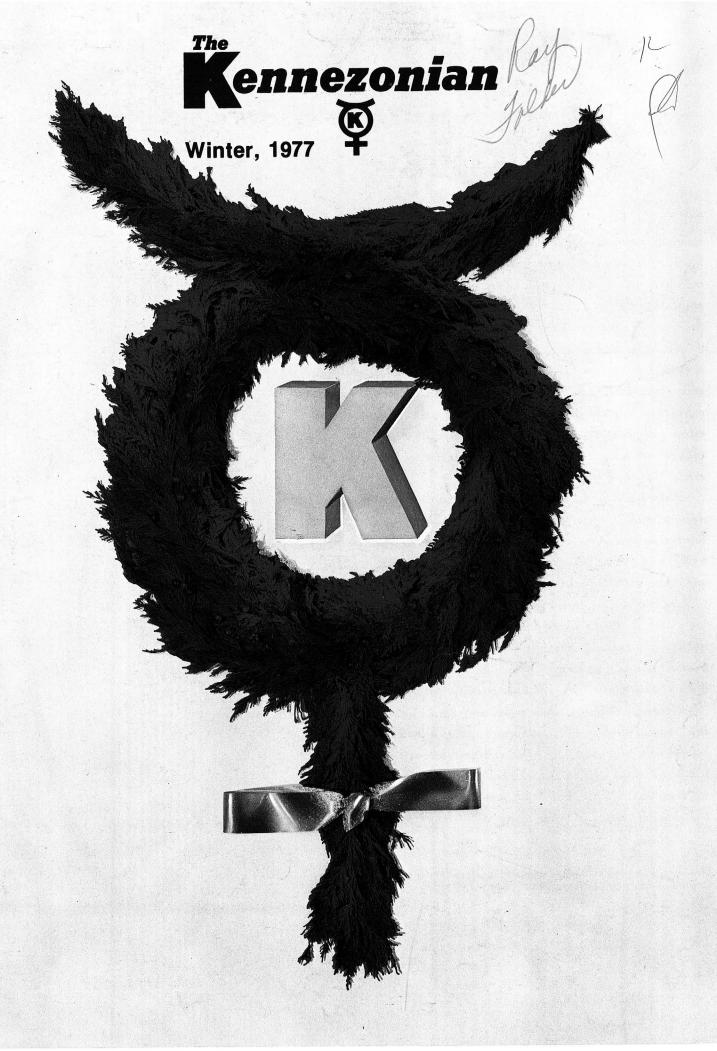
... where he works.

Four currently active employees have the possibility of completing 40 years of employment at the property known today as Ray Mines Division. The first one of these four to be featured this year in THE KENNEZONIAN is Nicholas P. Esquivel of Superior — a lead (Sulfide) crusher operator. "Nick", as he is known to a legion of friends, has spent the last 24 of his 40 years in this job and has literally watched millions and millions of tons of ore slide past his window out of trucks into the crusher. Incidentially, Nick passed his 40th anniversary earlier this year and is now working on his 41st year.



Kennecott Copper Corporation Ray Mines Division Hayden, Arizona 85235 Return Postage Guaranteed

BULK RATE
U. S. Postage
PAID
Hayden, Arizona
Permit No. 20



One Solitary Life

He was born in an obscure village, the child of a peasant woman. He was not attended at birth by a doctor. He and his mother never saw a hospital. He grew up in still another village, where he worked in a carpenter shop, like his stepfather before him. When he was 30, he left home and became an itinerant preacher.

He never had a family or owned a house. He never wrote a book. He never held an office. He didn't go to college. He never visited a big city. He saw neither the highest mountain nor the largest ocean. He never traveled 200 miles from the place where he was born. He did none of the things one usually associates with greatness. He had no credentials but himself.

He was only 33 when the tide of public opinion turned against him. His friends ran away. Some even denied having known him. He was turned over to his enemies for a price and went through the mockery of a trial. Palse witnesses testified against him.

He was nailed to a cross between two thieves. He asked for water and was given vinegar to drink. While he was dying, his executioners gambled for his clothing, the only property he had on earth. When he was dead, he was laid in a borrowed grave, the gift of a friend's pity.

Nineteen centuries have come and gone, and today he is the central figure of the human race and the leader of mankind's progress. All the armies that ever marched, all the navies that ever sailed, all the parliaments that ever sat, all the kings that ever reigned, put together, have not affected the life of man as has that One Solitary Life.

(The above was written by Dr. James A. Francis, minister of the First Baptist Church of Los Angeles from 1916 to 1928.)





In my messages to you through the Kennezonian, I have been commenting on the urgent need for cost reduction without loss of production. The response from all concerned has been very good. However, we are not yet out of the woods and we need to double our efforts to keep going.

There is no increase in sight in the price we receive for our copper, so we must continue to work on the assumption the price will remain unusually low for at least the next nine months to a year.

Productivity is the key word for Ray Mines Division to insure its survival.

Records for productivity were recently set by the Secondary Crushing Plants at both the Reduction Plant and Silicate Leaching Operations. The people operating these plants are to be commended, of course, but without the backup of other production and maintenance personnel — the full cooperation of all departments, as well as the Southern Pacific and its crews — these new records could not have been set.

Productivity can also be upgraded through the use of larger and more efficient equipment, the redesign of plants and rescheduling of manpower. Towards that end, new, larger, trucks and shovels are presently being added to our Mines Plant Fleet.

We have just recently called for bids to do all the engineering studies and design for a proposed Solvent Extraction Plant at the Mine. We are hopeful that economic conditions will permit construction of this plant. This would go a long way toward improving the quality of our cathodes.

We are also in the process of doing the engineering work which would lead to greater production improvement at both the Mine and Concentrator.

As I have said before, we are not out of the woods yet, but if we all pull together and keep our best efforts going we will make it!

May the Christmas Season and the coming New Year bring for all of you and yours the best of everything you have always wished for.

Sincerely.

K. IJ. Wather f.

K. H. Matheson, Jr.



Published by Kennecott Copper Corporation Ray Mines Division Public Relations Department J. H. Maize, Director

CONTENTS

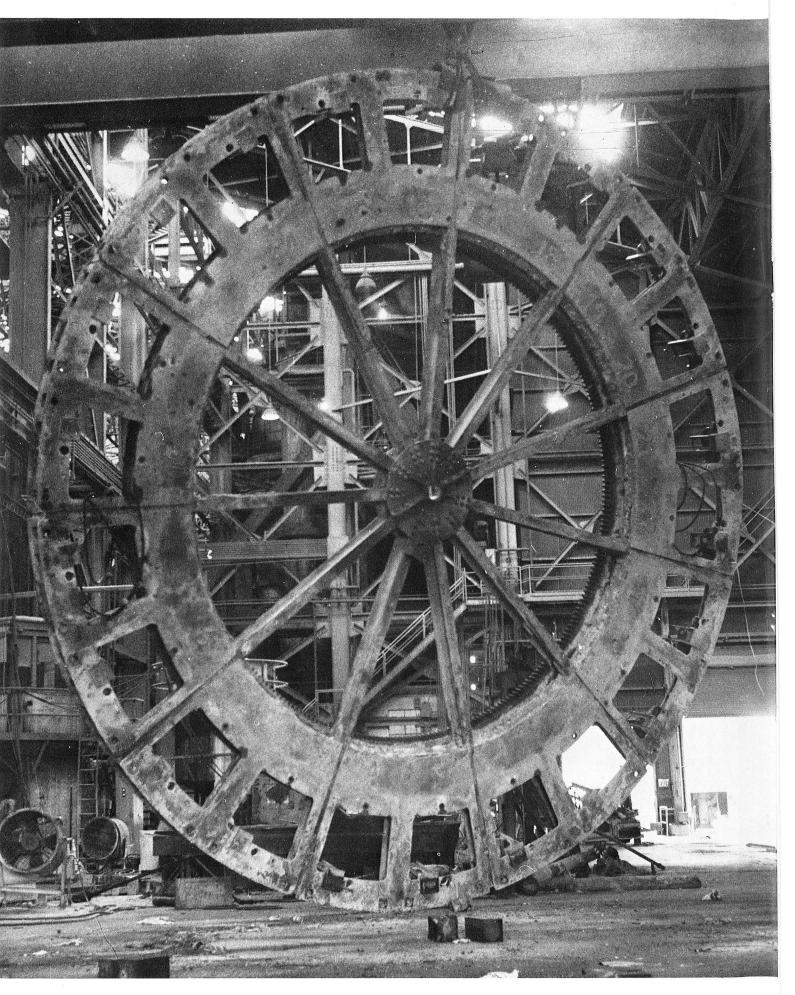
| One Solitary Life 2 |
|--|
| Danger, Heat, Grease, Dirt and Acid Are Always With Smelter Maintenance 4 |
| 20 Years Ago at RMD 8 |
| 10 Years Ago in Copperland 9 |
| Stories in Black and White, Part I |
| Outstanding Apprentices at RMD |
| An 82-Year-Old Invention Plays Important Role in Concentrator |
| Stories in Black and White, Part II |
| Salute to Seniority |

THE COVERS:

FRONT: In honor of the season, we have a traditional wreath of Arizona greenery which has ben uniquely fashioned into the familiar Kennecott trademark. Just in case you're wondering about the origin of the trademark, it is derived from the ancient Egyptian "ankh"—a symbol of everlasting life. Copper, too, is almost everlasting. Authorities say that 65% of all copper mined in the world is still in use somewhere.

BACK: Paul E. Knee, a MP Boiler Shop Welder and a resident of Superior, is one of the very few active RMD employees born in 1912 making this elite group our oldest employees in years, but not necessarily in service. Knee turned 65 this year and has been at RMD since March, 1964. He's a native of Deer Trail, Colo. and will soon complete his 14th year of service. The back page photographs show him ready to turn on his welding equipment on the job and working on a pet project, refinishing antique brass bedsteads, in his leisure time at home.

EDITOR: Norman B. Harrington



Danger, Heat, Grease, Dirt and Acid Are Always With Smelter Maintenance

Since the process of mining, milling and smelting is a line operation where each process must wait until the preceding process has occurred, all maintenance has a high priority because if a link in the chain is broken, sooner or later the line is broken.

There are those who claim that Smelter Maintenance is the most important of all maintenance because it is the smelter where the finished product is produced. Each of the other maintenance areas, obviously, believes it is the most important, so the stage is set for a vigorous argument. However, one can get general agreement that Smelter Maintenance is one of the most critical of all maintenance areas since it is responsible for a line operation by itself within the major line operation.

In other words, if there's a breakdown or upset in the smelter complex which includes the smelter, acid plan, filter plant, material handling or limestone operation--the smelter complex goes down. Everything works or nothing works. Of course there are some minor exceptions to this rule, but not many.

The smelter complex with its five separate components requires the Reduction Plant's largest maintenance force. It is also the most varied of the maintenance crews because of the variety of crafts needed to service the totally different process equipment.

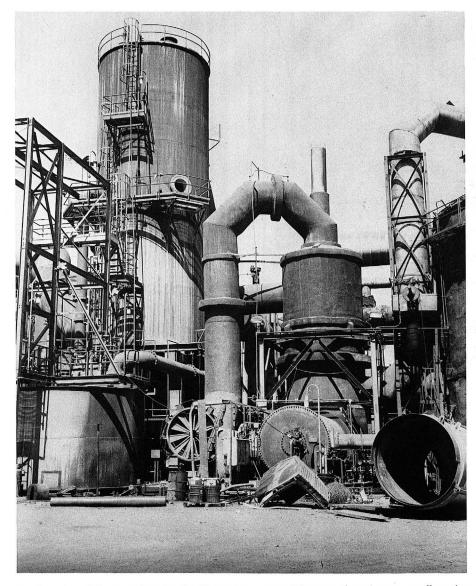
Under the supervision of the Reduction Plant Maintenance Superintendent, R. A. Barrass, Dale E. Collier, Smelter Field Repair General Foreman, directs the activities of approximately sixty employees, comprising the Smelter Maintenance Force. Collier delegates direct supervision of his troops to seven front line supervisors. The highly skilled work force in Smelter Maintenance consists of twenty five maintenance mechanics with six apprentices, eleven boilermakers with three apprentices, and eight pipefitters with two apprentices. Brickmasons play a most important role in this maintenance area, but they are assigned to Smelter

Operations. Support is also provided by eight electricians and one apprentice assigned to the Smelter Complex.

You'll get no argument from anyone that maintenance in the smelter complex is the toughest and hardest of any area in the division. These employees are always working with such unpleasant partners as heat, smoke, grease, gas, acid, dust, height, cold, molten metal and moving machinery. On some jobs, there may be only one of these hazards; on the next, several of these or maybe all will be present.

This means that not only must the employee concentrate on the job to be done but he must be equally conscious of the dangers involved to himself and his fellow employees. Doing the job right is important, but doing it right and safely is the name of the game.

To support the statement this is a hazardous area, statistics for the first nine months of this year show Smelter Maintenance with 12 percent of the RP employees had about 40 percent of the plant's reportable accidents. And yet, by careful attention to safe working prac-



Another view of the area where Smelter Maintenance serves. These vessals make up a small portion of the acid plant and it had a general overhaul during the vacation shutdown. Portholes are open, fan covers are off, ducts are being repaired and all sorts of maintenance activity are caught in this one scene.

Guess what this is? That's not a fair question for employees outside the smelter. This is the Casting Wheel where the division anodes are cast. The wheel was rebuilt from top to bottom this summer during the vacation shutdown. Picking it up and turning it over like you see here is a tricky task, but it was done safely several times during the rebuilding.



This is a dramatic example of work done by Smelter Maintenance during the vacation shutdown. An important conveyor had to be reconstructed and here's the job at its mid-point. That missing section of the high conveyor, seen on the ground, was later used to fill the gap and connect the two areas.

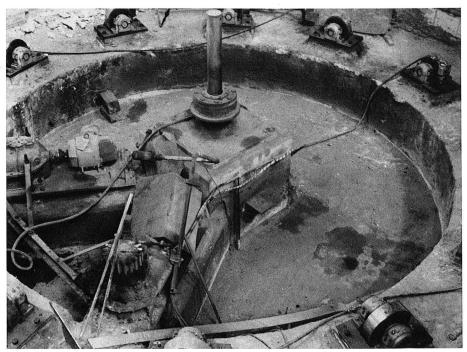
tices, hazards can be minimized as demonstrated by the fact this group just completed 90 days without a disabling injury.

Another problem faced by this maintenance group is the fact that much of the work comes under the heading of "crash" jobs. To say it another way, someone has pushed the "panic" button in the smelter complex and something needs immediate attention. This emergency minute-by-minute scheduling tosses normal planning and scheduling procedures into the nearest wastebasket. However, the planners immediately go into action with the rest of team and provide support with their expertise.

Repairs are needed now if the complex is to continue to function. There is no time to make sure that the proper manpower, supplies, tools and equipment are on hand.

It's a case of get to the job, evaluate the situation and start repairs. This "crash" approach to maintenance is unavoidable and requires much flexibility on the part of employees and supervision.

Another factor in this somewhat unusual approach to maintenance is the fact



Here's where Smelter Maintenance accomplished a number of major repair jobs during the vacation shutdown. This is the "well" under the casting wheel in the smelter and while the wheel was being rebuilt, much of this equipment was being repaired or replaced. The post in the center is the "axle" for the wheel and those large bearings support the multi-ton wheel with its 22 copper molds used to form molten copper into anodes during casting time.

that this crew is dealing with some relatively new processes where the state-of the-art is not perfect. This especially applies to the metallurgical gas acid plant and the fluo-solids reactor. While these units are not exactly experimental, many, many changes have been made in these units since they were installed. Design capabilities and projected results often differ, sometimes greatly, from actual operation. When this happens, it calls for modification and changes almost and usually the same day, or as quickly as possible.

The team of Smelter Operations and Maintenance is working constantly to change basic equipment to make it work better and more trouble free. Often, these changes require parts not immediately available and perhaps not available any place. This calls for improvisation and usually calls for supportive action from other Reduction Plant departments.

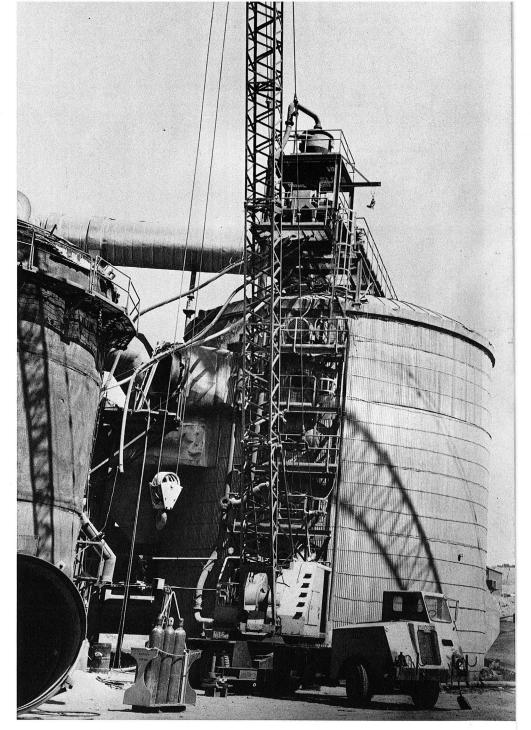
Such support comes from a variety of sources including engineering, machine shop, boilership, service department, electric shop, control systems, pipe shop, garage and carpenter shop. Purchasing, warehousing and other staff departments often get into the act. If the projected project is a major one and there is a little time, Planning and Scheduling comes into the picture with its expertise.

Another area in Smelter Maintenance that requires constant surveillance is making sure that the proper craftsmen are used on jobs within their union jurisdiction.

In recent years, changes too numerous to mention have been made in the smelter complex to comply with air pollution regulations and to increase production. Such equipment as the reactor feeder, cyclones, gas cooling, flue systems, conveyors, vibrators, hoppers, piping, etc., have been modified, moved, installed or changed and all this requires skilled people at the right time and in the right number.

The division's sulfuric acid plant is probably Smelter Maintenance's largest headache. Since it must be kept working at almost any cost for air pollution control demands, it is sometimes classified as "the tail wagging the dog."

