



Entergy Nuclear Operations, Inc.  
Vermont Yankee  
P.O. Box 0500  
185 Old Ferry Road  
Brattleboro, VT 05302-0500  
Tel 802 257 5271

February 20, 2007  
Docket No. 50-271  
BVY 07-010

Ms. Anne De'Francisco  
USNRC RI  
475 Allendale Rd,  
King of Prussia, PA 19046

Reference: 1. Letter, Entergy to USNRC, "Vermont Yankee Nuclear Power Station, License No. DPR-28, License Renewal Application," BVY 06-009, dated January 25, 2006.


**Subject: Vermont Yankee Nuclear Power Station  
License No. DPR-28 (Docket No. 50-271)  
License Renewal Regional Inspection Proprietary Information Request**

On January 25, 2006, Entergy Nuclear Operations, Inc. and Entergy Nuclear Vermont Yankee, LLC (Entergy) submitted the License Renewal Application (LRA) for the Vermont Yankee Nuclear Power Station (VYNPS) as indicated by Reference 1. During the week of January 19, 2007, NRC Region 1 conducted a License Renewal Inspection at VYNPS. A request for a document published by the Electric Power Research Institute (EPRI) containing proprietary information was conveyed to Entergy personnel. This letter contains two attachments as necessary to transmit the requested information to the NRC.

Information contained in Attachment 1 to this letter is considered proprietary and EPRI requests that the document be withheld from public disclosure in accordance with 10 CFR 2.390(a)(4) and 10 CFR 9.17(a)(4). An affidavit supporting this request is also contained in Attachment 1. Attachment 2 contains a non-proprietary version of the EPRI report.

Should you have any questions concerning this letter, please contact Mr. David Mannai at (802) 451-3304.

Sincerely,

  
\_\_\_\_\_  
David Mannai  
Licensing Manager  
Vermont Yankee Nuclear Power Station

Enc: Attachments 1 and 2.

**PROPRIETARY**

**Attachment 1**

**Vermont Yankee Nuclear Power Station**

**VYNPS License Renewal Regional Inspection  
Supporting Information**

**EPRI NSAC-202L-R3  
Recommendations for an Effective  
Flow-Accelerated Corrosion Program**

**Affidavit**

**and**

**PROPRIETARY VERSION**

**PROPRIETARY**

February 16, 2007

Document Control Desk  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

**Subject: Request for Withholding of the following Proprietary Document:**

"Recommendations for an Effective Flow-Accelerated Corrosion Program (NSAC-202L-R3)", EPRI Report 1011838, May 2006

To Whom It May Concern:

This is a request under 10 C.F.R. §2.390(a)(4) that the U.S. Nuclear Regulatory Commission ("NRC") withhold from public disclosure the information identified in the enclosed Affidavit consisting of the proprietary information owned by Electric Power Research Institute, Inc. ("EPRI") and identified above (the "Report"). Copies of the Report and the Affidavit in support of this request are enclosed.

EPRI desires to disclose, in confidence, the Report for in connection with an application for license renewal submitted to the NRC by Entergy Nuclear Vermont Yankee. The Report is not to be divulged to anyone outside of the NRC or to any of its contractors, nor shall any copies be made of the Report provided herein. EPRI welcomes any discussions and/or questions relating to the information enclosed.

If you have any questions about the legal aspects of this request for withholding, please do not hesitate to contact me at 704-595-2169. Questions on the content of the Report should be directed to Albert Machiels of EPRI at (650) 855-2054.

Sincerely,

ELECTRIC POWER RESEARCH INSTITUTE, INC.



John P. Gaertner  
Senior Sector Business Operations Manager

## AFFIDAVIT

**RE: Request for Withholding of the Following Proprietary Document:**

"Recommendations for an Effective Flow-Accelerated Corrosion Program (NSAC-202L-R3)", EPRI Report 1011838, May 2006

I, JOHN P. GAERTNER, being duly sworn, depose and state as follows:

I am a Senior Sector Business Operations Manager of Electric Power Research Institute, Inc. whose principal office is located at 3420 Hillview Avenue, Palo Alto, California ("EPRI") and I have been specifically delegated responsibility for the above-listed Report that is sought under this Affidavit to be withheld (the "Report"). I am authorized to apply to the U.S. Nuclear Regulatory Commission ("NRC") for the withholding of the Report on behalf of EPRI.

