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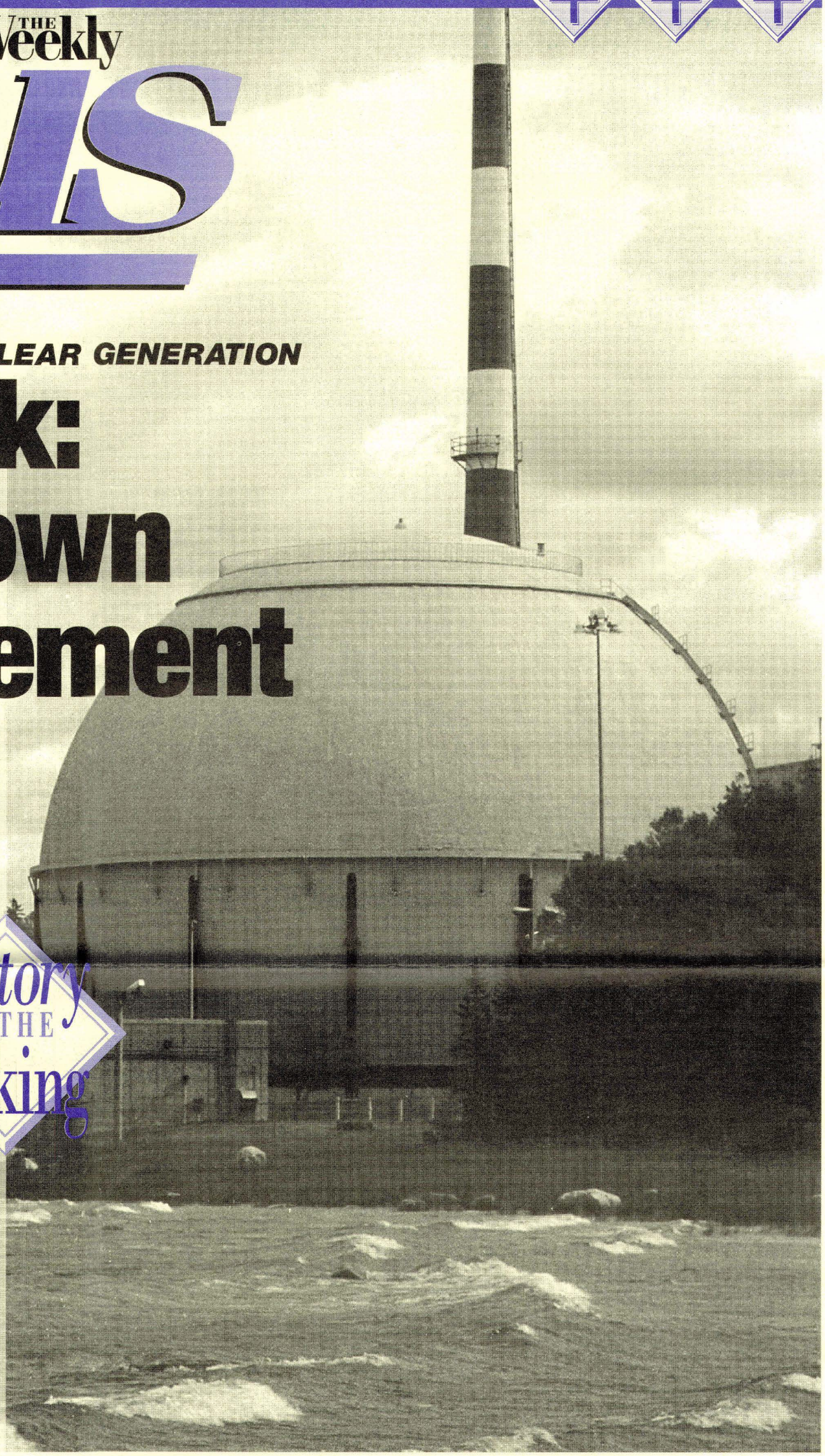

ENDING AN ERA OF NUCLEAR GENERATION

Big Rock: Countdown to Retirement

BY PARRI SONTAG

FOR A NUCLEAR POWER PLANT, ending life at 40 means checking out at a ripe old age. This is CPCo's goal for Big Rock Point, which began generating electricity on Dec. 8, 1962.

