Mitigation - 7. DEIS includes little information on barrier systems and acoustic deterrents.

The Department concurs that additional information and updates to the data used in the DEIS are necessary. Additional information on several technologies follows.

Wedge-Wire Screens

Recent designs in water withdrawal technology have included development of wedge-wire screens to "filter" water prior to entrance into a system. Wedge-wire screens usually are designed with small openings, for example 2 mm slot width, but they can be designed with larger or smaller openings. Screening of water being withdrawn from a source water body is standard practice to eliminate fouling and clogging of pumps and cooling systems by detritus or large fishes, thus older power generation facilities typically employed traveling screens with approximately 3/8 inch mesh openings. This design excludes sticks, macrophytes (large aquatic plants) and large fishes from being entrained with the cooling water but does not exclude smaller organisms or particles. Bowline Point, Roseton and Indian Point facilities incorporate various types of large-mesh traveling screens, often with improved collection mechanisms and fish/detritus return mechanisms, in their intake designs.

The advantage of fine mesh wedge-wire screens is that the small openings prevent small aquatic organisms from being entrained into the circulating water system. Two millimeter slot width has been employed in new facility designs and it is expected that this opening will prevent ichthyoplankton larger than 15 mm from being entrained. In general, fishes greater than 15 mm length are greater than 2 mm in width, and are thus not susceptible to entrainment. The velocity of the water drawn into a system is directly associated with the size of the slot through which it is drawn. The Department imposes a low through-slot velocity to ensure that organisms are not impinged on the screen because they cannot swim away from the intake velocity. EPA recommends a through-slot velocity of 0.5 fps or less, but the Department has issued recent permits for intakes that generally have halve that velocity.[185] Additional protection is afforded by the current from tides or river flow on a wedge-wire screen because it assists in moving organisms away from the influence of the intake.

New power generation facilities recently approved in New York are all combined-cycle designs with closed-cycle cooling.[186] Combined-cycle facility produces two thirds of its power with a gas turbine (which does not require cooling), only one third of the facility requires cooling. This cooling requirement is further reduced by approximately 95 percent by employing closed-cycle cooling. Thus, typical cooling water requirements are 7 to 9 million gallons of water per day (MGD). This volume can be accommodated with two T-shaped sets of cylindrical screens six feet in diameter with 1 mm slot openings, with through-slot velocity of 0.2 feet per second.

---

[185] Athens Interim Decision.

[186] Athens Interim Decision.

In contrast, a single-cycle power generating facility using once-through cooling, such as Roseton Generating Station, requires a maximum of 926 MGD for cooling at full flow operation (less at efficient flow). For such a once-through cooling system, even with larger screens at higher intake velocities, a great number of wedge-wire screens would be required to supply the necessary cooling water; engineering challenges, higher costs and loss of generating capacity would likely result.

Fish Barriers

Since the preparation and filing of the DEIS in 1999, a new technology for eliminating aquatic organisms from a cooling water intake structure has emerged and been permitted by the Department. The technology is known generally as an "aquatic filter barrier" (AFB); the Gunderboom® Marine Life Exclusion System™ (MLES™) is the system which has been deployed, studied and permitted in NYS. Despite its name, use of the MLES™ is not restricted to marine systems.

The MLES™ is a semi-permeable fabric barrier which surrounds an intake structure and allows water to enter while excluding most very small particles, including aquatic organisms. Additional components of the MLES™ include: the structures necessary to maintain the barrier in place, such as anchors and floatation; a cleaning device; monitoring equipment; and other miscellaneous equipment as necessitated by the specific site conditions. Because the system is flexible, it may be shaped to follow desired water depth or to increase surface area. The barrier may be constructed in sections, allowing easier maintenance, installation and retrieval. At present, only one company, Gunderboom, has a patent to construct this type of barrier. Thus, an MLES™ is commonly referred to by the "Gunderboom®" trade name.

Gunderboom® MLES™, alone and in combination with other technologies, have been determined to be BTA at a number of facilities on the Hudson River, and requirements for installation have been written into the SPDES permits. Those with MLES™ requirements include the new electric generation facilities at Bowline Unit 3 (700 MW combined cycle) and Bethlehem Energy Center (750MW combined cycle). The Empire State Newsprint Project, a 500 MW combined-cycle facility in Rensselaer, New York, was issued a draft permit for an MLES™ in 2001. Lovett Generating Station Units 3-5, an existing facility with a 450 MW generating capacity, was issued a SPDES permit which included an MLES™ in February, 2003.

