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Extracting Oil from Sand & Rock

Alternative technologies provide a critical
bridge to renewable energy sources



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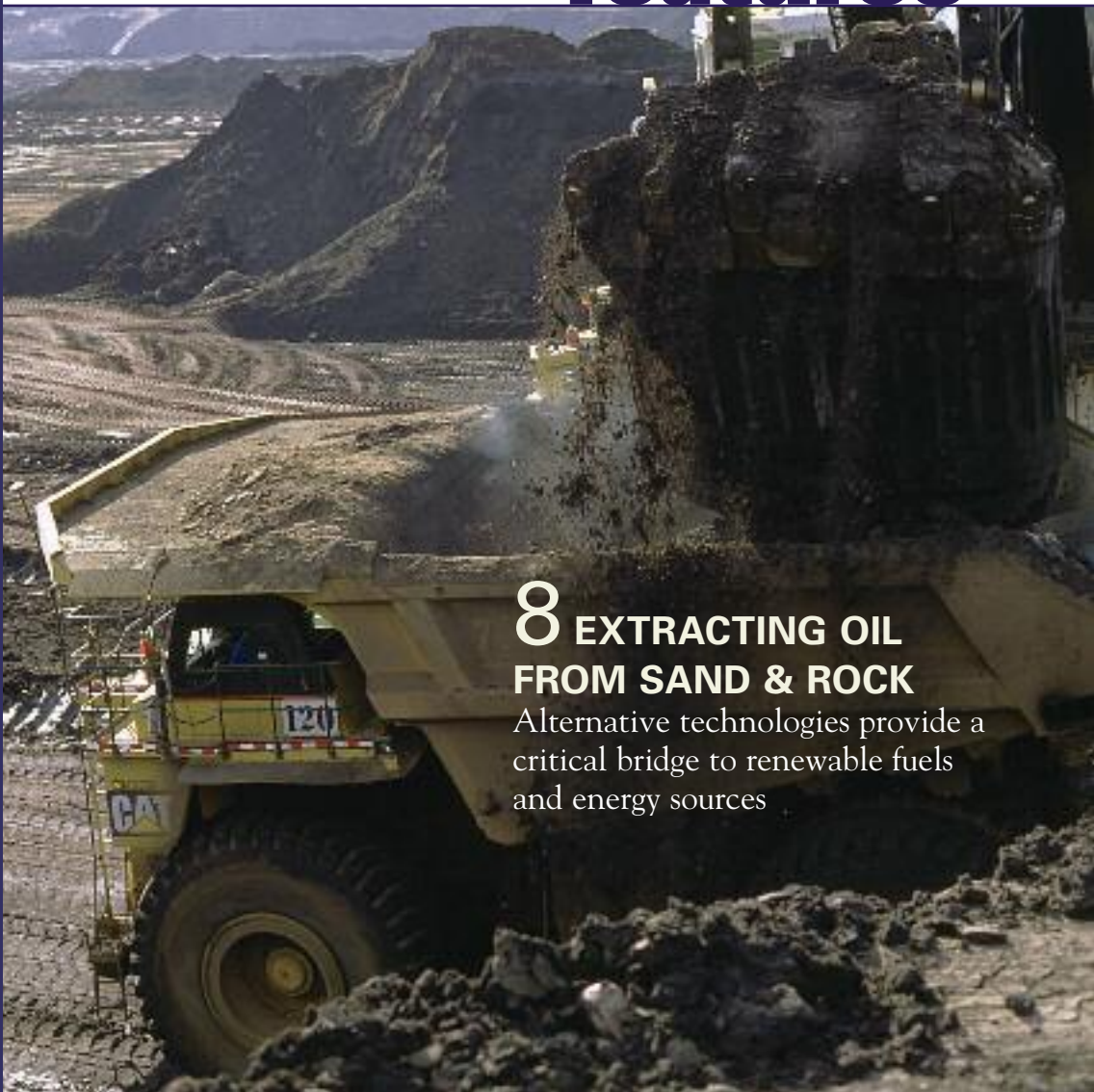
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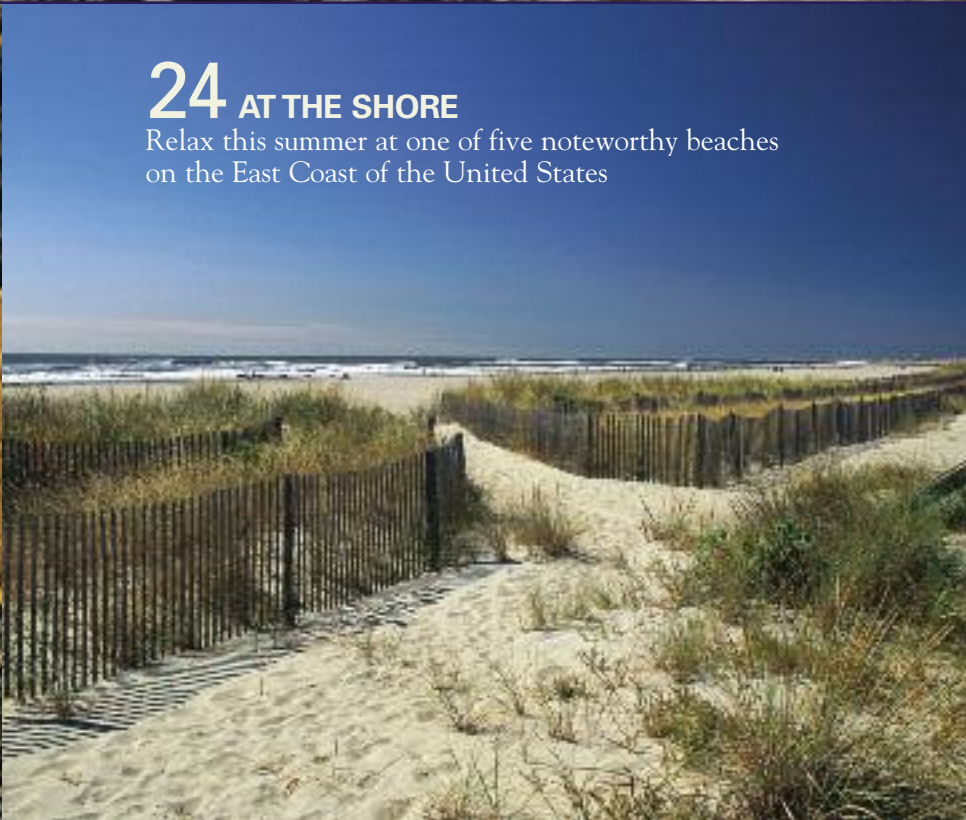


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Standing the Test of Time



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but one thing that has remained steadfast over the decades is Dixon's commitment to our customers.

Something else that Dixon customers have come to depend on is the delivery of the *Dixon Driller* newsletter, which, with two exceptions, has been mailed to customers every month since its creation. Over the years, many folks have shared with us how they enjoy the history, trivia and humor published in each monthly edition. With this in mind, we decided to add a new feature to *BOSS* magazine—a *Dixon Driller* page, found on page 31, so we can share these gems with more readers.

We hope you enjoy the new addition to *BOSS*! If you have any comments or questions about the publication, please e-mail us at boss@dixonvalve.com. As always, we look forward to hearing from you!

Thanks for reading.

Dick Goodall

BOSS

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ASIA/PACIFIC – WINTER 2009

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Admitting Errors

BY MICHAEL JOSEPHSON

As several listeners pointed out, I once made a broadcast mistake when I attributed the Army's slogan: "Be all that you can be," to the Marine Corps. I apologized to all concerned. It was a foolish error.

It's a lot easier now for me to admit when I'm wrong than it was earlier in my career. A turning point occurred during my third year of teaching law while I was still the youngest professor at my law school. During one of my classes, after I explained a particular statute, a student suggested that I had misinterpreted the law. In fact, he said, it meant the opposite of what I said. I read the provision again and it was immediately apparent that he was right. More crucially, I was wrong.

My immediate reaction was to confuse the issue and bluff my way through. But I realized that if I failed to fess up, I'd be sending more than 100 soon-to-be lawyers into the world with dangerous misinformation. I remember the sinking feeling that

my academic career was about to be nipped in the bud. Though I thought the earth would open up and swallow me, I was surprised that my disclosure simply produced some murmurs and frantic note-taking.

Still, I was mortified and as soon as the class ended I darted for the exit. To my horror, the student who corrected me cut off my escape. I was ready for the worst when he said, "Professor Josephson, I want to thank you. This was the first time I ever saw a teacher admit he was wrong. It was great."

Thanks to this gracious student, I not only survived my first public error (there were many more to follow), but I learned that admitting a mistake can actually build credibility. I think of this every time I see someone squirming shamefully to cover up rather than confess an error. ■

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Amelia Earhart stands in front of the Lockheed Electra in which she disappeared in July 1937.

Flying High

Amelia Earhart is remembered for her fateful flight, but her life was filled with accomplishments—both in the skies and on the ground

BY SARAH ACHENBACH

“It was a thing of rusty wire and wood and looked not at all interesting.” Such was Amelia Earhart’s recollection of the first time she laid eyes, at age 10, on an airplane at the 1908 Iowa State Fair. Her passion for aviation and her feats as one of its greatest pioneers would capture—and continue to hold—the world’s attention long after Earhart’s mysterious disappearance on July 2, 1937, during her attempt to become the first person to fly around the world.

With an adventurous spirit both born and bred—her mother, Amy Earhart, was the first woman to scale Colorado’s Pikes Peak, and young Amelia’s tomboy exploits in Kansas included building a homemade roller coaster and shooting rats with a .22-caliber rifle—Earhart was not afraid to break the molds that early 19th-century society set for women. After graduating from high school in Chicago in 1915, she served as a civilian nurse’s aide during World War I in Toronto, where she, once again, saw an airplane up close. This time, she was impressed. “When the snow blown back by the propellers stung my face, I felt a first urge to fly,” she wrote. In 1921, Earhart began flying lessons, and bought her first plane a year

later: a used, bright yellow Kinner Airster.

Though she took classes at Columbia University and worked as a social worker in Boston, flying quickly became a consuming passion. On Oct. 22, 1922, she broke the women’s altitude record, flying to 14,000 feet, and by age 30, Earhart was among a handful of licensed female pilots in the United States. Known for her courage, competency, compassion and engaging demeanor, she was selected to be the first woman crew member and captain on a 1927 trans-Atlantic flight, one year after Charles Lindbergh’s famous flight. Only the men aboard were allowed to pilot the craft and receive payment, but the 20-hour, 40-minute trek made her internationally famous. The publicist for the expedition, George Putnam, helped her publish a book about the flight, and in 1931, he became her husband.

Over the next six years, Earhart lectured, wrote, co-founded an airline, designed a line of aviation clothes and active wear for women and set three aviation speed records. Her “firsts” include being the first woman to reach 18,415 feet in an autogyro (a precursor to the helicopter), the first woman to fly solo across the Atlantic (for which Congress awarded her the Distinguished Flying Cross), the first woman to fly nonstop coast to coast, and the first person to fly solo from Honolulu to Oakland, Los Angeles to Mexico City and solo nonstop from Mexico City to Newark. In 1935, Purdue University asked her to join its staff as a visiting faculty member, and Earhart enjoyed lecturing on career opportunities for women.

