May 3, 2000

EA-00-045
EA-00-053

Mr. L. W. Myers
Senior Vice President
FirstEnergy Nuclear Operating Company
Beaver Valley Power Station
Post Office Box 4
Shippingport, Pennsylvania 15077

SUBJECT: NOTICE OF VIOLATION
(NRC Inspection Report Nos. 50-334/99-10, 50-412/99-10, 50-334/00-01, 50-412/00-01, 50-334/00-02, and 50-412/00-02)

Dear Mr. Myers:

This refers to three NRC inspections conducted from November 27, 1999 to April 1, 2000, at the Beaver Valley Power Station, the results of which were discussed with you at exit meetings on January 13, February 24, and April 10, 2000. The inspections reviewed issues associated with (1) a water hammer event that impacted the Unit 2 service water (SW) system; (2) an event that resulted in mechanical binding of two of the Unit 1 river water (RW) pumps; and (3) the design of the seal water supply to the RW pumps. During the inspections, apparent violations of NRC requirements associated with corrective actions, design control, and test control were identified. On April 13, 2000, a predecisional enforcement conference (conference) was held in the NRC Region I office with Mr. Saunders, you, and members of your staff to discuss the apparent violations, their causes, and your corrective actions.

Based on the information developed during the inspections and the information provided at the conference, the NRC has determined that four violations of NRC requirements occurred. The violations are cited in the enclosed Notice of Violation (Notice) and the circumstances surrounding them are described in detail in the subject inspection reports.

The first violation, which is set forth in Section I of the enclosed Notice, involved the failure to correct a condition adverse to quality involving the SW and RW pump vacuum break check valves. The valves were subject to mechanical binding due to corrosion. Valve binding could result in conditions that could render the affected RW and/or SW pumps inoperable. Although you were aware that the valves occasionally stuck open due to corrosion binding, and you initiated preventive maintenance (PM) task procedures in 1993 to clean and inspect these check valves, the procedures were ineffective. In addition, the tasks were deferred in 1999 without the required evaluations or approvals. Further, although design change requests were initiated in 1996 to replace these valves, the valves had not been replaced as of November 9, 1999. On that date, the vacuum break check valve for the “C” SW pump failed to open, as required, when the SW pump was secured. As a result, a water hammer event occurred on a

subsequent pump start, causing deformation of an expansion joint downstream of the "C" SW pump. This event rendered the "C" pump inoperable because it was not certain that the deformed SW expansion joint was capable of withstanding a SW pump restart.

The water hammer event was not identified until November 21, 1999 (when an operator discovered that the expansion joint was deformed), despite several opportunities to do so. For example, although an operator identified on November 11 that the indicator needle on the discharge pressure gage for the "C" SW pump was bent (significantly deformed), readings were nonetheless taken from the damaged gage for several shifts. In addition, the pressure gage was later repaired without recognizing or further evaluating the cause. As a result of your failure to recognize that the water hammer event had occurred, you unknowingly had two SW pumps inoperable (when you removed the "B" SW pump from service on November 15, 1999). As a result, only one SW train was operable between November 15-21, 1999, contrary to the Technical Specifications.

The second violation involved the failure to perform an adequate design review of a temporary modification to the filtered water system (a source of seal water to the RW pumps). The temporary modification, which bypassed a portion of the filtered water system, resulted in elevated seal water temperature. Prior to the modification, you failed to recognize that a temperature differential between river water and pump seal water supply could adversely impact pump operation. In fact, thermal expansion of the pump internals occurred, causing both the "B" and "C" RW pumps to mechanically bind (which was discovered when attempts were made to start the pumps on February 8, 2000). At the enforcement conference, you contended that your technical review of the temporary operating procedure, which implemented the temporary modification, was reasonable given that, prior to February 2000, there was no technical or industry information available regarding critical characteristics for temperature effects on pump shaft length. Notwithstanding your contention, the NRC concluded that your failure to ensure that the temporary modification to the filtered water system was suitable for application to provide seal water to the safety-related RW pumps constitutes a violation of design control requirements, as set forth in Section II of the Notice.

