EDITOR'S NOTE: For almost a year, truck drivers and shovel operators at the Tyrone Branch of Phelps Dodge have been receiving their instructions from a computer. It has led to improved efficiency in the pit. Moreover, the drivers like the system.

By RICHARD PETERSON
Daily Press Writer

The driver pushes a button on a stainless steel console mounted on the dash of his 170-ton haulage truck. In a flicker, the red readouts give his destination.

Within those few fractions of a second, he is dispatched to another shovel. In fact, that's the name of the system: "Dispatch."

Since May last year, Phelps Dodge's Tyrone Branch has been dispatching their trucks and shovels by a complex computer system. Already, efficiency improvements of around 11 percent have been reported.

That, says management, is significant, especially since drivers like Dispatch.

"On days when it's not working," said John Vaughn, a truck driver, "I don't even like to go to work. It's a good system. It really helps."

Why? It saves time, fuel and equipment. Lost time hurts profits, and the computer is incredibly fast.

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At the dispatch tower, the dispatcher still keeps a watchful eye on the pit's operations — his telescope and field glasses are nearby.

Yet a few miles away in the administration building, the new VAX computer scrutinizes the operation with super-human efficiency. A truck has just emptied its load at a waste dump, and the driver has pushed the button seeking orders.

In microseconds the computer makes its decision: send the truck to shovel No. 12. That message is flashed back to the truck by radio, and "Shovel 12" flashes on the driver's console.

He's on his way to another shovel for another load.

"At first, we didn't think we'd like it," conceded Vaughn. "We changed our minds."

No longer do drivers have to wait for the dispatcher, sometimes buried by a flood of activity, to assess the situation, grab his microphone and bark out an order.

The truck cabs are quiet now. The radio infrequently sounds. The computer uses a separate frequency to send its messages, which the truck and shovel operator never hears.

It's the pride of Tyrone. Branch Manager Arthur Himebaugh appeared at a meeting of the American Mining Congress in San Francisco to talk about Dispatch.

He also authored a detailed article on the project in the *Mining Congress Journal* last year.

The project is still growing, says Mike Arnold, president of Modular Mining Systems of Tucson. His firm, together with Phelps Dodge, developed Dispatch.

"We're just beginning," he said, "to realize the extent of the information which can be made available to management through a system like Dispatch.

"At any time, information on mine operation is available — information which management has really needed but could not obtain until now.

Computer printer terminals constantly hammer out information about the mine status — information updated constantly.

The real beauty, though, is its acceptance.

"I get complaints when Dispatch goes down for maintenance," said Arnold. I definitely want to say this system doesn't eliminate the dispatcher: it's a tool to assist him.

"It's a tool to improve production in the mine."

It wasn't an easy task. The hardware — and the software — were a long time in design and debugging. A mine is a complicated operation, concedes Arnold.

"Looking back," he says, "I guess at first I was rather naive about the number of upsets in any mining operation. A mine is never a smooth operation. Dispatch evolved to the point where it's pretty sophisticated.

"You might have rain in the pit. The fog might roll in. There could be snow and ice. The time for a given route starts to lengthen. Your system has to be smart enough to compensate for these changes."

In less than two years, Phelps Dodge personnel and staff with Arnold's firm prepared the system for its first trial after the corporation decided in June of 1978 to explore computerized dispatching.

It originated as a mathematical concept. Following preliminary studies, it was funded in March of 1979.

Dispatch was born.

The first test was in February last year, and the whole mine was on line with Dispatch in May.

"There was no one part that was astoundingly difficult," said Arnold. "The tough part was integrating it all. And we knew nothing about mining to begin with. Muck for instance: what the devil is that?"

No longer does the dispatcher grow hoarse. He keeps his eyes on the terminal. Occasionally, a driver will have to drop out of production, there is an equipment failure, or there's another problem.

The dispatcher punches the information into the terminal to VAX. The adjustment is instantly made.

Despite the tremendous power of the central VAX computer, Dispatch probably wouldn't be possible if it were not for the microprocessors installed in each of the trucks and shovels.

