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December 20, 1996  
NPD2VPO:0565

*Beaver Valley Power Station, Unit No. 2  
Docket No. 50-412 License No. NPF-73  
LER 96-007-00*

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

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

LER 96-007-00, 10 CFR 50.73(a)(2)(i), "Control Room Ventilation System Purge Mode Operation."

T. P. Noonan

LB/ds

Attachment

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**LICENSEE EVENT REPORT (LER)**

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

FACILITY NAME (1) Beaver Valley Power Station Unit 2										DOCKET NUMBER (2) 05000412		PAGE (3) 1 OF 5		
TITLE Control Room Ventilation System Purge Mode Operation														
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 Beaver Valley Power Station Unit 1			DOCKET NUMBER 05000334		
10	15	96	96	007	00	12	20	96	N/A					
OPERATING MODE (9)		Unit 1 -1 Unit 2 -5		20.402(b)		20.405(c)		50.73(a)(2)(iv)		73.71(b)				
POWER LEVEL (10)		1-100% 2-0%		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(v)		73.71(c)				
				20.405(a)(1)(ii)		50.36(c)(2)		50.73(a)(2)(vii)		OTHER				
				20.405(a)(1)(iii)		X 50.73(a)(2)(i)		50.73(a)(2)(iii)(A)		(Specify in abstract below and in Text				
				20.405(a)(1)(iv)		50.73(a)(2)(ii)		50.73(a)(2)(viii)(B)		NRC Form 366A)				
				20.405(a)(1)(v)		50.73(a)(2)(iii)		50.73(a)(2)(x)						
LICENSEE CONTACT FOR THIS LER (12)														
NAME T. P. Noonan, Vice President Nuclear Operations and Plant Manager										TELEPHONE NUMBER (include Area Code) (412) 393-7622				
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)														
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS					COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS			
SUPPLEMENTAL REPORT EXPECTED (14)										EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)				X NO										
ABSTRACT (Limited to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)														
<p>On October 15, 1996, at 0925 hours, the BVPS Unit 2 Control Room Ventilation System was operated in the purge mode, to ventilate paint fumes from the Control Room, temporarily rendering the Control Room Emergency Bottled Air Pressurization Subsystem (CREBAPS), and the Control Room Emergency Supply Filtration Subsystem, both Engineered Safety Features (ESFs), inoperable.</p> <p>On October 15, 1996, at 1105 hours, the purge mode was secured and the Control Room Ventilation System restored to the normal lineup, when it was identified that the Updated Final Safety Analysis Report (UFSAR) specifies a maximum normal ventilation intake flow rate of 500 cfm for the Unit 1 and Unit 2 Control Room envelope. The purge mode, which is designed to remove smoke or toxic gases from the Control Room atmosphere, introduces unfiltered outside air at approximately 20,000 cfm, or about 40 times the normal intake flow rate for the combined Unit 1 and 2 Control Room envelope. During the follow-up evaluation of this event (completed November 25, 1996), it was determined that operation of the Control Room Ventilation System in the purge mode invalidates the UFSAR analysis assumptions for the Control Room personnel radiation exposure and effectively renders the Control Room Emergency Bottled Air Pressurization Subsystem (CREBAPS), and the Control Room Emergency Supply Filtration Subsystem inoperable. It was also identified that Technical Specification 3.0.3 should have been invoked at the time of purge initiation. This was an operation or condition prohibited by the plant's Technical Specifications and is reportable pursuant to the requirements of 10CFR50.73(a)(2)(i).</p> <p>The causes of this event were: 1) painting was permitted in the Control Room Envelope with no provision for mitigating the paint fumes; 2) Control Room operators were not aware of the design basis ventilation flow rate for operation of the Control Room Ventilation System in the purge mode; 3) Control Room operators interpreted paint fumes to constitute the toxic gas described in the Control Room Ventilation System purge procedure.</p> <p>Corrective actions will include appropriate changes to planning and work control processes, operator training and procedures.</p> <p>There were no implications to the health and safety of the public due to this event. Operation of the Control Room Ventilation System in the purge mode did not impact normal plant operations.</p>														

**LICENSEE EVENT REPORT (LER)****TEXT CONTINUATION**

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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 (PWR)

Area Ventilation Systems - Control Area {VI}\*

Control Room Emergency Bottled Air Pressurization Subsystem (CREBAPS) {VI}\*

Control Room Emergency Supply Filtration Subsystem {VI}\*

\* Energy Industry Identification System (EIIIS) plant system and component codes are identified in the text as {EIIIS:SS/CC}

**CONDITIONS PRIOR TO OCCURRENCE**

Unit 1: Mode 1, 100% Power

Unit 2: Mode 5, 0% Power

**DESCRIPTION OF THE EVENT**

On October 15, 1996, at 0925 hours, the BVPS Unit 2 Control Room Ventilation System {EIIIS:VI} was operated in the purge mode, to ventilate paint fumes from the Control Room, temporarily rendering the Control Room Emergency Bottled Air Pressurization Subsystem (CREBAPS) {EIIIS:VI}, and the Control Room Emergency Supply Filtration Subsystem {EIIIS:VI}, both Engineered Safety Features (ESFs), inoperable.

