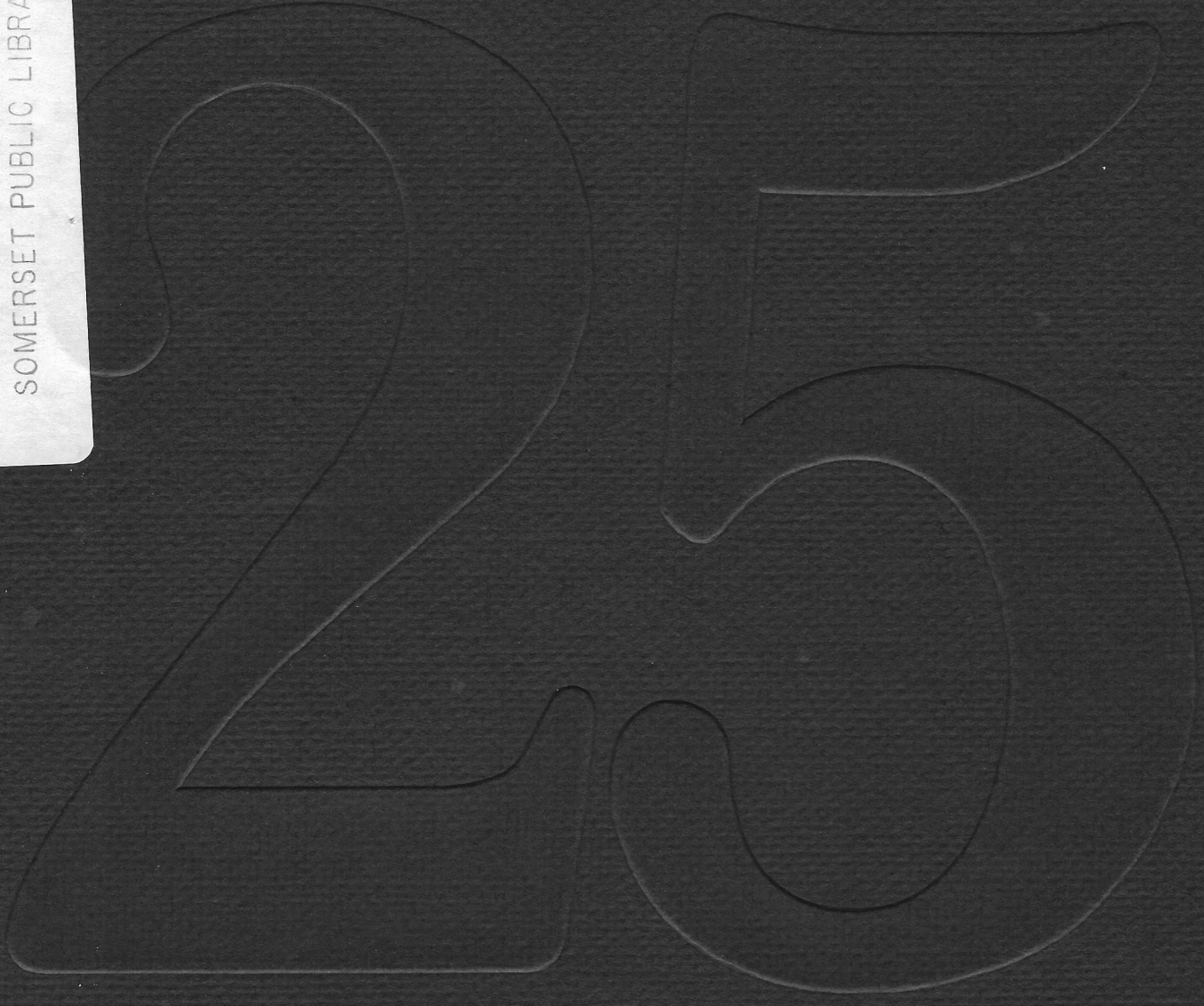


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BRAYTON POINT STATION

The Shawomet Purchase: From Corn to Power

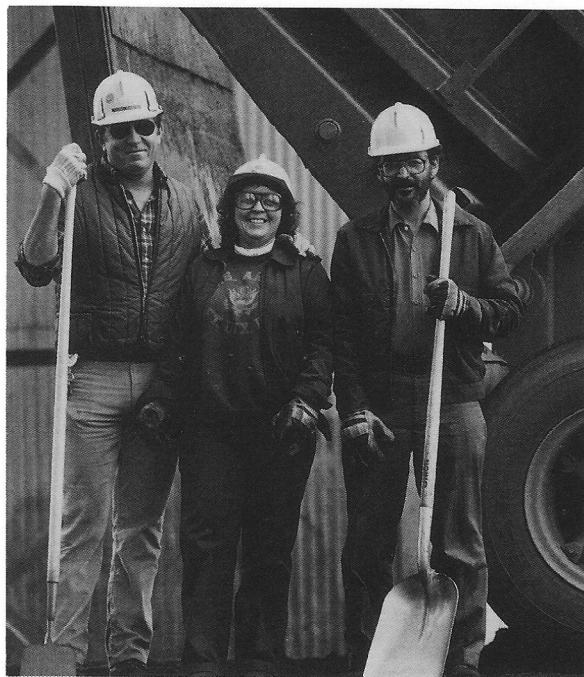
Once the ice shield receded northward from southeastern Massachusetts about 8500 years ago, the area was home to a succession of tribes. The last of them—called Indians—probably raised their corn, melon, and peas in the area now known as Brayton Point, between the Taunton and Lees rivers. Indeed, this may have been the place from which they first sighted the ships of early explorers.

The Shawomet Purchase

In the late 1600s, a group of settlers acquired the area now called Somerset, including Brayton Point, from the Pilgrim government in a deal called the Shawomet Purchase. The Braytons were one of the pioneer families who labored here to transform the wilderness into a functioning economy. Their name appears on the deed held by New England Power to the 225-acre tract from Mount Hope Bay to the Lees River. The company purchased the land in 1957, announcing it would be the future site of a “large, modern steam-electric generating station.” This was, at least, an understatement.

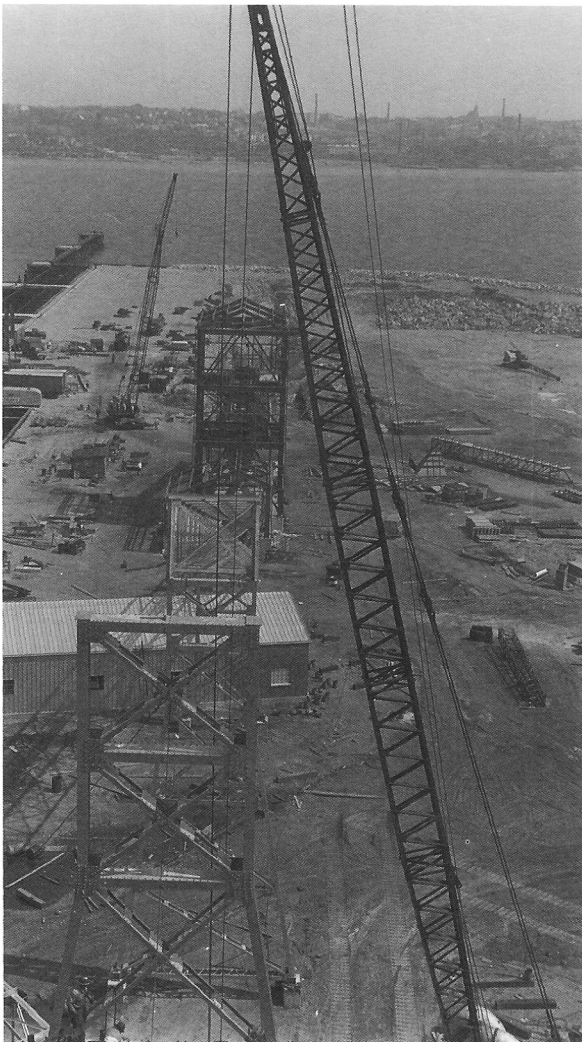
The Race Was On!

In 1960, as the first summer of a new decade began, so did construction of Brayton Point Station’s Unit One, a 250,000-kilowatt steam-electric giant. Almost immediately, the region’s growing need for power dictated the construction of a second unit, a duplicate of the first. This would raise the new station’s generating capability to a half-million kilowatts. The race was on to meet the climbing curve of New England’s energy requirements.



Building a Million-Kilowatt Capacity

Brayton Point Station's first quarter-century of service began on August 1, 1963, a year after the nation sent a man into earth orbit and survived the Cuban missile crisis. Within months of the start of commercial operation, the Los Angeles Dodgers took the World Series from the New York Yankees in four straight games, and the shocked nation said goodbye to an assassinated young president.



Unit One Produced More with Less

Unit One went on line that first day of August, its boiler exerting 2520 pounds of steam pressure against the blades of the turbine. It produced more than 225 megawatts, enough power to meet the needs of a city the size of Providence. After six months, it had produced nearly three-quarters of a billion kilowatthours of electricity, while using 25 percent less fuel than the company's other steam-electric plants. But the most telling effect of this single unit was that almost half of its production replaced (a) hydro generation lost to subnormal rainfall, (b) generation of less efficient fossil-fired plants, and (c) electricity that otherwise would have been bought from other utilities.

Meanwhile, a few yards away, the station's second unit—identical to the first—was fast taking final form at the hands of a small army of New England Power's own engineers and their contractors.

