

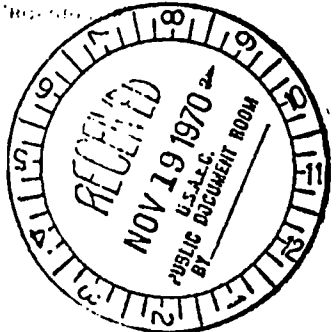
**EXHIBIT A**

ROPES & GRAY  
225 FRANKLIN STREET  
BOSTON 02110

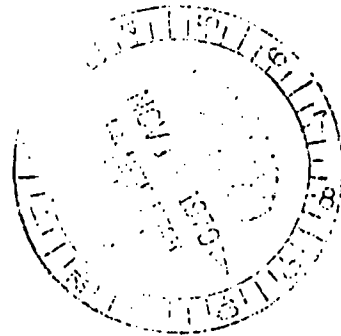
ADDRESS ONLY

AREA CODE 017 423-6100

November 13, 1970



AEC PUBLIC DOCUMENT ROOM



United States Atomic Energy Commission  
1717 H Street, N.W.  
Washington, D. C. 20545

Attention Director, Division of Reactor Licensing

Re: Vermont Yankee Nuclear Power Corporation  
Docket No. 50-271

Dear Sir:

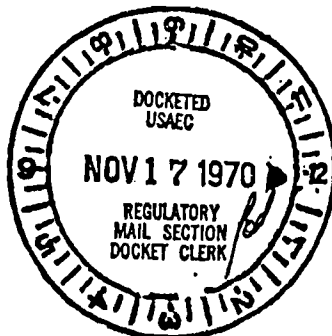
Pursuant to the Commission's Rules and Regulations and in compliance with the Water Quality Improvement Act of 1970, there are enclosed herewith for filing in the above docket one signed and twenty copies of a certification issued by the State of Vermont Water Resources Board on October 29, 1970 relating to the proposed facility being constructed by Vermont Yankee Nuclear Power Corporation in Vernon, Vermont.

Very truly yours,

*John A. Ritsher*  
John A. Ritsher

JAR/ljc

Enclosures



027369

3686

STATE OF VERMONT  
WATER RESOURCES BOARD

Received by Mr. Miller 11-13-70

IN RE: Application of Vermont Yankee  
Nuclear Power Corporation  
for Certification Under  
Public Law 91-224

CERTIFICATION

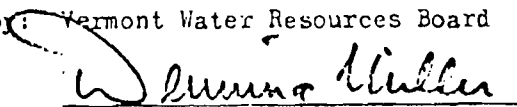
By application dated August 24, 1970, Vermont Yankee Nuclear Power Corporation applied to the Vermont Water Resources Board for certification pursuant to Public Law 91-224 known as the Water Quality Improvement Act of 1970 which amended the Federal Water Pollution Control Act (33 U.S.C. §456, as amended). The Board was asked to certify that the nuclear-powered electric generating plant of such corporation located in Vernon, Vermont from which a discharge into the Connecticut River will originate will be conducted in a manner which will not violate applicable water quality standards. Following procedures in existing regulations, the board gave public notice of the application and on October 1, 1970 held a public hearing in Montpelier, Vermont concerning such requested certification.

Pursuant to Section 21(5)(1) of the above statutes, this is to certify that the State of Vermont has reasonable assurance that the nuclear-powered electric generating plant at Vernon, Vermont will be conducted by Vermont Yankee Nuclear Power Corporation in a manner which will not violate applicable water quality standards.


Dated at Montpelier, Vermont this 27<sup>th</sup> day of October,  
1970.

