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Above, a worker inspects oil storage tanks located in Unocal's Lake Pagie field in Southern Louisiana. The company made eight new hydrocarbon discoveries in the Gulf Coast area in 1990 and completed several development projects that added more than 100 million cubic feet per day of gas production.

Focus on Performance

At Unocal's 101st annual meeting, Chairman, President, and Chief Executive Officer Richard J. Stegemeier reviewed the company's progress and enumerated the steps being taken to increase cash flow, reduce debt and invest for growth in the years ahead. Held April 29th at the company's Fred L. Hartley Research Center in Brea, California, the meeting also served to commemorate the 100th anniversary of the Science & Technology Division.

"This centennial reminds us that the company's success is ultimately built on a spirit of innovation," Stegemeier told the assembled shareholders. "That spirit has served us well for more than a century."

Quoting from *The Prize*, Dan Yergin's best-selling book on the petroleum industry, Stegemeier also noted that Unocal is the only major American corporation outside of Standard Oil and its successors to have maintained a continuous independent existence, since 1890, as a major integrated oil company.

"We did not achieve this distinction by sitting on our hands, doing the same things in the same ways, day after day," said Stegemeier. "We anticipated problems, seized opportunities, and changed with the times. We are continuing to follow this approach in the 1990s."

Last year, Unocal substantially expanded its energy resource base, acquired several valuable oil and gas properties in areas where the company enjoys a competitive advantage, and continued a restructuring program to ensure that each asset earns an adequate rate of return. For the fourth consecutive year, the company increased its total oil and gas reserves by 5 percent. Worldwide crude oil and natural gas production within the company rose by 53 percent in 1990.

"As an energy company, expanding our resource base is absolutely critical to future growth," said Stegemeier. "Of course, our goal must also be to increase the *value* of our reserves."

For every dollar the company invested in exploration and development in 1990, \$1.80 in value was added in oil and gas reserves. Unocal's exploration and development strategy continues to emphasize creating value in all the company's operating areas around the globe.

Current exploration focuses on areas that are most likely to produce large, high-value discoveries, including relatively under-explored regions overseas such as Senegal, Myanmar, Syria, and Yemen. In terms of development, the company aggressively pursues a program to develop reserves and boost production from existing fields, both in the United States and abroad.

Adding to its exploration inventory, Unocal acquired four attractive oil and gas properties in the U.S. and Canada last year. These acquisitions include proven fields and high-potential lands in the Gulf Coast region, offshore California, the Cook Inlet of Alaska, and in Saskatchewan and British Columbia—areas that fit well with Unocal’s existing operations. Totalling 27,000 acres, the new exploratory lands have contributed significantly to the company’s proved reserves and daily production of crude oil, natural gas, and sulfur.

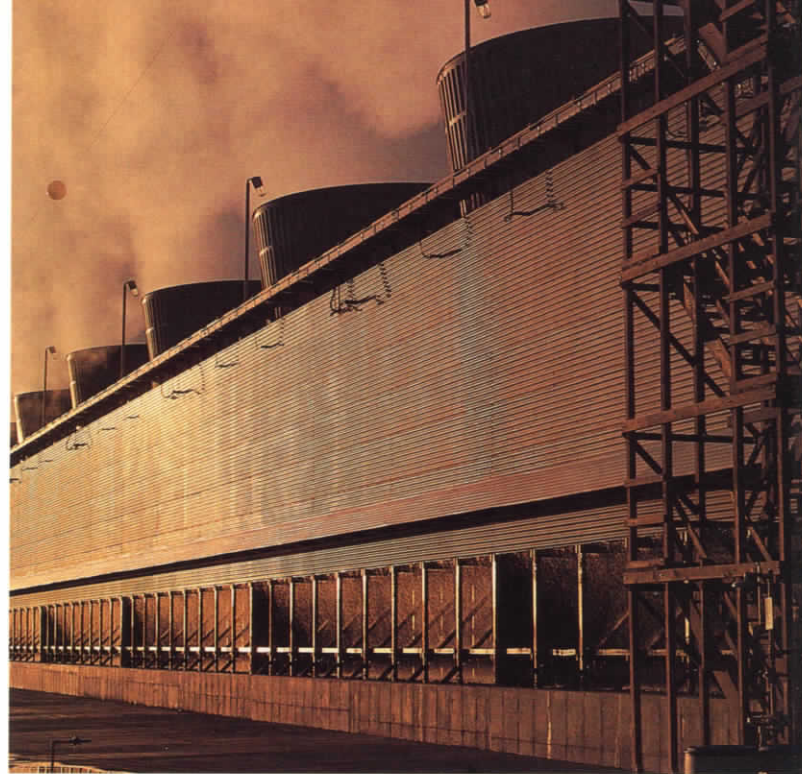
“We see exploration and development opportunities in all of these properties that could substantially increase their proved reserves,” noted Stegemeier. “Most of this new acreage is in the Gulf of Mexico—a region where we have long enjoyed outstanding success.”

Unocal Exploration Corporation (UXC), the company’s publicly traded subsidiary, made eight new hydrocarbon discoveries in the Gulf Coast area in 1990 and completed several development projects that added more than 100 million cubic feet per day to natural gas production.

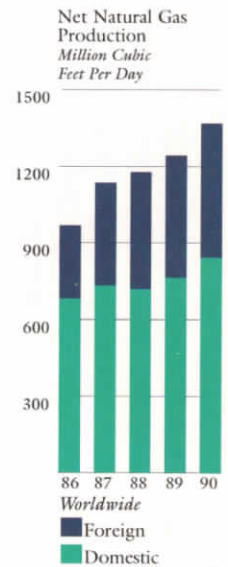
Overseas, Unocal completed gas-compression facilities in Thailand that have boosted production to 690 million cubic feet per day—more than doubling the average production from the region in less than five years. “By the end of 1991, we expect to begin production from the Funan field—our sixth natural gas field in the Gulf of Thailand—increasing our total output to nearly 800 million cubic feet per day,” added Stegemeier.

Last year, in Indonesia, net production from Unocal’s fields offshore East Kalimantan averaged 53,000 barrels of oil per day, the highest level in nearly a decade. Additionally, the company extended its production-sharing contract with Pertamina, Indonesia’s state oil company, through the year 2018. The new agreement has enabled Unocal to book additional proved reserves of 38 million barrels of oil and 158 billion cubic feet of gas.

Moving on to other areas of the company, Stegemeier noted that the Geothermal Division continues to lead the world in the production of steam and hot brine for electricity generation. To maximize cash-flow opportunities, Unocal is going beyond its traditional role as resource producer to become a power supplier in Southern California. In April 1990, the company started up a new 18-megawatt unit at the Salton Sea, increasing the company’s electricity generating capacity within the area to 78 megawatts.



The Geothermal Division continues to lead the world in the production of steam and hot brine for electricity generation. Above, the cooling tower of Unocal’s Salton Sea Unit 3—the company’s first large-scale geothermal operation and power plant in California’s Imperial Valley.





Unocal is also stepping up efforts to reduce costs and improve the efficiency of its refining and marketing operations in the West, while complying with increasingly stringent environmental regulations. Late in 1990, work commenced on a new \$515 million hydrotreater project at the Los Angeles refinery.

“This project will provide a number of environmental benefits, while generating a favorable cash return for the company,” said Stegemeier. “When completed in 1993, it will significantly increase gasoline production and expand our ability to produce reformulated fuels, while reducing the production of low-value fuel oil. It will also reduce sulfur emissions from our fluid catalytic cracking unit.”

In 1992, Unocal plans to upgrade its chemical manufacturing complex in Kenai, Alaska, to reduce emissions and increase production of ammonia and urea — two basic nitrogen fertilizers. Last year’s acquisition of additional natural gas reserves in the nearby Cook Inlet assures a long-term source of feedstock for the plant.

While constantly looking for ways to improve the profitability of its operations, the company recently has taken several cash-generating steps to reduce debt and invest for future growth. Last year, Unocal sold its Norwegian oil and gas subsidiary and several marginal properties in North America. In February of 1991, the company announced that it is evaluating financial and strategic options for the company’s petroleum marketing and distribution operations in the southeastern U.S. and its nationwide system of auto/truckstops.

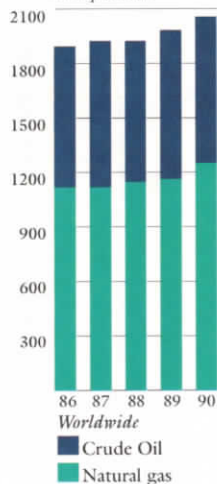
In April, the company announced that it will sell its Molycorp minerals and mining subsidiary, as well as its chemical distribution and emulsion polymers businesses. Unocal will retain its other chemical operations, including its carbon, graphite, and agricultural business lines.

“Our goal is to complete the sales by the end of the year,” said Stegemeier. “We will take the cash generated by these transactions and use it either to reduce debt or for reinvestment in our basic businesses.”

Effective June 1, Unocal will suspend production at its oil shale project in Parachute Creek, Colorado. The company operated the plant for nearly five years and produced almost 4.5 million barrels of high-quality syncrude.

“We made good progress in developing our oil shale technology,” said Stegemeier, “but we never achieved sustained production rates high enough to avoid cash losses. We gave oil shale our best shot, but we cannot afford to take continued losses on any project. All of us at Unocal are proud of the determination and hard work of our employee team at Parachute.”

Net Crude Oil and Natural Gas Reserves
Million Barrels Crude Oil Equivalent



Late in 1990, work commenced on a new \$515 million hydrotreater project at the Los Angeles refinery (above). “The project will provide a number of environmental benefits, while generating a favorable cash return for the company,” said Stegemeier.

Venturing a look ahead, Stegemeier thought it unlikely that crude oil or natural gas prices would rise significantly over the next year or two, putting an even greater importance on the company's efforts to improve efficiency and increase cash flow.

"We'll continue to build on the things we do best," he said. "This includes finding and producing crude oil, natural gas, and geothermal energy, not just here in the U.S. but in more than a dozen nations overseas. We're taking a hard look at the entire company and making some difficult decisions."

During his remarks, Stegemeier addressed some of the broader, general issues affecting Unocal and its operating environment. Noting the recent energy strategy proposed to Congress by the Bush administration, Stegemeier applauded the President for taking an important first step.

"However," he added, "I don't think the new plan puts enough emphasis on energy conservation and efficiency, nor on the development of renewable and alternative energy sources. I hope Congress and the administration ultimately approve an energy strategy that encompasses these concerns as well."

According to Stegemeier, creating a national energy strategy is actually part of a much bigger challenge, the problem of coordinating a trio of national priorities—energy, the environment, and the economy.

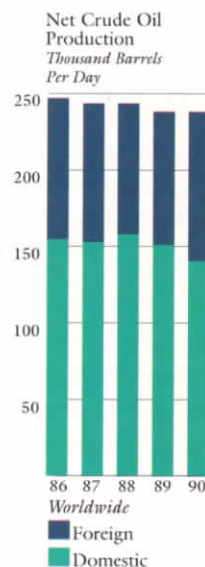
"We must protect the environment—that's a given," said Stegemeier. "But we must also have adequate energy supplies and strong economic growth. Obviously, these issues are interrelated and interdependent. Creating a national energy strategy that effectively balances the competing needs of environmental protection and economic growth will be—to say the least—a formidable challenge."

To deal with these issues as they affect the company, Unocal's board of directors recently authorized the creation of a new committee which will meet periodically to review health, safety, and environmental issues. The committee will also review the findings of any major environmental investigation conducted by a regulatory agency.

Unocal actively supports efforts to protect the environment. Within the last year, the company developed and sponsored five environmental programs designed to reduce pollution in the Los Angeles area. In the first of these, Unocal conducted a joint household hazardous waste roundup with the City of Los Angeles. Held at the company's Los Angeles refinery, the event provided an opportunity for area residents to dispose of paint, household chemicals and other toxic waste in an environmentally safe manner.



Unocal completed gas-compression facilities in the Gulf of Thailand that have boosted production to an average of 690 million cubic feet per day. Above, a view of the Erawan field platform complex.





In 1992, Unocal plans to upgrade its chemical manufacturing complex (above) in Kenai, Alaska, to reduce emissions and increase production of ammonia and urea — two basic nitrogen fertilizers. Right, some of the toxic refuse gathered at the Los Angeles refinery's hazardous waste roundup.



With an initiative called SCRAP, Unocal purchased and scrapped nearly 8,400 highly polluting old cars. The 76 Protech Patrol program offers free assistance to stranded freeway motorists, which helps prevent traffic tie-ups and the extra smog they cause.

The Smogfighter effort offered free low-emission tune-ups to qualifying pre-1975 vehicles in the Los Angeles area. And a program offering compressed natural gas to motorists will establish public CNG refueling facilities at Unocal service stations in Southern California. CNG is the cleanest burning of the fossil fuels. (See accompanying story.)

“If you don’t mind a bit of bragging,” said Stegemeier, “I should note that the concept of SCRAP has been included in the President’s new energy strategy, which calls for government and private sector programs that offer a ‘bounty’ for scrapping older, highly polluting, gas-guzzling cars.” The Southern California Air Quality Management District (SCAQMD) also lent its support to the SCRAP program in the form of a \$100,000 contribution.

In closing, Stegemeier summarized the key points of his address. “We are currently refocusing company operations to improve cash flow and profitability, and we’re accelerating our efforts to provide a safe and healthy workplace and protect the quality of our environment,” he said.

In the final analysis, he added, expenditures to protect the areas in which the company operates are not an expense — they are an investment. Unocal cannot afford to have good projects go bad because the company fails to be vigilant in matters of health, safety, and the environment.

Stegemeier re-emphasized the problems facing the nation in energy, the environment and the economy. To address these issues, he stressed, America must adopt a comprehensive national energy strategy, one that effectively balances the competing requirements of in each of the three areas.

“We’re trying to help show the way, to help create a more flexible, scientific, cost-effective framework for environmental regulation and economic growth,” said Stegemeier. “But Unocal is only one company. To succeed will require strong national leadership. Our company is ready to do its part.” 76



NEAL E. SCHMALE

Neal E. Schmale, 44, is senior vice president of corporate development for Unocal Corporation, and president of the Unocal Chemicals & Minerals Division.

Schmale joined Unocal in 1968 as a drilling engineer. He served in various reservoir and drilling engineering positions until receiving his law degree. Specializing in maritime law and international business transactions, he worked in Unocal's legal department from 1974 until 1979. That year Schmale transferred to a planning position, becoming director of corporate economics and budgets in 1981.

He was appointed vice president for budgets, planning and economics in 1986, and elected senior vice president of corporate development two years later. In 1991, he became president of the Unocal Chemical & Minerals Division. In his current position, Schmale is responsible for Unocal's chemicals and minerals operations, as well as the company's research programs and oil shale facility.

Born in Sidney, Nebraska, Schmale earned a bachelor's degree in petroleum engineering at Colorado School of Mines in 1968. He received a juris doctor degree from Loyola University of Los Angeles Law School in 1974. Schmale is a member of the American Bar Association, the California Bar Association, the Society of Petroleum Engineers, and the Maritime Law Association. He serves on the President's Advisory Committee for the Petroleum Engineering Department of the Colorado School of Mines, and on the board of directors of the Los Angeles Educational Partnership.



JOHN W. AMERMAN

John W. Amerman, 59, was named chairman and chief executive officer of Mattel, Inc. in 1987. He has been a member of Mattel's board of directors since 1985. The company is a worldwide leader in the design, manufacture and marketing of children's toys. With headquarters in El Segundo, California, Mattel has offices and facilities in more than 20 countries and sells its products in more than 100 nations worldwide.

In his first year as the chairman and chief executive of a leading company in a troubled industry, Amerman undertook an aggressive program to reduce overhead costs, reorganize management, restructure financially, and emphasize the company's core products. In 1988, Mattel reported a net income of \$36 million, compared with a net loss of \$113 million the year before.

Amerman joined Mattel in 1980 as president of the company's international division. Before then, he served for fifteen years as president of Warner Lambert's American Chicle division. Prior to that, Amerman was product manager at Colgate-Palmolive, a company he joined in 1958 after completing military service.

Raised in New Jersey, Amerman received a bachelor's degree from Dartmouth College in 1953 and an MBA from Dartmouth's Amos Tuck School in 1954.



REAPING THE BOUNTY OF THE BAYOU

Water is a constant in Southern Louisiana. As such, development of the region's rich hydrocarbon deposits typically requires drilling and processing operations amid lakes, swamps, bayous and the Gulf of Mexico. Top, a Unocal production facility lies among the swamps of the onshore North Freshwater Bayou field.

Southern Louisiana can be rather mysterious to an outsider. A nighttime drive from New Orleans to Lafayette, headquarters of Unocal's Louisiana Region, takes you through more than 100 miles of dark swampland where only the twisted silhouettes of tall trees punctuate a moonless sky. Frogs croak, crickets chirp. The humid air smells of rich, wet earth — musty and vaguely sweet.

Daylight reveals additional surprises. Potholed two-lane roads slice through a verdant bayou overgrown with dense, jungle-like vegetation. A local pulls his muddied pick-up to the road's shoulder and drops a fishing line in brackish, algae-covered water where alligators and turtles sun themselves on logs. Further down the roadside, a dead armadillo lies at the foot of a cryptic hand-lettered sign which reads, "WE CLEAN DUCKS."

To a city slicker, such unfamiliar sights underscore the enigmatic nature of this shadowy swampland. But to the explorationists, engineers and geologists of Unocal's Louisiana Region, there is no mystery. Southern Louisiana is a treasure trove of oil and gas deposits.

