CHAPTER THREE

Transformation

The East-West Crude Oil Pipeline, 1985.
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Though the event rightly honored those who had transformed the Kingdom through its oil industry, the speeches that day focused not just on an illustrious past but also on a promising future. Minister Yamani told the crowd, “Aramco is now a Saudi Arabian institution that ‘speaks our language.’” He added, “We hope that the sun of this year will not set until a Saudi has become president of this company.” His prediction became reality that November when the Aramco board of directors appointed Al-Naimi the company’s first Saudi president, effective January 1984.

The 1980s were a crucial period in the transformation of Aramco, as the Saudi government assumed full ownership of the company in the first year of the decade. The creation of EXPEC reflected this major shift in that EXPEC enabled Aramco to consolidate all of its high-tech exploration and petroleum engineering functions in Dhahran, work that had previously been performed in the United States or Europe by the four former owner companies.

This transformation continued when Al-Naimi assumed his duties as president in 1984. Al-Naimi was a product of the company’s career development and Saudization programs and proof of their success. A Saudi national, he was elected because he was the most qualified due to his extensive training and years of service with the company. Al-Naimi, said Yamani, was not selected to be president “because he is Saudi to satisfy national sentiment, but because he earned the office through sweat and hard work, and because he has built himself and helped build others.”

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Aramco had been caught short-staffed when the 1970s oil boom began. Company planners were determined not to make that mistake again in the 1980s. Extrapolating from trends at the end of the previous decade indicating strong global demand for oil, Aramco’s corporate planners predicted the company needed to hire 30,000 more Saudis by 1985, more than doubling its Saudi workforce, to reach an anticipated total payroll of 75,000 employees.

To help train these new employees, the company approved a training budget of nearly $300 million for 1980. New programs were introduced, training facilities built and staff added. "Developing people is time consuming and expensive, but it pays off in the long run—both from the individual’s and the country’s point of view," noted Abdulaziz M. Al-Hokail, senior vice president of Industrial Relations in the early 1980s, who retired in 2002 as executive vice president of manufacturing operations.

Fortunately, Aramco could afford to foot the training bill. The company’s revenues ballooned by 1980 to more than $84.5 billion. In the wake of the Iranian Revolution in the late 1970s, global oil prices soared once again. Arabian Light crude oil climbed from $12.70 a barrel in 1978 to $26 a barrel by January 1980. Aramco, making up for lost Iranian oil output, produced a record 9.6 million bpd during 1980, an increase of 1.5 million bpd over 1978. Saudi Arabia was now the world’s second-largest oil producer, after the Soviet Union’s 11.7 million bpd. (The United States was third at 8.6 million bpd. No other country was close to the top three. Iraq was fourth largest with 2.6 million bpd.)

**THE FAST TRACK PROGRAM** During this period, Aramco significantly stepped up the hiring of Saudi high school students in anticipation of sharply higher staffing needs. In the decade prior to 1979, the company hired an annual average of only 90 high school graduates; that year the number expanded enormously, to 796. In 1980, the figure jumped again, to 1,281.

The College Fast Track Program, instituted in 1979, attracted a great deal of interest among Saudi high school students. High school graduates with a grade average of 85 (out of 100) or better who agreed to join Aramco were sent to the United States for up to one year of intensive training in English. Those who achieved a 500 or better (out of 677) on the Test of English as a Foreign Language (TOEFL) proficiency exam qualified for an Aramco college scholarship. Even though only 57 high school graduates, including 13 women, qualified in 1979, many high school students joined Aramco after being initially attracted by the College Fast Track Program.

Aramco also intensified its pursuit of Saudi college graduates. In 1979, the company hired 124; in 1980, it hired 203. The two-year total exceeded the number of Saudi college graduates hired by Aramco in the previous two decades. These robust numbers, however, hardly put a dent in demand. Kelberer wrote to members of executive management on December 14, 1981, demanding additional hiring. "Every Saudi college graduate should be hired and developed," he said, adding that the matter was "of utmost importance."

The story of Al-Naimi’s rise from Bedouin shepherd boy to president and CEO of Aramco, and later Minister of Petroleum and Mineral Resources, is perhaps the best-known example of the company’s contribution to the extraordinary transformation of Saudi Arabia and its people, but thousands of Saudis experienced similar journeys.