Big Rock was the nation's first high-power-density boiling water reactor and the fifth commercial nuclear plant in the United States. Its green dome has become a familiar part of the landscape of northern Michigan.

"Nuclear power plants are typically licensed to operate for 40 years from the start of construction," said plant manager Pat Donnelly. "We're planning for Big Rock to become the first commercial nuclear unit to operate until its license expires."

History IN THE Making

While CPCo could seek to extend Big Rock's license, it has chosen not to. Big Rock has performed well over the years, but it is a small power plant with relatively large operating costs.

"The company expects there to be more economical options for power generation beyond the year 2000," Donnelly said.

Almost 33 years have gone by since Big Rock first opened its doors. Back then, a young actor named Ronald Reagan hosted an educational film shown at the plant's visitor center. *Headstart on Tomorrow* was a primer on atomic power as a newfangled source of electricity.

Once the new kid on the block, Big Rock is now in its twilight years.

D-Day will be May 31, 2000, when the plant enters the first phase of decommissioning. This military-sounding term means taking a nuclear plant out of service and restoring the site. As required by federal law, the plant is closed, dismantled and decontaminated.

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Big Rock Counts Down to Year

COUNTDOWN FROM PAGE 1

History IN THE Making

There's more than one way to do this.

In October 1993, CPCo appointed a 12-person team to develop a decommissioning plan. The team examined three methods, referred to as DECON, SAFSTOR and ENTOMB.

- DECON is the immediate decontamination and dismantlement of a plant. Soon after the plant shuts down, its radioactive structures are dismantled and transferred to a low-level radioactive waste disposal site.
- SAFSTOR is deferred decontamination and dismantlement. The plant is overseen by a caretaker, and nothing is dismantled for up to 60 years. This gives radioactive material time to decay. When the plant is finally dismantled there is less waste material to ship to a disposal site.
- ENTOMB is short for entombment. The plant is wrapped in a concrete shield. Since it is impossible to enter, caretaking is unnecessary. Again, the company has up to 60 years to dismantle the plant.

BASED ON the lack of low-level and high-level radioactive waste repositories, Big Rock's decommissioning team selected SAFSTOR.

"A low-level storage site is not yet available in Michigan," said Jim Rang, director of CPCo's nuclear services support, and decommissioning team leader. "We have nowhere to ship such materials. The plant will be put into a custodial state until such a site becomes available."

Under the Nuclear Waste Policy Act of 1982, the state of Michigan is responsible for developing a low-level waste storage site for all generators of radioactive materials in the state. These includes hospitals, research reactors and power plants.

Rang and other decommissioning team members believe a repository will be available no later than 25 to 30 years after Big Rock's shutdown — hopefully much sooner.

Keeping Big Rock in a SAFSTOR state for that time is likely to cost as much as $85.6 million. Had the decommissioning team been able to anticipate that a low-level waste storage site would be available by Big Rock's May 31, 2000 shutdown, their first choice would have been immediate dismantlement — a much less expensive option.

> ***"Clearly, the message we're getting from the community is that they would like to see Consumers Power continue to have a presence in the area."***

Lack of a low-level site wasn't the only glitch Big Rock's decommissioning team had to consider. A federal high-level nuclear waste storage site also is not yet available.

Also under the Nuclear Waste Policy Act of 1982, the Department of Energy is supposed to assume ownership of the spent nuclear fuel from power plants by 1998. But the federal agency has backed away from that commitment and may not assume ownership of the fuel until 2010.

