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Beaver Valley Power Station, Unit No. 2
Docket No. 50-412 License No. NPF-73
LER 99-011-01

United States Nuclear Regulatory Commission
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Washington, DC 20555

In accordance with Appendix A, Beaver Valley Technical Specifications, the following Licensee Event Report Supplement is submitted:

LER 99-011-01, 10 CFR 50.73(a)(2)(i)(B) and 10 CFR 50.73(a)(2)(ii)(B), "Inoperability of Service Water System Train B Due to Deformed Discharge Expansion Joint on In-Service Pump 2SWS*P21C." This LER supplement reflects results of a formal root cause evaluation of deformed expansion joint 2SWS-EJM222C and the failure of vacuum break check valve (VBCV) 2SWS-488 of SWS pump 2SWS*P21C. In addition, this submittal corrects the safety implications and updates the corrective actions.

K.L. Ostrowski for

Lew W. Myers

Attachment

IE22

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NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION
(6-1998)

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Beaver Valley Power Station (BVPS) Unit 2	05000412	1 OF 12

TITLE (4)
Inoperability of Service Water System Train B Due to Deformed Discharge Expansion Joint on In-Service Pump 2SWS*P21C

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	
11	09	99	99	011	01	3	28	2000	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1
POWER LEVEL (10)	100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)	✓ 50.73(a)(2)(i)	50.73(a)(2)(viii)
	20.2203(a)(1)		20.2203(a)(3)(i)	✓ 50.73(a)(2)(ii)	50.73(a)(2)(x)
	20.2203(a)(2)(i)		20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
	20.2203(a)(2)(ii)		20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
	20.2203(a)(2)(iii)		50.36(c)(1)	50.73(a)(2)(v)	
	20.2203(a)(2)(iv)		50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
M. S. Ackerman, Manager - Safety & Licensing	(412) 393-5203

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	BI	EXJ	F155	Y		X	BI	CKV	W030	Y
X	BI	PI	D243	Y		X	BI	ISV	W030	Y

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	X	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

(All times are approximate) Service Water System (SWS) "swing" pump 2SWS*P21C was supplying the SWS B Train, since 0428 hours on 11/15/99, while the train normal supply pump 2SWS*P21B was out of service for planned replacement of the pump vacuum break check valve (VBCV) 2SWS-487. At 0056 hours on 11/21/99, it was discovered that the 2SWS*P21C discharge expansion joint 2SWS-EJM222C was deformed. Due to the unknown ability of 2SWS-EJM222C to maintain pressure boundary integrity, 2SWS*P21C was declared inoperable and required action of Technical Specification (TS) 3.7.4.1 was entered. At 0154 hours on 11/21/99, Standby Service Water Pump 2SWE-P21B was placed into service to supply B SWS Train and 2SWS*P21C was removed from service. The work on 2SWS*P21B was completed and the pump was available at 2232 hours on 11/21/99. The pump was placed into service to supply B SWS Train and TS required action was exited at 0035 hours on 11/22/99.

Investigation has determined 2SWS-EJM222C deformed at 1149 hours on 11/9/99, due to water hammer of the 2SWS*P21C discharge piping during pump startup for quarterly safeguards protection system slave relay testing. The water hammer resulted from a stuck closed pump VBCV, 2SWS-488. 2SWS-EJM222C and 2SWS-488 have been replaced. NRC notification per 10 CFR 50.72(b)(1)(ii)(B) was made, at 1430 hours on 12/16/99, following engineering assessment that concluded the ability of 2SWS-EJM222C to withstand a transient and maintain SWS pressure boundary integrity was indeterminate and, therefore, the capability of the SWS to perform its intended function under all design conditions was potentially adversely affected.

PLANT AND SYSTEM IDENTIFICATION

Westinghouse Pressurized Water Reactor (PWR)

Service Water System (SWS) {BI}*

SWS Pump 2SWS*P21C {BI/P}

SWS Pump 2SWS*P21C Discharge Expansion Joint 2SWS-EJM222C {BI/EXJ}*

* Energy Industry Identification System (EIIS) system and component function identifier codes appear in the text as {XX/XX}.

Times discussed in this report are approximate.