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The transformation of Saudi Arabia from desert kingdom to modern nation was mirrored in the personal journeys of thousands of Saudis who came of age in the 1950s and rose to high positions in Aramco in the 1970s and 1980s. Some of these accomplished men are shown in this November 1988 photo, including, left to right, Ahmed S. Al-Humaid, vice president of Government Affairs; Douhan Al-Douhan, executive director of Management Services; Sa’ud Al-Ashgar, vice president of Planning; Ismail I. Nawwab, general manager of Public Affairs; and Faysal M. Al-Bassam, vice president of Public Affairs. Standing behind Al-Ashgar and Nawwab is John Duke Anthony, president of the National Council on U.S.-Arab Affairs.

Doughan Al-Douhan, for example, as a teenager in the 1950s made the three-day journey across the roadless desert from Najran to Abqaiq in the back of a truck with more than 20 other passengers. Al-Douhan was “looking for a future” with Aramco. “In the United States, people said ‘Go west, young man, go west.’ Here, they said ‘Go east,’” to Aramco, Al-Douhan recalled.

By 1984, Aramco had 55,819 employees. The Saudi workforce totaled 34,226, of which 3,343 held supervisory positions—nearly 62 percent of the supervisory jobs available. Training opportunities. Riyadh University graduate Khalid Nassir Al-Maghlouth joined Aramco in 1980, entering its Professional Development Program. He was sensitive to the fact that among the older generation “many of them had worked day and night for 20 to 25 years to reach grade code 10.”

In its first year, PdP enrolled 400 employees, 203 of whom were newly graduated Saudis. This total included new employees with fewer than three years of previous employment, although the program allowed them to follow a different course of study from the recent graduates. Senior Vice President of Finance Abdullah A. Al-Othman, who entered PdP in 1981 after working for two years outside the company, was relieved to find that the company “was actually very aware of the need for flexibility” for those with prior work experience. The program initially enrolled some expatriates but soon shifted its focus to encompass only Saudis. By 2008, more than 11,000 employees had benefited from the program.
Prosperity Well

Dammam Well No. 7, the original discovery well that set the stage for the modern era in Saudi Arabia, was finally shut down in 1982 because of slack demand for oil, even though it was still capable of turning out about 1,800 bpd under natural pressure. The well, also known as “Lucky No. 7,” had produced nearly 32.5 million barrels of oil. In 1999, King Abd Allah, then Crown Prince, visited Well No. 7 during a tour of company facilities and gave it the name “Prosperity Well.”

Twenty-five years after the well was shut down, company geologists analyzed newly acquired 3-D seismic readings of the Dammam Dome in anticipation of once again producing oil from the structure, but not from Well No. 7. To avoid disrupting life in Dhahran, plans were drawn up to use horizontal wells that, from a safe distance, could tap the estimated 1 billion barrels of crude remaining in the reservoir.

“I SEE A CHALLENGE” By the 1980s, young Saudis who had witnessed the phenomenal growth of the oil industry and the Kingdom during the 1970s were flocking to Aramco. They were not simply looking for a paycheck or status; many wanted to make a difference in their country’s future, and they wanted a challenge. As Haider Al-Awwami, production supervisor at Safanaya in the mid-1980s, explained, “If it was money I wanted I would go and open a supermarket in al-Khobar. If I wanted a name and prestige I would go into government. I see a challenge in what I am doing here.”

Many young professionals jumped at the opportunity to demonstrate that Saudis could run their own oil company. Salm Abu Khamis graduated from the College of Petroleum and Minerals in 1973, and after a stint with another oil company and earning a master’s degree in petroleum engineering, joined Aramco in 1978. By 1984, he was superintendent of Safanaya Offshore Producing. He conceded that the isolation of offshore work was sometimes difficult, “but some Saudi has to do the job; we don’t want to be spoon-fed by expatriates.”

Other Saudis realized that a job with Aramco gave them the opportunity to make an impact on the company and in some cases the oil industry itself. One example was Hesham Al-Musaid, who joined Aramco after graduating with a degree in civil engineering from the University of Petroleum and Minerals. After reviewing the American Petroleum Institute (API) standard for design of storage tanks during the course of work on a project, he concluded that two of the assumptions on which the standard was based were incorrect. He recommended changes that would result in a more conservative and safer standard. The API Standards Committee accepted his proposal, and the standard was revised accordingly in the late 1980s.