"To date, 105 trillion cubic feet of natural gas have been found offshore Louisiana," says John Donohue, district exploration manager, offshore west. "For that, we can thank the Mississippi River — and the sediment it's deposited in the region over the past 15 million years. This is the main reason why Southern Louisiana is such a garden spot for Unocal's exploration and production."

A garden spot indeed. Since Unocal began petroleum exploration in Louisiana during the 1940s, the company has produced 9.8 trillion cubic-feet of natural gas, and 589 million barrels of oil and condensate, from both offshore and onshore sources. A combination of favorable geological conditions and operational expertise has helped make the Louisiana Region such a prolific producer for Unocal.

"Throughout the world, most known petroleum-bearing formations are horizontally distributed beneath the earth's surface. But unique to our region is an abundance of vertically stacked producing formations," says David Watkins, regional engineering manager.



This environment has exerted great impact on the production of the Louisiana Region. When developing a hydrocarbon deposit, drilling crews throughout the industry typically try to bore through the entire subsurface formation and work their way upward from the bottom with perforations and recompletions. The abundance of stacked formations increases the overall production potential of many wells in the Region by allowing several pay zones to be developed from a single well.

This technique, along with the natural wealth of hydrocarbons present in the region, has helped produce wells that are significantly more productive than most others in the contiguous United States. “It’s not unusual for one of our wells to produce 10 to 30 million cubic feet of gas per day,” says Watkins. “Outside the Gulf of Mexico area, 10 million cubic feet per day would be considered super. In Unocal’s Central Region, a well that brings in 5 million cubic feet per day is a good producer.”

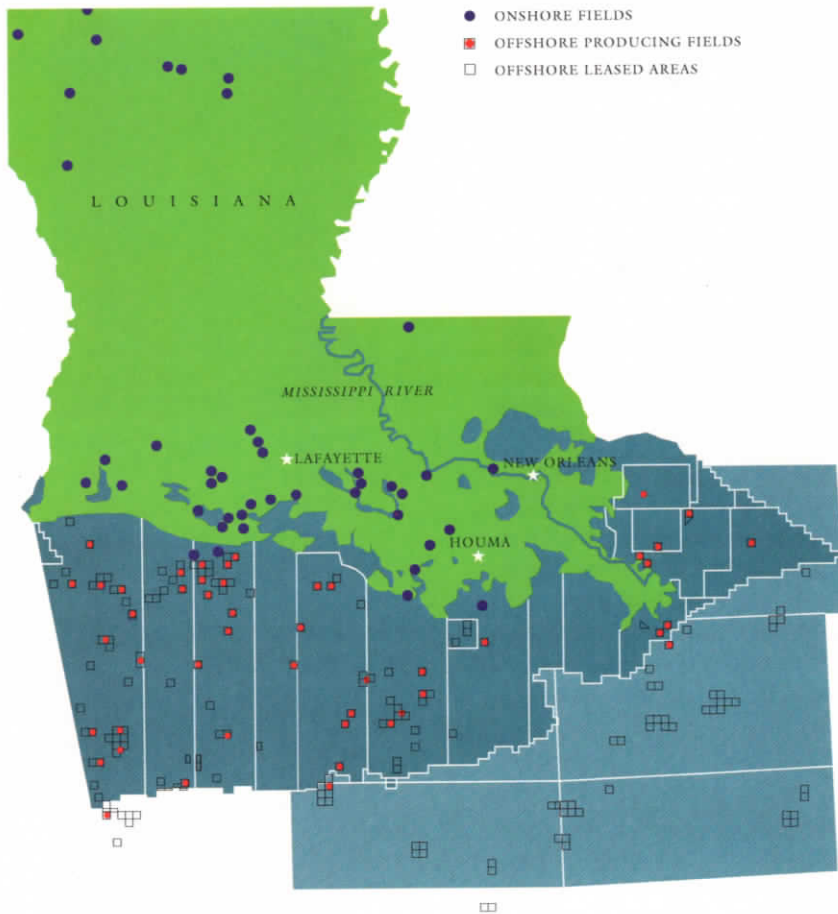
Petroleum fields in the Louisiana Region—particularly in shallow Gulf waters—currently yield much more natural gas than crude oil. In part, geologists attribute this preponderance of gas to the terrigenous, or land-based, nature of sediments deposited by the Mississippi River. Crude oil formation, on the other hand, is most often associated with ancient marine sediments that have formed deep-water shales. This explains why Unocal’s regional production is roughly 80 percent gas and condensate, and only 20 percent oil.

During the past decade, this bounty of natural gas has presented Unocal with some difficult production decisions. Improved cost efficiency, continuing exploration success and increases in the region’s reserve base—coupled with relatively depressed natural gas prices—prompted the company to slow development of reserves in anticipation of an upturn in the gas market.



Above, natural gas processing equipment at the West Starks production plant in Southwestern Louisiana. Below, a worker examines wellhead valves at the Lake Pagie field just south of Houma, La.





“Between 1987 and 1989, our performance was very good,” says Marty Miller, vice president of the Louisiana Region. “We were able to maintain our reserve base while having one of the industry’s lowest finding and development costs. Also, our production expense was among the lowest in the industry. But almost 40 percent of our reserve base—primarily gas—was undeveloped.”

However, recent market forecasts of rising natural gas prices have motivated Unocal to step up development of its considerable reserves. This corporate mandate, aimed at increasing cash flow, has become a top priority for Miller’s team. “The Louisiana Region is one of Unocal’s largest business units, so our performance has a major impact on shareholder value,” he says.



Already, this emphasis on production has augmented company cash flow while providing the Louisiana Region with capital for continued exploration and development. Last year, the Region's natural gas production amounted to 519 million cubic feet per day, a rise of nearly 20 percent over 1989's daily rate.

With Unocal currently acting as operator on 42 offshore and 24 onshore fields in Louisiana, the extra capital comes at a fortuitous time indeed. "We have quite a number of opportunities that will require much higher funding levels than we've had in the past three or four years," Miller says. "Currently, our inventory of exploration lands is at one of its highest levels ever, and our exploration department is generating drilling prospects faster than we can drill them."

But as important as increased capital is to the continued success of Unocal's Louisiana Region, so are the efforts and expertise of its people. And, Watkins notes, as many as two-thirds of them are Louisiana natives.

Like many employees of the Louisiana Region, Joe Badon, district exploration manager, was born and raised on the bayou. A Unocal employee since 1973, he has spent the last 34 years working in the oil industry. Given his ancestral heritage and employment background, the 56-year-old Badon is something of a local authority on the intertwined histories of Louisiana petroleum and the region's people.

Though Southern Louisiana is rich with Spanish and German influences from long-ago waves of European colonization and immigration, it is the French legacy—dating back to the mid-1700s—that is most evident today. The curious cultural blend that evolved in this swampy environment, whose people are known as "Cajuns," is echoed in its music—a unique hybrid of accordions, fiddles, French lyrics and country & western chord progressions.



Clockwise from top left: a gas contact tower removes water from unprocessed natural gas at Unocal's Lake Pagie production facility; heater treaters at the West Starks production plant warm natural gas to separate various hydrocarbon components; field workers "make hole" at the onshore North Freshwater Bayou field.



The original Cajuns were French-born farmers and fur trappers who settled in Nova Scotia. They called themselves “Acadians.” In fact, Badon explains, the term “Cajun” is really a colloquial pronunciation of Acadian.

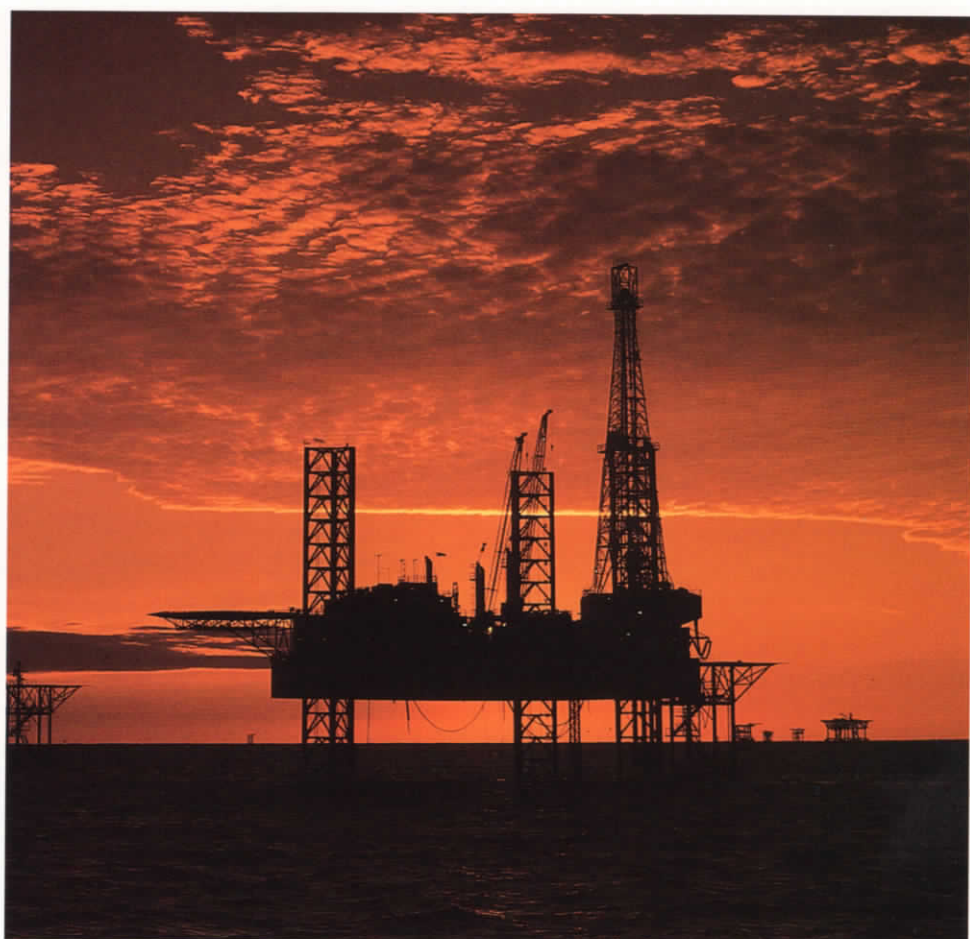
When the English assumed possession of Canada during the French and Indian War, the Acadians were exiled from Nova Scotia. In 1755, Badon says, approximately 300 Acadian families relocated in Southern Louisiana, drawn by the French colonial presence in New Orleans. Soon after, the Acadians moved west of the Crescent City to pursue farming and trapping amid the sprawling Atchafalaya swamp. They called their piece of the bayou “Acadiana.”

Southern Louisiana’s Cajun tradition is well-established, and a source of local pride. Today, the region’s ethnic flavor is reflected in the names of most towns—Lafayette, New Iberia, Opelousas, Broussard—and, of course, in its food. Rich, spicy seafood is *de rigueur*, and crawfish king. In such towns, good cooking is an art form that’s enjoyed at every opportunity.

“It’s really not surprising that Cajun culture flourished here—the population was relatively isolated from the rest of the country up through the early 1900s,” Badon says. “But all that changed when the oil business came into the area.”

Today, automobile license plates bill the state as a “Sportsman’s Paradise” but, as far as the petroleum industry is concerned, Louisiana might as well be called “Oilman’s Paradise.”

How important is oil and gas to Southern Louisiana? The signs are ubiquitous. Prices for natural gas futures are quoted several times daily on local newscasts. In Lafayette, a substantial cluster of lowrise office buildings forms the regional headquarters for several petroleum companies besides Unocal. Collectively called the Oil Center, the enclave was constructed in the 1950s specifically for the use of oil industry workers.



Up the street, retail needs of many residents are satisfied by the merchants of the Oil Center Shopping Village. If not for the presence of the University of Southwestern Louisiana — home of the Ragin' Cajuns — nearly every building and business in Lafayette would contain some reference to oil and gas.

Other towns in the area place similar emphasis on the petroleum industry. South of Lafayette, on the outskirts of Houma, gargantuan offshore platforms are constructed near bayou outlets to the Gulf of Mexico. Once assembled, the giant steel-frame platform jackets — which, out of water, look like electrical transmission towers laid on their sides — will be towed by barge and anchored at sea.

Six miles offshore Louisiana, in Vermilion block 14, Unocal operates such a platform. Perched above the turbid Gulf waters, a crew of 10 maintains the network of valves, gauges and pipes that controls and monitors the flow of gas from several of the field's wells. As platform operator Elbert Repp immediately points out, Vermilion block 14 is Unocal's most productive gas field in the Louisiana Region.

But the field is noteworthy for another reason. Soon after Unocal began developing it in the late 1950s, the extreme natural pressure of the subterranean formation blew out the field's first well. Before it could be brought under control, the resulting eruption of natural gas ate a sizable crater in the ocean floor, swallowed the original drilling platform and sent a column of high-pressure gas bubbling to the ocean surface. Ignited by navy pilots as a safety precaution, the well burned violently for more than five months. Fittingly, the blow-out became known as the "Wild Tiger of the Gulf."



Facing page: Top, natural gas is piped to a scrubber station in the North Freshwater Bayou field. Middle, work crews and supplies are ferried offshore by boat. Bottom, drilling continues at North Freshwater Bayou.

This page: Top left, gas contact towers on the Vermilion block 26-C production platform. Top right, offshore development drilling proceeds in Vermilion block 14. Above, an offshore operator checks production equipment.



Clockwise from above, various views of Vermilion and West Cameron platforms. Once development drilling is complete, geologists estimate that the West Cameron 196 field will produce 100 million cubic feet of natural gas daily.

Today, with the Wild Tiger long-since tamed, the field produces almost 190 million cubic feet of natural gas per day. But Vermilion block 14 is only one of the region's offshore success stories. Coaxing substantial production from a difficult prospect is a feat that's been repeated many times by Unocal's Louisiana team.

Consider the cases of West Cameron block 196 and Ship Shoal block 268.

The rights to West Cameron block 196 were acquired by Unocal, as part of a co-venture with another oil company, in the mid-1980s. The other company originally acted as operator on the block, and discovered natural gas in two plays. After reviewing well logs and other data, geologists found indications of a larger deposit at a greater depth. Still, attempts to develop the prospect were hampered by difficult drilling conditions.

In 1989, Unocal took over the reins as operator on West Cameron 196. After tapping the skills of Louisiana Region geologists and engineers, the company promptly drilled a successful well to the deep formation. "So far, we've found 250 billion cubic feet of natural gas," says exploration geologist Patrick O'Rourke, one of the key players responsible for Unocal's success with the prospect. With additional development drilling slated for completion this year, West Cameron block 196 is expected to produce 100 million cubic feet of natural gas daily.

Until recently, Ship Shoal block 268 had a history of failed drilling attempts. But, Joe Badon says, that situation changed soon after Unocal acquired rights to the block in 1985.



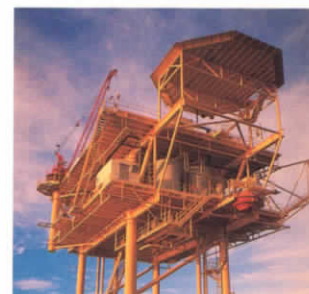
“Another company originally held the lease on Ship Shoal 268 from 1962 through 1975. They drilled five unsuccessful wells,” he explains. “Once Unocal got rights to the block, we conducted exhaustive 3-D seismic analyses and identified some promising formations. We drilled last year and found 140 feet of pay that contains at least 28 billion cubic feet of gas.”

These and other finds have made the Louisiana Region a top producer for Unocal. Maintaining this level of success, David Watkins believes, will depend in large measure on the skill and dedication of the Region’s work force.

“We have very knowledgeable employees here,” he says. “They’re aware and proud that the Louisiana Region is a major profit center for Unocal and they strive to be the best in the industry. Our outstanding teamwork is just one of the reasons we’ve managed to increase our reserve base in spite of our relatively low funding levels.”

The efficiency and versatility of operations personnel have also played a significant role in building the Region’s successful track record. “We have broad expertise with many types of wells and techniques,” says Joe Danos, district drilling superintendent. “We can drill in just about any geographical location and we try to avoid mistakes. Our employees are ‘common sense’ people who know how to use good, sound engineering judgment.”

Also playing a major role in Unocal’s continued success is simply the wealth of hydrocarbon deposits in Southern Louisiana. As in other petroleum-rich parts of the world, competition remains keen among oil companies to develop this finite and valuable resource. But, as proven in the cases of West Cameron block 196 and Ship Shoal block 268, Unocal’s Louisiana employees have developed a knack for finding oil and gas even in specific locations deemed unproductive by other companies. This edge should continue to serve Unocal profitably for years to come.





In Southern Louisiana, the designation “onshore” does not necessarily denote dry land. “Actually, almost every well we have — offshore or onshore — lies in some depth of water,” says David Watkins, regional engineering manager. Above, an offshore drilling rig in West Cameron block 196 and, top, a wellhead in the swampy West Starks field.

“Even though this area of the United States is incredibly rich in oil and gas deposits,” says John Donohue, “we may never find an elephant field—like Alaska’s Prudhoe Bay—in the Gulf of Mexico. But, the intriguing thing about Louisiana is that we might be able to *build* an elephant.”

If current forecasts prove accurate, the Louisiana Region may be well on its way toward “building” a petroleum pachyderm. According to Vic Rosato, regional geologist, estimated production for 1991 is expected to reach 166 billion cubic feet of natural gas and 9.2 million barrels of oil and condensate.

