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PATIENCE PAYS OFF

“Welcome to Calipatria: home of the world’s tallest flagpole and the lowest-down city in the Western Hemisphere — 184 feet below sea level?”

So reads the sign posted at the city limits of Calipatria, California. Perhaps the city’s leaders should consider adding a new claim to the sign: “Gateway to one of the world’s most promising hot-water geothermal fields?”

Located near the Salton Sea, Calipatria is the closest town to Unocal’s Salton Sea Unit 3 — the company’s first large-scale geothermal operation and power plant in the Imperial Valley. After more than 25 years of production testing and painstaking research and development, Unocal is now harnessing the Salton Sea area’s abundant geothermal energy in a big way.

On April 5, the company dedicated the new 47,500-kilowatt plant in high style. Geothermal division personnel conducted tram tours of the facility throughout the day. A tent set up outside the plant displayed geothermal energy exhibits, including a scale model of the new facility. The dedication ceremony, followed by a buffet lunch, recognized the contributions of all those who worked toward Unit 3’s development. Attendees included local landowners and public officials, as well as Unocal employees.

In particular, company management and elected officials paid tribute to the Geothermal Division’s enduring effort to gain control over the Salton Sea reservoir’s salty, mineral-laden fluids. For years, these corrosive brines wreaked havoc on production equipment. But technological innovation — and a large measure of determination on the part of the Geothermal and Science & Technology Division personnel — led to ultimate success.

The ceremony also helped usher in a new role for the Geothermal Division — that of a commercial producer of electricity. In Unocal’s other geothermal operations, the steam generated is delivered to power plants operated by other companies. But Desert Power, a wholly owned Unocal subsidiary, owns the Unit 3 power plant. Unocal, under contract to Desert Power Company, operates the power plant as well as the brine processing facility.

“We’re moving ahead to fully develop this important resource,” said Richard J. Stegemeier, Unocal’s president and chief executive officer, during the ceremony’s main address. “In fact, the Salton Sea field may eventually support more electrical generating capacity than any other geothermal field in the world.”

Among the approximately 300 people attending the dedication were Stephen Lipman, president of Geothermal; Carel Otte, the division’s former president; and several Unocal senior executives and board members.

“The success of the technology that we’re celebrating today is the result of a monumental effort on the part of two Unocal groups — the Geothermal Division and the Science & Technology Division,” Lipman told the gathering. Lipman gave special congratulations to the Imperial District employees. “Today is your day in the sun,” he said. “You’ve triumphed over the toughest geothermal fluid in the world.”

Another speaker at the ceremony was Jeanne Vogel, chairman of the Imperial County Board of Supervisors. Vogel cited a county report estimating that up to 1.4 million kilowatts of energy could be harnessed from the Salton Sea area’s geothermal resource.



Salton Sea Unit 3 (top) is Unocal's first large-scale geothermal operation in California's Imperial Valley, generating 47,500 kilowatts of electricity. "We're moving ahead to fully develop this important resource," said Richard J. Stegemeier.



Olin Whitescarver (left), operations manager for the Geothermal Division's Imperial District, presents a plaque to Carel Otte in recognition of his leadership role in Unit 3's development.



Unit 3's state-of-the-art control room permits continuous monitoring of the facility's operation.



Above, Unit 3's standard and low-pressure crystallizers. Right, some of the 300 people who attended the facility's dedication ceremony.





Top, Geothermal Division President Stephen Lipman congratulates Imperial District employees during Unit 3's dedication. Above, guests board a tram for a guided tour of the Salton Sea brine facility and power plant.

The local community stands to benefit considerably from Unocal's Salton Sea development. In addition to strengthening the local tax base, the project figures to provide many jobs for area residents. The company has worked closely with local employment agencies to hire qualified workers, says Olin Whitescarver, Imperial District operations manager.

Both Stegemeier and Lipman credited Carel Otte as the driving force behind the Salton Sea project. "I don't know whether Unit 3 is a tribute to persistence or just plain stubbornness," jokes Otte, who in January stepped down as the Geothermal Division's president. Otte's pioneering work in geothermal energy won him membership in the prestigious National Academy of Engineering last year.

"I'm amazed by how much progress we've made in the technology," Otte says, "particularly the technology to inhibit scaling (clogging of the production pipes)."

The Unit 3 brine processing facility employs a major technological breakthrough called the crystallizer/clarifier process. The technique prevents the deposit of particles on the walls of the production piping. When left unchecked these particles can plug the pipes, which halts production. This innovation was developed originally by Magma Power, but Unocal has extended and improved the technology considerably.

Another technological hurdle that Unocal has overcome is corrosion of production equipment. Collaborating with corrosion specialists from the Science & Technology Division, the Imperial District drilling department identified alloys that could withstand the corrosive agents in the reservoir's brine.

Unit 3 is located near the southern tip of California's Salton Sea. The power plant produces 47,500 kilowatts of electricity, which is sold to Southern California Edison Co. One well that supplies steam and brine to the processing facility, called Vonderahe 1, is the world's largest geothermal well. The well produces 2.5 million pounds of hot brine and steam per hour — more than 170,000 barrels each day. Unit 3's other producing well, Sinclair 10, produces 1.75 million pounds per hour.

The wells tap the resource about 5,500 feet underground, where the average temperature is 520 degrees Fahrenheit. Heated by molten rock at great depths, the hot brine and steam flow from each producing well to a wellhead separator. There, the first stage of "flashing" occurs — a sudden reduction of pressure that causes some of the liquid to change into steam. The vapor exits off the top of each separator and enters the main steam line to the power plant turbine.

The liquid brine is routed to the standard-pressure crystallizer, where it undergoes another stage of flashing. The remaining liquid then flows to a low-pressure crystallizer, where the final stage of flashing occurs. Steam generated during these flashing phases is cleaned in two "scrubber" vessels. The scrubbers remove water droplets and particulates.

The residual brine flows to another separator and then into the clarifier, where clean brine rises to the top. This solution enters the secondary clarifier for further settling of the solids. Finally, the treated brine is acceptable for reinjection into the underground reservoir. Unit 3 has three injection wells.

"The fluid entering the clarifier is heavily laden with suspended solids," says David Newell, district area production engineer. "It looks like sludge. But when it comes out of the secondary clarifier, the fluid is crystal clear, like drinking water. That fluid can go down-hole without plugging up the formation."

Meanwhile, in the power plant, the produced steam drives a turbine, which in turn powers the electricity generator. "Energy is essentially heat, and the turbine extracts the heat from the steam," explains John Featherstone, field superintendent for the Salton Sea operations. About 25 percent of the brine produced by the wells is flashed into steam that ultimately powers the turbine.

The electricity generated is channeled to a transmission system operated by the Imperial Irrigation District, a local utility. The system transports the electricity to the northern Coachella Valley, located 100 miles away. There, the power is delivered to Unocal's customer, Southern California Edison, which sells the electricity to consumers in Southern California.

"We're doing everything here," says Featherstone. "We're operating the production wells, the brine handling system, the steam gathering system and the power plant."

Unit 3's success is largely an outgrowth of lessons learned from Unit 1, a 10,000-kilowatt pilot plant just down the road from Unit 3. Unocal drilled the first well for Unit 1 in late 1978. Southern California Edison built the power plant in 1982 and ran it until 1987, when Earth Energy, another wholly owned Unocal subsidiary, assumed ownership. The utility had opted to bow out of geothermal power generation efforts in the Salton Sea area.

Unit 1's production facility has served as a stringent test for the crystallizer/clarifier process. Pilot testing for the system began in 1979.

Scaling can occur during brine flashing and processing because of a drop in pressure. Minerals dissolved in the fluid then have a natural tendency to come out of the solution and attach themselves to the wall of piping. The crystallizer/clarifier process protects pipes and other vessels from scaling by providing alternative sites for the precipitating solids to attach.

Particles that have previously come out of the solution are injected into the crystallizer. The brine's precipitating solids attach themselves to the newly introduced particles, rather than a pipe's wall.

In the clarifier, the suspended solids are separated from the brine and recirculated through the processing system. As a result, these solids grow by attaching themselves to other suspended solids. Periodically, the material, called "seed," is extracted from the clarifier and sent through a filter.

"The seed is nearly pure silica—a nonhazardous byproduct resembling fine beach sand," explains Philip Messer, the Imperial District production superintendent. After it has dried, the silica is mixed with cement and used for road and levee construction and maintenance.

"Unit 3 made only minor refinements to the crystallizer/clarifier process," David Newell says. "Unit 1 and Unit 3 are almost identical. We just scaled up the equipment and extended the technology based on what we've learned from Unit 1."

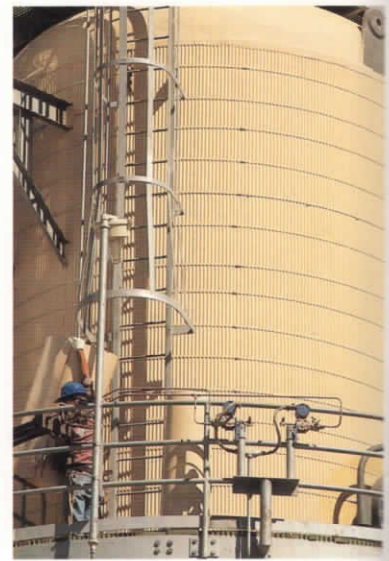
"Certainly, Unit 1's success is what sold Unit 3," Featherstone agrees. "Unit 1, which was designed and built for demonstration purposes, has served as a development plant. It has an incredible on-line capacity record—the best of any power plant in the western United States the past couple of years."

Of course, a steady production rate makes corrosion control all the more crucial, because production pipes are continuously exposed to highly saline and mineral-laden fluids. During efforts to demonstrate and refine the crystallizer/clarifier technique, Unocal was also engaged in extensive testing of production metallurgy.

"During a six-year period, we tested practically all the known alloys, in order to find out which ones would work and which ones would be the most economical," says John Bush, district drilling superintendent. "An alloy could be capable of lasting 30 years, but if it's prohibitively expensive, it doesn't do us any good."

Drilling personnel lowered test casing down into wells and recovered the casing as much as six months or even a year later. Then the alloy's rate of corrosion could be measured.

Many of the alloys were acceptable for some production areas, while inadequate for others. "Temperatures and conditions at the bottom of the well are different from those at the top," Bush says. "The bottom is generally harsher. For Unit 3, we chose materials that can either last the lifetime of the well, or that can be rather easily and inexpensively replaced."



Above, a worker inspects the standard-pressure crystallizer. Right, insulation is applied to a steam line.



Guests enjoy a buffet lunch following the dedication ceremony.





Left, Unit 3's cooling tower. Top, an Imperial District employee uses a scale model to explain the plant's operation to guests at the April dedication. Above, the wellhead of Vonderahe 1, the world's largest geothermal well.

Unocal's fight with corrosion and scaling in the Salton Sea area can be traced back to the early 1960s, when Carel Otte was vice president and manager of Earth Energy, Inc., Pure Oil's geothermal energy subsidiary. The company set out to use the area's geothermal energy to recover minerals, particularly potash — which is used as a fertilizer.

"We drilled a total of three wells," Otte recalls. "We operated a pilot plant for mineral recovery, and that's when we encountered a lot of problems — mostly scaling. Corrosion wasn't a problem, but only because the pipes plugged up before they had a chance to corrode."

In 1965, Pure Oil merged with Unocal, and Unocal's management elected to concentrate on the company's geothermal production efforts at The Geysers — a dry steam reservoir in Northern California. Otte, however, remained intrigued by the potential of the Imperial Valley's hot water fields.

"We recognized the problems associated with developing the Salton Sea reservoir," he says. "But the Imperial Valley still had a lot of appeal because it was near the fast-growing energy market of Southern California."

Unocal continued to conduct exploratory work and production experiments near other Imperial Valley communities — Brawley, East Mesa, Holtville and Heber. In 1978, the company returned to the Salton Sea, after the Southern Pacific Land Company and Mono Power Company (a Southern California Edison subsidiary) sought Unocal's partnership in a power plant project. The arrangement resulted in the construction of Unit 1. When Unocal's partners decided to pull out of the project, Unocal bought their interests and took complete control of the facility.

"It was very sobering having that power plant there," Otte says. "It's one thing to do research on a small scale and on an intermittent basis. But to be in the power generating business, we had to operate the production facilities 24 hours a day, seven days a week."

In 1990, the Unit 1 facility will be joined by another operating power plant — Unit 2. Sitting adjacent to Unit 1, Unit 2 will employ a 10,000-kilowatt turbine originally used at another Unocal geothermal project in nearby Brawley. In addition, a low-pressure, 4,000-kilowatt turbine will harness the steam released from Unit 1's vent tank.

Unit 2's production facility will employ a new geothermal innovation — a technology that keeps dissolved solids in solution by modifying the fluid's acidity. This new development shares the same function as the crystallizer/clarifier process — the prevention of scaling.

To preserve Unocal's historical ties with the Salton Sea area, the subsidiary operating Unit 1 — and soon Unit 2 — bears the same name as Pure Oil's geothermal energy subsidiary, Earth Energy, Inc. "We decided to use the Earth Energy name for sentimental reasons, to honor the division's history and tradition," Otte explains.

"This industry was nowhere in the early 1960s. We started it, so we had to learn the hard way. But Unocal has proved to the world that geothermal development can be pursued economically and competitively with other sources of energy."

Today, Unocal geothermal operations, located in California and the Philippines, combine to supply power plants with an electrical generating capacity of more than 1.8 million kilowatts. Work is now under way to develop a large resource in Indonesia, 40 miles south of Jakarta. The project's power plant, expected to be on line by 1992, will generate 165,000 kilowatts.

"Scientists have long been intrigued by the possibility of utilizing the energy created by the natural heat of the earth," Stegemeier noted in his dedication remarks. "Nature supplies the heat of the earth, and we supply the technological expertise to make it do our bidding. Through the combined efforts of energy companies, public utilities and the government, we can develop and use this valuable energy source for generations to come." C.S. 76

Southern California's Salton Sea area, located in the agriculturally rich Imperial Valley, is the site of one of the world's largest geothermal hot-water fields. But for years the deep reservoir's severe environment frustrated Unocal's efforts to harness this abundance of energy.

A turning point for the project came in 1983, when the Science & Technology Division's corrosion research and engineering group identified a titanium alloy that could withstand the reservoir's harsh conditions — especially its high temperatures, acid gases and concentrated salt content. Today, the production casing of three of the project's wells is composed of this alloy, Beta C titanium. This use of Beta C titanium was so innovative that the company earned a patent for the alloy's application in geothermal production.

"Our Geothermal Division plants probably pose more challenges in the selection of production materials than any other division in Unocal," says Bill Amend, a metallurgical engineer in the corrosion group.

However, the Geothermal Division isn't unique in its dependency on corrosion control efforts. In fact, the Science & Technology corrosion specialists service all of the company's divisions, principally advising operations personnel on how to protect Unocal's production and processing equipment from corrosion.

Equipment needing safeguarding ranges from oil well production tubing to product pipelines and storage tanks. The corrosion control team, consisting of eight engineers and two technicians, is based at the Fred L. Hartley Research Center in Brea, California.

The Salton Sea project illustrates the increasingly crucial role that corrosion specialists figure to play in Unocal's future. As the company becomes further committed to viable alternative energy sources — such as geothermal energy — and taps ever deeper oil and gas reservoirs, the control of corrosion will demand inventive approaches.

HIGH-TECH PROTECTION



Indeed, many of today's most promising geothermal, gas and oil reservoirs are miles under the earth's surface. Underground temperatures generally rise with depth, so the temperatures in these reservoirs are extremely high compared to shallower reservoirs.

Further, corrosive gases such as hydrogen sulfide are often more plentiful at great depths. Like carbon dioxide, another corrosive agent, hydrogen sulfide forms an acid when it dissolves in water.

Corrosion, in general, reflects a metal's tendency to return to the more stable compound state from which it was refined. Extreme conditions in deep reservoirs can aggravate this predisposition, triggering a chemical reaction that causes the gradual destruction of a pipe's alloy. In such cases, conventional production equipment made of carbon steel simply isn't durable enough.

"If the Salton Sea project used the same types of materials used for a typical oil and gas well, for example, the pipe would perforate as a result of corrosion in a matter of months," Amend says.

The Salton Sea reservoir conditions are hardly typical. The geothermal fluids contain as much as 20 to 30 percent salt — about 10 times as much as sea water. The temperature of the reservoir, located 3,000 to 6,000 feet below the surface, reaches 550 degrees Fahrenheit. Moreover, hydrogen sulfide and carbon dioxide are present.

"The largest and most comprehensive corrosion test I've ever worked on was the test for the Salton Sea project, and I've been working in the corrosion field for 17 years," says Carl Cron, supervisor of corrosion research and engineering. During this testing effort, Cron and Amend set out to determine which alloys could best withstand the reservoir's hot, salty brine.

Unocal Science & Technology Division specialists work to protect equipment from the threat of corrosion. Above left, the harm that can result from corrosion is evident on this section of pipe that failed a high-temperature test.

The researchers, along with Geothermal Division personnel, constructed a 1,600-foot string of production tubing composed of eight different high-grade alloys. The tubing was lowered into a well, where it operated for six months. This was an ideal test of the alloys' durability, because actual formation fluids were produced through the string before it was retrieved for study.