The Bowline Unit 3 MLES™ may generally be described as a straight line fabric screen, 137 feet in length and 27 feet deep, that allows 7.5 MGD of intake flow (maximum). ® Flow-through velocity is predicted to be approximately 0.004 fps with a flow rate of approximately 1.4 gallons per minute per square foot. An air-flow backwash system, strain gauges, water level monitors, and special bottom sealing fabric are required as part of the system. Seasonal deployment of the MLES™, from February 15 through September 30, will allow protection during the reproductive seasons of major Hudson River fish species.

The Bethlehem Energy Center facility will employ a different MLES™ design, yet still use Gunderboom fabric material as the principal screening device. A 16' by 145' rectangular H-pile and sheet pile structure will be constructed to support twelve removable filter panels orientated to the river flow. The structure is sized for a maximum of 8.5 MGD flow with a fabric flow-through rate of 3.1 gallons per minute per square foot. (0.007 fps). Seasonal deployment of the MLES™ from April through August will be necessary for adequate protection to organisms. These filter panels will be removed mechanically for maintenance and at the end of each seasonal deployment; monitoring by the plant operator to ensure water passage, of strain on the panels, and related variables will be required.

The SPDES permit issued for the existing Lovett Generating Station requires the permittee to provide information, analyses and plans necessary to install, operate and maintain an MLES™. It is anticipated that this structure will be a Gunderboom curtain in the river that surrounds the intakes of Units 3,4 & 5. This means the curtain will be subject to tidal influence and will have some movement with river currents and wind. Close attention to operational parameters and maintenance will be required. The permit includes a protocol for operation, maintenance, monitoring, and responses.

The draft permit for the proposed Empire State Newsprint Project (ESNP) specifies an MLES™ that is somewhat different from those already permitted. The intake will be constructed a distance into the river along the bottom. The proposed Gunderboom® barrier of the MLES™ will necessarily be offshore, too, surrounding the wedge-wire intake screens in an oval shape 90' by 60' and be attached to 16 fender piles permanently installed in the river. This system is designed for a maximum of 9.7 MGD, with a through-screen flow of 0.01 feet per second and a flow rate of approximately 4.0 gallons per minute per square foot through the Gunderboom® fabric. The MLES™ would be deployed and operational during the primary fish spawning season in that section of the Hudson River, April 15 - June 30.

The Department is working with other facility owners toward investigating this method of aquatic mitigation at other existing generation facilities within New York State where an MLES™ could potentially reduce impingement and entrainment mortality.

Acoustic Deterrent System

A number of behavioral deterrent systems (e.g. fish hammers, hanging chains, bubble curtains, strobe lights, mercury lights etc.) have been studied by utilities in New York State for reducing impingement impacts at cooling water intakes. High frequency sound is the only behavioral deterrent technology shown to be effective and currently in use as an impingement mitigation technology in New York. The technology is in use at the J. A. Fitzpatrick Nuclear Generating Station (NGS), located on the south shore of Lake Ontario, and has effectively reduced the impingement of alewife at the station. The fish deterrent system, known by the trademark “Fish Startle System”, emits a high frequency, broadband sound (122 - 128 KHz) at a source level of 190 decibels. The system has three major components: the integrated projector assemblies (IPAs), the power cable running from shore to intake, and the control panel. The IPAs contain the signal generators and transducers that emit the high frequency, broadband sound which has been shown to be strongly avoided by members of the clupeid family.

