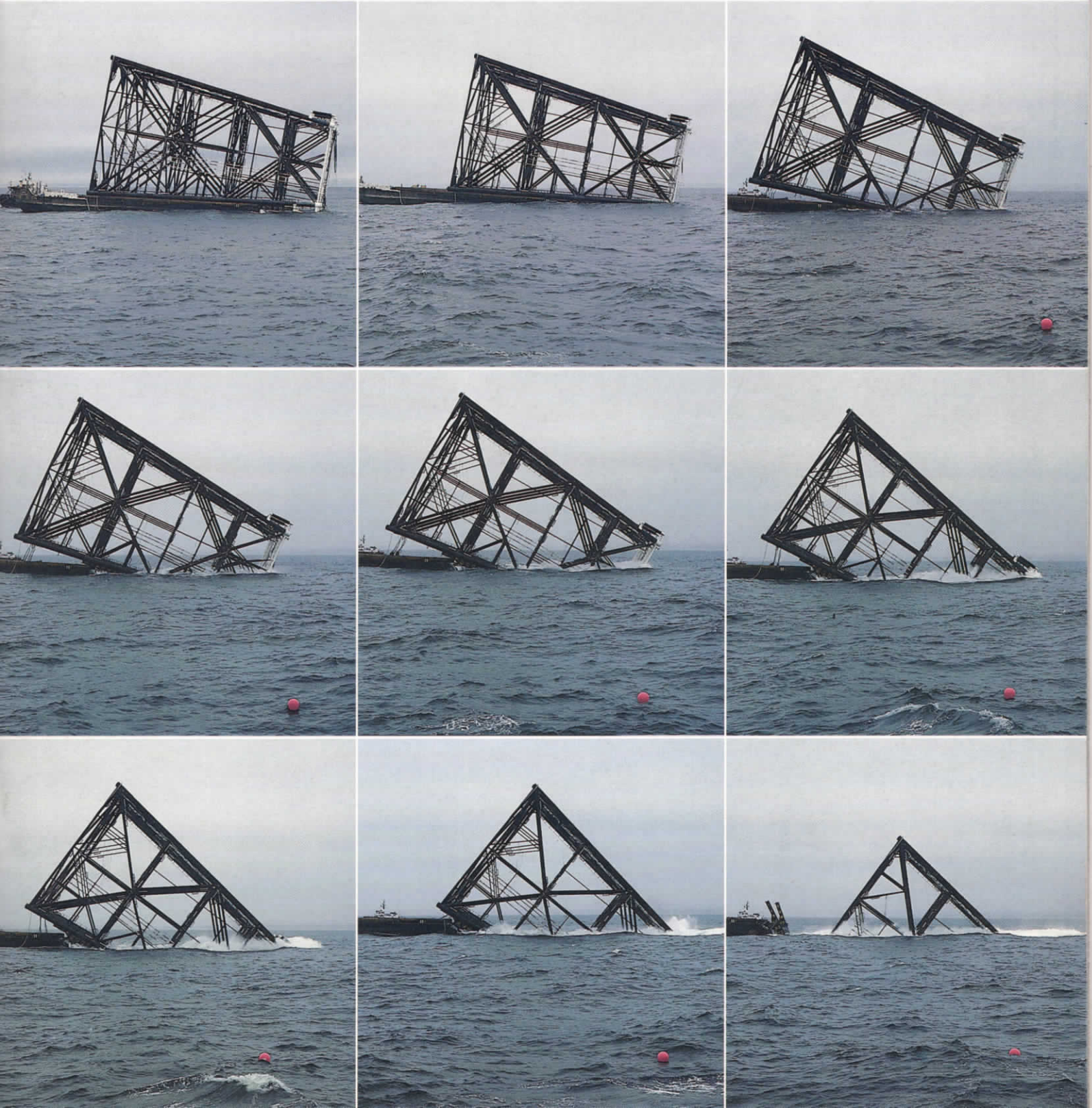


# Seventy SIX

September  
October 1985



# OFFSHORE CALIFORNIA:

## Irene gets set to go.

The waiting ended at approximately five o'clock Wednesday afternoon, August 7. The moment had finally arrived for an anxious, restless crew who had just spent close to 48 hours on the barge *Sarita*, four and one-half miles from shore near Point Conception.

The jacket for Platform Irene was about to be launched in 242 feet of water. Irene would be the first offshore structure in California's central Santa Maria Basin, with the potential of adding up to 20,000 barrels of oil and 13.3 million cubic feet of natural gas per day to domestic supplies. Almost everyone there felt the excitement—and the tension.

"From the actual moment the platform starts moving down the launch skids until it's settled into a stable position in the ocean is a highly nerve-racking time. When the platform first splashes into the water, everyone holds his breath," says Mike Craig, senior engineer for Oil & Gas, Western Region.

Craig, who is responsible for Irene's structural design, knows how unpredictable a platform launch can be. The 260-foot-tall jacket, weighing nearly 3,000 tons, needed careful handling. And it didn't help matters that waters around Point Conception are usually rough—heavy storms to the west and northwest often generate extreme wind and wave conditions. In fact, Irene's debut had to be postponed a day and a half because of gusty winds and turbulent waters.





“But in this business, delays are typical,” notes Craig. “We’re at the mercy of Mother Nature.”

Work crews are familiar with the offshore routine. They know that spending cold and vigilant days and nights at sea is sometimes necessary until the weather improves enough to allow the launch. Only then can workers leave the *Sarita* and venture over to the launch barge by boat, where the platform jacket looms like a skeletal mountain. On its side, the structure is about as long as a 26-story building is high. After climbing onboard, they cut the tie-downs that keep Irene in place and attach cables to it. When the barge is tilted at a two-degree angle, the jacket overcomes the friction of the runners and slides toward the sea.

When the moment for launching finally did arrive that Wednesday, the sighs of relief were cut short by another unforeseen though not uncommon event. The platform jacket failed to right itself into the proper position once in water. A jacket normally enters the sea top-down, then floats up on its side. Irene, however, stabilized in an inverted position. “Nobody knows the exact reason it happened,” says Rich Keller, regional production manager, Oil & Gas, Western Region. “A combination of factors could be attributed.”

One factor concerns the structure’s center of gravity, the balancing point around which all the platform’s weight is equally distributed. Platforms built for use in relatively shallow waters—such as Irene—are shorter and boxier than those built for deeper waters. This makes the center of gravity more critical in achieving stability in the desired position after launch. “Irene could have found any one of six positions in which to become stabilized in the water,” notes Keller. “Unfortunately, it found the wrong one.”

To reposition the jacket, the crew attached air hoses to its hollow legs to force out the water, then used slings to maneuver it. The entire operation took about 60 hours, and then work began to secure Irene to the ocean floor.



*Arrival: Platform Irene’s jacket dwarfs the barge that tows it to its launch point offshore California. At top, the jacket is angled towards the sea in the first stage of the launch. Once secured to the ocean floor, the jacket is ready to receive its decks (above).*



The platform's launch was the culmination of over two years of intense effort. Getting the necessary authorizations to build a platform like Irene is not easy—especially in California, where regulations are stiffer and permits more difficult to get. Dick Gillen, regional offshore construction manager in Ventura, had the primary responsibility of getting Irene from paper to a production-ready platform. Of the two and one-half years it took to develop Irene, says Gillen, only half of the time was spent in actual construction. "The rest was used for getting permits. That's probably a good 50 percent of what I do."

More than 60 government agencies imposed requirements which had to be met before Irene was engineered, built and set. The proposed oil dehydration facility in Lompoc, a small city in Santa Barbara County, also had to comply with various regulations. Linked to Irene by nearly 22 miles of pipelines, the Lompoc facility will treat recovered oil. Regulatory concerns for both the platform and dehydration site included water and air pollution, socioeconomic impact on surrounding communities and the effects on habitats of endangered native plants and animals.

Although this is Gillen's sixth offshore project, experience rarely makes the permitting process any easier because regulations are constantly added or changed. "I'm getting to the point where I expect anything to happen," he says.

Before the first welding arc was ever struck, a complex process of design, analysis and verification took place. Reservoir engineers and geologists first studied information from the exploratory wells to determine where to locate the platform, how many wells to drill for maximum recovery and what type of production to expect.

"You have to make estimates of what it's going to cost to build a platform, put in the pipelines and get the oil to market," explains Gillen. "Then you give those figures to the reservoir engineers who will estimate the amount of oil to be produced. Using the two, an economic decision can be made on whether to proceed with the project?"







*Two decks are installed atop Irene for production and drilling activity. Left, workers prepare to be lifted in "baskets" to the tugboat by crane. Opposite page: Mike Craig (right) talks with Dick Gillen aboard the Sarita before boarding the launch barge to inspect the jacket.*



Once the decision is made to begin, numerous permits must be obtained before work on the project can actually start.

Gillen and a small staff start by incorporating scores of scientific projections into a voluminously detailed plan. They submit the plan for review to the U.S. Minerals Management Service (MMS), part of the U.S. Department of Interior, which regulates platforms like Irene that are located in federal offshore waters. The Lompoc facility, being onshore and under California jurisdiction, required state and county permits. In addition, the county of Santa Barbara requested an Environmental Impact Report (EIR).

Roy Martens, district land manager, Oil & Gas, Western Region, sought and received approval on a special proposition for the platform: running 11 miles of pipelines across a military station. Because Vandenberg Air Force Base is located between the coastline and the Lompoc oil dehydration facility, it was more efficient to install the pipelines for oil, natural gas and water across the base.

"We actually had to talk to the assistant secretary of the Air Force to do that," Gillen recalls.

Unocal and two co-venturers began exploring the central Santa Maria Basin in 1981, and discovered oil there in November 1982. A confirmation well was drilled about two months later. Impressed by the potential amount of oil and natural gas reserves within the three-square-mile area, the company decided to build the platform in February 1983.

During the early planning stages, Gillen got a call from another employee who wanted to know the new platform's location. Gillen found out and called him back with news that it would be in the "I" sector. Just for clarification, he added, "As in 'Goodnight Irene,' " from the title of an old folk song.



*Platform installation is a round-the-clock proposition with many phases dependent on the weather.*





The platform whose name Gillen coined will accommodate two decks, 72 well slots and two rigs once it is completed. From the sea floor to the rig's top, Irene will stand 465 feet—more than twice the height of Unocal Center. After most of the construction is finished in mid-December, the main responsibility for the platform will move from Gillen to Bill Flint, northern California district operations manager, Santa Maria, who will oversee production and drilling operations. Drilling is expected to begin in the first quarter of 1986.

Oil and natural gas recovered from Irene will be pumped to Lompoc. The oil will be stripped of water, heated for flow improvement, then pipelined to the Santa Maria Refinery. The water will be treated to remove any impurities, then returned to the platform for disposal under National Pollutant Discharge Elimination System (NPDES) permit conditions, as set by the Environmental Protection Agency. The gas will go to the Battles plant in Santa Maria to be processed into natural gas liquid propane, butane and natural gasoline.

It is not surprising that the launch of Platform Irene attracted a considerable amount of media coverage and community interest. The Santa Barbara Channel area has traditionally reflected a high degree of environmental awareness. It was largely because of this concern that the company conducted two special news conferences the week after Irene was launched. In an effort to demystify the project, Dick Gillen acted as company spokesman to explain environmental safeguards planned for both Irene and the Lompoc facility.



*Workers on the tugboat get an up-close view of the jacket moments before its launch.*

“Irene is the only platform north of Santa Barbara that is powered by electricity from shore. A 10-mile-long power cable connects the platform to Pacific Gas & Electric grid power at Surf. Compared to all the other projects that have been proposed and that are going in, Irene’s emissions will by far be the lowest. Emissions from the onshore facility will be the equivalent of 10 houses with one car each. Really, that’s not very much,” he reported.

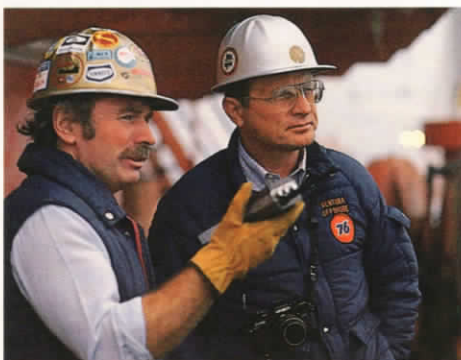
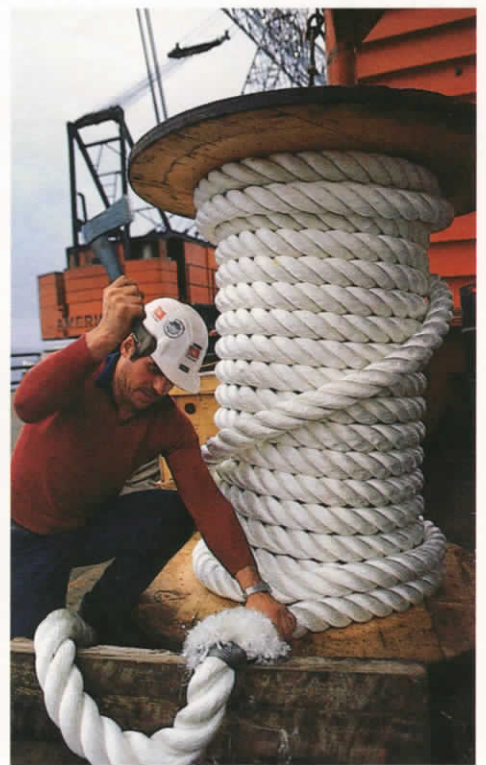
The local community is expected to realize a \$15-million gain in revenue from the resulting contract bids, employment and other sources, according to the Environmental Impact Report. Gillen predicts that Irene’s economic boost will spread over the nearby areas of Lompoc, Orcutt, Santa Ynez, Santa Maria, Santa Barbara and San Luis Obispo. All, with the exception of the latter, are in Santa Barbara County.

Although he has orchestrated the production of many platforms before, Gillen says some feelings about the experience will never change. “It’s exciting, and you get a real sense of accomplishment when it’s over.” After a pensive moment, he adds, “I suppose what I like better than anything else is the challenge. All through this deal, you’re working with the government to get your permits, and trying to do the same thing quicker and better than other oil companies. That’s what is really interesting about working offshore.” <sup>76</sup> A.B.