The consolidation of computer-intensive work at EXPEC in the early 1980s opened up a new field of endeavor for ambitious Saudis. Ibrahim S. Mishari joined the company in 1974 after earning a doctorate in computer science from Leeds University in the United Kingdom, and became manager of the Computing Technology Department in 1984. He was attracted to the oil industry by “the scope of the work and the challenge,” he said. “I was becoming more aware of oil and its future importance.” He saw Aramco as representing the future of computer applications in the petroleum industry. Mishari advanced through the ranks, leading the company through successive waves of computer modernization and information technology advances. He retired as vice president of Marketing and Supply Planning in 2007.

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Petroleum Sleuths

EXPEC brought together under one roof the equipment and expertise to enable Aramco to move to the forefront of world-class technology in exploration, drilling and reservoir engineering. Company personnel, rather than outside consultants, could now conduct company headquarters in Dhahran their search for hydrocarbons and the best means of producing them.

Within the Exploration & Producing organization, a variety of geoscientists and petroleum engineers today consider a host of clues gathered from seismic surveys, core samples, wire-line logs and other means, and employ tools ranging from satellite surveys to scanning electron microscopes. The overall goal of all this data analysis, explained Dave Cantrell, former chief geologist and current chief technologist in the EXPEC Advanced Research Center, is “to characterize the reservoir, its internal stratigraphy or architecture.”

A hydrocarbon reservoir is more like a sponge soaked with oil and gas, rather than an underground lake, and two key factors in how productive a reservoir might be are how big the holes are in the sponge and how they connect, known as porosity and permeability. Some reservoirs might contain a lot of hydrocarbons in the pore spaces within the rocks, but unless the rock is permeable, the hydrocarbons will likely remain trapped in the stone. Porosity and permeability are therefore vitally important for petroleum engineers to know.

Thus, in one sense, petroleum engineers in EXPEC see hydrocarbon reservoirs as a giant plumbing problem. What is the best way to drain the fluids from the reservoir? “With multilateral wells and horizontal drilling, understanding the inner structure is even more important,” Cantrell noted.

After earning a master’s degree in electrical engineering from Oregon State University, Altunisi declined several job offers from companies in California’s Silicon Valley to return to Saudi Arabia in late 1982 and work in EXPEC. She immediately began writing petroleum engineering computer applications on a state-of-the-art IBM mainframe. Within a few years, Altunisi was working in project management, on assignment in Houston, Texas, overseeing multimillion-dollar contracts. In 2005, she was promoted to manager of the Project Support and Controls Department, overseeing a staff of more than 380 employees. The following year, she returned to the United States and earned an executive MBA from Stanford, and then was called on to serve as the company’s director of engineering on a proposed petrochemicals project with Dow Chemical Co. In 2006, Altunisi was included on a list of 25 influential women from around the world in project management by PM Network magazine.

Thuraya Al-Arrayed, who joined Aramco in 1980, obtained her doctorate in educational planning and administration from the University of North Carolina in 1976. The company had wanted her to start immediately in Corporate Planning, but she insisted that she preferred to get a good overview of the company’s range of activities first, and that Public Affairs was a better starting point. One of her first projects was to start a mobile library program as community outreach to local schools. She worked with a designer to retrofit two used vehicles as mobile libraries to carry books to schools across the Eastern Province.

In another project, Al-Arrayed wrote Public Affairs’ first guidebook for implementing the then new Personal Development Program, which became the seed for the Professional Development Program guidebook that today is used throughout the company. In 1981, she joined Corporate Planning as its first permanent Saudi employee. Upon her request, one of her first assignments was to assist in coordinating the company’s five-year planning process with that of the Kingdom’s plans for the energy sector. Huda M. Al-Ghossan received an undergraduate degree in English literature from Riyadh’s King Saud University (then known as Riyadh University) before joining Aramco’s Medical Services organization in April 1981 as a patient relations representative. A few years later, the company granted her a leave of absence to complete her master’s degree in business administration at American University in Washington, D.C. Shortly after receiving her master’s degree in 1986, she transferred to Industrial Relations, where she completed various assignments of progressive responsibility until becoming the first woman in a corporate adviser position. In 2007, Al-Ghossan was the first woman named to the board of directors of a company subsidiary when she joined the board of Vela International Marine Limited. Two years later, Al-Ghossan was appointed general manager of Training and Career Development.

