Logan, Dennis

From: Logan, Dennis
Sent: Monday, March 01, 2010 10:39 AM
To: 'Dillard, Steve'; 'Steve.Duda@earthtech.com'
Cc: Eccleston, Charles
Subject: mitigation memo
Attachments: Mitigation Memo.doc

One last thing that might be helpful, while I think of it:

Attached is a memo that explains our guidelines for addressing mitigation in EISs for DLR . Please pass this on to other members of the team that might need it. One difference from our past guidelines is that we no longer state whether or not mitigation might be warranted, as mitigation is typically under the control of other agencies. This was in effect when you did Indian Point, but I just wanted to make sure you had everything you might need. Thanks.

-Dennis

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D-74

MEMORANDUM TO: Samson Lee, Acting Director
Division of License Renewal
Office of Nuclear Reactor Regulation

FROM: Eric Benner, Branch Chief
Environmental Review Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

SUBJECT: SUPPLEMENTAL STAFF GUIDANCE TO DOCUMENT CONSIDERATION OF MITIGATION IN LICENSE RENEWAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENTS

This memorandum transmits supplemental staff guidance (attached) to document consideration of mitigation in license renewal supplemental environmental impact statements. The guidance was developed to further enhance staff assessment of the environmental impacts associated with license renewal. The guidance will subsequently be incorporated into the Environmental Standard Review Plan for license renewal (NUREG-1555, Supplement 1) which is currently being revised along with the Generic Environmental Impact Statement for the License Renewal of Nuclear Plants (NUREG-1437) and 10 CFR Part 51, Appendix B to Subpart A, which codifies the findings of the NUREG-1437.

CONTACTS: Jeffrey Rikhoff, NRR/DLR
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Dennis Logan, NRR/DLR
301-415-0490

Enclosure:
As stated

cc: DLR R/F
DLR Staff (via e-mail)

May XX, 2008

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Division of License Renewal
Office of Nuclear Reactor Regulation

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Attachment: As Stated

Cc: DLR R/F
DLR Staff (via e-mail)

G:\ADRO\DLR\REB Common\Mitigation Measures - Technical Basis\Mitigation Memo.doc

Adams Accession No.: **ML080**

OFFICE	RERB:DLR	RERB:DLR	RERB:DLR	OGC	BC:RERB:DLR
NAME	JRikhoff	DLogan	LA		EBenner
DATE	5/ /08	5/ /08	5/ /08	5/ /08	5/ /08

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Guidance and Sample Language for Consideration and Documentation of Mitigation Measures for Category 2 Issues in License Renewal Supplemental Environmental Impact Statements

Guidance:

For Category 2 issues with no adverse impact, no consideration or documentation of mitigation is required.

For Category 2 SMALL levels of impact, list mitigation measures as necessary with brief descriptions on how each measure would mitigate impacts. Incorporate available cost-benefit and other pertinent information into mitigation analysis and discussion, as appropriate. Any incorporation of cost-benefit or other information should also include a brief statement or discussion about the relevancy and adequacy of this information with respect to site-specific issues. If no cost-benefit analysis is available, then state that fact. Do not draw conclusions as to whether or not mitigation measures are warranted. Where applicable, identify the responsible agency that could impose mitigation. See sample language below.

For Category 2 MODERATE or LARGE levels of impact, more fully describe the potential mitigation measures and how each measure would mitigate impacts the same approach would be used as in Pilgrim Final SEIS. Incorporate available cost-benefit and other pertinent information into mitigation analysis and discussion, as appropriate. Any incorporation of cost-benefit or other information should also include a brief statement or discussion about the relevancy and adequacy of this information with respect to site-specific issues. If no cost-benefit analysis is available, then state that fact. Do not draw conclusions as to whether or not mitigation measures are warranted. Where applicable, identify the responsible agency that could impose mitigation. See sample language from Pilgrim Final SEIS below.

Sample Language:

For Category 2 issues with no adverse impact:

No documentation.

For Category 2 issues with SMALL impact:

The staff identified a variety of measures that could mitigate potential impacts resulting from continued operation of the FACILITY X cooling water system, although it should be noted that the NRC cannot impose mitigation requirements on the applicant. The Atomic Safety and Licensing Appeal Board in the "Yellow Creek" case determined that EPA has sole jurisdiction over the regulation of water quality with respect to the withdrawal and discharge of waters for nuclear power stations and that the NRC is prohibited from placing any restrictions or requirements upon the licensees of those facilities with regards to water quality (Tennessee Valley Authority [Yellow Creek Nuclear Plant, Units 1 and 2], ALAB-515, 8 NRC 702, 712-13 [1978]).

A few mitigation measures for the effects of the cooling water system on aquatic organisms include, installation of a fish return system, conversion to a closed cycle cooling water system, and derating the facility and scheduling plant outages during historic peak impingement periods. These mitigation measures could reduce impacts by reducing the flow rate of water drawn into the facility resulting in a commensurate decrease in impingement and entrainment.