Earhart believed the pinnacle of her career as a long-distance "stunt" flier, though, would be completing the never-before-attempted flight around the world. "I have a feeling that there is just about one more good flight left in my system, and I hope this trip is it," she wrote of the 29,000-mile trip in her Lockheed Electra 10E aircraft.

On May 21, 1937, Earhart and former Pan American Airways navigator Fred Noonan flew the first leg from Oakland to Miami, with millions around the globe following the historic flight. On July 2, 1937, they began the final and most dangerous leg: crossing 2,500 miles of the open Pacific Ocean in search of the tiny, 2-mile-long Howland Island. Neither pilot nor navigator had much experience using the aircraft's two-way radio or knew Morse code well, but the U.S. Coast Guard cutter *Itasca* was stationed at Howland Island to help guide the plane via radio. Earhart knew well the risk of the 18-hour flight from Lae, New Guinea, to Howland Island, stating, "I shall be glad when we have the hazards of its navigation behind us."

At 6:45 a.m. on July 2 (Earhart had flown over the International Date Line), the radio crackled aboard the *Itasca*. Earhart's voice asked for a bearing. Her message nearly an hour later informed the ship's crew that the plane was low on fuel and that they could not locate the island. The *Itasca* crew responded to each of Earhart's four messages, but Earhart did not stay on the radio long enough for the ship's crew to get a

bearing on the plane. Her final message came at 8:45 a.m. with news that she was "running the line 157-337." Then there was silence. Two hours later, the largest U.S. military search to date ensued with nine ships and more than 60 planes searching the South Pacific for two weeks with the full backing of President (and Earhart's friend) Franklin Delano Roosevelt. Earhart, Noonan and the plane were never found.

Just what happened remains a mystery. Some researchers claim she was a U.S. spy and was captured and tortured to death in a Japanese prison. Another has her plane landing in the Marshall Islands with the crew released by the Japanese and Earhart returning to the States to live an assumed identity in New Jersey. Others, such as The International Group for Historic Aircraft Recovery, believe she crash-landed on a small island and died in the jungle. Searches have produced tantalizing artifacts (bones, a woman's shoe, plane parts), though all theories remain inconclusive. Earhart's only sibling, Muriel Earhart, believed her sister's plane crashed into the ocean and was submerged within minutes.

The hold Amelia Earhart continues to have on the world nearly a century after she took to the skies is less about her final hours and more about a life filled with risk, courage and sheer joy of following her passion. "The most difficult thing is the decision to act, the rest is merely tenacity," she once said. "You can act to change and control your life; and the procedure, the process, is its own reward." ■

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Extracting Oil from Sand & Rock

Alternative technologies
provide a critical bridge
to renewable fuels and
energy sources

By Virginia Hughes

Spread across the mountainous region where Wyoming meets Utah and Colorado, the 48-million-year-old Green River Formation holds tens of thousands of deer, millions of fish and dinosaur fossils and 213 billion tons of oil shale—the fine-grained sedimentary rock that, when properly cooked, turns into oil.

Energy experts estimate that the Green River Formation's oil shale reserve holds at least 800 billion barrels of recoverable liquid oil. About half lies in a 35-by-45-mile plot of the Piceance Basin, on U.S. federal land in northwestern Colorado.

“It’s a very, very compact area,” says James Bartis, a senior policy researcher at RAND Corp., a nonprofit U.S. research organization. “And in that area alone, we’ve got more oil than all of Saudi Arabia.”

Meanwhile, 1,500 miles north, underneath the Boreal Forest in Alberta, Canada, rests the world's largest reservoir of crude bitumen. This "heavy oil" is trapped inside a sticky, dense mixture of sand and water known as "oil sands." The Canadian oil sands are processed by just a few factories, the largest of which, Syncrude, produced 77 million barrels of its refined product in 2006—accounting for 14 percent of all Canadian oil sales.

If and when these alternative oil technologies advance, they will potentially help free North America from its dependence on foreign oil. "Because of that, they also provide a national security premium because that means less money goes to fairly unstable governments," Bartis says.

These industries have a long way to go—in both ensuring environmental protections and increasing output efficiencies—before they can be scaled up for worldwide use. Still, alternative oil technology advocates say it is going to be hugely important in the transition to a renewable energy system.

"This is a bridge," says Jerry Boak, director of the Center for Oil Shale Technology and Research at the Colorado School of Mines. "In the long run, we'll all use renewable fuels and energy sources. But that long run may be quite long."

Oil From Shale

About 48 million years ago, the Green River Formation consisted of two massive lakes, each full of robust blooms of blue-green algae. Over time, the algae accumulated in the sedimentary basins at the bottom of the lakes and, thanks to rapid climate swings, was periodically covered by mud and sand. Sheltered from the oxygen in the air, the algae decomposed very slowly, and was joined by layers of more algae and more sand. As still more time passed, the basin sank under the accumulated organic matter, and increasing temperatures and



The highest concentrations of oil shale are found in the United States, China and Russia.

pressures compressed the layers into carbon-based rocks, called oil shale.

Had the rocks been buried deeper, and left for another 250 million years, they may have formed coal, the black rock that's made of mostly carbon. But oil shale contains a premature form of carbon, called kerogen, which, when heated, turns into crude oil.

Most of the world's oil shale deposits are small, thin, and thus insufficient for commercial production. But in regions with large deposits—such as the Baltic Basin of Estonia and São Mateus do Sul, Brazil—oil shale is a viable commercial industry. (See By the Numbers, pg. 15.)

In these regions, miners obtain oil shale using one of two methods, depending on the depth of the deposit. For deep deposits, they use underground mining with a 'room-and-pillar' method, in which many 30-foot-square columns are cut vertically into the shale beds. These spaces (the 'rooms') are cut out in a parallel grid, leaving undisturbed 100-foot-wide 'pillars' of earth in between them. The pillars support the top weight of the mine while miners can dig out the shale in the rooms.

The second mining method, called surface mining, is simply removing the rock and plant material that's covering oil shale deposits close to the surface.

After mining, the oil shale is transported to a facility for retorting, a heating process that extracts the oil from the rock. The shale is crushed into small (half-inch to 3-inch) particles, then quickly heated and reheated in an approximately 100-foot-tall, steel vessel, called a retort, at 650 to 700 degrees Fahrenheit until the kerogen becomes liquid oil. After retorting, the oil goes through further chemical processing and is eventually shipped to a refinery. The oil-less rock leftovers, called spent shale, are usually dumped in landfills or put back into the mined area.

In November 2006, for the first time in 30 years, the U.S. federal government issued six, 160-acre "research, development and demonstration" (RD&D) leases for exploratory oil shale production on federal land in the Green River Formation.

"Our national and economic security depend on our developing domestic energy resources like the oil shale found in western Colorado," said C. Stephen Allred, assistant secretary of the interior for land and minerals management, in a public statement.

The U.S. government first looked into oil shale during World War I, and the Middle East oil crises of 1973 and

Oil shale resources

The U.S. holds more than half of the world's oil shale resources, but extracting the oil requires huge amounts of energy.

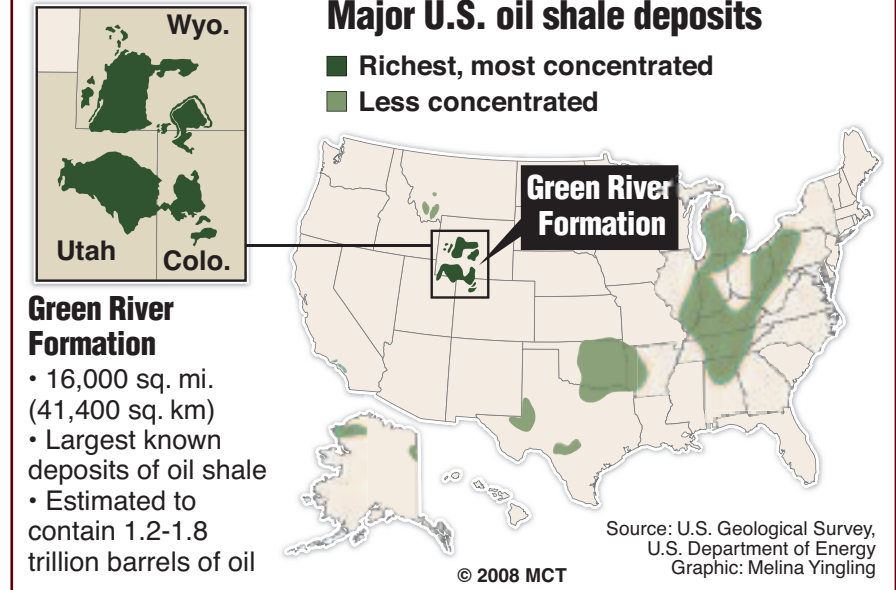
1979 caused a boom in the American oil shale industry. But by the early 1980s, when Middle East oil supplies were restored and prices plummeted, all but one American company abandoned oil shale development.

Slow-cooking Underground

Shell Oil Co. didn't give up. In 1982, on privately owned land in Rio Blanco County, Colo., Shell began testing a new, more efficient oil shale technology: heating the shale underground and then pumping it out as liquid.

This "in-situ" technology works by first lowering electric heaters into heating wells, spaced about 40 feet apart, that reach the shale deposits 2,000 feet below ground. The heaters, which reach between 650 and 750 degrees Fahrenheit, slow-cook the shale for about four years. In that time, the kerogen slowly changes into oil and gas, which are then pumped through separate recovery wells to the surface for further refining.

Keeping this liquid oil out of the

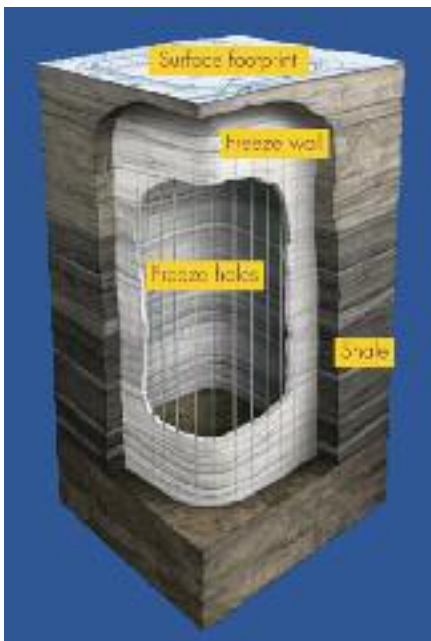


groundwater is one of the biggest challenges facing the technique. To solve this problem, in early 2007, Shell scientists began testing a "freeze wall" technology on the same private land in Colorado. The technology works by pumping boiling ammonia through pipes surrounding the shale deposits. Because ammonia's boiling point is 27 degrees

Fahrenheit below zero, this freezes the water surrounding the shale, and thus forms an impermeable barrier between the shale and the groundwater.

