SPDES FACT SHEET NARRATIVE

National Grid - E.F. Barrett Power Station

October 2009

The State Pollutant Discharge Elimination System (SPDES) Permit for the E.F. Barrett Power Station is being modified at this time to renew the permit which was extended under the State Administrative Procedures Act (SAPA) on April 22, 2009 and to incorporate requirements of the federal Clean Water Act associated with the facility's cooling water intake structures. The following permit has been modified:

Facility	**SPDES Permit Number**	**DEC Number**
E.F. Barrett Power Station	NY 000 5908	1-2820-00553/00001

The April 26, 2006 SPDES permit modification included biological monitoring requirements to evaluate and reduce impacts to the environment through entrainment and impingement of organisms in the cooling water intake structures at this facility. Initial actions required information collection and development of a Design and Construction Technology Review Report for the Department's review and approval. Based upon this and other relevant information, the Department has selected the technologies and/or operational measures that will meet the requirements of 6 NYCRR Part 704.5 and Section 316(b) of the federal Clean Water Act. This selection of technologies and/or operational measures is referred to as a Best Technology Available (BTA) determination and the schedule for implementation and follow-up activities are being incorporated into this permit through a SPDES Permit modification in accordance with 6 NYCRR Part 750-1.18 (b)(7). For this facility, BTA has been determined to be closed-cycle cooling. Additional information regarding this BTA determination is presented in the attached Biological Fact Sheet - Cooling Water Intake Structure prepared by the Division of Fish, Wildlife and Marine Resources, Bureau of Habitat, Steam Electric Unit.

This draft permit has been modified from the existing SPDES Permit in the following ways:

- Biological monitoring requirements have been revised to remove completed actions and to address the installation and implementation of technologies and/or operational measures identified in the BTA determination.

- The Schedule of Compliance section of the permit has also been revised to remove completed actions and to address the installation and implementation of technologies and/or operational measures identified in the BTA determination.

- The compliance schedule also contains a requirement to submit a SPDES permit modification request and engineering report addressing proposed changes to the thermal discharge at outfall 005 as a result of implementation of BTA.

- Footnote 3 on page 5 of the draft permit has been revised to state, “Results of the July 2009 E. F. Barrett Thermal Study Report (or subsequent submissions) or implementation of BTA technologies resulting in a significant change to cooling water flows or discharge temperatures at outfall 005 may result in the need to modify the permit to address changes to the Discharge Temperature, Intake-Discharge Temperature Difference or Net Heat Addition permit limits.”

Biological Fact Sheet - Cooling Water Intake Structure
Bureau of Habitat, Steam Electric Unit

Name of Facility: E.F. Barrett
Owner/Operator: National Grid
SPDES #: NY-0005908
Location: Nassau County, New York
Town of Hempstead
Barnum's Channel

1. Description of Facility

E.F. Barrett (Barrett) is a natural gas/oil fired steam electric generating facility located on Barnum's channel, in the Town of Hempstead, Nassau County. Barrett has two operating units, Unit 1 and Unit 2, rated at 181 MW each, for a total output of 362 MW. These units became operational in 1956 (Unit 1) and 1963 (Unit 2).

Barrett uses a once-through cooling system, where cooling water is withdrawn from the western end of Barnum's channel via two shoreline intake structures. The heated cooling water is returned into the eastern end of Barnum's channel. The intakes and discharges are separated by a sheet pile wall that divides Barnum's Channel. This wall prevents any recirculation of cooling water and confines all of the thermal discharge in the eastern end of Barnum's channel. Barrett has a Δ T of 30° F, with a maximum discharge temperature of 110° F.

Each unit has its own cooling water intake structure (CWIS). The structure for Unit 2 is located approximately 190' east of Unit 1. Each CWIS is screened by trash racks, a curtain "skimmer" wall, and ¼" x 1" mesh traveling screens. Any fish and debris washed off the traveling screens are deposited into the discharge canal, via a fish return pipe. Each unit also uses two circulating water pumps, for a total of four pumps for the entire system, and a combined rated capacity of 294 MGD.

National Grid has replaced one of the conventional screens at Unit 2 with a polymer plastic traveling screen with fish protective features (Hydrolox ™), in order to conduct an impingement survival study.