Doubling Capability in 13 Months

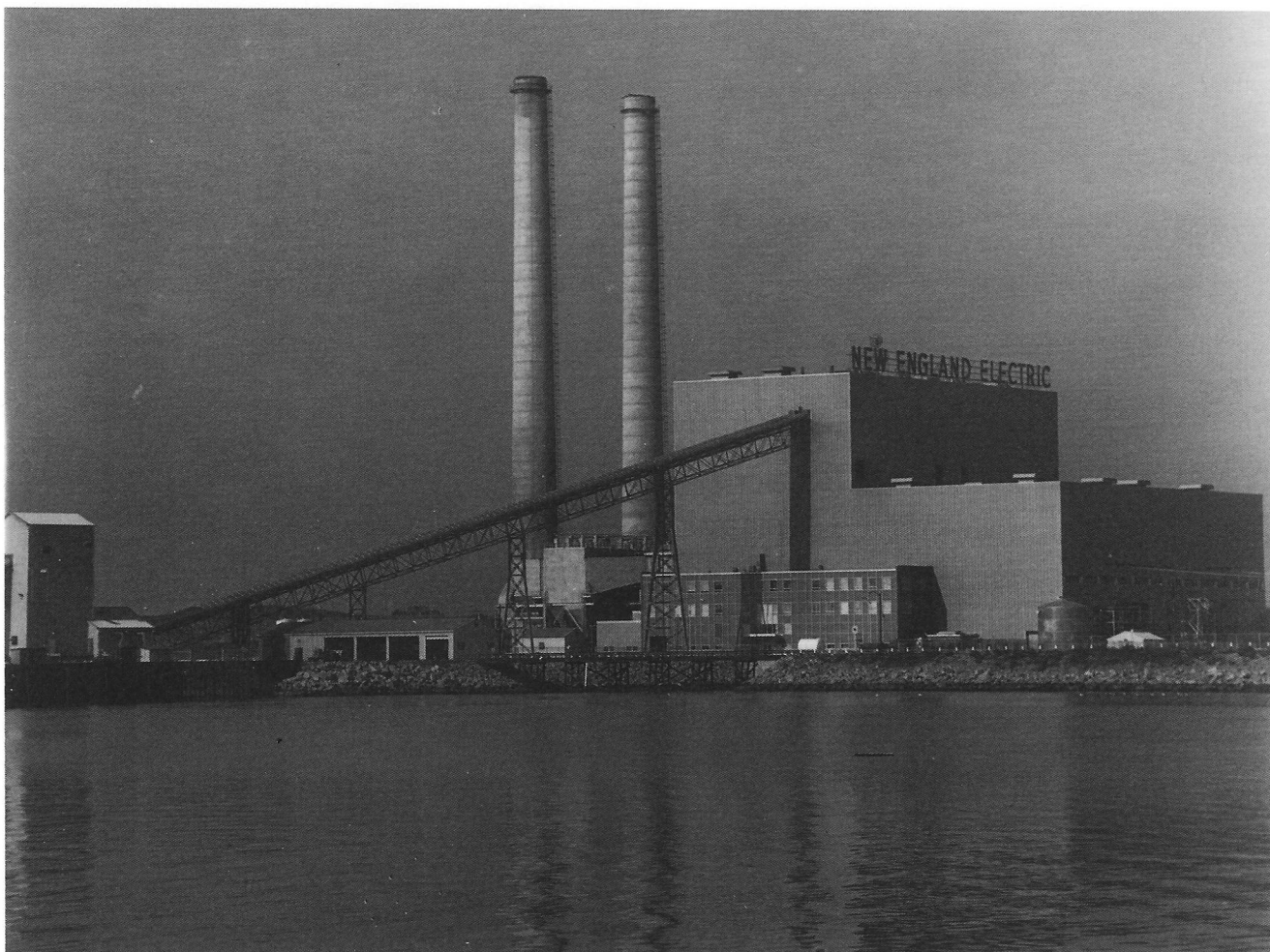
Thirteen months after Unit One went on-line, Unit Two joined it, doubling the station's capability to 500,000 kilowatts. That year, 1964, Brayton Point Station topped the list of the country's most efficient generating plants. While this was good news for the company and its customers, it brought personal satisfaction to the small group of caretakers who operated and maintained the station 24 hours a day.

By the end of that year, Brayton Point Station was meeting about 40 percent of New England Electric's power needs.

The Night the Lights Went Out

On November 9, 1965, a massive power failure darkened two Canadian provinces and the northeastern United States. Along with most other stations involved, Brayton Point Station automatically tripped off-line in the domino effect that followed.

Soon afterward—here and at its other steam generating plants—the company added auxiliary start-up equipment that would allow an easy return to service in the event of another such interruption.



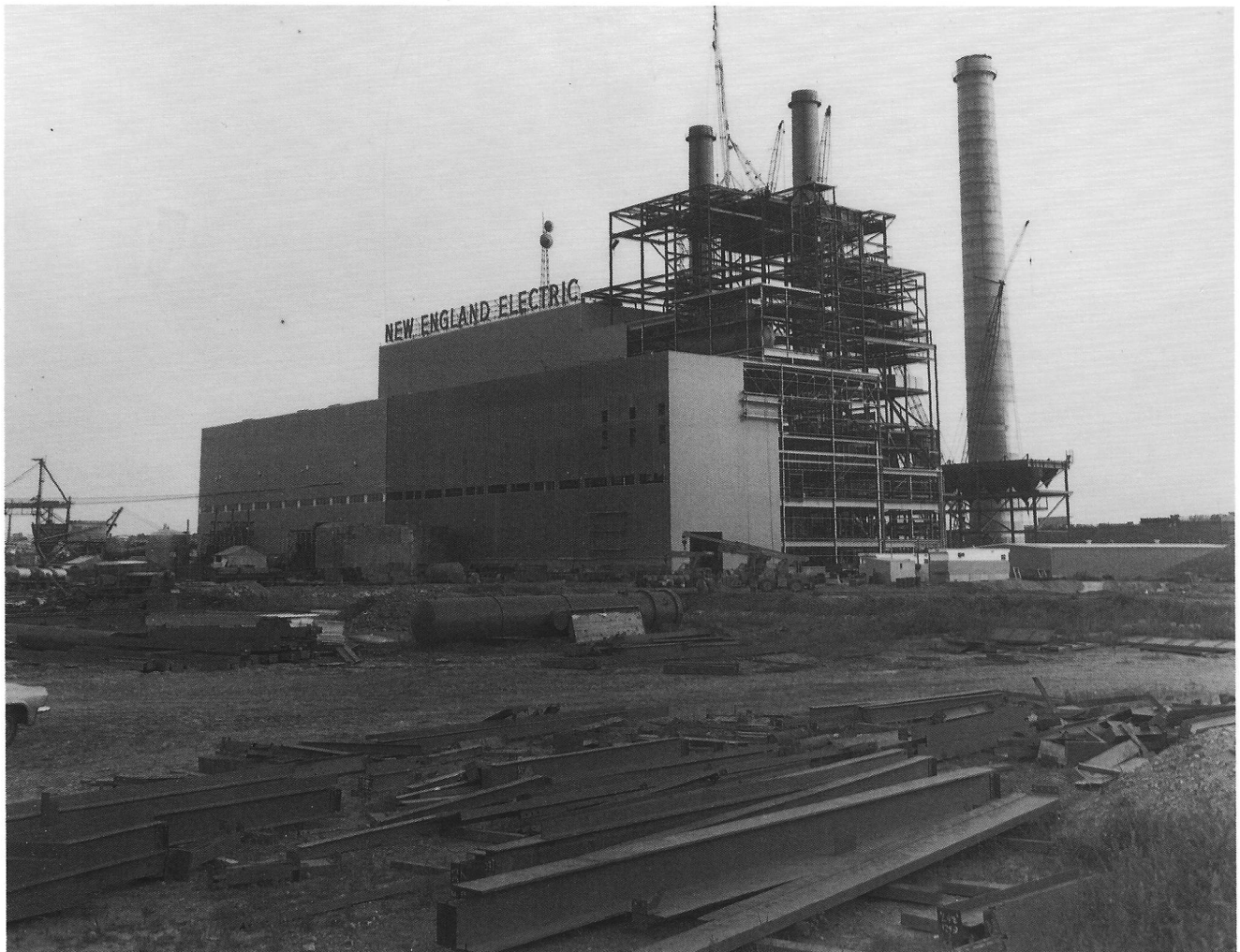
Unit Three Construction Began a Year Early

In 1966, while Brayton Point Station was becoming New England's most efficient plant, other developments were shaping its destiny. From the beginning, the plan for the station's future had called for a third unit to go on-line in 1970. But the vigorous New England economy of the mid-sixties, with its attendant sharp increase in kilowatthour usage, caused New England Power to accelerate its schedule.

Ground was broken for Unit Three on May 2, 1966, a year ahead of schedule. The company hoped to place

the new unit on-line at the beginning of 1969.

Earlier, as civil, mechanical, and electrical engineers had worked on the drawings for the superunit, its scale had been only numbers on paper. The enormous size of the new machine could be appreciated only after the materials called for by those drawings began to arrive in the station's lay down area. There were stacks of reinforcing rod, nearly a million feet of condenser tubing, thousands of tons of steel, miles of cable and pipe, and an almost endless variety of pumps, motors, and other equipment.



K. Charles Sokolosky

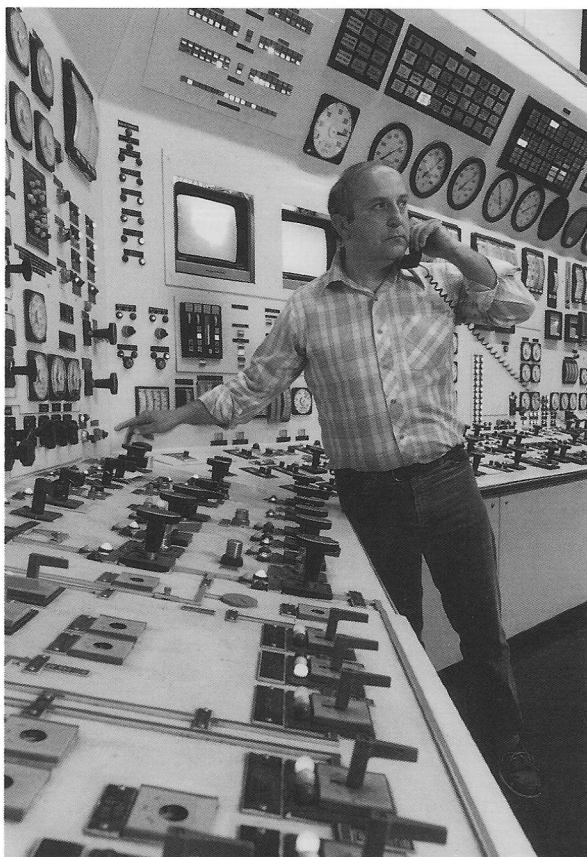
“We operated the first unit and the coal yard—and that included unloading the incoming ships—with a total of just 88 people. I was superintendent at Brayton for its first nine years, during which the first three units were built and brought on-line. The most satisfying part of it was staffing, planning, and seeing it all in successful operation... and then receiving a letter from the U.S. Congress informing us that we were the most efficient generating plant in the country in 1964.