Shell representatives say they won't know the full effectiveness of the freeze wall until 2012. "I think they're cautious, but optimistic" about the feasibility of oil shale development, says

Shale oil heated to liquid form underground must be kept out of groundwater. Shell Oil Co. is using freeze wall technology to contain the liquid oil, below left. Steam-assisted gravity drainage technology injects steam into underground wells near oil sands deposits and collects the bitumen released by the heat, below right.





One of the world's largest resources of oil sands is located in Alberta, Canada. The sands are moved out to processing plants—at the rate of 500,000 tons per day—by the world's largest Caterpillar trucks.



Boak, director at the Colorado School of Mines.

Despite the excitement over the new federal oil shale leases, the leasers are still in the initial research and development stages, notes Glenn Vawter, executive director of the National Oil Shale Association, who has been an engineer in the Colorado oil shale industry for half a century. “The first thing they have to do is demonstrate the technology is going to be economically feasible and environmentally acceptable,” he says.

On the environmental front, one of the biggest obstacles may be water supply. Last fall, the Colorado Department of Natural Resources published a study that questioned whether the Colorado rivers could provide enough water for extensive oil shale production, which would consume 123 billion gallons of water a year.

Vawter says that oil shale developers are all looking at ways to reduce water consumption, such as using the region's wastewater. “Many developers believe their technologies will use much less water than stated in the study,” he says. Still, he admits that “we're certainly

into the next decade before there would be any commercial projects.”

Oil Sands Technology

If you think of oil shale as a kind of undercooked oil, then oil sands are more like overcooked oil: a sticky tar in which an extremely heavy oil, called bitumen, is embedded in sand, clay and water.

Scientists debate how oil sands formed, but the prevailing theory is that over millions of years, water and bacteria turned naturally occurring petroleum into bitumen.

The world's largest oil sands—which cover 54,000 square miles—are the Athabasca oil sands in northeastern Alberta. For centuries, Canadian Indians have used this tar to waterproof their canoes. In the early 18th century, European fur traders wrote home about it.

In 1883, Canadian geologist G.C. Hoffman discovered how to separate the bitumen from the rest of the tar. “When you put that heavy molasses in water, and heat it gently, it separates very nicely,” explains Eddy Isaacs, executive director of the Alberta

Energy Research Institute. That's because within the tar, water surrounds each grain of sand, separating it from the oil. By adding hot water, “you get all of the oil going to the top, and the sand settling on the bottom,” he says. “That's how the industry got started.”

Nineteenth-century Canadian explorers and geologists thought that the oily sand was a hint of black gold far below. In 1888, the director of the Geological Survey of Canada said that Athabasca was likely to become “the most extensive petroleum field in America, if not the world.” Between 1906 and 1917, 24 oil wells were drilled in the region. But all came up dry.

Half a century passed before the oil sands industry rose to commercial success. In 1978, a company called Syncrude shipped its first barrel of light crude product, called “Syncrude Sweet Blend,” which can be used just like regular crude oil. Today, it makes 350,000 barrels every day.

More than 70 countries benefit from a modest oil sand industry, but only Canada, Venezuela and the United States have robust production. Experts estimate a worldwide production of

1.25 million barrels of oil per day from oil sands. “That is a remarkable achievement, considering that you’re talking about an industry that’s quite young,” Isaacs says.

To mine the surface oil sands in Alberta, Syncrude and the handful of other Canadian oil sands companies start by cutting down spruce and fir trees from the Boreal Forest. Once cleared, they must dig out up to 150 feet of soil, rock and plant and animal habitat (called overburden) to finally uncover the oil sands. The sands are moved out—via the world’s largest Caterpillar trucks, with payloads of 380 tons—to processing plants where the tar is mixed with hot water, the bitumen separated and hydrocarbons added to make the synthetic liquid crude.

This surface mining—which is used for about 20 percent of oil sands reserves in Alberta—comes with significant environmental consequences. Huge sections of forest land must be destroyed;

160 square miles of forest was cleared in Canada in 2007 alone. And Canadian oil sands processing plants draw large amounts—up to 92,000 gallons per year, according to Greenpeace—of water from the Athabasca River. That water is recycled many times in the plant, eventually emerging as a black liquid full of toxic waste. It’s then funneled to nearby ‘tailing ponds,’ where it sits dammed and uncapped.

The other 80 percent of the oil sands reserves, resting beneath at least 250 feet of overburden, must be acquired using in-situ methods. Usually, this is done by injecting steam into horizontal wells near the base of the oil sand deposit. The steam thins out the tar, which can then be pumped to the surface for further processing.

Efficiency Concerns

The growth of these unconventional oil industries will depend mostly on the supply of conventional oil.

“The truth is, the world is running out of the cheap and readily available oil that we’ve had for the past century,” Isaacs says. He predicts that within the next decade, as demand for oil grows and supply drops, “you will see higher oil prices on average, and that will [mean] a lot of unconventional resources will be developed.”

One caveat to that idea is that both oil shale and oil sands depend on conventional oil. “Everything they use to mine it—the trucks and tires and steam shovels—comes from the main economy that’s driven by oil and gas,” says Charles Hall, a professor at the State University of New York College of Environmental Science and Forestry. “So when the price of oil and gas goes up, so does the cost of producing the alternatives.”

Even if economic and political pressures favored the production of oil shale and oil sands, Hall says that these technologies are not efficient enough

Extraction separation cells separate large masses of raw bitumen from the oil sand using the most advanced technologies in the industry.





One of the largest oil sands production plants is located north of Fort McMurray, Alberta. Officials there hope to more than double oil sands production to over a half-million barrels per day in the next decade.

“So the question for [unconventional oil] is, can you scale it up to make any sense of it all?”

Yes, say its advocates, and the sooner the investment is made, the better. “It’s slow and capital intensive,” says Boak. “There’s a lot of work that’s done before you get product out of it.”

The speed is all the more important, they say, because unconventional oils are only a short-term bridge to more sustainable forms of renewable energy, such as nuclear or wind power.

“We’re seeing the peaking of petroleum supplies in the world. In the next 10, 20, 30 years, it’s essential that we have some domestic supply that’s going to bridge the need,” says Vawter. “Nobody looks to unconventional oil as ‘the answer.’ It’s only one of a number of answers to get us to the ultimate energy solution.”

to take the place of conventional oil.

When making efficiency calculations, he says, the most vital figure is the energy return on investment (EROI), the net energy gained from a technology after subtracting the amount of energy it takes to produce it. In the large oil wells of the Middle East, for example, you get 14 units of

energy back for every one unit that you spend on pumping it out. The EROI for Canadian oil sands is about 3-to-1, and the EROI of oil shale is lower still.

“Three-to-one is great for companies, [because] you can make money on it. But our calculations show that the minimum required ... today is something around 5-to-1,” Hall says.

Coal-to-Liquids Technology

While some American engineers and geologists are trying to figure out how to profitably turn the country’s huge oil shale reserves into liquid oil, others are looking to do the same conversion from a long-proven source: coal.

“We have about 270 billion tons of coal, more coal than any other country in the world. We use about a billion tons a year, which means we have over 200 years of coal,” explains James Bartis, a senior policy researcher at RAND Corp. “If we took 15 percent of that coal and used it to make liquid fuels, we would be able to make something like 3 million barrels a day for almost 100 years,” he says.

These numbers are compelling, and “coal to liquids” (CTL) fuel technology was worked out a long time ago. First, coal is mixed with very hot water at very high temperatures. This results in a gas, called syngas, which is a mixture of hydrogen and carbon monoxide. The syngas, when exposed to a chemical catalyst, condenses into

liquid fuel, which can then be further refined into specific types of oil, including petroleum, diesel, synthetic waxes and methanol.

The major obstacle facing CTL development is not the technology itself, but carbon emissions. Producing oil from coal releases twice as much carbon into the air as drilling crude oil. “And that’s unacceptable these days,” says Bartis.

CTL would quickly take off, however, if scientists developed a successful carbon capture technology, says Bartis, who testified before Congress in 2007 with recommendations for CTL development. “We think there are approaches to using coal for making liquid fuels in which you can have greenhouse gas emissions at a significantly lower level than conventional petroleum,” he says. “On the other hand, not all of the technology for that has been proven, especially carbon sequestration.”

By the Numbers: Top countries in oil shale/bitumen reserves

Estimated Oil Shale Resources (million barrels)*

Country	
United States	2,085,228
China	328,000**
Russia	247,883
Democratic Republic of the Congo	100,000
Brazil	82,000
Italy	73,000
Morocco	53,381
Jordan	34,172
Australia	31,729
Estonia	16,286

*Source: 2007 Survey of Energy Resources, by the World Energy Council

**Source: Adjusted estimate by Jerry Boak, based on Jilin University study

Estimated Reserves of Extra-Heavy Oil and Bitumen (Primarily in Oil Sands) (million barrels)*

Country	
Canada	173,605
Venezuela	58,555
Kazakhstan	42,009
Russia	28,373
China	750
Nigeria	574
Angola	465
Indonesia	422
Italy	300
Madagascar	221

*Source: 2007 Survey of Energy Resources, by the World Energy Council

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Levi Strauss quietly started a San Francisco company making pants that would become a favorite around the globe

BY SARAH ACHENBACH

No other garment symbolizes new ideas, ingenuity and independent thinking quite like a pair of jeans. And no other person is as synonymous with the iconic garment as Levi Strauss, the dry goods merchant and co-inventor of the modern blue jean.

In 1847, when Strauss, then 18, arrived in New York City from his native Bavaria, denim and jean were two different fabrics. Jean fabric was a blend made of cotton, wool or linen, while denim, a close cousin of today's blue jeans, was a comfortable, durable fabric woven from cotton, wool or linen. Both fabrics were twills with one key difference: two same-colored threads were woven to make jean, while one colored thread and one white thread were (and still are) used in denim. In Europe, both fabrics were popular, with denim typically the fabric of choice for laborers while finer clothing was made from jean fabric. In America, both fabrics were used for work wear.





Levi Strauss' transforming influence on the fashion industry would blur the linguistic lines between the fabrics forever. Today "denim" and "jeans" are interchangeable terms, both referring to the same fabric. The garments he manufactured from denim would surpass all other fabrics in popularity for work clothes, and the men and women Levi Strauss & Co. outfitted—for work and play—would help shape a nation. Today, his blue jeans are deeply woven into the world's cultural and social fabric, a fitting legacy to Strauss, who was as modest and straightforward as the humble, utilitarian fabric he used.

Strauss was born Loeb Strauss in 1829 in Bavaria (now southern Germany), the youngest of dry goods merchant Hirsch Strauss' seven children. After his father's death in 1845, Loeb immigrated to New York City with his two sisters and widowed mother in 1847 to join older brothers Jonas and Louis in the family's wholesale dry goods business, the J. Strauss Brother & Co. Once in America, he adopted the nickname "Levi," and in 1853, became an American citizen. That same year, he headed west to San Francisco with his brothers' blessing to open up a dry goods business under his own name, while serving as a West Coast representative for his brothers' firm.

