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Your ref: Project Number 740
Our ref: DCP/NRC1763

July 19, 2006

**SUBJECT: AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-022, Revision 1
(Technical Report Number 8)**

In support of Combined License application pre-application activities Westinghouse is submitting Revision 1 of AP1000 Standard Combined License Technical Report Number 8. This report completes and documents, on a generic basis, activities required for COL Information Item 3.6-2 in the AP1000 Design Control Document. This report is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in this report is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

This report revises Technical Report 8, Revision 0, which was previously submitted in the Referenced Letter. The revisions have been listed in a table of revisions in the report and are identified by bar marks in the margins of affected pages. The Leak-Before-Break curves and stress analyses for the pressurizer surge line, Figures 2-8 and 2-9, have been completed and added to the document. The list of references has been updated.

The critical points for five of the curves, Figures 2-10 through 2-14, for the ADS-4 line have been updated. The critical points for these curves remain under the curve. The need for the change was discovered during the evaluation of the pressurizer surge line. The issue that resulted in the changes has been entered into our corrective action program and we have verified that the critical point locations in the remaining curves are not impacted.

The purpose for submittal of this report was explained in a March 8, 2006 letter from NuStart to the NRC.

Pursuant to 10 CFR 50.30(b), APP-GW-GLR-022, Revision 1, "AP1000 Leak-Before-Break Evaluation of As-Designed Piping," (Technical Report Number 8) is submitted as Enclosure 1 under the attached Oath of Affirmation.

It is expected that when the NRC review of Technical Report Number 8 is complete, the portion of COL Information Item 3.6-2 requiring an as-designed Leak-Before-Break evaluation, will be considered complete for COL applicants referencing the AP1000 Design Certification. The engineering calculations documenting the leak-before-break evaluations, including the updated evaluations, and other design calculations and analyses are available for NRC review or audit at the Westinghouse offices.

DO79

Westinghouse is hereby requesting staff interaction and review of these calculations as part of the review of Technical Report Number 8.

Questions or requests for additional information related to content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests for additional information to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Very truly yours,

Handwritten signature of D. F. Hutchings in cursive, with the word "for" written below it.

A. Sterdis, Manager
Licensing and Customer Interface

/Attachments

1. "Oath of Affirmation," dated July 19, 2006
2. APP-GW-GLR-022, Rev. 1, "AP1000 Leak-Before-Break Evaluation of As-Designed Piping,"
Technical Report Number 8

cc:	S. Bloom	-	U.S. NRC	1A	1E
	S. Coffin	-	U.S. NRC	1A	1E
	G. Curtis	-	TVA	1A	1E
	P. Grendys	-	Westinghouse	1A	1E
	P. Hastings	-	Duke Power	1A	1E
	C. Ionescu	-	Progress Energy	1A	1E
	D. Lindgren	-	Westinghouse	1A	1E
	A. Monroe	-	SCANA	1A	1E
	M. Moran	-	Florida Power & Light	1A	1E
	C. Pierce	-	Southern Company	1A	1E
	E. Schmiech	-	Westinghouse	1A	1E
	G. Zinke	-	NuStart/Entergy	1A	1E

ATTACHMENT 1

“Oath of Affirmation”

dated July 19, 2006

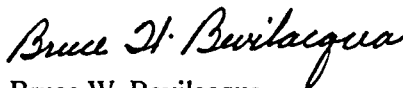
ATTACHMENT 1

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:)
NuStart Bellefonte COL Project)
NRC Project Number 740)

APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

Bruce W. Bevilacqua, being duly sworn, states that he is Vice President, New Plants Engineering, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.



Bruce W. Bevilacqua
Vice President
New Plants Engineering

Subscribed and sworn to
before me this 19th day
of July 2006.

COMMONWEALTH OF PENNSYLVANIA

Notarial Seal
Debra McCarthy, Notary Public
Monroeville Boro, Allegheny County
My Commission Expires Aug. 31, 2009

~~Member, Pennsylvania Association of Notaries~~
Notary Public

ATTACHMENT 2

APP-GW-GLR-022, Revision 1

“AP1000 Leak-Before-Break Evaluation of As-Designed Piping”

Technical Report Number 8

AP1000 DOCUMENT COVER SHEET

TDC:

Permanent File:

APY

RFS#:

RFS ITEM #:

AP1000 DOCUMENT NO. APP-GW-GLR-022	REVISION NO. 1	Page 1 of 64	ASSIGNED TO W-Sterdis
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ALTERNATE DOCUMENT NUMBER: N/A

WORK BREAKDOWN #:

ORIGINATING ORGANIZATION: Westinghouse

TITLE: AP1000 Leak-Before-Break Evaluation of As-Designed Piping

ATTACHMENTS:		DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION:
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PATENT REVIEW	SIGNATURE/DATE <i>M. M. White</i> 7/13/06

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REVIEWERS P. J. Kotwicky	SIGNATURE/DATE <i>P. J. Kotwicky</i> 7/13/2006	
VERIFIER B. R. Mutyala	SIGNATURE/DATE <i>B. R. Mutyala</i> 7/13/06	VERIFICATION METHOD Detailed Review
AP1000 RESPONSIBLE MANAGER P. R. Mandava	SIGNATURE* <i>P. R. Mandava</i>	APPROVAL DATE 7/14/06

* Approval of the responsible manager signifies that document is complete, all required reviews are complete, electronic file is attached and document is released for use.

AP1000 Standard Combined License Technical Report

AP1000 Leak-Before-Break Evaluation of As-Designed Piping

Westinghouse Electric Company LLC
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REVISION HISTORY

Original document: APP-GW-GLR-022 Revision 0

Revision	Location	Change Description
1	Section 2	Description of loading combinations for surge line.
1	Section 2	Critical points added to surge line Figures 2-8, 2-9
1	Section 2	Critical points updated for Figures 2-10 thru 2-14
1	Sections 2, 4	Line number RCS-L131A has been removed
1	Sections 2, 4	DCD Figures 3B-12 and 3B-16 are to be left in the DCD and marked as not used.
1	Section 5	Updated references
1	Throughout	Various editorial corrections

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1.0 INTRODUCTION

This report addresses AP1000 Design Control Document (DCD) (Reference 1) Section 3.6.4.2. Combined License applicants referencing the AP1000 certified design are committed to completing the leak-before-break (LBB) evaluation for all of the candidate pipe lines by comparing the results of the as-designed piping stress analysis with the bounding analysis curves documented in Appendix 3B of the DCD. This is COL Action Item 3.6.3.1-2 (FSER, Reference 2, Action Item Section 3.6.3.1-2).

DCD Section 3.6.4.2 states:

“Combined License applicants referencing the AP1000 certified design will complete the leak-before-break evaluation by comparing the results of the as-designed piping stress analysis with the bounding analysis curves documented in Appendix 3B. The Combined License applicant may perform leak-before-break evaluation for a specific location and loading for cases not covered by the bounding analysis curves. Successfully satisfying the bounding analysis curve limits in Appendix 3B may necessitate lowering the detection limit for unidentified leakage in containment from 0.5 gpm to 0.25 gpm. If so, the Combined License applicant shall provide a leak detection system capable of detecting a 0.25 gpm leak within 1 hour and shall modify appropriate portions of the DCD including subsections 5.2.5, 3.6.3.3, 11.2.4.1, Technical Specification 3.4.7 (and Bases), Technical Specification Bases B3.4.9, and Technical Specification 3.7.8 (and Bases). The leak-before-break evaluation will be documented in a leak-before-break evaluation report.”

The LBB evaluations for the as-designed piping stress analysis have been completed for all applicable lines and are documented in piping analysis reports (References 3 through 15). The results show that the calculated stresses are on or below the applicable bounding analysis curve (BAC) as described in the DCD.

The leak detection capability limit for unidentified leakage inside containment is 0.5 gpm as described in the DCD.

The results are summarized in Section 2.0 of this report.

Based on this report the LBB evaluation of the as-designed piping systems is acceptable and satisfies the DCD criteria and is applicable to COL applications referencing the AP1000 design certification.

2.0 TECHNICAL BACKGROUND

The as-designed piping analyses for the candidate LBB pipe lines identified in DCD Appendix 3E have been completed. Each analysis includes the evaluation of the ASME Code requirements for deadweight, thermal expansion (with thermal stratification when applicable) and SSE (inertia and anchor motion) loadings. The critical location for LBB evaluation of each pipe line was determined based on the calculated maximum stress value. The LBB evaluation for the surge line includes two bounding curves. The first curve is similar to those used for the rest of the lines. The second curve evaluates a load combination corresponding to the startup/shutdown case of the surge line (DCD Figure 3B-6, Sheet 2 of 2) and does not include SSE loading. The maximum stress and the corresponding calculated normal stress were found to be on or below the associated bounding analysis curve (BAC) so that the dynamic effects of postulated high energy line pipe breaks need not be evaluated for all of the candidate pipe lines. The as-designed piping analysis also demonstrates that the piping layout is compatible with the overall plant configuration.

The detailed description of the LBB evaluation procedures are summarized in DCD Section 3.6.3 and Appendix 3B. The equations used to calculate the maximum and normal stresses are Equations 3B-2 through 3B-11 of the DCD. The LBB evaluations of the as-designed piping analysis followed the DCD evaluation procedures and are summarized in Table 2-1 and Figures 2-1 to 2-37. Figures 2-1 to 2-35 plot the maximum stress value shown on each bounding analysis curve. Figures 2-36 and 2-37, which correspond to the 12" Passive Residual Heat Removal (PRHR) Vent Line and the 8" ADS Stage 2, 3 (under a normal operating temperature of 653 degrees F), are not used (as explained below), and therefore do not have analysis results that would indicate corresponding critical stress points. The detailed piping analysis and LBB evaluation of each line is included in References 3 through 15.

The BAC for the 8" ADS stage 2, 3 pipe lines in the DCD are supplemented in this report to reflect the pipe temperature in the cold trap region (maximum temperature of 250 degrees F). The supplemental curve is the new DCD Figure 3B-22 which will be added to Appendix 3B of the DCD. Figure 3B-16 of the DCD will be marked unused, and DCD Table 3B-1 also indicate that the BAC Figure is unused, because the operating temperature used to generate the bounding analysis curve is no longer applicable.

The PRHR Vent Line (PXS-L107) is a 14" line (not a 12" line) hence Figure 3B-12 of the DCD will be marked unused. Accordingly, DCD Figure 3B-8, as well as Table 3B-1 of the DCD, will indicate an addition of this line. DCD Table 3B-1 will also indicate that Figure 3B-12 is unused.

The Direct Vessel Injection Lines (PXS-125A and B) are not in a cold trap region. Accordingly, these lines will be moved from DCD Figure 3B-15 to DCD Figure 3B-14. DCD Table 3B-1 will also indicate the relocation of the lines.

All of the changes to the DCD mentioned above, as well as changes made to other affected figures of the DCD, are included in Section 4.0 of this report.

Table 2-1 (Sheet 1 of 2)

AP1000 LEAK-BEFORE-BREAK EVALUATION SUMMARY

LBB Result Figures	DCD Figure Number	System/ Subsystem	Analysis Package	Nom. Diam. (Inch)	Line number	Ref.
2-1	3B-2	Primary Loop Hot Leg	APP-RCS-PLR-050	31(ID)	L001A, B	3
2-2	3B-3	Primary Loop Cold Leg	APP-RCS-PLR-050	22(ID)	L002A, B, C, D	3
2-3	3B-4	SGS/ Main Steam Line A	APP-SGS-PLR-030	38	L006A	4
2-4	3B-4	SGS/ Main Steam Line B	APP-SGS-PLR-040	38	L006B	5
2-5	3B-5	RCS/ Normal RHR - 20"	APP-RNS-PLR-010	20	RCS-L139	6
2-6	3B-20	RCS/ Normal RHR - 12"	APP-RNS-PLR-010	12	RCS-L140	6
2-7	3B-21	RNS/ Normal RHR - 10"	APP-RNS-PLR-010	10	L001; L002A,B	6
2-8	3B-6 (Sheet 1 of 2)	Surge Line (100% Power)	APP-RCS-PLR-040	18	L003	7
2-9	3B-6 (Sheet 2 of 2)	Surge Line (Startup/Shutdown)	APP-RCS-PLR-040	18	L003	7
2-10	3B-7	ADS4 - 18"	APP-RCS-PLR-030	18	L135B; L136B	8
2-11	3B-8	ADS4 - 14"	APP-RCS-PLR-030	14	L133B; L137B	8
2-12	3B-7	PRHR Supply/ADS4 - 18"	APP-PXS-PLR-030	18	RCS-L135A; RCS-L136A	9
2-13	3B-8	PRHR Supply/ADS4 - 14"	APP-PXS-PLR-030	14	RCS-L133A; RCS-L137A; RCS-L134; L102; L107	9
2-14	3B-9	RCS/PXS/PRHR Return (Includes Cold Trap) - to Isolation Valve	APP-PXS-PLR-030 APP-PXS-PLR-040	14	L102; L104A,B; L103	9 10
2-15	3B-11	PXS/PRHR, Return – after Isolation Valve	APP-PXS-PLR-040	14	L105 L104A,B; RCS-L113	10
2-16	3B-10	Automatic Depressurization System Stage 2, 3 (Lower Tier)	APP-RCS-PLR-010	14	L004B; L006B; L020B; L030B; L131	11
2-17	3B-22	ADS Stage 2 (Cold Trap)- Lower Tier	APP-RCS-PLR-010	8	L021B	11
2-18	3B-22	ADS Stage 3 (Cold Trap)- Lower Tier	APP-RCS-PLR-010	8	L031B	11
2-19	3B-19	ADS Header to RCS Safety Valve (Lower Tier)	APP-RCS-PLR-010	6	L005B	11
2-20	3B-10	Automatic Depressurization System Stage 2, 3 (Upper Tier)	APP-RCS-PLR-010	14	L004A; L006A; L020A; L030A	11
2-21	3B-22	ADS Stage 2 (Cold Trap)- Upper Tier	APP-RCS-PLR-010	8	L021A	11
2-22	3B-22	ADS Stage 3 (Cold Trap)- Upper Tier	APP-RCS-PLR-010	8	L031A	11
2-23	3B-19	ADS Header to RCS Safety Valve (Upper Tier)	APP-RCS-PLR-010	6	L005A	11

Table 2-1 (Sheet 2 of 2)

AP1000 LEAK-BEFORE-BREAK EVALUATION SUMMARY

LBB Result Figures	DCD Figure Number	System/ Subsystem	Analysis Package	Nom. Diam	Line number	Ref.
2-24	3B-13	PXS/ Accumulator to Isolation valve (DVI-A)	APP-PXS-PLR-010	8	L029A	12
2-25	3B-14	PXS/ DVIA Cold Trap to RPV	APP-PXS-PLR-010	8	L021A	12
2-26	3B-15	PXS/ DVIA-CMT IRWST Various sections	APP-PXS-PLR-010	8	L015A; L016A; L017A; L018A; L020A; L021A; L025A; L127A	12
2-27	3B-17	PXS/ Accumulator after Isolation Valve (DVI-A)	APP-PXS-PLR-010	8	L027A	12
2-28	3B-18	RNS/ RNS Discharge (DVI-A)	APP-PXS-PLR-010	6	L019A	12
2-29	3B-13	PXS/ Accumulator to Isolation Valve (DVI-B)	APP-PXS-PLR-020	8	L029B	13
2-30	3B-14	PXS/ DVIB Cold Trap to RPV	APP-PXS-PLR-020	8	L021B	13
2-31	3B-15	PXS/ DVIB-CMT IRWST Various sections	APP-PXS-PLR-020	8	L015B; L016B; L017B; L018B; L020B; L021B; L025B; L127B	13
2-32	3B-17	PXS/ Accumulator after Isolation Valve (DVI-B)	APP-PXS-PLR-020	8	L027B	13
2-33	3B-18	RNS/ RNS Discharge (DVI-B)	APP-PXS-PLR-020	6	L019B	13
2-34	3B-14	RCS/PXS/ Cold Balance Line & Vent (CMT-A)	APP-PXS-PLR-050	8	L007A; L070 A; RCS-L118A; L125A	14
2-35	3B-14	RCS/PXS/ Cold Balance Line & Vent (CMT-B)	APP-PXS-PLR-060	8	L007B; L070B RCS-L118B; L125B	15
2-36	3B-12	PRHR Vent Line	N/A	12	Not used	N/A
2-37	3B-16	Automatic Depressurization System Stage 2, 3 (Operating Temperature=653.0F)	N/A	8	Not used	N/A