These devices are themselves computers — extremely tiny but highly sophisticated. These smaller computers communicate by radio with the larger VAX, exchanging telemetry and instructions.

They never tire.

Production increases have ranged from a low of three percent to a high of 22 percent, with an average of 11 percent.

"Part of this increase," wrote Himebaugh in a report, "can be attributed to consistency and uniformity in dispatching from shift start to shift end.

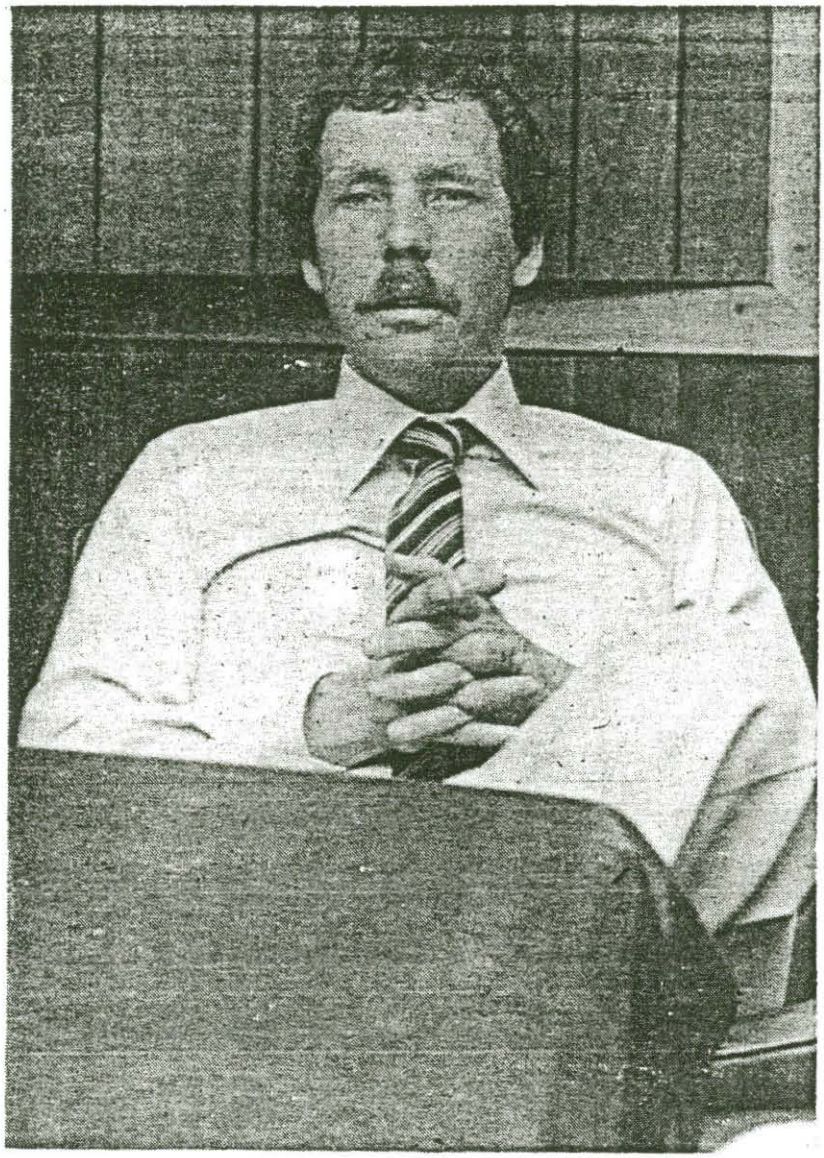
"Production differences due to various manual dispatching techniques have been eliminated.

"The system monitors all truck and shovel operations and alerts the dispatcher to developing potential problems.

"Misroutes have been practically eliminated because assignments are displayed on truck panels for the duration of each trip."

Phelps Dodge now plans installation of a similar dispatch system on the trains at the Morenci Branch in Arizona.