A frequent and probably the most unplesant task in this area is boilermaker welding. The men must do the job "hot," since there is no time to cool vessels down. Besides that, cooling and reheating tears up a plant like this and generates more problems. Cast iron acid cooling coils were originally installed in series. When maintenance was required, it was necessary to shut down the plant. The "team" went to work on this problem and by installing valves at strategic locations, faulty units may be



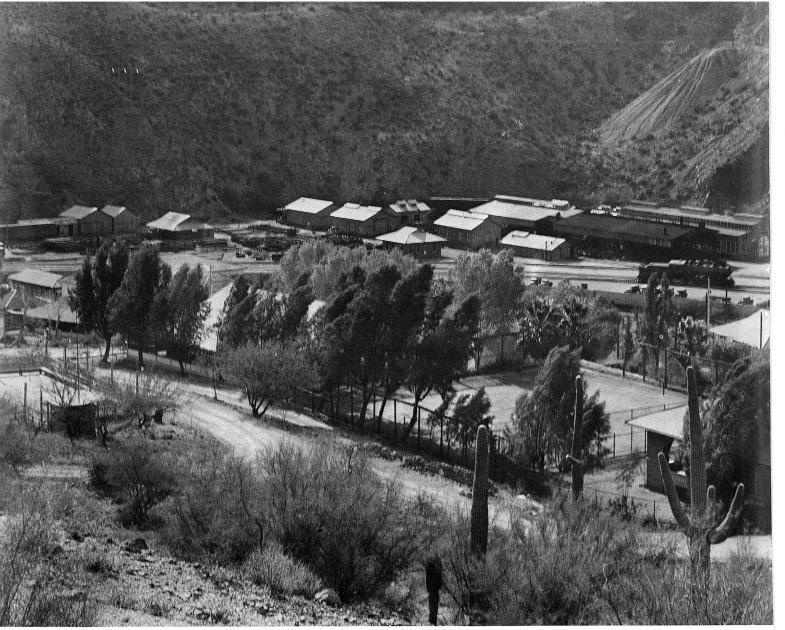
It takes big machinery and lots of manpower to perform most of the maintenance jobs in the acid plant. Here's the scene where the catalyst is being screened. This photo shows several modifications completed in this area recently to make the equipment operate more efficiently. For example: Most of the units on top of the big vessal were on the ground at one time and were moved to improve operations.

isolated for quick repair while production continues.

In another acid plant area, fiberglass piping was installed. When a leak developed, patching and curing required 72 hours. The "team" solution to this was stainless steel with one-hour repair time. Huge ID fans used to pull or push sulfur dioxide to the acid plant had bearing problems not too long ago. Solution: cool the bearing with circulating oil to take off heat and flush out bearing - destroying dirt.

The list of major conversions goes on and on--water-cooled converter hoods, filter plant changes, 160-foot thickener modifications, major changes at the concentrate dryer. Each of these projects and many more have been accomplished by Smelter Maintenance and nearly all under far less than optimum conditions.

Maintenance at any point in the division is no picnic. It is a job that has to be done and it's a job that provides a great amount of personal satisfaction for the doer.



Our information about this scene is rather limited. It was taken at the Mines Plant, probably in the mid-30's. In the foreground are the Ray Con Club and tennis (

20 YEARS AGO AT RMD

A summary of events making news at Ray Mines Division 20 years ago in 1957.

RMD was shut down Oct. 7-20 for the biennial inspection of the power plant's 10,000 KW turbine.

Donald L. Marksbury was appointed staff geologist.

Steel erection continued at the smelter and both converter aisle cranes have been assembled and installed.

Dividends of \$1.50 per share were distributed for the third quarter.

KCC announced it will build a new electrolytic refinery near Baltimore, Md. and Ivor G. Pickering of UCD was named project manager for the \$20 million facility.

The third series of Kennecott Lectures at the University of Arizona will deal with various phases of life in the U.S.S.R.

More new 50-ton Euclid haulage trucks have arrived at the MP.

Nembers of the Arizona Industrial Editors Association held a dinner meeting at Ray preceded by a pit tour; C.V. Coffey and Joe Fenton were hosts.

Francis T. Coleman & Son was awarded a contract to build a haulage road overpass over Highway 177 near Ray.

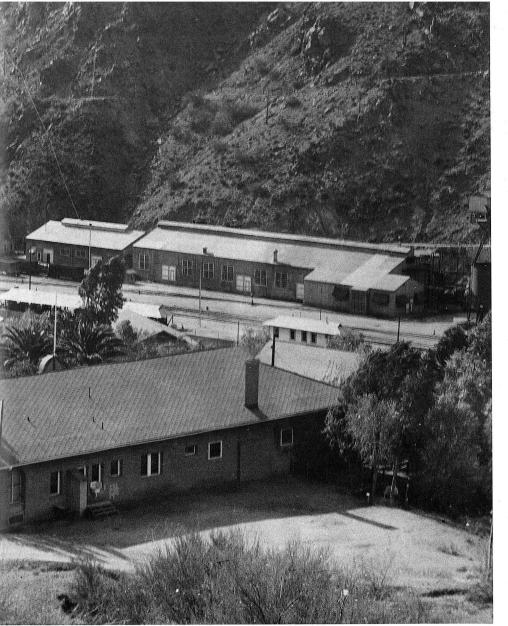
Shop site preparations were completed at the MP.

KCC President Charles R. Cox cited by Forbes Magazine as one of "America's 50 Foremost Businessmen."

Over 8,000 persons visited the RMD display in the Mineral Resources Museum at the Arizona State Fair.

The new LPF section in the concentrator has increased copper recovery by two pounds per ton.

Because of a "continued lack of domestic demand for copper," KCC announced a 12 percent production eut and the layoff of 900 employees.



rts, while in the background can be seen a locomotive and shops of the Ray and Gila Valley Railroad.

10 Years Ago In Copperland

A summary of events making news in the Copper Basin 10 years ago in 1967. [From the Copper Basin News files.]

W. R. Duffy of Kearny and Wayne Curtis of Hayden were elected to the Ray and Hayden School Boards, respectively.

Kennecott held a press conference to announce a joint venture with the U.S. Atomic Energy Commission on "Project Sloop," an underground nuclear mining project near Safford, Ariz.

Petitions were being circulated in Kearny for the recall of the Town Council and Justice of Peace Kelly Haddad.

Olivia Velasco of Hayden entered the Miss Gila County Contest.

The Orville Abernathys of Kearny celebrated their 40th wedding anniversary.

The Copper Basin News moved to a new location in the Kearny Shopping Center.

Hey Kids!

We're going to have a contest for the best drawings on the subject, "What My Mom or Dad Does At Kennecott." We'll have \$30 in cash prizes to be split between the best entries in two age groups — 5 through 9 years of age and 10 through 14 years.

Only one entry per child will be accepted and materials used may be crayon, pencil, water colors, oil, finger paints or ink. Name, age, address and parents' names should be attached on a separate sheet of paper. Drawings must be on white paper no larger than 11 by 14 inches.

The deadline for entries will be 4:30 P.M., Monday, January 16, 1978. Drawings of the three winners in each age group will be published in the spring issue of *THE KENNE-ZONIAN*.

W. H. Blair, retired RMD Safety Supervisor, announced he would run against Kelly Haddad in the coming recall election. Running against the council members in that recall were C. Steveson, G. Cellis, C. Sandoval and Kelly Haddad.

George Alex was named Kearny Police Chief replacing the fired Jim Helper.

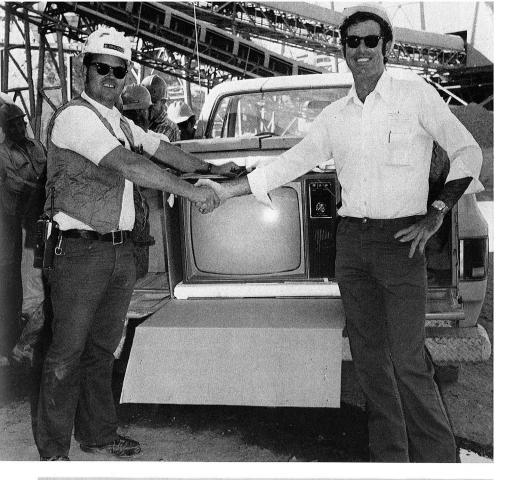
Kearny Councilmen J. T. Mortimer, E. A. Heckman, R. E. Hughes, J. A. Cooper and Joseph McCrone won the recall election, as did Justice of the Peace Kelly Haddad.

A public dedication was held for the new Ray School District auditorium and classrooms.

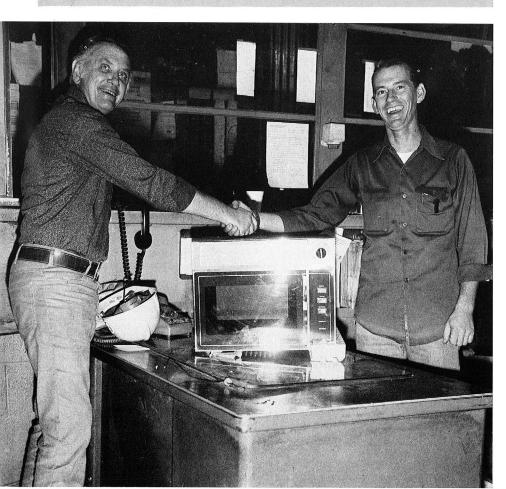
Hayden residents Mr. and Mrs. Nathan E. Guyer, Sr., celebrated their 50th wedding anniversary.

Record rainfall caused the Gila and Aravaipa Rivers to flood Santos Ranch, lower Kearny and Riverside.

As the year ended, the copper strike called July 14 was still in progress.

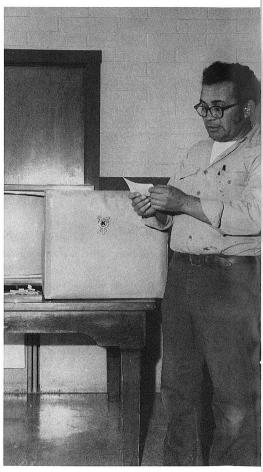


The Leaching Team earned a second consecutive Safety Incentive Award last Oct. 18 in recognition of six months without a disabling injury. Sweepstakes winners were: (top) Ronald D. Hamilton (left) being congratulated on winning the Color TV by Leaching Operations Superintendent D. J. Quinn; (bottom) Refrigeration Repairman Dannie L. Carpenter, (right) winner of the Microwave Oven, is congratulated by MP Maintenance Superintendent D. J. Justeson.

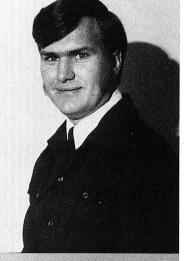


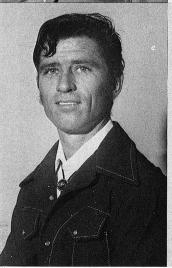
in BLACK and WHITE

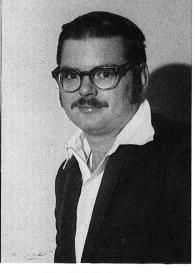
Part I



The Concentrator Safety Team earned the Reduction Plant's first Safety Incentive Award last Nov. 3 when the group completed 90 days without a lost-time accident. Here's Y. T. Martinez, Maintenance Mechanic, drawing the names of Sweepstakes Winners out of the box in front of the grand prize, a Color TV.







Joe D. Rios David E. Lievsay

Max B. Wheeler Charles H. Hamilton

Ray Mines Division named eight of its employees to participate in the 18th Annual Outstanding Apprentice Awards Ceremony staged this year in the Student Union Building at the University of Arizona in Tucson.

Outstanding Apprentices named from the Mines Plant are: Joe D. Rios, Kearny, Pipefitter; David E. Lievsay, Superior, Shovel & Drill Mechanic; Max B. Wheeler, Riverside, Machinist and Charles H. Hamilton, Superior, Electrician.

The Reduction Plant's Outstanding Apprentices are: Timothy L. Buzan, Mammoth, Instrument Repairman; Philip S. Garcia, Tucson, Pipefitter; Allan A. Verdugo, Mammoth, Maintenance Mechanic and Lemuel B. Young, Aravaipa Canyon, Boilermaker-Welder-Layerout.

To be eligible for this honor, candidates must be in the last year of the training program or a recent graduate. They are selected by the Local Joint Apprenticeship Council composed of two representatives of management and two representatives of the union having jurisdiction over the craft involved. The Council considers work records, supervisors' evaluations, attitude and grades earned in related technical training.

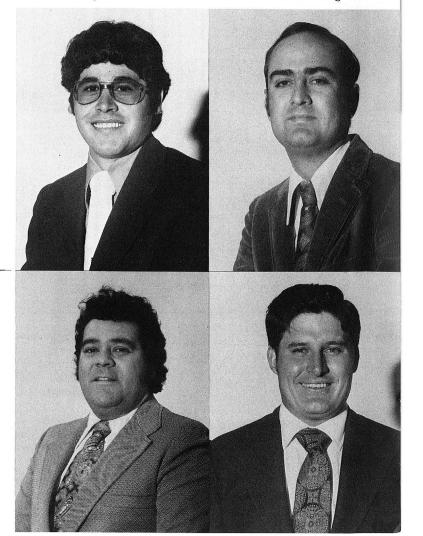
RMD's apprenticeship program runs either four or five years, depending on the craft requirements, and includes 8,000 hours of a combination work-study program.

The Annual Outstanding Apprentice Awards Ceremony is a cooperative effort between Labor and Management to honor the outstanding apprentices in each of the many crafts represented, as well as the respective apprenticeship programs in the state of Arizona.

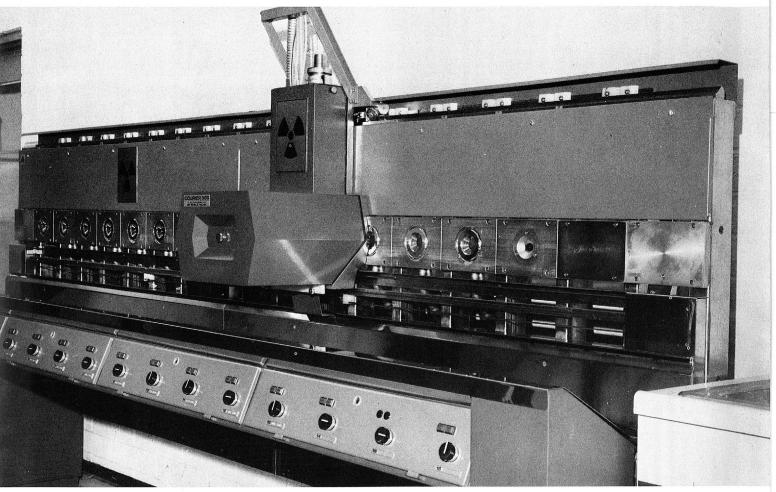
OUTSTANDING APPRENTICES of 1977 at RMD

Timothy L. Buzan Philip S. Garcia

Lemuel B. Young Allan R. Verdugo



An 82-Year-Old Invention Plays Important Role in Concentrator



Here's the beginning of the function of the process control, on-line X-ray analyzer. This is the battery of sample stations filling one wall in the X-ray room. Process streams from key points are pumped to the stations where the flowing material is X-rayed through a mylar window. Almost in the center of the photo can be seen the head that cycles back and forth stopping at each station to collect data.

It was back in 1895 when Wilhelm Konrad Roentgen, a German physicist, discovered X-rays and during the last eight-plus decades the X-ray has been utilized in hundreds, maybe thousands, of applications for the betterment of man.

In every facet of health care around the world, in numerous areas dealing with safety, in many fields of manufacturing and countless other small and large endeavors worldwide, you'll find the X-ray working as an indispensible tool. A tool enabling man to see into some situation where it would be impossible to see without this 19th century invention.

Here, in the 20th century, Ray Mines Division has put the X-ray on its payroll in the form of a process control on-line X-ray analyzer system for the concentrator. It required about seven months to complete the complex and sophisticated installation, some fine tuning is still

underway but it is humming along these days and nights, spitting out assays and other valuable information in a neverending stream.

This is the second such installation at Ray Mines Division. While the first, a decade ago, was considered a marvel in its time and served well, this third or fourth generation model makes the old one look like a Model T in comparison.

A brightly-lighted, temperature-and humidity-controlled block room has been constructed on the second level of the Concentrator Building to house the various components of this new milling tool. An adjoining room has been prepared to house additional equipment in the future to apply computer technology to the mill's grinding circuits.

Reduced to its simplest form, RMD's process control on-line X-ray analyzer

consists of three parts today, with a fourth to be added before 1977 ends. The most important part is the sampling system, which through an array of pumps and pipelines, delivers process material to a point where it is to be X-rayed. Next, comes the X-ray machine which X-rays the sample and transmits the data to the digital computer which transforms the data into meaningful numbers within the framework of its program. Completing the system is a two-way teletype for reporting results of the analysis and for delivering certain instructions to the computer when it is necessary.

That additional segment of the system to be added shortly will be a group of strip chart recorders located near the station of the head flotation operator. The recorders will relay significant assay information from the X-ray system to that point so the operator can tell at a glance how

the process is functioning. Other flotation instrumentation is now located at that station.

Although the system has the capability of analyzing up to six elements simultaneously, it is currently programmed for three -- copper, iron, and molybdenite. It will accept and sample 14 separate streams of process material, but right now only ten streams are being utilized. Half are general plant samples, the remainder originate in test flotation units where experimentation will be conducted.

Sampling streams start at 80 gpm and are cut to five gpm for X-ray analysis. Material in each stream is pumped into a special receptacle or sample cell mounted in the X-ray machine sample station and each sample cell has a mylar window for exposing the material to the X-ray tube. These cells are all in a row and the X-ray head automatically moves from one to the next, pausing only long enough to collect the data. This sampling and analysis goes on continuously to provide practically an instantaneous profile of the entire flotation process.

In the analysis phase, the slurry sample is "shot" with high intensity X-rays which causes elements in the slurry to emit characteristic X-ray radiation which can be detected and analyzed through electronics to produce assays. Pulse counts are processed by the digital computer and transformed into assays, determined by the computer program, and then typed out every ten minutes on the teletype.

Prior to installation of this system, the mill performance was monitored once every two hours.

Currently, five of the streams being fed to analysis are considered plant samples. These cover the key points of the flotation circuit, including plant "heads," tails, general concentrate (before moly removal), rougher concentrate and cleaner scavenger tails.