The other two violations involved design deficiencies associated with the seal water supply to the RW pumps, as well as the failure of the RW pump testing program to identify one of those deficiencies. One deficiency involved the safety-related seal water supply strainers for the RW pumps being undersized and susceptible to river silt fouling. Another deficiency involved the possibility of seal water being supplied from the filtered water storage tank at elevated temperatures, creating the potential for pump failure due to mechanical binding. The failure to ensure that safety-related strainers and the filtered water system were suitable to supply seal water to the safety-related RW pumps constitutes a violation of design control requirements, as set forth in Section III of the Notice.

The NRC is particularly concerned that neither your initial qualification testing nor periodic surveillance testing identified the design deficiencies associated with the safety-related strainers. Although the strainers were tested during pre-operational testing and aligned for a portion of the time during surveillance testing, they were not tested under the most adverse design conditions, or under suitable environmental conditions, as required. Although the design deficiencies were introduced before initial plant startup, the failure of the test program to

demonstrate that the RW pump seal water system would perform satisfactorily under the most adverse conditions allowed the deficiencies to exist for more than 23 years.

The violations were risk significant because the deficiencies could have led to a loss of cooling to safety-related plant equipment such as the emergency diesel generators (EDGs). In the case of the water hammer event, as well as the mechanical binding of the RW pumps, the potential existed for a loss of all cooling water if a single active failure made the other cooling water train inoperable. Additionally, with respect to the design deficiencies associated with the RW seal water supply, the potential existed for common mode failure of the RW pumps during periods of high silt conditions in the river, or failure of the pumps due to mechanical binding during colder weather. Therefore, given the risk significance of the violations, and considering that the SW and RW systems may not have been able to perform their intended safety function under certain conditions, the violations in Sections I and II of the Notice are categorized as Severity Level III violations and the violations in Section III of the Notice are categorized as a Severity Level III problem in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600 (November 9, 1999[1]).

In accordance with the Enforcement Policy, a base civil penalty in the amount of $55,000 is considered for a Severity Level III violation or problem. Because your facility has been the subject of escalated enforcement action within the last 2 years[2], the NRC considered whether credit was warranted for *Identification and Corrective Action* in accordance with the civil penalty assessment process in Section VI.B.2 of the Enforcement Policy.

The NRC has determined that credit is warranted for identification for these Severity Level III violations. With respect to the SW/RW vacuum break check valves, although you had the opportunity to identify that the water hammer event had occurred because of the bent needle on the discharge pressure gage, no personnel were in the cubicle when the event occurred. Because neither the occurrence of the water hammer event nor the resulting deformed expansion joint were readily obvious by human observation, the problem with the degraded vacuum break check valves was not considered an “event revealed” violation in accordance with the Enforcement Policy. Therefore, credit is warranted for your identification of the deformed expansion joint, as well as your identification of the degraded vacuum break check valves as the cause of the water hammer event. With respect to the mechanical binding of the RW pumps, you promptly identified, after the pumps bound, that the cause of the problem was related to thermal expansion and identified the deficiency associated with the temporary modification to the filtered water system. Therefore, identification credit is warranted for this “event revealed” violation. Your event review team (ERT) for the mechanical binding of the RW pumps identified the design deficiencies associated with the seal water supply to the RW pumps. Although the resident inspectors questioned the adequacy of your test program, the NRC recognizes that your review of the design deficiencies was not complete at the time. Therefore, the NRC determined that identification credit is warranted for this Severity Level III problem.

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[1]These enforcement issues were identified during inspections that ended prior to April 2, 2000; therefore, they are being dispositioned in accordance with the Enforcement Policy in effect prior to April 2, 2000.

[2]A Notice of Violation was issued on October 21, 1999, for a Severity Level III problem associated with biofouling which affected the SW supply to the heat exchangers for the emergency diesel generators (EA 99-212).