The system is being marketed by Modular Mining Systems under an agreement with Phelps Dodge.

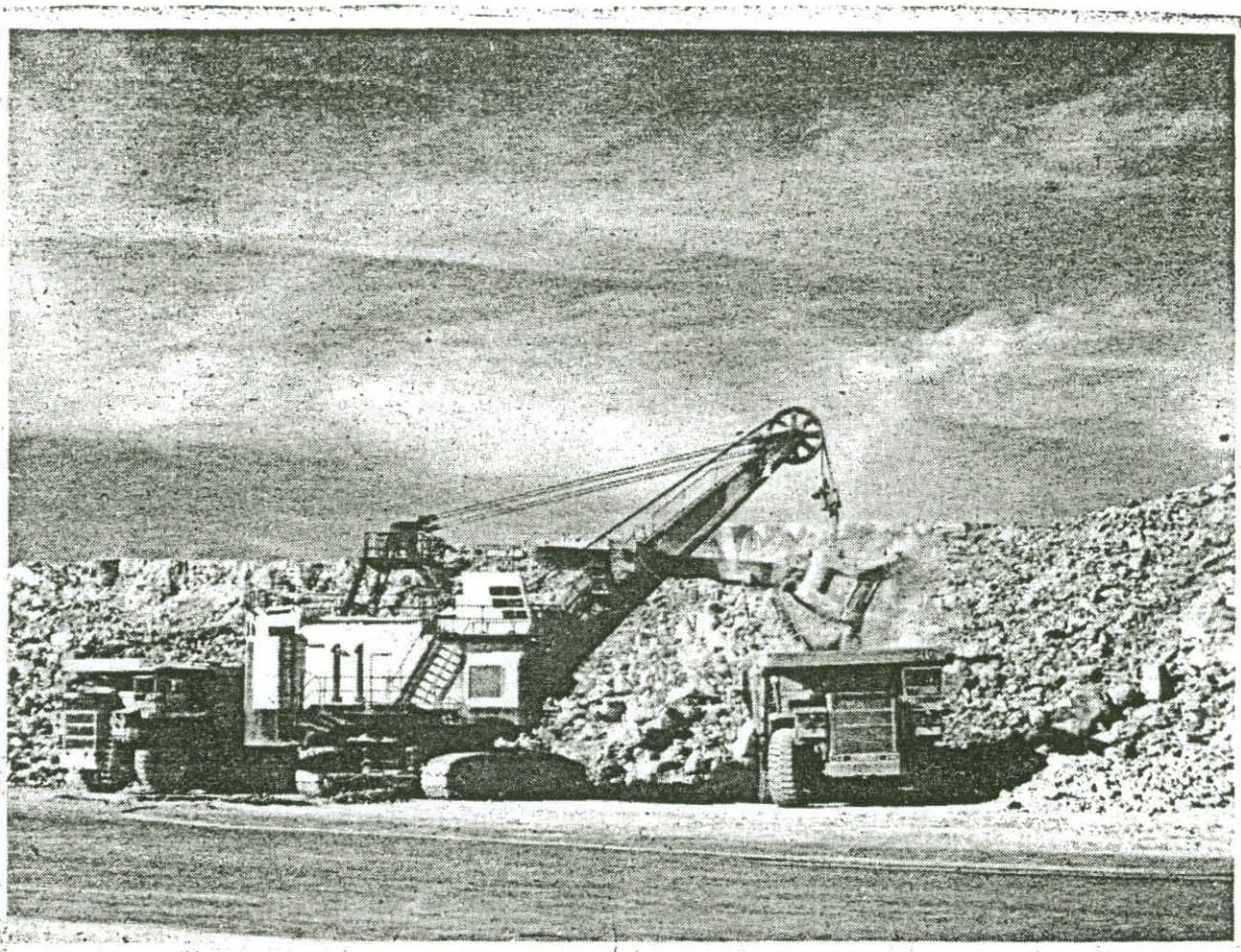