STATE OF VERMONT

By: Vermont Water Resources Board

  
Denning Miller, Chairman

  
Walton S. Elliott, Member

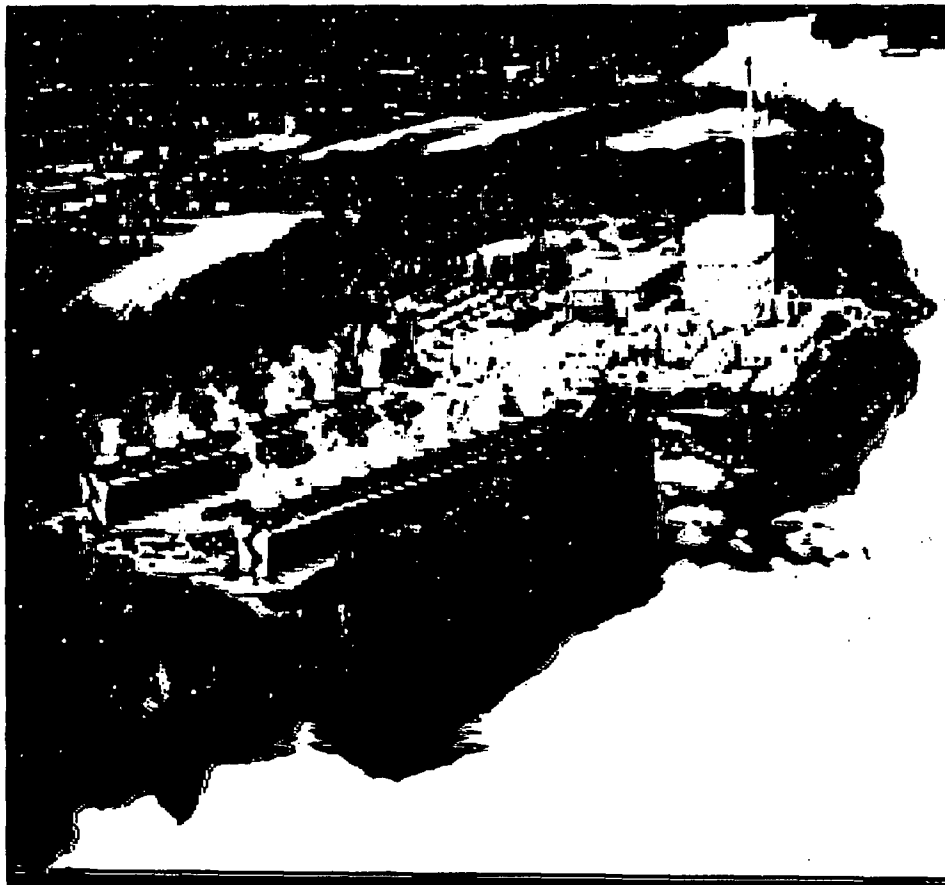
  
Frederick G. Ehlman, Member

**EXHIBIT B**



**LICENSE RENEWAL APPLICATION**

**Appendix E**



**VERMONT YANKEE  
NUCLEAR POWER STATION**

## **9.0 STATUS OF COMPLIANCE**

### **9.1 Requirement [10 CFR 51.45(d)]**

The environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection.

### **9.2 Environmental Permits**

Table 9-1 provides a list of the environmental permits held by VYNPS and the compliance status of these permits. These permits will be in place as appropriate throughout the period of extended operation given their respective renewal schedules. Other than routine renewals required at frequencies specified by the permits in Table 9-1, no state, federal, or local environmental permits have been identified as being required for re-issuance to support the extension of the VYNPS operating license.

Since VYNPS is not located in a municipality, no zoning restrictions apply. However, the site headquarters and training center for VYNPS which is located in Brattleboro is subject to zoning restrictions. The town of Brattleboro Zoning Ordinance (March 16, 2002) requires a "zoning permit" before any "land development" may be commenced or before any "land or structure may be used differently or in any way extended." Additional restrictions that VYNPS could be subjected to, depending on the activity, are as follows.

#### **9.2.1 Water Quality (401) Certification**

With respect to applicants for a federal license to conduct an activity that might result in a discharge into navigable waters, Section 401 of the Clean Water Act (CWA) establishes certain requirements for certifications from the state that the discharge will comply with certain CWA requirements (33 USC 1341). As reported in the FES (1972), the Vermont Water Resources Board provided a water quality certification on October 29, 1970, as amended on November 26, 1971, reflecting its receipt of reasonable assurance that operation of Vermont Yankee will not violate applicable water quality standards. In addition, the current and effective NPDES permit issued by the Vermont Agency of Natural Resources reflects continued compliance with applicable CWA standards. Excerpts of this permit are included in Attachment D.

### **9.3 Environmental Permits - Discussion of Compliance**

Station personnel are primarily responsible for monitoring and ensuring that VYNPS complies with its environmental permits and applicable regulations. Sampling results are submitted to the appropriate agency. VYNPS has an excellent record of compliance with its environmental permits, including monitoring, reporting and operating within specified limits.