"Beta C titanium performed the best," Cron recalls. "It was unaffected by the environment — virtually impervious to corrosion. We also believe it may have applications in oil and gas production."

The research group is now investigating whether Beta C titanium could benefit future oil and gas production efforts in the Mobile Bay area, located offshore Mississippi and Alabama. Last year, Union Exploration Partners — the master limited partnership that holds substantially all of Unocal's oil and gas assets in the Gulf Region — discovered what appears to be a new major gas field in the area. Crews drilled about four miles below the surface, penetrating the Norphlet formation.

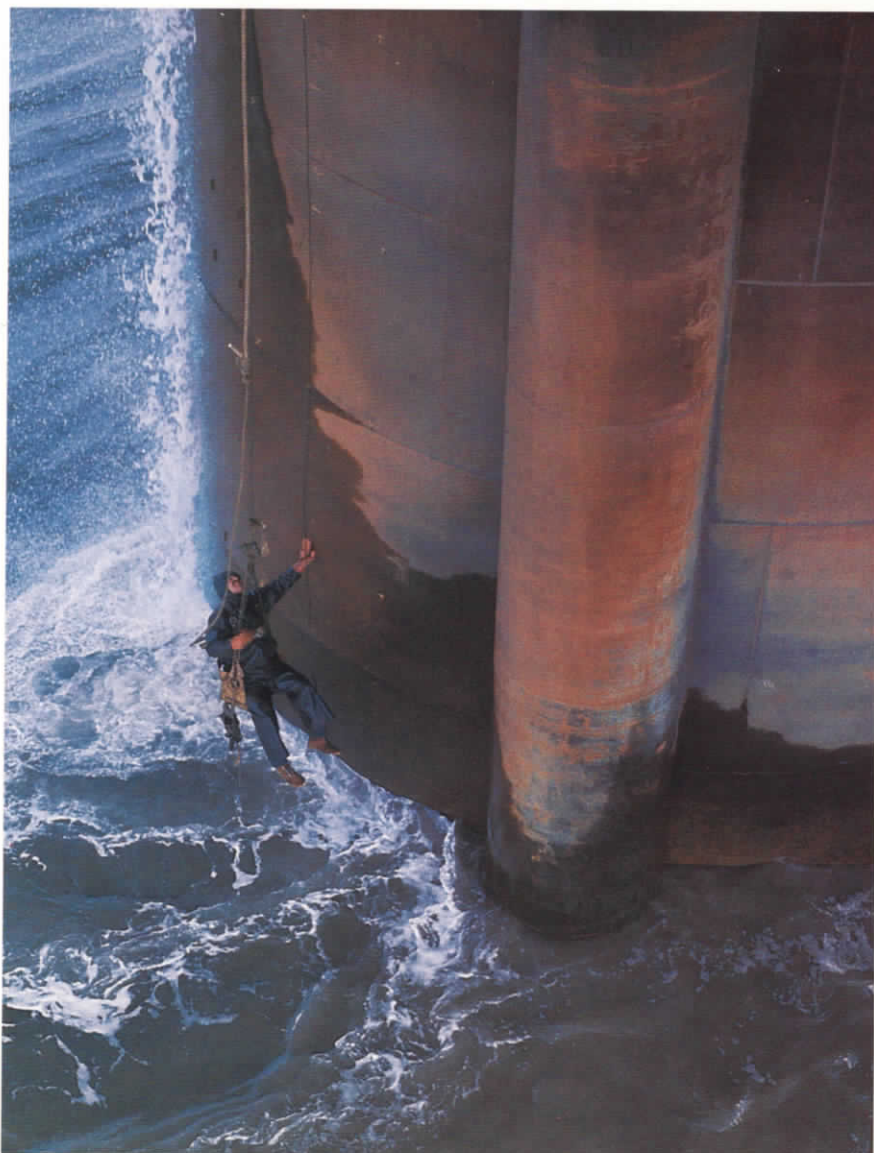
Company geologists believe the Mobile Bay area shows great promise as a major producer of natural gas. However, like the Salton Sea geothermal reservoir, Mobile Bay's deep gas deposits pose a major corrosion control challenge. Temperatures in the formation can reach up to 430 degrees Fahrenheit, and the reservoir pressure can be as great as 20,000 pounds per square inch. Geologists also believe that the bay's Norphlet formation has a high content of hydrogen sulfide and perhaps elemental sulfur.

"The presence of elemental sulfur in oil and gas production is rare," Cron explains. "It's a result of high hydrogen sulfide concentrations. Elemental sulfur can promote cracking in an alloy that normally wouldn't crack."

In this particular type of corrosion — known as stress corrosion cracking — very little metal is lost, but piping becomes riddled with cracks and loses structural integrity.



Above, technician Mike Tuffley prepares a sample for metallurgical examination. Below, an engineer inspects an offshore platform for signs of corrosion.





Above, corrosion specialist Mark Schilling inspects the protective coating on pipes that will be used for offshore production. Below, he studies the coating inside a crude oil storage tank. Left, test panels used to evaluate coatings for offshore equipment.



“We’re now conducting tests to determine whether Beta C titanium will perform well under the kinds of conditions found in Mobile Bay,” Cron says. “If Beta C titanium isn’t appropriate, we’ll select a nickel-based alloy instead.”

One of the corrosion team’s responsibilities is keeping abreast of the wide range of materials — both metals and plastics — available for production and storage equipment. In most cases, less expensive carbon steel is adequate. Stainless steel, consisting of at least 12 percent chrome, is the next step up in resistance to corrosion, says Robert Palmer, another engineer in the corrosion group. Adding more chromium, as well as molybdenum and nickel, can make stainless steel even further resistant to corrosion.

Of course, these alloys are more expensive than carbon steel, the material typically used in oil and gas production pipes and equipment. But corrosion-resistant alloys can ultimately be more economical by cutting maintenance costs and stabilizing production.

In some low-temperature, low-pressure environments, plastic pipe is more durable than steel. Plastics are also less expensive than many corrosion-resistant alloys. In the Stearns field in Brea, for example, one of the gas pipelines is made of plastic reinforced with fiberglass. In addition, Molycorp and the oil shale project in Colorado both use corrosion-resistant polyethylene pipes in some of their operations.

Safeguarding against corrosion isn’t limited to the selection of materials, however. Sometimes corrosion can be entirely eliminated using an electrochemical technique known as cathodic protection.

Corrosion itself is an electrochemical process in which metallic atoms in a structure lose electrons and, consequently, become positive ions. The ions flow into moist soil or water, dissolving the equipment’s material. As a result, the equipment is left weakened or even destroyed.



Above right, corrosion of a carbon steel pipe welded to an alloy steel flange.

Metal atoms have a natural propensity to lose electrons. But cathodic protection provides a surplus of electrons to these surface atoms, thus thwarting the ionization process, Palmer explains.

One type of cathodic protection, which is particularly effective in protecting buried pipelines, is called the “sacrificial anode” method. A metal that’s more prone to corrosion than steel — such as aluminum, magnesium and zinc — is buried near a pipeline that needs protection. A wire is used to electrically connect the buried metal — which acts as an anode, or positively charged electrode — to the pipeline.

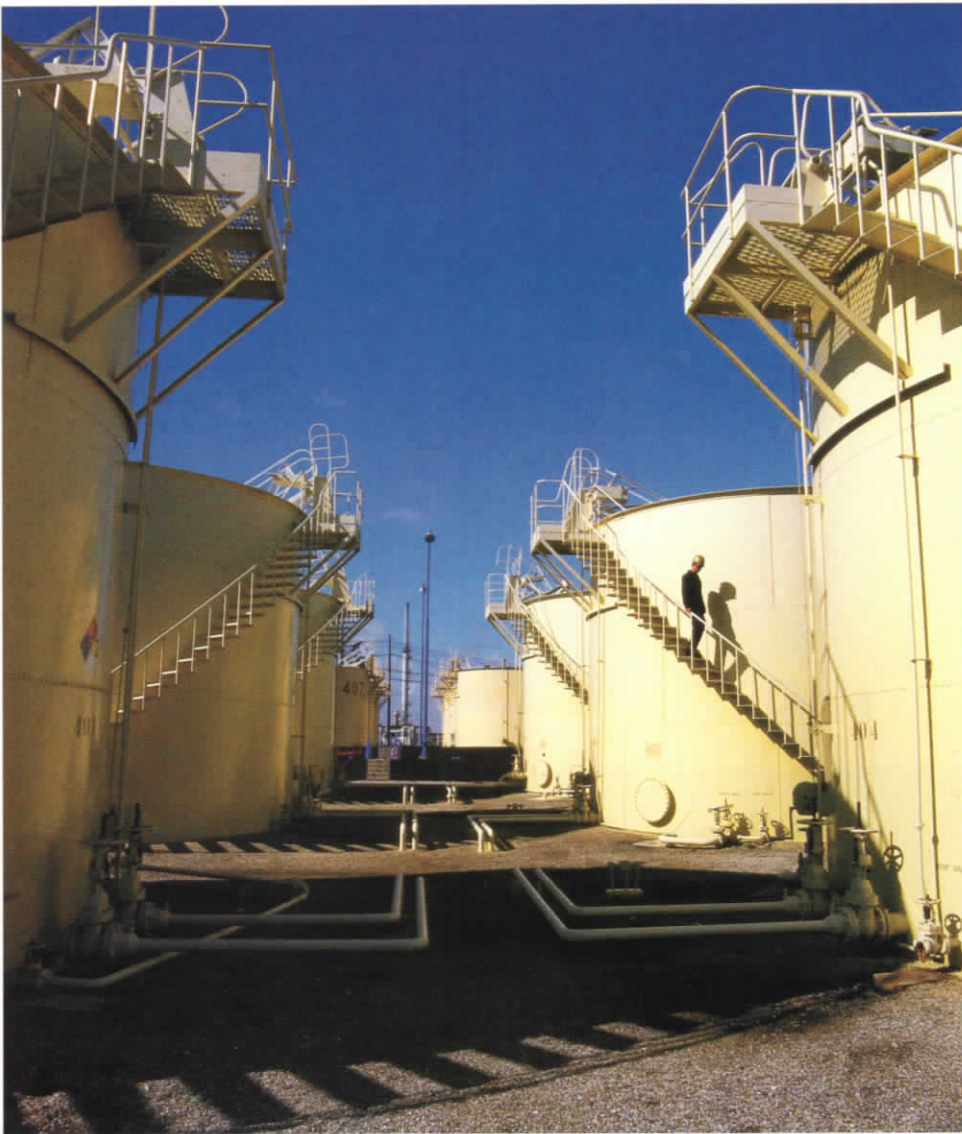
This “sacrificial anode” readily loses electrons, which flow through the wire to the pipeline. These additional electrons are then available to prevent the surface atoms on the pipeline from ionizing and, thus, corroding.

Another method of cathodic protection provides extra electrons using a rectifier, which converts alternating current to direct current. Unocal routinely uses this technique to protect buried pipelines, storage tank bottoms and some offshore platforms.

Electrons flow from the rectifier to the structure needing protection, again preventing the formation of surface ions and corrosion. “We monitor the effectiveness of cathodic protection systems routinely by making voltage readings,” Palmer says. “From the absolute value of voltmeter readings, I can tell whether corrosion is possible.”

Cathodic protection primarily guards against exterior corrosion. However, the technique can be used to protect the interior of a vessel when water is present. “Many of the water tanks in our refineries have been cathodically protected,” Palmer says. “So have other storage tanks that contain a considerable amount of water.”

One common method of protecting the interiors of pipes in oil and gas production is the continuous injection of corrosion inhibitors into a well. Although hundreds of types of corrosion inhibitors are available, they generally fall into two categories — film formers and scavengers, Palmer says.



S&T's corrosion experts regularly inspect and test corrosion control systems for all of the company's operating divisions. Below, inspecting anodes that will protect an offshore pipeline. Right, Carl Cron, supervisor of S&T's Corrosion Research and Engineering group.



A film former attaches itself to the inside surface of a pipe, providing a barrier to corrosive agents. "The layer of inhibitor may be extremely thin — perhaps just one molecule thick," Palmer says. But corrosion inhibitors, when effective, can permit production in corrosive environments without the greater expense of using pipes made of corrosion-resistant alloys.

Scavengers and neutralizers combat corrosion by changing the environment. For example, some chemicals can neutralize acidity. Others can remove corrosive agents such as dissolved oxygen or hydrogen sulfide.

Not all means of keeping corrosion at bay are highly technical. Paints and coatings frequently provide adequate protection against both internal and external (atmospheric) corrosion. "We probably deal with 100 or so coating manufacturers," says corrosion specialist Mark Schilling. "I'm continually evaluating different kinds of coatings."

The research team tailors each corrosion control program to the special needs of a particular facility or project. Once the program is in place, the specialists consult regularly with operations personnel to ensure proper maintenance. "For instance, I usually go to Indonesia about twice a year to monitor ongoing corrosion control efforts there and to train local engineers," Palmer says. The group also evaluates the cathodic protection systems on many of Unocal's offshore platforms on an annual basis.

The corrosion group's members who specialize in protecting refinery equipment — engineers Ara Bagdasarian and Bill Coyle — consult with personnel at Unocal's five refineries on an almost daily basis. "Proper material selection as well as corrosion protection and control are critical factors in the safe operation of our refineries," Cron says.

S&T specialists continually evaluate different types of anti-corrosive coatings. Above right, a coating test panel that failed.



However, Bagdasarian and Coyle aren't restricted to protecting Unocal facilities. Because the company licenses its hydrocracking and hydrotreating technology to other firms, the corrosion group's refinery team fields inquiries about metallurgy and corrosion from licensees throughout the world. Bagdasarian and Coyle also consult regularly with personnel from Unocal Chemicals Division plants and the retort and upgrade shale oil plants in Parachute, Colorado.

Like other members of the corrosion group, the refinery specialists devote considerable time to failure analysis. When a piece of equipment fails, the corrosion group is often called upon to perform laboratory tests to pinpoint the exact cause.

"Some of our analyses have resulted in the recovery of thousands — in some cases, hundreds of thousands — of dollars from other parties," Cron says. "We've demonstrated that the failures resulted from faulty manufacturing on the part of our suppliers."

Analysis findings also help to prevent similar failures from occurring in the future. And, as Cron is quick to point out, "preventing failures adds directly to Unocal's profitability."

Another principal goal of the corrosion group is educating company personnel about corrosion. The group publishes a quarterly newsletter that's distributed to operations personnel throughout the company. The corrosion specialists also host an annual two-day seminar that addresses corrosion control issues. The seminar, held in Brea, attracts personnel from all company divisions. Over the past 15 years, about 600 people have attended. Similar presentations are held periodically at field locations.

"Mother Nature will always keep corrosion specialists in business because of the strong tendency for alloys to return to their natural state," Cron says. "Because corrosion control is of critical importance, our employees must know how to monitor our control systems and how to recognize signs of corrosion." C.S. 76

Approaching Our Second Century

In his address to shareholders at Unocal's 99th annual meeting, President and Chief Executive Officer Richard J. Stegemeier discussed the company's strategies for growth as it approaches its 100th year of operation.

"Few companies — in or out of the petroleum industry — can say that they've been in business for the past 100 years," Stegemeier told those assembled for the meeting, held at Unocal Center in Los Angeles on April 24. Two of the guiding principles behind Unocal's century of success — an emphasis on technological innovation and long-term growth — will continue to move the company aggressively forward in the years ahead, Stegemeier said.

"Complacency had no role in the company's past, and it will have no role in the company's future," asserted Stegemeier, who was named chairman of Unocal's board of directors after the meeting, succeeding Fred L. Hartley (see accompanying story).

Stegemeier's remarks were centered around the four key operating goals he has established for the company: increasing profitability, expanding the energy resource base, developing a satisfactory rate of return on all assets, and encouraging innovation and creativity to promote long-term growth.

"To help us achieve these goals, we've pushed responsibility deeper into the organization," Stegemeier said. "We've also expanded our communication efforts at every level — with shareholders, with employees and with the general public."

Taking each of the four goals in turn, Stegemeier reviewed recent progress and commented on the company's plans for the future. The effort to increase profitability was discussed first. "This goal is first among equals, because — one way or another — all of the other goals contribute to its success," Stegemeier said.

Reducing costs is one way to help increase profits, he explained. One of the efforts being pursued on this front by Unocal is effective management of the company's debt, which had increased substantially as a result of Mesa Petroleum's hostile takeover raid in 1985.

"Through cost-cutting, careful controls on capital expenditures and timely refinancing, we've reduced company debt from a peak of \$6.1 billion in late 1985 to \$4.3 billion at the end of last March," Stegemeier reported. "Shareholders' equity was \$2.2 billion — an increase of more than \$600 million in three years — and our debt ratio was down to 66 percent." This was achieved, he added, despite a period of intense volatility in crude oil prices.

Increasing profitability also hinges on maintaining growth in product sales. Despite the economic turmoil that has beset the oil industry in recent years, Unocal's petroleum product sales have continued to exhibit strong growth. Sales have increased steadily during each of the last five years, from 402,000 barrels per day in 1984 to 520,000 barrels per day in 1988.



