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Beaver Valley Power Station, Unit No. 1
Docket No. 50-334 License No. DPR-66
LER 96-009-01

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 96-009-01, 10 CFR 50.73(a)(2)(ii), "Containment Penetrations Not in Accordance with the Design Basis."

Ronald L. LeGrand

R. L. LeGrand
Division Vice President
Nuclear Operations

LB/ds

Attachment

IE22

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FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

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

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TITLE
Containment Penetrations Not In Accordance With The Design Basis

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
07	31	96	96	009	01	01	27	97	Beaver Valley Power Station Unit 2	05000412
									FACILITY NAME	DOCKET NUMBER 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
OPERATING MODE (9)	1	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	100	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)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	(Specify in abstract below and in Text NRC Form 366A)
		20.405(a)(1)(iv) X	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (include Area Code)
R. L. LeGrand, Vice President Nuclear Operations and Plant Manager	(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)

On June 27 and July 31, 1996, an engineering review revealed that some Units 1 and 2 liquid filled lines passing through containment were not designed to compensate for the effects of liquid filled thermal expansion during a design basis accident. This could result in pressures exceeding the system design pressure and jeopardize the structural integrity of the associated containment penetrations during a design basis accident (DBA). As an immediate corrective action for Unit 1 penetrations 1, 2, 4, and 5, Technical Specification (TS) action statements were entered and inboard isolation valves on affected lines were opened to provide pressure relief paths using installed relief valves. As an immediate corrective action for Unit 1 penetrations 55-1, 56-1, 97-1, 97-2, and 105-2, Technical Specification action statements were entered and inboard isolation valves on affected lines were declared inoperable until a temporary modification could be performed to provide draining and venting by removing leak monitoring connection caps. A multidisciplinary task force has performed a design basis review with respect to thermal overpressurization during a DBA for Units 1 and 2 penetrations. Relief valves have been installed on the nine Unit 1 lines. At the time of the occurrence, both Units 1 and 2 were in Mode 1, operating at 100 % power.

This event was reported in accordance with 10 CFR 50.72 (b) (1) (ii) (B) on July 3, 1996. An update was provided on July 31, 1996. This event is also reportable in accordance with 10 CFR 50.73 (a) (2) (ii) (B). These reports were made because the design of the liquid filled lines passing through containment was not in accordance with the UFSAR, placing them outside the design basis for the plant.

On August 5, 1996, Unit 1 was being shutdown to Mode 5 for maintenance on a reactor coolant pump. In order to place the RHR system in service and allow sampling to be accomplished, various valves that had been isolated in accordance with action statements described in this LER were required to be unisolated and placed in service. When these valves were unisolated, then a Technical Specification action statement (3.6.3.1, action d) was entered that required the unit to be in cold shutdown within 30 hours. The initiation of a shutdown required by TS was reported in accordance with 10 CFR 50.72 (b) (1) (i) (A).

The root cause of this event is inadequate design reviews relating to containment penetration relief protection during initial plant design and construction as specified in the UFSAR section 5.3.3 (Unit 1) and 6.2.4 (Unit 2).

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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

Containment Leakage Control System {BD/PEN}*

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

IDENTIFICATION OF OCCURRENCE

Discovery Date: July 31, 1996

Date Determined to be Reportable: July 31, 1996

The design deficiencies described in this report occurred during original Unit 1 and 2 design and construction.

CONDITIONS PRIOR TO OCCURRENCE

Unit 1: Mode 1, 100% Reactor Power
Unit 2: Mode 1, 100% Reactor Power

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

DESCRIPTION OF EVENT:

On May 24, 1996, operators attempted to stroke Unit 1 isolation valve MOV-CC-112B2 (residual heat removal system (RHS) heat exchanger 1B component cooling water (CCR) inlet valve) (Penetration Number 5) for surveillance testing. When the valve failed to open, it was declared inoperable, Technical Specification 3.6.3.1 was entered, and actions were initiated to determine the cause and corrective actions. On May 31, 1996, in order to determine if thermal/hydraulic locking of the valve might have caused the inoperability, a pressure measurement was taken in the piping section between the two isolation valves. This revealed that the line was pressurized to 181 psig. When the line was vented, isolation valve MOV-CC-112B2 stroked satisfactorily. It was subsequently determined that the design pressure of 150 psig for this line was exceeded, but it was below the code allowable pressure of the pressure retaining components of Penetration Number 5.