This LER supplement reflects results of a formal root cause evaluation of deformed expansion joint 2SWS-EJM222C and the failure of vacuum break check valve (VBCV) 2SWS-488 of SWS pump 2SWS*P21C. This submittal also updates the safety implications and the corrective actions.

EVENT DESCRIPTION

Service Water System (SWS) "swing" pump 2SWS*P21C was in-service since 0428 hours on November 15, 1999, supplying the B SWS Train (subsystem), while the train normal supply pump 2SWS*P21B {BI/P} was out of service to replace the pump VBCV 2SWS-487 {BI/VACB}. 2SWS*P21C is capable of being aligned to supply either SWS Train (A or B). At 0056 hours on November 21, 1999, it was discovered that the 2SWS*P21C pump discharge metal expansion joint, 2SWS-EJM222C, was deformed from an apparent pressure excursion. Due to the unknown ability of 2SWS-EJM222C to maintain pressure boundary integrity, 2SWS*P21C was declared inoperable effective at time of discovery and required action of Technical Specifications (TS) was entered. Required ACTION of TS 3.7.4.1 specifies that with less than two SWS subsystems OPERABLE, to restore at least two subsystems to OPERABLE within 72 hours or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. At 0154 hours on November 21, 1999, Standby Service Water (SWE) Pump 2SWE-P21B {KG/P} was placed into service to supply B SWS Train and 2SWS*P21C was removed from service. The work on 2SWS*P21B was completed and the pump was available at 2232 hours on November 21, 1999. The pump was placed into service to supply the B SWS Train, and the required action of TS 3.7.4.1 was exited at 0035 hours on November 22, 1999.

TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

EVENT DESCRIPTION (continued)

2SWS-EJM222C (Senior Flexonics, Incorporated Drawing Number D-54909) deformed on November 9, 1999, at 1149 hours. This determination is based upon a formal root cause analysis. This analysis included: review of surveillance test procedures, computer logs, operating shift logs for the pump run documentation prior to November 15, 1999, and discovery on November 11, 1999 that the idle pump local pressure indicator, 2SWS-PI101C {BI/PI}, had been over-ranged, as evidenced by a bent indicator pointer.

An in-kind replacement pressure indicator had been installed in place of failed pressure indicator 2SWS-PI101C, Dresser Industries Valve & Instrument Division / Ashcroft Trade Mark, Model No. 45-1279SS-04L-XSG6N.

Event discovery was made during routine rounds of the Intake Structure and is credited to attention to detail by the outside tour operator (OTO) (non-licensed, utility). This condition was not readily self-revealing, as the expansion joint is partially obscured from visual observation by a cover and the expansion joint was holding normal SWS pressure.

REPORTABILITY

TS 3.7.4.1 requires at least two service water subsystems (trains) be OPERABLE to supply safety related equipment. Required ACTION of TS 3.7.4.1 specifies that with less than two SWS subsystems OPERABLE, to restore at least two subsystems to OPERABLE within 72 hours or to be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours. Therefore, operation with 2SWS*P21C supplying the B SWS Train, from November 15, 1999 until November 21, 1999, exceeded the TS required action time frame. As such, this event constitutes an operation or condition prohibited by TS, which is applicable to the non-emergency event 30-day LER reporting criteria of 10 CFR 50.73(a)(2)(i)(B).

Engineering assessment initiated following event discovery concluded, at 1345 hours on December 16, 1999, that the ability of 2SWS-EJM222C to withstand a transient and maintain SWS pressure boundary integrity was indeterminate. Consequently, the capability of the SWS system to perform its intended function under all design basis conditions was potentially adversely affected due to the as-found condition of the expansion joint. Based on this conclusion, it could not be assured that the Unit had remained within plant design basis during the

REPORTABILITY (continued)

time frame that 2SWS*P21C was relied upon to maintain operability of SWS Train B. Therefore, at 1430 hours on December 16, 1999, NRC 1-hour non-emergency event notification was made per the reporting criteria of 10 CFR 50.72(b)(ii)(B), for the Unit having been "In a condition that is outside the design basis of the plant." In addition, the NRC Resident Inspector was advised of this notification. This condition is therefore also applicable to the non-emergency event 30-day LER reporting criteria of 10 CFR 50.73(a)(2)(ii)(B), for the plant being "In a condition that was outside the design basis of the plant."