"We intend to continue improving the company's financial strength," Stegemeier noted, "but we have reached a turning point. We are now moving from a defensive strategy that emphasized debt reduction to a more aggressive focus on investment and growth."

An example of this more aggressive approach is evident in California's Imperial Valley, where Unocal is developing a major new geothermal resource while moving into the electricity generating side of the geothermal business for the first time. On April 5th, the company dedicated a new 47,500-kilowatt generating plant at the Salton Sea. Unocal also owns and operates an existing 10,000-kilowatt plant, and will have another 16,000 kilowatts of generating capacity in 1990.

"The long-term potential of this resource is excellent," Stegemeier noted. "The Salton Sea field could be as big as our geothermal resource at The Geysers in Northern California, which currently supports the largest geothermal operation in the world."

Goal number two — expanding the resource base — directly ties into the company's renewed emphasis on investment and growth.

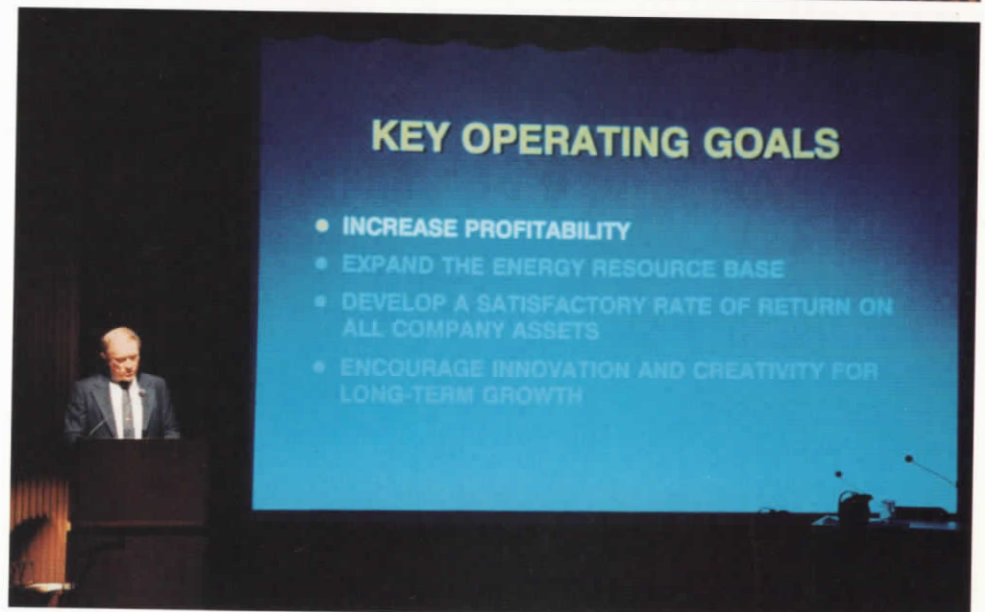
"One of the best ways for Unocal to increase shareholder values is through a successful exploration program," Stegemeier emphasized. "We have replaced our production over the past five years — a rare achievement for U.S. energy companies. I'm optimistic that we can increase this strong reserve base in the years ahead."

At year-end 1988, Unocal had proved reserves of 764 million barrels of crude oil, 6.1 trillion cubic feet of natural gas and 151 billion kilowatt-hours of geothermal power. On an oil-equivalent basis, this makes Unocal a 2 billion barrel energy company. In addition, the company currently holds what is probably the best exploratory land position in its history.

Unocal now has oil and gas production in seven countries — eight later this year, when the Veslefrikk field in Norway comes on production. The company also holds exploration licenses in eight more countries, including new acreage in Syria which was acquired in March.

The company's basic strategy, Stegemeier explained, is to conduct low-cost exploration work in a variety of areas in an effort to find fields with truly giant potential. "This is an ambitious exploration program, but we can manage it," he said. "Our financial commitments are modest, the risks are well spread, and the reward for success could be substantial."

Domestically, two areas in which Unocal has acquired holdings offer exceptional reserve potential: Alaska and the "new frontiers" of the Gulf of Mexico. Last year, Unocal acquired nearly 300,000 net acres in four major lease sale areas of Alaska — the North Aleutian Basin, the onshore Kuparuk uplands, the Chukchi Sea and the Beaufort Sea.



Below, a customer fills up at a new three-grade gasoline pump. Unocal's petroleum product sales have shown steady growth over the past five years, helping increase profitability. Bottom, exploration drilling in the Mobile Bay area, where Unocal has made 10 discoveries since 1985. Expanding the resource base directly ties into the company's renewed emphasis on investment and growth.



On the Gulf Coast, where Unocal has been highly successful since the 1950s, the company acquired interests in 77 new offshore tracts in 1988. This brings the total acreage of Unocal's exploration properties in the state and federal waters of the Gulf of Mexico to more than 1 million acres.

Overseas, Unocal continues to expand its existing oil and gas operations as well as increase its exploration activity. For the second consecutive year, the company's Thailand operations set new production records for natural gas, Stegemeier reported. Gross production from Unocal's four natural gas fields totaled 535 million cubic feet per day, up 18 percent from the 1987 level. A fifth field will begin production later this year. The company is now installing compression facilities to increase pipeline capacity to 850 million cubic feet per day.

"We plan to increase our gas production to well over 600 million cubic feet per day in 1990," Stegemeier said. "In addition, we've recently expanded our acreage position in the gas-prone area south of the Baanpot field. A third gas sales contract is being negotiated to cover additional areas around these fields, where several gas discoveries have been made."

In Indonesia, the Attaka field, where Unocal holds a 50-percent interest, produced its 500 millionth barrel of oil in 1988. Sales of natural gas from this field rose to 70 million cubic feet per day—a 120-percent increase over the prior year.

"In Balikpapan Bay, Unocal made a gas discovery in 1988 that tested at more than 17 million cubic feet per day," Stegemeier said. "We plan to begin talks with Indonesian officials this year for possible utilization of this and other gas discoveries for generating electricity in the Balikpapan area."

Unocal's third key goal is to develop a satisfactory rate of return on all assets. The company's preliminary agreement with Petroleos de Venezuela, which will transfer Unocal's Chicago refinery (below) and related assets to a joint venture, will help improve the competitive strength of refining and marketing operations in the east.

Unocal's operations in the North Sea continue to be strong. Offshore the Netherlands, Unocal's pioneering horizontal drilling technology could add 10 percent to the recoverable reserves of the company's three offshore oil fields, which are now producing about 14,000 barrels per day. Last February, the company acquired an interest in another license block offshore the Netherlands.

In Norway, the Veslefrikk field is scheduled to start production late this year and should average about 62,000 barrels of crude oil per day in 1990. Unocal holds an 18-percent interest in the field and is technical adviser to Statoil, the Norwegian national oil company that is project operator.

Keeping in line with Unocal's basic strategy, much of the company's overseas exploration activity is focusing on high-potential, relatively unexplored areas, Stegemeier reported. Among these are highly prospective blocks in Angola, the People's Democratic Republic of Yemen, Syria and Ecuador. Seismic work, and in some cases, exploration drilling, are proceeding in each of these locations.

The company's activities in geothermal energy — an area in which Unocal is already the world leader — are also expanding into new frontiers, Stegemeier reported. In addition to the new Salton Sea venture, Unocal recently announced plans to develop a large, hot-water resource the company discovered several years ago near Jakarta, Indonesia.

Unocal's third key goal is to develop a satisfactory rate of return on all company assets.

"We are serious about this," Stegemeier told shareholders. "If an asset fails to produce an adequate rate of return, we'll sell it off or shut it down."



In the east, Unocal has taken strong steps to improve the profitability and competitive strength of its refining and marketing operations. The company reduced costs at its Beaumont, Texas, refinery by limiting operations to the manufacture of high-margin solvents and lubricants. And last December, Unocal signed a preliminary agreement with Petroleos de Venezuela that will transfer the company's Chicago refinery (plus related pipeline, terminal and marketing assets in the midwest) to a joint venture.

Under terms of the agreement, Unocal will hold a 50-percent interest in the joint venture, which will bring together Venezuela's large crude supplies and Unocal's refining and marketing system in the midwest. "This agreement could generate more than \$500 million in available funds to Unocal," Stegemeier said.

In the west, the company is working with its dealers in an ongoing program to upgrade Unocal service stations and focus on expanded motorist services. This effort has helped increase average monthly gasoline sales for company's lessee stations by 20 percent since 1984.

Moving on to the company's chemicals business, Stegemeier noted that Unocal's nitrogen operations are being restructured to reduce costs and increase production of upgraded fertilizers, which are enjoying increased demand.

"We plan to close our ammonia and urea facilities in Brea, California, reducing costs and improving our manufacturing and distribution system," Stegemeier explained. "We will continue to produce ammonia and urea at our larger, more modern Kenai, Alaska, complex. And we plan to expand upgrading facilities to produce higher value products."

Stegemeier also announced plans to re-open the company's molybdenum mine at Questa, New Mexico, which has been closed for three years due to adverse market conditions. "We have identified major cost reductions, and have developed a flexible operating system to achieve competitive costs at reduced production rates," Stegemeier said. "We expect to resume production around mid-year, at about half capacity."

Although the company's Parachute, Colorado shale project is also undergoing scrutiny, recent progress has been highly encouraging. Operating expenses were cut significantly last year, Stegemeier reported, and production of synthetic crude oil was up 74 percent over 1987. Currently, the plant is producing at a sustained rate of about 6,500 barrels per day.

As part of its effort to focus on efficient use of assets, Unocal has also redeployed some of its real estate holdings. In December of 1988, for example, the company's downtown Los Angeles headquarters was sold for more than \$200 million. Several other tracts of land have also been identified as no longer essential to the company's operations.

The fourth key operating goal — encouraging innovation and creativity for long-term growth — is one that extends back to Unocal's beginnings.

Creativity and innovation help keep Unocal on the cutting edge of new technology. An example is the Unocal-developed Unisulf process, which removes sulfur from refining streams. Below, the Unisulf unit at the company's Santa Maria refinery.

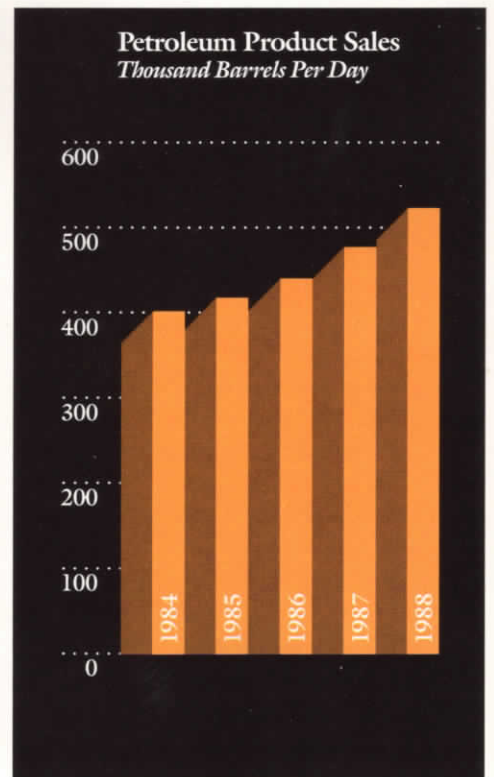
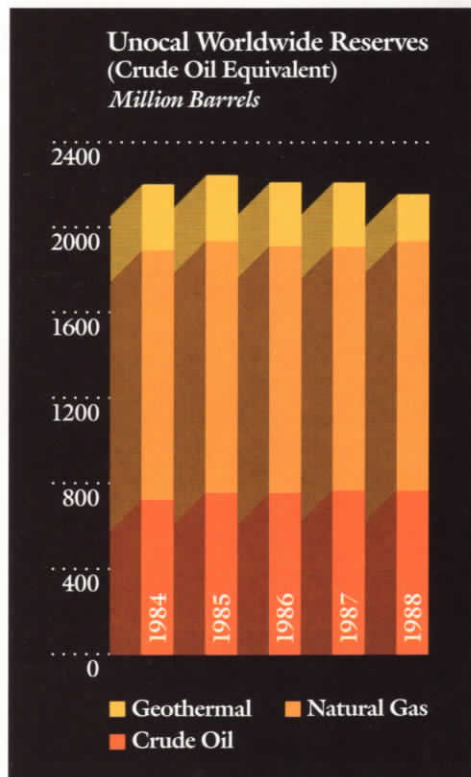
“At Unocal, we have a long tradition of technological innovation,” Stegemeier said. “We have one of the best research organizations in the energy business. Through the years, we’ve developed a number of new products and processes that improve our ability to find, produce and market earth resources.” In 1988 alone, Unocal researchers were awarded 70 new U.S. patents, bringing the company’s worldwide total close to 1,100.

This focus on innovation will continue to help the company grow in the years ahead, Stegemeier said. New technologies, processes and strategies are continually being developed by Unocal to benefit every segment of the company’s operations. Recent successes range from new exploration and production techniques — such as horizontal drilling and enhanced oil recovery methods — to refining innovations in catalytic cracking and sulfur removal.

Innovation has also borne fruit for the company’s chemicals business. Several new products have been or are currently being developed, from specialty graphite and polymer products to lanthanides, nitrogen fertilizers and other environmentally preferred agricultural chemicals.

“In summary, by focusing on these four goals, we expect to increase Unocal’s profitability and to enhance shareholder values,” Stegemeier said. “As we prepare to begin our second century, we must rely on the creativity, judgment and leadership of Unocal’s employees, and the ongoing support of our long-term shareholders, if we are to enjoy continued success.

“I know we can do it. At Unocal, those qualities have always been in good supply.” 76



New Directors Announced

The Unocal Corporation announced the election of two new directors at the company's annual meeting: Frank C. Herringer and Ann McLaughlin.



Frank C. Herringer, 46, was elected president of Transamerica Corporation in 1986. He is a director of Transamerica and its major subsidiaries and the Sedgewick Group plc, the international insurance broker that is 39-percent owned by Transamerica.

Herringer joined Transamerica as vice president and assistant to the chairman in 1979, and was named senior vice president responsible for corporate strategic planning in 1980. In 1984, he became executive vice president responsible for all of Transamerica's insurance-related operations.

Prior to joining Transamerica, Herringer was general manager and chief executive officer of the San Francisco Bay Area Rapid Transit District (BART). Before heading BART, he served as administrator of the U.S. Urban Mass Transportation Administration, and was a principal with the management consulting firm of Cresap, McCormick and Paget.

Herringer holds an A.B. degree in mathematics and economics from Dartmouth College and an M.B.A. degree from the Amos Tuck School of Business Administration.



Ann McLaughlin, 47, is a Visiting Fellow at The Urban Institute in Washington, D.C. From 1987 to 1989, she served as U.S. Secretary of Labor in the Reagan administration. Upon the completion of her term, President Reagan awarded her the Presidential Citizen's Medal.

Prior to her appointment as Labor Secretary, McLaughlin served as assistant secretary for public affairs at the Treasury Department (1981 to 1984) and as undersecretary of the Department of the Interior (1984 to 1987).

She has also served as a consultant to the Center for Strategic and International Studies; manager of the Washington, D.C., office of Braun and Company of Los Angeles; and assistant director of state and local government relations for Union Carbide Corporation.

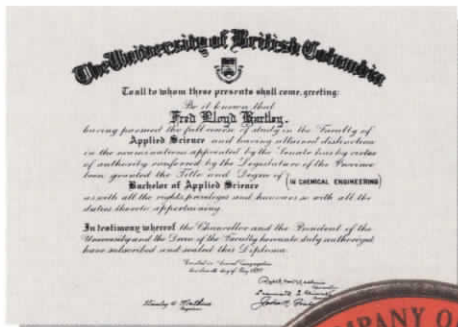
McLaughlin recently rejoined the board of directors of Union Camp Corporation, a post she held prior to her government service. She holds a bachelor of arts degree from Marymount College, and has studied at the University of London and the University of Pennsylvania's Wharton School of Business. ®

A Remarkable Legacy

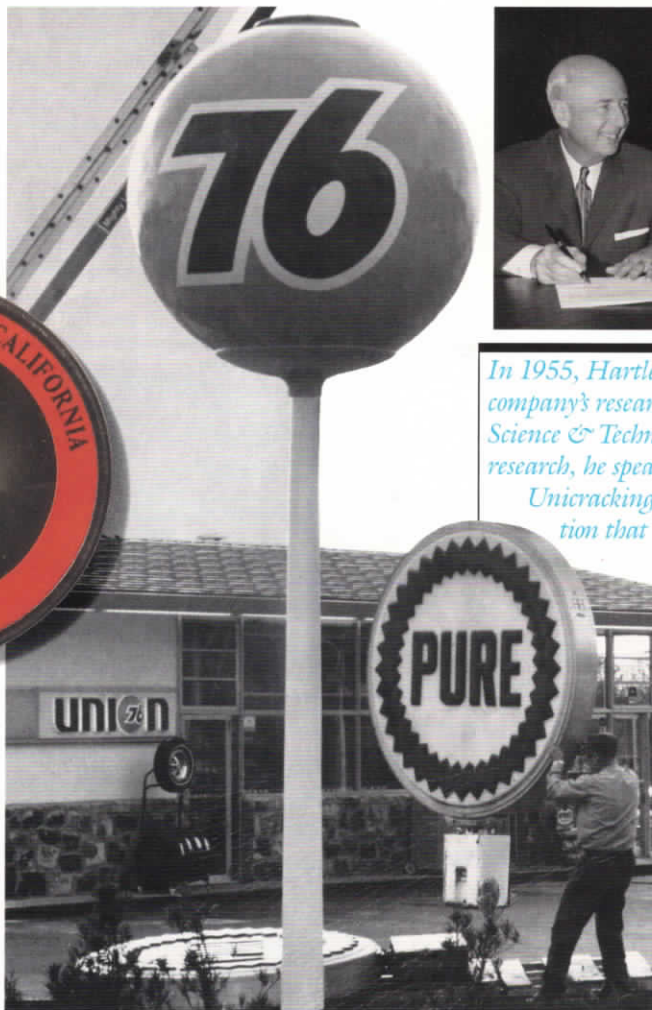
This year's annual shareholders' meeting included a tribute to Fred L. Hartley, who has served Unocal for half a century — including 24 years as the company's president and chief executive officer. 🍷 Hartley announced at the meeting that he has chosen to step down as chairman of Unocal's board of directors, a position he has held since 1974. The board appointed President and Chief Executive Officer Richard J. Stegemeier as his successor. 🍷 Hartley, who retired as the company's chief executive officer on June 30, 1988, will remain on the board as a non-employee director. In recognition for his valued leadership and many years of service to Unocal, the board accorded Hartley the title of "Chairman Emeritus" — the first time in the company's history this honor has been bestowed. 🍷 "During his illustrious career, Fred has been a leader of vision, integrity and determination," Stegemeier told shareholders. "He's left us a remarkable legacy that we are determined to build on in the years ahead." 🍷 In this special fold-out section, Seventy Six is pleased to present a photographic tribute to Fred L. Hartley, chronicling the highlights of his extraordinary career. Mr. Hartley's annual meeting address follows.



