Deerpark Diary

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Cuddebackville Hydroelectric Power Plant

Did you know that a hydroelectric power plant in Cuddebackville provided electricity to part of Orange and Sullivan Counties for fifty years? The concrete structure still remains and may be seen along the edge of Hoag Road in the Orange County D & H Canal Park in Cuddebackville.

The Delaware and Hudson Canal required a continual supply of water. The Neversink River was near the highest point or summit of the canal and as such was a significant source of water. The canal company built a dam to divert the river into a mile long feeder which flowed into the canal.

The diversion of the river to the canal was not a simple undertaking. The canal company had invested over $250,000.00 in the construction of a dam, feeder canal, feeder gates, waste weirs and other hydraulic equipment to insure the flow of water which was vital to the canal's operations.

The operation of this section of the canal ended in 1898. In 1900 the New York State Legislature passed a special act calling for its abandonment. The abandoned dam and related operation presented an ideal opportunity for a hydropower plant.

In 1902, a hydropower plant was built by the Neversink Light and Power Company, headed by a local citizen, Dr. Henry C. MacBrair, who had purchased the rights to the water in the Neversink River, the feeder canal, and a one-mile section of the D & H Canal.

The Henry Floy Company, of New York City, was the contractor for building the power plant and making the necessary modifications to the existing facilities.

Another dam was built across the Neversink River to improve the flow of water into the feeder. Heavy duty oaken flood gates, operated by cogs, controlled the amount of water that entered the feeder. An overflow weir drained excess water along the west side of the canal back into the Neversink River. Raising the walls of the former boat basin eight feet created a power pool, making the water level with the feeder.

Today, visitors to the D & H Canal Park can see remnants of the hydropower plant. The building is forty feet by sixty feet and forty-five feet in height. It was built entirely of steel reinforced concrete, including the roof, floors, walls and foundation. The use of steel in concrete was considered revolutionary at that time and enabled light construction. The walls were three feet thick instead of ten feet thick. The rear portion of the powerhouse consists of three large concrete chambers. These housed heavy turbine wheels to operate the generators in the main room, and smaller turbines which ran the exciters. There were massive floodgates at the back of the building and when they were lifted the incoming water would fall thirty-two feet. The power plant was equipped with the most advanced state-of-the-art equipment, including General Electric generators which were each a 300-kw capacity, three-phase, 60 cycle, 600 volts, revolving field type, running at 300 r.p.m. The machinery was erected on concrete floors supported by walls of the same material. They rested on a two foot foundation twenty feet below. The discharge water from the turbines flowed between these walls through a great dugout back into the river.

As the electricity was made, it was sent from the generators into seven Westinghouse transformers, which increased the voltage from 500 to 10,000. Wires from the transformers extended to the lightning arrester gallery above.

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The lightning arrester gallery was used to prevent lightning from entering the building after running along the wires. The separate upper lightning arrester gallery was considered novel at that time. The electricity traveled from the lightning arrester gallery through circuits to the thirty-five miles of transmission wires that went to Port Jervis, Middletown, and Monticello, where other transformers reduced the 10,000 voltage to whatever force was desired.

The Company was purchased by the Orange County Power Company and the Neversink Valley Water Company on February 22, 1909. Subsequently it was owned by the Rockland Light and Power Co., which later merged to form Orange and Rockland Utilities.

The hydropower plant was abandoned in 1949 when a section of one wall of the power pool gave way and operation of the generating plant ceased. Since this also released all of the water in the canal, residents in Cuddebackville brought suit for restoration of their riparian rights. This resulted in reconnecting the feeder to the canal by means of an underground pipe about 500 feet long, and plugging the end of the canal to prevent the water from flowing back into the area that had recently been the power pool.

During the 1970s, the Citizens Foundation of Orange County began acquiring properties surrounding the canal for the creation of the Orange County D & H Canal Park. On June 7, 1980, Orange and Rockland Utilities, Inc. transferred their property to the county to be included in the park. Since that time the hydropower plant has fallen into disrepair.

An attempt at reconstruction was made in 1985 by Charles Pepe of Spring Valley when he proposed the Rivers Electric Co. Inc. Cuddebackville Hydroelectric Project. Due to economic conditions, the project was abandoned.

Power Plant Construction

Port Jervis Evening Gazette

October 16, 1902

One of the most interesting scenes in the Neversink Valley is the construction of the Neversink Light and Power Company's plant now in process at Rose's Point. It is the scene of great activity–the merging of several small industries into one. Over a hundred men are engaged in various occupations, a large number of teams and single rigs are continually hauling dirt and stone, and little clouds of steam arise from several engines.

Just at the edge of the canal bank and about two hundred feet above where the aqueduct once crossed the Neversink River is an immense excavation, the bottom of which is 8 feet below the bed of the stream. In one corner of the dugout several men wade in the puddles that constantly form and load the large dumps as they are let down by the huge derrick. Once filled, the dumps are hauled to the top, forty feet above, and during the process a small boy with a guy rope swings the arm of the derrick around, so that the earth may be emptied on a big pile beside the excavation. This process is repeated as many times during the day as the derrick can be operated, and tons and tons of dirt are removed. The motive power is supplied by a little steam engine, and a man at the brake regulates the descent of every load. With the fresh earth, there is, of course, a quantity of stone brought to the surface, and it is the work of one man to roll the stone to the foot of the mound as fast as the dumps are emptied, and then half a dozen laborers transport it to the stone crusher, a few yards nearer the river. When a sufficient amount is gathered, the crusher is put in operation and soon a pile of crushed stone like that put on our streets accumulates in a bin in back of the crusher.