Regardless of the actual year-end tally, the Louisiana Region will surely preserve its position as the centerpiece of Unocal’s domestic exploration and production efforts. Southern Louisiana may seem mysterious to an outsider, but the record of success compiled by the region’s employees is testament to just how intimately they understand this enigmatic place. *M.B.* ②

Editor’s note: In this article, the term, “Unocal” refers both to Unocal Exploration Corporation (UXC) and its parent, Union Oil Company of California. A 96 percent-owned subsidiary of Union Oil, UXC explores for and develops oil and gas in the Gulf of Mexico region.

Also, since this article was written, John Donohue has been appointed manager of exploration for Unocal’s Alaska Region.

Donna Staples will assume his former position as Louisiana’s regional exploration manager, offshore west. Previously, Staples served as a district development geologist with the Louisiana Region.

Richard Landrum, who was replaced by Donohue, has left the Alaska Region to take over the reins as exploration manager of the Louisiana Region.

A COMMITMENT TO COMMUNITY



A mix of fund-raising and volunteer initiatives has played a key role in fostering this *esprit de corps* among employees, Duffy adds.

Taking a hands-on approach to community service, Region employees donated their free time over the past year to staff area blood drives, assemble playground equipment, teach adult literacy curriculums, and serve as members of local volunteer fire departments. In addition, employees collected almost 1,800 pounds of food and donated it to an area food bank for the needy.

The children of the Lafayette area also have benefitted from the work of Unocal volunteers. Via a local Adopt-A-School program and other youth-oriented efforts, employees have set up science exhibits, made presentations during school "career days," and have donated their time to support the activities of area Girl and Boy Scout troops. During last winter's holiday season, employees collected more than 200 toys for the annual Toys for Tots program.

But Unocal employees in Southern Louisiana donate more than just their time. When a cynic wants to measure the extent of your commitment to a cause or principle, he asks you to "put your money where your mouth is."

That is exactly what the people of the Louisiana Region do on a regular basis.

In fact, employees' continuing financial support for community initiatives prompted the Volunteer Center of Lafayette to present its Corporate Pacesetter Award for 1989 to the people of the Louisiana Region. "Unocal typifies the true spirit of corporate volunteerism," Mike Blanchard, director of the Volunteer Center, said during presentation of the award.

When a business and its employees contribute thousands of dollars and volunteer hours each year to serve the surrounding community, area residents certainly benefit. But, as the people of Unocal's Louisiana Region have found, corporate benefactors sometimes reap unexpected rewards from the seeds of their generosity.

"In the Louisiana Region we have worked hard over the years to develop a team spirit among our people," says Bob Duffy, regional geologist. Important to this effort, he notes, has been a managerial philosophy which stresses the role of individual employees in contributing to the business success of the Region as a whole. "But the team spirit we have today has been sparked, perhaps more than anything else, by the community involvement of our employees," says Duffy.

Last year, employees contributed more than \$85,000 to the Louisiana Region United Way Campaign. This amount, which exceeded the Region's \$75,000 fund-raising goal by nearly 14 percent, led all other area oil companies in total pledges and average donation per employee.

Moreover, Unocal was the largest single corporate donor in the United Way's Lafayette Chapter. Including matching funds provided through the Unocal Foundation, the Region's total United Way donation for 1990 topped \$170,000. Continuing this effort, Regional Vice President Marty Miller is currently serving as chairman of Lafayette's 1991 United Way campaign. Other organizations that have augmented their coffers with cash raised by Unocal employees include the March of Dimes and the American Red Cross.

In addition to donating time and money, some Unocal employees have gone a step further and lent their organizational expertise to civic groups such as the Lafayette Chamber of Commerce. In fact, members of the Louisiana Region serve on nine different chamber committees.

Because such volunteer efforts have entailed close interaction between management and the rank and file, business operations in the Louisiana Region have benefitted as well. "Certainly, our community service efforts have enhanced employee morale," Duffy says.

"When managers work shoulder-to-shoulder with engineers, field operators and office staff in these volunteer endeavors, they really get to know each other on a more informal, personal basis," Duffy adds. "From the standpoint of day-to-day operations, this has helped us break down communication barriers from the bottom of the organization up."

Indeed, from the perspectives of employee morale to corporate image, community service in Unocal's Louisiana Region has proven itself to be a win-win proposition. 76

KUDOS FOR CREATIVITY

"It is extremely important that the company encourage and reward excellence among its employees," says Steve Lipman, president of S&T. Creativity Week honored the creative efforts of about 5 percent of S&T's staff, shown below with their spouses and Unocal senior executives Steve Lipman, Richard J. Stegemeier and Neal Schmale (center, left to right).

On March 25, Unocal's Science & Technology Division (S&T) kicked off its second annual Creativity Week to focus on long-range issues and recognize the creative efforts of the division's research scientists. Activities included panel discussions, award ceremonies, research seminars, and the unveiling of an S&T "Inventors Wall of Fame" in the administration building.

"It is extremely important that the company encourage and reward excellence among its employees," says Steve Lipman, president of S&T. "Creativity Week provides a vehicle for recognizing the best achievements of our people here at the Research Center."

By honoring the creative efforts of its personnel with company-wide recognition, S&T hopes to stimulate increased innovation in the work of the division. Those awarded receive cash and a plaque to commemorate their work, with one winner being given a grand prize.



Neeta Kurani, an applied scientist honored for her work on new computer software to help paleontologists find oil and gas, says recognition plays an important role in supporting creative work. "When management acknowledges the efforts of its staff, there is more incentive for employees to put in extra effort," she says. "The Creativity Week program will help S&T find technical solutions to support the future needs of the company."

The primary work of the Research Center focuses on assisting Unocal's operating divisions find and develop crude oil, natural gas and geothermal energy resources, and convert them into useful products such as fuels, lubricants and electricity. S&T also conducts chemicals research, designs environmental protection systems, and develops processes to convert basic products such as coke and sulfur into high-value products like needle coke and popcorn sulfur. This year marks the 100th anniversary of the division.



Don Van Slyke

The development of oil-based drilling fluids has been a boon to exploration and production the world over. Used primarily for drilling wells in difficult subsurface environments, these fluids have several advantages over conventional water-based varieties. Among them are improved lubrication of the drill bit, better bore hole stability, improved high-temperature performance and enhanced corrosion protection. All of this makes for speedier, more efficient drilling.



Unocal has had great success employing the newest oil-based drilling fluids in areas such as the Gulf of Thailand and the North Sea. But their use brings with it a new set of problems. Because they are saturated with oil, cuttings from wells drilled with these fluids cannot be disposed of easily or economically. The cuttings must be shipped to special disposal sites — an expensive and logistically difficult task, especially from offshore.

Unocal research engineer Don Van Slyke looked at this problem and saw an opportunity.

"This was an area ripe for a breakthrough," he says. "The need was to find a way of cleaning the cuttings at the well site. Other companies had tried this, using heat and various solvents. But none of these methods is very effective. The solvents used are costly, and some are highly toxic, which creates environmental problems."

With the encouragement of S&T management, Van Slyke, who joined Unocal in 1981, set about looking for a non-toxic substance that could do the job cheaply and effectively. He began by turning to his college chemistry textbook. "I had a hunch that an organic compound might work," he explains.

His hunch proved correct. In May of last year, Van Slyke found a chemical derived from a vegetable-based, non-toxic material that looked promising. When applied to sample cuttings, the material combined with the oil, putting it in solution. The cuttings emerged clean, with less than one percent of the oil remaining. Best of all, the expensive drilling fluid — and the cleaner itself — could be recovered and recycled. The application method, also developed by Van Slyke, worked at room temperature and atmospheric pressure.

"The first time we tried it in the lab on some sample cuttings, the results were just great," he recalls. "That was pretty exciting."

A patent for the new material and process — named "Unoclean" — was applied for last November. A full-scale Unoclean unit is currently being built at S&T for further testing, and the process will be tested in the field later this year. Down the road, Unoclean may be licensed to other companies.

"The potential applications are broad," says Van Slyke. "Unoclean could be used to remove oil from beach sands, from soil, and to clean dirty tank bottoms. We're looking at a whole range of possibilities."

“Creativity is the name of the game here at the Research Center,” says Don Fenton, manager of new technology development at S&T, who coordinated this year’s Creativity Week events. “Though there are no simple guidelines for encouraging inventive thinking, we’ve tried to design our program to foster creativity by recognizing and rewarding work efforts that show a high level of ingenuity. This year’s award winners all achieved measurable results for Unocal in such areas as energy production, development of cost efficient technology, and environmental protection.”

But Creativity Week encompasses a broader purpose than merely honoring past achievements. The first event of the program, called Issues Day, provided an opportunity for S&T staff and guests to discuss the future with nationally acknowledged experts in scientific fields. Divided into four subject areas — energy, transportation, the environment, and communication — the panelists at this year’s seminars presented the future as seen from the perspectives of government, academia, and private industry.

Held in the Research Center’s auditorium, the discussions buzzed back and forth between the speakers and the attending scientists. One panelist thought it likely that oil would remain the nation’s main transportation fuel well into the 21st century.



Top, a research chemist tests a catalytic process that converts natural gas to liquid transportation fuel. Above, a research technician uses a CAT scanner to monitor the flow of acid through a well core sample.



“Oil is so cheap and plentiful that transportation will continue to depend on it,” said Richard Bilas, a member of the California Energy Commission. Dr. Hillard Huntington of Stanford University, and a member of the Energy Modeling Forum, predicted “an increase in oil consumption, coupled with falling domestic production by the year 2000.”

The questions from the audience came fast. “How do you reconcile increased domestic oil consumption while at the same time restricting drilling offshore California?” one person asked the panel. “What are the economic mechanisms that might keep the price of oil rising so that alternative fuels will be viable?” asked another.



Left, a researcher studies refinery processes in a small unit called a pilot plant, which can simulate most modern refining methods. Above, by using a microprocessor in a pilot plant, scientists obtain data to help develop methods for reducing potential pollutants in fuels.

Chuck Stout

Unocal has long been an industry leader in developing and applying sulfur-removal technologies. Science & Technology petroleum chemist Dr. Charles Stout extended that successful tradition last year, when his process for removing hydrogen sulfide (H_2S) from produced hydrocarbon liquids was granted a U.S. patent.



Already in use on one of the company's offshore platforms, the process, which employs sulfur dioxide (SO_2), is saving Unocal more than one-half million dollars per year. “We are now exploring ways to apply this technique to other production situations, and to refinery streams,” Stout says.

Stout hit on the idea for using SO_2 while visiting Unocal's Platform Gilda in the Santa Barbara Channel back in 1988. At the time, the company was employing an expensive process to remove H_2S from Gilda's oil before it was piped to shore. In addition to its high cost, the process relied on a chemical that was toxic.

“I was out on Gilda to help with the start-up of an amine/Selectox unit, which removes sulfur from produced gas,” Stout recalls. “I was cautioned by one of the operators about the correct sampling of mixed sulfur dioxide-hydrogen sulfide gas streams, and something clicked.”

Back in his office at the Research Center in Brea, Stout delved into his reference books and studied the applications of a well-known chemical reaction involving SO_2 and H_2S . Using this background information, he worked out a method of injecting SO_2 into produced oil which successfully removed the H_2S . After two years of experimentation and testing, the process was being employed on Gilda.

“The beauty of this process is that it derives from basic chemistry first developed a century ago,” says Stout, who joined Unocal in 1984. “It's always nice to come up with a new wrinkle on something that old.”

Eugene Lin

He doesn't sport a ten-gallon hat, but Dr. Eugene Lin has made a sizable contribution to the success of Unocal's oil operations in west Texas. Since the mid-1980s, Lin, a reservoir engineer who specializes in enhanced oil recovery (EOR) projects, has been involved in development of the company's Dollarhide Devonian field, located near Midland.



Through numerical reservoir modeling on computer, Lin developed a new EOR method — dubbed the “hybrid” process — that is tailored to the unique behavior of the Dollarhide field. Since the technique was first applied there in 1985, the field has produced 2.5 million barrels of incremental oil. The process is expected to recover an additional 20 million barrels of oil.

“When I came on the project in 1985, Dollarhide presented a very challenging reservoir problem,” Lin says. “Water flooding had been used to boost oil production from the field for years, but the average water content had risen to 85 percent of produced fluids. We wanted to find a way to reduce the water cut while increasing oil production.”

The most attractive alternative was carbon dioxide (CO₂) injection, which had shown positive results in similar oil fields. This was done in one of two ways — by continuous injection of CO₂, or by water-alternating-CO₂ (WAG) injection. Each method has advantages and drawbacks. Continuous injection tends to boost oil production more quickly, but a steep drop-off usually follows. The WAG technique yields better long-term production, but the initial response is not as good.

After constructing a complex numerical model of the Dollarhide field, Lin “crunched numbers” for months on the computer. His work indicated that a new process employing both continuous CO₂ injection and WAG could yield the best of both techniques: accelerated oil recovery early on, along with higher production rates over the long term. Thus far, the field's production has definitely responded to the hybrid process.

“We have a group of extremely competent and highly energetic people who implement and handle daily operations in the Dollarhide field,” Lin says. “Over the years, they have developed expertise in many crucial areas of operations concerning CO₂ flooding. Several S&T personnel have also provided solutions to field operation difficulties.”

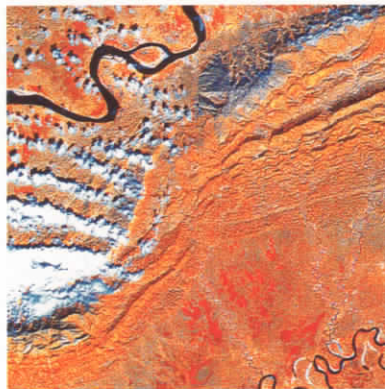
Lin is currently involved in performance evaluation of the Dollarhide project. In September of 1989, he received a U.S. patent for the hybrid process, which presents an opportunity for Unocal to generate additional income through licensing. The process has potential for application in several of the company's other oil fields as well.

“It's been very satisfying to work on this project and see it succeed,” Lin says. “It takes a real team effort to carry out a project like this one. I've been fortunate to have the full support of management and the people out in the field.”

The ensuing interchange of ideas demonstrated the concept behind Issues Day. “It's important that our staff remains well-informed about current and future issues that affect Unocal,” says Lipman. “Information is an important stimulus for creativity, and by inviting discussion with specialists about their particular areas, we at S&T can get a unique perspective on the road ahead.”

The experts were asked to speak on topics which relate closely to Unocal's business. Developments in transportation, energy, communication and the environment all could significantly affect Unocal's activities and plans for the future.

“Predicting the future is always a challenge, and the energy industry is especially complex,” says Kess Alley, S&T's vice president of products, processes and materials research. “But no matter how difficult a task, attempting to look ahead is a necessity if one is to prepare adequately.”

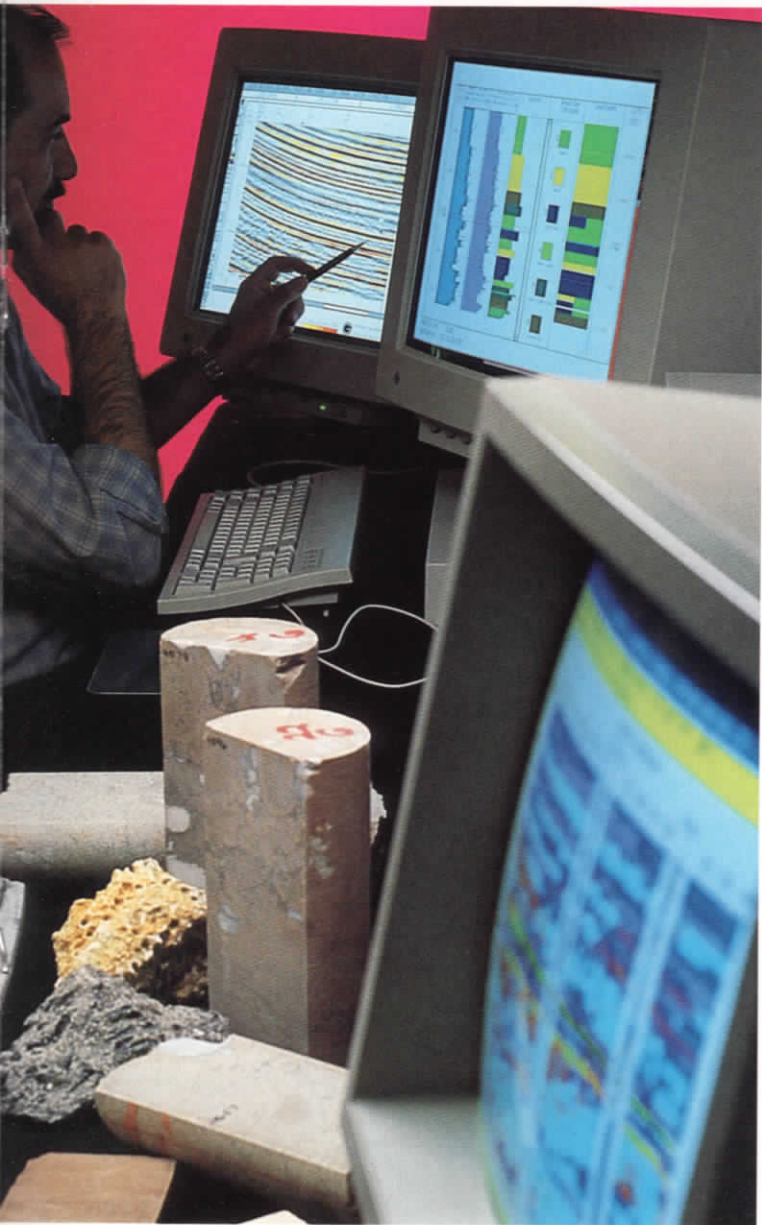


Because S&T carries the responsibility for developing the next generation of fuels for the company, the issues discussed have a direct bearing on several research and development projects now underway at Brea. The heightened environmental concerns of the 1990s, for example, and the resulting amendments to the federal Clean Air Act, require that energy usage conform to ever more stringent emissions standards. However, the fuels that Unocal develops must satisfy not only environmental regulations, but also the needs of its customers. In addition, the fuels must be produced and marketed profitably.

