

May 12, 2008

**UNITED STATES OF AMERICA**  
**NUCLEAR REGULATORY COMMISSION**  
Before 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. ) ASLBP No. 06-849-03-LR  
)  
(Vermont Yankee Nuclear Power Station) )

**TESTIMONY OF JEFFREY S. HOROWITZ AND JAMES C. FITZPATRICK**  
**ON NEC CONTENTION 4 – FLOW-ACCELERATED CORROSION**

**I. WITNESS BACKGROUND**

**Jeffrey S. Horowitz (“JSH”)**

- Q1.** Please state your full name.
- A1.** (JSH) My name is Jeffrey S. Horowitz.
- Q2.** By whom are you employed and what is your position?
- A2.** (JSH) I am an independent consultant.
- Q3.** Please summarize your educational and professional qualifications.
- A3.** (JSH) My professional and educational experience is described in the *curriculum vitae* attached to this testimony as Exhibit E4-02. Briefly summarized, I have more than 36 years of experience in the field of nuclear energy and related disciplines. For the last 22 years, I have specialized in flow-accelerated corrosion (“FAC”) and nuclear safety analysis. My main client during this time has been the Electric Power

Exhibit E4-06, Section 5.0.

**Q20.** What inspections are performed under VY's FAC Program?

**A20.** (JCF) The VY FAC Program conforms to the inspection recommendations contained in NSAC-202L. See Exhibits E4-06, Section 5.0, and E4-07. The FAC Program calls for piping and component inspections to be conducted at each refueling outage, with the items to be inspected being selected based on:

- required re-inspections and recommendations from previous outages.
- CHECWORKS susceptibility rankings or to calibrate the CHECWORKS models.
- industry/ utility/ station experience including items identified through work orders and condition reports.
- the susceptible non-modeled large bore and small bore program piping.
- engineering judgment.

See Exhibit E4-06, Section 5.3.

**Q21.** Could you explain in more detail how CHECWORKS is used in the FAC Program?

**A21.** (JCF) The FAC Program at VY primarily uses CHECWORKS' FAC wear rate analysis. VY uses CHECWORKS as a tool in planning inspections, evaluating inspection data, and managing the ultrasonic thickness ("UT") data compiled over the past thirteen refueling outages at Vermont Yankee.

**Q22.** Are there features of the VY design that result in a reduction of the amount of piping and components at a typical plant that are potentially susceptible to FAC?

A22. (JCF) Yes. Compared to the majority of nuclear power plants in operation, VY is a relatively small and simple plant. There are fewer FAC-susceptible systems and piping components than at a typical plant, and many of those were either originally constructed of FAC-resistant materials or have been replaced with FAC-resistant materials since their initial installation.

VY has vane-type moisture separators with no reheat steam system. This eliminates a large amount of FAC-susceptible piping and a number of components known to be susceptible to FAC found in a typical nuclear power plant.

The extraction steam system piping, which contains a significant portion of the two-phase piping in a power plant, was originally constructed from FAC-resistant materials. A number of other components and associated piping subject to two-phase flow (wet steam) have been replaced with FAC-resistant materials.

The original plant design and the component replacements result in a significantly smaller amount of FAC-susceptible piping at Vermont Yankee as compared to the typical nuclear power plant of similar size.

Q23. Please describe the use of FAC-resistant material at VY.

A23. (JCF) The most effective action in a Boiling Water Reactor ("BWR") to minimize potential FAC effects is to use piping materials that are resistant to FAC. As previously stated, the original design of VY already incorporated FAC-resistant piping for the entire extraction steam system. In addition, since the plant went into operation, carbon steel piping and equip-