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Return to
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Bruce D. Kenyon
Vice President-Nuclear Operations
215/770-7502

JUN 07 1984

Mr. Thomas T. Martin, Director
Division of Engineering and Technical Programs
U.S. Nuclear Regulatory Commission-Region I
631 Park Avenue
King of Prussia, PA 19406

SUSQUEHANNA STEAM ELECTRIC STATION
NRC INSPECTION REPORT 50-388/84-12
NOTICE OF DEVIATION
ER 100508 FILE 841-04
PLA-2221

Docket No. 50-388

Dear Mr. Starostecki:

This letter and its attachments provide PP&L's response to your letter of May 8, 1984, which forwarded the subject inspection reports & Appendix A, "Notice of Deviation". Attachment 1 contains the response to Appendix A.

Your notice advised that PP&L was to submit a written reply within (30) days of the date of the letter. We trust that the Commission will find the attached responses acceptable.

Very truly yours,

W. Curtis For

B. D. Kenyon
Vice President-Nuclear Operations

Attachment

cc: Mr. R. H. Jacobs - NRC Resident Inspector
Mr. D. J. Florek - NRC Region 1

Attachment 1

RESPONSE TO NOTICE OF DEVIATION

DEVIATION (388/84-12-02)

Final Safety Analysis Report (FSAR) Section 6, Paragraph 6.2.1.1.3.2 states that the inboard and outboard suppression pool drywell vacuum breakers will indicate "not fully closed" when the valve disk is 0.32 inches (inboard) and 0.2 inches (outboard) off their seat.

Contrary to the above neither surveillance procedure SO-259-002, Revision 0, nor SM-259-002 Revision 0, used to test the suppression pool drywell vacuum breakers provided any quantitative values or instructions to calibrate or verify settings of the vacuum breaker position indication switches as stated in the FSAR.

DISCUSSION

The values given in paragraph 6.2.1.1.3.2 of the FSAR are the result of the multiplication of the switch hysteresis through the vacuum breaker's mechanical linkage and are not intended for use as the criteria for the channel calibration required by Technical Specification section 4.6.4.6.3(b). Furthermore, knowing the precise position of each vacuum breaker is unnecessary. We believe this position is justified by certain vacuum breaker design characteristics and the fact that no credible means exists for the vacuum breaker to remain partially open. In addition to our confidence in the design of the vacuum breaker valves, certain operating characteristics of the drywell and wetwell have been observed on Unit 1 which aid in developing a measure of safety and suffice for alternative means of ensuring minimum bypass leakage.

Vacuum breakers are mounted two in series on five downcomers on Susquehanna Unit 1 and Unit 2. These devices function post-LOCA to equalize the pressure between the wetwell and drywell to prevent exceeding the drywell negative design pressure. The vacuum breakers consist of a swinging disk which seats against a patented seal design. The vacuum breaker valve disk is held in the closed position by spring force transmitted through a mechanical linkage. This force will keep the valve disk seated until a differential pressure of greater than 0.5 psi exists across the valve. A cutaway view of the vacuum breaker is shown in Attachment 2. The spring force holding the valve closed results in a torque of approximately 2200 in-lbs acting on the valve seat.

During a LOCA, the steam release in the drywell will provide additional force on the valve disk to keep the valve seated. The initial differential pressure is approximately 22 psid during the initial vent clearing phase of a LOCA and decays to 5.2 psid (downcomer submergence of 12 ft.) during the steam blowdown phase. This results in approximately 6238 lb_f and 1474 lb_f respectively applied against the disk in the closing direction.

The patented seal design is illustrated in a cutaway view included as Attachment 3. An elastomer diaphragm is stretched over a moat which encircles the valve seat. The diaphragm is held in place by two concentric retainer rings. The valve seals when the seal lip on the valve disk assembly touches the diaphragm. The inner seal retainer ring serves to limit the penetration

of the lip into the seal from 0.010 to about 0.020 inches. The primary seal between the lip and diaphragm is pressure boosted. Pressure from the wetwell side of the vacuum breaker is fed into the moat under the elastomer diaphragm. This results in a zero pressure difference across the seal at point A and a full pressure difference across the seal at point B thus assuring a firm contact between the disk and seat. The vacuum breakers are equipped with an anti-tilt, anti-rotation clamp device. This device assures that the disk remains centered and aligned with the valve seat once the initial adjustments are completed. Once adjusted, the valve disk alignment should be adequate for the life of the vacuum breaker. In addition, the device will prevent misalignment during the monthly vacuum breaker operability tests required by Technical Specification section 4.6.4b.2. As a result of the above, it can be seen that the valve is designed to form and maintain a reliable, positive seal under normal and accident conditions.