The other five steams originate in Rows 1 and 2 which will be utilized for comparison testing of reagents and control strategies. Selected samples are taken from test row flotation units to analyze the performance of the testing procedures.

The primary purpose of sampling and analyzing the test rows by on-stream X-ray is to provide the division with the capability of doing developmental reagent testing to try and improve the metallurgy and also to test control strategies which would allow RMD to operate the plant under present conditions more effectively.

This is tied in with the control strategy development now going on in Section 5 trying to develop a system to control by computer the entire grinding/flotation process from start to finish for optimum recovery.

The time of computer-controlled milling/flotation for RMD is down the road somewhere in the future. The state-of-the art has not been developed yet to a point where a universal package of systems can be purchased and installed to take over a plant. Each segment must be researched carefully and then tailored to each individual type of ore and plant requirement. The X-ray system is a most important part of such a system, but it is only one part of the necessary "hardware" required for an automatic operation.

One of the weaknesses of the division's first X-ray on-stream unit was the unreliability of the sample streams. This has been corrected in the present installation by developing a system of sampling process streams with maximum reliability.

How can a sophisticated installation like this assist in maintaining optimum rercovery? This question is answered by pointing out there are several operating variables that can be changed by the operators, such as changing the pH to regulate the amount of iron being floated if the grade starts to drop, changing the amount of collector being added, or changing the froth removal rate. The instrument will also pick up difficulties or upsets in the grinding circuit.

It should be pointed out this installation does not replace any present assaying facilities operated by the division. In fact, the X-ray is fully compatible with all current assay programs. The sole purpose for making this installation was to provide fast analysis for better process control which, in turn, provides greater copper recovery. It does not function to provide assay data for metal accountability, that has been and remains the responsibility of the Quality Control Department.

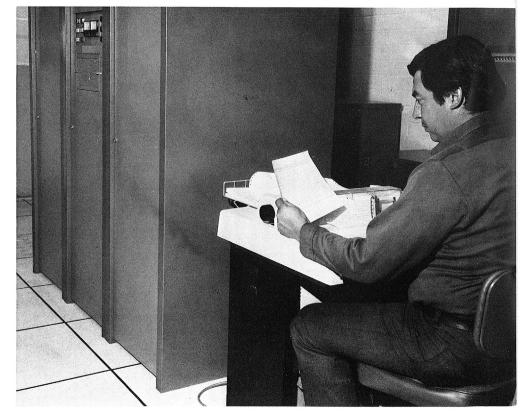
In some ways the X-ray will cut down on the sample load of Quality Control by eliminating many of the so-called "quickie" assays, but the demand for analysis to double check the X-ray will be added.

A justification for this installation was the possibility it would improve recovery by one-quarter of one percent to add an additional 390,000 pounds of copper annually.

That statement cannot be substantiated, yet. The X-ray unit has not been on line long enough to judge from our own experience. However, records of other users of this type of instrument show that added recovery will be realized because faster analysis means better control and better control means better recovery.

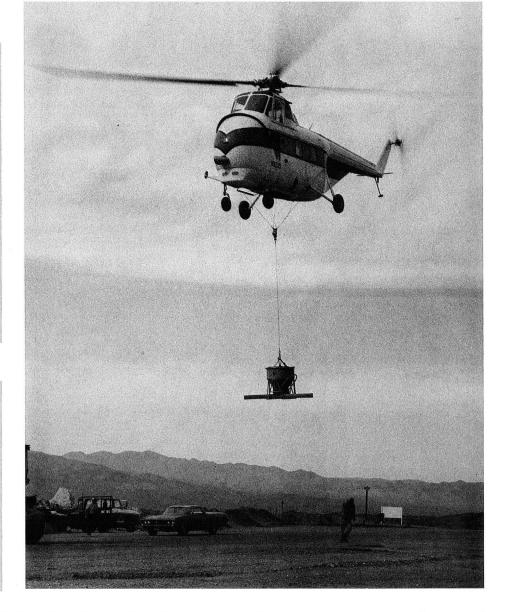
The X-ray process control on-stream analyzer is another example of the dedicated struggle of RMD management to reduce costs as low as possible in this period of economic distress. The acquisition of instruments like this to improve recovery, larger trucks, larger shovels, better ways of doing necessary tasks all make contributions to reducing the unit cost of producing copper and the continuing operation of Ray Mines Division.

This is the end of the function of the process control, on-line X-ray analyzer. Mike A. Martinez, X-ray Analyzer Technician, uses the teletype to "feed" calibration data to the computer housed in the cabinets just ahead of him. Every 10 minutes around the clock the teletype delivers a printout based on the X-ray data collected and interpreted by the computer.



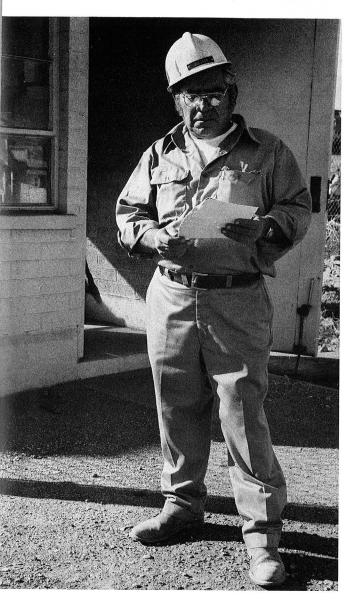
STORIES in BLACK and WHITE Part II

A large flat area between the smelter and limestone quarry became a heliport recently for some time as a Colorado contractor built a microwave reflector on a hill east of the Reduction Plant. This job for Mountain Bell was accomplished in its entirity with this helicopter since there are no roads where the communications link was installed. In this photo, one-half yard of concrete was on its way to the mountain as they poured the footings for the steel framework supporting the reflector.



These new Reduction Plant journeymen proudly display their "diplomas" from the division's apprenticeship program. It takes four or five years and 8,000 hours of work and study to earn one of these certificates. Left to right, the new journeymen are: George H. Davis, Jr., Winkelman, Pipefitter-Welder; Wiley L. Warren, Kearny, Pipefitter-Welder and Raymond J. Sawyer, Winkelman, Boilermaker-Welder-Layerout.





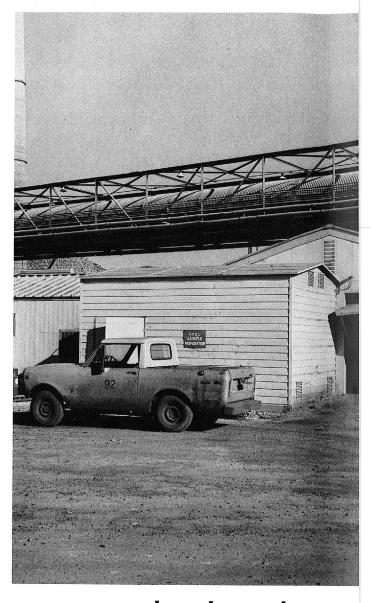
The employee. . .

On the job. 40

Years!

TO





.where he works.

Four currently active employees have completed 40 years of employment at the property known today as Kennecott's Ray Mines Division. The fourth of these to be featured in THE KENNEZONIAN this year is Secundino A. Quesada of Hayden, a RP QC Supervisor. His RMD career began Sept. 26, 1937 as a Cleanup Carpenter, but he soon moved on to sampling and assaying responsibilities and has spent the majority of his years in the department known today as Quality Control. Quesada, who has been a supervisor since 1961, is a native of Hayden and attended Hayden schools.



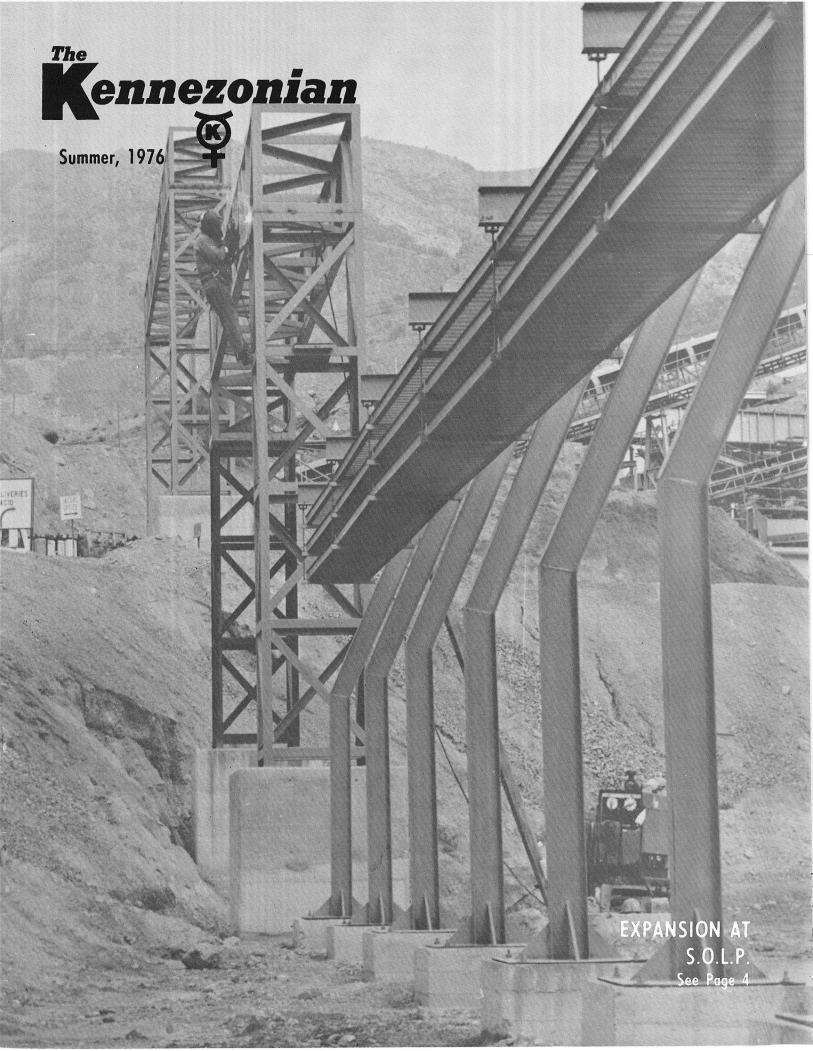


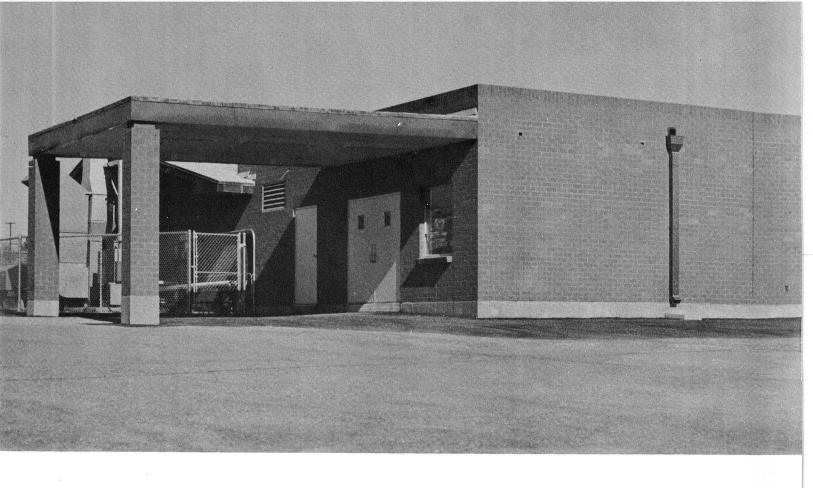
Kennecott Copper Corporation Ray Mines Division Hayden, Arizona 85235 Return Postage Guaranteed

BULK RATE U.S. Postage

PAID

Tucson, Arizona Permit No. 859





This is the exterior part of the first major change made at the division hospital since it was built in 1962. The new structure with a sheltered entrance is located at the northwest corner of the health care facility and houses the emergency treatment center and ties in to the rest of the 20-bed hospital.

HOSPITAL GETS AN "EMERGENCY" ADDITION

The division's 14-year-old health care facility in Kearny has been undergoing its first major change — relocation of the emergency treatment center — and minor modifications throughout the original 14,800 square-foot structure.

A 1,600 square-foot area has been added at the northwest corner of the cross-shaped building to house emergency facilities thus creating a separate emergency care center outside the surgical wing to eliminate traffic in that wing. A roofed porch to

provide shelter for patients being boaded or unloaded is a part of the new structure.

Interior changes in the hospital have been made to provide additional rooms when more that one patient arrives at the emergency room, a waiting room for the family or company personnel in the event of sickness, accidents or job injuries, equipment storage rooms and an access corridor to the balance of the 20-bed hospital.

This corridor is a significant part of

the remodeling because it will provide access to and from the other hospital areas without disturbing the surgical wing which requires a highly antiseptic environment at all times.

Everything in the remodeling project, being done by Lawrence Hickey & Son, Inc. of Tucson, is designed to eliminate deficiencies that have been under critical review by inspecting agencies. A number of minor modifications scattered throughout the hospital will be completed under terms of this contract.



As one of the first steps being taken to improve our communications within the Division we are reinstating the publication of the Kennezonian on a quarterly basis but using a less pretententious style.

I am happy to have this opportunity to thank and compliment all employees for their efforts toward meeting or exceeding our 1976 first half goals. Most of our goals were met and a number exceeded. Generally speaking, where goals were not met it was a result of a management decision to vary from our budgeted operating schedule or a condition over which the employee had no control.

The Division's safety performance for the first quarter was above our expectations, but the performance for the second quarter was poor. We opened the year with no disabling injury for the first 83 days. Then, we had four lost-time accidents in the space of 20 days and two more by the end of the second quarter. This should be a matter of concern to each of us and we must redouble our efforts to eliminate accidents by performing our work assignments properly, cognizant of potential hazards, and looking out not only for ourselves but for fellow employees. Safety is everybody's business.

Recently there have been some encouraging signs in the copper market and some improvements in sale price. We operated at a loss during the first quarter and are still at a loss — year to date. However, during the second quarter we did move into the black. We are not out of the woods yet and must continue our productive and cost control efforts. We still have many on layoff, but I am confident that by pulling together as a team that the Ray Mines Division can continue to make progress and operate at a profit.

Again, my thanks for your efforts in the first half and please continue to pull a little harder in the months ahead.

Sincerely,

K. H. Matheson, Jr.



Vol. 14, No. 1 Summer, 1976

CONTENTS

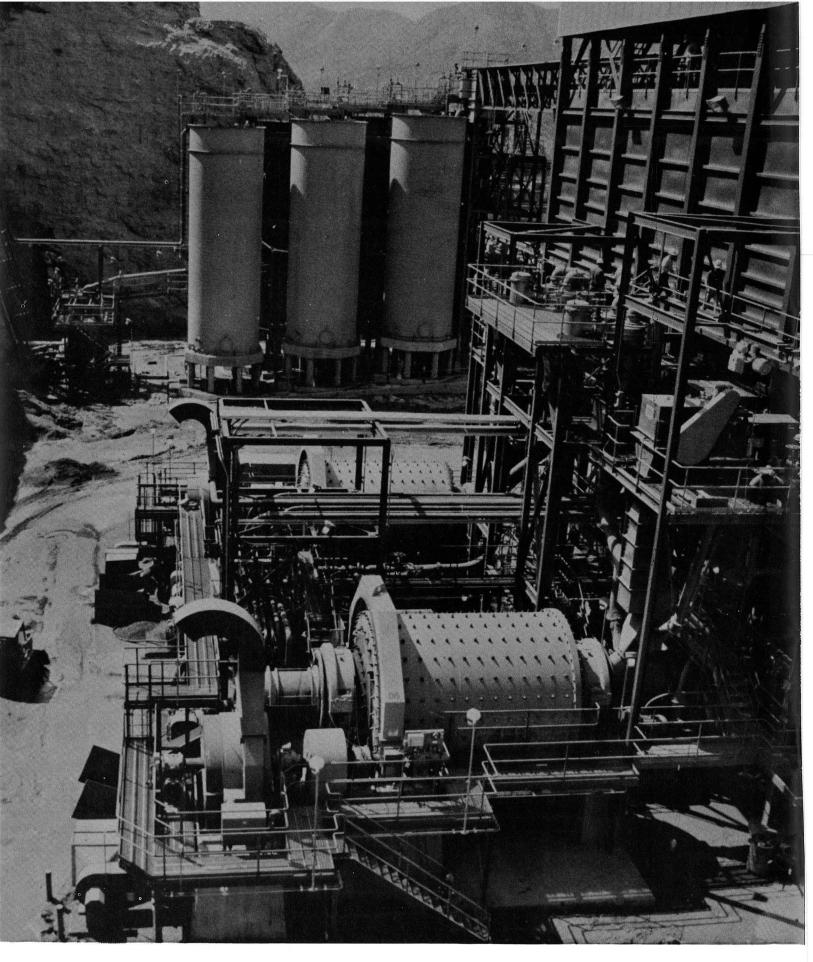
| | ruge |
|--|------|
| More Acid Plus Ore Equals More Copper | 4 |
| 20 Years Ago At RMD | 8 |
| New Faces | 8 |
| Copper Basin Headlines of 10 Years Ago | 9 |
| Eight Hours On A Haulage Truck | 10 |
| Calcines — Their Care And Feeding | 13 |
| Salute To Seniority | 15 |

THE COVERS

FRONT: I -Beams fabricated into the shape of the numeral "7" criss-cross the Silicate Ore Leach Plant to support cable trays, which in turn support wires of all sizes needed for power and instrumentation in the plant.

BACK: Joseph L. Bittick, a mines plant bank spray attendant, is RMD's oldest employee in years, not service. Currently, he is 67 and is our only employee born in 1909. He's been on the job 24 years and the photographs show him on and off the job.