**EXHIBIT C**

June 30, 2006 (7:40am)

UNITED STATES  
NUCLEAR REGULATORY COMMISSIONOFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFFBefore the Atomic Safety and Licensing Board*In the matter of*

ENTERGY NUCLEAR VERMONT YANKEE, LLC )	Docket No. 50-271-LR
and ENTERGY NUCLEAR OPERATIONS, INC. )	ASLB No.06-849-03-LR
Vermont Yankee Nuclear Power Station )	
License Renewal Application	

**NEW ENGLAND COALITION, INC.'S REPLY TO ENTERGY AND NRC  
STAFF ANSWERS TO PETITION FOR LEAVE TO  
INTERVENE, REQUEST FOR HEARING, AND CONTENTIONS**

Entergy and the NRC Staff argue that New England Coalition, Inc.'s (NEC) Contentions 3-6 are inadmissible for failure to state a factual basis demonstrating a material dispute with the Application. Entergy objects to admission of Contention 1 and 2 on these same grounds, and also argues that Contention 1 is barred by the Clean Water Act, and constitutes an inadmissible challenge to NRC's license renewal rules. The NRC Staff does not object to the admission of Contentions 1 and 2, with certain limitations to scope.

NRC rules governing NEC's Petition to Intervene are intended to ensure that "full adjudicatory hearings are triggered only by those able to proffer at least some *minimal factual and legal foundation* in support of their contentions." *Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*, 49 N.R.C. 328, 334 (1999)(emphasis added). An intervenor is not required to prove its case at the contention filing stage: "the factual support necessary to



fully assess the impacts of Vermont Yankee's increased thermal discharge: it does not address cumulative impacts, nor does it address impacts into and through the proposed renewed license's twenty-year duration.

Fourth, any determination of whether a federally permitted activity complies with water quality standards must be made pursuant to CWA § 401, 33 U.S.C. § 1341. Indeed, that is § 401's exact purpose. See S.D. Warren, 126 S.Ct. at 1846.<sup>2</sup> And, as mentioned above, Entergy has not applied for a § 401 Certification.

The Staff may argue that the NPDES permit is functionally equivalent to a § 401 Certification. See *Sequoyah Fuels Corp.*, 38 N.R.C. at \_\_\_, 1993 NRC LEXIS 55 at \*42. However, the NPDES permit is not functionally equivalent to a § 401 Certification for all of the above reasons, and particularly for the reasons that: (1) the NPDES permit has expired, (2) any new permit must be based on studies that have not yet occurred, and (3) any new permit will expire prior to 2012 and have no bearing on the relicensing period or the discharge's cumulative impacts. Simply put, the expired permit has no bearing on discharges from 2012 to 2032 and wholly fails to discharge either Entergy's or the NRC's NEPA obligations.

Fifth, the NPDES permit amendments allowing a greater thermal discharge are not final. They are under appeal, and a stay has been requested. Therefore it does not provide the authority purported by Entergy.

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<sup>2</sup> See also 18 C.F.R. 4.38(f)(7) (FERC rules requiring 401 certification or proof of the request for certification as part of application for FERC license).

done neither. Pointing out Entergy's failures does not amount to a rule challenge.

Entergy also argues that the CWA precludes NEPA review from looking beyond an NPDES permit. Entergy Answer at 12-13 (citing 33 U.S.C. § 1371(c)(2)). Entergy misreads this provision. It only states that NEPA shall not be deemed to authorize federal agencies to review a state's water quality standards (effluent limitations) established under the CWA or the adequacy of a § 401 water quality certification. *Id. See also S.D. Warren*, 547 U.S. at \_\_\_, 126 S.Ct. at 1852, n.8. Requiring an adequate assessment is not a challenge to Vermont's Water Quality standards or the effluent limitations they establish. Further, even if 33 U.S.C. § 1371 applies to particular permits (which it does not), there is no permit establishing effluent limitations for the license renewal period. And, as explained above, Entergy does not have a § 401 Certification the adequacy of which can be challenged. If anything, Entergy's argument underscores the need for a § 401 Certification. Entergy's reliance on this provision of the CWA is wholly misplaced.

Entergy also makes the astonishing argument that water quality impacts are not material to its license renewal. Entergy Answer at 11. The license, if renewed as Entergy requests, will allow much hotter water to be discharged into the Connecticut River for an additional twenty years. Hence, Entergy includes an Environmental Report (albeit inadequate) of this impact

**EXHIBIT D**

RAS 12440

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
ATOMIC SAFETY AND LICENSING BOARD

DOCKETED 10/30/06

SERVED 10/30/06

Before Administrative Judges:

Alex S. Karlin, Chairman  
Dr. Richard E. Wardwell  
Dr. Thomas S. Elleman

In the Matter of

ENTERGY NUCLEAR VERMONT YANKEE,  
LLC, and  
ENTERGY NUCLEAR OPERATIONS, INC.