The next move is to admit the stone through a wooden shute into a revolving conical receptacle. At the same time, water, cement, and sand are sent into the rotary by men through other chutes and the whole reappears at the bottom ready for the masonry. The newly mixed mortar is carried in wheelbarrows to the edge of the excavation and let down in iron dumps to the farther end to be used in the foundations of the power house. By this simple process the stone returns to almost the same place in the ground from which it is taken, but in an entirely different state.

At the same time men are working in the bottom of the forty foot hole, water constantly

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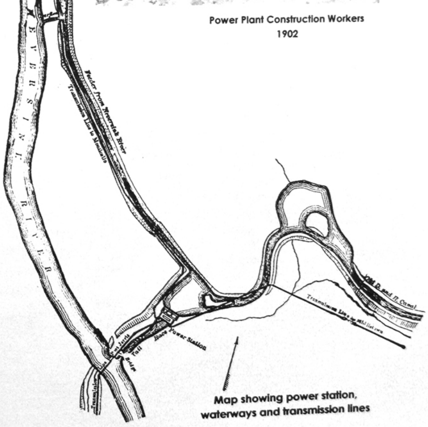
oozes from the ground and is diverted into a small channel to a steam pump which lifts it several feet and sends it on through a litle wooden raceway to the narrow ditch at the foot of the canal bank and finally to the Neversink River, whose waters are dyed a muddy color in consequence. The motive power for the pump, stone crusher and mortar mixer is supplied from one boiler, steam being admitted to each through long pipes supported by wooden props. In connection with the erection of the foundations of the power house, the services of a small force of carpenters are utilized in the temporary wooden frame.

Between the site for the building, the canal bank and the river, men and teams are hauling away earth and depositing the same on the river bank and the road that parallels it. We understand that this is the preparatory work for taking care of the waste water from the power house. In moving this dirt the workmen struck a stream of fine mortar sand and one cart therefore is taxed to the limit transporting the sand through a big opening in the canal bank to a place beside the crusher. A novel procedure was witnessed at the works one day this week. On one side of the excavation a protruding layer of stone prevented the workmen from making that particular spot even with the rest, and no one could get at it from above on account of the danger of a fall, nor could anyone reach the stone from below lest he should suddenly receive a fractured skull or some other injury from the loosened rocks. The problem was solved, however, by one man being let down on a rope in a true Alpine style over the edge of the excavation until he reached the desired place. The while his feet were firmly wedged in the earth, men above held him from falling and he quickly forced the stone to the foot of the bank.

A mile from the site of the power house, a dam will be built in the canal bed and the water from the Neversink River will go through the feeder thus keeping a supply in the ditch ready to operate the big electric dynamos at the power house. The power will be conveyed by wire to Port Jervis, Middletown and Monticello for trolley, light and manufacturing purposes. Once completed this industry will be one of the most flourishing in the Neversink Valley and will do much toward its development.

Power Plant Construction Workers 1902



Map showing power station, waterways and transmission lines

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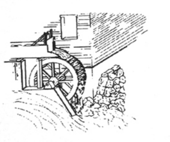
Waterwheels to Turbines

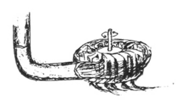
Ways of Using Waterpower

There is evidence that Egyptians used the energy in river currents to turn wheels as early as 2500 B. C. Roman engineers, during the first century B. C., built upright paddle wheels that turned with the current of a river to raise water into troughs above the river. In the Middle Ages, overshot and breast types of waterwheels were developed. The breast wheel was turned by water brought to the wheel at axle level in a trough called a millrace. The water struck the blades at axle height and turned the wheel with its impact and its weight. Overshot wheels were also turned by the weight and speed of water. The millrace brought water to a high level, where it shot over the top blades of the wheel.



The powerful hydraulic (water) turbine was developed in the mid-1800s. Turbines are enclosed waterwheels, taking full advantage of the pressure and velocity of water.

In 1849 James B. Francis, an American engineer, perfected the *reaction turbine,* also called the *Francis turbine.* Around the edge of this enclosed waterwheel are blades called vanes. Water enters the enclosure and flows against the vane. The vanes deflect the water and the runner is spun by reaction.

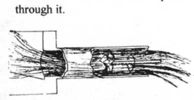


Francis type turbine is used in power houses with great flow of water

In 1890 L. A. Pelton designed the *impulse turbine,* also called the *Pelton wheel.* A high pressure jet of water directed against "buckets" on the wheel's rim turns this turbine.

Impulse-type Pelton wheels are generally used when there is very high pressure but little water.

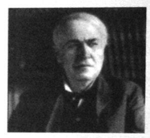
About 1919 Forest Nagler developed another reaction turbine, called the *propeller turbine.*. The propeller turbine is similar in principle to the Francis turbine, but the propeller has fewer blades than the Francis runner has vanes. Therefore there are larger spaces between blades, reducing the chance that the turbine will be damaged by debris in the water that passes through it.



Propeller type turbines are used where the volume of water is great but the pressure is low.

Thomas Edison

In 1882,Thomas Edison established the first central generating system of the United States in New York City. There were only 59 consumers of electric power.



Thomas Edison (1847-1931)

Flood of 1903

The highest water and the greatest flood ever known in the Neversink River took place in October 1903. The flood overflowed the bank of the feeder and threatened the hydropower plant and the entire community of Cuddebackville. The bank of the feeder was cut part way between the dam and the power house. Frank Gaffney and John Darby cut fir trees and dropped them into the feeder which turned the water back into the river at a lower point.

Holiday Gift Idea

Sparrowbush Cookbook Goes on Sale

The Sparrowbush Ladies Auxiliary Histories and Recipes -- 1800s-2005 will be available after December 16, 2005 at the Sparrowbush Fire Co. The cost is $10.00. Pre-sale coupons are available to reserve copies. Call 856-3001, for additional information.

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