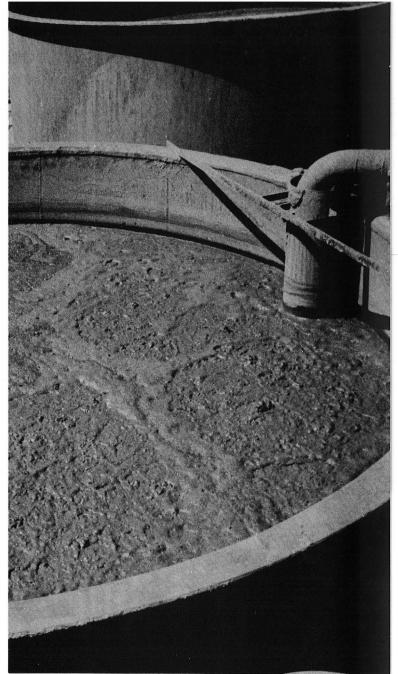
Published by Kennecatt Copper Corporation Ray Mines Division Public Relations Deportment J. H. Maize, Director



This is the "heart" of the Silicate Plant expansion. A number of other units of various types were installed at other points, but in this one area by the head of the line of leaching vats has been crowded the expansion's major compo-

nents. In the center foreground, the twin $12 V_2$ by 16 foot ball mills and cyclones; on the right side, the multi-story classification unit and the background the six 16 by 50 foot pachuca agitation leaching tanks.

MORE ACID PLUS MORE ORE EQUALS MORE COPPER



The camera peeks over the edge of one of the six pachuca agitation leaching tanks and "stops" some of the agitation action. Here starts the job of dissolving copper out of the tiny particles of silicate ore. That copper winds up in an electrowon cathode.

Ray Mines Division's Silicate Ore Leach Plant, largest of its type in the state and the only one in the Kennecott family, has been expanded by 40% and the enlarged plant is now on line.

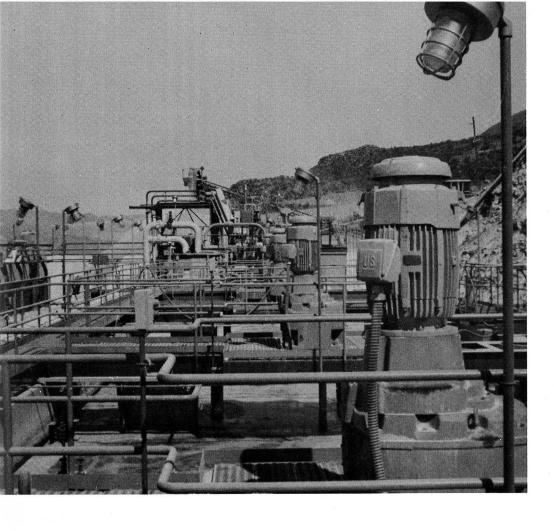
This expansion was first contemplated several years ago when it became obvious that RMD's acid plant would have to be expanded to meet the division's commitment to comply with air pollution regulations. Since an enlarged acid plant would provide more sulfuric acid, it was necessary to provide a greater in-house use for the

extra acid. It was only logical to expand the silicate ore treatment facility since this would use more acid and at the same time provide more copper for world markets.

Corporate funds were released in late 1973 for the expansion of the Silicate Plant from 10,000 tpd to 14,000 tpd. Jacobs Engineering Company of Pasadena, California, an integrated engineering-construction organization specializing in serving process industries in the U. S. and abroad, was

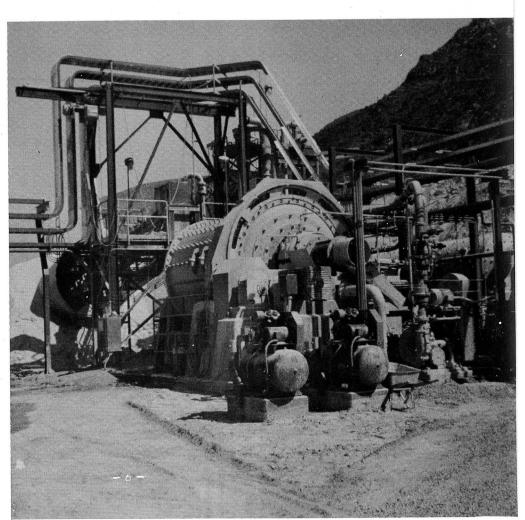
awarded a contract to complete the expansion in 14 months.

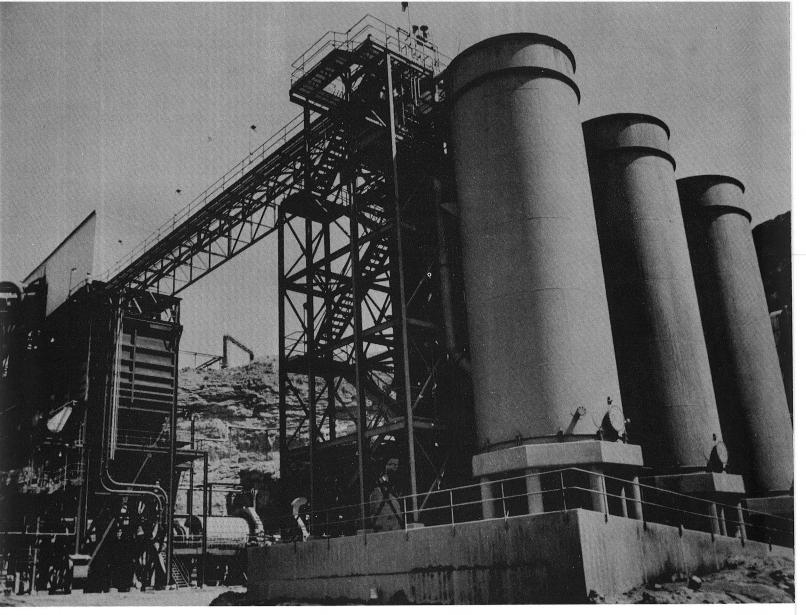
In early 1974, site preparation for the plant expansion was started by division personnel, while the contractor's personnel were proceeding with final engineering details, equipment procurement and other segments of the multi-million dollar project. A special team of skilled RMD workers was assembled for the earth moving job which involved handling more than 130,000 cubic yards of rough and tough Gila conglomerate.



This water treatment plant is technically classified as a tail water neutralization facility using raw limestone to remove objectional salts from the reclaimed water prior to its reuse. This plant is a maze of pumps, piping and swirling water. Dirty water is fed in; clean water pours out.

Another segment of the Silicate Plant expansion involved opening a limestone quarry nearby and equipping it with a crusher and two balls mills to properly size the material for utilization in the new nearby water treatment plant.





Each of these six pachuca agitation leach tanks is 16 feet in diameter and 50 feet high. Compressed air is introduced to keep the slurry of ore, acid and

water moving about to extract copper from the ore and hold the copper in solution for later removal as metallic copper.

The decision to use division personnel for this task was based on the need for extremely careful blasting procedures since much of this delicate work was immediately adjacent to the operating silicate plant. A set of special techniques were developed for the necessary blasting to protect men and equipment always close by.

The original Silicate Ore Leach Plant had been in operation since early 1969 and by this time several operational weaknesses had been pinpointed and it was decided to base the expansion on correcting some of the weak areas. Removal of fine material (slimes) was a problem in the original plant design, so it was decided to make the expansion by capitalizing on these slimes both in quantity and increased recovery.

number of vats, but to create the plant expansion by jumping the input to 14,000 tpd with the increase coming in the fine material. A larger quantity of fines would be removed providing more, but better classification for the vat leach ore.

All of this was accomplished by modifications in the secondary crushing circuits and the addition of four new wet screening devices to provide improved ore classification to obtain maximum feed of the proper size for both the vats and pachuca leaching circuits. Two new $12\frac{1}{2}$ x 16 foot ball mills with necessary cyclones are employed after the screening cycle to properly size material which is sent to six new pachuca agitation leach tanks each 16 by 50 feet.

Significant modifications were done It was decided not to increase the on the 250-foot wash thickeners to ac-

comodate the new circuits and other additions and modifications were accomplished in the Precipitation Plant to handle the additional volume.

Other segments of the expansion included opening a limestone quarry within the mines plant and equipping it with two ball mills to size the raw limestone for utilization in a tail water neutralization facility contructed to remove objectional salts from reclaimed water prior to its reuse.

Another control tower and additional instrumentation were also included along with many additional electric power circuits and miles of pipelines.

Silicate ore processing as it is practiced by Ray Mines Division at the increased rate of 14,000 tpd is complicated, but it is pollution-free.

20 YEARS AGO AT RMD

A summary of events making news at Ray Mines Division 20 years ago in the first quarter of 1956.

Everybody was talking about the sale of company housing and utilities to the John W. Galbreath Development Corp.

At Ray and Sonora, houses could be purchased with five or 10 year land leases depending on the mining program. Houses and land could be purchased in Hayden-San Pedro.

Site preparation for the Sponge Iron & Acid Plant was underway at the RP, with all eyes in town watching the 200-foot stack being erected.

Work was underway on a second two and one-half mile segment of Highway 177 between Hayden and Ray. The first section of 177 rebuilding started at Hayden.

John (Red) Chambers completed his 52-week Engineer Trainee program and was waiting for a job assignment.

The 1955 corporate annual report announced per-share earnings of KCC stock in 1955 were \$11.61.

A red-flashing signal was installed by Southern Pacific at the intersection of Kennecott's railroad and Highway 177 east of Hayden Junction. The signal was suggested by Hayden Electrician Foreman Lee Stacey.

A half-ton of samples from the tailings pond was shipped to the Research Center at Salt Lake City to determine if the copper content could be recovered by the Leach-Precipitation-Float process.

The copper price was raised to 46*—the highest peak since 1872 when copper was a relatively scarce metal.

Members of the Ray-Sonora Recreational Association filed a petition for the first Little League franchise in the area. This will allow Ray-Sonora teams to participate in district play with Coolidge, Casa Grande and other communities in the valley.



Dorine Soper smiles during a conference.

Can an Iowa railroad telegrapher's daughter find happiness as the administrator of a mining company's small hospital in Kearny, Ariz.?

You bet. She has.

She, in this case is Ardis Dorine Soper, who accepted the post last December, upon the retirement of Hospital Administrator Joseph T. Fenton. The hospital is a modern 20-bed facility owned and operated by Kennecott's Ray Mines Division at Kearny.

Her father was a telegrapher-station agent for the Chicago, Burlington & Quincy Railroad in Iowa and her mother was a housewife. "We were living in a small town where my father was stationed when it was time for me to arrive so my mother rode the train to Osceola where the nearest hospital was located," she recalls.

As a child, she lived in a number of Iowa towns where her father was stationed. Schooling was obtained in

Daniel C. Jackling, founder of the Utah Copper Co., died at his California home. Mr. Jackling was instrumental in organizing the Ray Consolidated Copper Co., forerunner of Ray Mines Division. Many universities and technical societies honored mining pioneer Jackling for his outstanding engineering work in the development of low grade porphyry copper deposits.

A new 100-home housing area was being developed southwest of Sonora using pit waste.

The RP received its first radio communications equipment consisting of a base station, one mobile unit and two portable walkie-talkies.

various towns with graduation from the Albia (Iowa) High School. It was on to college at Iowa State in Ames where she decided to major as a dietitian.

About this time it was decided her father needed a different climate, so after a year at Iowa State the family moved to Arizona and Dorine enrolled as a sophomore at ASU. On campus she met a former World War II bomber pilot who was studing to be a teacher; before too long the two were married.

Her college education was put aside and she went to work as a service representative for Mountain Bell so he could finish work on his degree. "That was interesting work and really started me thinking about doing something else with my life than what I had planned in college."

Eventually, a daughter was born and the former bomber pilot became a school teacher in Buckeye. Not for long. The Korean Conflict crashed upon the scene; the pilot-teacher was recalled to active duty.

"Our daughter and I followed him to Ohio, Florida, Japan for three years, Texas and finally New Mexico where our marriage ended in divorce." Dorine wanted her daughter to go to college, so it was back to work to support the two. Positions were found in credit and collection departments in Tucson retail stores and then came another bombshell.

"Our daughter decided she did not want to go to college, but wanted to get married so I was left alone. Incidentially, she and her husband reside in Great Falls, Mont., with their two daughters. He is a farrier and loves it, although that wasn't what he started out to be in college."

By this time, it was 1968 and Dorine was all alone. "I had put my husband through school and then followed him all over the world. My daughter didn't want to go to college, so I decided that I would." She promptly enrolled at the University of Arizona as a junior working toward a major in Public Ad-



Kennecott's to Egyptian "Ar Medieval ala to designate ministration with a minor in Health Services Administration. In 1970, she earned a B.S. and immediately enrolled in graduate school earning 24 more units and then a job opportunity came along.

She joined the staff at the Pima County Hospital as a medical social worker and activities director. "I enjoyed the work so much that I was convinced that I had found my career. However, I needed more income and soon I was given an opportunity to join the Central Arizona Association of Governments as a planner of programs for senior citizens. This excited me because I had received special training in working with the aged, so I accepted the job offer."

Along with the new job came a new husband, Donald Soper, a retired florist now interested in real estate and investments. "Luckily, he's not tied down to one place, so he can go with me to wherever my career takes me."

Before too long, CAAG decided Dorine would be more valuable as a health planner and she moved on to that assignment. Naturally, her work involved discussions with Hospital Administrator Fenton at the Kearny Hospital and during a phone conversation with him last October he casually mentioned his retirement was imminent.

"That remark really struck a responsive chord because I was familiar with the Kennecott Hospital and I decided to go after the vacancy. It seemed to me that I was qualified for the post with my formal training in Public Administration and Health Services plus my work experience in the bureaucracy of health."

She took over the post last Dec. 15th.

"I'm happy and really excited about this work. The Kennecott Hospital is an outstanding example of a health maintenance organization as far as employees and their dependants are concerned."

mark is derived from the ancient — a symbol of everlasting life. nists used a similar sign "everlasting metal," copper.



During that same conference, she asks a question.

"I really believe the health maintenance concept is going to be the answer to health care in this nation. It may be called something else but the concept of a single fee paid monthly for health care of the entire family unit appears to me to be the answer to affordable health care."

What does a hospital administrator do in her spare time? "Prior to moving here, Don and I greatly enjoyed dancing, but opportunities here for that are limited so we have turned to bridge and gardening. We love both."

"Dorine, are you a woman's libber?"

"Definitely not, but I do strongly believe in equal pay and recognition for equal work and responsibility."

And that seems like a good place to end our word portrait of an outspoken and articulate woman with a challenging new position.

and Lilia Dorame represented Hayden High

Harpist Maryjane Barton and the Revelers male quartet were the artists offered by the Copper Basin Community Concert Association.

Full-scale planning was underway for Kearny's seventh annual Pioneer Day celebration with George Milton selected as the general chairman.

Curtis Steveson replaced Vivian Kenemore Major as postmaster of Kearny.

E. L. (Jack) Liffick and the late Henry K. Dyer were elected presidents of the KCC Ray Plant Employees Federal Credit Union the Hayden Federal Credit Union, respectively.

10 Years Ago In Copperland

A summary of events making news in the Copper Basin 10 years ago in the first quarter of 1966. (From Copper Basin News Files).

House moving firms were busy in Ray and Sonora and in Hayden ASARCO, Inc. was razing the old YMCA building, home of the town's first swimming pool — an indoor pool.

Winkelman's town council authorized a request for \$4,000 in federal funds to finance a feasibility study on a town sewer system.

Trustees of the Ray School District held a \$1.3 million bond issue election, which passed, to finance classrooms and an auditorium.

A dozen Kearny residents sought election to the town council.

Legislative reapportionment joined Gila and Pinal counties into a new District 5 and took away half of the counties' lawmakers.

The Kearny Hospital Auxiliary held its successful annual silver tea.

Simple ceremonies marked the official closing of the Sonora Post Office Feb. 25.

Lloyd Labrum, who built Kearny's Ford agency, sold out to Dick Phelps of Phoenix.

The J. W. Galbreath Development Corp. started construction on new buildings to house the post office, a jewelry story and a cantina.

Anne R. Mulhern, a Tucson architect, was selected by the Hayden town council to design a new town library.

St. Helen's Catholic Church in Sonora closed after services of Feb. 6 and one month later it was sitting in Kearny after a three-day, problemplagued move.

Town councils in Winkelman and Kearny approved entering the federal Social Security program for employees of the two towns.

Students selected for Boys' and Girls' States were: Cecil Ash and Bernie Velasco, Hayden High and Randy Bartlett and George Mortimer, Ray High; Linda Chastain and Nicky Brown were named from Ray High



Haulage Truck Driver Arthur M. Padilla, Kearny, is a study in concentration as he heads his 120-ton load of waste up a mine road at a speed of about six miles an hour. That collection of gauages, lights, switches, buttons and levers tell him many things about the unit he is driving. In this cab, except for a couple of brief stops, he spends eight hours every day all by himself.

 ${f I}_{
m t's}$ a lonely life, driving a haulage truck.

Driving any kind of a truck is usually lonely, although drivers of the big highway rigs quite often have relief drivers or friends for company.

Not so for a haulage truck driver; he is alone with the roar of the truck and the chatter of the radio for eight hours. Usually, the only conversation he has comes at the lunch hour.

He can't even have any fun with his radio like the drivers of the big highway rigs can. There's no opportunity to chat with other drivers, check on the location of "Smokies," or talk about the best place to eat in Safford.

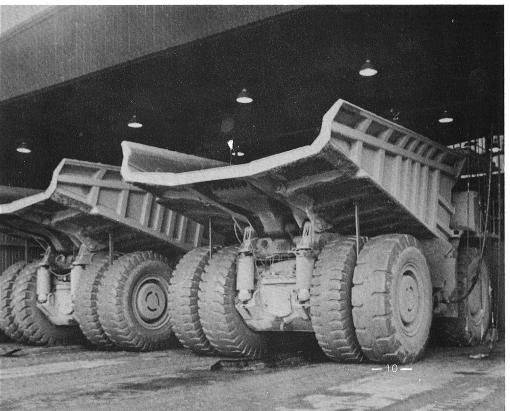
In fact, he can't talk to anybody on his radio except the control tower and only the control tower can talk to him.

Like we said earlier, it's a lonely life.

A haulage truck driver's shift starts and ends at the Pit Office — a big, noisy complex of rooms with lots of talking, perhaps a bit of razzing and occasionally a little horseplay. Telephones ring all the time, supervisors are concentrating on their paper work at the shift's end while other supervisors have lists in their hands lining up their employees for the coming shift. Sample sacks containing tools are being dispensed to shovel runners and tool sacks are being returned as other shovel runners complete their shift.