Credit is also warranted for corrective actions for these Severity Level III violations. You took appropriate immediate corrective actions for all of the problems when they were identified, and your long term corrective actions, as described at the enforcement conference, were considered comprehensive. These actions included, but were not limited to: (1) replacement of the deformed expansion joint and the vacuum break check valves for all of the SW and RW pumps; (2) inspection and evaluation of equipment affected by the water hammer event; (3) training to address personnel awareness of anomalous conditions; (4) procedure revisions and communication of expectations to address preventive maintenance performance issues; (5) protection of the "A" RW train when the "B" and "C" RW pumps mechanically bound; (6) implementation of controls to preclude the use of filtered water to supply seal water to the RW and SW pumps; (7) installation of cyclone strainers for the RW pumps; (8) revision of vendor technical information to reflect the seal water temperature effects; (9) revision of procedures to periodically test the safety-related seal water supply during pump start; and (10) extent of condition reviews for PM, seal water, and surveillance testing issues.

Therefore, to encourage prompt identification and comprehensive correction of violations, I have been authorized, after consultation with the Director, Office of Enforcement, to not propose a civil penalty for any of the violations. Nonetheless, you should recognize the importance of your long term corrective actions, and give appropriate oversight to their proper implementation, given that you have had three significant challenges to your safety-related cooling water systems in less than one year (e.g. mechanical binding of the RW pumps in February 2000 and the SW water hammer event in November 1999, described herein, as well as the macro biological fouling of the SW supply to the EDG heat exchangers in July 1999, described in a prior Notice of Violation).

The violations in the enclosed Notice also would not have resulted in civil penalties if evaluated under the Revised Reactor Oversight Program (RROP), since they did not result in actual safety consequences. Nonetheless, you should be aware that significant violations in the future could result in escalated NRC actions in accordance with the RROP Action Matrix. Our plant performance review letter, dated March 31, 2000, informed you of our plans and schedule for two supplemental inspections focused on reviewing the effectiveness of your corrective actions to address the SW biological fouling and the degraded check valve issues. We will inform you by separate correspondence of our plans and schedule for a supplemental inspection to review your corrective actions for the RW seal water design issues.

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. The NRC will use your response, in part, to determine whether further enforcement action is necessary to ensure compliance with regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response will be placed in the NRC Public Document Room (PDR).

Sincerely,

/RA/

Hubert J. Miller
Regional Administrator

Docket Nos. 50-334, 50-412
License Nos. DPR-66, NPF-73

Enclosure: Notice of Violation

cc w/encl:
K. Ostrowski, Plant General Manager
R. Fast, Director, Plant Maintenance
F. von Ahn, Director, Plant Engineering
R. Donnellon, Director, Projects and Scheduling
M. Pearson, Director, Plant Services
W. Pearce, Manager, Operations
T. Cosgrove, Manager, Licensing
J. A. Hultz, Manager, Projects and Support Services, FirstEnergy
M. Clancy, Mayor, Shippingport, PA
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HBell, OIG
PLohaus, OSP
GCaputo, OI
LTremper, OC
OE:EA
OE:Chron
DScrenci, PAO-RI
NSheehan, PAO-RI
NRC Resident Inspector - Beaver Valley
J. Rogge, DRP
D. Holody, RI
T. Walker, RI

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NAME	TWalker	DHolody		BHolian		RBlough		BFewell		HMiller	
DATE	4/25/00	4/28/00		4/28/00		4/28/00		5/1/00		5/2/00	

ENCLOSURE

NOTICE OF VIOLATION

FirstEnergy
Beaver Valley Power Station

Docket Nos. 50-334, 50-412
License Nos. DPR-66, NPF-73
EAs 00-045, 00-053

During NRC inspections conducted from November 27, 1999 to April 1, 2000, violations of NRC requirements were identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions," NUREG-1600, Rev. 1, the violations are listed below:

I. VIOLATION ASSOCIATED WITH INADEQUATE CORRECTIVE ACTIONS FOR SW VACUUM BREAK CHECK VALVES

10 CFR 50, Appendix B, Criterion XVI "Corrective Action," requires, in part, that conditions adverse to quality be promptly identified and corrected. The cause of significant conditions adverse to quality must be identified and corrective actions taken to preclude recurrence.

