



**1976 Annual Report**  
**Power Authority of the State of New York**

# 1976 Annual Report

March 29, 1977

To the Governor, Comptroller and Legislature  
of the State of New York

Pursuant to the provisions of Sections 1002 and 2500 of the Public Authorities Law, Power Authority of the State of New York herewith submits its Forty-Sixth Annual Report covering the 1976 calendar year.

Respectfully,

James A. FitzPatrick, *Chairman*  
George L. Ingalls, *Vice-Chairman*  
William J. Ronan, *Trustee*  
Richard M. Flynn, *Trustee*

George T. Berry, *General Manager and Chief Engineer*

Lewis R. Bennett, *Assistant General Manager-General Counsel*

Wilbur L. Gronberg, *Assistant General Manager—Engineering*

John W. Boston, *Director of Power Operations*

Thomas F. McCrann, Jr., *Controller*

John C. Bruel, *Secretary*

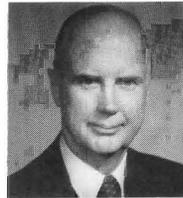
Power Authority of the State of New York  
10 Columbus Circle  
New York, New York 10019

Power Authority of the State of New York is a public benefit corporation created by the state to finance, build and operate electric generation and transmission facilities for purposes specified by the Legislature and Governor.

The Authority is composed of five trustees appointed by the Governor with the advice and consent of the State Senate to serve overlapping terms of five years.

Authority projects are built without use of tax monies or state credit. They are financed by sale to private investors of Authority bonds. The projects are operated and bonds are retired using revenues from operations.

The Authority's generating plants are the 800,000-kilowatt St. Lawrence Project near Massena, the 2,400,000-kilowatt Niagara Project near Niagara Falls, the 1,000,000-kilowatt Blenheim-Gilboa Pumped Storage Project in Schoharie County, the 821,000-kilowatt James A. FitzPatrick



James A. FitzPatrick



George L. Ingalls



William J. Ronan



Richard M. Flynn



Raymond J. Lee (Retired September 22, 1976)

Nuclear Plant in Oswego County, the 873,000-kilowatt Indian Point 3 Nuclear Plant in Westchester County and the 800,000-kilowatt oil-fired Astoria 6 Plant in New York City. Authority transmission lines connect the projects to the state power grid.

The Authority is building a 765,000-volt transmission line that will permit import of at least 800,000 kilowatts of Canadian hydroelectric power, and plans to build the 1,000,000-kilowatt Prattsville Pumped Storage Project, the 1,200,000-kilowatt Greene County Nuclear Plant and a 700,000-kilowatt coal and refuse-fired plant on Staten Island.

The Authority sells its electricity to municipal systems and rural electric cooperatives, to private utilities for resale to retail customers, to public agencies in the New York Metropolitan area, to industries and to the Plattsburgh Air Force Base. Federally mandated allocations of St. Lawrence and Niagara power have been made to the State of Vermont and to an association of rural electric cooperatives in Pennsylvania and New Jersey.

## Generation

Operation of two new nuclear plants, combined with continued high Niagara and St. Lawrence River flows, enabled the Authority to generate a record 31,783,293,000 kilowatt hours (kwh) in 1976. This was approximately 28 percent of the total for New York State.

The James A. FitzPatrick Nuclear Plant generated 4,156,385,000 kwh in its first full year of operation. The Indian Point 3 Plant, after starting operation in 1976, produced 3,097,654,000 kwh. The St. Lawrence and Niagara Projects generated 24,529,254,000 kwh.

Production of the 31 billion kwh would have required burning about 53 million barrels of oil or 13 million tons of coal if generation had been in fossil-fired plants.

Additionally, the Blenheim-Gilboa Pumped Storage Project generated 1,317,063,000 kwh at periods of peak consumer demand during its third full year of operation.

The St. Lawrence Project set a production record of 985,000 kilowatts (kw) on May 5 when a combination of high winds and water on Lake Ontario produced a flow of nearly 150 million gallons a minute at the power dam.

## Construction

Construction of the 800,000-kw Astoria 6 oil-fired plant in New York City neared completion at year-end. The boiler was fired on December 3. Electricity was produced for the first time on February 12, 1977.

The Indian Point 3 Plant generated its first electricity April 25 and began partial commercial operation in August. Full commercial operation at currently licensed levels was initiated in October.

Pursuant to 1974 legislation, both plants were acquired from the Consolidated Edison Company of New York, Inc. and completed by the Authority primarily to serve public customers in New York City and Westchester.

During the year work began on three new transmission lines, a 230,000-volt circuit from the St. Lawrence Project to Plattsburgh, a 345,000-volt connection from the Blenheim-Gilboa Project to Leeds and a 765,000-volt line from Massena to Marcy, with a connection to Quebec, that will permit the import of at least 800,000 kw of Canadian hydroelectric power.

## Staff

Lewis R. Bennett, Assistant General Manager, was appointed Assistant General Manager-General Counsel.

## Finances

### Bonds

During 1976, the Authority continued to finance the Astoria 6 Plant, the Indian Point 3 Plant, the Massena-Marcy Transmission Line, the Greene County Plant as well as studies and purchases of long-lead time items for future projects by the sale of \$760 million bonds under the General Purpose Bond Resolution and \$60 million of promissory notes. On January 25, 1977, \$200 million of general purpose bonds were sold, bringing the total issued since 1975 for these projects to \$1.26 billion. \$200 million of promissory notes issued in 1975 also are outstanding.

In May, 1976, \$80 million of bonds were issued under the Revenue Bond Resolution to complete the 1970 Project which consists of the FitzPatrick Nuclear Plant and the Blenheim-Gilboa Project, as well as to repay \$10 million promissory notes issued in 1975 and to make required deposits in the 1970 bond reserve account.

### Revenues

Revenues of \$118.285 million from the Niagara and St. Lawrence Projects remained above those expected from average river flows. \$26.375 million were deposited in the operating fund and \$8.76 million in the improvement fund under the General Revenue Bond Resolution for these projects.

Interest of \$14.768 million was paid on the bonds, and \$52.887 million of bonds were retired at a cost of \$50.741 million, including \$17.813 million accepted from tender offers. There remained \$348.343 million of bonds outstanding at January 1, 1977. The Authority continues to meet all requirements of the General Revenue Bond Resolution and to maintain a favorable position with respect to the schedule of General Revenue Bond retirements required by its 1970 Revenue Bond Resolution.

Revenues of \$61.246 million were received from the operation of the 1970 Project. \$24.789 million were deducted for expenses and \$36.457 million were applied, together with \$4.874 million from the bond reserve account, to the payment of interest on the bonds, meeting the requirements of the Revenue Bond Resolution.

In October, 1976, the first revenues were received from a project under the General Purpose Bond Resolution. Through December, \$44.661 million from the Indian Point 3 Plant were deposited in the General Purpose revenue fund. After deduction of \$31.408 million for operating expenses \$11.524 million were applied to payment of interest and \$1.729 million to the bond reserve account, meeting the requirements of the General Purpose Bond Resolution.

# Astoria 6 Generating Plant

Robert E. Hammond, Resident Manager

Fire was ignited in the boiler of the Authority's first fossil-fired power plant in December, and electricity was generated initially early in 1977.

Following ignition of the first of 36 oil burners in the 17-story-high boiler, the Astoria 6 plant began producing steam. Equipment and systems testing continued in preparation for power generation.

The plant produced its first electricity on February 12, 1977.

Located on the East River, in the New York City Borough of Queens, the plant was purchased in a partially completed state from Con Edison in 1974.

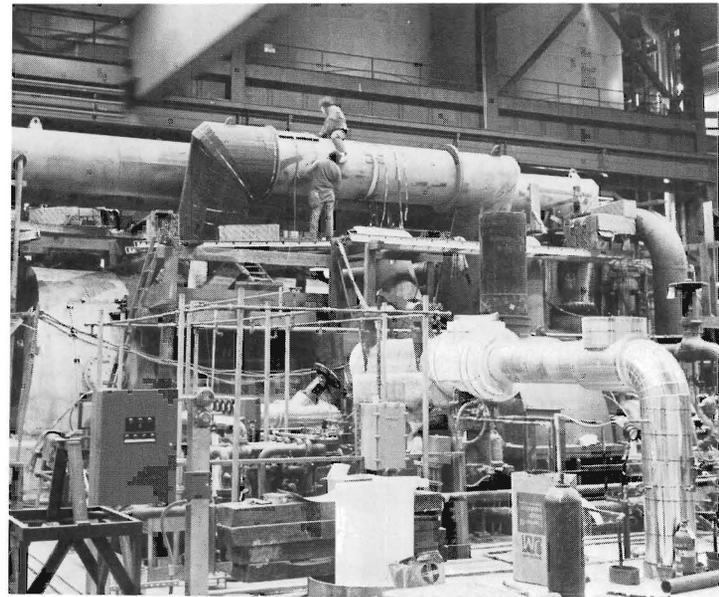
To permit independent operation of the plant, the Authority is providing oil storage and handling facilities, as well as a waste water treatment system. It is also renovating the warehouse building and modifying the control room, electric metering and fire protection systems.

Astoria 6 is expected to generate about 4.4 billion kwh annually, with a fuel consumption of 7.2 million barrels of oil.

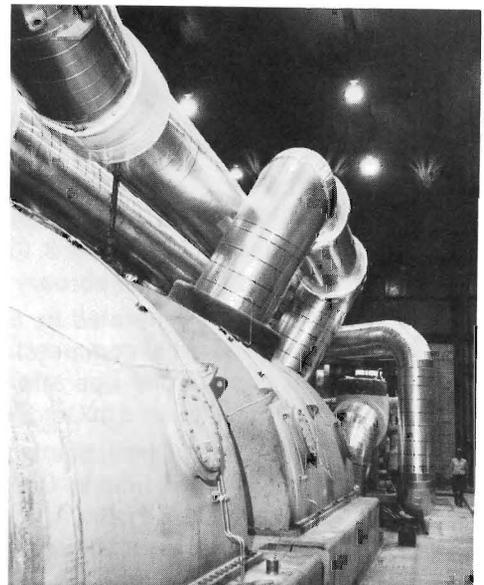
The oil is preheated and sprayed into the furnace of the 175-foot-tall boiler, which has a continuous production capacity of 6.6 million pounds of steam per hour. With a temperature of 1,000 degrees Fahrenheit and a pressure of 2,400 pounds per square inch, the steam turns the turbine-generator at a speed of 3,600 revolutions per minute to produce electricity at 26,000 volts.

Transformers increase the voltage to 345,000 volts for transmission via underground circuits to a distribution substation at 15th Street in Manhattan, about 7½ miles to the south, on the opposite bank of the East River.

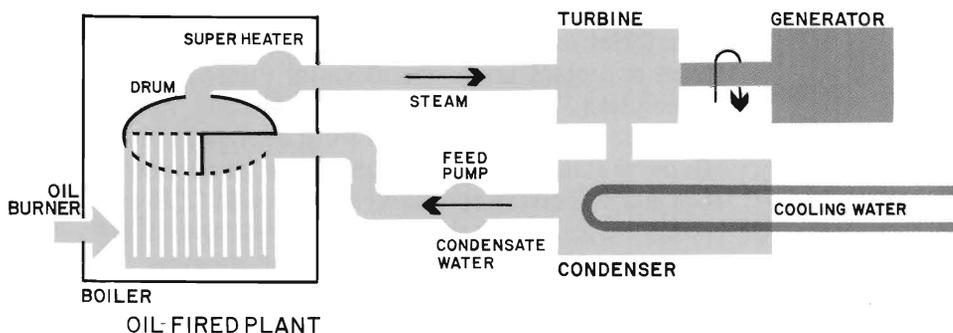
Exhaust steam from the turbine is condensed to water and returned to the boiler. The condenser cooling water is taken from the East River and returned through underwater ports in a specially-designed discharge canal that eliminates any significant thermal effect on the river.



Workers atop turbine steam lines

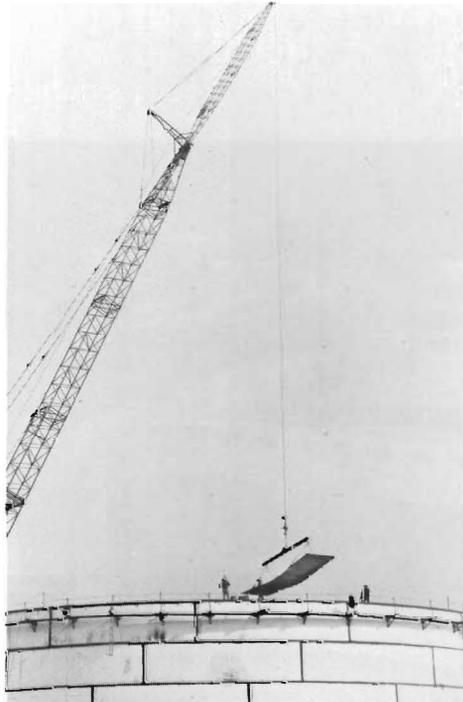


Insulated steam lines and turbine

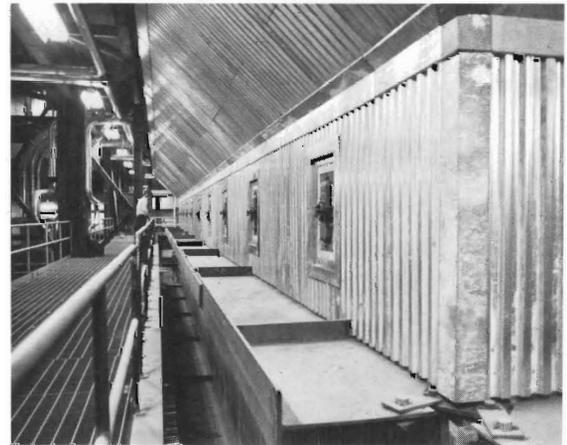




Astoria 6 Generating Plant (foreground)



Crane positions roof section of oil storage tank



Boiler wall with inspection ports



First boiler fire viewed through port



# Indian Point 3 Nuclear Power Plant

J. Phillip Bayne, Resident Manager

The Indian Point 3 Plant in Westchester County generated its first electricity in April and began partial operation in late August. Commercial operation at an 873,000-kw level started in October and by year-end the plant had produced almost 3.1 billion kwh of electricity.

To produce an equal amount of electricity in a fossil-fired plant would have required the burning of approximately 5.2 million barrels of oil or 1.3 million tons of coal.

The plant has operated without significant interruption, and its rate of production has surpassed original engineering estimates.

During the testing program, power was sold to Con Edison for distribution to consumers in New York City and Westchester who saved an estimated \$18.5 million in fuel adjustment charges. On September 22, immediately after approval of contracts by Governor Hugh L. Carey, power began to flow to the first group of public customers for use in public facilities. Savings to these customers amounted to \$10 million by the end of the year.

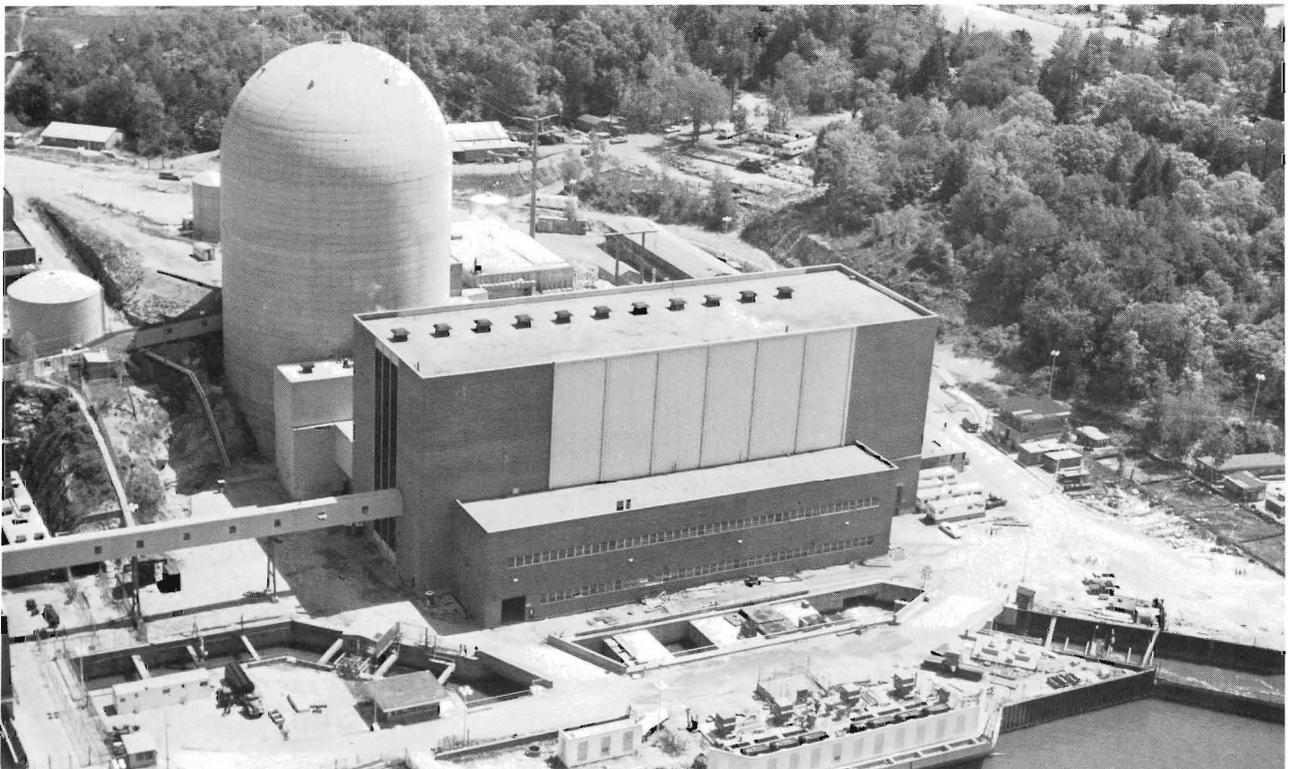
Indian Point 3, located on the east bank of the Hudson River in the Village of Buchanan near

Peekskill, was purchased in December, 1975 from Con Edison in accordance with 1974 legislative authorization to acquire two partially completed plants from the company.