The position indicating switches are operated through a mechanical linkage external to the valve body that is connected to the body penetrating shaft (see Attachment 2) which rotates as the valve disk opens or closes. Disk movement is transmitted through the mechanical linkage to the position indicating switches. The switches complete an electrical connection to a remote indicator which provides a visual indication that the valve is closed. When the valve disk reaches the full open position a rotary switch is actuated which provides remote visual indication that the valve is open. Hysteresis exists in the mechanical linkage and the switches. Wherever possible, hysteresis is minimized, but its exact value is not established nor is it constant (due to manufacturing tolerances, mechanical wear, and thermal growth). The position indication switches provide nominal indications of valve disk position (open or closed) above the hysteresis tolerance.

The position indicating switches are calibrated using standard procedures for calibrating limit switches. This procedure involves the following:

(1) The vacuum breaker is closed.

(2) When the vacuum breaker is closed, the lever plunger actuator bolt is adjusted to depress the limit switch plunger.

(3) The vacuum breaker is opened. Red OPEN indication is observed.

(4) Rotary switches are adjusted if AMBER closed indication has not extinguished.

(5) The vacuum breaker is closed. Amber CLOSED indication is observed.

(6) Limit switches are adjusted if RED open indication has not extinguished.

(7) The vacuum breakers are cycled several times and correct OPEN/CLOSE indication is verified.

Surveillance procedures SM-59-002 and SM-259-002 will be expanded to give a more detailed explanation of the position indicating switch calibration. This

procedure review and revision process was underway prior to NRC inspection and has now been expedited to a target date for conclusion of 7/1/84. The subject section of the FSAR will also be clarified. The FSAR will be revised at the next FSAR revision after the July 1984 revision.

The valve is protected from any degradation during the monthly operability test required by Technical Specification section 4.6.4b.2. When the remote test switch is actuated, air is applied to the bottom of spring and actuating cylinders. The air pressure overcomes the closing force applied by the spring and opens the valve. When the test switch is released, the pressure to the cylinders is slowly vented to the atmosphere through an orifice. The spring force gradually returns the valve to the closed position.

As indicated previously, a considerable amount of force is exerted to hold the valve closed, the seal design is sophisticated and misalignment is prevented by the anti-tilt, anti-rotation device, and the position indicating switches are capable of providing an indication of valve position over a certain narrow tolerance. Due to the amount of force exerted on the valve disk, PP&L feels that any partial opening (below the tolerance of the position indicating switches) is not credible. If it were to occur, the likelihood of both vacuum breakers in series having the same marginal opening (under the tolerance of the position indicating switch) is even more remote.

In addition, the drywell/wetwell leakage is verified to be below the maximum value of $A/\sqrt{K}$ listed in Technical Specification section 3.6.2.1 at least once every 18 months by the performance of a drywell to wetwell bypass leakage test in accordance with Technical Specification Section 4.6.2.1d. This bypass leakage test insures that the drywell to wetwell leakage is less than or equal to 10% of the $A/\sqrt{K}$ design value of 0.0535 ft^2. This conservative test provides additional assurance that any slight opening below the tolerance of the position indicating switches will be identified before a safety concern exists. It also should be noted that these valves have gone through a rigorous qualification program and are capable of withstanding severe loads.

During the operation of Unit 1, operating characteristics were observed which support the aforementioned reasons for not needing precise indication of valve disk position. The drywell and wetwell normally operate at different pressures. The FSAR states the maximum leakage factored into the accident analysis is 0.0535 $A/\sqrt{K}$ ft^2 and that this approximates a 4 inch hole. Now that Unit 1 is inerted, the drywell usually runs at a slightly higher pressure than the wetwell and the nitrogen supply is not a continuous makeup system. If a 4 inch hole existed between the wetwell and drywell this difference in pressure could not be maintained. Occasionally, after HPCI and RCIC testing have added a sufficient amount of oxygen to the wetwell, the wetwell must be vented and nitrogen added to maintain the atmosphere within limits. Again, if a 4 inch hole existed between the drywell and wetwell, the drywell atmosphere would also be affected by these conditions.