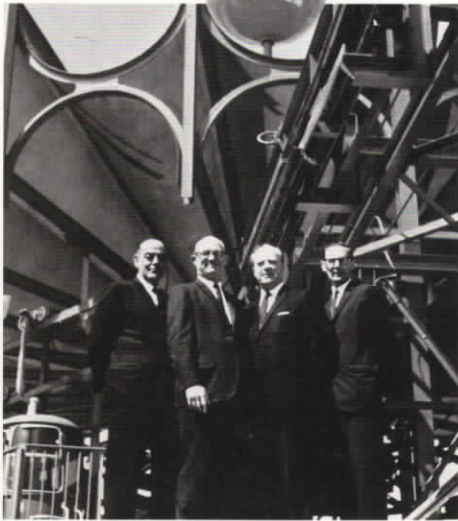
Fred L. Hartley



Fred L. Hartley joined Union Oil Company in 1939, just five days after graduating from the University of British Columbia. Beginning his career as a laborer at the company's Oleum refinery, Hartley quickly advanced, winning a series of promotions. By 1953, he was head of operations at the Los Angeles refinery. Following that assignment, he established a division to promote the licensing and sale of Union patents and technology to industry.



In 1955, Hartley was put in charge of the company's research wing—later to become the Science & Technology Division. As head of research, he spearheaded development of the Unicracking process, a refining revolution that still sets the standard. (Below, the L.A. refinery's Uni-cracker.) By 1962, Hartley was heading up all of Union's refining and marketing operations. In 1964, he was named president and chief executive officer. Bottom, Hartley confers with Union Oil president A. C. Rubel, his predecessor.



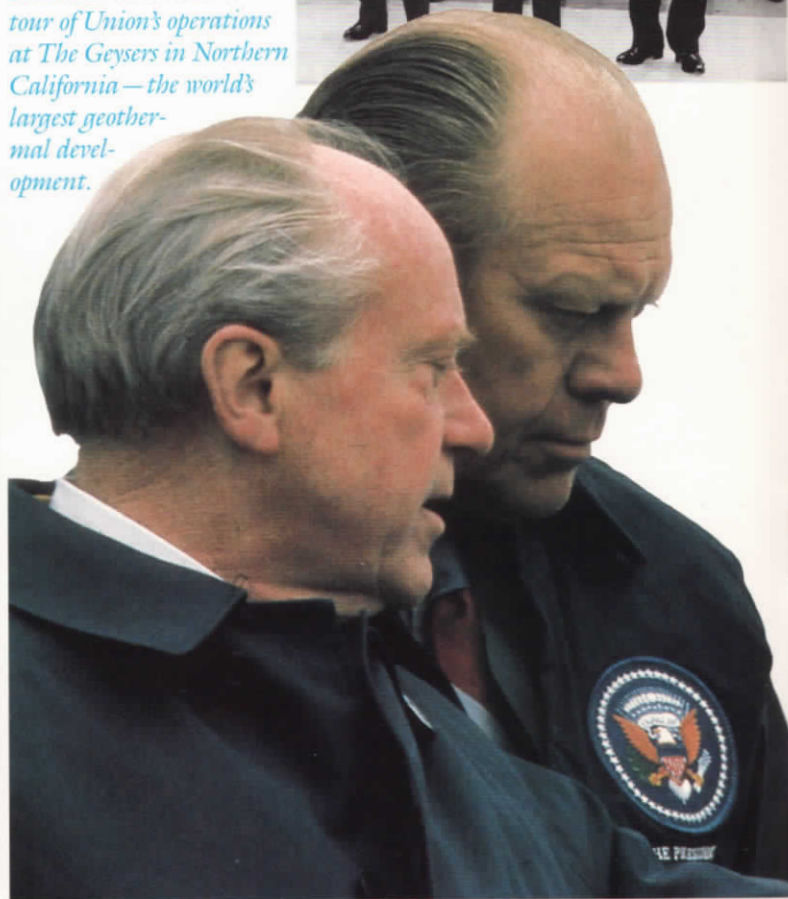
Left, U merger Robert into a Under expansion search frontiers Mexico

As Un Hartl ment sided Chicago rated nology the com intern Comp Comp ily exp operat the de source.

Left, Union's new CEO signs the 1965 merger agreement with Pure Oil president Robert Milligan, which transformed Union into a strong international competitor. Under Hartley's direction, Union steadily expanded the scope of its activities. The search for oil and gas was extended to new frontier areas in Alaska (right), the Gulf of Mexico (below) and overseas.



In 1975, Hartley escorted President Gerald Ford on a tour of Union's operations at The Geysers in Northern California—the world's largest geothermal development.



As Union Oil moved into the 1970s, Hartley aggressively pursued the development of new technologies. In 1970, he presided over dedication ceremonies for the new Chicago refinery (above), which incorporated the latest advances in refining technology. Hartley also continued to broaden the company's marketing effort—including international alliances with Maruzen Oil Company in Japan and Kyung In Energy Company in Korea (upper right). He steadily expanded Union's chemicals and metals operations, and committed the company to the development of alternative energy sources such as geothermal.



As his stewardship progressed, Hartley steered Union through the tumultuous rise of OPEC, and greatly expanded the company's international oil and gas operations—most notably in the North Sea, Thailand and Indonesia. At right, top to bottom: greeting Queen Beatrix of the Netherlands; joining Thai Prime Minister Prem Tinsulanonda (left) at the dedication of a Gulf of Thailand natural gas platform; speaking at the opening of Vancouver's Expo 86, to which Hartley served as U.S. Ambassador and Commissioner General to the U.S. Pavilion; talking with California Governor George Deukmejian at The Geysers 25th anniversary celebration in 1985.

Hartley's commitment to innovation was reflected in the 1982 expansion of the company's Brea, California research facility. One of the most significant technological challenges pursued under his leadership has been the development of oil shale — a key technology for the nation's energy future. Far right, a view of the company's Parachute, Colorado shale project.



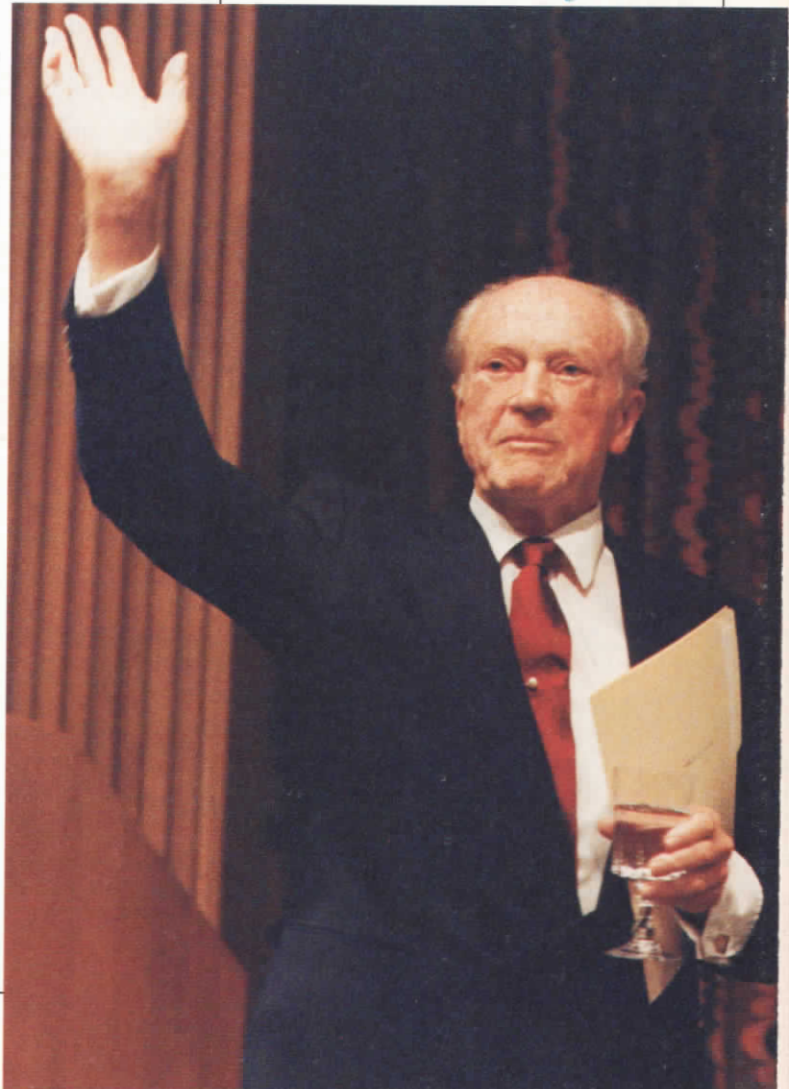
In 1985, the company began doing business under a new name: Unocal. A new corporate logotype was introduced, selected by Hartley, which incorporated the "sign of the 76" — one of the most widely recognized marketing symbols in the nation.

Fred L. Hartley has indeed left a remarkable legacy. Today, Unocal is a stronger, more competitive company thanks to his efforts. Below, the company's new chairman emeritus acknowledges the applause of shareholders at Unocal's 99th annual meeting.



Bill Schorr, Los Angeles Herald Examiner, 5/22/85

A scant two months after the new logo was adopted, Unocal faced one of its greatest challenges when an investment group headed by oilman T. Boone Pickens, Jr. attempted a hostile takeover of the company. Hartley successfully defended the rights of Unocal's shareholders, handing corporate raider Pickens his first defeat in a hostile takeover attempt.



MR. HARTLEY REPORTS

An Exciting Half Century With Unocal 1939–1989

Fellow shareholders, good morning.

I thought the film documentary you have just seen of my career at Unocal, prepared by Karen Sikkema, vice president for corporate communications, was well done. I do appreciate the efforts of you and your staff, Karen. Please take a bow.

On May 18, 1989, just three weeks and three days from now, I will have served Unocal for 50 years. What an exciting way it has been to spend my life, especially as chief executive officer for 24 years. I feel most fortunate to have had this splendid opportunity to serve my company, society and country. It was fellow employees and directors along the way that made it all possible.

How in the world did this Canadian immigrant get on the payroll? The dean of chemical engineering, Dr. William F. "Bill" Seyer, at the University of British Columbia in Vancouver, Canada, propositioned Bob Kenmuir, the general manager of Unocal's Canadian Division, to interview the class of '39. This was a quid pro quo for all the gasoline and fuel oil Unocal imported into Canada from our Oleum (now San Francisco) refinery.

John D. Rockfellow, our fabulous professional employee recruiter, interviewed the class, and I was asked to come to Seattle to be looked over by L. G. "Lester" Metcalf, the company's general manager of refineries. After dinner I was offered my first cigar, which I managed to smoke without getting sick. Apparently I passed the final test, because a few weeks later I got a job offer to join the company in California as an engineering trainee.

On May 18, 1939, the now defunct "owl" train dropped me off at the Oleum refinery flag stop with \$25 and a suitcase of dirty clothes — my total possessions at that time. But I had a job in the labor gang at 75 cents per hour, and a 36-hour government regulated work week. In those days, a single man had to live in the company dormitory to be available to fight fires and other emergencies. Paying \$30 a month for room and board, who could turn it down? The Great Depression was still around.

I made lots of friends, including Paul Fryar, one of the plant superintendents, who now lives happily retired in Long Beach. I joined the research department at the Los Angeles refinery in the fall of 1939 as a process design engineer. In late 1942, I was named process supervisor in the Los Angeles home office. I became totally involved in the war effort for the production of 100-octane aircraft fuels and toluene for making TNT explosives. Associates involved in this effort included Homer Reed, the company's chief engineer, and many more.

The plants that were built during the '40s depended upon outside process engineering and licenses from a number of construction and licensing firms. Three of the plants were of such poor conception and design that by 1950 they were sold as junk. It was time to strengthen our resolve and greatly increase our staff and expenditures in basic research and development.

Fortunately, the development of our own technology for future growth became one of the company's top management goals. During the '50s and '60s, new processes were developed for removing sulfur from our products and converting heavy oils into gasoline, jet fuel and diesel oil by a technology we call Unicracking.

The first commercial Unicracker was built at the Los Angeles refinery in 1964. We extrapolated the 1.6-barrel-per-day demonstration pilot plant built and operated at our laboratories at Brea, California by a factor of 10,000 times. The 16,000-barrels-per-day unit started up and has been running ever since. In fact, relatively minor modifications and better catalysts have increased the capacity to 27,500 barrels per day. And so Unocal became known as a very successful, innovative company. We now sell to other companies 12 licenses involving various processes for every one we buy.

Our licensing department, headed by Herb Hemmen, and then for years by Bill Baral and now Gerry Simmons, has done a fabulous job of selling over 63 Unicracking licenses alone, plus 115 other processes in 25 countries. Even the Chinese experts from the People's Republic of China bought four very high technology licenses.

During the late '40s, '50s and '60s, a "heyday" of catalyst invention and the creation of overall process engineering systems was an exciting period. Dr. Rowland Hansford was the catalyst genius, assisted by Dr. Grant Mickelson and Dr. John Ward. Others involved were Basil Hopper, Dr. W. E. Bradley (vice president of research), Dr. Hal Huffman, Cloyd Reeg and Grant Hendricks (research managers), Arnold Kelley (process manager), and Dr. Kess Alley and Dr. Robert Hass (process supervisors).

They and their associates were a great team of scientists and engineers, not forgetting patent attorneys such as C. E. "Speedo" Swift, Milton Lee, Dick Hartman and Dean Sandford, and analytical chemists such as George Lake and Jim Fraser, both managers.

Shortly after I was elected chief executive officer at the December 1964 board meeting, I met with Robert L. "Bill" Milligan, the chairman and CEO of the Pure Oil Company, Chicago, Illinois. His firm was about to be taken over by a New York investment banker. Those kind of fellows have been around for a long time — they just got more virile in the '80s.

By July 1965, Pure Oil was merged into Unocal to the satisfaction of both the boards of directors and the employees. Suddenly Unocal became a nationwide company with a much larger cash flow, resulting in an increased rate of growth, international expansion, exciting opportunities for the management of both companies and increased stockholder financial benefits.

During the late '70s and early '80s, another level of development in the technology of extracting shale oil from hard shale rock was under way. The Synfuels Corporation was created in 1980 by the Energy Security Act in response to the crude oil embargo placed against the United States by OPEC. Unocal was ready for the challenge, and committed the company to build and operate the first 10,000-barrel-per-day commercial scale shale plant in Garfield County, Colorado.

"I feel most fortunate to have had this splendid opportunity to serve my company, society and country."

“It was our combined spirit and determination that made it all possible. To one and all, my heartfelt thanks.”

The battle for the total success of this venture goes on, with the plant now operating at 6,500 barrels per day. Those involved in this great project include Clyde Berg, Arnold Kelley, John Hopkins, John Duir, Roland Dhondt, Rolly Deering, Robert Switzer, Allen Randle, John Pownall, Darcel Hulse, Bob Bunday, George Snyder, Dick Stegemeier, Cloyd Reeg (our current president of Science & Technology and the Unocal Energy Mining Division), and many, many more fine scientists and engineers. We had many competitors, including Exxon, but they have all given up the challenge. I believe our team is going to have an even greater technological success in the near future.

The finding, development and commercialization of our high-pressure steam and hot water resources for the production of electricity was another great team effort, involving the Geothermal operating division, Science & Technology and Corporate Engineering. Such men as Dr. Carel Otte, the founding father and recently retired president of the Geothermal Division, was certainly a dynamic force. The new president is Stephen C. Lipman.