*Editor’s note: Early in this story, Dick Gillen is quoted as saying he expects “anything to happen” during the offshore permitting process. In fact, it has. Construction of the pipeline that is to carry Irene’s crude oil to the Lompoc dehydration plant may be delayed because of certain issues raised by the State of California Lands Commission. These issues concern pipeline access for potential oil production in state-owned coastal waters. The issue is unresolved as we go to press.*







*At left, Rich Keller (with camera) discusses strategy with a member of the Sarita crew during the setting of the platform jacket. The decks were installed about two weeks later.*



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# Scholarships

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## Help

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## Students

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## Make the

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## Grade

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John W. Powell had never really expected to win. He was in the minority—a broadcast management major competing for an oil company scholarship against mostly science and engineering students. But his father John A. Powell, retired from Pure Transportation Company, had always talked of the Unocal Foundation scholarship award. So in 1983, as a high school senior, Powell applied—and won.

“I felt great! It shows they recognized that I had good potential to be a success in my field,” he says.

Currently in his third year at the University of Florida, the 20-year-old student has been awarded a total of \$4,600 through the foundation program. “That pays for my tuition and more,” he says. “It’s really made a big difference.”

That has always been the purpose of the scholarship program—to make a difference, both through financial assistance and formal recognition of student accomplishment. The Unocal Foundation (formerly the Union Oil Foundation) was formed in 1962 to distribute the company’s donations to various organizations supporting charitable, scientific, cultural and educational projects. Almost half of the foundation’s dollars support education programs.

From 1963 to 1975, the scholarship stipends were distributed under the National Merit Scholarship Program. Starting in 1976, however, winners began receiving awards under the present-day Unocal Foundation scholarship program. Science, engineering and business fields are emphasized; 15 of the 20 students selected each year are majors in these fields.

Students are awarded between \$500 and \$3,000 annually for up to four years, depending on financial need as determined by the College Scholarship Service (CSS). Since the first awards were made in 1963, the company has given well over \$900,000 to more than 200 college-bound high school seniors under this program.

“The kids are very appreciative,” says Rufus Van Zandt, assistant corporate secretary of Unocal and vice president of the foundation. “The awards give them recognition for excellent scholastic work.”

The scholarship program provides financial help in a time when educational costs are rapidly rising. Since 1960, the average cost to attend American colleges and universities has more than tripled. Twenty years ago, the average annual cost of tuition, room and board at a public four-year university was \$980, and \$2,000 per year for private institutions. Recent figures dwarf those amounts: students now pay an average \$3,160 per year at public universities and \$7,500 at private schools. (The figures are from a 1983-84 poll of colleges and universities taken by the National Center for Educational Statistics.)

Richard Vogel, who won a scholarship in 1966, notes: “When you’re going to college, every little bit helps.”

The son of Lee Vogel, senior research associate with Science & Technology in Brea, California, Richard always wanted to work with computers. But since computer science degrees were virtually unheard of in the mid-’60s, Vogel majored in applied mathematics at Massachusetts Institute of Technology.

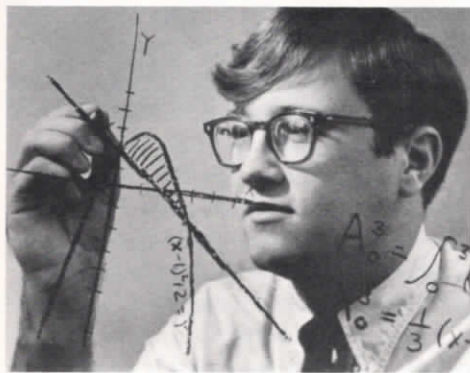


His foundation scholarship enabled him to work less on his part-time job, and study more. Presently, Vogel works with computers as a subproject manager for software development at TRW near Los Angeles.

Science has long been Jean Paul Chauvel's favorite subject. The term "good grades" understates his academic accomplishments. The 1975 foundation scholarship winner graduated first in his class in junior college, then continued his studies at the University of California at Davis where he maintained a nearly perfect grade-point average.

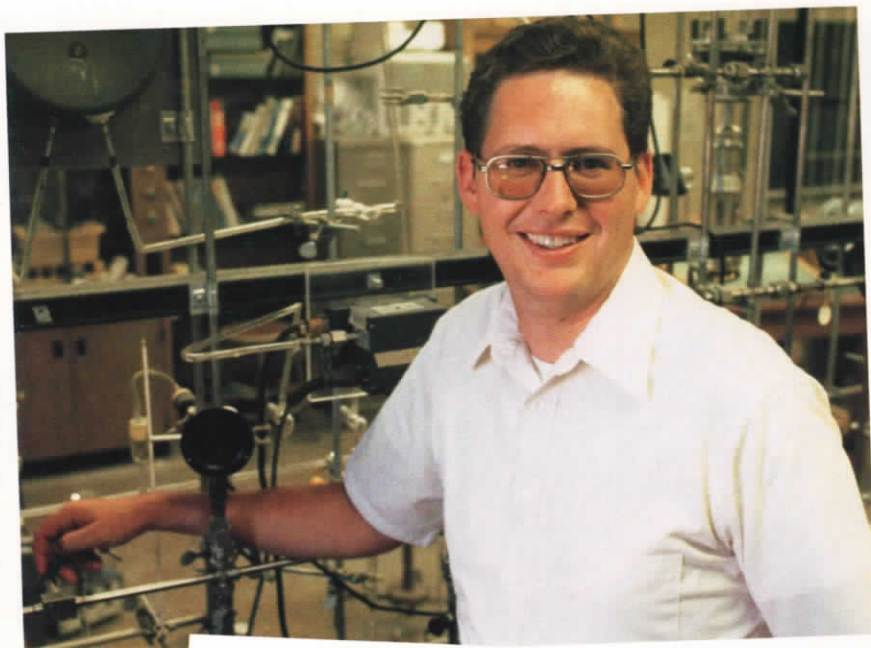
Now, after obtaining a Ph.D. in chemical physics from UC Davis, Chauvel conducts scientific studies there and plans to do product research and development work with industrial chemicals. He had known about the scholarship program before he was even old enough to apply. "My dad (Jean Paul Chauvel Sr., senior exploration geologist with Oil & Gas, Ventura) had been telling me about this for years."

Besides helping with educational costs, Chauvel says the Unocal award enhanced his record of accomplishments, which made it easier for him to win other scholarships.



*Teen-age math wizard Richard Vogel (above) became a computer expert (right). Awardee John Powell (top) goes on the air at his college campus radio station.*





Winning the foundation award in 1976 made Andrea Vargo more motivated to do well in college: "An award like that gives students a great deal of pride. It's always nice to have someone else realize you're doing a good job?"

The daughter of Andrew Vargo, manager of loss prevention, Chemicals Division, Schaumburg, she majored in journalism at Chicago's Northwestern University. After growing dissatisfied with her post-graduate job as a newspaper reporter, Vargo enrolled in law school at the University of Notre Dame. Today she works as a tax attorney.

Catherine Kretch is the daughter of Schaumburg analyst Dolores Kretch. She received a foundation scholarship in 1971 to major in education, and remembers, "The money and recognition were a big help to me." An attorney who also lives in Chicago, Kretch currently works for a bankruptcy judge.



*Hard work in high school paid off with foundation scholarships for Jean Paul Chauvel and Andrea Vargo in the mid-'70s. Today, Dr. Chauvel performs studies in chemical physics at a northern California university, and Vargo is a tax attorney for a large Chicago accounting firm.*



Today's scholarship winners are another generation for whom education—and financial resources—are important. Susie Breiten was awestruck after learning her son had won a 1985 foundation scholarship—two years after her daughter had won the same award. A senior general clerk at Schaumburg's Chemicals Division, Breiten is proud of children John and Sara, both of whom are engineering majors at the University of Illinois.

"The scholarships have been great," she says. "I sometimes wake up sweating in the middle of the night, thinking about what I'd have done if there wasn't that help."

For 19-year-old Sara, the scholarship's assistance was more than financial. Since she had always planned to work in the aerospace industry, she thought she knew every step needed to get there. But filling out some of the application questions forced Breiten to take a closer look at herself. She had to define her objectives and values more clearly than ever before—for the judges, and herself.

"Doing that really made me put my goals into words," says Breiten. "I think it's an experience parents and their children should share."

The Unocal scholarships have given many families something else to share, too. John Powell remembers attending the awards banquet in 1983, where he was formally presented with the scholarship. His family was there, and his father, in particular, looked quite proud.

"My dad worked 45 years for Union Oil," Powell explains. "The scholarship sort of recognized him, too. It's a matter of pride. If anything, do it for your parents."

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## How To Apply For Scholarships

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High school students graduating in 1986 may qualify for a Unocal Foundation scholarship award. Students are eligible if one parent is:

■ A regular full-time employee who will have at least two years of continuous service on Unocal's U.S. payroll by April 1, 1986.

■ A person who, either as an individual or partner, has held a contract marketer (jobber) sales agreement, commercial consignment agreement, service station lease, or retail dealer gasoline purchase contract with Union Oil or Unocal for at least two years preceding April 1, 1986.

■ A retired or deceased employee who, immediately prior to retirement or death, had at least five years of continuous service to Unocal or one of its wholly owned subsidiaries.

All applicants must take the Scholastic Aptitude Test (SAT). Scholarships will be awarded only to those who plan next year to enter a U.S. college accredited by one of the six regional accrediting associations.

The selection process is handled by the College Scholarship Service, a non-profit organization which appoints a scholarship committee of educators. These judges choose semifinalists on the basis of SAT scores and class rank. Winners are then selected by further consideration of academic and extracurricular achievements.

Details and application forms may be obtained at most Unocal personnel offices, or by writing to: The 1986 Scholarship Program, Unocal Foundation, P.O. Box 7600, Los Angeles, California 90051. 76 A.B.

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### IMPORTANT DEADLINES

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#### November 30, 1985

Completed scholarship applications must be received by CSS in Princeton, New Jersey.

#### December 7, 1985

Last day to take SAT.

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# Bright Horizons in Indonesia

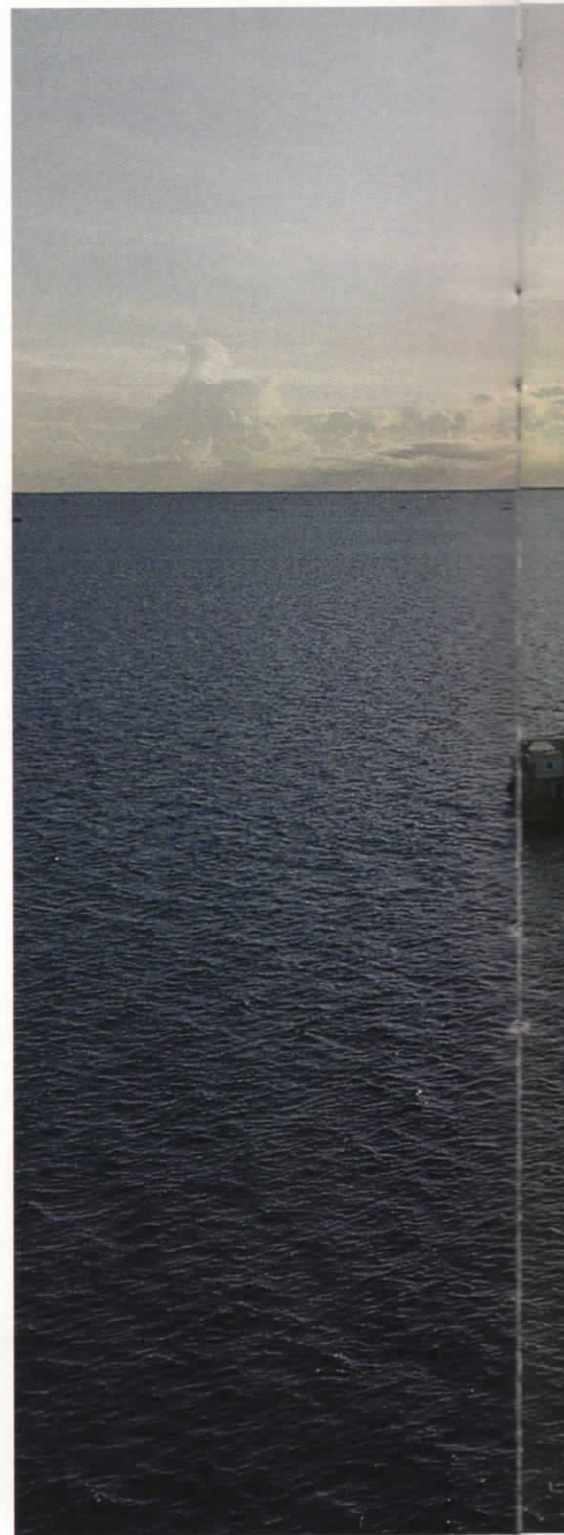
From a distance, the massive construction barge with its towering crane looked like something out of a Jules Verne tale—a gigantic sea creature looming up out of the glassy blue water. Standing in the open cargo bay of a supply boat speeding toward the barge, Graham Dryden checked the settings on his camera. It's not every day that one can witness a wellhead platform being set offshore, and for Dryden, this was a big event.

As senior production engineer for Union Oil of Indonesia (UOI), Dryden spends a lot of hours laying the groundwork for projects like this one. The platform installation, one of two that took place last June in UOI's Yakin North field offshore East Kalimantan, Indonesia, was one that he'd especially looked forward to seeing—even if it did mean spending a Sunday afternoon out on the water under a blistering equatorial sun.

As the boat drew closer to the work barge, however, something seemed amiss. The bright yellow platform was already perched atop the jacket—an hour ahead of the scheduled installation time.

"Isn't this typical?" Dryden said, suppressing a laugh as he waved up at the Indonesian construction crew. "You spend months planning out and working on a project. Then, before you can blink, it's already off and running."

To be sure, this incident aptly sums up the history of Unocal's operations in Indonesia. From their beginnings over 15 years ago to the present, UOI's endeavors here are a story of big challenges being met and big dreams being realized—often ahead of schedule. The results have not only yielded benefits to Unocal, but have helped spur development of the burgeoning oil and gas industry in this diverse island nation of over 165 million people.