CAUSE OF THE EVENT

The cause of deformed expansion joint 2SWS-EJM222C on the 2SWS*P21C pump associated discharge piping is attributed to water hammer on November 9, 1999. The root cause of the deformed expansion joint was failure of the pump VBCV, 2SWS-488 {BI/VACB} Walworth Co. Model 5341WE to open as designed. This occurred due to corrosion buildup/binding of the valve disc, hinge and hanger.

The VBCV is designed to admit air into the pump suction piping after pump shutdown. This is intended to prevent separation of the water column in the pump suction piping and a vacuum condition from occurring when the water column in the piping falls back to the pump intake source. Operability of the Unit 2 SWS pumps VBCVs is verified on a quarterly basis during performance of each SWS pump's respective Operating Surveillance Test (OST) 2OST-30.2 (pump 21A), -30.3 (pump 21B), and -30.6 (pump 21C).

The water hammer occurred when 2SWS*P21C was auto-started on November 9, 1999, for Operations Surveillance Test 2(OST)-1.12B, "Safeguards Protection System Train B Safety Injection System Go Test." To prepare for this test, the pump, which had been in service since October 20, 1999, was shutdown, at 1051 hours on November 9, 1999. However, while the pump was shutdown (58 minutes duration), the water column in the pump suction piping separated causing a vacuum condition to occur in the pump suction and discharge piping, upstream of the pump discharge check valve, 2SWS-59. This resulted from the VBCV being stuck closed. Consequently, upon pump startup at 1149 hours for the test, the pump suction water column rejoined causing the water hammer.

CAUSE OF THE EVENT (continued)

The corrosion buildup/binding of VBCV 2SWS-488 resulted from a missed performance of a regularly scheduled preventative maintenance (PM) task for inspection and cleaning of the valve. The prior performance of the PM was on June 26, 1998. The next scheduled PM, tracked via repetitive task work order (W/O), should have been targeted for completion during the work week of June 21, 1999. However, this work was not completed and the PM subsequently slipped into its 25% grace period, which ended September 19, 1999. While still within the grace period, the PM repetitive task was rejected on August 18, 1999, in favor of another non-repetitive task to replace the entire 2SWS-488 valve per Technical Evaluation Report (TER) 10884. This TER was developed for Unit 2 to upgrade these valves to a flanged nozzle check valve. The repetitive task for the PM was rejected with the intent to complete the replacement of the valve per the TER prior to expiration of the PM grace period. However, the closure of the PM repetitive task did not formally address the need to implement the TER, which was subsequently delayed. Had the PM been performed within the original scheduled time frame, the water hammer event, which occurred on November 9, 1999, would not have occurred. Additional contributors include: inadequate guidance in administrative instruction for linking tasks together, failure to adequately initiate add/drop forms for the work which was dropped from the 12-week schedule, an inadequate questioning attitude by the involved Work Planner, and inadequate communication/coordination between the involved work planner and PM coordinator.

The date/time at which 2SWS-488 ceased to have the ability to open is unknown. Prior to the waterhammer on November 9, 1999, operability of the valve was verified by the OST on September 18 and 19, 1999. Based on review of operating narrative logs, corroborating data from operator tour logs, and engineering judgment, 2SWS-488 was demonstrated to be functional through the last start/stop of the pump on October 20, 1999, at 1824/1827 hours. In addressing the SAFETY IMPLICATIONS of this occurrence, 2SWS-488 was conservatively considered to be not capable of opening following the last successful start/stop of the pump on October 20, 1999.

The primary failure mechanism of the valve gate of 2SWS-483, Walworth Co. Model 5202WE {BI/ISV} was determined to be corrosion of the gate carbon steel material. As a result of the incurred corrosion and the waterhammer event, the valve gate had separated from the valve stem and lodged in the vacuum break flowpath piping.

Prior to the time of discovery on November 21, 1999, the station missed opportunities, when 2SWS*P21C was idle, to identify that a

CAUSE OF THE EVENT (continued)

water hammer had occurred on November 9, 1999. This included when the OTO, who discovered the failed indicator on November 11, 1999, did not recognize the significance of the bent indicator needle. In addition, the significance of this discovery was not further evaluated by the Senior Reactor Operator (utility licensed) in the work control center.