(Vermont Yankee Nuclear Power Station)

Docket No. 50-271-LR

ASLBP No. 06-849-03-LR

October 30, 2006

MEMORANDUM AND ORDER

(Denying New England Coalition's Motion to Amend Contention 1  
and Motion For Reconsideration of Contention 1)

Before the Licensing Board is a motion by the New England Coalition (NEC), a non-profit organization that is a petitioner herein, requesting the admission of a late contention or, alternatively, requesting leave to amend NEC Contention 1.<sup>1</sup> In addition, NEC has filed a motion for reconsideration of part of our admission of NEC original Contention 1.<sup>2</sup> For the reasons set forth below, these motions are denied.

I. BACKGROUND

This proceeding concerns the application of Entergy Nuclear Vermont Yankee, LLC, and Entergy Nuclear Operations, Inc. (collectively, Entergy), to renew the operating license for the Vermont Yankee Nuclear Power Station in Windham County, Vermont.<sup>3</sup> Entergy seeks to

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<sup>1</sup> NEC's Late Contention or, Alternatively, Request for Leave to Amend or File a New Contention (Aug. 7, 2006) [NEC Motion to Amend].

<sup>2</sup> [NEC]'s Motion for Leave to File Motion for Reconsideration (Oct. 2, 2006).

<sup>3</sup> Vermont Yankee Nuclear Power Station License Renewal Application (Jan. 25, 2006), ADAMS Accession No. ML060300085 [Application].

NRC, 924 F.2d 311 (D.C. Cir. 1991), the contention pleading requirements do not require a petitioner “to provide an exhaustive list of possible bases, but simply to provide sufficient alleged factual or legal bases to support the contention.” Louisiana Energy Serv., L.P. (National Enrichment Facility), CLI-04-35, 60 NRC 619, 623 (2004). Thus, there should be no such thing as a motion for leave to file a “late, amended, or new” basis. In short, contentions, not bases, are admitted.

Turning to the two bases proffered in support of NEC’s amended (and, as we have noted, already admitted) contention, we conclude that the first basis was part of the original contention and provides nothing new. Our September 22, 2006, ruling recognizes that NEC’s original Contention 1 involves questions such as the status of Entergy’s NPDES permit, whether the NPDES is a CWA § 316 variance or determination, and, if so, whether such a variance fully satisfies an applicant’s duties under 10 C.F.R. Part 51. Vermont Yankee, LBP-06-20, 64 NRC at \_\_\_ (slip op. at 49-50, 55-56). Without reiterating or expanding upon our earlier ruling, it is sufficient to note that the NPDES CWA § 316 basis proffered in the NEC Motion to Amend is already part of the “brief explanation” underlying NEC Contention 1.

With regard to the second basis suggested in the NEC Motion to Amend – the alleged need for Entergy to obtain a CWA § 401 water quality certification – this also is not entirely new. In our September 22, 2006, ruling we rejected this CWA § 401 argument, not on the merits, but because NEC first raised it in its reply brief, thus not giving Entergy a fair opportunity to respond. Id. at 57. NEC filed its “amended” contention 1 on August 7, 2006, and Entergy and the Staff now complain the CWA § 401 arguments are too late. We do not agree.

More to the point, Entergy argues that the need for a CWA § 401 certification is “simply irrelevant to NEC’s contention that Entergy failed to assess impacts to water quality.” Entergy Answer at 7. Here, we do agree with Entergy. A CWA § 401 certification is a document issued

by the State certifying that a proposed discharge satisfies the State's water quality standards and criteria. But a CWA § 401 certification is simply an independent statutory requirement, and neither NEPA nor 10 C.F.R. Part 51 incorporates or requires it. Meanwhile, NEC Contention 1 focuses on the alleged insufficiency of Entergy's environmental report in assessing the impacts of increased thermal discharges over the proposed 20-year license extension, and we fail to see how the existence, or not, of a certification from the State is relevant to the adequacy of Entergy's environmental assessment.

In sum, we deny NEC's Motion to Amend on the ground that it is moot because the proposed "late, amended, or new" contention has already been admitted as NEC original Contention 1.<sup>13</sup> Neither basis proffered in the Motion to Amend is new. The first, dealing with the status of the NPDES permit, CWA § 316(a), as satisfying the Part 51 requirements, is already accepted a part of the arguments to be considered under NEC Contention 1. The second, the existence of a CWA § 401 certification, is not relevant.<sup>14</sup>

### III. NEC MOTION FOR RECONSIDERATION OF CONTENTION 1

On October 2, 2006, NEC filed a motion for leave to file a motion for reconsideration regarding, inter alia, our September 22, 2006, ruling declining to consider NEC's Contention 1 argument that Entergy is required to obtain a CWA § 401 certification.<sup>15</sup> Entergy and the NRC Staff have responded to this motion.<sup>16</sup> Even assuming *arguendo* that NEC's motion for

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<sup>13</sup> On October 10, 2006, Entergy filed a petition for "interlocutory review" of our decision admitting NEC's original Contention 1. Entergy's Petition for Interlocutory Review of LBP-06-20 Admitting [NEC]'s Contention 1 (Oct. 10, 2006).