In 1989, the New York Power Authority, which owns and operates the Fitzpatrick NGS, started developing the mitigation system after learning that high frequency sound evoked a strong avoidance effect in some species of herring. Laboratory testing was successfully conducted on alewife, then a temporary sound system was developed and tested in Lake Ontario in 1991. Preliminary results showed that the number of fish in front of the intake was reduced by 81 to 87 percent when the system was operated. Between April and July 1993, a second full scale test was conducted. Paired impingement samples were collected with the system on and off and compared against impingement samples collected at the nearby Nile Mile Point Unit 1 NGS (control facility). The Nile Mile Point station is a similar sized NGS, with a similar offshore intake structure. The 1993 study reported the overall effectiveness of the system to be 84 percent (i.e., an 84 percent reduction in impingement as compared to the control facility).[187]

In 1995, the Department determined the acoustic deterrent system to be BTA for minimizing adverse environmental impact at the Fitzpatrick NGS, and the system was therefore incorporated as a condition of its SPDES permit. Because sound at this frequency and decibel level has been shown to be effective for certain clupeid species only (alewife, blueback herring and American shad), the technology by itself has limited application. However, in combination with other mitigative technologies, its application may be more widespread.

British researchers have been testing an acoustic deterrent system on a number of species at a nuclear generating station in Belgium since 1997. The effectiveness of the system is stated to vary among species, due to species-specific hearing sensitivities and the levels at which a species will react to a sound stimulus. System efficiencies (deflection of fish) from 21 percent for flatfish, to up to 98 percent for herring are reported.[188] This work is promising if it proves to be effective over a wide range of species.

---

[187] Ross et al, 1996; Radle et al, 2003.

[188] Maes et al, 2003.

Mitigation - 8. The DEIS significantly overstates costs and energy impacts of closed cycle cooling.

A discussion of cooling tower design and operation was presented in Section VIII and Appendix VIII of the DEIS. The Department requested ESSA Technologies, Ltd., to review these analyses. This work was performed by D.B. Grogan Associates, Inc. and is included in Appendix V to this FEIS.

The information presented in the DEIS regarding cooling tower design and cost estimates is generally reasonable, based upon the assumptions used for this analysis. In order to determine BTA for individual sites, these assumptions should be modified or expanded to present further site-specific cooling tower alternatives which will result in different construction and operational costs, as well as different environmental impacts. Such additional analyses should include: tower designs based on a variety of wet/dry bulb scenarios; wet towers; a variety of tower fill and nozzle scenarios modified to increase operational efficiency; pre-treatment of cooling tower makeup water; and historical operation information from large, existing wet/dry (hybrid) systems.

The different closed-cycle cooling alternatives each result in different environmental impacts, including land use, aesthetics, fogging, evaporative losses, drift impacts, composition of the blowdown discharge, and thermal effects on the river. Energy efficiency, too, varies among the cooling technologies. For example, wet/dry cooling tower systems create a larger parasitic load when compared with wet systems. This results in a need for replacement power from other facilities whose air and water emissions may have an adverse environmental impact.

Costs of both construction and operation of closed systems are a concern when analyzing cooling system alternatives. The operational costs have been presented in the DEIS, but D.B. Grogan Associates, Inc. points out that the cost of lost electric generation may be significantly different in the present era of power deregulation and may be seriously underestimated in the DEIS.[189] Alternative designs that minimize this loss would significantly change the cost projections.

A recent EPA update, published on March 19, 2003, concerning 40 CFR Part 125, *Proposed Regulations To Establish Requirements for CWIS at Phase II Existing Facilities; Notice of Data Availability; Proposed Rule*, provides additional information on the cost of connecting a new facility to a closed-cycle system. It noted that the period of time for interconnections to be made for installations at existing facilities should be increased from EPA's earlier estimate and could require up to seven months at nuclear facilities. This could significantly increase the cost of closed-cycle systems unless very detailed planning and construction schedules are carried out to expeditiously complete this activity. Other revisions in EPA's analysis, however, show that compliance costs may actually be lower regarding energy penalties than originally forecast.

---

[189] Grogan, 2000.

Mitigation - 9. DEIS alternatives and proposed action do not present a fair picture of available alternatives.

The Department concurs strongly with this comment. As discussed in the "Mitigation and Alternatives" section earlier in this FEIS, based on the more specific descriptions of newer technologies and recent advances in established technologies discussed in preceding responses, and on discussions in the original DEIS, including DEIS Sections VII and VIII and Appendix VIII, the Department contends that a range of alternatives exist from which site-specific aquatic resource protection programs can be developed which will meet the requirements for BTA. Furthermore, the Department maintains that some of the most promising approaches for existing plants like these three Hudson River facilities will be in combinations of technologies, or technologies combined with improvements to management systems.