Fatema H. Al-Awami, a supervisor in the Reservoir Description and Simulation Department, earned a degree in engineering in the early 1980s from the University of Southern California. She attended the University of Southern California and graduated in 1984 with a degree in petroleum engineering. She put her skills to good use in reservoir simulation, contributing to work on the Safaniya, Shaybah and Manifa projects, among many others. Al-Awami was one of the developers of the Event Solution, an innovative multidisciplinary approach to resolving reservoir management issues.

NEW NEIGHBORS The dramatic increase in hiring beginning in 1980 caught Aramco without enough housing, remanding company veterans of similar situations during the 1950s. New housing units were constructed as quickly as possible, but the company could not keep up with the stream of new recruits—expatriates as well as Saudis. New employees often found themselves living in trailers or other temporary housing while permanent accommodations were built.

James R. Tracy, a member of the Tracy family mentioned earlier (p. 15), lived in Ras Tanura from age three until he went away to high school. He was recruited by Aramco in 1980 after serving in the U.S. Army, earning a master’s degree in international management and working in banking. He had fond memories of a spacious house and a grassy yard in Ras Tanura. But

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Thuraya Al-Arrayed, a planning adviser with Saudi Aramco at the time, was a featured speaker at the Doha Debates in Qatar in 2005. After earning her doctorate from the University of North Carolina in 1976, Al-Arrayed began her career in Aramco Public Affairs.
LEAN TIMES Saudi Arabia has often been one of the few voices of oil market stabilization at OPEC. When revolution temporarily halted the flow of Iranian oil in the late 1970s, many OPEC members raised prices in response to the shortage. Saudi Arabia stood by the official price, however, and strove to persuade other OPEC members to choose stability over short-term profit. However, the combination of reduced demand stemming from energy conservation measures enacted in the West and Japan following the price hikes of the 1970s, the continuation of high production levels by OPEC, and increased production from Alaska, the Gulf of Mexico and the North Sea resulted in lower oil prices in the 1980s. Oil on the spot market peaked in 1981 at $42 a barrel. In October 1981, OPEC finally agreed to stabilize the price of oil at $34 a barrel if Saudi Arabia would lower its output.

The compromise, however, came too late to prevent a crash. While Saudi Arabia again struggled to maintain the official price, other OPEC countries dropped their prices to stay competitive with oil from the North Sea and other new fields. When prices started declining, OPEC...
In Saudi Arabia, expatriate ranks were thinned significantly by the time the payroll hit its low point of about 43,500 employees in 1987. More than 14,000 of the 17,000 positions elimi-
nated since 1982 had been held by expatriates. Among Saudis, many longtime employees were
encouraged to take early retirement. With so many expatriates leaving or taking early retirement,
by 1985 the Saudi component of the workforce had increased to 65 percent.

The impact of the downturn on the smaller Aramco housing compounds was especially
striking. Aramco began a phased withdrawal of families from ‘Udhaiiyah in 1985 in anticipation
of shuttering the entire community. The size of employee populations at Tanajib, Khurais, Abu
Ali, Shedgum and Berri was slashed by 60 percent. In addition, from the end of 1984 through
the end of 1985, the number of contractors with living quarters assigned by Aramco plunged
from 6,400 to 1,600.

It was a tough period for those who remained at the company as well as those who were let
go or took early retirement. For many who had joined during the booming 1970s, it was their first
lesson in coping with lean times. Khalid Al-Falih worked as a project engineer during the early to
mid-1980s: “The company went through a painful period. There were layoffs, there were cutbacks
in budgets, there were a lot of adjustments that we had to make. . . . That period also taught us as
individuals as well as an institution a lot in dealing with the upsides which we did in the 1970s, but
also managing to work under more austere financial conditions in the 1980s.”

“THE BIG PICTURE” Saudi industry received a dramatic boost from the new sources of power and
feedstocks provided by the Master Gas System and other projects that originated with the Second
Five-Year Development Plan. By 1986, after the MGSS had been expanded to include offshore
fields, Aramco had the capacity to produce up to 2 billion scfd of gas.

In the summer of 1985, the Saudi government abandoned the quota strategy. By producing
large quantities of crude oil, Saudi Arabia hoped to regain market share from non-OPEC sources
with higher production costs. Crude oil prices plunged to levels not seen since before the 1973–1974
price hikes. In 1986, oil prices dropped more than 50 percent below bottoming out at less than
$10 a barrel. Faced with tumbling oil prices, OPEC members returned to the negotiating table in
1986. While not wholly satisfactory to anyone, the resulting revised quota system successfully
stabilized oil at between $15 and $18 a barrel through the end of the 1980s—the same price it
had sold for in 1979.