On October 15, 1996, at 1105 hours, the purge mode was secured and the Control Room Ventilation System restored to the normal lineup, when it was identified that the Updated Final Safety Analysis Report (UFSAR) specifies a maximum normal ventilation intake flow rate of 500 cfm for the Unit 1 and Unit 2 Control Room envelope. The purge mode, which is designed to remove smoke or toxic gases from the Control Room atmosphere, introduces unfiltered outside air at approximately 20,000 cfm, or about 40 times the normal intake flow rate for the combined Unit 1 and 2 Control Room envelope. The maximum normal ventilation intake flowrate of 500 cfm is an assumption of the UFSAR analysis used to evaluate the limiting design basis accident for the Control Room personnel radiation exposure. The analysis is part of the design evaluation used to assess Control Room habitability and to achieve compliance with General Design Criterion (GDC) 19. The CREBAPS and the Control Room Emergency Supply Filtration Subsystems are designed in accordance with GDC 19. During the follow-up evaluation of this event (completed November 25, 1996), it was determined that operation of the Control Room Ventilation System in the purge mode invalidates UFSAR analysis assumptions for the Control Room personnel radiation exposure and effectively renders the Control Room Emergency Bottled Air Pressurization Subsystem (CREBAPS), and the Control Room Emergency Supply Filtration Subsystem inoperable. It was also identified that Technical Specification 3.0.3 should have been invoked at the time of purge initiation. This was an operation or condition prohibited by the plant's Technical Specifications and is reportable pursuant to the requirements of 10CFR50.73(a)(2)(i).

**CAUSE OF EVENT**

The root cause analysis determined three causal factors which led to the operation of the Control Room Ventilation System in the purge mode.

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The first factor that caused this event was the fact that the maintenance planning and work control processes did not identify any special precautions for painting in the Control Room envelope. Consequently, painting was permitted in the Control Room Envelope with no provision for mitigating the paint fumes, and Control Room supervision initiated purge mode operation of the ventilation system when the Control Room operators complained of adverse effects.

The second factor that caused this event was the fact that Control Room operators were not aware of the design basis ventilation flow rate for operation of the Control Room Ventilation System in the purge mode.

The third factor that caused this event was the fact that the NSS and ANSS believed that it was correct to use the system in the purge mode to purge paint fumes. Control Room operators interpreted paint fumes to constitute the toxic gas described in the Control Room Ventilation System purge procedure. The operating procedure for the Control Room Ventilation System in the purge mode, 2OM-44A.4.E, has no specific precautions or limitations to prohibit use of the purge mode for paint fumes. The procedure purpose states that it "may be entered from an AOP," and specifies initial conditions as "smoke or toxic gas in the Control Room," but does not state that it must be used under accident conditions only or give other guidance which would limit its application.

**ANALYSIS OF THE EVENT**

The ESF filter systems, including Control Room ventilation, are designed in accordance with GDC-19 as described in Unit 2 UFSAR, Section 6.5.1.1, "Design Bases." In accordance with GDC 19, Control Room personnel exposure is limited to 5 Rem whole body, or its equivalent to any part of the body, for the duration of any accident postulated in Chapter 15. Unit 1 UFSAR Section 11.3.5, "Control Areas," also specifies the 5 Rem limit for Control Room personnel. Therefore, a specified safety function of the Control Room Ventilation System is to maintain the radiation exposure of Control Room personnel within GDC 19 limits.

As described in the Unit 2 UFSAR, Section 6.4.2.5, exposure from inhalation is principally attributable to airborne radioactivity in the Control Room envelope due to: 1) intake prior to Control Room isolation, 2) inleakage during Control Room isolation, and 3) post-isolation intake. The maximum normal ventilation flowrate of 500 cfm (for both units) prior to isolation is used in the Control Room dose calculations for the Design Basis Accidents (DBAs). Depending on the DBA being evaluated, Control Room ventilation intake flow is terminated by a Containment Isolation Phase B (CIB) signal [Loss of Coolant Accident (LOCA) only], by radiation monitor alarms, or by manual operator action at 30 minutes into the event (T=30 minutes).