<sup>14</sup> Although NEC's Motion to Amend makes some cryptic closing remarks about NEC original contention 2 related to "environmentally assisted metal fatigue," in the end NEC "finds it unnecessary to amend Contention 2" and accordingly, we take no action with reference to it.

<sup>15</sup> [NEC]'s Motion for Leave to File Motion for Reconsideration (Oct. 2, 2006).

<sup>16</sup> Entergy's Answer to [NEC]'s Motion for Reconsideration of Board Rulings on NEC Contentions 1 and 5 (Oct. 12, 2006); NRC Staff Response to [NEC]'s Motion for Leave to File Motion for Reconsideration (Oct. 13, 2006).

reconsideration satisfied the other criteria of 10 C.F.R. § 2.323(e), for the reasons stated above we conclude that the CWA § 401 certification issue has not been shown to be relevant. Accordingly, we deny the portion of NEC's motion for reconsideration concerning NEC original Contention 1.<sup>17</sup>

#### IV. CONCLUSION

For the reasons set forth above, NEC's motion requesting the admission of a late contention or alternatively, requesting leave to amend NEC Contention 1 and its motion for reconsideration of part of our admission of NEC original Contention 1 are denied.

It is so ORDERED.

THE ATOMIC SAFETY  
AND LICENSING BOARD<sup>18</sup>

*/RA/*  
Alex S. Karlin, Chairman  
ADMINISTRATIVE JUDGE

*/RA/*  
Richard E. Wardwell<sup>19</sup>  
ADMINISTRATIVE JUDGE

*/RA/*  
Thomas S. Elleman  
ADMINISTRATIVE JUDGE

Rockville, Maryland  
October 30, 2006

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<sup>17</sup> We will be dealing separately with the remainder of NEC's motion for reconsideration as well as the motions for reconsideration filed by Entergy and by the Department of Public Service of the State of Vermont.

<sup>18</sup> Copies of this order were sent this date by Internet e-mail transmission to counsel or a representative for (1) applicant Entergy Nuclear Vermont Yankee, LLC and Entergy Nuclear Operations, Inc.; (2) petitioners Vermont Department of Public Service and the New England Coalition; and (3) the NRC Staff.

<sup>19</sup> While Judge Wardwell dissented on the original decision admitting this contention, he agrees with all the conclusions related to NEC's requests presented herein.

**EXHIBIT E**



RDB received 7/7/06  
RJ

MLO61770066

From: "Gjessing, Catherine" <Catherine.Gjessing@state.vt.us>  
To: <VermontYankeeEIS@nrc.gov>  
Date: Fri, Jun 23, 2006 5:21 PM  
Subject: Scoping Comments

71FR20733

Good afternoon,

Attached are scoping comments from the Vermont Agency of Natural Resources. Please feel free to contact Catherine Gjessing at 241-3618 or Julie Moore 241-3687 with any questions. Thank you.

CC: "Moore, Julie" <Julie.Moore@state.vt.us>, "Sayles, John" <John.Sayles@state.vt.us>

4/31/06

71FR20733

18

SUNSI Review Complete

E-RIDS=ADM-03

Template=ADM-213

Call = R. Emch (RLF)

**Mail Envelope Properties** (449C5B3A.6EE : 1 : 59118)

**Subject:** Scoping Comments  
**Creation Date:** Fri, Jun 23, 2006 5:20 PM  
**From:** "Gjessing, Catherine" <[Catherine.Gjessing@state.vt.us](mailto:Catherine.Gjessing@state.vt.us)>

**Created By:** [Catherine.Gjessing@state.vt.us](mailto:Catherine.Gjessing@state.vt.us)

**Recipients**

nrc.gov  
 TWGWPO03.HQGWDO01  
 VermontYankeeEIS

state.vt.us  
 John.Sayles CC (John Sayles)  
 Julie.Moore CC (Julie Moore)

**Post Office**

TWGWPO03.HQGWDO01

**Route**

nrc.gov  
 state.vt.us

<b>Files</b>	<b>Size</b>	<b>Date &amp; Time</b>
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**Return Notification:** None