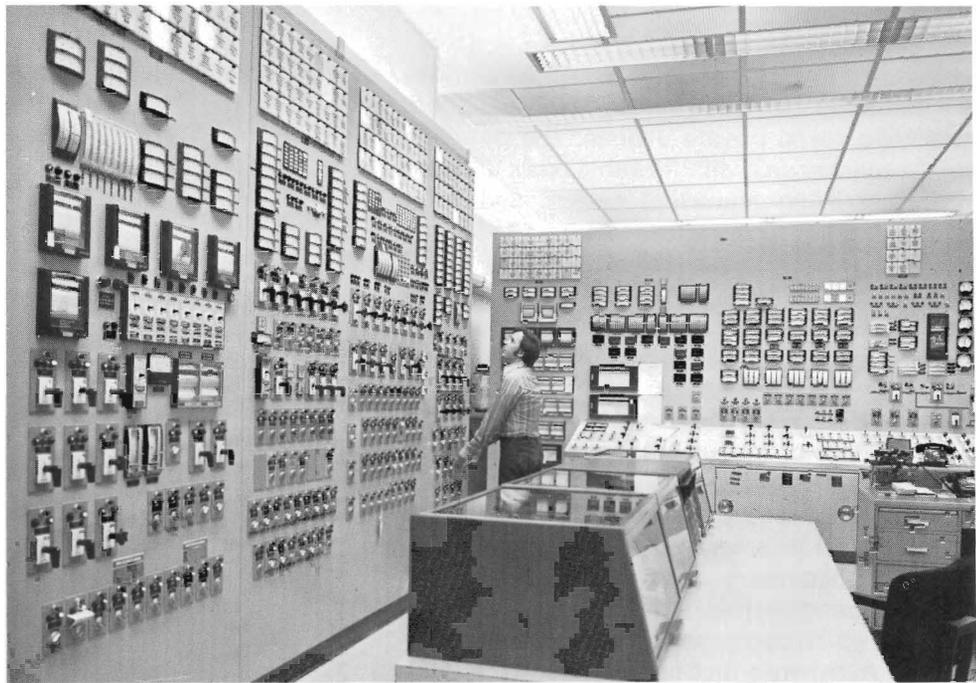
The plant uses a pressurized water reactor to heat water by the energy of controlled nuclear fission in the reactor. The water, kept from boiling by the pressure in the reactor, flows through a steam generator where, in a separate lower pressure system, steam is produced which flows to the turbine-generator.

The 433-ton reactor vessel is enclosed and supported by a primary shield of six-foot-thick concrete, which is surrounded by a steel-lined domed cylinder of reinforced concrete. The cylindrical containment structure has a volume of 2.6 million cubic feet, and also encloses the entire reactor coolant system, steam generator reactor coolant loops and portions of the auxiliary and engineered safeguard systems.

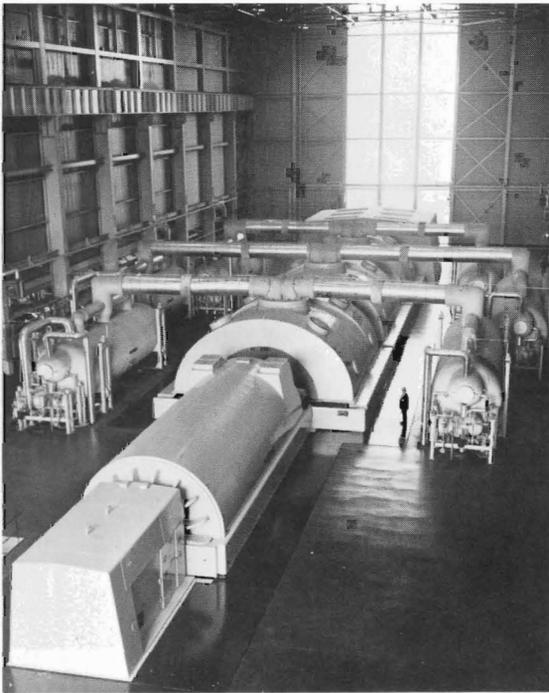
After sufficient operating experience the plant's rating is expected to be increased from 873,000 to 965,000 kw.



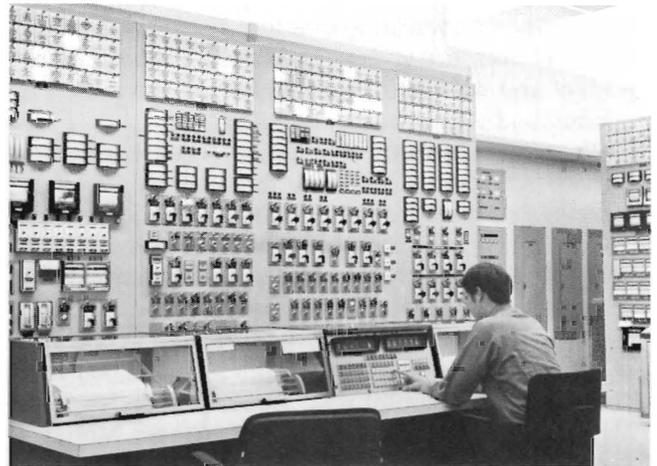
Indian Point 3 Nuclear Power Plant



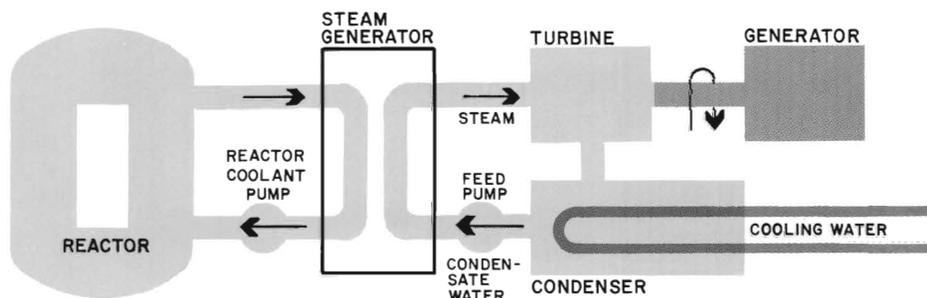
Control room



Turbine-generator



Control room computer



PRESSURIZED WATER REACTOR PLANT

# James A. FitzPatrick Nuclear Power Plant

John D. Leonard, Jr., Resident Manager

The FitzPatrick Plant generated 4.16 billion kwh in 1976 for use by industries and by retail customers of the state's seven private utilities. The power is sold to the utilities on a withdrawable basis until the Authority's existing municipal system and rural electric cooperative customers require allocations to meet their growing needs.

About 6.9 million barrels of oil or 1.7 million tons of coal would have been required to produce an equivalent amount of electricity in a fossil-fired plant.

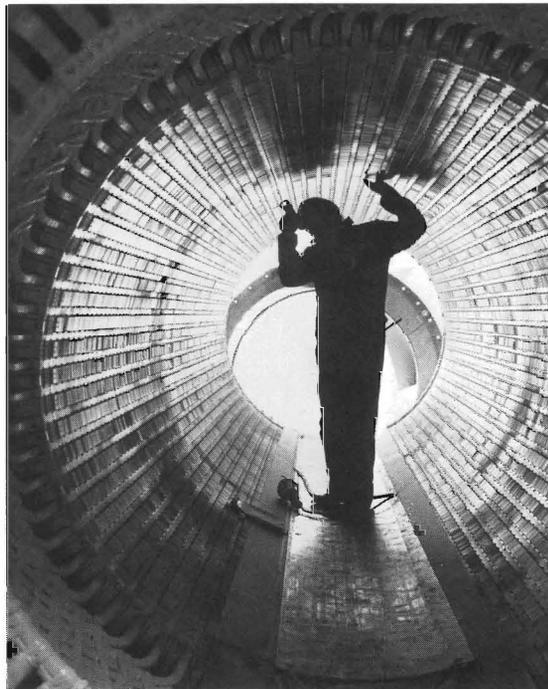
After a 67-day shutdown early in the year to correct vibration of instruments installed between the reactor's fuel channels, the plant operated without significant interruption. During the shutdown a major inspection was conducted of all plant components, and necessary adjustments and maintenance were accomplished.

The plant, which began partial commercial operation as the Authority's first nuclear facility in July, 1975, is located on the south shore of Lake Ontario in the Town of Scriba, about seven miles northeast of Oswego.

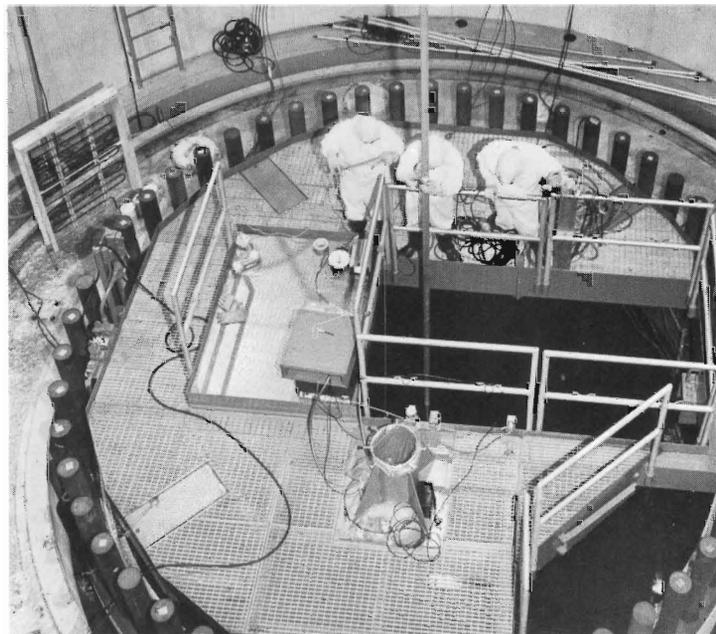
The nuclear steam supply system is a boiling water reactor consisting of a fuel core inside a 503-ton steel pressure vessel. The vessel is enclosed by a steel and concrete containment system which is surrounded by the reactor building.

Water pumped into the reactor vessel from the bottom is turned to steam by the heat produced by a controlled chain reaction within the nuclear core. The resulting steam flows through separators and driers at the top of the reactor before turning the turbine connected to the generator.

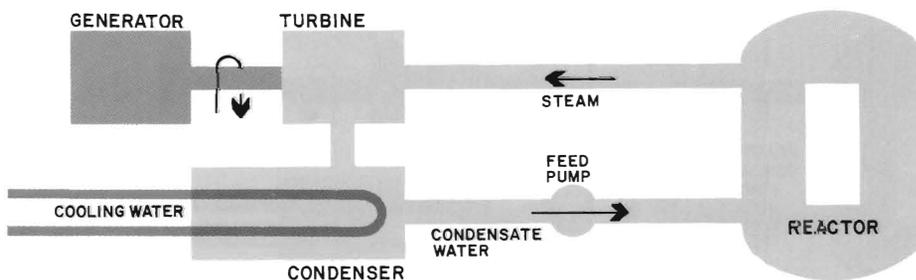
Power from the plant is transmitted to the Authority's main cross-state system by a 345,000-volt, 70-mile line to a point near Utica. Transmission is also provided via a tieline to the Niagara Mohawk Power Corporation's adjacent Nine Mile Point switchyard, from which two additional 345,000-volt lines extend to the cross-state network near Syracuse.



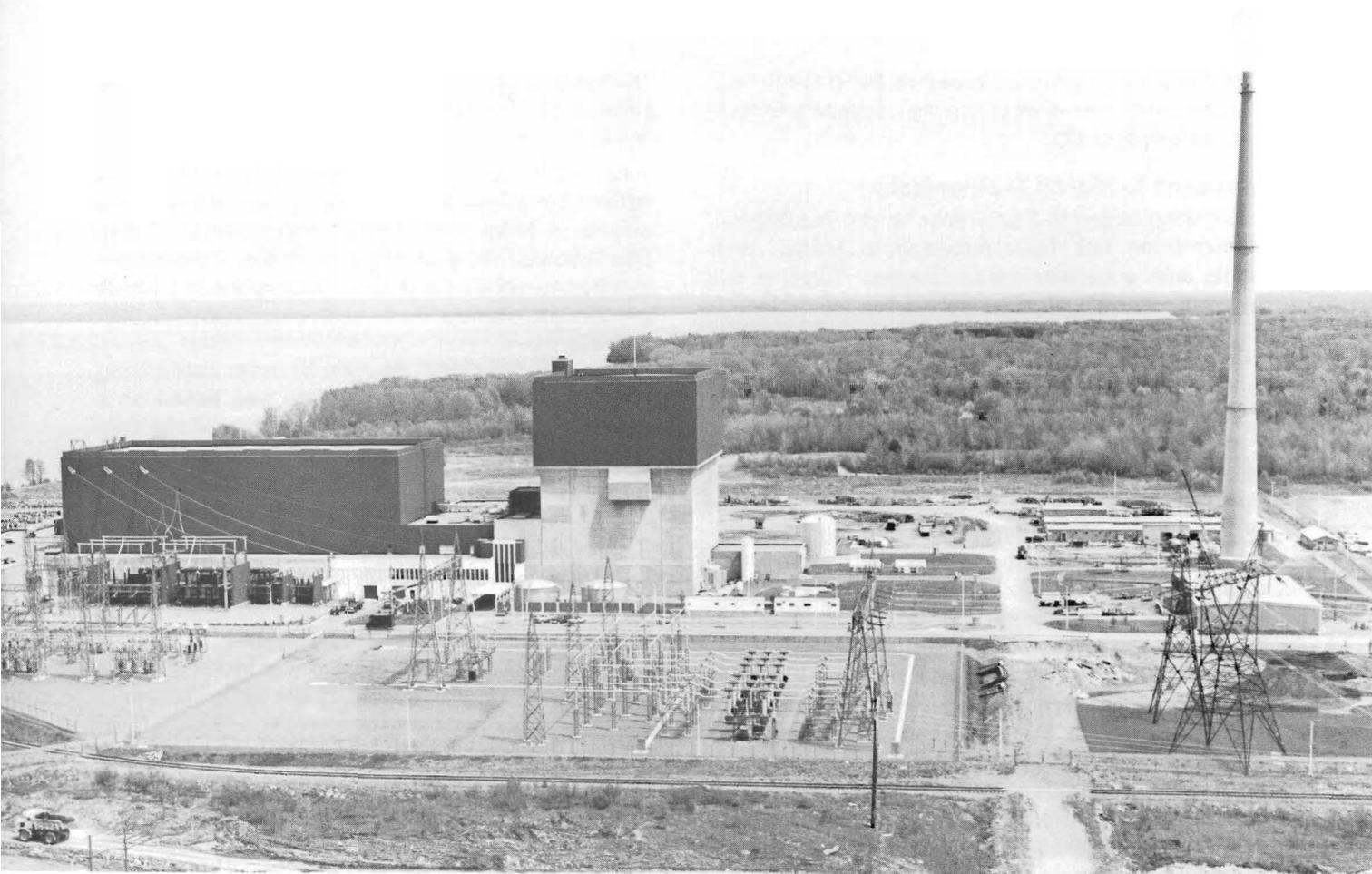
Inspection of FitzPatrick Plant generator stator



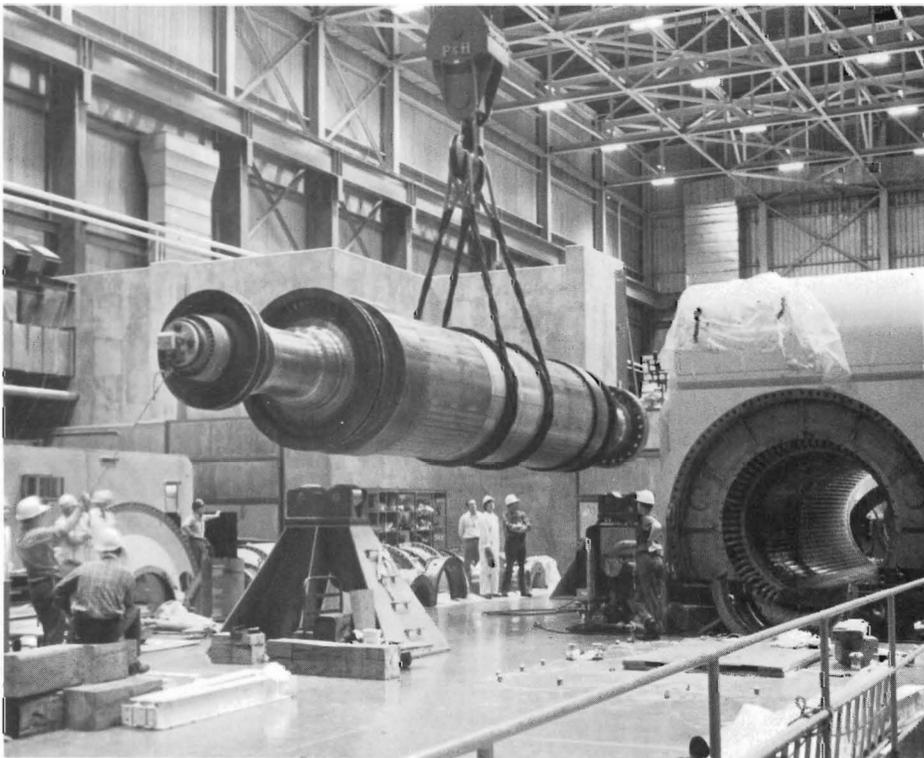
Technicians atop FitzPatrick Plant reactor



BOILING WATER REACTOR PLANT



James A. FitzPatrick Nuclear Power Plant



Rotor removed from FitzPatrick Plant generator for inspection

# Construction

In 1976, the Authority began to build three new transmission lines after receiving necessary federal and state approvals.

## Massena to Marcy Transmission

Clearing began in September for the 765,000-volt transmission line from Massena to Marcy, near Utica, with a connection to Quebec. The line will transmit at least 800,000 kw of Canadian hydro-electric power during the seven "warm weather" months of each year, saving New York State consumers a minimum of \$45 million annually through lower fuel costs.

Approximately 18 miles of right-of-way had been cleared by the end of the year. Construction was authorized by the State Public Service Commission (PSC) on June 30 after extensive hearings. The Authority's application to build the line was submitted to the PSC in September, 1973. The required Federal Power Commission (FPC) approval of the border crossing was obtained in September, 1974, in accordance with Public Law 93-19 of the 93rd Congress, which directed issuance of the permit.

Work began on the line after PSC approval of detailed Environmental Management and Construction Plans submitted by the Authority.

The PSC by January, 1977 had certified all but about 30 miles of the route of the 165-mile project. Awaiting certification are portions traversing reforestation areas, one small segment touching Adirondack parkland, segments requiring completion of evidence on noise, and one small portion involving a sugarbush plantation on which a hearing has been held to determine precise location. Most of the right-of-way adjoins existing transmission lines.

The Authority's application to build the line was subjected to two series of hearings. The first, covering routing of the line, tower structures and construction practices, resulted in a 6,000-page record.

The hearing examiner in 1975 recommended a route generally in accordance with the one proposed by the Authority.

On November 25, 1975, the PSC ordered the second set of hearings to consider health and safety effects of extra high voltage transmission. These also involved Niagara Mohawk Power Corporation and Rochester Gas and Electric Corporation, which are seeking permission to build a separate 765,000-volt line.

The PSC noted that its June 30 order authorizing construction of the Authority line was based on a review of over 10,000 pages of hearing record concerning health and safety. Construction began after PSC approval of the Authority's detailed Environmental Management and Construction Plans.

The PSC called the hearings "to our knowledge, the most far-reaching investigation in a public forum of the health and safety aspects of extra high voltage overhead transmission facilities."

The PSC said it was clear that "the worst possible hazards now on the record . . . are not sufficient to preclude our authorizing construction now . . . If we err now in assessing the standards required to protect the public health and safety it will be on the conservative side."

It was also noted by the PSC that extra high voltage lines in the range of 700,000 to 800,000 volts have been operated in Canada since 1965 and in the United States since 1969 without identifiable effects.

The Authority had originally planned to place the line in service by June, 1977. Because of the lengthy hearing process, it is now scheduled for completion May 31, 1978.

The transmission system will include new substations at Massena and at Marcy; an eight-mile, double-circuit 230,000-volt line from the Massena



Tower erection for 230,000-volt line from St. Lawrence to Plattsburgh

Substation to the St. Lawrence switchyard; a two-mile, 345,000-volt line between the Marcy Substation and the existing substation at Edic; a 134-mile, 765,000-volt line connecting the new substations; and a 21-mile, 765,000-volt line linking the Massena Substation with Quebec.