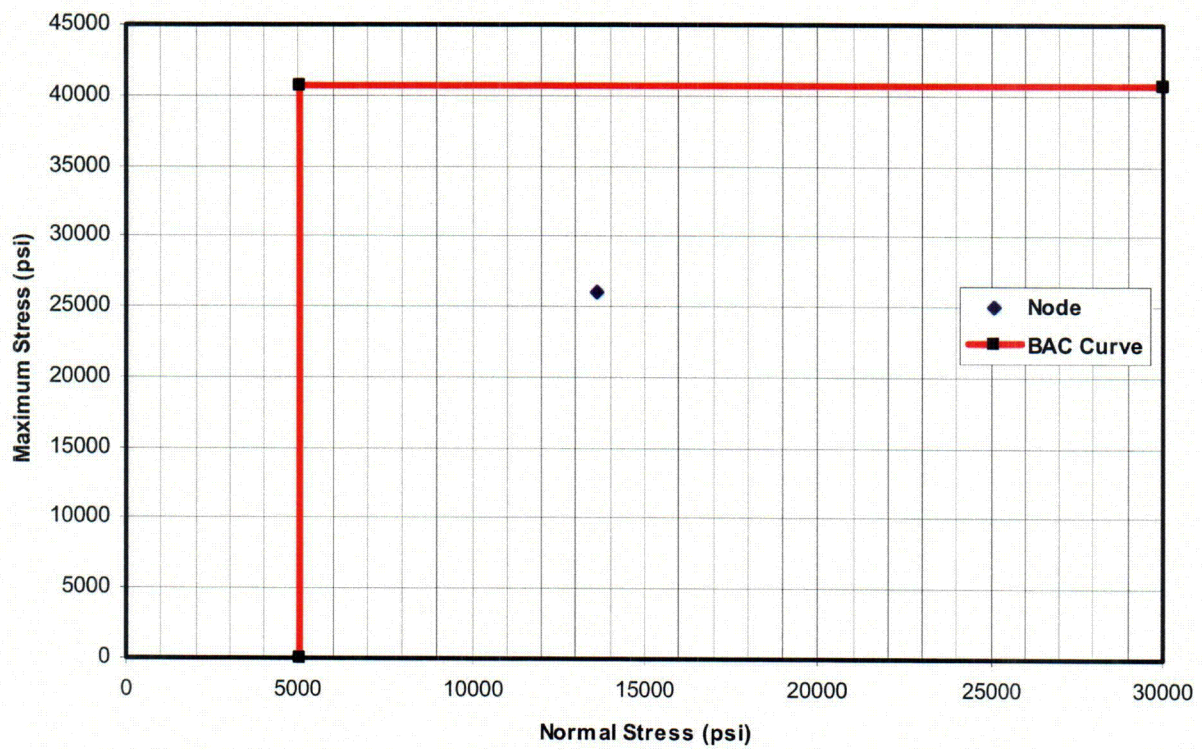


Figure 2-1

LBB Results for 31" (ID) Primary Loop Hot Leg

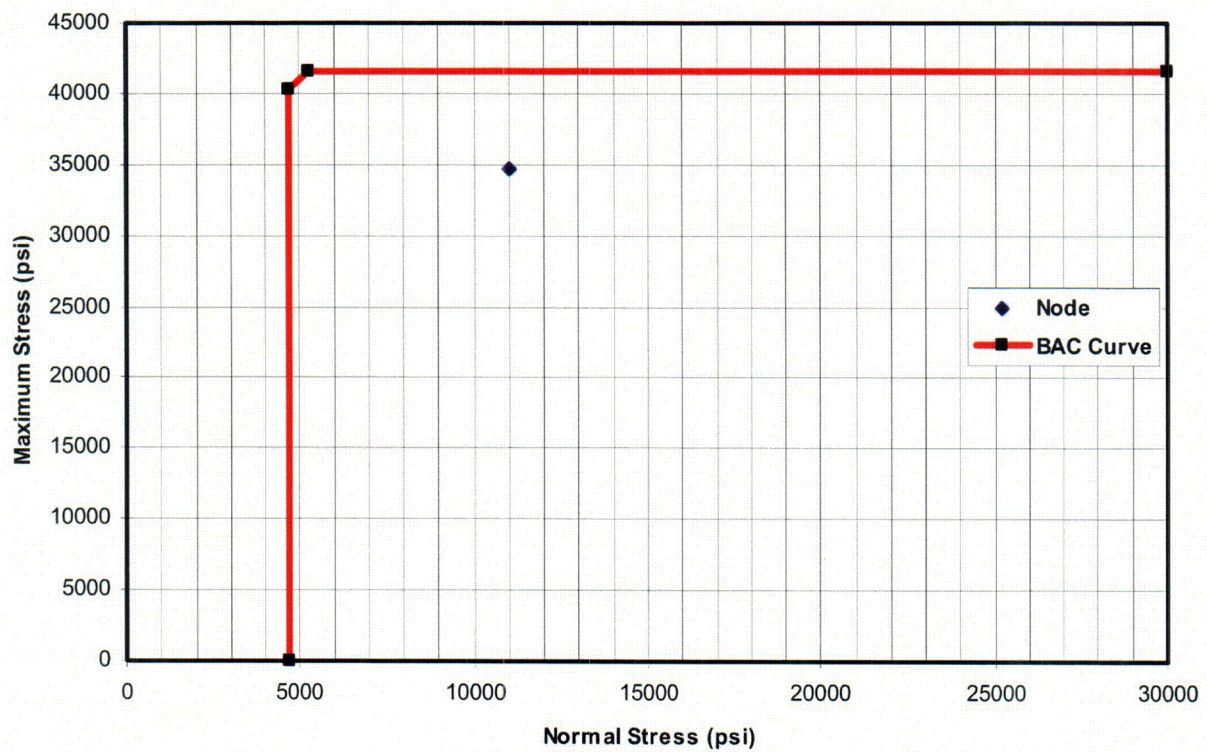


Figure 2-2

LBB Results for 22" (ID) Primary Loop Cold Leg

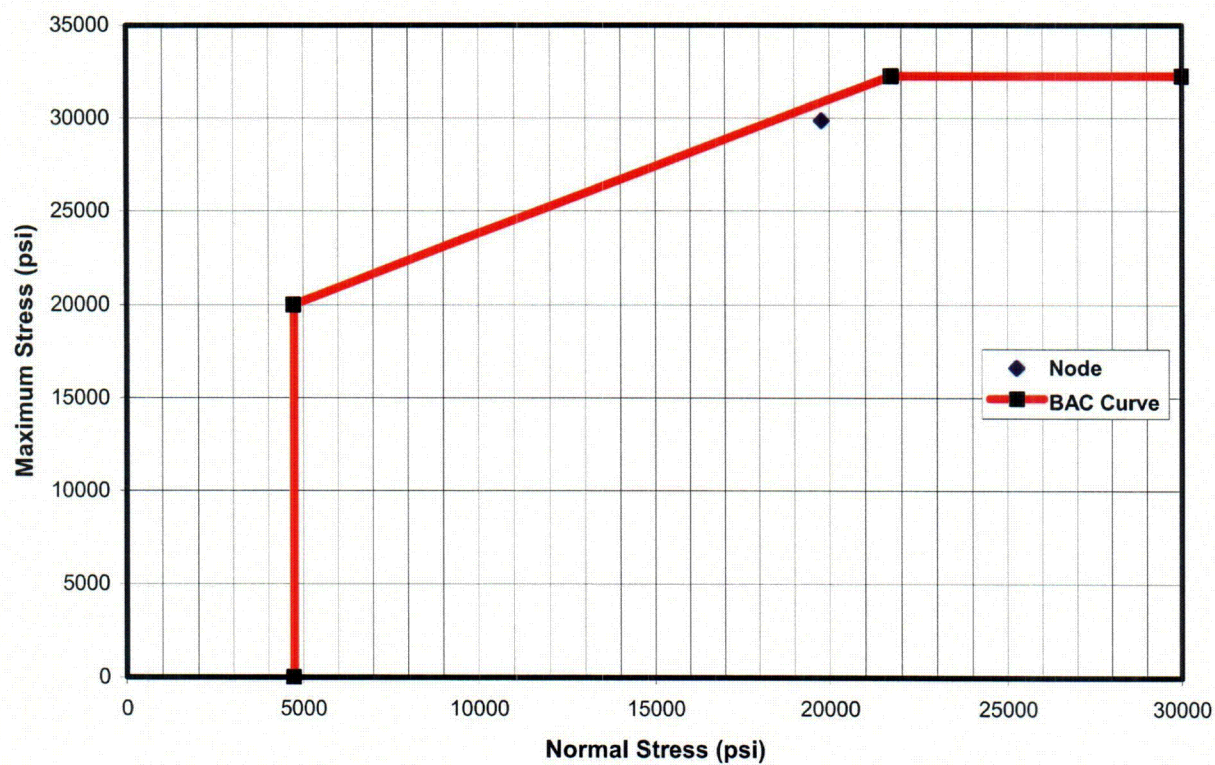


Figure 2-3

LBB Results for 38" Main Steam Line A

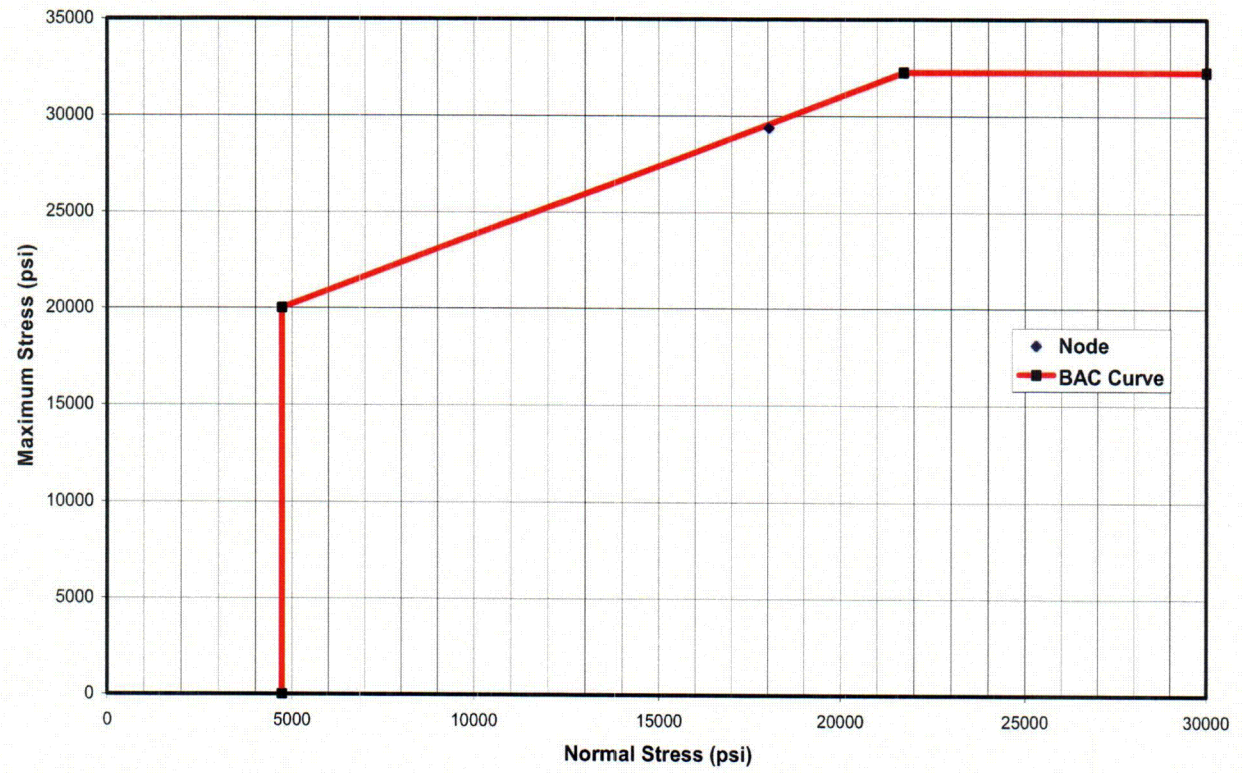


Figure 2-4

LBB Results for 38" Main Steam Line B

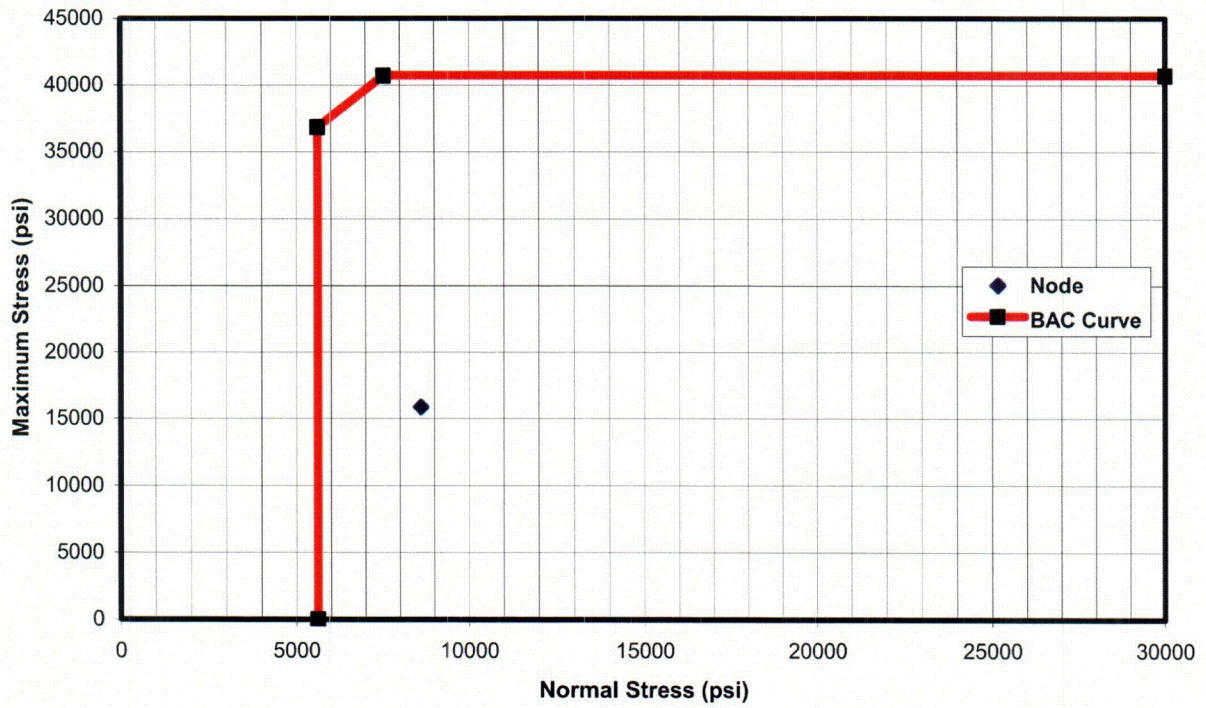


Figure 2-5

LBB Results for 20" Normal Residual Heat Removal

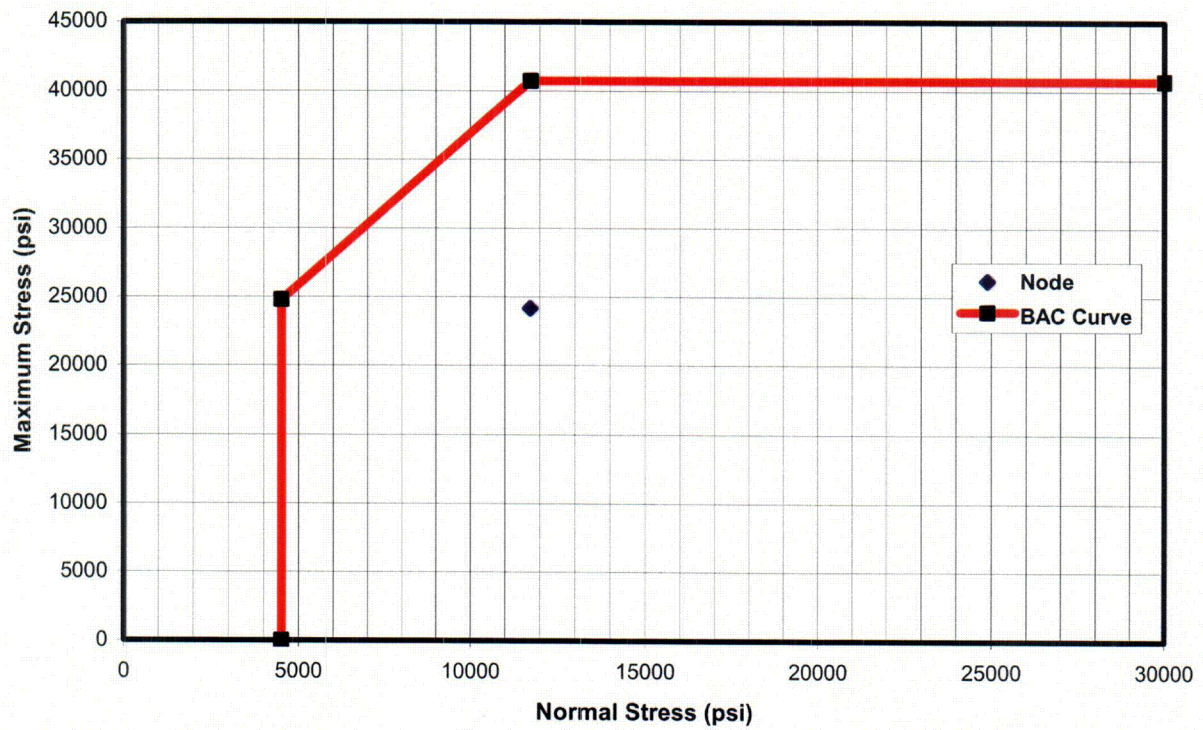


Figure 2-6

LBB Results for 12" Normal Residual Heat Removal

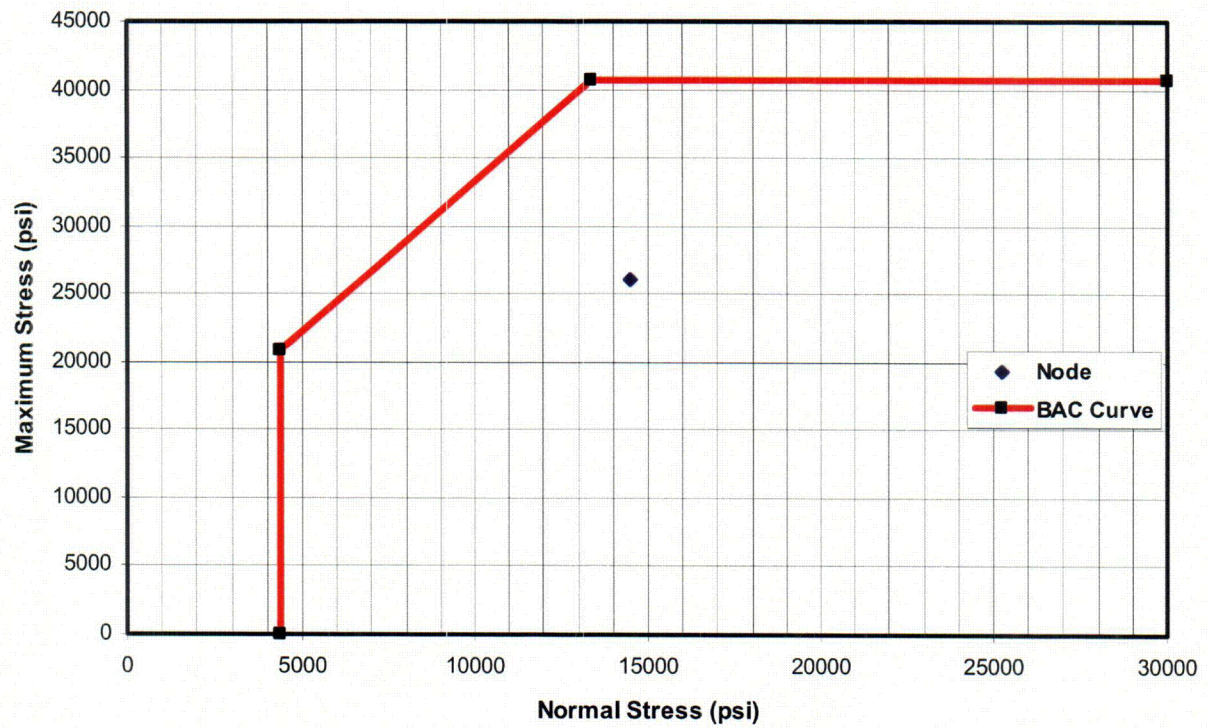


Figure 2-7

LBB Results for 10" Normal Residual Heat Removal

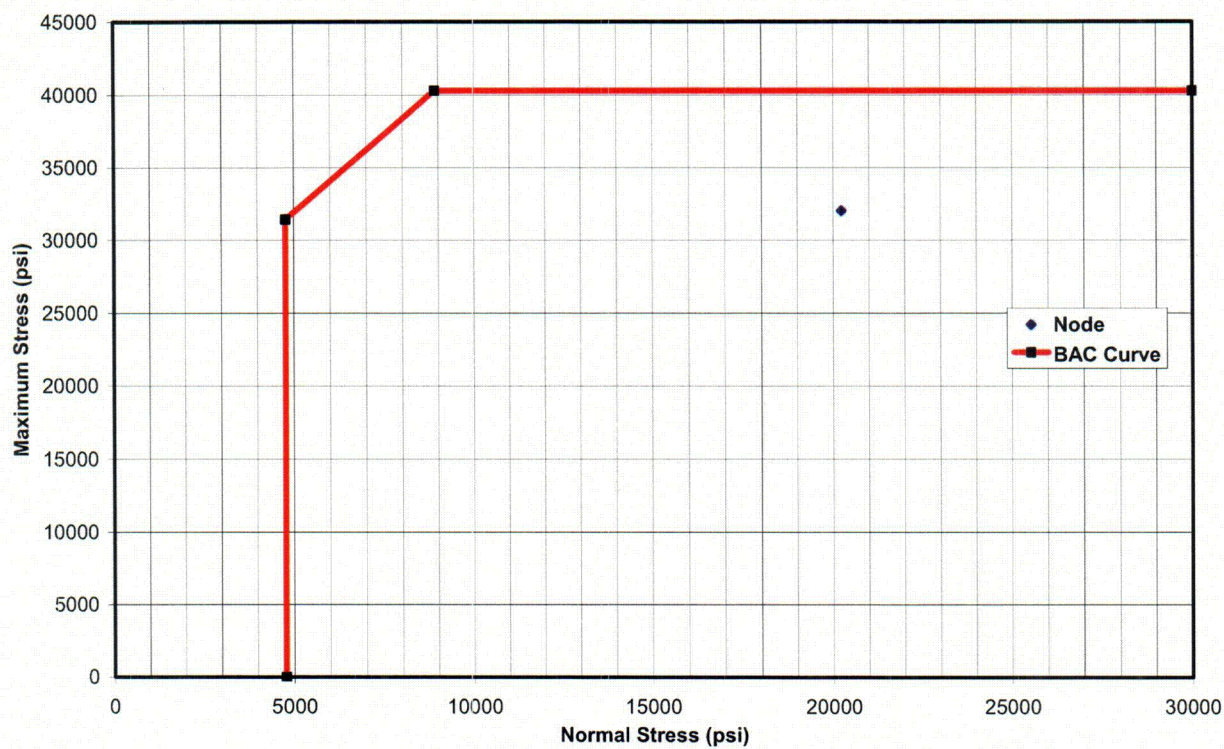


Figure 2-8

LBB Results for 18" Surge Line (100% Power)