Aramco planners had bascd estimates of the company’s output and staffing needs for the
1980s on late 1970s trends that had been wildly optimistic, as had planners at most major
oil companies. Indeed, the boom-and-bust trend in oil prices had frustrated industry executives
since the early 1970s and continued to do so through the decade that followed. Aramco’s aver-
age daily production hit a record high of 9.63 million bpd in 1980. Four years later, production
at times dipped as low as 2 million bpd as demand contracted. In 1985, Aramco’s average daily
production stood at 3 million bpd, the lowest since 1969.

The personal toll was dramatic. The company’s 1980 estimate that it would employ 75,000
workers by 1985 proved off the mark. Instead, the total was slightly more than 50,000 by mid-
decade, about 15 percent below its peak in 1982 of 61,227. At Aramco Services Company in
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Saud contractors and other companies that supplied goods and services to Aramco also benefited from the construction prompted by Aramco’s expansive budgets of the early 1980s. In a number of locations, the company trained contractors in tandem with its new employees to ensure there was adequate manpower to complete its ambitious roster of projects. The dramatic growth among contractors and other Saudi companies led to a considerable amount of poaching of Aramco’s talent.

Some promising trainees were recruited by Saudi companies, which often offered higher starting salaries than Aramco. But that was the price Aramco paid for running a quality training program, said Abdulaziz Al-Hokail in 1984. “They are stars that shine in any company they go to,” he noted. “If you have been working with Aramco you are recognized. We have discipline and experience.”

Hamad A. Juraifani, vice president of Northern Area Manufacturing at the time, lamented the departure of these young Saudis, but was able to see the contribution of the program in broader terms: “Although we have lost a lot of experienced Saudis to the private sector, we Saudis [at Aramco] look at the big picture: what is good for the Kingdom.”

Sadad Al-Husseini, then vice president of northern Area operations, put a team together to study the issue and create a mothballing plan. The concept was simple, but the scale was very large: Clean and store everything so that it would not corrode or deform, and provide enough maintenance so facilities could be reactivated quickly. Crews lifted huge rotors and turbines out of their moorings, put them on end—if left horizontal while not rotating, they would deform under their own weight. They pumped diesel fuel through pipelines to displace all the corrosive sour crude. Likewise, nitrogen, an inert gas, was pumped through sensitive systems and equipment to displace corrosive oxygen-containing air. A minimal amount of power directed to instrument systems in control rooms kept them dry. Three or four guards provided security on each major offshore facility, minimizing personnel costs.

While a group of executives and engineers responsible for major offshore facilities in the company’s Northern Area Operations was exploring cost-cutting ideas, some of the group came across an engineering journal that described the “mothballing” of U.S. Navy warships after World War II. The executives began thinking: If it worked for warships, why not oil-processing plants?

Aramco’s talent. government—slashed construction budgets and canceled or delayed major projects. the ripple effect was felt in virtually every corner of the Saudi economy.

**MOOTHBALLING** Aramco shuttered some facilities as crude oil production fell in the 1980s. That made economic sense for some older operations, such as an oil processing plant in Manifa, where the company was facing hefty maintenance and repair costs. However, for others it proved extremely costly: A planned refinery in Qasim in central Saudi Arabia was canceled, but the cost of terminating construction contracts and other costs made dropping the project roughly as expensive as completing it. There had to be a better way.

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The concept was simple, but the scale was very large: Clean and store everything so that it would not corrode or deform, and provide enough maintenance so facilities could be reactivated quickly. Crews lifted huge rotors and turbines out of their moorings, put them on end—if left horizontal while not rotating, they would deform under their own weight. They pumped diesel fuel through pipelines to displace all the corrosive sour crude. Likewise, nitrogen, an inert gas, was pumped through sensitive systems and equipment to displace corrosive oxygen-containing air. A minimal amount of power directed to instrument systems in control rooms kept them dry. Three or four guards provided security on each major offshore facility, minimizing personnel costs.

