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AT CLOSE RANGE:

The Science of Biostratigraphy

To the naked eye, the tiny particles appear to be nothing more than grains of fine white sand. But viewed up-close through a powerful microscope, they undergo a remarkable transformation. Each minute speck is revealed to be a web of intricately patterned spines and plates. Brilliant white, they look like ornate seashells.

"In a way, that's exactly what these are," says Harry Leffingwell, supervisor of biostratigraphy at Unocal's Science & Technology Division. "You're looking at the fossilized remains of microscopic marine organisms."

These particular objects—called foraminifera, or "forams" for short—are single-celled microorganisms that have existed in the earth's oceans for millions of years. When forams die they drift down to the sea floor, where their external skeletons become fossilized over time in successive layers of sediments.

Forams are just one of several types of "microfossils" scrutinized by Leffingwell and his staff, who are based at the company's research center in Brea, California. The group works in a branch of geology called biostratigraphy—the study of microfossils found in underground rock formations. As the worldwide search for new sources of oil and gas becomes more difficult and complex, the science of biostratigraphy plays an increasingly important role.

Biostratigraphy has two major applications in petroleum exploration: helping determine the age of differing rock strata, and helping reconstruct the environmental conditions (such as climate and water depth) that existed at the time the layers of sediments were deposited.

"This kind of information is very useful in the search for potential oil-and-gas-bearing formations," says Leffingwell. "That's because certain ages of rock, and certain depositional environments, are closely associated with hydrocarbon source beds and reservoir rocks."

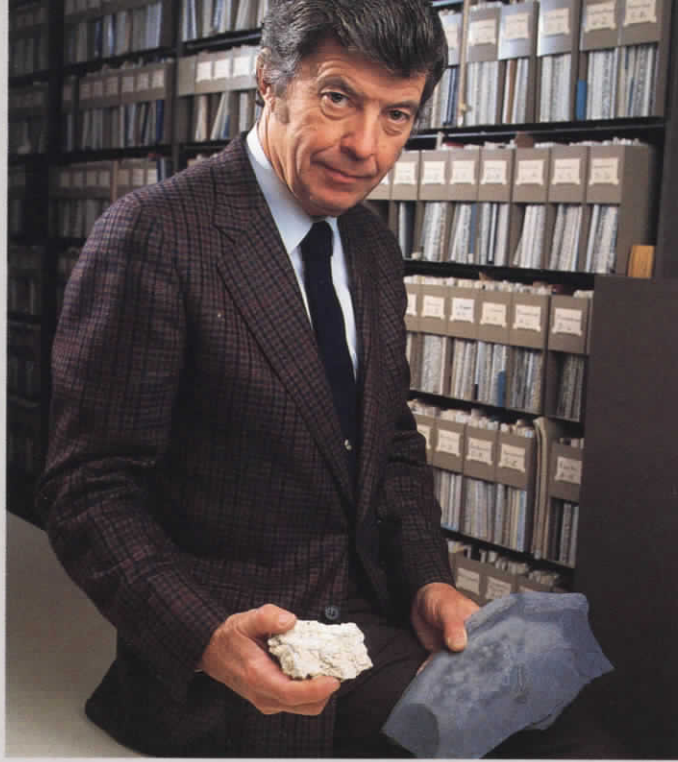
Biostratigraphy also has direct applications during drilling operations. Because they can be used to date different rock strata, the microfossils found in well cuttings can reveal whether a targeted geologic stratum has been hit, passed through or not yet reached. And because most of the microfossils studied are geographically widespread, rock samples from a well drilled in one location can often be correlated to samples from another.

Other kinds of microfossil analyses made by paleontologists—and by scientists working in related geologic disciplines—can yield further clues about hydrocarbon formation, migration and trapping.

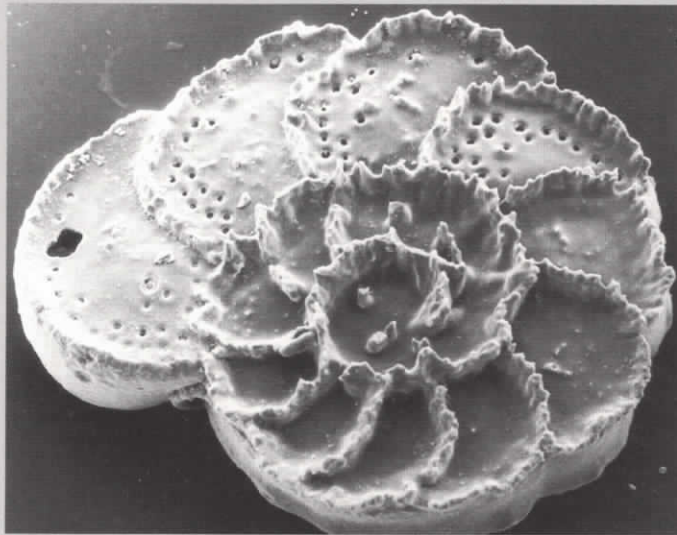
Most of the microfossil types studied by paleontologists are the remains of marine plants and animals. Among the most widely used are tiny single-celled organisms called nannoplankton—free-floating marine algae that are found throughout the world's oceans. The microfossils themselves are plates and spines that form a layer over the living cell structure. These are composed of calcium carbonate, the substance that makes up common blackboard chalk.

Invisible to the naked eye, nannoplankton are much smaller than forams (see illustration, page 3). While they can be seen under a conventional microscope, nannoplankton are also viewed through a scanning electron microscope (SEM), which gives extremely high magnification.

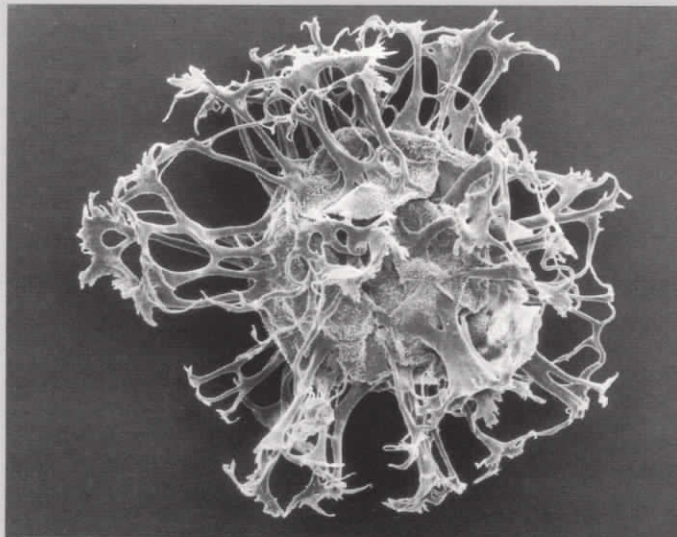
Harry Leffingwell, supervisor of biostratigraphy at Unocal's Fred L. Hartley Research Center, displays samples of fossil-bearing rock.



Bottom-dwelling foraminifera like this one, from Gulf of Mexico sediments, secrete external skeletons of calcium carbonate—the material used to make blackboard chalk.



The fossilized remains of a dinoflagellate, the single-celled marine organism that causes red tides, form an intricate webbed pattern. This specimen was found in North Sea sediments deposited about 175 million years ago.



Lab technician Gary Roquet treats rock cuttings with concentrated acids to obtain samples of organic-walled microfossils. The microfossils are mounted on slides for viewing under a microscope.



Another group of microfossils studied are referred to as “organic-walled,” because their remains consist of organic compounds. Among these are dinoflagellates (the single-celled marine organisms that cause red tides) and various types of spores and pollen from land vegetation. These microfossils were carried into ancient marine basins—where most of the world’s oil and gas deposits were formed—primarily by rivers.

“The study of this particular microfossil group, a discipline called palynology, enables us to correlate land and marine environments,” Leffingwell says. “By doing that, we’re able to get a much clearer idea of what climatic and geographic conditions were like millions of years ago.”

How are paleontologists able to reconstruct ancient environments—and accurately date age-old rock samples—merely by looking at microscopic fossils? The process of evolution is the key.

“The organisms we study have changed continually over millions of years,” Leffingwell explains. “Although these changes are often subtle, they occur quite rapidly in geologic terms. By spotting such changes visually in the microfossil samples we look at, we can date the rock layers where the samples were found.”

A major goal of biostratigraphy is to gain the best possible “resolution,” or precision in determining the age of rock strata. The best resolution that can be achieved is something on the order of 100,000 years. That may sound far from exact. But in geological terms, it’s extremely precise—the equivalent of guessing someone’s age to within a few days.

“Some of our exploration objectives are in sediments up to 500 million years old,” Leffingwell says. “In those cases, a resolution of several million years is excellent. But the time frame we’re dealing with is usually much narrower. In some of our Gulf of Mexico exploration targets, for example, we’re looking at the past 1.6 million years. So our resolution needs to be much sharper.”

Achieving such precision requires a good measure of detective work on the part of paleontologists, who typically look at microfossils taken from rock cuttings at 30-to-90-foot intervals. During periods of rapid sedimentation, a 30-foot layer of subsurface rock might represent only a few thousand years of accumulation. Evolution doesn’t occur that rapidly, however. So to gain the required time resolution, paleontologists compare several different species of microfossils—each with its own evolution rate, population variance, and extinction point.

Reconstructing ancient environments is the other half of the paleontologist’s job. “We try to form a picture of what the earth was like when the sediments were actually deposited in an area,” says Dr. Merton Hill, a senior research geologist at Brea who works in biostratigraphy. “We want to learn what the climate was, and where the hills, valleys, oceans and rivers were.”

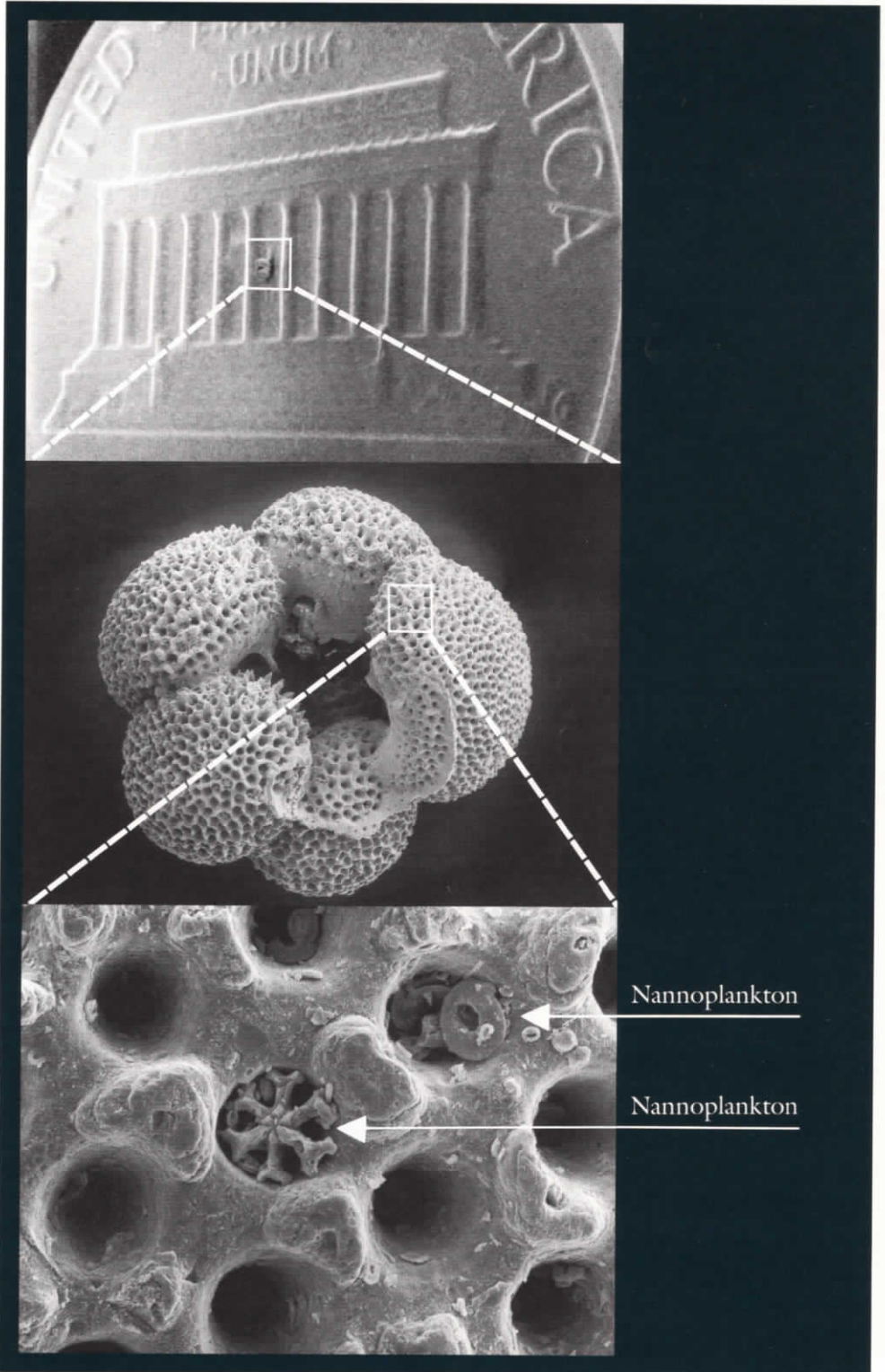
Barely visible magnified 4½ times, a foram rests on the back of a penny. The same foram is enlarged 120 times in the middle photo. At bottom, a section of the foram is shown at 7,500 times magnification, revealing even smaller microfossils—nannoplankton—nestled in its pores (arrows).

Studying microfossils can help determine the answers. “Many of these organisms could flourish only under certain temperatures and conditions,” Hill explains. “So the mix and the characteristics of the microfossils are closely related to the environment at the time of their deposition.”

A good example of this is found in the North Sea region, which has experienced great fluctuations in water depth over time. Species of bottom-dwelling foraminifera, taken from different North Sea rock strata, show much more variation than those that lived in more stable environments.

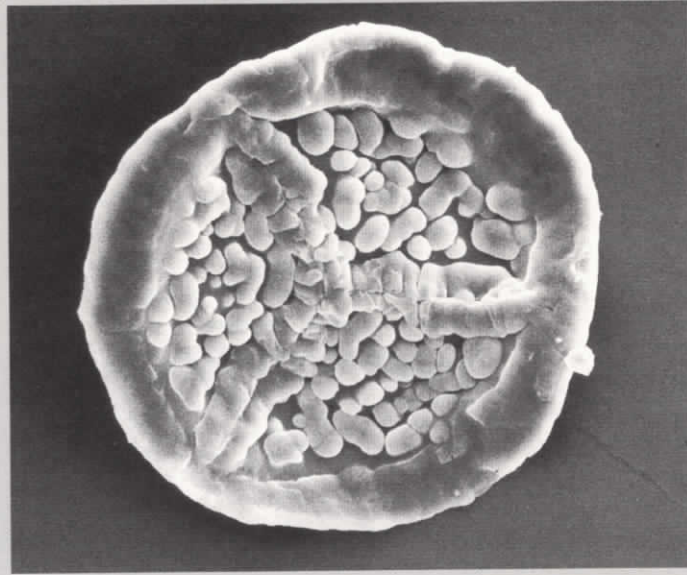
“Fluctuations in climate can also be determined by noting the numbers and types of spores and pollen present in successive rock strata,” Leffingwell adds. “And we can calculate ancient ocean water temperature very accurately by determining the ratio of two different oxygen isotopes found within certain forams.”

Once paleontologists have correlated microfossil samples from two or more wells in an area (or from surface deposits, if well cuttings are not available), ancient environments can be fairly accurately reconstructed. This information is then interpreted along with data from other geologic disciplines. Among these are seismic surveys (to detail the subsurface structures), sedimentological studies (to predict the location and quality of reservoirs), geochemical studies of organic matter (to determine potential for hydrocarbon formation), and geohistory studies (to pinpoint periods of subsidence and uplift of rock strata that could result in the formation of oil traps).

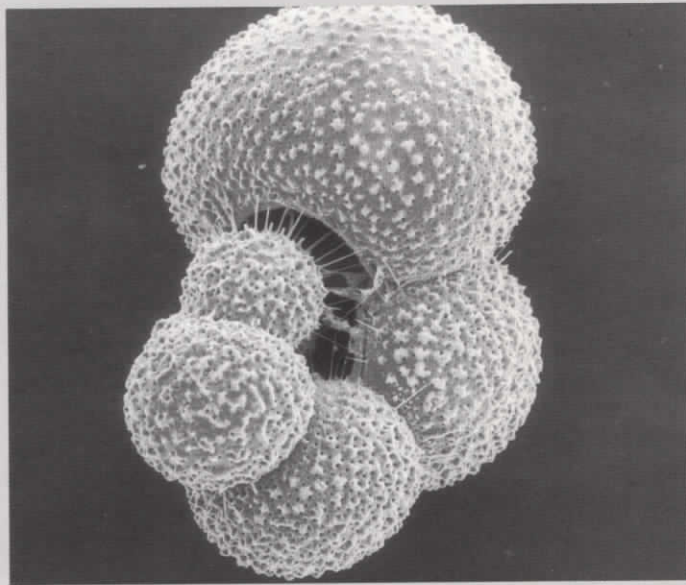


Photos courtesy of Unocal's Houston Paleontology Lab

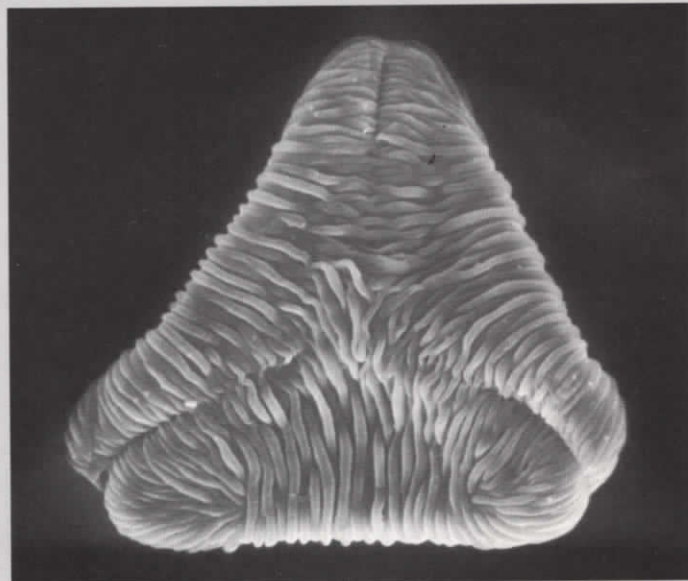
Plant spores and pollens are also studied in biostratigraphy. This fern spore, approximately 125 million years old, was found in sediments beneath Mobile Bay, offshore Alabama.