Other Topics - 10. The DEIS needs to consider effects of New York's recent conversion to a competitive energy market, take the State Energy Plan into account, or impose parity among facilities.

The concept of parity, or leveling the playing field between two or more separate holders of the same type of permit, is not a Department policy *per se*; nor is it required in law or regulation. For each SPDES permit application that includes a cooling water intake structure, the Department must determine whether the location, design, construction, and capacity of the cooling water intake structure reflects the "best technology available" (BTA) to minimize adverse environmental impact.[190] The Department makes each BTA decision on a case-by-case, site-specific basis, without necessarily applying the technology(s) or methodology(s) to minimize impacts between separate facilities in a rote manner that supports comparisons.[191]

To make a BTA decision, the Department must assess the proposed action (issuance or renewal of a SPDES permit) against the environmental impacts (direct, indirect and cumulative) and determine whether the applicant's proposed method of addressing impacts outweighs alternative methods. This is necessarily a site-specific endeavor that requires examination of technologies having the potential to "fit" the facility and minimize adverse impacts to the extent warranted by the environmental harm in the source water body. A particular mitigative technology may not produce comparable reductions of impacts between two otherwise comparable facilities. Furthermore, for any particular mitigative technology a success differential is likely to exist between facilities with different types of generation systems, CWIS, and/or cooling systems.

Mandating parity between existing facilities and new facilities subject to BTA determinations would require that an agency be able to resolve inherent difficulties and numerous issues, such as: (a) environmental impacts may not be the same, (b) construction, operation, and maintenance costs may not be the same (even using the same technology), (c) water bodies may be different, (d) public reaction to the project and/or perception of the need for minimization of impacts may be different, and (e) impacts to the State's energy capacity may be different. Such a mandate would also limit a decision maker's flexibility to prescribe BTA remedies within the boundaries of the statute, which does not require parity between facilities or BTA decisions.

In cases where the issues listed above are not present, in other words, where there is a strong basis for comparison between facilities, it is reasonable to expect that similar technologies and associated costs would be involved in prescribing a BTA remedy. However, this does not necessarily translate to "parity" because it is more likely to occur between the same types of facilities (i.e., between existing facilities or new facilities but not between an existing facility and a new facility). The

[190] 33 U.S.C. §1326(b); 6 NYCRR §704.5.

[191] Athens Interim Decision

distinguishing issues listed above as examples are more likely to create discrepancies that interrupt attempts to level the playing field between or among separate BTA determinations.

Parity thus does not present itself as a clear component of mitigation remedies in making a BTA determination. That does not prevent a decision making agency from assessing whether the level of costs imposed on an existing facility can generally be measured in terms of costs of mitigative technology installed by other (new or existing) facilities. However, the apparent physical, engineering discrepancies between an existing and a new facility and the potential biological differences between source water bodies militate against direct comparisons of such facilities.

In conclusion, parity is not defined in the context of making a BTA determination. Absent a policy or administrative or judicial decision which identifies an acceptable equation for leveling out inherent discrepancies, the differences between existing and new facilities (and, potentially, the source water bodies) present significant obstacles to imposing parity to make newer, less polluting facilities cost competitive with older facilities.

Other Topics - 11. Radiation discharges are not discussed in the DEIS, but should be.

Under the Atomic Energy Act of 1954 (AEA/1954), authority to regulate nuclear discharges is reserved to the federal government.[192] Discharges of cooling water from Indian Point Units 2 and 3 are regulated by NYS as SPDES discharges to the extent they contain effluent substances regulated pursuant to 6 NYCRR Part 703. Because Indian Point is a nuclear power generating facility, its construction, operation, and maintenance are regulated by the federal Nuclear Regulatory Commission(NRC), pursuant to the AEA/1954.

In 1962, the Atomic Energy Commission (AEC), the NRC's predecessor agency, and then-Governor Nelson A. Rockefeller, executed an "Agreement . . . for Discontinuance of Certain Commission Regulatory Authority" (Agreement). Pursuant to that Agreement the AEC discontinued its regulatory authority over certain radioactive materials ("byproduct materials, source materials, and special nuclear materials in quantities not sufficient to form a critical mass") so that NYS could apply its own licensing program to those substances. However, the AEC retained its licensing authority with respect to, among other things, the construction and operation of any production or utilization facility, including nuclear power generation facilities. Consequently, radioactive releases or discharges from nuclear power generation facilities are regulated, today, by the NRC, not NYS.