Should the DOE not follow through on its 1998 commitment, Big Rock's spent fuel will be stored in licensed dry, transportable canisters. Such canisters are not currently on the market, but should be available in time for the last of the plant's spent fuel to be loaded. This system is expected to cost about $16 million.

While other dry canisters, including those storing spent fuel at Palisades, are available now, the designs allow for storage only. They have not been approved for shipping waste.

"We want to use transportable canisters at Big Rock, so the canisters need only be loaded once," Rang said. "They can be stored on site while the rest of the plant is dismantled, and shipped to a repository later."

Rang said site restoration cannot begin until the spent fuel is gone.

The decommissioning plan calls for returning Big Rock Point to a "greenfield." That means removing all the buildings and restoring the land to its original state.

At the same time, the company is looking into repowering the plant, using a different energy source.

"We need to determine how feasible it is to put another power plant at that site and what kinds of expenses would be associated with that," said Bob Fenech, vice president of nuclear operations.

"We're examining whether repowering is the option that will allow us to provide the best rates to our customers," added Dave Joos, executive vice president and chief operating officer for the electric business unit.

"Repowering Big Rock Point will be considered along with other options to meet CPCo's growing capacity needs. Other options include: repowering other CPCo facilities, purchasing power or even building a new plant."

If Big Rock is not repowered, both the Charlevoix and Petoskey communities could feel the loss.

"Our payroll is about $13.1 million a year," Rang said. "That means support for these communities, through taxes and purchases. We also provide financial support to local organizations such as the United Way."

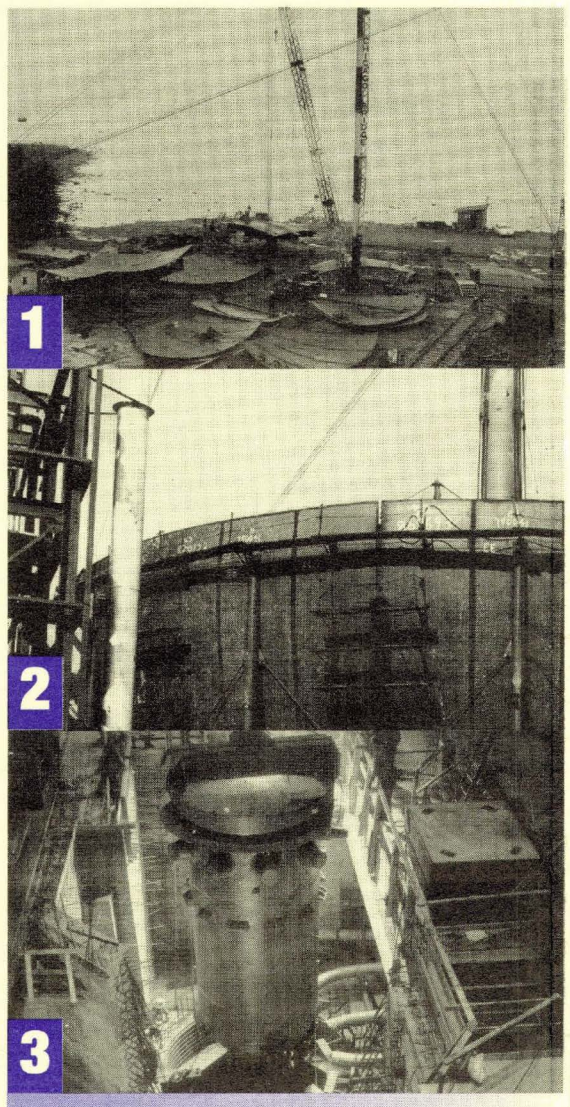
Big Rock Point is the second-largest taxpayer in Charlevoix County, with more than $900,000 a year in property taxes.

"Each year we buy about $300,000 in local goods and services," said Tim Petrosky, Big Rock's public affairs director. "You can add another $250,000 during a refueling outage. Contractors move into the area and rent homes, hotel and motel rooms, buy meals and entertainment. It's not unusual to have more than 100 people come in to help with an outage. They can spend up to 75 days in the area."