2. Ecological Resource

Barnum's channel is classified as a class SC (saline surface water) water, with the best uses of these waters being fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival. The water quality shall be suitable for primary and secondary contact recreation, although other factors may limit the use for these purposes. Marine life found in this vicinity includes finfish such as bay anchovy, Atlantic menhaden, cunner, gobies, scup, pipefish, tautog, windowpane flounder and winter flounder. Shellfish in the vicinity include American lobster and blue crabs. Hard clams, soft clams, ribbed mussels and blue mussels may also be found in nearby Middle Bay.

Studies conducted from February 2003 through February 2004 showed that approximately 1.2 billion fish eggs and larvae were entrained, and approximately 178,000

fish were impinged on the intake screens. Thirty-three taxonomic groups of fish were collected in entrainment sampling, with five taxa (cunner, bay anchovy, tautog, windowpane, and searobin) comprising more than 90 percent of the sample. Fifty-seven species of fish were collected in impingement sampling. Atlantic silverside, Atlantic menhaden, mummichog, striped killifish, and winter flounder comprised more than 92 percent of the sample. In addition, a total of 1,394 individuals of selected macroinvertebrate species were also collected in the impingement monitoring at Barrett. Blue crab was the dominant species impinged, both numerically and by weight.

Winter flounder made up 2.7 percent (26,800,000 eggs and larvae) of the entrained species, and 3.0 percent (5,300 adults) of the species impinged. The E.F. Barrett Generating Facility entrains more winter flounder eggs and larvae than any other steam electric generating facility located in the marine district. Based on reports provided to the Department by National Grid, almost 40 percent of the estimated annual entrainment of winter flounder by power plants in New York State occurs at E.F. Barrett. The Atlantic States Marine Fisheries Commission has recently determined that this species is overharvested throughout its range, with only 9.0 percent of the target biomass remaining, and is requiring New York, along with all Mid-Atlantic States, to impose drastic reductions in commercial and recreational take in 2010.

In 2007-2008, a study was conducted at Barrett to determine the survival of fish impinged on the Hydrolox™ screens. The results indicated that for the fish species sampled, impingement survival on the Hydrolox™ screens was comparable to that obtainable using ristroph-modified traveling screens.

National Grid conducted a *Thermal Standard Study* of the discharge at E.F. Barrett in 2007. This study showed a prevalence of pollution and heat tolerant benthic organisms within the sampling area at the discharge during the June and August sampling. A more varied community of benthic organisms exists in sampling locations further from the discharge, at Garrett Lead North, Garrett Lead South, and Shell Creek. Although the facility is exempted from the thermal criteria stated in 6 NYCRR Part 704.2, the Department has determined that the E.F. Barrett thermal discharge fails to meet the thermal standard contained in 6 NYCRR Part 704.1.

3. Alternatives Evaluated

The following feasible technologies were evaluated at this facility:

1. Closed-cycle cooling
2. Continuous operation of existing screens
3. Installation of coarse-mesh screens with fish protection features
4. Installation of wide-slot wedgewire screens
5. Installation of an Impingement Barrier Net
6. Installation of fine-mesh screens with fish protection features
7. Installation of narrow-slot wedgewire screens
8. Installation of Variable Speed Pumps

With the exception of closed- cycle cooling, the analyses of these technologies or operational measures include reduction benefits from planned outages and continuous screen operation.

4. Discussion of Best Technology Available

According to 6NYCRR Part 704.5 - *Intake structures* and Section 316(b) of the federal Clean Water Act, the location, design, construction, and capacity of cooling water intake structures must reflect the "best technology available" (BTA) for minimizing adverse environmental impact. The identification of BTA is a technology driven determination, however, the final decision may also consider cost.

Feasibility of Closed- Cycle Cooling (wet and wet/dry plume abated towers)

Location: Barrett has two shoreline, surface intakes situated parallel to the shore. The location of these intake structures may or may not be modified to accommodate the wet closed-cycle cooling system.

Design: Current conceptual plans provided to the Department by National Grid indicate that the current intake structure would be modified by sealing off the intake and discharge canals to form two basins to hold recirculated water from the cooling towers. This water would be sent to the cooling towers, and then redirected into the intake basin, where it would then be sent to the existing condenser. New pumps would be added to withdraw water from the discharge channel and a smaller pump would be added to the new intake basin to withdraw makeup water from Barnum's channel. However, no designs have been approved or agreed upon as to what, if any modifications would be required.

Construction: Construction activities associated with cooling towers could include: (1) installing sheet pile walls to create retaining ponds in Barnum's channel to contain the cooling water; and (2) the actual construction of the cooling towers themselves. Some filling of a wetland area in the vicinity of the station may be unavoidable to accommodate the cooling towers. As is the case with the *Design* discussion above, no final plans for the actual siting of the cooling towers have been reviewed of approved by the Department.