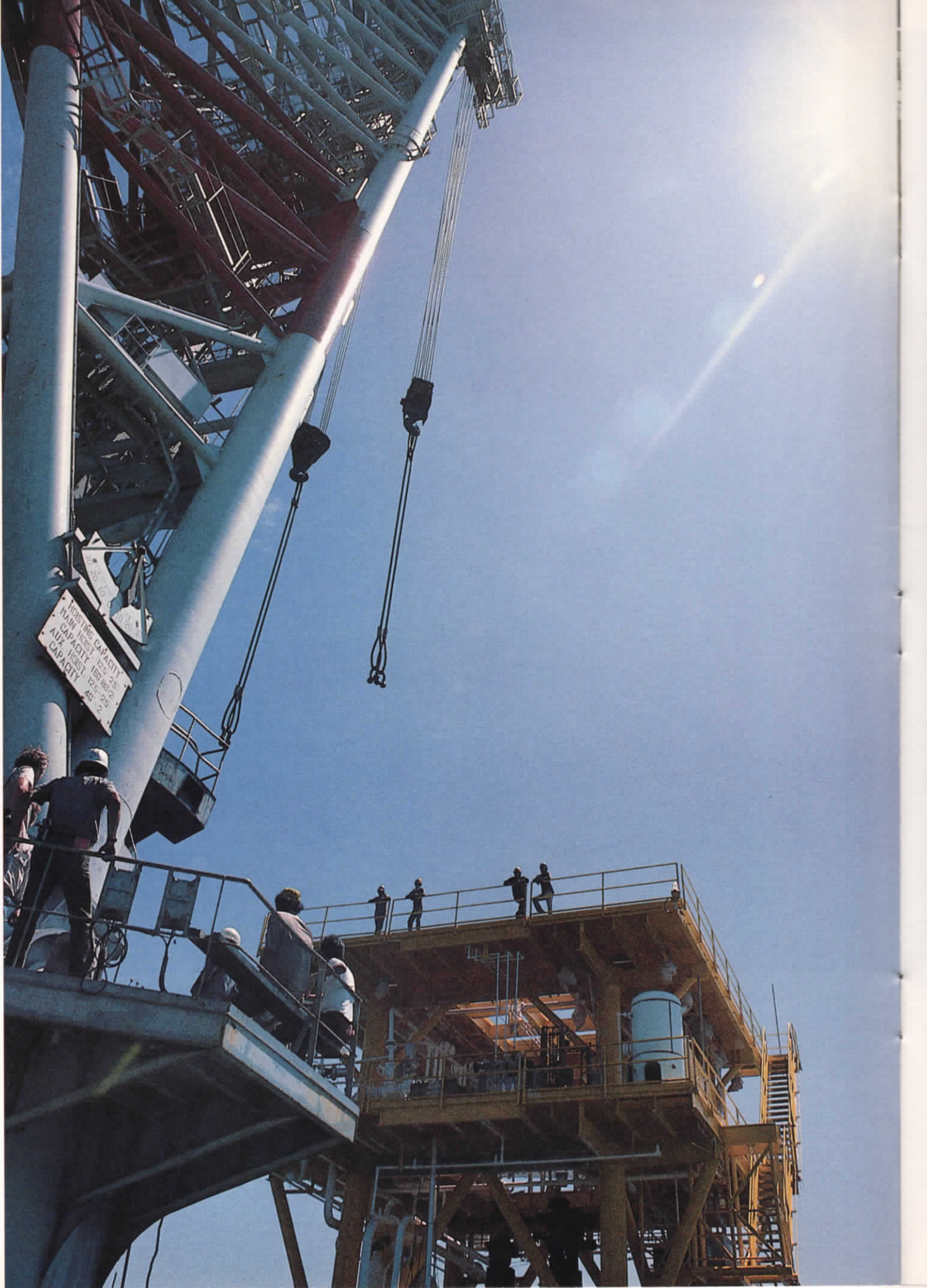






*Drilling underway in the Yakin complex, offshore East Kalimantan. Unocal's Indonesian operations now span 15 successful years.*





• HOISTING CAPACITY  
MAIN HOIST 150,000 LBS  
CAPACITY 150,000 LBS  
AUX. HOIST 100,000 LBS  
CAPACITY 100,000 LBS



Consider what's been accomplished in little more than a decade and a half. Back in May of 1970, the company spudded its first well offshore East Kalimantan. (Kalimantan is the Indonesian sector of Borneo.) Three months after drilling began, oil was struck—and by November of 1972, just 27 months later, production began to flow from the Attaka field. It was the first offshore oil field ever developed in Southeast Asia.

Four more commercial fields were soon discovered by UOI offshore East Kalimantan: Melahin, Kerindingan, and Sepinggan (which all came on stream in 1975), and Yakin (1976). Meanwhile, two large onshore terminals were constructed on the East Kalimantan coast to process and ship the oil and gas, and a company housing complex—Pasir Ridge—was built in the city of Balikpapan. That this flurry of development was completed on time and under budget is remarkable—especially given the operations' relatively remote location.

Today, East Kalimantan is a booming oil and gas region. The Attaka field alone (the name means "bonanza" in Japanese) has produced in excess of 375 million barrels of oil and 487 billion cubic feet of natural gas (through June of 1985). Concurrently, Indonesia has gone from an oil-importing nation to a thriving oil exporter which produces a total of 1.3 million barrels a day. One of the 13 OPEC nations, the country garners 70 percent of its gross national product from oil and gas.

"Unocal's success in Indonesia has gone hand-in-hand with the growth of the oil industry here," says Gene Ward, vice president of exploration and production, UOI. "Our relationship with the government has been very stable and positive over the years, and we expect that to continue."

Unocal's development rights in Indonesia are held under production sharing contracts (PSCs) with Pertamina, Indonesia's state-owned oil company. "Basically we operate as contractor to Pertamina," explains David St. John, UOI operations manager. "We explore for, develop, and produce oil and gas; then obtain a share of production after recovering costs?"

Under the production sharing arrangement, all exploration costs in the contract areas are borne by UOI. If a discovery is made and proves commercial, the company recovers these costs in oil (out of the production) immediately. Each year of production, operating expenses are also repaid to the company in oil. Remaining production is then split, with 15 percent going to UOI and 85 percent to Pertamina.

Although UOI's operations (and most employees) are based in Balikpapan, the company maintains its head office in Jakarta, Indonesia's capital on the island of Java. The city also serves as Pertamina's headquarters. "We deal with Pertamina on a daily basis, so it's very helpful to be here," explains Ward, who is based in Jakarta along with UOI president Ken Zerda and 33 other staffers.

Pertamina's production sharing arrangement with UOI also calls for hiring and training Indonesian nationals as a way of helping develop the country's domestic oil and gas industry. Over the years, the company has maintained one of the industry's most successful "Indonesianization" programs. Currently, more than 90 percent of UOI's 1,384 employees are Indonesian nationals.



*Left, a new wellhead platform just installed by a construction barge in the Yakin North field. Above, a ship takes on liquid propane at a loading facility offshore UOI's Santan terminal.*



“Our overall policy is to gradually replace expatriates with nationals who move up through the ranks into skilled positions,” says UOI personnel manager Eddie Dharmawan, himself an Indonesian who started with the company in 1975 as an engineer trainee. “This not only helps the domestic industry, it also benefits the company economically by decreasing the number of employees who have to be brought in from abroad.”

UOI maintains an ongoing recruiting and training program for engineers and other skilled workers. Six to 10 newly graduated engineers from Indonesia’s four major universities are admitted to the program every other year. Chosen from among hundreds of students who apply, these recruits undergo a two-and-one-half year training period as operating engineers, rotating among the various departments (such as reservoir, drilling, and production). Instruction takes place both in the field and at UOI’s onshore training facility, located at the Lawi Lawi terminal complex just south of Balikpapan.

“Rotating the trainees among the different departments allows us to evaluate them and see which job individuals are best suited for,” Dharmawan explains. Upon completion of training, recruits are given permanent assignments. Periodically, they return to the classroom for additional instruction to upgrade their skills.

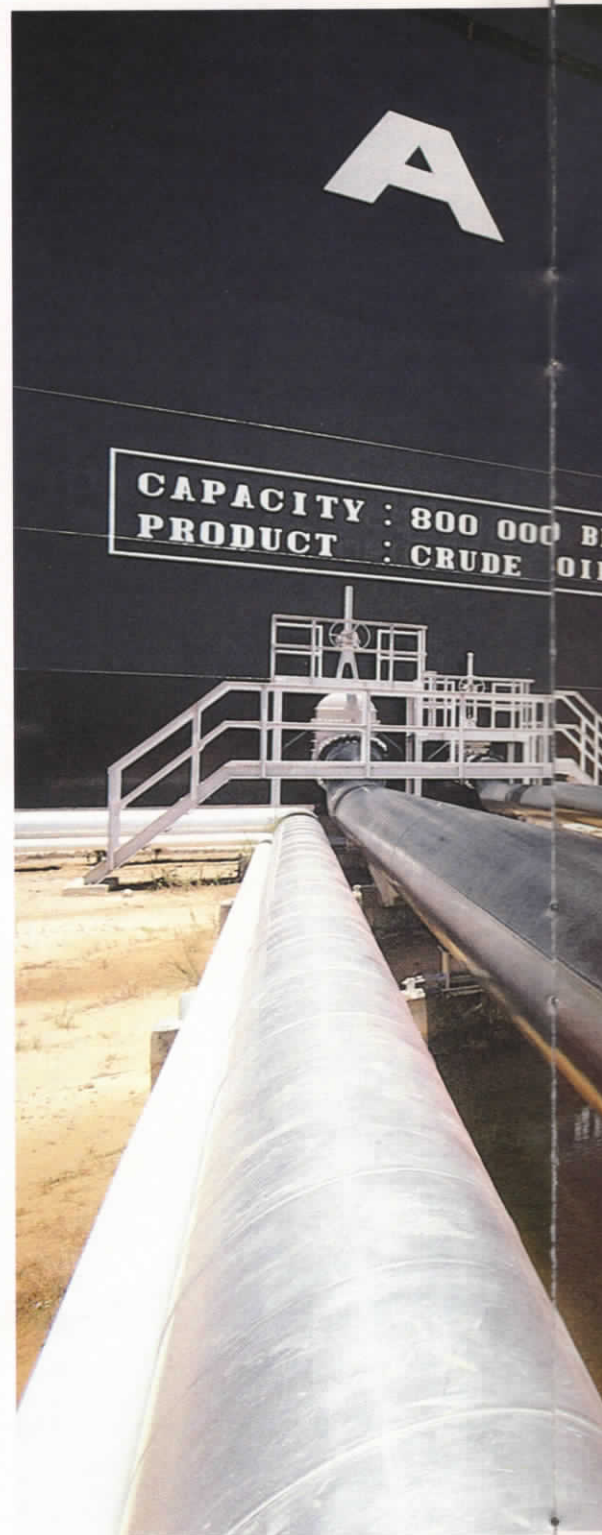
“Over the years, the quality of the trainees has been excellent and the attrition rate has been extremely low,” Dharmawan says.

The success of the Indonesianization effort underscores the forward-looking nature of UOI operations. While total crude production from UOI fields (the company has a 50 percent interest in Attaka, 100 percent in the others) has inevitably declined from its 1977 peak of over 140,000 barrels per day, oil continues to flow at the healthy rate of 70,000 barrels per day. And an active exploration effort along with innovative production techniques are helping to enhance that output.

“Of course, Attaka’s output has diminished—that’s to be expected with a maturing field,” says UOI production manager Art Bracci, who has been in Indonesia from the start of development. “But around here we like to look ahead. And there’s a lot of potential for expansion, in our proven fields as well as new areas.”

David St. John agrees. “We’re now involved in a second stage of development—building on what we’ve already accomplished, exploring new techniques and taking a closer look at things,” he says. “These efforts have already brought results, and we’re confident there’s a lot more to come.”

Despite its production falloff, Attaka remains Unocal’s largest overseas oil producer. Current average daily output of the field is 45,000 barrels, plus another 4,000 in recovered liquids from the liquid extraction plant. But starting this year, Attaka’s yield is actually on the upswing. New production in the northeast flank of the field (from a 1982 discovery) began flowing this fall, adding more than 10 million barrels of new reserves. Attaka is also getting a boost from “vertical” extensions. Two recent well completions in deeper zones of the field have added another 5,000 barrels per day of production.



*Above, a massive crude oil storage tank at UOI's Lawi Lawi terminal. Right, operating engineer trainees receive instruction at UOI's Lawi Lawi training center.*







“Attaka’s structure is a system of sands stacked on top of one another,” explains UOI exploration manager Greg Dixon. “Most of the previous production was from shallow zones, around 5,000 feet. Now we’re finding extensions in the deeper zones—down to 10,000 feet—which is very encouraging.”

As of last summer, UOI and partners planned to drill at least eight more wells to delineate deeper pools of oil and gas in Attaka. “It’s been a very active year out here,” says Attaka production supervisor Wahyu Dinata. “We’re looking forward to the new production coming in soon.”

The northern area of UOI’s operations offshore East Kalimantan encompasses Attaka and two smaller fields, Melahin and Kerindingan. Production from these goes to the Santan terminal, located 100 miles north of Balikpapan—a city of 380,000 where UOI maintains its operations base. Owned and operated by UOI, the Santan facility (which employs 600) also handles production from a number of other companies.

From Santan, crude is loaded on tankers through a single-buoy mooring system. Most of the oil goes to Indonesian refineries; some to the U.S. and Japan. Natural gas produced goes through Santan’s liquid extraction plant. Gas liquids are added to the crude stream, while residual gas is sold to nearby liquefied natural gas and fertilizer plants.

In the southern portion of UOI’s contract area, extensions in new zones of the Sepinggan and Yakin complexes are enhancing production from these two offshore East Kalimantan fields. (Their combined production, which goes to the company’s Lawi Lawi terminal, currently stands at around 20,000 barrels per day. Pertamina’s share is piped to their refinery in Balikpapan, while UOI’s share is loaded on tankers for export.)

Two substantial extensions to Yakin are helping boost output there considerably. Called Yakin West and Yakin North, both are separate fault blocks within the Yakin geologic complex. Yakin West, discovered in 1982, lies just a half mile southwest of the original Yakin field. Two new platforms installed in 1983 are now producing 6,800 barrels per day from eight wells. Yakin North is expected to be on production by early 1986, upping total output from the Yakin complex to 15,000 barrels per day.

“Overall, the extensions to our proven fields have already yielded millions of barrels of new reserves,” says Gene Ward. “The discoveries are even more valuable since we already have in place the infrastructure and facilities for developing them. All we have to do is tie in the new production.”

Further exploration activity is planned for the future in the areas encompassing most of UOI’s proven fields. The company is planning to drill four wildcats and 10 delineation wells in the Attaka area this year. And a 3-D seismic survey—the first 3-D campaign in East Kalimantan—is scheduled for the near future in the Sepinggan field.

“A 3-D survey will be very helpful in Sepinggan because the structure has a lot of faulting,” says Dixon. “And that’s just one place where taking a closer look may yield results.”