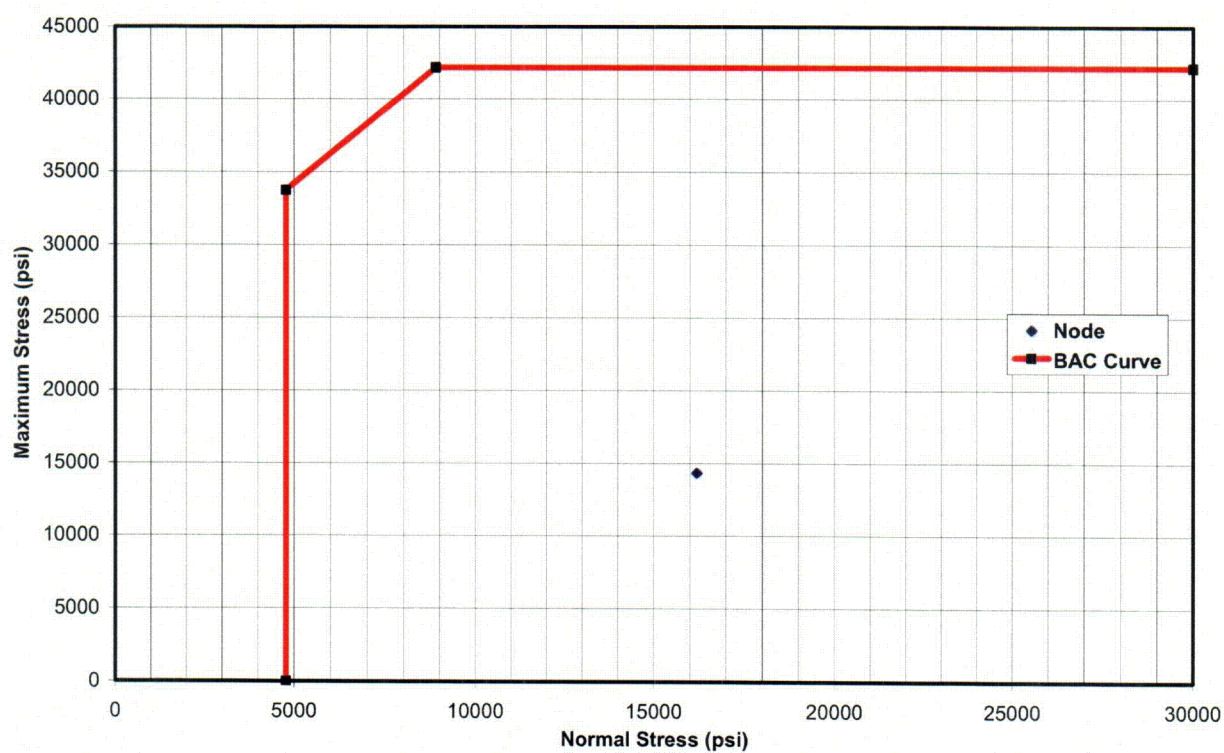


Figure 2-9

LBB Results for 18" Surge Line (Startup/Shutdown) |

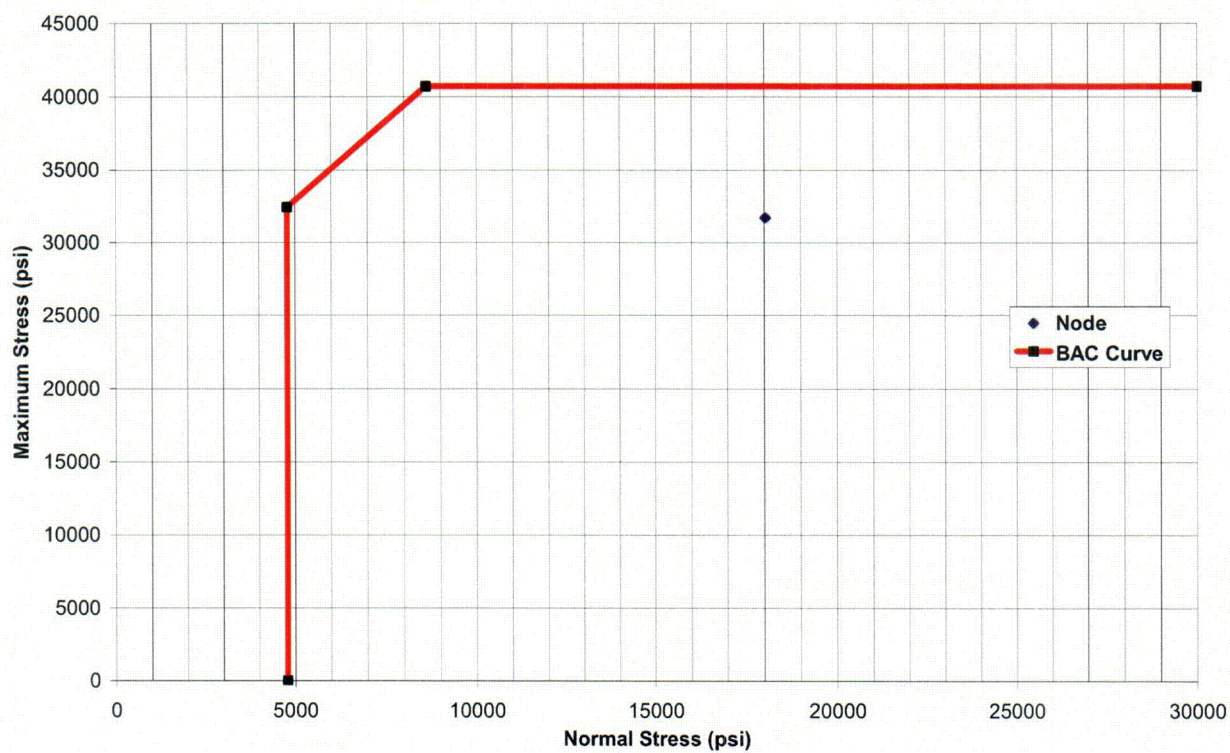


Figure 2-10

LBB Results for 18" ADS Stage 4

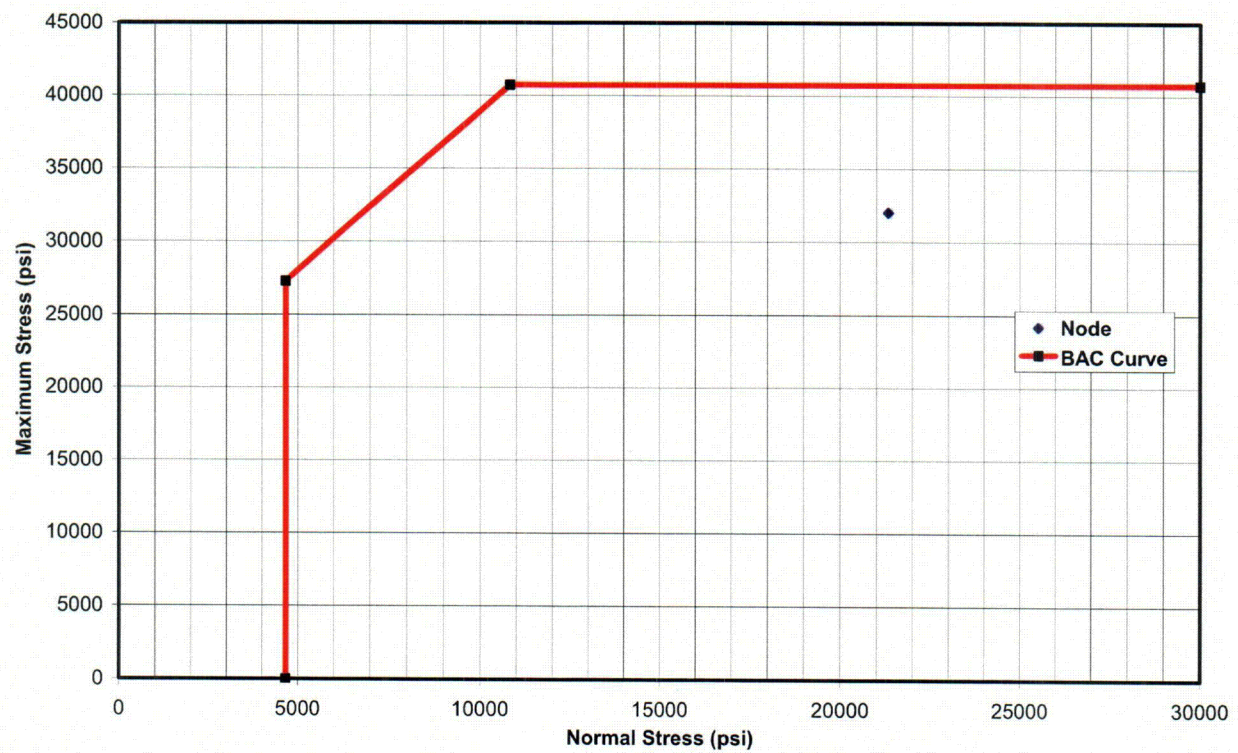


Figure 2-11

LBB Results for 14" ADS Stage 4

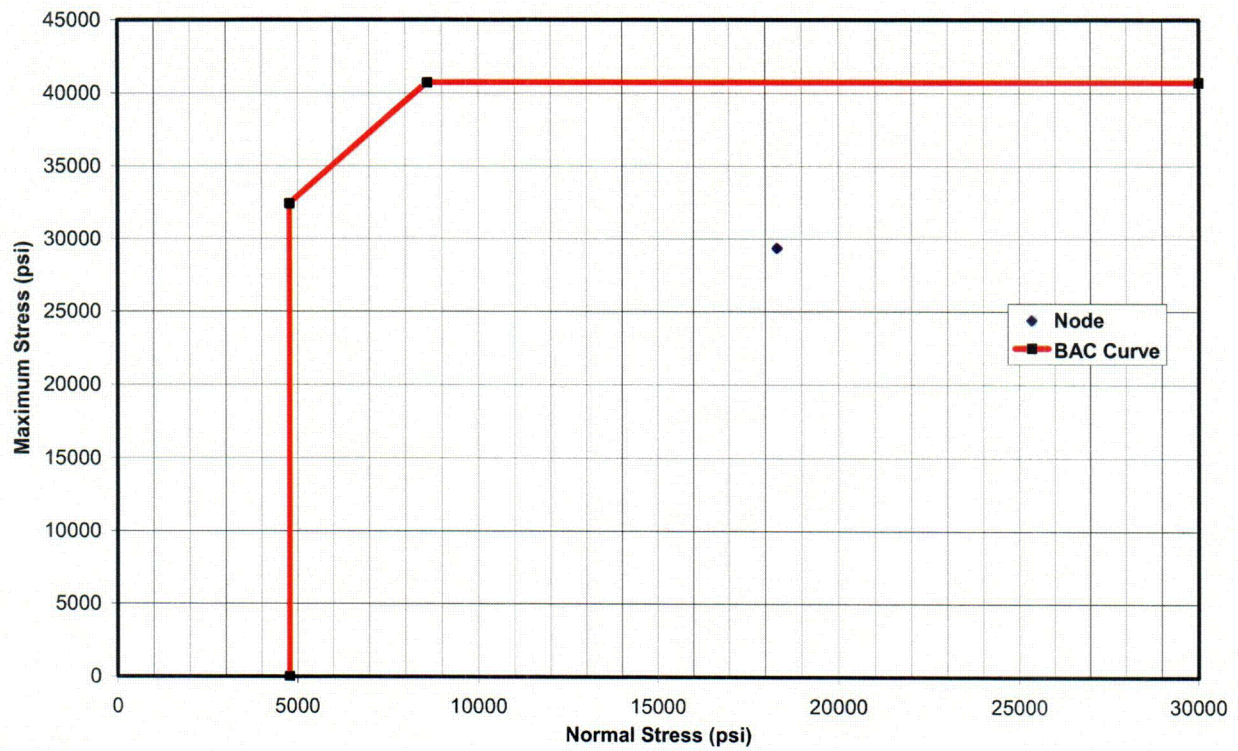


Figure 2-12

LBB Results for 18" PRHR Supply and ADS Stage 4

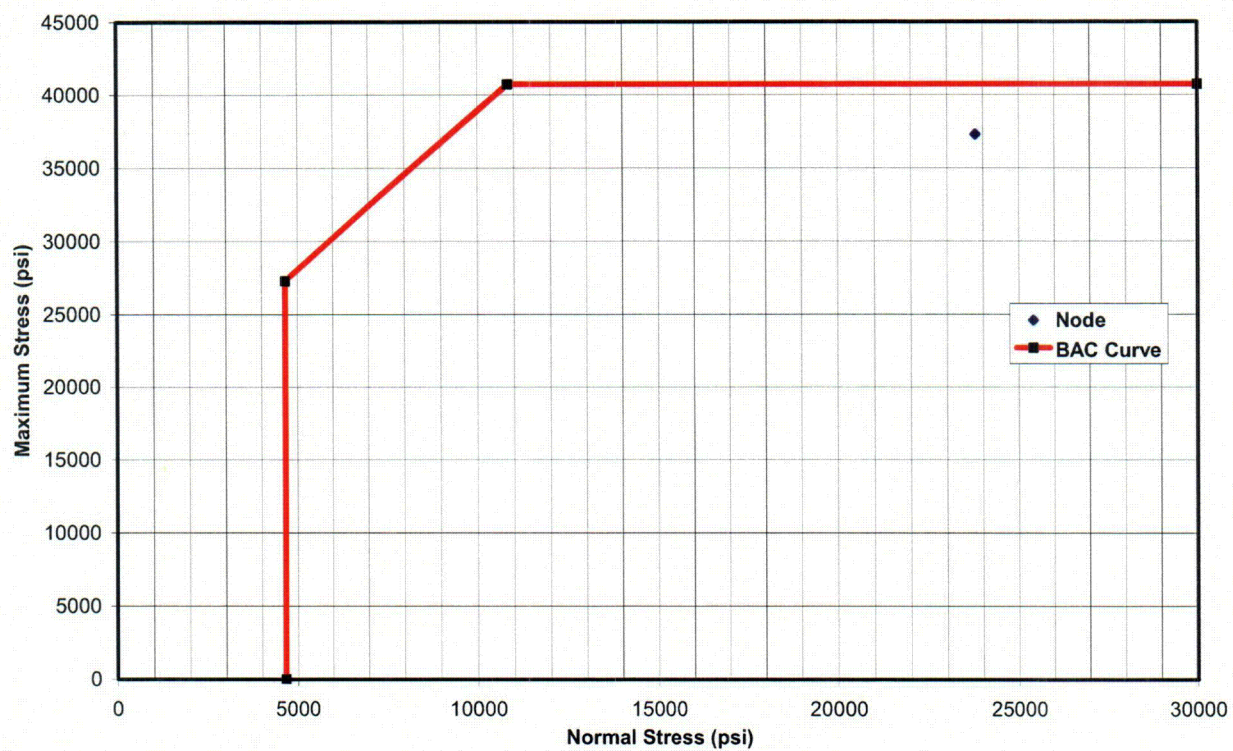


Figure 2-13

LBB Results for 14" PRHR Supply and ADS Stage 4

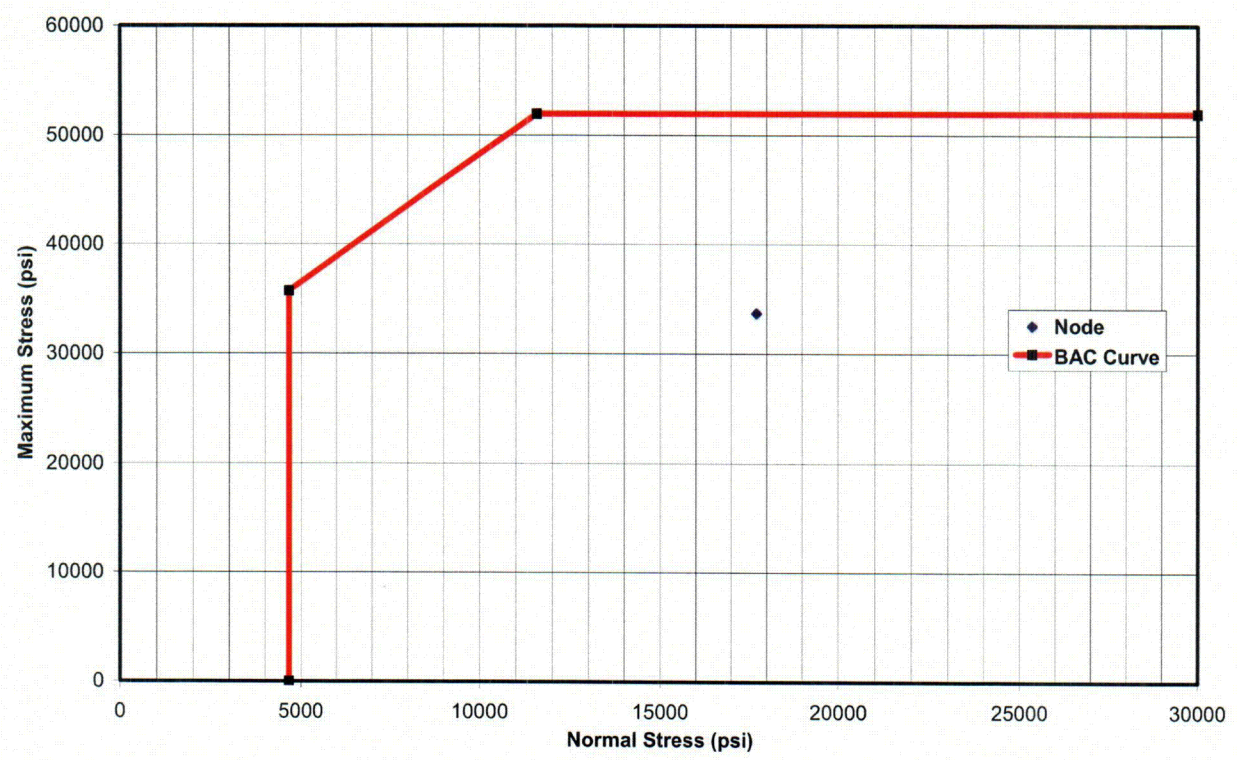


Figure 2-14

LBB Results for 14" PRHR Supply after Cold Trap, Return - to Isolation Valve

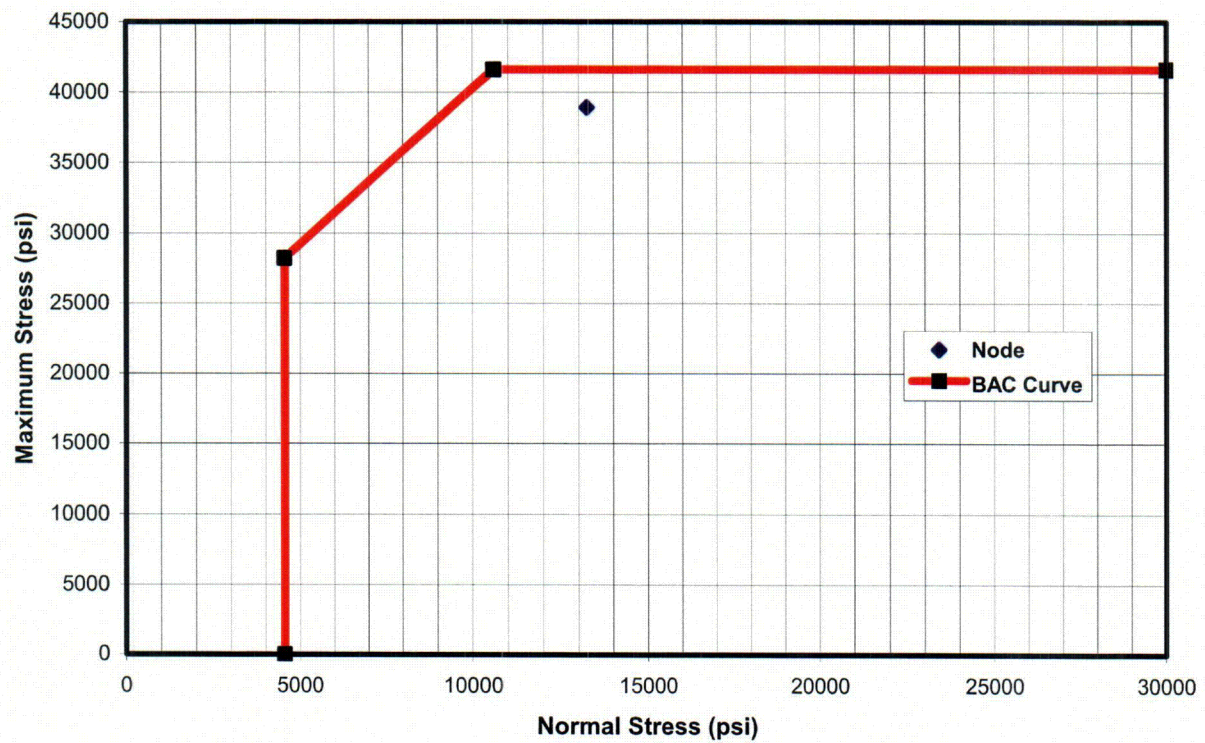


Figure 2-15

LBB Results for 14" PRHR Return after Isolation Valve

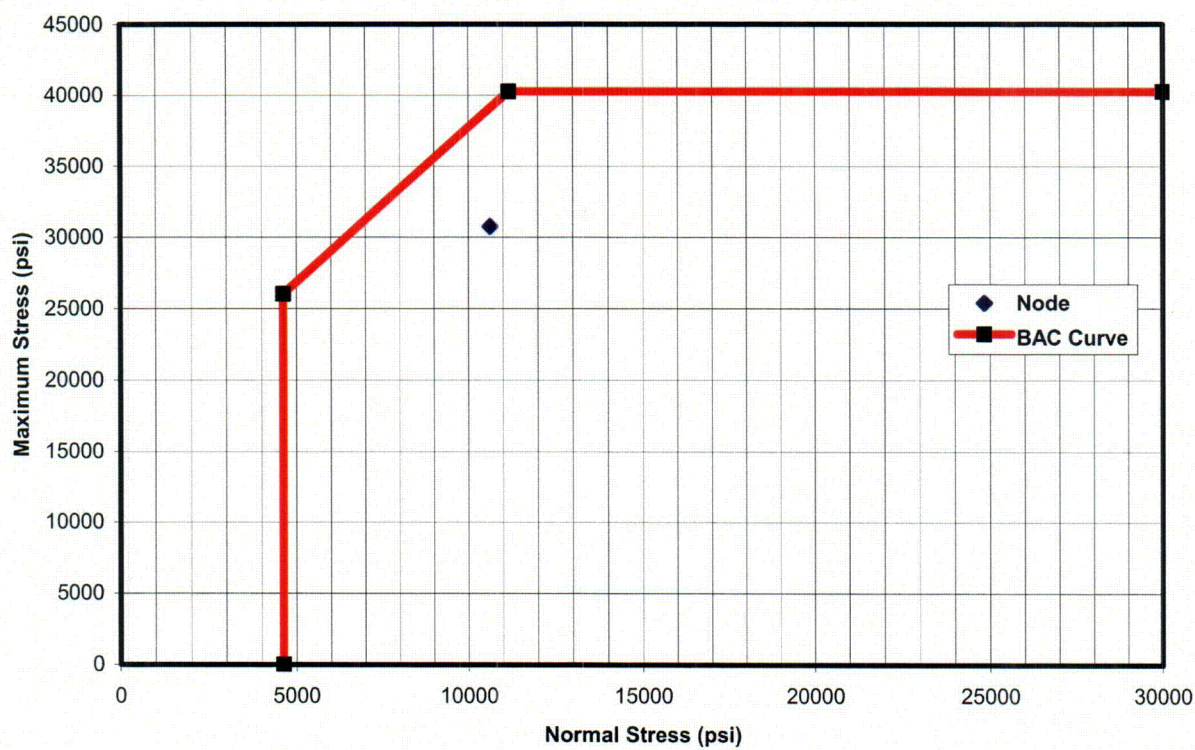