EPRI requests that the Report be withheld from the public on the following bases:

Withholding Based Upon Privileged And Confidential Trade Secrets Or Commercial Or Financial Information:

a. The Report is owned by EPRI and has been held in confidence by EPRI. All entities accepting copies of the Report do so subject to written agreements imposing an obligation upon the recipient to maintain the confidentiality of the Report. The Report is disclosed only to parties who agree, in writing, to preserve the confidentiality thereof.

b. EPRI considers the Report and the proprietary information contained therein (the "Proprietary Information") to constitute trade secrets of EPRI. As such, EPRI holds the Report in confidence and disclosure thereof is strictly limited to individuals and entities who have agreed, in writing, to maintain the confidentiality of the Report. EPRI made a substantial economic investment to develop the Report, and, by prohibiting public disclosure, EPRI derives an economic benefit in the form of licensing royalties and other additional fees from the confidential nature of the Report. If the Report and the Proprietary Information were publicly available to consultants and/or other businesses providing services in the electric and/or nuclear power industry, they would be able to use the Report for their own commercial benefit and profit and without expending the substantial economic resources required of EPRI to develop the Report.

c. EPRI's classification of the Report and the Proprietary Information as trade secrets is justified by the Uniform Trade Secrets Act which California adopted in 1984 and a version of which has been adopted by over forty states. The California Uniform Trade Secrets Act, California Civil Code §§3426 – 3426.11, defines a "trade secret" as follows:

"Trade secret" means information, including a formula, pattern, compilation, program device, method, technique, or process, that:

(1) Derives independent economic value, actual or potential, from not being generally known to the public or to other persons who can obtain economic value from its disclosure or use; and

(2) Is the subject of efforts that are reasonable under the circumstances to maintain its secrecy."


d. The Report and the Proprietary Information contained therein are not generally known or available to the public. EPRI developed the Report only after making a determination that the Proprietary Information was not available from public sources. EPRI made a substantial investment of both money and employee hours in the development of the Report. EPRI was required to devote these resources and effort over a period of several years to derive the Proprietary Information and the Report. As a result of such effort and cost, both in terms of dollars spent and dedicated employee time, the Report is highly valuable to EPRI.

e. A public disclosure of the Proprietary Information would be highly likely to cause substantial harm to EPRI's competitive position and the ability of EPRI to license the Proprietary Information both domestically and internationally. The Proprietary Information and Report can only be acquired and/or duplicated by others using an equivalent investment of time and effort.

I have read the foregoing and the matters stated herein are true and correct to the best of my knowledge, information and belief. I make this affidavit under penalty of perjury under the laws of the United States of America and under the laws of the State of California.

Executed at 1300 W T Harris Blvd, Charlotte, North Carolina being the premises and place of business of Electric Power Research Institute, Inc.

Date 2-16-07

  
John P. Gaertner

Subscribed and sworn before me this 16<sup>th</sup> day of February 2007

 Sheryl R. Stogner, Notary Public

My Commission expires August 23, 2009

**NON-PROPRIETARY**

**Attachment 2**

**Vermont Yankee Nuclear Power Station**

**VYNPS License Renewal Regional Inspection  
Supporting Information**

**EPRI NSAC-202L-R3  
Recommendations for an Effective  
Flow-Accelerated Corrosion Program**

**NON-PROPRIETARY INFORMATION**

**NON-PROPRIETARY**

# **Recommendations for an Effective Flow-Accelerated Corrosion Program (NSAC-202L-R3)**

**1011838**

Final Report, May 2006

**EPRI Project Manager  
A. Machiels**

## **DISCLAIMER OF WARRANTIES AND LIMITATION OF LIABILITIES**

THIS DOCUMENT WAS PREPARED BY THE ORGANIZATION(S) NAMED BELOW AS AN ACCOUNT OF WORK SPONSORED OR COSPONSORED BY THE ELECTRIC POWER RESEARCH INSTITUTE, INC. (EPRI). NEITHER EPRI, ANY MEMBER OF EPRI, ANY COSPONSOR, THE ORGANIZATION(S) BELOW, NOR ANY PERSON ACTING ON BEHALF OF ANY OF THEM:

