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February 23, 2000
L-00-027

Beaver Valley Power Station, Unit No. 1 & No. 2
BV-1 Docket No. 50-334, License No. DPR-66
BV-2 Docket No. 50-412, License No. NPF-73
LER 2000-001-00

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

LER 2000-001-00, 10 CFR 50.73(a)(2)(ii), "Inadequate Guidance Provided to Operators Regarding Post-DBA Operation of SLCRS," was previously submitted by letter (L-00-024) dated February 21, 2000. However, the LER abstract page inadvertently listed an incorrect report date of 02/17/2000. The attached copy of LER 2000-001-00 correctly lists the report date as 02/21/2000 on the LER abstract page and supersedes the previous version. No other changes were made to the LER.

We apologize for any inconvenience that this has caused.

K. L. Ostrowski

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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

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TITLE (4)

Inadequate Guidance Provided to Operators Regarding Post-DBA Operation of SLCRS

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL	REVISION	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									Beaver Valley Unit 2	05000412
01	21	2000	2000	001	00	02	21	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)	X	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)
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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

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

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

During the evaluation of a separate Condition Report involving the Beaver Valley Power Station (BVPS) Unit 1 Supplemental Leak Collection & Release System (SLCRS), it was discovered that the control room operators did not have sufficient guidance for ensuring that the safety related SLCRS would be operating following an accident. SLCRS operation post-DBA ensures that Engineered Safety Features (ESF) leakage following the postulated DBA LOCA will not cause the total calculated dose to exceed 10CFR100 limits and also provides post-DBA cooling air flow for the ESF pump motors. Thus post-DBA SLCRS operation is needed to maintain plant design basis conditions. Though SLCRS exhaust fan operation is credited post-DBA, operator guidance did not ensure that SLCRS would be available in all conditions where SLCRS flow is required following a DBA. This lack of sufficient administrative controls would potentially not ensure adequate post-DBA SLCRS operation, when required. This is a condition beyond the plant design basis. Operation of BVPS Unit 1 and Unit 2 in a condition which is beyond the design basis of the plant is reportable pursuant to 10CFR50.73(a)(2)(ii)(B).

A cause of this event is a failure to translate design requirements for the BVPS Units 1 and 2 SLCRS into appropriate administrative controls (e.g., Emergency Operating Procedures, EOPs) to ensure mitigation of a DBA. The root cause for this event is a lack of understanding regarding the design bases and the time required for SLCRS to meet design bases analytical assumptions. EOP E-0 for BVPS Unit 1 and Unit 2 have been revised to ensure at least one SLCRS fan is running during DBA conditions.

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

PLANT AND SYSTEM IDENTIFICATION

Westinghouse-Pressurized Water Reactor System
Emergency/Standby Gas Treatment System {BH}

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1 at 100 % power
Unit 2: Mode 1 at 100 % power

There were no systems, structures, or components that were inoperable that contributed to the event.

DESCRIPTION OF EVENT

During the evaluation of a separate Condition Report involving the Beaver Valley Power Station (BVPS) Unit 1 Supplemental Leak Collection & Release System (SLCRS) {BH}, it was discovered that the control room operators did not have sufficient guidance for ensuring that the safety related SLCRS would be operating following an accident.

BVPS Unit 1 and Unit 2 Technical Specification 3/4.7.8 Bases states "SLCRS System operation was assumed in that portion of the design basis accident Loss Of Coolant Accident (LOCA) analysis which addressed Engineered Safety Feature (ESF) leakage following the LOCA. ...Based on the results of the analyses, the SLCRS must be operable to ensure that ESF leakage following the postulated DBA LOCA ...will not exceed 10CFR100 limits." SLCRS also provides post-DBA cooling to the ESF pumps' motors during design basis environmental conditions by providing room exhaust air flow. These pumps include the High Head Safety Injection pumps at Units 1 and 2 and Low Head Safety Injection, Auxiliary Feedwater and Quench Spray Pumps at Unit 1. Thus post-DBA SLCRS operation is needed to maintain plant design basis conditions.

The SLCRS contains two trains with a HEPA air filter / charcoal adsorber and exhaust fan in each train. One exhaust fan is normally operating at Unit 1 with the other train's exhaust fan in standby. Both exhaust fans normally operate at Unit 2. The required post-DBA alignment of the SLCRS ventilation dampers occurs automatically following a containment isolation Phase "A" signal. However, there is no post-DBA automatic start signal for the exhaust fans; SLCRS exhaust fans are manually started. Since the fans are manually operated, having an SLCRS fan not operating in manual does not make the SLCRS train inoperable pursuant to Technical Specification 3/4.7.8.