Figure 2-16

LBB Results for 14" ADS Stage 2, 3 – Lower Tier

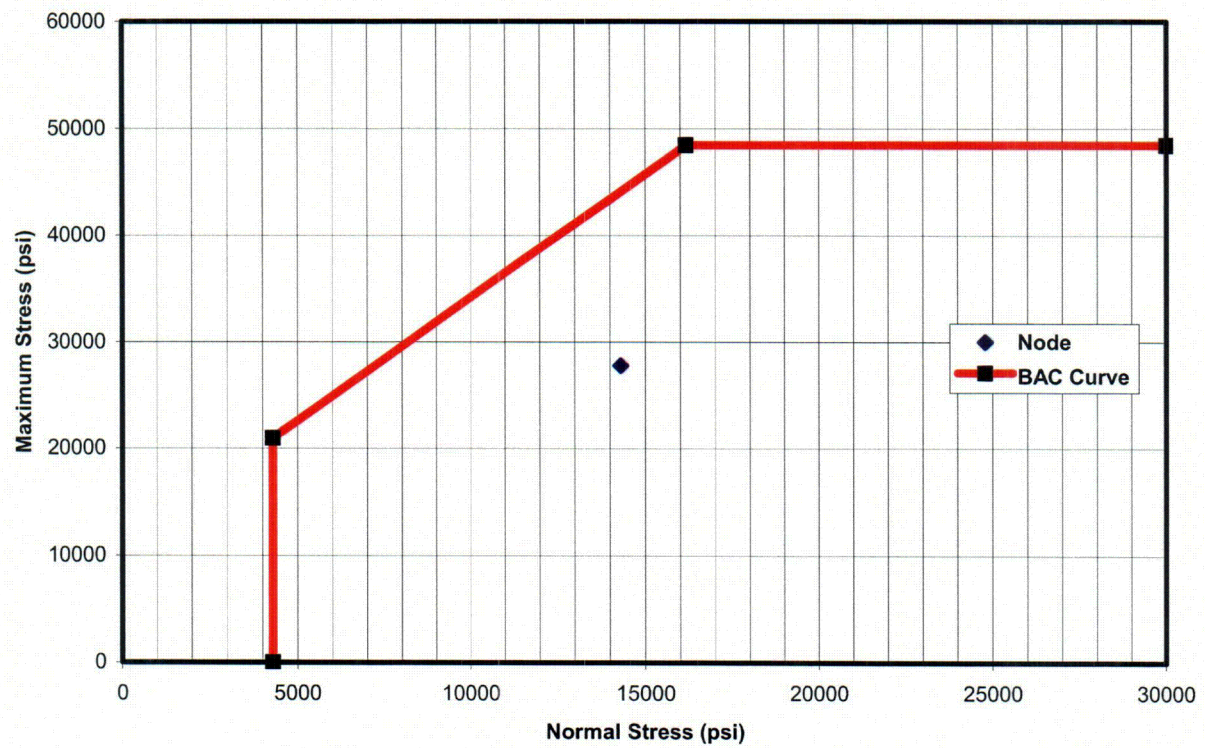


Figure 2-17

LBB Results for 8" ADS Stage 2 (Cold Trap) – Lower Tier

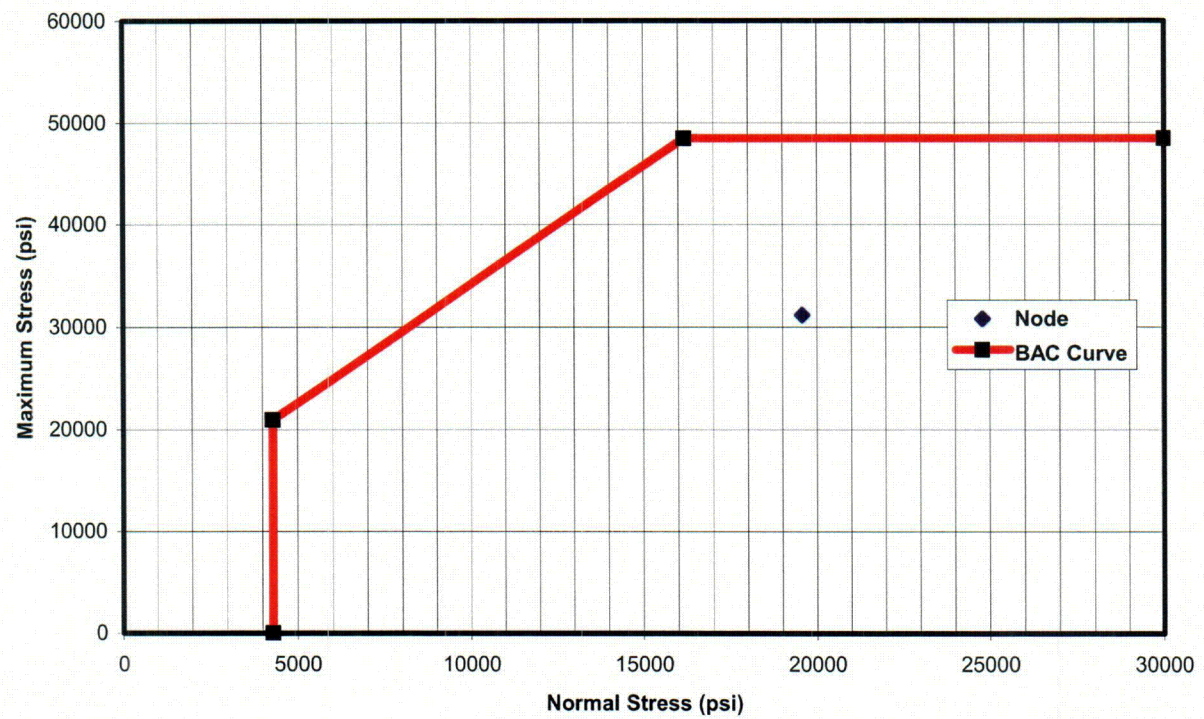


Figure 2-18

LBB Results for 8" ADS Stage 3 (Cold Trap) – Lower Tier

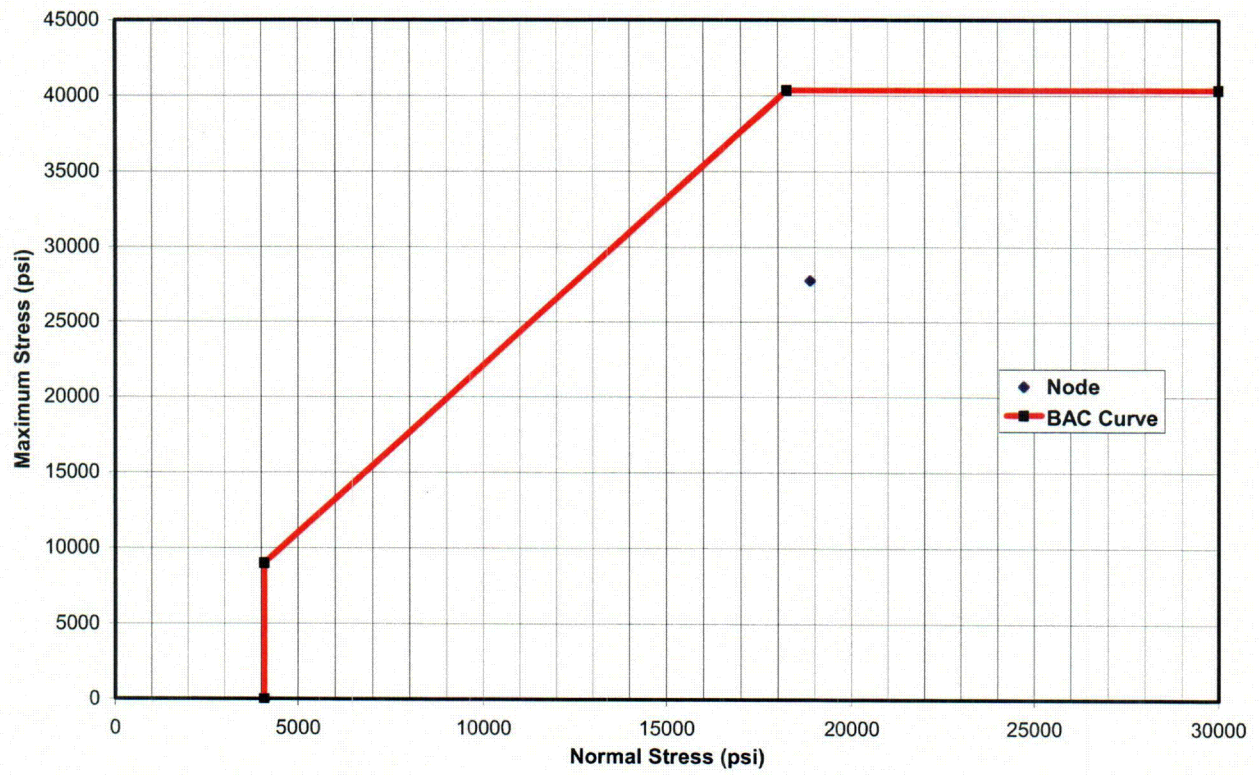


Figure 2-19

LBB Results for 6" ADS Header to RCS Safety Valve – Train B

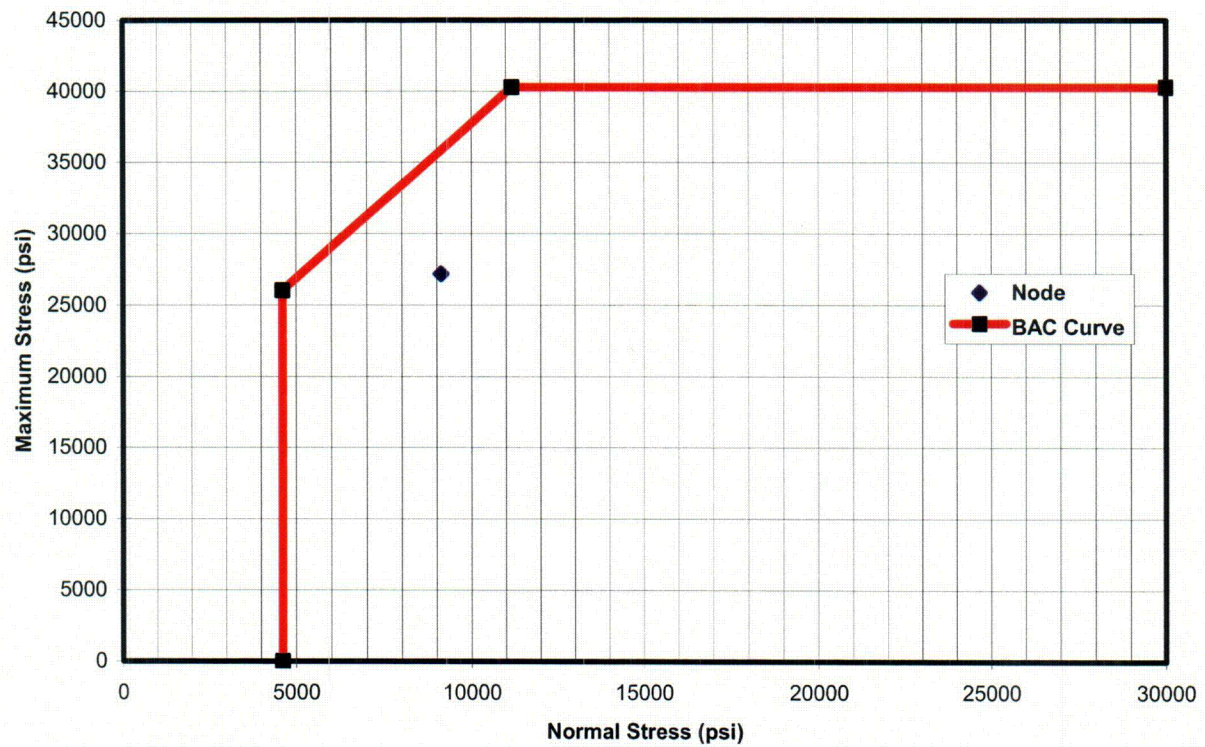


Figure 2-20

LBB Results for 14" ADS Stage 2, 3 – Upper Tier

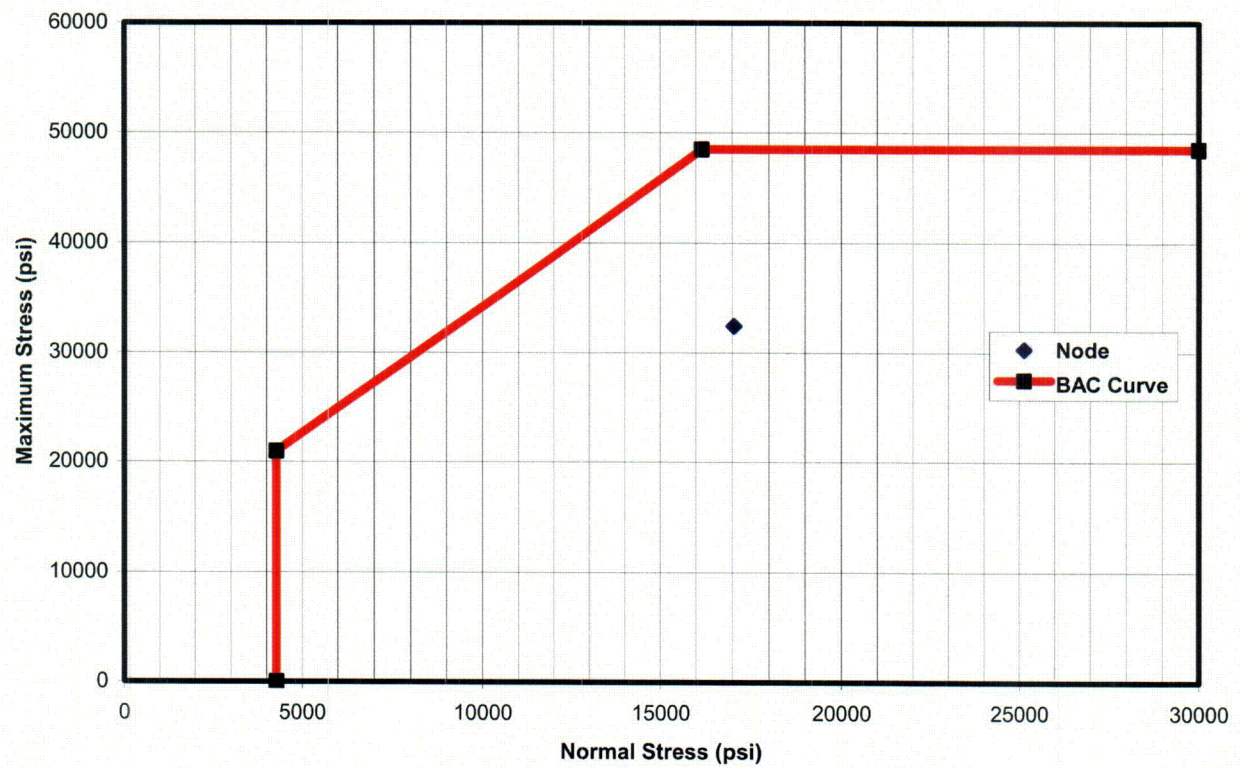


Figure 2-21

LBB Results for 8" ADS Stage 2 (Cold Trap) – Upper Tier

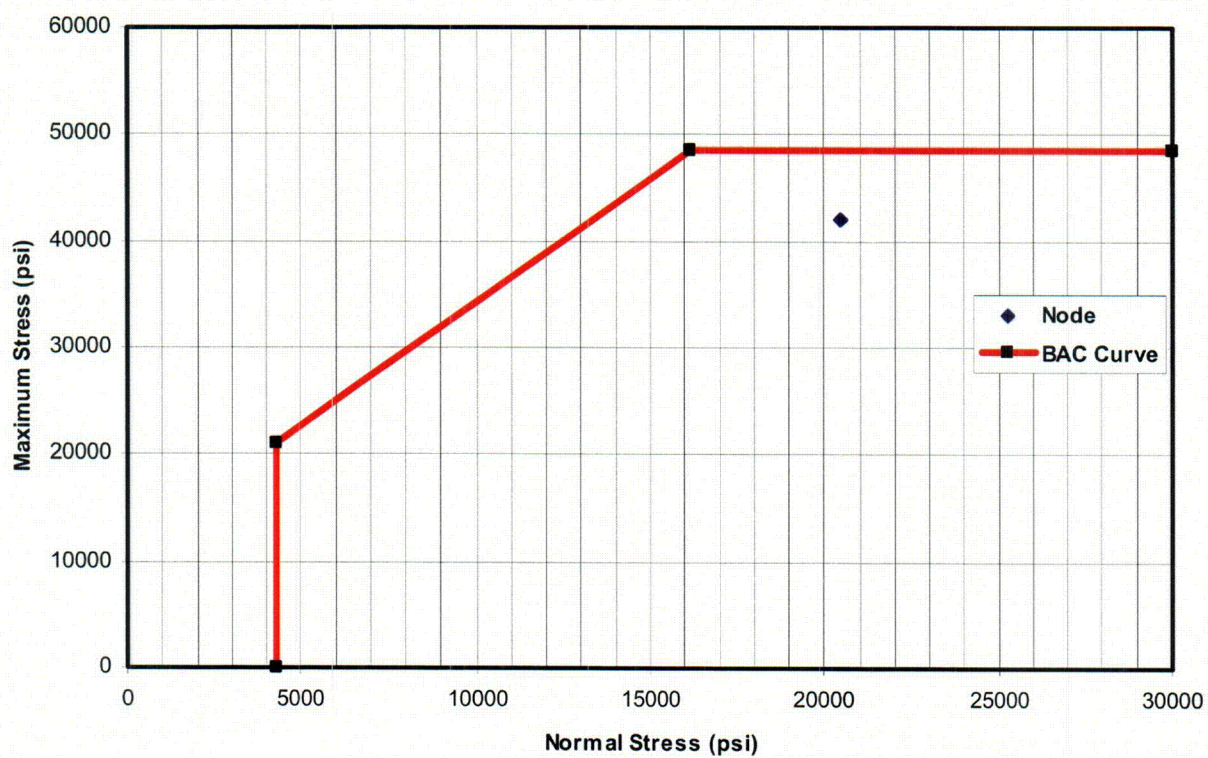


Figure 2-22

LBB Results for 8" ADS Stage 3 (Cold Trap) – Upper Tier