Visual differences in microfossils help paleontologists pinpoint time frames and ancient environmental conditions. This foram is a floating variety which lives on the ocean surface.



This fossilized pollen grain, about 65 million years old, was taken from dinosaur-bearing sediment beds in eastern Wyoming. The presence of this type of pollen, a flowering plant variety, indicates that the climate was subtropical then.



"We also want to learn the thermal history of the rock, since hydrocarbon formation requires exposure to certain intensities of heat," Leffingwell says. Studying fossilized spores and pollen can help reveal this, because they darken in color to varying degrees depending on the amount of heat they've been subjected to over time.

Because oil exploration is so competitive, and drilling so expensive, speed in evaluating biostratigraphic data can be crucial. Sometimes rock samples from a well are studied as the well is being drilled, with cuttings delivered to the laboratory daily by courier. Based on the lab's rock dating analysis, field personnel can know on a daily—and sometimes hourly—basis if a targeted geologic zone has been reached. Paleontologists also may be at the well site when necessary for "up-to-the-minute" decisions.

Another aspect of exploration involving biostratigraphy is the conducting of "post-mortems" on dry-holes. "By looking at dry-hole cuttings very carefully—especially those from areas with complex geology—we can learn a lot about where we may have gone wrong," Leffingwell explains. "Then we can adjust our knowledge of the subsurface, and continue to go after that first discovery."

The paleontologist's job doesn't end when a discovery is made, however. Once development begins, there are still more questions to be addressed.

"It's important, for example, to know whether various oil-bearing sands within a given field are connected," Hill says. "If they are, you may have a much larger reservoir. And production decisions are greatly influenced by the structure of reservoir sands. That's where high-resolution rock dating again becomes helpful, because we can correlate sands from different wells."

The various types of biostratigraphic analyses are not confined solely to the company's Brea research center. Several of Unocal's regional oil and gas operations offices perform some of this work as well. In fact, Unocal was one of the first oil companies to establish operational microfossil laboratories for petroleum exploration applications.

In the late 1920s, the company opened one of the first foram labs in the United States, under the direction of Dr. Sam Wissler. Set up inside a corrugated metal building, the facility was located on Unocal's Dominguez property in the Los Angeles basin. Today, Unocal maintains major diversified operational laboratories in Ventura and Houston, a foram lab in Balikpapan (Indonesia), and a palynology lab in Sunbury (United Kingdom).

The lab work itself has two basic stages: preparation of microfossil samples, and viewing the samples under high-powered microscopes. Preparation varies for each microfossil type. Organic-walled microfossils are separated from rock cuttings by treatment with a series of concentrated acids. To yield the non-organic microfossils, rock fragments are dissolved in water or solvents. Forams are retrieved from the resulting slurry through use of fine-mesh sieves, while the smaller nannoplankton are separated out by centrifuge.

The microfossils are then mounted on slides for viewing under microscopes with magnification powers of up to 1,400. Viewing is also done on the scanning electron microscope, which has capabilities of enlarging microfossils from 500 to more than 20,000 times.

"The SEM is very useful for picking out extremely minute detail," says Hill. "It can also give you a three-dimensional view of the smaller fossils, which isn't possible through a conventional microscope."

SEMs are used most often to view nannoplankton, the smallest of the microfossils studied. They range from 20 microns to less than one micron in diameter. (A micron is one thousandth of a millimeter.) The larger microfossils—such as forams and dinoflagellates, which are typically over 50 microns across—don't require an SEM for viewing.

"But we commonly use it to study their smaller features," Hill says. "We can sometimes spot details on the SEM that would otherwise escape us." Such details—subtle aberrations in the structure and appearance of the tiny plates and spines—are the markers paleontologists use to pinpoint changes in microfossils that can be linked to time and environment.

The process of identifying and counting microfossils from different rock samples—which must be completed before analytical work can begin—is a painstaking task. But new computer applications have made the data-gathering phase of biostratigraphy less time-consuming and more accurate.



Leonard Ford, senior research geologist, examines microfossils at a work station which incorporates a microscope, computer and digitizing tablet.

"In the past two years we have gone from recording our observations manually on paper to putting them directly into the computer," explains Hill, whose work station at Brea incorporates a microscope, computer, and special digitizing tablet. As Hill views slides through the microscope, he touches a pressure-sensitive pen to various coded sections on the tablet. The computer then automatically tabulates and records information about the microfossils he observes.

Developed in-house at Brea by programmer analyst Doug Brink, this computer-automated system has greatly increased the speed and efficiency of microfossil study. "The system has both streamlined the way we gather our data, and increased the amount of data we record," says Hill.

In addition to Brea, the digitizing system is now used at three of the company's operations offices—Ventura, Houston, and Sunbury. "We had the system in place for a recent licensing round in the U.K. sector of the North Sea," Leffingwell says. "It enabled us to double the number of wells we could look at under a very tight deadline. By evaluating more data, we were able to submit a much more detailed and accurate geological analysis."

Somewhere down the road is another quantum leap in data gathering: a fully automated system that would employ computers and robotics to identify and tabulate microfossil species. Such a system would reduce operator involvement to a minimum, leaving more time for interpretation.

"We've looked at the computer systems used by law enforcement agencies to match fingerprints," Hill says. "Our concept is to do the same thing with microfossils." In addition to researching such a system in-house, Unocal is currently supporting work in this area at several universities. Advances are eagerly anticipated by paleontologists.

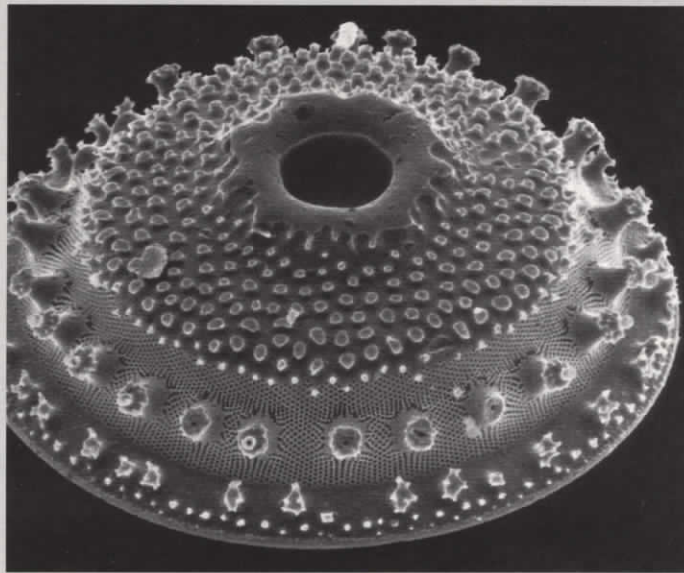
"Even with digitizing, we still spend 80 percent of our time gathering data, and only 20 percent interpreting it," Hill says. "We'd like to have that the other way around. Any time machines can do the repetitive tasks, that frees us up for more creative, analytical work."

The analytical work, of course, is where the real challenge of biostratigraphy lies. "It's also where the payout comes," Leffingwell adds. "Analysis is where we put all the pieces together to try and help figure out where the oil is."

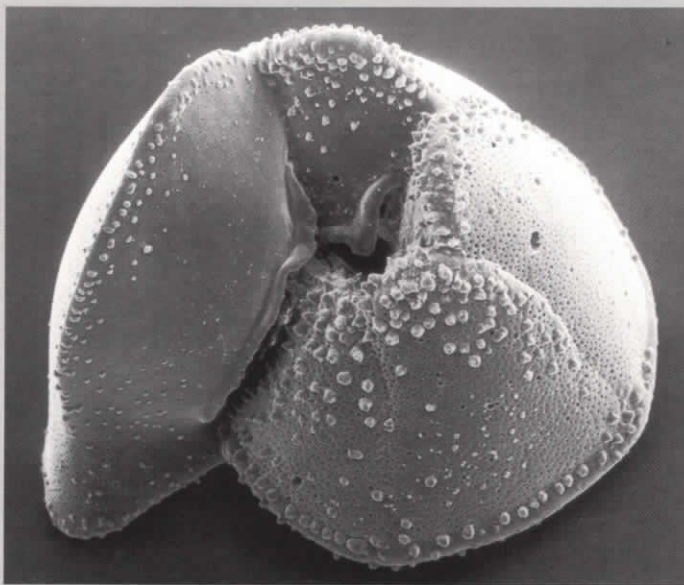
In the years to come, the role of biostratigraphy in helping solve that puzzle will continue to expand. "Finding new oil and gas reserves is becoming increasingly difficult," notes Dr. Cortez Hoskins, manager of geological research at Brea. "We've already discovered most of the world's 'elephants'—the large structures that can be found on the surface or seismically. In the future we'll be going after much more subtle and geologically complex hydrocarbon traps.

"These are not easily seen by seismic methods, so our bag of tools must expand to help us find them. We have to draw from a variety of sophisticated science disciplines, and biostratigraphy is one of the most valuable." T.S. 76

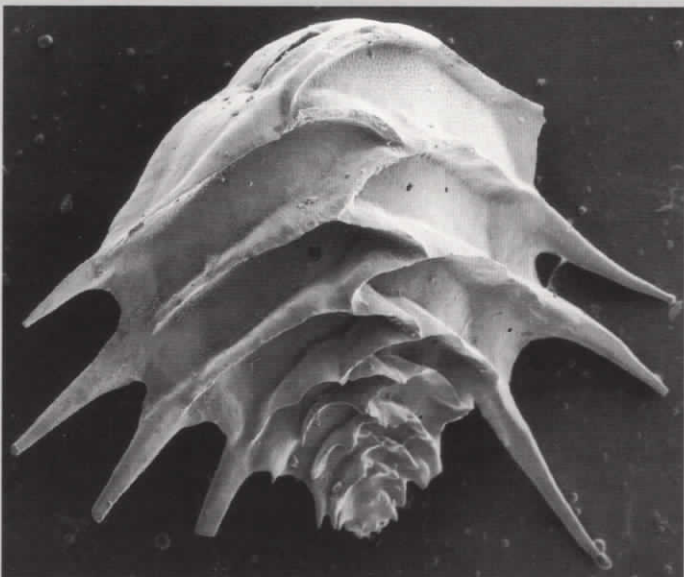
The fossilized silica shell of a diatom, a type of floating marine algae, looks like a huge flying saucer in this view. Diatomite—a light, porous rock consisting of these shells—is the material used in swimming pool filters.



This Gulf of Mexico foram was found in “modern” sediments just a few thousand years old. In geologic terms, 1,000 years is but the blink of an eye.



This bottom-dwelling foram, approximately 1 million years old, lived in very deep ocean waters below 6,000 feet. Knowledge about water depth at the time of sediment deposition can yield important clues in the search for hydrocarbon deposits.



Tight times in the oil patch

The past couple of years have not been easy ones for the U.S. oil industry. Plummeting oil prices, burgeoning imports and hostile corporate raids have combined to drain resources and disrupt normal operations. During these difficult and turbulent times—a period which witnessed a 60-percent plunge in oil prices—the task of integrated oil companies like Unocal has been to find ways of remaining profitable. That task has been especially critical for the “upstream” end of the business, which explores for, develops and produces oil and gas resources.

Unocal's Oil & Gas Division has met this difficult challenge head on. To help our readers better understand exactly what this effort has entailed, *Seventy Six* decided to focus on one of the division's largest and most diverse production districts.

Covering an area of roughly 6,000 square miles, the Southern California District of the Oil & Gas Division's Western Region is quite a sprawling “oil patch.” Encompassing oil and gas producing operations in the Los Angeles and Ventura basins onshore, and the Santa Barbara Channel offshore, the district also has a direct link to the company's beginnings. One of its two area offices is located in the very same Santa Paula building where Union Oil was born in 1890. And several of the company's original—and still productive—oil fields are under the district's jurisdiction.

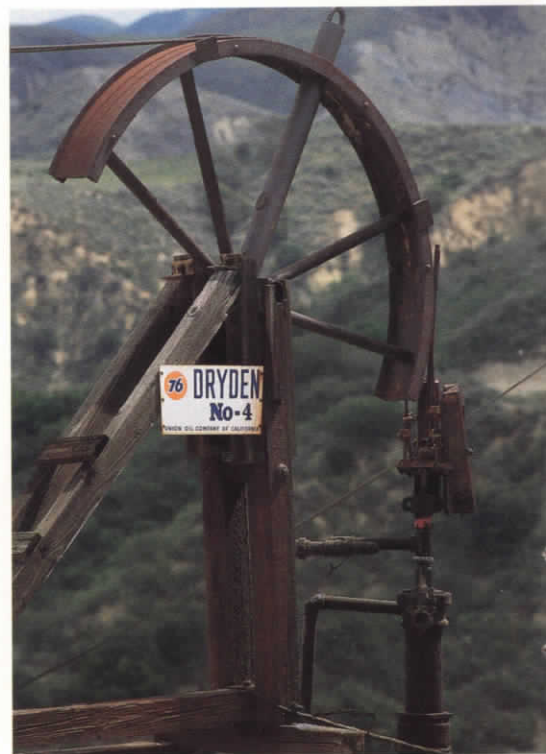
Oil production methods in the district are equally diverse. Several different “vintages” of technology are employed—from central power-driven jack lines on 100-year-old wells in the Santa Paula area, to the latest Unocal-patented hydrogen sulfide gas removal process on Platform Gilda in the Santa Barbara Channel. The district's operated daily production stands at over 30,000 gross barrels of oil per day, lifted from more than 1,000 active oil wells.

Prior to the oil price decline of 1986, the primary focus of the district's engineering and operating efforts was on expansion. This was pursued through relatively large capital outlays for development drilling and related facilities.

“It became apparent long before the oil price bottomed out in mid-summer of last year that this strategy would have to change,” says Bren Dehn, operations manager of the Southern California District. “For one thing, the price drop had the effect of nearly doubling our production costs as a percentage of revenue. So we realized that our focus would have to shift toward maintaining profitability in difficult times.”

This meant, first of all, that capital expenditures would have to be slashed. Expensive long-term projects would have to be put on hold. And several ongoing operations geared toward maximizing production rates would need to undergo serious scrutiny.

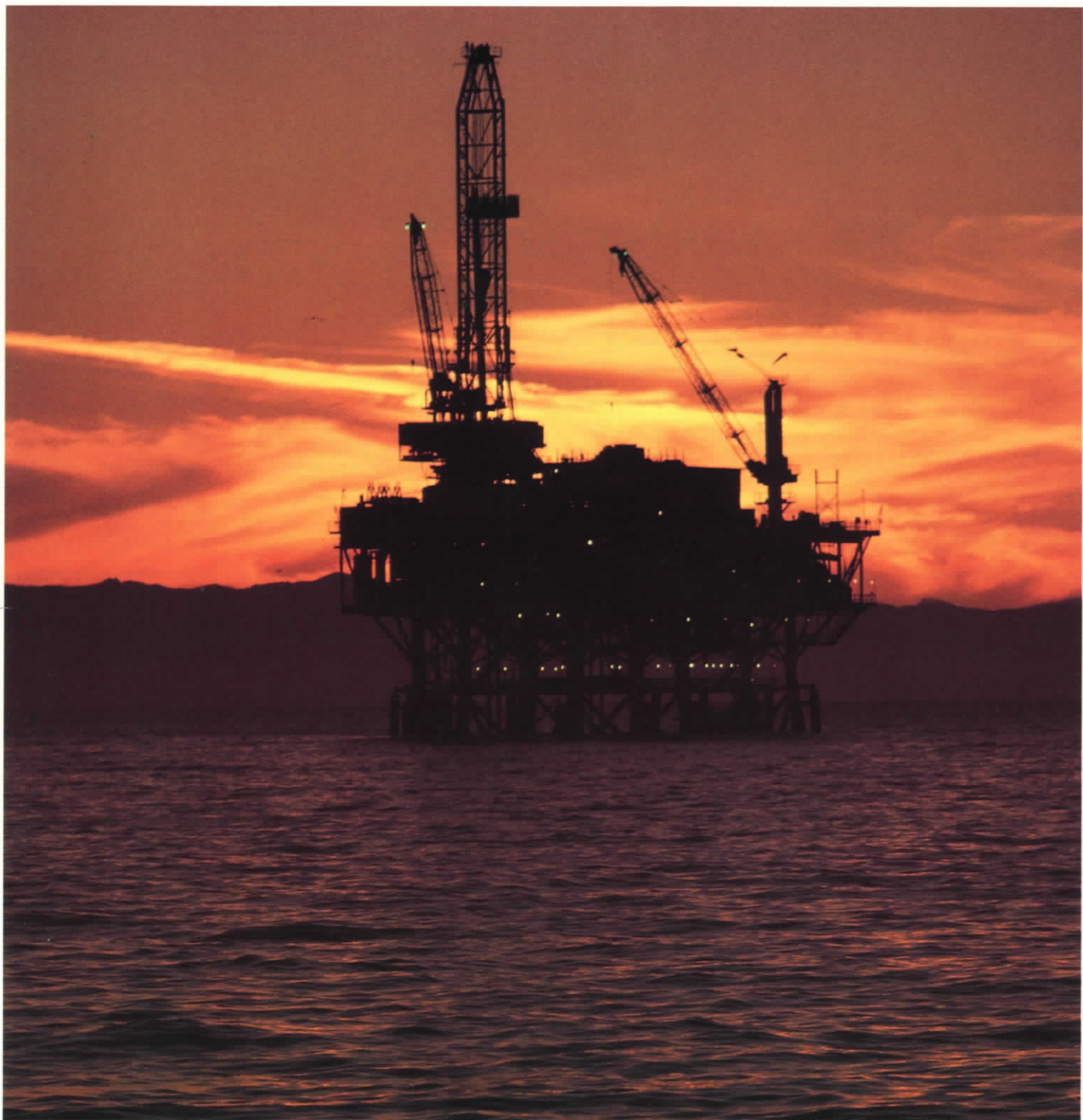
“In response to these new priorities, our production and reservoir departments initiated several new programs,” Dehn says. “The overall goal was to maximize operational efficiency and control production costs.”