Strauss correctly reasoned that the prospectors and pioneers pouring into California for the Gold Rush would need dry goods. He began importing clothing and bolts of fabric from his brothers' firm to supply to small stores along the West Coast and in the other Western states. His business prospered, as did his reputation for fairness and an uncompromising work ethic. By 1863, the company was renamed Levi Strauss & Co.

His fate and the future of denim changed in 1872, when he received a letter from one of his regular customers, Jacob Davis, an immigrant tailor in Reno, Nev. Davis sent a sample pair of denim work pants with an interesting modification: copper rivets at the pocket corners and base of the

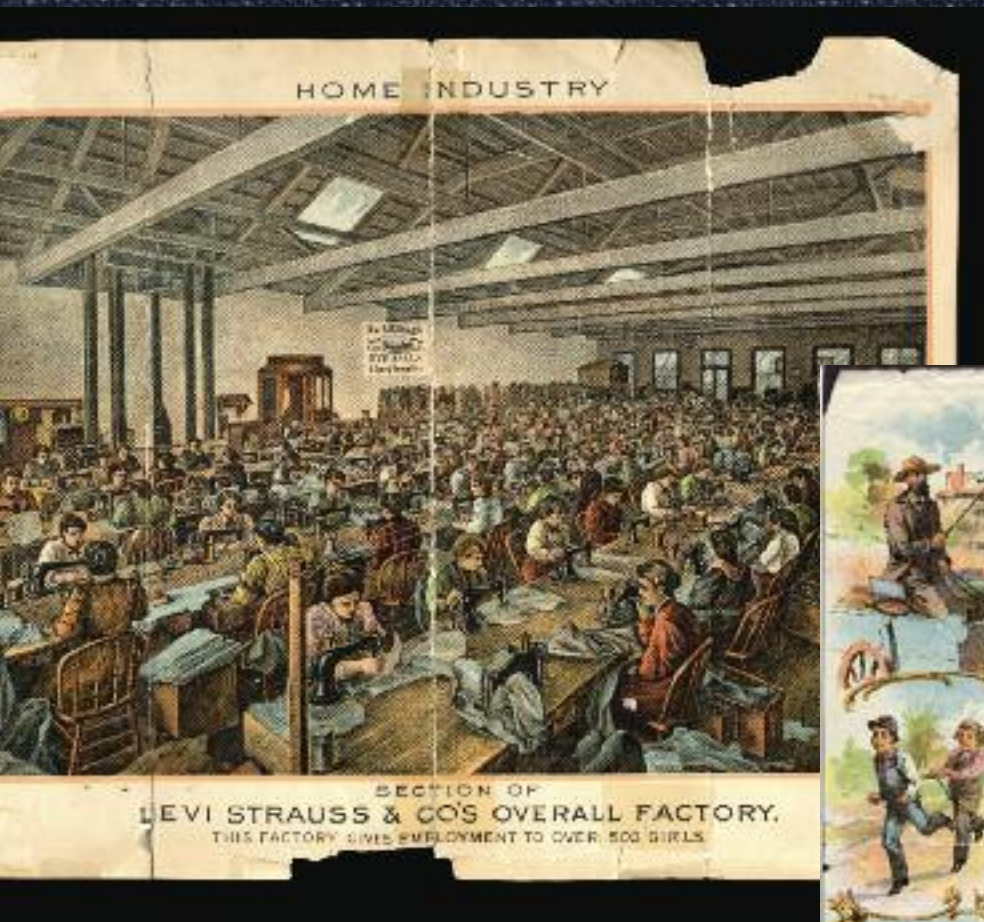


A leather patch from a 1939 pair of Levi's, left. Miners from Placer County, Calif., wear early Levi's jeans in 1882, above. Copper rivets like the one below, c. 1879, made Levi Strauss' jeans unique and sturdy.

button fly on pants, points of stress where cloth would frequently rip. Lacking the funds to apply for a patent for his invention, Davis appealed to Strauss for financial backing. Strauss filed for the patent under both their names, and on May 20, 1873, they received U.S. Patent 139,121 for an "Improvement in Fastening Pocket-Opening," and the quintessential American blue jean was born.

Strauss brought Davis to San Francisco to oversee manufacturing of the "waist overalls"—Levi Strauss & Co. would not use the term "jeans" in print until the late 1950s when millions of American teenagers adopted the pants as their unofficial uniform and started calling them "jeans." Davis' exact role is unknown, as all company records from the 19th century were destroyed in the 1906 San Francisco earthquake and fire, but it is believed that Davis oversaw the cutting and production by individual seamstresses across San Francisco. What is certain is just how quickly the "waist overalls" caught on with American workers. By the 1880s, the famous 501® cut—it was known as "XX" until 1890 when Levi Strauss & Co. incorporated and named its flagship garment after its lot number 501—was a best-seller.

When the never-married Strauss died in 1902 at age 73, he left a thriving company in the hands of his nephews and Davis, who sold his interest in the patent and manufacturing



A handbill, left, shows the Levi Strauss factory in the 1880s, south of Market Street in San Francisco. Levi's salesmen used the 1899 handbill; below, as advertisement for the new, popular clothing line.



ALL IMAGES COURTESY OF LEVI STRAUSS & CO.

to the company before his death in 1908. Strauss' estate was worth some \$6 million (\$800 million in 2007 dollars), and his adopted hometown of San Francisco was infinitely better for his largesse. Soon after arriving in San Francisco, Strauss began supporting the region's Jewish community, specifically the Pacific Hebrew Orphan Asylum and Home and the city's first synagogue, Temple Emanu-El. His generosity extended to scholarships at the University of California, Berkeley, and he was a charter member and treasurer of the San Francisco Board of Trade, as well as a director of the Nevada Bank and the San Francisco Gas and Electric Co. Though it ultimately failed, Strauss and other prominent businessmen in the city funded a new railroad from San Francisco to the San Joaquin Valley.

By 1911, the demand for the company's denim line was so great that the company discontinued manufacturing garments out of heavy cotton duck, which did not soften after washing. A decade later, Levi's jeans were the top-selling men's work pants in the western United States (they were not sold east of the Mississippi until the 1940s). In 1936, when Levi Strauss & Co. added a red tab next to the back pocket—the one-word tab simply states "Levi's," after the man who insisted that his employees refer to him by his first name—the company became the first to sew a label on the outside of a piece of clothing.

The 1940s elevated the blue jean to mythic proportion with movie heroes like Gary Cooper and John Wayne and on-leave American GIs introducing jeans to the world. Levi Strauss & Co. began exporting jeans a decade later, and

today, the global jeans business is a highly competitive, \$51.6 billion industry. Levi's are sold in more than 110 countries, and 501 jeans are made in 108 sizes and 20 finishes and fabrics. A few pairs of the company's jeans are part of the Smithsonian Institution's permanent collection.

Levi Strauss & Co. continues to emulate its founder's compassionate corporate leadership. In the mid-20th century, the company's U.S. factories in the South were integrated before mandated by the government, and decades later, Levi Strauss & Co. was a pioneer in policies to assist employees with HIV/AIDS, as well as the first in the blue jeans industry to develop responsible product sourcing guidelines. Whether worn for work or play, the blue jean—and the company responsible for the garment—remains steadfast to its humble, hard-working beginnings by a man known for his humility and humanity in the storefront or on the factory floor. ■

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The Great Hunger

*Ireland's potato famine was caused
as much by a government's gross
negligence as by a devastation of crops*

By Eugene Finerman

In 1845, the population of Ireland was 8.5 million. Within five years, that population had been reduced to 6 million. More than 1 million people had starved or died of the diseases of malnutrition. Another million had fled Ireland, desperate to escape the famine and grinding poverty. A fungal blight had destroyed the potato crop that sustained a third of the Irish population. More than the crop failed, however; so did the entire system by which England governed Ireland. John Mitchel, a witness to the period that the Irish remember as “The Great Hunger,” wrote, “The Almighty, indeed, sent the potato blight, the English created the famine.”

The Irish were a conquered people. In the 17th century, English armies had dominated the island. To maintain their control and suppress any future resistance, the English intended to break the Irish people, reducing them to a state of passive destitution. New laws forbade the Gaelic language and Catholic education. Irish landowners were stripped of their property; both aristocrats and small farmers became landless peasants. Northern and eastern Ireland had the most fertile land on the island; there the Irish

Catholics were driven out and supplanted by British Protestants. The uprooted Irish were forced into the western half of the island, where the soil was poor and rocky. Even here, however, the English claimed the land and exacted rent. The Irish now were tenants in their own country.

Throughout the 18th century, two Irelands evolved. The eastern half of the island, with its Protestant enclaves, reflected the flourishing culture and wealth of the British Empire. Even Catholics prospered in Dublin, working as tradesmen for the British. But western Ireland, where the majority of the people lived, was sinking into feudalism and chronic poverty. There the Irish peasants worked on the estates of the landlords; for their labors, they were granted housing and a few acres to grow their own food. But the homes were hovels—one-room huts—and the land was poor and yielded little. However, the potato seemed impervious to this harsh soil and produced crops sufficient to feed the tenant and his family for the entire year. So these tenant farmers—one-third of Ireland’s population—came to depend on potatoes as their chief, often sole, source of food.

“That 1 million should have died in what was then part of the richest and most powerful nation in the world is something that still causes pain as we reflect on it today. Those who governed at London at the time failed their people, standing by while a crop failure turned into a massive human tragedy.”

-British Prime Minister Tony Blair, 1997

By the 1830s, the British government started to recognize Irish poverty as a problem rather than a goal. A royal commission was shocked by the state of the Irish peasant; “their sufferings greater, we believe, than the people of any other country in Europe.” But the commission could not arrive at any meaningful solutions to this chronic poverty. It encouraged the British landowners to be more generous and endow workhouses for the poor. Unfortunately, charity was not a conspicuous trait among the gentry. Furthermore, workhouses only served the completely destitute, not the millions of working poor. Ireland’s cycle of poverty and stagnation would not be ended by a government report—but by a fungal spore.

The scientific name of the plant disease is *phytophthora infestans*, but the Irish and history know it as the potato blight. The origins of the disease are a matter of conjecture. In the early 1840s, American potato crops were ruined. In the summer of 1845, the potato blight was in England; that September, like so many of Ireland’s other problems, the blight arrived from England. The leaves on potato plants blackened and curled; the plants then would rot and stink, the plants’ potatoes were ruined. Worse, the blight easily spread, the fungal spores carried by the wind.

Half of Ireland’s potato crop was lost that year. Many of the Irish faced starvation and were reduced to eating weeds and grass. The British government did respond to the prospect of famine, purchasing £100,000 of cornmeal (\$11 million in

2007 dollars) to replace a potato crop worth £3,000,000 (about \$324 million in 2007 dollars). The cornmeal was available at government warehouses and offered at a discount price. So, a hungry Irishman merely had to be in the vicinity and have the money for the purchase.