“From day one, the plant represented the ultimate in technology. With an output of more than 225 megawatts, its Unit One could generate nearly twice as much electricity as the next largest unit in New England. Later, the immense Unit Three would dwarf them all with its size and output, producing more than 600 megawatts. Not only was it huge, it represented a radical change in design and had to be operated within precise temperature and pressure limits in order to achieve its maximum performance levels.

“Brayton is the last of the base units built in this area. It helped New England’s economy meet some major energy challenges, and I’m proud that I was part of it.”

Superintendent, Brayton Point Station
1961-1970
Retired 1988





By the fall of 1967, about 18 months after the start of construction, the huge addition was half completed. The stack had been topped off at 350 feet. At the same time, the rest of the air and gas section—precipitator, fans, and heaters—was nearing completion.

Five hundred workers, representing more than 15 trades, were hard at work everywhere—hammering, grinding, welding, cutting, lifting, climbing—doing whatever it took to get the job done. This, after all, was a race to bring much needed electricity to the region as soon as possible.

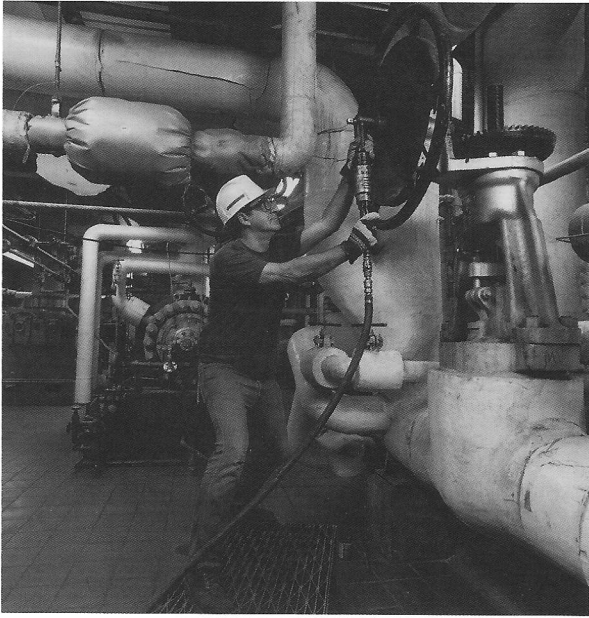
During the balance of the year and on into 1968, the station's appearance seemed to change almost daily. The boiler house rose as high as an 18-story building, towering above that of neighboring Units One and Two by more than 50 feet.

A Boiler Like Nothing Seen Before

Inside, the enormous boiler was suspended above the floor, supported within a skeleton-like framework that provided space for the entire vessel to expand at its 1005 degree Fahrenheit operating temperature. Flame temperatures, however, could be as high as 2700 degrees Fahrenheit. Soon, the chasm of the seven-story combustion chamber would become a carefully controlled inferno, transforming water to steam. The end product would be an incredible 1.8 tons per square inch of steam pressure, more than New England Power had ever produced from a single unit.

It was a new type of high-pressure boiler based on the once-through principle. Water would be turned to steam in a single pathway of tubes, without need for the conventional steam drum. In order to achieve its greatest output capability, it would have to be held within extremely tight operating parameters.





Power—The First Order of Business

On the other side of the construction site, an addition to the turbine hall measured 225 feet by 130 feet. Beneath the new hall's 90-foot ceiling, a massive concrete pedestal was completed, ready to support a tandem-compound, double reheat turbine.

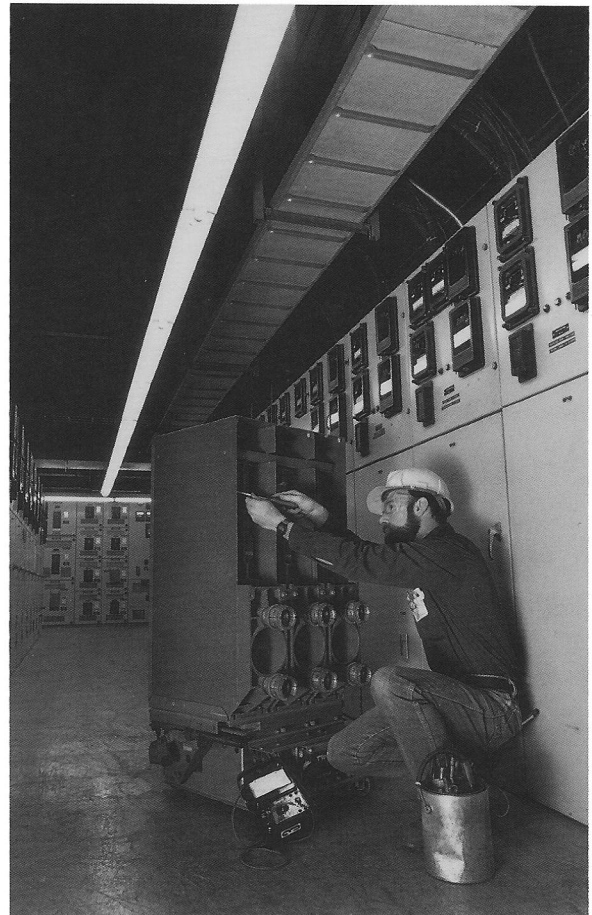
Soon, the 200-foot-long turbine generator—operating with the precision and balance of a fine watch—would transform steam pressure to electricity. It would do it in amounts that would impress even the six- and seven-year Brayton veterans who continued to produce record levels of power from Unit One and Unit Two. Often, that level of production wasn't easy, given the construction going on around them.

As the project moved through its final 18 months, nearly gone were most of the mountains of material required to complete the mammoth unit, including 4000 tons of steel, 963,000 feet of condenser tubing, and 25,000 cubic yards of concrete.

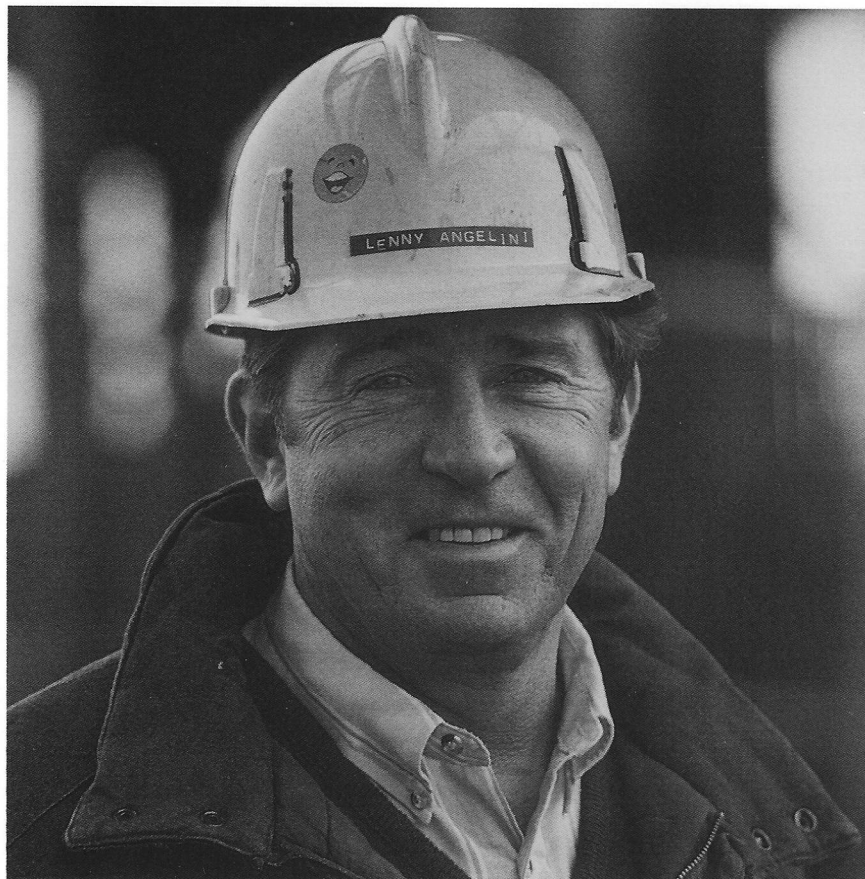
1,100,000 KW!

At one minute past midnight on July 29, 1969, Unit Three went on-line, sending more than 600,000 kilowatts of electricity into the energy-hungry Northeast Grid. Coincidentally, the station's total generating capacity more than doubled, to 1,100,000 KW! It was, by far, the largest generating capability of any plant in New England, a record that would stand until broken five years later at the same station.

The decade ended auspiciously for the nation with Neil Armstrong's walk on the moon. And so it did, on a somewhat smaller scale, for the people of Brayton Point Station, as they placed Unit Three's imprint on the energy landscape of an entire region.



