SPDES FACT SHEET NARRATIVE

for National Grid Generation, LLC - Glenwood Power Station

July 2009

The State Pollutant Discharge Elimination System (SPDES) Permit for the Glenwood Power Station is being re-noticed in response to comments received during the November 5, 2008 public noticing of this permit. This SPDES permit is also being renewed at this time. The following permit has been modified:

Facility	**SPDES Permit Number**	**DEC Number**
Glenwood Power Station	NY 000 5916	1-2822-00481/00011

The current SPDES permit includes 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. The permit required the development and submission of a Design and Construction Technology Review Report for the Department's review and approval. Based upon this and other relevant information, the Department's Division of Fish, Wildlife and Marine Resources, Bureau of Habitat, Steam Electric Unit has selected technologies and/or operational measures necessary to meet the requirements of 6 NYCRR Part 704.5 and Section 316(b) of the federal Clean Water Act. This is referred to as a Best Technology Available (BTA) determination and a schedule for implementation and follow-up activities were incorporated into a draft SPDES permit in accordance with 6 NYCRR Part 750-1.18(b)(7) and public noticed from November 5, 2008 to December 5, 2009 . Additional information regarding this BTA determination is presented in the attached Biological Fact Sheet - Cooling Water Intake Structure prepared by the Bureau of Habitat, Steam Electric Unit.

In response to the public notice, the permittee submitted a December 4, 2009 letter commenting on the draft permit and requesting a hearing if issues could not be resolved. The major issue raised by the permittee is the cost to design, purchase and install variable speed intake pumps at a power station where the future need for operation is uncertain. This power station is currently operated less than 15% capacity and operation may not continue beyond the current Power Service Agreement with the Long Island Power Authority which expires May 28, 2013. The permittee requested that the decision to proceed with variable speed pumps be based upon whether this power station is included in the next Power Service Agreement. The Department has agreed to modify the implementation schedule in this regard provided that the facility implement other actions upon permit issuance, such as, continued operation of the fish return system, continuous use of traveling screens, aggressive pump shutdowns and continued intermittent operation at or below 15 % capacity.

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.

- A correction on the permit cover page was made to list the compact area as IEC instead of ISC which reflects the name change of the Interstate Sanitation Commission (ISC) to the Interstate Environmental Commission (IEC).

- Clarification has been added to the note on page 6 to indicate that the outfall 06A discharge includes boiler blowdown from the house boiler system.

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

Name of Facility: Glenwood Generating Station
Owner/Operator: National Grid Generation, LLC.
SPDES #: NY-000 5916
SIC Code: 4911
Location: Town of Glenwood Landing, Nassau County
Hempstead Harbor, Long Island Sound

1. Description of Facility

The Glenwood Generating Station (GGS) is located in Glenwood Landing, on the Eastern shore of Hempstead Harbor opposite Bar Beach, on the North shore of Long Island. This facility has four natural gas fired steam-electric generating units which became operational from 1930 to 1954. Units 2 and 3 have been retired, leaving Units 4 and 5 as the remaining operating generators. Net generation for this facility is 210 MW of electricity. GGS has recently operated as a peaking facility, generating most of the power during the summer months. The facility's operation has decreased from 43 percent in 2001 to 11.2 percent in 2005. During the next five years, the station is expected to run at an average of 14.2 percent.

GGS employs a once-through cooling system that withdraws water from Hempstead Harbor using a shoreline intake structure, then discharges heated water back into the harbor via a submerged discharge opening, approximately 200 feet from the intake structure. The intake structure consists of a concrete curtain wall that extends eight feet below the water surface at high tide. Each unit has two separate screenbays with trash racks, stoplog gates and two 3/8" mesh vertical traveling screens per unit. Additionally, each unit has two circulating water pumps rated for a total water withdrawal capacity of 179 MGD. GGS has a delta T of 30 degrees F, with a maximum discharge temperature of 112 degrees F.

2. Ecological Resource

Hempstead Harbor is located on the southern shore of Long Island Sound. The Harbor south of Bar Beach is classified as SB (surface saline) waters. The best uses of Class SB waters are primary and secondary contact recreation and fishing. These waters are suitable for fish propagation and survival.

The Harbor is bordered by residential and industrial areas, boating facilities and commercial sites. The surrounding landscape in the immediate vicinity of the plant includes steep bluffs and headlands. The water depth of the Harbor in the vicinity of the station ranges from 12 to 25 feet. This portion of the harbor contains intertidal mudflats and salt marsh.

The finfish in this area include: Atlantic silversides, Atlantic menhaden, weakfish, windowpane, winter flounder, scup, mummichog, striped killifish, and bay anchovy. Shellfish in the harbor include blue mussels, soft and hard clams, ribbed mussels, oysters, and razor clams. Crustaceans such as blue crab, shrimp, and lobster can also be found in the harbor.