Investigation into the cause of the line pressurization revealed that the design was not in accordance with liquid filled thermal expansion overpressurization protection criteria, as described in the Unit 1 UFSAR section 5.3.3. Compliance with this criteria would have necessitated the installation of a relief valve on this line section in order to compensate for any thermal expansion that might occur as a result of design basis accident elevated temperatures. These requirements were not implemented during initial plant construction.

As a corrective action to the piping pressurization event, personnel performed a review of Unit 1 and Unit 2 containment penetrations {BD/PEN} to identify any others that were normally or potentially isolated without any thermal expansion pressure relief protection. This review identified a total of seven in this category:

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DESCRIPTION OF EVENT continued:

UNIT 1 ONLY

Penetrations 1, 2, 4, 5: The lines passing through these penetrations normally supply CCR to/from the RHS heat exchangers inside containment. They are not drained. The corresponding penetrations at Unit 2 were found to have adequate relief protection as defined in the Unit 2 UFSAR.

Penetration 24: The line passing through this penetration connects the refueling water storage tank to the RHS system. This line is now drained per procedure prior to startup after a refueling outage. The procedure change to accomplish this was approved by the Onsite Safety Committee in May, 1995. This was not routinely performed in the past, however. The corresponding penetration at Unit 2 was found to have adequate relief protection as defined in the Unit 2 UFSAR.

UNITS 1 AND 2

Penetrations 103, 104: The lines passing through these penetrations are the refueling cavity cooling and purification supply and return. Upon discovery of this deficiency, all four lines passing through these penetrations (Unit 1, penetration numbers 103, 104; Unit 2, penetration numbers 103, 104) were inspected. Unit 1 penetration number 104 was verified to be drained; the other three were found to contain water and were subsequently drained.

Where lines without relief protection could not be drained, Technical Specification action statements associated with Technical Specification 3.6.3.1 were entered and inboard isolation valves on affected lines containing liquid were opened to provide pressure relief paths using installed relief valves.

On July 31, 1996, continuing engineering review revealed ten other Unit 1 penetrations that were normally isolated without adequate thermal expansion pressure relief protection. These are:

UNIT 1 ONLY

Penetrations 20, 56-2, 106. The lines passing through these penetrations were drained on July 31, 1996.

Penetrations 56-3, 46: A Basis for Continued Operation was prepared and authorizes operation with the current configuration of these penetrations. For penetration 46, known measured isolation valve leakage is sufficient to provide adequate thermal relief protection. For penetration 56-3, the isolation valves are solenoid valves which are constructed to open at 50 to 100 psi differential pressure in the reverse direction. This provides adequate thermal relief protection.

Penetrations 55-1, 56-1, 97-1, 97-2, 105-2: Technical Specification action statements were entered and inboard isolation valves were declared inoperable until a temporary modification could be performed to provide draining and venting by removing leak monitoring connection caps. This modification was completed on August 1, 1996.

A multidisciplinary task force was formed to perform a design basis review with respect to thermal overpressurization during a DBA for Units 1 and 2 penetrations. For each Unit 1 penetration, this team reviewed available documentation, evaluated the findings for conformance with the design basis, prepared corrective actions as required, and codified the results. A summary of the results are as follows:

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DESCRIPTION OF EVENT continued:

UNIT 1 PENETRATIONS

145 Unit 1 containment penetrations were evaluated for conformance with thermal expansion overpressure protection design basis criteria. Penetrations with similar features were categorized as follows:

Review Category 1 — Penetrations With Relief Valves as Thermal Overpressure Protection

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be trapped between two non-relieving isolation valves. A relief valve on the piping is necessary to prevent overpressurization. There are 23 penetrations in this category. Fourteen had relief valves installed during original construction which provide adequate thermal relief protection. The remaining 9 penetrations were identified as requiring installation of relief valves. This has been performed as part of a recent maintenance outage.