Lenny Angelini



“When I was in the Lynn plant they had a posting for a ‘dozer’ operator at Brayton Point. I had run the same machine in the Seabees. So I took a test and Charlie ‘Sok’ (Brayton Point Superintendent K. Charles Sokolosky) hired me in 1962. That first winter, I commuted from Beverly in an old MG without a heater.

“Each of us was experienced and came from various parts of the system. Our group was on the docks all day, and the winters were bitter cold. I remember one stretch of 13 or 14 weeks without a day off. I never saw my family grow up. Now there are new hiring and training practices in place, and people are encour-

aged to move ahead and given opportunities to do so.

“Today I’m a working foreman in the Fuel Department with regular hours and weekends off. We’re in charge of the coal yard, the coal-handling equipment, and the plant’s vehicles. I like it because it’s multifaceted. I’m everywhere and it keeps me busy.

“If someone had told me when I started here that today we would be burning nine thousand tons of coal a day, I wouldn’t have believed him. That’s a shipload every four or five days.”

Working Foreman, Fuel Department
Brayton Point Station
Bulldozer operator, 1962

Meeting Energy Challenges: 1970 to 1979

In the seventies, the country sought solutions to a long list of problems, including racial segregation, Watergate, "legionnaire's disease," oil spills in our coastal waters, and American hostages overseas. And, as always, there was good news, too. The Vietnam War ended, the SALT II agreement with Russia was signed, and the nation celebrated its 200th birthday. Just as it was a time of struggle and resolution for the country, so it was for Brayton Point Station.

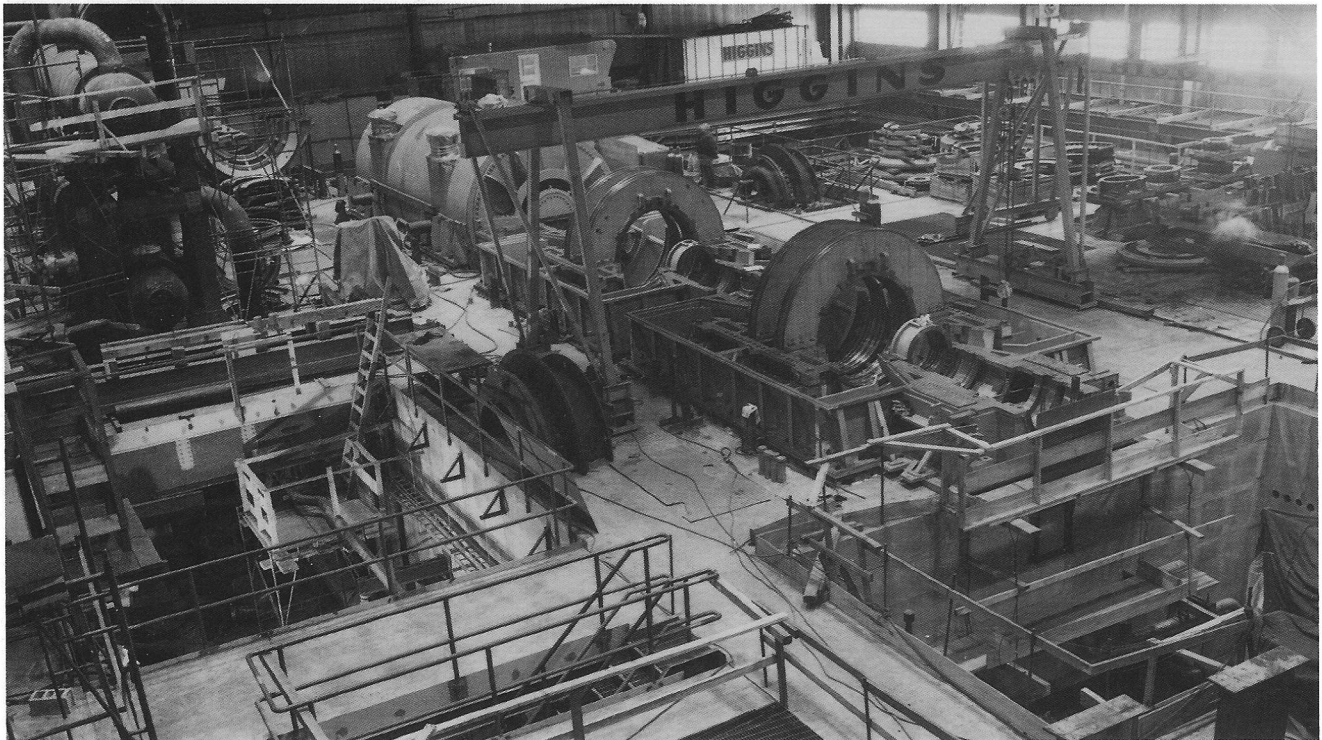
Adding Capacity— a Constant Process

Pressured by the voracious demands of a fast-growing market,

the company faced an almost constant process of adding to its generating capacity. Given the region's mature hydroelectric resources, this role fell increasingly to the System's base load facilities, Salem Harbor and Brayton Point stations.

Therefore, early in 1970—less than a year after placing Brayton's mammoth Unit Three in service—New England Power announced plans to follow it with Unit Four. Alone, the new unit's output would nearly equal that of Unit One and Unit Two together. Construction began late that year with an on-line date scheduled for 1973.

The estimated cost of Unit Four was \$60 million plus several million more called for by environmental safeguards, including a new stack and complex air pollution control equipment.



Two Opposite Goals

Oil prices had dropped in the late sixties. Therefore, Brayton's first three units, which could burn either coal or oil, had switched to burning oil. Then, in the early seventies, oil prices began to rise once more. Meanwhile, enactment of the federal Clean Air Act and other environmental statutes prevented the three units from being economically converted back to lower-priced coal.

The company was challenged throughout the decade to achieve two goals at once: protection of the environment and freedom from high-priced foreign oil.

Many Environmental Laws Changed Constantly

As new bodies of federal and state environmental law evolved, plant licensing procedures were not only complex but also constantly changing.

In 1970, as preliminary construction began, ongoing changes in such regulations brought all building to a halt. Eighteen months later, New England Power resumed construction on Unit Four, after design changes were made incorporating a number of environmental protection features.

Good News and Bad News

Just after New England's foliage reached peak color in the fall of 1973, there was good news and bad news: construction of Unit Four passed the halfway mark, but the Organization of Petroleum Exporting Countries (OPEC) embargoed oil exports to the United States.

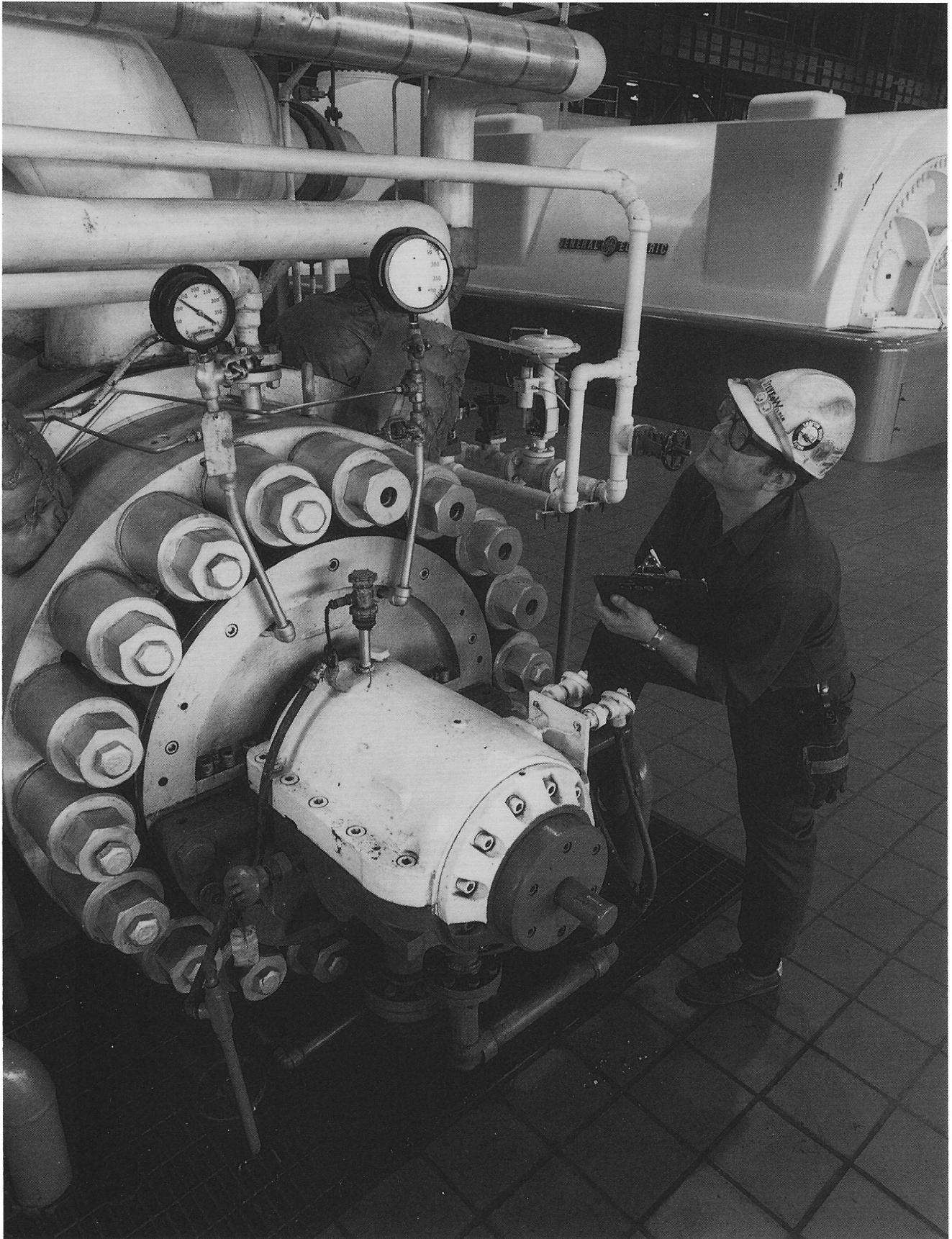
Over the next six months, world crude oil prices quadrupled, heralding the worst recession in the United States since the thirties.

