

# Piercefield Hydro: A Century of Power Generation in the Adirondacks

*The 2.7-MW Piercefield Hydro Plant, the Hydro Hall of Fame inductee for 2000, continues to generate clean, reliable power 101 years after it was constructed. The plant's present contributions to Orion Power New York's generation mix reaffirms the longevity of hydropower and its continuing importance in today's power market.*

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By Joseph Viau

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In the Adirondack Mountains 45 miles southwest of Lake Placid, New York, lies a reminder of another time, the 101-year-old Piercefield Hydro Plant. It gives testimony to the rise and fall of nineteenth century paper mills—and to the enduring quality of hydropower generation.

The Piercefield Hydro Plant, the 2000 Hydro Hall of Fame inductee, has survived and continues operating in a region transformed from its economic dependence on paper mills at the turn of the century to a thriving tourist trade today. The plant joins a growing list of other 100-year-old hydro plants whose continuing operation highlights the viability of hydropower in the changing world of power generation.

The plant was constructed in 1899 by the newly formed International Paper Company to provide electric power to the Piercefield Paper Mill No. 17. This mill, one of the largest in New England at the turn of the century, made paper using local pulpwood harvested from the vast surrounding timberland. All processes related to papermaking, such as pulp-

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wood grinding and paper finishing, were performed on site. On a bluff above the site, the hamlet of Piercefield became a mill town and is inhabited to this day.

At the time of the plant's construction, the Adirondack region of upstate New York was a remote area known for its hunting, trapping, and fishing. Much of this outdoor recreation took place in the 6-million-acre Adirondack State Park. The locals were employed in logging, mining, and the vast paper industry. The region's common folk were soon joined by the nation's elite, who was attracted to the area's breathtaking natural beauty, the believed health-giving effects of the clean mountain air, and the opportunity for rugged outdoor activities. One frequent visitor was Teddy Roosevelt, an avid hunter and outdoor sportsman.

The Vanderbilts, Rockefellers, Carnegies, Posts, and others built hewn-timber summer camps whose rustic appearance contrasted with the lush accommodations within. These compounds, tended by staffs of servants, often included private bowling alleys, ballrooms, carriage houses, and libraries. These elite residents often passed through tiny Piercefield in their horse-drawn buggies.

## **The Story behind the Piercefield Plant**

The original dam at the Piercefield Paper Mill consisted of a combination of timber bulkhead dams and a timber

crib spillway, a common practice at many northern New York paper mill sites at the time. These structures were repeatedly damaged by ice flows and spring runoff. The timber crib spillway was replaced in 1960 with a concrete ogee spillway and the timber bulkheads were incorporated into earthen dikes.

During the Piercefield Paper Mill's heyday, International Paper was the largest producer of newsprint in the U.S. After 1913, however, the company's newsprint business declined when the U.S. Congress eliminated tariffs on low-cost Canadian imports. International Paper consolidated its operations in the northeastern U.S., and, as a result, many of the paper mills were closed or sold. It

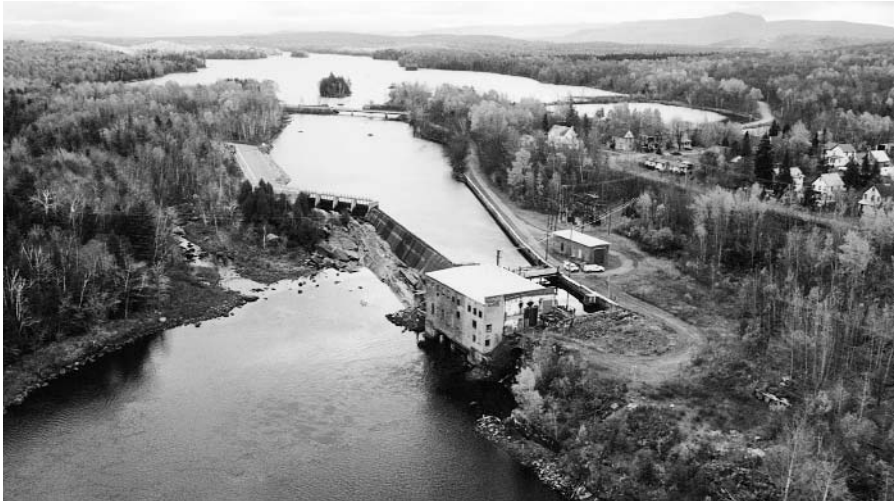


appears the Piercefield Paper Mill closed in the 1930s, though documentation could not be found to verify the closing date. The hydro-

power plant, however, continued to generate electricity for the town of Piercefield.