Beyond the financial hit, the community also stands to lose the personal support employees bring to local organizations.

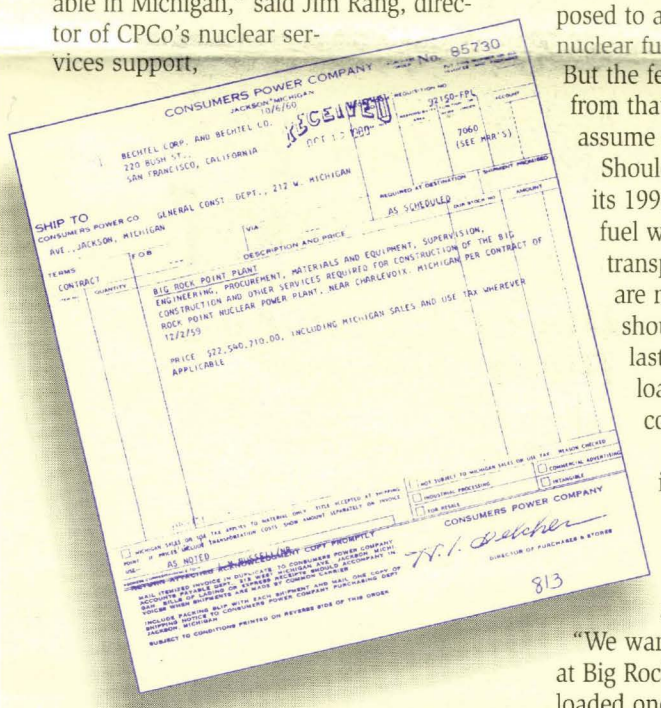
"Big Rock Point employees serve on the board of directors for the Chamber of Commerce, The Salvation Army and the United Way," Petrosky said. "They are Boy Scout troop leaders and American Red Cross volunteers. They coach Little League baseball. They truly make a contribution to the area."

"Clearly, the message we're getting from the community is that they would like to see Consumers Power continue to have a presence in the area," Fenech said. "They're very pleased to have this site in their community — not only because of the income they receive from the plant, but also because they think CPCo has been a good neighbor."



Construction of the "big green ball," more formally known as the containment sphere, took place in several phases.

1. ***A crane is positioned to begin hoisting the containment pieces into place.***
2. ***The structure half-completed. The sphere is partly located below ground and is constructed of 3/4-inch-thick steel. It stands 11 stories high and is 130 feet in diameter.***
3. ***Big Rock's reactor being lowered into place in the containment building. The reactor weighs 120 tons, is 30 feet tall, nine feet in diameter and has steel walls 5 1/2 inches thick. The reactor core consists of 10 tons of uranium oxide in the form of 84 fuel bundles. The power from a single load of fuel is about equal to that which could be generated by burning 260,000 tons of coal.***


CONSUMERS POWER COMPANY No. 85730
JACKSON, MICHIGAN 10/6/60
RECEIVED OCT 13 1960
BECHTEL CORP. AND BECHTEL CO. 220 BUSH ST., SAN FRANCISCO, CALIFORNIA
22150-FPL
7060 (SEE ABA'S)
SHIP TO CONSUMERS POWER CO AVE., JACKSON, MICHIGAN
GENERAL CONST. DEPT., 212 W. MICHIGAN
REQUIRED BY DESTINATION: AS SCHEDULED
DESCRIPTION AND PRICE
BIG ROCK POINT PLANT ENGINEERING, PROCUREMENT, MATERIALS AND EQUIPMENT, SUPERVISION, CONSTRUCTION AND OTHER SERVICES REQUIRED FOR CONSTRUCTION OF THE BIG ROCK POINT NUCLEAR POWER PLANT, NEAR CHARLEVOIX, MICHIGAN PER CONTRACT OF 12/2/59
PRICE $22,540,710.00, INCLUDING MICHIGAN SALES AND USE TAX WHEREVER APPLICABLE
CONSUMERS POWER COMPANY
W. L. Fletcher
DIRECTOR OF PURCHASES & STORES
813

In 1960, Consumers Power prepared this purchase order to build the Big Rock Plant. Today, the process is a little more complex.