The National Energy Board of Canada conducted hearings on Hydro Quebec's application for an export license and a certificate of public convenience and necessity to build the required Canadian 765,000-volt line. After examining the issues, including the health and safety effects of 765,000-volt transmission, the Board granted both the license and certificate in November, 1976.

The Board also noted the intention of the Authority and Hydro Quebec to negotiate an interconnection agreement for additional sales of surplus energy beyond the minimum delivery of 800,000 kw covered by the existing contract. The Authority and Hydro Quebec have approved such an agreement for submission to the Board in 1977.

### **St. Lawrence to Plattsburgh Transmission**

Construction of a second 71-mile, 230,000-volt transmission line from the St. Lawrence Project to Plattsburgh began in July after PSC approval of the Authority's Environmental Management and Construction Plan.

By year-end, the line was approximately 36 percent complete and on schedule to begin operation by October 31, 1977.

The PSC had previously issued a certificate of environmental compatibility and public need for the line conditioned upon approval of the detailed plan submitted by the Authority to minimize environmental impact during construction. The Authority applied for the certificate in 1974.

Power needs require construction of the line, which is being built adjacent to the 230,000-volt line completed in 1958, thereby minimizing the amount of land required.

The new facilities include a substation at the midpoint of the line near Willis Road at South Chateaugay. The substation's 115,000-volt step-down transformers will permit interconnection with existing and future lines of that voltage in the area. Similar interconnections will be made possible at the Plattsburgh Substation by the addition of a second transformer.

Authority customers in the North Country and Vermont will benefit through increased reliability and economy of power deliveries when the line is completed. It will reduce total transmission losses, eliminate low voltage problems that result from an outage on the existing line and permit transmission equipment to be removed from service for maintenance without overloading other area lines.

### **Gilboa to Leeds Transmission**

The Authority began construction of the 35-mile, 345,000-volt transmission line from the Blenheim-Gilboa Project to Leeds. Clearing of the right-of-way started after the United States Court of Appeals upheld a Federal Power Commission order establishing the route and design of the line.

The line was originally licensed in 1969 as part of the Blenheim-Gilboa Project, but was involved in hearings and litigation that delayed its construction. The project and two other 345,000-volt lines connecting to the state transmission network have been in operation since 1973.

The Gilboa-Leeds line is scheduled for completion in the fall of 1977.



Horse power aids 230,000-volt transmission line work.

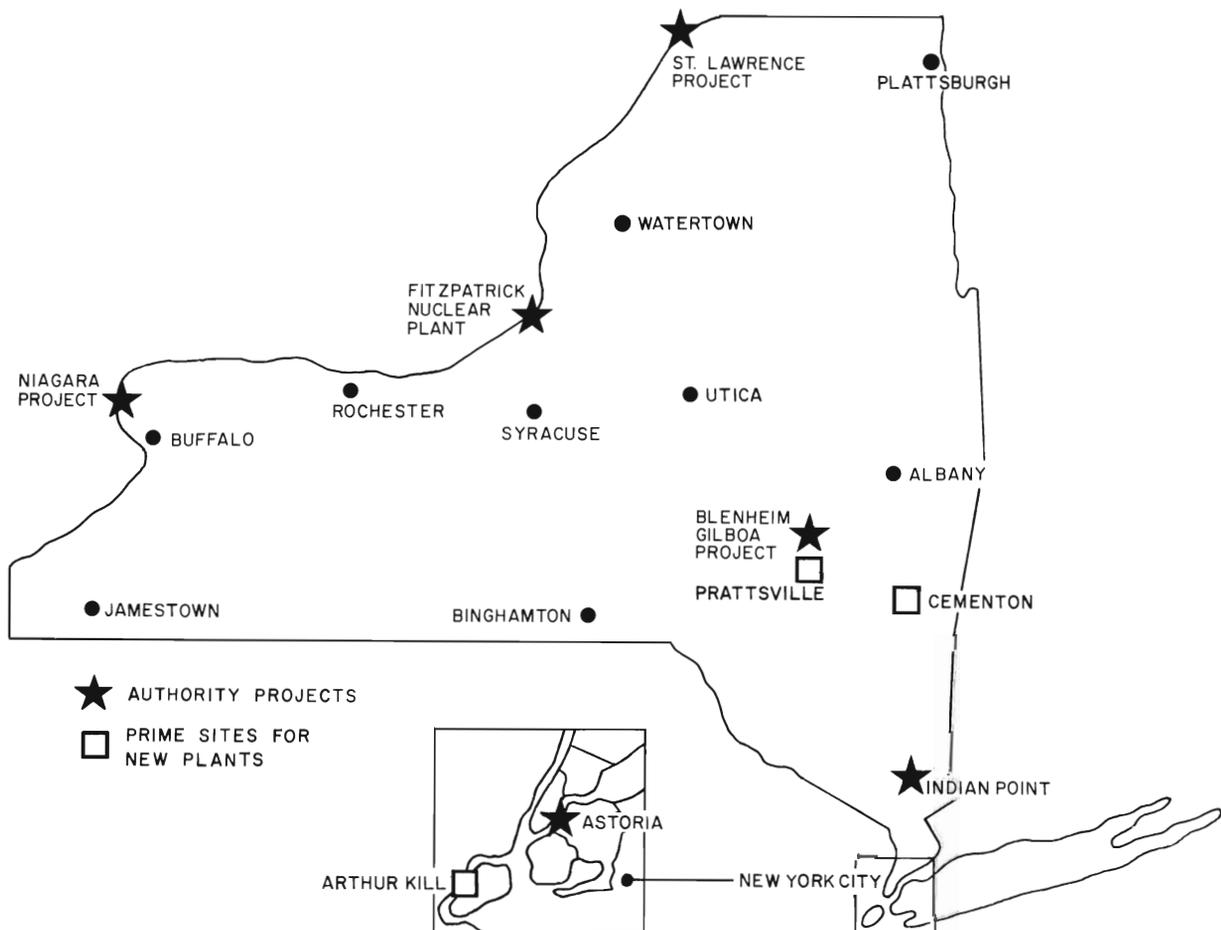
## Future Construction

In January, 1977, hearings started on the Authority's federal and state applications to construct the 1,200,000-kw Greene County Nuclear Power Plant. The prime site is at Cementon, 40 miles south of Albany on the Hudson River.

A pre-hearing conference was held in March, 1977 on the Authority application to build a 700,000-kw plant on Staten Island that would burn coal and refuse. Hearings have not yet been scheduled on the Authority application to build a 1,000,000-kw pumped storage project at Prattsville, five miles from the Blenheim-Gilboa Project.



Water sampling at Prattsville



## Greene County Nuclear Power Plant

In January, 1977, the United States Nuclear Regulatory Commission (NRC) and the New York State Board on Electric Generation Siting and the Environment began joint hearings on the Greene County Plant applications which were filed by the Authority in 1975. Construction of the 1,200,000-kw plant requires certification by both agencies, which for the first time agreed to joint hearings.

The prime site is located in an industrial area on the west bank of the Hudson River about a mile north of the hamlet of Cementon.

Three cement factories now operate in the area. They can continue operating during and after power plant construction. Cementon was selected as the prime site rather than an alternate location at Athens, 10 miles farther north, largely on the basis of existing land use.

In addition to the 2,100 workers required to build the plant at the peak of construction, more than 3,500 jobs will be created in the region during construction of the project. An operational force of about 200 is expected.

The plant's turbine-generator will be manufactured at the General Electric plant at Schenectady and the nuclear steam supply system and initial fuel will be provided by the Babcock & Wilcox Company. Minimal amounts of cooling water will be withdrawn from the Hudson River during plant operation to augment the closed-cycle cooling system.

About 6.8 billion kwh are expected to be generated annually in the pressurized water reactor plant. Production of an equivalent amount of electricity in a fossil-fueled plant would require burning about 11,400,000 barrels of oil or 2,900,000 tons of coal.

The estimated completion date of September 1, 1984 is based on receiving necessary certification to commence construction by July 1, 1978.



Cement plants and Hudson River surround the site (above) of the Greene County Nuclear Power Plant shown in artist's rendering (below)



## Fossil-fired Plant

The Authority's application to construct a 700,000-kw fossil-fueled power plant was docketed by the state siting board effective at the end of October. Public hearings are expected to begin in the first half of 1977.

The Authority applied for a certificate of environmental compatibility and public need in December, 1974, listing the prime site on Staten Island and three other studied locations as alternates.

The prime site is located on a 186-acre tract near New York City's Fresh Kills sanitary landfill on the east bank of the Arthur Kill, on Staten Island.

The plant is designed to burn coal and to use refuse as a supplementary fuel. It also will have an oil-burning capability. By consuming 2,100 tons of refuse daily, the plant would dispose of 10 percent of the city's burnable solid waste, and reduce an-

nual fuel requirements by 300,000 tons of coal or 1,200,000 barrels of oil.

The plant will be furnished with advanced equipment for air pollution control, including a sulfur dioxide scrubber system and an electrostatic precipitator. A closed-cycle cooling system with a natural draft cooling tower will minimize thermal discharges into the Arthur Kill.

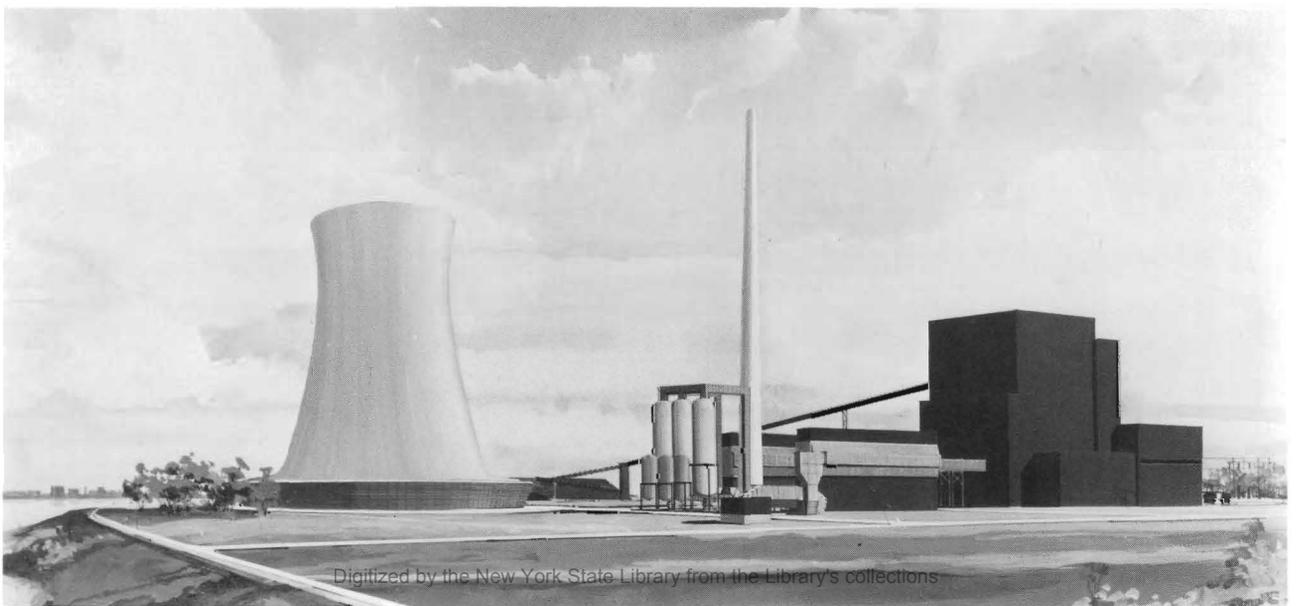
At the peak of construction the plant will provide employment for about 1,700 workers. In addition, it is expected construction will create about 3,000 secondary jobs. Operating and maintenance personnel will number 110.

Commercial operation is scheduled for September 1, 1982, based on receiving the necessary certification to begin construction by April 1, 1978.



Fossil-fired plant site beside the Arthur Kill. New Jersey is in background.

Artist's rendering of Staten Island coal-and-refuse-fired plant



## Prattsville Pumped Storage Power Project

In April, the Authority applied to the Federal Power Commission (FPC) for a license to construct a 1,000,000-kw pumped storage power project at Prattsville on Schoharie Creek.

Throughout the year, the Authority completed and forwarded to the FPC a series of exhibits and reports in support of its conclusion that Prattsville is the preferred site by reason of lessened environmental impact.

The request for an FPC license and the required supporting data were submitted in a supplement to the Authority's 1973 application which had listed Breakabeen, 10 miles farther north, as the prime site. The supplement made Breakabeen an alternate site, along with Livingstonville, Gardiner and Port Jervis North, which were originally listed as alternates.

Preliminary studies of Prattsville were begun in 1974, detailed studies were started in 1975, and Prattsville was designated as the prime site in 1976. The City of New York has indicated its willingness to permit dual use of the existing Schoharie Reservoir, part of the city water supply system. Engineering studies produced a plant design that will enable use of the Schoharie Reservoir as the lower reservoir of the project without impairing its supply function.

Other project features will be an upper reservoir on Dog Hill near Prattsville, an underground powerhouse and a new gated spillway in the existing Gilboa Dam.

Concurrent studies evaluated environmental considerations and were the basis of exhibits submitted to the FPC.

Like the Blenheim-Gilboa Project five miles to the north on Schoharie Creek, Prattsville will provide electricity at times of peak consumer demand by recycling water between two reservoirs.

Engineering feasibility studies indicate that the Prattsville alternate will have less environmental impact but greater cost than Breakabeen. To maintain the water supply capability for New York City, extra costs will be incurred in building a larger upper reservoir than would be necessary at the alternate sites.

The Prattsville site will not require construction of a lower reservoir. No major road relocation will be needed, no agricultural lands under cultivation will be removed from production, and only a few year-round residences will be affected by construction of the upper reservoir on Dog Hill.

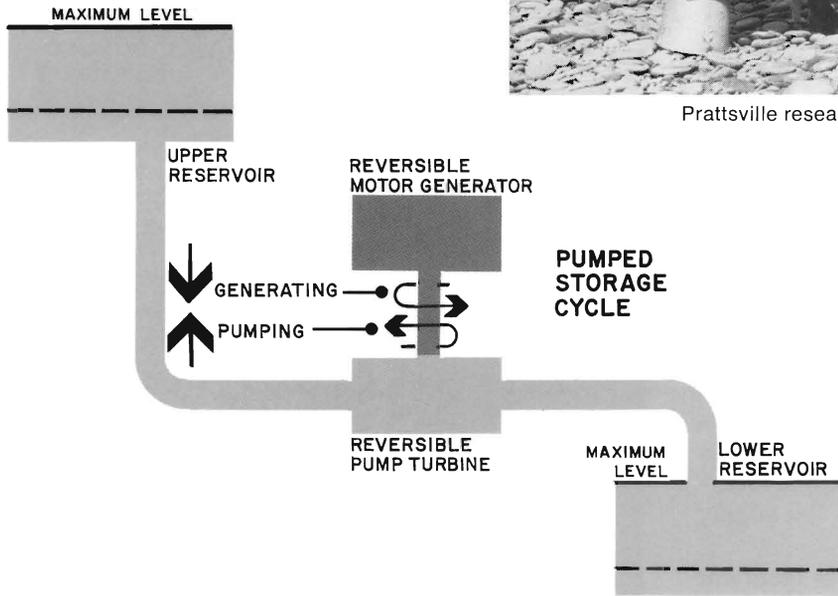
About 1,700 persons will be employed to build the project at peak of construction. Completion is estimated for 1983.



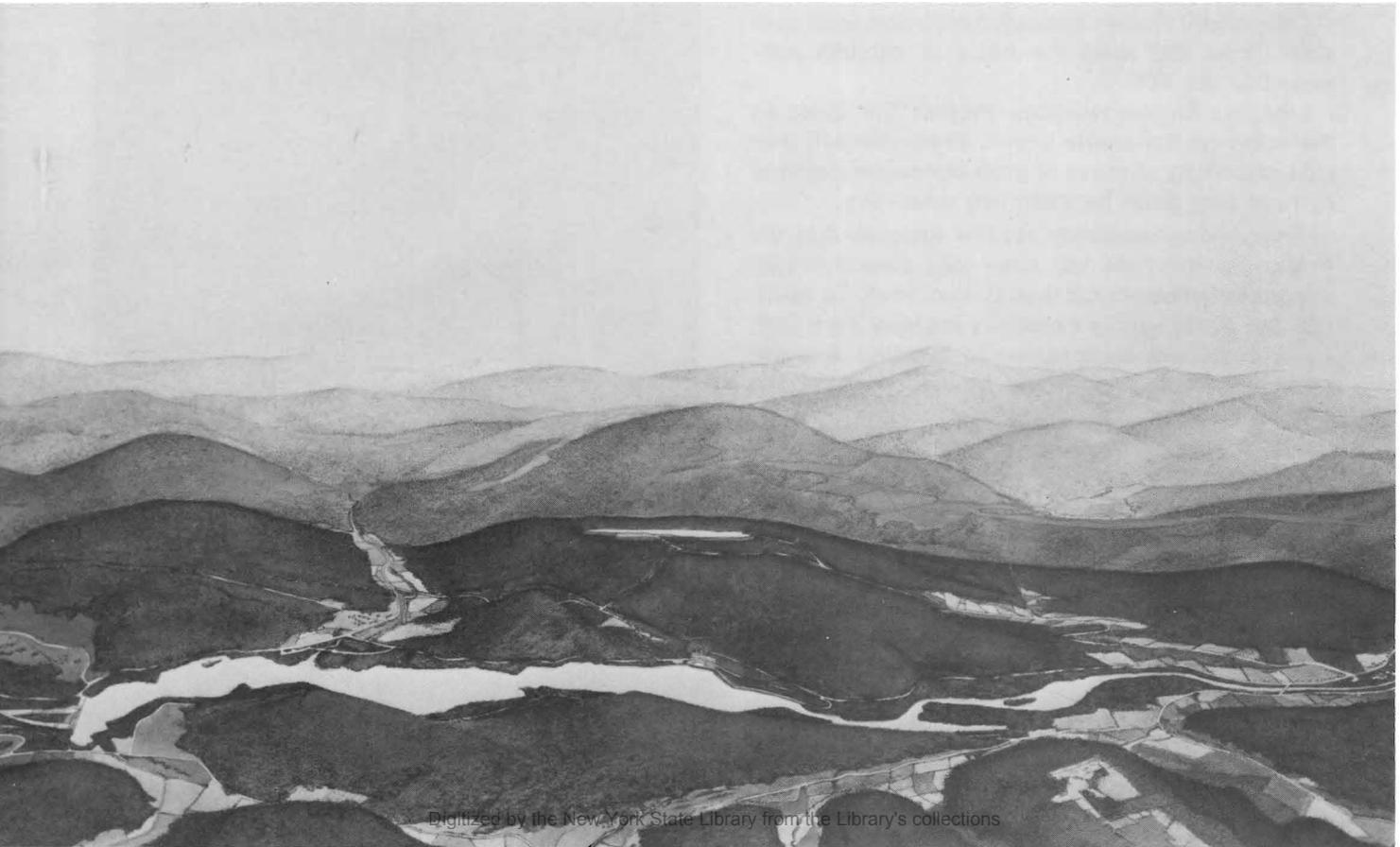
Schoharie Reservoir



Prattsville researchers catch, identify and release fish at Schoharie Creek



Artist's rendering of Prattsville Pumped Storage Power Project



# Blenheim-Gilboa Pumped Storage Power Project

Jack M. Collyer, Resident Manager

For the third straight year, the Blenheim-Gilboa Project generated more than one billion kwh. The 1976 total of 1.3 billion kwh is a record for the project, which continues to demonstrate its economy, reliability and versatility in meeting system peak loads and emergencies.