The sprawling Southern California District employs several different “vintages” of technology—from central-power driven jack lines on century-old wells (above) to the latest in offshore production techniques on Platform Gilda (right).



"Well review is an ongoing program for the district," says Santa Fe Springs Field Superintendent Dick Salisbury. "Using computers, we can track individual wells on a daily basis?"

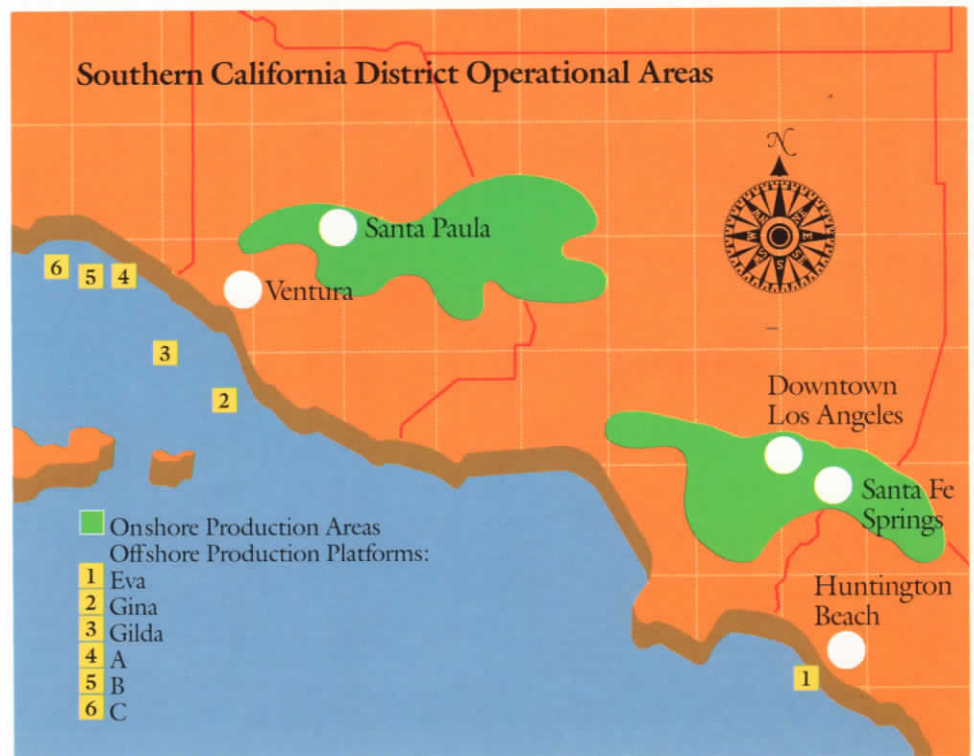




Clockwise from below: Brea's Imperial golf course, built over a district oil field; detail of a still-functioning 100-year-old jack line apparatus in the Bardsdale field near Santa Paula; pump jacks nod away at the nearby Torrey Canyon field.



Right: The Southern California District is a sprawling "oil patch" that encompasses the Los Angeles and Ventura basins onshore, and the Santa Barbara Channel offshore. (Not pictured is a small onshore field near Point Conception.)





One of the first steps taken was to review the performance and economics of every oil and gas well in the district. The purpose was to ensure that each well generated an adequate cash flow to pay for its directly attributable production expenses and still yield a profit. (Directly attributable expenses include the power needed to lift the fluid out of the wellbore, the cost of chemicals used to treat the produced fluid, and various well maintenance costs.)

“During the ‘good times,’ when oil prices were above \$22 a barrel, we knew that even our marginal wells were profitable,” says Dehn. “At current price levels this is no longer a given, so we have to weigh each well’s costs against its production. If a well becomes unprofitable to produce, it is shut in.”

Wells that pass this first screening are further evaluated on a lease-by-lease basis. This is done to determine if the combined revenue of wells on a particular lease or property offset the added expenses of labor and lease maintenance. In some cases, the failure of this second test may result in leases being shut in.

“Well review is now an ongoing program for the district,” says Santa Fe Springs Field Superintendent Dick Salisbury, who helped develop a computerized system used to monitor well performance. “Using the computer, we can track individual wells on a daily basis.”

The second task undertaken as part of the district’s new strategy was a bit more complex: finding better, cheaper and more efficient ways of producing oil from the remaining wells. One of the first areas looked at was energy usage, since electric power consumption constitutes a large percentage of the district’s expenses.

As part of this effort, energy utilization audits were performed on each of the district’s oil fields. These included evaluations of the lift system design of each well. As a result of these studies, some pumping units, electric motors, and other production equipment were redistributed—lowering power requirements and reducing the need for subsurface maintenance.

“The energy audits also uncovered opportunities for power savings in some of our electrical distribution systems,” Dehn notes. “And another opportunity to decrease costs came from the utility company which supplies our electricity.”

What the utility company offered was a rate reduction in exchange for placing some of the district’s oil fields on an “interruptible” power schedule. (This arrangement allows for power shut-off during periods of extreme high demand.)

“Since data supplied by the power company indicated that outages would not increase under the new schedule, we decided to make the change,” Dehn says. “The result has been a very meaningful energy cost reduction to us, with no substantial adverse impact on our business.”

Further efficiencies and savings have been realized in the area of labor costs. Through Unocal’s 1986 early retirement plan and normal attrition, the number of district employees was reduced by some 13 percent. The remaining work force was restructured, with many jobs combined and some being eliminated.

“The redeployment of manpower, coupled with restricting overtime to emergency needs only, has resulted in a substantial decrease in labor expense,” Dehn says. “Our contractor expense has also been reduced by establishing strict priorities for needed repair work. And we’ve achieved additional savings by modifying our offshore transportation schedules.”

The search for increased efficiency and cost savings has also brought about a change in focus for the district’s reservoir engineering department.

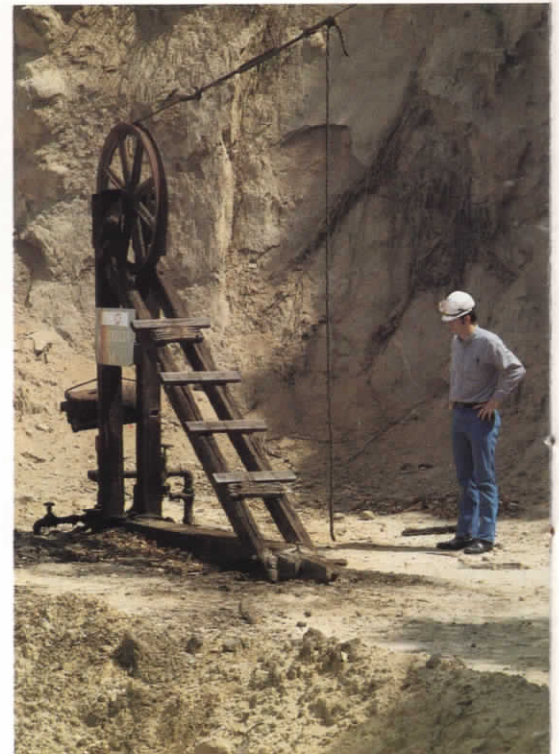
“We’re always looking for ways to inexpensively augment production,” says David Salzman, district engineer. “But in times like these, the effort takes on a new importance.”

Salzman and his group are concentrating on identifying wells whose production may be increased through small-scale repairs and enhancements. Among the techniques employed: wellbore cleanouts, pump upgrades, acid stimulation, and new injection patterns for wells that currently produce using waterflood techniques.

“These kinds of special well repair projects are small in scope,” Salzman says. “They don’t have the impact on reserves of large-scale development projects. But they are inexpensive, low-risk, and yield immediate results.”

The increased oil production such “mini-projects” can provide is valuable, especially with exploration and development drilling curtailed in the district. Most larger-scale enhanced oil recovery projects are also on hold, given the current economic climate.

At right, a view of platforms A and B in the Dos Cuadras field, where a polymer injection project has upped production. Below, an L.A. basin well.





Clockwise from left: Roger Dombrowski, Ventura Area production superintendent, inspects a 100-year-old well near Santa Paula; workers install a new pump on a well in Placentia; a view of the Torrey Canyon field's new gas plant. "Our overall goal is to maximize operational efficiency and control production costs," says Bren Dehn.

"There is certainly potential in the district for production increases through secondary and tertiary EOR processes," Salzman says. "But these kinds of projects are down-the-road propositions. Because they are expensive and have longer-term payouts, a depressed oil price makes initiating them now difficult to justify."

Some ongoing enhanced recovery projects are proceeding, however. Waterflooding, a secondary recovery technique employed in dozens of wells throughout the Southern California District, is one example. "Waterflooding is a proven process which increases oil recovery and production from many of our reservoirs," Salzman says. "It's been widely used in the district for many years, and continues to be an economic way to boost production."

Another EOR venture that is proceeding is the Dos Cuadras polymer injection project in the Santa Barbara Channel. The first offshore project of its type undertaken anywhere in the world, the effort was begun in February of 1986. The project has been going full-scale since August on platforms A, B and C.

"The Dos Cuadras field has been on a waterflood program for around 12 years," says Greg Terzian, a reservoir engineer working on the project. "What we're doing now is augmenting the waterflood with a special polymer additive. This thickens the water and displaces the oil more efficiently."

The fact that the waterflood program was already in place makes the polymer project a cost-effective way to boost production, despite today's depressed oil prices. "In all, we hope to recover an additional 7 million barrels of oil over the life of the project," says production engineer Russell Peterson.

Despite the current freeze on most other large-scale ventures, district personnel are continuing to study and evaluate longer-term projects for the future. "By doing so, we're building an inventory of ideas that have the potential of being profitable ventures down the road," Dehn says.

Among other efforts, detailed field studies on some of the district's older producing properties are in progress. A great deal of data is being gathered and analyzed, particularly on those fields still under primary depletion. Based on the results, studies on potential infill development wells, recompletions, well repairs and enhanced recovery processes are underway.

"Two new future waterflood prospects have been identified thus far," Dehn says. "An engineering study has been completed, and the projects are now on hold awaiting further recovery of the oil price."

Despite the delays they may be imposing on some development projects, the tough economic times besetting the oil patch have had their positive effects.

"Going through this difficult period has given us the opportunity to turn inward and explore new directions," Dick Salisbury says. "We've developed new ways to reduce costs, increase production and improve our efficiency. All of these efforts will continue to help our business down the road."

Bren Dehn agrees. "Necessity is the mother of invention, and we've had to do some of these things out of economic necessity," he says. "But we've learned a great deal about our business along the way, and we've come up with a lot of new ideas and methods. Many of the changes we've made will carry forward even if oil prices go back to where they were." T.S. 76



Ray A. Burke, top, and Dr. Harold M. Lian

Unocal Receives Royal Honors

Unocal's discovery and development of natural gas fields offshore Thailand have helped that country move toward energy self-sufficiency.

Unocal Thailand currently fulfills about one quarter of the country's energy needs. Since the gas began flowing in 1981, Thailand has been able to decrease its energy imports from 88 percent of its needs to 56 percent.

To honor Unocal's role in this accomplishment, His Majesty King Bhumibol Adulyadej has bestowed the "Royal Decoration of Commander of the Most Noble Order of the Crown of Thailand" on two Unocal executives: Ray A. Burke, executive vice president, Energy Resources, and Dr. Harold M. Lian, president and chief operating officer of Unocal Thailand, Ltd. First issued by King Chula Chom Klao, Rama V, in 1869, the Crown of Thailand is given to those who perform noble deeds for the government and citizens of Thailand.

The award ceremony was held March 18 in Bangkok. Industry Minister Pramual Subhavasit presided. "It is an honor and an award I will cherish," said Ray Burke in his acceptance remarks. "The natural gas industry is truly a great enterprise for the Kingdom of Thailand, one that promises to provide its people with energy for many years to come."

The natural gas project is an outstanding example of what can be accomplished through the cooperative efforts of government agencies and private industry, Burke noted, citing particularly the Petroleum Authority of Thailand and the Department of Mineral Resources.

In 1962, Unocal was the first company to be awarded exploration rights in the Kingdom of Thailand. The company was awarded concessions in the Gulf of Thailand in 1968 and made its first discovery of natural gas in 1972. Burke chose the name "Erawan" for that first gas field. In Thai mythology, Erawan is the name of a magical, three-headed elephant that often aided Thai kings in combating evil.

Burke directs all phases of Unocal's activities in Thailand. He has visited the country numerous times in the past 25 years and has developed excellent relations with Thai authorities.

Dr. Lian's involvement in the Thailand project began in 1965 when he was chief geologist in the company's International Division. He has played a supervisory role in all exploration and production operations and, in 1983, moved to Bangkok as president of Unocal Thailand. Dr. Lian has worked closely with high-ranking Thai officials on the project's development and serves on the Board of Trustees of the Petroleum Institute of Thailand.

As he accepted the Crown of Thailand, Lian gave credit to Unocal employees in Bangkok and Los Angeles for the project's success. Thai nationals make up over 90 percent of the 600 employees of Unocal Thailand. Lian also noted the importance of the support and cooperation of Thai government agencies.

"It is rare for an individual to have the opportunity to contribute to something as important to a nation and its people as this natural gas project is," he said. "That in itself is a reward."

Unocal has discovered a total of nine gas fields under the Gulf of Thailand. The company is developing four, and the other five will be brought on stream in accordance with Thailand's energy needs. The project is the largest, most capital-intensive effort ever undertaken by the private sector in Thailand. 76

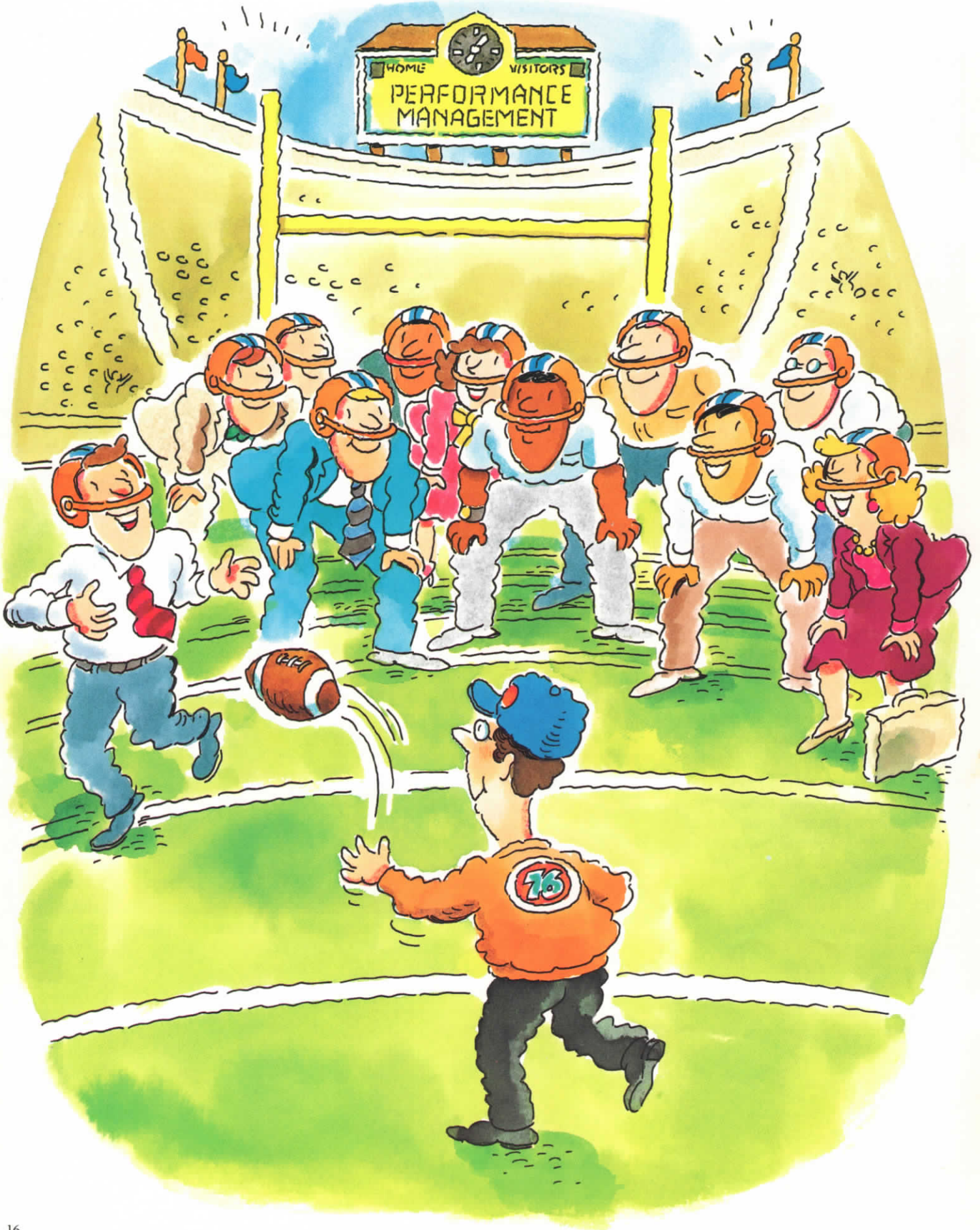


At the award ceremony, Mr. and Mrs. Ray A. Burke, left, and Dr. and Mrs. Harold M. Lian flank Industry Minister Pramual Subhavasul and a portrait of His Majesty King Bhumibol Adulyadej.



The Royal Decoration of Commander of the Most Noble Order of the Crown of Thailand honors those who perform noble deeds for the government and citizens of Thailand. The offshore platforms shown are in the Erawan field, where Unocal made the first commercial discovery of hydrocarbons in the Gulf of Thailand.





MANAGEMENT THEORY THAT WORKS ON THE JOB

In the often unpredictable

business climate of the late 20th century, management theories are a dime a dozen. While books and seminars abound, however, few provide guidelines for putting theories into play in daily business operations.

But Unocal's Human Resources Department offers

something special to the company's managerial employees: management theory that works on the job. "Performance Management," presented in a company training seminar, provides the nuts and bolts to put theory into practice. It is being implemented in different groups throughout Unocal's worldwide operations—with impressive results.

"We experienced more than a 20 percent reduction in costs in 1986, compared to 1985," says Graydon Laughbaum, resident manager, Unocal Netherlands. "Performance management played an important role."