Here's where a driver gets to leave the truck cab for a brief period on each shift. Trucks need fuel and other items every eight hours so each driver is sent to the "grease pit" by radio orders and other employees take over the unit for routine service. Drivers welcome this opportunity to stretch their legs, have a cup of coffee and chat with other drivers.

EIGHT HOURS ON A HAULAGE TRUCK



To the uninitiated, the Pit Office at shift change time has a noise level just under a roar; during the eight hours of each shift, one can hear a pin drop in that facility.

After receiving his starting assignment, the driver picks up his lunch box and heads for a waiting man-van parked in front of the Pit Office. It soon fills up and the driver starts through the pit delivering each man to his assigned truck.

The driver makes a quick inspection of several items on his truck and then starts up the ladder to his "home" for the next eight hours. He casts an experienced eye over the instrument panel, resets his mirrors, adjusts the heater or air conditioning to suit his taste, finds a place for his lunchbox and hard hat and finally is ready to unleash the 1,000 horses located directly beneath his seat.

The V-12 engine comes to life easily and the driver takes a moment to glance over the truck's eight gauges, dozen lights and as many switches, plus assorted levers and pedals. Everything looks and sound normal, so he eases the 174,300-pound unit into gear and starts rolling toward his assigned loading point.

Before he ever gets into the loading pocket along side the shovel, the shovel runner may signal him to stop under the cable bridge, raise the truck bed to pick up the bridge and move it to another location near the shovel. When that is finished, he expertly backs the yellow Haulpak into the pocket and waits for the shovel runner to do his thing.

Relaxing in the cab during the loading segment of the load-haul-dump cycle, the driver may gaze out of the window, read a pocket book or simply observe the shovel at work in his mirrors. Underneath him, the big truck shudders and shakes as the shovel runner loads the truck. A whistle blast from the shovel signals the driver the loading action is finished.

Now, the driver does his thing: heading his load of 120 tons toward one of the many waste dumps or toward the Primary Crusher.

As the truck starts climbing, a glance at the instrument panel shows the speed is between six and eight miles per hour. Cab insulation keeps the engine roar down to a point where conversation is possible and the tightness of the cab allows the heating or cooling to provide a most pleasant temperature environment.

In a matter of minutes, the Haulpack has crawled to the top of a dump and the driver skillfully backs to his unloading spot. Dumping takes less than a minute and as he leaves the dump he casually waves at the dozer operator who is busy keeping the dumping area level and a safety berm around the dumping edge.

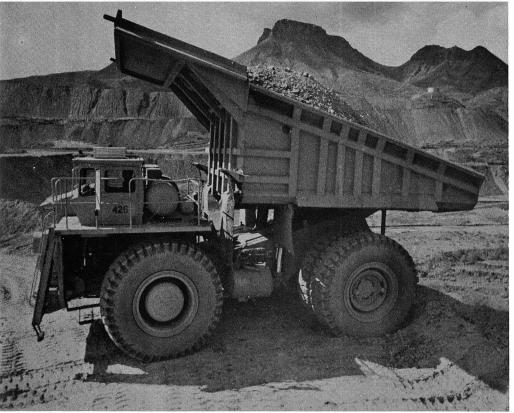
Downhill again, another load and back up the hill. Suddenly, the radio comes alive: "Tower to Haulage Truck 410, after dumping, go to the Grease Pit." The driver picks up the microphone and acknowledges the order.

At the Grease Pit, the driver is out of the cab and has time for a welcome cup of coffee while the Haulpak is being fueled and checked. Ten minutes or so later, the driver is back in the cab and headed for the shovel.

The lunch break — a most welcome pause in the day — comes and goes. Suddenly from the radio: "Tower to Haulage Truck 410, report at once to



This is the start of eight hours on a haulage truck. A man-van has delivered Padilla and other drivers to their trucks. Each driver has looked the unit over casually and with lunch box in hand starts up the steps to the cab — his home for the next eight hours. At the end of that period, the driver makes his way down the ladder with his lunch box, enters the waiting man-van and goes through the time clock routine to end the working day.



Here's the end of one of Padilla's many daily trips to the high waste dump. He was loaded at the shovel and headed for this spot to dump the load. He returns to the shovel and repeats the whole cycle over and over for eight hours every day. On many of his trips, he will never see another human being. It's a lonely life and on the dark shifts, it's even more lonely.

the 1740 level for ore." The driver acknowledges and expertly turns the 88-ton unit down a different road to reach his new assignment.

That's the way it goes eight hours a day, five days a week.

Up the hill and down the hill, Up and down. Up and down.

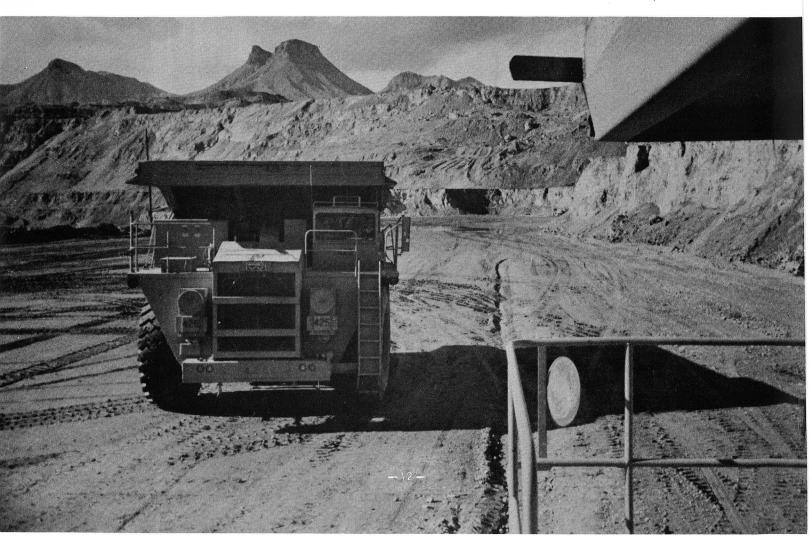
It is lonely; it can be monotonous.

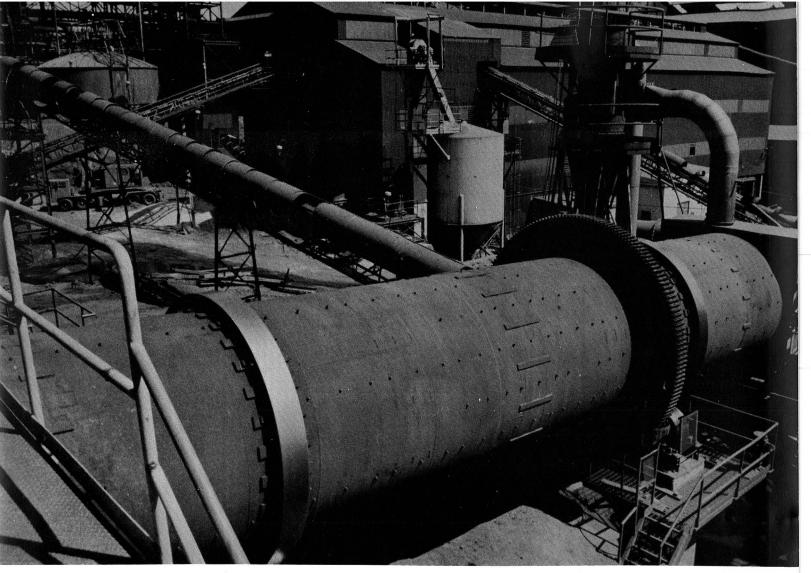
The haulage truck driver is an important member of the RMD production team. He keeps "the rocks in the box," and that's what keeps the pay checks coming.

At the mine, the engineer, the driller, the blaster, the shovel runner, the dozer operator, the crusher operator, the haulage truck driver and the supervisor each plays an important role. So do the mechanics, electricians, train crews, warehousemen, laborers and all the others.

But, the haulage truck driver honestly believes his lonely job is just a little bit more important.

The driver sits in his cab while the truck is being loaded and as the shovel dumps each "bite" the truck settles down a little more. While waiting the driver can keep his load record up to date, have a bite to eat or just look out the window. Usually, when looking out the window there is little to see except the bench or the higher mountains in the distance. Sometimes, he can watch another driver maneuver his truck into position to be loaded.





CALCINES - -

THEIR CARE AND FEEDING

CALCINE: To heat (a substance) to a high temperature but below the melting or fusing point, causing loss of moisture, reduction or oxidation.

— The American Heritage Dictionary of the English Language

Ray Mines Division now uses a calcine reverberatory furnace with a fluo-solids roaster as the first step in the smelting process instead of a green-feed, sidewall-charged reverberatory.

At this point, some readers might be inclined to say "So what?"

Some of these would probably think along these lines: "The furnace still makes copper just as it always did, what's the big deal?"

The "big deal" is this: That significant change in smelting technique made it possible to accomplish three important steps at the division. These are:

1. Reduce air pollution

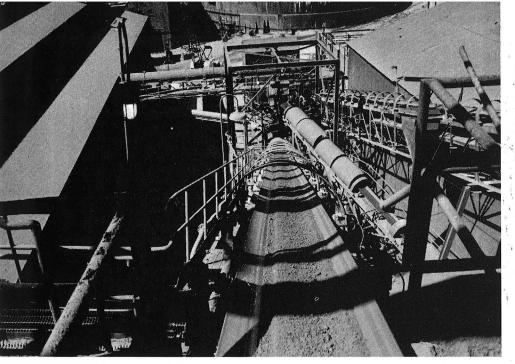
2. Increase smelting capacity

3. Provide a source of acid for mine leaching.

Eight years before the division received air pollution compliance certiIt's not a smokestack on its side; it's the smelter's concentrate dryer. Damp concentrate is fed into this slowly revolving unit where heat is applied to remove the maximum amount of moisture before the concentrate is fed into the reactor. Material moves through the dryer by gravity since the feed end is higher than the discharge end

'fication, management reached a decision to make that important step from green-feed to calcine-feed. Design work was started in 1967; construction was completed in March, 1969

Completion of construction signaled the start of problems with the new system, but the problem solvers won out. Many changes had to be made to the original plant before full commercial operation was achieved.



Copper concentrate, relieved of its mositure by a variety of processes, finally winds up on this conveyor belt headed for a bin high above the reactor. From the bin, the black powder will go into the reactor through the table feeder.

A table feeder drops the concentrate into the roaster at a steady rate of a ton a minute. In the confines of the roaster with a temperature of 1100-1200 degrees, the concentrate loses around 50% of its sulfur content and most of the calcines leave almost immediately as dust through high velocity flues to banks of cyclones for dust removal. Cleaned gas then heads for the gas coolers before reporting to the acid plant while all solids from the roaster overflow, underflow and cyclones report to the calcine feed bins on each side of the reverberatory furnace.

Under normal conditions, some 15 tons of calcines are fed automatically into the reverberatory during two minutes out of every 15 minutes.

The care and feeding of calcines is hardly an exact science, but it is a fairly routine operation now at RMD. However, an undetected pin hole in the wrong place for any length of time can shut the entire calcine operation down.

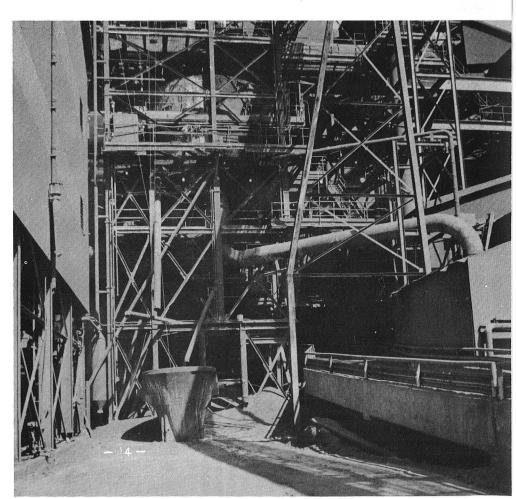
That possibility prevents the operation from being completely routine and turns it into a priority maintenance job.

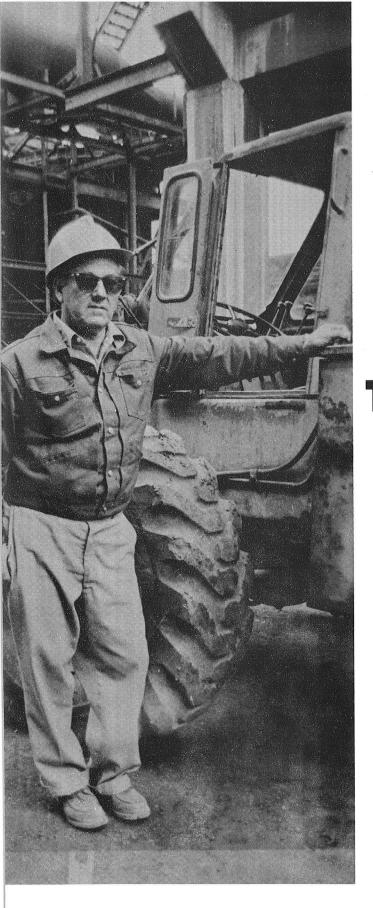
The first major change in the smelter flow sheet came in 1965, seven years after the smelter was finished, when a concentrate dryer was inserted into the circuit. Then came the decision to accomplish many changes: Construct a new acid plant, switch to a calcine feed for the reverberatory, install water jackets on the reverb and add a number of other facilities for support duty here and there in the smelter.

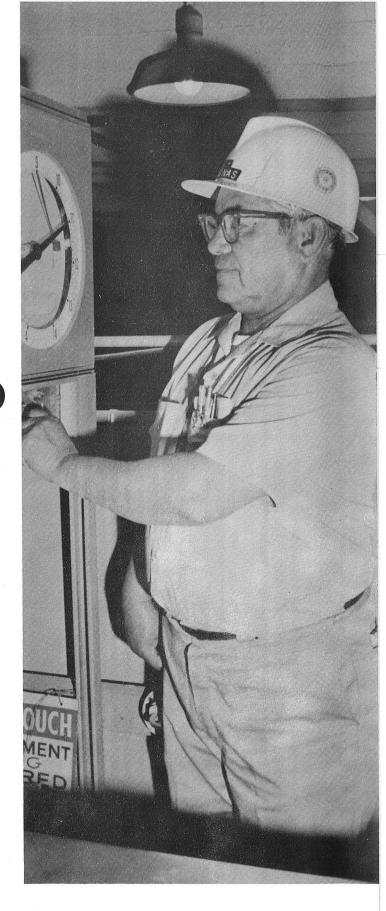
To accomplish the three steps mentioned earlier, it was necessary to construct a metallurgical gas acid plant; to make such a plant operate, it was necessary to provide a steady flow of relatively rich sulfur dioxide; to provide such a flow, it was necessary to add the fluo-solids roaster. And, with the roaster in the circuit, the smelter's green-feed days were over.

Today, the transformation of copper concentrate with a small amount of moisture to dry-as-dust calcines is accomplished daily round-the-clock with only an occasional delay. The calcining process starts in the concentrate storage area where it is stockpiled after drying. A front-end loader takes it from the floor to a conveyor for transport to a feed bin high above the roaster/reactor.

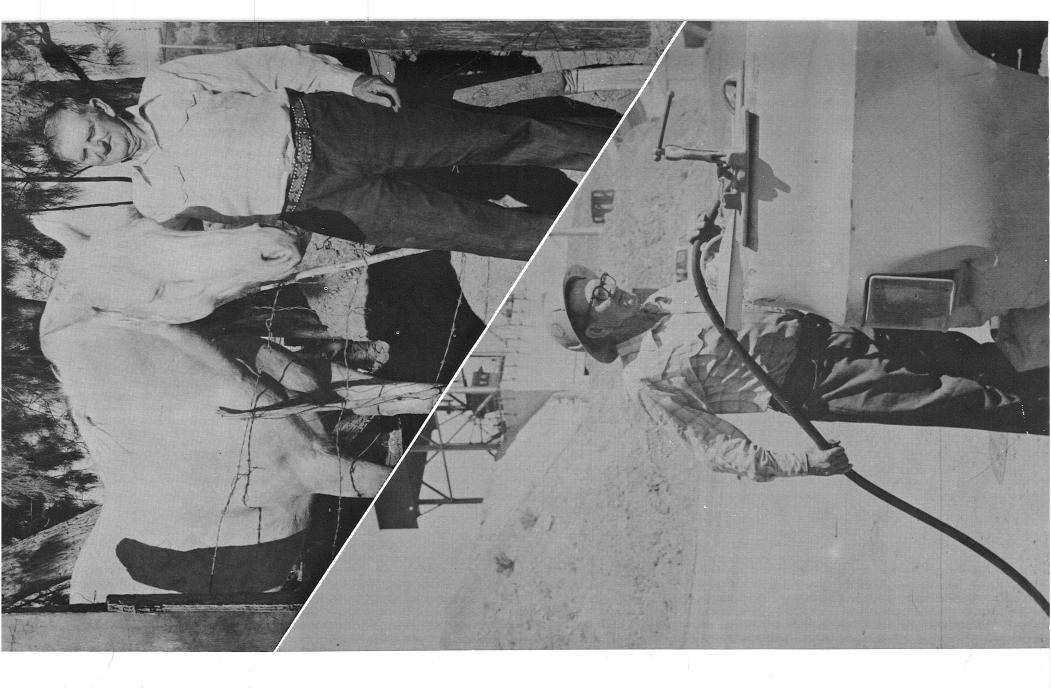
Hidden by this maze of supporting steel on the west side of the smelter is the fluo-solids reactor. Walkways and supporting beams hide the huge unit that turns concentrate into a calcine product ready for feeding into the reverberatory furnace. In that transformation, heat drives off sulfur dioxide that is collected to feed the sulfuric acid plant.







Two men share the division's current longest employment honors and each will complete 40 years of service at RMD before this year ends. An unusual twist to this work record is that both men were hired the same day — Nov. 9, 1936. Ernesto Urias, left, is an A&W crane operator at the Reduction Plant, while Arthur M. Lagunas, right, is a Reduction Plant Grinding and Flotation Foreman.



Kennecott Copper Corporation Ray Mines Division Hayden, Arizona 85235 Return Postage Guaranteed

BULK RATE
U. S. Postage
P A I D
Hayden, Arizona
Permit No. 20

ennezonian ©

Winter, 1976





A 19-year-old General Electric locomotive, retired from active service on the reverberatory slag haul, has a new assignment and has become a tribute to the Bicentennial from Ray Mines Division.