Why have the “closer looks” been so successful for UOI in Indonesia? “Improved testing techniques and better log analysis have paid off for us,” Dixon explains. “By looking a bit more closely, we’ve been able to pinpoint many new hydrocarbon zones within existing producing intervals. And use of advanced oil-based drilling muds has made it easier to drill deviated wells into deeper sections, where we’re also finding new reserves.”



*By early 1986, total production from the Yakin complex is expected to reach 15,000 barrels per day.*





*A fleet of tugboats stands ready at Santan.*



UOI is also turning its attention to new areas outside the company's proven offshore fields. One of the most exciting prospects is the Teweh block onshore Central Kalimantan. In February, Unionoil Teweh, Ltd. (U-T), a wholly owned subsidiary of Unocal, signed a production sharing contract to explore for and develop oil and gas resources in the block—a 4,200-square-mile concession located roughly 135 miles west of Balikpapan. (U-T has an 80 percent interest in the block.)

Sitting in the middle of one of the more remote and inaccessible areas on earth, the concession holds the potential of yielding what could be a giant natural gas deposit. Under a previous contract, Unocal performed extensive exploration in the Teweh area, including the drilling of four exploratory wells beginning in 1979. One of them, the Kerendan #1 well, discovered gas in 1982.

"Results from the drilling and seismic work were very encouraging," says Andrew Fawthrop, UOI's chief geophysicist. "We're now using Landsat satellite data to construct a better overall picture of the new contract area, and this fall we'll be conducting a new seismic survey."

"People around here are really fired up about Teweh," adds Greg Dixon. "You might call it a very ambitious project. Even if a large gas deposit is found, development will be difficult because of the logistics involved."

Central Kalimantan is not only remote; the terrain is rugged and covered by a dense jungle of tropical foliage. "It's got to be one of the most difficult places in the world to move around in," says geophysicist Don Demay, who recently joined UOI on a one-year contract. Now working full-time on the Teweh project, Demay has already taken several trips into the area by helicopter from Balikpapan.

"This is going to be a very intensive seismic effort," Demay says. "We're shooting 310 miles of seismic lines in a 12-by-20 mile grid. That's about four times what was shot previously, and in a much more concentrated area. It's extremely detailed work for this kind of terrain, but we want the best data we can get to delineate the Kerendan structure."

Slated to commence in October, the seismic campaign will take six to eight months to complete. At the peak of activity over 1,200 workers will be involved. "That may seem like a lot of manpower," Demay says, "but shooting seismic in the jungle is no picnic."

A visit to the Teweh area dispels any doubts on that score. The trip in from Balikpapan takes nearly two hours by helicopter—and virtually all of the ground flown over is dense, trackless jungle. "You don't want to run low on fuel out here," said Demay, who was heading into Teweh on this June morning to check on construction at the project's base camp. "There's literally no place to land."

Nearing the Teweh staging area, the chopper came within view of the Barito River—a narrow, twisting ribbon of mud-brown water that winds to the coast 225 miles southwest of Balikpapan. Following the river upstream, we reached the Teweh base camp at the village of Luwe Hulu—a small, isolated logging town of 200 people. Both up and downriver from the village, the steep banks of the Barito are choked with vegetation.

"Luwe Hulu is the only staging area we could find with river access," Demay said, explaining that fuel and supplies will be barged up from the East Kalimantan coast. Only one road currently has access to the town, a logging road that was lengthened and upgraded by UOI. The 30-mile dirt track now extends north from Luwe Hulu to the sealed-off Kerendan #1 well. "That road has 34 bridges," Demay said, "most of which we had to build. That'll give you an idea of the kind of terrain we're dealing with. It's one ridge after another—a huge washboard of jungle."

After the chopper landed on one of two helipads constructed at the site, Demay conferred with Wismar, an Indonesian national employed by UOI who is serving as field coordinator on the Teweh project. (For several months, preliminary construction work had been underway at the base camp, situated just upriver from Luwe Hulu. Around 50 workers—most of them from the town—were involved.)





*Clockwise from lower left: A view of the Attaka platform complex; drilling continues in the Attaka field; logs and handrails aid passage over jungle hills in the Tewe block; UOI geophysicist Don Demay (right) confers with Wismar (center), the Tewe project's field coordinator.*





*Above, trails through the Teweh jungle are cleared by machete and hatchet. "The vegetation grows back almost as fast as we can clear it," says Don Demay. Right, an aerial view of the Luwe Hulu staging area.*





"Everything is going very well," Wismar reported, telling Demay that construction work on a hangar, jetty, and warehouse was proceeding on schedule. "We've also done a lot of work on the explosives storage facility."

Located across the river and several hundred yards inland, the explosives storage area will house the 20 tons of dynamite needed for the seismic campaign. An earthen wall structure, the facility was being built entirely by pick-and-shovel hand labor.

After crossing the river by boat, Demay and Wismar hiked in to the TNT storage site to check on the progress being made. The trail leading in had also been cleared by UOI workers. Using machetes and hatchets, the workers had cut a six-foot-wide path through the jungle foliage, laying down logs and putting up handrails where needed on hills. "This is how all our seismic lines will have to be cleared," Demay said. "And it's so lush here, the vegetation grows back almost as fast as we can clear it."

Walking along the trail, one is enveloped by the sounds and smells of the surrounding jungle—a thick green canopy of riotous growth. "Is there a lot of wildlife out here?" Wismar was asked. "Sure," he replied. "Birds, monkeys, wild pigs, all kinds of animals?"

"Snakes, too," Demay added. "Pythons, cobras, pit vipers. But they usually stay out of our way."

In a large clearing about half a mile from the river, the storage facility was taking shape. A dozen laborers were hard at work, building up the eight-foot-thick earthen walls that will line the outside of the structure. "This will be as solid as Fort Knox when it's finished," Demay said. "You don't want to mess around with 20 tons of TNT."

Heading back toward the river, Demay explained how the seismic campaign would work. After a section of line is cleared, roughly 50 holes per mile will be drilled (about one hole every 110 feet), each to a depth of 65 feet. Drilling will be done with portable rigs, called Jackro 100s, each of which can be hand carried over the trails by a 25-man crew. A helipad will be cleared every two miles; the equipment can be transported in both directions from them. "This way, nothing needs to be carried further than one mile," Demay said. "That's a long way in jungle, especially with the hills."

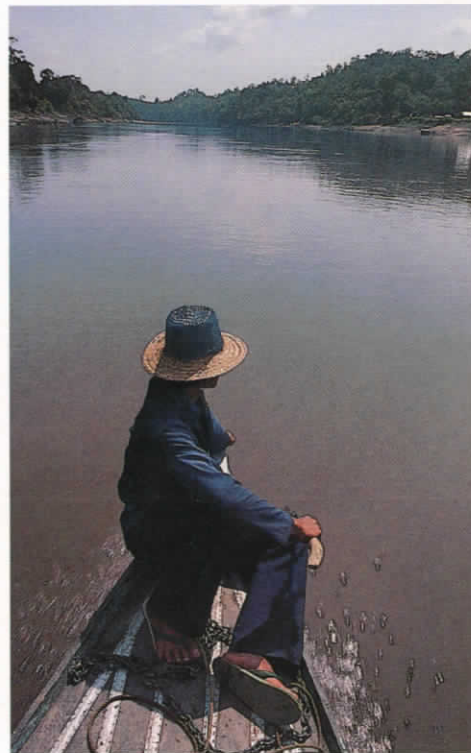
Twenty-five rigs will be used in the operation—so 625 men will be needed just for drilling. Each crew will drill two holes per day, with shooting going on concurrently. The 50 shots made per day (each employing a small 20-pound charge) will generate about 1.5 miles worth of seismic data.

"Each day's recordings will be flown to Jakarta for computer processing," Demay said. "Then we'll update our map on a daily basis as the data comes back to Balikpapan. That's when things will really start to heat up on this project."

To be sure, it seems that things are heating up just about everywhere for UOI these days.

"The potential remaining in all of our current PSC areas is still very high," says Greg Dixon. "And we always take a good look whenever new acreage becomes available." In fact, two new prospects, both offshore, are currently being considered for exploration by UOI.

"All in all, there continues to be a great deal of opportunity here," says Gene Ward. "The government is cooperative, and future prospects are very promising. I think we'll be quite active in Indonesia for a long time to come." © T.S.



*A shuttle boat crosses the Barito River near Luwe Hulu.*



**THE HEAT  
IS ON**





Visiting the rain forest of Gunung Salak in West Java is a bit like journeying back in time. Located some 4,000 feet up on the western flank of a huge volcanic mountain, the region harkens back to an age when the earth was young and still forming. Gunung Salak itself ("gunung" means mountain in Indonesian; "salak" is a tropical fruit) is covered by a lush blanket of trees, vines and ferns. Ghostly mists swirl over the ridges and hang motionless in the hollows. When the rain isn't falling—and it rains almost every day—the only sound you'll hear is the chatter of birds and monkeys hidden deep within the dense green foliage.

A few narrow foot trails meander through the area. One particular trail ends at a viewpoint overlooking a bubbling hot spring. Frothy white steam billows up out of a fumarole, shrouding the trees behind it in a primordial fog. Nearby, boiling mud pots gurgle and pop. The odor of sulfur hangs heavily in the air.

Hank Snow, vice president and managing director, Union Geothermal of Indonesia, Ltd. (UGI), likes to visit this spot when he's in the Gunung Salak area. "It seems almost unearthly, doesn't it?" Snow remarked to a companion during a morning visit last July. "But in a way, this is about as 'earthly' as you can get. Just feel that heat."

Snow's meaning is well taken, for the heat you feel here is the very essence of the earth, coming from deep beneath the planet's surface. At Gunung Salak, this primal heat reaches up close enough to be tapped and harnessed as geothermal energy. And that is precisely what brings Hank Snow and Unocal Geothermal to this region.

"In terms of development potential, Gunung Salak is an extremely promising geothermal resource," says Snow. "Salak is also ideally located, because it's relatively close to a major energy-consuming area. Jakarta (Indonesia's capital city of eight million) is only 50 miles away."

The project is important to Indonesia for other reasons as well. Seventy percent of the nation's 165 million people live on Java, and the island's electricity demand has been growing 20 percent annually. Oil is currently the main fuel used for power generation, and geothermal development will free up some of that oil for export. This in turn will help decrease the nation's trade deficit and strengthen its economy.





Unocal's geothermal activity in Indonesia dates back to the early 1970s, when Dr. Carel Otte, the division's president, made several visits to evaluate the nation's geothermal energy potential. Unocal's record of success and technological expertise drew a favorable response from the Indonesian government, which began discussions with the company on a development contract in 1978. In February of 1982, after five years of negotiations, Union Geothermal of Indonesia entered into a joint operating contract for the Gunung Salak area.

"This was the first geothermal development contract ever signed here," recalls Snow. "The provisions were difficult to work out because we were dealing with two separate government agencies: Pertamina (the state-owned oil company of Indonesia) and PLN (the Indonesian State Electricity Authority)."

Under the three-party arrangement, UGI is given responsibility for exploring, testing and developing Gunung Salak's geothermal resources. Once commercial potential is established, PLN will build the necessary power plants. Then, when production commences, PLN will pay Pertamina for the energy on the basis of kilowatts produced. Pertamina, in turn, will pay UGI.

After the final contract was signed, the first task facing UGI was to build an access road into the Gunung Salak contract area that could handle heavy, oversized loads such as drilling rigs. To reach the first exploration drill site, 11 miles of existing road had to be upgraded and three miles of new road had to be built through the rain forest.

"We needed to build an especially durable road because of the wet climate and rugged terrain," says Dick Engebretsen, UGI operations manager. "And those very conditions made the road construction itself extremely challenging."

Compounding the difficulties of terrain and climate (the Gunung Salak area gets an average monthly rainfall of up to 20 inches) was the nature of the rain forest topsoil. Thin and spongy, this type of soil is very difficult to compact. UGI's contractor used a road-building technique employed for generations in Indonesia that involves hand-laying chunks of rock over the cleared and graded roadbed. To insure uniform drainage, workers placed a layer of fiberglass sheeting underneath the rocks.

During road construction, as in all phases of Unocal's development projects, great care was taken to minimize environmental disruption. This was especially critical in Gunung Salak, as a portion of the 175-square-mile contract area is situated in a national forest.







*Clockwise from left: an access road to the Gunung Salak contract area is constructed; workers test geothermal fluids at an Awibengkok well; a natural steam vent within the contract area.*





*An innovative "big hole" completion technique was employed on the last two wells drilled in the Awi field, greatly increasing well productivity.*



Cleared areas adjacent to the roadbed, where steam pipelines will eventually run, were revegetated with grass and shrubs to stabilize them until the pipelines go in. (In later phases of development, abandoned drillsites and other cleared areas will be replanted with trees.)

The Gunung Salak contract area encompasses two geothermal fields—Awibengkok, currently being considered for immediate development, and Ratu, slated for future development. On February 10, 1983, UGI spudded its first exploration well in the Awibengkok (Awi) field. Over the ensuing months, nine more exploratory wells were drilled and tested—six in the Awi field and three in Ratu. Testing consisted of several production, injection and observation periods, during which fluid pressure, temperature, and flow rates were measured from the different wells. The data were analyzed by UGI engineers and geologists using sophisticated computer programs.

Results more than confirmed the commercial potential of the resource. The wells, which averaged 5,500 feet in depth, produced an average of 84,000 pounds per hour of steam and 489,000 pounds per hour of hot water. The Awi field alone showed adequate reserves for an installed generating capacity of 230 megawatts of electricity for 30 years.

“For one field, that is fantastic,” says Engebretsen. “And you couldn’t ask for better fluids to work with from a temperature and chemistry standpoint.” A hot water geothermal field similar to the company’s Imperial Valley resource, Awi has a reservoir temperature of about 500 degrees F, with extremely good permeability. But unlike the Imperial Valley resource, Awi’s fluids are low saline and have caused no corrosion or scaling problems during testing.

On March 1, 1985 UGI informed its partners that the company had confirmed sufficient reserves for an initial 110 megawatt facility in the Awibengkok field. The next step will be to notify Pertamina and PLN of the company’s “intention to develop” this initial increment of geothermal energy. Under terms of the joint operation contract, PLN will then begin construction of its first 110 megawatt power plant.

Construction of the facility—one of three 110 megawatt plants that may ultimately be built in the Awi field—will begin in the near future and should be completed by late 1989. Using steam flashed from the wells to turn huge turbines, the plant will be capable of generating power equivalent to 1.5 million barrels of oil per year.