In conclusion, the vacuum breaker design is sophisticated and has several inherent features that prevent leakage through the valve. For drywell to wetwell leakage to occur it would have to pass through two valves. Additional vacuum breaker integrity assurance is provided by an 18 month surveillance.

Operating characteristics serve as a backup to vacuum breaker position indicators and are indicative of the leak-tight integrity between the drywell and wetwell. As a result, PP&L feels confident that the vacuum breaker will operate as required and precise position indication is not necessary.

RESPONSE

(1) Corrective steps which have been taken and the results achieved:

Susquehanna is not in deviation with the FSAR since the values provided in the FSAR are for design information and do not constitute calibration criteria. In addition, for the reasons presented above, precise position indication for each vacuum breaker is unnecessary.

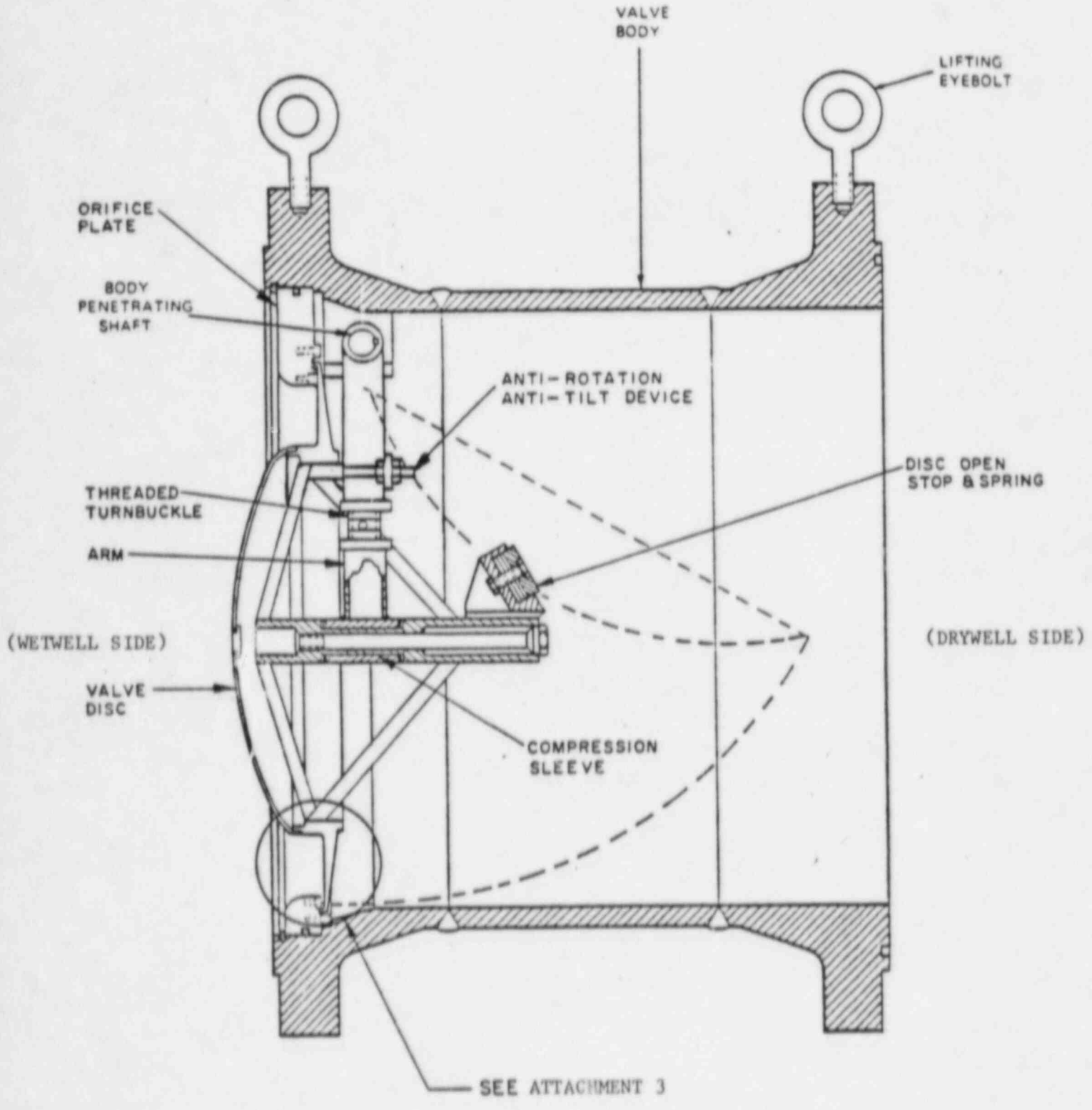
(2) Corrective steps which will be taken to avoid further deviations:

None required.