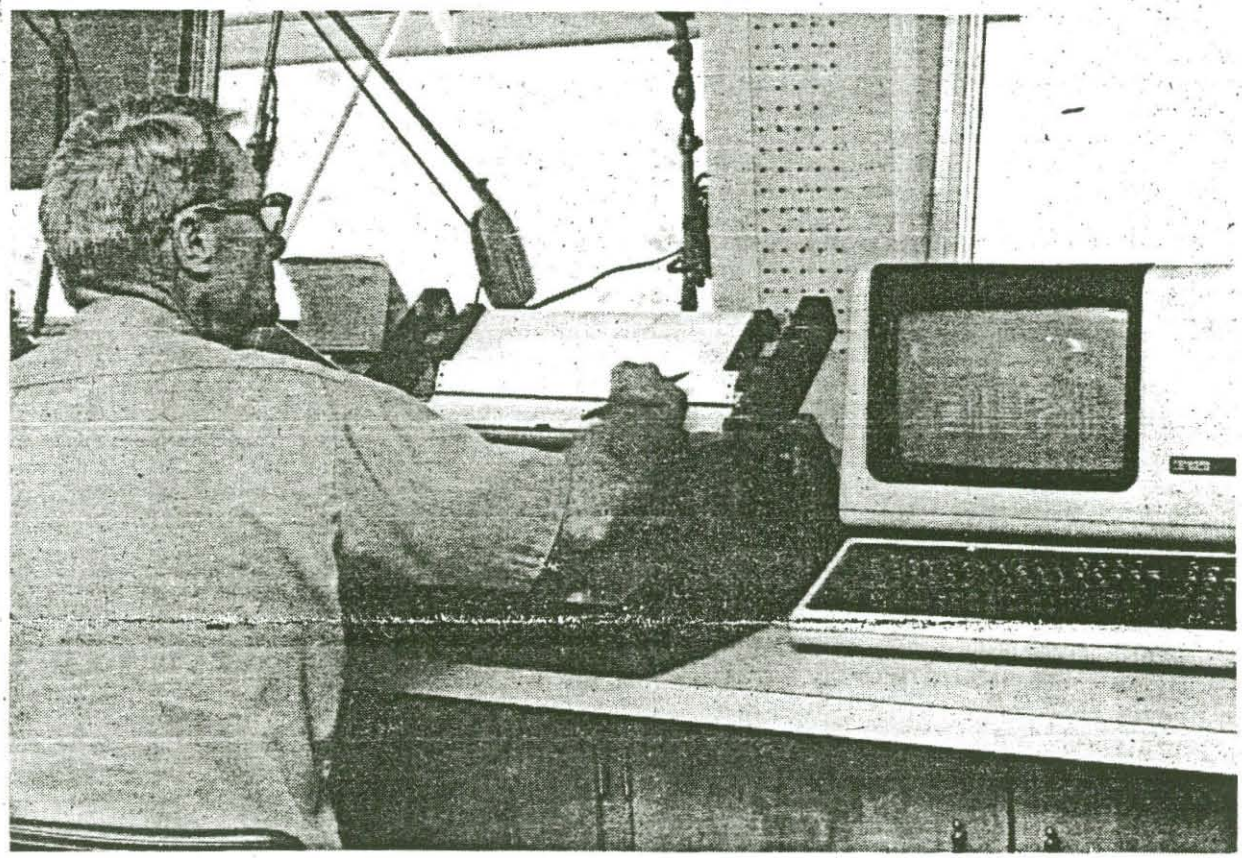
Mike Arnold, President Of Modular Mining Systems
Firm Worked With Phelps Dodge

(Photos By Peterson)