In 2004-2005, an entrainment and impingement mortality monitoring study was performed to determine the numbers of organisms entrained and impinged at the plant. Twenty species of fish were collected in the entrainment sampling. Using the full-flow calculation baseline, approximately 247 million eggs and larvae were entrained at the plant. Bay anchovy, menhaden, gobies, Atlantic silversides and winter flounder comprised 90 percent of the entrainment sample. About 16,000 fish were estimated to be impinged annually, using the full flow calculation. Of the 26 species impinged, winter flounder, mummichog, striped killifish, Atlantic menhaden, weakfish, and tautog made up about 87 percent of the impingement sample.

Fish protective measures currently in place at GGS include scheduled outages, aggressive pump shutdowns, and a fish return system, where fish and other debris washed from the traveling screens are returned to Hempstead Harbor. GGS has an impingement reduction of 53 percent from the calculation baseline with the use of the current screens, fish return system and outages. Entrainment reductions are about 24 percent from the calculation baseline using current plant operational measures.

3. Alternatives Evaluated

As part of the current SPDES permit, the permittee was required to submit a *Proposal for Information Collection* (PIC) that included a description of the proposed and/or implemented technologies and/or operational measures to be evaluated in a *Design and Construction Technology Plan.* At a minimum, the applicant was required to evaluate the following technologies and operational measures:

Closed Cycle Cooling
Sonic Deterrent System
Ristroph Screens with a fish return system*
Aquatic Filter Barrier
Variable Speed Cooling Water Pumps (VSP)*
Diurnal Cycling of Cooling Water Flows
Operation of the station using only one cooling water circulator pump
Fish protection outages
Limit capacity to 15%
Aggressive pump shutdowns when plant is offline
Stratified water withdrawal
Substratum Intake System
Wedgewire screens (not included in the PIC, but an analysis was submitted by KeySpan)

*The analyses of these technologies or operational measures include reduction benefits from

planned outages and aggressive pump shutdowns.

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 following paragraphs summarize the BTA evaluation for GGS.

BTA is separated into four components:

Location: GGS has a shoreline, surface intake situated parallel to the shore. Extending the intake further into Hempstead Harbor would cause navigational hazards, and no studies have been performed to show that this alternative location would reduce adverse environmental impacts at this site. There is no other practicable location for the intake structure.

Design: Alternatives such as Ristroph screens (coarse and fine-mesh), cylindrical wedgewire screens, stratified water withdrawal and an aquatic filter barrier would change the intake structure design by providing a physical barrier to reduce larvae and egg entrainment, and/or to reduce impingement mortality. Application of the Ristroph screens would not meet the SPDES requirements in entrainment reductions. Wedgewire screens (2mm) have been used in a marine environment on a smaller plant, however the effectiveness of 0.5 mm wedgewire screens at GGS has not been demonstrated, in part due to the large volume of cooling water withdrawn at this facility and biofouling. The substratum intake system would withdraw groundwater from the harbor, however this technology is under development, and therefore not considered feasible. The aquatic filter barrier and stratified water withdrawal were not considered further due to site constraints or lack of biological data demonstrating these technologies in this environment. The remaining technologies would use the existing intake structure.

Construction: National Grid evaluated the use of cooling towers to reduce environmental impact. There is not adequate open space available to site two towers (one for each unit) on National Grid property. Construction of one tower to cool a single unit would require either locating the tower across Shore Road and pumping the cooling water to the tower and back, or demolishing an existing building (Old Station 2) on the west side of the property. The existing building houses a waste water treatment facility for Units 4 and 5, city water and gas mains, administrative offices, warehouse space in the turbine room, Long Island Power Authority transmission lines and a National Grid fiber optic cable. Additionally, National Grid indicated that operation of cooling towers would likely violate the Town of North Hempstead noise ordinance. Because of these issues, this alternative was not considered feasible at GGS. Installation of the coarse-mesh Ristroph Screens would not require major construction activities, only modifications to current mechanisms. GGS currently has a fish return system in place, so construction of a new one is unnecessary. 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 with an access deck. Installation of fine-mesh Ristroph screens would also require enlarging the current intake structure, which would then impact the navigational channel of Hempstead Harbor. Based on the installation difficulties and lack of adequate biological protection, the fine mesh Ristroph screens were not considered feasible. Installation of the wide-slot wedgewire screens would require the construction of a bulkhead to attach 6 "T" heads. Each "T" head would be 15 feet long by 4.5 feet wide. The narrow-slot screens would require dredging of the channel, and submersion of an intake pipe to house 19 "T" heads. Use of wedgewire screens was not considered as BTA due to the amount of dredging required, the lack of entrainment reduction benefits, and the potential for biofouling, which would make the screen system ineffective. The Sonic Deterrent System (SDS) would include installation of submerged devices to produce the sound to drive fish away. SDS has not been proven to be effective on the species of fish impinged at this facility and will not be considered further at this time. None of the flow-reduction alternatives would have adverse environmental impacts due to construction. The Variable Speed Cooling Water Pumps would have no aquatic construction effects, but would require a structure to protect electrical equipment.