The annual generation is about seven times the amount estimated when the project was planned in the late 1960's to provide the lowest cost power to meet short-term maximum consumer demand for electricity.

Blenheim-Gilboa, named for the two Schoharie County towns in which it is located, has a capability to produce over one million kw.

Principal features of the project are upper and lower reservoirs, a tunnel system within Brown Mountain, a four-unit powerhouse and a switchyard linked to the state power grid by two 345,000-volt transmission lines. A third line is under construction on a route approved by the Federal Power Commission.

At times of peak consumer demand, water released from the upper reservoir falls to spin the four turbine-generators which produce electricity.

When power demands are lower, the turbine-generators are reversed to become electrically-motorized pumps that raise the water back to the mountaintop. The electricity to accomplish this comes from the most efficient generating sources available at the time.

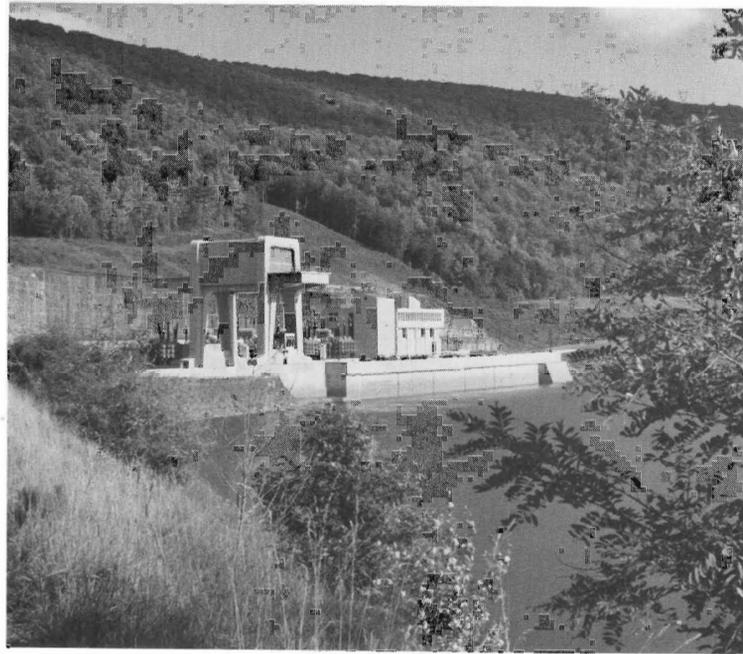
The 360-acre upper reservoir on Brown Mountain can contain almost five billion gallons of water with an energy potential of 12 million kwh of electricity. It was formed by an embankment of 5½ million cubic yards of earth and rock.

The lower reservoir, with a surface area of about 430 acres and a five-billion-gallon capacity, is located 1,100 feet below the mountaintop. The water is impounded behind an 1,800-foot-long earth and rock dam across Schoharie Creek, downstream from the powerhouse. A gated spillway and a low-level outlet are built into the dam.

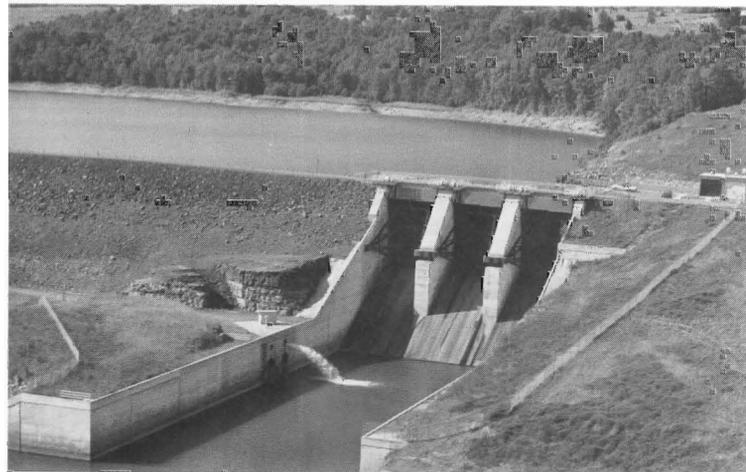
The reinforced-concrete, semi-outdoor-type powerhouse is 526 feet long and 130 feet high. Only the top few feet are visible above the level of the lower reservoir.

In the powerhouse, four reversible hydraulic pump-turbines are each connected to a generator-motor. Each unit has a capability as a generator of 250,000 kilowatts under minimum operating conditions. Power is generated at 17,000 volts and stepped up to 345,000 volts for transmission.

The project produced its first power on July 5, 1973, less than four years after ground-breaking and five years after the legislative authorization for the Authority to build pumped-storage projects. The full rated capacity of one million kilowatts was generated for the first time on December 17, 1973.



Blenheim-Gilboa Pumped Storage Power Project Powerhouse



Lower reservoir dam and spillway



Aerial view of Blenheim-Gilboa Project

# St. Lawrence Power Project

Robert D. Conner, Resident Manager

The St. Lawrence Project, the Authority's first, consists of three dams and many miles of dikes. Construction involved channel excavation spread over 40 miles of the St. Lawrence Valley and creation of the 60-square-mile Lake St. Lawrence which tamed the International Rapids section of the river to improve navigation and make power production possible.

Built jointly by the Authority and Ontario Hydro, the project began generating power in July, 1958. Since then, the Authority's generators have produced approximately 116 billion kwh of electricity.

The Robert Moses-Robert H. Saunders Power Dam, extending 3,300 feet from Barnhart Island near Massena, New York to Cornwall, Ontario, contains 16 turbine-generators on each side of the international boundary. The generators in New York have a total firm capability of 800,000 kw. The units on the Canadian side have a comparable capability.

The power dam closed the northern channel of the St. Lawrence River in the vicinity of the former rapids. Long Sault Dam closed the southern channel and directs the flow of the river toward the power dam  $3\frac{1}{2}$  miles downstream. Long Sault Dam is a curved-axis concrete structure, 2,960 feet long, with 30 spillway gates.

The gates can be opened to pass the entire river flow or a portion of it during periods of exceptionally high water conditions. The dam is situated entirely within the United States, extending from the New York mainland to Barnhart Island.

Iroquois Dam, located at the western end of Lake St. Lawrence about  $28\frac{1}{2}$  miles upstream from the power dam, was designed to regulate the outflow of Lake Ontario. It is 1,980 feet long and has 32 sluiceways to accommodate the large river flow, with releases through the dam ranging from 180,000 to 350,000 cubic feet per second. Adjacent to the Canadian end of Iroquois Dam is Iroquois Lock, uppermost of seven Seaway locks on the St. Lawrence River.

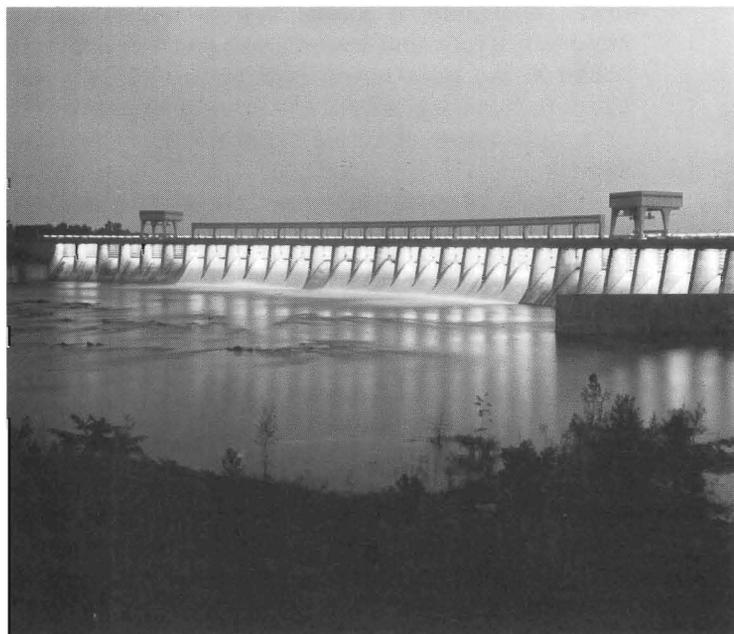
Upstream from Long Sault Dam, extensive excavation was accomplished to provide an adequate channel for Seaway navigation and to reduce river velocities to enable an ice cover to form in winter. This has served to alleviate the danger of ice jams that could disrupt power production and damage shore properties.

The dikes which form Lake St. Lawrence have long since blended into the natural topography of the valley.

The Massena Intake control structure, flanked by a series of dikes at the upper end of the Massena Canal, provides the water supply both to the Village of Massena and the Alcoa plant.



Robert Moses-Robert H. Saunders Power Dam



Long Sault Dam spills water to reduce high water levels on Lake Ontario



Iroquois Dam

# Niagara Power Project

Eugene L. Gochnauer, Resident Manager

The Niagara Power Project remains one of the world's largest electric power producers. It has generated more than 213 billion kwh since operation began in 1961.

The project was designed to develop the full potential of the United States' share of the Niagara River waters available for power diversion while preserving the scenic beauty of Niagara Falls.

The United States and Canada agreed in a 1950 treaty that 100,000 cubic feet of water per second must flow over the Falls during daylight hours in the tourist season from April through October. At other times, the flow may be reduced to 50,000 cubic feet per second.

The remainder of the water in the river, which has an average flow of 202,000 cubic feet per second, is available to both countries to be shared equally, after certain adjustments, to produce power.

To use water most efficiently under these conditions, the Niagara Project includes a pumped storage plant in addition to the main generating plant.

By locating the main generating plant 4½ miles below the Falls and the water intakes 2½ miles upstream from the Falls, the project takes advantage of 310 feet of the 326-foot drop in elevation between Lakes Erie and Ontario.

Visible parts of the water intakes are a concrete bulkhead and two gate structures nearly 100 feet high. The latter house 400-ton gates which can stop the flow of water into the two underground conduits. These conduits are each 46 feet by 66 feet, and carry the water four miles under the City of Niagara Falls to the open canal and forebay connecting the Lewiston Pump-Generating Plant and the main Robert Moses Niagara Power Plant. The conduits are completely covered and the ground above is landscaped.

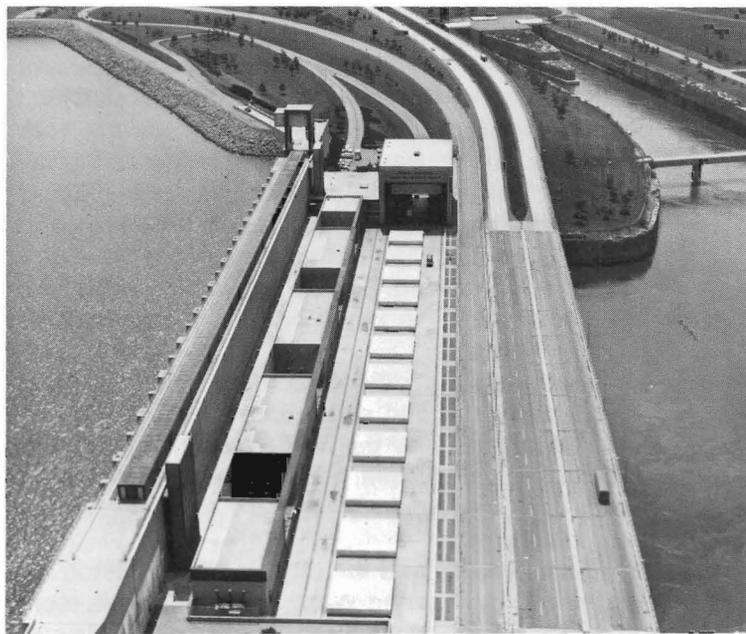
Behind the pump-generating plant is an 1,880-acre reservoir which can hold 60,000 acre-feet of water. At night when additional diversion is permitted and at other times when power demands are reduced, water is pumped into the reservoir using power from the main plant.

When power demands increase, the 12 pump-motor units of the storage plant are reversed to become turbine-generators.

The stored water then joins that coming directly from the river. The intermingled water flows to the 13 units of the Moses Plant, after which it is discharged into the lower river. The two Niagara plants, operated together, have a firm capability of 2,400,000 kilowatts, although the nameplate rating of the units is 2,190,000 kilowatts.



Niagara Power Project



Lewiston Pump-Generating Plant



Niagara Project Intake Gate Structures

## Power Marketing

In 1976 the Authority approved applications for power that would nearly triple the number of its public customers from 41 at the beginning of the year to 120 in the near future. All Authority power contracts are subject to the approval of the Governor.

After three public hearings, the Authority approved applications for the sale of power from the Indian Point 3 and Astoria 6 plants to 72 public customers in New York City and Westchester.

Seventeen of the public customers began receiving partial Authority service after the Governor approved their contracts in September. The power is being used to operate New York City's subways, and for public housing, schools, street lighting and other public purposes such as the operation of sewage and water treatment plants.

The first group of approved contracts covers service to the City of New York; the Metropolitan Transportation Authority; State of New York Office of General Services; Port Authority of New York and New Jersey; New York City Housing Authority; City of Yonkers; City of New Rochelle; City of Peekskill; Westchester County; the Westchester villages of Buchanan, Croton-on-Hudson, North Tarrytown, Ossining, Pelham Manor, Scarsdale and Tarrytown; and the Hendrick Hudson School District in Montrose.

Twenty-eight additional contracts that were the subject of a second public hearing were also reported favorably by the Authority to the Governor and approved by him, while a third group of 27 contracts was similarly reported to the Governor in January, 1977.

It is estimated that the eligible public customers in New York City and Westchester will save more than \$85 million annually as the result of their purchases of Authority electricity. Other consumers in the area will save an estimated \$11 million annually as a result of Authority operation of the two plants because they will not be included in Consolidated Edison's rate base.

Customers of Con Edison saved an estimated \$18.5 million in fuel adjustment charges as the result of the company's purchases of energy from Indian Point 3 during operational testing of the plant.

Seven additional municipal distribution systems were added to the list of Authority customers during the year, drawing on the short supply of Niagara Project power reserved for such purposes.

Firm power deliveries began for the Villages of Holley, Brocton and Richmondville, and for the City of Sherrill, which established its municipal system during the year by purchasing the facilities of the Sherrill-Kenwood Power and Light Co., Inc.

The three upstate villages have long-established municipal power systems, as do the Long Island Villages of Rockville Centre, Freeport and Greenport, which requested Authority power to reduce their own high-cost, oil-fired generation. Service has begun to Freeport and Rockville Centre on an interim basis when energy and transmission capability are available. Service to Greenport was scheduled to begin on a similar basis upon completion of interim transmission arrangements. Future allocations of firm power and firm transmission to the three villages are expected.

Increased allocations of hydroelectric power to 20 municipal system and rural electric cooperative customers were made effective at the beginning of 1977. The customers are the Villages of Akron, Angelica, Arcade, Bath, Bergen, Boonville, Churchville, Fairport, Holley, Lake Placid, Marathon, Penn Yan and Philadelphia, the City of Plattsburgh, the Villages of Skaneateles, Spencerport, Tupper Lake and Watkins Glen, and the Oneida-Madison and Otsego Rural Electric Cooperatives.

Power for the increased allocations was withdrawn from the three upstate utilities in accordance with their contracts with the Authority. This withdrawable hydroelectric power sold to Niagara Mohawk, New York State Electric & Gas Corporation and Rochester Gas and Electric Corporation has been reserved for the future needs of the municipal and rural cooperative systems.

The three utilities are required to pass on to their rural and residential customers the savings obtained by using Authority hydroelectric generation instead of their own.



In 1976, Niagara Mohawk credited customers with \$2,416,782, New York State Electric & Gas \$1,561,310, and Rochester Gas and Electric \$547,286.

Additional savings to rural and residential customers amounting to about \$73 million in 1976 resulted from low-cost energy generated at the Authority's Niagara and St. Lawrence Projects compared to the average cost of thermal generation from the utilities' own thermal generating plants.

In 1976, the Authority approved retail rate increases for the Villages of Ilion and Westfield and the Oneida-Madison Cooperative to cover increased operating expenses as well as the cost of new facilities. There has been no change in the rates charged by the Authority for the power it supplies or in its transmission charges.

The 385,400 kilowatts of the FitzPatrick Nuclear Plant output reserved for future growth of the Authority's existing municipal and rural electric cooperative customers is being sold on a withdrawable basis to the state's seven major private

utilities. It is anticipated that the municipal and cooperative customers will start to draw on this supply in the next few years.

In 1976, customers of the state's seven private utilities saved about \$30 million in fuel adjustment charges as the result of utility purchases of Authority power from the FitzPatrick Plant.

### Energy Conservation

Municipal systems, rural electric cooperatives and industries served by the Authority continue to implement programs to reduce non-essential uses of electricity in response to the Authority's advocacy of energy conservation.

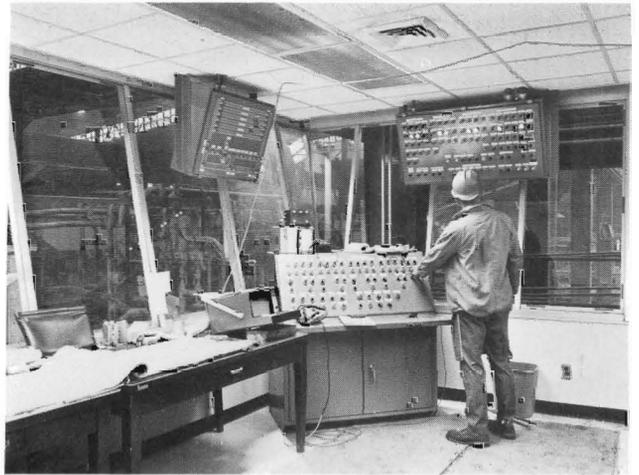
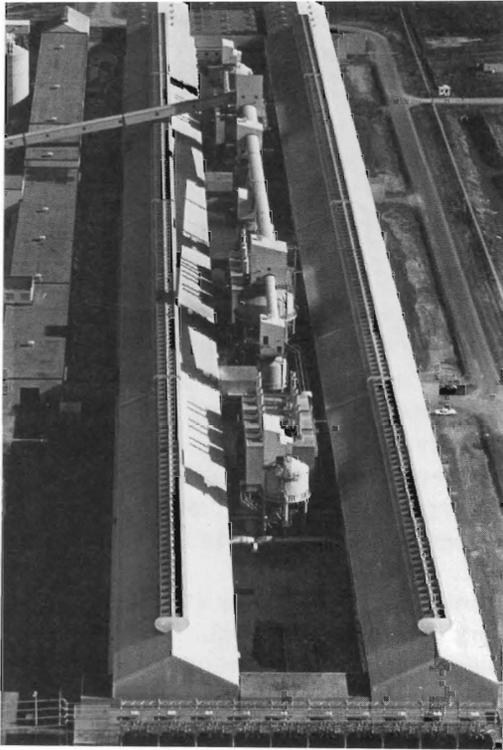
The Authority's own program of conservation includes reduced lighting, lowering of heat levels and elimination of unnecessary electrical use at its offices and projects.