Acknowledgements

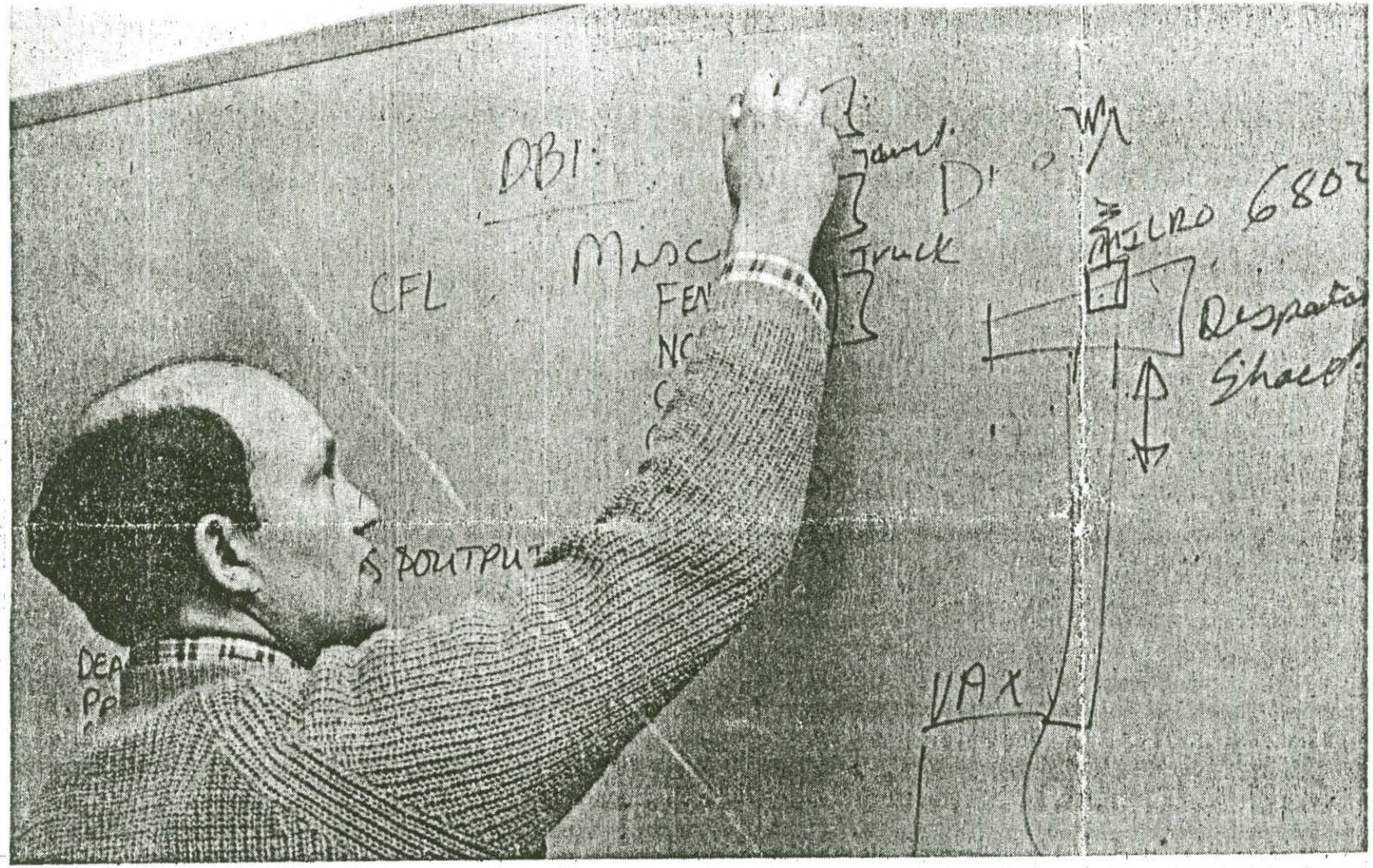
Credit is due the Project Director, R.L. Winslow of Phelps Dodge Corp. and the project consultants, Modular Mining Systems, Inc., for the design, development and installation of the computer-based Dispatch system. Credit is also due the Tyrone Branch Operations and Senior Technical Staff for their analyses on critical operating considerations and the system features in Dispatch.