According to Alley, meeting these and other challenges facing Unocal in the years ahead will require no major new technological breakthroughs. "The solutions are within the grasp of available knowledge," he says. "The challenge for us lies in finding innovative and cost-effective ways to develop and apply the needed technologies."

The remaining portion of Creativity Week honored researchers whose projects are directed toward this goal. On the second day, Lipman presented awards to the employees who distinguished themselves during 1990. Their identities kept secret until the day of presentation, the winners were called up to the stage, where Lipman read aloud the achievements of each to the cheers and applause of their colleagues.

Ninety projects were nominated to receive Creativity Awards this year. Twenty-five made the final selection, and one was honored with the grand prize. Because some projects were collaborative, 40 people in all received recognition—about 5 percent of the Research Center's employees. (Six of the winners are profiled here.) The selection process began with managers singling out projects and accomplishments that showed creativity, exhibited exceptional effort, and proved to have a significant benefit to Unocal. From this pool, a committee of S&T executives winnowed the number down to an even more select group.



Above, a computer hardware specialist works with a disk storage unit. Left, an exploration researcher examines seismic and structural data, with well-log and rock samples in the foreground. Far left, a satellite image shows an area of the earth having potential for oil and gas accumulations

Dr. Julius Scherzer

To the layman, an oil refinery presents an imposing array of intertwining structures. Most of the petroleum refining takes place out of sight, in vast networks of pipes, valves and process units. Central to a refinery's operations is "cracking," by which a feedstock of crude oil is broken down into lighter, higher-value components. These in turn are ultimately transformed into end products such as gasoline and jet fuel.



The most widely employed method, called fluid catalytic cracking (FCC), uses a catalyst to break up feedstock molecules. Unocal operates an FCC unit at its Los Angeles refinery, which until recently relied on commercially available catalysts. This year, however, Unocal's Dr. Julius Scherzer succeeded in developing a new and more effective catalyst for the FCC unit. It was the first FCC catalyst ever developed within the company.

A senior research associate at S&T, Scherzer specializes in the study of zeolites, the primary component of FCC catalysts. The product he formulated has outperformed all others commercially available, and is predicted to improve yields at the Los Angeles refinery by about \$10 million annually.

"The main economic value derives from the catalyst's ability to generate greater amounts of high-value end products," says Scherzer. "By using it, a refinery can increase the percentage of valuable fuels produced from a feedstock."

At the same time, catalyst loss is significantly reduced. During normal operation of an FCC unit, much of the catalyst breaks up and must be replaced. Scherzer's product is especially resistant to this kind of attrition, saving several tons of catalyst per day.

The catalyst can be modified for use in other refineries, as well. Flexible enough to be adapted to the needs of several processes, the new formulation puts Unocal in a position to license the product to other companies. "The catalyst is easily adapted to the varying needs of individual refineries," says Scherzer. "Flexibility is built into the manufacturing process itself."

Three years in development, the catalyst is slated for use at the company's Los Angeles refinery later this year. "It's quite a coup for Unocal," says Steve Lipman, president of S&T, "considering that other companies which specialize in catalyst development have not come up with as good a product."

This year, the top honor went to Dr. Julius Scherzer for his work in developing a new catalyst for the fluid catalytic cracker at the company's Los Angeles refinery. The first Unocal-developed product of this type, the catalyst outperformed all commercial equivalents and is predicted to improve refinery yields by more than \$10 million annually.

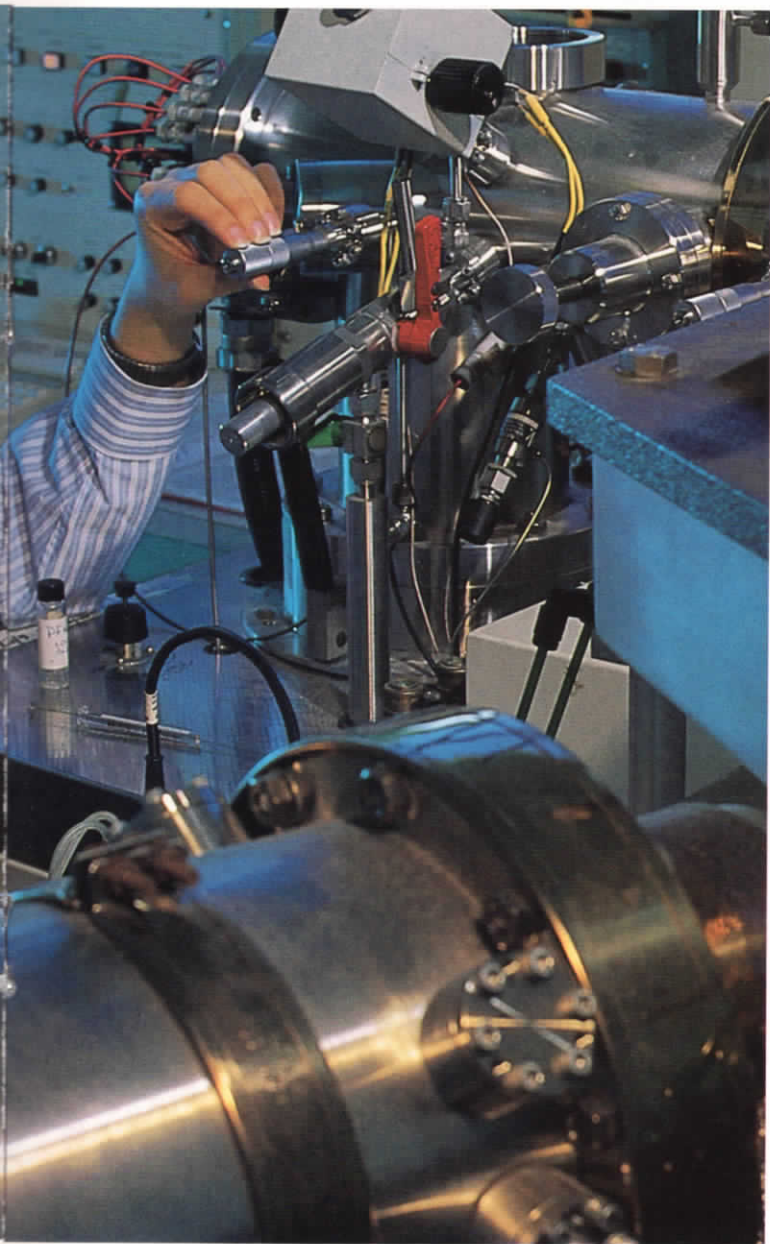
"This project moved us into a new area," says Lipman. "The company has been involved with hydrocracking and Unicracking catalysts, but this is the first catalyst for a fluid catalytic cracker we've developed. In addition to increasing the yield at our refinery, the product has the potential to be modified so it can be licensed to others."

Below, an analytical chemist uses gas chromatography and mass spectrometry to evaluate oil.



Creativity Week's third day featured a "poster session." At this event, 32 of the division staff displayed their current projects in the form of posters. The idea was to give the researchers a chance to meet informally, learn about what their colleagues are working on, and discuss their projects with each other. Employees can wander in, view the various displays, and zero in on the ones that interest them the most.

"Sometimes, communication alone can stimulate creativity," says Fenton. "A colleague may be able to provide a fresh angle on a particular problem, or simply spark a new idea. The poster session gets the staff together so this kind of idea transfer can occur.



Neeta Kurani

To aid in the search for oil and gas, Unocal explorationists rely on a number of highly specialized computer software packages. One advanced system, called Express, is used by paleontologists to plot the distribution of microfossils in underground forma-



tions. The program limits the kind of information that can be plotted, however, and in 1989, a group of paleontologists approached software specialists at S&T for help in designing a program that would allow for more detailed interpretation.

The scientists wanted software that would map paleontological information in two dimensions, a function which was not available to Express users. Eventually, the project was assigned to Neeta Kurani, an applied scientist for the software team at S&T. With her team members, she designed a new program, called Palchart, as a module to work as part of Express. The software plots the distribution of microfossils. Using Palchart, data from well samples can be recorded and printed out as a two-way plot.

"Palchart helps us in our search for oil and gas by providing detailed information about where microfossils are located," says Hal Heitman, a paleontologist in Unocal's Oil & Gas Division. "The program enables us to construct a much better picture of the paleontology surrounding an oil or gas well than was previously available."

By the time Kurani took over the project, work on the software design was six months behind schedule. Kurani recognized an opportunity to apply software engineering, a scientific technique for designing computer programs on paper. The method aims to find solutions to particular programming problems before the product is put into use.

"Initially, the process of designing software in this manner may take longer," says Kurani, "but the end result is a better product. I started by holding highly concentrated meetings with small groups of Express users and system analysts to pinpoint specific requirements of the program."

By using this innovative design approach, Kurani was able to turn the project around, and complete the program on schedule.

"All software should be designed like this," says Heitman. "All too often, software is rushed through the design process and the bugs aren't worked out. Palchart was done the right way."

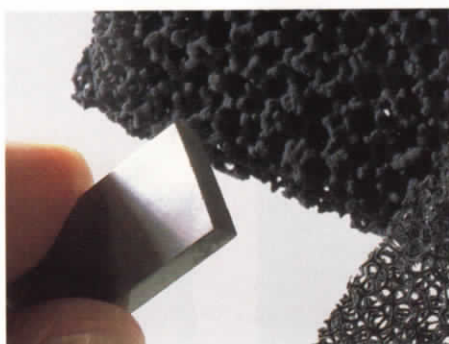
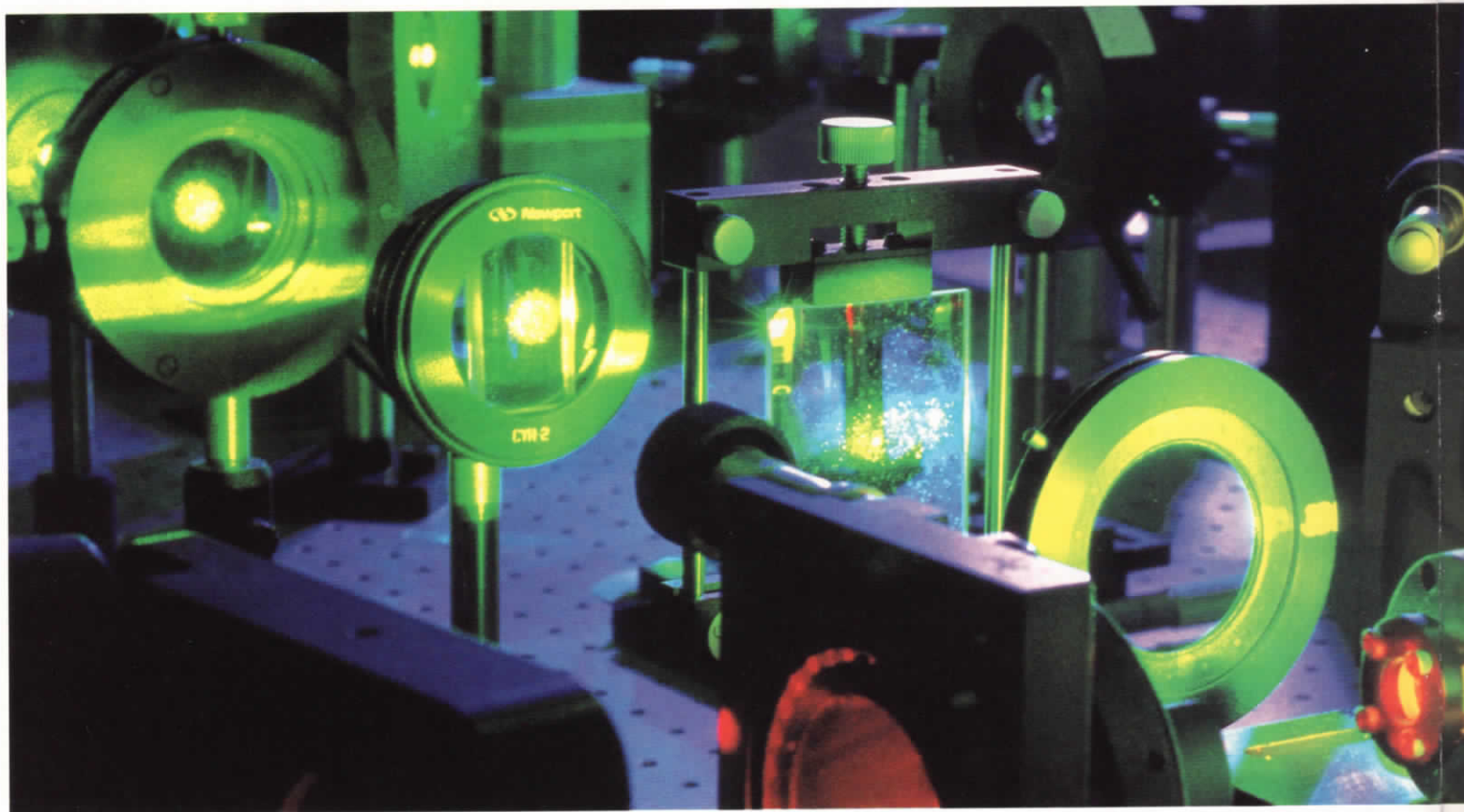
“Communication has to be very good, not only within S&T, but between us and the operating divisions we serve,” Fenton continues. “When another area of the company identifies a problem, a need or an opportunity for technology to provide a benefit, both the receiver and provider of technology need to have very clear ideas about the project.”

Operating divisions often refer problems to S&T for solutions. At times, the answer presents little difficulty—perhaps a process component functions incorrectly, and the equipment requires only slight modification.

“Usually, however, the easy solutions have already been spotted,” says Fenton. “In a majority of cases, the relationship between the amount spent on developing a new technology and the possible payoff is an important one. Projects must be carefully evaluated by S&T, and by the operating divisions, to make sure that the benefit to the company will be worth the effort and expense.”

Unocal’s lengthy list of patents testifies to its history of creative success. For the past 25 years, the company has sold an average of 10 licenses for every one it acquires. In 1990, Unocal filed a record 110 U.S. and 170 foreign patent applications. On the last day of Creativity Week, S&T honored 46 of its inventors who have received more than five patents for their work on behalf of the company.

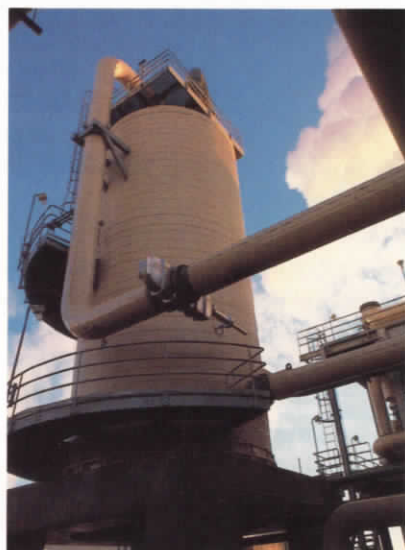
The ceremony consisted of two events—unveiling the Inventor’s Wall of Fame, and presenting individual prizes. The Wall names all 104 inventors with more than 10 patents throughout Unocal’s history. Individual employees were honored with plaques and statuettes in categories for more than five, 10, 20 or 50 patents.



“The reaction of the inventors to being recognized was very positive,” says Greg Wirzbicki, chief patent counsel. “It really meant a lot to them. One retiree listed on the Wall of Fame came in just to see his name, despite having to make a long journey with great difficulty.”

Patents are just one way of measuring the level of a company’s creative effort. A program such as Creativity Week recognizes the scientific achievements of an organization, and also serves to foster a work climate conducive to innovation.

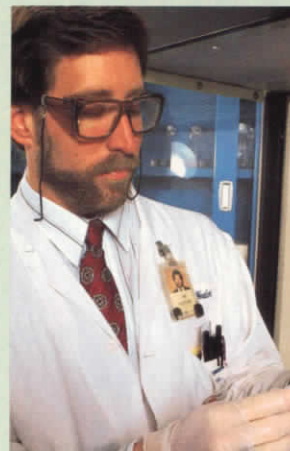
“Today, our commitment to research and innovation continues, with an emphasis on maximum application to Unocal’s businesses,” says Richard J. Stegemeier, chairman, president and chief executive officer. “As I’ve said before, creativity and innovation are the key to the company’s long-term growth.” V.A. 76



Clockwise from top left: lasers help scientists study fuel combustion in engines; Unocal’s Salton Sea Unit 3 plant uses corrosion-reducing technology pioneered at S&T to harness geothermal fluids in the area; analyses of geothermal fluid samples for hydrogen isotopes help monitor changes in reservoir characteristics; silicon carbides developed at the Research Center are used in product prototypes such as burner plates and cutting tools.

James Hudson

Sometimes discovering new ways to apply existing products can create as much impact as developing a completely new idea. Such was the case with James Hudson’s project to evaluate the possibility of using urea hydrogen peroxide as a fungicide. A lab technician in the agricultural chemicals group at S&T, Hudson carried out an independent research program to test the chemical.