Facilities in the Marjan, Zubair, and Safaniya offshore fields were all mothballed using this approach. Oil from the offshore wells served by these facilities was piped at reduced volumes to facilities on shore for processing. GOSPs at Hawiyah, Haradh and ‘Uthmaniyah were also mothballed. Similar mothballing was applied to facilities in Khurais, Abu Safah, Harmalayh and Mizaj, the community at ‘Uthmaniyah and the 152-centimeter pipeline running from the Qurayyah Seawater Treatment Plant to the Ghawar field.

Saad A. Turki, a production engineer in ‘Uthmaniyah during the early 1980s who later became vice president of Southern Area Oil Operations, recalled that the mothballing process did not just look at the aboveground impact of shutting in facilities. Petroleum engineers also analyzed the impact on the oil reservoirs. “We had to go and conduct studies to find out exactly what are the most critical areas to mothball and shut down those that will have no effect on the reserve,” he said.

Aramco formed its own shipping subsidiary, Vela International Marine Limited, in 1984. Vela draws its name from the constellation Vela, part of a much larger constellation known in ancient times as Argo Navis, the ship of the mythical Jason and the Argonauts. Argo Navis was split up into four smaller constellations: the Argo (Vela), the keel (Carna), the stern (Puppis) and the compass (Pyxis); the ships in the Vela fleet were named after stars in Argo Navis. Aramco had long used the stars to help them navigate their vast desert and sea expanses, now these “stars” would lead Aramco’s expanding fleet of oceangoing tankers.

The Sails

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A drilling crew works in the Safaniya oil field in 1982. Even though world demand for oil was dropping, resulting in a concurrent drop in Aramco's production from more than 9.6 million bpd in 1981 to a low point of 3 million bpd in 1985, the company kept building production capacity in anticipation of future demand. The strategy proved to be prescient at the end of the decade.
The costs associated with mothballing were significant. They were paid back several times over, however, when global demand rebounded, along with prices, beginning in the late 1980s and continuing into the early 1990s. Mothballing expenses paled when compared to the cost and time involved in building new facilities after demand had already started to increase. In this manner, the mothballing program dovetailed with the company’s approach to maintaining spare production capacity to help stabilize global energy markets.

**Non-associated Gas**

The overly optimistic projections that drove planning for crude oil production as the 1980s began also impacted plans to utilize natural gas to fuel economic growth in the Kingdom. When the MGS was designed in the mid-1970s, it was based on the assumption that Saudi crude oil production would climb steadily to a level of 12 million to 15 million bpd by the mid- to late 1980s. That amount of crude oil would yield a corresponding amount of associated gas to meet much of the Kingdom’s estimated gas requirements. The rapid decrease in oil production in the early 1980s clearly indicated that unless drastic steps were taken, Aramco would not be able to produce enough gas to meet the country’s projected needs.

With little if any commercial demand for Saudi gas in the early decades of oil exploration, Aramco engineers had not focused on locating potential non-associated gas reservoirs. (Non-associated gas is free gas, or gas not associated with crude oil in a reservoir.) However, they had inadvertently found a large non-associated gas reservoir in the late 1940s in the Dammam Dome, where oil had first been discovered. Dammam Well No. 43 was deepened significantly after World War II as the company searched for additional sources of oil. At a depth of between 3,350 and 3,660 meters, the drilling crew hit what would become known as the Khuff formation, which contains non-associated gas.
A team including Narilah Mousli, manager of Reservoir Engineering, petroleum engineer Martes Yushafly and Vice President of Petroleum Engineering and Development Ed Price developed a program to revisit existing oil wells and drill deeper in search of Khuff gas. There was one problem, however: they did not have a budget to drill for gas, and with Aramco trying to cut costs whenever possible during the mid-1980s, they were not likely to secure funding anytime soon. However, with crude oil production plummeting, the team needed to do something fast.

As Sadad Al-Husseini recalled:

Whenever we had a well that was located at a promising location, I would get the engineers to change the program to deepen it two, three thousand feet and say we’re doing this for structural delineation … just to tap into the gas and find it … The oil would be at about 7,000 feet, and we’d get down to maybe 9,000 feet to find the Khuff (gas). So by the time we were running out of gas because oil production was coming down, we had enough information on the Khuff in North Ghawar to be able to concoct a program where we would produce some of the wells as gas wells.

The Khuff gas project officially commenced in 1983. The gas, after passing through a pressure-reducing and processing system, was sent into the MGS. By 1985, Aramco’s capacity for non-associated gas reached 1 billion scfd. As Al-Husseini recalled, “We never made as much (non-associated) gas as we had designed the system for, but it was enough to save the Kingdom many years of low oil production.”