The staff did not identify any cost benefit studies applicable to these mitigation measures. NRC expects that a more thorough analysis of the costs and benefits of these technologies would be included as part of the Clean Water Act (CWA) Section 316(b) comprehensive demonstration project currently being conducted by FACILITY X in support of an NPDES permit renewal. Additionally, EPA's evaluation of the FACILITY X NPDES permit renewal application would likely address any applicable site-specific mitigation measures that may reduce entrainment and impingement impacts. EPA's Phase II Rule has been suspended and compliance with CWA Section 316(b) is based on EPA's best professional judgment.

For Category 2 issues with MODERATE or LARGE impact:

From the Pilgrim SEIS:

"The staff has identified a variety of measures that could mitigate potential impacts resulting from continued operation of the PNPS cooling water system (It should be noted that the NRC cannot impose mitigation requirements on the applicant. The Atomic Safety and Licensing Appeal Board, in the "Yellow Creek" case determined that EPA has sole jurisdiction over the regulation of water quality with respect to the withdrawal and discharge of waters for nuclear power stations, and that the NRC is prohibited from placing any restrictions or requirements upon the licensees of those facilities with regards to water quality (Tennessee Valley Authority [Yellow Creek Nuclear Plant, Units 1 and 2], ALAB-515, 8 NRC 702, 712-13 [1978]).These could include:

- Automated chlorine monitoring
- Behavioral barriers
- Diversion devices
- Alternative intake systems
- Alternative intake screen systems
- Closed-cycle systems
- Variable-speed pumps
- Cooling water flow adjustments
- Scheduled outages
- Movement of fish return
- Habitat restoration
- Fish stocking

The NRC staff has not conducted an analysis of each of these measures relative to their applicability to PNPS. This discussion is meant to provide only a brief overview of these technologies. ENSR (2000) conducted an analysis of several of these technologies in the 316(b) demonstration report as required by Section 316 of the Clean Water Act. It is expected that a more thorough analysis of the costs and benefits of these technologies would be included as part of the 316(b) CDS currently being conducted by PNPS in support of the NPDES permit renewal. Additionally, EPA's evaluation of the PNPS NPDES permit renewal application would likely address any applicable site-specific mitigation measures that may reduce entrainment and impingement impacts. It should be noted that EPA's Phase II Rule should be considered suspended and compliance with the rule is based on EPA's best professional judgment (EPA 2007).

An automated chlorine monitoring system would allow for continuous monitoring of chlorine levels in the service water and/or condenser cooling water systems. This system could also include a warning system to alert the PNPS operator whenever equipment malfunctions or when chlorine concentrations deviate from preset limits.

Behavioral barriers are designed to cause fish to actively avoid entry into an area. These may include sound, light, or air bubbles (Clay 1995). Sound barriers, which would be located at an intake structure, would include low-frequency, infra-wave sound; pneumatic or mechanically generated low-frequency sounds; or transducer-generated sound. Light barriers may emit either a constant or strobe-type beam of light. Air bubble curtains produce a continuous, dense chain of bubbles. These barrier types may deter some species of fish from entering the intake structure. ENSR (2000) determined that, of the behavioral barriers evaluated, light barriers would be the most effective. According to ENSR (2000), several studies have shown that some fish species are repelled by light while others are attracted to light and can be guided away from areas to be avoided. Therefore, additional analysis of the potential effectiveness of light barriers in altering the behavior of the fish species of principal concern at PNPS would be needed. In addition, this technology is still considered to be experimental in nature and would be effective only on species and/or life stages that can actively respond to a stimulus (i.e., not fish eggs, early larval life stages, or other planktonic organisms).

Diversion devices, the most commonly used barriers, are physical structures, such as louvers, barrier nets, or chains and cables, that are designed to guide fish away from a certain area, such as the intake (Clay 1995). Louvers consist of a series of evenly spaced vertical slats that create localized turbulence that fish can detect and actively avoid. Louvers typically have a smaller spacing between the slats or bars than a standard trash rack. Barrier nets are simply nets placed across an intake channel to prevent fish from access to an intake structure. The design of a barrier net system has to finely balance the mesh size with the intake requirements.(EPA has suggested the Gunderboom fabric barrier as a potential mitigation measure. However, NRC staff does not consider it as a viable option because it could present safety issues at intakes of nuclear power plants.) Chains or cables may be vertically hung in an intake structure to form a physical and visible barrier to fish. However, similar to barrier nets, they may alter hydraulic flow patterns in an intake (ENSR 2000). These types of structures also only affect those organisms that can actively respond and would not impact entrainment or impingement of fish eggs, larvae, or other planktonic organisms. Implementation of a biological surveillance program potentially could increase the effectiveness of barrier nets or other diversion devices. Such a program might identify the presence of large numbers of fish susceptible to being attracted to the thermal plume and discharge canal in time to allow the deployment of the most effective devices.