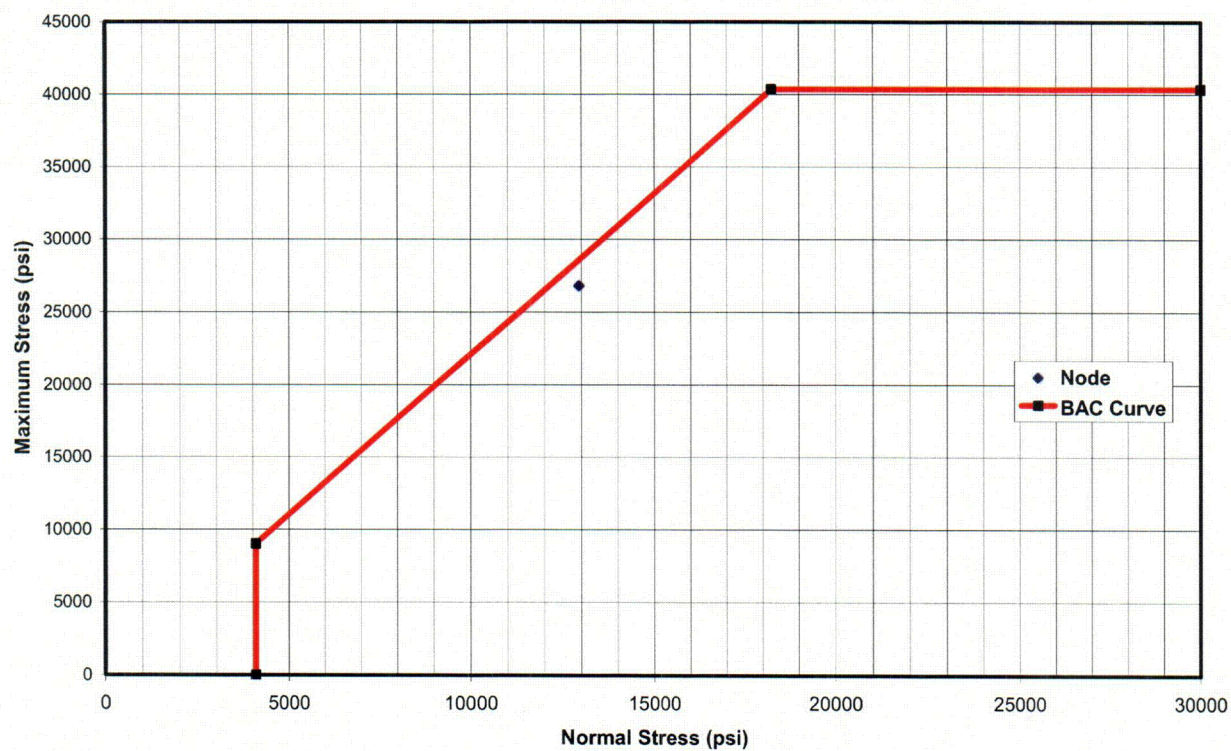


Figure 2-23

LBB Results for 6" ADS Header to RCS Safety Valve – Train A

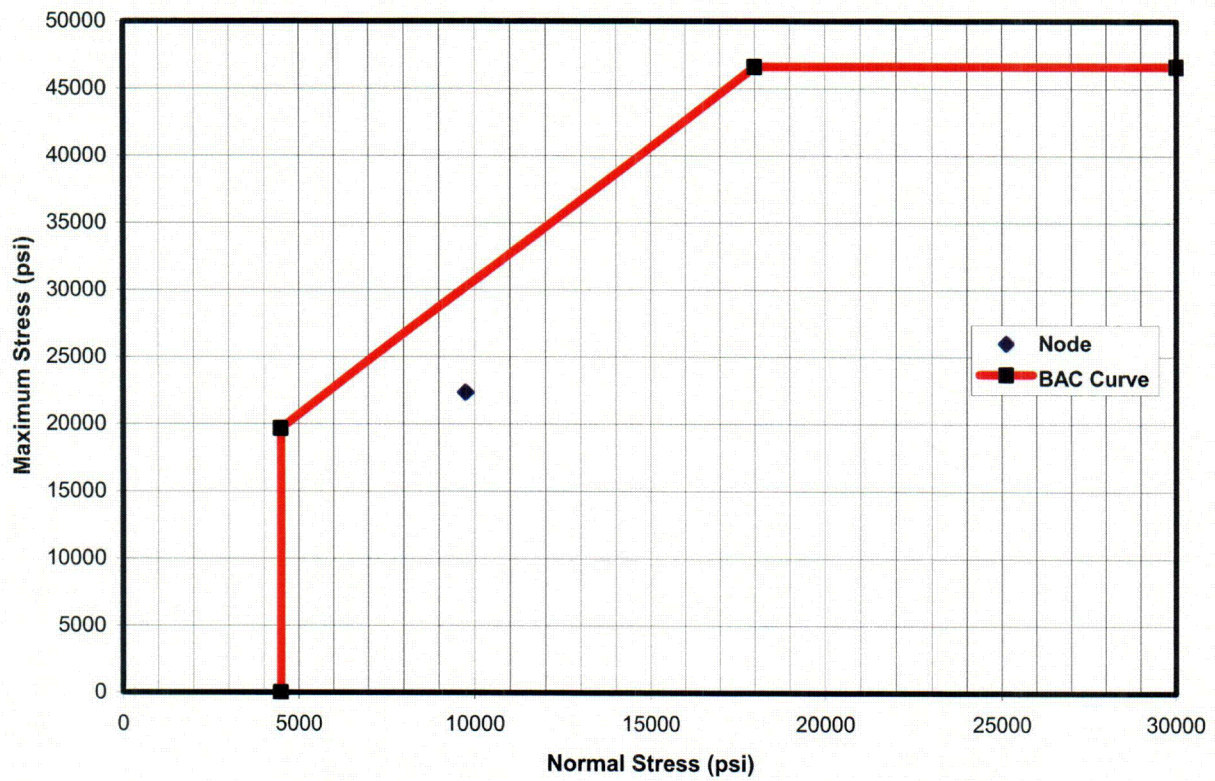


Figure 2-24

LBB Results for 8" Accumulator to Isolation Valve (DVI-A)

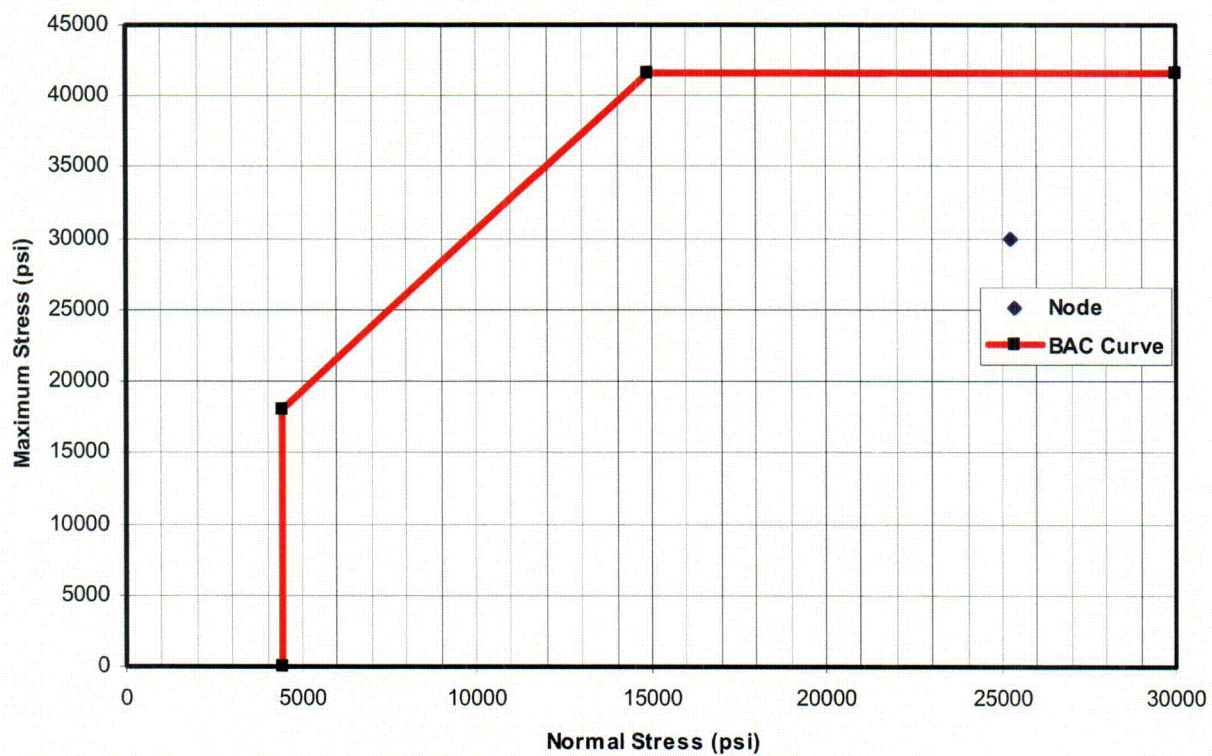


Figure 2-25

LBB Results for 8" DVI-A Cold Trap to RPV

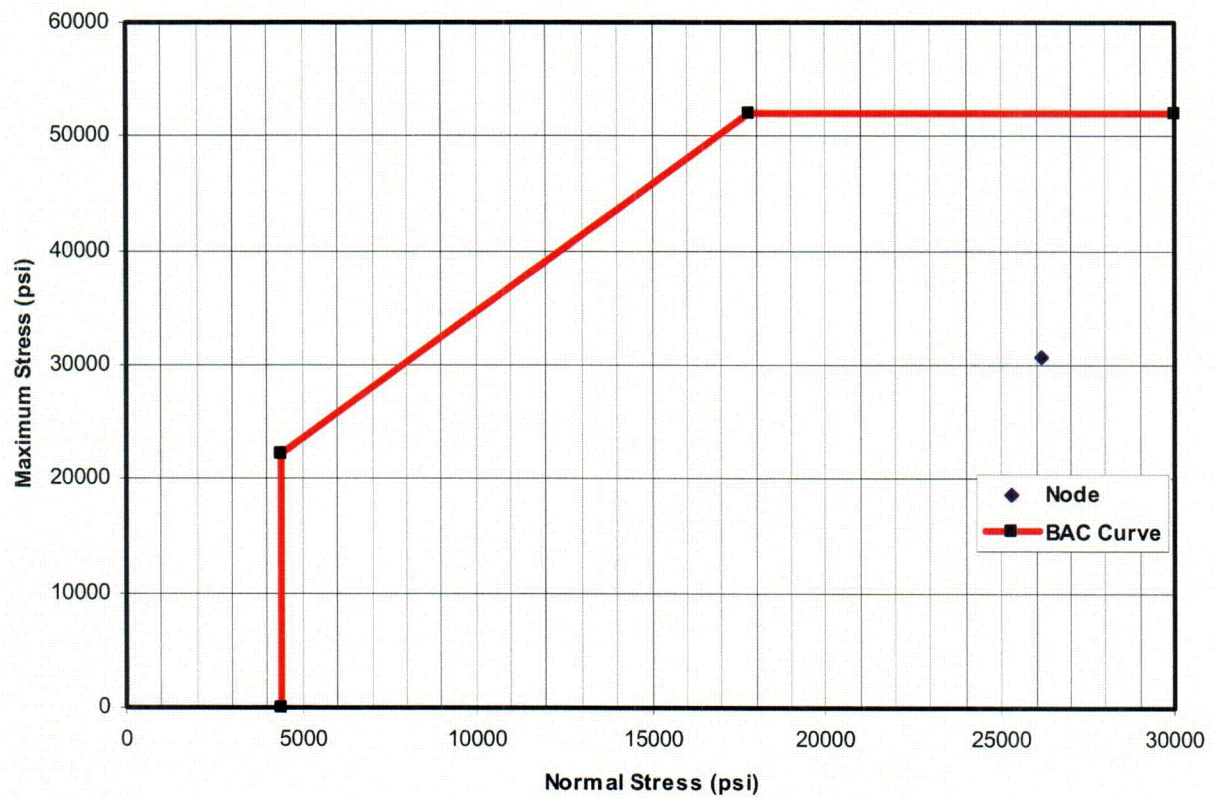


Figure 2-26

LBB Results for 8" CMT-DVIA-IWRST – Various Sections

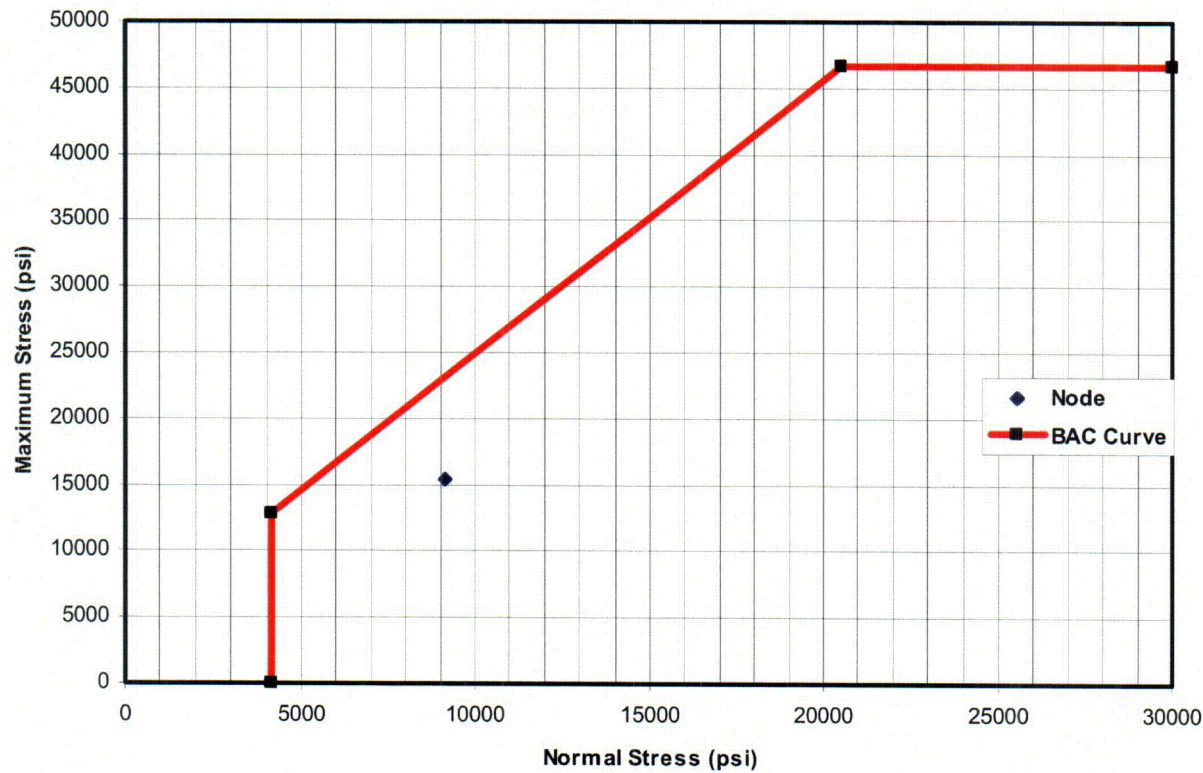


Figure 2-27

LBB Results for 8” Accumulator After Isolation Valve (DVI-A)

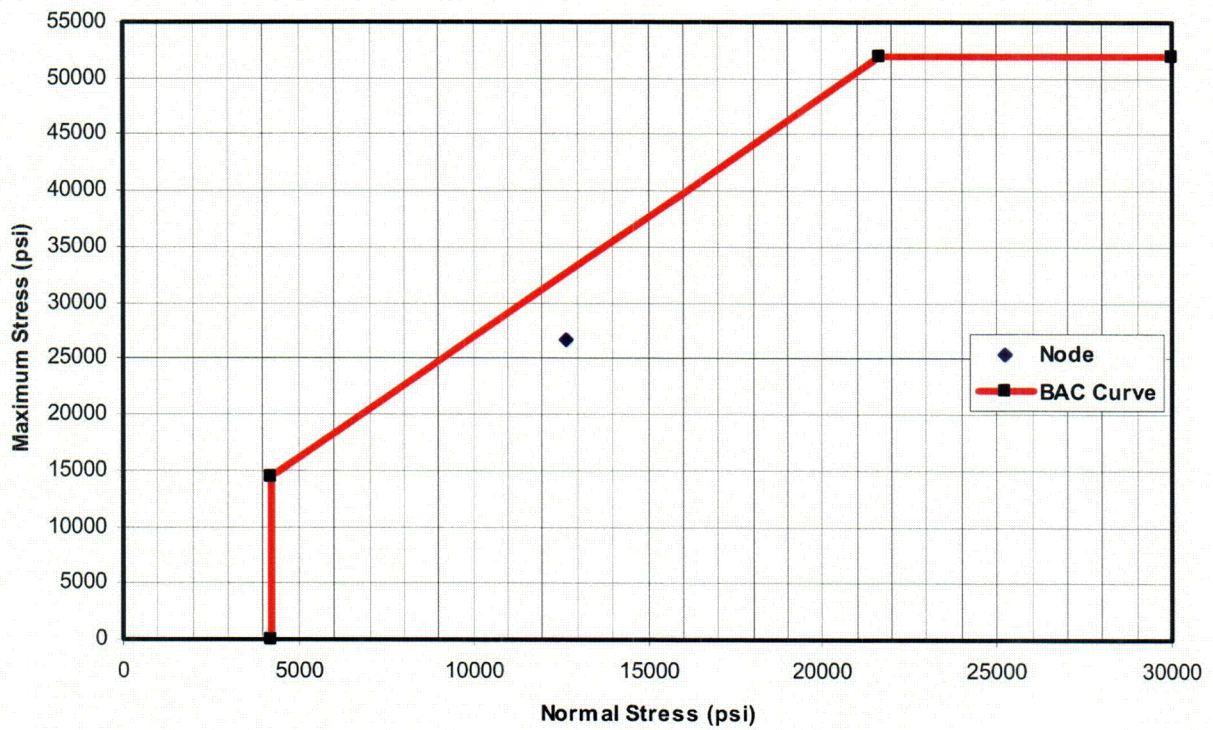


Figure 2-28

LBB Results for 6" RNS Discharge (DVI-A)

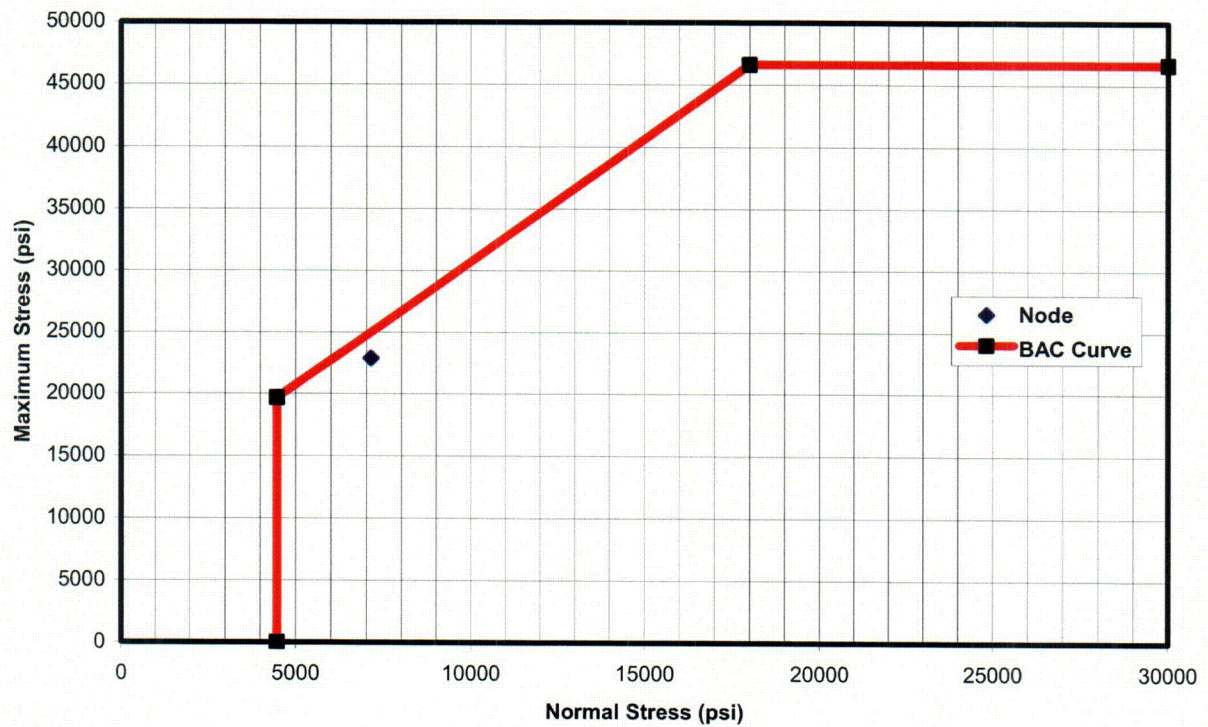


Figure 2-29

LBB Results for 8" Accumulator to Isolation Valve (DVI-B)