Capacity: The closed-cycle cooling system would still require cooling water, though significantly less so than the existing once-through cooling system, to provide make up and blow down replacement water for the cooling towers. Closed-cycle cooling would reduce the amount of water used by approximately 95 percent, which would provide the greatest benefit in entrainment and thermal pollution reductions.

Alternative technologies other than Closed Cycle Cooling

Location: As stated previously, Barrett has two shoreline, surface intakes situated parallel to the shore. No information was presented by National Grid to suggest that relocation of the intake structures would minimize adverse environmental impact.

Design: Alternatives such as Ristroph screens, cylindrical wedgewire screens, and an impingement barrier net (IBN) would change the intake structure design by providing a physical barrier to reduce entrainment and/or to reduce impingement mortality. Variable Speed Pumps (VSP) would use the same intake pipes, but the design would be altered by the change in pump motors. Continuous operation of the existing traveling screens (COS) would not change the design of the existing intake structures.

Construction: Installation of the coarse-mesh Ristroph screens with fish protection features would not require major construction activities, only modifications to current mechanisms. Implementation of the fine-mesh screen system would require the construction of a new screenhouse, the construction and removal of a cofferdam and the construction of sheet pile isolation walls, which would connect to the existing sheetpile walls surrounding Unit 2. Seven new screen bays would be constructed to house seven new fourteen foot wide fine-mesh Ristroph screens. Installation of the wide-slot wedgewire screens would require the construction of a bulkhead to attach five "T" heads. Each "T" head would be 15 feet long by 4.5 feet in diameter. The narrow-slot wedgewire screens would require 16 "T" heads to meet flow demands. Installation of wedgewire screens would also require dredging and disposal of dredged material. The VSPs would have no aquatic effects from construction, but would require a structure to protect electrical equipment. COS would not require construction efforts.

Capacity: In addition to closed-cycle cooling discussed above, VSPs are the only remaining technology that would reduce the amount of cooling water used.

5. Determination of Best Technology Available

After evaluating all of the available alternatives, the New York State Department of Environmental Conservation (NYS DEC) has determined that the following technology represents the best technology available for minimizing adverse environmental impacts from the cooling water intake structure.

BTA for E. F. Barrett is wet closed-cycle cooling. In keeping with the Department's established, environmentally-protective BTA requirements for existing facilities with cooling water intake structures, a 98 percent reduction in impingement mortality and a 95 percent reduction in entrainment from the calculation baseline level, are the minimum impact reductions the Department expects to achieve from implementation of this technology. This technology will also significantly reduce the number of winter flounder eggs and larvae entrained and impinged – more than any other technology or operational measure available to reduce aquatic impacts. In addition, the replacement of the current once-through technology with a closed-cycle cooling system would eliminate the thermal pollution that currently does not meet the New York State's thermal standard. This too will improve habitat in the area of the existing thermal discharge to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in Barnum's channel as required by New York State regulations (6 NYCRR Part 704.1).

The following technologies may represent BTA at another facility, however these alternatives were not considered BTA for this specific station:

1. Wedgewire screens were not considered feasible for several reasons. First, there is a lack of demonstrated effectiveness of wedgewire screens in a marine environment at a plant the size of Barrett. Second, potential exists for fouling of the screens by marine organisms, making the screen system ineffective. Finally the lack of tidal action in the vicinity of the intake would diminish the effectiveness of the air burst wash system, potentially allowing re-impingement of organisms.

2. COS, coarse-mesh ristroph screens and an IBN would decrease impingement mortality, but would not reduce entrainment, so they were rejected as BTA at this site.

3. VSP alone, or in combination with COS and IBN, would reduce impingement mortality and entrainment, but not to the degree achievable with closed-cycle cooling, therefore this suite of technologies was not selected as BTA for this station.

6. Monitoring Requirements

In accordance with Biological Monitoring Requirement No. 8 of the attached permit, if the permittee proposes, and the Department approves of, an alternative suite of technologies and operational measures that will result in a minimization of adverse environmental impacts equivalent to that obtainable with a wet closed-cycle cooling system, National Grid must also submit to the NYS DEC Steam Electric Unit, for Department approval, a *Verification Monitoring Plan*. This plan is designed to confirm that the reductions in impingement mortality and entrainment required by this permit are being achieved. At a minimum, the plan must include two years of biological monitoring to verify full-scale performance of BTA measures. These studies must quantify by species the numbers of fish and shellfish impinged and the number of fish entrained at the facility under both estimated calculation baseline conditions and actual operating conditions during the two year study period. The studies must also evaluate the effectiveness of technologies and operational measures implemented to reduce fish and shellfish mortality.