Unit 2 Technical Specification (TS) 3.7.4.1 requires that with less than two service water (SW) subsystems supplying safety related equipment OPERABLE, at least two SW subsystems are to be returned to OPERABLE status within 72 hours, or the plant must be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

Contrary to the above, between 1991 and December 1999, the licensee failed to correct and prevent recurrence of a significant condition adverse to quality involving mechanical binding of the river water (RW) (Unit 1) /service water (SW) (Unit 2) pump vacuum break check valves. Specifically, as early as 1991, the licensee identified that the RW and SW pump vacuum break check valves occasionally stuck open due to corrosion binding. Failure of the check valves to close could flood the affected intake structure cubicle making one RW and one SW pump inoperable. The licensee failed to recognize, as evidenced by the lack of procedural direction to verify proper RW/SW vacuum break check valve performance during equipment operation, that failure of the check valve to open due to corrosion binding could also have an adverse affect on the systems. Failure of the vacuum break check valve to open as designed could cause a water hammer in the SW or RW system. The licensee's corrective actions to resolve the degraded condition were not timely or effective as evidenced by the following:

- In 1993, the licensee initiated an annual preventive maintenance (PM) task to clean and inspect the check valves. However, the procedures for implementing the associated PM tasks were incomplete in that they did not contain sufficient instruction to ensure the effects of the valve failure mechanism (corrosion binding) had been corrected. Specifically, the SW PM did not contain instructions to lubricate the collar/hinge pin interface and the RW PM did not verify free valve movement. The RW and SW pump vacuum break check valves continued to exhibit degraded performance within the prescribed PM periodicity.

- In 1995, the vacuum break check valve for the "C" RW pump failed to open and the licensee failed to modify the PM task or implement other corrective actions necessary to preclude recurrent failure of the RW/SW vacuum break check valves.

- Design change requests to replace the check valves were initiated in 1996; however, as of November 9, 1999, the check valves had not been replaced.

- From June to December 1999, PM tasks for safety related Unit 1 RW pump vacuum break check valves and Unit 2 SW pump vacuum break check valves were rejected/rescheduled beyond their periodicity without the required documented technical evaluations or manager approvals.

Consequently, on November 9, 1999, the vacuum break check valve for the "C" SW pump failed to open, causing a water hammer event. The water hammer caused deformation of an expansion joint downstream of the "C" SW pump which rendered the pump inoperable. Subsequently, on November 15, 1999, the "B" SW pump was taken out of service for maintenance, and was not declared operable until November 22, 1999. Therefore, since the "C" SW pump was being relied upon during this time to support operability of the "B" SW train, the "B" SW train was inoperable. As a result, only the "A" SW train was operable with the plant in Mode 1. This condition lasted longer than 72 hours, contrary to Technical Specification 3.7.4.1. **(01013)**

This is a Severity Level III violation (Supplement I)

II. VIOLATION ASSOCIATED WITH INADEQUATE TEMPORARY MODIFICATION OF RW PUMP SEAL WATER SUPPLY SYSTEM

10 CFR 50, Appendix B, Criterion III, requires, in part, that measures shall be established for the selection and review for suitability of application of equipment that is essential to the safety-related function of the system.

Contrary to the above, prior to February 5, 2000, the licensee failed to adequately review the suitability of a temporary modification to the Unit 1 RW pump seal water supply system, which resulted in elevated seal water temperature and led to failure of two RW pumps. Specifically, on February 5, 2000, operators implemented temporary operating procedure (TOP) 90-17, "River Water (RW) Supply to the Six Way Flow Splitting Box," Rev. 3, which altered the RW pump seal injection temperature to river temperature differential to a value outside of the pumps' critical performance attributes. As a result, thermal expansion of the pump internals caused the "B" and "C" RW pumps to mechanically bind, making the "B" RW train inoperable. **(02013)**

This is a Severity Level III violation (Supplement I)

III. VIOLATIONS ASSOCIATED WITH DESIGN DEFICIENCIES AND INADEQUATE TESTING OF SEAL COOLING WATER

A. 10 CFR 50, Appendix B, Criterion III, requires, in part, that measures shall be established for the selection and review for suitability of application of equipment that is essential to the safety-related function of the system.