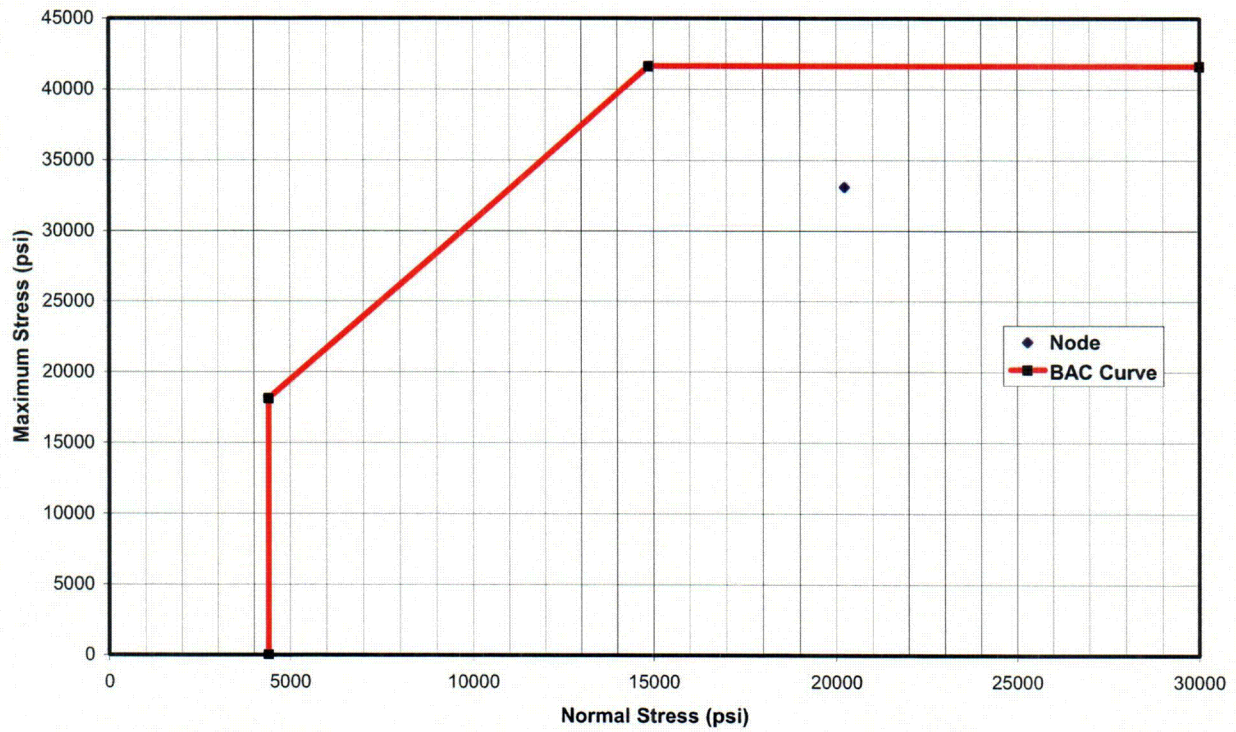


Figure 2-30

LBB Results for 8" DVI-B Cold Trap to RPV

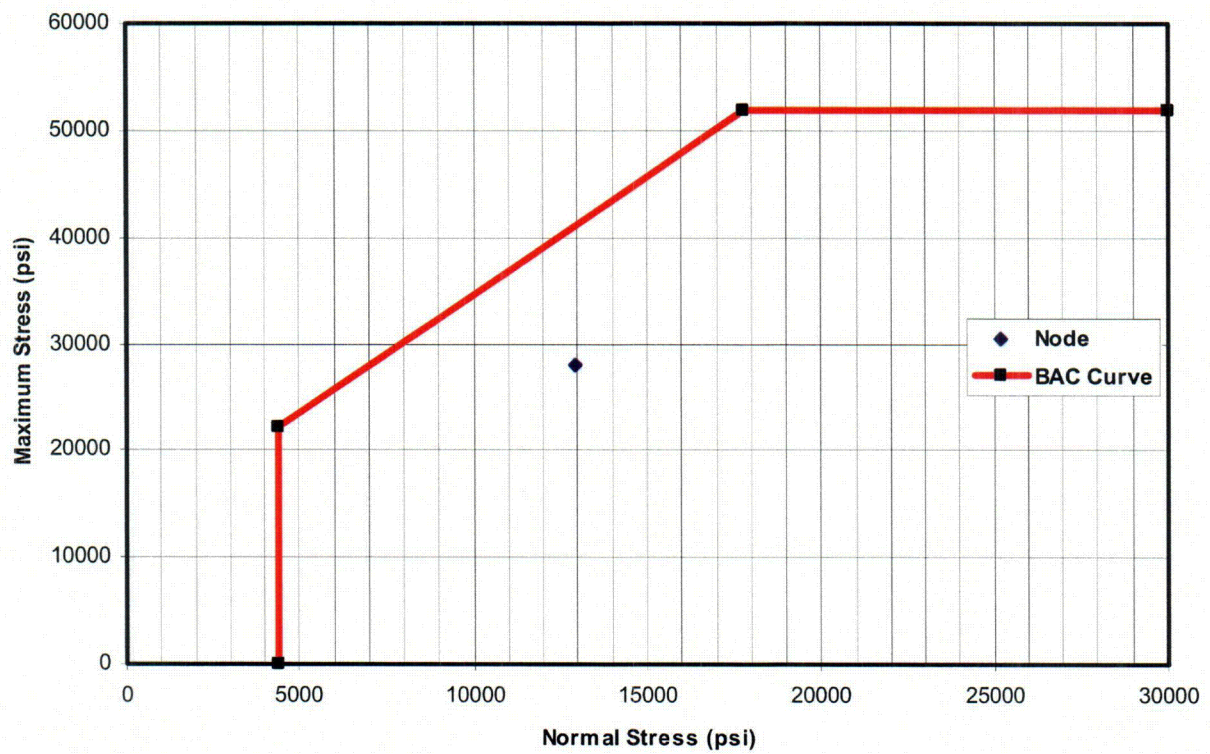


Figure 2-31

LBB Results for 8" CMT-DVIB-IWRST – Various Sections

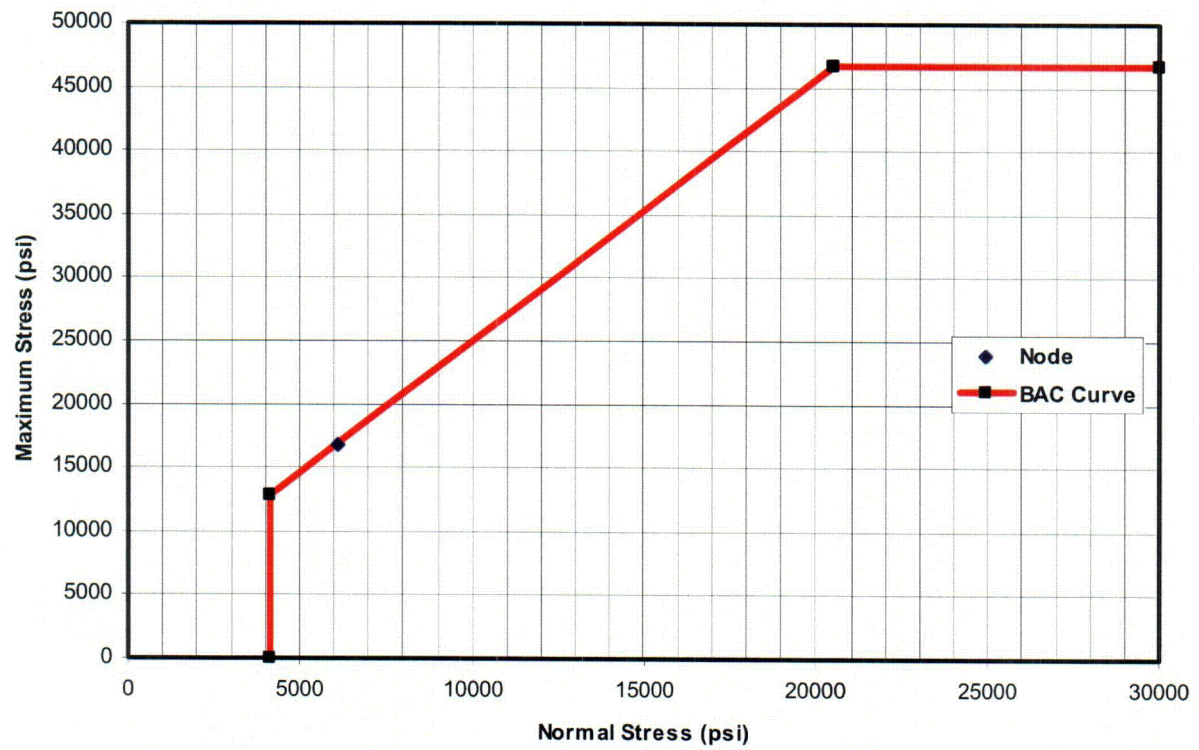


Figure 2-32

LBB Results for 8" Accumulator After Isolation Valve (DVI-B)

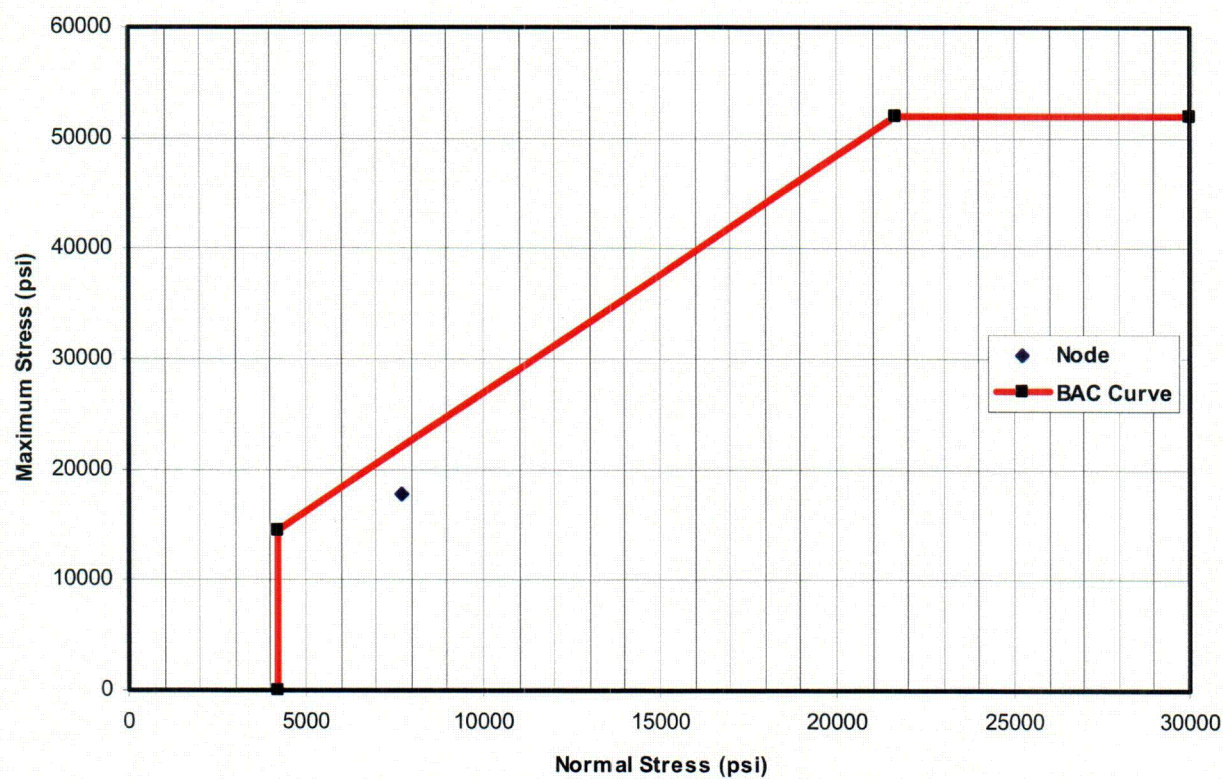


Figure 2-33

LBB Results for 6" RNS Discharge (DVI-B)

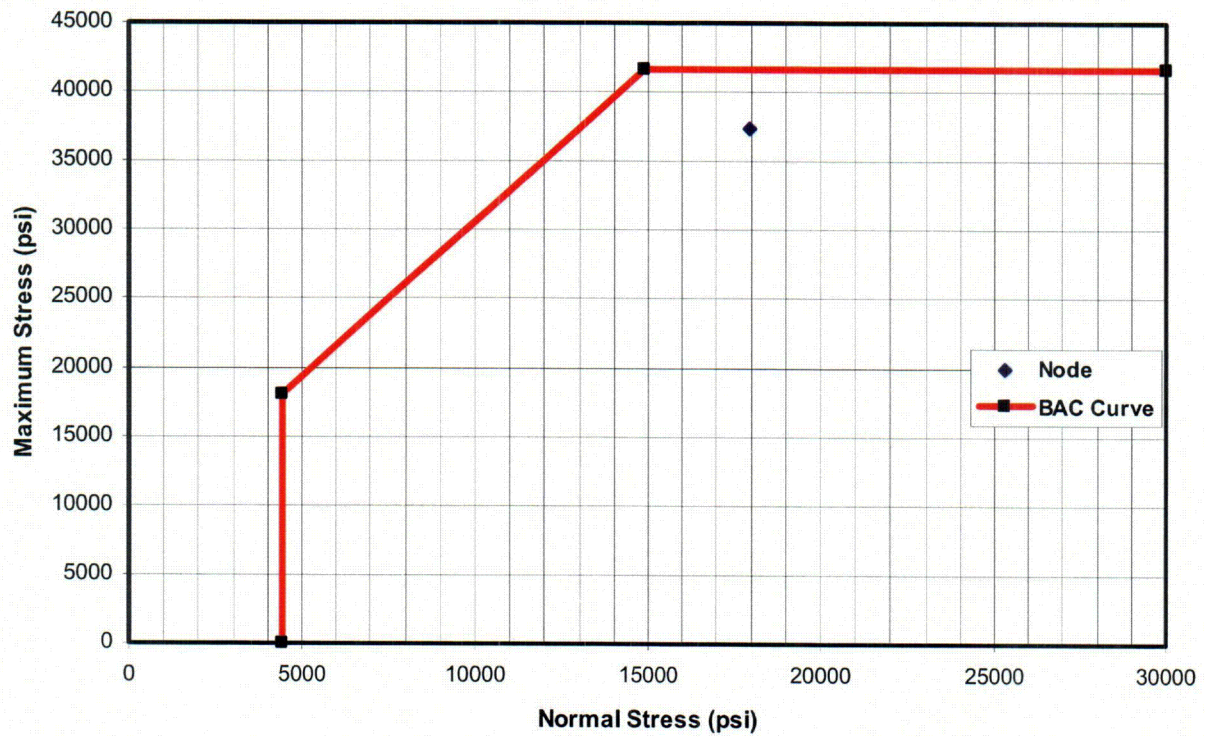


Figure 2-34

LBB Results for 8" CMT-A Cold Leg Balance Line and Vent

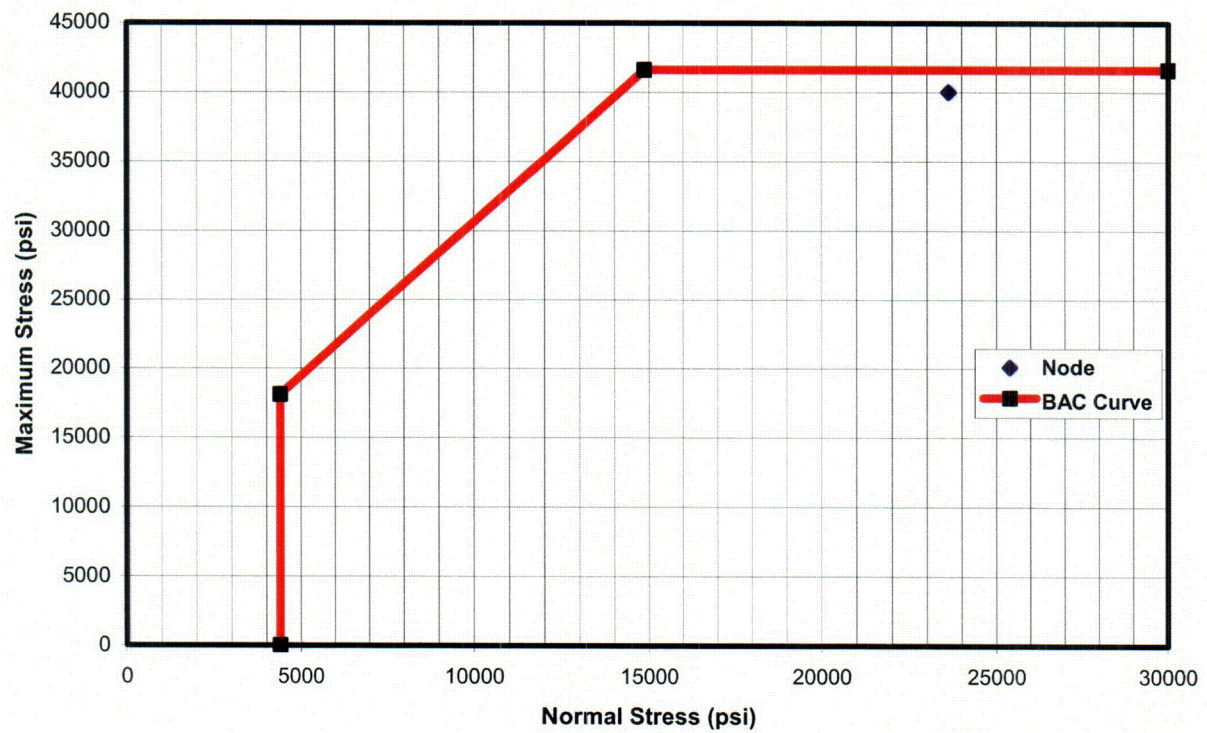
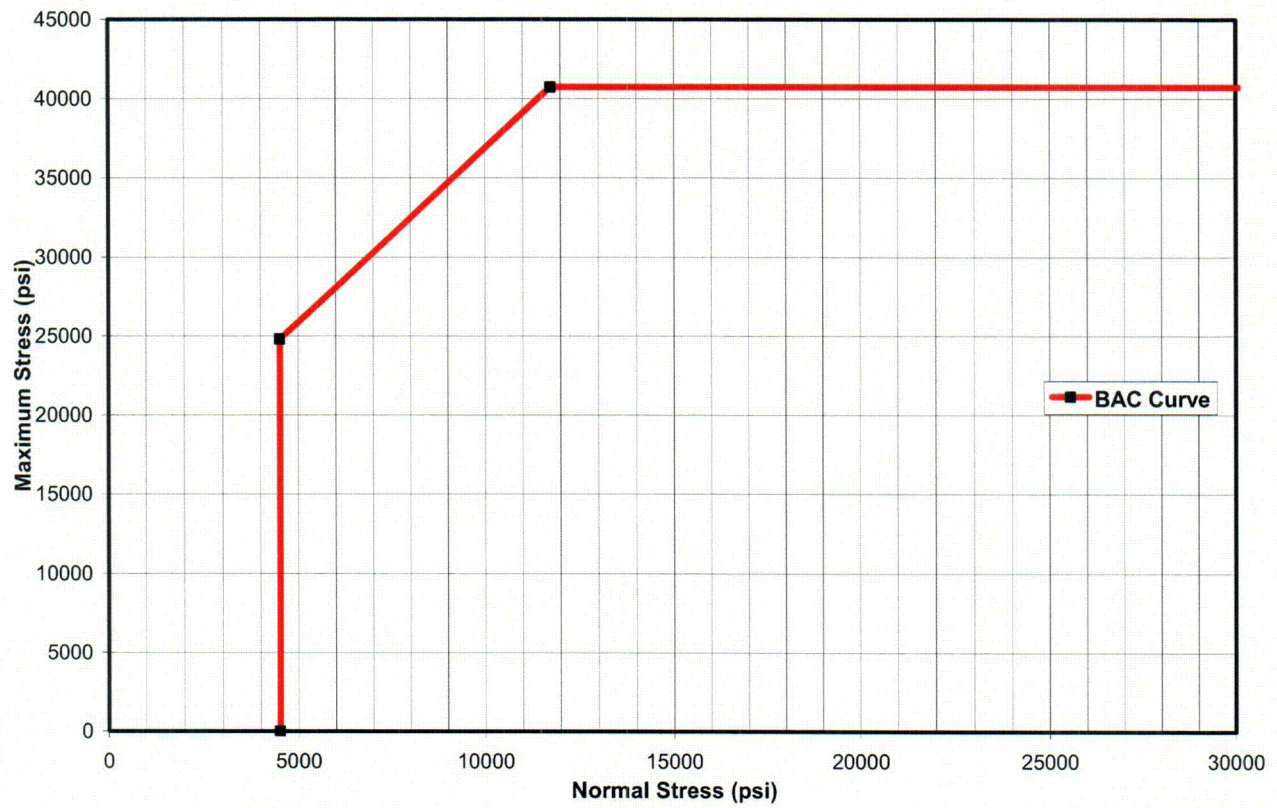


Figure 2-35

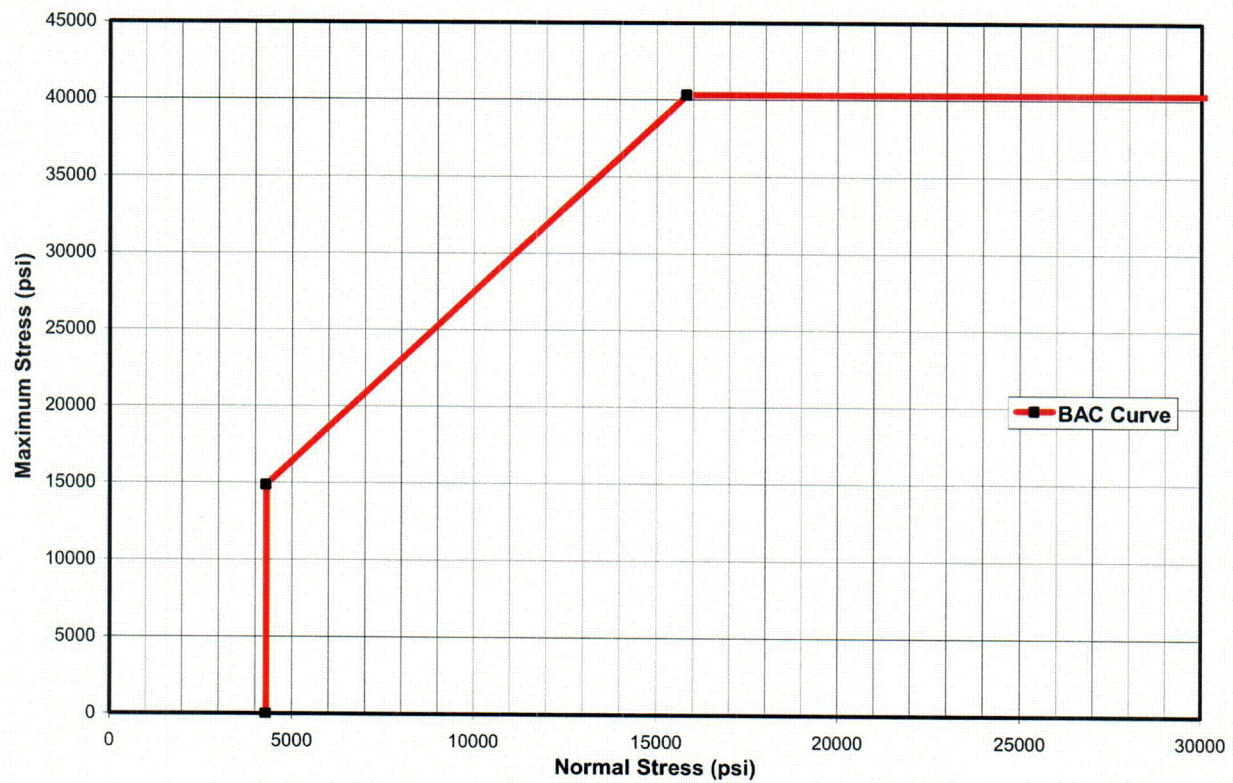
LBB Results for 8" CMT-B Cold Leg Balance Line and Vent



Not Used

Figure 2-36

Bounding Analysis Curve for 12" PRHR Vent Line



Not Used

Figure 2-37

Bounding Analysis Curve for 8" ADS Stage 2, 3

3.0 REGULATORY IMPACT

The AP1000 FSER (Reference 2) in Subsection 3.6.3 discusses the application of leak-before break (LBB) to exclude from the design basis, consideration of the dynamic effects of pipe ruptures. The use of bounding analysis curves (BACs) for AP1000 LBB candidate piping subsystems is evaluated. The procedures to calculate the normal stress and the maximum stress are considered. The information presented in this report is consistent with evaluation and procedures considered in the FSER. The completion of the as-designed LBB evaluation does not alter the conclusions in FSER Subsection 3.6.3.5.