During plant construction, UGI will be drilling development wells and installing production facilities. Just as with road construction, the rough terrain and climatic conditions of the Gunung Salak area will pose a challenge to UGI’s design and construction engineers. “Use of computers will be essential in determining optimum pipeline design and placement,” says Engebretsen. “We’re obligated to deliver steam to the plant for 30 years, so we want to be absolutely certain of having the most efficient delivery system possible.”

Computers have also been used to justify an innovative drilling and completion technique that UGI has employed on the Gunung Salak project.





“Our reservoir people did a computer analysis which determined that the mass flow (steam and hot water) of the Awi wells would be greatly limited by pipe size,” Engebretsen explains. “The data showed that simply by using a larger casing, we could almost double well productivity?”

Based on these results, the last two wells drilled in the Awi field employed a new “big hole” completion technique, used for the first time ever in Indonesia. Utilizing oversized casing, the method takes longer than conventional well completion and costs a lot more. But the productivity increase makes the big hole technique extremely cost effective in the long run.

Awi No. 6, the first big hole completion, tested out initially at a production rate of 400,000 pounds per hour of steam—over three times the normal rate obtained in a standard completion. The well’s 2.1 million pounds per hour total mass flow (steam and hot water) makes it one of the largest producing geothermal wells in the world.

Awi No. 7, the final exploration well drilled in the field, was also a big hole completion. Preliminary tests show a yield of over 250,000 pounds per hour of steam. Further testing of both wells is continuing.

“Awi No. 6 alone is capable of generating 18 megawatts of electricity,” says Snow. “That’s a lot of power from just one well.”

As development proceeds, UGI’s staff (which currently stands at 83 employees, 70 of them nationals) will expand to a peak of around 200 workers. As in Unocal’s oil and gas operations here, training and employment of Indonesian nationals will be a top priority. UGI is already preparing to set up a training school for field technicians.

“This will be essentially a brand new industry here, so training will have to be very extensive,” says Snow. “Fortunately, with our California and Philippines operations, we have a wide range of experience to draw from.”

Although completion of the first Gunung Salak power plant is still a few years away, it won’t be long before the pace of activity here—now in a lull with exploration drilling completed—again picks up for UGI. There are environmental studies to be done—air, wind, and surface water monitoring—data from which will later be used to closely gauge the operation’s impact on the rain forest ecosystem. A new, more direct road to the field must be built. And development drilling and construction work will soon get underway.

At the Awi No. 6 well site, Hank Snow gazes up at a huge plume of steam being released during a test. Standing close to this towering column of white, you can feel the heat and power radiating out. It’s mid-afternoon now, and the clouds hanging low in the sky have darkened to a slate gray. The first, soft droplets of rain are beginning to fall—the leading edge of what soon will be a torrent.

The same can be said about the heat of Awi No. 6. *T.S.*







*Left, workers set up a drilling rig. Top, a view of road construction in progress. Rough terrain, a wet climate and the spongy rain forest topsoil make road building a major challenge.*



# WOULD YOU BELIEVE 88.2 MPG?

*Author Art Bentley, no relation to the prestigious car company, works in Unocal's Corporate Communications Department as a public relations supervisor.*

Residents of the West Coast were offered what may have been a brief glimpse into the future recently. What they saw were strange cars built by engineers who had pulled out practically all the stops. The fuel stops, that is. The cars were competing in the Unocal 76 Three Flags Econorally, a demanding 1,570-mile test of fuel economy through city and country from Vancouver, B.C., to the Mexican border.

Don't look for these cars on a dealer's lot for about a decade at the earliest, though. Whether they ever make an appearance may depend on the American driver's ego: can it be gratified more by a small fuel bill than by a big fuel guzzler?

Historically, the ego has tended to defy reason in such matters. But it's getting harder to argue with a mode of transportation that can take you from Canada to Mexico for about \$20.

By any standard, the fuel consumption of the winning car in the Unocal Econorally was less than small. It was miniscule. Built and driven by students at Western Washington University, the car, known as Viking IV, set a world record for fuel economy of 88.2 miles per gallon, beating its previous record of 87.3 miles per gallon set in 1980. At that rate, it cost only \$20 or so to keep Viking IV in enough 76 Diesel fuel to win.

Mileage of the other three cars that finished the course ranged from 40 to 57.6 miles per gallon. Mechanical problems forced out three contenders. All but Viking IV burned (not much) 76 Unleaded gasoline.





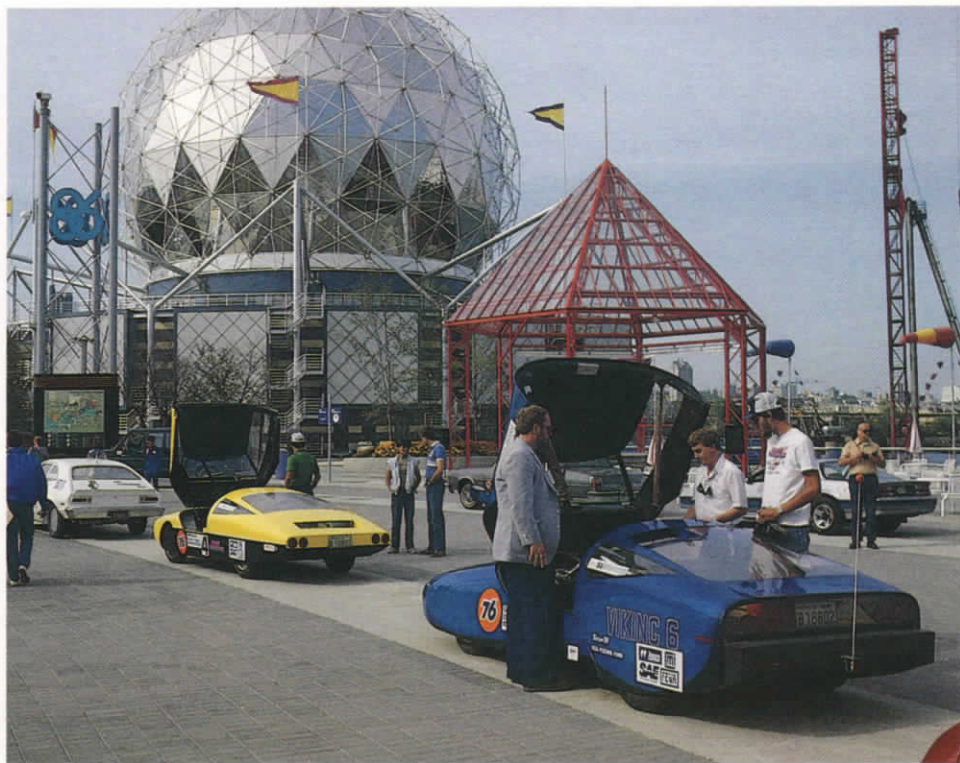
The young designers of these sophisticated machines are optimists. They believe their vehicles are harbingers, not freaks. To support that conviction, they cite the first econorally, a transcontinental event in 1975. The winner then averaged 51 miles per gallon.

"That really proved you could get 51 miles per gallon," said Bill McRae, director of the Fuel Efficient Vehicle Association and a graduate of Western Washington University. "Now, you and I can go out and buy a car that gets 51 miles per gallon. I think what we're seeing in the Three Flags Econorally is what's down the road in this country in the next eight to 10 years."

These young designers are also in the vanguard of the push for fuel economy. Their work, and the quiet influence they've exerted, make a persuasive argument that the road to fuel economy in the U.S. begins not in Detroit but in Bellingham, Washington, home of Western Washington University. The school has been a leading exponent of fuel efficient automobiles for more than a decade. At its Vehicle Research Institute, directed by Dr. Mike Seal, students learn to make cars the old-fashioned way. They build them, rather than turn the assignment over to a battery of computers, as they contend Detroit does.

"We're trying to advance automotive engineering in our own small way," Seal said. The prime result of Western's focus is its Viking series of prototypes. Four competed in the Unocal Econorally, two finishing and two failing to. Collectively, they offer numerous examples of things students and faculty say the U.S. auto industry won't do.

A case in point is Viking IV, built in 1978. With its unstressed aluminum body and aluminum monocoque chassis, it weighs a scant 1,250 pounds. Viking IV is powered by a turbo-charged 1,500-cubic-centimeter Volkswagen diesel engine. Like the other Vikings, it carries two passengers. Western Washington students like to joke that its capacity is half a passenger more than the average occupancy of a car in Bellingham.



*The Unocal 76 Three Flags Econorally began at the Expo '86 site in Vancouver, British Columbia (above) on August 10. Eleven days later, seven cars—including the chase car—crossed the finish line. One contender was stymied by gearbox problems in San Francisco.*



Students Steve Kirkwood and Mark Small drove Viking IV in the Unocal Econorally. Kirkwood was delighted to set the record but thought he could have done better. "We had hoped to break 90, but the course was a lot hillier than it was in 1980. If the course had been the same, I think we would have done it?"

Viking VI, which finished second at 57.6 miles per gallon, was intended to demonstrate that fuel economy could be combined with a high degree of safety. The plan worked. Dummy passengers showed no sign of damage after a crash test at more than 40 miles per hour. (Noted McRae: "To save money, Dr. Seal wanted to use students, but...")

If an encounter with a coyote in northern California is any indication, Viking VI, with a specially designed front bumper, may also represent less danger to pedestrians than any other car in America. It hit the coyote, which then left the scene of the accident under its own power. Drivers Dave Clark and Mark Prince had to repair the bumper with electrical tape, however.

Viking VII is the new kid on the block in Bellingham. A high performance sport car, it has a 10-speed transmission, a body constructed of Kevlar epoxy and a special carburetor that enables a mechanic to tune each intake and exhaust port individually. According to Seal, it is the Viking most likely to see production.

Viking V contains two engines, each able to run independently. The primary engine can run on two or four cylinders. The secondary engine is a one-cylinder machine with its own transmission. The driver thus can choose to run on one, two, four or five cylinders.

All the Vikings typify the students' commitment to achieve fuel economy without sacrificing performance. As fast as it is economical, Viking IV has reached 167 miles per hour at the Bonneville Salt Flats in Utah. It has also recorded 116 miles per gallon at an average speed of 35 miles per hour on the U.S. Department of Transportation's 10-mile test course at East Liberty, Ohio. In the Unocal Econorally, the car traveled at an average speed of 50 miles per hour.





The Vikings emphasize aerodynamics. It and light weight are the keys to economy, according to McRae.

"The automotive power plant is almost as efficient as it's going to get," McRae said. "But if you cut the weight by half and have good aerodynamics, you're going to get excellent performance, good fuel economy and good results from emissions testing."

It should be pointed out that all the cars in the rally complied with federal and California pollution controls. They are registered and can be driven legally in any state in the country.

What the cars lack is comfort. Viking IV has no doors. To get in and out, you raise a hinged canopy that covers the cockpit. Part of the canopy serves as the windshield.

Sitting in the car is rather like sitting in a seat on a floor. You stretch your legs out in front of you, and you realize immediately that you are sitting very close to the road. These cars are low. They're also noisy and ventilation is almost nonexistent.

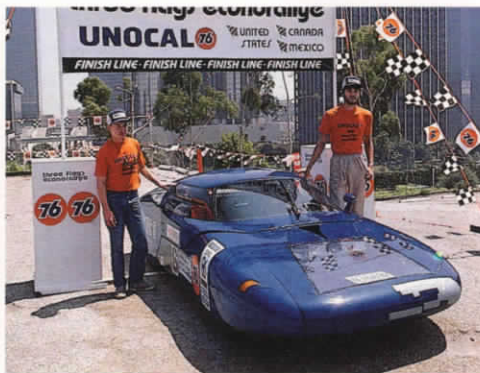
"Viking IV is not a paragon of comfort," Dr. Seal admitted.

Consequently, the world is not beating a path to Bellingham to buy Vikings. But Seal believes it would not be difficult to make the cars comfortable enough to attract buyers. All it would cost would be a few miles per gallon in economy, and at 88.2 miles per gallon, who's going to quibble.

"Right now, the public is not concerned about economy," he said. "But we're sure it will be in the future?"

If Detroit doesn't know where Bellingham is, Tokyo does. The Japanese auto industry is quite interested in the Viking program. Viking VI has been exhibited in Tokyo. Japanese manufacturers have sent representatives to econorallies.

"We know Tokyo pays attention," McRae said. At Bellingham, it's a two-way street. Graduates of Western Washington gravitate toward the Japanese rather than the American auto industry. According to Seal, the Japanese appreciate innovation more than Detroit does. They also encourage their engineers to acquire hands-on experience.



*The Carson Mansion in Eureka, California was one of many rally press stops. The blue Viking 6, shown with drivers Mark Prince and Dave Clark, finished second. The red Avion finished fourth. Opposite: Don Hanley (right), senior vice president, Unocal Refining & Marketing, Western Region, presented the trophy. From left, Steve Kirkwood, Mark Small and Bill McCrae.*



The Western Washington program emphasizes such factors. Detroit, according to students and faculty, is more interested in “numbers crunching,” or designing and building by computer, with very little direct involvement.

“Consequently,” Seal said, “if an automotive engineer in Detroit has anything to do with making an automobile, he feels he has failed at his chosen profession.”

McRae calls them “paper engineers.” “They can solve anything on paper,” he said. “But they can’t solve problems. They’re doing everything theoretically as opposed to how things really work. And if it doesn’t work in the real world, what’s the point?”

Another school takes a tack that differs somewhat from Western Washington’s approach. Instead of building a prototype, students at Northwest Missouri State University rebuilt a Detroit production car. Their entry in the econorally, Bearcat II, finished third.

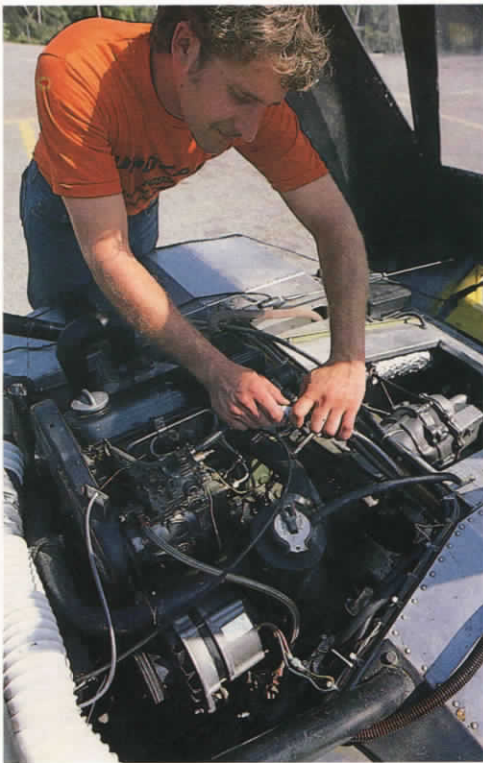
The car is a highly modified 1975 Ford Pinto, powered by a 1,300-cubic-centimeter Ford Escort engine. Fiberglass has been used extensively to lighten and reshape the body for better aerodynamics. The car weighs 2,100 pounds.