SAFETY IMPLICATIONS

The event was isolated to deformation of 2SWS-EJM222C, with no indication of existing or potential piping failures noted beyond the 2SWS*P21C discharge isolation valves 2SWS-MOV102C1 and 2SWS-MOV102C2 {BI/ISV}. During the time period 2SWS*P21C was supplying the SWS B Train with the deformed expansion joint 2SWS-EJM222C, the pump discharge piping remained capable of maintaining pressure integrity under normal plant operation. However, pressure boundary integrity could not be assured if an additional challenge to the expansion joint would have occurred due to a pump re-start, either through Emergency Diesel Generator (EDG) automatic start sequencing or manual starting of the pump. With a postulated failure of the expansion joint SWS pressure boundary, it is expected that the Operator would have promptly shutdown 2SWS*P21C, which would have then isolated 2SWS Train B from the pump due to automatic closure of the pump motor-operated discharge valve, 2SWS-MOV102C2, and through the reverse flow seating of discharge check valve 2SWS-59 and the 2SWS Train B discharge header check valve, 2SWS-107.

In addition, it is expected that the opposite SWS Train A would have functioned to mitigate an accident. If an assumed single failure of SWS Train A prevented the train from completing successful mitigation of a design basis accident (DBA), SWS Train B could have provided required cooling flow through the use of the Standby Service Water (SWE) Pump 2SWE*P21B, located in the alternate intake structure. SWE pumps are adequately sized to provide enough flow for all Engineered Safety Feature loads supplied by the SWS. 2SWE*P21B would have automatically started on low Train header pressure unless a loss of offsite power (LOOP) occurred. In the case of a LOOP, appropriate action could have been taken to manually start the pump. In addition, discharge pressure from the running 2SWE*P21B would have closed the 2SWS Train B discharge header check valve, 2SWS-107. This would have further isolated 2SWS Train B from a failure of expansion joint 2SWS-EJM222C.

TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

SAFETY IMPLICATIONS (continued)

The potential effect of this occurrence upon a running EDG would be mitigated by the Operator actions to either shutdown the affected EDG or to start an alternative source of SWE supply. Specific allowable operating times for the operators to shutdown the EDG with a loss of SWS under DBA scenarios have been evaluated. These operating times are based on analysis, which concluded that a time period of over seven minutes would be available prior to exceeding EDG recommended temperature limits. These allowable times would permit the Operators to diagnose and adequately respond to events related to a failure of a SWS expansion joint.

Subsequent static pressure testing of damaged expansion joint 2SWS-EJM222C by the vendor (Senior Flexonics, Incorporated), was performed. This testing utilized the same method used for hydrostatically testing new expansion joints. The design pressure for the expansion joint is 150 psig, the damaged joint was pressurized and held at a hydrostatic test pressure of 230 psig. The joint pressure was increased, and the test was stopped at 495 psig, when a failure of the structural integrity of the damaged joint occurred. This testing demonstrated that a pressure boundary failure of the damaged expansion joint during normal operating conditions would not have occurred. It is recognized that the results of the static pressure test performed cannot readily predict the ability of the damaged joint to withstand additional dynamic loadings.

Assumed SWS leakage from a postulated pressure boundary failure of 2SWS-EJM222C may have adversely affected operation of Unit 1 River Water System (RWS) (reactor plant) Pump 1WR-P-1B, which is located in the same pump cubicle. In response to the resulting SWS low header pressure, it is anticipated the Operator would have expeditiously shutdown 2SWS*P21C to limit the consequences and severity of this postulated occurrence.

Based on the above, it is expected that the postulated failure of expansion joint 2SWS-EJM222C, would not have prevented the fulfillment of Service Water supplying all ESF loads. As such, the deformation of expansion joint 2SWS-EJM222C had minimal effect on the health and safety of the public.

The change in core damage frequency (delta CDF) associated with the deformed Unit 2 Service Water expansion joint (2SWS-EJM22C) was determined to be low at Unit 2 and very low at Unit 1. These delta CDF determinations were based on the forthcoming NRC Significance Determination Process (SDP) using the Updated PRA models of record.