In the Hayden shops of Kennecott Copper Corp., this 35-ton locomotive was completely rebuilt and given a red, white and blue paint job with silver stars as a salute to the Nation's 200th birthday celebration. With its old job phased out in favor of newer methods of slag disposal, the new No.

engine for in-plant railroad car movement. A sister unit, No. 802, also shares these responsibilities.

No. 801 arrived in Hayden Nov. 17, 1957 fresh from the factory and was immediately placed in service hauling material for the smelter which was under construction. When the smelter became operational the following year, the locomotive began its long. career as the motive power for the slag train and made thousands and thousands of trips to and from the dump. It served in that capacity until earlier this year when it was retired in 801 will be the reduction plant's switch favor of a giant motoized slag carrier.

Craftsmen in the Hayden shops under the direction of Shop Support General Foreman Charles F. Hune overhauled almost every part of No. 801 and added a new cab before the Bicentennial paint job was applied. Today, "The Spirit of '76" is moving smoothly around the Hayden Plant doing its job and attracting much attention.

Incidentially, the power package of the GE diesel-electric locomotive includes a supercharged, aspirated sixcylinder diesel engine developing 275 HP at 2100 RPM.



In the middle of the Holiday Season, it's time to take a look at where we have been this past year, and also attempt to predict a short distance into the future.

Working as a solid team this past year, you as employees of Ray Mines Division have been able to cut costs and at the same time increase production of the copper which provides our livelihood. A special tip of the hard hat is due for the all-out efforts of the mine and concentrator crews for the daily tonnage records which were recently set. At the same time, a special "thank you" must go to the Southern Pacific crews which hauled the ore to make the record possible.

At the smelter, through no fault of the individual employee's efforts, there are still some problems which must be resolved, but even so, overall production has been up. I hope that we will be able to start engineering soon to draw up plans to eliminate some of the bottlenecks in the smelter area.

In the next year or two, we must continue to control capital expenditures tightly except in those areas where substantial cost savings can be made through the use of larger, more productive equipment. A good example of this is shown on page 8 of this issue of the KENNEZONIAN in which the new rotary drills and 25-yard shovel are featured.

For the foreseeable future, the overall outlook for the copper industry is not good. The selling price of copper is depressed severely in relation to the cost of production. Large inventories of copper on hand in warehouses and manufacturing plants around the world have lessened the demand for new copper.

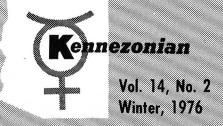
Next year, we face constantly increasing costs for both labor and materials and there is no indication that this trend will change. Consequently, we must all continue to do the best possible job at the lowest possible cost. With everyone pulling together we will be able to continue making progress to survive the rough economic weather ahead. We have a great orebody and the personnel with the expertise necessary to make the operation successful. Ray does not have to take a back seat to any other mining operation.

My sincere best wishes to you and your family for a Merry Christmas and a most Happy New Year.

Sincerely,

K. IJ. Wather f.

K. H. Matheson, Jr.



Published by
Kennecott Copper Corporation
Ray Mines Division
Public Relations Department
J. H. Maize, Director

CONTENTS

| | rage |
|---|------|
| It Takes Water, Fertilizer and Patience To Make Plants Grow On The Tailings Pond | 4 |
| 1976 RMD Scholarship Recipients | 7 |
| Bigger Mining Machinery Arrives; More Coming | 8 |
| 10 Years Ago In Copperland | 9 |
| 20 Years Ago At RMD | 9 |
| Two Limestone Quarries Supply RMD Requirements | 10 |
| So You Think Social Security Is A Gyp? | 12 |
| Where Do The RMD Employees Live? | 13 |
| Salute To Seniority | 15 |

THE COVERS

FRONT: A view of Tea Pot Mountain and portions of the Mine Plant taken from inside the inlet of the Mineral Creek Flood Control Tunnel. The 3.6-mile tunnel, concrete-lined and 16-feet in diameter, moves Mineral Creek water around the open pit for flood control purposes.

(Kennecott Copper Corporation photo by Don Green)

REAR: B. W. Carr, a MP Machinist, is one of Ray Mines Division's oldest employees in years, not service. Currently, he is 64 years old and is one of five active employees born in 1912. He has been on the job 11 years and the photographs show him at work and at home.

EDITOR: Norman B. Harrington



One of the most successful plants on the tailings slope is the Salt Cedar. These healthy small trees are well over six feet tall and this is their second year in the artificial growth environment.

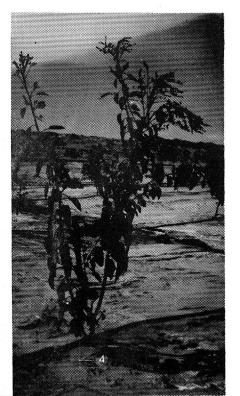
It Takes Water, Fertilizer And Patience To Make Plants Grow On The Tailings Pond

The promotion of plant life on the slopes (sides) of the tailings pond has been going on for years and years, it seems, but in reality it all started in late 1971 with a legume planting project on 10 acres.

Although that project was a complete and total failure, much was learned from it and today there are 40 acres under cultivation with almost everything doing well. That's a complete turnabout in five years and there is evidence that success will come more rapidly in the future.

Back in the early 70's, there was a universal cry, almost a demand, on the local, state and national levels to immediately stop all types of pollution. One of the prime local targets for pollution control was the RMD tailings pond. Area housewives had battled the wind borne tailings for decades. Periodic wind storms carried tailings all over Winkelman-Hayden area dirtying clean houses, soiling laundry on the line and causing general discomfort.

Another six-footer plus is the Wild Tobacco plant that seems to be well on its way to becoming a tree. This is only one of hundreds of these plants and each is doing well.



Control of particulate matter (dust) from the tailings pond became a top division priority. A plan was worked out and construction rushed to conclusion. It involved the installation of a peripheral, pressurized discharge line around the entire pond with spigots spotted at regular intervals for maximum coverage of the area to keep the surface damp, thus preventing blowing dust.

While this plan worked well on top, it did nothing for the slopes. Obviously, a remedy had to be found to stabilize that material to prevent it from becoming wind borne. Water wasn't practical; additives didn't work and other suggestions were not feasible or esthetically acceptable.

Plant growth on the slopes seemed the best solution, but was it attainable? Opinion was divided, with the most weight on the negative side. How do we grow something in virtually sterile material?

The first attempt, as mentioned ear-



In the middle of the Holiday Season, it's time to take a look at where we have been this past year, and also attempt to predict a short distance into the future.

Working as a solid team this past year, you as employees of Ray Mines Division have been able to cut costs and at the same time increase production of the copper which provides our livelihood. A special tip of the hard hat is due for the all-out efforts of the mine and concentrator crews for the daily tonnage records which were recently set. At the same time, a special "thank you" must go to the Southern Pacific crews which hauled the ore to make the record possible.

At the smelter, through no fault of the individual employee's efforts, there are still some problems which must be resolved, but even so, overall production has been up. I hope that we will be able to start engineering soon to draw up plans to eliminate some of the bottlenecks in the smelter area.

In the next year or two, we must continue to control capital expenditures tightly except in those areas where substantial cost savings can be made through the use of larger, more productive equipment. A good example of this is shown on page 8 of this issue of the KENNEZONIAN in which the new rotary drills and 25-yard shovel are featured.

For the foreseeable future, the overall outlook for the copper industry is not good. The selling price of copper is depressed severely in relation to the cost of production. Large inventories of copper on hand in warehouses and manufacturing plants around the world have lessened the demand for new copper.

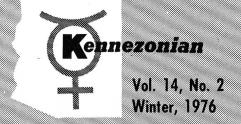
Next year, we face constantly increasing costs for both labor and materials and there is no indication that this trend will change. Consequently, we must all continue to do the best possible job at the lowest possible cost. With everyone pulling together we will be able to continue making progress to survive the rough economic weather ahead. We have a great orebody and the personnel with the expertise necessary to make the operation successful. Ray does not have to take a back seat to any other mining operation.

My sincere best wishes to you and your family for a Merry Christmas and a most Happy New Year.

Sincerely,

K. IJ. Wather f.

K. H. Matheson, Jr.



Published by
Kennecott Copper Corporation
Ray Mines Division
Public Relations Department
J. H. Maize, Director

CONTENTS

| | Page |
|---|------|
| It Takes Water, Fertilizer and Patience To Make Plants Grow On The Tailings Pond | 4 |
| • | • |
| 1976 RMD Scholarship Recipients | 7 |
| Bigger Mining Machinery Arrives; More Coming | 8 |
| 10 Years Ago In Copperland | 9 |
| 20 Years Ago At RMD | 9 |
| Two Limestone Quarries Supply | |
| RMD Requirements | 10 |
| So You Think Social Security Is A Gyp? | 12 |
| Where Do The RMD Employees Live? | 13 |
| Salute To Seniority | 15 |

THE COVERS

FRONT: A view of Tea Pot Mountain and portions of the Mine Plant taken from inside the inlet of the Mineral Creek Flood Control Tunnel. The 3.6-mile tunnel, concrete-lined and 16-feet in diameter, moves Mineral Creek water around the open pit for flood control purposes.

(Kennecott Copper Corporation photo by Don Green)

REAR: B. W. Carr, a MP Machinist, is one of Ray Mines Division's oldest employees in years, not service. Currently, he is 64 years old and is one of five active employees born in 1912. He has been on the job 11 years and the photographs show him at work and at home.

EDITOR: Norman B. Harrington



One of the most successful plants on the tailings slope is the Salt Cedar. These healthy small trees are well over six feet tall and this is their second year in the artificial growth environment.

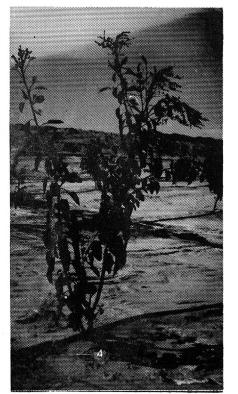
It Takes Water, Fertilizer And Patience To Make Plants Grow On The Tailings Pond

The promotion of plant life on the slopes (sides) of the tailings pond has been going on for years and years, it seems, but in reality it all started in late 1971 with a legume planting project on 10 acres.

Although that project was a complete and total failure, much was learned from it and today there are 40 acres under cultivation with almost everything doing well. That's a complete turnabout in five years and there is evidence that success will come more rapidly in the future.

Back in the early 70's, there was a universal cry, almost a demand, on the local, state and national levels to immediately stop all types of pollution. One of the prime local targets for pollution control was the RMD tailings pond. Area housewives had battled the wind borne tailings for decades. Periodic wind storms carried tailings all over Winkelman-Hayden area dirtying clean houses, soiling laundry on the line and causing general discomfort.

Another six-footer plus is the Wild Tobacco plant that seems to be well on its way to becoming a tree. This is only one of hundreds of these plants and each is doing well.



Control of particulate matter (dust) from the tailings pond became a top division priority. A plan was worked out and construction rushed to conclusion. It involved the installation of a peripheral, pressurized discharge line around the entire pond with spigots spotted at regular intervals for maximum coverage of the area to keep the surface damp, thus preventing blowing dust.

While this plan worked well on top, it did nothing for the slopes. Obviously, a remedy had to be found to stabilize that material to prevent it from becoming wind borne. Water wasn't practical; additives didn't work and other suggestions were not feasible or esthetically acceptable.

Plant growth on the slopes seemed the best solution, but was it attainable? Opinion was divided, with the most weight on the negative side. How do we grow something in virtually sterile material?

The first attempt, as mentioned ear-

lier, was a contract job and a total loss. After the shock of the failure passed, realization came rapidly that the problem was still with us. Where do we go from here?

After consultations with various plant specialists, RMD decided to undertake the project by itself avoiding the mistakes made earlier. A mixture of hardy grass seeds was planted in the same area and an important ingredient missing on the initial project—irrigation— was added with Rainbird sprinklers. The irrigation method was spotty and not totally satisfactory. However, results were obtained and there was a general belief the project was on the right track.

Next came a decision to switch over to drip irrigation for the grass and to prepare another 10-acre plot for trees, shrubs and plants of almost any type. Some 5,000 individual plantings were made and they generally did well. Another 10-acre plot followed on the same pattern and the majority of those plants are doing well.

It's really a case of experimentation. A wide spectrum of plantings has been made to determine which will survive in the unlikely environment. Those who can't make it are eliminated; those who can make up the bulk of the next planting.

The 40 acres are now watered with some 18 miles of plastic hose servicing 7,680 emitters (drip outlets) for shrubs and 1,920 for grass. Each releases 1.5 gallons per hour. Irrigation is twice weekly for 10 hours each with fresh water and fertilizer (Osmocote 18-6-12 with the initial planting and ammonium nitrate with regular irrigation).

Consumption of water is 14,400 gallons per hour.

What's growing up there? What can one see from Highway 177?

One can see 7,680 plants and 1,920 plots of fast spreading grass. Most of the plants are native species with some foreign natives. All are doing well with one exception — the Quetta Pine. Here's a listing of the prinicpal plants:

Mesquite (Arizona and Chilean)
Tobacco Tree
Salt Cedar
Desert Broom
Four-wing Salt Bush
Bristley Locust
Brittle Bush



Here's an unusually fine crop of Tumbleweeds growing along with other plants on the tailings slope. These naturally were not planted but simply sprouted and flourished by themselves. Such growth is highly encouraging because it proves that wind-borne seeds can and will react normally to the artificial environment.

Cottonwood Tree Hackberry Bush Quetta Pine.

The final answer on the Quetta Pine isn't in yet. Few have died but they just seem to be standing still while some other plants have shot up or out six to eight feet. It will take a little longer to make the final evaluation on the pine tree.

Costs of such a project are high, but the success is sufficient justification.

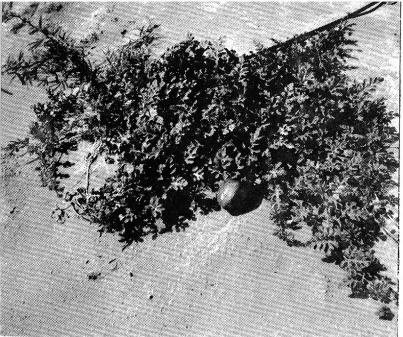
Contouring the slope, installing the drip system and buying the plants is set at \$1,350 per acre. The annual budget for the plant development project is \$25,000.

Between \$200 and \$300 of that annual budget goes for repairing hose chewed up by the squirrels. That black plastic seems to be a desireable delicacy.

The tailings pond plant development project is alive and well. Enjoy it as you drive by and watch us grow.

Grass is doing well in the original 10-acre plot on the slope. At the end of three years, it has almost completely covered the area and will be extended into other areas as rapidly as possible. It is mainly Bermuda, but experimentation is underway with Blue Panic Grass, Lovegrass Mixture, Plains Bristlegrass and Alkali Sacatan.

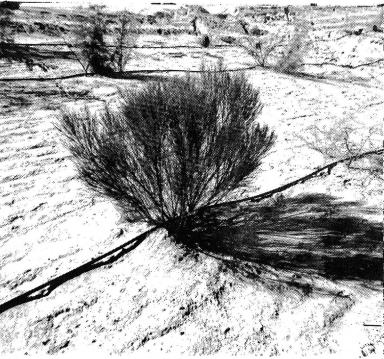




This watermelon vine is growing normally at the base of one of the fast-growing Chilean Mesquite trees. During the past summer, seeds of squash, pumpkin, cucumber and other garden crops were unofficially dropped in around other plants on the slope and each did amazingly well.

Numerous native plants direct from the deserts of Arizona have been transplanted to the pond and here's a very healthy young ocotillo surrounded by many varieties of desert and non-desert plants. Numerous varieties of cacti have been introduced to the slope and are doing well.

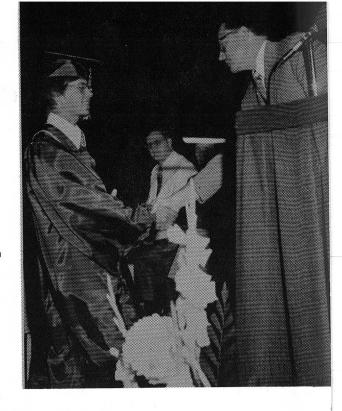




This Desert Broom taken from the desert is doing well on the tailings slope, along with several varieties of Mesquite, cacti, Salt Cedar, Four-wing Salt Bush and the Wild Tobacco. Desert Broom is plentiful in the desert and grows rapidly. It appears to have accepted its new environment easily.



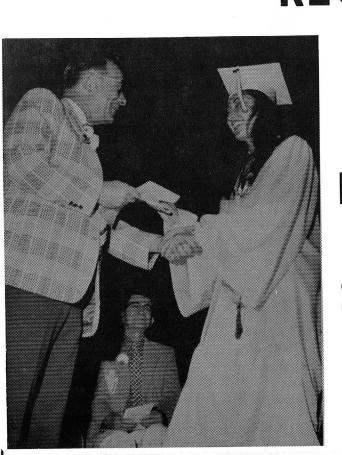
RAY HIGH SCHOOL



A pair of \$500 Kennecott Scholarships were awarded by Ray Mines Division General Manager K. H. Matheson, Jr. at the Ray High School graduation. Receiving the honors were (left) Belinda Ortiz, daughter of Mr. and Mrs. Modesto Ortiz of Silver Creek and a student at Arizona State University, and Donald P. Johnson, son of Mr. and Mrs. Stanley F. Johnson of Kearny and a student at the University of Arizona.

1976 RMD SCHOLARSHIP RECIPIENTS

A Pair of \$500 Kennecott Scholarships were awarded by Ray Mines Division smelter Operations Superintendent J. E. Stocker at the Hayden High School graduation. Accepting their awards were (left) Virginia M. Velsoco, daughter of Mr. and Mrs. Bernardo C. Velasco of Hayden, and Carlos Kame (right), son of Mr. and Mrs. Alfred Kame of Winkelman. Both young people are now students at the University of Arizona.



HAYDEN HIGH SCHOOL



Bigger Mining Machinery Arrives; More Coming

In the endless struggle to increase production and reduce costs, Ray Mines Division has enlisted the aid of three new giants to increase mine production. They are a pair of 60-R blast hole drills and a 25-cubic yard electric mining shovel.