(A) MAKES ANY WARRANTY OR REPRESENTATION WHATSOEVER, EXPRESS OR IMPLIED, (I) WITH RESPECT TO THE USE OF ANY INFORMATION, APPARATUS, METHOD, PROCESS, OR SIMILAR ITEM DISCLOSED IN THIS DOCUMENT, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, OR (II) THAT SUCH USE DOES NOT INFRINGE ON OR INTERFERE WITH PRIVATELY OWNED RIGHTS, INCLUDING ANY PARTY'S INTELLECTUAL PROPERTY, OR (III) THAT THIS DOCUMENT IS SUITABLE TO ANY PARTICULAR USER'S CIRCUMSTANCE; OR

(B) ASSUMES RESPONSIBILITY FOR ANY DAMAGES OR OTHER LIABILITY WHATSOEVER (INCLUDING ANY CONSEQUENTIAL DAMAGES, EVEN IF EPRI OR ANY EPRI REPRESENTATIVE HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES) RESULTING FROM YOUR SELECTION OR USE OF THIS DOCUMENT OR ANY INFORMATION, APPARATUS, METHOD, PROCESS, OR SIMILAR ITEM DISCLOSED IN THIS DOCUMENT.

ORGANIZATION(S) THAT PREPARED THIS DOCUMENT

**Munson & Associates**

**dba Jeffrey Horowitz**

### **NOTE**

For further information about EPRI, call the EPRI Customer Assistance Center at 800.313.3774 or e-mail [askepri@epri.com](mailto:askepri@epri.com).

Electric Power Research Institute and EPRI are registered service marks of the Electric Power Research Institute, Inc.

Copyright © 2006 Electric Power Research Institute, Inc. All rights reserved.



## CITATIONS

---

This report was prepared by

Munson & Associates  
724 Spencer Court  
Los Altos, CA 94024

Principal Investigator  
D. Munson

dba Jeffrey Horowitz  
3331 Avenida Sierra  
Escondido, CA 92029

Principal Investigator  
J. Horowitz

This report describes research sponsored by the Electric Power Research Institute (EPRI).

The report is a corporate document that should be cited in the literature in the following manner:

*Recommendations for an Effective Flow-Accelerated Corrosion Program (NSAC-202L-R3).*  
EPRI, Palo Alto, CA: 2006. 1011838.

# REPORT SUMMARY

---

The loss of pressure boundary material in piping and vessels to flow-accelerated corrosion (FAC) damage has caused a number of significant plant events over the last 20-plus years. This report presents the third revision of the EPRI Report "Recommendations for an Effective Flow-Accelerated Corrosion Program," NSAC-202L, issued in response to the tragic 1986 Surry pipe rupture event. Conforming FAC programs established throughout the domestic nuclear fleet have allowed plant operators to identify, monitor, and mitigate FAC-related damage in advance of failure without a single FAC-related injury at a domestic nuclear plant since that time.

## Background

FAC—sometimes referred to as flow-assisted corrosion or erosion-corrosion—leads to wall thinning (metal loss) of steel piping exposed to flowing water or wet steam. The rate of metal loss depends on a complex interplay of many parameters such as water chemistry, material composition, and hydrodynamics. Carbon steel piping components that carry wet steam are especially susceptible to FAC and represent an industry wide problem. Experience has shown that FAC damage to piping at fossil and nuclear plants can lead to costly outages and repairs and can affect plant reliability and safety. EPRI and the industry as a whole have worked steadily since 1986 to develop and refine monitoring programs in order to prevent FAC-induced failures.

This revision of NSAC-202L contains recommendations updated with the worldwide experience of members of the CHECWORKS™ Users Group (CHUG), plus recent developments in detection, modeling, and mitigation technology. These recommendations are intended to refine and enhance those of the earlier versions, without contradiction, so as to ensure the continuity of existing plant FAC programs. The guidance contained in this document supersedes that contained in EPRI Report NP-3944 and all prior versions of NSAC-202L.

## Objectives

To present a set of recommendations for nuclear power plants for implementing an effective program to detect and mitigate FAC.

## Approach

Working together with the members of CHUG, EPRI developed a set of recommendations to help utility personnel design and implement a comprehensive FAC mitigation program.

## Results

The Institute of Nuclear Power Operations (INPO), the Nuclear Energy Institute (NEI), the U.S. Nuclear Regulatory Commission (NRC), and the American Society of Mechanical Engineers (ASME) have all issued guidance related to the prevention of FAC failures. This report describes the organization and activities necessary to implement a successful FAC program. It identifies

typical elements of an effective FAC program and describes the steps utilities should take to minimize the chances of experiencing a FAC-induced failure and minimize the consequence of FAC-induced wall thinning in large-bore piping, small-bore piping, and equipment. However, since the approach is based on inspection of a prioritized sample of susceptible locations, the industry recognizes that it will never be possible to prevent all FAC-related leaks and ruptures.