In the 1940s, the property was acquired by the Paul Smith's Electric Light & Power & R.R. Co. of Saranac Lake, New York. In 1955, Paul Smith's upgraded a portion of the original power plant by constructing a reinforced concrete foundation and installing a Leffel vertical Francis turbine with a GE generator at a cost of \$233,067.

Niagara Mohawk Power Corporation of Syracuse, New York, acquired the facility in 1966. In 1971, a 118-foot-long portion of the earthen dike was removed and replaced with a stanchion spillway consisting of a series of mechanically tripped stoplogs. This structure was built to increase the flood discharge capacity of the site. In 1991, a portion of the ogee spillway and the stanchion spillway structure were stabilized with post-tensioned anchors. The remaining 497 feet of earthen dike was removed in 1992 and replaced by a



The Piercefield Plant was constructed in 1899 by International Paper to provide power for a paper mill. This photo, taken in 1934, shows the original timber crib dam.

gravity-retaining structure, using the upstream portion of the dike as a cofferdam to facilitate the construction. In 1996, the Unit 2 and 3 intake structures were rehabilitated by constructing a reinforced-concrete intake structure immediately upstream of the powerhouse and by modifying the existing steel pressure cases. The existing forebay walls also were rehabilitated and raised approximately 3.5 feet to prevent overtopping during flooding.

In 1999, Niagara Mohawk sold 71 hydropower plants to Orion Power Holdings, Inc. The hydropower plants contribute approximately 24 percent of the power generated by Orion Power New York, a subsidiary of Orion Power Hold-

ings, Inc. Under its present ownership, the primary change at Piercefield Hydro Plant has been the automation of the plant's controls.

#### Present-Day Piercefield

Today, the 2.7-MW Piercefield Hydro Plant is the furthest upstream hydro plant on the Raquette River. The Raquette is often called the "Workhorse River" because it provides water for 15 hydropower sites. The Carry Falls Reservoir also is located on the river. Piercefield is a "black-start" plant that can be used when the grid is off-line to re-establish power following a blackout. The value of this capability has been proven in several instances. For example, during

the famous 1965 Blackout in which 30 million residents in most of the northeastern U.S. and part of Canada were without power for more than 13 hours, the Adirondack region of New York State was back on-line more quickly than most surrounding regions. Piercefield played a part in this power restoration. Then in January 1998, hundreds of thousands of residents in the northeastern U.S. and part of Canada were without power due to a severe ice storm. Piercefield helped provide power during the blackout, and was instrumental in power restoration to the region.

During Niagara Mohawk's ownership, Piercefield was used for voltage control on the grid. To provide voltage control, the unit is left on line and runs as a motor with the water shut off. The unit acts as a rotating condenser to help compensate for transmission line losses so that the voltage is brought back to the desired level. Orion Power New York may provide this service on demand to Niagara Mohawk.

Regardless of the way in which the plant is used, Piercefield continues to generate power more than a century after its construction—a proud testimony to the fact that hydropower is here to stay! ■

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## Technical Information *Piercefield Hydro Plant*

### General Information

On the Raquette River within the New York State Adirondack State Park

*Owner:* Orion Power New York

*Capacity:* 2.7 MW

*Head:* 37 feet

*Average Streamflow:* 5,300 cubic feet per second (cfs) spring runoff and an annual average of 1,291 cfs

*Average Annual Generation:* 16,000 MWh

### Equipment

#### Turbines (3)

*Unit 1:*

SNW-2446 vertical Francis

Manufactured by J. Leffel & Co.

Rated at 2,600 horsepower at 35 feet of head

Operates at 112.5 rpm

Woodward governor

*Units 2 and 3:*

22-SN-W1221 horizontal double Francis

Manufactured by J. Leffel

Rated at 1,000 horsepower at 34 feet of head

Operates at 200 rpm

Turbines retrofit into the original S. Morgan Smith pressure cases in 1946

Lombard Governor bases retrofit with Woodward Governor heads

#### Generators (3)

*Unit 1:*

Allis Chalmers

1,875 kVa, 1,500 kW, 60 cycle, 2,400 volts

451 amps, 112.5 rpm, 3 phase

*Units 2 and 3:*

GE

750 kVa, 600 kW, 60 cycle, 600 volts

721 amps, 200 rpm, 3 phase

### Construction

#### Intake

Integral to powerhouse; originally

constructed of stone masonry

140-foot-long forebay originally

constructed of stone masonry

#### Powerhouse

70 feet wide, 90 feet long, 60 feet tall

Brick masonry structure

Concrete foundation at Unit 1; stone

masonry foundation at Units 2 and 3

Unit 2 and 3 foundation was rehabilitated with reinforced concrete in 1979

#### Draft Tubes

*Unit 1:* concrete

*Units 2 and 3:* double-pipe