Two former students of Western Washington, Craig Henderson of Bellingham and Bill Green of Berkeley, California, have designed and built their own car, the Avion, which finished fourth in the competition. Henderson and Green hope to sell models of the Avion for about \$30,000 each.

Depending on the engine selected, the 1,400-pound car is expected to average 50 miles per gallon in conventional use, with a top speed of about 135 miles per hour.

Unocal sponsored the Three Flags Econorally because the company supports the most efficient use possible of motor fuel.

“Energy conservation has never been more important than it is today,” said Bill McConnor, a corporate senior vice president and president of the company’s Refining & Marketing Division. “An event such as this clearly shows what inquiring minds and hard work can do to help bring better fuel economy to the motoring public under real-world driving conditions. In this type of competition, everybody is a winner.” 76



Mark Small switches gas lines. Each car had separate fuel supplies, one for record mileage and one for free transits. Right, third-place Bearcat II and drivers Jerry Price and Dr. John Rhodes.





# UNOCAL

## CORPORATE

### September 1985

- 45 YEARS Earle F. Mead, San Francisco, Ca.
- 15 YEARS Herbert D. Farrington, Unocal Center  
Kenneth M. Gordon, Schaumburg, Il.
- 10 YEARS Olivia L. Ayala, Unocal Center  
Theodore E. Doss, Unocal Center  
Thomas A. Neal, Burbank, Ca.
- 5 YEARS Gerald E. Borough, Unocal Center  
Nancy L. Kurachi, Unocal Center  
Jane A. Neal, Pasadena, Ca.  
Patricia M. O'Toole, Unocal Center

### October 1985

- 20 YEARS Consuelo E. Pulido, Unocal Center
- 15 YEARS Walter W. Crim, Unocal Center  
Mary A. Erickson, Unocal Center
- 10 YEARS Gary R. Miller, Unocal Center  
Willie P. Redmond, Schaumburg, Il.  
Eli F. Suazo, Unocal Center
- 5 YEARS Natividad F. Chavira, Unocal Center  
Alina Papa, Unocal Center  
Robert G. Pott, Pasadena, Ca.  
Deborah W. Robinson, Unocal Center

## CORPORATE DEVELOPMENT

### ENERGY MINING

#### September 1985

- 5 YEARS Melvin N. Bennett, Parachute, Co.  
Bryan D. Byers, Parachute, Co.  
Steven W. Cox, Parachute, Co.  
David W. Hall, Parachute, Co.

#### October 1985

- 15 YEARS David L. Lovin, Parachute, Co.
- 5 YEARS William G. Dobbs, Parachute, Co.  
Gary R. Morris, Parachute, Co.

### SCIENCE & TECHNOLOGY

#### September 1985

- 25 YEARS Charles R. Gahr, Brea, Ca.
- 15 YEARS Susan E. Johnson, Brea, Ca.  
Michael L. Smith, Brea, Ca.  
Ernest A. Van Zile, Brea, Ca.
- 10 YEARS J. Wayne Miller, Brea, Ca.

- 5 YEARS Gregory R. Andersen, Brea, Ca.  
Lorraine A. Bell, Brea, Ca.  
Donald R. Craig, Brea, Ca.  
Susan K. Farrar, Brea, Ca.  
Richard A. Griswold, Brea, Ca.  
Leonard J. Kalfayan, Brea, Ca.  
Stanley S. Leese, Brea, Ca.  
Richard B. Miller, Brea, Ca.  
Terence P. O'Sullivan, Brea, Ca.  
Sara J. Sakurai, Brea, Ca.  
Zoe M. St. Laurent, Brea, Ca.  
Holly A. Tuscher, Brea, Ca.  
Jonathan P. Voth, Brea, Ca.  
Jesse L. Wallace, Brea, Ca.  
Susan L. Woodward, Brea, Ca.

#### October 1985

- 25 YEARS Lawrence F. Weidner Jr., Brea, Ca.
- 20 YEARS J. C. Campbell III, Brea, Ca.  
Gary L. Roquet, Brea, Ca.
- 5 YEARS Michael R. Anderson, Brea, Ca.  
Steven P. Brooks, Brea, Ca.  
Mark S. Canaday, Brea, Ca.  
Geniel P. McAllister, Brea, Ca.  
Susan A. Roshon, Brea, Ca.  
Alvin S. Tenpo, Brea, Ca.

## ENERGY RESOURCES

### OIL & GAS

#### September 1985

- 35 YEARS Bobby H. Arnold, Midland, Tx.  
Richard E. Cook, Van, Tx.  
Marion A. Pickett, Ardmore, Ok.  
Jerry J. Wasicek, Unocal Center
- 30 YEARS Joseph A. Lanko, Coalinga, Ca.  
James W. Livingston, Santa Paula, Ca.  
Jack A. Menefee, Houston, Tx.  
Harold M. Rainey, Pasadena, Ca.
- 25 YEARS Mary E. McCarty, Houston, Tx.  
Herman L. Penaluna, Andrews, Tx.  
Baird E. Stephens, Orcutt, Ca.
- 20 YEARS Charles E. Augustus, Orcutt, Ca.  
Gary E. Bowen, Santa Fe Springs, Ca.  
David M. Courtis, Anchorage, Ak.  
James A. Hensley, Coalinga, Ca.
- 15 YEARS Eric J. Broussard, Lafayette, La.  
William J. Holden, Orcutt, Ca.  
Lawrence E. Hutchins, Orcutt, Ca.  
George D. Richard, Lafayette, La.  
Francis A. Victor, Lafayette, La.
- 10 YEARS Kevin R. Binns, Anchorage, Ak.  
R. Terence Budden, Ventura, Ca.  
Akbar Sheriff, Bakersfield, Ca.  
John G. Trahan, Lafayette, La.

- 5 YEARS Scott E. Aubrecht, Unocal Center  
Donna T. Auzenne, Lafayette, La.  
Charles A. Black, Mobile, Al.  
John W. Byhoffer Jr., Ventura, Ca.  
Wesley R. Cackler, Santa Paula, Ca.  
Diane Campbell, Ventura, Ca.  
Jean B. Chruscicki, Midland, Tx.  
Daniel B. Crandell, Houma, La.  
William J. Dalton Jr., Lafayette, La.  
Kenneth Doucet, Lafayette, La.  
Max A. Evans, Coalinga, Ca.  
James L. Flint, Worland, Wyo.  
Douglas A. Fogliadini, Ventura, Ca.  
Benjamin J. Guzman, Moab, Ut.  
Mary R. Kirk, Taft, Ca.  
Michael K. Kitchens, Santa Paula, Ca.  
Thomas P. Ledet, Houma, La.  
Robert W. Lewis, Houston, Tx.  
Reyes Lopez, Moab, Ut.  
Melvin S. Martin, Unocal Center  
David P. McPhetridge, Santa Paula, Ca.  
James F. Orwig, Midland, Tx.  
Terry M. Porche, Houma, La.  
Jan J. Rogers, Houma, La.  
Fritz L. Spencer III, Lafayette, La.  
Gary W. Smith, Worland, Wyo.  
William T. Sterlin, Taft, Ca.  
Doris F. Van Cleave, Midland, Tx.

#### October 1985

- 45 YEARS Harry Mandeville, Midland, Tx.
- 40 YEARS Milton W. Barry, Santa Fe Springs, Ca.  
Edward A. Hall, Ventura, Ca.  
Rita I. Sork, Unocal Center
- 35 YEARS Leslie J. Ford, Pasadena, Ca.  
Gordon E. Otto, Unocal Center  
Robert W. Plumb, Orcutt, Ca.
- 30 YEARS Milton A. MacLean Jr.,  
Santa Fe Springs, Ca.  
James W. Redding, Coalinga, Ca.  
Charles K. Rose, Coalinga, Ca.
- 20 YEARS Jerome D. Bosek, Ventura, Ca.  
Archie A. Craddock, Orcutt, Ca.
- 15 YEARS Clay L. Chivers, Anchorage, Ak.  
Cynthia L. Embody, Houston, Tx.  
Buck F. Giffin, Coalinga, Ca.  
Robert G. Hebert, Lafayette, La.  
Kenneth P. LeBoeuf, Houma, La.  
George B. Reed, Ventura, Ca.  
John R. Watson, Santa Fe Springs, Ca.
- 10 YEARS John S. Hadley, Santa Fe Springs, Ca.  
Stephen J. Pavlak, Ventura, Ca.  
Joseph L. Pillette, Lafayette, La.



5 YEARS Larry J. Baggs, Coalinga, Ca.  
Jimmy L. Baughman, Cut Bank, Mt.  
Trudi K. Bridges, Oklahoma City, Ok.  
Gary L. Foy, Unocal Center  
Barry L. Gouger, Casper, Wy.  
Karen E. Hutek, Olney, Il.  
Tammy S. Kennedy, Midland, Tx.  
David J. Mikelson, Unocal Center  
Rocco M. Papietro, Coalinga, Ca.  
David B. Wilkerson, Midland, Tx.

## INTERNATIONAL OIL & GAS

### September 1985

15 YEARS Gerald E. Marrall, Unocal Center

10 YEARS Josefina Gaytan, Unocal Center  
Edward J. Ruckstuhl, London, England

5 YEARS Catherine Dean, London, England  
Peter D. Rafferty,  
The Hague, Netherlands

### October 1985

30 YEARS William K. Lewright, Unocal Center  
Edward Marks, Unocal Center

5 YEARS Mariam Davidian, Los Angeles  
Bruce I. Hovey, Aberdeen, Scotland  
Deborah L. Johnston, Unocal Center  
Christopher J. Murphy,  
Balikpapan, Indonesia  
Peter K. Wong, London, England  
Lida Sirounian, Unocal Center

## Unionoil Co. of Great Britain

### September 1985

5 YEARS Michael Knox, Aberdeen, Scotland  
Maureen Roche, London, England

### October 1985

5 YEARS Maud Bech, The Hague, Netherlands

## Union Oil Co. of Indonesia, Inc.

### September 1985

10 YEARS Hermanu  
Soenardi  
Soetadji  
Suharto  
Sutarto  
Tugiso  
Soetomo Ba  
Muhammad Gozie  
Unang Gunawan  
Julius Hunitetu  
Frank Indrakusuma Ichsan  
Murnie Bin Japeri  
Netty Kalangi  
Jimmy Karnadi  
Mohamad Junus Kartawidjaj  
Hamzah Kasjim  
Hendrik Kumajas  
Yapie H. Lumintang  
Hengkesa M.  
Hasan N.  
Idham Noor  
Jos Iwa Sardjono  
Bambang Soengeng Sutomo  
Jonathan Tanusendjaja  
Bambang Tjahjono  
Agustinus Toding  
Vera Watung  
Eddy E. Willar

## Service Awards



5 YEARS Sumani  
Moestafa Akkas  
Safrudin Azis  
Benny W. Boedihardjo  
Jami Ngatin  
Rachmat Saleh  
Terry Saptoyuwono

### October 1985

10 YEARS Rusman  
Sunarto Effendi  
Nicolus Oroh  
Glen Rompis  
Hari Setijono  
Pardo Sitorus  
Didik Imam Sugandhi  
Kardiat Adan Sukandi  
Gatot Supardi

5 YEARS Rusdiyanto  
Supriyanto  
Trimo Ghozali  
Karel Johannes

## Union Oil Limited—Singapore

### October 1985

10 YEARS Mary Lim Poh Hong

5 YEARS Hashim bin Bachok

## Unionoil Suez

### May 1985

10 YEARS Tahany El Wassimy, Cairo

### June 1985

10 YEARS Ahmed El Banna, Cairo

### September 1985

10 YEARS Fadi Ryad, Cairo

## UNION OIL CO. OF CANADA, LTD.

### July 1985

5 YEARS Tim Adamson, Hinton, Alta.

### September 1985

30 YEARS F. Grant Vouri, Calgary, Alta.

5 YEARS O. Miles Baynham, Slave Lake, Alta.  
Bernadette Law, Calgary, Alta.  
Bill Meeuwissen, Calgary, Alta.  
Deborah D. Rodtka, Calgary, Alta.  
Sharon A. Stevens, Calgary, Alta.  
Ruth I. Timms, Calgary, Alta.

### October 1985

5 YEARS Peter Armstrong, Calgary, Alta.  
Wilfred R. Barrette, Fort St. John, B.C.  
Ahmet Baykan, Calgary, Alta.

## UNION OIL CO. OF THAILAND

### September 1985

10 YEARS Wayne A. Bougas  
Alfred S. Sigmund

5 YEARS Pratana Barpuyawart  
Harn Narapruet  
Suchin Saelim

### October 1985

5 YEARS Lars-Eric Nils Boas  
Somboon Hirunkajornpun  
Douglas N. Magee  
William A. Walton

## GEOHERMAL

### September 1985

10 YEARS Gregory D. Raasch, Santa Rosa, Ca.

5 YEARS William F. Ryan, Big Geysers, Ca.  
Shamsuz Zaman, Imperial Valley, Ca.

### October 1985

35 YEARS Delbert E. Pyle, Unocal Center

5 YEARS Richard Hernandez, Big Geysers, Ca.  
Alfonso S. Pingol Jr., Santa Rosa, Ca.  
George I. Stone, Imperial Valley, Ca.

