

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)

FACILITY NAME (1)

Beaver Valley Power Station Unit 1

DOCKET NUMBER (2)

05000334

PAGE (3)

1 OF 4

TITLE

Small Bore Piping Support Design Deficiencies

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
10	17	97	97	035	00	11	14	97	N/A	

OPERATING MODE (9)

Defueled

POWER LEVEL (10)

000

20.402(b)	20.405(a)(1)(i)	20.405(a)(1)(ii)	20.405(a)(1)(iii)	20.405(a)(1)(iv)	20.405(a)(1)(v)	20.405(c)	50.73(a)(2)(iv)	50.73(a)(2)(v)	50.73(a)(2)(vii)	50.73(a)(2)(viii)(A)	50.73(a)(2)(viii)(B)	50.73(a)(2)(x)	73.71(b)	73.71(c)	OTHER	
																x
																Voluntary LER

LICENSEE CONTACT FOR THIS LER (12)

NAME

R. A. Hruby, Director, Design Basis Engineering

TELEPHONE NUMBER (include Area Code)

(412) 393-5705

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	AB	SPT	N/A	N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES

(if yes, complete EXPECTED SUBMISSION DATE)

NO

EXPECTED SUBMISSION DATE (15)

MONTH DAY YEAR
02 28 98

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

On June 3, 1997, at Beaver Valley Power Station Unit 1, various original Stone and Webster Engineering Corporation pipe support design deficiencies on small bore piping (2 inch and smaller lines) were identified during an engineering review. It was identified that a sliding support was disengaged from its guide on a 2 inch line that comprises the "B" Reactor Coolant System (RCS) loop drain piping. This sliding support was restored to the proper configuration. Engineering reviewed sliding supports for safety-related small bore lines and modified some additional sliding supports to ensure they would meet design requirements.

Additional evaluation of RCS loop drain small bore pipe supports identified that the design of some bar type anchors was not meeting code requirements. Subsequently, anchors of this style on other small bore safety-related piping were also reviewed and modifications were made for those supports identified during the reviews which were determined to be outside their AISC (support) and ANSI (piping) code design requirements. This condition is not applicable to Unit 2.

Reportability determinations have identified no requirement for a 10CFR50.73 report to date. This report is being made as a voluntary LER to describe identified small bore piping support design concerns and to outline the follow-up investigative approach and associated corrective actions. Additional evaluation, which will include an operability review of the safety-related small bore piping supports, is ongoing. Continuing assessments are being performed to identify any inoperable supports in accordance with Generic Letter 91-18. These assessments will be completed prior to startup from the current refueling outage.

The apparent cause of this event was inadequate original design by the architect engineer, in that: 1) a sliding support became physically disengaged from its guide and 2) certain bar anchor supports were identified which had loads in excess of their AISC code rating and piping integral weld stresses in excess of their ANSI B31.1 code rating.

The actual safety significance of this event is low, since evaluations performed thus far indicate that, as a consequence of safety-related small bore piping support design deficiencies, none of the lines would experience pipe stresses or support loading of a magnitude that would result in an inoperable condition or a condition that significantly compromises plant safety. There are currently no safety implications to the health and safety of the public as a result of this event.

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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)

Reactor Coolant System {AB}

Chemical and Volume Control System (CVCS) {CB}

Pipe Support {SPT}

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

DESCRIPTION OF EVENT

On June 3, 1997, at Beaver Valley Power Station Unit 1, various original Stone and Webster Engineering Corporation pipe support {SPT} design deficiencies on small bore piping (2 inch and smaller lines) were identified during an engineering review. It was identified that a sliding support was disengaged from its guide on a 2 inch line that comprises the "B" Reactor Coolant System (RCS) {AB} loop drain piping. This sliding support was restored to its proper configuration. Engineering reviewed sliding supports for safety-related small bore lines and modified some additional sliding supports to ensure they would meet design requirements. Additional evaluation of RCS loop drain small bore pipe supports identified that the design of some bar type anchors was not meeting the requirements. Subsequently, anchors of this style on other small bore safety-related piping were also reviewed and modifications were made for those supports identified during the reviews which were determined to be outside their AISC (support) and ANSI (piping) code design requirements. This condition is not applicable to Unit 2.

On October 17, 1997, at 1030 hours, continuing investigations associated with the extent of condition evaluation of the small bore piping support concerns identified that three (3) bar anchor supports on the Chemical and Volume Control System (CVCS) {CB} were inadequate such that the resulting pipe stresses or support loading were beyond the ANSI B31.1 code limits and possibly the ASME Appendix F operability limits allowed by Generic Letter (GL) 91-18. On October 17, 1997, at 1246 hours, with Unit 1 shutdown and defueled, this condition was conservatively reported to the NRC in a 4 hour report pursuant to the requirements of 10CFR50.72(b)(2)(i). Subsequently, however, the lines associated with these bar anchors were re-evaluated by use of a model that assumed the degraded supports were not present (which would be a bounding worst-case condition). This re-evaluation concluded that none of the lines would experience pipe stresses or support loadings of a magnitude that would result in an inoperable condition. Consequently, a reportable condition pursuant to the reporting requirements of 10CFR50.73 has not been identified as of the submittal date of this report. There were no automatically or manually initiated safety system actuations in response to this event.