One of the drills is in operation, components of the second have started to arrive and the shovel is scheduled to be delivered by this year's end. There is a possibility that a second 25-yard shovel might be in service by late 1978.

Let's look at some of the rather startling dimensions of these behemoths of the open pit operation.

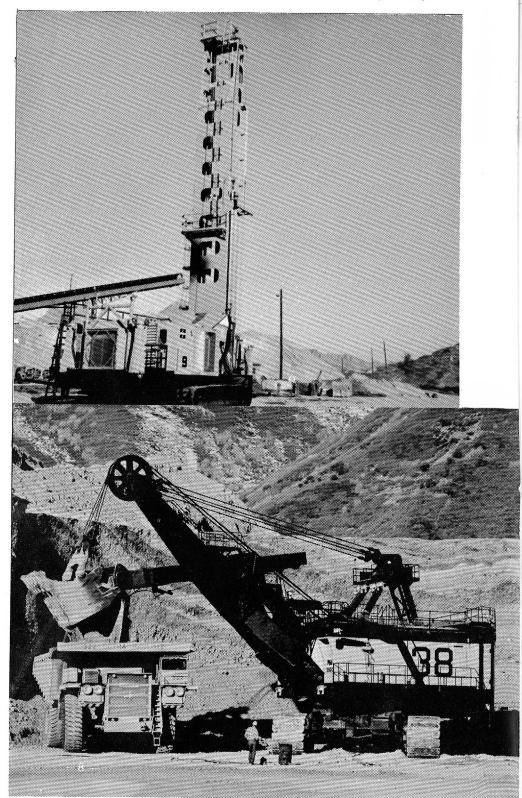
The Bucyrus-Erie 60-R blast hole drill is a diesel-electric model weighing 212,000 pounds. This crawler-mounted giant will be used to drill nine and seven-eighths-inch holes to a depth of 50 feet in one pass. Power for the generator-electrical system is provided by a Cummings V-12 diesel engine developing 480 HP. Each specification of the 60-R is significantly greater than those for the 40-R's now in use in the mining operation.

That new P&H Series 2800 electric mining shovel will tower over other shovels in the pit since the topmost part of the new model is just several inches short of 40 feet above the ground. Total weight of an operating shovel is 1,500,000 pounds and it carries a 51-foot boom. The Model 2800 has a travel speed of 78 feet per minute on its king-size crawlers and the ceiling of the operator's cab is $30\frac{1}{2}$ feet above the ground.

Here's a profile view of our new 25-cubic yard electric mining shovel on duty at Kennecott's Utah Copper Division. Note the size of the man in relation to the giant shovel whose crawler tracks are above his head. The operator's cab on the other side provides him with a view comparable to looking out a third story window. (Kennecott Copper Corporation photo by Don Green).

While mining machinery of these sizes has been in operation in other mines for some time, this is the first time for such giants to appear in Kennecott's Arizona operation.

The Division's new 60-R blast hole drill is ready for its first job in the pit.



A summary of events making news in the Copper Basin 10 years ago in 1966. (From the Copper Basin News files).

Open Houses at RMD's Mines Plant and Reduction Plant attracted 902 persons.

A Hayden resident, George J...Allen, RMD Smelter Operations Superintendent, was promoted to Reduction Plant Superintendent at Nevada Mines Division.

Terry Quinn was named area manager for Mountain States Tel. & Tel. Co., replacing Bob Howard.

Ten candidates ran for the Kearny Town Council with J. T. Mortimer, J. M. McCrone, R. E. Hughes, John Cooper and Ed Heckman being elected. Mortimer was selected mayor.

Karen Dyer was named Pioneer Day Queen in Kearny.

The Town of Hayden called for bids for construction of a new library to be located in the park around the swimming pool.

A new building block in Kearny was completed to house the Post Office, Walt's Jewelry and La Cantina.

Ray High School's Wayne Smith was named principal of Gilbert High School.

Hayden High School graduated 59 with Kathleen Nicholson and Frances Parker as top students; Ray High School's graduating class numbered 72 with Susie Taylor and Jeannette Lavelle as top students.

10 Years Ago In Copperland

A \$475,000 bond issue was proposed by the Hayden school system to finance a new auditorium and elementary classroom.

Drilling was underway on a new well for the Town of Kearny.

The Winkelman Town Council re-elected Bob Bracamonte, Sr. Mayor.

Rev. George Randle, minister to the Hayden and Kearny Methodist Churches, was transferred to Chandler and replaced by Rev. E. W. McRea of Tucson.

RMD announced the official demise of the Town of Sonora with everything burned and all remaining structures leveled.

Kearny residents, S. F. Johnson and C. K. Vance, were named MP Maintenance Superintendent and Smelter Operations Superintendent respectively by RMD.

Hayden Mayor Jane Sewell officiated at the ground breaking ceremony for RMD's new molybdenum plant.

The Pinal County Junior College board selected a site near Coolidge for the proposed new two-year college and called for a \$2.6 million bond election to finance construction.

An election date was set by the Ray District School Board for bonds amounting to \$1,340,000 to expand facilities.

A summary of events making news at Ray Mines Division 20 years ago in 1956.

The 1956 second quarter copper price was 46° per pound, by the end of the year it dropped to 40° .

RMD employees were lighting the Hayden Baseball Field (across the river at the old barracks site) for Little League and softball with lights from the Hayden High School football field at the golf course.

The division paid its 1955 taxes of \$1,673,570 — more than twice the 1954 total.

Mr. and Mrs. Jacobus (Jack) van Blitterswijk and daughter, a displaced family from The Hague, Netherlands, arrived in Ray to make their home.

The Air Defense Command established ground observer posts in Sonora and Kelvin to be manned by civilian volunteer workers to report area plane traffic.

Robert F. Winkle was hired as a RP Industrial Engineer; two months later he was promoted to Mine Planning Engineer.

KCC announced that RMD's productive capacity would be increased by 20,000 tpy, operations would be expanded and a smelter constructed.

20 YEARS AGO AT RMD

The J. W. Galbreath Development Corp. announced the sale of Ray and Sonora homes starting at \$500 for a Wingfoot to \$3,600 for three-bedroom homes, with payments from \$10 to \$43.80 monthly including principal, interest, insurance and taxes.

A contract was awarded Western-Knapp Engineering Co. of San Francisco to build the Hayden Smelter in 20 months.

Over 40,000 pounds of blasting powder were used to blow the cap off Emperor Hill. Residents were warned to prepare for the blast and sirens were used to alert residents just prior to the shot. Reporters from two state daily newspapers and a Phoenix radio station covered the event.

Engineer-trainee Kenneth Vance was named Assistant Drilling and Blasting Boss at the end of his 52-week orientation course; several months later he was promoted to Pit Shovel Foreman.

The 200-foot stack at the Sponge Iron plant was finished and painted red and white.

A 40-ton Kenworth haulage truck was on demonstration at the MP and a second Bucyrus-Erie 40-R blast hole rotary drill was ordered.

Fred Ash, local contractor, started clearing 25 acres in North Hayden where the smelter was to be constructed.

It was announced that 104 houses and lots in Hayden would be offered for sale in the near future.

Few minerals are so extensively distributed in nature as limestone.

Limestone is generally classified as rocks consisting essentially of calcium carbonate, but rarely altogether pure. They frequently contain silica, as quartz, flint or chert; iron oxide or carbonate; carbon and other organic matters, such as bitumen or asphalt.

The fact that limestone is so extensively distributed in nature is a real asset to the copper industry because it is so widely used in various processes. RMD has a limestone quarry at the Reduction Plant and another at the Mines Plant. There are several others in the immediate vicinity.

Ray Mines Division now has three uses for limestone or limestone products. It had more uses in the past; it will have more uses in the future. The division opened its first quarry 18 years ago in the smelter's back yard, while the second quarry, east of the Silicate Ore Leach Plant(SOLP), was opened eight months ago.

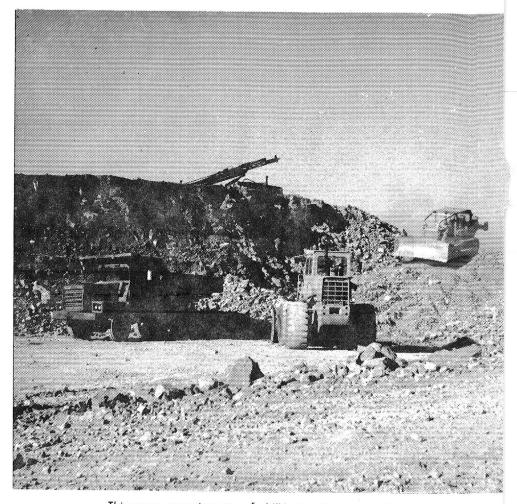
On a hill, 600 feet above the Town of Hayden and just north of the smelter is RMD's first limestone quarry. It was opened almost smiultaneously with the smelter to provide flux for the reverberatory furnace. Three years later, kilns and slaking facilities were added for production of milk-of-lime.

The first year the Hayden quarry was in operation and for a number of years thereafter it produced 90,000 tons of limestone annually; today, production has leveled out to 50,000 tons annually. Reasons for the decrease in production is that very little flux is now needed in the calcine furnace operation and none is being sold to ASARCO, Inc. The former greenfeed operation required 60 tons of crushed limestone daily for smelter flux.

Limestone from the Hayden quarry is classified as belonging to the Mississippian age (350 million years old) and consists of Escabrosa Limestone. The limestone ore zones within the Escabrosa Limestone will run about 53% pure lime (Ca0).

Currently, that quarry operates five days per week with a three-man crew — a loader operator and two truck drivers. After blasting, the limestone is loaded into trucks and hauled to the flux crushing facility near the smelter.

TWO LIMESTONE QUARRIES SUPPLY RMD REQUIREMENTS



This quarry scene is on top of a hill behind the Hayden Smelter where the elevation is equal to the top of the smelter's 600-foot stack. Limestone from this quarry is intermingled with layers of waste from 30 to 50 feet thick. In this scene, a crew of three mines the waste which is dumped into a convenient nearby canyon. Limestone is trucked to the side of the quarry and dumped over the side into a catch basin at the bottom of the hill and close to the crushing plant.

There, limestone is sized for feeding to the five lime kilns. Four of the five are utilized to produce the burned lime and one is maintained on stand-by. Each kiln is provided with 200 tons of storage capacity; it requires 40 tons of raw limestone to make 20 tons of burned lime.

To accomplish the burning process, limestone is allowed to trickle down through a series of baffles in a kiln maintained at 2250 degrees F. Nor-

mally, it takes 24 hours for a charge to pass through. In the furnace, heat drives off the carbon dioxide and the resulting end product is pure burned lime (calcium oxide).

A belt system collects the burned lime as it is released from the kilns and conveys it to a storage bin where it is fed into the lime slaker on demand. This slaking operation simply mixes burned lime with water in a large mixing tank. The result is milk-of-lime.

Impurities in the burned lime are removed from the milk-of-lime by a classifier and stockpiled for use as road and area surfacing around the plant. The milk-of-lime — a slimy, snow-white liquid — is pumped through 3,000 feet of underground pipe to a storage tank in the concentrator for use on demand.

Milk-of-lime (calcium hydroxide) is a vital additive in the ore concentration process. Normally, five pounds of burned lime are needed to every ton of ore milled. Primary function of the additive is to maintain selective flotation, which makes it possible to float copper sulphides and just enough iron to maintain the proper metallurgical balance in the concentrate.

The Hayden-produced milk-of-lime also has a second function. It goes by

Limestone from a deposit high above the Silicate Ore Leach Plant is mined by a crew of five — loader operator, truck driver, two-man drill crew and dozer operator (out of the picture). Trucks move the limestone to the edge of the quarry and dump it over the side of the mountain. It falls into a catch basin almost 700 feet below where it is reloaded into trucks for transportation to the limestone crushing and grinding facility.

tank truck to the waste water treatment plant located on the banks of Mineral Creek where the Ray Mine Road meets Highway 177. At this facility, the milk-of-lime is used as the primary treatment agent for any waste or process water reaching that site before it is released into Mineral Creek.

RMD's newest limestone quarry is located at an elevation of 3,750 feet on the western slope of the Dripping Spring Mountains east of the SOLP. Nornmal production from this facility is 750 to 800 tpd. This limestone is the Escabrosa and Black Prince varieties, currently averaging between 49 and 50% Ca0.

A crew of eight is utilized at this quarry — two truck drivers, loader operator, dozer operator and two two-man drill crews. Trucks haul the blasted limestone about 1,200 feet where it is dumped over the side of a mountain. It then slides down some 660 feet to a catch basin. On days when there is no quarry production, copper ore haulage trucks are used to move the limestone from the catch basin to the crushing plant.

The crusher sizes the limestone which reports to a pair of ball mills for grinding. The limestone slurry is used in a nearby tail water neutralization facility designed to remove objectionable salts and acid from process water prior to its reuse.

Summing up the current demands for limestone and limestone products: It is being used for selective flotation in the concentrator, for a cleaning agent in the MP waste water treatment facility and as a cleaning agent for tail water (leach solution from which copper has been removed) in the SOLP.

One usage — smelter flux — was reduced when the reverberatory furnace was modified from green-feed to a calcine operation. However, present plans call for construction in the future of a Flux Preparation Plant at the smelter and this will require a sizable amount of raw limestone to be transformed into a powder for use as reverberatory furnace flux.

Ray Mines Division is fortunate in having a plentiful supply of good quality limestone at both plants. Without such a ready supply of this vital raw material handy, production costs would be greatly increased.

Ever wonder how much you would have for retirement if you'd deposited in a savings account the same sum that was withheld for FICA every payday?



So You Think Social Security Is A Gyp?

By A. D. Kline.

Reprinted by permission of RETIREMENT LIVING (c) April, 1976

SO YOU'LL REACH retirement age this year, and you're all set to yield your job and relax in the lap of luxury — because on the 3rd of each month you'll receive a fat Social Security check from Uncle Sam. You know it's got to be a bundle because, after all, haven't you paid in the full amount each and every year since it all started in 1937? That's thirty-nine years!

You decide to pay a little advance visit to your local Social Security Administration headquarters. A courteous young man looks at your birth certificate and Social Security card, asks you a few questions, checks a few charts, pushes a few buttons, writes a few figures on a scratch pad, and tells

you that — yes indeed — you will receive a monthly check. It will begin one month after you retire, and will be in the amount of \$364.00. He goes on to say that your wife, upon reaching 65, can receive half that amount even if she has never been employed — and perhaps considerably more if she has been steadily employed during the 17 years preceding her 65th birthday. She may even receive it at age 62 if she desires it, at a reduced monthly rate.

As of the first of July, 1976, that maximum payment was raised again to \$387.30. This greatly improves the case the author is making in this article.

The big comedown

You stare silently at him for a moment. Clearing your throat, you say as politely as you can: "Only \$364.00? There must be something wrong. Why, I've been paying in the full amount every year for 39 years. I must have paid on taxable earnings of \$175,000 or more!"

The young man whirls in his chair, pushes a few more buttons, and waits for the computer answer. Slowly he swivels back facing you and says: "You've paid *more*. It's \$184,200 sir. But your Social Security monthly benefits are figured on only your best 19 years out of your last 25."

"Why? What happened to all the other years?" you ask.

"That's the law," he answers.

Somehow, you remember to thank him as you stumble out into the fresh air. The adrenalin begins to flow.

"What a gyp! What a bust!" you mutter. "Social Security is for the birds!"

You think of all the money you've contributed to Social Security for 39 of your hard-working years and all *they* count is the last 25! No, the best 19 out of the last 25!

What if . . .

You begin wondering to yourself: If I had taken the amount that was with-

held for FICA each and every payday, deposited it in a savings account, and just let it lay there drawing interest, I'd probably be able to withdraw a great deal more than \$364.00 per month for as long as I live, and still have money left.

Whoa, citizen, back up. Let's look at the facts.

Beginning with January 1, 1937 through December 31, 1975, and assuming that you contributed the full amount of FICA withholdings each and every year, your total contribution would come to \$6,868.05. If you had just left that amount in the bank drawing the interest the average bank paid over the same 39 years, you would

have \$10,443.96. This includes the better interest you would have been paid as your savings moved from the Open Passbook category to the Time Passbook category to the One- and Two-Year Certificate of Deposit category.

Past rates were lower

Now, if you never learned to jitterbug or rock 'n' roll and can't remember exactly when Elvis Presley made his first appearance on the Ed Sullivan Show, you've probably also forgotten that your contribution to the FICA for the first 20 years totaled only \$837.00 — and that most bank interest rates were still 1% per annum, paid quarterly.

It doesn't make much difference whether you use the old fourth-grade long-division or today's New Math to figure out that you would be stone broke in just over three years if you withdrew \$364.00 per month on that \$10,443.96 — even counting the interest you'd get on your balance still on deposit after each monthly withdrawal.

But what about the equal share your employer contributed, you ask yourself. If he, or they, had put that on my pay check instead of contributing it to the FICA. I could have banked *twice* as much, you think. OK, so let's double everything. You would still be stone broke before the end of six years. And remember, this would be at a withdrawal rate of \$364.00 per month—not at the "great deal more" you thought you'd be getting when you first walked into the Social Security office.

Stock ups and downs

So now you say you would have invested in mutual funds or the stock market from time to time. With a good financial advisor, a clear crystal ball, and a lot of luck you might have bought when the Dow Jones was down to 840.00 and sold when it was 916.00. You might have doubled or tripled your savings.

Repeat *might*. For, on the other hand, if you left your money in stocks until you actually retired in December 1975, you might have found the value down to 650.00. You not only could lose that solid 6½ or 7% interest your safe Certificate of Deposit would have earned, you might also have lost some of the principal.

A supplement, not a wherewithal

Social Security was originally designed to give Americans an income base after retirement — for the rest of their lives. It was never meant to be a person's sole source of income after

Where Do The RMD Employees Live?

Employees of a single industry or major employer usually and traditionally make their homes in a nearby town or perhaps several communities close to their job site.

Until the last few years, it was always that way in Arizona's mining towns. The worker, from general manager to laborer, lived close to his job. Maybe as close as a stone's throw. It was that way at Ray Mines Division with workers residing at Ray, Sonora and Hayden. It was a little further for those who resided in Winkelman.