“SELL MY QUOTA” Since the 1973–74 price shock and embargo, OPEC countries, for the most part, had wrested control of prices out of the hands of the major oil companies and tried to set member-country production quotas. The system worked to varying degrees, subject to geopolitical events and each country’s willingness to adhere to its agreed production caps.

Today’s pricing methods, however, were born out of the chaos of the mid-1980s price collapse. In 1985, OPEC members adopted “net-back” contracts to try to stabilize prices. Such contracts pegged the price of crude oil to the value of a refined product, after subtracting refining costs, margins and freight.

The jarring downturn in crude oil prices in 1986 sent oil producers in search of a new pricing mechanism. In December 1986, OPEC created the basket of prices, which quoted amounts for pricing Saudi crude oil for more than two decades. Beginning in October 1987, Aramco priced its crude oil based on the prices for crude oil produced from a particular region, minus a certain differential based on several factors, including the quality of the oil, the distance from Saudi Arabia and related shipping costs. The company sold Saudi crude oil in the United States based on the price for West Texas Intermediate oil; in Europe, based on the Brent Weighted Average price for North Sea oil, and in the Far East, based on the average price quoted in Dubai and Oman.

The Smokeyless Flare

In 1986, as part of Aramco’s ongoing effort to reduce the flaring of natural gas, the company completed the installation of a new, modernized safety flare system in Abqaiq, which dramatically reduced the amount of gas flared at such facilities. Flares are needed as emergency sources of burning excess gas, which occurs at times during the production process or in the case of a plant malfunction or regular maintenance shutdown. The new flare consumed eight times less gas than the flare it replaced. In addition, its atmospheric emissions were nearly 10 times less than its predecessor.

In 1999, a young Saudi engineer named Mazen M. Mashour invented a smokeless flare system technology that uses nonconventional methods of operation and won a Gold Award at the Institute of Petroleum Engineers Conference in New York. Mashour’s smokless flare was first installed at Shaybah in June 2000 and was subsequently included at gas plants in Yamaniyah and Shedqum in 2005.

In May 2008, a joint venture agreement to produce Mashour’s invention on a commercial scale was signed between the Al-Rushaid Group of Saudi Arabia and Zeus, a U.S. combustion technology company based in Tulsa, Oklahoma. Saudi Aramco will be the first customer with a project to upgrade 29 GOSPs and two other facilities in Southern Area Oil Operations with the new technology.
By 1987, rebounding industrialized economies had increased demand for oil, and prices reversed a five-year decline. Late that year, OPEC set a reference price of $18 a barrel, far from the $7 a barrel or less for which many types of Arabian Gulf crude oil had been selling in July 1986. Aramco’s 1988 average daily production of 4.93 million barrels was the highest in six years. Rising employment levels reflected this increase. While still well below its peak of 61,227 employees in 1982, the number began to trend upward, with 43,822 employees on the payroll by 1988.

Expanded production prompted a modernization of Ras Tanura Refinery, including construction of a new 250,000-bpd crude oil distillation unit and a major upgrade of Saudi Arabia’s East-West Crude Oil Pipeline. The pipeline, 122 centimeters in diameter, at the time delivered 1.85 million bpd to Yanbu for refining or export. Aramco took over operation of the crude oil pipeline from Petromin’s Petroline in 1984, and began implementing a major expansion by laying a parallel 142-centimeter pipeline connecting to the existing pump stations, which were required to pump oil across Saudi Arabia and lift it over the Kingdom’s western mountains. The second line boosted capacity to 3.2 million bpd. An additional pump station completed in 1992 increased total crude oil capacity to 5 million bpd.

**Quick Response**

On the evening of August 15, 1987, Abdallah Jamrah, then vice president of Government Affairs, found himself managing a crisis. Malfunctioning equipment at the company’s Juraymah Gas Plant had resulted in a serious fire, catching the company’s operating crews by surprise. The only injuries were burns sustained by four workers. By responding quickly to minimize damage and utilizing backup resources, the operating crews at Juraymah managed to maintain a continuous flow of ethane feedstock to the industrial city in nearby Jubail and elsewhere, and a flow of NGL for export. With Aramco President Al-Naimi out of the country on vacation, Jamrah became company spokesman and chief liaison officer with the government.
As early as 1986, Al-Naimi had been advocating, in conversations with the Ministry of Petroleum and Mineral Resources, that the company should become more of an integrated petroleum company. Rather than limiting itself mostly to the “upstream” part of the industry, which includes exploring for and producing petroleum, Aramco should diversify, Al-Naimi believed, into what the industry terms “downstream” activities, which include international refining, distribution and marketing of petroleum products.

