



## INNOVATIVE INTAKE SCREEN PROTECTS FISH AT NEWINGTON ENERGY

COMMISSIONED IN October 2002, the Newington Energy plant uses state-of-the-art combustion turbines and heat recovery steam generators (HRSGs) with a steam turbine to produce electricity at greater efficiency and with significantly lower emissions than from traditional plants. It is the first of its kind to be built in New Hampshire. The plant has the ability to burn oil or natural gas.

When Con Edison Development began working with its affiliate, Newington Energy LLC, in October 2000 to design a new 525 MW gas- and oil-fired combined-cycle power plant in Newington, N.H., the company wanted to make sure the cooling intake structure for the new plant met best technology available (BTA) requirements. Meeting these requirements would ensure compliance with future U.S. Environmental Protection Agency (EPA) regulations.

After more than a year of fish impingement studies, recent findings reveal that the number of fish impinged (pinned against screens or other parts of a cooling water intake structure) at Newington is significantly lower than the values reported at most other New England power plants.

### THE REGULATIONS

The EPA has developed regulations under section 316(b) of the Clean Water Act that apply to cooling water intake structures. The rule states that the “location, design, construction and capacity of cooling water intake structures reflect the best technology available to protect aquatic organisms from being killed or injured by impingement or entrainment (being drawn into cooling water systems and subjected to thermal, physical or chemical stress).”

The final rule requires protection against these aquatic losses. Impingement requirements call for the number of organisms pinned against parts of the intake structure to be reduced by 80% to 95%. Entrainment requirements call for the number of aquatic organisms drawn into the cooling system to be reduced by 60% to 90%.

On December 18, 2001, the EPA published its final rules for new facilities using U.S. waters (Phase I). On February 16, 2004, the EPA signed a final rule for existing facilities drawing more than 50 million gallons of water a day (Phase II). The Phase II regulation takes effect 60 days after the date it is published in the Federal Register. It is expected that a proposed rule for Phase III (all other existing facilities) will be signed in November 2004.

### MEETING THE REGULATIONS

To ensure compliance with these regulations, Con Edison Development contacted USFilter’s Envirex Products in Waukesha, Wis. The company specializes in designing, manufacturing and installing fish-protection screens, and retrofitting standard screens into efficient fish screens. More than 20 years ago, Envirex developed a capture-and-release method of handling fish. This fish screen design led to substantial modifications to

and slots sized to the nearest 0.04-inch exclude even very small fish.

“We wanted to install the fish screens before plant startup, rather than wait until regulations were signed,” said Salvatore Boccuzzi, Con Edison Development’s (New York) engineering and construction manager. “It would not only be more cost effective, but also the right thing to do environmentally.”

In May 2001, USFilter’s Envirex Products provided the Newington plant with Modified Ristroph fish screens, grab-style trash rakes, stop logs, wash water pumps and bar racks. The Maguire Group of Portsmouth, N.H., designed and constructed the cooling intake and discharge system. Besides housing the USFilter equipment, the intake pumping station consists of two 5,000-gallon-per-minute (gpm) vertical turbine pumps. The 30-foot by 70-foot cast-in-place concrete structure is located 350 feet from the shore of the Piscataqua River in tidal waters 25 feet



*A typical cooling water intake structure arrangement.*

the standard traveling water screen.

The Envirex Modified Ristroph fish screen was designed specifically for environmentally sensitive conditions and safely removes fish from intake systems. The screen has been approved as BTA in several states. The Smooth-tex flat wire screen surfaces minimize fish injury,

deep. It is accessed by a pile-supported pre-stressed concrete five-span bridge structure. All the marine structures are designed for the substantial ice loads common to the river, as well as tidal currents, wind and seismic loads. The pump building houses the vertical turbine pumps, variable frequency

drives, wash water pumps, traveling water screens, fish sluiceways and debris baskets. Salt water is transported to the cooling tower reservoir 1,500 feet from the intake structure through an 18-inch ductile iron pipeline.

The intake system began operation in November 2001. “There were minor challenges along the way, such as upgrad-

## FIELD NOTES

ing the wash-water pump to a more robust design and placing a containment hood over the spray compartment. But overall, things went well, and our main contact at USFilter's Envirex Products was very helpful," Boccuzzi said.

### **RESULTS**

Marine Resources Inc. conducted fish impingement studies at the Newington site from October 2002 to January 2004, and reported the findings to the EPA. Thirteen species with an extrapolated annual total of 324 fish were represented in the samples collected. An analysis of the high- and low-pressure return system

showed that the low-pressure system recovered 85% of all fish impinged. Even with the low number of fish impinged, the data showed that the majority of the fish were removed by the low-pressure system, reducing the chances of injury and increasing chances of survival. For invertebrates, 46% of those sampled were removed by the low-pressure system. Some invertebrates such as crabs may use their legs to hold onto the screens, and thus were not readily removed by the gentle stream of the low-pressure system.

When compared to the extrapolated annual numbers of fish impinged

at the Newington Power facility with data from other New England power plants, the Newington facility's values were lower than those reported elsewhere. Annual impingement at Newington was 10 times less than the next lowest rate.

"Although there were no fish survival studies done at the plant, the impingement rate met the conditions of our NPDES permit," Boccuzzi said. "The observed annual total of 300 fish is one quarter the number estimated in the permit application."



Envirex Products  
1901 S. Prairie Ave.  
Waukesha, WI 53189

Ph: 262.547.0141  
Fx: 262.547.4120  
E-mail: [Productinformation@usfilter.com](mailto:Productinformation@usfilter.com)  
Website: [www.usfilter.com](http://www.usfilter.com)