"Our energy savings last year were \$2 million, yields of gasoline have gone up, chemical costs are way down—because the engineers and foremen understand what's expected of them," says Bob Campbell, manager of Unocal's Beaumont (Texas) Refinery.

The essence of performance management is formalized, short-term planning and review to meet goals. It requires that managers and subordinates fully understand their areas of responsibility and the ways in which their performance will be measured. It also requires periodic goal-setting and performance review.

That may sound something like management by objectives, which was introduced in the company in the 1960s and '70s. But it goes further.

"The MBO program was good," says Roger Beach, president of the Refining & Marketing Division, "but it didn't get down to the nitty gritty on implementation and application. And that's what performance management does." The system is in place with excellent results in various refining and marketing groups. Beach has recently formed a task force to study the best method for implementing it in every group in his division.

The performance management concept is one of control. Managers and subordinates agree on the standard of what constitutes good performance for a certain activity. They also agree on control limits within which the subordinates are accountable for daily operating decisions. Then during periodic reviews, or when exceptions occur which are outside control limits, they can focus on those areas that either have exceeded or fallen short of expectations.

Managers don't waste time reviewing daily activities that are running smoothly. Subordinates don't waste time doing busy work or laboring over minor tasks. Instead, both managers and subordinates can focus on the future—and potential improvement.

"Performance management results in a more objective way of measuring performance," says Joe Byrne, vice president, Human Resources Department. "It lets people know what is expected of them and how their performance will be measured?"

And that's the key. "If you don't define performance, measure it and reward it, you don't get it," says Doug Fletcher, managing partner of Performex, a management training and development firm. Fletcher, who teaches performance management, has had many years of experience as a corporate manager in several large organizations.

Performance Management is based on a team effort. The coach works with the players to help them perfect their skills, but the players carry the ball. Everybody understands the game plan, and what he or she has to do to contribute to the victory. As the game is played, everybody knows the score.

But the success of an organization does not depend solely on individual performance. “Performance management is based on the concept of a group of people with a common goal working together as a team,” says Fletcher. “They are interdependent. That is, if I—as quarterback—take the snap but the guard doesn’t do his job, the play is ruined.”

A key aspect of performance management that makes it work while other management systems remain theoretical, according to Fletcher, is the concept of short-term planning and review of the team effort.

“The management team meeting—that’s the glue,” says Fletcher, “the heart that pumps every month and says review, commit, review, commit. It provides the discipline that’s necessary on the part of a manager to make the management theory work.”

At a management team meeting, the members can review the goals they have set and focus on the exceptions—performance commitments which were not met and which have an effect on the other members of the team. They can then work together to identify the cause and to develop a plan for corrective action.

The purpose of reviewing is not to agonize over past mistakes and figure out who to blame, Fletcher says. “The purpose of reviewing is to ask: what did we do well, what didn’t we do well, and what’s the commitment for the future?”

John Imle, president of the International Oil & Gas Division, has implemented performance management throughout his organization, including Unocal Center staff and all overseas locations.

The management team works together to develop short-term goals. Each player understands his own strengths, and the coach keeps the focus on the goal. Together, they agree on the strategies that will work best on the playing field.

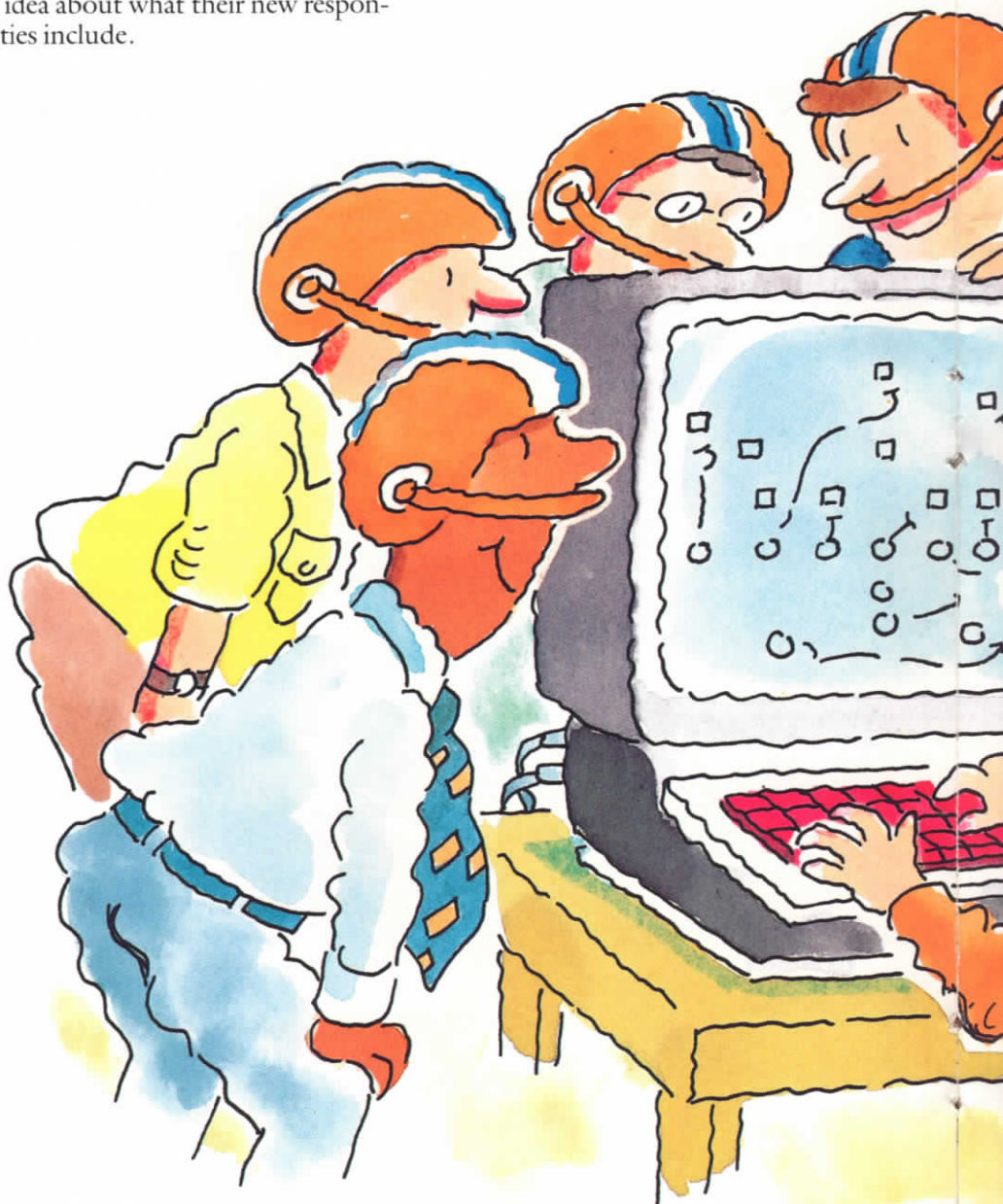
“An organized performance management system is an excellent catalyst for accomplishing, as a team, the goals that we are all working toward individually. Each individual in the organization needs to see that his efforts really do make a difference,” Imle says.

“This more organized—but not regimented—approach to what one of our drilling men has called ‘professional management’ has really added to the International bottom line,” he notes.

In a corporation people often get to be managers because of their expertise in technical areas, such as geology or engineering. But they may not have a clear idea about what their new responsibilities include.

They may rely on their “natural leadership” abilities—in which the new manager assumes that he or she will make all the decisions and decide on the “right way” to operate. This can work in a small organization.

But in a larger organization, people have to spend time compiling detailed reports—just to keep managers informed enough to make decisions. Decision-making can get bogged down in delays and paperwork.



And, as the center of decision-making moves away from the employees in the field or at the operator level, those employees can lose sight of organizational goals. They may not have a clear understanding of their roles in the company's overall strategy. They may just wait to be told what to do next.

Productivity suffers, and so does morale. At this point, natural leadership can benefit from a more systematic approach, such as performance management.

"The purpose of management training is not to teach managers that there is a 'right way' to do things, but to teach them to do the right things to increase profits for the organization," says Valerie Whitman, manager of management training and development in Corporate Human Resources.

"It's the difference between being merely efficient or being truly effective," she adds. "The quality of the management team has a significant impact on a company's ability to achieve its goals."

Unocal offers six training modules to its managerial employees. In addition to performance management, these two-and-a-half day workshops include modules on situational leadership; group dynamics and interpersonal skills; problem solving and decision making; face-to-face communication; and negotiation.

Unocal offered the first of these management training modules in 1977. Performance management, which is Module IV, was introduced in 1981.

So far, some 1,500 people have attended Module IV. For those who implement it, a series of workshops designed to be taught on site by line managers has been developed.

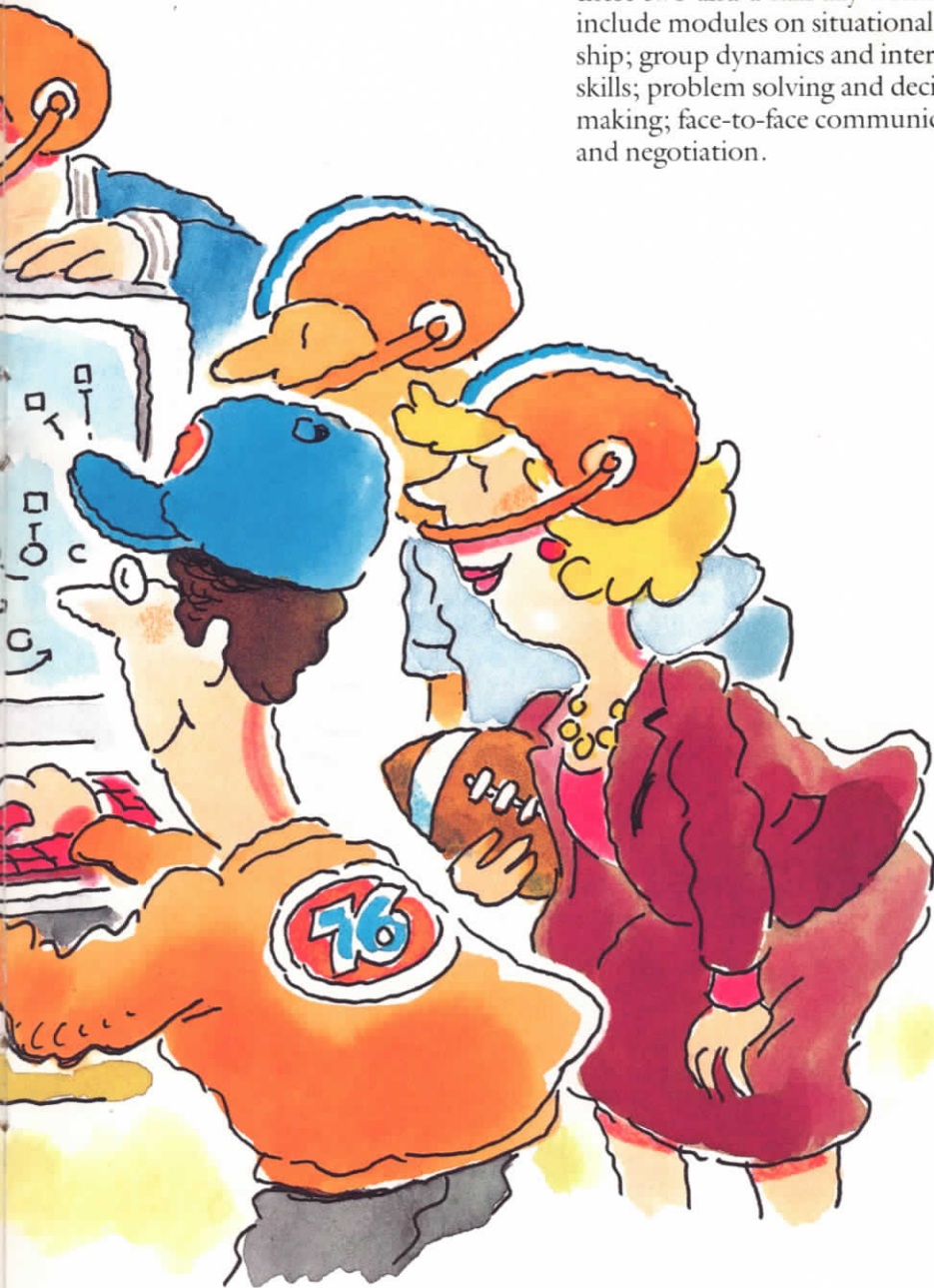
"This is a program that each individual can apply immediately to his or her own real-life situation on the job," Whitman says. "When many managers realized that this new approach affected the entire way they did business, they began to see benefits for their whole organizations—in terms of better communication, improved morale and greater teamwork."

Time was when a manager didn't have to worry much about morale. During the Great Depression of the 1930s, people were grateful just to have jobs. More lean years followed in the 1940s as the U.S. channeled its resources into fighting World War II. But after the war, Americans worked hard to build the "good life." The children of the postwar "baby boom" grew up in a land of plenty.

In the last 35 years, Americans have seen vast social change—some peaceful, some turbulent. The worker of the 1980s has a different set of expectations about jobs than did workers in earlier decades.

Today's employees want more from their jobs. For example, you do your job well and you'd like someone to notice. You want to know that the work you do for the organization makes a difference. You want to know what's going on. This makes you what the statisticians refer to as a "new values" worker—and that adds a new aspect to the managerial role.

"The definition of a manager's job is to get results through and with other people, both peers and subordinates," says Fletcher.



Today, that means satisfying the human needs of employees—needs for information and recognition—in order to get their best efforts. The manager, Fletcher explains, has to answer three questions for each employee: Where are we going (so I know where I'm going)? What is expected of me? How am I doing?

Performance management answers those questions—but implementation takes time and a methodical approach. The first step is to define the organization's "mission": that is, its direction and purpose. Next, you must spell out who is accountable for what in accomplishing the mission.

It is important that employees understand their roles clearly. Unless areas of responsibility are formally agreed upon, work roles may overlap, be duplicated or be misunderstood—leading to conflict. It is equally important that employees understand and agree to the points by which their performance will be measured.

In mid-1985, Graydon Laughbaum, resident manager of Unocal Netherlands, and his department heads began the process of implementing performance management. Once they agreed on their mission, their individual roles, and appropriate standards to measure individual performance, Laughbaum's staff repeated the process with their subordinates.

Laughbaum feels that even this first step of the program, in which people were asked to take a new look at their jobs and negotiate goals for performance with their supervisors, has been beneficial.

"People are now thinking about how to do a better job," he says. "People know what their responsibilities are, and they are committed to what they have agreed to do—not something that was imposed on them."

"There's really nothing revolutionary about it," says Brian Marcotte, district manager of operations in the Netherlands. "It's a matter of formalizing what we were doing all along. It's a matter of gathering your thoughts, putting them down absolutely on paper, and following through."

"There's a lot of material out there about management and being more effective," says Laughbaum, "but performance management puts it all into one book. In our operations, where we have so many people of various nationalities, disciplines and backgrounds, it gives us a common reference.

"Performance management is not rigid," he continues. "It provides a structure in which each person understands his own responsibility. We may not have all the answers, but we have the right environment in which to seek the answers. As long as people are willing to admit when something goes wrong, then it can be discussed and made to work—and we all feel good about it."

Performance review is regularly scheduled for each employee. "If you have achieved all your goals, you get a pat on the back," says Marcotte. "Then you stretch your goals a bit—and that's how operations continue to improve."

Team members review their performance. Good performance is applauded. If someone doesn't meet his goal, the team can help identify the problem and suggest corrective action for the next game.



The effect in the Netherlands is that people have learned to plan much better, which in turn helps the budgeting process. And, as employees become more aware of the standards that define good job performance, they have been able to suggest many ways to improve operations and cut costs. Performance management reinforces the safety and risk management program in the Netherlands, which has also contributed to lower operating costs.

Performance management was just what Bob Campbell, manager of the Beaumont Refinery, was looking for in 1981. He recognized that his work force was about to go through a major shift in age and experience as people began reaching retirement age. He also knew that low costs and high profits were more important than ever—and that Beaumont would have to operate at peak efficiency.

“Rather than being a theoretical management deal, performance management was a means of getting the decision-making to the level where it could be done on a much more timely basis,” Campbell explains. “And that’s the whole idea—to get the person doing the job to make the decisions, and to report results rather than problems.”

Campbell can point to the improvements in the operating data he calls up on his computer screen. “I used to be able to pick out the weekends—the times when there was minimum supervision here,” he says. “Yields would drop and utility expenses would go up. Now I can’t do that. The shift foremen and the operators make their own corrections. We’ve seen significant changes. Now timely corrections are made as they are needed regardless of the shift or day of the week.”

Once a month, Campbell meets with his six department heads for a management team meeting. “They report on what we did last month and agree amongst themselves about what they’re going to do next month,” says Campbell.

“The meeting pretty much runs itself and usually lasts about an hour,” says Steve Plesh, general superintendent of operations. “But it wasn’t always that way. At first, it was much more structured and people were less willing to air their problems.

“As we have matured as a team, we’ve gotten more open, more willing to share problems and ask for some help—and now we will recognize others in the group who have helped us solve a particular problem,” Plesh adds.

“The beauty of it is the positive feedback you get from your team on how to handle a problem,” says Vicki Hollomon, superintendent of industrial relations. “One brain working on a problem is not nearly as good as six or seven.

“You analyze what went wrong, and you commit to what you’re going to do to correct it,” she continues. “You can negotiate with another team member whose department might be contributing to your problem. And you say to your boss—this is what we’re going to do to get it right and not have it happen in the future.”

At Beaumont, the team meeting concept has been cascaded down to lower levels of supervision. Once these team meetings have become routine, they provide a mechanism for the transfer of information.

At least one member of each team will also be part of a team at the next management level up. So the goals and actions of the people at the operator level can affect performance commitments at higher levels. Instead of top managers setting goals for the organization that may be unrealistically high or low, the people doing the work contribute to realistic performance planning.

Every area of Beaumont Refinery operations has seen improvements in the last few years. “We’re very proud of the fact that we exceeded 3 million safe man-hours in the refinery,” says Plesh. “We’ve had the best environmental performance year ever in 1986.