The Crusade for Coal

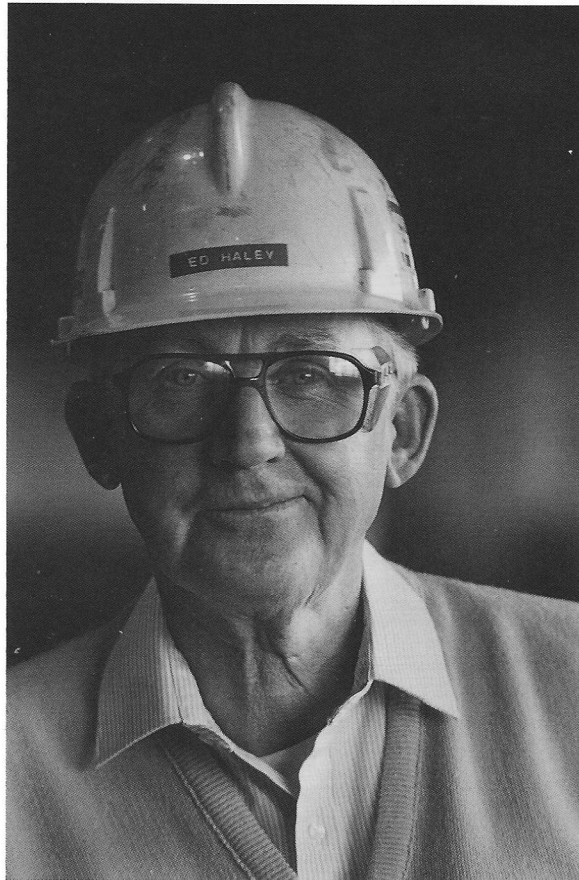
As the nation prepared to celebrate the 200th anniversary of its first rebellion, New England Electric System played a leadership role in another kind of rebellion. It was the energy revolution, a drive to replace New England's dependence upon foreign oil with the independence of domestic coal, while protecting the environment and holding customer costs down. Plainly, it was not an easy undertaking.

Brayton Units 1, 2, and 3, which were originally designed to burn coal, did so until 1969, when they were converted to oil. Following the oil embargo, they burned coal again for a short time, but returned to oil-firing when temporary variances expired.

The threat of foreign oil dependency remained clear, held in vivid images of gas lines, heating oil shortages, and shrinking paychecks. New England Electric began the urgent quest for a longterm solution, the conversion of Brayton Units One, Two, and Three to coal burning on a permanent basis.



Eddie Haley



“I started in mechanical maintenance here in 1963 after having worked for 14 years at Narragansett Electric. I convinced my brother, Bob, who was working a rotating shift in operations, to join our department. We commuted together. During those drives, I learned about operations from him and he learned about mechanical maintenance from me. In those days, it was important to know as much as possible about the various aspects of the plant, particularly if you were in mechanical maintenance, as I was.

“Before long, things began to break down. There was no redundancy. If something went out, we had to fix it and get it back on-line. The overtime was unbelievable and my wife told me that the kids

said, ‘Isn’t Daddy ever coming home?’ Although the hours were long, there was a sense of comradeship among us here. But times changed for the better, and mechanical maintenance was placed on a shift basis about 1974.

“Today we have strong preventive maintenance and training programs. Now, when equipment is down, it’s likely to be because of scheduled overhaul, not repair. We’ve come a long way around here. When I started 25 years ago, there were three people and a supervisor in the mechanical maintenance department. Now there are about 75.”

General Foreman,
Mechanical Maintenance
Brayton Point Station
Retired 1988

Power Output Jumped Again

Meanwhile, Unit Four went on-line December 19, 1974. At the time, the new oil-fired steam-electric generator was producing about 400,000 kilowatts, raising the station's total production capability to more than 1,500,000 kilowatts.

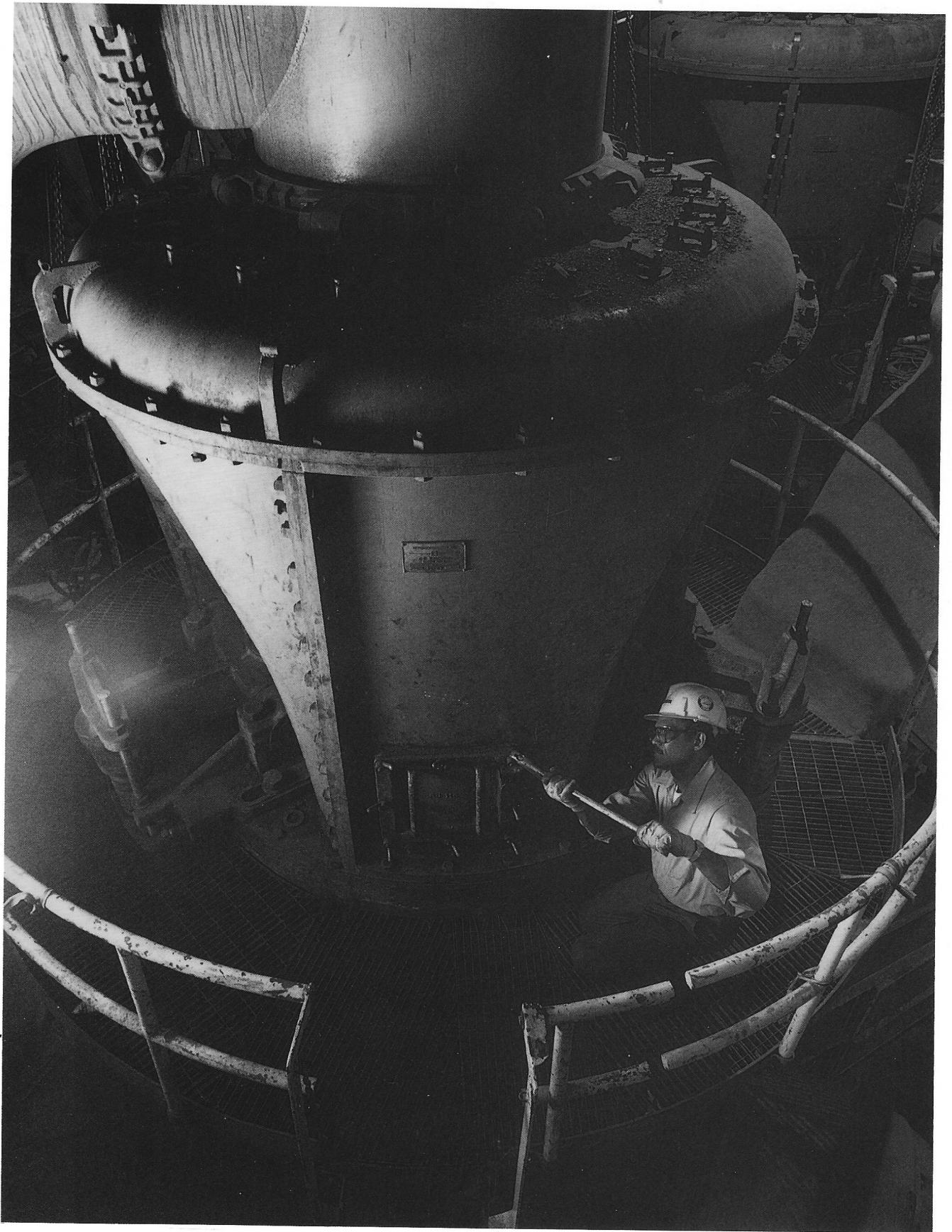
The Great Clam-Moving Project

As the summer of 1975 began, fishermen working for a New England Electric subsidiary began a 10-year project to move 13,670 bushels of quahogs. The clams were harvested from both the station's discharge and intake areas and carefully transplanted in nearby state-designated areas on the same day they were taken.

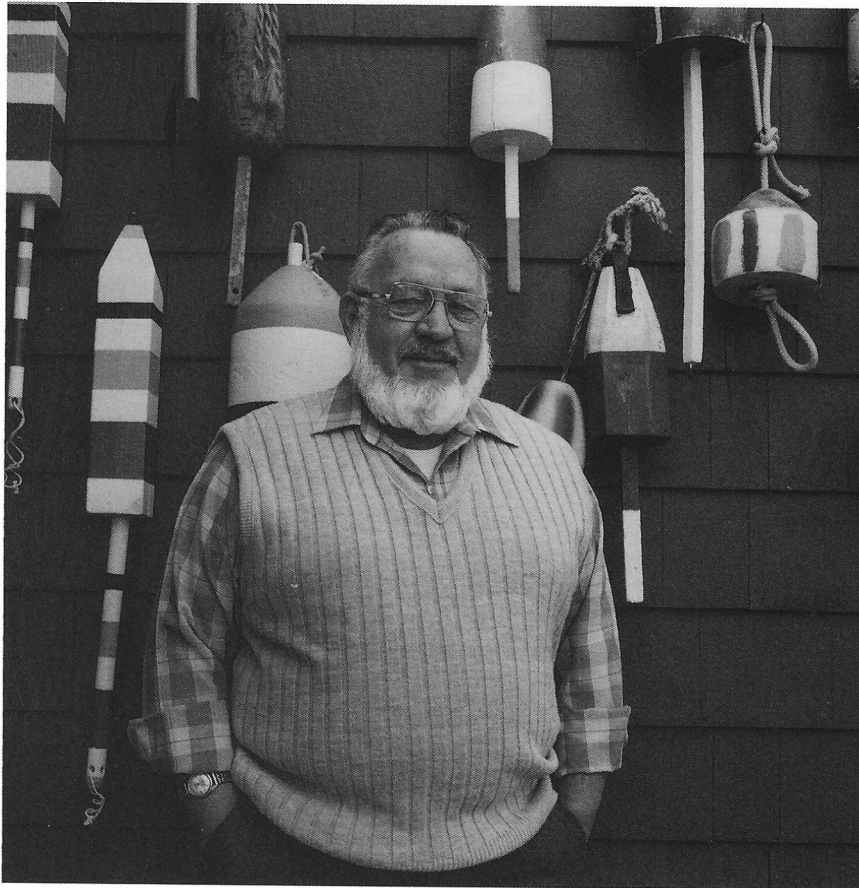
When planted in the new locations, the bivalves adapted within a few months. One-quarter of the estimated total crop in the intake/discharge areas was moved in this manner.