The Authority continues to distribute its energy conservation folders in response to requests from individuals who use them to plan energy-saving efforts.



Authority power began flowing in 1976 to public customers in New York City and Westchester County. They include the Hendrick Hudson School District at Montrose near the Indian Point plant (below); New York City subways (left); the Jacob Riis public housing project (bottom left); and Manhattan's Haaren High School (facing page).





Authority power spurred New York industrial development that included a new potline at the Aluminum Company of America plant at Massena (top left); a new plant built by the Airco Industrial Gases Division of Airco, Inc., at Feura Bush near Albany (top right); and new production facilities at Dresser Transportation Equipment Division of Dresser Industries at Depew (right)



Dunlop Tire and Rubber Corporation in Buffalo

### Electric Sales by Power Authority: Municipal Systems and Rural Electric Cooperatives

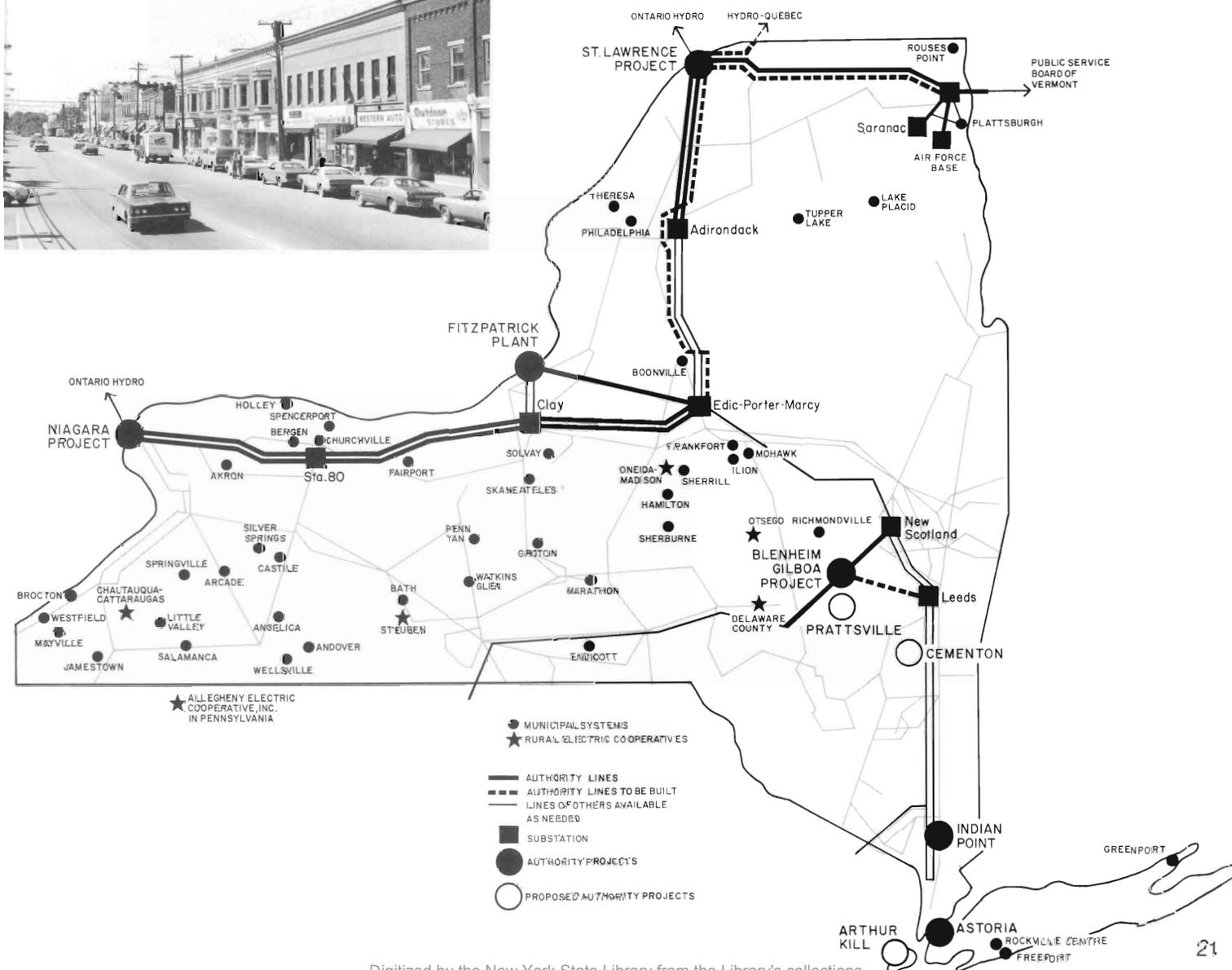
1959  173 million kwh

1976

2801 million kwh



Authority power serves municipal systems including Westfield (left), Akron (top right) and Brocton (top left)



## Transmission

Electricity from Authority projects is transmitted to load centers over lines built and operated by the Authority and other members of the New York Power Pool.

The Authority owns two 345,000-volt circuits extending from Niagara Falls to Utica, a distance of 199 miles. They deliver power to Stations 80 and Pannell of Rochester Gas and Electric, to Niagara Mohawk Power Corporation's Clay Substation near Syracuse and to Niagara Mohawk's Edic Substation.

At Edic, the Authority lines connect with those of Niagara Mohawk, which extend to a connection with Consolidated Edison north of New York City.

A connection also is made at Utica to two Niagara Mohawk 230,000-volt lines which run north-erly to the Authority's Adirondack Substation. From Adirondack, two 230,000-volt, 86-mile lines owned by the Authority extend to the St. Lawrence switch-yard. Thus, the total system provides a connection between the Niagara and St. Lawrence Projects.

Power from the FitzPatrick Plant flows to the main cross-state transmission network over a 70-mile, 345,000-volt transmission line to the Edic Substation near Utica.

The Authority owns a 230,000-volt, 71-mile line from Massena to an Authority substation near Plattsburgh where voltage is reduced to 115,000 and 46,000 volts. Construction of a second line to Plattsburgh is now underway.

From the Plattsburgh Substation, power is trans-

mitted to Vermont at 115,000 volts, utilizing an over-head transmission line which connects to subma-rine cables under Lake Champlain. The New York portion of the line is owned by the Authority and the Vermont portion by the Vermont Electric Power Company.

Power from the Plattsburgh Substation also is transmitted over a 115,000-volt line to the Author-ity's Saranac Substation, where there is an inter-connection with the New York State Electric & Gas Corporation system.

The United States Air Force Base near Platts-burgh purchases all of its electric power directly from the Authority via a 46,000-volt line which the Authority built from its Plattsburgh Substation.

The City of Plattsburgh built a 115,000-volt line from its Receiving Station No. 1 to the Authority's Plattsburgh Substation and constructed its Receiv-ing Station No. 2 to obtain power from the Author-ity's Plattsburgh-Saranac Line.

Power to and from the Blenheim-Gilboa Project flows over two 345,000-volt lines, each about 30 miles long. One to the southwest connects with a New York State Electric & Gas line near Delhi in Delaware County. The other, running northeast from the project, connects with the New Scotland Substation of Niagara Mohawk in Albany County. A third line, connecting the project with the Leeds Substation to the southeast, is being built.

Construction is underway on the 765,000-volt line from Massena to Marcy, with a connection to Quebec.



Cows graze beneath Authority 230,000-volt circuit

## Improvements, Maintenance and Operations

The Authority was able to sustain normal operations in 1976 despite unusual weather conditions and the highest water levels ever recorded at St. Lawrence.

Total generation for the year from the Authority's four baseload power plants was 31.78 billion kwh.

St. Lawrence, which began operations in 1958, set an all-time generation record of 985,000 kw on May 5, 1976. The peak occurred when high river levels and winds swept nearly nine billion gallons of water through the power dam during a one-hour period.

St. Lawrence River flows of 350,000 cubic feet per second were the highest ever recorded. Because of high Lake Ontario water levels, the International St. Lawrence Board of Control directed the St. Lawrence Project to release water through Long Sault Dam. The level of Lake Ontario is controlled by releases through the St. Lawrence Project dams in accordance with the board's instructions.

Approximately one trillion gallons were "spilled" through Long Sault Dam, which has no generating equipment, from May to September. As a result, lake levels were lowered eight inches.

Production for the year at St. Lawrence totaled 7.5 billion kwh as the Authority's 16 generating units remained in continuous operation at full load 24 hours a day from February 28 through December 3. At year-end, ice conditions forced a curtailment of production.

Crews worked virtually around the clock when necessary to perform maintenance on units during periods of lowered river flows.

At St. Lawrence and Niagara, maintenance operations are scheduled to insure maximum availability of units during periods of high water and times of high customer demand.

The Niagara Project generated 17 billion kwh while accomplishing normal maintenance operations.

Authority nuclear power generation totaled 7.25 billion kwh, with the James A. FitzPatrick Nuclear Power Plant producing 4.16 billion kwh and the Indian Point 3 Plant producing 3.09 billion kwh. Major inspection and maintenance of all plant components was accomplished at the FitzPatrick Plant during a two-month shutdown near the beginning of the year.

The Blenheim-Gilboa Project generated 1.3 billion kwh to meet peak consumer demands.

Improvements at Niagara included installation of an additional computer which will improve project generation control and will support the computerized equipment of the production control center. A new sewage collector system is being construc-

ted to tie in with a new local sewage district.

Work continued on additions to the St. Lawrence switchyard to provide added voltage support to the North Country area and accommodate new Authority transmission lines.

The Authority plans to establish its system-wide energy control center and a transmission line maintenance and training center in the Town of Marcy near Utica.

The proposed facilities, to be built adjacent to the Marcy Substation at the southern end of the Authority's 765,000-volt transmission line, will be completed in stages.

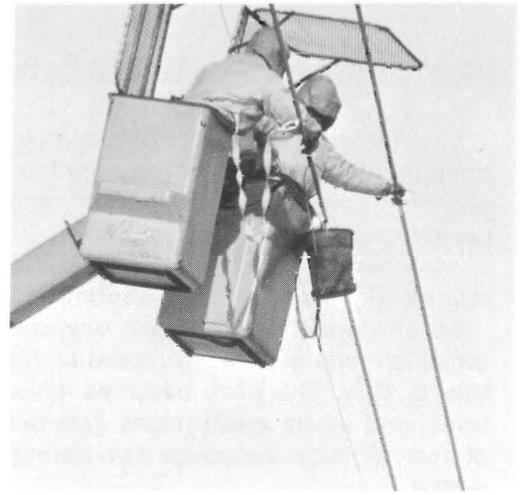
The energy control center will be an expanded version of the production control center previously established at the Niagara Project. It will coordinate operations and power dispatch from Authority facilities and will have communications links with the operations centers of the state's private utilities and the New York Power Pool Control Center near Albany. The energy control center will begin operation in 1979.

The transmission line maintenance center will service the Authority's transmission lines in central New York, and line crews from throughout the state will receive centralized training under field conditions when the training center begins operation in September, 1977.

About 100 workers will be required at the peak of construction of the new facilities, which will be headquarters for about 70 permanent employees.



Computer operation at Niagara Project



Linemen perform maintenance on energized 345,000-volt Gilboa-Fraser circuit

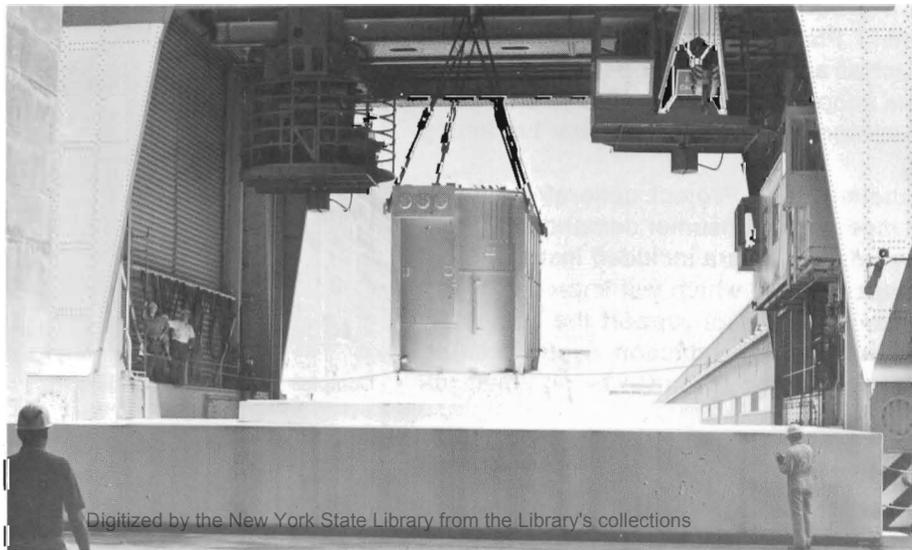


Worker positions one of the Blenheim-Gilboa stop logs that permit dewatering of units for inspection



Switchyard additions at St. Lawrence Project

New transformer at St. Lawrence for switchyard enlargement



## Ice and Power

The Authority and Ontario Hydro jointly installed ice booms for the 18th straight year at St. Lawrence and the 11th at Niagara. The Niagara boom operated successfully to permit formation of a stable ice cover under which the full flow could move freely without ice jams that in pre-boom years caused flooding, damaged private and public property and lowered power production.

The St. Lawrence ice booms were kept open beyond scheduled closing to accommodate St. Lawrence Seaway shipping which was still in the Great Lakes system.

The booms crossing the navigation channel were closed in late December. Because the final closure of these booms was delayed well into the initial ice formation period, a favorable ice cover capable of permitting high St. Lawrence River discharges was not formed. Resultant snow and ice accumulations in an unusually large open water area near Iroquois

Dam produced a "hanging" ice dam and the St. Lawrence Project experienced reduced flows and power output.

When the St. Lawrence generation fell below the minimum needed to meet customer loads in the North Country, the Authority moved electricity over 350 miles of its high-voltage transmission lines from the Niagara Project. Energy from the FitzPatrick Nuclear Plant augmented the storage in Niagara's Lewiston reservoir during the transfer of power to the St. Lawrence area.

The power transfers demonstrated again the value of strong transmission interconnections in the state and region and underscored the fact that reliable winter power production for the benefit of millions of persons can only be guaranteed by prompt installation of the ice booms to form a stable ice cover.

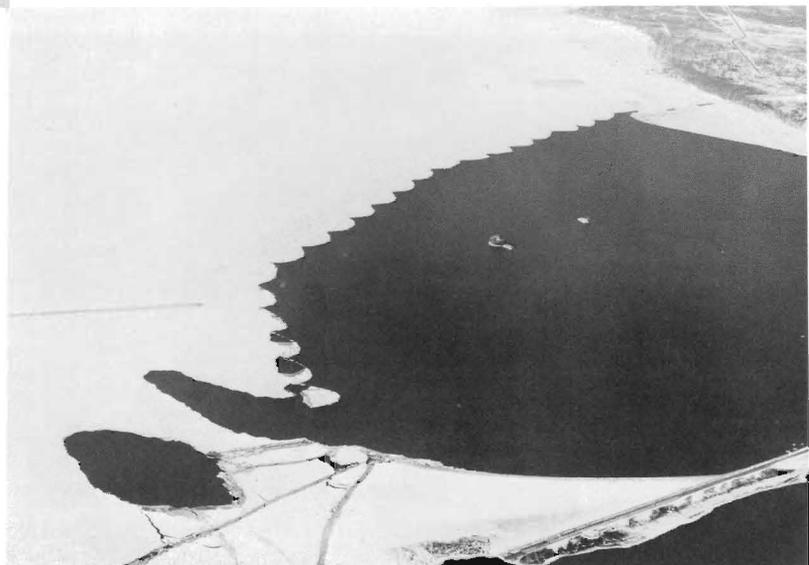


Placing ice boom on the St. Lawrence River

### River Flows and Lake Levels

	Niagara		St. Lawrence	
	Average River Flow	End of Year Lake Erie Level (IGL 1955)	Average River Flow	End of Year Lake Ontario Level (IGL 1955)
1965	172,000	569.6	195,000	244.2
1966	186,000	569.8	220,000	244.3
1967	194,000	570.4	234,000	244.7
1968	207,000	570.5	252,000	244.3
1969	219,600	571.4	265,800	243.7
1970	209,800	571.0	249,800	244.2
1971	213,000	571.6	258,000	243.7
1972	229,000	572.3	280,800	245.7
1973	247,000	571.5	308,100	244.7
1974	243,000	571.6	299,000	243.9
1975	238,000	570.3	284,000	244.2
<b>1976</b>	<b>236,000</b>	<b>571.6</b>	<b>300,100</b>	<b>244.0</b>
Long Term Average	204,000	569.7	242,000	244.0

Ice boom in Lake Erie



## Empire State Electric Energy Research Corporation

The Authority and the state's seven major electric utility companies formed the Empire State Electric Energy Research Corporation (ESEERCO) to coordinate research and development in the generation and transmission of electricity. The corporation is a restructured and expanded successor to the Empire State Atomic Development Associates (ESADA), which was created by the utilities in 1960 and joined by the Authority in 1972.

The Authority participates in ESEERCO projects relating to its program, including cooling tower design, advanced nuclear reactor design and air pollution controls.

The Authority is authorized to build demonstration plants utilizing economically feasible new energy technologies.

## New York Power Pool

The Authority and the state's seven major private utilities are members of the New York Power Pool (NYPP), headquartered in an automated control center near Albany.

The NYPP coordinates the reliable and economic dispatch of power produced by its members and imported from outside the state. To accomplish this, the NYPP center is equipped with advanced computers and linked by voice and data communications with the Authority's production control center at Niagara, similar centers of other members and neighboring regional pools.

On December 21, 1976, the pool-coordinated dispatch of 18,923,000 kw represented an all-time winter peak demand. The 1976 summer peak of 19,120,000 kw was reached on June 24.

The nationwide cold spell that began in December strained energy supplies to the point where the

pool members instituted a five percent voltage reduction on January 17, 1977, so that power could be transmitted to meet shortages in other areas. The municipal systems served by the Authority assisted in this effort by reducing voltage.

The NYPP was formed in 1966 in response to the Northeast power blackout of the preceding year. The Authority joined the pool in 1967. The original pool purpose of strengthening the state power network to avoid future blackouts has been expanded to combine the resources of its members in long-range planning for generation and transmission needs and in such areas as environmental protection and energy conservation.