Jum’ah’s task involved careful communication with government officials to allay fears that the accident might have been the result of a deliberate attack and to reassure customers that supplies of feedstock and fuel would not be interrupted. He worked closely with one of Aramco’s leading in-Kingdom customers, Saudi Arabia Basic Industries Corporation (SABIC), communicating critical information in the crucial period after the accident occurred. In a subsequent meeting with Al-Naimi, then Aramco Executive Vice President Nassir Ajmi praised Jum’ah’s performance as well as that of the entire Aramco response team.

Khalid Al-Falih was a lead project engineer on the team that rebuilt Juaymah Gas Plant. Team members drew on years of training—and plenty of adrenaline, he recalled—getting the crucial facility back up to speed as soon as possible: “We put parts of the plant in service right away, and others were rebuilt in record time. So that was a highlight in terms of the intensity of the work, the long hours, the criticality of the project for the local industry.”

Aramco also reviewed the accident from fire and safety perspectives to absorb lessons that could be applied systemwide. “Accidents like this, as unfortunate and bad as they are, always force you to go back and reexamine your safety systems to determine what really went wrong,” Al-Falih noted. “In that case it was a hardware problem. Sometimes it’s people issues, but these accidents, we learn from them, and we improve our facilities, our systems and our human resource practices to make sure we avoid repetition of such incidents.”

A NEW NAME Saudi Arabia’s Council of Ministers met in November 1988 and approved the charter of a new national oil firm—the Saudi Arabian Oil Company, or Saudi Aramco—to assume the responsibilities previously carried out by Aramco on behalf of the government. (While the name “Aramco” no longer accurately reflected ownership of the company, it was retained to ensure continued name recognition as well as preserve a link to the company’s rich heritage.) The transition was seamless.

The company marked another milestone in April of that year—following the retirement of John J. Kelberer—when then-President Al-Naimi was also named the first Saudi CEO of Saudi Aramco, and Minister of Petroleum and Mineral Resources Isham Nazer was named the first Saudi chairman of the company’s board of directors.
The company proposed the forging of joint ventures with other international petroleum companies to increase the Kingdom’s revenue from its oil. With the green light from Riyadh, Kelberer led a team that entered into negotiations with several international downstream companies. In 1988, a company subsidiary formed a joint venture with Texaco in the United States called Star Enterprise.

Star Enterprise began operations on January 1, 1989, with assets that included major refineries in Delaware City, Delaware; Convent, Louisiana; and Port Arthur, Texas. With nearly 4,000 employees, the joint venture also included four marketing divisions in the United States, 48 product distribution terminals and more than 11,000 Texaco-branded service stations. While the company gained added value through its share of the profits from the refining, distribution and marketing of crude oil products in prominent or growing markets, its efforts to enter and expand into international downstream operations were part of a higher strategic goal. As it secured a share of a downstream operation, the company could also secure a long-term agreement to regularly supply the operation with Saudi crude oil. By doing so, the company secured an outlet for its oil and reduced its vulnerability to market changes.
In 1989, Saudi Aramco geologists and drilling teams made headway in this new exploration campaign when they found oil in previously unexplored areas. Premium-value Arabian Super Light crude oil (which is extremely low in sulfur) was struck at a depth of about 1,900 meters at Hawtah in central Arabia, south of Riyadh.

In the five years from 1989 to 1994, Saudi Aramco discovered 15 oil and gas fields in the central, western and northwestern regions of the Kingdom. Found by using increasingly sophisticated technology to peer into previously uncharted regions, these discoveries heralded a new era of hydrocarbon exploration.

The Star Enterprise joint venture and the exploration successes, coming after Saudis had taken over management of the company, signified a renewed vitality at Saudi Aramco. The company continued to look internationally to increase its business over the coming years. In response to mounting global demand for crude oil, Saudi Aramco began reactivating numerous facilities that had been mothballed early in the 1980s. New plants and facilities were slated for construction. Little did Saudi Aramco officials realize how fortuitous their expansion plans would prove to be.