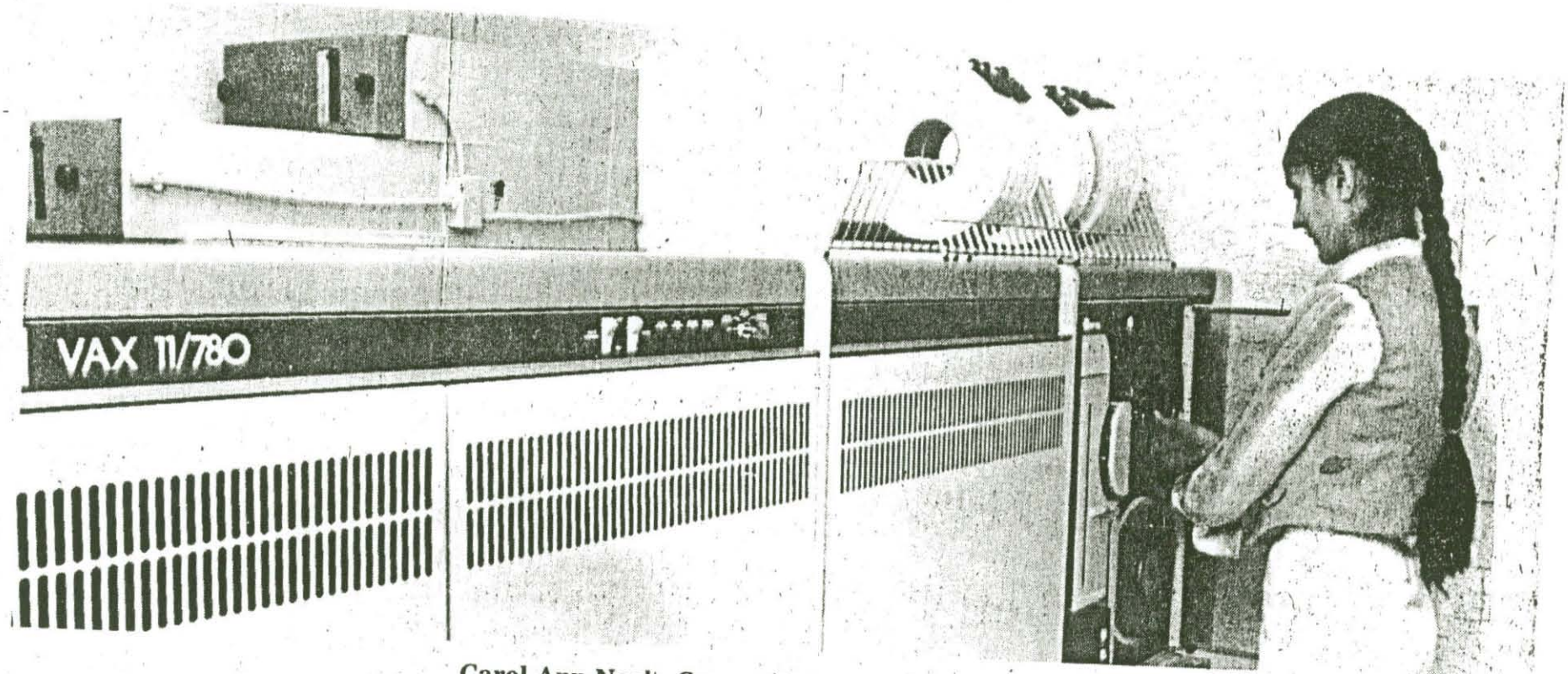


COMPUTER DISPATCHING—An experiment in computer dispatching at the Tyrone Branch of Phelps Dodge has proven to be so successful that the corporation now plans to implement similar systems at another of its properties. In the top photograph, an electric shovel loads a huge haulage truck — and both are "dispatched" by computer. Below, Assistant Mine Shift Foreman Robert Barnes scans the computer printout from the "dispatch shack" which overlooks the open pit mine. See related story and photos on page 3B.