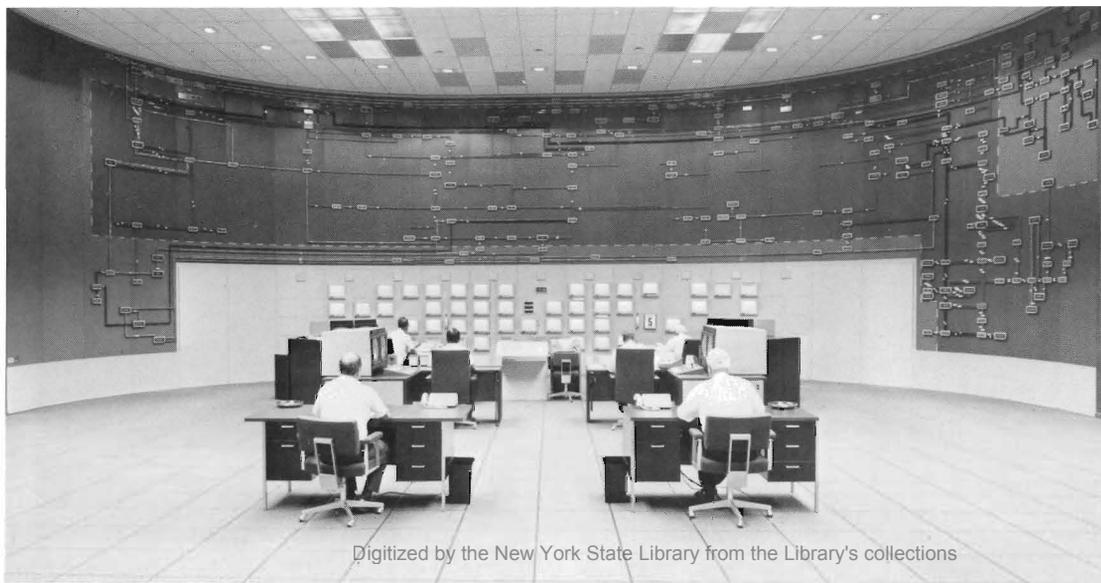
## Great Lakes Commission

The Authority's participation in the work of the Great Lakes Commission continued throughout 1976. The Commission is an informal consultative body of the eight Great Lakes states—New York, Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania and Wisconsin. The participants consult on matters affecting the Great Lakes Basin and provide recommendations to member states and the federal government.

## Northeast Power Coordinating Council

As an active member of the Northeast Power Coordinating Council (NPCC), the Authority contributes to the goals of improving efficiency and reliability of electric service in a region embracing New York, New England and the Canadian provinces of New Brunswick and Ontario. The 21 electric power systems in the Council operate generating plants with a capacity of 74 million kw, approximately 98 percent of the region's generating capability.

New York Power Pool Control Center



## Related Improvements and the Environment

Since it began building its first project at St. Lawrence in 1954, the Power Authority has made environmental protection a major concern. The efforts have taken different forms depending on local conditions.

### St. Lawrence Project

The St. Lawrence Project provided a comprehensive recreational and conservation program. Parklands created by the Authority attract thousands of residents and visitors yearly. Other areas were reserved for wildlife management. Authority contributions to the St. Lawrence Valley included:

- Wilson Hill Waterfowl Management Area, with 3,000 acres, of which 1,900 are under water. It is located near Wilson Hill, a 350-acre promontory into Lake St. Lawrence. Preserved by the Authority under agreement with and managed by the State Department of Environmental Conservation, it has become a major location for establishment of flocks of wild Canada geese and other water fowl.
- Robert Moses State Park, with 700 acres on Barnhart Island and 1,600 acres on the New York mainland, including picnic areas, camping, trailer sites and scenic overlooks. The park is a haven for deer and other wildlife.
- Barnhart Island Marina, Boat Basin and Picnic Area, a sheltered cove for mooring small craft.

Camping at Robert Moses State Park



Barnhart Island beach



Docks, launching ramps and picnicking facilities are located nearby.

- Barnhart Island Beach on the shore of Lake St. Lawrence.
- Hawkins Point Overlook and Boat Launching Ramp on the mainland.
- Coles Creek Marina and Campsite in the Town of Waddington.
- Outdoor recreation facilities for the Towns of Massena, Waddington and Lisbon and the Village of Waddington, among them beaches, parks, boat launching ramps and play areas.

Islands encompassing some 2,700 acres remain in their natural state under Authority jurisdiction and are available for conservation, recreation and wildlife management uses when needed.

### Niagara Project

In 1976, the Lewiston Reservoir of the Niagara Project was opened to public fishing from designated shoreline areas from April through November in a program that will be repeated annually. The action was taken after a survey determined that a viable sports fishery had been created in the reservoir.

Major Authority contributions to the Niagara Project area included:

- Expansion of the Niagara Reservation, the state

Fishing at Lewiston Reservoir





Fishing at St. Lawrence



Barnhart Island Marina at St. Lawrence



Sledding at Lewiston reservoir embankment

park at the famed cataracts; extension of the upstream end of Goat Island, situated between the American and Horseshoe Falls; and building of the American Rapids Bridge between the mainland and Goat Island. These facilities are operated by the Niagara Frontier State Park and Recreation Commission.

- Construction of a 10-mile section of the Robert Moses State Parkway to provide scenic access and bypass a congested industrial district.

- Creation of the 132-acre Reservoir State Park and initial development of recreation, including use of the reservoir embankment for sledding and skiing.

- Acquisition of land for the 193-acre Lewiston State Park on which the State Office of Parks and Recreation built Artpark, a major performing arts center.

- Creation of a park near the falls in which the Commission built a geological museum.

- New facilities for the City of Niagara Falls, including a 144-acre enlargement of Hyde Park, expansion of the municipal golf course, and construction of a golf course clubhouse, the first playground in the downtown area and a sledding hill.

- Financial contributions to the effort to reduce erosion of the Horseshoe Falls.

At Niagara, as at all Authority projects, buildings were designed to present a pleasing appearance and areas were landscaped.

### **Blenheim-Gilboa Project**

In 1976, the Authority received the U.S. Department of the Interior's highest outdoor recreation award for its program at the Blenheim-Gilboa Project.

The program included:

- Mine Kill State Park, with a three-pool swimming complex, picnic areas, playfields, scenic overlooks, hiking trails, and a launching ramp that opens the lower reservoir to boating and fishing. Built by the Authority and transferred to the Saratoga-Capital District State Park and Recreation Commission for operation, it opened in 1973.

- Planting of thousands of trees to improve the scenic quality of the area surrounding major project features.

- Acquisition of additional land for a wildlife management program to offset any possible loss of wildlife areas.

- Maintenance of Mine Kill Falls in the park area as a natural sanctuary for deer and small animals that can be explored only by hiking trails.
- An overlook on Route 30 providing a scenic view of Mine Kill Falls.
- A comprehensive cultural, educational and recreational center at the historic Lansing Manor property adjoining the lower reservoir, as detailed on page 31.

### FitzPatrick Nuclear Plant

Continuing scientific monitoring is conducted at the FitzPatrick Plant to insure operation without risk to the public or harm to the environment. Conducted jointly with Niagara Mohawk, owner of a nearby nuclear plant, the monitoring program dates to the pre-construction period when the data assembled was used to design the plant in a way that would assure compliance with state and federal regulations on safety and environmental protection.

With the use of a laboratory at the plant site, a meteorological tower, monitoring stations both off and on the site and frequent lake cruises, researchers are able to maintain continuous surveillance of air and water quality as well as fish, animal and plant life.

Environmental monitoring at FitzPatrick Plant laboratory



Bald eagle at Blenheim-Gilboa Project



### Transmission

With three new transmission lines under construction in 1976, the Authority continued its policy of providing for multiple use of the rights-of-way.

The Authority generally acquires permanent easements to build and maintain the lines. They permit the owner to use the land on the right-of-way for any purpose which does not interfere with operation and maintenance of the lines.

Farming, pasturing, recreation and wildlife management are among the activities carried on under the lines without difficulty.

Authority transmission lines incorporate new approaches to environmental considerations, as set forth in guidelines of the Federal Power Commission and the President's Commission on Natural Beauty.

Also included in the Authority's plans for transmission are:

- Selective clearing at major highway and stream crossings and in scenic areas to preserve esthetic values.
- Design and placement of transmission towers for minimal disruption of the terrain and for structural forms that will best blend into the setting while maintaining reliability.



Farming under Authority transmission line



Mine Kill Park swimming complex and Blenheim-Gilboa powerhouse



Blenheim-Gilboa Lansing Manor Visitors' Center (left) beside reservoir



Crowds at Niagara Power Vista

## Visitors' Centers

The Authority operates visitors' centers at three of its projects and in 1976 joined with Niagara Mohawk to reopen the Nine Mile Point Energy Information Center near the FitzPatrick Plant.

At year-end, cumulative attendance at the visitors' centers exceeded 6½ million persons.

### Niagara Power Vista

More than three million visitors have toured the Niagara Power Vista, crowning the south end of the Robert Moses Niagara Power Plant, since it opened in 1963. In 1976, it attracted more than 120,000 persons before closing for renovation scheduled for completion in the first half of 1977.

The Power Vista includes open observation decks offering spectacular views of the Niagara River and Gorge 350 feet below.

Exhibits and audio-visual presentations depict energy use centuries ago, the harnessing of water power, various methods used to produce electricity and potential future energy sources, as well as Niagara Frontier history.

A striking Thomas Hart Benton painting of Father Louis Hennepin at Niagara Falls in 1678 and a terrain map showing all prominent natural features and structures in the area are other highlights.

### St. Lawrence Project

More than 150,000 persons toured the St. Lawrence visitors' center in 1976, bringing total attendance to 3.2 million. The St. Lawrence center is located in the Robert Moses Power Dam, 116 feet above the lower level of the St. Lawrence River. An observation deck provides a panorama of the river, man-made Lake St. Lawrence, the beauty of the surrounding parks, eastern Canada and the Adirondack Mountains 30 miles away.

Two paintings by Thomas Hart Benton and a carved terrain map trace the travels of explorer Jacques Cartier on his St. Lawrence River voyages in 1534.

Cutaway working models, maps, films and dioramas explain the project and detail the history of the area.

### Blenheim-Gilboa Project

More than 122,000 persons have attended the visitors' center of the Blenheim-Gilboa Project, including a temporary construction exhibit and the permanent center opened in 1974.

The center is located in a classic barn, restored and refurbished on the historic Lansing Manor property overlooking the project's lower reservoir and powerhouse. Adjoining Mine Kill State Park, the property was acquired for a wildlife management program which is continuing.

The group of post-Revolutionary War buildings that form Lansing Manor was transformed into an educational-scientific-historical complex by the Authority with the assistance of the Schoharie County Historical Society and the State University of New York (SUNY) at Albany.

The visitors' center in the barn contains displays explaining energy sources of the past, present and future; exhibits on Schoharie Valley culture, history and environment; an observatory with scenic views of the power project and surrounding countryside; and a multi-media show.

Also located in the barn is the Schoharie Valley Field Station of the Atmospheric Sciences Research Center of SUNY, Albany. It contains scientific instruments and provides daily local weather forecasts.

The manor house will be operated as a museum by the Schoharie County Historical Society starting in 1977.

### FitzPatrick Nuclear Plant

In September, the Authority and Niagara Mohawk reopened the Energy Information Center at Nine Mile Point, near the FitzPatrick Plant and the utility's Nine Mile Point Nuclear Station.

The center includes a multi-screen show relating development of energy. A 40-foot nuclear station model shows how electricity is produced by nuclear fission. Another room is designed as a fission chamber, where a simulated chain reaction is set in motion to show how nuclear fission generates heat.

Also featured are a number of visitor-operated displays, as well as aquariums and a three-dimensional model showing thermal patterns at the FitzPatrick Plant, and exhibits on research and conservation.

### Student Programs

Students at various grade levels are offered special educational programs at the visitors' centers at Niagara, St. Lawrence and Blenheim-Gilboa. At Niagara, the Power Vista classroom was used by about 5,800 students during 1976. At St. Lawrence, a similar program benefited some 2,400 students. The Blenheim-Gilboa program attracted about 1,400 pupils.

### Stimulation of Tourism

Authority staff members are engaged in programs to encourage tourism in project areas and cooperate with Chambers of Commerce and federal, state and local agencies.

### Publications

During the year, the Authority distributed a new

publication, "Electric Energy and the Environment," a concise description of Authority projects with information on environmental programs. Booklets and folders on energy conservation, other energy subjects and Authority projects are available at visitors' centers and on request to Authority offices.

### Films

A film, "Electricity . . . for People," recounts the history of the Authority, explains how electricity is produced at its projects and shows how it is used by people. The 22½-minute color-and-sound film is available for showing by Authority representatives on request. A nationally-produced film on nuclear power and other presentations also are available.



Environmental program at St. Lawrence



Young visitor at St. Lawrence

# Power Sales and Revenues

Energy Sales		Revenues <sup>(A)</sup>				
Year	KWH (1000's)	From Power	From Use of Transmission Facilities	From Wheeling Charges	From Gilboa Pumped Storage Services	Total
1958	1,285,560	\$ 4,345,696	\$ 307,950	\$ 17,901	\$	\$ 4,671,547
1959	5,547,343	20,495,739	1,937,529	290,612		22,723,880
1960 <sup>(B)</sup>	6,194,552	24,509,004	1,746,763	297,569		26,553,336
1961	12,830,254	45,613,516	1,703,314	403,779		47,720,609
1962	15,783,266	59,045,185	2,821,491	660,835		62,527,511
1963 <sup>(C)</sup>	16,483,579	64,757,453	2,420,908	802,318		67,980,679
1964	16,306,466	69,040,117	2,552,395	798,858		72,391,370
1965	17,891,473	78,163,168	3,330,981	817,354		82,311,503
1966	19,251,242	84,954,912	4,198,128	1,037,934		90,190,974
1967	19,753,704	88,330,631	4,125,577	1,331,119		93,787,327
1968	20,796,780	91,595,592	4,338,799	1,453,096		97,387,487
1969	22,234,733	96,508,443	4,339,810	1,739,241		102,587,494
1970	20,882,750	93,208,530	4,375,523	1,877,987		99,462,040
1971	21,130,429	93,950,742	4,414,332	2,014,484		100,379,558
1972	22,705,862	98,582,787	4,509,747	2,233,729		105,326,263
1973	24,803,717	106,627,339	4,611,265	2,481,194	4,816,085	118,535,883
1974 <sup>(D)</sup>	24,597,450	105,994,911	4,632,214	2,619,917	17,854,709	131,101,751
1975	26,324,431	116,409,805	4,757,857	2,921,949	19,274,381	143,363,992 <sup>(E)</sup>
1976 <sup>(F)</sup>	30,396,937	177,206,865	5,050,707	16,157,711	20,498,088	218,913,371 <sup>(G)</sup>
<b>TOTAL</b>	<b>345,200,528</b>	<b>\$1,519,340,435</b>	<b>\$66,175,290</b>	<b>\$39,957,587</b>	<b>\$62,443,263</b>	<b>\$1,687,916,575</b>

(A) Inter-project sales and revenues between the Niagara and St. Lawrence Projects are included in years 1958-1966. In later years inter-project revenues are excluded to permit better statistical comparisons, even though some inter-project transactions are incorporated in the financial statements.

(B) First full year with full capacity at St. Lawrence Project.

(C) First full year with full capacity at Niagara Project.

(D) First full year with full capacity at Blenheim-Gilboa Project.

(E) Includes inter-project sales with the 1970 Project.

(F) First year with partial sales to governmental customers in New York City metropolitan area.

(G) Includes inter-project sales with the 1970 and 1974 Projects.

## Customers Served Directly with Power from Hydroelectric Projects

Village of Akron  
 Village of Andover  
 Village of Angelica  
 Village of Arcade  
 Village of Bath  
 Village of Bergen  
 Village of Boonville  
 Village of Brocton  
 Village of Castile  
 Village of Churchville  
 Village of Endicott  
 Village of Fairport  
 Village of Frankfort  
 Village of Freeport  
 Village of Greenport  
 Village of Groton  
 Village of Hamilton  
 Village of Holley  
 Village of Ilion  
 City of Jamestown  
 Lake Placid Village, Inc.  
 Village of Little Valley

Village of Marathon  
 Village of Mayville  
 Village of Mohawk  
 Village of Penn Yan  
 Village of Philadelphia  
 City of Plattsburgh  
 Village of Richmondville  
 Village of Rockville Centre  
 Village of Rouses Point  
 City of Salamanca  
 Village of Sherburne  
 City of Sherrill  
 Village of Silver Springs  
 Village of Skaneateles  
 Village of Solvay  
 Village of Spencerport  
 Village of Springville  
 Village of Theresa  
 Village of Tupper Lake  
 Village of Watkins Glen  
 Village of Wellsville  
 Village of Westfield

Allegheny Electric Cooperative, Inc.  
 Delaware County Electric Cooperative, Inc.

Oneida-Madison Electric Cooperative, Inc.  
 Otsego Electric Cooperative, Inc.  
 Steuben Rural Electric Cooperative, Inc.  
 Aluminum Company of America  
 General Motors Corporation  
 Reynolds Metals Company  
 United States Air Force  
 Public Service Board of the State of Vermont  
 New York State Electric & Gas Corporation  
 Niagara Mohawk Power Corporation  
 Rochester Gas and Electric Corporation

## Blenheim-Gilboa Pumped Storage Project

Central Hudson Gas and Electric Corporation\*  
 New York State Electric & Gas Corporation  
 Niagara Mohawk Power Corporation  
 Rochester Gas and Electric Corporation

\* Central Hudson's share of Blenheim-Gilboa capacity has been assigned to New York State Electric & Gas Corp. on a temporary basis.

## Industry Served Indirectly with Niagara Project Power

### Replacement Power:

The Power Authority is required by Federal law to supply 445,000 kilowatts of its low cost firm power to the Niagara Mohawk Power Corporation to replace low cost power previously obtained from the Company's Adams and Schoellkopf Plants at Niagara Falls. This power is largely resold to designated industries at the Power Authority's wholesale firm power rate plus a transmission charge and such state and local revenue taxes as are applicable. The following industries were supplied during the year with this low cost power:

Airco Alloys Division, Airco, Inc.  
Airco Speer Carbon-Graphite Division, Airco, Inc.  
Allied Chemical Corporation  
American Standard, Inc.  
Anaconda-Brass Division, Anaconda Company  
Atlas Steel Casting Company  
Bethlehem Steel Corporation  
Buffalo Forge Company  
The Carborundum Company  
Donner-Hanna Coke Corporation  
Dresser Transportation Equipment Division, Dresser Industries, Inc.  
Dunlop Tire & Rubber Corporation  
E. I. duPont de Nemours & Company Inc.  
FMC Corporation Industrial Chemical Division  
General Abrasive Company, Inc.  
General Mills, Inc.  
Great Lakes Carbon Corporation  
Hooker Chemicals & Plastics Corporation  
International Multi-Foods Corporation  
International Paper Company  
Nabisco, Inc.  
Niagara Falls Water Treatment Plant  
Nitec Paper Corporation  
Olin Corporation  
The Pillsbury Company  
The Prestolite Company Division, Eltra Corporation  
Republic Steel Corporation  
Spaulding Fibre Company, Inc.  
Stauffer Chemical Company

TAM Division, NL Industries  
Union Carbide Corporation

### Expansion Power:

The Power Authority has allocated all of the 250,000 kilowatts of Niagara Project firm power reserved for sale to industries within thirty miles of the Niagara Project. This power is sold to local utility companies and by them to industries which require low cost power to enable them to expand operations or to establish new industries in the Niagara Frontier area. Allocations of expansion power were provided during the year to the industries listed below:

Airco Alloys Division, Airco, Inc.  
Airco Industrial Gases Division, Airco, Inc.  
Airco Speer Carbon-Graphite Division, Airco, Inc.  
Arcata Graphics Corporation  
Bethlehem Steel Corporation  
The Carborundum Company  
Donner-Hanna Coke Corporation  
E. I. duPont de Nemours & Company, Inc.  
General Mills, Inc.  
General Motors Corporation-Harrison Radiator Division  
Graphite Products Division, The Carborundum Company  
Great Lakes Carbon Corporation  
Hooker Chemicals & Plastics Corporation  
International Multi-Foods Corporation  
Moog, Inc.  
Nitec Paper Corporation  
Olin Corporation  
The Pillsbury Company  
Pyron Company Division, Amax Inc.  
Republic Steel Corporation  
Spaulding Fibre Company, Inc.  
TAM Division, NL Industries  
Union Carbide Corporation

### Customers Served with Power from James A. FitzPatrick Nuclear Power Plant

Aluminum Company of America  
Hooker Chemicals & Plastics Corporation  
Air Products & Chemicals Inc.  
Reynolds Metals Company

Airco Industrial Gases Division, Airco, Inc.  
Airco Speer Carbon-Graphite Division, Airco, Inc.  
Burdock, Inc.  
E. I. duPont de Nemours & Company, Inc.  
Dresser Transportation Equipment Division, Dresser Industries, Inc.  
Olin Corporation  
Airco Alloys Division, Airco, Inc.  
Central Hudson Gas and Electric Corporation  
Consolidated Edison Company of New York, Inc.  
Long Island Lighting Company  
New York State Electric & Gas Corporation  
Niagara Mohawk Power Corporation  
Orange and Rockland Utilities, Inc.  
Rochester Gas and Electric Corporation

### Customers Served During 1976 with Power from the Indian Point 3 Nuclear Power Plant

City of New York  
Metropolitan Transportation Authority  
The Port Authority of New York and New Jersey  
Village of Buchanan  
Village of Croton-on-Hudson  
Hendrick Hudson School District  
New York City Housing Authority  
Village of North Tarrytown  
Village of Ossining  
City of Peekskill  
Village of Pelham Manor  
City of New Rochelle  
Village of Scarsdale  
State of New York, Office of General Services  
Village of Tarrytown  
Westchester County  
City of Yonkers  
Consolidated Edison Company of New York, Inc.