Dozens more were involved, including Vane Suter, Olin Whitescarver, Chester Budd, Neil Stefanides, J. Erick Mack, Jr., Thomas Minette, Richard Lindwall, Bill Lieffers, Pete Gallus, John Jost and Carl Cron. Our operations now extend from California to the Philippines and, by 1991, Indonesia.

I could go on telling you about the accomplishments of your great organization that would not have been possible without talented personnel, risk capital and a team effort. Regardless, a few more names are in order:

Recently retired Ray Burke, who led our exploration and production and geothermal efforts all over the world, had many associates. Such men as Kenny Vaughan, John Imle, Harry Keegan, Hal Lian, Vance Lynch, HD Maxwell, Harry Lee, Sunny Suttles, Bill Lewright, John Sherborne, Richard Crog, Paul Fisher, Wally Holmes, John Sloat, Bill Greenwalt, Bill Raymer, John Fraser, Bill Farrar, Clem Dumett, Sam Grinsfelder and dozens more come to mind. Their zeal made Unocal an innovator in offshore drilling, seismic technology for optimizing discoveries, and most recently, horizontal drilling deep in the earth for increased production.

Our Chemicals Division — responsible for our very large ammonia fertilizer operations in Alaska and the West Coast, our polymer and solvent activities nationwide, our new rare metals group and our long-established specialty coke and carbons operations — was under the direction of retired director Craig Henderson, and is now headed by director Tom Sleeman.

Again, dozens of scientists and engineers from both Science & Technology and Corporate Engineering teamed up with the division's operating people to develop their future products and processes. Those responsible included Nick Lynam, Bob Carlson, Gene Dewey, Keith Openshaw, Lee Pierson, Chuck Merrill, Ed Johnson, Dr. William Schaeffer, Milan Skripek, Dr. Michael Block and Dr. Donald Young.

Men of the Refining & Marketing Division, who created our great "sign of the 76" ball — and more recently, our Protech guaranteed service program — include such leaders as John Towler, Claude Brinegar, Bill McConnor and currently our director, Roger Beach. Others include Ted Rathbone, Tom Matthews, Clay Warnock, Woody Hiatt, Kem Cadwell, John Grunewald, Bill Martin, Lee Spencer, Oz Ousdahl, Elton "Barney" Barnett, Hoot Bragg, Dick Davis, Jack Mullen, Ted Seden, Jerry Luboviski and dozens more.

And, in an organization as large as Unocal, you cannot overlook your various staff organizations:

Financial, Planning and Real Estate — Directors and Chief Financial Officers Charles P. Parker, Claude Brinegar, Harold Sanders, Philip Blamey, Neal Schmale (Corporate Development) and Rick Jemison (Real Estate).

Treasury — Bill Craig, Roy Houghton and Ed Powell.

Accounting — Max Lorimore, Bob Dalbeck, Lyle Rutherford and Charles McDowell.

Legal — Bert Gibbons, Douglas Gregg, George Bond, Andy Hauk, Bill Cole, Tom Hairston and Sam Snyder, our current vice president and general counsel.

Human Resources — Nick Ugrin, Paul Doyle, Joe Byrne and Wellman Branstrom.

Environment — Dr. C. B. "Bud" Scott and Don Hanley.

Medical — Richmond Ware, Richard Call, Reynold Schmidt and Donald Molenaar.

Corporate Secretary — Robert F. Niven and Robert Hedley.

Corporate — W. L. "Bill" Stewart and Arthur C. Stewart, retired, descendants of the founders of the company.

As I ponder the names of the past, I must tell you of two men that I considered to be my mentors — Reese H. Taylor, president and chief executive officer from 1938 to 1962, and A. C. "Cy" Rubel, president and then CEO from 1956 to 1964. They established a corporate climate that made my task as CEO much easier.

Further, I wish to acknowledge three very important ladies in my life — first, the lovely lady you saw launching the *Sansinena II* in the tribute film was my wife, Peggy. We shared overseas travel to meet with our staff and government officials and visit the many installations in England, Indonesia, the Philippines, Brazil, Holland, Norway, Thailand, Korea, Australia and many other countries over the past 48 years.

The other two are my secretary for 29 years, Miss Grace Brubaker, who so efficiently and charmingly — along with her most recent associate, Mrs. Norma Ham — ran me and the office so effectively over the years.

The past 50 years have been marvelous for me. It was a great honor to have the opportunity to help Unocal make the transition from a regional company to one of national and international coverage and broad diversification in the fields of energy and mineral resources; petroleum, chemical and metallurgical manufacturing; and technological sales.

My remembrances of associates is with apologies to those I didn't individually mention. It was our combined spirit and determination that made it all possible. To one and all, my heartfelt thanks.

Today a press release will be issued after the reorganization meeting of the board directly following this meeting. I have advised the board I no longer wish to serve as its chairman. Richard J. Stegemeier will be elected chairman, president and CEO. I will continue on as a non-employee director, and the board will elect me to be the company's first chairman emeritus. This is indeed an honor, and I deeply appreciate their action.

Dick, I congratulate you on the leadership you are giving the company, and extend my best wishes for Unocal's and your continued success.

In conclusion, my thanks to all the Unocal employees, officers, directors and stockholders — past and present — who have given me their support over the past 50 years. I have been truly blessed to spend my career working with and for such fine people. And, thanks to our customers, for without them it would not have been possible.

Thank you. ☺

A GLOBAL CONCERN

From the air, the drilling camp looks like a tiny island floating on a sea of bright green vegetation. We are deep in the Amazon jungle, and the nearest city is more than 200 air miles away.

For several weeks, an exploration crew has been hard at work here. Under contract to Unocal, the team is drilling a wildcat well on a promising new prospect. The hole is now approaching the hoped-for pay zone, and excitement is mounting.

A Unocal geologist has been on the site for three days, examining rock cuttings and updating the well log. This morning she is up early, eager to get to work. Downing a quick cup of coffee, she heads up to the drilling floor to talk with the tool pusher. But halfway up the stairs, the geologist is stricken with severe abdominal pains. It soon becomes evident that this is something serious. The drilling foreman hurries down to find the camp medic.

After tending to the woman, the medic radios the company office, located across a mountain range in the nation's capital city. He's done a cursory examination, and he suspects appendicitis.

Within minutes, a helicopter is dispatched to the drilling camp. The chopper picks up the stricken geologist and flies her to an airstrip, where a chartered plane — staffed by a physician and nurse — is already waiting. The plane will fly directly to the nearest major city. A hospital has been alerted, and a surgical team is on standby.

A few hours later, the patient is resting comfortably after undergoing an appendectomy. She's already asking about the latest rock cuttings.

The above scenario is fictional. But the medical response to it is not. Unocal operations worldwide, no matter how isolated, have evacuation plans to handle medical emergencies.

Although such situations rarely occur, the plan is always ready to be set in motion on a moment's notice. And emergency evacuation is but one program of the Unocal Medicine Department's International Medicine organization — the medical support arm of the company's overseas operations. (The Medicine Department itself is a branch of the company's Health, Environment and Safety Department.)

Established by former Unocal medical director Dr. Richard Call in 1965, International Medicine has grown and evolved along with the company. Unocal operations now span the globe — from the North Sea to South America, from Africa to the Far East. Including expatriate employees and their dependents, national employees, and contract workers (at some locations), a total of close to 8,000 individuals must be provided medical support overseas.

"Health care is something a lot of people take for granted at home," says Dr. Donald M. Molenaar, Unocal's director of medicine. "But providing it overseas is a complex undertaking. Our goal is to support the health needs of our overseas employees and dependents — who are living and working in often challenging international environments — and to continue to improve the quality and scope of health services provided by our local medical departments."

Based at Unocal's Sunbury office in Great Britain, International Medicine is headed by Dr. Donald Dawson, who joined the company in 1975. He is assisted in Sunbury by Margaret Fox, a full-time occupational nurse; and secretary Eileen Woodcock.



An Englishman, Dawson possesses a calm demeanor which belies his busy work schedule. As manager of International Medicine, he spends nearly half his time in the field, traveling to Unocal locations throughout the world.

Dawson sees his group's mission as four-fold: "First, to assure that our people are healthy when they go abroad. Second, to work with management and industrial hygiene personnel to identify potential job exposure hazards. Third, to guard against injury and disease at all of our locations. And fourth, to ensure that all of our people get the best medical attention possible if they do become ill or injured."

International Medicine approaches these tasks through a series of specialized programs. These include physical examination, immunization, medical treatment, health education and consultation programs. Dawson's group also maintains liaisons with local medical facilities, and performs health and sanitation inspections in the field.

A major objective is the prevention and early detection of health problems. In addition to undergoing thorough pre-employment examinations, all of Unocal's expatriate employees are given mandatory physicals once a year. (Family members are examined every other year.)

Most exams are conducted in company medical offices in either Los Angeles, San Francisco, Schaumburg or Sunbury. Results of these physicals, as well as medical records for each individual, are stored and updated on a computer system in Sunbury. Detailed records are also maintained on the Medicine Department's Unocal Center computer system in Los Angeles.

Each employee who works or travels abroad must undergo a series of immunizations. To determine which ones are needed, careful tracking is required of disease patterns in each part of the world where Unocal has operations.

"We're concerned mainly with diseases you don't find much of in the West," Dawson says. Among those of particular concern are typhoid, malaria, hepatitis B, yellow fever, tuberculosis and rabies. Some of these diseases are endemic to certain regions, while others have been largely eradicated in the West. All can be very serious if contracted.

Hepatitis B is a case in point. Uncommon in Europe and the United States, this form of hepatitis — which can cause liver cancer — has been encountered in Southeast Asia in recent years. "Unless our personnel are immunized against hepatitis B, they're subject to contracting it," Dawson says. "That's why it's important for us to track disease trends abroad."

Malaria is another disease that bears close scrutiny. Endemic to most tropical regions, malaria is carried by mosquitoes and causes debilitating bouts of fever. "The disease is largely preventable through medication," Dawson says. "But the effectiveness of drugs used against malaria is always changing, so it has to be closely monitored."



The need for on-site medical care is especially important on remote offshore facilities. Above, the Satun field living quarters platform — located more than 125 miles from shore in the Gulf of Thailand — houses a clinic staffed by a physician. Left, offshore workers tend to an "injured" co-worker during a medical emergency drill. Facing page, Dr. Donald Dawson, Manager of International Medicine.



If Unocal employees do become ill or injured overseas, treatment is readily available. At most locations, care is given through a network of local hospitals and physicians. Many of these are under contract to Unocal to provide care to company employees as needed.

One of Dawson's functions as international medical director is to serve as liaison between the company and this medical care network. "At every location where we have people, I establish and maintain contact with hospital administrators and local physicians," he says. "Then if someone becomes ill, I can pick up the phone and make immediate arrangements."

Whenever Unocal establishes operations in a new location, Dawson personally scouts out the area in advance, locating hospitals and doctors with the best standards he can find. Each facility is then visited and inspected twice yearly. "Our people may need treatment in these hospitals," Dawson explains, "so we've got to ensure their quality and know their capabilities."

To provide immediate care, clinics are maintained by the company on offshore platforms and at other isolated facilities overseas. Numbering more than 20 at present worldwide, the clinics are staffed by trained doctors and/or medics, and are equipped with emergency medical gear and medications.

"We average more than 80,000 visits to these clinics each year," Dawson says. "Most are for small problems, such as colds or minor injuries. But they can require serious attention. The key is to handle problems when they're manageable. This way, we can provide the most cost-effective medical care."

In the Gulf of Thailand, where Unocal has a very extensive offshore natural gas operation, the need for on-site medical care is especially important. At any given time, about 600 employees live and work on Unocal drilling rigs and production platforms in the Gulf. Most of these are located at least 125 miles from shore.

Medical care at these facilities is provided by a network of doctors and trained medics, all of whom are Thai citizens. Each of the three Unocal Thailand physicians (Drs. Chokchai, Suteap and Aran) has undergone specialized training in offshore and occupational medicine. The three physicians rotate month-long shifts both on and offshore, with one doctor based in Bangkok and one stationed offshore at any given time.

On call 24 hours-a-day, the offshore doctor—who serves as medical supervisor—is based at a clinic on the Satun field living quarters platform. He makes regular rounds of all the platforms, instructing medics, seeing patients and reviewing operations for potential job hazards.

"Our Thailand operation is an extensive offshore project which has to be managed very carefully," explains Dr. Dawson. "It costs a lot—in time, effort and money—to take an individual off one of these platforms. So we try to treat patients on-site if possible. One of the reasons for having trained medics offshore is so you'll know if something is an emergency requiring evacuation."

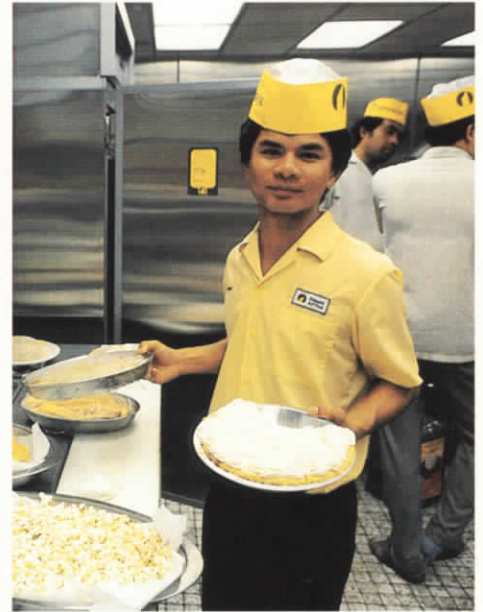
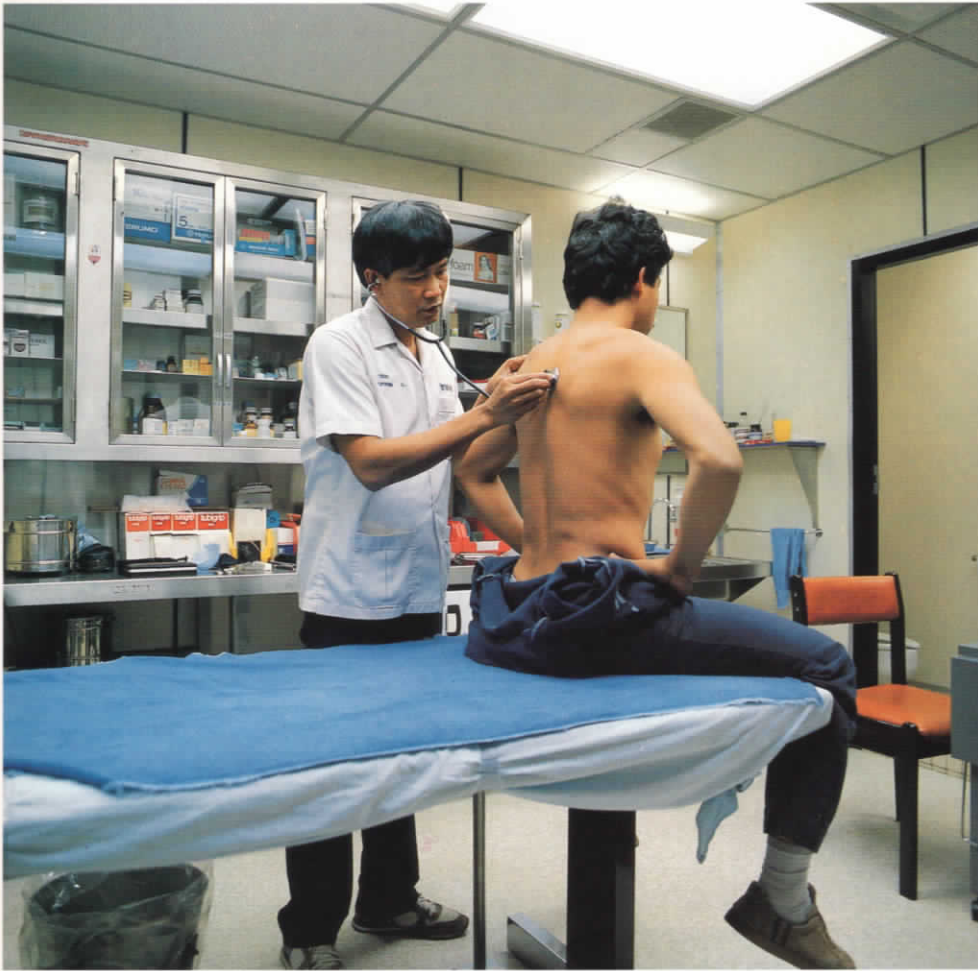
In such cases, the main role of the offshore medical staff is to stabilize the patient's condition before he's sent ashore to a hospital. With a helicopter based on the Satun platform at all times, the medical supervisor can be at the scene of any offshore emergency within 20 minutes.

Sometimes medical crises offshore can arise from unexpected quarters. On one occasion, a Thai fishing boat radioed Satun with an urgent plea for help: one of the fishermen had severely mangled a leg on the boat's winch. The man was brought to the Satun clinic, where his wounds were tended and emergency transportation to shore was arranged. Two babies have also been delivered at the Satun clinic. The mothers of both infants were Vietnamese refugees who were attempting to cross the Gulf by boat.