“It goes back to the our original mission statement,” he continues. “If you define why you’re here as just operating the plant, then you’ll just operate the plant. If you define it as working safely, making a good margin, being a good environmental neighbor in the community, and treating people with respect and dignity, you’ll find that you’ll focus on all those areas.”

We felt that performance management dovetailed with the needs and expectations of our people better than the system we were using,” says Stu Taylor, division sales manager for Refining & Marketing’s Continental Division.

“If we could be more effective in managing our people, they would produce better results, both tangible and intangible, for the company,” he adds. “People will usually set their own goals higher than you—as the manager—would.”

Taylor notes that in the last 20 years both the dealers and the sales force have changed. Dealers are much higher-caliber businessmen, and employees have different expectations about their jobs. They want more involvement. They want to be part of the team.

The Continental Division services retail accounts in Southern California, Arizona and southern Nevada. In 1982, as a part of the implementation of performance management, the division surveyed its dealers. "We thought we knew what the dealers wanted," says Taylor. But there were some surprising results.

The dealers were surveyed by mail; their anonymity was protected. A response of 4 percent would have been considered good for a mass mailing, but almost 22 percent of the dealers responded. They indicated that they wanted more assistance and feedback from the sales representatives on their business problems and concerns. The reps were not spending enough "quality" time with them.

This resulted in some "temperature corrections," according to Taylor. When reps wrote down their major areas of job responsibility and the corresponding performance measures, emphasis was placed on service as well as sales.

"One of the keys to success for the manager of the future will be how he or she relates to the person doing the job—in this case, how the sales rep relates to the dealer," Taylor says. For example, it is not enough for sales reps to write up orders for products. They need to understand the dealer's business so they can offer support. Sales reps can then help dealers review marketing patterns, forecast future needs and identify areas for sales and service improvement.

"I think people welcome responsibility, as long as authority goes along with it," Taylor says. "I believe that when people are happy in their assignments, there is less waste. When you have self-esteem, there are some cost-impactive ways that you do business.

"Once you implement the program, maintenance is neither difficult nor time-consuming," he continues. "All the time you spend, you get back in efficiency."

Since 1981, the Continental Division's staff—including some sales positions—has dropped from a total of 105 to fewer than 90. "We're functioning more efficiently, and I know we have not lost a single sale as a result of the reductions," Taylor says.

You've got a different work force today," says Diane Pardini, industrial relations supervisor for the Geothermal Division's Santa Rosa District in Northern California.

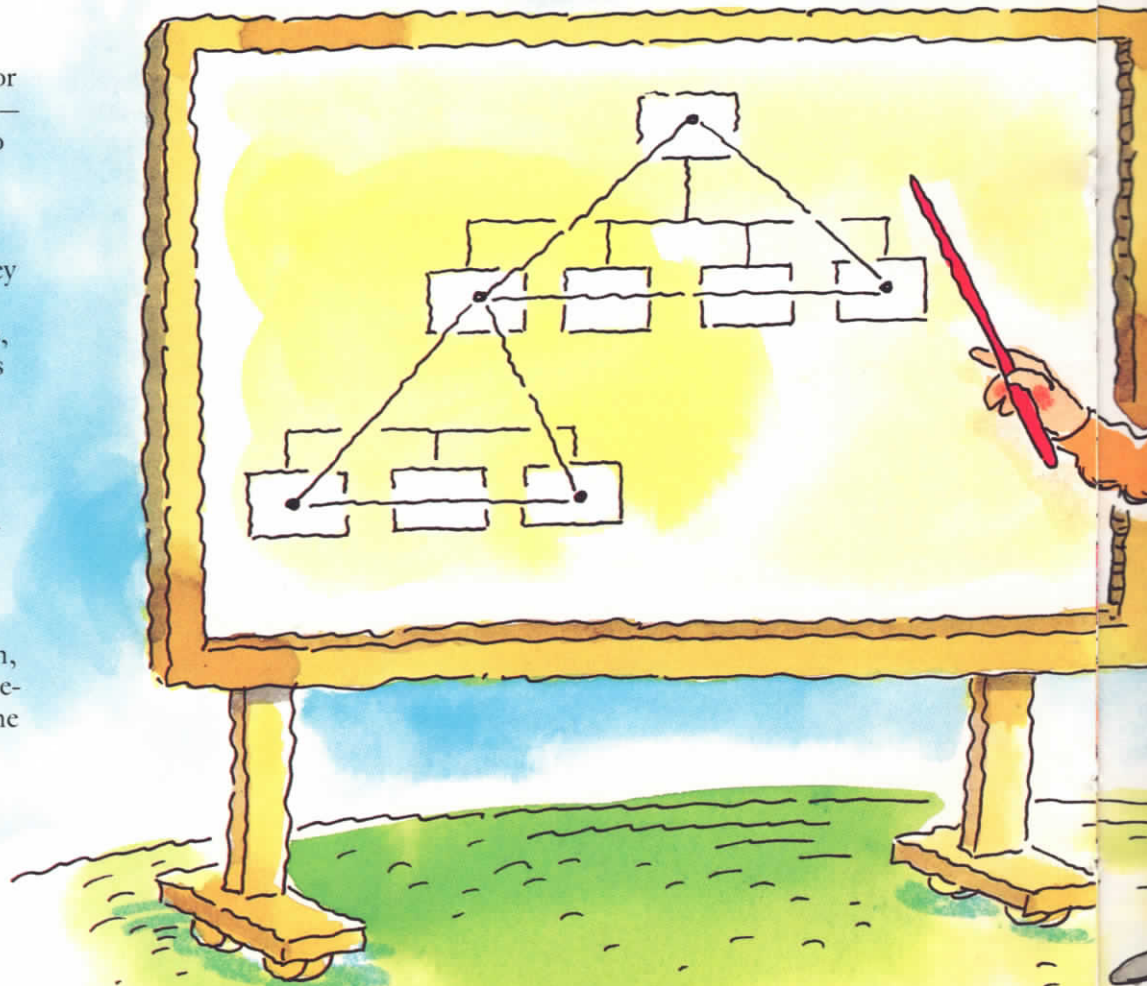
"In the past, people believed that you were supposed to get a job, work on it 35 or 45 years, and then retire. It's not like that now. People want to know where they are going and what's in it for them."

A uniform performance appraisal program was introduced in the Santa Rosa geothermal district a year ago. "It's basically a communication builder," says Pardini. And the response has been generally good. Employees say, "It's great knowing where I stand."

"The program gives the supervisor the discipline to think about goals," Pardini adds. "And that builds more of a 'buy-in' by the employee."

Once a year, employees are asked to evaluate themselves. Their supervisors also evaluate them. Then, supervisor and employee discuss points of difference and agree on new performance goals. The evaluation forms are passed on to the supervisor's superior.

During the year, the supervisor and employee meet informally to talk about goals, progress and timetables—and make adjustments as necessary.



"I view our program as a strong encouragement for more frank communication between employees and supervisors," says Joel Robinson, district manager of operations. "I believe our productivity and performance have improved. We have definitely seen some individuals improve in their ability to satisfy the demands of their jobs."

In 1987, productivity is the name of the game—and that depends on good morale and a high level of commitment to excellence by the people in the field or on the line. Such commitment has been achieved by Unocal Thailand, thanks in part to performance management.



When Unocal began to develop its discoveries of natural gas under the Gulf of Thailand, it wasn't long before some unusual circumstances were uncovered. "The subsurface geology was extremely complex," notes Dr. Harold M. Lian, president of Unocal Thailand. "Developing gas fields within acceptable economic parameters posed a major challenge to our earth scientists and engineers, and pushed available drilling and production technology to their limits."

Drilling began in 1981. In five years, drilling and completion time for each well dropped from 60 days to fewer than 20. The cost per well dropped 60 percent.

"That turnaround has been a key factor in the project's success," says Marty Miller, who was manager of operations for Unocal Thailand until last summer. "I attribute much of that success to the way the drilling teams managed their business. They worked at it in a participative way with the emphasis on teamwork."

The method is the essence of performance management. Everyone understood his own responsibility and the team's goals. Teams met weekly to review progress, identify trouble spots, propose solutions, and agree on new goals.

The results speak for themselves. Today, four gas fields are on production fulfilling nearly 30 percent of Thailand's commercial energy needs—and the emphasis on teamwork continues.

"High levels of efficiency and resulting lower operating costs have come about through greater individual participation by both employees and contractors because they know they are part of a team," says John Tyler, current manager of operations.

"The solution to our problems in Thailand has required the closest cooperation among all disciplines—geologists, geophysicists, drilling engineers and reservoir engineers," says Dr. Lian. "Each had to be fully aware of the problems others were facing and what was being done to overcome them. I have never seen a group work together as harmoniously. The successful outcome was truly an unselfish team effort."

Marty Miller, who is now manager of operations in the Oil & Gas Division's Central Region, is implementing performance management in his new team.

"We're making an all-out commitment here," he says. "I think it's pretty fundamental that people understand their areas of responsibility and how to measure performance in each. It just makes good common sense to me."

He compares it to keeping score in bowling. "If you put a curtain between you and the pins so you couldn't see them getting knocked down, it would be pretty dull and not many pins would fall. When you raise the curtain and start keeping score, everyone wants to throw strikes. Likewise, keeping score at work improves performance."

Tom Minette, resident manager for the Geothermal Division in the Philippines, will second that. Philippine Geothermal introduced performance management in 1983—and within six months had applied the team approach to reservoir management.

Department managers worked together to develop goals for reservoir management. Goals centered on development drilling, well stimulation, building new pipelines, or whatever projects had the highest priority for study and action.

In Performance Management, team meetings provide effective communications throughout the organization. One person from each team is also part of a team at the next management level up. So the goals and actions of the people on the playing field affect performance commitments at higher levels.

Then, teams were formed with representatives from each department, such as drilling, geology, reservoir engineering, and production. The team leader was the person from the department with primary responsibility in the project. The department managers set the goals, and the teams worked out the best programs to reach the goals.

"People might think these teams operate like committees, but they don't," says Minette. "The team leader has the primary responsibility, so he has to push the project through. The other team members support him with knowledge." At the end of last year, the department managers reconvened to review the projects, reset goals and form new teams as necessary to address changing priorities.

Each team has full responsibility for its project and reports on activities on a monthly basis. "It's worked extremely well," says Minette. Now, instead of managers seeking out bits of technical advice, the technical experts form part of the team. Each project benefits from a broader view. Problems can be analyzed from all sides.

"Our people are widening their understanding of reservoir management," Minette adds. "They're learning what the other engineers or geologists on their team can teach them. It may work a little more slowly than if only one department was assigned to handle a specific project, but the team approach puts more science into the process. I think it's resulted in a higher success ratio and more originality than you ordinarily would expect."

Minette also makes the point that today's geologists and engineers are, by and large, better educated than their predecessors were 20 years ago. There is, in fact, more to know today; growth in technological knowledge has been phenomenal. People want to apply their knowledge—and in the Philippines, the performance management team approach has provided the structure to allow that.

When Fielding Walker was introduced to performance management in 1981, he was already looking for new ways to describe job responsibilities and measure job performance. Then manager of the Chicago Sales Division, Walker became "a believer in the process."

In July 1986, he was assigned to his present position—general manager, National Auto/Truckstop Marketing. "I feel that we need to offer a uniform management system to our operators so that we can deliver the levels of service required to make us the market leader."

That's the purpose of the Five-Star Management Program for auto/truckstops, now in the pilot stage. In addition to a uniform management system, the five points include: developing an atmosphere of open and timely communication; developing a competitive advantage in customer service; measuring performance in meeting goals for improved quality; and using a team approach so that everyone learns from successes and failures throughout the organization.



The approach is pure performance management, tailored to suit the needs of auto/truckstop operators. The object, says Walker when he introduces operators to the new program, "is that we want our customers to prefer to stop at Unocal because the services and products are better, the food is better, the store is better, and because we treat them better. We want to be the best."

The operators are independent businessmen, so why should they adopt Unocal's ideas about managing their businesses? "The reality is," Walker says, "that you don't make these kinds of changes in a management system anywhere—not even within your own organization—unless you have everyone's commitment to change. I hope to sell the operators on the changes much as I hope to sell those within our organization. The key is commitment."

It takes time to build commitment. One of the first areas Walker was concerned about was measuring levels of service at auto/truckstops. He and five of his managers performed a field test of the existing inspection system. They formed teams and inspected several facilities. But one team's results for a facility were not necessarily compatible with another team's assessment of the same facility. The inspection program left too much room for subjectivity to be a reliable measurement tool.

So they worked to develop a new way to measure "image performance." Walker and his staff visited various auto/truckstops to compile a list of some 400 items that could be judged as either acceptable or not, yes or no. Are the restrooms clean? Are the fuel islands clean? Is the service friendly?

After several drafts, these image performance measurements were presented to the operators' council, twelve operators elected by their peers. The council agreed that improvements were needed and endorsed image performance measurements as one way to help raise standards at Unocal auto/truckstops.

"To get commitment, you need to involve people at the grassroots level," says Walker. As he tells operators when talking about five-star management, "No one succeeds or fails alone in this enterprise. Every department in the truckstop, the truckstop itself, our division, and our entire company represent different levels of a team effort."

Performance management combines the best elements of rugged individualism—the spirit that built American industry—and teamwork.

Team efforts are essential to running large organizations. The best team players are individuals with self-esteem and competence, who can make decisions about their jobs within well-defined areas of responsibility. And that's what performance management is all about. *B.P.* 76

When performance commitments are met, the team shares the victory and the way is clear to aim even higher.



At Unocal's "Just Say No" rally, each ballplayer told his own story of personal tragedy due to drug addiction. In doing so, each man provided the obvious evidence that such problems can be licked. Following are excerpts from the players' talks.



"Sweet" Lou Johnson joined the Los Angeles Dodgers in 1965 at a crucial time in their race for the pennant that year. Star hitter Tommy Davis had been sidelined with a broken ankle. Johnson, who played left field, helped fill the gap—and the Dodgers went on to win the World Series.

Today, he still works for the Dodgers but in a different position. He talks to schoolchildren to help them "just say no" to drugs.

I played in the World Series for the Los Angeles Dodgers in 1965, and that year I got hit by pitched balls 19 times. Not because I was such a ferocious hitter, but because I had crossed the "imaginary line." I began to take pills and drugs before I got to the ballpark—just to cope. I was so high sometimes I couldn't see what I was doing. I got hit with a 95-mile-plus fast ball that went right through my helmet, and I've got the scars today to prove that...

Now you might say, 'Mr. Johnson you look like you're in pretty good shape'—but I'm kind of rotten on the inside. A little cirrhosis, lung problems, two operations on my nose because I sniffed cocaine for 20 years. And I have

Covering the Bases About Drugs

Five major-league baseball players had an important message for the families that gathered at the Fred L. Hartley Research Center in Brea, California on the evening of February 10.

The athletes came to share their personal experiences with the devastation of drug addiction, offering hope to those who need it and encouragement to others to "just say no" to drugs in the first place. For the five ballplayers the primary drug was alcohol, and a couple of the players had used other drugs as well.

The athletes are or were star players. Bob Welch is the "fireball" pitcher for the Los Angeles Dodgers. Lou Johnson played left field and Don Newcombe pitched for the Dodgers. Jim Merritt and Jim Maloney both pitched for the Cincinnati Reds.

The event demonstrated Unocal's support for First Lady Nancy Reagan's national anti-drug campaign, which is aimed at children and teenagers. It developed out of safety meetings that John Newton, manager of the corporate alcoholism program, held at the research facility last December with about 600 employees of the Science & Technology Division.

Bill Hosband, S&T safety specialist, had invited Newton because of the current national focus on problems of drug abuse. The program was well received, and some employees asked if it could be repeated for their families.

"John responded positively," said Mike Thomas, safety technician. "He would do it any time, any place—and he would try to bring a few friends."



"It snowballed from there," said Hosband. As the time drew nearer and the celebrity list longer, invitations were opened up to employees' neighbors and friends, as well as to local schools. Attendance was about 260. "We were really happy with it," said Hosband.

"There are a lot of young ones out there that are dying."

"We're very pleased and very proud tonight to be able to present this seminar. It's a very needed thing," said Cloyd Reeg, president of S&T, as he opened the rally and introduced John Newton.

Newton, who has been manager of the alcoholism program for 16 years, has lectured on the subject to both the American and British medical associations. In addition to his work on Unocal's program, which has an impressive recovery rate of close to 90 percent, he has worked with the Los Angeles Dodgers and other sports organizations to develop similar programs. In 1982, he was called to the White House by Nancy Reagan to participate in a discussion of teenage alcoholism and drug abuse.

"JUST SAY NO"



"Alcohol is still the number one problem," Newton told the Brea gathering. "There are more deaths, more suicides and more problems with alcohol than all the other drugs combined—because it's legal and it's in virtually every home throughout the United States."

About 260 Unocal employees, their families and neighbors attended the "Just say no" to drugs rally held at the Fred L. Hartley Research Center in February. The message was for everyone—but with an emphasis on the young.

brain damage. These are some of the physical problems we don't want you young kids to have to go through...

You know about the Biases, the Rogers, the Belushis. But you don't know about the no-names that are dying—kids 12, 13 and 14 years old. There are a lot of young ones out there that are dying.

So when you say no, say no. Parents, help them to say no.



Bob Welch began pitching for the Los Angeles Dodgers in 1978. If he has his way, the Dodgers are about to have a great season. But the "fireballer" was pitching a different message at the rally—one that will help everyone be winners. This is a message of sobriety that he has carried back to his hometown, helping to institute a treatment program for drug abusers at his high school—where his addiction began.

I'm a recovering alcoholic. I've used everything [that Newton mentioned] in my lifetime with the exception of heroin. I used most of those at a very young age. When I was 15 years old back in Hazel Park, Michigan, I bought a bottle of Mogen David blackberry wine. From the very first day I had a problem. I drank it, I loved it. My disease began to progress at age 15.

So it does start very early, and I was kind of late in my neighborhood to start drinking. There were a lot of kids in our junior high school in 1968 who were using marijuana. When I got to high school, I joined them.

I started choosing my friends. I was hanging around with people who didn't participate in athletics—but did do drugs. Parents can detect these things—see if your children pick up some friends you really don't like.

By twelfth grade I was looking forward to going out at lunch to get stoned on marijuana or alcohol.... I went on to college and drank for three years, and was drafted by the Dodgers in 1977....