The Indian Point 3 Project began commercial operation on August 30, 1976. Service to additional public agencies in the New York City area from the Indian Point 3 and Astoria 6 plants is anticipated upon approval of contracts and completion of Astoria 6.

# Financial Statements

## Statement of Receipts and Disbursements

January 1, 1976 to December 31, 1976

(In thousands)

<b>Cash Balance, January 1, 1976</b>	\$ 124,616
<b>Cash Receipts:</b>	
Sale of power, etc.	210,224
Earnings on investments	27,623
Lease of property, etc.	93
Sale of General Purpose Bonds:	
Series C	610,000
Series E	150,000
Sale of Revenue Bonds—Series H	80,000
Accrued interest on bonds	1,399
Sale of Promissory Notes	60,000
Sale of property	208
Employees' taxes withheld	712
Interest purchased	16
<b>Total Receipts</b>	<u>1,140,275</u>
<b>Total Cash Available</b>	<u>1,264,891</u>
<b>Cash Disbursements:</b>	
Interest on bonds and notes	148,338
Retirement of 1954 bonds:	
Serial (\$12,563 principal amount)	12,550
Term (\$40,324 principal amount)	38,191
Repayment of promissory notes:	
9½ % due March 30, 1976	75,000
9¼ % due September 15, 1976	10,000
Operations and maintenance including replacements	42,961
Wheeling charges	11,035
Construction costs including additions to electric plant	540,890
Nuclear fuel	6,517
Financing costs	6,919
Taxes withheld	681
Preliminary investigations	6,722
Purchase of investments (net)	262,254
Purchase of U.S. Government Securities under agreements to resell (net)	3,094
<b>Total Disbursements</b>	<u>1,165,152</u>
<b>Cash Balance, December 31, 1976</b>	<u>\$ 99,739</u>

The accompanying notes are an integral part of these financial statements.

**Statement of Condition December 31, 1976**

(in thousands)

<b>Assets</b>	<b>1954 Project</b>	<b>1970 Project</b>	<b>General Purpose</b>	<b>Total</b>
Expenditures for electric plant (Note B)				
In service	\$1,098,027	\$565,409	\$ 438,387	\$2,101,823
Construction work in progress	18,298	155	508,679	527,132
Nuclear fuel		42,003	69,624	111,627
Cash (includes time deposits)	33,562	7,490	58,687	99,739
Investment in U.S. Government and New York State securities, at cost (Principal \$433,645 Note B)	87,497	86,749	251,528	425,774
U.S. Government securities purchased under agreements to resell, at cost	1,219	3,250	2,000	6,469
Interest receivable on investments and time deposits	1,766	2,645	4,585	8,996
Receivables—power sales, etc.	14,607	6,302	9,322	30,231
Deposits (Note F)	1,761			1,761
Materials and supplies (at average cost)	2,128	1,396		3,524
Prepayments and other assets	1,965	101	268	2,334
Preliminary investigations			25,713	25,713
Intra Authority balances	7,085	(2,091)	(4,994)	
	\$1,267,915	\$713,409	\$1,363,799	\$3,345,123
<b>Liabilities and Other Credits</b>				
Bonds outstanding (Note D)	\$ 348,343	\$734,000	\$1,060,000	\$2,142,343
Promissory notes payable:				
Short-term			20,000	20,000
Long-term			240,000	240,000
Retained on contracts	514	432	4,732	5,678
Accounts payable and accrued liabilities	6,359	11,408	25,483	43,250
Total liabilities	355,216	745,840	1,350,215	2,451,271
Bonds Retired From:				
Bond service	237,639			237,639
Bond reserve	267,502			267,502
General reserve	248,566			248,566
	753,707			753,707
Revenues Allocated To:				
Bond service	8,336	2,049	6,793	17,178
Bond reserve	26,816		2,748	29,564
General reserve	43,772			43,772
Insurance and improvement fund	27,639			27,639
Working capital	26,171	269	8,563	35,003
Additions to electric plant	26,258	1,029	6	27,293
Fuel reserve		7,879		7,879
	158,992	11,226	18,110	188,328
Bond proceeds used to provide interest and fuel		(43,657)	(4,526)	(48,183)
	158,992	(32,431)	13,584	140,145
	\$1,267,915	\$713,409	\$1,363,799	\$3,345,123

The accompanying notes are an integral part of these financial statements.

**1954 Project**  
**Summary of Funds 1976**  
(in thousands)

	Revenue	Operat- ing	General*				Insur- ance & Improve- ment
			General Construc- tion	Bond Service	Bond Reserve	General Reserve	
<b>Available Funds January 1, 1976</b>	\$ —0—	\$25,171	\$ 27	\$ 3,063	\$37,328	\$16,869	\$27,239
<b>Cash Receipts:</b>							
Sale of power, etc.	109,890						
Sale of property			208				
Earnings on investments	8,302		6				
Lease of property, etc.	93						
Employees' taxes withheld		712					
<b>Total Receipts</b>	<u>118,285</u>	<u>712</u>	<u>214</u>				
<b>Total Available</b>	<u>118,285</u>	<u>25,883</u>	<u>241</u>	<u>3,063</u>	<u>37,328</u>	<u>16,869</u>	<u>27,239</u>
Transfer of funds—Revenue	(118,285)	26,375		35,107	14,043	42,760	8,760
—Other					(8,760)		
	<u>\$ —0—</u>	<u>52,258</u>	<u>241</u>	<u>38,170</u>	<u>51,371</u>	<u>50,869</u>	<u>35,999</u>
<b>Cash Disbursements:</b>							
Interest on bonds				14,768			
Retirement of bonds:							
Serial (\$12,563 Principal amount)				12,251	299		
Term (\$40,324 Principal amount)				8,184	15,828	14,179	
Operations and maintenance including replacements		17,820					
Wheeling charges		3,070					
Construction costs including additions to electric plant		3,692	11				8,761
Taxes withheld		681					
Inter fund receivables		7,085					
<b>Total Disbursements</b>		<u>32,348</u>	<u>11</u>	<u>35,203</u>	<u>16,127</u>	<u>14,179</u>	<u>8,761</u>
<b>Available Funds December 31, 1976</b>		<u>\$19,910</u>	<u>\$230</u>	<u>\$ 2,967</u>	<u>\$35,244</u>	<u>\$36,690</u>	<u>\$27,238</u>
Distributed as follows:							
Demand deposits	\$ 401	\$ 5	\$ 524	\$ 1,917	\$ 2,372	\$ 15	
Time deposits	14,415	225			1,150	12,538	
Investment in U.S. Government securities	5,094		2,443	24,108	10,618	14,684	
Investment in New York State securities				8,000	22,550		
U.S. Government securities purchased under agreements to resell				1,219			
Accrued interest purchased							1
<b>Totals</b>		<u>\$19,910</u>	<u>\$230</u>	<u>\$ 2,967</u>	<u>\$35,244</u>	<u>\$36,690</u>	<u>\$27,238</u>

\*In the hands of the Bond Trustee.

The accompanying notes are an integral part of these financial statements.

**1970 Project**  
**Summary of Funds 1976**  
(in thousands)

					<b>General*</b>	
	<u>Revenue</u>	<u>Operating</u>	<u>Nuclear Fuel Reserve</u>	<u>Construction</u>	<u>Bond Service</u>	<u>Bond Reserve</u>
<b>Available Funds January 1, 1976</b>	\$ —0—	\$ 64	\$ 4,799	\$ 8,725	\$ —0—	\$49,216
<b>Cash Receipts:</b>						
Sale of power, etc.	55,694					
Earnings on investments	5,552			696		
Sale of Revenue Bonds				38,760		41,240
Accrued interest on Revenue Bonds				16		
<b>Total Receipts</b>	<u>61,246</u>			<u>39,472</u>		<u>41,240</u>
<b>Total Available</b>	61,246	64	4,799	48,197		90,456
Transfer of funds—Revenue	(61,246)	18,210	6,579		36,457	
—Other					4,874	(4,874)
	<u>\$ —0—</u>	<u>18,274</u>	<u>11,378</u>	<u>48,197</u>	<u>41,331</u>	<u>85,582</u>
<b>Cash Disbursements:</b>						
Interest on bonds and notes				658	41,331	
Repayment of 9¼ % promissory notes due September 15, 1976				10,000		
Operations and maintenance including replacements		19,660				
Wheeling charges		266				
Construction costs including additions to electric plant		626	6,517	28,774		
Financing costs				1,525		
Inter fund payables		(2,695)		604		
<b>Total Disbursements</b>		<u>17,857</u>	<u>6,517</u>	<u>41,561</u>	<u>41,331</u>	
<b>Available Funds December 31, 1976</b>		<u>\$ 417</u>	<u>\$ 4,861</u>	<u>\$ 6,636</u>	<u>\$ —0—</u>	<u>\$85,582</u>
Distributed as follows:						
Demand deposits		\$ 26	\$ 1,611	\$ 57		\$ 196
Time Deposits				5,600		
Investment in U.S. Government securities		391		979		85,379
U.S. Government securities purchased under agreements to resell			3,250			
Accrued interest purchased						7
<b>Totals</b>		<u>\$ 417</u>	<u>\$ 4,861</u>	<u>\$ 6,636</u>		<u>\$85,582</u>

\*In the hands of the Bond Trustee.  
The accompanying notes are an integral part of these financial statements.

**General Purpose**  
**Summary of Funds — 1976**  
(in thousands)

	Revenue	Operating	Construction	
			Astoria 6	Indian Point 3
<b>Available Funds January 1, 1976</b>	\$ —0—	\$ —0—	\$ 8,388	\$ —0—
<b>Cash Receipts:</b>				
Sale of power, etc.	44,640			
Earnings on investments	21		4,559	3,626
Sale of general purpose bonds			84,821	431,148
Accrued interest on general purpose bonds			942	55
Sale of promissory notes 5¾ % , due semi-annually in six equal installments beginning March 30, 1977				60,000
<b>Total Receipts</b>	<u>44,661</u>		<u>90,322</u>	<u>494,829</u>
<b>Total Available</b>	44,661		98,710	494,829
Transfer of funds—Revenue	(44,661)	31,408		
—Other			4,000	13,350
	<u>\$ —0—</u>	<u>31,408</u>	<u>102,710</u>	<u>508,179</u>
<b>Cash Disbursements:</b>				
Interest on bonds and notes				574
Repayment of 9½ % Promissory Notes due March 30, 1976				75,000
Construction costs including additions to electric plant			71,012	367,019
Operations and maintenance		5,481		
Wheeling charges		7,699		
Financing costs			576	3,000
Preliminary investigations				2,703
Transfer to construction				(1,104)
Inter fund payable		(350)	(890)	
<b>Total Disbursements</b>		<u>12,830</u>	<u>70,698</u>	<u>447,192</u>
<b>Available Funds December 31, 1976</b>		<u>\$18,578</u>	<u>\$ 32,012</u>	<u>\$ 60,987</u>
Distributed as follows:				
Demand deposits		\$ 4,685	\$ 59	\$ 74
Time deposits		1,450	11,810	4,225
Investment in U.S. Government securities		12,443	20,143	56,688
U.S. Government securities purchased under agreements to resell				
Accrued interest purchased				
<b>Totals</b>		<u>\$18,578</u>	<u>\$ 32,012</u>	<u>\$ 60,987</u>

\*In the hands of the Bond Trustee.

The accompanying notes are an integral part of these financial statements.

Construction			General*			
Greene County	Massena-Marcy Line	Projects' Study	Temporary Interest	Bond Service	Bond Reserve	Note Proceeds Account
\$ 3,112	\$ —0—	\$ 602	\$15,696	\$ —0—	\$23,544	\$67,734
267	749	431				3,414
24,978	74,651	11,837	63,877		68,688	
35	338	13				
<u>25,280</u>	<u>75,738</u>	<u>12,281</u>	<u>63,877</u>		<u>68,688</u>	<u>3,414</u>
28,392	75,738	12,883	79,573		92,232	71,148
12,575	4,525			11,524	1,729	(34,450)
<u>40,967</u>	<u>80,263</u>	<u>12,883</u>	<u>79,573</u>	<u>11,524</u>	<u>93,961</u>	<u>36,698</u>
			64,858	11,524		14,625
22,246	38,749					
652	915	242				9
		6,722				
	14,732	(17,435)				
(1,014)	(890)	(746)				
<u>21,884</u>	<u>53,506</u>	<u>(11,217)</u>	<u>64,858</u>	<u>11,524</u>		<u>14,634</u>
<u>\$19,083</u>	<u>\$26,757</u>	<u>\$24,100</u>	<u>\$14,715</u>	<u>\$ —0—</u>	<u>\$93,961</u>	<u>\$22,064</u>
\$ 124	\$ 180	\$ 74	\$ 881		\$ 209	\$ 6
1,050	6,325	17,275				10,260
15,909	20,252	6,751	13,792		93,752	11,798
2,000						
			42			
<u>\$19,083</u>	<u>\$26,757</u>	<u>\$24,100</u>	<u>\$14,715</u>		<u>\$93,961</u>	<u>\$22,064</u>

## Revenues . . . Disposition of Revenues — 1976

(in thousands)

	<u>1954 Project</u>	<u>1970 Project</u>	<u>General Purpose*</u>
<b>Revenues</b>			
Power Sales			
Demand charges	\$ 35,588	\$34,070	\$13,233
Energy charges	66,079	23,465	22,330
Other	2,940		
Transmission charges	4,710	341	
Wheeling charges	3,368	396	12,393
Investment and other income			
Interest	7,443	5,317	112
Lease of property, etc.	94		
	<u>\$120,222</u>	<u>\$63,589</u>	<u>\$48,068</u>
<b>Disposition of Revenues</b>			
Operating expenses			
Operations	\$ 11,726	\$16,019	\$ 5,024
Fuel consumed		\$ 7,854	\$4,526
Less: Provided from initial fuel supply		<u>7,854</u>	<u>4,526</u>
Maintenance	5,438	5,035	1,017
Wheeling charges	3,368	396	12,393
Replacement of electric plant	237	11	
Interest on long-term debt	14,417	40,222	18,317
Less: Provided from bond reserve		<u>6,014</u>	
Retirement of bonds	71,262		
Additions to:			
Electric plant	12,634	617	6
Fuel reserve		7,179	
Bond reserve			2,748
Accumulated working capital	1,140	124	8,563
	<u>\$120,222</u>	<u>\$63,589</u>	<u>\$48,068</u>

\* Revenues were paid into the Revenue Fund and expenses paid from the Operating Fund beginning October 1, 1976 in accordance with the General Purpose Bond Resolution.

The accompanying notes are an integral part of these financial statements.

## Notes to Financial Statements

### Note A—General

Power Authority of the State of New York is a body corporate and politic, a political subdivision and a corporate municipal instrumentality of the State of New York created by the Legislature of the State by Chapter 722 of the Laws of 1931, approved April 27, 1931, and last amended by Chapter 482 of the Laws of 1976.

Properties and income of the Authority are exempt from taxation.

### Note B—Accounting Policies

(a) Accounts of the Authority are maintained in accordance with the Uniform System of Accounts as prescribed by the Federal Power Commission, adapted to the provisions of the Authority's bond resolutions.

(b) Expenditures for electric plant in service and construction work in progress consist primarily of amounts expended to construct, acquire and complete, and place in operation the generating, transmission and related facilities of the Authority and include, in accordance with the bond resolutions, net bond discount and financing costs incurred in the issuance of bonds and notes, interest on bonds and notes (less interest income on unexpended funds), and revenues and expenditures in connection therewith during the period of construction. These expenditures are stated at initial cost and include the cost of additions financed from operating revenues as follows:

1954 Project	
General Revenue Bonds	\$1,090,067,160
Operating Revenues	26,258,261
1970 Project	
Revenue Bonds	564,535,012
Operating Revenues	1,029,130
General Purpose Projects	
General Purpose Bonds	
and Sale of Notes	947,059,985
Operating Revenues	5,722

(c) Amounts disbursed from the Projects' Study Fund for preliminary investigations of a project are transferred to construction work in progress upon the specifying of the project by the Authority.

(d) The Authority's bond resolutions provide that operating expenses shall not include any provision for depreciation, amortization or similar charges. Effective recovery of investment in facilities is accomplished through allocation of available revenues to funds for the retirement of bonds at cost. The excess of principal amount over the cost of bonds retired is used for additional bond retirements. Replacements of the facilities are treated as operating expenses.

(e) The 1970 resolution and the General Purpose resolution provide for a fuel re-

serve account as a part of the Operating Fund established by each resolution. Each of the resolutions provides that in addition to the initial fuel requirements funded from bond proceeds, sufficient amounts from revenues be deposited in the account to enable the Authority to pay the cost of fuel as it becomes payable. Operating expenses are charged for the amount of fuel consumed.

(f) Investments are stated at cost. The aggregate market value of investments in securities, based upon published bid prices at December 31, 1976, amounted to \$434,686,309.

(g) Employees of the Authority are covered by the New York State Employees' Retirement System. For personnel employed prior to July 1, 1976, the Authority contributes the entire amount to the system. Effective January 1, 1977, personnel employed July 1, 1976 and thereafter deposit three percent of gross salary with the system. The Authority contributes the balance. Pension costs for the year 1976 of \$3,469,000 are based on billings received from the Retirement System. The Authority's employees are also covered by the Federal Insurance Contributions Act (Social Security).

(h) Sales and purchases of power between the Niagara and St. Lawrence projects have been eliminated in the presentation of revenues and operating costs.