Another type of mitigation measure may be an alternative intake system. An alternate surface water intake system could include an offshore intake structure with a velocity cap. Vertical placement of the offshore intake within the water column would be a major factor in impingement and entrainment reduction. For example, ENSR (2000) conducted an evaluation of this type of structure and determined that it would result in lower fish impingement but an increased entrainment rate, especially for winter flounder as later stages of winter flounder larvae (stages 3 and 4) tend to settle on the bottom substrate. The Seabrook Nuclear Power Station utilizes a similar structure; however, the intake structure opening is at mid-depth. Based on analysis by Salia et al. (1997), the losses due to entrainment at this facility are less than the losses observed at other facilities. Groundwater could also be potentially used as a cooling water source. According to EPA Region 1, the Keyspan North Point Station is currently conducting a pilot study to evaluate the feasibility of using offshore groundwater extraction as a cooling water source (Earth Tech 2006a).

Alternative intake screen systems may include Ristroph traveling screens, wedgewire screens, and/or fine-mesh screens. Ristroph screens are traveling screens fitted with fish buckets that collect fish and lift them out of the water where they are gently sluiced away prior to debris removal with a high-pressure spray. They have been approved as the best technology available in several states (Siemens 2006). Recent studies have shown survival of species exceeding 95 percent when using the Ristroph screen (EPRI

2006). Wedgewire screens are constructed of wire of triangular cross sections so that the surface of the screen is smooth while the screen openings widen inwards (ENSR 2000). This type of screen has been widely used for hydropower diversion structures and has been shown to essentially eliminate impingement and reduce larval entrainment (ENSR 2000). Fine-mesh screens are simply wire screens with the mesh sized to minimize the ichthyoplankton entrainment. As reported in ENSR (2000), fine-mesh screens have not been proven effective at reducing winter flounder larvae entrainment losses. However, as with any screen, smaller mesh could result in more clogging and fouling problems.

Closed-cycle systems recycling cooling water in a closed piping system and utilize evaporative cooling (such as is in a cooling tower or pond) as a means of dissipating the heat from the condensers. Cooling towers could include wet, hybrid, or dry towers. Wet and hybrid cooling towers would still require withdrawal of water from the bay to make up for water losses due to blowdown and evaporation. However, the water withdrawal rate would be significantly lower than the current once-through cooling system. A dry cooling tower utilizes ambient air to dissipate heat, essentially acting as an automobile radiator (ENSR 2000). No make-up water is required for this type of system as the steam is condensed in a closed cycle. However, this results in lower plant efficiency, thus requiring more fuel to produce the same amount of electricity (ENSR 2000).

Adjustments to the flow of cooling water through the plant is another type of mitigation strategy that may be applicable to PNPS. This could include the use of variable speed pumps, cooling water bypass flow, or rotating the existing screens more often or continuously. Variable-speed pumps would reduce the intake flow during periods of peak entrainment or impingement. These have been shown to be effective at reducing impingement and entrainment, but by reducing the amount of cooling water moving through the system, power generating efficiency may decrease, and the thermal plume may increase in size (ENSR 2000). Cooling water bypass flow would reduce the cooling water flow rate through the condensers and add a corresponding amount of bypass flow into the discharge canal (ENSR 2000). This alternative assumes that mortality in the discharge canal would be less than the condensers. It may reduce entrainment but not impingement (ENSR 2000).

A mitigation strategy related to the cooling system would be to rotate the existing screens more often or on a continual basis. This would increase the survival of impinged organisms and may reduce impingement rates for some species, but it would have little impact on the impingement rate or entrainment.

Another potential mitigation strategy may be to schedule outages for performing regular inspection, maintenance, and refueling during the peak spawning seasons of specific fish species such as the winter flounder, Atlantic menhaden, or rainbow smelt.

Movement of the fish-return sluiceway discharge point may also provide some mitigation benefits as impinged fish are currently returned to the intake embayment where potentially stunned, disoriented, or injured fish may not be able to actively avoid reentering the intake structure.

Habitat restoration and fish stocking are also potential mitigation strategies for some species. However, these are compensatory measures as opposed to preventive measures, which are the preferred mitigation strategies of Federal and State resource agencies. Several studies have been funded by the applicant over the last few years to evaluate these options. A monitoring program has been conducted by the applicant to assess the feasibility of improving the local winter flounder stock by releasing young-of-the-year flounder into the Plymouth area. No genetic studies have been conducted to determine if released hatchery fish breed with the wild stock. Up to 25,000 fish, ranging from 26 to 34 mm (1 to 1.3 in.) in length have been released into Plymouth Harbor on an annual basis since 2001. Post-release sampling has indicated that the released fish do survive and grow well when released earlier in the season (MRI 2006). The NRC staff has not found evidence indicating that this pilot program has substantially offset impacts from continued operation of PNPS to the local winter flounder population. If expanded, this stocking program may have a beneficial impact on the local winter flounder population. The applicant also provided funding to the MDMF for a limited stocking of rainbow smelt eggs and habitat enhancement in the Jones River as a means to enhance production of rainbow smelt in this critical spawning ground (Lawton and Boardman 1999b). Stocking of young-of-the year fish or eggs may be a proven mitigation strategy; however, both the EPA and MDMF have stated that re-stocking is not a preferred mitigation measure (Earth Tech 2006a)."