SAFETY IMPLICATIONS (continued)

The risk associated with this condition at Unit 2 was characterized to be low. If it is assumed that the expansion joint had some probability of remaining intact by applying non-quantifiable factors during a LOOP transient, the resultant delta CDF value would be less than the 1.0E-06 threshold value and the event would result in low risk or be considered a "GREEN" condition. While the probability of a damaged expansion joint surviving a LOOP cannot be quantified, certain qualitative factors were present that would have acted to mitigate the severity of a waterhammer from a pump start following a LOOP. These qualitative factors include an opened pump discharge motor operated valve which would have provided a large discharge volume to reduce the peak transient pressure experienced by the expansion joint, and normally encountered leakage past the pump discharge check valve which, over time, would provide some vacuum break capability to reduce the severity of the pressure transient.

However, if it is conservatively assumed that the damaged expansion joint would actually rupture 100% of the time for any modeled seismic event or pump restart following a LOOP during the period of vulnerability, the resultant delta CDF value would be considered "WHITE" (1.0E-05 > delta CDF > 1.0E-06) per the NRC SDP guidelines. This value would also be slightly above the non-risk significant threshold value (CDP < 1.0E-06) as discussed in EPRI Probabilistic Safety Assessment (PSA) Applications Guidelines.

The risk associated with this condition at Unit 1 was characterized to be very low and would be considered a "GREEN" condition per the NRC SDP and non-risk significant, per the EPRI PSA Applications Guide screening criteria for temporary changes.

The duration used in the delta CDF determinations was based on an engineering review that determined that a SWS expansion joint in an undamaged state with an existing stuck closed VBCV, would have remained functional in response to a pump restart. Consequently, although the opening capability of 2SWS-488 was unknown beginning after the last start/stop of the pump on October 20, 1999, and until the performance of 20ST-1.12B on November 9, 1999, it is expected that the undamaged expansion joint would have remained functional in response to a pump restart. Therefore, this timeframe is not included in the delta CDF calculation. Also, since there is an insignificant increase in CDF during the time that the expansion joint was deformed and pump 2SWS*P21C was either not in-service or was in-service and considered to be the only pump unavailable, it was not included in the

SAFETY IMPLICATIONS (continued)

delta CDF calculation. The delta CDF calculation was performed during the time period that significant risk occurred when two (2) Service Water pumps were unavailable, which amounted to a duration of 160.7 hours. This duration represents the timeframe when 2SWS-EJM222C was deformed and 2SWS*P21C was in-service with 2SWS*P21B cleared for Preventive Maintenance work (at 0549 hours on November 15, 1999), until the time when 2SWS*P21B would have been available for service following its successful start during the post maintenance test, at 2232 hours on November 21, 1999. The start time for 2SWS*P21B unavailability is based on the time that the pump was placed on clearance and not the time that the pump had been secured from the SWS B Train at 0428 hours on November 15, 1999, since it would have been available for realignment to the train, if required. The delta CDF analysis at Unit 2 was conservatively calculated, based on the assumption that two Service Water pumps would not have been available for use given that 2SWS*P21B was out-of-service and a postulated failure of the expansion joint (in its damaged state) would have failed pump 2SWS*P21C, due to either a seismic event or pump restart following a LOOP. Other initiating events that result in the LOOP due to the fast bus transfer failing were not factored into the delta CDF due to the low probability of occurrence.

The postulated rupture of 2SWS-EJM22C (in its damaged state) is also assumed to result in flooding of the "B" intake structure cubicle, which then impacts the Unit 1 River Water pump located within the same cubicle. The Unit 1 increase in CDF was based on the failure of the running River Water pump as a result of a flood and also conservatively assumed that the spare River Water pump was unavailable during this time frame.

CORRECTIVE ACTION

1. On November 21, 1999, inspection of the remaining metal expansion joints in both Unit 2 SWS trains was conducted and the joints were found to be in good condition, with no apparent signs of distress.

2. On November 24, 1999, structural engineering personnel performed walkdowns of the SWS piping in the pump cubicles of the Unit 2 SWS pumps and determined there were no indications in the cubicles that the piping or adjacent structures experienced significant displacements.

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TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

CORRECTIVE ACTION (continued)

3. An inspection of pipe supports downstream of 2SWS*P21C and SWS-EJM222C was performed, which found no apparent damage.

4. Deformed expansion joint 2SWS-EJM222C of SWS pump 2SWS*P21C was removed and a replacement expansion joint was installed on December 22, 1999.