While studies continued on the feasibility of a permanent conversion to coal of the three units, a number of preliminary conferences were held with appropriate state and federal regulatory agencies. In mid-1977, the Federal Energy Administration (FEA) issued an order prohibiting the continued use of oil in the three units. However, environmental studies had to be completed before the units could be converted back to coal. Another step had been taken in a slow process that led—five years later—to the station becoming the first in New England voluntarily converted to coal.

By this time, the people who had operated the plant's first two units back in the sixties were 15-year veterans at Brayton Point, many with previous experience at other System locations. Some of their number were in various new posts throughout the System, no doubt sharing with others lessons they had learned earlier, often the hard way.



David Goyer



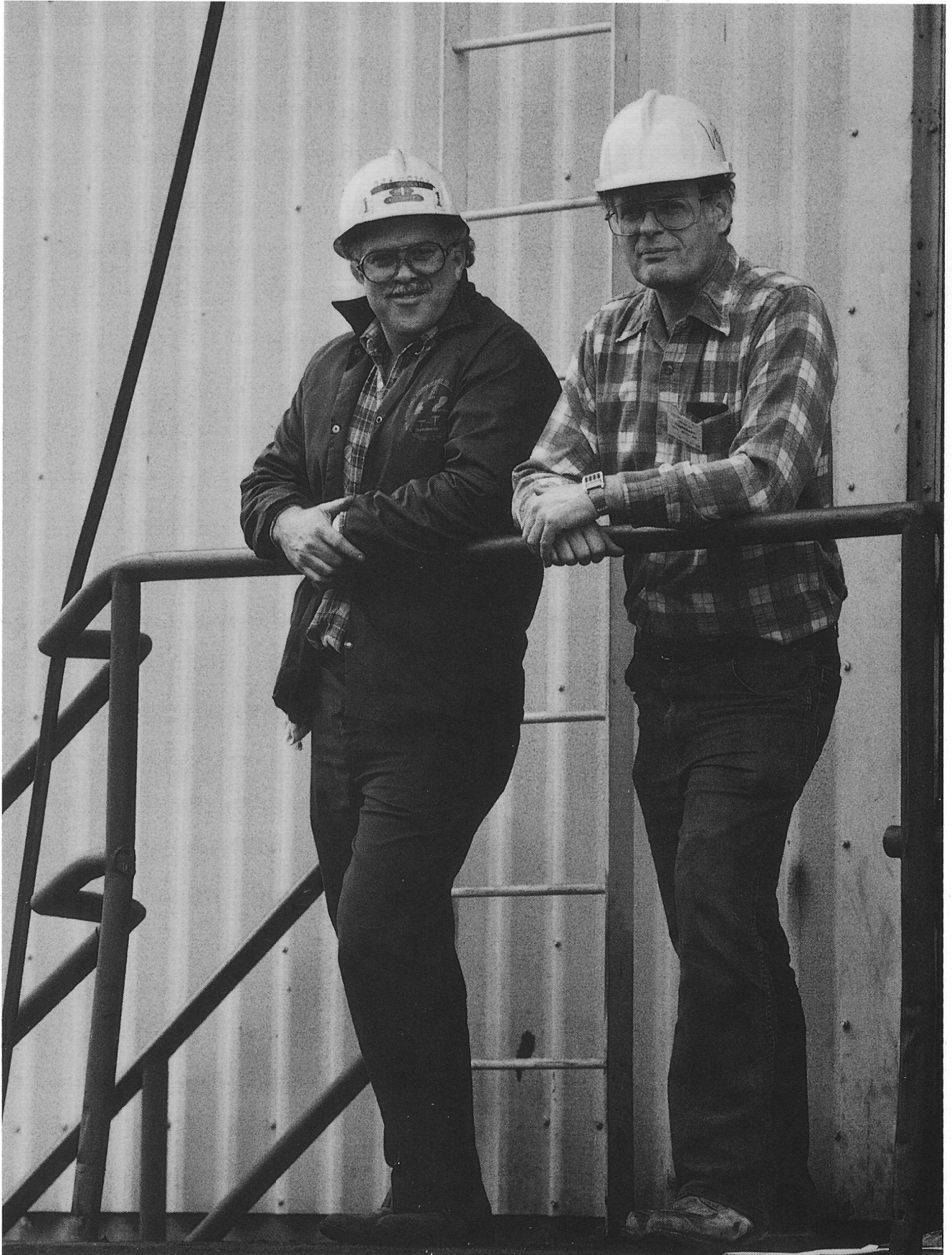
“Before going on-line, we broke systems down into subsystems to test them, the smaller the better. After testing such a subsystem, we connected it to an adjacent one and tested the two together, then added a third and tested again, and so on. In this manner, we worked our way up to checking entire sections of the plant. Finally, we put it all together and were ready for the ultimate test—successfully starting the new unit and generating electricity. That happened four times while I was at Brayton. And it was exciting, to say the least.

“My father had done quite a bit of boiler work and he was able to look up into the boilers of Units One and Two before they put the bottoms on. Since he

was so impressed with the size of those boilers, I wish he had lived long enough to look up into the boiler of Unit Three. It would have amazed him, as it did most of us.

“To me the most interesting time of all here was the 1965 blackout. A potentially dangerous chain of events began when the cooling pumps stopped, eventually causing hydrogen to leak into the plant. We spent anxious hours carefully expelling the remaining hydrogen harmlessly out into the atmosphere through the roof of the darkened station. Somehow, you tend to remember experiences like that.”

Watch Engineer, Brayton Point Station
Retired 1987



Keeping an Eye Out

The day to day life of generating power had its occasional surprises at Brayton Point Station. Some of them involved plenty of excitement, at least for a few minutes. So it was on an early spring day in 1978 for two company employees and a visiting consultant. They literally dropped what they were doing and, using the company's 17-foot Whaler, plucked four people—one of whom was unconscious—from the cold, choppy waters of Mount Hope Bay. All survived. It was a happy ending. But it wasn't the first such incident and it wouldn't be the last. "Keeping an eye out" went with the territory.

The Final Steps Leading to Permanent Coal-Firing

That summer, the company and the Massachusetts Department of Environmental Quality Engineering (DEQE) moved a step closer to coal-firing at the station, when both signed an agreement to allow the coal conversion—as long as it was done in an environmentally sound manner.

The pact permitted burning of 1.5 percent sulfur coal, without the installation of costly scrubbers. However, the plant's electrostatic precipitators would be upgraded to more stringent particulate emission standards.

In May 1979, the EPA granted final approval to New England Power to burn coal on a permanent basis at Brayton Point Station. Stone & Webster Engineering Corporation was hired as engineer/contractor and, in October—after nearly five years of planning, research, and hearings with local, state, and federal regulators—the huge permanent coal conversion project was launched.

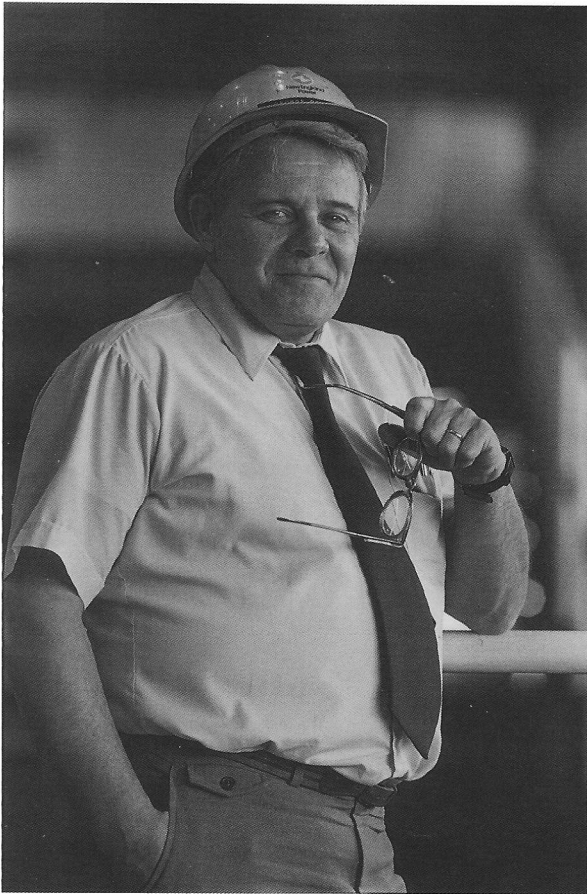
A First for the Nation

It was the nation's first large-scale switch from oil to coal by an electric utility, one the *The Wall Street Journal* would recognize as a model for study by legislators involved with environmental regulation.

In the late fall, the EPA permitted the company to burn coal temporarily in Brayton's Unit One and Unit Two under a Delayed Compliance Order (DCO), whereby the station was allowed to exceed emission limits during the installation of additional pollution controls. The eight-month interim coal burn under the DCO—lasting through July 1980—replaced three million barrels of oil and saved customers \$27 million in fuel costs.

Finally, as the decade ended and permanent coal conversion began, the people of Brayton Point Station realized that they were going to win their long quest to gain more freedom from oil while protecting the environment.

George Downing



The coal yard guys were already here when the rest of us arrived a couple of weeks before Christmas, 1962. We hardly ever saw the temperature above zero for the remainder of 1962. We had one electrician, two mechanics, and four instrument technicians in the work force. The rest of the work force were operators and coal yard people.