The potato blight continued in 1846 and destroyed three-quarters of that year’s crop. The famine was spreading and the British government had to respond. To bring desperately needed management to its relief program, the Crown appointed Charles Trevelyan as the administrator. The assistant secretary to the Treasury proved a tireless administrator but also a dogmatic bigot. He regarded the Irish as lazy, ignorant people who were the chief cause of their own poverty. In his view, the famine had an inherent efficiency: it was nature’s “mechanism for reducing surplus population.” If the Irish expected to be fed by the British government, they would have to work. Some 700,000 men and women were employed in breaking and carrying rocks for road construction. There was no special provision for feeding children; they had to do roadwork, too. For their toil, the Irish laborers earned porridge and bread, not a nourishing ration but it did avert starvation.

If these people were saved, more than a million were not. Children were the first to die. Then adults succumbed. Entire families were found dead in their hovels. Some had starved, but most died of the diseases of malnutrition: dysentery, scurvy and typhus. There was not enough wood

The Illustrated London News in 1886 portrayed Irish citizens collecting limpets and seaweed for food in the west of Ireland after failure of the potato crop, page 20. In 1848, the publication illustrated how many Irish peasant families were unable to pay rent because of the failed potato crop and were evicted from their homes, right.



Illness was rampant on “coffin ships” from Ireland to the United States and nearly one-quarter of the passengers who made the trek to escape the potato famine died on the voyage.

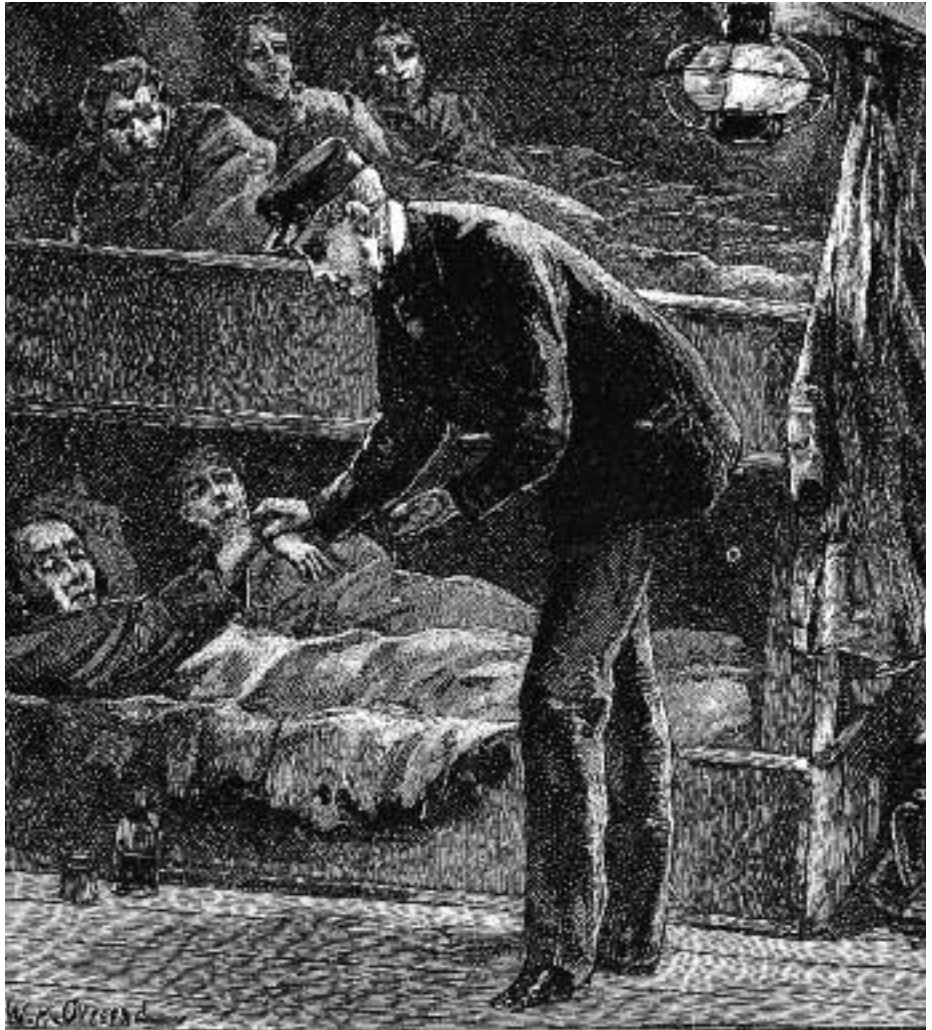
in all of Ireland for coffins, and the survivors had little strength to bury their dead. The victims of the Great Hunger lay in unmarked graves covered only by a few inches of soil.

Yet, while millions went hungry, Ireland was shipping grain and meat abroad. The potato blight had no effect on the other crops. The livestock of Ireland ate better than the field hands. Committed to free trade, the British government refused to stop the export of grain from a starving country; however, the Crown did increase the number of troops to protect the grain shipments.

In the fall of 1847, the potato crop was free of blight but the crop itself was meager. Few Irish, that spring, had the seed potatoes or the optimism to plant a new crop, and so that year’s harvest was one-quarter the normal yield. Ireland would still go hungry. In England, there was growing public criticism of the mean-spirited nature of the government’s work projects. (A prominent young woman named Victoria was among the critics.) The British government relented and, in place of work projects, it began a program of free soup kitchens for the poor. The government did expect that the landowners of Ireland would subsidize half the cost of this program. In the words of Trevelyan, “Let Irish property support Irish poverty.”

But the landowners of Ireland came up with a different way to deal with the poor: evict and banish them from the district. Landowners and, by no coincidence, also the local magistrates, could call upon the British army to enforce the evictions. An estimated half million people were driven from their homes. But many landowners had a more subtle strategy to coax the Irish away: boat tickets to America. The tickets were relatively inexpensive, especially when compared to supporting indigent Irish for an indefinite time. And the Irish needed little persuasion to migrate. The American economy could not be worse than Ireland’s, and the government had to be better.

For many Irish, however, the voyage was the conclusion of a tragedy. The ships that made the crossing were dilapidated and unsanitary, crammed with hungry and sick



refugees. No adequate provision was made for feeding the passengers. Nearly a quarter of the passengers died on the voyage; so the boats were remembered as “the coffin ships.” Yet, 1 million Irish did land in America.

The census of 1850 reported that one-fourth of the population of New York City was born in Ireland. By then, the potato blight had ended in Ireland, but the poverty continued and so did the migration. In 1850, the population of Ireland was 6 million; by 1900, it had fallen to 4.5 million. The chief export of Ireland was its own people. Between 1851 and 1921, the year Ireland won independence from Britain, an estimated 4 million people left Ireland. Most went to America. Their lives in America confronted prejudice, poverty and struggle, but it also offered hope and opportunity that they could not find in Ireland. The potato famine was almost as much a milestone in American history as it was for Ireland. ■

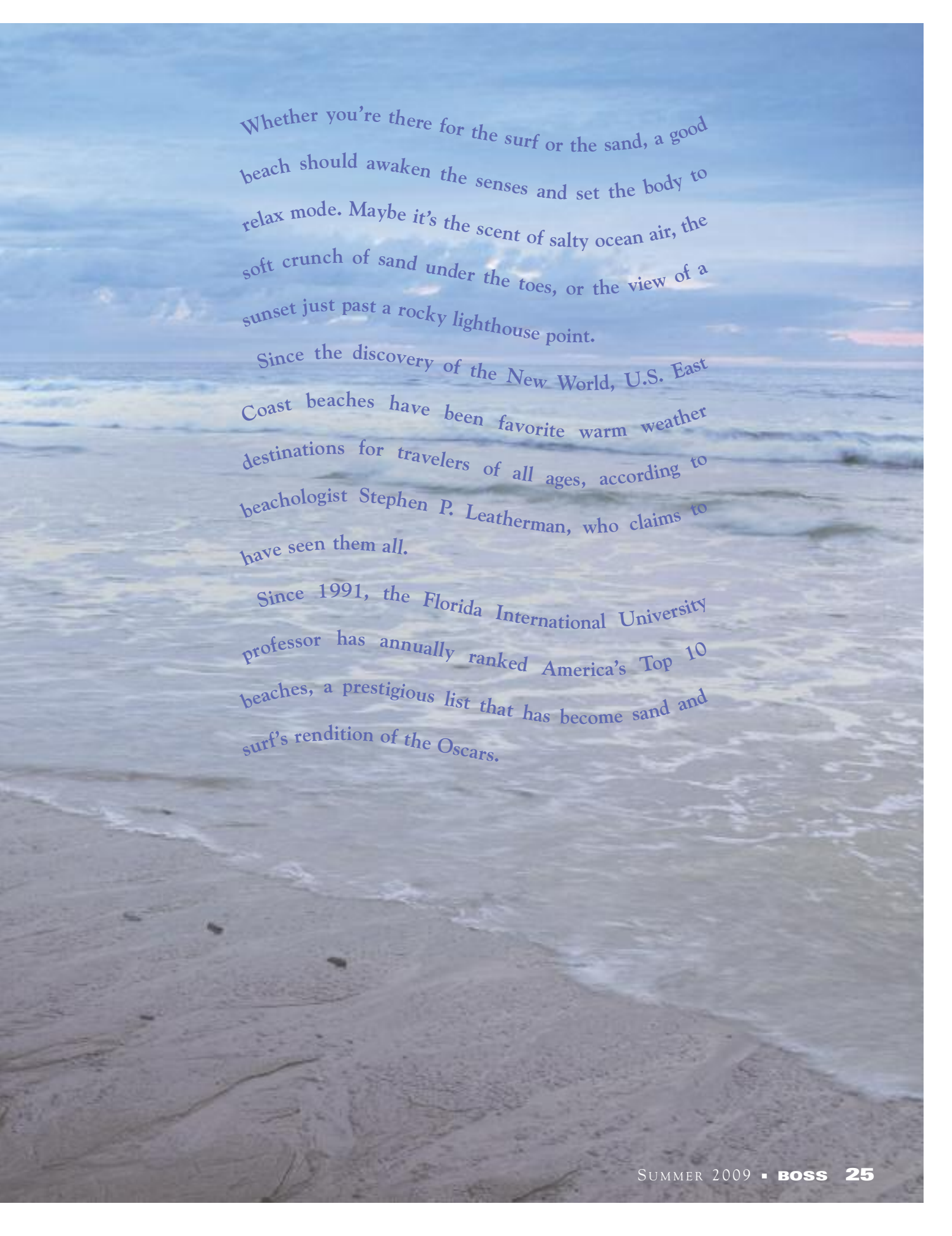
Source for calculations of British pounds sterling to 2007 U.S. dollars (latest figures available): Lawrence H. Officer and Samuel H. Williamson, “Computing ‘Real Value’ Over Time With a Conversion Between U.K. Pounds and U.S. Dollars, 1830 - 2007,” *MeasuringWorth*, 2008. <http://www.measuringworth.com/exchange/>

A photograph of a beach with a large rock in the water under a cloudy sky. The sky is filled with soft, white and grey clouds, and the ocean has gentle waves with white foam. The beach is sandy and shows some tracks and small rocks.