In 1979, Don Newcombe was one of the people who noticed that things were getting ugly for me. If it had not been for him and John Newton, I know for a fact that I would not be playing baseball for the Los Angeles Dodgers today. There's a very good chance that I'd be dead....

In 1980 I told my mother and father that I loved them for the very first time. I think the neatest gift that I have given myself was sobriety, so that in turn I could tell my mother and father that I loved them.

I wish you all the best. And parents—pay attention to your children, because they love you.



John Newton introduced Jim Merritt as the man who "had the misfortune in 1965 of throwing a baseball in the World Series to Lou Johnson, who hit it out of the park," clinching the Dodgers' victory over the Minnesota Twins. Two years later Merritt was traded to the Cincinnati Reds where, in 1970, he won 20 games and was an all-star.

I am delighted to be here. I see all these young folks, and I hope that if you're ever approached, you can just say no.

I developed a dependency on alcohol when I was in high school. I had the feeling that I was a big, tall swizzle stick—an ugly duckling. I had a lot of trouble communicating with girls and going to dances and parties. But give me a couple of drinks and I turned



In 1985, the College of American Physicians released a position paper on chemical dependency, which stated:

"The problem use of alcohol is the major drug problem in this country, affecting 5 to 10 percent of all drinkers for a total of 10 million people. Alcohol misuse is the leading killer of persons aged 15 to 45."

But today, alcohol abusers—especially the young—frequently take other drugs with alcohol. The most recent government statistics show that 56 percent of the nation's 12-to-17-year-olds have used alcohol, 24 percent have used marijuana and 5 percent have used cocaine.

Among 18-to-25-year-olds, the generation now entering the work force, 44 percent have used illicit drugs in the last year. In the general population, it is estimated that 18 million people currently use marijuana and close to 6 million use cocaine. Some \$100 billion in productivity is lost in the United States every year because of alcohol and drug abuse.

At the rally, Newton gave a mini-seminar on the dangers of drug abuse. He began by listing three general categories of drugs: sedatives, stimulants and hallucinogens.

Sedatives, called "downers" in street lingo, slow down the user's movements, reactions and thinking. These drugs include barbiturates (barbs), tranquilizers (tranks), heroin, morphine, codeine and alcohol. Heroin, the most addictive drug known, has been banned even for medical use in the U.S.

"...the neatest gift that I have given myself was sobriety..."

Stimulants, also known as "uppers," speed up the user's reactions and thinking. The "rush" can make the user feel superhuman—and so impair judgment. These drugs include Benzedrine (bennies), Dexedrine (dexies), other amphetamines and cocaine.

Cocaine was once perceived as relatively harmless, but events have proven it to be a highly addictive killer. It can bring on heart attack, stroke, convulsions and death—as demonstrated by the recent deaths of Len Bias, the Boston Celtics top draft choice, and Don Rogers, defensive back for the Cleveland Browns. A mixture of cocaine and heroin, called "speedballs," killed comedian John Belushi in 1982.



Use of “crack” or “rock” cocaine, a highly potent form of the drug that some experts say is almost instantly addictive, is now spreading. It sells for as little as \$10 a “fix”—easily affordable by many young people.

Hallucinogens, such as PCP (phencyclidine) and LSD (lysergic acid diethylamide), are the third drug type. They cause the user to sense things that aren't there. “You will hear colors, you will see music,” says Newton.

Marijuana can also fall into this category, because in large doses it can cause hallucinations. In smaller doses, its effects are varied and may include distortion of thinking and perception, loss of coordination, slowed reflexes, increased appetite, drowsiness, excitement and feelings of alienation.

Because of the widespread misperception of marijuana as “harmless,” Newton spent several minutes discussing it. Studies have shown that the drug's active agent, tetra hydrocannabinol (THC), is changed only slightly when the body breaks it down into metabolites. THC metabolites remain active—influencing the user to some degree—while the body eliminates them over a period of days. For comparison, alcohol is eliminated from the body in a matter of hours.



Autographed baseballs and mitts, and Dodger tickets were given away at the end of the rally. Above, John Newton emphasizes the dangers of addiction—and makes the point that while there is no cure to addiction, education can help stop young people before they start using drugs.

THC metabolites accumulate in the fatty outer membranes of body cells—including brain cells. Animal studies have shown that brain damage and birth defects can result from prolonged use of marijuana. Some studies show that THC can be physically as well as psychologically addictive, with users experiencing withdrawal symptoms when they stop—much as smokers suffer withdrawal from nicotine.

“...there's nothing but heartache and pain on that road.”

Regular users develop a tolerance to the effects of marijuana, so that the “high” from the drug may become less pronounced. For this reason, regular users often smoke more marijuana or seek out more potent forms of the drug, such as hashish. They may also use marijuana in combination with alcohol, PCP or other drugs.

into Fred Astaire and Cary Grant. Alcohol would transform me into what I thought I wanted to be....

As things progressed, I pretty well drank up my family. I was in the process of getting a divorce from my wife. My kids hated my guts. It wasn't until I was pushed to the very limits that I was willing to try to do something about my alcoholism. Because it is a disease of denial. It's the only disease you'll ever have that tells you you don't have it....

A Catholic priest, who's also an alcoholic, makes the statement that feelings and emotions are the things we have the most of and know the least about. The longer I've been sober, which on May the first this year will be seven years, the more I realize how true that is. I used alcohol as an anesthetic to all those feelings I had as a kid, and I never dealt in reality until I was sober...

We have all been down the path where drugs and alcohol can take us and believe me, there's nothing but heartache and pain on that road. Being a recovering alcoholic, I've gotten my marriage back on track. My kids care about me today.

While I'm grateful for that, I wish I'd never gone through the ordeal. But I did, and all I can do now is share with you that it's not worth it. So, just say no.



Series. In 1965, he won 20 games and was an all-star. He pitched three no-hitters in his career, and he holds the Reds' record for total strike-outs.

Everybody's story is a little different. In 1970 I was pitching a game against the Los Angeles Dodgers. I ruptured my achilles tendon running to first base, and that was the end of my career.

I realized that baseball was no longer a part of my life. No more cheering from the people in the stands, no more write-ups in the paper—and that's where addiction to alcohol started in my life.

I began to drink quite heavily. I couldn't go one hour without trying to find a drink. It was that bad. My weight ballooned up to 320 pounds. My wife kicked me out of the house. My life was in total shambles. I knew I was alcoholic and thought I could handle it—but the disease is too much.

I was sitting at a friend's house when the phone rang, and it was Jim Merritt. He said if you need some help, I can give you a number. The guy who answered the phone was John Newton. It was the greatest move of my life. I have gone two years without having to take a drink. I have a choice and I choose not to drink.

There is help, there is support. If you think you have a problem, all you have to do is reach out and ask for it.



In the late '60s, Don Newcombe began lobbying virtually every sports organization in the country. He wanted something done about players' problems with addiction to alcohol and other drugs. At first, no one would listen—but today no one doubts his wisdom.



The ballplayers congratulated the prize winners at the end of the event and the audience picked up free literature about drugs and drug abuse.

“If you hear your child talking about a ‘Sherman,’ he’s talking about a cigar,” Newton continued. “They sell them in front of the schools—long, skinny cigars rolled in PCP, then cut in four pieces and sold for \$5 apiece.”

“I thought I could handle it, but the disease is too much.”

The bizarre behavior of people on PCP has been widely publicized. “I was in an Arizona treatment center,” Newton recalled, “and they brought in a 16-year-old girl. She was so wild under the influence of PCP that it took six police officers to restrain her.”

Drugs are cheap and accessible, and they are becoming more dangerous than ever. Better methods of cultivation and new hybrids of marijuana plants make today’s “pot” three times more potent than its counterpart 10 years ago.



Cocaine and heroin found “on the street” today are also much stronger and purer forms of the drugs. And the so-called “designer drugs,” including synthetic versions of heroin and cocaine, are highly potent—and much cheaper than the “real stuff,” according to Newton.

Purity is another issue. Alcohol is quality-controlled under the law, but illegal drugs are under no controls.

While prescription drugs are carefully manufactured, the street variety of Bennies, tranquilizers and other pills differ from those produced for medicinal purposes. Even drugs carrying pharmaceutical labels may be counterfeit—imports of uncertain ingredients and potencies from the Middle East and South America. Pills sell for 15 to 30 cents apiece—less than a candy bar.

“I have a choice and I choose not to drink.”

Drugs such as cocaine and heroin are commonly mixed with extenders so that the dealers will have more drugs to sell. These cut versions of the drugs are cheaper—affordable by juveniles.



For example, a user may buy cocaine that has been cut with sugar, baby laxative, aspirin, amphetamines or other substances. The effects of these combinations can vary from very mild to very severe—up to and including death, according to Dr. Reynold Schmidt, Unocal's corporate medical director.

“We’d better start looking into it, parents. We’d better start finding out why...”

“We’re talking about a serious problem,” says Dr. Schmidt. “We’re seeing a fairly significant increase in the number of drug-related problems with children of employees. We’ve experienced some deaths in the last couple of years with employees’ children using drugs—and that doesn’t count the kids who were hospitalized for overdoses.

“I think most medical doctors in industry would agree that 7 to 10 percent of employees are either themselves or have family members involved with chemical dependency problems,” Schmidt added.

John Newton and assistant alcoholism program managers Bob Phillips and Kelly Hunt are ready to help families with alcoholism problems and provide information about drugs, drug abuse and treatment. For a completely confidential talk, employees and members of their families are invited to call anytime, collect:

John Newton
Medical Department, Los Angeles
Work 213/977-7710
Network 230-7710
Home 213/694-5311

Bob Phillips
Medical Department, Los Angeles
Work 213/977-7266
Network 230-7266
Home 714/653-6696

Kelly Hunt
Medical Department, Schaumburg
Work 312/885-5184
Network 545-5184
Home 815/722-8367

Newcombe was a pitcher for the Brooklyn Dodgers, moving west with the team in 1958. He helped propel the team to victory in the 1955 World Series. During his career, he was named Rookie of the Year and Most Valuable Player, and won the Cy Young award—making him the only player to have received all three honors.

Today, Newcombe works for the Dodgers in a new capacity—as a sort of advance recruiter. He talks to schoolchildren to educate them about the dangers of chemical addiction.

I am Don Newcombe, and I am also an alcoholic. I'm glad to be here tonight. In fact, when I think about my life, I'm glad to be anywhere tonight.

You heard young Bobby Welch tell you where his problem started—at the junior high school level. Maybe it got by you, but you also heard him say that he might be dead if someone hadn't helped him do something about it.

I can ask 800 junior high-schoolers the question, “How many have drunk alcohol in your lives?” As God is my witness, 700 will raise their hands and joke about it, thinking it funny.

Why, moms and dads, is it happening? Not once, not twice, but a whole host of times? I've spoken to thousands of kids across this country in the last 14 years. And I see it all the time. I'm worried because I wonder where this attitude comes from. And why is it happening at that junior high school level? We'd better start looking into it, parents. We'd better start finding out why....

You've heard five big, strong, strapping athletes tell you about where our lives have gone because of the use of drugs. We had better be about the business of finding out what we are going to tell our kids. There has to be a continuing effort.

Moms, dads, people who care—make sure your kids understand when you tell them to say no. Explain to them the devastation if they get involved in using drugs.

Don't let them start young. Don't ask them to say no, make them say no. Make them understand what you're talking about. 76

ALL IN A DAY'S WORK

The S&T Volunteers: a shared concern for the community leads to stronger working relationships between employees. Volunteer leader Milan Pavlovich (below) hopes to expand the program to other parts of the company.



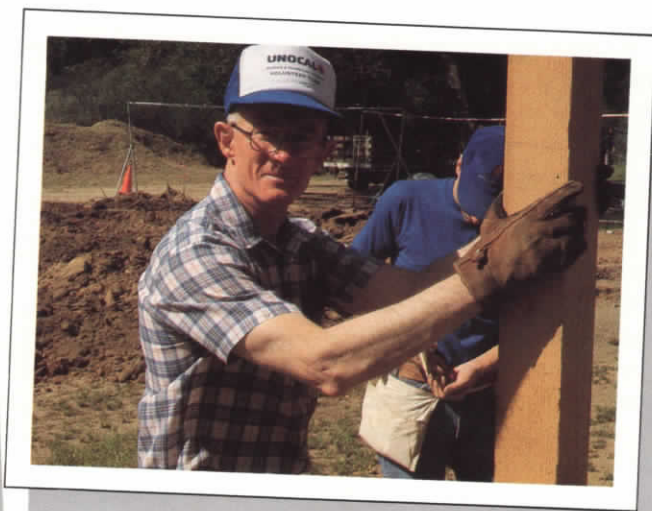
When Milan Pavlovich and the other volunteers from Unocal's Science & Technology Division entered the house that Saturday morning, they were a little startled by what they saw. The walls were smudged with dirt. Cobwebs hung from drapes and ceiling corners. Dust covered the living room couch, tables and lamps. The kitchen floor tiles were chipped and buckled.

"Right then we knew we had a pretty long day ahead of us," recalls Pavlovich, who directs S&T's community affairs.

From early morning to late afternoon, the volunteers worked to revitalize the house. They moved furniture and curtains to scrub and paint the walls. They dusted lamps and tables, and washed windows. They swept the floors and replaced the kitchen tiles.

"We wanted to get the house in shape for the the married couple who lived there," explains Pavlovich. "They were almost 90 years old and couldn't do any heavy-duty cleaning, so we did it for them. When Mr. and Mrs. Stanley returned home that evening, they walked into a completely different house. You should have seen their faces."

Renovating homes for senior citizens is just one of many projects undertaken by the S&T Volunteers, an employee-volunteer team organized by Pavlovich three years ago. Comprised of Unocal and contractor's employees who work at the company's research center, the group assists local organizations and United Way agencies. These organizations, like the research center, are located in Orange County, just south of Los Angeles County.



Nick Lombardi (left), a contractor's employee at S&T, tackles a paint job at the Orange Children & Parents Together center. Research chemist Dr. Chuck Stout lends a hand at the Corporate Combined project.



The camaraderie between people from various companies (right) made the tremendous work load at the Corporate Combined flow more smoothly. Above, Kim Supp of Food Services spruces up a building.

Don Wymore (right), a buyer in S&T's purchasing department, cuts overgrown shrubs down to size.



Pavlovich decided to form a volunteer group in 1984, when he was chairman of S&T's United Way fund-raising campaign which helps support Orange County community-service agencies.

"I learned that some of the facilities weren't in the best shape," he recalls. "But the agencies didn't have enough money to make repairs or improvements. I figured if we could get people to provide these services for free—which would drastically cut the agencies' costs for outside labor—that would be a big help."

Pavlovich consulted with S&T President Cloyd Reeg, and then with other Orange County companies which sponsored community-oriented volunteer groups. After weeks of planning, he launched the "S&T Volunteers." The agencies provide most of the necessary materials, and volunteers work on their own time.

Since 1984, the S&T Volunteers have assisted 14 organizations, including the Santa Ana Zoo, Brea Senior Citizens Center, Children's Home Society of California, Anaheim Independencia Community Center, Exploratory Learning Center, and Help for Brain-Injured Children, Inc. Pavlovich receives invaluable assistance on each project from S&T's Nita Shedrick, who is the office services coordinator.

"We've done everything from renovating houses to clearing nature trails," says Pavlovich. "Our volunteers have expertise in a lot of different areas. We can take on any type of project."

In the beginning, however, the volunteer group was limited by its size. Less than 10 people participated in the first project: building bookcases, painting walls and baby cribs, and tearing down an old fence at the Blind Children's Learning Center in Anaheim. "We just didn't have enough

volunteers to tackle the bigger jobs," remembers Pavlovich.

Determined to increase the size of his workforce, he began posting volunteer information and photos taken during the projects. These "mini-exhibits" soon ignited widespread interest around the research center—and Pavlovich had enough volunteers to plan more demanding weekend projects.

Today, about 125 people form the core group of S&T's volunteer program. They represent a variety of professions, from chemistry and food services to carpentry and administration. "We're just like a big family," says Pavlovich. "Our volunteers come from all over S&T."

Leslie Bachor, a secretary in the Analytical Research department, has worked on several projects. "I contributed to United Way annually, but I



Building a volleyball site is no easy task—just ask word processing operator Kathleen Butts (left, front of wheelbarrow), data entry clerk Patti Herrera (at other end) and secretary Leslie Bachor (top right, in hat).

wanted to have more personal contact with these agencies throughout the year," she explains.

"I liked what the volunteer group was doing," recalls Lauren Briggs, a buyer in the Administrative Services department and one of the first employees to join the program. "One of my favorite projects was the Blind Children's Learning Center. I met the kids and learned more about what the agency was trying to accomplish for them. I left there knowing I'd done something worthwhile."

Encouraged by the overwhelming interest in the S&T Volunteers, Pavlovich launched an even more ambitious volunteer effort—the annual Corporate Combined project. The program links volunteers from companies such as Unocal, Southern California Edison, Fluor Corporation, Disneyland and McDonnell Douglas to perform large-scale community-service projects.

The third annual Corporate Combined, held March 28, drew nearly 500 volunteers from 20 companies. They assisted the Bright Light Center in Santa Ana, which aids abused, disabled and other disadvantaged young people. The volunteers transformed Camp Axelrod in Orange County into a summer recreation center. They cleared nature trails, painted picnic tables and built a doughboy swimming pool, a baseball and soccer field, shade shelters and several small game sites—all in one day!

"It sounded ambitious," says Pavlovich, "but we knew we could do it. The Corporate Combined project representatives had been planning Camp Axelrod for nearly a year."

The success of past Corporate Combined projects no doubt boosted Pavlovich's confidence. The volunteers completed an exhaustive remodeling project at the Santa Ana Zoo two years

ago, in which they planted trees and flowers, dug ditches, and put up fences and enclosures for animals. The following year at the Exploratory Learning Center, the volunteers built an educational turn-of-the-century community for children by remodeling two houses, reshaping the grounds, and planting small groves of orange and lemon trees. The volunteer program is not only good for the community. It creates a more closely knit group of employees, too. "These are people-to-people projects," Pavlovich says. "We work with each other in different, more relaxed settings, and get to know people from other companies."

"When you're sweating together on the same job, you get to know each other pretty well," adds J. C. Campbell, a process development foreman at the research center.