### Note C—Financing

The Authority has adopted the following resolutions:

A General Revenue Bond Resolution adopted on December 21, 1954 (the 1954 resolution), provides that revenues from the St. Lawrence and Niagara projects and related transmission line (the 1954 Project), in excess of operating expenses, working capital and necessary reserves are first applied to the payment of bond service (interest and principal installments due on outstanding bonds); then a sum equal to forty percent of each year's bond service is set aside in a bond reserve account (the amount in such account above the next year's bond service is used to retire bonds); any remaining revenues are deposited in a general reserve account to be used for the retirement of bonds or paid to the Authority for deposit in an insurance fund or an improvement fund. A total of \$1,102,050,000 bonds was issued under the resolution, of which \$348,343,000 remain outstanding at December 31, 1976. No additional bonds may be issued under the 1954 resolution.

A Revenue Bond Resolution adopted as of June 15, 1970 (the 1970 resolution), provides that proceeds from the sale of bonds for the Blenheim-Gilboa Pumped

Storage Project, the FitzPatrick Nuclear Plant and the FitzPatrick-Edic Transmission Line (the 1970 Project), be sufficient to provide for construction costs, to pay interest during construction and to deposit in the bond reserve account a bond reserve requirement of two years' interest. Amounts in the bond reserve account are applied by the Bond Trustee monthly to meet any deficiency in the bond service account and may be paid to the Authority for emergency repairs or replacements of the 1970 Project. Amounts in such account above the bond reserve requirement are used to retire bonds. Upon the retirement of all the bonds issued under the 1954 resolution, the bond reserve requirement will be reduced to one year's interest. Revenues in excess of operating expenses, working capital and necessary reserves are applied first to the payment of bond service (interest only to December 31, 1984, thereafter, interest and principal installments due on outstanding bonds); then a sum equal to twenty five percent of each year's bond service is set aside in a bond reserve account; any remaining revenues are deposited in a general reserve account to be paid to the Authority for any lawful corporate purpose. Upon the retirement of all bonds issued for the 1954 Project not later than December 31, 1984 (the date established in a schedule set forth in the 1970 resolution) revenues of the 1954 Project, after providing for operating expenses, working capital and reasonable and necessary reserves, will be applied to the extent necessary to meet any deficiency in the 1970 bond service or bond reserve accounts. A total of \$734,000,000 bonds has been issued under the 1970 resolution, all of which remain outstanding at December 31, 1976. The Authority has the right to issue additional bonds on a parity with the 1970 bonds (i) to complete the 1970 Project, (ii) to refund one or more series of bonds outstanding under the 1970 resolution or all of the 1954 bonds then outstanding, and (iii) to finance major repairs, replacements, improvements, betterments or additions to the 1970 Project.

On May 19, 1976, the Authority sold for settlement and delivery on June 2, 1976, pursuant to the 1970 resolution and the Eighth Supplemental Revenue Bond Resolution adopted on May 19, 1976, \$80,000,000 Revenue Bonds, Series H. \$41,240,275 from the proceeds of the bonds was required to be deposited in the bond reserve account, and the balance was deposited in the Construction Fund.

The \$10,000,000 promissory notes sold by the Authority on December 29, 1975 matured on September 15, 1976 and were paid from the Construction Fund.

A General Purpose Bond Resolution

adopted on November 26, 1974 (the General Purpose resolution) provides for the financing of future projects of the Authority. Projects are defined in the resolution to mean any project of the Authority directly or indirectly related to power generation or transmission, whether owned jointly or singly by the Authority, including any output in which the Authority has an interest, heretofore or hereafter authorized by the Power Authority Act and hereafter specified in the supplemental resolution adopted at the time a series of bonds is issued. The General Purpose resolution pledges the full faith and credit of the Authority to the payment of the bonds as well as all its revenues and other income not subject to previous pledges (i.e., the 1954 and 1970 resolutions). The Authority also pledges not to issue any bonds or notes secured by a charge or lien on such revenues and income equal or prior to the charge or lien of the General Purpose resolution.

The General Purpose resolution provides that proceeds from the sale of bonds for the projects specified in the supplemental resolutions be sufficient to provide for construction costs, to pay interest during construction and a bond reserve requirement of one year's interest. Amounts in the bond reserve account will be applied by the Bond Trustee monthly to meet any deficiency in the bond service account and may be paid to the Authority for emergency repairs or replacements of the projects. Amounts in such account above the bond reserve requirement are used to retire bonds. All revenues not pledged under the 1954 or 1970 resolutions from any project of the Authority after its completion (after deductions for operating expenses, working capital, necessary reserves and projects' study) are applied first to the payment of bond service, (interest only to December 31, 1985, thereafter interest and principal installments due on outstanding bonds), then a sum equal to fifteen percent of each year's bond service is set aside in a bond reserve account; any remaining revenues are deposited in a general reserve account to be paid to the Authority for any lawful corporate purpose. Upon the retirement of all bonds issued for the 1954 Project, that portion of the revenues of such project (after providing for operating expenses, working capital and reasonable and necessary reserves) in excess of the amount required under the 1970 resolution, will be applied to the bonds under the General Purpose resolution. The Authority covenants that at all times rates and charges will be sufficient, together with other moneys available therefor, to meet the requirements of the General Purpose resolution. The General

Purpose resolution provides that upon the issuance of bonds for a project for which bonds have not previously been issued, the Authority will certify that for the five years commencing either in 1986 (the year after the 1954 bonds are covenanted to be retired) or, if later, in the year after the latest estimated date of completion of any project, estimated revenues not subject to the pledge of the 1970 resolution, less estimated operating expenses will be at least 1.20 times estimated maximum aggregate bond service for all bonds then estimated to be outstanding.

The General Purpose resolution also establishes a Projects' Study Fund to finance preliminary efforts of the Authority to determine appropriate methods to fulfill its purposes under the Power Authority Act. There is deposited into the fund (i) out of bond proceeds, the amount set forth in a supplemental resolution, and (ii) if there is no deficiency in bond service, an amount not to exceed two percent of revenues not pledged under the 1954 or 1970 resolutions.

On January 20, 1976, pursuant to the General Purpose resolution and the Fourth Supplemental General Purpose Bond Resolution adopted on January 20, 1976, the Authority entered into agreements of purchase with 63 purchasers of \$610,000,000 General Purpose Bonds, Series C. Settlement and delivery of the Series C Bonds were on January 29, 1976, at which time \$528,000,000 of bonds were delivered to the purchasers. Deliveries of \$25,000,000 bonds to a purchaser on July 1, 1976 and of \$57,000,000 to two purchasers on September 23, 1976 completed the sale.

On September 21, 1976, pursuant to the General Purpose resolution and the Fifth Supplemental General Purpose Bond Resolution adopted on September 21, 1976, the Authority sold for settlement and delivery on October 6, 1976 \$150,000,000 General Purpose bonds, Series E. The proceeds of the bonds, after deposits of \$10,738,380 to the bond reserve account, \$12,140,177 to the temporary interest fund and \$11,854,722 to the Projects' Study Fund, will be used to pay a portion of the cost of construction of Indian Point 3, Astoria 6, Massena-Marcy Line and the Greene County Plant.

The Authority has announced its intention to offer for sale on January 25, 1977, \$200,000,000 General Purpose Bonds, Series F. It is expected that the proceeds of the bond issue, after deposits to the bond reserve account and temporary interest fund, will be used to pay a portion of the cost of construction of Astoria 6, Indian Point 3, Massena-Marcy Line and the Greene County Plant.

The \$200,000,000 promissory notes sold

by the Authority pursuant to a Note Resolution adopted on July 16, 1975, remain outstanding. The notes are direct and general obligations of the Authority payable out of any moneys of the Authority available therefor and not otherwise pledged. The pledge created by the note resolution is subordinate to the prior pledges created by the 1954 resolution, the 1970 resolution and the General Purpose resolution. Substantially all of the proceeds of the notes have been applied to pay a portion of the cost of construction of the General Purpose projects and to pay a portion of the cost of construction of the future projects of the Authority.

On September 30, 1976, pursuant to a Note Resolution adopted on September 21, 1976, the Authority sold \$60,000,000 5¾% Promissory Notes to pay a portion of the cost of construction of Indian Point 3. The notes will mature in six equal semi-annual installments beginning March 30, 1977.

**Note D—Bonds Outstanding**

The General Revenue Bonds issued for the 1954 Project outstanding at December 31, 1976 bear interest payable semiannually on January 1, and July 1, with maturities and interest rates per annum shown below:

1954 Project	Amount	Maturity January 1	Interest Rate
Series A—St. Lawrence Power Project Term Bonds	\$ 95,015,000	1995	3.20%
Series B—Barnhart Plattsburgh Transmission Line Project Serial Bonds	1,233,000	1978 to 1985	2.75% and 2.80%
Series C—Supplemental Transmis- sion Line Project Serial Bonds	1,038,000	1978 to 1985	3.75%
Series E—Niagara Power Project Term Bonds	59,696,000	2006	4.20%
Series F—Niagara Power Project Term Bonds	62,415,000	2006	4.20%
Serial Bonds	6,675,000	1978 to 1979	3.75%
Series G—Niagara Power Project Term Bonds	38,314,000	2006	4.375%
Serial Bonds	4,000,000	1978 to 1979	4.00%
Series H—Niagara Power Project Term Bonds	25,756,000	2006	4.125%
Serial Bonds	4,660,000	1978 to 1980	3.75%
Series J—Niagara Power Project Term Bonds	31,351,000	2006	3.75%
Serial Bonds	3,325,000	1978 to 1979	3.40%
Series K—Niagara Power Project Term Bonds	8,319,000	2006	3.625%
Serial Bonds	970,000	1978 to 1980	3.30% and 3.35%
Series L—Second Circuit Trans- mission Line Project Term Bonds	3,336,000	2006	3.55%
Serial Bonds	2,240,000	1978 to 1984	3.25% and 3.30%
	<u>\$348,343,000</u>		

The Bonds become subject to redemption prior to maturity in whole or in part in inverse order of the maturities on January 1, 1978 or any date thereafter at various redemption prices according to the date of redemption, together with accrued interest to the redemption date. None of the bonds of Series D or I has been or will be issued by the Authority.

The Revenue Bonds issued for the 1970 Project outstanding at December 31, 1976 bear interest payable semiannually on January 1, and July 1, with maturities and interest rates per annum shown below:

1970 Project	Amount	Maturity January 1	Interest Rate
Series A			
Term Bonds	\$120,000,000	2010	6.875%
Serial Bonds	20,000,000	1986 to 1993	6.50%
Series B			
Term Bonds	85,500,000	2010	5.625%
Serial Bonds	24,500,000	1986 to 1995	5.10% to 5.50%
Series D			
Term Bonds	98,000,000	2010	5.875%
Serial Bonds	22,000,000	1986 to 1995	5.10% to 5.60%
Series E			
Term Bonds	39,000,000	2010	5.50%
Serial Bonds	11,000,000	1986 to 1995	4.90% to 5.30%
Series F			
Term Bonds	95,000,000	2010	5.50%
Serial Bonds	29,000,000	1986 to 1995	4.75% to 5.30%
Series G			
Term Bonds	85,000,000	2010	5.375%
Serial Bonds	25,000,000	1986 to 1995	5.00% to 5.20%
Series H			
Term Bonds	64,000,000	2010	7.50%
Serial Bonds	16,000,000	1986 to 1995	6.00% to 7.10%
	<u>\$734,000,000</u>		

None of the Bonds of Series C has been or will be issued by the Authority.

The Bonds will be subject to redemption prior to maturity in whole or in part in inverse order of maturities beginning on January 1, 1981 at various redemption prices according to the date of redemption and the amount redeemed together with accrued interest to the redemption date.

The General Purpose Bonds issued for the Astoria 6 Project, Projects' Study, the Indian Point 3 Project, the Transmission Line Project and the Greene County Plant outstanding at December 31, 1976 bear interest payable semiannually on January 1, and July 1, with maturities and interest rates per annum as shown below:

General Purpose	Amount	Maturity January 1	Interest Rate
Series A—Astoria 6 Project			
Term Bonds	\$ 125,000,000	2010	7.875%
Serial Bonds	25,000,000	1987 to 1995	6.50% to 7.30%
Series B—Astoria 6 Project and Projects' Study			
Term Bonds	110,000,000	2010	8.125%
Serial Bonds	40,000,000	1987 to 1997	6.90% to 7.90%
Series C—Astoria 6 Project, Indian Point 3 Project and Transmis- sion Line Project			
Term Bonds	610,000,000	2001	9.50%
Series E—Astoria 6 Project, Indian Point 3 Project, Transmission Line Project, Greene County Plant Project and Projects' Study			
Term Bonds	130,000,000	2010	7.25%
Serial Bonds	20,000,000	1987 to 1994	6.00% to 6.90%
	<u>\$1,060,000,000</u>		

None of the Bonds of Series D has been or will be issued by the Authority.

The Bonds will be subject to redemption in whole or in part in inverse order of maturities beginning January 1, 1985 in the case of Series A, June 1, 1985 in the case of Series B, January 1, 1986 in the case of Series C and October 1, 1986 in the case of Series E at various redemption prices according to the date of redemption and the amount redeemed, together with accrued interest to the redemption date.

Funds for the payment of interest on all bond indebtedness due and payable on January 1, 1977 had been deposited with each of the Bond Trustees prior to December 31, 1976 and accordingly there is no liability reflected in the accompanying statements for such interest.

#### Note E—Commitments and Claims

Estimated costs to be incurred on outstanding contracts for projects under construction or authorized for construction at December 31, 1976 aggregated approximately \$231,000,000. In addition, the Authority has entered into contracts for materials and major components for future projects. Termination provisions in the contracts limit the Authority's liability to reimbursement of contractor's costs to date of such termination.

No provision has been made for land acquisition claims in excess of appraisal estimates deposited with the Comptroller of the State of New York. Such deposits are included in Construction Work in Progress.

At December 31, 1976 the Authority was obligated on trades for the purchases of \$6,320,000 principal amount Power Authority of the State of New York General Revenue Bonds for delivery subsequent to December 31, 1976 at a cost of \$6,038,925.

#### Note F—F.P.C. Annual Charges

Deposits include \$1,760,756 of annual charges for the years 1961 through 1976 representing amounts assessed by the Federal Power Commission for its cost of administering Part 1 of the Federal Power Act, from which charges the Authority contends its Niagara Project is at least partially exempt. All charges were paid under protest and are kept by the Commission in a special account subject to refund.

Main Lafrentz & Co.  
certified public accountants

McLintock Main Lafrentz  
International

Power Authority of the State of New York  
New York, New York

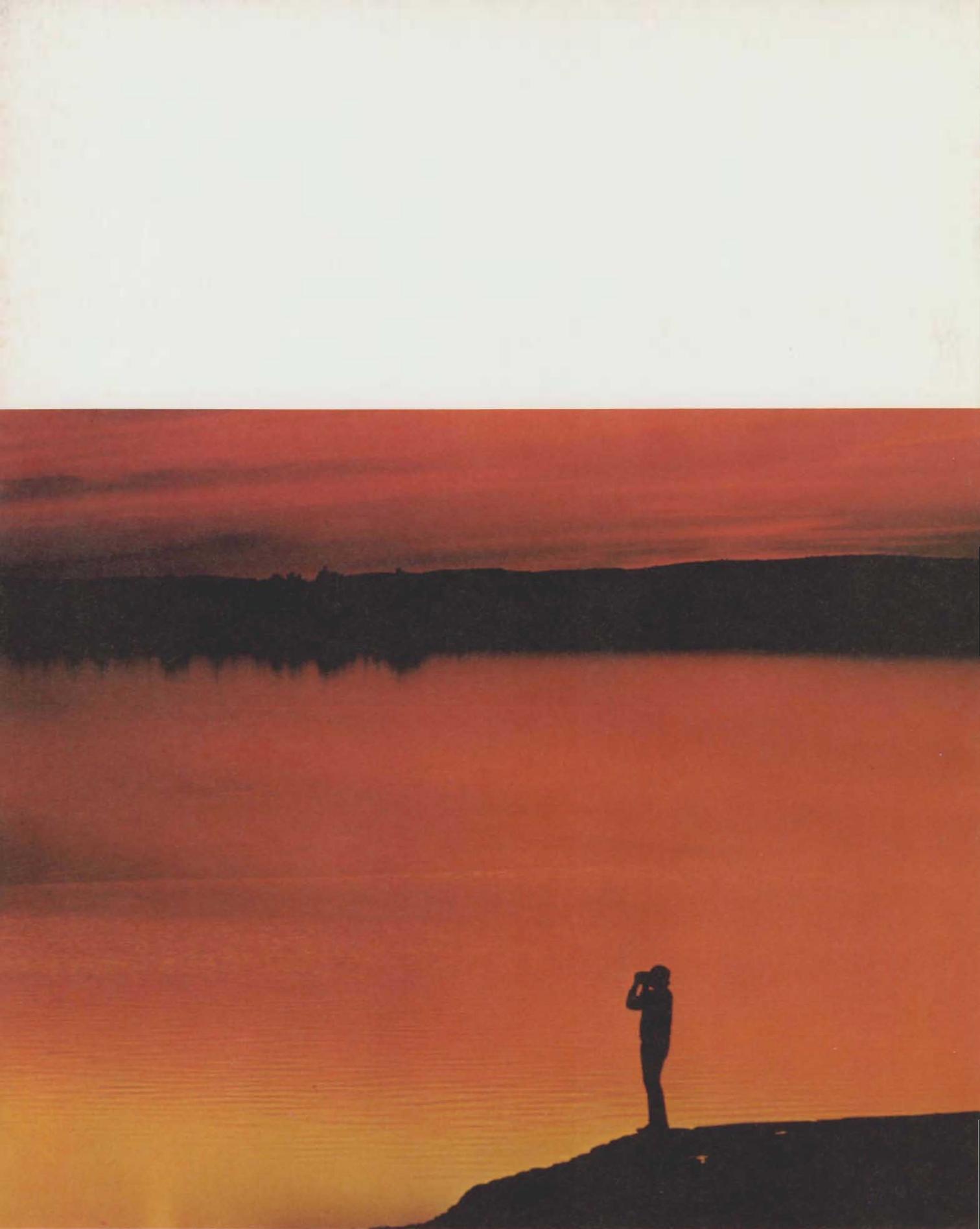
We have examined the statement of condition of the Power Authority of the State of New York as of December 31, 1976, and the statements of revenues, disposition of revenues, receipts and disbursements, and summary of funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

As indicated in the note on accounting policies, the Authority's Bond Resolutions provide that operating expenses shall not include any provision for depreciation, amortization or similar charges. Effective recovery of investment in facilities is accomplished through allocation of available revenues to funds for the retirement of bonds at cost.

In our opinion, such financial statements present fairly the financial position of the Power Authority of the State of New York at December 31, 1976, and revenues, disposition of revenues, cash and fund transactions for the year then ended, in conformity with generally accepted accounting principles adapted to the provisions of the Bond Resolutions, as being appropriate for the Authority, applied on a basis consistent with that of the preceding year.

*Main Lafrentz & Co.*

New York, New York  
January 24, 1977



**About the Covers**

**Front: Welder in maintenance operation at Niagara**

**Above: Sunset at Blenheim-Gilboa upper reservoir**