Review Category 2 — Penetrations With Gas Medium

Penetrations in this category are expected to contain gas in the lines passing through them. The thermal expansion stress was adequately evaluated, and no changes are necessary. There are 25 penetrations in this category.

Review Category 3 — Penetrations Maintained Drained

Penetrations in this category can be drained prior to startup or after use. Relief protection is provided by draining the penetration. Administrative controls will verify that these penetrations are drained prior to a plant restart. There are 10 penetrations in this category.

Review Category 4 — Penetrations Associated With The Reactor Vessel Level Instrumentation System (RVLIS)

Penetrations in this category are specialized units which contain a hydraulic isolator. This provides a barrier to the release of containment atmosphere. Corrective actions are not necessary. There are 6 penetrations in this category.

Review Category 5 — Penetrations With Check Valves And No Downstream Isolation Valves

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be allowed to expand via the downstream check valve. Administrative controls to maintain downstream valves are not necessary. There are 8 valves in this category.

Review Category 6 — Penetrations With Check Valves And Downstream Isolation Valves

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be allowed to expand via the downstream check valve. To ensure that relief flow path integrity is maintained, operating and emergency procedures have been reviewed and revised as necessary to maintain correct positioning of intervening valves. Evaluation has shown that in the event of any postulated single failure, the design basis of protection against fission product release will still be maintained. There are 11 penetrations in this category.

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DESCRIPTION OF EVENT continued:

Review Category 7 Penetrations With Manual Isolation Valves To Relief Path

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be allowed to expand via normally open manual isolation valves. These are steam generator blowdown sample lines, and the normal expansion path is to the respective steam generator. The normally open sample line manual isolation valve must be maintained in the open position. To ensure that relief flow path integrity is maintained, operating and emergency procedures have been reviewed and revised as necessary to maintain correct positioning of intervening valves. Evaluation has shown that the stresses remain within the code allowables and the design basis is maintained. There are 3 penetrations in this category.

Review Category 8 Penetrations With Trip Valves And Downstream Manual Isolation Valves

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be allowed to expand via a spring-loaded globe valve (trip valve). The plugs of these valves are designed to lift at predetermined pressures, then reseat when pressure decreases. Although trip valve relief pressures exceed system design pressures for penetrations in this category, evaluation has shown that the structural integrity of the piping and fittings associated with these penetrations is not threatened and the design basis of protection against fission product release is maintained. To ensure that relief flow path integrity is maintained, operating and emergency procedures have been reviewed and revised as necessary to maintain correct positioning of intervening valves. There are 11 penetrations in this category.

Review Category 9 Penetrations With Open Ended Pipe Inside Containment

Penetrations in this category may contain water in the line passing through them. During a containment isolation and heatup following a Design Basis Accident, there is no inside isolation valve to trap liquid. No overpressure concern exists, and no corrective actions are necessary. There are 8 penetrations in this category.

Review Category 10 Spare Penetrations

Penetrations in this category are not expected to contain water in the lines passing through them. No overpressure concern exists, and no corrective actions are necessary. There are 34 penetrations in this category.

Review Category 11 Penetrations With Multiple Trip Valves And No Downstream Manual Isolation Valves

Penetrations in this category are expected to contain water in the lines passing through them. During a containment isolation and heatup following a Design Basis Accident, this water would be allowed to expand via a spring-loaded globe valve (trip valve). The plugs of these valves are designed to lift at predetermined pressures, then reseat when pressure decreases. Although trip valve relief pressures exceed system design pressures for penetrations in this category, evaluation has shown that the structural integrity of the piping and fittings associated with these penetrations is not threatened and the design basis of protection against fission product release is maintained. There are 3 penetrations in this category.

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DESCRIPTION OF EVENT continued:

Review Category 12 Penetrations With Insulation Inside Containment As A Thermal Barrier

Penetrations in this category have lines passing through them that are thermally insulated, protecting them from the high temperatures expected for a short time after a Design Basis Accident. No overpressure concern exists, and no corrective actions are necessary. It has been verified that thermal insulation is installed in accordance with design. There are 3 penetrations in this category.