Big Rock: 40 Years in Perspective

1962 Big Rock begins generating electricity.

1963 Martin Luther King Jr. delivers his famous "I have a dream speech."

1960 Construction begins at Big Rock.

1967 Campbell Unit 3 completed.

1969 American astronauts make first lunar landing.

1965 CPCo declares Big Rock commercial.

1968 CPCo incorporates in Michigan.

1971 Palisades nuclear plant first generates electricity.

1972 Swimmer Mark Spitz wins a record seven Olympic gold medals.

1977 Big Rock hits longest operating run, 343 days, a world BWR record at the time.

1976 United States celebrates its bicentennial.

1982 Big Rock plant employees complete 5 years without a lost-time injury.

1984 Construction canceled on the Midland nuclear plant.

1986 Space Shuttle Challenger explodes, killing all crew members.

1983 Big Rock employees win National Safety Council's Award of Merit.

1987 CPCo shareholders authorize creation of CMS Energy.

1989 East Germany opens the Berlin Wall.

1991 Big Rock reaches production milestone of 10 million megawatts.

1995 CPCo celebrates three millionth customer.

1994 O.J. Simpson is arrested for the murder of his ex-wife, Nicole, and Ronald Goldman.

2000 Big Rock's operating license expires.

1965 1970 1975 1980 1985 1990 1995 2000

2000

Last year, Big Rock formed a citizen advisory board to provide a communication channel to the community as the plant approaches decommissioning. The board includes Charlevoix and Petoskey community leaders.

"The biggest concern of local citizens is that Big Rock not go away," said advisory board president Dale Troppman, vice president of corporate resources for the Lexalite International Corp., a Charlevoix company that does plastics injection molding. "They'd like CPCo to continue to have a presence in Charlevoix County. The plant gives a tremendous economic boost to the community. And, as a businessman, I want the price of electricity to remain stable in the state of Michigan, so my company can continue to do business here."

Jacqueline Merta, executive director of the Charlevoix Chamber of Commerce and an advisory board member, said she feels the business community would wholeheartedly support CPCo converting Big Rock into a natural gas-fired plant.

"There's a growing demand each year for power in our area," she said. "When the plant is decommissioned, there will need to be another source of power."

Anti-nuclear activist Jo Anne Beemon, a grassroots environmentalist in the Charlevoix area, also serves on Big Rock's citizen advisory board.

"I think we can all stand together and say we hope CPCo maintains a long-term presence at Big Rock," Beemon said. "That would include wide support of another plant on site, possibly a gas-fired plant."

She also hopes CPCo will look into harnessing renewable resources such as wind and solar power.

Beemon noted that area environmentalists would feel more secure if CPCo stayed on site to monitor the spent fuel that will be put into dry storage at Big Rock.

"We don't have confidence in the federal government moving ahead and taking responsibility for the high-level waste that's been generated at Big Rock Point," she said. "While CPCo is on site, it remains responsible for the maintenance and storage of that waste. I think that's positive."

> ***"I think we can all stand together and say we hope CPCo maintains a long-term presence at Big Rock. That would include wide support of another plant onsite, possibly a gas-fired plant."***

Rang said the decommissioning plan has been structured in such a way that if CPCo does repower Big Rock Point, it can take place simultaneously with decommissioning. The company would probably be able to keep the present substation and build a new plant next to the existing plant, while the existing plant is torn down. A new plant could be up and running within about a year of Big Rock's shutdown.

Meanwhile, about 215 people continue to work at Big Rock Point, including security and the decommissioning staff.

During the "wet" SAFSTOR stage in which spent fuel cools in the spent fuel pool, the number of employees will drop to 40 or less. Once the fuel is loaded into the canisters, less than 25 employees will be needed.