**Concealed Subject:** No  
**Security:** Standard

**Junk Mail Handling Evaluation Results**

Message is eligible for Junk Mail handling  
 This message was not classified as Junk Mail

**Junk Mail settings when this message was delivered**

Junk Mail handling disabled by User  
 Junk Mail handling disabled by Administrator  
 Junk List is not enabled  
 Junk Mail using personal address books is not enabled

State of Vermont Agency of Natural Resources  
100 South Main Street, Center Building  
Waterbury, VT 05671-0301  
Telephone: (802) 241-3620  
Fax: (802) 241-3796

## MEMORANDUM

**TO: NUCLEAR REGULATORY COMMISSION**

**FROM: VERMONT AGENCY OF NATURAL RESOURCES**

**DATE: JUNE 23, 2006**

**SUBJECT: SCOPING COMMENTS FOR VERMONT YANKEE NUCLEAR  
POWER STATION LICENSE RENEWAL**

The primary purpose of these scoping comments is to request site specific analysis of various issues in the context of the license renewal process for Vermont Yankee Nuclear Power Station. The Vermont Agency of Natural Resources (Agency) has referred to the list of NEPA issues for license renewal set forth in Table A-1 of NUREG-1850, *Frequently Asked Questions on License Renewal of Nuclear Power Reactors* (March 2006). It is the Agency's understanding that this comprehensive list also indicates whether the issue is subject to a generic or site specific Environmental Impact Statement. The Agency is suggesting that some of the generic issues be examined in more detail in order to determine whether a site specific environmental impact analysis should be performed. The Agency has the following comments regarding the generic environmental impact analysis:

- *Issues 18, 20, 23, 24, and 28 through 30 (Thermal plume barrier to migrating fish, Premature emergence of aquatic insects, Losses among organisms exposed to sublethal stresses, Stimulation of nuisance organisms, Entrainment, Impingement, and Heat shock)* As we understand it, these issues are associated with intake structures and thermal discharge issues which require a NPDES permit. The requirements of the Clean Water Act and the NPDES permit will provide assurance that the impacts of permitted intake structures and discharges meet the applicable federal and state requirements. It would be helpful, however, to have some limited site specific review of these issues. For example, have recent scientific studies regarding intake structure and thermal impacts on migrating fish species and aquatic organisms, in similar habitats or within this region, led to new knowledge applicable to these issues? Are there any organisms present in the Vernon area which are particularly susceptible to sublethal stresses or heat shock? Are there any specific study protocols recommended for determining the impacts of intake and discharges on species present in the affected regions of the Connecticut River?
- *Issues 43 and 46 (Bird collisions).* The Agency is interested in bird mortality rates. In particular, the Agency is interested in whether the numbers and species of birds which

**EXHIBIT F**



Home > NRC Library > NUREG-Series Publications > Staff Reports > NUREG-1437 Vol. 1 > Part 4

## Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437 Vol. 1)

### 4. Environmental Impacts of Operation

[ [Prev](#) | [Next](#) | [Table of Contents](#) ]

#### 4.1 Introduction

[ [Prev](#) | [Next](#) | [Table of Contents](#) ]

Nuclear power plant operations during the license renewal term will result in a continuation of most of the impacts that were occurring prior to license renewal. Some operational procedures will change, however, in response to efficiency, reliability, and safety goals. These new procedures may result in a new baseline of plant-induced impacts that will continue throughout the license renewal term. In addition, the environmental receptors such as air, water, population, and biotic communities may be changing. These receptor changes in turn will influence the significance of any plant-induced impacts. Therefore, this chapter defines the prelicense-renewal baseline for plant-induced impacts and additional impacts due to a changing environment, refurbishment, and changes in plant operation.

It is the intent of this chapter to discuss all substantive issues of concern that were identified in the scoping process (Section 1.3). This chapter is organized according to the major modes by which nuclear power plants affect the environment. Because the cooling system is a major mode of interaction with the environment and because the three types of cooling systems have substantially different effects, the first three sections address the impacts of operation for each of the three cooling system types. Transmission lines have distinctly different effects from cooling systems, so they are discussed separately in Section 4.5. Operation of nuclear power plants also has potential human health, socioeconomic, and groundwater effects that are not closely related to either the cooling system or the transmission lines. These effects are discussed in Sections 4.6, 4.7, and 4.8.