Separately, urea and hydrogen peroxide have been used in the agricultural chemicals business for some time. Both products act as biocides, killing organisms that spoil crops. Last year, Hudson began work to combine urea with hydrogen peroxide, with the ultimate goal of forming a better fungicide than either chemical on its own. A background in biology provided Hudson with the specialized knowledge necessary to complete the project.

“The most difficult part of the process was coming up with an effective way to evaluate the product,” says Hudson. “The goal of a testing procedure is to get reproducible and accurate results. Doing that within a biological system like the one in this project is difficult — a lot of repetition is involved, and Mother Nature tends to throw a lot of curves.”

Initially, the tests measured the effectiveness of urea hydrogen peroxide on two of the most pathological fungi which attack stone fruits such as peaches and apricots. One of these fungi creates so much crop damage annually, that it accounts for about one-third of the market for fungicides. Hudson found urea hydrogen peroxide to be effective against both.

In addition, the chemical kills harmful bacteria. Some organisms which live on stone fruits exude a protein that aids the formation of frost. Urea hydrogen peroxide stops the process and saves the fruit from frost damage. As an added benefit, the chemical poses no threat to the environment, breaking down after use into water, oxygen and ammonia — substances that occur naturally in the soil.

The development of urea hydrogen peroxide as a viable alternative to existing fungicides capitalized on areas where Unocal already holds a competitive advantage. “The chemical is easily synthesized and the company already produces urea, its primary ingredient,” says Steve Lipman, president of S&T. “Hudson’s efforts could well lead to a commercial product for the agricultural products group of Unocal’s Chemicals Division.”

CNG: A NATURAL AT THE PUMP

At the Unocal 76 station on Sycamore Avenue in Vista, California—a suburb of San Diego—gassing up may never be the same. Though no change is immediately apparent, one of the fuel pumps looks somewhat different, sporting a thinner fuel line with a long, valve-like nozzle. Instead of the familiar “gallons,” the word “therms” is displayed on the pump’s dials.

This is not typical fueling equipment—but this is not a typical service station, either. The special pump dispenses compressed natural gas, or CNG. It’s the same type of natural gas used in homes for cooking ranges, water heaters and clothes driers, except that here it is compressed to about 3,000 pounds per square inch. And this natural gas fuels vehicles rather than appliances.

Unocal has joined with San Diego Gas and Electric Company to make CNG publicly available as a vehicle fuel in the San Diego metropolitan area. Ultimately, plans call for two Unocal service stations there to be outfitted for dispensing CNG. In addition, Unocal recently announced an agreement with Southern California Gas Company to offer the fuel at two stations in the Los Angeles area by the end of this year. The jointly operated projects form part of Unocal’s effort to find innovative, market-based ways to help reduce air pollution in Southern California.

The gas companies provide the design, engineering, general maintenance and customer billing involved in supplying CNG—which by current law can only be sold to the public by utilities. Unocal handles the day-to-day operation through its dealers. The CNG pumps are self-serve units accessed by computerized cards issued to gas company customers.

“We’re at the beginning of a new era in transportation fuel,” said Unocal’s Richard J. Stegemeier at a press conference announcing the program. “Using domestic energy resources like compressed natural gas will help lessen our nation’s dependence on unstable foreign petroleum supplies, and provide a cost-effective approach to alleviating air quality problems.”

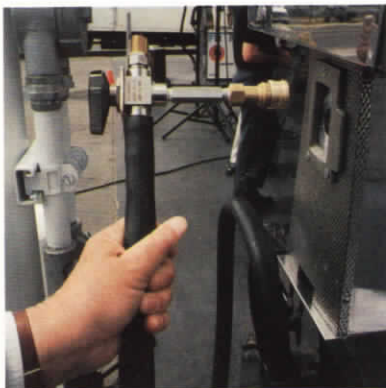
As a vehicle fuel, natural gas offers significant environmental benefits. According to the Environmental Protection Agency, natural gas-fueled vehicles (NGVs) pollute significantly less than conventional gasoline-powered vehicles — emitting as much as 50 percent fewer ozone-forming organic compounds and up to 90 percent less carbon monoxide.

In fact, CNG-powered engines are exceptionally clean-burning. Combustion of the fuel produces low levels of smog-forming pollutants such as carbon monoxide, nitrogen oxides and reactive organic gases, and almost no particulates. Evaporative losses are non-existent, due to the pressure-tight natural gas fueling system. Cold-start emissions are also minimal because CNG remains in a gaseous state even at very low temperatures — so no extra fuel needs to be added to aid combustion. A gasoline-powered engine, on the other hand, often requires an enriched — or “choked” — fuel mixture to start up in cold weather. The additional fuel increases emissions.

“Natural gas is the cleanest burning fossil fuel,” says Richard Farman, chairman of the Southern California Gas Company. “Because vehicle emissions are the number one cause of air pollution in Southern California, this program marks a significant step forward in battling that pollution.”

“Natural gas is the cleanest burning fossil fuel,” says Richard Farman, chairman of the Southern California Gas Company. “Because vehicle emissions are the number one cause of air pollution in Southern California, this program marks a significant step forward in battling that pollution.”

Until now, a lack of convenient fill-up stations and the limited size of the user fleet have been the main roadblocks restricting growth of clean-burning CNG as a motor fuel. Suppliers have been reluctant to make natural gas widely available until more vehicles can use it. At the same time, automakers have little incentive to produce more CNG-powered vehi-



cles until the necessary supply system exists. However, as the energy industry begins to take an interest in supplying CNG, the supply/use stalemate may begin to resolve itself.

“With this program, we hope to take a first step by improving the fuel availability side of the equation,” says Stegemeier. “As CNG fueling stations become more prevalent, we encourage other companies in Southern California to introduce CNG-powered vehicles to their businesses.”

The opening of the Vista service station marked the first time Southern California’s motoring public has had access to CNG for vehicle use. The facility provides the opportunity for local fleet owners to use the fuel without investing in compression equipment of their own. Vista-area companies interested in switching from gasoline to CNG need only carry the cost of vehicle conversion, about \$1,500 to \$3,000 apiece.

“We’re excited about getting this project off the ground,” says Jennifer Sansone, vehicles program administrator at San Diego Gas and Electric. “It makes sense to increase the availability of CNG, so that potential users have the opportunity to become better informed about the fuel.”

In the United States, about 30,000 vehicles have already been built or converted to run on natural gas. Most of these are fleet vehicles with access to privately operated fueling stations.

“We see good market potential for CNG as a transportation fuel, but we’re taking it one step at a time,” says Farman. “The outlook beyond the 1990s will depend on how the market responds to the fuel.”



Currently, CNG is best suited for fleet use. Since the fuel is stored in a gaseous state, its energy output is less than an equivalent amount of gasoline—affecting both engine power and driving range. Recent technological advances, however, have increased the power output of natural gas-burning engines to a level approaching that of conventional motors.

In terms of driving range, NGVs cannot travel as far as vehicles powered by gasoline, unless adequate space is available for more than one CNG cylinder. Automobiles outfitted for the fuel typically have a driving range of about 100 miles per tank. Fleet vehicles are only slightly affected by this limitation, however, because they follow regular routes and refuel at specific locations. In selecting the Unocal stations for marketing CNG, the project teams targeted areas with a high concentration of commercial fleet operators.

“CNG is especially attractive for larger, heavier vehicles since they can more easily accommodate the fuel storage cylinders,” says Dave Plumley, a fuels planning engineer at Unocal, and a member of the CNG project team. “And because most fleets return to a central location to refuel, the present limited public availability of CNG poses little difficulty.”

The smaller energy content per cubic foot of natural gas, compared to gasoline, forms one of the main drawbacks in using the fuel to power motor vehicles. However, new technology is extending the driving range of NGVs. Using composite-reinforced aluminum, the CNG Cylinder Company of North America has developed storage tanks which contain the fuel at higher pressures. The new cylinders can hold nearly two-thirds more natural gas than a typical steel tank of the same weight. This means a larger amount of CNG can be used per vehicle, translating into increased mileage between fuel stops.

As far as vehicle safety is concerned, advances in storage technology have made natural gas cylinders safer aboard vehicles than gasoline tanks. “People in the natural gas industry like to joke that you could use a CNG cylinder as a car bumper,” says Plumley. “They just aren’t very easily damaged.”

The CNG Cylinder Company has extensively tested its tanks. They have survived 50 m.p.h. crashes, being shot with armor-piercing bullets (normal bullets do not even penetrate the tanks), being cooked in a bonfire and tested with dynamite. The cylinders did not rupture, explode or even catch fire.

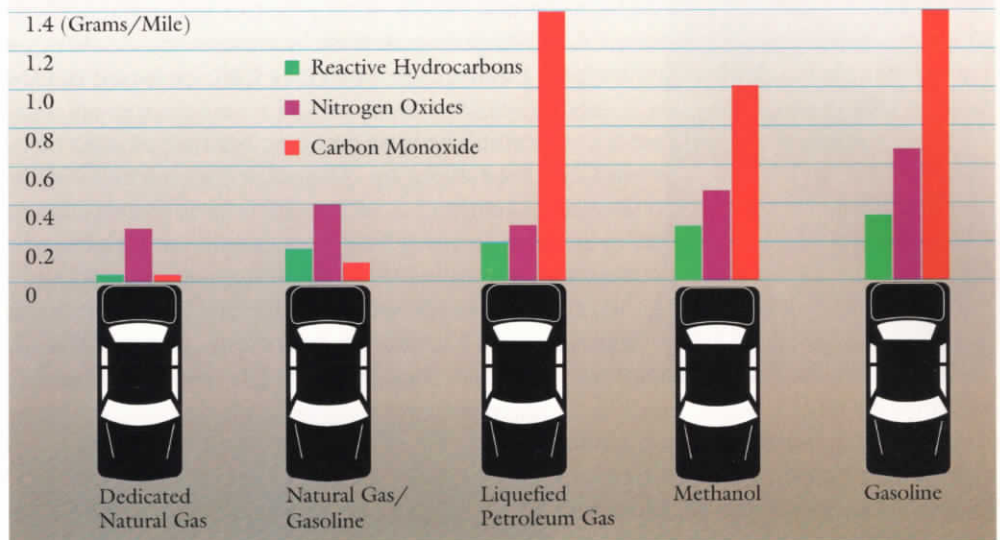
Instead, when a tank was punctured, the gas harmlessly escaped and dispersed without burning. When heated, special valves released the gas, which again escaped without ignit-

“We’re at the beginning of a new era in transportation.”



Increasingly stringent clean air regulations may add impetus to user acceptance of CNG.

POLLUTANT EMISSIONS BY VEHICLE FUEL TYPE



ing. In fact, an entire vehicle has been burned — using gasoline — for more than half an hour before the natural gas in its tank was released. Although the gas then ignited and burned in a steady jet, the tank still did not explode.

“One of the keys [to the safety of the fuel] is that CNG is lighter than air—it just goes straight up,” says Sansone. “Unless you’re in an enclosed area, any escaping gas dissipates. Also, compressor stations are designed to shut off if there’s any malfunction.”

NGVs have logged an impressive safety record. In more than 430 million miles of operation worldwide, no burn accidents, other injuries or fatalities associated with the fuel system have occurred. Braun Linen Service in Paramount, California has used 20 CNG-fueled trucks for the past 15 years. The Pasadena, California-based Dy-Dee Diaper Service has operated its 40-truck fleet on CNG since 1974 without serious incident. Dy-Dee first began using the fuel to avoid gasoline shortages, which plagued the country in 1973. The environmentally clean aspects of the fuel were important considerations, as well.

“Natural gas is a secure source of fuel,” says Brian O’Neil, owner of Dy-Dee. “By choosing to convert to CNG, we knew we wouldn’t ever have to wait in gasoline lines. Our drivers are very happy with natural gas — the vehicles have very few problems related to CNG. And all of us at Dy-Dee have a sense of pride and accomplishment in using a fuel that benefits the environment.”

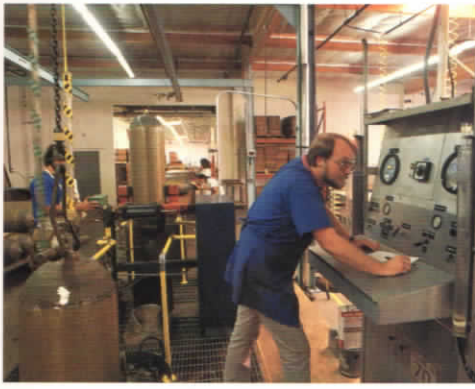
Increasingly stringent clean air regulations may add impetus to user acceptance of CNG. Vehicles continue to be the largest single source of carbon monoxide and ozone-forming emissions. Last year’s amendments to the federal Clean Air Act mandated tough new standards for vehicle emissions.

By 1998, 30 percent of light-duty fleet vehicles sold in the most polluted areas will be required to operate on alternative fuels such as CNG, methanol or reformulated gasoline. By the year 2000, the total increases to 70 percent. In California, the Clean Air Act requires that more than 1 million clean fuel-burning vehicles be produced and sold by the end of the century.

“People won’t test alternative fuels until they have the opportunity and the incentive,” says Sansone. “By providing more outlets for CNG, we hope to give companies the opportunity to begin testing this fuel voluntarily.”

On the user side of the equation, several fleet projects are testing CNG and other alternative fuels, including programs by the Rapid Transit District of Los Angeles (RTD), Federal Express and United Parcel Service. General Motors will soon begin the first





large-scale production of natural gas-powered vehicles in the United States. The company recently announced a \$39-million project to build light- and medium-duty trucks powered solely by natural gas.

Eventually, the vehicles will be sold throughout the country. Co-sponsored by a gas industry consortium, the project forms part of GM's broader program to explore alternative-fuel vehicles that would meet federal and state clean air requirements.

In addition, Cummins Engine Company,

Inc., of Columbus, Indiana, is in the process of developing a dedicated natural gas-burning engine, called the L10G-240, for buses and eventually trucks. The motor runs quieter and pollutes significantly less than a diesel engine of similar power. Several of these engines are already being tested on RTD buses in Los Angeles.

"The development of the L10G is proceeding rapidly," says Clark Ahrens, director of Cummins' worldwide bus business. "When fully developed, we think it will perform as well if not better than a typical diesel engine. With worldwide demand for natural gas on the rise, CNG-burning engines have a very promising future."

A test fleet of seven natural gas-powered RTD buses currently operates between the San Fernando Valley and downtown Los Angeles. With a range of 400 miles per fueling—about the same as a diesel-fueled bus—the buses fill up once daily at a temporary facility in Sun Valley, about 30 miles north of Los Angeles. RTD plans to build a permanent station which will have the capability to refuel four buses every 10 minutes.

"The CNG field test is one of a range of alternative fuel programs we are evaluating," says Rick Jagger, RTD spokesman. "We estimate that it will take two years before we can make an evaluation. One unanswered question is how long a CNG-powered engine will last. A typical diesel engine lasts 12 years. No one knows yet how long an engine running on CNG or other alternative fuels will last."

This sentiment echoes a common concern among companies evaluating alternative fuels for use in their vehicles. But companies that have been using CNG for some time in their fleets report that maintenance costs have been relatively low, and engine life is as good as or better than that of a gasoline-powered vehicle.

Because the chemical makeup of natural gas is relatively pure, especially when compared to gasoline, combustion results in low levels of soot and deposits, leading to fewer contaminants in the lubricating oil. Engine wear is reduced, prolonging engine life. Another technical advantage is CNG's high octane rating—120 to 130—which allows natural gas engines to operate at higher compression ratios than those running on gasoline. The result is increased power output and improved fuel economy.

"The fuel itself is not expensive," says Unocal's Plumley. "Including compression costs, CNG can be cheaper than gasoline and as much as 50 percent less than other alternative vehicle fuels. The domestic supply of natural gas is large, and an extensive distribution infrastructure already exists. All of this makes CNG a very appealing alternative fuel for the future."

Historically, the availability of new fuels and the engine technology to use them have progressed hand-in-hand. By supplying CNG to the public, Unocal and the participating gas companies have taken the first step toward making natural gas a viable fuel for vehicles. As the demand for CNG grows, Unocal's large natural gas reserves leave the company well-positioned to supply the fuel for vehicles on a commercial scale.

"Unocal is to be commended," says San Diego Gas and Electric's Sansone, "for having the foresight to support efforts to make this clean-burning fuel available to the public." V.A. 76



"Including compression costs, CNG can be cheaper than gasoline."



BREAKING THE CHAIN OF VIOLENCE

Though they downplay their volunteer efforts as a simple case of helping out the neighbors, a select group of employees at Unocal's Los Angeles refinery has found that giving is truly a reward in itself.

"All we're really doing is passing along information, but to the kids it's a big deal," says Susan Oviedo, a senior inspector at the refinery. "I think they recognize that we're trying to help them break the chain of violence in their lives and in their community."

"Seeing firsthand what today's kids are faced with has really helped me put the frustrations of my life into perspective," adds inspector Steve Williams. "With children, it seems that you always get back more than you give."

Williams and Oviedo are among a handful of specially trained Unocal employees who have answered refinery manager George Walker's call to community service. In the small coastal suburb of Wilmington—home to Unocal's Los Angeles refinery for more than 70 years—this commitment to service has a name: it's called Wilmington ALIVE.

"All kinds of local organizations approach us with requests for support," Walker says. "Usually, that means they want Unocal to write them a check. But Wilmington ALIVE was different—their primary need was for volunteers."

Patterned after a now-defunct organization which served the South Bay area of Los Angeles, Wilmington ALIVE—an acronym for Alternatives to Living In a Violent Environment—won Walker's support for two main reasons. First, he believed that the volunteer effort would have a positive effect on Wilmington residents. Second, he realized that employee participation in a volunteer program would foster a team spirit among refinery workers.