“There were hard times but there was also a lot of enthusiasm. For example, enthusiasm for the ball field we built in back of the plant. At times there were about 40 of us outside raking stones and spreading grass seed we bought ourselves. We did it all on our own time. Eventually we lost some of the outfield when the oil storage tanks were built.

“I’ve been involved in the growth of computers here since the beginning. Today, about 30 percent of the control systems that operate things like valves and dampers are computer driven, and the figure is growing.

“This is a challenging business. Given its size, this building probably requires more different types of knowledge to operate it than most other industries. For instance, we need steam power operators, mechanics, electricians, electronics specialists, and instrument and computer people.”

Project Coordinator for Brayton Point’s
Preventive Maintenance Effort

Formerly Supervisor, Instrumentation
and Controls, Brayton Point Station

Control Specialist, 1962

Bringing Back Coal: 1980 to 1988

For the nation, the next eight and one-half years would have ups and downs. The “downs” included Olympic boycotts and the death of a NASA space crew, while the “ups” included freedom for 52 hostages and the first woman appointee to the Supreme Court.

Coal Conversion More Costly Than the Original Plant

In the first six months of the new decade, 30 shipments of coal arrived at the station’s pier. This supply helped meet the needs of the interim coal burn and prepared the coal pile for the demands of later permanent coal-burning by three of Brayton’s four units.

Work continued throughout 1980 on the \$192 million project, which cost more than the original Brayton Point plant. It involved three components: major modifications of the coal and ash handling systems, boiler modifications, and the installation of additional precipitator capacity. Half the price tag was for pollution control hardware, the largest part of it for immense electrostatic precipitators.

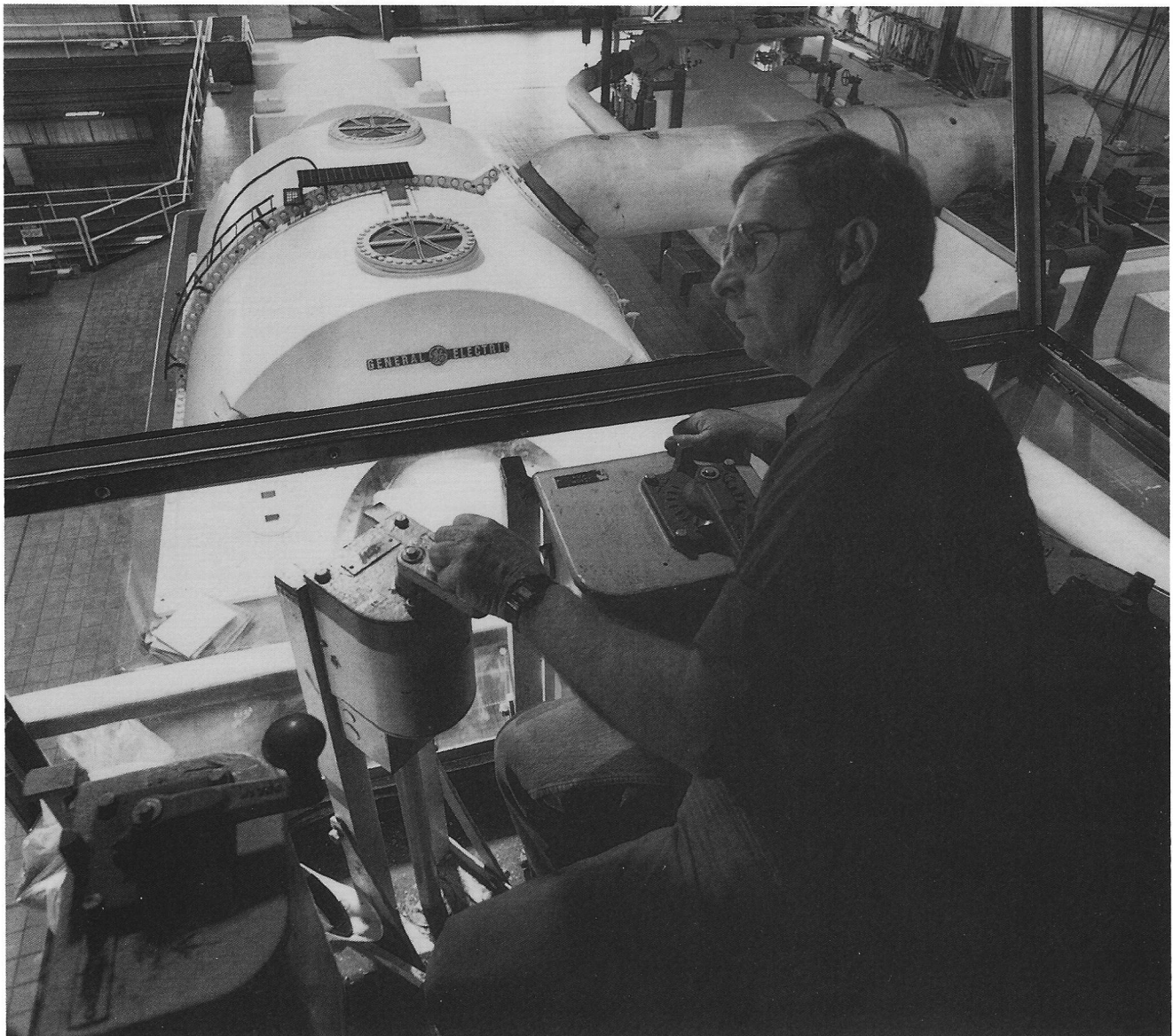
Permanent-coal burning began on March 30, 1981. On that day, Unit One began burning coal on a permanent basis, followed four months later by Unit Two. Then, early in the following year, Unit Three joined them, completing the permanent conversion to coal-firing of three of Brayton Point Station’s four units. The same year, 1982, the keel was laid for the System’s own coal-fired, coal-carrying ship.



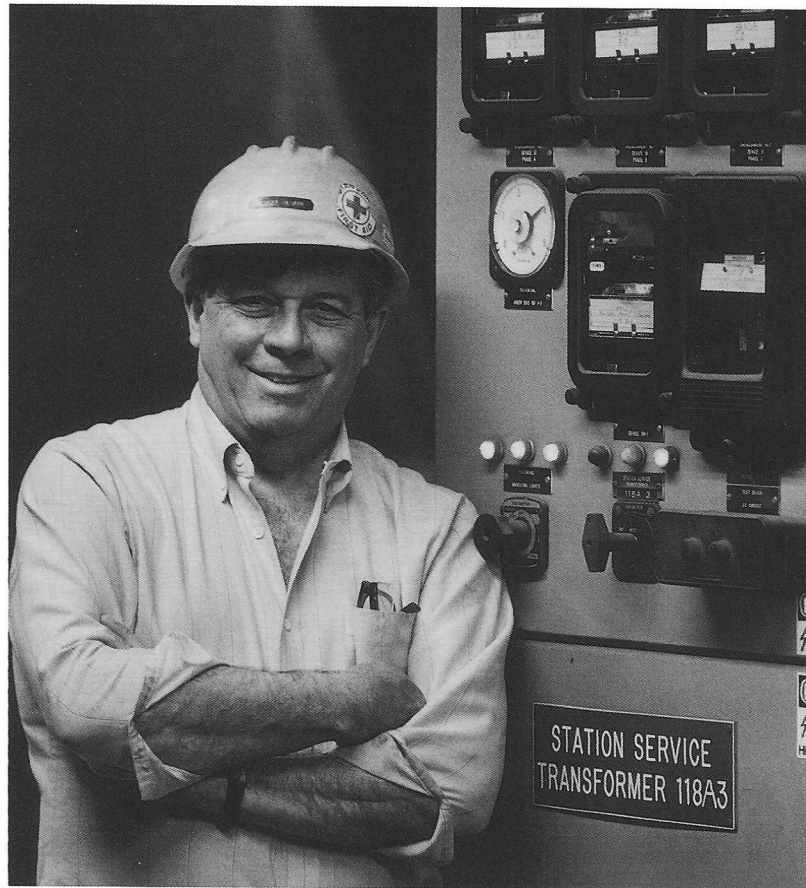
1983 Was a Very Good Year

Nineteen eighty-three was a very good year at Brayton Point Station. The shift of three of its oil-fired units to coal-burning exceeded all expectations by saving customers \$36.4 million through December, and helping the System cut its use of imported oil by more than 50 percent. The average cost of electricity for customers of the System's retail companies was in the lower third among major New England utilities.

The project was an environmental success, too. The precipitators removed more than 99 percent of the fly ash from the flue gas and cut particulate emissions by more than two-thirds from what they had been when these units burned oil. At the same time, the domestic bituminous coal burned by these three units helped cut their sulfur dioxide emissions by 20 percent.



Eugene Houde



I went to Brayton Point in 1963 as a second class electrician. I was kind of green and didn't know many people. But everybody was in the same boat, so we got acquainted. I was actually there when all four units were started, broken in, and placed on line.

"The biggest change I saw over the years was the addition of people. Whereas we had started off with a pretty small crew, many of whom did a variety of different jobs out of necessity, we eventually brought in more people with very specific skills. Of course, as the station became larger, more people were required to operate it. Today, new people don't have the opportunity to learn it all by doing it all, as we did. Now, we have a training center

and a good training program. There are more opportunities for people to advance.

"Brayton also is working hard on its plant life extension program, to assure the productivity of its four units for years to come."