The issue of impacts to threatened or endangered species is potentially relevant to all cooling system types and to transmission lines. Review of power plant operations has shown that neither current cooling system operations nor electric power transmission lines associated with nuclear power plants are having significant adverse impacts on any threatened or endangered species. However, widespread conversion of natural habitats and other human activities continues to cause the decline of native plants and animals. As biologists review the status of species, additional species threatened with extinction are being identified; consequently, it is not possible to ensure that future power plant operations will not be found to adversely affect some currently unrecognized threatened or endangered species. In addition, future endangered species recovery efforts may require modifications of power plant operations. Similarly, operations-related land-disturbing activities (e.g., spent fuel and low-level waste storage facilities) could affect endangered species. As noted in Section 3.2, without site-specific and project-specific information, the magnitude or significance of impacts on threatened and endangered species cannot be assessed. For these reasons, the nature and significance of nuclear power plant operations on as yet unrecognized endangered species cannot be predicted; and no generic conclusion on the significance of potential impacts on endangered species can be reached. The impact on threatened and endangered species, therefore, is a Category 2 issue and will not be discussed further in this chapter.

#### 4.2 Once-Through Cooling Systems

[ [Prev](#) | [Next](#) | [Table of Contents](#) ]

A once-through cooling system can affect the environment by withdrawing a large amount of water, heating it, adding biocides, and discharging it back to the receiving body. The main issues associated with plants using such a system are (1) effects on aquatic organisms due to changes in water quality, entrainment, and impingement; (2) water-use conflicts; and (3) effects on groundwater quality, hydrology, and use. These issues as they relate to license renewal are addressed in this section.

The following sections discuss the potential effects of operation of once-through condenser cooling systems on surface water quality, hydrology, and use (Section 4.2.1) and aquatic ecology (Section 4.2.2). Section 4.2.2.2 summarizes the conclusions for each of these issues.

#### **4.2.1 Surface Water Quality, Hydrology, and Use**

This section considers how once-through cooling systems may alter surface water quality, hydrology, and quantity; the consequent biological effects of such changes and the methodology used to arrive at conclusions are described in Section 4.2.2. Each issue is described and, as appropriate, illustrated with examples from operating nuclear power plants. Any ongoing effects will probably continue into the license renewal term, assuming that the cooling system design and operation will not change for any plant under the requirements for license renewal. Judgments about the significance of these issues during the license renewal term are based on published information, agency consultation, and information provided by the utilities (Appendix F) on every nuclear power plant in the United States. The conclusions reached in Section 4.2.1 apply to all nuclear power plants with once-through cooling systems.

Seventy nuclear power plants have a once-through cooling system (see Table 2.2). The operation of once-through cooling systems alters water quality primarily through the discharge of heat and chemicals to a receiving body of water. The largest volumes of discharge are associated with the main condenser cooling system, but there are other sources of liquid effluents (e.g., the service water system and sanitary wastes). Because the volumes of water discharged from other systems are relatively small compared with those of the once-through condenser cooling system (typically around 10 percent), concern about water quality impacts of discharges has generally focused on the condenser cooling system. The amounts of heated effluent from such a system can be large; a nuclear power plant with once-through cooling discharges water at about 46 m<sup>3</sup>/s (736,000 gal/min) per 1000 MW(e) with a temperature increase of 10°C (18°F).

##### **4.2.1.1 Regulation of Condenser Cooling System Effluents**

The U.S. Nuclear Regulatory Commission (NRC) considered the costs and benefits of alternative condenser cooling systems (including potential impacts on water quality and aquatic ecology) in the environmental statements associated with issuance of construction permits and operating licenses. Once a plant is operating, however, the continuing regulation of nonradiological impacts on water quality and aquatic ecology is primarily the responsibility of the U.S. Environmental Protection Agency (EPA) or the applicable state permitting agency. This section describes the environmental statutes that underlie the regulation of impacts on aquatic resources from operating nuclear power plants. An understanding of the requirements of these statutes and the procedures under which aquatic resources effects are controlled by the permitting agencies is important to the interpretation of the issue categories.

As with other industries, discharges from steam-electric power plants are regulated under the Clean Water Act (CWA). Because power plants discharge wastewater into surface bodies of water, they must obtain a National Pollutant Discharge Elimination System (NPDES) permit under Section 402 of the CWA (33 USC 1342). The NPDES permit specifies the discharge standards and monitoring requirements that the facility must achieve for each point of discharge or outfall. NPDES permits must be renewed every 5 years, and during the renewal process, the plant must certify that no changes have been made to the facility that would alter aquatic impacts and no significant adverse impacts on aquatic resources have been observed. An NPDES permit is issued by EPA or, more commonly, a designated state water quality agency.