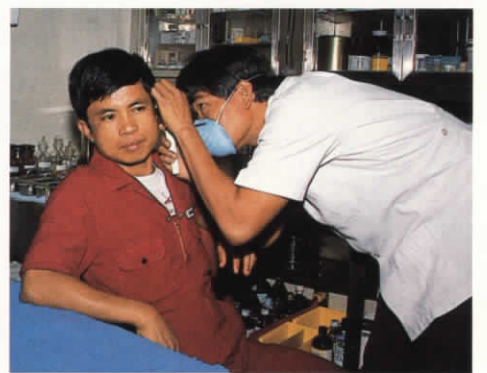
"It's quite a unique world offshore Thailand," Dr. Dawson says. "Because of the great distance from shore, our medical staffs on board the platforms must be prepared to handle any kind of emergency medical situation on a moment's notice."

Unocal also has extensive operations in Indonesia, where over 1,700 are employed by the company. More than 100 families live at the company's Pasir Ridge housing complex in Balikpapan, East Kalimantan, where two full-time physicians and a large medical staff are stationed. The staff provides care for both expatriate and Indonesian employees and their families.

Unocal Indonesia's chief medical officer, stationed in Jakarta, is Dr. Thomas Tabaluyan. Dr. Jeffrey Cunningham, a British physician, serves as senior medical officer, based in Balikpapan.



Top left and bottom right, patients are tended at the Satun clinic. Most medical problems are minor. Bottom left, a chopper departs a Unocal platform offshore Indonesia. Top right, an offshore chef displays his wares. Regular inspections of kitchens and living quarters are performed at all Unocal facilities, both domestic and international.



Unocal operations span the globe — from the Philippines (top) to the North Sea (left). The company is committed to maintaining a first-rate and professional overseas health program.

"Most of the medical problems here are identical to Western-style ones — colds, upset stomachs and minor injuries," Cunningham says. "Of course, there is always the risk of tropical diseases and more serious ailments. But we take precautions to minimize that risk. We also provide preventative services, such as pre-natal care and well baby exams."

According to Dawson, most expatriate employees are very health-conscious. "They realize that in a foreign environment, it's especially important for them to look after themselves," he says. "Most are very active in sports, and they watch what they eat. That helps make our job a bit easier."

"One of the most important medical precautions taken overseas is to provide a safe and healthful workplace," says Dr. Reynold T. Schmidt, Unocal's director of health services. "To assure that the strictest occupational health and sanitation standards are being met, regular inspections of work facilities are conducted by International Medicine personnel, working under the direction of the company's industrial hygiene staff."

As part of this effort, Dr. Dawson personally checks each location twice a year, making recommendations for changes and improvements as necessary. Trained nurses and physicians perform frequent follow-up inspections. Later this year, industrial hygienists from the company's Health Services Department will begin formally reviewing operations, training personnel and monitoring for potential job hazards at overseas locations — the same procedure followed for Unocal's domestic operations.

"This effort will help further Unocal's emphasis on the health risk management of its international operations," says Don Hanley, vice president of the company's Health, Environment and Safety Department.

"Our platforms, camp facilities and other live-in work locations are all closely monitored for personal hygiene standards," says Dawson. "Every time I visit a company location, I'll do an inspection of living quarters, the kitchens, food storage, laundry — anything connected with day-to-day living that might have an effect on the health of our employees."

During his visits, Dawson also checks on each of the field clinics. He meets with the doctors and medics, checks the stock of medications and equipment, and looks through records to see if any disease or accident patterns have developed.

Dawson's field trips serve another purpose as well. "Whenever I travel to an area, a memo is sent to all company personnel informing them that I'm coming through," he explains. "Anyone who wants to see me about health-related matters can set up a consultation appointment."

These consultations may involve everything from giving second opinions to helping employees with unique medical conditions find the proper treatment. On one of Dawson's visits to Bangkok, for example, an employee brought by a daughter who had aggravated a previous knee injury. Dawson got in touch with the girl's orthopedist in the States for background, then contacted a specialist in Bangkok who provided treatment.

Maintaining this kind of personal accessibility is important, Dawson believes, even when he's thousands of miles away in Sunbury.

"I'm sort of an anchor man," says Dawson, who has written — and continually updates — extensive health guides on each of Unocal's foreign locations. "Employees know that if a problem arises, they can always ring me up in Sunbury or send a telex."

Although International Medicine's primary function is to ensure the health of Unocal employees, the group does not limit its activities to company concerns alone. The division also offers its resources to local communities to help them deal with their own medical problems.

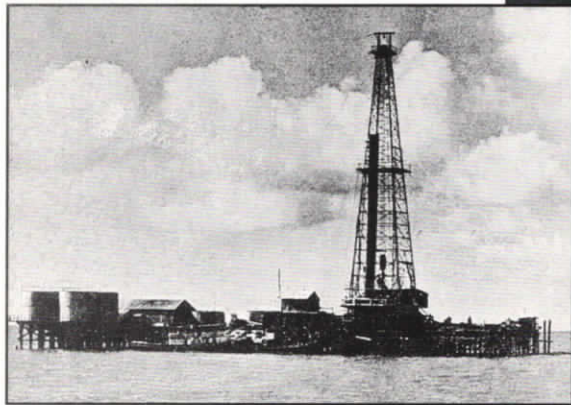
In Indonesia, for example, International Medicine helped build a clinic for the government at Santan, where Unocal has terminal facilities. In Kenya, where the company was engaged in exploration activity, the involvement was more urgent.

"A couple of years ago, there was an outbreak of a very resistant strain of malaria in Kenya," Dawson explains. "None of our people was affected, but many of the locals were. At the time, there was a critical shortage of quinine in the area with which to treat them. So the company sent 800 ampules down from London to a hospital in Mombasa to tide them over."

A heroic action, to be sure; as were the Satun clinic's ministrations to the injured fisherman and delivering mothers. But to Dr. Dawson and the International Medicine team, such efforts are simply part of the company's commitment to maintaining a first-rate and professional overseas health program.

T.S. 76

Below, a view of Gulf of Mexico State No. 1, the first offshore well in the Gulf of Mexico. Right, Unocal's modern Cerveza platform, located offshore Texas, came on production in 1987. Technological advances in offshore oil and gas development have been enormous.



THE Offshore Pioneers

Curtis Roux's curiosity was piqued the first time he noticed a crew of wildcatters heading out to the Gulf of Mexico's open waters. Growing up in the shrimping port of Cameron, Louisiana, in the 1930s, the teenager routinely saw hunters, fishermen and fur trappers exploring the swampy marshes around his hometown. But these oilmen were a new breed of adventurers—they were the first to tap the ample oil resources that lay beneath the Gulf of Mexico.

Roux was witness to some oil industry history that year—1937—as Pure Oil and Superior Oil drilled the Gulf's first open-water well. The town of Cameron quickly became an oil town as well as a hunter's paradise, says Roux, a retired Pure Oil senior clerk who came to Unocal when the company merged with Pure in 1965.

Dubbed the Gulf of Mexico State No. 1, the well was located over a mile from the Louisiana shore. This feat, dwarfed by today's offshore drilling standards, was nonetheless a major milestone in 1937. Located on a 40,000-acre lease, the discovery was called the Creole field, after the nearby French-speaking community of Creole.

Although the roots of offshore exploration can be traced to turn-of-the-century slant drilling efforts in Lake Erie and along the California coastline near Santa Barbara, the Gulf of Mexico State No. 1 was the farthest well from land ever attempted. It also represented the first successful offshore drilling venture—producing an initial yield of 200 barrels of oil and 200,000 cubic feet of gas per day. To date, the field's cumulative production totals are 8.2 million barrels of oil and 7 billion cubic feet of gas.

More than 50 years have passed since Pure and Superior drilled the Gulf of Mexico State No. 1. The endeavor spawned an industry-wide push to explore oil and gas prospects beneath the open seas, leading Unocal and others as far as 150 miles offshore.



Pure began its exploration of the coastal waters off Louisiana after reviewing the results of geophysical land surveys started in 1934. Employing early seismic exploration methods, Pure geologists found evidence of a salt dome (a prospective trap for oil deposits) just west of the town of Creole. Further research efforts along the shore led geologists to believe that considerable oil potential existed under the Gulf of Mexico.

In 1937, Superior joined Pure in leasing 33,000 acres offshore for exploration. Although water depth at the targeted well site was only 14 feet, the companies' decision to drill in the open sea was a difficult one. At that time, no exploration and production equipment had been designed for offshore work.

"The Creole crew members had to charter a shrimping boat to take them out to the field from Cameron, where they were based," recalls Roux. "The commute to the drilling site consisted of a choppy 13-mile ride, part of which traversed densely weeded salt marshes."

All the heavy production equipment, such as generators and boilers, was transported to the site on flat-topped barges.

"This was basically a land operation in the water," says Frank Dial, a retired Unocal senior engineer who originally worked for Pure Oil as an offshore engineer in the Gulf region. "Nobody was designing platforms for offshore exploration yet."

The rig used in the Creole field was a wooden, steam-operated land rig. To withstand the corrosive sea water, the rig was coated with creosote — an oily wood preservative. Wood pilings embedded in the ocean floor provided strong support for the rig, which remained standing until it was disassembled in 1981.

The sturdy foundation withstood some rather rigorous weather conditions. Hurricane winds are not uncommon along the Gulf coast, and the rig had to endure gales of up to 150 miles per hour, as well as battering by waves. In addition to high winds and choppy water, dense fog often hindered efforts to transport drilling crew members.

Below, barges were used to deliver equipment to the State No. 1 platform. Crew members commuted from shore on shrimping boats. Right, a drilling crew at work aboard Cerveza. Today's offshore rigs can drill in water depths exceeding 1,300 feet.



When taking the crew out to the rig on a foggy day, the captain of the shrimping boat sometimes cut the engine and asked the crew to listen for the rig. "Generally, everybody had a different opinion about which direction the sounds were coming from," says Dial.

Once aboard the rig, the offshore wildcatters were relatively cut off from the rest of the world. "The drilling crew had no telephone. If they needed to communicate with someone on the mainland, they had to take a boat back into Cameron," says Roux. "Unfortunately, Cameron only had one telephone line, and it usually didn't work."

Roux recalls seeing a crew member swim back to shore on one occasion to seek medical attention for an injured crew member. "The crew learned to be pretty careful, because getting a doctor was no easy task," he says.

Although these first few months were challenging ones for the crew members, the venture paid off. The State No. 1 well was completed on March 3, 1938, only five months after it was spudded. The well was drilled as a straight, vertical hole to a total depth of 9,394 feet. The hole was then plugged back to 5,610 feet and perforated between 5,110 and 5,120 feet. Production began on March 12, at a rate of 22.5 barrels of oil per hour.

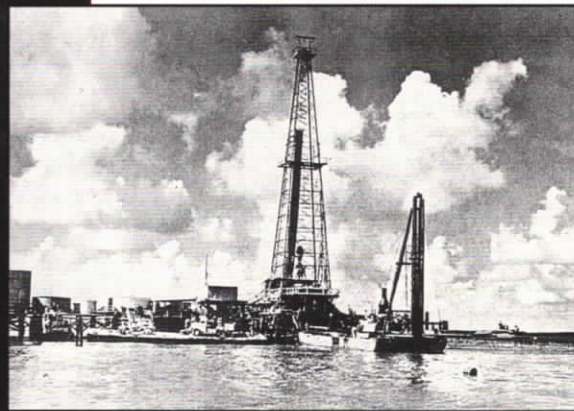
Pure's nearest refinery was located in Smith's Bluff, Texas, 70 miles away. With no available pipeline, the oil had to be barged over to the refinery.

Eventually the platform was enlarged, and 15 more producing wells were drilled. "By drilling multiple wells, we were able to keep the costs down," says Robert Milligan, former president of Pure Oil. "The costs of drilling offshore were enormous compared to onshore drilling, largely because we were pioneering the field."

Looking out into the Gulf of Mexico today, it's difficult to imagine a time when only one platform stood there. Unocal alone operates 278 platforms and 290 producing wells in the Gulf, and is part owner of many others.



Modern steel structures—such as this jack-up exploration rig at work in the Gulf—dwarf the wooden derricks and platforms of old.



“Today’s technological advances in offshore exploration are considerable,” says Ben Mayfield, a Unocal district development geologist based in Lafayette, Louisiana. “Seismic exploration in open water was only in its infancy in the 1930s. Now high-quality, detailed seismic records blanket the Gulf of Mexico.”

Wooden derricks and platforms have long since been replaced by prefabricated steel structures, which are equipped for drilling in water depths exceeding 1,300 feet. High-power supply boats specially designed for offshore oil operations are used to transport equipment. And crew members no longer travel out to platforms in shrimping boats. Instead, they’re flown by helicopter.

Living conditions for offshore workers have also markedly improved. Whereas the Creole field’s rig originally had no sleeping quarters, today’s offshore platforms offer many home comforts—including bedrooms, kitchens, and recreation rooms equipped with televisions and VCRs. In addition, offshore platforms boast excellent communication capabilities. Telephones and radios are available to crew members, and facsimile machines can send daily reports via satellite to onshore offices.

Today’s offshore platforms also are equipped with numerous safety systems which aid in the prevention of fires, blowouts and equipment failure. Safety and medical emergency drills are conducted regularly, as are thorough equipment inspections. Unocal has also developed a detailed hurricane evacuation plan for its Gulf of Mexico platforms.

Although there is no question that technology has greatly improved in the 52 years since Pure and Superior spudded the Gulf of Mexico State No. 1, the Creole field project continues to stand out as the venture that opened the door to offshore drilling. *H.S.* ©

Honoring Tomorrow's Scientists

Like many of her friends at Belmont High School in downtown Los Angeles, Nani-Li'l Bajarias often listens to music while doing her homework. However, the 16-year-old wondered whether the music was affecting her concentration.

Bajarias decided to turn her natural curiosity into a science project. The resulting investigation not only confirmed the student's suspicions, it earned her one of the top prizes in Belmont High's science fair, sponsored by Unocal in April.

This was the second straight year Unocal hosted the fair, as part of the Los Angeles Unified School District's Adopt-A-School program. Under the program, corporations lend their support and expertise to local schools. In addition to sponsoring the science fair, Unocal offers job training to qualifying Belmont High School students each year.

Held April 13 at Unocal Center, the science fair attracted 87 entries in the following categories: behavioral and social sciences, physics and earth science, chemistry and microbiology, medicine and health, and zoology and microbiology.

Like the other science fair entrants, Bajarias closely adhered to the principles of the "scientific method" — a research procedure which sets out strict rules for conducting experiments and validating hypotheses. Bajarias' hypothesis was that listening to rock music during study sessions can hinder learning, while listening to more tranquil music — such as piano instrumentals — would not.

Bajarias selected students at random for her test group. Their task was to study the meanings of several obscure English words. The students were split into three groups: one studied while listening to rock music, one while listening to a piano recital, and one to no music at all.

The test results confirmed Bajarias' hypothesis. Students who studied to rock music retained less information, while those who studied to the piano instrumental or without music retained more.

Belmont High School's second annual science fair, sponsored by Unocal, drew 87 entries. Below, the competition's winners. An awards ceremony and reception for entrants (opposite) was held at Unocal Center.



“Many students listen to music while doing school work, so I really wanted to know how it affected concentration,” Bajarias says. “I spent quite a bit of time on the project, and I’m proud of my work.”

The prize winners — selected by a panel of Unocal scientists and engineers — were announced during a ceremony and reception at Unocal Center. First place winners in each category received \$25 and a gold medal. Students finishing second earned a silver medal, while those finishing third carried home a bronze medal. All participants received a certificate.

Thirteen of the top contestants also won the right to compete in the Los Angeles County science fair, held in May at the California Museum of Science and Industry.

“The students were especially enthusiastic about the fair because it was held at Unocal — not at the school,” says Belmont Vice Principal Andrea Pruitt. “This ceremony and awarding of medals showed the students that the community appreciates and recognizes their hard work.”

Winning entrants in the Belmont fair researched a diverse range of subjects. Among them: the effects of overcrowding and isolation on mice, which bridge design best supports weight, and how water quality affects the breathing rate of fish.

“This was a very worthwhile effort,” says Tom Fisher, a Unocal Oil & Gas Division vice president who served as a judge. “For our nation to compete internationally in the future, we must have competent scientists and engineers. It’s important that we help young students — particularly those in inner city areas — develop the discipline and interest they’ll need to pursue the sciences.”

Belmont science teachers encouraged their students to be creative in choosing a project theme. “This was more than just a conventional science fair,” says science teacher Benton Thompson, the event’s director. “A lot of the projects probed into the social sciences and community issues.”

Participating students learned firsthand how to conduct research using the scientific method — a skill they’ll employ later in college, says Belmont principal Marta Bin. “Belmont is extremely appreciative of the economic and personal support we’ve received from Unocal,” she says. “Unocal is the force behind the fair.”

In preparation for the fair, Unocal Community Affairs Representative Christie Smith arranged for several company scientists to meet with students. They spent time discussing project ideas and explaining the procedures governing scientific research.