The BVPS Unit 1 and Unit 2 Emergency Operating Procedures did not include a step to either verify SLCRS fan operation or to initiate SLCRS fan

DESCRIPTION OF EVENT (Continued)

operation post-DBA, if needed. Since there were inadequate administrative controls to ensure adequate post-DBA SLCRS operation, a DBA followed by a single failure of the operating SLCRS fan could potentially prevent post-DBA SLCRS operation at either Unit. This condition of inadequate administrative controls would have existed whenever only one SLCRS fan had been initially operating at either Unit. Similarly, a DBA with no subsequent failures could potentially prevent post-DBA SLCRS operation at either Unit where both SLCRS fans had initially not been operating, but in a standby condition.

REPORTABILITY

Though SLCRS exhaust fan operation is credited post-DBA, there was not adequate operator guidance to ensure that SLCRS would be available in all conditions where SLCRS flow is required following a DBA. As a result of this lack of sufficient administrative controls, required post-DBA SLCRS operation was not ensured. This is a condition beyond the plant design basis. Operation of BVPS Unit 1 and Unit 2 in a condition which is beyond the design basis of the plant is reportable pursuant to 10CFR50.73(a)(2)(ii)(B). This lack of adequate EOP guidance was reported pursuant to 10CFR 50.72(b)(1)(ii)(A) on January 21, 2000, at 1945 hours when the issue was initially identified.

CAUSE AND ANALYSIS OF THE EVENT

The cause of this event is a failure to translate design requirements for the BVPS Units 1 and 2 SLCRS into appropriate administrative controls to ensure mitigation of a DBA, specifically a large-break LOCA. This deficiency in the BVPS Unit 1/2 Emergency Operating Procedures (EOPs) dates from the earliest development of the procedures by Westinghouse (BVPS Nuclear Steam System [NSSS] provider).

This failure to translate appropriate design requirements resulted in the EOPs for both units lacking any steps to verify the operation of the SLCRS fans [VS-F-4A or B at BVPS Unit 1; 2HVS-FN204A and B at BVPS Unit 2]. These fans do not receive an automatic start signal post-DBA. These fans, according to the design bases analyses of record, must be functioning near the onset (i.e., prior to the initiation of recirculation) of a DBA LOCA in order to: 1) collect and filter ESF component leakage to ensure 10CFR100 dose limits are not exceeded; and 2) to remove the heat generated

CAUSE AND ANALYSIS OF THE EVENT (Continued)

by the various ESF pumps. The affected ESF pumps include High Head Safety Injection pumps at Units 1 and 2, and the Low Head Safety Injection, Auxiliary Feedwater and Quench Spray at Unit 1. However, neither the BVPS EOPs nor the Westinghouse generic guideline documents (i.e., the Emergency Response Guidelines) from which the EOPs were developed ever recognized the two safety related SLCRS (ventilation) functions. [These Westinghouse guidelines did acknowledge the need to address plant specific systems.]

The root cause for this event is a lack of understanding regarding the design bases and the time required for SLCRS to meet design bases analytical assumptions. This confusion dates from the earliest development of the system, as the BVPS Unit 1 Preliminary Safety Analysis Report (PSAR) reflects a March 1971 decision by Stone and Webster (SWEC; the BVPS Architect Engineer) to change from automatic SLCRS fan operation (wherein VS-F-4A/B would have started on either a Containment Isolation Phase B (CIB) or high-high Containment Radiation signal) to manual operation. However, the SWEC dose analysts assumed SLCRS operation at the start of the DBA scenario as an input to their dose calculations for DBA LOCA source terms and releases. At that time, it was assumed by SWEC that the SLCRS collected and filtered containment penetration leakage immediately following the DBA.