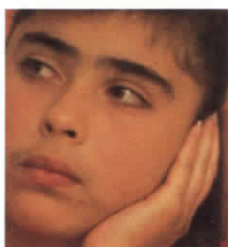
Simply stated, the consciousness-raising group aims to help stamp out family violence in Wilmington by educating and empowering those who are often its victims—specifically, the children of the community.

"I like the fact that Wilmington ALIVE is geared toward kids," Walker explains. "The earlier we can make a positive impact on young people, the better our chances of influencing them for the rest of their lives. In a way, this program is an investment in the future of our local community."

In making this "investment," Unocal volunteers visit neighborhood schools—usually twice per month—to discuss with students the negative life-long ramifications of violence in the home. Key to the presentation is the distribution of resource cards which contain the telephone numbers of 17 area agencies that are expert at counseling victims of violence and abuse.

Since Wilmington ALIVE was founded in late 1988, the Los Angeles refinery has made available the services of more than a dozen employees, as well as \$10,000 annually, for the program.

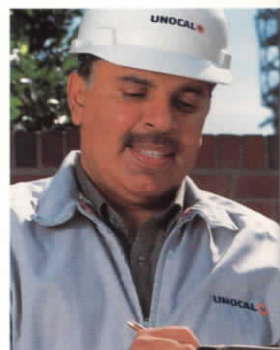
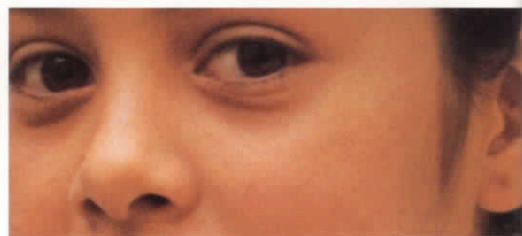
Fidel Rivera, a 43-year-old building equipment attendant at the refinery, didn't need to think twice about getting involved in Wilmington ALIVE. Having spent most of his life in Wilmington as either a resident or a refinery employee, Rivera viewed the program as his opportunity to make a positive and necessary contribution to the community he has considered home for so many years.



1 million children are abused annually...



Left and bottom right, Fidel Rivera, one of several Los Angeles Refinery employees involved in the Wilmington ALIVE community outreach program, talks to a class of sixth grade students about the evils of domestic violence.



"I'm proud to be working for Unocal," he says. "And the fact that the company encourages us to get involved with the Wilmington community—where I was raised—well, it's like icing on the cake."

The sheer size and economic impact of Unocal's refinery have dominated the industrial west side of Wilmington for nearly three-quarters of a century. But the eastern portion of this working-class community—which lies on the northern border of bustling Los Angeles Harbor—is primarily a middle- to low-income residential area. Judging by the graffiti evidence of gang activity and the liberal sprinkling of closed-up storefronts, the residents of Wilmington's east side have seen better days.

"Many of the people I grew up and went to school with still live in Wilmington," Rivera says as he sits down with a cup of coffee in the cafeteria of the Unocal refinery. "It was always a tight-knit, working-class community, and I really don't remember it being a bad neighborhood. I guess Wilmington became a rougher area when gang activity and drug abuse started to increase. Those things just seem to go hand-in-hand with the violence we're seeing out there today."



An original member of Wilmington ALIVE, Rivera's long-time familiarity with the community made him the group's natural choice for the key position of community relations director. As such, Rivera has become a familiar face at Wilmington elementary schools. When not actually conducting a classroom discussion, Rivera is talking with teachers and school administrators to solicit their input and to schedule future presentations.

On this particular February morning, Rivera and four refinery co-workers are slated to present the Wilmington ALIVE program to several classes. Their destination, Hawaiian Avenue Elementary School, is situated just a few blocks from the West Basin of L.A. Harbor. A 15-foot-tall chain-link fence separates the school grounds from several acres of low-rise housing projects painted in pastel shades of beige and blue.

Adjusting the volume control on the squawking two-way radio in her hand, Principal Tommye Keenan pauses from her patrol of the schoolyard to greet Rivera and his Wilmington ALIVE colleagues. Keenan leads the volunteers to various classrooms—Oviedo and maintenance mechanic Nick Guerrero take Spanish-speaking classes; Williams and Jean Kochesky, a secretary at the refinery, conduct their presentations as a team. Finally, Keenan brings Rivera to Ms. Virginia Wong's fourth-grade class and introduces him to the students.

A glance around the classroom confirms that many elementary school traditions remain constants to this day: everything from homework assignments on the chalkboard and world maps on the wall, to cartoon doodling on notebooks and surreptitious note passing between classmates. Even so, the mere presence of Wilmington ALIVE volunteers underscores the fact that many other aspects of childhood have changed—and not necessarily for the better.

"Today we're going to talk about abuse—physical, sexual and emotional abuse," Rivera says. "It may bother some of you to talk about this, but we need to bring it out into the open."

"If you've ever been a victim of abuse, you're not alone," he continues. "I'm here to tell you that—whether it's happening to you or a friend—the only way to stop abuse and violence is to tell somebody about it."

Rivera displays a large placard which catalogues a sampling of disconcerting statistics compiled by the U.S. Surgeon General and a Seattle-based child advocacy group. One entry on the list claims that 6 million wives are abused annually in the United States—and as many as 4,000 of them are beaten to death.

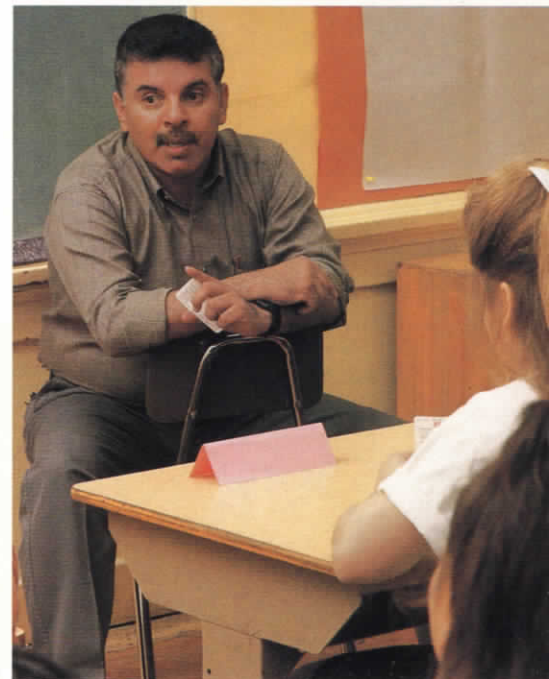
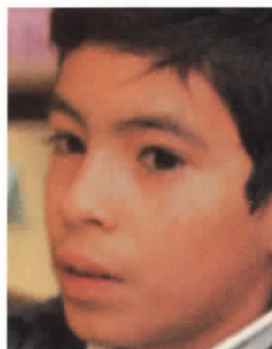


6 million wives are abused annually...

"What Jean says is true," Rivera interjects. "The only way to stop abuse and violence is to tell somebody about it."

90% of prison inmates were abused...

"People who abuse you are sick," says Jean Kochesky, above, a secretary at the Los Angeles refinery, "but that doesn't mean you should accept what they do."



Another item says that 1 million children are abused in this country each year, and as many as 2,000 die as a result. The last entry on the sign maintains that 90 percent of all prison inmates were abused at some point during their lifetimes.

Sadly, Rivera tells the class, such statistics are conservative figures.

After listening to the presentation for a few moments, Keenan leaves Ms. Wong's classroom to continue her patrol of the school grounds and hallways. "We know that violence occurs everywhere—in rich families and poor, from Beverly Hills to Watts," she says, "But in Wilmington, we're definitely seeing more instances of family violence than we saw 25 years ago."

Though the Wilmington ALIVE volunteers have yet to put measurable dents in community-wide statistics relating to domestic violence, local authorities do believe that the group has made an important contribution to Wilmington.

"Unocal is a vital and dynamic force for good in our community," says Lois Denzin, executive director of the Wilmington Chamber of Commerce. "Their Wilmington ALIVE presenters give local families options and solutions they need. We applaud their efforts."

Joan Milke Flores, the Los Angeles city councilwoman whose district encompasses the Wilmington area, has also lauded the work of Wilmington ALIVE for "recognizing and breaking the cycle of family violence."

Outside observers—even school principals—might find it difficult to quantify the effect Wilmington ALIVE has had on local violence, particularly the often-unreported varieties that occur within the privacy of individual homes. But, says Keenan, the example set by refinery volunteers has exerted an obvious impact on her students.

"The Wilmington ALIVE group is especially unique because it is made up of people from business and industry," Keenan explains. "The children know that these people aren't paid to instruct them—they have jobs out in the real world. And the efforts of the volunteers help kids understand that when they grow up, they will have a responsibility to give something back to the community."

Back in the classroom, Rivera has joined forces with Williams and Kochesky to deliver Wilmington ALIVE's anti-violence message to a group of sixth graders. Despite the gravity of their subject matter, each of the volunteers quickly finds a level on which he or she can comfortably relate to the children.

Equipped with an intimate knowledge of local hangouts and a familiarity with kid-pleasing television shows like "The Simpsons," Rivera has little difficulty wooing the students' confidence. Kochesky, who looks like a schoolteacher herself, relies on a soothing voice and sincere manner. Williams, who weighs 220 pounds and stands 6 feet 6 inches tall, manages to put the kids at ease by sitting cross-legged on the floor and talking sports.

"Hey, did anyone here see last night's Laker game?" he asks. "How 'bout that Magic Johnson!"

The question unleashes a flurry of responses. "He's good," one boy blurts out, "but he's no Michael Jordan." The ensuing controversy over the talents of contemporary pro basketball players rapidly disperses any tension remaining in the classroom.

After a few minutes of small talk, Rivera segues into the true business at hand. "Who here knows what violence is?" he asks.

"Rapes" and "fighting" are among the answers which rise from the buzzing chorus of sixth-grade voices. "When somebody gets stabbed," calls out a girl in the front row of desks.

As many as 4,000 wives are beaten to death....



"The earlier we can make a positive impact on young people, the better our chances of influencing them for the rest of their lives," says Refinery Manager George Walker, left. Steve Williams, right, a refinery inspector, apprises students of the negative consequences of violence and abuse.



"My cousin, he got jumped by some gang-bangers," a boy offers. "They shot him in the stomach 42 times."

Perhaps the students' reaction to this statement is governed by a prematurely developed sense of hyperbole. Maybe the boy who uttered it has a reputation for telling tall tales. Or worst of all, perhaps he speaks the truth. In any event, his declaration evokes little disbelief among his classmates. It's evident that they've heard stories like this before.

Neither do the refinery volunteers question the veracity of such revelations. Instead, Rivera distributes a stack of Wilmington ALIVE resource cards.

"This card lets you know that you're not alone," he tells the children. "If you or someone you know is a victim of abuse or violence, you've got to run—away from trouble and toward help. I promise that if you call any of the phone numbers on the card, you'll be running to someone who can help."

The three volunteers run their presentation like a tag team wrestling match. One of the group introduces a concept to the children and the other two jump into the discussion to embellish it.

"You know, people in our families are supposed to love us the most but sometimes they don't," Kochesky says.

"Sometimes they hurt us with the things they say, or by hitting us. People who abuse you are sick, but that doesn't mean you should accept what they do. It means that you should get help—for them and for yourself."

"What Jean says is true," Rivera adds. "When somebody who's drunk or high on drugs comes around you, how do they act?"

"Crazy!" a student calls out. "Like a wild man!" cries another.

"That's right, they come on strong, don't they?" Rivera continues. "People like that are out of control. They're like King Kong. Now if you let King Kong hurt you, you're really acting like a doormat. And what do people do with doormats? They step on them."

Then Rivera shifts gears a bit. "Who knows what a champion is?" he asks, as a flock of outstretched hands instantly rise above the rows of desks. "Can anybody here name any champions?"

"Mike Tyson! Hulk Hogan!" the students shout.

"A champion isn't afraid. In fact, a champion is strong," Rivera tells the class. "A champion will stop an out-of-control King Kong."

"And do you know what? Any one of you can be a champion, instead of a doormat, just by calling one of the numbers on the cards we gave you."

Use of the resource cards might make them "champions" today, but essays pinned to the classroom bulletin board detail the students' ambitions for tomorrow. Danny wants to be an electrician when he grows up. Crystal says she will study to be a historian. Ricardo would like to be a policeman. Their environment may have robbed these kids of some innocence, but it has not destroyed their optimism or dreams for the future.

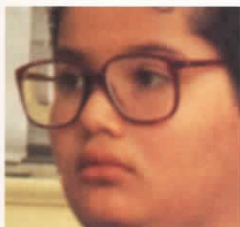
"The children of Wilmington need somebody who will talk to them and set a good example for them," Walker explains. "We at Unocal have the resources to do these things, and we believe we're making a difference in their lives."

To refinery employees involved in the anti-violence community outreach effort, Wilmington is more than a name on a freeway exit sign. It is more than a mere collection of streets that they must drive through on the way to work. Wilmington is a community of people with feelings, dreams and problems.

And to the local residents—particularly the children—Unocal is more than just a big refinery on the west side of town. Unocal is people who care enough to get involved in the community where they work. *M.B.* 76



Left, Williams and Senior Inspector Susan Oviedo at work in the refinery lab. A student peruses a Wilmington ALIVE resource card, right, which lists the telephone numbers of 17 agencies expert at counseling victims of violence.



2,000 children die annually from abuse...



OFFICE RECYCLING

GETTING DOWN TO BUSINESS



Compared to the mountains of trash produced daily by American society, the recycling efforts of individuals might appear, on the surface, to yield little more than scraps of benefit. But when a corporation mobilizes to “reduce, reuse and recycle” its daily accumulation of office waste products, the results are much more impressive—and morale-enhancing.

“Employee response to our office recycling program has been entirely enthusiastic,” says L. Carl Hebert, vice president of Unocal’s Texas/Southeastern Region. “But that’s no surprise. The office recycling idea originated with the employees themselves, and the concept worked its way from the bottom of our organization right up through the top.”

Given management’s green light, a core committee of office employees moved swiftly to develop a recycling program. In January, Hebert helped inaugurate the recycling effort at Unocal’s Regional office building—located in the Houston suburb of Sugarland—by performing a “ceremonial dumping” of office wastepaper into a large, clearly labeled recycling bin.



“Each ton of paper that is recycled will save 17 trees,” Hebert told his audience of more than 400 Unocal employees. “With anxiety increasing about the condition of our environment and the amount of waste in our landfills, we feel that recycling our office papers is a solid first step toward addressing several environmental concerns.”

Within 10 weeks of the kickoff event, the staff of the Houston office—which also includes more than 200 employees of the North American Oil & Gas Division’s accounting group—had collected more than 16 tons of recyclable white ledger and computer paper. “We earned almost \$900 by recycling that paper,” says Keith McKeel, an exploration geologist and member of the Houston office recycling committee. “The money will be donated to charity.”

But Unocal's growing commitment to recycling and corporate environmentalism is not relegated solely to the Texas/Southeastern Region. In early April, color-coded trash cans, labeled "Food Waste Only" and "White Paper Only," began appearing in offices and photocopier rooms throughout Unocal's corporate headquarters and Refining & Marketing offices in Los Angeles. As employees soon discovered, these waste-specific receptacles were harbingers of building-wide recycling efforts launched later that month with two separate lunch-hour presentations in the auditorium of Unocal Center.

Outside the auditorium, office personnel were invited to browse through a display of recycling literature and various samples of recycled stationery, file folders and pocket portfolios. Inside, Dave Rozas, building services supervisor, apprised employees of the pressing need for a stepped-up office recycling effort.

"We are confronted with a trash crisis in America today," he said. "If we don't do something to address this problem, our children will have to live with the consequences. But simply by recycling your office computer paper and white ledger paper, you can help turn the trash crisis into a recycling opportunity."

Facing page, Ralph Lopez, a maintenance worker at Unocal Center, empties a ream of used computer paper into a bin reserved for recyclable material. Below, examples of the "waste-specific" recycling receptacles in use at Unocal's Los Angeles offices. Bottom, employees browse through a display of environmental literature and recycled paper products.

"Each ton of paper that is recycled will save 17 trees."

A host of statistics supports Rozas' concerns about the trash problem. In 1980, for example, 16 operating landfills served the rubbish-disposal needs of the Los Angeles metropolitan region. Today, all but nine of these garbage dumps have been closed due to the possible contamination of area groundwater or a lack of additional capacity.

Exacerbating the increasing scarcity of suitable landfill space is the snowballing volume of trash produced by the convenience-oriented consumption habits of many Americans. According to the California Disposal Association, Los Angeles County residents, per capita, generate two times the amount of waste produced by the average American. As if this isn't problem enough, unnecessary waste of recyclable materials also imposes an increasing burden on the Earth's finite natural resources.



According to the book, "50 Simple Things You Can Do to Save the Earth," wood pulp from more than one-half million trees—literally an entire forest—is used to produce the amount of newsprint required for America's total weekly press run of Sunday newspapers. If Unocal Center employees pitch in to meet the building's goal of recycling 320 tons of waste paper annually, Rozas says, nearly 5,500 trees could be spared each year from processing at paper mills.

But recycling conserves more than trees alone. Paper made from recyclable sources consumes 30 to 55 percent less energy during fabrication than paper manufactured from trees directly.

Using current processing techniques, the manufacture of 320 tons of new paper consumes more than 11 million gallons of water and the energy equivalent of 744 barrels of oil. Also, the manufacturing process for recycled paper produces only 5 percent as much air pollution as new paper.