“When I visited the school, I really emphasized the importance of documenting findings and keeping a lab notebook,” says judge Ed Barnum, manager of technical services for MolyCorp, Inc, Unocal’s minerals subsidiary. And the students took the advice to heart.

“This year’s fair was very successful, and a lot of fun for everyone involved,” Smith adds. “We hope to continue hosting these events in the future.” C.S. 76



Keeping in Touch

When Lorraine Cosner retired from Unocal five years ago, she wasn't content to while away her spare time. After 41 years of secretarial service in the company's Bakersfield office, Cosner jumped at the opportunity to begin a Unocal retiree club in 1985 for Kern County, California.

"This was a way for me to keep active and retain a link to the company," she says. According to Cosner, who serves as the club's chairperson, preparations for the group's bi-monthly meetings keep her plenty busy.

Like Unocal's nine other retiree clubs, the Kern County group generally meets at a local restaurant and invites a company representative to speak at each luncheon. The groups meet anywhere from once a month to annually.

"We try to invite speakers from all of the company's divisions," says Cosner. "Many of us have spent at least half our lives working for Unocal, and we want to keep abreast of current operations."

Unocal "alumni" clubs can be found in most parts of the country where the company has operations. The Chicago area club has the highest membership, with a mailing list that exceeds 900. The Southern California and the Northern California organizations send out monthly newsletters updating their readership on the activities and whereabouts of members. The Beaumont group, which meets five times a year, is famous for serving its guest speakers home-cooked chili at their luncheons.

Wellman Branstrom, vice president of Human Resources, says he has enjoyed the opportunity to address retiree club members. "Many of our retirees are eager to hear about the company's activities and to stay in touch with fellow retirees," says Branstrom. "The alumni clubs are a good way to accomplish both." ☺

For more information about Unocal's retiree clubs, contact the chairperson in the following areas:

KERN COUNTY

Lorraine Cosner, 2700 F Street, Bakersfield, CA 93301,
(805) 324-6571

HONOLULU

Wilfred Y. S. Chung, 1519 Noelani Street, Pearl City, HI 96782,
(808) 455-4872

NORTHERN CALIFORNIA

Evertt C. Smith, 41 Excelsior Court, Oakland, CA 94610,
(415) 893-8672

CHICAGO

Inez L. Martin, 705 N. Western, Park Ridge, IL 60068,
(312) 384-7550

BEAUMONT

Bubba Davis, Jr., 2333 10th Street, Port Neches, TX 77651,
(409) 722-5824

SAN DIEGO

Al Van Nest, 8301 Mission Gorge Road, Space 304, Santee, CA 92071,
(619) 449-2995

SOUTHERN CALIFORNIA

Larry Higbee, 2007 Parkside Avenue, Burbank, CA 91506,
(213) 849-5619

NORTHWEST

George F. Herrman, Jr., 21028 S. E. 257th Place, Maple Valley, WA 98038,
(206) 432-4337

FLORIDA

Robert B. Paxton, 8903 Seeley Lane, Hudson, FL 33567,
(813) 862-7841

ARIZONA

Roy Davidson, 2008 W. Alvarado, Phoenix, AZ 85009,
(602) 258-5557

UNOCAL 76

CORPORATE

- 35 YEARS Hans E. Menter, Unocal Center
- 30 YEARS Helen E. Jones, Unocal Center
Daniel Stein, Los Angeles, Ca.
- 25 YEARS Russell P. Dangelo, Schaumburg, Il.
Bernard W. Dorin, Unocal Center
- 20 YEARS Delbert L. Brown, Unocal Center
Thomas R. Horn, Schaumburg, Il.
Jean L. Moore, Unocal Center
- 15 YEARS Danny M. Darst, Atlanta, Ga.
Denver L. Durst, Los Angeles, Ca.
Marjorie E. Harwell, Santa Fe Springs, Ca.
Richard K. Jemison, Unocal Center
Noel Kurai, Unocal Center
William T. Nickerson, III, San Francisco, Ca.
Richard J. Rodriguez, Unocal Center
Robbie Roundtree, Unocal Center
Kimberley R. Sabott, Unocal Center
Victoria A. Simonian, Unocal Center
Jimmie R. Venable, San Luis Obispo, Ca.
- 10 YEARS Cherie L. Bartlett, Unocal Center
Donald E. French, Atlanta, Ga.
Sunny Hua, Unocal Center
Roger W. Lipps, Unocal Center
Violet M. Manson, Schaumburg, Il.
Vicky M. Morales, Unocal Center
Michael K. Morgan, Santa Maria, Ca.
Michael J. O'Leary, Unocal Center
Soonchan Park, Unocal Center
Elizabeth A. Steffey, Unocal Center
Leonard L. Tucker, Unocal Center

SCIENCE & TECHNOLOGY

- 35 YEARS Robert L. Hilliard, Brea, Ca.
- 25 YEARS David A. Gaudio, Brea, Ca.
Hugh A. Harvey, Brea, Ca.
- 15 YEARS Susan A. Bharvani, Brea, Ca.
Nuel C. Henderson, Jr., Brea, Ca.
- 10 YEARS William E. Amend, Brea, Ca.
Alan D. Denniston, Brea, Ca.
Regina A. Johnson, Brea, Ca.
Leonard D. Krenzke, Brea, Ca.
Jay C. Selover, Brea, Ca.
Dennis M. Shellman, Brea, Ca.
Charles B. Weil, Brea, Ca.
Steve T. Woods, Brea, Ca.
Enrique M. Zeiger, Brea, Ca.

ENERGY MINING

- 10 YEARS Arnold P. Acosta, Parachute, Co.
Dane T. Ashley, Parachute, Co.
Cliff L. Bennett, Parachute, Co.
Richard W. Harrison, Parachute, Co.
Jake J. Ortiz, Parachute, Co.

ENERGY RESOURCES

OIL & GAS

- 45 YEARS Dwight B. Berson, Midland, Tx.
- 40 YEARS Charles G. Newhouse, Mobile, Al.
- 35 YEARS Charles C. Heinbach, Lafayette, La.
Robert P. Howard, Midland, Tx.
C. D. Kozlowski, Coalinga, Ca.
Roderick D. McLennan, Houston, Tx.
- 30 YEARS Jean P. Chauvel, Ventura, Ca.
Donald J. Durham, Unocal Center
J. J. Steigerwald, Oklahoma City, Ok.
- 25 YEARS Wendell W. Anderson, Orcutt, Ca.
Robert G. Arends, Ventura, Ca.
Johnson J. Hedges, Houma, La.
Graydon H. Laughbaum, Jr., Houston, Tx.
Charles W. Leboeuf, Lafayette, La.
Barbara J. Maxwell, Bakersfield, Ca.
Bobby C. Neal, Orcutt, Ca.
Clay P. Portier, Houma, La.
Jessie G. Price, Snyder, Tx.
Robert K. Smalley, Santa Fe Springs, Ca.
- 20 YEARS Frank E. Boblett, Santa Paula, Ca.
William Brower, Kenai, Ak.
Willie Brown, Andrews, Tx.
Leslie A. Dedeke, Jr., Houston, Tx.
Gerard Green, Jr., Lafayette, La.
Alfred T. Morrison, Carpinteria, Ca.
Clarence L. Myles, Houston, Tx.
Louis P. Pitre, Houma, La.
Billy G. Shearer, Jackson, Ms.
Mary A. Sidney, Houston, Tx.
John C. Stevenson, Jr., Cutbank, Mt.
Safwat F. Tadros, Houston, Tx.
Carol A. Veillon, Lafayette, La.
- 15 YEARS Sidney S. Abshier, Lovington, N.M.
Linda L. Carson, Lafayette, La.
Albert J. Ciallella, Lafayette, La.
Jacqueline J. Cipolla, Orcutt, Ca.
Ernest C. Corral, Orcutt, Ca.
Aquila O. Fleetwood, Jr. Andrews, Tx.
Raphael Fusilier, Abbeville, La.
Leoncio G. Garza, Andrews, Tx.
Catherine L. Gause, Santa Fe Springs, Ca.
Bennie J. Gipson, Van, Tx.
Philip D. Harrington, Pasadena, Ca.
Richard A. Hernandez, Orcutt, Ca.
Catherine J. Hiebert, Unocal Center
James R. Isham, Orcutt, Ca.
Frances Jennings, Unocal Center
Roger D. Lovette, Van, Tx.
Joseph D. Meche, Abbeville, La.
Eugene J. Ohms, Beckenridge, Mi.
Michael A. Peek, Santa Fe Springs, Ca.
Ralph R. Pflaum, Clay City, Il.
James W. Pitts, III, Placentia, Ca.
Lee H. Price, Houston, Tx.
Santiago J. Romero, Jr., Andrews, Tx.
Victor J. Rosato, Ventura, Ca.
Robert C. Ryan, Orcutt, Ca.
Carl Sash, Jr., Van, Tx.
Mary W. C. Y. Shih, Houston, Tx.
Huey P. Thomas, Lafayette, La.
Dupree Torrence, Houma, La.
Donald H. Wotring, Jr., Anchorage, Ak.
- 10 YEARS Susan L. Allen, Orcutt, Ca.
Lonny J. Babin, Houma, La.
Sandra M. Barber, Houston, Tx.
David H. Billington, Cisne, Il.
Blaine P. Bourg, Houma, La.
Roy D. Bricker, Clay City, Il.
Charles A. Broussard, Lafayette, La.
John M. Bruhl, Mobile, Al.
Paul B. Calcote, Lafayette, La.
Roberta K. Cameron, Grayling, Mi.
James A. Campbell, Sr., Mobile, Al.
John D. Coles, Lafayette, La.
Barbara A. Ditto, Andrews, Tx.
Benjamin F. Duff, IV, Healdton, Ok.
Lonnie D. Dugas, Lafayette, Al.
Katherine C. Enloe, Lafayette, La.
Truett E. Enloe, Lafayette, La.
Robert E. Estill, Houston, Tx.
James S. Garcia, Carpinteria, Ca.
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Ralph P. Hammack, Kenai, Ak.
Linda R. Hedrick, Oklahoma City, Ok.
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Autumn C. Hood, Taft, Ca.
Michael E. Hughey, Mobile, Al.
Glenn M. Kooly, Kenai, Ak.
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Dwayne M. Manceaux, Lafayette, La.
Jimmy D. Martinez, Orcutt, Tx.
Kathleen A. Milone, Clay City, Il.
Gregory W. Moon, Orcutt, Ca.
Joseph B. Mouton, Abbeville, La.
Sheila K. O'Connor, Ventura, Ca.
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Ronald J. Parro, Houma, La.
Chris H. Peterson, Casper, Wy.
Forrest R. Price, Lovelady, Tx.
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Keith J. Romero, Abbeville, La.
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Sandra K. Schubert, Houston, Tx.
Jerome W. Sherrod, Mobile, Al.
Gary V. Sims, Mobile, Al.
Michael A. Sroczyński, Lafayette, La.
Joseph W. Sellers, Jr., Abbeville, La.
William Sermon, Houston, Tx.
Bryce L. Tenold, Santa Fe Springs, Ca.
Jeffrey R. Tenzer, Bakersfield, Ca.
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Edward A. Vohnout, Taft, Ca.
Preston M. Walters, Houston, Tx.
Adrienne M. Wilder, Coalinga, Ca.
Marier A. Wilson, Houston, Tx.
Patricia I. Wooden, Ventura, Ca.
Brenda M. Young, Mobile, Al.

INTERNATIONAL OIL & GAS

- 25 YEARS Larry R. McHodgkins, Unocal Center
- 15 YEARS Donald A. Bray, Egypt
Bruce S. Davis, Netherlands
William G. Gombur, Unocal Center
Michael J. Hursey, Unocal Center
Stephen J. Schreiber, Norway
Harry J. Weatherspoon, Bangkok, Thailand
- 10 YEARS James A. Campbell, Thailand
I. Carmichael, Netherlands
M. Douglas Kypfer, Sunbury, England
John P. Short, Aberdeen, Scotland

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25 YEARS Paramaporn Krairiksh

15 YEARS Aue-Aree Vudhiwat
Udom Soonthornphanich

Unocal Singapore, Ltd.

Geoffrey Ang Lay yew

Unocal Indonesia, Ltd.

15 YEARS Amberi
Husein
Parno
Safrudin
Subiyono
Sudir
Sugijono
Suwardji
Suwardjo
Tohardjali
Wardjito
Mocho Ali
Benny B. Dictus
Muhammad Djaini
Daud Doallo
Sugeng H.S.
Caroline Hanafie
Slamet Hartono
Jusup Iskandar
Tinneke M. Kambey
Johannes Kapa
Achmad Marzuki
Yusman Marzuki
Muhamad Salim
Sjahan Sawala
Frans Bertus Soesman
Handar Subiman
Ingrid A. Sumajouw
Thomas Tabalujan
Muhammad Tahir
Willy Tapada
Willy Theodoros
Cornelius Toyang
Ellen Wasmana
Nico Winterstein
Benny Zunir

10 YEARS Djaliansyah
Antonius C. Djentamat
Isnain
Bustam Abdul Ganie
Hasyim Harsono
Anton Khornaylius
Bambang Kristiono
Abdul Madjid
Muhammad Noor
Hasanuddin Pane
Paulus Patulungan
Syamsul Abdul Rachman
Muhammad Tang
Jafar Jaya Umar
Abdul Wachid

Unocal U.K., Ltd.

10 YEARS Alex Beaton, Aberdeen, Scotland
David Boshier, Aberdeen, Scotland
Andrew MacFarlane, Aberdeen, Scotland

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35 YEARS Ronald B. Jarrett, Calgary, Alberta

25 YEARS George Petrie, Fort St. John, B.C.

20 YEARS David G. Bruneau, Calgary, Alberta
Paulette M. Pynenburg, Calgary, Alberta

15 YEARS John N. Abramchuk, Calgary, Alberta
Brenda M. Palm, Calgary, Alberta
Lea D. Steeves, Calgary, Alberta

10 YEARS Douglas R. Boisvert, Slave Lake, Alberta
W. James Jackins, Calgary, Alberta
Brian J. MacDonald, Slave Lake, Alberta
Anil Relan, Calgary, Alberta
Werner C. Rutzger, Calgary, Alberta
Ronald E. Senger, Calgary, Alberta

GEOTHERMAL

30 YEARS Olin D. Whitescarver, Imperial Valley

25 YEARS Richard F. Dondanville, Santa Rosa, Ca.
Donald E. Hedges, Santa Rosa, Ca.

20 YEARS Bruce W. Blaikie, Santa Rosa, Ca.
Mae L. Wong, Unocal Center

15 YEARS Agustin L. Viesca, Santa Rosa, Ca.
Thomas L. Waggoner, Imperial Valley

10 YEARS Simion L. Agustin, Imperial Valley
John M. Curtis, Imperial Valley
Linda M. Dudzic, Santa Rosa, Ca.
Dennis L. Hale, Imperial Valley, Ca.
Earnest W. Higgins, Imperial Valley, Ca.
Roberto Kadry, Imperial Valley, Ca.
Christopher D. Miller, Santa Rosa, Ca.
Danny W. Miller, Imperial Valley, Ca.
Leopoldo O. Rodriguez, Imperial Valley, Ca.
Suzie T. Suarez, Unocal Center
Laura L. Willis, Santa Rosa, Ca.

Philippine Geothermal, Inc.

10 YEARS Efrén O. Abrigo, Bulalo
Benedicto O. Alarcon, Makati
Emma F. Aquino, Makati
Benito B. Banluta, Bulalo
Saturnino C. Clavecillas, Tiwi
Wilson C. Clemente, Makati
Araceli B. Confiado, Makati
Rodrigo C. Cuebillas, Tiwi
Cynthia C. Custodio, Makati
Eliodoro C. Dacir, Tiwi
Rustico A. Daypo, Bulalo
Leonardo A. Enaje, Tiwi
Domingo B. Goncena, Tiwi
Anacleto D. Ignacio, Makati
Leopoldo A. Labaro, Makati
Carlito R. Mariscal, Tiwi
Dionisio T. Roxas, Bulalo
Adonis P. Templado, Tiwi

REFINING & MARKETING

40 YEARS Robert C. Wilkinson, Schaumburg, Il.

35 YEARS Andrew L. Barone, Seattle, Wa.
Richard A. Copelan, San Francisco Refinery
Donald E. Dueck, Richmond, Ca.
Thomas J. George, Nederland, Tx.
Thomas E. Guyney, Schaumburg, Il.
John M. Taylor, Los Angeles Refinery

30 YEARS Eugene F. Canote, Richmond, Ca.
F. G. Carlson, Los Angeles, Ca.
Phyllis D. Cross, Sacramento, Ca.
Lucy J. Mitchell, San Francisco, Ca.
Jerry Perona, Columbus, Oh.
Richard C. Uphoff, Portland, Or.
John E. Weir, Schaumburg, Il.

25 YEARS Thomas G. Bailey, Los Angeles Refinery
Michael E. Bowman, San Francisco Refinery
Michael D. Hickey, San Francisco Refinery
Paul F. Lambach, Jr., Orange, Ca.
Elaine F. Prokusi, Schaumburg, Il.
Dwayne J. Wilkinson, Los Angeles, Ca.