Supervisor, Electrical Operations and
Maintenance, Thermal Department,
New England Power Company

Formerly General Foreman,
Brayton Point Station

Electrician, Second Class, 1963

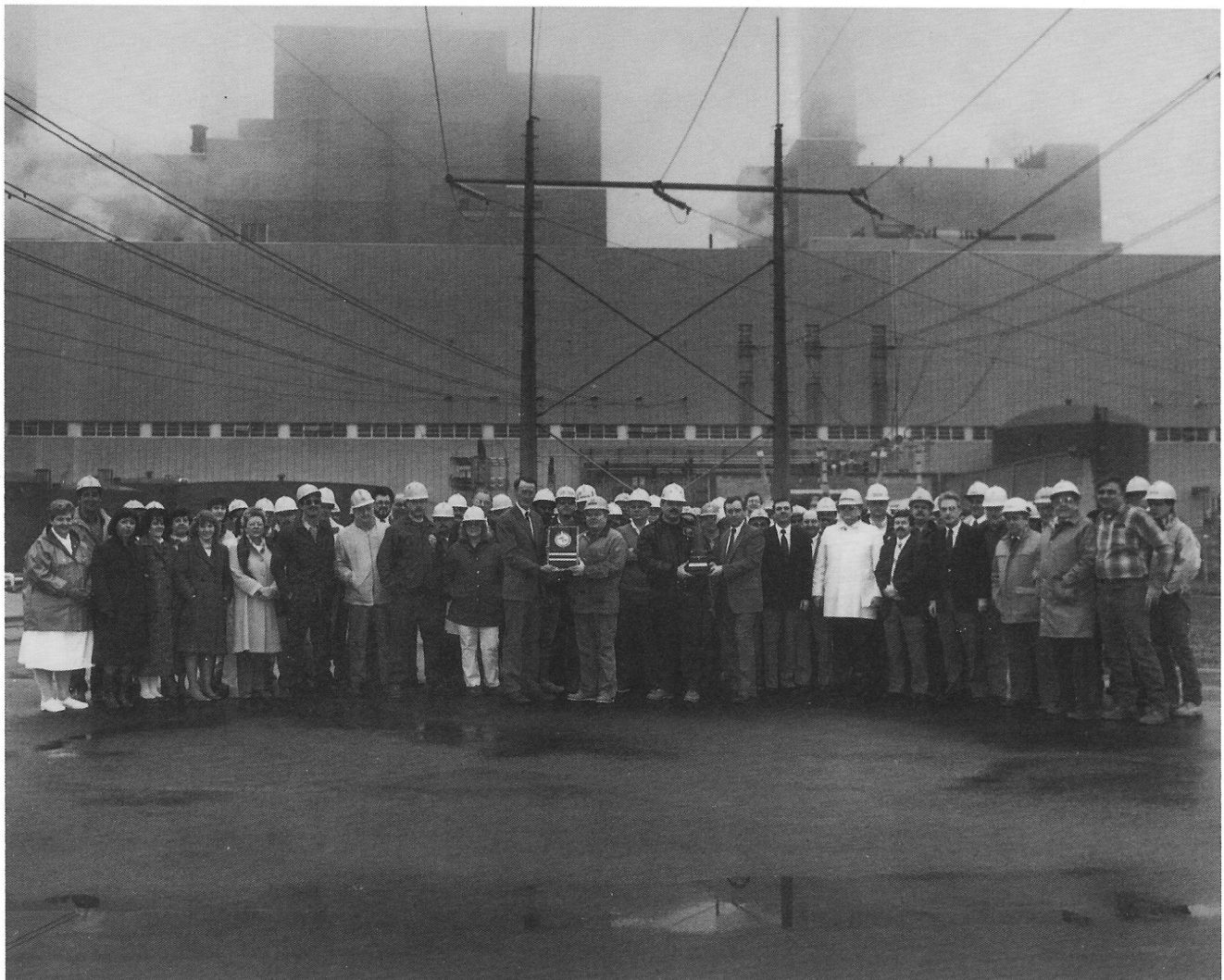
Reliable Coal Supplies at Minimum Delivery Costs

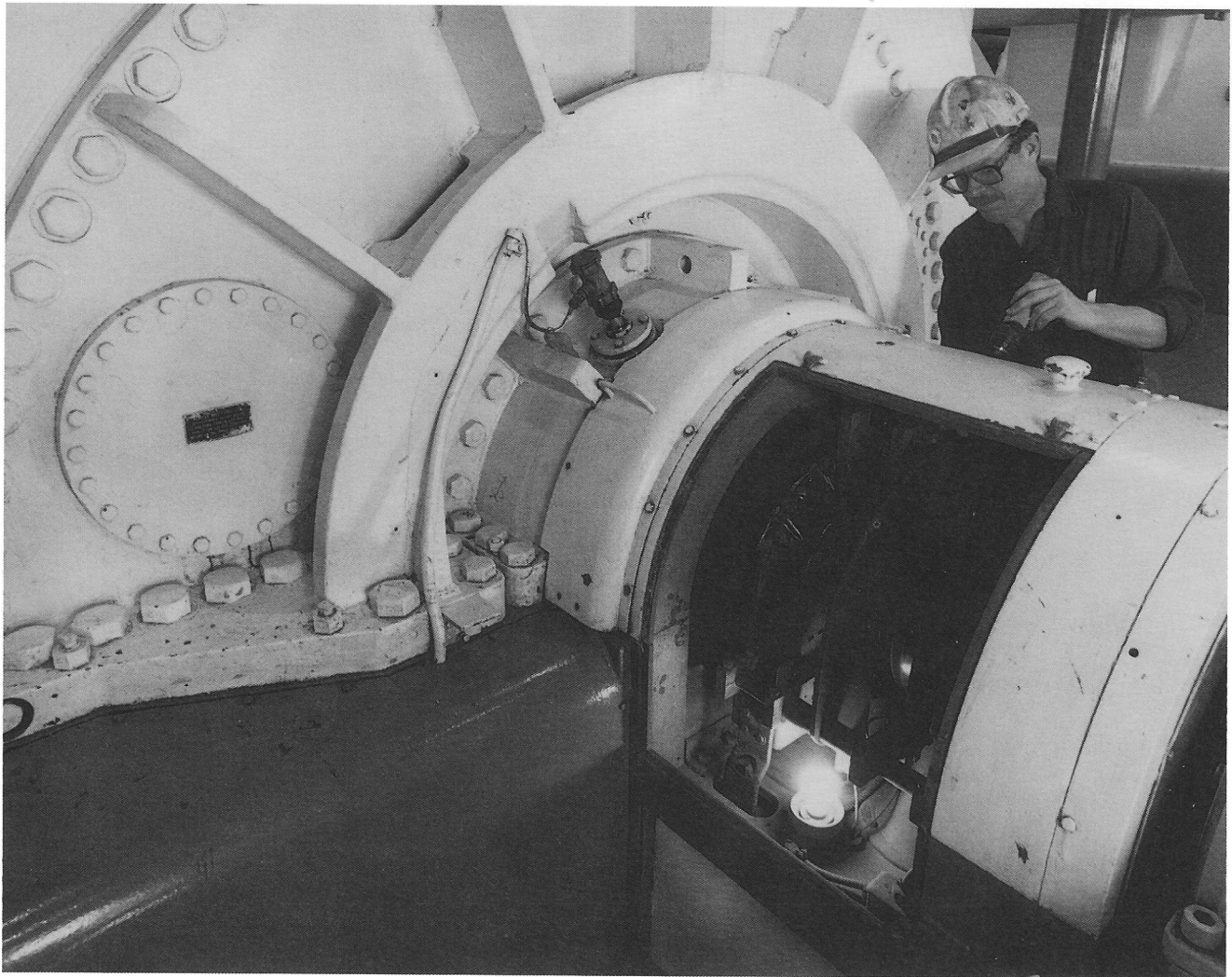
The same year, the company moved to assure a reliable coal supply at minimum delivery costs by launching its own coal-fired, coal-carrying ship, *Energy Independence*. The first coal ship of its kind built in the United States in more than half a century, the modern 665-foot collier steams to Brayton Point, self-unloads its 40,000-ton coal cargo, and returns to its port of origin in about four and one-half days.

The First Quarter-Century Ended As It Began— Successfully

Early in 1988, as preparations were made to celebrate the plant's first quarter-century, the people of Brayton Point Station won the Safety Achievement Award for having the System's most improved safety record.

The same people also played a major role in achieving another System record: oil is now less than one-third of New England Electric's fuel mix.





A Key Player in Meeting Future Needs

Beginning its second quarter-century, Brayton Point Station remains the largest fossil-fired power generating facility in New England. As such, it will continue to play a pivotal role in the area's base load energy supply. Therefore, New England Electric will look to the station to lead the way in producing the lowest cost electricity with the least possible dependence upon foreign fuel sources, while

exercising the highest concern for the environment. In the ongoing struggle to strike a balance between the supply of and demand for power, System planners will depend upon Brayton Point Station to anticipate change and react to it quickly. If these expectations have a familiar ring to them, it is only because they are part of the station's history, its proven record of accomplishment. But, back in 1963, they, too, were only goals for an unclear future. Today, in light of the uncertainties ahead, Brayton Point Station is proof of what people and technology can accomplish together.

Joe Matthews



“In 1962, as we traveled around the System individually selecting the people who would operate the plant; we placed strong emphasis on their willingness to learn and to work with others. It was a unique situation. It was a new plant; nothing had been here before. The people were all new, too—none of them were from around here. But they were anxious to learn and to help and to work together. Later, amazed contractors would say things like, ‘Where did you get this group, anyway?’ We were very lucky, indeed.

“Technologically, Brayton was the first of its kind, with new designs and ideas—many of them without precedent. That first operations group spent countless hours studying prints and instruction books at home, and together. First, whatever their assigned specialties were to be—pumps, pulverizers, condensers—they got hands-on experience with them, including their piping, electrical, and instrumentation aspects. Everything. Then, they explained it to the rest of the group. It was a sure way of demonstrating their own knowledge and readiness, and it prepared others to provide back-up. It was a system that would prove itself many times. I wish continued success to present and future employees in the operation and maintenance of Brayton Point Station.”

Chief Engineer, Brayton Point Station
Retired 1985