Ute Wallner (below), a draftsman for International Oil & Gas, puts on the finishing touches. Right, Unocal retiree Don Pavlovich steadies a log for chemical researcher Dr. Lon Spada, as their Corporate Combined co-workers move on to another task.



S&T staff photographer and volunteer Chuck Schoenfeld agrees: “Working with your fellow employees creates camaraderie that carries back into the workplace.”

The success of the group owes a lot to Pavlovich’s dedication—and planning. The initial steps in coordinating each project are crucial. Pavlovich sometimes seeks out local organizations (like the Santa Ana Zoo) and offers the group’s assistance. But he usually works with two Orange County volunteer centers that recommend United Way agencies with facilities needing repairs.

“I discuss the project with an agency representative so we both have a clear understanding of what’s expected,” he explains. “Then a few of us visit the site to determine the materials and number of volunteers we’ll need.”

It took 19 volunteers to recondition several rooms inside Orange Children & Parents Together, a family services center in Orange County. The S&T employees met on a Saturday morning last September, ready to tackle a list of jobs which included painting a shed, patio cover, wheelchair ramp, doors and walls; trimming trees and bushes; and building a wooden enclosure for the ramp.

But what if you’re not the world’s most experienced shrub-cutter or carpenter? “You learn,” Pavlovich says. “This volunteer work has practical benefits. In fact, you can use the skills you learn here to fix up your own place.”

“I’ve seen a lot of people discover that painting, laying tile, or building bookcases isn’t as difficult as they first thought,” says Campbell, an experienced carpenter.

Volunteers often have all day to hone these newly learned skills, for few projects are completed before late afternoon. Many people, to compensate for being away from home for long hours, bring family members to the projects. Some visitors even lend a hand in the work, like Bob Pavlovich (Milan’s uncle), who retired from S&T’s Exploration Production Recovery Methods department last June. The volunteers and their guests receive free lunches and soft drinks during the noon-time break. And few Saturdays end without football-tossing or other games.

“We’re never too busy to have a little fun,” says Pavlovich. “But we take care of business, too. Unless we’ve planned to complete the project in two Saturdays, we don’t leave a site until the work is done. And sometimes we don’t finish until after dark. I’m getting the reputation for being a real taskmaster,” he adds, laughing.

Slowly but surely, the site begins to resemble the youth summer camp it will shortly become—thanks to the work of some 500 volunteers from Unocal and other companies.



The volunteers' efforts have been strongly supported by S&T President Cloyd Reeg and other company executives. "The program is an excellent way for Unocal to identify with the Orange County community," says Reeg. "As a result of S&T's involvement, people view the company as an active force in the community. These programs have also become more important because of diminishing federal funds."

Last year, the S&T Volunteers earned the nationally esteemed President's Volunteer Action Award for its community activities, as well as an award from the Orange County Engineers Council.

Pleased with the volunteer program's success, Pavlovich wants to enlarge the scope of its service projects. "I'm always looking for new ways to help different agencies," he says.

He hopes to generate more awareness about the S&T Volunteers by circulating a short videotape program, currently being produced, that highlights the team's activities. The tape will be shown throughout Unocal and to various charitable agencies that may be interested in using volunteer services.

"Even though we're trying to expand the program," says Pavlovich, "we don't lose touch with the agencies for whom we've already worked." In fact, he and other volunteers plan a return to Camp Axelrod this summer to see how the youngsters are enjoying their new facility.

"You get a real sense of satisfaction from working on these projects," he says. "It's sometimes easy for people to give a monetary contribution, then forget about it. But when you visit an agency, you get to meet the people who actually benefit from your involvement."

Pavlovich recalls an interesting experience at the Southwest Minority Economic Development Association last year. The center was then operated by Annie Mae Tripp, a senior citizen who provided food and clothing to nearly 200 people there each day. While Pavlovich and other volunteers were repairing the center's kitchen, several patrons approached them and began asking questions.

"They wanted to know why we were working on our day off, without getting paid," he explains. "They found it hard to believe that we'd do something in our spare time for people we didn't know. But they finally saw that we'd come to help. Their appreciation really showed me the impact our involvement can have on people's lives." A.B. 76

UNOCAL 76

CORPORATE

- 35 YEARS Alice C. Smith, Unocal Center
Carleton B. Scott, Unocal Center
- 30 YEARS Patricia L. Huebert, Schaumburg, Il.
- 20 YEARS George D. Bennett, Oklahoma City, Ok.
Randall B. Gibson, Unocal Center
Darryll E. McMaster, Orcutt, Ca.
Joseph E. Perkins, Los Angeles, Ca.
Laura E. Ross-Elder, Unocal Center
- 15 YEARS C. Frank Corbin Jr., Unocal Center
Billy J. Leach, Schaumburg, Il.
Norma G. Litton, Unocal Center
Barbara J. Lyle, Unocal Center
Anthony G. Melas, Unocal Center
Matthew D. Norcia, Unocal Center
John T. Newton, Unocal Center
Kendall B. Smith, Unocal Center
- 10 YEARS Fredric A. Bonner, Unocal Center
Liberty L. Garcia, Unocal Center
Walter F. Guy, Unocal Center
Kellogg R. Hunt, Schaumburg, Il.
James M. Keating, Unocal Center
George W. Mellinger,
San Francisco, Ca.
Donna L. Wong, Unocal Center

ENERGY MINING

- 20 YEARS Louis E. Jelinek, Tucson, Az.
- 10 YEARS John A. Abramo, Tucson, Az.
Kent D. Aveson, Parachute, Co.
Paul E. Martin, Parachute, Co.
Gary W. Parks, Parachute, Co.

SCIENCE & TECHNOLOGY

- 25 YEARS Donald M. Fenton, Brea, Ca.
- 15 YEARS James A. Baur, Brea, Ca.
Carl J. Cron, Brea, Ca.
Ronald J. Lukaszewicz, Brea, Ca.
- 10 YEARS Bryce M. Bahner, Brea, Ca.
James A. Green II, Brea, Ca.
Richard E. Gutman, Brea, Ca.
Jeffery W. Koepke, Brea, Ca.
Steven R. Ross, Brea, Ca.

ENERGY RESOURCES

OIL & GAS

- 35 YEARS Aline M. Broussard, Lafayette, La.
Kenneth E. Martin, Woodward, Ok.
Buford E. Parrish, Midland, Tx.
Warren R. Shepherd, Unocal Center
- 30 YEARS Francis C. Breaux, Houma, La.
Charles L. Broussard, Lafayette, La.
C. Richard Hard, Oklahoma City, Ok.
Harold A. LeBlanc, Houma, La.
Lillian S. Lee, Houston, Tx.
Robert Marquez, Houston, Tx.
Eugene M. Myers, Lafayette, La.
Mickey W. Renaud, Houston, Tx.
K. J. Robertson, Oklahoma City, Ok.
David K. Spradlin, Andrews, Tx.
Robert F. Watson, Van, Tx.

- 25 YEARS James E. Brixey, Coalinga, Ca.
Daniel J. Detraz, Lafayette, La.
James R. Lemaire, Houma, La.
James L. Smith, Andrews, Tx.

- 20 YEARS Donald M. Allis, Orcutt, Ca.
Michael L. Atmore, Carpenteria, Ca.
Bobby G. Bryan, Midland, Tx.
Anita K. Burling, Unocal Center
Robert L. Caine, Bloomfield, N.M.
Robert H. Church, Anchorage, Ak.
John R. Eisenbarth, Orcutt, Ca.
Gordon L. Ferguson, Oklahoma City, Ok.
Gilbert J. Gonzales, Santa Fe Springs, Ca.
Glenn L. Hagemann, Santa Fe Springs, Ca.
Fred H. Neal, Midland, Tx.
Mary D. Padron, Pasadena, Ca.
Edward Ratto Jr., Orcutt, Ca.
Ralph P. Richoux, Lafayette, La.
Robert K. Rios Jr., Orcutt, Ca.
Bobby L. Searcy, Oklahoma, Ok.
Clifford M. Tippins, Coalinga, Ca.
Robert C. Warthen, Anchorage, Ak.

- 15 YEARS Bruce S. Alexander, Houston, Tx.
Lavern Brewer, Midland, Tx.
Stephen W. Earp, West Liberty, Il.
Jerry L. Hatten, Kenai, Ak.
Ronald Dean Hoover, Coalinga, Ca.
Aubin J. Hutchinson, Houma, La.
James H. Jones, Houma, La.
Tony R. Lopez, Piru, Ca.
James T. Lowe, Houston, Tx.
John T. Russell, Lafayette, La.
Virginia A. Simons, Ventura, Ca.
George G. Stanley, West Liberty, Il.
E. Harry Taylor, Mobile, Al.

- 10 YEARS Walter T. Aakre, Casper, Wv.
Terry D. Adcock, Santa Fe Springs, Ca.
Albert J. Allemand, Lafayette, La.
Richard D. Andrews Jr., Casper, Wv.
Launa C. Armstrong, Van, Tx.
Jeffery S. Attebery, Ventura, Ca.
Hattie M. Aubrey, Pasadena, Ca.
Earl D. Backus, Grayling, Mi.
Frank Bello, Pasadena, Ca.
Belinda D. Bennett, Anchorage, Ak.
Russell J. Bertrand, Houma, La.
Rodney J. Boudreaux, Houma, La.
Anthony J. Brajkovich, Midland, Tx.
Larry C. Broussard, Lafayette, La.
Dallas L. Caldwell, Coalinga, Ca.
Edward L. Chancery, Mobile, Al.
Michael R. Cornyn, Lafayette, La.
Benjamin E. Duggins, Orcutt, Ca.
Charles L. Ellison, Van, Tx.
Jeanne M. Gallagher, Ventura, Ca.
Albert L. Giles, Mobile, Al.
John R. Giles, Mobile, Al.
Harry Granger, Houma, La.

- Ernest A. Henderson, Kenai, Ak.
Lynwood Hill, Ventura, Ca.
Robert V. Hoffmeyer, Casper, Wv.
Walter C. Hollada Jr., Santa Fe Springs, Ca.
Robert L. Jenkins Jr., Lafayette, La.
Jerry L. King, Ardmore, Ok.
Michael J. Langlinais, Lafayette, La.
Leander J. Lavergne Jr., Lafayette, La.
Steven E. Leusby, Grayling, Mi.
Berne A. Life, Lafayette, La.
Jimmy D. Mason, Snyder, Tx.
William W. McGinnis, Taft, Ca.
Burl K. McKeel, Midland, Tx.
Eria M. Meurer, Midland, Tx.
Ronald J. Monceaux, Houma, La.
Timothy R. Munoz, Orcutt, Ca.
Steve A. Neuman, Cisne, Il.
Ernie Ortiz, Santa Fe Springs, Ca.
Ronnie M. Oyabu, Orcutt, Ca.
Roy O. Priest, Anchorage, Ak.
Onnie J. Rainey, Kenai, Ak.
Alvin P. Richard, Lafayette, La.
Michael D. Schie, Cisne, Il.
Edward C. Smith, Mobile, Al.
Harry O. Thomas Jr., Healdton, Ok.

INTERNATIONAL OIL & GAS

- 20 YEARS Carl R. Brick, Unocal Center
W. J. Gelinneau, Unocal Center
- 10 YEARS Christopher R. Landeck, The Hague,
Netherlands
Martin T. Morell, The Hague, Netherlands
Andrew L. Fawthrop, Balikpapan, Indonesia

Unocal Indonesia, Inc.

- 15 YEARS Frans Hutagalung
Ramses Napitupulu
Lisa Rahardjo
Dodie Ririhena
Phongsuk Suphaphong
Tatang Suriadi
R. M. Tamtanas
Wahidin Wisaksono
- 10 YEARS Muballaga
Rifani
Rochmad
Siswadi
Sudarmo
Sukardjo
Sukarmin
Sukir
Berty Aguw
Daud Dawin
M. Hasan
Adrian Lontaan
Ekie Lumingkewas
Otto Maramis
Rinawati S. Martono
Leopold Matheos
Bambang Pradsodjo
Sulaiman R.
Herry Raintama
Bambang I. Rivai
John N. Runtuwarouw
Luhut Siahaan
Heroe A. Soeranto
Lintong Tobing

Unocal Limited (Singapore)

10 YEARS Faridah bte Md Taha

Unocal U.K. Limited

10 YEARS Anne Duncan, Aberdeen, Scotland
Leonard Poskitt, Aberdeen, Scotland
Susan Woof, London, England

UNOCAL CANADA LIMITED

20 YEARS G. G. (Bert) Van Donselarr,
Fort St. John, B.C.
Jack A. Yucytus, Calgary, Alta.

15 YEARS Helmut Verges, Calgary, Alta.

10 YEARS Hisham Abdullah, Calgary, Alta.
Lawrence G. Dykers, Calgary, Alta.
Doral S. Paxman, Calgary, Alta.
Hart W. Schneider, Calgary, Alta.

UNOCAL THAILAND, INC.

30 YEARS John M. Tyler

20 YEARS James Austin
Leslie C. Boyer
Thomas K. Muir

15 YEARS Thomas H. Albert
Phongsuk Suphamong

10 YEARS Mark A. Stephens
Loren W. Stock

GEOTHERMAL

30 YEARS Carel Otte, Unocal Center

20 YEARS Stephen Pye, Unocal Center

15 YEARS Larry R. Cadd, Santa Rosa, Ca.
Lyle E. Shaffer, Santa Rosa, Ca.

10 YEARS Sandra L. Austin, Imperial Valley, Ca.
Benjamin J. Barker, Manila, Philippines
Joseph P. Bowen, Manila, Philippines
Vivienne L. Rochioli, Santa Rosa, Ca.
Carlisle A. Sagon, Santa Rosa, Ca.
Barbara L. Stagg, Santa Rosa, Ca.

Philippine Geothermal, Inc.

10 YEARS Roberto S. Abinon
Rodolfo B. Balaguer
Benjamin B. Bandola
Eutiquio B. Barrion Jr.
Epifanio C. Bayte
Edgardo N. Briones
Norma C. Caayao
Avelino T. Cabais
Ma Elena P. Camacho
Jose C. Canale
Senen P. Canale
Milagros B. Canlas
Antonio B. Carrillo
Antonio C. Cellona
Felix C. Ciocson
Romeo D. Clerigo
Rizalino B. Comboy
Jether M. Consuelo
Jesus C. Consulta
Melchor C. Corino
Teodoro D. Cuya
Salvador C. Dacullo
Lauro D. Dacuya
Domingo C. de Leon
Leonardo C. Delos Reyes
Ofelia E. Garcia
Benito G. Gatmaitan
Eduardo J. Gervero
Romeo L. Penaredondo
Leonides Q. Rinon
Ramon B. San Andres
Jaenbert P. Templado
Luzviminda T. Tomas

REFINING & MARKETING

40 YEARS James E. Culpepper, Schaumburg, Il.
Lourae E. Gorich, San Francisco Refinery
Robert R. Smith, Chicago Refinery

35 YEARS Robert J. Carlson, Chicago Refinery
Harry E. Kenny Jr., Charlotte, N.C.
John C. Matejcek, Chicago Refinery
Frank S. Moranda, Schaumburg, Il.
William H. Nelson, Taft, Ca.
Merle L. Osgood, San Francisco Refinery
Aaron M. Palmer, Los Angeles Refinery
William D. Rodeghero, Chicago Refinery
Ernest L. Savala, Chicago Refinery
Raymond F. Shields, Chicago Refinery
Donald E. Wilson, Coalinga, Ca.

30 YEARS L. A. Anderson, San Francisco, Ca.
T. D. Esse, Bloomington, Ca.
Denny W. Evans, San Francisco, Ca.
Eddie J. Girado, Fresno, Ca.
Ronald G. Grady, Cincinnati, Oh.
Charles T. Kumle, Schaumburg, Il.
James F. Lacey, Atlanta, Ga.
Gary C. O'Connell, Los Angeles, Ca.
Ann L. Pittard, Atlanta, Ga.
Donald W. Robb, Milwaukee, Wi.
Peter Ruiz, Los Angeles Refinery
Barbara J. Shevchik, Southfield, Mi.
Willard C. Stone, Columbus, Oh.
Donald G. Trapp, San Diego, Ca.
James H. Vanderveen, Los Angeles, Ca.

25 YEARS C. J. Abrams Jr. Chicago Refinery
Jerry N. Davis, Atlanta, Ga.
Lorraine L. Flentge, Schaumburg, Il.
Christine A. Hodge, San Francisco, Ca.
Gerald A. Lyons, Schaumburg, Il.
Y. Matsuyoshi, Honolulu, Hi.
Ludy D. Reyes, San Francisco, Ca.
Nick Smernes, San Jose, Ca.
Richard M. Sullivan, Sacramento, Ca.
Einar M. Westly, Portland, Or.