The changes to the DCD presented in this report do not represent an adverse change to the design function or how design functions are performed or controlled. The changes to the DCD do not involve revising or replacing a DCD-described evaluation methodology nor involve a test or experiment not described in the DCD. The DCD change does not require a license amendment per the criteria of VIII.B.5.b. of Appendix D to 10 CFR Part 52.

The changes described do not involve design features used to mitigate severe accidents. Completion of the as-designed LBB evaluation does not alter design features used to mitigate severe accidents. Therefore, a license amendment based on the criteria of VIII.B.5.c. of Appendix D to 10 CFR Part 52 is not required.

The subject changes will not alter barriers or alarms that control access to protected areas of the plant. The subject changes will not alter requirements for security personnel. Therefore, the proposed change does not have an adverse impact on the security assessment of the AP1000.

4.0 REVISIONS TO THE DESIGN CONTROL DOCUMENT (DCD)

Table 3B-1 of the DCD is revised and Figure 3B-22 is added to the DCD to reflect the temperature in the cold trap region for the Automatic Depressurization System Stage 2, 3 pipe line (8"). DCD Figure 3B-16 is marked as unused. The entry in DCD Table 3B-1 involving this DCD Figure is marked unused.

The Hot Leg and Cold Leg diameters in Table 3B-1 of the DCD indicate that they are nominal diameters. To provide clarification, the nominal diameter in Figures 3B-2 and 3B-3 now reads inside diameter.

Table 3B-1 of the DCD is revised to reflect the proper diameter (14") of the Passive Residual Heat Removal Vent Line (PXS-L107) as part of the Passive Residual Heat Removal Supply to Cold Trap, DCD Figure 3B-8. Accordingly, DCD Figure 3B-12 is marked as unused and the entry in DCD Table 3B-1 involving this DCD Figure is marked unused. An addition has been made to the description of DCD Figure 3B-8 in Table 3B-1 to indicate the inclusion of the Vent Line. The change in diameter has been made to the Passive Core Cooling System-Piping and Instrumentation Diagram (Sheet 2, Figure 6.3-2) in DCD Section 6.3, as well as the High Energy Piping-Passive Core Cooling System (Figure 3E-4) in Appendix 3E.

A 14"x8" reducer has been added to line RCS-L031A on the Upper Tier of the ADS 2,3 to make it consistent with the Lower Tier. The Reactor Coolant System-Piping and Instrumentation Diagram (Figure 5.1-5) in DCD Section 5.1 and High Energy Piping –Reactor Coolant System in DCD (Figure 3E-3) Appendix 3E reflect the addition of the reducer.

Table 3B-1 of the DCD is revised to reflect the relocation of PXS-L125 (A, B) to the DVI Subsystem (Figure 3B-14) from (Figure 3B-15). Table 3B-1 of the DCD is revised to indicate that line numbers L019 (A,B) are in both the PXS and RNS systems. "38-21" in Table 3B-1 of the DCD is revised to read "3B-21". This is an editorial change.

Table 4-1 (Sheet 1 of 2)

AP1000 LEAK-BEFORE-BREAK BOUNDING ANALYSIS SYSTEMS AND PARAMETERS (Revised, DCD Table 3B-1)

System	Subsystem	Line No(s).	Nominal Diameter (Inches)	Material	Temp (°F)	Pressure (psig)	Figure No.
RCS	Primary Loop Hot Leg	L001A, B	31 (ID)*	SA-376 TP316LN	610.0	2248	3B-2
RCS	Primary Loop Cold Leg	L002A, B, C, D	22 (ID)*	SA-376 TP316LN	537.2	2310	3B-3
SGS	Main Steam Line	L006A, B	38	SA-333 GR6	523.0	821	3B-4
RCS	Normal Residual Heat Removal	L139	20	SA-312 TP316LN	610.0	2248	3B-5
RCS	Surge Line	L003	18	SA-312 TP316LN	653.0	2248	3B-6 (Sheet 1)
RCS	Surge Line	L003	18	SA-312 TP316LN	455.0	430	3B-6 (Sheet 2)
RCS	Passive Residual Heat Removal Supply/ADS 4	L135A,B; L136A,B	18	SA-312 TP316LN	610.0	2248	3B-7
RCS	Passive Removal Heat Removal Supply/ADS 4	L133A, B; L137A, B; L134	14	SA-312 TP316LN	610.0	2248	3B-8
PXS	Passive Residual Heat Removal Supply to Cold Trap and Vent Line	L102, L107	14	SA-312 TP316LN	610.0	2248	3B-8
PXS	Passive Residual Heat Removal Supply after Cold Trap to PRHR HX	L102	14	SA-312 TP316LN	120.0	2248	3B-9
PXS	Return – PRHR HX to Isolation Valve	L103; L104A, B	14	SA-312 TP316LN	120.0	2248	3B-9
RCS	Automatic Depressurization System Stage 2, 3	L004A,B; L006A,B; L020A,B; L030A, B; L131	14	SA-312 TP316LN	653.0	2235	3B-10

*ID = Inside Diameter

Table 4-1 (Sheet 2 of 2)

AP1000 LEAK-BEFORE-BREAK BOUNDIG ANALYSIS SYSTEMS AND PARAMETERS (Revised, DCD Table 3B-1)

System	Subsystem	Line No(s).	Nominal Diameter (Inches)	Material	Temp (°F)	Pressure (psig)	Figure No.
PXS	Passive Residual Heat Removal Return – after Isolation Valve	L104A, B; L105	14	SA-312 TP316LN	537.0	2190	3B-11
RCS	Passive Residual Heat Removal Return	L113	14	SA-312 TP316LN	537.0	2190	3B-11
PXS	Passive Residual Heat Removal Vent Line	L107	12	SA-312 TP316LN	610.0	2248	3B-12 (NOT USED)
PXS	Accumulator to Isolation Valve	L029A, B	8	SA-312 TP304L	120.0	700	3B-13
RCS	Balance Line from Cold Leg to CMT Isolation Valve	L118A, B	8	SA-312 TP316LN	537.0	2310	3B-14
PXS	Balance Line from CMT Isolation Valve to CMT	L007A, B; L070A, B,	8	SA-312 TP316LN	537.0	2310	3B-14
PXS	Direct Vessel Injection Line to RV	L021A, B; L125 A, B	8	SA-312 TP316LN	537.0	2310	3B-14
PXS	Core Makeup Tank (Injection Line, RV Side of Isolation Valve, Core Makeup Tank Side of Isolation Valve), Direct Vessel Injection (Accumulator Connection to Cold Trap), IRWST Injection	L015, L016, L017, L018, L020, L021, L025, L125, L127 (All A, B)	8	SA-312 TP316LN	120.0	2310	3B-15
RCS	Automatic Depressurization System Stage 2, 3	L021A,B; L031A,B	8	SA-312 TP316LN	653.0	2235	3B-16 (NOT USED)
PXS	Accumulator after Isolation Valve	L027A, B	8	SA-312 TP304L	120.0	700	3B-17
PXS/RNS	RNS Discharge	L019A, B	6	SA-312 TP316LN	120.0	2310	3B-18
RCS	Automatic Depressurization System Header to RCS Safety Valve	L005A, B	6	SA-312 TP316LN	653.0	2235	3B-19
RCS	Normal Residual Heat Removal	L140	12	SA-312 TP316LN	610.0	2248	3B-20
RNS	Normal Residual Heat Removal	L001, L002A, B	10	SA-312 TP316LN	610.0	2248	3B-21
RCS	Automatic Depressurization System Stage 2, 3 (Cold Trap)	L021A,B; L031A,B	8	SA-312 TP316LN	250.0	2235	3B-22

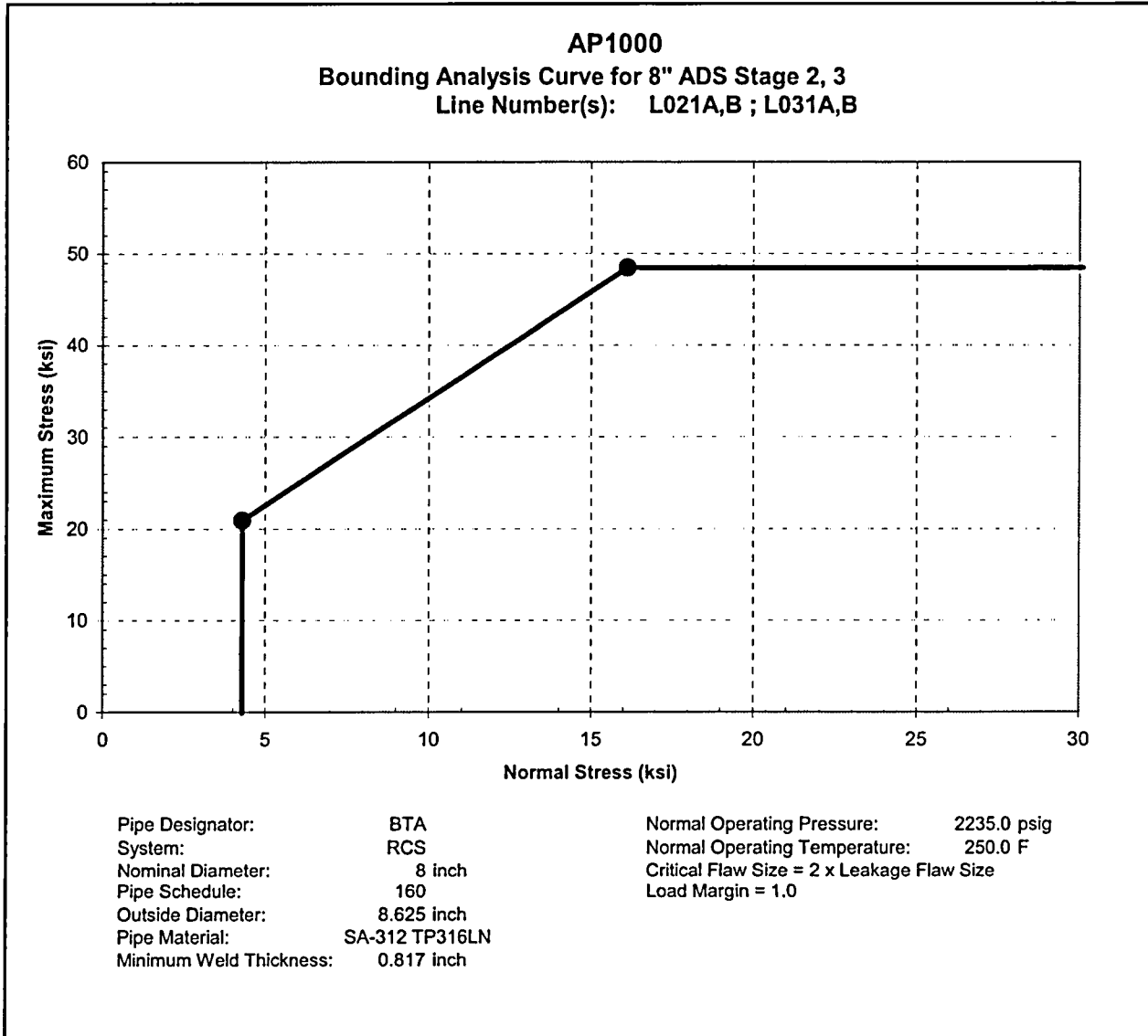


Figure 3B-22 is added and used for evaluation of the 8" ADS Stage 2-3 instead of Figure 3B-16 in Appendix 3B of the DCD. The bounding analysis curves for the 8" ADS stage 2, 3 pipe lines in the DCD are supplemented in this report to reflect the pipe temperature in the cold trap region (maximum temperature of 250 degrees F).

Figure 4-1

Bounding Analysis Curve for 8" ADS Stage 2, 3
(Cold Trap, DCD Figure 3B-22)

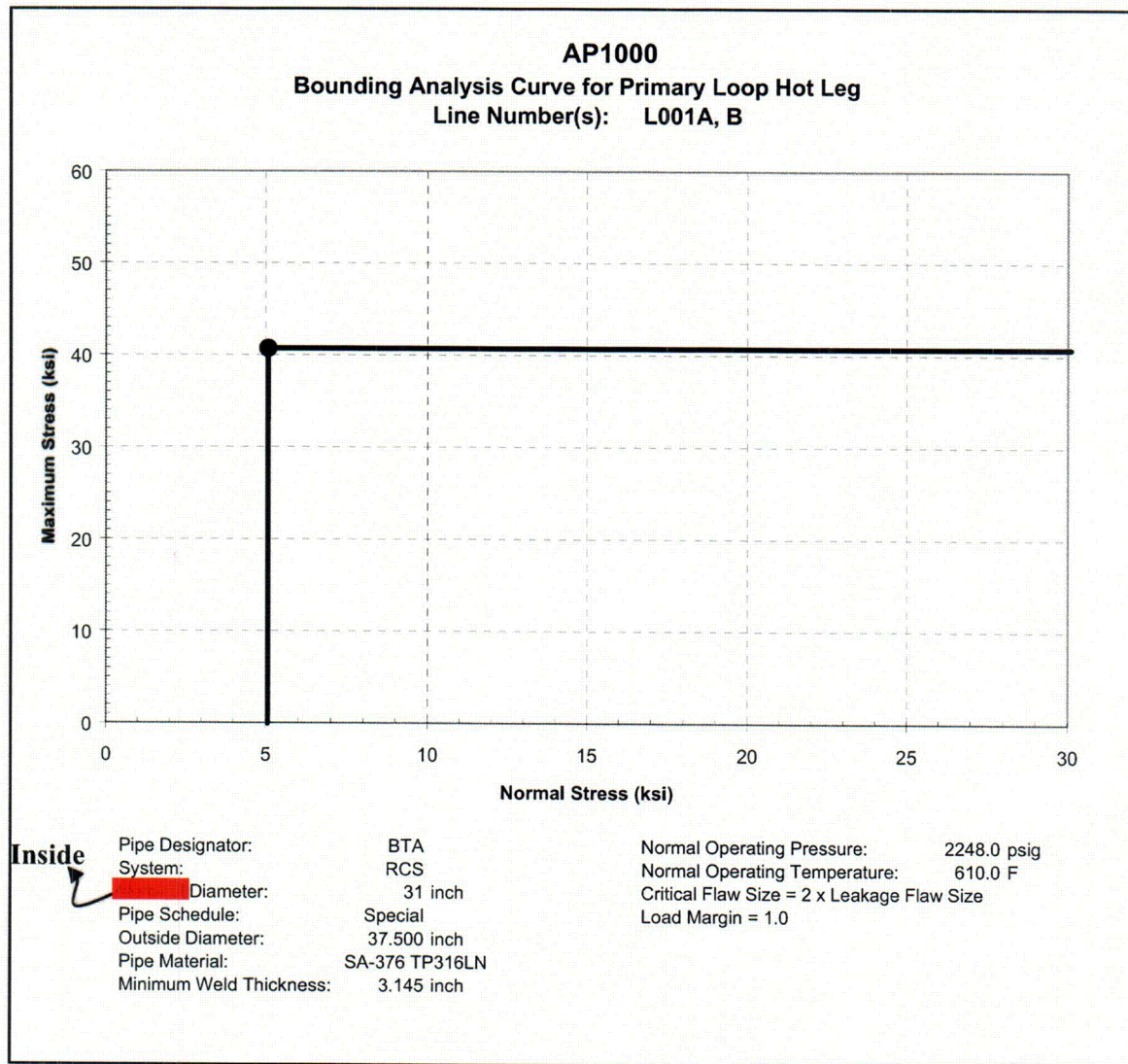


Figure 3B-2 is changed so that the 31" diameter is the inside diameter, not a nominal diameter.