CAUSE OF EVENT

The apparent cause of this event was inadequate original design by the architect engineer, in that: 1) a sliding support became physically disengaged from its guide and 2) certain bar anchor supports were identified which had loads that resulted in stresses in excess of their AISC code rating and piping integral weld stresses in excess of their ANSI B31.1 code rating.

ANALYSIS OF EVENT

The design of small bore piping is described in UFSAR Section B.2.1.10. The 1967 ANSI B31.1 code requires that the piping stress for integral welded attachments be evaluated. Local stresses at integral welded attachments (IWA) are required to meet a specified limit. These limits are applicable to the pipe and the weld. The overall pipe stress, including localized effects of the support attachments are required to meet those equations as delineated in UFSAR Section B.2.1.5, "Piping Stress Limits."

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Small bore pipe supports were designed to constrain the pipe in either one, two, or three translational directions, depending on the required support function per the pipe stress requirements. The standard or "decal" loads were established relative to pipe size. The support designs are required to meet the AISC Code, 7th Edition. The support designer had several standard pipe support designs to select from. One such standard design consisted of bar style anchors. With appropriate support spacing and function to meet the required piping stress limits, the loads generated on the supports would generally be within the "decal" or load rating of the support.

Sliding supports were generally used in applications where large thermal movements were expected. This type of support could be used to constrain the pipe in either one or two directions, while allowing unrestricted pipe movement in the "guided" direction. Therefore, these supports should remain within their guides under expected thermal movements.

Bar type anchor supports are comprised of two parallel plates that attach directly to the pipe wall, at the centerline of the pipe. The plates are fillet welded at both the pipe attachment point and at the base of the plate to the structural steel or supporting frame. The welds will act to constrain the piping in translational and rotational directions. The anchors were designed for forces in three translational directions only.

Non-conforming Conditions

A sliding support was found to be disengaged from its guide. This condition seems to have occurred over several thermal cycles (i.e., plant heatups or cooldowns) such that the support had, in effect, "walked" out of its guide. The standard guide design does not employ travel stops to preclude this.

Bar type anchor supports for 2 inch and 1.5 inch piping were determined by engineering review to have inadequate attributes as specified in the associated pipe support sketch, and the support capacity had to be derated. The attributes include plate size, thickness, weld sizes and the certified material to be used for the bars. The anchors were originally designed for translational forces only. In reality, this type of support has the capacity to resist moments, however a low capacity to resist moments exists in certain directions.

The ongoing evaluation and analysis by Engineering has been utilizing the criteria of Generic Letter 91-18 to evaluate the identified non-conforming conditions. Specifically, GL 91-18 allows the use of Appendix F of Section III of the ASME Code for making an operability determination.

A more detailed accounting of the ongoing engineering analyses performed during the investigation of this event will be provided in a supplement to this LER.

CORRECTIVE ACTIONS

Additional evaluation, which will include an operability review of the safety-related small bore piping supports, is ongoing. Continuing assessments are being performed to identify any inoperable supports in accordance with Generic Letter 91-18. These assessments will be completed prior to startup from the current refueling outage.

An evaluation pursuant to the requirements of 10CFR21 is in progress. The results of that evaluation and a more definitive listing of corrective actions will be submitted in a supplement to this LER.

REPORTABILITY

Three (3) bar anchors on the Chemical and Volume Control System (CVCS) were inadequate such that the resulting pipe stresses or support loading were beyond the ANSI B31.1 code limits and possibly the ASME Appendix F operability limits allowed by Generic Letter (GL) 91-18. On October 17, 1997, at 1246 hours, with Unit 1 shutdown and defueled, this condition was conservatively reported to the NRC in a 4 hour report pursuant to the requirements of 10CFR50.72(b)(2)(i).

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Subsequently, however, the lines associated with these bar anchors were reanalyzed by use of a model that assumed the degraded supports were not present (which would be a bounding worst-case condition). This evaluation concluded that none of the three lines would experience pipe stresses or support loading of a magnitude that would result in an inoperable condition. Consequently, a reportable condition pursuant to the reporting requirements of 10CFR50.73 has not been identified as of the submittal date of this report. This report is being made as a voluntary LER.

The BVPS NRC Resident Inspector has been and will continue to be kept informed of the results of engineering investigations pertaining to this event.

SAFETY IMPLICATIONS

The actual safety significance of this event is low, since evaluations performed thus far indicate that, as a consequence of safety-related small bore piping support design deficiencies, none of the lines would experience pipe stresses or support loading of a magnitude that would result in an inoperable condition or a condition that significantly compromises plant safety. There are currently no safety implications to the health and safety of the public as a result of this event.

SIMILAR EVENTS

A review of Licensee Event Reports for the past two years identified the following similar events involving piping and support design issues :

1. LER 1-96-009-01, "Containment Penetrations Not In Accordance with Design Basis," January 27, 1997.
2. LER 1-96-010-00, "Containment Piping Supports Not in Accordance with the Design Basis," September 11, 1996.