UNIT 2 PENETRATIONS

A multidisciplinary task force determined that Unit 2 containment penetrations have adequate Design Basis Accident thermal overpressure protection. Some penetrations require administrative controls to ensure that draining is performed in order to meet this condition.

CAUSE OF EVENT:

The root cause of this event is inadequate design reviews relating to containment penetration relief protection during initial plant design and construction as specified in the UFSAR section 6.2.3 (Unit 1) and 6.2.4 (Unit 2). The design basis for each unit requires that lines passing through containment that may contain trapped liquid be protected against the effects of liquid thermal expansion and piping overpressurization during a design basis accident. The lines identified in this report were not protected in this manner.

CORRECTIVE ACTIONS:

1. As an immediate corrective action for Unit 1 penetration numbers 1, 2, 4, 5, Technical Specification 3.6.3.1 was entered, inboard isolation valves were declared inoperable on affected lines and were opened to provide pressure relief paths using installed relief valves. In accordance with action statements, outboard isolation valves were closed and administratively controlled in this position. An engineering evaluation and supporting 10 CFR 50.59 determination were reviewed and approved prior to taking these actions.

2. As an immediate corrective action for Units 1 and 2 penetration numbers 103 and 104, all four lines passing through these penetrations (Unit 1, penetration numbers 103, 104; Unit 2, penetration numbers 103, 104) were inspected. Unit 1 penetration number 104 was verified to be drained; the other three were found to contain water and were subsequently drained.

3. As an immediate corrective action for Unit 1 penetration number 24, it was verified that the line was drained, and that a procedure was in place to ensure that draining was performed at the completion of each refueling outage.

4. As an immediate corrective action for Unit 1 penetrations 20, 56-2, 106, draining was performed.

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CORRECTIVE ACTIONS continued:

5. As an immediate corrective action for Unit 1 penetrations 55-1, 56-1, 97-1, 97-2, 105-2, Technical Specification action statements were entered and inboard isolation valves were declared inoperable until a temporary modification could be performed to provide draining and g by removing leak monitoring connection caps. This modification was completed on August 1, 1996.

6. Relief valves have been installed on the nine Unit 1 penetrations identified as requiring relief valve installation. These penetrations are: 1; 2; 4; 5; 20; 55-1; 56-1; 56-2; 97-2. This was performed in August, 1996.

7. Procedure changes to ensure that Units 1 and 2 penetration numbers 103 and 104 are drained at the completion of each unit refueling outage have been completed. Unit 1 changes were completed in December, 1996. Unit 2 changes were completed in September, 1996.

8. Unit reviews of containment penetrations to evaluate whether they are designed in compliance with Unit 1 UFSAR section 5.3.3 and Unit 2 UFSAR section 6.2.4 have been performed. Unit 1 review was completed in November, 1996, and Unit 2 review was completed in October, 1996.

9. Hardware changes, such as the installation of additional relief valves, will be evaluated by the Nuclear Engineering Department.

REPORTABILITY

This event was reported in accordance with 10 CFR 50.72 (b) (1) (ii) (B) on July 3, 1996. An update was provided on July 31, 1996. This event is also reportable in accordance with 10 CFR 50.73 (a) (2) (ii) (B), plant in condition outside its design basis. These reports were made because the design of the fluid lines passing through containment was not in accordance with the UFSAR, placing them outside the design basis for the plant.

On August 5, 1996, Unit 1 was being shutdown to Mode 5 for maintenance on a reactor coolant pump. In order to place the RHR system in service and allow sampling to be accomplished, various valves that had been isolated in accordance with action statements described in this LER were required to be unisolated and placed in service. When these valves were unisolated, then a Technical Specification action statement (3.6.3.1, action d) was entered that required the unit to be in cold shutdown within 30 hours. The initiation of a shutdown required by Technical Specifications was reported in accordance with 10 CFR 50.72 (b) (1) (i) (A).

SAFETY IMPLICATIONS

The potential safety significance is moderate, since a release of radioactivity to the environment during a Design Basis Accident (DBA) would necessitate not only the failure of the identified liquid filled lines but the additional failure of the outboard containment isolation valve(s).

SIMILAR EVENTS

A review of LERs for Beaver Valley Units 1 & 2 did not identify any similar occurrences within the last two years.