Subsequently, SWEC did not consider the performance of SLCRS in ventilating/cooling the ESF pump cubicles, particularly the BVPS High Head Safety Injection pump cubicles. A review of pertinent design bases calculations generated by SWEC, as correspondence indicates that SWEC concluded that BVPS Unit 1 High Head Safety Injection pump ventilation in a DBA would be by means of portable ventilation fans, since the existing Auxiliary Building ventilation was non-safety related. It had been understood that SLCRS would ventilate various safety related pumps in the Safeguards Building; however, the SLCRS flow rates had not been identified by SWEC as an important parameter that required verification by testing. The original surveillance tests only verified the requirement to maintain a negative pressure. [Note the credited use of portable ventilation was removed in 1991 by BVPS in favor of crediting SLCRS heat removal.]

In a similar manner, Westinghouse did not consider the operation of SLCRS or any other ventilation system outside containment, as a vital support system for mitigating the consequences of a DBA.

CAUSE AND ANALYSIS OF THE EVENT (Continued)

There were numerous missed opportunities over the operating life of both Units to have identified this concern. Several SLCRS operating and design issues have previously arisen and been addressed, without identifying this need for more administrative controls needed to assure the adequate post-DBA operation of manually started safety related ventilation fans. This was attributed to an overall mindset about the design and function of SLCRS. It was assumed to be a safety related system with redundant Class 1E powered dampers and fans that would adequately perform its mitigation function following a DBA, apparently without directly reaffirming how this would be conducted by a manually actuated fan. This mindset was furthered by the knowledge that the alignment of the SLCRS dampers occur automatically post-DBA by a containment isolation signal.

This administrative control inadequacy was discovered during an evaluation of a previous event involving the tripping of the running SLCRS fan on BVPS Unit 1 while the standby fan had been declared inoperable. It was determined that the operating SLCRS fan trip was unexpected, but that the fan was available for immediate manual restart. Given that SLCRS fan actuation/operation is manual, the operating SLCRS train remained operable. The post-DBA administrative control inadequacy was identified during this review as a result of involved personnel's questioning attitude.

SAFETY IMPLICATIONS

This post-DBA administrative control inadequacy to verify SLCRS operation has existed since initial operation of both BVPS Units. For BVPS Unit 1, one SLCRS fan is normally operating with the other in standby (the Unit 1 SLCRS system can not support two fans continuously running). Infrequently, but occasionally, Unit 1 operated with no train of SLCRS running. A fan that is operating would continue to operate post-DBA, as the operating SLCRS fan is automatically sequenced onto the emergency bus. However, in the event of a single failure of a running fan or the infrequent case of no fan running pre-accident, SLCRS would not be available to perform its design basis function without operator action.

For BVPS Unit 2, normally two trains of SLCRS are operating (in support of normal auxiliary ventilation). Similar to Unit 1, a fan that is operating would continue to operate post-DBA, as the operating SLCRS fans are automatically sequenced onto the emergency bus. In the infrequent case of only one or no trains of SLCRS operating at Unit 2, the situation would be the same as Unit 1.

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SAFETY IMPLICATIONS (continued)

SLCRS is credited at both Units for providing two safety related functions post-DBA: radiological filtration and room heat removal. There are various alarms at both Units which would alert the control room operators to inadequate room cooling and equipment temperature. BVPS Unit 1 and Unit 2 would receive an alarm indicating that the SLCRS fan has stopped and BVPS Unit 2 would receive an alarm on low SLCRS flowrate. There are also control room indications at both Units which would indicate if a SLCRS fan is not operating and various computer alarms which would indicate temperature concerns for overheating ESF pumps. Although immediate operator action following a significant DBA would be focused on implementing the Emergency Operating Procedures, it is reasonable to expect that either the lack of SLCRS flow or an overtemperature condition would be recognized in approximately 30 minutes after initiation of a DBA.

One train of SLCRS is adequate to meet post-DBA requirements. If both trains of SLCRS were not functioning following the LOCA DBA, the current BVPS Unit 1 and Unit 2 dose calculations show that the calculated Exclusion Area Boundary (EAB) dose values would exceed Part 100 dose limits. However, the BVPS Unit 1 and Unit 2 dose calculations have recently been revised (in response to a corrective action from BVPS Unit 2 LER 97-008). These new dose calculation results are currently in the process of being implemented into the UFSAR and is expected to become the BVPS Unit 1 and Unit 2 dose calculations of record. The new dose calculations, which continue to credit SLCRS operation for radioactivity filtration, provide lower calculated LOCA dose values. However, if SLCRS operation were not credited, a review of the new dose calculation results shows that the calculated Unit 1 and Unit 2 post-LOCA Exclusion Area Boundary (EAB), Low Population Zone (LPZ) and Control Room Operator doses would be less than the Part 100 dose limit and GDC 19 criteria.