(3) Date when full compliance will be achieved:

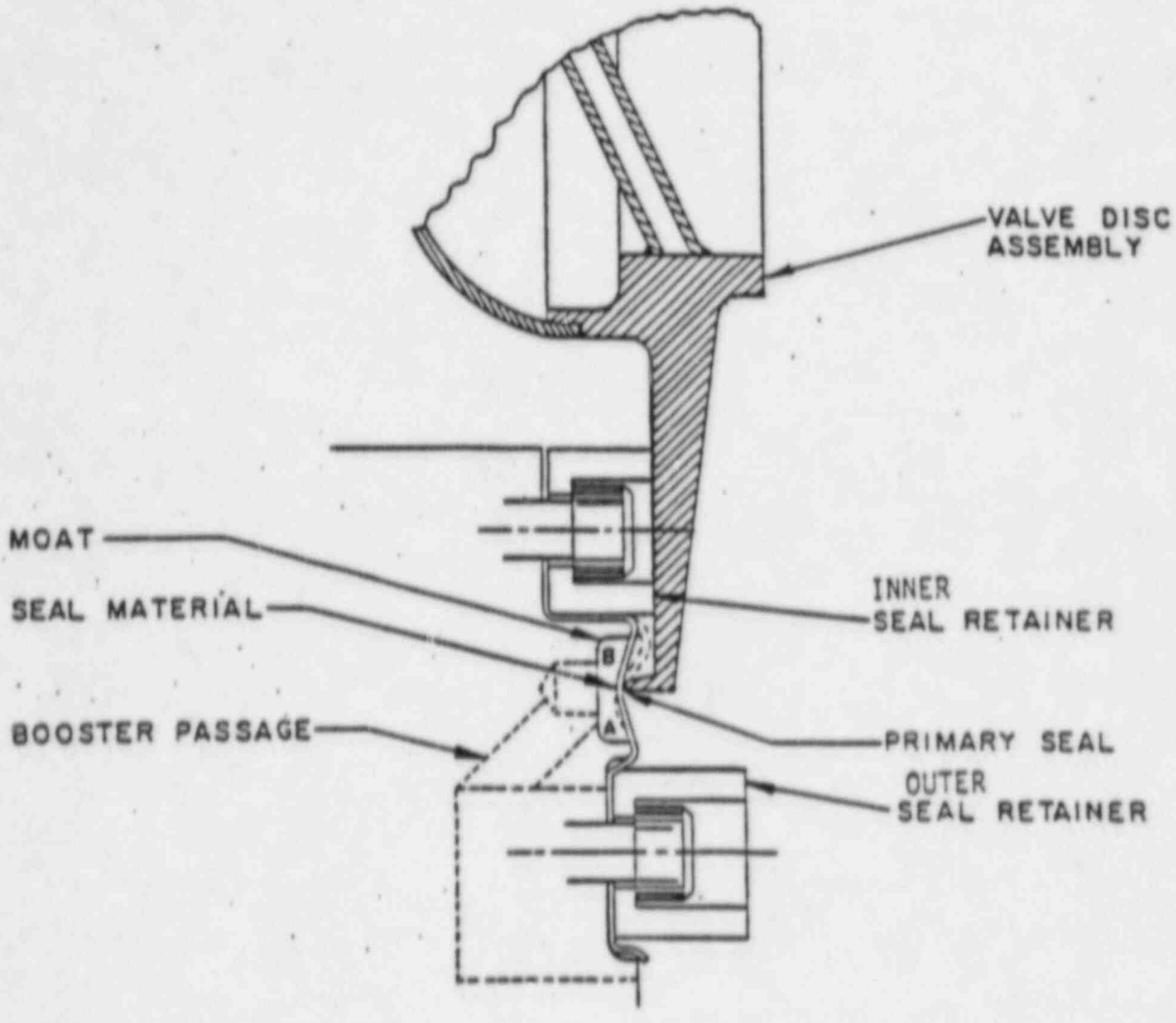
PP&L is in full compliance.

ATTACHMENT 2



Disk Assembly Installed in the Valve Body

ATTACHMENT 3



CV1-L Valve, Seal Detail
Patent 3,722,852