Top, coffee mugs were given to employees who attended lunch-hour recycling presentations at Unocal Center. More than 1,000 cups have been distributed thus far. Left, L. Carl Hebert, vice president of the Texas/Southeastern Region, performs a "ceremonial dumping" of reusable office waste paper during the recycling kickoff at Unocal's Houston offices.

"Employee response to our office recycling program has been entirely enthusiastic."

By meeting the 320-ton paper recycling goal, Rozas added, employees of Unocal Center could also help save more than 600 cubic yards of Los Angeles-area landfill space for the disposal of non-recyclable refuse.

Because office recycling is a net source of revenue, normal building maintenance costs are also offset by a concerted employee effort to recycle. "This is a program that's environmentally responsible and cost effective," Rozas says.

The mechanics of the recycling programs in place at Unocal's Houston and Los Angeles offices are similar. At Unocal Center, employees merely deposit their refuse—whether it be food-related waste, used paper or aluminum cans—in any of the numerous, color-coded receptacles distributed throughout the premises. Blue bins are for paper, tan receptacles for food waste and packaging. Brown garbage cans, which are located in vending machine and break areas, are dedicated for disposal of aluminum cans.

At the Houston offices, each employee has two trash cans at his or her desk. One is for recyclable materials and the other for non-reusable trash.

"When we first started the recycling program, the biggest obstacle we came up against was getting some of our people to sort their office waste and put it in the proper receptacle," says McKeel. "But now, it's gotten to be a reflex action for them."

The Texas/Southeastern Region operates out of a 10-story building. On the six floors occupied by Unocal employees, 65-gallon bins have been placed in 25 easily accessed locations. When an employee's desk receptacle is filled, he merely dumps it into one of the 65-gallon bins. As at Unocal Center, maintenance staff at the Houston offices takes the accumulated materials to the building's shipping and receiving area. There, it is inventoried and picked up by a firm that specializes in recycling.

Apparently, the recycling program installed at the Houston office has made a lasting impression on more than just Unocal employees. At least, that's what Edward Chen thinks.

Chen, recycling coordinator for the Houston Department of Public Works, attended Unocal's January recycling kickoff. "It was very impressive," he says. "The company presented a sensible recycling strategy for its employees and did a good job of raising awareness. Now they're trying to recruit the 18 other tenants of the building to join the recycling effort."

Already, says McKeel, half of these tenants have signed on for participation in the recycling program. "We think the rest of them will follow suit once they see how easy and beneficial office recycling is," he adds.



"This is a program that's environmentally responsible and cost effective."



When faced with wide-ranging environmental concerns, an individual's resolve to take action is sometimes undermined by the nagging feeling that a single person can do little to solve such huge problems. But when people band together, as members of a corporation, neighborhood or community, their desire to promote positive change can yield tangible results.

At Unocal's Los Angeles and Houston offices, these results can be measured, in part, by the thousands of trees which will be saved each year. When put in perspective, the relative inconvenience of sorting trash for recycling purposes seems negligible compared to the benefits of doing so.

Carl Hebert sums up this notion well. "We don't recycle simply because it's convenient or cost effective," he says. "We recycle because it's the right thing to do." M.B. 76

UNOCAL 76

CORPORATE

30 YEARS Frances C. Marada, Schaumburg, Il.
Barbara J. Williams, Schaumburg, Il.

25 YEARS Robert E. Beechler, Burbank, Ca.
Ronald O. Bruning, Unocal Center
James J. Chevalier, Unocal Center
Melvin D. Gabel, Kenai, Ak.
Merrilee A. Garcia, Unocal Center
Kenneth D. Hall, Unocal Center

20 YEARS Joe D. Cecil, Unocal Center
Leslie A. Gibson, Unocal Center
Mary Jane Nelson, Lemont, Il.
Kenneth L. Riedman, Jr., Unocal Center
Michael D. Riehle, Unocal Center

15 YEARS Robert J. Anderson, Jr., Unocal Center
Byron C. Mobus, Santa Rosa, Ca.
Phillip R. Robbins, Unocal Center

10 YEARS Victor S. Apostol, Brea, Ca.
Gilbert W. Coates, Unocal Center
Salvador Garcia, Unocal Center
Michael J. Laurence, Unocal Center
Esteban A. Mejia, Unocal Center
Scott A. Meyer, Unocal Center
Mary L. Moore, Brea, Ca.
Monty P. Pollard, Unocal Center
Cheryl L. Sotelo, Unocal Center
Rod L. Steinbrook, Unocal Center
Joyce A. Zizzo, Schaumburg, Il.

REAL ESTATE

25 YEARS Richard T. Davies, Unocal Center
Paula M. Young, Unocal Center

15 YEARS James A. Martinez, Brea, Ca.
Robert J. Schrag, Unocal Center

SCIENCE & TECHNOLOGY

35 YEARS Robert E. Helander, Brea, Ca.
R.A. Whisenand, Brea, Ca.

30 YEARS Starling K. Alley, Brea, Ca.
Barbara J. Orosz, Brea, Ca.

25 YEAR Sidney F. Krupicka, Brea, Ca.

20 YEARS Jerome Kalinowski, Brea, Ca.

15 YEARS James R. Durham, Brea, Ca.
Tim B. Keller, Brea, Ca.
E. Gale Smith, Brea, Ca.

10 YEARS Jared L. Black, Brea, Ca.
Kei Tai Chan, Brea, Ca.
Martin R. Coggins, Brea, Ca.
Irene E. Davis, Brea, Ca.
Darush Farshid, Brea, Ca.
Patricia S. Garcia, Brea, Ca.
Robert L. Harris, Brea, Ca.
Steven E. Howe, Brea, Ca.
Neeta N. Kurani, Brea, Ca.
Alain P. Lamourelle, Brea, Ca.
Jimmie L. Robinson, Brea, Ca.
Paul R. Robinson, Brea, Ca.
Rosanne M. Turczynskyj, Brea, Ca.
Dennis A. Vauk, Brea, Ca.
Marcia Ward, Brea, Ca.
Vera E. Williams, Brea, Ca.
Mary A. Young, Brea, Ca.

ENERGY MINING

10 YEARS Michael N. Anderson, Parachute, Co.
Michael K. Barta, Parachute, Co.
Stephen F. Blakely, Parachute, Co.
Brenda F. Carter, Unocal Center
David R. Courtney, Parachute, Co.
Vera L. Creagar, Parachute, Co.
Timothy L. Hall, Parachute, Co.
Alan L. Salter, Parachute, Co.

ENERGY RESOURCES

NORTH AMERICAN OIL & GAS

35 YEARS Allen J. Brugman, Lafayette, La.
Edwin H. East, Unocal Center
Janie R. Morris, Houston, Tx.

30 YEARS Clark J. Dugas, Houma, La.
Floyd G. Fleming, Abbeville, La.
David L. Knutson, Piru, Ca.
George T. Mayer, Lafayette, La.
Robert H. Stanaker, Houston, Tx.
Phillip E. Webb, Hominy, Ok.
T.A. Winkelmann, Houston, Tx.

25 YEARS James E. Church, Los Angeles, Ca.
Paul E. Crossman, Bakersfield, Ca.
Thomas L. Dewitt, Coalinga, Ca.
Dale L. Elchlepp, Orcutt, Ca.
Thomas E. Fisher, Los Angeles, Ca.
William E. Goffinett, Brea, Ca.
Paul W. Holderfield, Piru, Ca.
Rosalee F. Ingram, Bakersfield, Ca.
David E. Johnson, Casper, Wy.
William A. Lee, Placentia, Ca.
Clarence J. Melancon, Lafayette, La.
George E. Moore, Midland, Tx.
Byron R. Scott, Bakersfield, Ca.
Nancy Alice Watson, Orcutt, Ca.
Carl H. White, Kenai, Ak.

20 YEARS Terrill L. Barton, La Habra, Ca.
Leroy J. Charles, Cocodrie, La.
Charles D. Hodkins, Orcutt, Ca.
Alfred Harris, Theriot, La.
Jack L. Heindselman, Liberty, Il.
Joe A. Hollis, Ventura, Ca.
E.J. Istre, Houma, La.
T. Wayne Jackson, Sr., Houma, La.
Ruben G. Jaramillo, Piru, Ca.
Edward N. Labauve, Bell City, La.
John K. Leong, Bakersfield, Ca.
Hal G. Lindle, Jr., Kenai, Ak.
John A. Robinson, Amelia, La.

15 YEARS Clemmie H. Adkins, Coalinga, Ca.
Roland P. Aucoin, Cocodrie, La.
James T. Braxton, Kaplan, La.
Earl P. Champagne, Houston, Tx.
Ricky L. Colton, Kenai, Ak.
Robert D. Conklin, Grayling, Mi.
Paul F. Duhon, Abbeville, La.
Clifton Faulkner, Kenai, Ak.
Mark V. Filewicz, Ventura, Ca.
William R. Green, Jal, N.M.
Wesley H. Griesemer, Grayling, Mi.
Robert L. Meyer, Oklahoma City, Ok.
Teresa A. O'Sullivan, Orcutt, Ca.
Lemmie R. Parker, Houston, Tx.
Eris A. Porche, Kaplan, La.
Sharon S. Puckett, Houston, Tx.
John R. Rohner, Walnut Grove, Ca.
William D. Runnalls, Worland, Wy.
Roger B. Stickney, Anchorage, Ak.
Kevin T. Sullivan, Houston, Tx.
Walter G. Tezeno, Bell City, La.
James R. Webster, Snyder, Tx.

10 YEARS Lucien M. Abernathy, Jr., Lafayette, La.
Louis J. Antonini, Houston, Tx.
James P. Avioli, Jr., Houston, Tx.
David M. Bacchus, Houston, Tx.
Renato R. Bizzio, Lafayette, La.
Stacie K. Boyd, Midland, Tx.
Irvin J. Champagne, Houma, La.
Charles W. Chezick, Kenai, Ak.
Jerry D. Collins, Kenai, Ak.
Stephen G. Davidson, Cut Bank, Mt.
Jeanine C. Denton, Oklahoma City, Ok.
Charlie Easterling, Jr., Oklahoma City, Ok.
Clarence E. Farley, Dulac, La.
Steven T. Garcia, Moab, Ut.

Jessie L. Gaspard, Abbeville, La.
 Matthew W. Glassman, Santa Paula, Ca.
 Mary S. Glovanovitch, Houston, Tx.
 Robert C. Gnagy, Midland, Tx.
 Margaret S. Hagelstein, Midland, Tx.
 James R. Harrison, Lafayette, La.
 Richard B. Hill, Casper, Wy.
 Alan L. Hurt, Ventura, Ca.
 Mark A. Ivanowicz, Coalinga, Ca.
 Arsic Jaramillo, Moab, Ut.
 Jonell S. Johnson, Houston, Tx.
 Frank Kpodo, Santa Fe Springs, Ca.
 Johnnie D. Lee, Lander, Wy.
 Robert A. Mercer, Houston, Tx.
 Jan Mutz, Midland, Tx.
 David L. Niichel, Ventura, Ca.
 Gregory A. Nunn, Houston, Tx.
 Daniel Ortega, Coalinga, Ca.
 Robert W. Owens, Lafayette, La.
 Bruce E. Parker, Madill, Ok.
 James F. Pettit, Coalinga, Ca.
 Dudley J. Ponville, Jr., Mobile, Al.
 Bryan A. Price, Houma, La.
 Patrick L. Prout, Anchorage, Ak.
 Darel J. Richard, Morgan City, La.
 Velma J. Richardson, Anchorage, Ak.
 John E. Rowland, Casper, Wy.
 David L. Saylor, Santa Fe Springs, Ca.
 James R. Schultz, Kenai, Ak.
 Keith A. Schwindt, Orcutt, Ca.
 Navin K. Sharma, Anchorage, Ak.
 Barbara L. Shultz, Casper, Wy.
 George A. Sims, Santa Fe Springs, Ca.
 Charles V. Smalley, Kenai, Ak.
 Joe A. Smith, Levalland, Tx.
 Lawrence C. Smith, Houston, Tx.
 Bruce L. Stanton, Ventura, Ca.
 Sam K. Steele, Casper, Wy.
 Colling K. Tam, Houston, Tx.
 Faron J. Thibodeaux, Lafayette, La.
 Glenn P. Thibodeaux, Lafayette, La.
 Edward C. Turner, Orcutt, Ca.
 Jay M. Waldrop, Andrews, Tx.
 Steven P. Webre, Lafayette, La.
 Dennis O. Wilson, Worland, Wy.
 William D. Zumwalt, Kenai, Ak.

Unocal Canada, Ltd.

25 YEARS Nestor R. Shular, Calgary, Alberta
 20 YEARS Jerry W. Block, Fort St. John, B.C.
 Marcel H. Levac, Fort St. John, B.C.
 Diane N. Willgoose, Calgary, Alberta
 15 YEARS Donald T. Brown, Grande Prairie, Alberta
 Fritz H. Perschon, Jr., Calgary, Alberta
 10 YEARS Malcolm D. Anderson, Calgary, Alberta
 Vernon G. Mantey, Calgary, Alberta
 Gordon T. Stabb, Calgary, Alberta

INTERNATIONAL OIL & GAS

40 YEARS Eugene F. Griffin, Unocal Center
 35 YEARS Ben E. Talley, Unocal Center
 25 YEARS Frederik E. Dekker, Unocal Center
 William D. Jones, Unocal Center
 Timothy C. Lauer, Unocal Center
 Robert R. Rose, Unocal Center
 15 YEARS Steven J. Benedetti, Netherlands
 Glenn C. Frederick, Balikpapan, Indonesia
 Arun K. Metre, Unocal Center
 John M. Thompson, Netherlands
 10 YEARS Charles A. Day, Unocal Center
 Paul S. Granata, Sunbury, England
 Kent E. Newsham, Unocal Center
 Sy Nguyen, Unocal Center

Unocal Thailand, Ltd.

15 YEARS Prinya Musodee
 Amporn Tanmeesilp
 Narongchai Tantrakul
 10 YEARS Pirote Chansuwangpong
 Pojjanun Charoensuk
 Sopon Charoensuk
 Seri Hararak
 Subharerk Hemarat
 Chiravid Jao-Javanil
 Chaowalit Kaeomano
 Somchai Kaivalkrittayakul
 Tirapol Kalambaheti
 Nut Kanchanachoti
 Decha Kocharoenkit
 Rojn Laoprasopwattana
 Piroje Launprueg
 Subin Leeyaan
 Thongsai Namwong
 Krisada Onporat
 Anusorn Phutarak
 Shonthaya Ponpinyo
 Yiam Pradidtham
 Panot Puangrub
 Wichian Rasanocha
 Paitoon Rujireksarygul
 Suchart Sawasdipisal
 Khavec Singhaman
 Khunchai Sridakoon
 Sarithpong Suanmalee
 Phithak Surasarang
 Wirayut Tabthong
 Pichai Tanamaitreejitt
 Bopiti Tongsak
 Tongchai Tonsuwunnarat
 Uchai Tungsatitporn
 Anont Tungsritut
 Panjama Tunvuttikul
 Vitoon Udompol
 Hibbraheng Wasani
 Boonchouay Wimolsukpirakul
 Bandid Wongcharoen
 Soontorn Yokyongsakul

Unocal Indonesia, Ltd.

15 YEARS Edeng
 Poniman
 Subijono
 Sugimin
 Hasan Ali
 Sulhan Askandar
 Harsono Hadipranoto
 Herman Hutabarat
 Peter Harmande Karsono
 Zeth M. J. Lopian
 Paul Andrias Lengkey
 Pondasaka Lubis
 Henky Masoko
 Julian Rembet
 Adinda Sunoko
 Maxi Wowor

SERVICE AWARDS



10 YEARS Hanafarin
 Mardiyanto
 Marjoko
 Matadji
 Purwoko
 Arismen Bermawi
 Peter Iwan Bolung
 Gustaf Petrus Gosal
 Achmad Huda
 Benny Johannies
 Petrus Lamba Mangiwa
 Yusuf Muhamad
 Peggy S. Odang
 Soekamto Dino Saputra
 Fajar Shodiq
 Benny Benyamin Sidik
 Eko S. Sutjipto
 Hidayat Taufik
 Ralph Tehupuring
 R. I. Trijanto
 Syahrul Wasioen

Unocal U.K., Ltd.

10 YEARS Roy McCourt, Aberdeen, Scotland
 Kevin Ross, Aberdeen, Scotland

Unocal Singapore, Ltd.

20 YEARS Raymond Chan Lay Ho

Unocal Netherlands, B.V.

10 YEARS Gerard den Boestert
 Mike Burghardt

Unocal Suez, Ltd.

15 YEARS Mohamed Abdalah
 Aly Sebak

GEOTHERMAL

20 YEARS Althea M. Thomas, Unocal Center
 15 YEARS Harry O. Bain, Unocal Center
 Dwayne P. Daunch, Santa Rosa, Ca.
 Linda J. Dondanville, Santa Rosa, Ca.
 Joseph I. Morford, Santa Rosa, Ca.
 Brian P. Roberts, Santa Rosa, Ca.
 10 YEARS Steven J. Butler, Imperial Valley, Ca.
 Richard C. Eliason, Santa Rosa, Ca.
 John L. Featherstone, Imperial Valley, Ca.
 David T. Gambill, Philippines
 Patrick E. Laursen, Santa Rosa, Ca.
 Iris M. Lutz, Santa Rosa, Ca.
 Philip G. Mogen, Imperial Valley, Ca.
 Vincent J. Signorotti, Imperial Valley, Ca.