20 YEARS William D. Ackerman, St. Paul, Mn.
James R. Beale, Los Angeles, Ca.
Lloyd M. Berger, Olney, Il.
Christine Bowman, San Francisco, Ca.
Dorothy L. Brock, San Diego, Ca.
Fred E. Brown, San Francisco Refinery
Alfred G. Castro, Santa Paula, Ca.
Ronald W. Cooper, San Jose, Ca.
Clarence W. Crenshaw, Los Angeles Refinery
Harold Crossman, San Francisco Refinery
Gerald L. Dorband, Schaumburg, Il.
Armin E. Fette, Schaumburg, Il.
Alton R. Gill, Chicago Refinery
Raymond M. Halbrosk, Mokena, Il.
Stephen J. Hebert, Houma, La.
Richard A. Horrocks, Portland, Or.
Melvin D. Jackson, Los Angeles Refinery
John G. Kelly, Los Angeles Refinery
Ronald M. Kielma, Chicago Refinery
Nicholas T. Martinez, Los Angeles, Ca.
James R. Matthews, San Francisco Refinery
Walter J. McChaney, Los Angeles Refinery
Gary F. Morgan, Los Angeles, Ca.
Richard D. Payne, Los Angeles Refinery
Frank A. Pfister, San Francisco Refinery
Alfred W. Richards, Frankston, Tx.
Allan E. Simpson, Portland, Or.
Harold W. Weinrich, San Luis Obispo, Ca.
William H. Whittaker, Los Angeles, Ca.

15 YEARS John A. Ambriz, Brea, Ca.
Kirk C. Amspoker, San Francisco Refinery
Ronnie R. Belk, Los Angeles Refinery
Joseph Chacko, San Francisco Refinery
Bill R. Crawford, Phoenix, Az.
Ronald H. Hamada, San Francisco Refinery
Elisabeth Hooks, Schaumburg, Il.
Robert E. Lowe, Phoenix, Az.
Marina M. Madrigal, Los Angeles Refinery
Benny T. McLemee, Frankston, Tx.
Roy L. Neal, San Francisco Refinery
H. L. Stanley, Nederland, Tx.
Keith A. Upton, Portland, Or.
Paython Veazie, Jr., Torrance, Ca.
Laurell White, Schaumburg, Il.
Rickey Woo, San Francisco Refinery

10 YEARS Richard D. Adams, Beaumont Refinery
Londza Allen, Chicago Refinery
Carolyn A. Beck, San Francisco Refinery
David W. Bianchi, Chicago Refinery
Patricia M. Blickhahn, Schaumburg, Il.
Michael J. Bodziak, Chicago Refinery
Kyndl S. Buzas, San Francisco Refinery
Thomas J. Carter, Chicago Refinery
Linda S. Cary, Chicago Refinery
Ricardo G. Castaneda, Edmonds, Wa.
Douglas L. Chance, Portland, Or.
Steven N. Clark, San Francisco Refinery
Leo P. Cleveland, Chicago Refinery
John A. Combs, San Francisco Refinery
Joseph P. Connolly, III, San Francisco Refinery
Colleen B. Coulon, Schaumburg, Il.
Sheila Crossman, San Francisco Refinery
Robert S. Dahle, San Francisco Refinery
Alberto R. Deharo, Los Angeles Refinery
Rickey J. Delege, San Francisco Refinery
Dennis M. Doherty, San Pedro, Ca.
Wolfgang Ewert, San Francisco Refinery
George H. Fletcher, San Francisco Refinery
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Margaret K. Fryburger, Cincinnati, Oh.
Doree A. Hazen, Schaumburg, Il.
Virginia A. Henley, Beaumont Refinery
Harold P. Hill, San Francisco Refinery
Cheryl L. Hughes, Los Angeles, Ca.
Kinya Iiyama, Los Angeles Refinery
Bradley A. Jacque, San Francisco Refinery
Garland A. Jones, Los Angeles Refinery
Melvin L. Jones, Los Angeles Refinery
Wilma N. Joseph, Beaumont Refinery
Lawrence R. Kinzel, Chicago Refinery
Craig R. Lamont, San Paula, Ca.
Linda F. Larry, Beaumont Refinery
Mario G. Lozano, Chicago Refinery
Terry A. McNulty, Sacramento, Ca.
Lisa J. Mower, Los Angeles Refinery
Willie L. Nash, Richmond, Ca.
Bruce E. Nesom, Beaumont Refinery
Timothy C. Neville, San Francisco Refinery
Than Nguyen, Portland, Or.
George S. Olson, Los Angeles, Ca.
Danny E. Oster, San Luis Obispo, Ca.
David F. Platter, San Luis Obispo, Ca.
Mohanlal Ramcharan, Los Angeles Refinery
Raphael Richardson, Cincinnati, Oh.
Alfonso Sanroman, Los Angeles Refinery
Daryl J. Schout, Cincinnati, Oh.
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Evelyn A. Thompson, Beaumont Refinery
Gilman E. Thompson, Jr., San Francisco Refinery
Joe D. Thompson, Ketchikan, Ak.
Norman L. Voth, Los Angeles Refinery
Phillip L. Whitney, San Francisco Refinery

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50 YEARS Burke, Inc., Valdese, N.C.

35 YEARS Harold Justice, Crescent City, Ca.

30 YEARS Michael Webb, Napa, Ca.

25 YEARS Gallatin Oil Co., Inc., Gallatin, Tn.
Mid-South Sales, Inc., Helena, Ar.
Smithfield Farmers, Inc., Smithfield, Va.

SERVICE AWARDS



20 YEARS Moore Oil Co., Inc., Batesville, Ms.
Robin Hood Oil Co., Inc., Benson, N.C.
Sanders Oil Co., Inc., Columbus, Ms.

15 YEARS Edison Oil Co., Inc., Ft. Myers, Fl.
Hodge Distributor, Inc., Myrtle Point, Or.
Southwest Wisconsin Petroleum, Inc.,
Big Bend, Wi.

10 YEARS Channel's Union 76, Inc., Lee Vining, Ca.
Stuart M. Corey, Coupeville, Wa.

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35 YEARS S. P. Crockett, Brea, Ca.
Harold D. Dowell, Unocal Center
Edwin E. Johnson, Unocal Center
Carl W. Littrell, Kennewick, Wa.

30 YEARS James A. Laurie, St. Clair Shores, Mi.
Maxwell Minar, Brea, Ca.

25 YEARS Wilbur W. Fields, Kansas City, Mo.

20 YEARS Kenneth A. Drake, Charlotte, N.C.
Michael W. Gates, Houston, Tx.
Walter D. Gruskowski, Carteret, N.J.
Bland T. Moser, Charlotte, N.C.
Jennings H. Thornton, Tucker, Ga.
Kenneth F. Welch, Atlanta, Ga.
Charles E. Wilkins, Kenai, Ak.
Larrie O. Woods, Kenai, Ak.

15 YEARS Burl E. Cline, Charlotte, N.C.
T. J. Hinkle, Kenai, Ak.
Steven C. Loughridge, La Mirada, Ca.
Margaret Mena, Unocal Center
John P. Scott, Charlotte, N.C.
David A. Simon, La Mirada, Ca.

10 YEARS Carol E. Bozeman, Atlanta, Ga.
Rickey Bradshaw, Charlotte, N.C.
Doris M. Burdick, Schaumburg, Il.
James W. Campbell, Lemont, Il.
Andrew B. Cofer, Portland, Or.
Terry H. Creekmore, Lemont, Il.
Langley P. Galarneau, Jr., West Sacramento, Ca.
David C. Haring, Kenai, Ak.
John Hynek, Schaumburg, Il.
Debbie Luper, Schaumburg, Il.
Robert W. Piatt, Portland, Or.
Dale E. Stockton, Kenai, Ak.
Ronald P. Wright, Houston, Tx.

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30 YEARS Michael Bieda, Washington, Pa.
David L. Burns, Washington, Pa.
Robert W. Clutter, Washington, Pa.
Homer R. Day, Washington, Pa.
John R. Farrar, Washington, Pa.
Thomas W. Folkens, Washington, Pa.
Norman G. Horner, Washington, Pa.
Allen R. Keirs, Washington, Pa.
Duane A. McMullen, Washington, Pa.
John W. Sanders, Washington, Pa.
Jerry L. Wilkinson, Washington, Pa.

25 YEARS Paul M. Gallegos, Jr., Mountain Pass, Ca.

15 YEARS Gary F. Eisenbraun, Mountain Pass, Ca.

10 YEARS Steven C. Flink, Mountain Pass, Ca.
Ignacio D. Garcia, Rawlins, Wv.
Albert S. Johnson, Mountain Pass, Ca.
Alan C. Whitchurch, Mountain Pass, Ca.

POCO GRAPHITE, INC.

15 YEARS Kenneth D. Cooper, Decatur, Tx.

10 YEARS Francisco Amador, Decatur, Tx.
Jeffrey B. Cleveland, Decatur, Tx.
Jess E. Shook, Decatur, Tx.
Rickie D. Tarpley, Decatur, Tx.
Bobby D. Ward, Decatur, Tx.

RETIREMENTS

Science & Technology

Harold J. Bickford, June 8, 1953
Juanita B. Shedrick, July 20, 1956

Chemicals

Calvin D. Allen, October 1, 1965
Ted L. Bradshaw, December 17, 1973
Harold M. Flood, October 16, 1967
Manuel Perry, December 22, 1969
Jerald M. Simmons, March 21, 1960
Thomas Edmund Sisneros, November 6, 1972
Robert W. Vasquez, December 26, 1956

Molycorp, Inc.

Robert B. Hobbs, January 6, 1964

Refining & Marketing

Robert C. Blum, December 19, 1966
George E. Bokan, March 24, 1949
Charles O. Burch, August 1, 1947
John Campagne, August 22, 1952
John E. Campbell, March 10, 1951
William M. Collier, July 22, 1955
Joseph Csiszer, November 12, 1956
Donald E. Dueck, March 5, 1954
Raymond Walter Ferencik, March 31, 1949
Robert R. Jarrett, May 5, 1954
Paul Klemenok, Jr., March 23, 1955
Arthur G. Likar, July 19, 1948
William L. Marquardt, August 3, 1959
Joseph E. Mason, November 21, 1954
Robert T. Mays, July 10, 1957
Judith M. McIntosh, February 2, 1967
Oliver J. Stepp, November 7, 1952
Martin L. Tabbs, February 7, 1977
Eugene J. Thompson, November 14, 1966
Richard D. Van Curen, January 31, 1966
Donald F. Wilson, March 31, 1952

IN MEMORIAM

EMPLOYEES

Corporate

Robert G. Pott, January 31, 1989

Chemicals

Paul H. Flowers, December 11, 1988
Angela Hinds, February 10, 1989

Oil & Gas

Bobby H. Arnold, December 15, 1988

Refining & Marketing

Conrad B. Edgett, Jr., February 26, 1989
Jessie Jackson, February 26, 1989
Joan Neil, March 19, 1989
Raymond R. Woods, March 3, 1989

Molycorp, Inc.

Paul Alex Tiedemann, February 6, 1989

RETIRES

Corporate

Golda S. Bratten, January 1, 1989
William E. Bright, Jr., January 17, 1989
Eva M. Searing, November 10, 1988

Science & Technology

Mark P. Harrington March 15, 1989

Oil & Gas

Wayne Blake, February 15, 1989
Ira H. Cram, January 15, 1989
Kenneth R. Crossman, January 16, 1989
Mary M. DePriest, January 26, 1989
George P. Elderkin, February 8, 1989
Lloyd W. Hiles, January 1, 1989
Jerry I. Hockenberry, January 27, 1989
Stanley L. Isle, January 6, 1989
Justin E. Lacoste, February 2, 1989
Ervin W. Oxford, December 7, 1988
Frank E. Poulsen, November 18, 1988
Thomas O. Spates, February 12, 1989
Gail Underwood, March 19, 1989

Molycorp, Inc.

Bernard L. Himmelright, January 5, 1989
Thomas L. Hoskins, January 20, 1989
Amadeo J. Trujillo, January 10, 1989

Chemicals

Billy G. Bennett, December 27, 1988

Refining & Marketing

Arthur J. Ackerman, January 7, 1989
Allison R. Allen, December 25, 1988
Agnes M. Bender, February 20, 1989
Leonard H. Berglund, February 2, 1989
Keith L. Biechlin, January 4, 1989
Wilson A. Bradford, January 2, 1989
John Joseph Breen, January 17, 1989
Thomas F. Brinnon, December 25, 1988
Lonnie C. Brookins, January 27, 1989
James Russell Burrell, March 7, 1989
Fred W. Bush, February 15, 1989
James F. Cahill, February 6, 1989
John A. Coxon, December 16, 1988
Matilda A. Dornburg, February 16, 1989
Gerald H. Durey, January 14, 1989
Daniel L. Ebright, February 16, 1989
Ernest Earl Edwards, November 27, 1988
Erick H. Erickson, February 13, 1989
George Albert Farnum, March 6, 1989
Carl P. Garner, April 16, 1988
Percy W. Goodell, January 10, 1989
Chester A. Gorley, December 17, 1988
Ellis L. Hamner, December 28, 1988
Helen B. Hankey, February 1, 1989
Ross Hanson, March 13, 1989
William I. Hays, December 30, 1988
Anna M. Hegener, January 7, 1989
Leonard L. Herman, February 10, 1989
Howard Holloway, January 27, 1989
Robert A. Home, March 18, 1989
James Elmo Jones, December 10, 1988
Thomas E. Killelea, December 31, 1988
Frank N. Kuhn, February 13, 1989
Raymond J. LaPointe, January 16, 1989
Cadwalder I. Larson, December 31, 1988
Roger M. Levan, March 5, 1989
Joe R. Longino, January 17, 1989
William N. McCrory, December 31, 1988
Percy N. McKinney, January 11, 1989
William R. McNaughton, December 30, 1988
Mary Merva, March 8, 1989
Joseph Louis Miller, January 5, 1989
Milton D. Miller, March 1, 1989
Joseph M. Murphy, February 3, 1989
Roy O. Norick, February 7, 1989
James H. Norris, Sr., February 15, 1989
John M. Pollen, March 5, 1989
Merriewether Quarles, December 17, 1988
Mary T. Reinking, February 6, 1989
Cecil F. Richards, March 17, 1989
James J. Richards, March 10, 1989
Harold P. Sanders, January 11, 1989
Alban C. Scheuber, March 11, 1989
Andrew A. Sefcik, February 19, 1989
Anne D. Shealy, January 1, 1989
Richard D. Shields, February 8, 1989
Harold C. Strand, January 17, 1989
William V. Stucker, January 20, 1989
Dorothy M. Temte, January 11, 1989
Eugene R. Tyler, March 6, 1989
George A. Wahoff, January 28, 1989
Wesley W. Ward, January 27, 1989
Elmo S. Worthington, February 14, 1989
Clarence L. Zellefrow, January 9, 1989

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CONTENTS



8

Patience Pays Off Page 1
The dedication of Unocal's new Unit 3 power plant culminates more than 25 years of geothermal development in California's Imperial Valley.

High-Tech Protection Page 8
Unocal scientists use advanced technology and field-tested know-how to safeguard equipment against the threat of corrosion.

Approaching Our Second Century Page 14
President and Chief Executive Officer Richard J. Stegemeier outlined Unocal's key goals at the 99th annual shareholders' meeting.

A Remarkable Legacy Page 20
This year's annual meeting included a tribute to Fred L. Hartley, who has now served Unocal for 50 years — 24 of them as chief executive. *Seventy Six* salutes Hartley's illustrious career in a special foldout section.

An Exciting Half Century Page 24
In his annual meeting address, Fred L. Hartley recounts Unocal's milestones during his tenure with the company and thanks his many colleagues.

A Global Concern Page 28
Unocal's International Medicine organization works to ensure the health and safety of overseas employees.

The Offshore Pioneers Page 34
The first open-water oil well was drilled in the Gulf of Mexico back in 1937. Pure Oil, later to merge with Unocal, was a partner in this historic venture.

Honoring Tomorrow's Scientists Page 38
Unocal invests in the future by sponsoring a Los Angeles high school's science fair.

Keeping In Touch Page 40
Retiree clubs help Unocal "alumni" maintain links with the company and each other.

Service Awards Page 41

Cover: A dramatic Gulf of Mexico sunset frames Unocal's Cerveza platform, located offshore Texas. In the years ahead, the company plans to step up exploration efforts in the Gulf and other high-potential areas. Expanding Unocal's resource base was one of four key goals outlined at the company's 99th annual shareholders' meeting. Story on page 14.
Photo by Bob Thomason.



28

Seventy Six is published by the CORPORATE COMMUNICATIONS DEPARTMENT, Unocal Corporation, Box 7600, Los Angeles, California 90051. **Karen Sikkema**, Vice President, Corporate Communications; **Tim Smight**, Editor; **Cathy Stephens**, Assistant Editor; **Heidi Siegmund**, Editorial Assistant; **Ray Engle and Associates**, Art Directors.

Editor Barbara Pederson, temporarily assigned to a special corporate centennial project, has accepted a new position in the Corporate Communications Department. Effective May 1, she was named a Senior Staff Writer for Executive and Corporate Communications. Concurrently, Acting Editor Tim Smight was named Editor of Seventy Six.

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