5. VBCV 2SWS-488 of 2SWS*P21C was replaced with a new style nozzle check valve, Enertech Model DRVZ on December 22, 1999.

6. The piping downstream of 2SWS*P21C has been evaluated for potential over-stress conditions due to the hydraulic transient, resulting from this condition and determined to be acceptable.

7. Prior to returning 2SWS*P21C to service, possible effects from potential over-stress conditions upon the pump and its discharge isolation valves, 2SWS-MOV102C1 and 2SWS-MOV102C2, resulting from the waterhammer on November 9, 1999, were evaluated. This evaluation concluded there were no detrimental effects to the pump and the discharge isolation valves. The evaluation included data taken from static tests and valve strokes during pump start and shutdown. Review showed this data was typical for normal performance during comparable previous tests.

8. Manual isolation valve 2SWS-483 was repaired on December 22, 1999.

9. The 2SWS*P21C discharge check valve, 2SWS-59 was inspected for signs of distress due to the hydraulic transient that deformed the pump discharge expansion joint 2SWS-EJM222C and on December 19, 1999, was determined to be acceptable.

10. Following return of 2SWS*P21C to service, an inspection of the manual isolation valves of the corresponding VBCVs of the other SWS pumps on Unit 2 was completed. As a result of this inspection, appropriate repairs were made to the corresponding valves for the 2SWS*P21A and B pumps in response to an as-found corroded condition of these valves.

11. The primary failure mechanism of the 2SWS-483 valve gate was evaluated under a separate Condition Report and determined to be corrosion of the valve gate carbon steel material. During the current Unit 1 refueling outage (1R13), the corresponding manual isolation valves of the VBCVs on the Unit 1 RWS (reactor plant) pumps were inspected and repaired or replaced, as necessary.

TEXT *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

CORRECTIVE ACTION (continued)

12. The VBCVs originally employed on the intake pumps of the Unit 2 SWS have been replaced with nozzle style check valves, Enertech Model DRVZ. The originally used plug style vacuum check valves for the three Unit 1 (reactor plant) RWS pumps have been replaced with nozzle style check valves (Enertech Model DRVZ) during the current Unit 1 refueling outage (1R13). By November 30, 2000, a PM of the appropriate periodicity will be established for these new style VBCVs on the three SWS pumps of Unit 2, as well as the three (reactor plant) RWS pumps on Unit 1. It should be noted this PM periodicity will be based on the results of sample inspections of the recently installed nozzle style check valves on the Unit 2 SWS pumps.

13. This event was summarized, along with examples of water hammer operating experience at other nuclear facilities, and was presented in Operations shift briefings to emphasize the importance of observing those passive components that support component operability and the importance of having a questioning attitude for equipment deficiencies.

14. The Training Department has included this event in the Plant Status Update portion of the licensed re-training and non-licensed re-training Module 1 of the 2000 cycle. This training module discussed information regarding this water hammer, including symptoms of a water hammer occurrence, causes, Management expectations regarding a questioning attitude, and actions required if water hammer is suspected.

15. The expectations associated with PM limit dates and proper documentation have been clearly expressed to the Surveillance/PM Coordinators. In addition, the PM coordinators have been instructed to generate PM limit date reports for review and resolution of any items identified.

16. A complete list of PM tasks beyond their limit date was developed on December 23, 1999, and an engineering review was conducted to determine impacts to operability. Each item on the list was determined to be acceptable and documented or the PM was performed.

CORRECTIVE ACTION (continued)

17. A site communication memorandum was issued from the BVPS Sr. Vice President expressing the expectations and requirements for approving a PM task to enter the performance grace period or to exceed a limit date. To reflect the guidance provided in the memorandum from the BVPS Sr. Vice President, the appropriate administrative procedure was revised effective January 27, 2000.

PREVIOUS SIMILAR EVENTS

A review of LERs for BVPS Unit 1 and Unit 2 within the last three years to-date identified two occurrences involving design or operational issues on the BVPS Unit 1 River Water System or BVPS Unit 2 Service Water System.

BVPS Unit 2 LER 99-07, "Forced Shutdown Due to Inoperable Emergency Diesel Generator."

BVPS Unit 1 LER 2000-02, "Condition Outside Design Basis for One Train of River Water System Inoperable."