## Philippine Geothermal, Inc.

### September 1985

10 YEARS David C. de Ocampo  
Buenaventura A. Flores  
Carlos V. Retuerto

5 YEARS Levino B. Baliza  
Wenifredo B. Barrion  
Antonio N. Belista  
Jose Allen C. Berces  
Antonio C. Bobiles  
Gregorio C. Brucales  
Augusto C. Cardano  
Jose C. Cerdeno  
Ernesto C. Cernechez Sr.  
Antonio B. Cilo  
Iglecerio C. Clarino  
Victor C. Clavecillas  
Felipe C. Climaco  
Angeles D. Cobilla  
Salvador C. Cobilla  
Erasmus C. Competente  
Dennis C. Corral  
Jose C. Cortuna  
Noriel B. Crucillo  
Honesto C. Dacame  
Alfredo C. Dacoco  
Aquinaldo C. Dacullo  
Crestito E. Dacuno  
Augusto L. Jalmanzar  
Alfredo C. Nacor  
Loreto B. Rayala

### October 1985

10 YEARS Jaime B. Barcebal

5 YEARS Tomas H. Arao Jr.  
Emmanuel N. Baldo  
Orlando V. Bermundo  
Teodoro C. Clave Jr.  
Emmanuel Z. Espinosa  
Vicente N. Madaong



**REFINING & MARKETING****September 1985**

- 35 YEARS Robert J. Calloway, San Francisco, Ca.
- 30 YEARS Don. H. Johnson, Rainy Lake, Mn.
- 25 YEARS Genevieve L. Cwynar, Schaumburg, Il.  
Thomas J. Gordon, Schaumburg, Il.  
Robert A. Webster, Schaumburg, Il.
- 15 YEARS Leticia A. Malvar, San Francisco, Ca.  
Danuta Regalado, Schaumburg, Il.  
Barbara A. Scott, San Francisco, Ca.
- 10 YEARS Reynold C. Deles, Schaumburg, Il.
- 5 YEARS Judy Y. Beasley, San Francisco, Ca.  
Frenchie F. Jackson, San Francisco, Ca.  
R. Lorraine Morgan, Schaumburg, Il.  
Tamara A. Pundsack, Schaumburg, Il.

**October 1985**

- 25 YEARS Charley L. Ellis, San Francisco, Ca.
- 20 YEARS L. Engelsgaard, Unocal Center  
Donald W. Schmidt, San Francisco, Ca.  
Joann Wille, Schaumburg, Il.
- 15 YEARS Gloria D. Guinto, San Francisco, Ca.  
Barbara A. Hasbun, San Francisco, Ca.
- 10 YEARS Laura A. Kunz, Schaumburg, Il.
- 5 YEARS Cheryl S. Carlson, Schaumburg, Il.  
Stephen R. Jacobson, San Francisco, Ca.  
Karen A. Krempetz, Schaumburg, Il.  
Vera M. McGuire, Schaumburg, Il.  
Joan Neil, Schaumburg, Il.  
Maureen Y. Petroff, Schaumburg, Il.  
Lucille Picras, San Francisco, Ca.  
Magdalena L. Sacramento,  
San Francisco, Ca.  
Deidre J. Smith, Tulsa, Ok.  
Barbara M. Vosyka, Schaumburg, Il.  
Susan M. Zeman, Schaumburg, Il.

**EASTERN REGION****September 1985**

- 35 YEARS Edward J. Bowlan, Chicago Refinery  
Lewis W. Kaminga, Tampa, Fl.  
Dan McInnis Jr., Beaumont Refinery  
Robert E. Montgomery,  
Birmingham, Al.  
John L. Rende, Chicago Refinery  
Thelma H. Sharpe, Birmingham, Al.
- 30 YEARS Joseph T. Myers, Tallmadge, Oh.  
Joseph D. Rosenberger, Tallmadge, Oh.  
Norman C. Sloan, Atlanta, Ga.
- 25 YEARS Frederick J. Buob Jr., Schaumburg, Il.
- 20 YEARS Donald E. Jordan, Columbus, Oh.  
James E. Shelton, Schaumburg, Il.  
Merlin J. Thies, Romulus, Mi.
- 15 YEARS Norman R. Engen, Minneapolis, Mn.  
John H. Goolsby, Beaumont Refinery  
Neugene Hall, Romulus, Mi.  
Willie J. Hooks, Wildwood, Fl.  
Donald L. Janes, Chicago Refinery  
John M. Lawson, Chicago Refinery  
Richard W. Meiferdt, Chicago Refinery  
Arthur S. Merzlock, Chicago Refinery  
Alan J. Onchak, Chicago Refinery  
Zelda M. Rouse, Wildwood, Fl.  
Cecil H. Smith,  
Pure Trans. Co., Brush, Co.  
William J. Thomas, Beaumont Refinery  
Calvin W. Walker, Chicago Refinery

- 10 YEARS James E. Alston, Chicago Refinery  
Michael J. Bauer, Chicago Refinery  
Dennis C. Breaux, Beaumont Refinery  
Betty A. Doucet, Beaumont Refinery  
James E. Goers, Chicago Refinery  
Ruben Gonzalez, Chicago Refinery  
Isaac Gunner Jr., Beaumont Refinery  
Gail P. Hadnot, Beaumont Refinery  
Gregory J. Heim, Schaumburg, Il.  
Fred J. Hoffman, Chicago Refinery  
Edward J. Jahn, Chicago Refinery  
Barbara J. Landers, Beaumont Refinery  
Ubaldo Pacheco, Chicago Refinery  
Ronald G. Rentfro,  
Pure Trans. Co., Olney, Il.  
Aubrey D. Soileau, Beaumont Refinery  
Richard G. Stauss, Chicago Refinery  
Samuel A. Turney, Chicago Refinery  
Laurence R. Vonch, Chicago Refinery

- 5 YEARS Freddie D. Ayers,  
Pure Trans. Co., Van, Tx.  
Dolores A. Barajas, Schaumburg, Il.  
Sandra L. Conner, Beaumont Refinery  
Steven R. Fletcher, Beaumont Refinery  
Louis L. Guidry Jr., Beaumont Refinery  
David K. Hart, Chicago Refinery  
Mary A. Jensen, Schaumburg, Il.  
Ivy E. Locke, Beaumont Refinery  
Martin L. Mason, Schaumburg, Il.  
Sharon A. Thomas, Beaumont Refinery  
Oscar A. Vara, Beaumont Refinery  
Ray L. Wright, Beaumont Refinery

**October 1985**

- 45 YEARS Clay Albright, Birmingham, Al.
- 40 YEARS Frederick F. Braz, Milwaukee, Wi.  
Rosemary Radicek, Schaumburg, Il.
- 35 YEARS James M. Hagerty, Chicago Refinery
- 30 YEARS Rupert C. Hurt, Memphis, Tn.  
Lea V. Wilson Jr., Richmond, Va.
- 25 YEARS Roy P. Gillis Jr., Minneapolis, Mn.  
Paul A. Incapreo, Schaumburg, Il.  
Richard T. Ketza, Schaumburg, Il.  
Gustav C. Seavall, Schaumburg, Il.
- 20 YEARS Anne H. Elsberry, Atlanta, Ga.
- 15 YEARS Stephen M. Horath, Chicago Refinery  
Thomas M. Kotowicz, Chicago Refinery  
Evelyn R. Lasher, Schaumburg, Il.  
Dennis J. Schwartz, Cincinnati, Oh.
- 10 YEARS James D. Allen,  
Pure Trans. Co., Casper, Wy.  
Lawrence F. Glines, Schaumburg, Il.
- 5 YEARS Drendella Berrod, Beaumont Refinery  
Barbara A. Buzzelli, Schaumburg, Il.  
Dennis R. Dugas, Beaumont Refinery  
Alice F. Guidry, Beaumont Refinery  
Richard D. Hughes, Beaumont Refinery  
Anthony J. Harmon,  
Beaumont Refinery  
Linda S. Havar, Chicago Refinery  
Arthur M. Klein, Chicago Refinery  
Judy A. Leach, Beaumont Refinery  
Timothy L. Murphy,  
Beaumont Refinery  
Mark L. Roth,  
Pure Trans. Co., Olney, Il.  
Dolores A. Selesky, Schaumburg, Il.

**WESTERN REGION****August 1985**

- 30 YEARS L. J. Porkleson, Edmonds, Wa.
- September 1985**
- 35 YEARS Oliver F. Conrey, Pasadena, Ca.  
Forrest B. Crites, San Francisco Refinery  
John T. Urone, San Francisco Refinery
- 30 YEARS Wendell R. Gott, Los Angeles Refinery  
Donald L. Hanley, Los Angeles, Ca.  
Charles J. Holland, Avenal, Ca.
- 25 YEARS Douglas A. Campbell, Cerritos, Ca.
- 20 YEARS Michael L. Perkins,  
San Luis Obispo, Ca.  
Dudley A. Welch, Hayward, Ca.
- 15 YEARS John A. Becky, San Francisco Refinery  
Lee O. Bell, Los Angeles Refinery  
Louis F. Gucker, Los Angeles, Ca.  
Billy D. Haupt, Los Angeles Refinery  
Wesley E. Heinrich, Richmond, Ca.  
James A. Hopkins, Richmond, Ca.  
Marguerite S. Huse, Seattle, Wa.  
Bettie Johnson, San Francisco Refinery  
John R. Landry, Edmonds, Wa.  
Frank Munoz, Los Angeles Refinery  
Richard M. Ritz, San Francisco Refinery  
Ralph A. Sandercock Jr., Portland, Or.
- 10 YEARS Philip H. Barnes, Tucson, Az.  
Harold T. Takara, Honolulu, Hi.  
Randy M. Taylor, Portland, Or.
- 5 YEARS Jay B. Atkins, Honolulu, Hi.  
Robert J. Barman, Los Angeles, Ca.  
Leronica S. Brown, Los Angeles, Ca.  
Peter S. Clark, Santa Maria Refinery  
Brian C. Conners, Los Angeles Refinery  
Susan F. Cook, Los Angeles, Ca.  
Robert M. Coupe, Beaumont, Tx.  
David W. Dassler, Los Angeles, Ca.  
Michelle Del Castillo, Los Angeles, Ca.  
Sheree L. Downing,  
San Francisco Refinery  
Donald L. Frazier, Los Angeles Refinery  
Gary A. Freiburger,  
San Francisco Refinery  
Peter M. Hallock, Los Angeles, Ca.  
Jeffrey P. La Mont, Los Angeles, Ca.  
David M. Loseman,  
Los Angeles Refinery  
Stephen P. Loving, Los Angeles Refinery  
Michael J. Papsadore, Los Angeles, Ca.  
Elizabeth A. Rendon,  
Los Angeles Refinery  
Allan D. Stewart, Edmonds, Wa.  
Todd S. Swenson, Avila, Ca.  
Suzanne F. Taglang, San Francisco, Ca.
- October 1985**
- 40 YEARS Eugene L. Phillips,  
San Francisco Refinery
- 35 YEARS Roy M. Robinson, Los Angeles, Ca.
- 30 YEARS Paul D. Critton, San Francisco Refinery  
Richard F. Ithal, Anchorage, Ak.  
Darrell F. Keating, San Francisco, Ca.  
E. E. Pease Jr., Phoenix, Az.  
Vern N. Weller Jr., Los Angeles, Ca.
- 25 YEARS David L. Gregory, Richmond, Ca.  
Keith L. Shurtz, Portland, Or.



20 YEARS	Joe A. Bryant, Los Angeles Refinery Charles N. Cooper Jr., San Francisco Refinery Robert H. Hunter, San Francisco Refinery David R. McKinley, Los Angeles, Ca.
15 YEARS	Keith M. Curtin, San Francisco Refinery Spencer H. Green, Los Angeles, Ca. Bruce W. Hall, San Francisco Refinery George Lopez, Los Angeles Refinery James W. Thompson, San Francisco, Ca. Lamar White, Torrance, Ca.
10 YEARS	Maria B. Alvarado, Los Angeles, Ca. Nardito D. Calvero, Los Angeles Refinery Francisco F. Leon, Los Angeles, Ca. Ronald J. Pearson, Edmonds, Wa.
5 YEARS	Brian W. Austin, Santa Paula, Ca. David H. Close, Los Angeles, Ca. Gary L. Estrada, San Luis Obispo, Ca. Carla R. Holcombe, Los Angeles, Ca. Dean D. Logan, Santa Margarita, Ca. Craig R. Munson, Phoenix, Az. Alan S. Parker, Los Angeles, Ca. Scott J. Segal, Los Angeles Refinery Edward J. Toney, Los Angeles, Ca. Emilie V. Villari, Los Angeles, Ca. John W. Youngblood, Los Angeles, Ca.

## MARKETERS & DISTRIBUTORS

### September 1985

35 YEARS	R. E. Cox, Chelan, Wa. Brighton Oil Co., New Brighton, Mn.
30 YEARS	Gene Bradley, Holbrook, Az.
20 YEARS	Richard Oil Co., Inc., McClure, Oh.
15 YEARS	John Bosman, Bellingham, Wa. Jim Jonas, Inc., Lower Lake, Ca.
10 YEARS	Hawkeye Oil Co., Cedar Rapids, Ia.
5 YEARS	George Reece, Pasco, Wa.

### October 1985

50 YEARS	Carter Oil Co., Inc., Walhalla, S.C.
30 YEARS	Charles L. Bryant, Modesto, Ca. J. W. Earley, Port Angeles, Wa.
25 YEARS	B & W Oil Co., Inc., Ariadna, Fl. John Hodges, Westley, Ca.
20 YEARS	Bell Oil Co., Augusta, Ga.
15 YEARS	Robert C. Brown, Halfway, Or. Kenneth Edgmon, Madras, Or. Espy Oil Co., Huntingdon, Tn. Mitch Vuksanovich, Miami, Az.
10 YEARS	W. G. Bruner Oil Co., Inc., Cedartown, Ga. Rupp Oil Co., Inc., Bay City, Mi. Circleville Oil Co., Circleville, Oh.

## CHEMICALS

### June 1985

5 YEARS	Bonnie E. Hanley, Schaumburg, Il.
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### September 1985

30 YEARS	Andrew R. Brennan, Houston, Tx. Lyle L. Burnett, Clark, N.J. Frank Emeterio, Brea, Ca. Jerome J. Raymond, La Mirada, Ca.
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25 YEARS	Charles Waugh, Brea, Ca.
20 YEARS	Charles E. Benfield, Charlotte, N.C.
15 YEARS	Oscar L. Azcua, Unocal Center David W. Barthelmeh, La Mirada, Ca. Irene M. Conti, Schaumburg, Il. Ralph J. Koneski, Carteret, N.J. Basil L. Mack, Lemont, Il. Peter F. Travers, Clark, N.J.
10 YEARS	Joey L. Clark, Charlotte, N.C. Kenneth A. Drozd, Bridgeview, Il. Daniel A. Harris, La Mirada, Ca. James D. Justice, Arroyo Grande, Ca. Clifford S. McElrea, Kenai, Ak.
5 YEARS	Michael D. Chapman, La Mirada, Ca. Jeffrey V. Dagdigian, Brea, Ca. Darlene A. Hamway, Clark, N.J. Bryan S. Hervey, Miami, Fl. Leslie L. Hunter, La Mirada, Ca. Kelli J. Inkenbrandt, Unocal Center Wayne M. Lutz, Rodeo, Ca. Loran C. Maggi, Kenai, Ak. Macie H. Mooney, Atlanta, Ga. Chester W. Tomala, Lemont, Il. Rebecca R. Stone, Rolling Meadows, Il. Michael B. Vining, Brea, Ca.