7. Legal Requirements

The requirements for the cooling water intake structure in this State Pollutant Discharge Elimination System permit are consistent with the policies and requirements embodied in the New York State Environmental Conservation Law, in particular - Sec.1-0101.1.; 1-0101.2.; 1-0101.3.b., c.; 1-0303.19.; 3-0301.1.b., c., i., s. and t.; 11-0107.1; 11-0303.; 11-0535.2; 11-1301.; 11-1321.1.; 17-0105.17.; 17-0303.2., 4.g.; 17-0701.2. and the rules thereunder, specifically 6NYCRR Part 704.5. Additionally, the requirements are consistent with the Clean Water Act, in particular Section 316(b), and the rules thereunder.

8. Summary of Proposed Permit Changes

Table 1. Deletions (Former permit requirements)

Permit Requirement	Reason for Deletion
Biological Monitoring Requirement B1-B3, B11	Permit requirements met.
Biological Monitoring Requirement B4-B6	Requirements require rewriting based on the Department's BTA determination, the remanding of the Phase II Rule [40 CFR 125 Subpart J] and the Department's sequential permitting process.

Table 2. Additions/Changes (New permit requirements)

Permit Requirement	**Description**
Biological Monitoring Requirement B1	Addition. Requires implementation of BTA (wet closed-cycle cooling) by ExDP.
Biological Monitoring Requirement B2	Addition. Requires the submission of an *Impact Assessment* scope.
Biological Monitoring Requirement B3	Addition. Requires the submittion of a draft *Impact Assessment* report.
Biological Monitoring Requirement B4	Addition. Requires the submission of a final *Impact Assessment* report.
Biological Monitoring Requirement B5 (former Requirement B4)	Change. Requires submission of a *Technology Installation and Operation Plan* required to implement BTA.
Biological Monitoring Requirement B6	Addition. Requires the submission of a *Pre-Design Engineering Report.*
Biological Monitoring Requirement B7	Addition. Requires the submission of stamped and signed design plans for the closed-cycle cooling system.
Biological Monitoring Requirement B8	Addition. Requires continuous operation of the traveling screens.
Biological Monitoring Requirement B9	Addition. Allows permittee to submit plans for alternatives to closed-cycle cooling.
Biological Monitoring Requirement B10 (former Requirement B5)	Change. Requires submission of a *Verification Monitoring Plan* that demonstrates compliance with 6NYCRR part 704.5 reductions in impingement mortality and entrainment of fish, for the alternative technology option.
Biological Monitoring Requirement B11 (former Requirement B6)	Change. Requires submission of an approvable report that demonstrates compliance with 6 NYCRR Part 704.5 and 316(b) of the Clean Water Act
Biological Monitoring RequirementB12	No Change. Requires maintenance of records for a minimum of 10 years from EDP.
Biological Monitoring Requirement B13	No Change. Requires submission of status reports.
Biological Monitoring RequirementB14	No Change. Requires submission of a report on cumulative reductions in impingement and entrainment mortality and analysis of technologies.
Biological Monitoring Requirement B15	No Change. Requires no modifications made to the intake structure without prior Department approval.

9. References

6 NYCRR part 701.12 Classifications-Surface Waters and Groundwaters www.dec.ny.gov

New York State Dept. Of State Division of Coastal Resources: Coastal Fish and Wildlife Habitat Assessment form March 15, 1987. http://nyswaterfronts.com

ASA Analysis & Communication, Inc. 2005. E.F. Barrett Entrainment and Impingement Monitoring. Prepared for KeySpan Generation, LLC by ASA Analysis & Communication. January 2005.

ASA Analysis & Communication, Inc. 2007. Design and Construction Technology Review for E.F.Barrett Power Station. Prepared for KeySpan Corporation by ASA Analysis & Communication. April 2007.

Proposed Suite of Technologies and Operational Measures prepared by KeySpan Corporation. December 2007

Alden Research Laboratory, Inc. and Burns Engineering Services, Inc. 2007. An Engineering and Cost Assessment of Retrofitting Closed-Cycle Cooling Technologies at E.F. Barrett Power Station. Prepared for KeySpan Corporation by Alden Research Laboratory. September 2007.

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