In Section 6.4.4.1 of the Unit 2 UFSAR, "Radiological Protection," the limiting design basis accident for Control Room personnel whole body dose and skin dose is the LOCA. This UFSAR section is also applicable to both Units, since they share a common Control Room envelope. The small line break outside containment (SLB) is the limiting DBA for the thyroid dose. The UFSAR analyses consider a conservative selection of parameters to calculate thyroid dose. "Ventilation intake prior to Control Room isolation and an assumed 10 cfm unfiltered leakage [post-isolation] are the main contributors to the thyroid dose." The maximum normal ventilation intake rate of 500 cfm (for both units) prior to isolation and a minimum cleanup flow rate of 690 cfm post-isolation are used to maximize the dose estimate. A 20,000 cfm purge flow rate assumed at the onset of a DBA represents an unanalyzed condition where the maximum allowable thyroid dose to the Control Room operators could be exceeded.

Consequently, operation with Control Room ventilation intake flow rates greater than 500 cfm in order to purge paint fumes constitutes an event or condition that is outside of the Control Room Ventilation System design basis. At higher flowrates, it cannot be assured that the system could accomplish the design basis function of mitigating the consequences of a DBA to the Control Room personnel to meet the GDC-19 criteria (by maintaining operator exposure less than 5 Rem whole body). Purge flow rate at 20,000 cfm to ventilate paint fumes is not within the reference bounds of design and renders the system incapable of performing one of its safety functions.



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According to BVPS Unit 1 and Unit 2 Technical Specifications: "A system, subsystem, train, component or device is OPERABLE when it is capable of performing its specified functions." The specified functions of a system is (are) that (those) specified safety function(s) in the current licensing basis for the facility. The current licensing bases for the Control Room Ventilation System include the plant specific design basis information as documented in the UFSAR, including compliance with GDC 19. The design of the Control Room Ventilation System is in compliance with GDC 19; however, operation of the system at higher than 500 cfm, to purge paint fumes, given the current procedural controls, is not. For the purposes of radiological analysis, it is assumed in Unit 2 UFSAR Section 6.4.2.5 that with the DBA, there is a seismic event and loss of offsite power. Emergency operation of the system in the purge mode for smoke or toxic gas removal presumes no coincident DBA. Thus the purge capability of the system can be used in the event of a fire or toxic gas event without invalidating the radiological analyses. However, by permitting operation at higher flowrates, absent of these two conditions, at the outset of a DBA, by definition the system was rendered INOPERABLE.

**CORRECTIVE ACTIONS**

The following corrective actions will be taken in response to this event:

1. Industrial Safety will be notified by Work Planning of evolutions involving use of processes that may impact the habitability of CR or other areas where ventilation may be a concern. This will be in effect by February 28, 1997.
2. Operations supervision will contact Industrial Safety to evaluate any situation involving work activities in the CR envelope that impact CR habitability. This will be in effect by December 31, 1996.
3. Industrial Safety will pursue the purchase of a portable ventilation system with charcoal filtration capability. This will be purchased and tested by February 28, 1997.
4. A Study Guide will be developed which addresses this event and CR Ventilation System operation in purge mode for issue to all Licensed operators and STAs. The Study Guide will be issued and operator/STA review completed by April 30, 1997.
5. This Licensee Event Report will be included in Licensed operator retraining by June 30, 1997.
6. An Operations Night Order was written to clarify that the Control Room Ventilation System in the purge mode is intended for emergency use. This was completed by December 17, 1996.
7. Procedure 20M-44A.4.E will be enhanced to include the following precautions: 1) operation of CR ventilation system in the purge mode will normally be used to mitigate toxic gases or smoke and not for routine painting or similar processes; 2) the system can be used to mitigate paint fumes, vapors etc., if no other means are available and if these substances interfere with the ability of the operators to safely perform their duties. This will be completed by January 31, 1997.
8. An evaluation of procedure 20M-44A.4.E and its use will be conducted to clearly define the proper applications of the purge mode. The evaluation will be completed by June 30, 1997.

**REPORTABILITY**

Date of Event: October 15, 1996

Date of Reportability Determination: November 25, 1996

This report is being submitted pursuant to the requirements of 10CFR50.73(a)(2)(i) as "Any operation or condition prohibited by Technical Specifications."

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**SAFETY IMPLICATIONS**

There were no safety implications to the health and safety of the public as a result of this event. Operation of the Control Room Ventilation System in the purge mode did not impact normal plant operations.

**SIMILAR EVENTS**

A review of BVPS Licensee Event Reports from the past two years did not identify any similar events.