### October 1985

30 YEARS	Jack O. Canaday, Unocal Center Robert Davis, Brea, Ca.
25 YEARS	Mildred B. Murphy, Baltimore, Md. Carl G. Pope, Charlotte, N.C.
20 YEARS	Calvin D. Allen, Atlanta, Ga. Albert T. Oliver, La Mirada, Ca. Dorothy A. Schmidt, La Mirada, Ca.
15 YEARS	William M. Dippe, Schaumburg, Il. Terri L. Wilson, Kenai, Ak.
10 YEARS	Daniel G. Brown, Schaumburg, Il. Harry A. Dierks, La Mirada, Ca. Robert D. Flager, Brea, Ca. Mark R. Howard, Portland, Or. Linda Jo Kennedy, Arroyo Grande, Ca. Willie L. McCloud, Charlotte, N.C. Nathan P. Taleon, Brea, Ca. John R. Wright, Charlotte, N.C. Richard J. Zlatos, Lemont, Il.
5 YEARS	Douglas S. Born, Clark, N.J. Frank P. Dougherty, Louisville, Ky. Marion D. Garner, Unocal Center Phillip D. Koon, Brea, Ca. Bruno Koziel, Lemont, Il. Michael P. Mitchell, Newark, Ca. Craig W. Naig, Brea, Ca. Jacqueline D. Nicosia, Brea, Ca. Norman J. Rain, Brea, Ca. Carlos Torricella, Brea, Ca. Edward C. Vann, Kenai, Ak. Katherine M. Wilharm, Schaumburg, Il. Ronald L. Zavodney, Schaumburg, Il.

## MOLYCORP, INC.

### May 1985

5 YEARS	Carole Welander, Mountain Pass, Ca.
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### September 1985

30 YEARS	Jack E. Beecham, Washington, Pa. Harry O. Dorsey, Washington, Pa.
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## Service Awards



20 YEARS	James T. McCartney, Questa, N.M.
15 YEARS	Amador J. Rael, Questa, N.M. J. Edward Wendel, Nipton, Ca.
5 YEARS	Leroy E. Apodaca, Questa, N.M. Michael W. Bravo Jr., Questa, N.M. Mercedinio Cisneros Jr., Questa, N.M. Elefio E. Chavez, Questa, N.M. Joseph Crespín, Questa, N.M. Armond C. Cunningham, York, Pa. Norbert G. Garcia, Questa, N.M. Frank Gomez, Questa, N.M. Stanley F. Klein, Nipton, Ca. Loren P. Maes, Questa, N.M. Repito P. Romero, Questa, N.M. Peter Andamo Sanchez, Questa, N.M. Miguel D. Trujillo, Questa, N.M. Toby Vasquez, Questa, N.M. Lawrence M. Velasquez, Questa, N.M. Vincent Young, Questa, N.M.

### October 1985

30 YEARS	Lew R. Hellmann, Washington, Pa. Arthur E. Jeffers Jr., Washington, Pa. Charles W. Miller Sr., Washington, Pa. Richard W. Spellman, Washington, Pa.
20 YEARS	David L. Denson Jr., Washington, Pa. Jack Loar, Washington, Pa. Donald G. Sterner, Nipton, Ca. David L. Walker, Washington, Pa. Clarence W. Wilson, Washington, Pa. Edward H. Wiszczor, Washington, Pa. Jon S. Young, Washington, Pa.
15 YEARS	Eugene H. Lindsey, Denver, Co.
10 YEARS	James A. Vanosten, Questa, N.M.
5 YEARS	Anthony K. Mathes, Nipton, Ca. Jerry D. Mathes, Nipton, Ca. Norman W. Sanchez, Questa, N.M. Anthony C. Sorrento, Nipton, Ca. Raymond I. Trujillo, Questa, N.M.

## POCO GRAPHITE, INC.

### September 1985

15 YEARS	Vernon A. Lee, Decatur, Tx.
5 YEARS	Lawrence E. McGinnis, Decatur, Tx. Nadine K. McGovern, Decatur, Tx. Nelda R. Parrent, Decatur, Tx. Jimmy R. Wallace, Decatur, Tx.

### October 1985

15 YEARS	Jimmy J. Sherman, Decatur, Tx.
5 YEARS	Garry L. Musser, Decatur, Tx. Walter M. Rainwater, Decatur, Tx.



## RETIREMENTS

### May 1985

**George A. Middendorf**, Refining & Marketing, Cincinnati, Oh., July 13, 1959

### July 1985

**Albert F. Elliott**, Refining & Marketing, Klamath Falls, Or., May 13, 1957

**Harry F. Kelly**, Oil & Gas, Hesperia, Ca., July 3, 1964

**Stephanie T. Kowalczyk**, Refining & Marketing, Palatine, Ill., July 8, 1968

**Lewis D. Lawrence**, Corporate, Arcadia, Ca., March 1, 1952

**Percy J. LeBlance**, Oil & Gas, Abbeville, La., February 12, 1952

**Fidel A. Martinez**, Molycorp, Questa, N.M., March 1, 1969

**Shirley A. Monroe**, Refining & Marketing, San Diego, Ca., November 6, 1946

**Simeon Nixon Jr.**, Refining & Marketing, Richmond, Va., December 7, 1953

**Henry J. Paulsen**, Oil & Gas, Coalinga, Ca., March 8, 1949

**Clarence J. Pieterick**, Refining & Marketing, Rodeo, Ca., December 15, 1944

**Cipriano Quintana**, Molycorp, Questa, N.M., May 23, 1955

**Roy J. Ricks**, Oil & Gas, Mancos, Co., May 27, 1963

**John Sego**, Science & Technology, Burbank, Ca., December 27, 1944

**Oscar F. Smith**, Refining & Marketing, Newark, Oh., March 8, 1942

**George H. Stoner Jr.**, Oil & Gas, Midland, Tx., December 1, 1949

### August 1985

**Benjamin Airey**, Refining & Marketing, Vista, Ca., January 7, 1946

**Gus S. Beltran**, Refining & Marketing, Hacienda Heights, Ca., July 4, 1966

**George C. Bond**, Corporate, Pasadena, Ca., December 16, 1954

**Winters J. Bump**, Refining & Marketing, Cuyahoga Falls, Oh., January 1, 1953

**Anna L. Doone**, Refining & Marketing, Schaumburg, Ill., October 1, 1967

**Leroy G. Evans**, Oil & Gas, Fullerton, Ca., January 30, 1963

**William A. Fyock**, Refining & Marketing, San Clemente, Ca., August 9, 1950

**Ernest J. Goularte**, Refining & Marketing, Hercules, Ca., December 14, 1945

**Arline F. Hanson**, Chemicals, Fanwood, N.J., January 1, 1967

**Fred L. Hixon**, Oil & Gas, Coalinga, Ca., March 26, 1947

**Margaret H. Kinslow**, Refining & Marketing, Hoffman Estates, Ill., January 19, 1968

**John G. Mertz**, Refining & Marketing, Stayton, Or., Aug. 13, 1954

**John E. Phillips**, Molycorp, Washington, Pa., September 30, 1948

**Bill L. McCloud**, Refining & Marketing, Knoxville, Tn., July 6, 1949

**Orville L. Onken**, Refining & Marketing, Long Beach, Ca., March 21, 1955

**James E. Rath**, Refining & Marketing, Alameda, Ca., July 5, 1955

**Anselm P. Russell**, Refining & Marketing, Gulfport, Ms., August 1, 1947

**Philip W. Smith**, Refining & Marketing, La Habra, Ca., July 21, 1947

**William N. Stark Jr.**, Refining & Marketing, Danville, Ca., June 1, 1949

**W. D. Wallace**, Corporate, Palos Verdes, Ca., January 23, 1950

### September 1985

**Ferdinand A. Barrette**, Refining & Marketing, Dearborn, Mi., December 1, 1953

**Joseph C. Carnes**, Oil & Gas, Andrews, Tx., April 1, 1962

**Floyd W. Carroll**, Refining & Marketing, Danville, Ca., June 29, 1951

**Reuben G. Danielson**, Refining & Marketing, Schaumburg, Ill., November 1, 1969

**Robert L. Depweg**, Corporate, Covina, Ca., October 1, 1953

**Siverina C. Griffin**, Refining & Marketing, Savannah, Ga., August 16, 1950

**Marie L. Healy**, Oil & Gas, Glendale, Ca., January 22, 1963

**Frances G. Kare**, Chemicals, Schaumburg, Ill., February 15, 1969

**Bernard Kouzel**, Science & Technology, Fullerton, Ca., February 1, 1957

**Donald J. Krause**, Refining & Marketing, Redlands, Ca., July 16, 1951

**Thomas W. Lindsay**, Corporate, Westlake Village, Ca., April 16, 1973

**Willis A. Menard**, Refining & Marketing, San Pedro, Ca., June 30, 1965

**Beverly B. Mulliken**, Refining & Marketing, Alameda, Ca., August 20, 1940

**Herbert P. Oldham**, West Coast Shipping Co., Placentia, Ca., August 24, 1965

**William C. Seigler**, Refining & Marketing, Augusta, Ga., January 15, 1973

**Carl E. Smith**, Oil & Gas, Abbeville, La., January 18, 1951

**Stephen A. D. Underdown**, Refining & Marketing, Torrance, Ca., March 2, 1964

**John A. Wierschem**, Refining & Marketing, Channahon, Ill., June 30, 1952

## IN MEMORIAM

### Employees

**Royce W. Broussard**, Oil & Gas, Vinton, La., June 17, 1985

**Alvin E. Gibbs**, Refining & Marketing, Los Angeles, Ca., July 17, 1985

**Moises M. Medina**, Molycorp, Taos, N.M., June 1, 1985

**Donald E. Van Liew**, Refining & Marketing, Long Beach, Ca., June 13, 1985

**Fred G. Walker**, Refining & Marketing, Lakewood, Ca., June 24, 1985

**Robert E. Webb**, Refining & Marketing, Orlando, Fl., July 6, 1985

### Retirees

**Irene R. Abbott**, Refining & Marketing, Modesto, Ca., March 5, 1985

**Neyland F. Allen**, Oil & Gas, Kerrville, Tx., June 16, 1985

**Marshall H. Ard**, Oil & Gas, Van, Tx., June 17, 1985

**A. Kathleen Bell**, Refining & Marketing, Columbus, Oh., June 2, 1985

**Ralph W. Burleson**, Oil & Gas, Arlington, Tx., October 17, 1984

**Nicholas K. Chase**, Refining & Marketing, Northwood, Oh., July 9, 1985

**Ben L. Clark**, Oil & Gas, Okemah, Ok., June 21, 1985

**Carrie L. Clark**, Refining & Marketing, Grove City, Ok., June 21, 1985

**Gerald E. Cole**, Refining & Marketing, Toledo, Oh., July 21, 1985

**Albert L. Crnkovich**, Refining & Marketing, Joliet, Ill., June 22, 1985

**Daniel Ervin**, Oil & Gas, Norris City, Ill., May 20, 1985

**Adlia E. Felkamp**, Oil & Gas, Olney, Ill., June 1, 1985

**Walter J. Freeman**, Refining & Marketing, Dayton, Oh., May 22, 1985

**Blanche A. Gaylord**, Refining & Marketing, Miami, Fl., May 30, 1985

**Reba C. Gohn**, Molycorp, York, Pa., June 7, 1985

**Julien R. Graham**, Refining & Marketing, Bainbridge, Ga., June 28, 1985

**Clark D. Grove**, Refining & Marketing, Napa, Ca., June 15, 1985

**Lars J. Halvorsen**, Refining & Marketing, Concord, Ca., June 27, 1985

**Elizabeth M. Higgason**, International Oil & Gas, Los Angeles, Ca., June 19, 1985

**Quenten C. Highfield**, Oil & Gas, Perryton, Tx., June 15, 1985

**John G. Hudnall**, Refining & Marketing, Lewisburg, Ky., May 28, 1985

**William L. Kent**, Science & Technology, Fullerton, Ca., July 16, 1985

**Joseph R. Kruger**, Refining & Marketing, Laguna Hills, Ca., April 27, 1985

**Morrison Manics**, Refining & Marketing, Shasta, Ca., May 31, 1985

**Dallas W. Manning**, Refining & Marketing, Newark, De., May 21, 1985

**Ruth Middleton**, Refining & Marketing, Tunnel Hill, Ga., May 28, 1985

**William E. Morlan**, Refining & Marketing, La Habra, Ca., May 28, 1985

**Leo New**, Oil & Gas, Oilton, Ok., May 17, 1985

**Adolph Podoll**, Oil & Gas, Kalispell, Mt., March 2, 1985

**George Potasnak**, Pure Transportation Co., Minneapolis, Mn., June 3, 1985

**John I. Price**, Oil & Gas, Long Beach, Ca., June 7, 1985

**Paul C. Ramun**, Refining & Marketing, Rodeo, Ca., July 19, 1985

**Roscoe Reneau**, Refining & Marketing, Tallmadge, Oh., June 21, 1985

**Russell B. Rogers**, Refining & Marketing, Dunedin, Fl., May 28, 1985

**Robert A. Royce**, Chemicals, Walnut Creek, Ca., January 20, 1985

**James L. Samples**, Oil & Gas, Santa Paula, Ca., June 12, 1985

**Sylvester H. Schilling**, Refining & Marketing, Flat Rock, Mi., July 5, 1985

**Ernest Sigueiros**, Refining & Marketing, Wilmington, Ca., February 20, 1985

**James H. Smith**, Pure Transportation Co., Olney, Ill., July 4, 1985

**Joseph Smudak**, Refining & Marketing, Uniontown, Oh., May 31, 1985

**John B. Todd**, Refining & Marketing, Wilmette, Ill., July 18, 1985

**George J. White**, Oil & Gas, Oilton, Ok., June 27, 1985

**Richard J. Wilkins**, Oil & Gas, Norphlet, Ar., July 5, 1985



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**COVER:** Going, going...the jacket for Platform Irene slips into the Pacific Ocean off the California coast near Vandenberg Air Force Base. Story on page 1. **Photo by Lon Harding.**

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