Contrary to the above, in 1975 and 1976, measures for the selection and suitability of the seal water supply to the Unit 1 river water (RW) pumps were inadequate. Specifically:

- The safety-related self supply seal water strainers for the RW pumps had insufficient capacity to provide an uninterrupted seal cooling flow to the pumps during all river conditions. The safety-related self supply seal water strainers were undersized and susceptible to fouling during conditions of high river silt. In fact, on February 19, 2000, during a period of increased river water level, the safety related seal water strainer for the "B" RW pump clogged causing low seal water pressure to the pump. Additionally, on March 3, 2000, the "C" RW pump seal water strainer clogged immediately after pump start, reducing seal flow below that required for continued pump operation.

- The filtered water system which provided the normal seal water supply to the RW pumps was not suitable for the application in that the potential existed for the seal water temperature to be higher than river water temperature which could cause thermal expansion of the pump internals. Thermal expansion of the pump internals could result in mechanical binding when starting an idle pump which would prevent the pump from performing its safety related function. During installation of filtered water as the normal source of seal water to the RW pumps, the licensee failed to recognize that differential temperature was a critical attribute to pump performance. Consequently, the licensee failed consider that seal water could be supplied from the filtered water storage tank at a higher temperature than river water. **(03013)**

B. 10 CFR 50, Appendix B, Criterion III requires that design control measures provide for verifying the adequacy of design by performance of design reviews, calculational methods, or a suitable test program. Where a test program is used to verify the adequacy of a specific design feature, it shall include suitable qualification testing under the most adverse design conditions.

10 CFR 50, Appendix B, Criterion XI, requires in part, that all testing required to demonstrate that systems will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements contained in applicable design documents. Additionally, the test is to be performed under suitable environmental conditions.

Contrary to the above, since initial plant operation in 1976, RW pump testing did not demonstrate that the RW system would perform satisfactorily in service under the most adverse design and environmental conditions. Specifically, the test program, including original system acceptance testing and periodic

surveillance testing, required by Technical Specifications, failed to verify the safety related self supply seal water strainers were adequate to provide RW pump seal and motor cooling following start of an idle RW pump during all river conditions, including high silt levels. **(03023)**

These violations constitute a Severity Level III problem (Supplement 1).

Pursuant to the provisions of 10 CFR 2.201, FirstEnergy is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region I, and a copy to the NRC Resident Inspector at the facility that is the subject of this Notice, within 30 days of the date of the letter transmitting this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation or severity level, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence, if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or a Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

If you contest this enforcement action, you should also provide a copy of your response to the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001.

Under the authority of Section 182 of the Act, 42 U.S.C. 2232, this response shall be submitted under oath or affirmation.

Because your response will be placed in the NRC Public Document Room (PDR), to the extent possible, it should not include any personal privacy, proprietary, or safeguards information so that it can be placed in the PDR without redaction. If personal privacy or proprietary information is necessary to provide an acceptable response, then please provide a bracketed copy of your response that identifies the information that should be protected and a redacted copy of your response that deletes such information. If you request withholding of such material, you must specifically identify the portions of your response that you seek to have withheld and provide in detail the bases for your claim of withholding (e.g., explain why the disclosure of information will create an unwarranted invasion of personal privacy or provide the information required by 10 CFR 2.790(b) to support a request for withholding confidential commercial or financial information). If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21.

In accordance with 10 CFR 19.11, you may be required to post this Notice within two working days.

Dated this 3rd day of May, 2000