At the Shore

Summer is for relaxing at the beach—
try one of these five noteworthy choices
from the East Coast of the United States

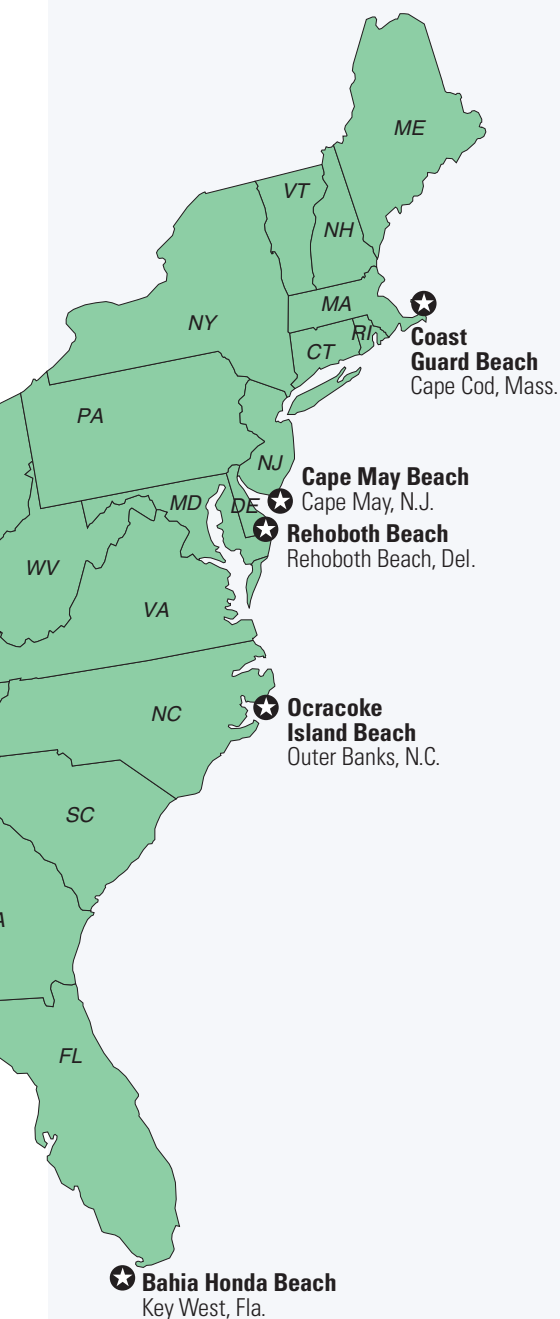
By Greg Rienzi



Whether you're there for the surf or the sand, a good beach should awaken the senses and set the body to relax mode. Maybe it's the scent of salty ocean air, the soft crunch of sand under the toes, or the view of a sunset just past a rocky lighthouse point.

Since the discovery of the New World, U.S. East Coast beaches have been favorite warm weather destinations for travelers of all ages, according to beachologist Stephen P. Leatherman, who claims to have seen them all.

Since 1991, the Florida International University professor has annually ranked America's Top 10 beaches, a prestigious list that has become sand and surf's rendition of the Oscars.



Leatherman, known to many as “Dr. Beach,” says that several of his all-time favorites reside on the Atlantic Ocean side of things. Unlike their West Coast counterparts, East Coast beaches tend to be more swimmer-friendly, with warmer waters and gentler surf, and are more picturesque, featuring flat stretches of soft pale-colored sand leading up to grass-covered dunes.

So pack your suntan lotion and sandals as you get ready to embark on a summer road trip to some of Dr. Beach’s top-rated East Coast shore destinations.

Coast Guard Beach Cape Cod, Mass.

On Nov. 9, 1620, Pilgrims aboard the *Mayflower* first sighted the southern tip of Massachusetts’ Outer Cape, a beautiful stretch of shoreline today known as Coast Guard Beach. Although en route to New York, a storm forced the travelers to Cape Cod’s picturesque cliffs and dunes—the same ones that now beckon thousands each year.

Coast Guard Beach, part of the Cape Cod National Seashore, marks the beginning of a 20-mile unbroken stretch of sandy coast from Eastham to Provincetown, Mass.

From mid-June to Labor Day, Coast Guard’s turquoise waters attract swarms of swimmers and water sport enthusiasts. In a waterfront Mecca, what separates Coast Guard from its neighbors is the ample elbowroom.

“Coast Guard is a wide beach, unlike many of the Cape’s other beaches,” said Bill DeSousa, vice president of a PR firm that represents the Cape Cod Chamber of Commerce. “The sand is soft and the water is pristine, plus [the beach] goes on for miles. You can be with the crowd if you want, or walk a

bit to find a quiet and secluded spot.”

Be warned, the water is “invigorating.” The warmest it gets is 62 degrees Fahrenheit (17 degrees Celsius), and even hardy surfers don wet suits.

One of the beach’s most prominent features is Nauset Marsh, located behind the former U.S. Coast Guard Station, an iconic white-sided and orange-roofed building that overlooks a shoreline formed by eroding glacial cliffs. Visitors can bike or hike the trail to the marsh and then rent a kayak, the perfect way to observe the pristine salt marsh habitat where shorebirds, including terns and endangered plovers, work the tidal flats.

Surfers worship Coast Guard’s summer swells—8- to 10-foot waves are not uncommon after a storm—and the sandbars that form off the shoreline.

For lodging, check out Eastham, the gateway to the Outer Cape. Originally called Nauset, Eastham is a quiet coastal resort town originally settled in 1644 by Pilgrims who were dissatisfied with the poor quality of the lands granted to them in Plymouth. Descendants of the original settlers still live in the area and three of the original passengers on the *Mayflower* are buried

Cape May, N.J., is known for its well-preserved Victorian-style homes, left.

in the town's Old Cove Cemetery.

DeSousa, who has lived on Cape Cod for 16 years, said the key to enjoying Coast Guard Beach is arriving early and having a backup plan. "If the crowds that day are too much for you, head down to Marconi Beach. It's the same water, same sand and the cliffs are even more pronounced."

Cape May Beach

Cape May, N.J.

New Jersey inevitably conjures up images of Atlantic City, Bruce Springsteen and miles upon miles of sandy shores. In effect, the Garden State gave birth to the American beach resort town. The one that started it all was Cape May.

For generations of locals and tourists, Cape May has been a favorite summer getaway. This year, the jewel of the Jersey shore celebrates its 400th birthday.

In 1609, the famed English sea captain Henry Hudson first documented the peninsula, situated in the southern portion of the state between the Atlantic Ocean and Delaware Bay. Dutch Capt. Cornelius Jacobsen Mey came upon the same peninsula 11 years later while exploring the Delaware River. He not so modestly named the area Cape Mey, but the spelling was later changed.

In 1761, Cape May officially became the first seashore resort in America and today a typical summer weekend attracts nearly 80,000 visitors.

The town is the only one in the United States wholly designated as a Historic Landmark City and is known for its well-preserved Victorian houses, gas lamp and tree-lined streets, as well as its beautiful expanse of beach with fine, powdery sand.

The downtown and waterfront areas have everything you'd want from a coastal town: ice cream shops, bed and breakfasts, top-flight seafood restaurants and even horse-drawn carriage rides. For amusement park-style excitement, the animated boardwalk of North Wildwood is just a short drive to the north.

The beach, of course, is a main draw. With a summertime water temperature

that hovers around 74 degrees Fahrenheit (23 degrees Celsius), visitors go there to swim in the friendly waves or walk the beach. Many just relax and soak up the sun, but a popular pastime in Cape May is bike riding. Locals recommend that you cycle down to Sunset Beach or the Cape May Lighthouse, built in 1859. The 157-foot lighthouse at Cape May is still operated by the Coast Guard but is leased to the Mid-Atlantic Center for the Arts, which offers tours up the tower and manages a gift shop.

Other area activities include whale- and dolphin-watching boat trips, salt-marsh safaris, kayaking in the saltwater marshlands, deep-sea fishing, a nautical museum and a historic World War II coastal defense gun emplacement.

While the town ramps up in the summer, Cape May also offers a variety of cooler weather activities, such as candlelight house tours and trolley rides. Whenever you go, get ready to step back in time to the days of bathing dresses and parasols.

Rehoboth Beach

Rehoboth Beach, Del.

In the off-season, Rehoboth lays mostly dormant. The Delaware town has a year-round population of only 1,500 and outside the summer months, finding a parking space on Rehoboth Avenue, the wide four-lane main street, is effortless (and free).

All that changes come Memorial

Day. Parking meters go into effect and thousands invade the one-square-mile town long billed as "the nation's summer capital." This summer tradition dates to the 1870s when Rehoboth Beach, the hub of the Delaware shore, became a Methodist campground.

Rehoboth is about 125 miles from major airports in Washington, Baltimore and Philadelphia. It has a wide sandy beach with tall dunes, warm summer water temperatures (75-79 degrees Fahrenheit/ 24-26 Celsius) and a concession for umbrellas and beach chairs. The area features a mile-long boardwalk for bike riding, strolling or jogging. There's plenty to do on the boardwalk, including miniature golf, arcades and a small amusement park. Summer concerts and events are held at the Bandstand Pavilion on Rehoboth Avenue.

At sunrise, many head down to the beach to check out the schooling dolphins and shorebirds.

The real action is on Rehoboth Avenue, with its nearly 75 tightly packed restaurants and bars. A favorite haunt is Dogfish Head Brewings & Eats, a microbrewery that regularly wins gold medals for its "oft-centered ales for oft-centered people."

For accommodations, Rehoboth has a collection of low-rise boardwalk hotels and Colonial and Cape Cod homes for rent, tucked deep into pine groves.

Entrance to Rehoboth Beach is free; just get there early.

A view of the Atlantic Ocean from the mile-long boardwalk in Rehoboth Beach, Del.





The second oldest operating lighthouse in North Carolina, the Ocracoke Lighthouse is open to the public for tours.

Ocracoke Island Beach Outer Banks, N.C.

In terms of unspoiled beauty and historic charm, Ocracoke Island Beach in North Carolina has few peers. Ocracoke Island, the one-time plundering ground of the famed pirate Blackbeard, features 15 miles of fine golden sand beaches that consistently rank among the nation's best.

The beach is part of the Cape Hatteras National Seashore, managed by the National Park Service. The distinction, thankfully (even business owners will tell you), prohibits development on the wide beach, which is lined with tall dunes and sea turtle nesting grounds.

Ocracoke Island, with Pamlico Sound on one side and the Atlantic Ocean on the other, is one of the barrier islands of North Carolina's Outer Banks. One can access the island by air or by water. Area experts recommend that visitors fly into Norfolk, Va., rent a car, and then drive down to Cape Hatteras to catch the free 40-minute ferry ride.

The beach itself offers first-class swimming, surf fishing, sea kayaking and surfing. The Gulf Stream keeps the waters warm most of the year, so pack your bathing suit. Pack a camera, too, as you might need one to capture the nesting

sea turtles in the summer or the packs of dolphins that play just past the shallows.