20 YEARS William Brent Jr., Los Angeles, Ca.
Johnny Castillo, Los Angeles Refinery
Gary L. Conklin, San Francisco Refinery
James A. Deshotels, Abbeville, La.
Barry L. Dabler, Colton, Ca.
William R. Emerick, Richmond, Ca.
Robert W. Fisher, Portland, Or.
Ronald J. Fontenot, Beaumont Refinery
John J. Horigan, Los Angeles, Ca.
Wanda K. Jurszewicz, Cerritos, Ca.
William R. Kinsey, Beaumont, Tx.
Eugene A. Kot, Chicago Refinery
Brigitte E. Kuester, Columbus, Oh.
Leslie R. Lannom, Schaumburg, Il.
George J. Marken Jr., Los Angeles, Ca.
Judith M. McIntosh, Chicago Refinery
Augusta D. Mueller, Schaumburg, Il.
Herbert L. Perozzi Sr., Chicago Refinery
Gregory L. Powers, Los Angeles, Ca.
Kenneth R. Samuelson, Schaumburg, Il.
Charles R. Schiavi, Schaumburg, Il.
Albert Schioppi, Pasadena, Ca.
Anthony L. Stefan, San Francisco Refinery
Jack C. Thorpe, San Francisco Refinery

SERVICE AWARDS



15 YEARS Fred C. Acuesta, Los Angeles Refinery
Bernard M. Arrington, Schaumburg, Il.
Ben D. Basham, Chicago Refinery
John K. Bassett, Chicago Refinery
John V. Bernickas, Chicago Refinery
J. C. Blackmon, Los Angeles Refinery
Melvin Blue, Los Angeles Refinery
Peter Cantu, San Francisco Refinery
Jean Chisnell, Los Angeles, Ca.
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Avelina G. Conde, San Francisco, Ca.
David C. Cotter, Chicago Refinery
Clemencia Y. Dehesa, San Francisco, Ca.
Kenneth R. Dorion, Chicago Refinery
Oscar N. Gozar, San Francisco Refinery
James C. Hall, Schaumburg, Il.
Willie E. Harris, Chicago Refinery
Dwight D. Hays, Chicago Refinery
Brad W. Henke, Schaumburg, Il.
William J. Houser, Los Angeles, Ca.
Thomas J. Hylka, Chicago Refinery
Carol B. Illg, Los Angeles, Ca.
William Jackson, Chicago Refinery
Richard C. Krein, Pasadena, Ca.
Lawrence T. Leslie Jr., Chicago Refinery
Harry J. Litchfield, Chicago Refinery
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Lawrence L. McLaughlin,
San Francisco Refinery
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Edward D. Pawlowski, Chicago Refinery
Constance Perez, Los Angeles, Ca.
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David B. Pogroszewski, Los Angeles, Ca.
James M. Potter, Colton, Ca.
Larry J. Remboldt, Tukwila, Wa.
Pete C. Serrano, San Francisco Refinery
James E. Shaw, Chicago Refinery
John L. Smith, San Francisco Refinery
Eugene Stockton, San Francisco Refinery
Martha L. Svitak, Pasadena, Ca.
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Ronald S. Willett, Los Angeles, Ca.
Joel J. Witte, Los Angeles, Ca.
Jeffrey Wong, San Francisco Refinery
Joseph R. Wrobel, Chicago Refinery
W. Duane Wyrick, Bakersfield, Ca.

10 YEARS Earl R. Bagley, Colton, Ca.
Gary R. Balzhiser, Los Angeles, Ca.
John R. Barron, Richmond, Ca.
Ruskin A. Battersby, Los Angeles Refinery
Jerr A. Bell, Los Angeles Refinery
Gerald C. Berggren, San Francisco Refinery
Thomas J. Berridge, San Francisco Refinery
Thomas F. Bradley, Beaumont Refinery

SERVICE AWARDS



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 James C. Carr, Beaumont Refinery
 Tommy G. Casey, San Francisco Refinery
 Lee D. Chamberlain, Chicago Refinery
 Kenneth L. Clendening, Cincinnati, Oh.
 Shelley Cole, San Francisco Refinery
 G. B. Cravey, Beaumont Refinery
 Darrell R. Davis, Los Angeles Refinery
 Ruby L. Decuir, Beaumont Refinery
 Daniel E. Ener, Beaumont Refinery
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 Clarence J. Galler, Beaumont Refinery
 Diane Gibula, Schaumburg, Il.
 Thomas R. Gilcrease, Beaumont Refinery
 Ruben Gomez, Beaumont Refinery
 Helen C. Hoover, Schaumburg, Il.
 Gene D. Ingram, Chicago Refinery
 Lily U. Kaneshiro, Honolulu, Hi.
 Franklin D. R. Kelley, Beaumont Refinery
 Terry W. Keyes, Beaumont Refinery
 Adam G. Leday, Beaumont Refinery
 Donald E. Lehman, San Diego, Ca.
 James E. Leonard, Beaumont Refinery
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 Robert W. McLaughlin, Charlotte, N.C.
 Michael C. McMillin, Chicago Refinery
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 Thomas J. Miller, San Francisco Refinery
 William F. Miller, Chicago Refinery
 Barbara J. Mise, Los Angeles, Ca.
 Mildred P. Moores, Beaumont Refinery
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 John C. Nevils, Chicago Refinery
 Lloyd I. Parkhurst, Chicago Refinery
 Glen A. Pericoli, San Francisco Refinery
 Leroy Pete Jr., Beaumont Refinery
 James R. Plum, Los Angeles Refinery
 Arlan J. Potter, San Francisco Refinery
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 Joe G. Price, Beaumont, Refinery
 Barbara C. Puckett, San Francisco, Ca.
 Ronald R. Read, Beaumont Refinery
 Edward J. Reiser, Beaumont Refinery
 Daniel C. Reynolds, Chicago Refinery
 Fredrick E. Robbins, Portland, Or.
 Gregory J. Schaeffer, Los Angeles, Ca.
 Anton N. Schilpp, San Diego, Ca.
 Robert M. Schoeppler, Torrance, Ca.
 Joseph A. Sequeira, Los Angeles Refinery
 Ruth A. Summers, Schaumburg, Il.
 Roxie C. Swiger, Beaumont Refinery
 Martin L. Tabbs, San Francisco Refinery
 Peggy A. Thomas, Chicago Refinery
 Alfonso Valdez, Los Angeles Refinery
 G. Carolyn Whitman, Los Angeles, Ca.
 Michael A. Whitmore, Los Angeles, Ca.
 Grayce M. Wilkinson, Schaumburg, Il.
 Thomas P. Zak, Beaumont Refinery
 Larry B. Zumbro, Los Angeles Refinery

MARKETERS & DISTRIBUTORS

55 YEARS Home Oil Co., McMinnville, Tn.
 45 YEARS Jack Russell Oil Co., Clearwater, Fl.
 40 YEARS J. D. Hinkle & Sons, Inc., Buckhannon, W.V.
 Stocks Oil Co., Snow Hill, N.C.
 35 YEARS Carpenter Oil Co., Newark, Oh.
 30 YEARS Bagwell Oil Co. Inc., Onancock, Va.
 Bruce Cooper Oil, Kelso, Wa.
 Couch Oil Co., Durham, N.C.
 D. F. McCaulay, Livermore, Ca.
 Williams Oil Co., Tallahassee, Fl.
 25 YEARS C. & K. Oil Co., Inc., Beckley, W.V.
 D. & R. Distributors, Inc., Kingwood, W.V.
 Neb King, Inc., Roxboro, N.C.
 20 YEARS James W. Biffle, Fallon, Nv.
 Carlisle Oil Co., Fultondale, Al.
 Florence Petroleum Prod. Inc.,
 Florence, S.C.
 William D. Walker, Long Beach, Ca.
 15 YEARS Arlington Oil Co., Inc., Arlington, Tn.
 Holden Oil Co., Henderson, N.C.
 Latvala Oil Co., Inc., Nashwauk, Mn.
 Maury River Oil Co., Inc., Lexington, Va.
 Salter Oil Co., Inc., Temperance, Mi.
 10 YEARS Cougar Oil, Inc., Selma, Al.
 Richard J. Pahrman, Sonora, Ca.
 Sutton Oil Co., Inc., Pageland, S.C.
 Swatek Sales Corp., Lake Geneva, Wi.
 Zero Oil Co., Belzoni, Ms.
 5 YEARS Roettgers Oil, Inc., Milwaukee, Wi.

CHEMICALS

35 YEARS Sekodrei Hawkins, Bridgeview, Il.
 David J. Pyper, La Mirada, Ca.
 Loye G. Rains, Kansas City, Mo.
 Henry L. White, Bridgeview, Il.
 25 YEARS Russell C. Reinking, Brea, Ca.
 Henry T. Waits, Mulga, Al.
 20 YEARS John J. Falco, Clark, N.J.
 Carol E. Gilliam, Unocal Center
 Donald W. Hall, Providence, R.I.
 Paul D. Lundblad, Atlanta, Ga.
 Otto C. Mauthe, Unocal Center
 Larry R. Pittman, Wilmington, N.C.
 James F. Ronan, Conshohocken, Pa.
 Ken R. Rose, Charlotte, N.C.
 Dionisio O. Sarmiento, Arroyo Grande, Ca.
 Howell M. William, Brea, Ca.
 15 YEARS Robert G. Boughton, St. Clair Shores, Mi.
 Paul F. Buchik, Rolling Meadows, Il.
 Rosemary C. Burbridge, Clark, N.J.
 Donald R. Day, Kenai, Ak.
 Sandra L. Grimes, Atlanta, Ga.
 William M. Kendall, Tampa, Fl.
 William F. Kennedy, Kenai, Ak.
 Kenneth P. May, Kenai, Ak.
 Barbara A. O'Neal, Oakland, Ca.
 Douglas A. Olson, Kenai, Ak.
 Claude E. Reeder, Lemont, Il.
 Gerard G. Swayze, Carteret, N.J.
 10 YEARS Christopher D. Arciniega, Brea, Ca.
 Edwin L. Burcham, Kenai, Ak.
 Ernest J. Carrick, Brea, Ca.
 Mott B. Covington, Charlotte, N.C.
 Severina G. Divinagrancia, Newark, Ca.
 Lowell G. Ebert, Brea, Ca.
 Lawrence M. Linderman, Kenai, Ak.
 Graydon Mallory, La Mirada, Ca.
 James M. McGhee, Atlanta, Ga.
 John C. Norder, Schaumburg, Il.
 Gary L. Poindexter, Kenai, Ak.
 Steven W. Rector, Portland, Or.
 Victor Sieux, Newark, Ca.
 Monte B. Smith, Kenai, Ak.
 Anthony L. Soares, Arroyo Grande, Ca.
 Stephen J. Toliver, Kenai, Ak.
 Arthur R. Valencia, Brea, Ca.
 Douglas L. Weathers, Kenai, Ak.
 Raul A. Yates, Charlotte, N.C.

MOLYCORP, INC.

35 YEARS John H. Miller, York, Pa.
 Roy W. Reily, York, Pa.
 25 YEARS William R. Hewitt, Washington, Pa.
 Paul E. Hichman, Washington, Pa.
 James W. Horne, Washington, Pa.
 Bennie F. Martinez, Questa, N.M.
 Robert G. McBratney, Washington, Pa.
 Richard A. Miles, Washington, Pa.
 John F. Penn Jr., Washington, Pa.
 John A. Pettit, Washington, Pa.
 A. Ray Plants, Washington, Pa.
 Shirles L. Williams, Washington, Pa.
 15 YEARS Peter C. Johnson, Denver, Co.
 10 YEARS Charles W. Clontz, Mountain Pass, Ca.
 Michael B. Glatfelter, York, Pa.
 Bradley E. Knaub, York, Pa.
 Steve V. Steever, Mountain Pass, Ca.
 Michael S. Sterner, York, Ca.

POCO GRAPHITE, INC.

10 YEARS Thomas W. Norriss Jr., Decatur, Tx.

RETIREMENTS

Corporate

William D. Farr, April 1, 1941
 Leroy E. Green, September 12, 1967
 Robert F. McClatchey August 19, 1954
 William S. McMenomy, October 1, 1954
 Joseph L. Wilson, November 16, 1953

Energy Mining

Vernon L. Maple, March 14, 1983

Science & Technology

James A. Klotz, December 19, 1960
 Robert C. Ransom, April 1, 1969

Oil & Gas

Theodore E. Alexander, May 24, 1960
 Richard A. Armstrong, January 15, 1951
 Elvis W. Bridges, December 1, 1952
 Lawrence B. Folks, July 12, 1956
 M. R. Hensley Jr., February 18, 1952
 William R. Hizar, March 27, 1950
 Bette R. Jensen, November 1, 1951
 Carl E. Newgreen, August 22, 1949
 Jack Perry, August 20, 1951
 Alton R. Roome, April 10, 1945
 Shirley A. Tillery, November 19, 1962
 Edward E. Zinser, June 19, 1944

International Oil & Gas

William A. Sax, November 15, 1955

Refining & Marketing

George J. Babjak Jr., January 13, 1949
 Thomas Barton, July 28, 1952
 Eric J. Broussard Jr., June 28, 1949
 Vernon E. Dearden, June 7, 1950
 Marvin E. Ditmars, May 8, 1953
 Reno A. Forza, October 5, 1956
 Jeanne M. Gallagher, March 1, 1977
 Jack K. Goff, July 17, 1967
 James L. Halliwell, June 8, 1949
 Ernest R. Herrera, July 29, 1968
 Milton M. Hirsch, January 5, 1954
 Billy Hobbs, May 29, 1948
 Charlie W. Holt, October 12, 1943
 Don H. Johnson, September 1, 1955
 Elmer G. Johnson, March 31, 1949
 Bernard M. Juresich, July 21, 1952
 George T. Kleespies, June 13, 1949
 Lawrence L. McLaughlin, January 17, 1972
 Edward B. Mudron, July 12, 1943
 Eldon V. Newland, March 29, 1948
 Stanley P. Nickleski, January 20, 1949
 Ernest L. Savala, March 24, 1952
 Joseph E. Sewell, October 27, 1947
 Barbara J. Shevchik, January 14, 1957
 Morris C. Teitgen, November 29, 1945
 Charlie L. Tompkins, January 30, 1950
 James M. Tompkins, August 4, 1947

SERVICE AWARDS



Chemicals

Lloyd M. Lundquist, November 1, 1951
Joseph C. Montagnino, March 1, 1959
David J. Pyper, February 15, 1952
Andrew Vargo, June 1, 1954

Molycorp, Inc.

Juan H. Fernandez, March 29, 1966
Luis Sena, March 14, 1964

IN MEMORIAM

EMPLOYEES

Science & Technology

George W. Lassell, December 5, 1986

Oil & Gas

Floyd R. Mullins, November 22, 1986
James E. Vest Jr., July 25, 1986

Refining & Marketing

Vincent J. Lioce, June 30, 1986

RETIREES

Corporate

Cleo W. Brooks, February 16, 1987
William W. Philips, December 1, 1986

Science & Technology

Donald E. Carr, September 12, 1986
Wilmer D. Haley, December 3, 1986
Leslie L. Sharar, November 26, 1986

Oil & Gas

George L. Anderson, January 26, 1987
Charles W. Buzzard, December 10, 1986
Harold L. Hamilton, December 7, 1986
Creel D. Laidley, January 27, 1987
John L. Shaw, February 4, 1987
Gaston Stephenson, February 3, 1987
Sidney J. Vial, November 15, 1986

Refining & Marketing

Clarence J. Abrams, February 1, 1987
Ace C. Ames, January 30, 1987
Benjamin F. Andis Jr., October 27, 1986
George W. Barker, November 6, 1986
Raymond W. Bee, February 11, 1987
Bee R. Bergman, June 9, 1986
Finis C. Bowles, December 27, 1986
Thomas H. Bowser, July 22, 1986
Gordon L. Boyce, January 19, 1987
Everett W. Bristow, February 1, 1987
Burton C. Butler, November 8, 1986
John C. Calhoun, November 5, 1986
William L. Carden, November 13, 1986
Roy A. Childers, July 7, 1986
Paul E. Coates, November 19, 1986
Herbert H. C. Cropp, November 1, 1986
Wyatt L. Crull, July 10, 1986
Hurshell Dennis, February 16, 1987
James J. Dowling, October 31, 1986
John D. Drake, November 18, 1986
Aileen M. Ernst, November 1, 1986
Winfred A. Erwin, January 31, 1987
Cecilia V. Firnbach, June 25, 1986
Mabel A. Force, December 28, 1986
George O. Forgie, November 19, 1986
Edward J. Gary, June 30, 1986
Edwin A. Geach, December 6, 1986

Thomas H. Glendon, October 23, 1986
Leo V. Glover, July 5, 1986
Charles J. Green, June 24, 1986
Cohen C. Hamilton, December 2, 1986
Harold L. Hamilton, December 7, 1986
Vivian N. Hermann, June 28, 1986
August F. Hisman, July 13, 1986
John R. Holland, October 31, 1986
George F. Hopkins, February 12, 1987
Florence M. Horn, November 11, 1986
Mallie E. Johnson, November 5, 1986
Frank W. Lennon, February 15, 1987
Robert C. Lewis, June 28, 1986
Merle J. Lindblad, June 25, 1986
Melvin L. Lund, December 5, 1986
Arthur A. Marcos, July 15, 1986
Wallace J. Maynard, November 21, 1986
Gregg B. McBride, November 14, 1986
Charles F. Meyer, October 28, 1986
Ella Mae Newsome, June 22, 1986
Philip S. Nisson, November 15, 1986
Michael Pesarchick, January 31, 1987
Fred C. Ponder, November 25, 1986
George Posthuma, February 11, 1987
Willard R. Priest, November 29, 1986
Henry R. Ramke, November 14, 1986
James E. Riou, December 6, 1986
Nettie B. Rose, November 10, 1986
Oliver Rothlisberger, September 16, 1986
Edward S. Rutkowski, February 16, 1987
Margaret K. Sarna, November 28, 1986
Vernon J. Schexnayder, December 2, 1986
Frank J. Schleibaum, July 18, 1986
Floyd O. Shirley, November 29, 1986
Maurice J. Siebenhausen, October 23, 1986
Capt. John Smith, July 21, 1986
Richard Spaan, July 3, 1986
Frank S. Sucharski, December 7, 1986
Bernard W. Toney, September 24, 1986
Eugene C. Vaughan, November 28, 1986
Frank L. Wilson, November 5, 1986
Samuel H. Zoller, November 22, 1986

Chemicals

Engard Burns, February 11, 1987
Robert L. Moore Jr., November 28, 1986

Molycorp, Inc.

James R. Goldsmith, January 25, 1987
Russell L. Heck, November 3, 1986



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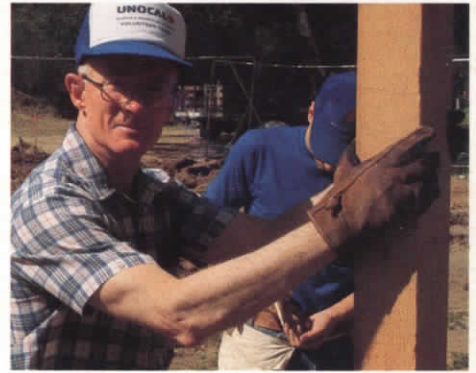
Performance Management puts theory into practice—with some impressive results throughout Unocal.

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Drug abuse has become a national tragedy. Unocal's John Newton and five major league baseball players spoke to company employees, their families and neighbors to deliver the message, "Just say no."

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Members of Unocal's S&T Volunteers use their leisure time to paint houses, clear nature trails, build playgrounds and perform other jobs to help local community organizations.

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Cover: No, it's not the latest in high tech drill bits. Our cover subject this issue is a 3-million-year-old microfossil, enlarged 250 times. Scientists study microfossils to gain clues in the search for oil and gas deposits. Story on page 1.

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