Under Section 316(a) of the CWA [33 U.S.C. 1326(a)], state-established thermal effluent limitations in the NPDES permit may be modified to a less stringent level if it can be shown that the less stringent level (i.e., higher temperatures) is sufficient to "ensure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife" (Bugbee 1978). The regulatory agency's decision to allow alternative thermal discharge limitations is based on the utility's 316(a) demonstration, which may present considerable information about the actual or projected thermal impacts of the power plant discharge. Like the NPDES permit, the 316(a) "variance" must be renewed every 5 years, and the applicant must provide evidence to the permitting agency as to why the variance is still appropriate. A 316(a) determination is not necessary for those power plants that are able to meet state water temperature standards; this is the

case for many nuclear power plants that use closed-cycle cooling systems (Appendix F). However, a biological assessment/study, similar to that which would be required by 316(a), may be required to ensure that the mixing zone meets water quality standards [Charles H. Kaplan, letter to G. F. Cada, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tennessee November 19, 1990].

Section 316(b) of the CWA [33 USC 1326(b)] requires that "the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." Like NPDES permits and 316(a) determinations, 316(b) determinations are made by EPA or a state permitting agency based on data supplied in the applicant's 316(b) demonstration. The 316(b) determination need not be separated from the NPDES process. Although 316(b) determinations are usually one-time judgments that are not periodically reconsidered, a determination under CWA Section 316(b) is not permanently binding. Where circumstances have changed (e.g., fish population has changed, the initial determination was deemed inappropriate, or some adjustment in the operation of the intake structure is warranted), a full 316(b) demonstration could again be required by EPA during the license period.

The 316(a) and (b) demonstrations provide EPA (or a designated state permitting agency) a means for considering condenser cooling system effects on aquatic biota, not just on water quality per se. Other federal and state agencies with responsibilities for aquatic resources [e.g., the U.S. Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), state fish and wildlife agencies] do not issue permits but are consulted in the development of NPDES permits and Section 316 determinations.

Under Section 401 of the CWA (33 USC 1341), an applicant for a federal license or permit (the utility in this case) must obtain a state water quality certification (i.e., the state must certify that the applicant's discharges will comply with state water quality standards). This requirement would apply, for example, to U.S. Army Corps of Engineers Section 404 permits for the disposal of dredged and fill material and to EPA-issued NPDES permits. Of course, issuance of an NPDES permit by a state water quality agency implies certification under Section 401.

Any pesticide must be registered under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC 136 et seq.); this includes the various chlorine compounds, bromine compounds, and molluscicides used to control biofouling in power plants. Registration requires development of toxicity data. Under FIFRA, no one can use a biocide except in accordance with labeled instructions. Information about toxicity developed by the biocide manufacturer as a FIFRA requirement may be used to determine permissible power plant discharge concentrations for the NPDES permit.

Other potential aquatic resource issues are the subjects of particular legislation or executive orders (EOs) with specific requirements that cannot be limited or eliminated. For example, potential effects of plant modifications on floodplains and wetlands must be considered under EOs 11988 and 11990, respectively. Modifications that entail disposal of dredged material may require a permit from the U.S. Army Corps of Engineers under Section 404 of CWA (Pub. L. 92-500). Because the impacts could range from small to large depending on the details of the site and the proposed construction, the potential effect on floodplains or wetlands is a Category 2 issue.

#### **4.2.1.2 Water Quality/Hydrology**

The continued operation of once-through condenser cooling systems will allow continuation of associated hydrologic changes, including altered current patterns at intake and discharge structures, altered salinity gradients, and altered thermal stratification of lakes. Water quality effects considered in this section include temperature effects on sediment transport capacity, scouring, eutrophication, and the discharge of biocides, sanitary wastes, and heavy metals.

##### **4.2.1.2.1 Current Patterns**

Operation of the cooling system usually causes changes in water currents in the immediate vicinity of both the intake and the outfall. The extent of the changes depends on the design and siting of the intake and discharge and the nature of the body of water (Langford 1983). Because many nuclear plants are located on large rivers, lakes, reservoirs or on the seacoast, such localized altered current patterns are minor. However, plants sited near small bodies of water may have marked effects on current patterns. Operation of the cooling water system of Oyster Creek Nuclear Generating Station (NGS) changed the flows of the lower portions of Oyster Creek and South Branch Forked River from alternating flows typical of estuarine streams to unidirectional flows with constant salinity. The South Branch Forked River became an intake canal, with salt water continuously moving upstream toward the power plant. Oyster Creek, on the other hand, became a discharge canal, with heated salt water moving continuously away from the plant. Although substantial