The high season lasts from Memorial Day (late May) to Labor Day (September), but the island's limited accommodations and access constraints keep the crowds down. Locals will tell you March and April might be the best time to go, as air temperature hovers between 60-70 degrees Fahrenheit (15-20 degrees Celsius) and you can call the place your own. However, you may need to be a member of the polar bear club to swim at this time of year—water temperature averages only around 50 degrees F (10 degrees C) compared to the 82 degrees F (28 degrees C) in the summer.

The quaint village of Ocracoke, located on the island's southern side and listed on the National Register of Historic Places, features the Ocracoke Lighthouse, several historic commercial buildings and homes, and dozens of unique shops. What visitors won't find are chain restaurants or hotels, so be prepared to be won over by the local food and lodgings.

If the beach doesn't amaze you, the island's history might. There's no shortage of naval battles stories, including Civil War tales and that of Edward Teach (aka Blackbeard), who was killed

during a bloody battle with a British navy force just off the island's shore. Want to hear more? Ask Philip Howard, the island's unofficial story collector, who traces his ancestry back eight generations to William Howard, Blackbeard's quartermaster and Colonial owner of Ocracoke Island.

Howard serves as a guide on the island's Ghost and Historic Walking Tour. Don't miss it.

Bahia Honda Beach Key West, Fla.

Coral reefs surround much of the Florida Keys, which make it an ideal spot for snorkeling and diving. The reefs also limit the number and size of sandy beaches, but they do exist. In fact, Bahia Honda Key, a small island in the Lower Keys, is home to a 2.5-mile pristine sweep of sand that just might be the Sunshine State's best.

The sugary white sand beach is part of the 524-acre Bahia Honda State Park, which occupies most of the virtually uninhabited tropical island located 12 miles south of Marathon, Fla. Untouched by development, Bahia Honda (pronounced both BAY-ah HON-da and Ba-hee-ah Own-dah) has become a prime eco-tourism destination that can be visited year-round. There are three separate beach areas in the park, and water temperatures are balmy, ranging from the mid-70s Fahrenheit (24 degrees Celsius) in the winter to the mid-80s F (29 degrees C) during the summer.

The park, open from sunrise to sunset, offers camping facilities, picnic areas, a water sports shop, marina, rental cabins, a convenience store, a nature center and plenty of opportunities for sunning. The rental cabins fill up fast in the winter months, so book ahead. The beach also features the Silver Palm Nature Trail, a short but diverse hike that passes dunes, hardwood hammocks and mangroves.

Marine life abounds in the clear ocean waters and many visitors rent kayaks or snorkeling gear to get up close and personal. The park, part of the Great Florida Birding Trail, is also a popular spot to observe white-crowned pigeons, great white herons, pelicans, willets, plovers and other wading birds and shorebirds.

Carol Shaughnessy, a writer and Florida Keys expert, calls Bahia Honda “a pure and natural wonderland.” The view from the beach is “absolutely gorgeous,” she said, but for an even better vantage point you must walk to the top of the old rail bridge, once part of the Florida Overseas Railroad that connected Bahia Honda with Spanish Harbor Key. (For more on the Florida Overseas Railroad, see the biography of Railroad founder Henry Flagler in the summer 2006 issue of BOSS at www.dixonvalve.com.)

The state of Florida purchased the bridge after the 1935 Labor Day hurricane and converted it to automobile use. After a replacement Bahia Honda Bridge was opened in 1972, two sections of the Rail Bridge were removed to allow ships to pass through and to remind drivers it’s no longer in use.

The old bridge offers breathtaking and expansive views of the beach and ocean. “You can really see forever up there, and it’s magnificent during sunsets,” Shaughnessy said. “It’s one of my favorite spots in the world.”



Bahia Honda State Park in the Florida Keys is open from sunrise to beautiful sunset.

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Communication Counts

Failing to notify the proper personnel before making a repair can have dangerous consequences

BY PHIL KIMBLE

When we think of communication cables, we typically think of the cables buried underground that carry television, Internet and phone service. These same cables are also buried under water spanning rivers, bays, and oceans. Underwater communication cables connect cities, countries and even continents.

For deep-water projects, the cable is deployed from a vessel with a large reel. The weight of the cable takes it to the ocean floor. For shallow-water projects, where damage to the cable from boating and fishing activities as well as shifting bottom conditions is anticipated, the cable must be buried. Since the 1970s, cable burial by plowing has been recognized as the only truly effective method for protecting communication cables from these hazards.

Initially, sled-type cable plows dug a trench into which the cable was set. Today, water-jet assisted plows can lay more cable per hour while reducing the size of the vessel needed to pull the plow, thus lowering costs. Either electric motor-driven pumps attached directly to the sled or portable diesel-powered pumps on board the tow vessel supply water to the jets.

Working on a vessel laying cable can be boring and tedious. With the vessel moving at no more than three miles per hour, there is not much more to do than watch the cable slowly slip

beneath the water surface—until something goes wrong.

On one such vessel, the onboard water pump began leaking at the outlet connection. Upon discovering the problem, a crew member decided to take matters into his own hands. Without notifying the captain of the condition or his intentions, the crew member decided he could fix the leak without interrupting the cable laying operation. Because the pump was operating at only 90 psi, he thought it would be quick and easy. All he had to do was tighten the clamp bolts.

When the crew member started to pull on the wrench to tighten the first bolt, the hose whipped off of the pump, striking him in the chest. The blow threw him several feet through the air into the crane that is used to deploy and retrieve the plow sled. He slumped to the deck unconscious.

What the crew member failed to notice when he went to make his repair was that the clamp was slightly askew on the fitting. Because the clamp was under pressure, the additional stress caused by moving the bolt was all that was necessary to cause it to release its grip on the coupling. Let's "Keep It Safe" by notifying proper personnel that a problem exists and making repairs only when it is deemed safe to do so. Never attempt any repair when a system is pressurized. Doing so can carry deadly consequences. ■

THE DIXON DRILLER JULY

"Published once a moon since 1932"

Dates in History

1775

On July 26, Benjamin Franklin was the first to be appointed postmaster general for the United Colonies. Through Franklin's efforts, the length of time for mail service between major cities in the colonies was cut in half.

1829

On July 23, William Burt from Detroit, Mich., was granted the first American patent for a typewriter. Burt's machine was designed with characters arranged on a rotating frame. Like many other designs of the time, it was cumbersome, hard to use, unreliable and often took longer to produce a letter than writing it by hand.

1900

On July 2, a zeppelin (the LZ-1) took its first flight near Lake Constance in Germany. The flight lasted approximately 17 minutes, reaching a height of 1,300 feet, carrying five passengers.

(<http://www.amusingfacts.com>)

Trivia

Did you know that...

- Orcas (killer whales), when traveling in groups, breathe in unison.
- The bright skin that hangs from a turkey's neck is called a "wattle."
- The world's smallest owl is the elf owl, which weighs 1.5 ounces and is the size of a sparrow.
- Unlike other four-legged mammals, kangaroos cannot walk backward.
- Construction workers' hard hats were first invented and used in the building of the Hoover Dam in 1933.
- One tree can filter up to 60 pounds of pollutants from the air each year.
- U-Haul is the world's largest advertiser in the Yellow Pages.
- The IRS employees' tax manual has instructions for collecting taxes after a nuclear war.
- Using recycled aluminum cans and making new cans out of them saves 75 percent energy compared to making them from new material.
- It takes about three hours for food to be broken down in the human stomach.
- A person will burn 7 percent more calories if they walk on dirt compared to pavement.

(<http://www.amusingfacts.com>)

On the Lighter Side

The homeowner was delighted with the way the painter had done all the work on his house.

"You did a great job," he said and handed the man a check. "Also, in order to thank you, here's an extra \$80 to take the missus out to dinner and a movie."

Later that night, the doorbell rang and it was the painter. The homeowner asked, "What's the matter, did you forget something?"

"Nope," replied the painter. "I'm just here to pick up your missus."

The census taker knocked on Donna's door. She answered all his questions except one. She refused to tell him her age.

"But everyone tells their age to the census taker," he said.

"Did Miss Maisy Hill, and Miss Daisy Hill tell you their ages?" she asked.

"Certainly," he replied "Well, I'm the same age as they are," she snapped.

"As old as the Hills," he wrote on his form.

One night, a lady with a black eye stumbled into the police station.

She told the desk sergeant that she had heard a noise in her backyard and went to investigate. The next thing she knew, she was hit in the face and knocked out cold.

An officer was sent to her house to investigate, and he returned a few minutes later, also with a black eye.

"Did you get hit by the same attacker?" his captain asked.

"No, sir," he replied. "I stepped on the same rake."

(<http://www.bestcleanfunnyjokes.info>)



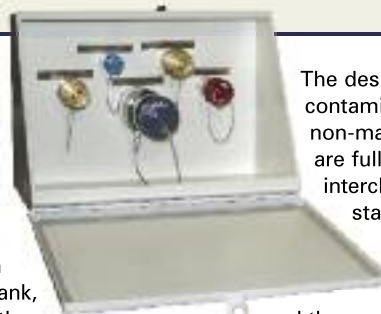
Product Spotlight

The FloMAX style connectors were designed in the 1960s to provide fast fueling for large equipment like earthmovers, bulldozers and haul trucks. Smaller connectors for oil, hydraulic oil, transmission oil and coolant provided a fast and safe method to transfer these products from the lube service truck to the equipment at the job site. The FloMAX FN600 and FN600BL are designed for 1 1/2-inch hose and can handle up to 180 GPM.

The diesel fuel tank has a vent at the top and a fuel receiver at the bottom. The tank is filled from the bottom to help prevent

foaming. As the fuel fills the tank from the bottom, air exits the top through the vent. When the fuel level reaches the vent tube it will close and stop the air flow out of the tank. With no air venting out of the tank, pressure will build inside the tank. When the right pressure is reached in the tank, the poppet closes and the nozzle is shut off.

FloMAX standard series connectors consist of four color-coded non-interchangeable nozzle and receiver sets.



The design prevents cross contamination of fluids from non-mating connectors. They are fully compatible and interchangeable with industry standard connectors.

All wear components are nickel-plated steel for durability

and the non-wear components are aircraft grade anodized aluminum. Connectors are color-coded and labeled for quick and easy identification. Aluminum caps are O-Ring sealed for greater contaminant resistance.



Life in Balance

A yoga practice provides benefits both physical and mental

BY MARIA BLACKBURN

Jan Schroeder likes to engage in many forms of physical activity. She runs. She teaches classes in step aerobics and muscle conditioning at the gym. She even teaches a hula-hooping class.

But when Schroeder and her husband hit challenging hiking terrain in Hawaii, she has little difficulty scrambling up and down the steep, rocky trails. Why? She credits yoga.

"Yoga gives me flexibility and balance that I don't get in other activities," says Schroeder, an associate professor of fitness at California State University, Long Beach. She's not alone. "People are starting to realize that they need something else to help them not just look good but to help them move better," Schroeder says. "Yoga provides that."