Capacity: Closed-cycle cooling, outages, diurnal cycling, one pump operations, aggressive pump shutdowns, limited capacity and Variable Speed Pumps (VSP) would reduce the amount of water used. Closed-cycle cooling would have the greatest reduction in cooling water use (95%), but this technology has already been determined to be infeasible due to lack of space and local ordinances at the site. The biological benefits of the flow-reduction alternatives (with the exception of VSP) would not meet the minimum requirement for reducing entrainment. Although GGS has been operating below 15 percent of the rated capacity and expects to continue operating at this level, National Grid could not commit to operating at this capacity in the future. Outages would achieve 86 percent reduction in impingement mortality, but only a 24 percent reduction in entrainment. VSP would produce a 93 percent impingement mortality reduction and 62 percent entrainment reduction.

5. Determination of Best Technology Available

After evaluating all of the available alternatives, the New York State Department of Environmental Conservation (NYSDEC) has determined that, in combination, the following technologies represent the best technology available for minimizing adverse environmental impacts from the cooling water intake structure at GGS:

1. Installation and operation of Variable Speed Pumps (VSP);
2. Continuous operation of the traveling screens and the existing fish return system; and
3. Aggressive pump shut downs when one or both units are not operating.

In keeping with the Department's established, environmentally-protective BTA requirements for existing facilities with cooling water intake structures in New York, the Department requires GGS to achieve a minimum of 80 percent reduction in impingement mortality and a 60 percent reduction in entrainment, from the full-flow calculation baseline with the installation and

operation of these BTA measures.

There are few environmental impacts from installation of VSP, however a two percent increase in a heat rate penalty is possible as the result of the VSP installations. This alternative is a demonstrated technology in use at other power facilities in New York State (Danskammer, Indian Point Unit 3, Charles Poletti Power Project). The fish return system and aggressive pump shutdowns are measures currently in place at the facility.

The other alternatives were rejected either due to lack of space on site, lack of demonstrated effectiveness or the technology did not meet the requirements for reductions in entrainment.

6. Monitoring Requirements

In accordance with Biological Monitoring Requirement 5 of the attached permit, the permittee must 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 monitoring to verify full-scale performance of BTA measures. These studies must quantify by species the numbers of fish and shellfish impinged and entrained at the facility under both estimated full flow 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

Best Technology Available

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 - § 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 6 NYCRR §704.5. In addition, the requirements are consistent with the Clean Water Act, in particular section 316(b) and the rules thereunder.

8. Summary of Changes

Table 1. Deletions (Former permit conditions)

Permit Conditions	Reason for Deletion
Biological Monitoring Requirement B1-B3, B11, C2	Permit requirements have been met.
Biological Monitoring Requirement B4-B10	Conditions 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. New permit conditions

Biological Monitoring Requirement B1	Requires continuous operation of traveling screens and fish return system, aggressive pump shutdowns and operation at or below 15% capacity.
Biological Monitoring Requirement B2a	Requires submission of an annual report demonstrating generation, capacity and cumulative average capacity.
Biological Monitoring Requirement B2b	Permittee must notify the Department of the status of the PSA agreement
Biological Monitoring Requirement B2c (optional)	Permittee proposes alternate technologies and operational measures
Biological Monitoring Requirement B3	Requires compliance with requirements 9 and 13 only, provided the PSA is not renewed AND the permittee ceases operation of the non-contact cooling water system after the PSA Termination Date.
Biological Monitoring Requirement B4	Requires submission of a *Technology Installation and Operation Plan* (TIOP) required to implement BTA.
Biological Monitoring Requirement B5	Requires submission of a *Verification Monitoring Plan* that demonstrates compliance with 6NYCRR part 704.5 reductions in impingement mortality and entrainment of fish and shellfish.
Biological Monitoring Requirement B6	Requires submission of an approvable report demonstrating compliance with 6NYCRR 704.5.
Biological Monitoring Requirement B7	Requires installation of variable speed pumps in accordance with TIOP.
Biological Monitoring Requirement B8	Requires a submission of a contingency plan if impingement and entrainment reductions are not achieved.
Biological Monitoring Requirement B9	Requires maintenance of records for a minimum of 10 years from EDP.
Biological Monitoring Requirement B10	Requires submission of status reports.
Biological Monitoring Requirement B11	Requires submission of monthly generation and circulating water flow reports.

Biological Monitoring Requirement B12	Requires submission of a report on cumulative reductions in impingement and entrainment mortality and analysis of technologies.
Biological Monitoring Requirement B13	Requires no modifications made to the intake structure without prior Department approval.

10. References

ASA Analysis & Communication, Inc. 2007. Design and Construction Technology Review for Glenwood Generating Station. Prepared for KeySpan Corporation by ASA Analysis & Communication. February 2007.

KeySpan Generation LLC. Glenwood Power Station, SPDES Permit # NY 0005916 Renewal Application.

6 NYCRR Part 701 Classification of waters

New York State Dept. Of State Division of Coastal Resources: Coastal Fish and Wildlife Habitat Assessment form October 15, 2005

Document prepared by C. Kimble and last revised on July 16, 2009