If both trains of SLCRS were not functioning following the LOCA DBA, there would be inadequate heat removal for some areas which house ESF equipment, assuming that the normal non-safety related room ventilation becomes non-functional. Room cooling provided by SLCRS was credited to maintain the required environment to preserve the equipment qualifications (EQ) for the High Head Safety Injection, Low Head Safety Injection, Auxiliary Feedwater and Quench Spray pumps at Unit 1. The qualifications assumed bounding initial and external environmental temperatures. Less than bounding initial and/or external environmental temperature would reduce the effect for a postulated lack of SLCRS cooling. However, for the design bases conditions and the postulated

SAFETY IMPLICATIONS (continued)

lack of any SLCRS operation, the room temperature enclosing both BVPS Unit 1 High Head Safety Injection pumps would exceed the pump motors' EQ limits within approximately 15 minutes following the design basis large break LOCA. Pumps are not expected to fail immediately when the local environmental conditions exceed the qualification limits. It is difficult to predict actual pump failure when EQ conditions are exceeded. Qualitatively, the safety related pumps would continue for some time frame after exceeding conditions for which the pumps were qualified to operate. However, it is presumed that the pumps could continue to operate for approximately another 15 minutes after exceeding its EQ qualified condition, given the subsequent room temperature profile. The lack of sufficient room cooling from SLCRS would also affect both trains of Auxiliary Feedwater, Quench Spray and Low Head Safety Injection pumps at Unit 1 at a slower rate than the Unit 1 High Head Safety Injection Pumps following a postulated DBA.

The room temperature housing the BVPS Unit 2 High Head Safety Injection pump would exceed its pump's EQ limits within approximately 30 minutes following the DBA LOCA with no SLCRS operation. The differences between the Unit 1 and Unit 2 High Head Safety Injection pump room heatup profiles are due to the differences in size and configuration. No other safety related pumps at Unit 2 are adversely affected by the postulated lack of both SLCRS trains.

Therefore, considering the normal alignment of SLCRS which is used for the majority of operation at BVPS Unit 1 and Unit 2, there would be little adverse consequences without any postulated failures. However, considering a postulated single failure when either Unit was operating only one SLCRS fan or considering the infrequent and short time periods where both SLCRS fans were in a manual standby condition, there were insufficient administrative controls to ensure that the lack of SLCRS would be identified before ESF pump design conditions are exceeded. Thus, there would be moderate consequences for the short time frame where the lack of SLCRS might have occurred following a DBA.

There is reasonable expectation, however, that the ESF pumps could continue to operate until the need for room cooling was recognized and sufficient cooling was re-established. Additionally, based on a review of new dose calculations just recently performed, it can be shown that the lack of SLCRS does not result in calculated dose values which exceed 10 CFR Part 100 or GDC19 limits.

CORRECTIVE ACTIONS

1. EOP E-0 for BVPS Unit 1 and Unit 2 have been revised to ensure at least one SLCRS fan is running during DBA conditions.

2. Training on this SLCRS event and issues described in this LER will be provided during Continuing Licensed Operator Retraining for Unit 1 and Unit 2. This action will be completed by September 29, 2000.

3. Training on this SLCRS event and issues described in this LER will be provided as part of the Engineering Personnel Training Program during a continuing training module. This action will be completed by November 6, 2000.

4. An extent of condition review was conducted to identify the BVPS Unit 1 and 2 ESF components which were credited with manual operator initiation and the adequacy of the controls contained within the EOPs. Although the review identified some manually actuated ESF components for each Unit, the BVPS Unit 1 and 2 EOPs already accurately directed appropriate operator action.

PREVIOUS SIMILAR EVENTS

A review of LERs for Beaver Valley Power Station Unit 1 and Unit 2 identified three occurrences involving Supplemental Leak Collection and Release System or Emergency Operating Procedure issues within the last three years:

LER 1-97-021, "Potential for Seismic Event to Result in Both Trains of Supplementary Leak Collection and Release System to Become Inoperable."

LER 1-98-009, "Failure to Perform Required Ventilation Filter Bank Testing as Required by Technical Specifications."

LER 2-97-003, "Technical Specification 3.0.3 Entry Due to Inoperability of Both Trains of the Supplemental Leak Collection and Release System."