WHEN A LOW-LEVEL waste repository becomes available and dismantlement of the plant finally begins (anticipated by January 2027), the staffing at Big Rock Point will once again increase. Between 150 and 200 employees and contractors will be needed for about three or four years.

"We're putting together an end-of-license human resources plan to address what will happen to the rest of the folks here," said plant manager Donnelly. The plan will be released after the UWUA contract is ratified.

"Our goal is to run the plant safely until May 31, 2000," Donnelly said. "That means retaining qualified and skilled people right to the end. After decommissioning, we hope employees will be placed elsewhere in the company or used in a repowered site."

Decommissioning Big Rock Point is expected to cost about $290 million in 1994 dollars.

Since 1991, CPCo has been collecting $19,372,800 a year from all of its customers and will continue to collect through the year 2000.

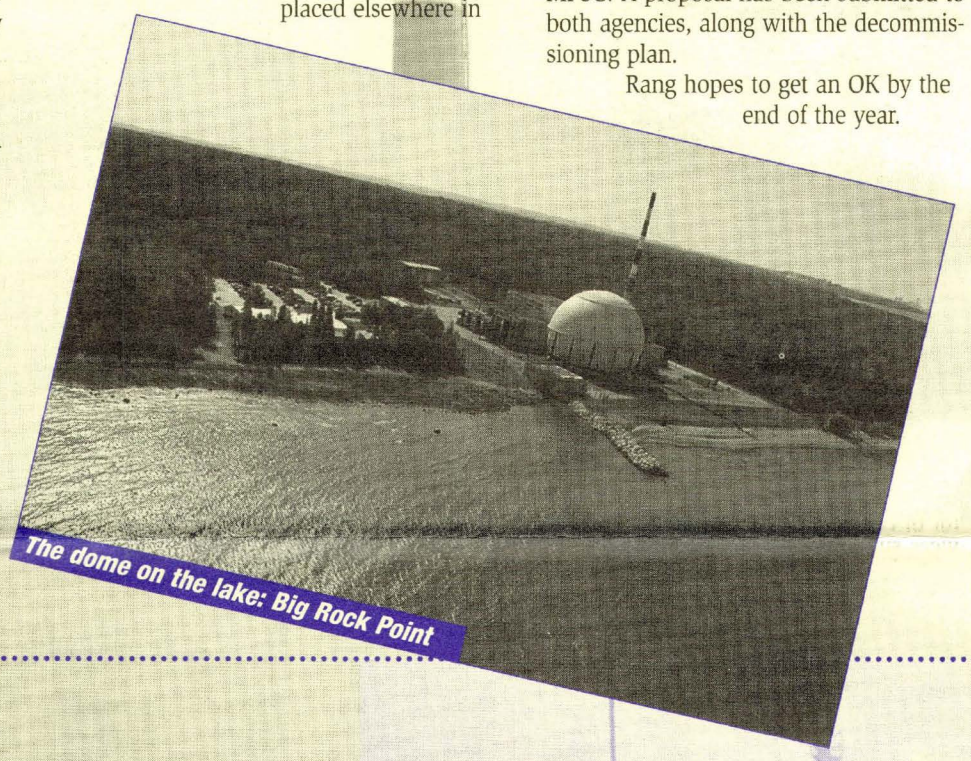
The money goes into a decommissioning trust fund. The fund was established under a Michigan Public Service Commission (MPSC) order and should bring in about $200 million by 2000.

CPCo expects to cover the $90 million shortfall by investing the money it is collecting from customers.

"We can invest in pretty safe securities," Rang said. "This would allow the return on our investment to pay for the additional costs. And it would save our customers about $90 million in rate surcharges."

This requires approval from both the Nuclear Regulatory Commission and the MPSC. A proposal has been submitted to both agencies, along with the decommissioning plan.

Rang hopes to get an OK by the end of the year.