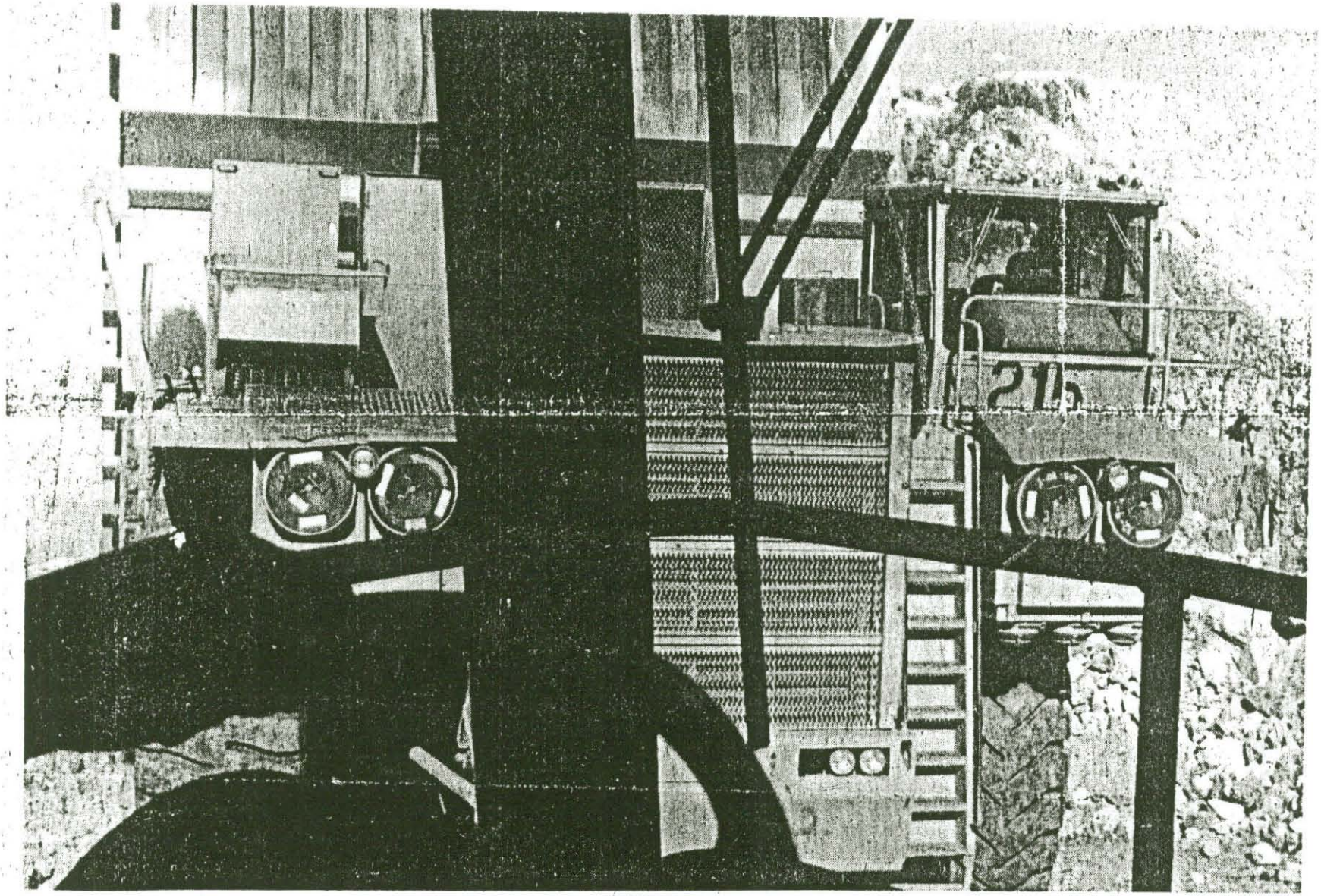
(Staff Photos By Peterson)



G. Layton Galbraith, Lead Programmer Analyst
Shown Diagraming Dispatch System



Carol Ann Nash, Computer Programmer
Loading The VAX Computer, Heart Of Dispatch



View From The Cab Of One Haulage Truck To Another
Equipment Now Dispatched By Computer