Hatha yoga, the physical exercise form of yoga, is being embraced by a wide variety of people: by grandmothers and surfers looking for better balance, by professional football players and runners desiring more strength, and by parents seeking calm for their children. Some 15.8 million Americans practice yoga and they spend \$5.7 billion a year on yoga classes and products, including equipment, clothing, books and DVDs like *Yoga Booty Ballet* and *Weight Loss Yoga*, according to a 2008 study in *Yoga Journal*.

Yoga is a combination of breathing exercises, physical postures and meditation that was developed more than 5,000 years ago in India. There are more than 800 forms of Hatha yoga practiced worldwide by about 30 million people. In the United States, where yoga has taken hold more as a physical activity than a spiritual one, Hatha yoga is the type of yoga most people practice.

The benefits of practicing Hatha yoga go beyond gaining balance and flexibility, says Ralph

La Forge, a physiologist at Duke University Medical Center who helps physicians and medical practitioners integrate mindful exercise practices like Hatha yoga into their treatment. Certain forms of Hatha yoga, when appropriately taught, can help alleviate lower back pain, according to recent studies, says La Forge. Studies also have shown that Hatha yoga can help alleviate certain anxiety disorders, improve musculoskeletal health and even reduce blood pressure. "Just yogic breathing therapy has been shown to help reduce systolic blood pressure in people who are pre-hypertensive," he says.

And just because you're healthy and work out regularly doesn't mean Hatha yoga won't benefit you, too, says Leigh Crews, a fitness trainer and registered Yoga Alliance instructor who is a spokeswoman for the American College of Sports Medicine. "Yoga helps prevent injuries so you can continue to do the things you love like running or lifting weights. It balances out all of the stresses you are putting on your body."

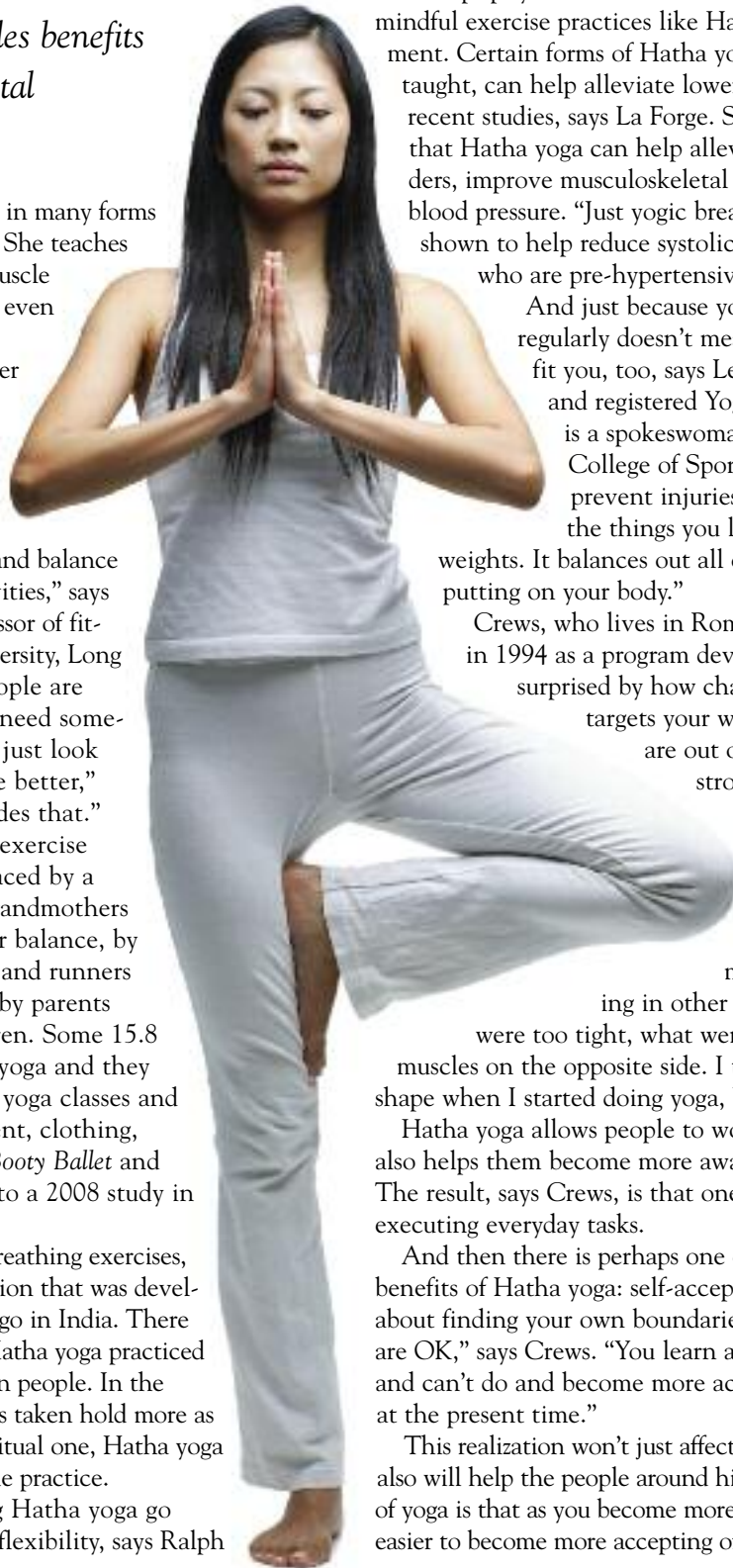
Crews, who lives in Rome, Ga., started doing yoga in 1994 as a program developer for Reebok and was surprised by how challenging it was. "Yoga targets your weak links," she says. "If you are out of balance, if one side is stronger than the other, you can ignore that in traditional strength training.

In yoga, you can't ignore it because if you do, you fall. Yoga brought up for me the things I was ignoring in other training—what muscles were too tight, what were too strong in relation to muscles on the opposite side. I thought I was in good shape when I started doing yoga, but yoga kicked my butt."

Hatha yoga allows people to work at their own pace and also helps them become more aware of their bodies in space. The result, says Crews, is that one becomes more fluid in executing everyday tasks.

And then there is perhaps one of the greatest non-physical benefits of Hatha yoga: self-acceptance. "Yoga teaches a lot about finding your own boundaries. And those boundaries are OK," says Crews. "You learn a lot about what you can and can't do and become more accepting of the way you are at the present time."

This realization won't just affect the yoga practitioner, but it also will help the people around him or her. "The philosophy of yoga is that as you become more accepting of yourself, it is easier to become more accepting of others," Crews says. ■



The Right Yoga for You

Hatha yoga refers to any of the physical types of yoga people practice as exercise, as opposed to the spiritual and philosophical aspects of yoga. There are a number of different styles of Hatha yoga, and although they are all based on the same poses or physical postures, they each have a different emphasis.

Here's a rundown from A(shtanga) to V(inyasa) of some popular Hatha yoga styles:

Ashtanga: Also known as power yoga, this is a physically demanding fast-paced style of yoga that emphasizes a set series of continuously flowing movements.

Bikram: Sometimes called hot yoga, Bikram is named for creator Bikram Choudhury and based on a series of 26 poses and done in a room heated to between 95 and 100 degrees Fahrenheit (35-37 degrees Celsius) to loosen muscles and encourage sweating.

Hatha: If a class is described as a Hatha-style class it will likely be slower paced, focus on stretching and will provide a general introduction to yoga poses.



Iyengar: A practice based on the teachings of B.K.S. Iyengar, this style focuses on body alignment and encourages the use of props like yoga blankets and straps to help align the body.

Kundalini: This style uses rapid repetitive movements and places special focus on breathing.

Vinyasa: In Vinyasa-style yoga classes, poses flow from one to another accompanied by synchronized breathing.

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Finding Your Way

The compass has been pointing travelers in the right direction for centuries

BY LISA DE NIKE

Benjamin Franklin once quipped that, “In this world, nothing is certain but death and taxes.” Words of wisdom, indeed. But astute as he was, Franklin forgot to mention one other certainty: wherever you stand on the Earth, the needle of a compass will always point north. Thousands of years before the now-ubiquitous GPS was invented, travelers the world over could orient themselves by means of a simple magnetic compass.

According to the Encyclopedia Britannica, the modern compass’ earliest relatives date back to about 226 B.C. in China, when fortunetellers used lodestones (stones made of magnetite, an iron oxide that aligns itself with the North and South poles) to tell fortunes. The lodestone would spin on a plate and point to various signs and constellations, predicting either good or bad fortune.

Eventually, mariners in China and Europe figured out that when floated in water, lodestones pointed to the Earth’s poles, and thus could be used to help sailors navigate at sea. Early sailors created compasses made of square blocks of wood that contained markings for the constellations and north, south, east and west, with a lodestone needle (usually shaped like a spoon) pointing the way (no water required).

By the 12th and 13th centuries A.D., ships in China and Europe navigated the oceans by compass. Some say, in fact, that in 101 B.C., Chinese ships, guided by compasses, reached India’s eastern coast for the first time. The Chinese also claim that Zheng He, from China’s Yunnan Province, made seven ocean voyages using the early compass between 1405 and 1433.

Many historians assert that the compass was brought to the Europeans by the Asians via the Silk Road, the ancient trading route that linked China with the eastern Mediterranean. Other experts strongly disagree. According to historical records, people from Saudi Arabia and the Middle East were using magnetic compasses by the early 1200s and those in Scandinavia by 1300.

Though there continues to be some debate about who put the compass to work first, there is no question that it not only revolutionized sea navigation and thus increased trade between the Mediterranean and Northern Europe, but it also was one of the primary factors leading to the great age of exploration that would quickly follow.

By the time Columbus sailed the ocean blue, most sailors were quite adept at navigating with the help of a compass. In fact, by the time Columbus set out for the New World with the *Nina*, the *Pinta* and the *Santa Maria*, navigators had discovered how to magnetize iron, which meant that the lodestone “needles” on compasses could be replaced with smaller, thinner ones fashioned from iron and steel and magnetized. Thus, the pocket compass was invented and became very popular.

Today, everyone from weekend sailors to Boy and Girl Scouts continue to find the magnetic compass a useful and simple way to navigate on sea and land. It still always points north. ➤

Invention of the Global Positioning System, or GPS

The Global Positioning System, also known as “GPS,” is the simple magnetic compass’ high-tech cousin and is becoming an increasingly popular feature in everything from cell phones to automobiles.

The system that so many use today can trace its history back to 1994, when the U.S. Air Force launched the 24th Navstar satellite, comprising a network of

24 satellites that were called the Global Positioning System. Thanks to this constellation of satellites, today anyone with a GPS receiver can almost immediately ascertain his or her place on the planet.

The GPS system was invented by the U.S. Department of Defense and a graduate from the Massachusetts Institute of Technology named Ivan Getting, who

worked in the 1950s at Raytheon Co. While there and in response to a U.S. Air Force requirement for a guidance system, Getting worked with aerospace engineers to study the use of satellites as the basis for a navigation system, and worked on a three-dimensional, position-finding system. Both became building blocks of the current GPS system.



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