When it was announced that the townsites of Ray and Sonora would be phased out at the end of 1965, numerous employees were faced with reestablishing residences elsewhere. The movement to other towns started in earnest during the 60's and continues. An employee who used to commute miles and miles every day is no longer a rarity; it has become an accepted life style for many.

When the question was asked: "where do RMD employees live?" it was only natural to feed that question to the corporate computer center. Shortly the answer came back showing the number of employees residing in each of the U. S. Postal Service's Zip Code areas.

It was not surprising to learn that 751 (41.7%) of the RMD employees list Kearny as home, but this includes Kelvin, Riverside and star routes. Hayden is in the runner-up spot was 251 (13.9%), closely followed by Winkelman with 248 (13.7%), which includes those along the Tucson Highway served by star routes. Nor was it any surprise to discover that Superior was the home of 218 employees (12.1%).

However, that concluded the listing of towns with employees counted in three-digit amounts. Another quick computation with the handy pocket calculator showed that over 80% of division employees resided in or near those four towns. The obvious next question: "Where do the remaining 20% live?"

Apache Junction with 61 (3.3%) and Mesa with 60 (3.3%) are the favorite spots away from the division, with the Globe-Miami area close behind with 57 (3.1%).

Not far behind in the preferential listing is Mammoth with 47 (2.6%), followed by the Florence/Coolidge/Casa Grande area with 24 (1.3%), Tucson with 20 (1.1%), Oracle with 18 and Phoenix, the home choice for 10.

any age. Although there are benefits for widows and dependents, and a small death benefit, it was designed to help keep a person from being entirely dependent upon kith, kin, and welfare in one's later years.

In 1974 alone, those drawing Social Security checks received an 11% increase. This is far better than most businesses did for their employees in order to meet the fast-rising cost of living. Insurance actuaries say the average life expectancy at 65 is an additional 11 to 13 years for males. So let's go back to the figures. If you had paid the maximum Social Security tax each year from 1937 through 1975, you and your employer would have paid \$13,736.10. Divide that figure by the \$364.00 you've been told you'll receive every month - and you'll get your contribution plus your employer's back in just over three years.

If you equal the average life expectancy figures, you'll get back at least three times as much as you and your employers both paid into the FICA. In all likelihood more than that, because under a 1972 law every time the Consumer Price Index rises a certain percentage your Social Security check gets larger.

As a matter of fact, all you have to do is live to age 76 and you will receive back *twice* as *much* as the total amount of what you and your employer both paid in *plus* whatever the bank interest on that amount would have been if you had left it in your savings account for 39 years.!

Fringe benefits, too

There are also fringe benefits under Social Security that we haven't mentioned, such as Medicare and Medicaid insurance, death of spouse benefits and widow's benefits.

For example, suppose the insurance actuaries are wrong about you, and you live only to age 70. Suppose also that your wife has never worked, and on reaching age 65 began getting her Social Security check of \$182.00 per month (which is half of your \$364.00). Now, on your death your bank would give her only the balance in your account. Social Security, on the other hand, would cut off her \$182.00 and replace it with your \$364.00 as long as she lives! And remember, since she was unemployed, she has contributed nothing.

So now, do you still think Social Security is a gyp? I certainly don't.

SOCIAL SECURITY

What If You'd Banked Those SS Withholdings?

| | | - Intonost | O. m. dether |
|------|--------------------|--------------|---------------------------|
| Veer | Maximum | Interest | Cumulative Savings and |
| Year | Amount Withheld | on Amount | interest |
| 1937 | \$ 30.00 | \$.30 | \$ 30.30 |
| 1938 | 30.00 | .53 | 60.83 |
| 1939 | 30.00 | .83 | 91.66 |
| 1940 | 30.00 | 1.14 | 122.80 |
| 1941 | 30.00 | 1.40 | 154.20 |
| 1942 | 30.00 | 1.77 | 185.97 |
| 1943 | 30.00 | 2.08 | 218.05 |
| 1944 | 30.00 | 2.41 | 250.46 |
| 1945 | 30.00 | 2.73 | 283.19 |
| 1946 | 30.00 | 3.08 | 316.27 |
| 1947 | 30.00 | 3.40 | 349.67 |
| 1948 | 30.00 | 3.73 | 383.40 |
| 1949 | 30.00 | 4.08 | 417.48 |
| 1950 | 45.00 | 4.53 | 467.01 |
| 1951 | 54.00 | 5.09 | 526.10 |
| 1952 | 54.00 | 5.69 | 585.79 |
| 1953 | 54.00 | 6.29 | 646.08 |
| 1954 | 72.00 | 7.03 | 725.11 |
| 1955 | 84.00 | 7.91 | 817.02 |
| 1956 | 84.00 | 11.05 | 912.07 |
| 1957 | 94.50 | 19.58 | 1,026.15 |
| 1958 | 94.50 | 21.88 | 1,142.53 |
| 1959 | 120.00 | 24.55 | 1,287.08 |
| 1960 | 144.00 | 38.37 | 1,469.45 |
| 1961 | 144.00 | 47.32 | 1,660.77 |
| 1962 | 150.00 | 53.24 | 1,864.01 |
| 1963 | 174.00 | 59.86 | 2,097.87 |
| 1964 | 174.00 | 75.52 | 2,347.39 |
| 1965 | 174.00 | 87.11 | 2,608.50 |
| 1966 | 277.20 | 127.31 | 3,013.01 |
| 1967 | 290.40 | 146.18 | 3,449.59 |
| 1968 | 343.20 | 186.65 | 3,979.44 |
| 1969 | 374.40 | 214.63 | 4,568.47 |
| 1970 | 374.40 | 244.65 | 5,187.52 |
| 1971 | 405.60 | 284.00 | 5,886.12 |
| 1972 | 468.00 | 333.87 | 6,687.99 |
| 1973 | 631.80 | 419.56 | 7,739.35 |
| 1974 | 772.20 | 533.87 | 9,045.22 |
| 1975 | 824.85 | 573.89 | 10,443.96 |

From the inception of Social Security withholding in 1937 through June 30, 1956, most banks paid only 1% interest semi-annually on Open Passbook Savings (OPS). July 1, 1956, most banks started paying 1% quarterly on OPS. Oct. 1, 1956, most banks started paying 2% quarterly on OPS. Jan. 1, 1960, most banks started paying 21/2 % quarterly on OPS. July 1, 1960, most banks started paying 3% quarterly on OPS. Mar. 31, 1964, most banks started paying 31/2 % quarterly on OPS. Jan. 1, 1966, most banks started paying interest at the rate of 41/2 % 90 days paid quarterly on Time Passbook Savings (TPS). Jan. 1, 1968, most banks started paying interest at the rate of 5% 90 days paid quarterly on TPS and, Feb. 1, 1968, started compounding the daily interest paid quarterly. Apr. 1, 1970, most banks started paying 51/2 % on one year Certificates of Deposit and 53/4 % on two year CD's. July 1, 1973, most banks started paying 6% on both one and two year CD's. Jan. 1, 1974, one to two-and-a-half year CD's in most banks started earning 6.27% annually on 6%. This is the current rate of interest as of Oct. 20, 1975

"Why? What happened to all the other years?" you ask. held for FICA each and every payday, deposited it in a savings account, and

"That's the law," he answers.

Somehow, you remember to thank him as you stumble out into the fresh air. The adrenalin begins to flow.

"What a gyp! What a bust!" you mutter. "Social Security is for the birds!"

You think of all the money you've contributed to Social Security for 39 of your hard-working years and all *they* count is the last 25! No, the best 19 out of the last 25!

What if . . .

You begin wondering to yourself: If I had taken the amount that was with-

held for FICA each and every payday, deposited it in a savings account, and just let it lay there drawing interest, I'd probably be able to withdraw a great deal more than \$364.00 per month for as long as I live, and still have money left.

Whoa, citizen, back up. Let's look at the facts.

Beginning with January 1, 1937 through December 31, 1975, and assuming that you contributed the full amount of FICA withholdings each and every year, your total contribution would come to \$6,868.05. If you had just left that amount in the bank drawing the interest the average bank paid over the same 39 years, you would

have \$10,443.96. This includes the better interest you would have been paid as your savings moved from the Open Passbook category to the Time Passbook category to the One- and Two-Year Certificate of Deposit category.

Past rates were lower

Now, if you never learned to jitterbug or rock 'n' roll and can't remember exactly when Elvis Presley made his first appearance on the Ed Sullivan Show, you've probably also forgotten that your contribution to the FICA for the first 20 years totaled only \$837.00 — and that most bank interest rates were still 1% per annum, paid quarterly.

It doesn't make much difference whether you use the old fourth-grade long-division or today's New Math to figure out that you would be stone broke in just over three years if you withdrew \$364.00 per month on that \$10,443.96 — even counting the interest you'd get on your balance still on deposit after each monthly withdrawal.

But what about the equal share your employer contributed, you ask yourself. If he, or they, had put that on my pay check instead of contributing it to the FICA. I could have banked *twice* as much, you think. OK, so let's double everything. You would still be stone broke before the end of six years. And remember, this would be at a withdrawal rate of \$364.00 per month — not at the "great deal more" you thought you'd be getting when you first walked into the Social Security office.

Stock ups and downs

So now you say you would have invested in mutual funds or the stock market from time to time. With a good financial advisor, a clear crystal ball, and a lot of luck you might have bought when the Dow Jones was down to 840.00 and sold when it was 916.00. You might have doubled or tripled your savings.

Repeat *might*. For, on the other hand, if you left your money in stocks until you actually retired in December 1975, you might have found the value down to 650.00. You not only could lose that solid 6½ or 7% interest your safe Certificate of Deposit would have earned, you might also have lost some of the principal.

A supplement, not a wherewithal

Social Security was originally designed to give Americans an income base after retirement — for the rest of their lives. It was never meant to be a person's sole source of income after

Where Do The RMD Employees Live?

Employees of a single industry or major employer usually and traditionally make their homes in a nearby town or perhaps several communities close to their job site.

Until the last few years, it was always that way in Arizona's mining towns. The worker, from general manager to laborer, lived close to his job. Maybe as close as a stone's throw. It was that way at Ray Mines Division with workers residing at Ray, Sonora and Hayden. It was a little further for those who resided in Winkelman.

When it was announced that the townsites of Ray and Sonora would be phased out at the end of 1965, numerous employees were faced with reestablishing residences elsewhere. The movement to other towns started in earnest during the 60's and continues. An employee who used to commute miles and miles every day is no longer a rarity; it has become an accepted life style for many

When the question was asked: "where do RMD employees live?" it was only natural to feed that question to the corporate computer center. Shortly the answer came back showing the number of employees residing in each of the U. S. Postal Service's Zip Code areas.

It was not surprising to learn that 751~(41.7%) of the RMD employees list Kearny as home, but this includes Kelvin, Riverside and star routes. Hayden is in the runner-up spot was 251~(13.9%), closely followed by Winkelman with 248~(13.7%), which includes those along the Tucson Highway served by star routes. Nor was if any surprise to discover that Superior was the home of $218~{\rm employees}~(12.1\%)$.

However, that concluded the listing of towns with employees counted in three-digit amounts. Another quick computation with the handy pocket calculator showed that over 80% of division employees resided in or near those four towns. The obvious next question: "Where do the remaining 20% live?"

Apache Junction with 61 (3.3%) and Mesa with 60 (3.3%) are the favorite spots away from the division, with the Globe-Miami area close behind with 57 (3.1%).

Not far behind in the preferential listing is Mammoth with 47 (2.6%), followed by the Florence/Coolidge/Casa Grande area with 24 (1.3%), Tucson with 20 (1.1%), Oracle with 18 and Phoenix, the home choice for 10.

any age. Although there are benefits for widows and dependents, and a small death benefit, it was designed to help keep a person from being entirely dependent upon kith, kin, and welfare in one's later years.

In 1974 alone, those drawing Social Security checks received an 11% increase. This is far better than most businesses did for their employees in order to meet the fast-rising cost of living. Insurance actuaries say the average life expectancy at 65 is an additional 11 to 13 years for males. So let's go back to the figures. If you had paid the maximum Social Security tax each year from 1937 through 1975, you and your employer would have paid \$13,736.10. Divide that figure by the \$364.00 you've been told you'll receive every month - and you'll get your contribution plus your employer's back in just over three years.

If you equal the average life expectancy figures, you'll get back at least three times as much as you and your employers both paid into the FICA. In all likelihood more than that, because under a 1972 law every time the Consumer Price Index rises a certain percentage your Social Security check gets larger.

As a matter of fact, all you have to do is live to age 76 and you will receive back *twice* as *much* as the total amount of what you and your employer both paid in *plus* whatever the bank interest on that amount would have been if you had left it in your savings account for 39 years.!

Fringe benefits, too

There are also fringe benefits under Social Security that we haven't mentioned, such as Medicare and Medicaid insurance, death of spouse benefits and widow's benefits.

For example, suppose the insurance actuaries are wrong about you, and you live only to age 70. Suppose also that your wife has never worked, and on reaching age 65 began getting her Social Security check of \$182.00 per month (which is half of your \$364.00). Now, on your death your bank would give her only the balance in your account. Social Security, on the other hand, would cut off her \$182.00 and replace it with your \$364.00 as long as she lives! And remember, since she was unemployed, she has contributed nothing.

So now, do you still think Social Security is a gyp? I certainly don't.

SOCIAL SECURITY

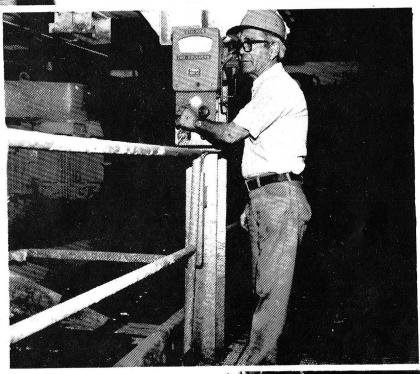
What If You'd Banked Those SS Withholdings?

| | Maximum | Interest | Cumulative |
|-------|----------|----------|-------------|
| Year | Amount | on | Savings and |
| 1 000 | Withheld | Amount | Interest |
| 1937 | \$ 30.00 | \$.30 | \$ 30.30 |
| 1938 | 30.00 | .53 | 60.83 |
| 1939 | 30.00 | .83 | 91.66 |
| 1940 | 30.00 | 1.14 | 122.80 |
| 1941 | 30.00 | 1.40 | 154.20 |
| 1942 | 30.00 | 1.77 | 185.97 |
| 1943 | 30.00 | 2.08 | 218.05 |
| 1944 | 30.00 | 2.41 | 250.46 |
| 1945 | 30.00 | 2.73 | 283.19 |
| 1946 | 30.00 | 3.08 | 316.27 |
| 1947 | 30.00 | 3.40 | 349.67 |
| 1948 | 30.00 | 3.73 | 383.40 |
| 1949 | 30.00 | 4.08 | 417.48 |
| 1950 | 45.00 | 4.53 | 467.01 |
| 1951 | 54.00 | 5.09 | 526.10 |
| 1952 | 54.00 | 5.69 | 585.79 |
| 1953 | 54.00 | 6.29 | 646.08 |
| 1954 | 72.00 | 7.03 | 725.11 |
| 1955 | 84.00 | 7.91 | 817.02 |
| 1956 | 84.00 | 11.05 | 912.07 |
| 1957 | 94.50 | 19.58 | 1,026.15 |
| 1958 | 94.50 | 21.88 | 1,142.53 |
| 1959 | 120.00 | 24.55 | 1,287.08 |
| 1960 | 144.00 | 38.37 | 1,469.45 |
| 1961 | 144.00 | 47.32 | 1,660.77 |
| 1962 | 150.00 | 53.24 | 1,864.01 |
| 1963 | 174.00 | 59.86 | 2,097.87 |
| 1964 | 174.00 | 75.52 | 2,347.39 |
| 1965 | 174.00 | 87.11 | 2,608.50 |
| 1966 | 277.20 | 127.31 | 3,013.01 |
| 1967 | 290.40 | 146.18 | 3,449.59 |
| 1968 | 343.20 | 186.65 | 3,979.44 |
| 1969 | 374.40 | 214.63 | 4,568.47 |
| 1970 | 374.40 | 244.65 | 5,187.52 |
| 1971 | 405.60 | 284.00 | 5,886.12 |
| 1972 | 468.00 | 333.87 | 6,687.99 |
| 1973 | 631.80 | 419.56 | 7,739.35 |
| 1974 | 772.20 | 533.87 | 9,045.22 |
| 1975 | 824.85 | 573.89 | 10,443.96 |

From the inception of Social Security withholding in 1937 through June 30, 1956, most banks paid only 1% interest semi-annually on Open Passbook Savings (OPS). July 1, 1956, most banks started paying 1% quarterly on OPS. Oct. 1, 1956, most banks started paying 2% quarterly on OPS. Jan. 1, 1960, most banks started paying 21/2 % quarterly on OPS. July 1, 1960, most banks started paying 3% quarterly on OPS. Mar. 31, 1964, most banks started paying 31/2 % quarterly on OPS. Jan. 1, 1966, most banks started paying interest at the rate of 41/2 % 90 days paid quarterly on Time Passbook Savings (TPS). Jan. 1, 1968, most banks started paying interest at the rate of 5% 90 days paid quarterly on TPS and, Feb. 1, 1968, started compounding the daily interest paid quarterly. Apr. 1, 1970, most banks started paying 51/2 % on one year Certificates of Deposit and 53/4% on two year CD's. July 1, 1973, most banks started paying 6% on both one and two year CD's. Jan. 1, 1974, one to two-and-a-half year CD's in most banks started earning 6.27% annually on 6%. This is the current rate of interest as of Oct. 20, 1975



SALUTE TO SENORITY



All three of these employees have one thing in common — all were hired in 1936 and all will complete 40 years on the job by the end of 1976. At the top is Eduardo R. Morales, MP Lead Crusher Operator, Superior, who started working here Nov. 14, 1936. In the center is Adelberto S. Cruz, Flotation Operation, Hayden, who started his RMD employment Dec. 6, 1936. At the bottom is Pedro Pena, MP Carmán, Kearny, who started working here Dec. 29, 1936.



Kennecott Copper Corporation
Ray Mines Division
Hayden, Arizona 85235
Return Postage Guaranteed



BULK RATE
U. S. Postage
P A | D
Hayden, Arizona
Permit No. 20