SERVICE AWARDS



Philippine Geothermal, Inc.

15 YEARS Ernesto C. Alcober, Bulalo
Antonio N. Base, Tiwi
Ernesto C. Bergantin, Makati
Vicente C. Bobiles, Tiwi
Wilfredo D. Canezo, Tiwi
Graciano R. Dela Cruz, Makati
Reymundo D. Frugal, Jr., Bulalo
Evelyn R. Puno, Makati
Rosendo M. Sarza, Tiwi
Robert Q. Talavera, Tiwi

10 YEARS Domingo B. Ador, Tiwi
Antonio C. Anonuevo, Tiwi
Virgilio L. Apuyan, Tiwi
Rey C. Balcueva, Tiwi
Emeliano N. Briones, Tiwi
Pedro C. Brusola, Tiwi
Lorenzo C. Calites, Tiwi
Abundio C. Cernechez, Tiwi
Consonico C. Cordenete, Tiwi
Gerardo C. Cresencio, Tiwi
Anastacio C. Cruel, Tiwi
Cyril C. Cruel, Tiwi
Yolanda B. Cruzana, Tiwi
Benjamin L. Go, Tiwi
Romeo R. Mendez, Tiwi
Eduardo R. Matulac, Bulalo
Rafael S. Ondis, Tiwi
Lilian G. Orsenado, Makati
Hedelita U. Patron, Makati
Jose O. Rebillon, Tiwi
Hilarion T. Querubin, Makati

REFINING & MARKETING

40 YEARS Leo Edwin Olsen, San Francisco Refinery

35 YEARS Jerry T. Carter, Pensacola, Fl.
Don M. Jacobs, Schaumburg, Il.
Leopold A. Luna, Ft. Lauderdale, Fl.
Jack L. McDaniel, Atlanta, Ga.
James T. Pearson, Torrance, Ca.
John M. Peck, Los Angeles, Ca.
Daniel Piro, Sacramento, Ca.
Andre J. Roy, Torrance, Ca.
Edmund A. Vasper, Honolulu, Hi.

30 YEARS Roger C. Beach, Los Angeles, Ca.
Helen S. Brown, Los Angeles, Ca.
John I. Buckles, Schaumburg, Il.
Jimmy B. Deering, Santa Maria Refinery
R.R. Huddleston, San Francisco Refinery
Robert R. Mitchell, Los Angeles, Ca.
Frank F. Molette, Santa Maria Refinery
Walter Schweikert, Reno, Nv.
F.J. Schweizer, Richmond, Ca.
Robert J. Sommerseth, Tacoma, Wa.
Louis D. Trost, San Francisco Refinery
John W. White, Houston, Tx.
George K. Yamamoto, Honolulu, Hi.

25 YEARS Marvin L. Baransy, Norfolk, Va.
Sid Ray Carter, San Francisco Refinery
John F. Caybut, Richmond, Ca.
Dennis E. Cook, Los Angeles, Ca.
James W. Cox, Portland, Or.
Vincent Egidi, Jr., Tallmadge, Oh.
Kenneth E. Guziak, San Francisco, Ca.
Harold E. Hanna, Richmond, Ca.
James A. Hayashi, Los Angeles Refinery
Joann M. Hodoval, Schaumburg, Il.
Russell M. Horton, Los Angeles, Ca.
Ronald M. Jackson, Los Angeles, Ca.
Benjamin D. Kell, Los Angeles Refinery
George M. Landbo, Schaumburg, Il.
Joseph Leaman, Schaumburg, Il.
Richard L. Louderback, Richmond, Ca.
David C. Lundgren, Los Angeles, Ca.
Judith A. Lussow, Schaumburg, Il.
Glen A. MacMaster, Los Angeles Refinery
Dean R. Masterton, Walnut Creek, Ca.
Colleen J. McGarry, Los Angeles, Ca.
Gary E. Myhro, Walnut Creek, Ca.
Richard P. Neilsen, Schaumburg, Il.
William A. Walker, San Diego, Ca.
George T. Schroeder, Allen, Tx.
Klepper Mason Scott, Los Angeles Refinery
Robert E. Youngquist, Bloomington, Ca.

20 YEARS Socorro Amezcua, Los Angeles, Ca.
Betty L. Ashley, Wildwood, Fl.
William F. Baron, San Francisco, Ca.
Betty C. Chan, San Francisco, Ca.
Melvin H. Chiya, Phoenix, Az.
Sandra A. Collins, Richmond, Ca.
Wendell L. Cox, Schaumburg, Il.
Eddie P. Davelt, Wildwood, Fl.
Jeannette V. Deverian, Los Angeles, Ca.
Thomas C. Farley, Atlanta, Ga.
John R. Fitzgerald, Schaumburg, Il.
Daniel Herrera, Los Angeles Refinery
Terry T. Holthe, Los Angeles, Ca.
David G. Hov, Portland, Or.
David C. Keith, Portland, Or.
Leonard M. Koontz, Los Angeles, Ca.
Donicio Lagodlagod, Honolulu, Hi.
James C. Lainhart, San Francisco Refinery
Michael E. Lindner, San Ramon, Ca.
Walter T. Mallory, Los Angeles Refinery
Lily M. Mar-Baird, San Francisco, Ca.
Dorothea E. Mason, Schaumburg, Il.
Johnny L. Mosley, Los Angeles Refinery
Eddie Paige, Jr., Atlanta, Ga.
James L. Prince, Schaumburg, Il.
Ronald R. Saarinen, Tacoma, Wa.
Ronald J. Smith, Los Angeles Refinery
Edward D. Sprott, San Francisco Refinery
Richard L. Veale, Jr., Houston, Tx.
Henry J. Ynostroza, Los Angeles, Ca.

15 YEARS Doyl E. Beard, Memphis, Tn.
Linda M. Bogue, Los Angeles, Ca.
June Brassel, Memphis, Tn.
Ronald C. Brinkman, Santa Maria Refinery
Stuart M. Cannes, Schaumburg, Il.
Geraldine R. Chauvin, Houma, La.
Joseph A. Dauster, Santa Maria Refinery
Jodie E. Fisher, Los Angeles Refinery
James J. Foster, Schaumburg, Il.
John A. Gilski, Schaumburg, Il.
Russell R. Goya, Hilo, Hi.
Narciso Guerrero, Los Angeles Refinery
Daniel W. Hoover, Schaumburg, Il.
Gary M. Lefebvre, Portland, Or.
Edward C. McCarthy, Los Angeles, Ca.
Lance M. McGilliard, Schaumburg, Il.
Robert J. Phillips, Los Angeles, Ca.
Gregory S. Sidor, Los Angeles, Ca.
Donald X. Stokes, Richmond, Ca.
Steven E. Ulm, Mokena, Il.

10 YEARS Judy Abdullah, Los Angeles, Ca.
Theodore J. Abeyta, Pasadena, Ca.
Armando Alcaraz, Torrance, Ca.
David W. Amble, Richmond, Ca.
James O. Anderson, Santa Maria Refinery
Bruce W. Bailey, Los Angeles, Ca.
Michael K. Beavers, San Francisco Refinery
Estelita A. Behti, San Francisco, Ca.
Steven D. Birckett, Los Angeles, Ca.
Richard A. Bowerman, Santa Maria Ref.
Michael J. Braun, Los Angeles Refinery
Leroy Carson, Los Angeles, Ca.
Patrick L. Chapman, San Francisco Refinery
Dennis R. Cook, Ft. Morgan, Co.
Christopher G. Denis, San Francisco Ref.
Dennis E. Dowling, San Francisco Refinery
Richard A. Durdle, Los Angeles, Ca.
Morgan L. Flaherty, San Francisco Refinery
Julie A. Gibby, San Francisco, Ca.
Thomas A. Green, Savannah, Ga.
Juan C. Gutierrez, North Hollywood, Ca.
Juan J. Hernandez, Santa Maria Refinery
Karen M. Hillyard, Taft, Ca.
Willie L. Huff, Wildwood, Fl.
Richard L. Jankowski, Santa Maria Refinery
Lars D. Jensen, North Hollywood, Ca.
Andrew Johnson III, Pasadena, Ca.
Albert Jones, San Francisco Refinery
Dorothy L. Korsvik, Schaumburg, Il.
Frederick F. Kuist, Los Angeles Refinery
Edmond C. Lee, Santa Fe Springs, Ca.
Robert J. Lee, Camp Hill, Pa.
Judith K. Lyen, Portland, Or.
Matthew W. Madden, San Francisco Ref.
Cheryl L. Martin, San Francisco Refinery
Alton D. Masters, Los Angeles, Ca.
Edward M. McAfee, Torrance, Ca.
Joseph M. McBroom, San Francisco Ref.
John S. McConnel, Richmond, Ca.
Elizabeth A. McHugh, Schaumburg, Il.
Demetria Y. McLaurin, Los Angeles, Ca.

SERVICE AWARDS



Armando O. Molina, Los Angeles, Ca.
Jack R. Moore, Jr., Los Angeles Refinery
Cheryl A. Morgan, San Francisco, Ca.
Richard L. Morris, San Francisco Refinery
Lee Neang, Los Angeles, Ca.
Anicia A. Nelson, San Francisco, Ca.
Michael R. Orr, Santa Fe Springs, Ca.
James J. O'Toole, Los Angeles Refinery
Timothy E. Perrott, Wexford, Pa.
Margaret L. Petrovich, Schaumburg, Il.
Richard A. Pompa, Los Angeles, Ca.
Michael J. Rehnberg, Los Angeles, Ca.
Virginia E. Romero, Nederland, Tx.
Corey Rucci, Schaumburg, Il.
Peter L. Schnieders, Los Angeles, Ca.
Judith M. Shipman, Tacoma, Wa.
Phyllis A. Sirchia, Los Angeles, Ca.
Hilding K.L. Spradlin, San Francisco Ref.
Arthur Tinajero, Los Angeles, Ca.
Ronald W. Toten, San Francisco Refinery
Robert C. Tyler, Santa Maria Refinery
Russell R. Wermers, Los Angeles, Ca.

MARKETERS & DISTRIBUTORS

65 YEARS Levens, Inc., Carrollton, Ga.
45 YEARS Knoll Brothers, Inc., Michigan City, In.
Sheffield Oil Co., Dothan, Al.
35 YEARS Cashion Oil Co., North Wilkesboro, N.C.
30 YEARS G&M Oil Co., Inc., Barbourville, Ky.
25 YEARS Curtis-Tharaldson Oil Co., Inc., Duluth, Mn.
20 YEARS Alabama Oil Co., Gadsden, Al.
Handley Distributing Co., Roanoke, Al.
Mid-South Oil Co., Tunica, Ms.
Northrop Oil Co., Inc., Century, Fl.
10 YEARS Go Mart, Inc., Gassaway, W.V.
W. Henry Hardy, Inc., Danville, Va.
Weiss Oil Co., Inc., Turlock, Ca.

CHEMICALS & MINERALS

35 YEARS Elsie Hufstetler, Carteret, N.J.
Bill R. Sponsler, Brea, Ca.
30 YEARS Gary W. Anker, Brea, Ca.
James Johnson, Charlotte, N.C.
William Lathan, Wilmington, N.C.
25 YEARS Robert Rowan, Atlanta, Ga.
20 YEARS Beatrice Barthelmeh, La Mirada, Ca.
Robert M. Cooper, Kenai, Ak.
Murton D. DePriest, Kenai, Ak.
Lucius Harris, Schaumburg, Il.
Karl Lukens, Conshohocken, Pa.
Richard P. Oelrich, Kenai, Ak.
Arnold E. Oskolkoff, Kenai, Ak.

15 YEARS Ronald D. Burger, Kenai, Ak.
Harold E. Collins, Jr., Kenai, Ak.
William Foggie, Charlotte, N.C.
Laura Gamboa, Unocal Center
Erlend A. Hoag, Kenai, Ak.
Willie Johnson, Lemont, Il.
Richard Kustwin, Kankakee, Il.
Daniel Lee, Charlotte, N.C.
John K. McCauley, Jr., Beaverton, Or.
Herbert M. Rooper, Kenai, Ak.
Billy Smith, Charlotte, N.C.
Ray Thomas, Charlotte, N.C.
Jim Yauch, Schaumburg, Il.

10 YEARS Linda Felton, St. Paul, Mn.
Andrew J. Ford, Brea, Ca.
John Frattini, Fairfield, Ca.
Robert A. Frost, Unocal Center
Richard A. Kolpin, Brea, Ca.
Catherine McMahan, Charlotte, N.C.
Fred A. Miller, Kenai, Ak.
Marcia Peco, Schaumburg, Il.
Alexander Sandoval, La Mirada, Ca.
Ed Skarbek, Schaumburg, Il.
Louise Zirkler, Unocal Center

MOLYCORP, INC.

30 YEARS H. Linn Weaver, Washington, Pa.
20 YEARS Zita A. Campbell, White Plains, N.Y.
15 YEARS Kathleen F. Carpenter, Louviers, Co.
Rick N. Trujillo, Questa, N.M.
Lloyd A. Vorwald, Louviers, Co.
Robert S. Young, Questa, N.M.
10 YEARS David K. Gallegos, Questa, N.M.
Christine Heinze, Mountain Pass, Ca.
David Partridge, Mountain Pass, Ca.
Ronald C. Soto, Mountain Pass, Ca.
James R. Terrill, Washington, Pa.
Kenneth R. White, Mountain Pass, Ca.

POCO GRAPHITE, INC.

15 YEARS Raymond L. McClelland, Decatur, Tx.
James R. Patrick, Decatur, Tx.
10 YEARS Norman F. Garrow, Jr., Decatur, Tx.
Richard M. Williams, Decatur, Tx.

RETIREMENTS

Corporate

Russell J. Hermann, March 17, 1958

Oil & Gas

Allen J. Brugman, June 11, 1956
Wilbert P. Rhodes, September 19, 1966

Refining & Marketing

William W. Lough, May 3, 1954
Clayo M. Martin, March 20, 1953
Vera M. McGuire, October 27, 1980
Amos W. Prince, October 30, 1972

Chemicals & Minerals

Max D. Nelson, January 6, 1968
Royal Preston Nix, January 2, 1976
Dorothy A. Schmidt, October 7, 1965

IN MEMORIAM

EMPLOYEES

Geothermal

Rick Shumard, February 21, 1991

Refining & Marketing

Estrellita C. Menor, January 26, 1991
Wayne R. Williams, January 8, 1991

Chemicals & Minerals

Paul Smith, February 1, 1991
Michael B. Vining, February 16, 1991

RETIREES

Corporate

Fred M. Anderson, February 28, 1991
Alice E. Kroeger, December 6, 1990
Agnes K. Snodgrass, February 6, 1991

Oil & Gas

Dyer A. Bennett, February 3, 1991
W.J. Bowden, February 2, 1991
Roy E. Crosby, October 13, 1990
Ralph A. Houdyshell, January 16, 1991
Thomas R. McIntyre, February 3, 1991
Jack A. Menefee, January 27, 1991
Samuel E. Morris, February 12, 1991
Charles R. Pierce, March 1, 1991

Refining & Marketing

Walter D. Bach, January 16, 1991
John C. Barnes, February 11, 1991
Florence Barresh, January 19, 1991
David C. Bradshaw, January 29, 1991
Carl R. Buckley, February 6, 1991
Theodore Byers, September 17, 1990
Frank E. Clark, February 6, 1991
Hugh Clifton, February 13, 1991
Dale Colby, February 17, 1991
Clem W. Conns, January 8, 1991
James M. Eaves, January 15, 1991
Henry D. Eglhoff, January 25, 1991
Guy B. Ford, February 24, 1991
Guy M. Gearing, January 18, 1991
Herbert Glenn, January 18, 1991
Wesley Hague, March 8, 1991
Billy B. Ivey, January 26, 1991
Janet Ivins, January 12, 1991
Margaret M. Johnson, January 23, 1991
Robert W. Johnson, February 5, 1991
Alma E. Jones, December 6, 1990
John D. Jones, January 10, 1991
Bernard M. Juresich, February 27, 1991
Frank Medisch, January 11, 1991
Herbert Milbrad, February 26, 1991
Irma M. Morrison, December 23, 1990
Tommie P. Murphy, February 23, 1991
Hilda Murray, December 26, 1990
Charles Lee Narry, February 9, 1991
Adeline Owens, March 1, 1991
Ernest J. Phillips, December 27, 1990
Eugene O. Quillen, January 5, 1991
Harold L. Reed, January 24, 1991
Frances S. Robinson, February 21, 1991
Joseph Seelye, February 25, 1991
Martin Leon Smith, March 5, 1991
Ralferd L. Snyder, February 21, 1991
Lawrence Leslie Sweet, December 29, 1990
Tom Townley, January 23, 1991
Walter A. Winters, January 17, 1991

Science & Technology

Arthur F. Mays, January 26, 1991

Chemicals & Minerals

Eugene M. Deane, January 7, 1991

Molycorp, Inc.

Perfecto Baca, March 10, 1991
Murrel Creed, February 2, 1991
Filiberto Jiron, Sr., February 25, 1991
Clarence W. Minnies, February 8, 1991
Herman Naylor, February 10, 1991
David Williams, January 30, 1991

GARY L FOY
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Cover: Sparkling waters surround a production platform in Unocal's West Cameron field 196, located offshore Louisiana. With operations both onshore and in the Gulf of Mexico, the company's Louisiana Region has achieved continuing success in finding and developing petroleum resources. Story on Page 6.

Photo by Bob Thomason.

Photo top of page 29 courtesy of CNG Cylinder Co. of North America.

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