Under the authority of the AEA/1954 and 10 CFR Part 50, the NRC issues licenses and license extensions to nuclear power generating facilities and regulates any releases of radioactive material from licensed facilities. The current NRC licenses for Indian Point Unit 2 and Indian Point Unit 3 expire in 2013 and 2015, respectively.[193] The New York State SPDES permit for Indian Point Units 2 and 3 will control effluent discharges as to all substances controlled by the regulations set forth in 6 NYCRR Part 703 that are not otherwise controlled by the federal NRC authority in 10 CFR Part 50. Thus, the Department does not have the authority to require a SPDES permit renewal application to identify discharges that do not fall within its SPDES jurisdiction.

The 1962 Agreement fostered the creation of a licensing program at the state level for limited purposes where NYS had demonstrated to the AEC that sufficient technical expertise had been developed with regard to a short list of regulated substances. It bears repeating that in 1962, NYS did not undertake to acquire the AEC's authority to license nuclear power generation facilities or any radiation releases or discharges that could be associated with them, nor does NYS presently have or seek to develop the expertise necessary to administer such a licensing program.

---

[192] Atomic Energy Act of 1954, 42 U.S.C. 2021; *see* §2021(c)(1).

[193] Entergy Nuclear Indian Point 2 and Entergy Nuclear Indian Point 3, operators of the respective nuclear generation plants, have stated in the media that they expect to begin the process of NRC license extension in 2006. Department staff understand from an independent inquiry to NRC staff that the 2006 date projected to start license extension is a reasonable one.

As noted above, New York State's SPDES permit renewal process is entirely separate from the federal NRC license extension process. However, the Department does have a role in the NRC license extension process. Because these facilities discharge cooling water into navigable waters of the United States, the Department's role in the NRC license extension proceeding will be to process and issue or deny the licensee's application for a state water quality certificate, pursuant to §401 of the Clean Water Act[194]. Obtaining a state water quality certificate is a prerequisite to extending an NRC license. For the NRC to make a decision to grant or deny license extension, Entergy Nuclear Indian Point 2 and Entergy Nuclear Indian Point 3 will need to deliver a NYS water quality certificate to the NRC applicable to both Units 2 and 3. In considering whether to issue or deny a water quality certificate for Indian Pont Units 2 and 3, the Department will apply the water quality standards set forth in 6 NYCRR Part 700, et seq.

In light of the foregoing, concerns for possible radioactive releases in the cooling water discharged from Indian Point, or concerns for possible health effects from radioactive emissions, should be addressed directly to the NRC, not the Department, either as a license compliance matter or in the course of license extension proceedings. Such concerns cannot be addressed in conditions to a SPDES permit.

---

[194] 33 U.S.C. §1341

Other Topics - 12. Several commentors expressed generalized opposition to renewal for one or more facilities.

These comments, while clearly deeply felt, did not raise substantive issues which can be addressed in the context of the issues and information included in this FEIS. Accordingly, no response or analysis is offered.

List of Appendices

Please note that appendices are not available on the website. However, you may request one or more of the appendices by contacting Betty Ann Hughes at bahughes@gw.dec.state.ny.us.

F-I. Notices and Comments on 1999 DEIS

- DEIS Notices
- Full texts of written public comments
- Public hearing transcripts
- Department comments (on CD; hard copy available on request)

F-II. Text of HRSA

F-III. Fourth Amended Consent Order

F-IV. ESSA reports

- On CD; hard copy available on request.

F-V. Other cited references and letters not readily available:

- 1991 letters by former Commissioner Jorling to HRSA utility executives
- Article by John Boreman
- Normandeau Associates, Inc. letter/reports
- Simpson letter
- List of Industrial Code 4911 Facilities in NYS
- On CD; hard copy available on request:
    - ASA 2002 (1999 year class report)
    - City of Poughkeepsie Hudson River Temperature Data (spreadsheet)

Back to FEIS Sections