The dome on the lake: Big Rock Point

How to Dismantle a Nuclear Power Plant

Highlights of the plan for decommissioning Big Rock Point, after its scheduled shutdown on May 31, 2000:

PERIOD 1: Pre-safe storage

Immediately after plant shutdown, systems not supporting the spent fuel storage pool are put into "dry lay up" (about half of the plant systems). With dry lay up, water is removed from the plant's piping systems, tanks and valves. (In a nuclear plant, water is used both for generating power as turbine-turning steam, and as a protective coolant.)

To begin: June 1, 2000.
Time required: About a year.

PERIOD 2: Safe Storage

PHASE 1: DORMANCY-WET

The last fuel to come out of the reactor vessel is cooled down in the spent fuel pool, a 30-foot-deep concrete pit filled with filtered, demineralized water.

Spent fuel is high-level radioactive waste. It will take about five years for it to cool enough to be loaded into dry transportable canisters and stored on site. About 10 to 15 canisters will be needed, depending on the design selected.

To begin: June 2001.
Time required: About four and a half years. All canisters should be loaded by December 2005.

PHASE 2: DORMANCY-DRY

After the fuel is out of the spent fuel pool, all the water is drained from the pool, and the rest of the plant's systems are put into dry lay up. This begins the dry dormancy phase.

The plant sits and awaits the availability of a low-level radioactive waste repository. Spent fuel is stored on site in dry transportable canisters.

Some employees are kept on at the plant to provide security and maintenance.

To begin: January 2006.
Time required: About 21 years.

PHASE 3: PRE-DISMANTLEMENT

About 18 months before beginning to dismantle the plant, CPCo begins mobilizing people and equipment.

Dismantlement is expected to require up to 200 people. The company intends to do most of the work with CPCo employees. Some specialty skills may be contracted out, such as rigging or cutting up the reactor vessel. This structure is about 30 feet tall, 10 feet across and weighs about 120 tons. It is possible to remove the reactor in one piece, but most likely it will be segmented.

To begin: about March 2025.
Time required: 18 months.

Period 3: Dismantlement

The company anticipates that all dry transportable canisters will be shipped to a Department of Energy high-level waste repository by the start of dismantlement. If not, the canisters will remain on site, while dismantlement begins.

Low-level waste materials such as piping, concrete, pumps and valves will be removed and shipped in containers to a repository.

To begin: As soon as a low-level waste repository is available in Michigan — anticipated, by January 2027.
Time required:: About 30 months.

Period 4: Site Restoration

Big Rock Point is returned to a "greenfield." After all of the radioactive materials have been removed and shipped to waste repositories, the NRC releases the site and terminates Big Rock's license for radioactive materials. Remaining equipment, buildings and other materials are removed and shipped to a local landfill. The site is then made available for public access, should CPCo desire to do so. The company may, however, keep the land for some other use, such as repowering.

To begin: July 2029.
Time required: About 10 months. The site should be a "greenfield" by April 2030.

Decommissioning Team

The following people served on the decommissioning team for Big Rock Point:

Jim Rang,
director of nuclear services support, Big Rock Point
William Kessler,
staff engineer, General Office
Jerry Corley,
project engineer, nuclear operations division, Palisades
Robert English,
radiation protection specialist, Big Rock Point
Richard Burdette,
senior performance assessor, Big Rock Point
Laurence Monshor,
senior engineer, Big Rock Point
George Petitjean,
operations and systems specialist, Big Rock Point
James Wcisel,
plant shift operations supervisor, Big Rock Point
Richard Wyniawskyj,
project controller/scheduler, Gilbert Commonwealth, an engineering construction firm in Reading, Pa.
Jane Grant,
manager of regulatory and industry affairs, Yankee Atomic Electric Co., Bolton, Mass.
Norman Labrecque,
senior mechanical engineer, Yankee Atomic Electric Co., Bolton, Mass.
Patricia Dilworth,
team secretary, Kelly Temporary Services