Key elements of the guidelines include:

- Discussion of an effective FAC program design, with emphasis on corporate commitment, FAC operating experience, inspections, engineering judgment, and long-term strategies
- Description of implementation procedures and documentation, including use of a governing document
- Identification of recommended FAC program tasks, with key steps of identifying susceptible systems, performing FAC analysis, selecting and scheduling components for inspection, performing inspections, evaluating inspection data, assessing worn components, and repairing and replacing components
- Explanation of how to develop a long-term strategy, with discussions of FAC-resistant materials, water chemistry, and system design changes.

### **EPRI Perspective**

All types of power and industrial process plants are susceptible to damage caused by FAC. The nuclear power industry has mounted a broad-based effort to reduce the amount of FAC that occurs and to uncover incidents of excessive FAC before failures are likely to occur. EPRI, NEI, and INPO have all contributed to this effort. Nevertheless, problems caused by FAC have continued to occur.

Several major ruptures in the early nineties showed the importance of having an effective FAC program. In response, EPRI—with the support of CHUG— sponsored a series of plant visits to learn about the implementation of utility FAC programs. These visits showed that there were large differences among utility programs. After these visits, EPRI and CHUG decided that a set of programmatic recommendations prepared by EPRI would be desirable. The original version of this document was a result of that decision. Later revisions have built on lessons learned from plant experience and from improvements to technology and industry understanding of FAC. This revision incorporates lessons learned and new technology that have become available since the last revision of this document published in April 1999.

### **Keywords**

Flow-accelerated corrosion  
Erosion corrosion  
Wall thinning  
Piping systems  
Reliability

### **Export Control Restrictions**

Access to and use of EPRI Intellectual Property is granted with the specific understanding and requirement that responsibility for ensuring full compliance with all applicable U.S. and foreign export laws and regulations is being undertaken by you and your company. This includes an obligation to ensure that any individual receiving access hereunder who is not a U.S. citizen or permanent U.S. resident is permitted access under applicable U.S. and foreign export laws and regulations. In the event you are uncertain whether you or your company may lawfully obtain access to this EPRI Intellectual Property, you acknowledge that it is your obligation to consult with your company's legal counsel to determine whether this access is lawful. Although EPRI may make available on a case-by-case basis an informal assessment of the applicable U.S. export classification for specific EPRI Intellectual Property, you and your company acknowledge that this assessment is solely for informational purposes and not for reliance purposes. You and your company acknowledge that it is still the obligation of you and your company to make your own assessment of the applicable U.S. export classification and ensure compliance accordingly. You and your company understand and acknowledge your obligations to make a prompt report to EPRI and the appropriate authorities regarding any access to or use of EPRI Intellectual Property hereunder that may be in violation of applicable U.S. or foreign export laws or regulations.

© 2006 Electric Power Research Institute (EPRI), Inc. All rights reserved.  
Electric Power Research Institute and EPRI are registered service marks of  
the Electric Power Research Institute, Inc.

♻️ Printed on recycled paper in the United States of America

### **The Electric Power Research Institute (EPRI)**

The Electric Power Research Institute (EPRI), with major locations in Palo Alto, California, and Charlotte, North Carolina, was established in 1973 as an independent, nonprofit center for public interest energy and environmental research. EPRI brings together members, participants, the Institute's scientists and engineers, and other leading experts to work collaboratively on solutions to the challenges of electric power. These solutions span nearly every area of electricity generation, delivery, and use, including health, safety, and environment. EPRI's members represent over 90% of the electricity generated in the United States. International participation represents nearly 15% of EPRI's total research, development, and demonstration program.

Together...Shaping the Future of Electricity

*Program:*

Nuclear Power

1011838

### **ELECTRIC POWER RESEARCH INSTITUTE**

3420 Hillview Avenue, Palo Alto, California 94304-1395 • PO Box 10412, Palo Alto, California 94303-0813 USA  
800.313.3774 • 650.855.2121 • [askepri@epri.com](mailto:askepri@epri.com) • [www.epri.com](http://www.epri.com)