Figure 4-2

Bounding Analysis Curve for Primary Loop Hot Leg
(Revised, DCD Figure 3B-2)

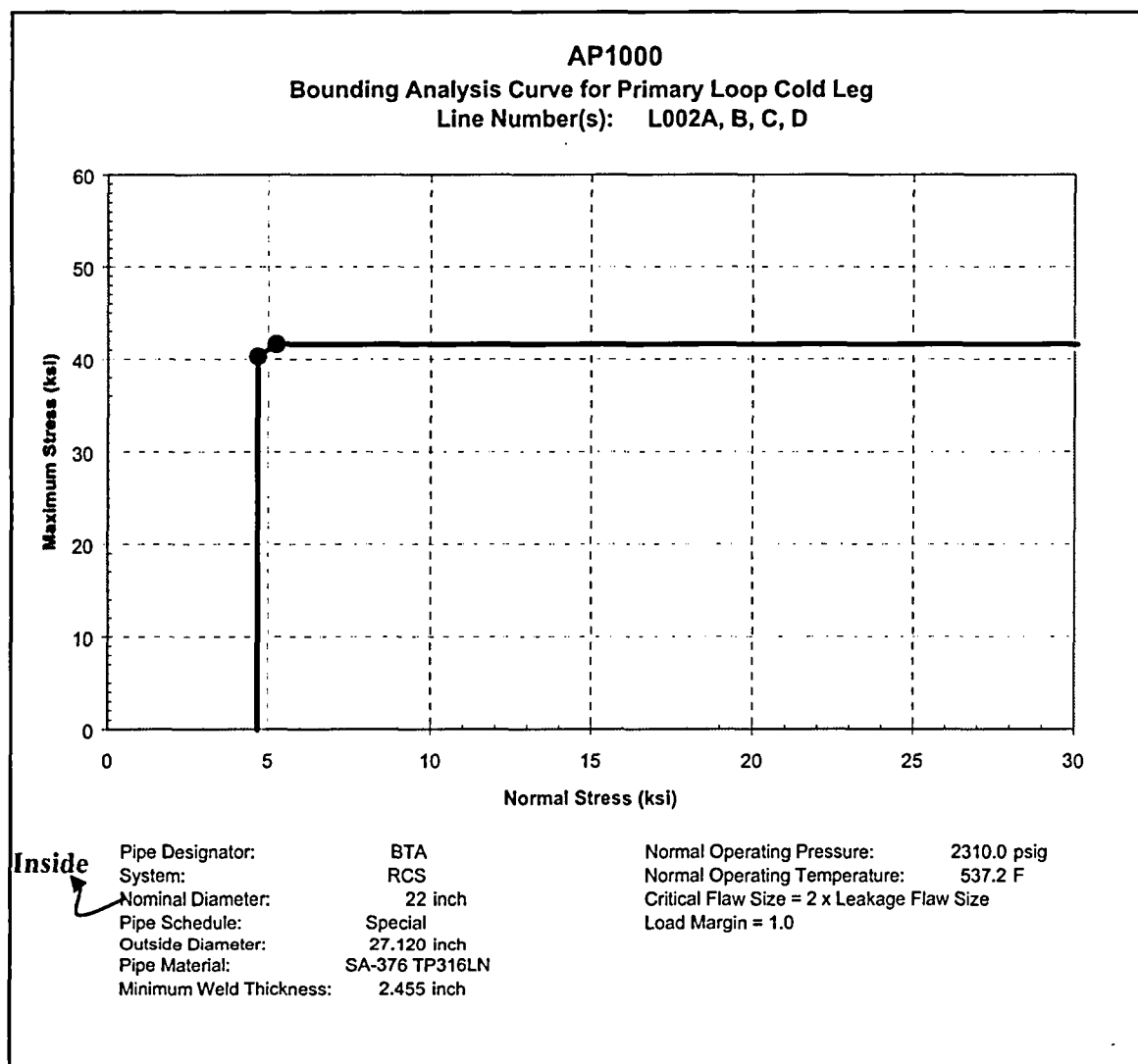
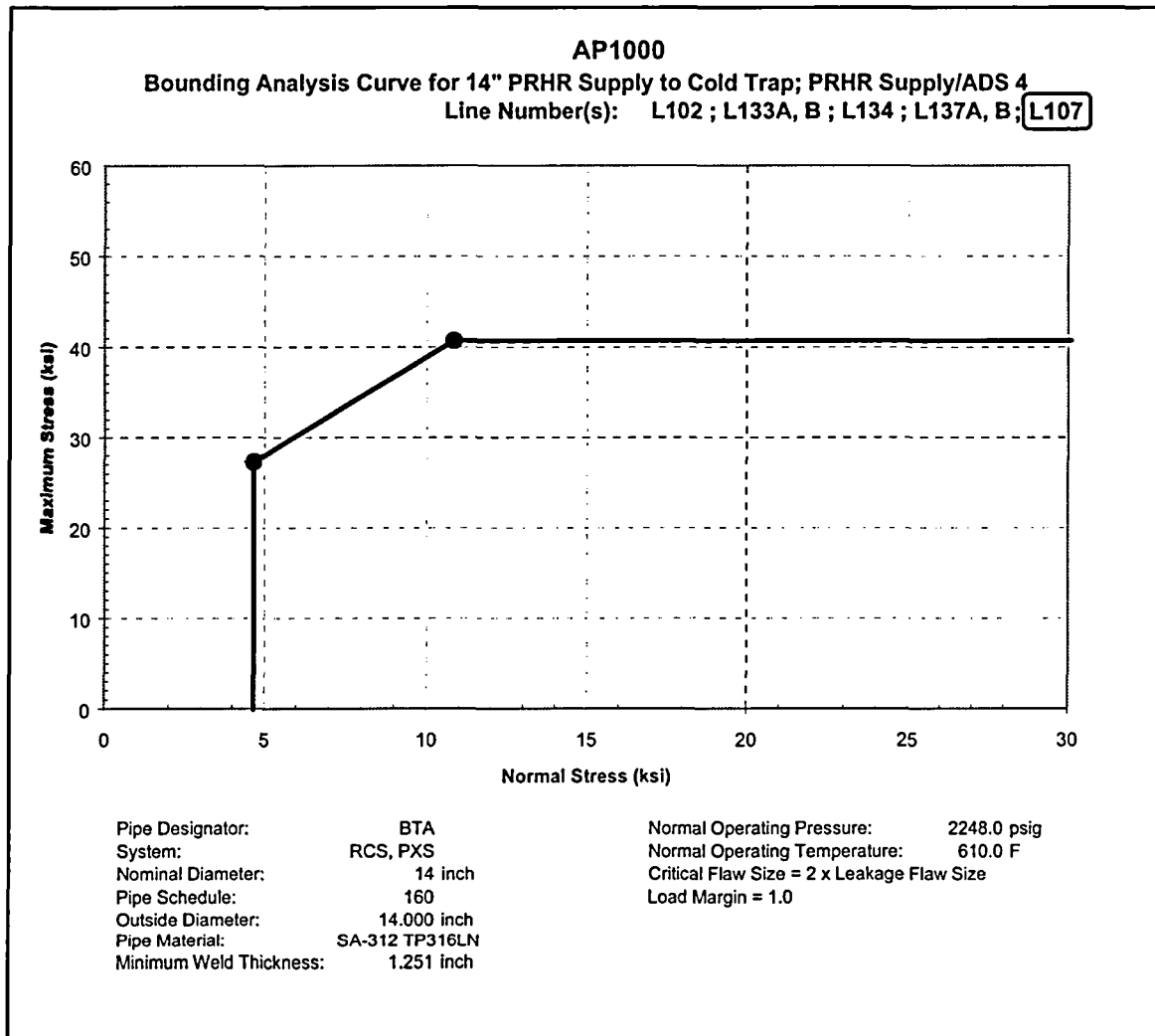


Figure 3B-3 is changed so that the 22" diameter is the inside diameter, not a nominal diameter.

Figure 4-3

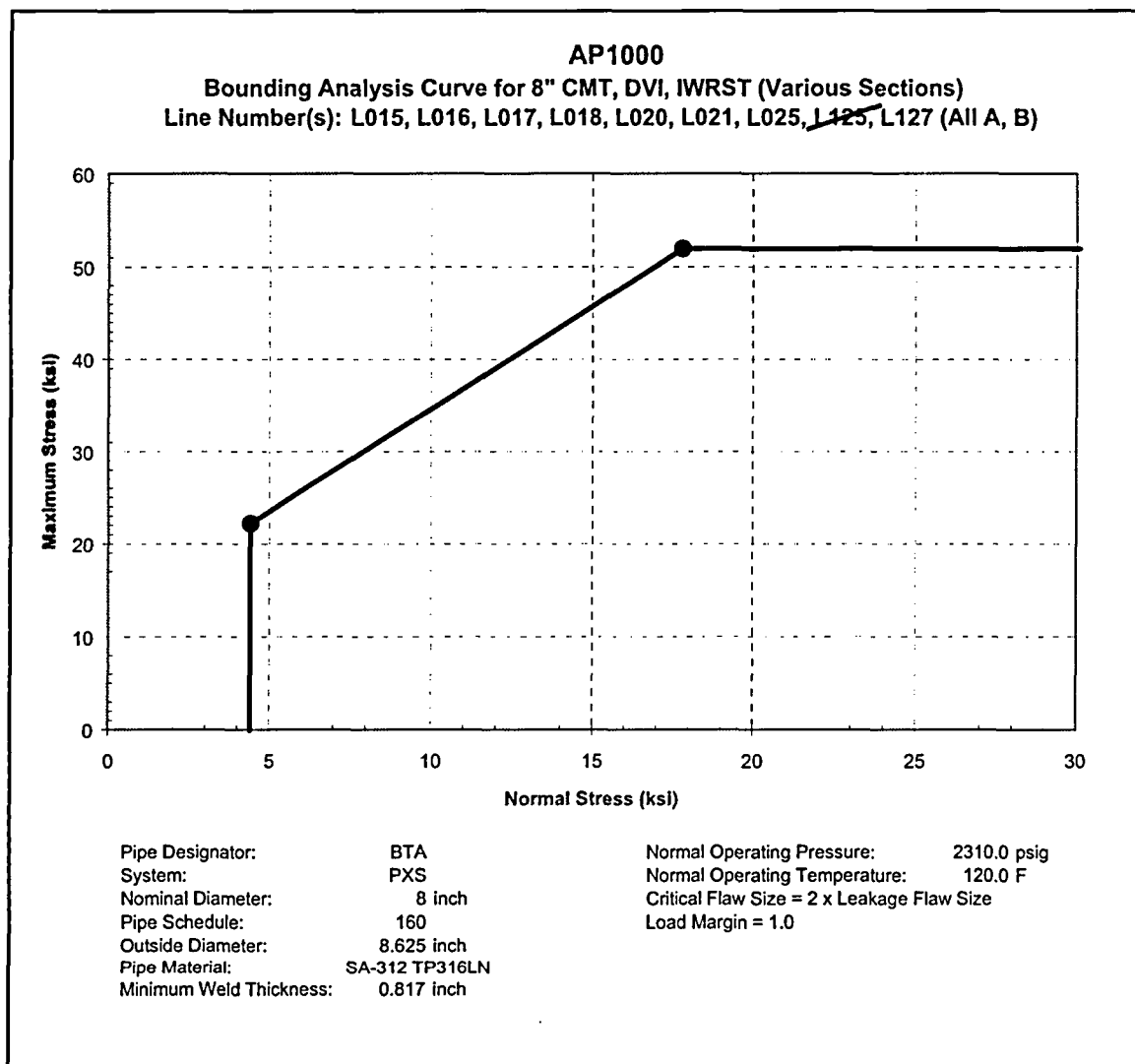
Bounding Analysis Curve for Primary Loop Cold Leg
(Revised, DCD Figure 3B-3)



Line L107 is added to DCD Figure 3B-8.

Figure 4-4

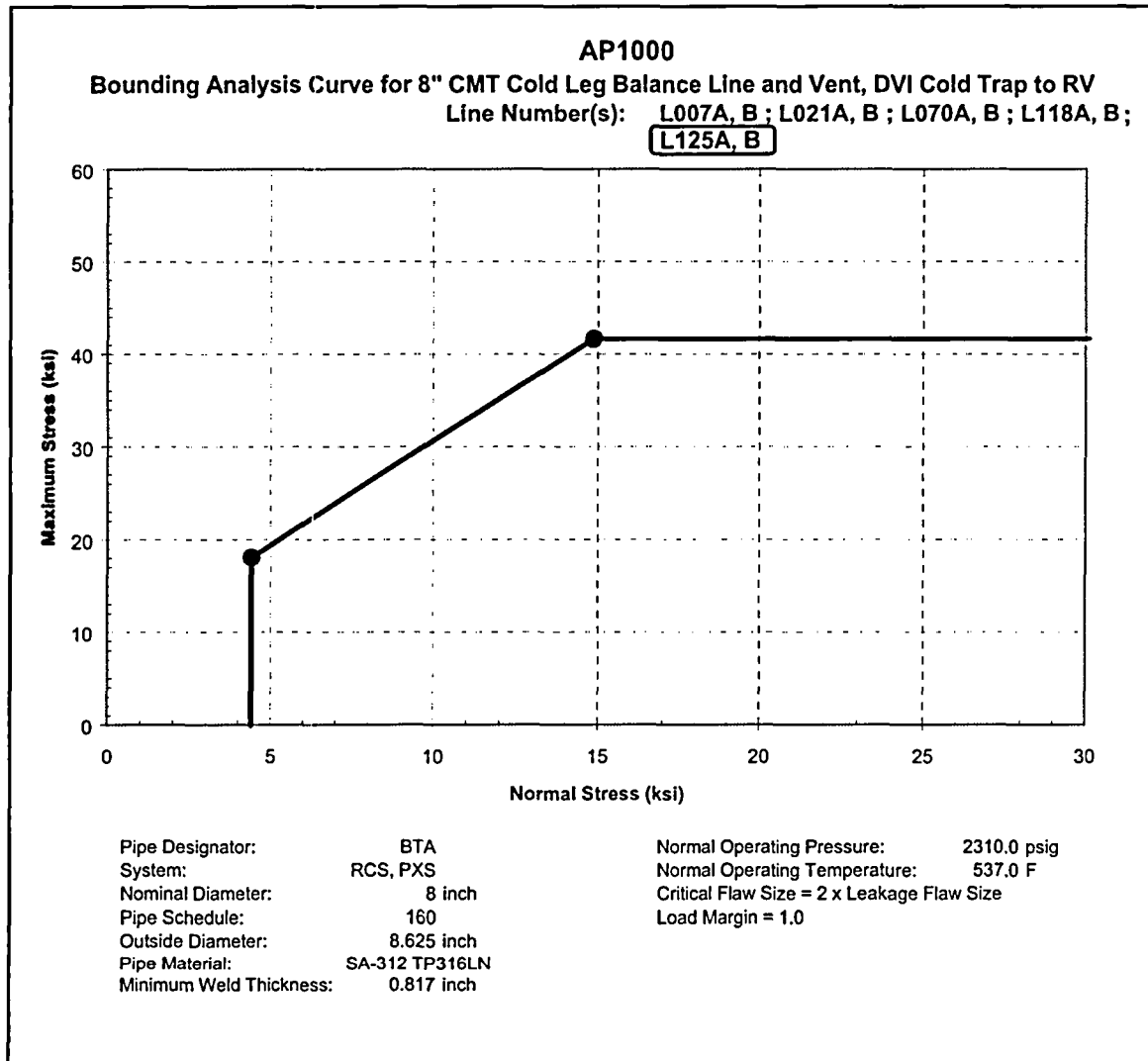
Bounding Analysis Curve for 14" PRHR Supply to Cold Trap; PRHR Supply/ADS 4
 (Revised, DCD Figure 3B-8)



Line L125 is removed from DCD Figure 3B-15 to reflect the move of the line to DCD Figure 3B-14.

Figure 4-5

Bounding Analysis Curve for 8" CMT, DVI, IWRST (Various Sections)
(Revised, DCD Figure 3B-15)



Line L125 (A,B) is added to DCD Figure 3B-14 to reflect the move of the line from DCD Figure 3B-15.

Figure 4-6

Bounding Analysis Curve for 8" CMT Cold Leg Balance Line and Vent, DVI Cold Trap to RV
(Revised, DCD Figure 3B-14)

Not used

Figure 3B-12 will be marked “Not used” in the DCD.

Figure 4-7

**Bounding Analysis Curve for 12” PRHR Vent Line
(Not used, DCD Figure 3B-12)**

Not used

Figure 3B-16 will be marked “Not used” in the DCD.

Figure 4-8

Bounding Analysis Curve for 8” ADS Stage 2.3
(Not used, DCD Figure 3B-16)

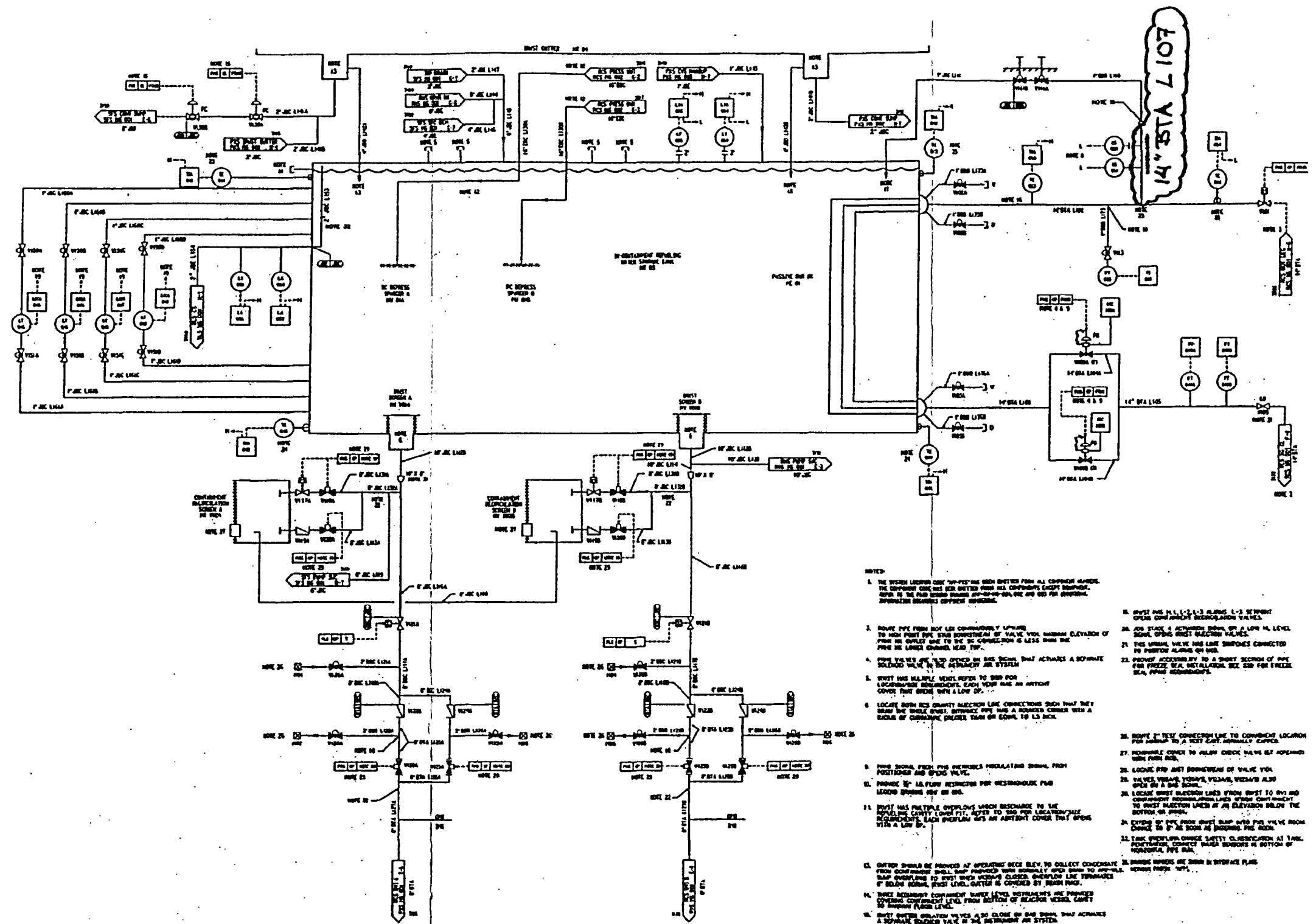
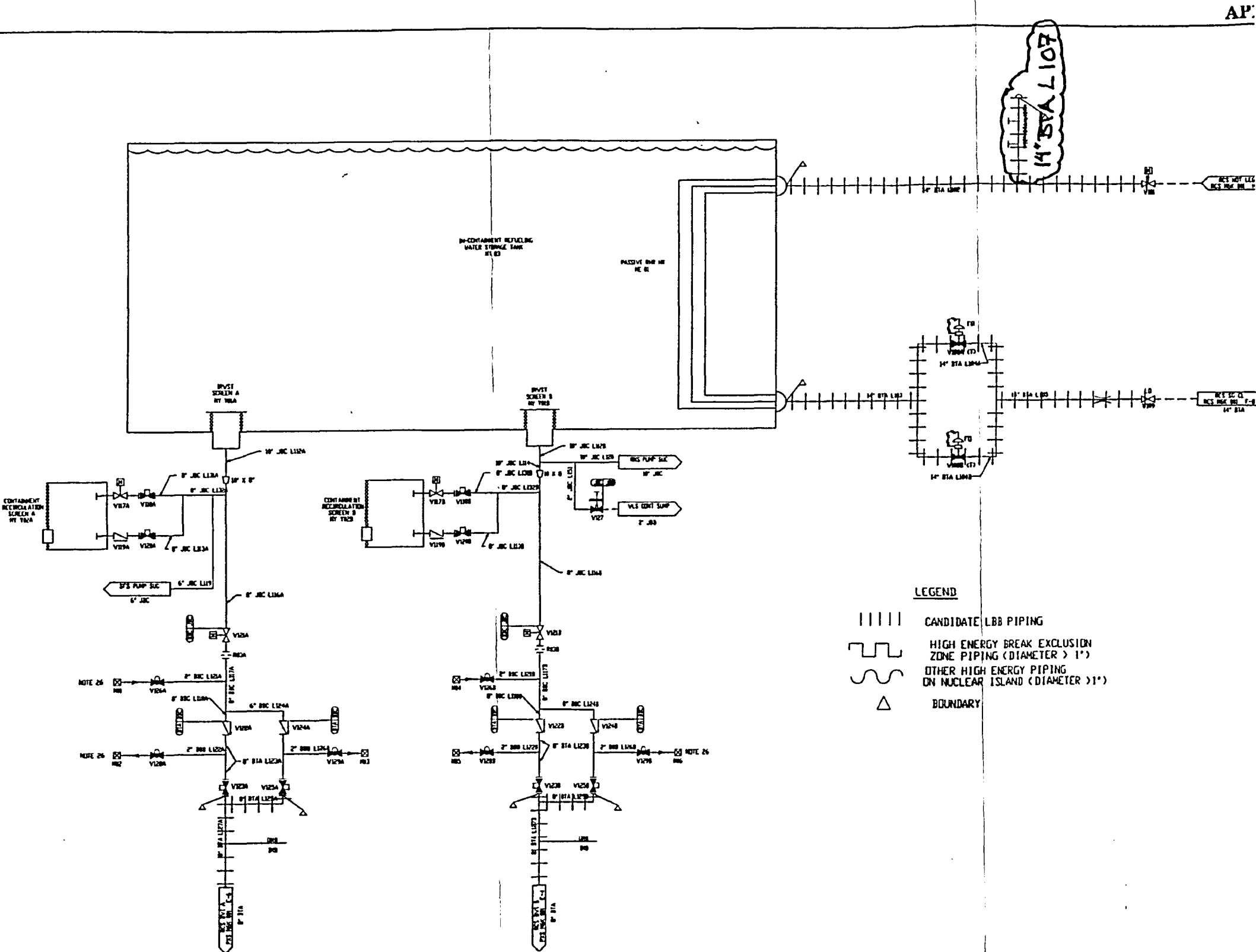


Figure 4-9

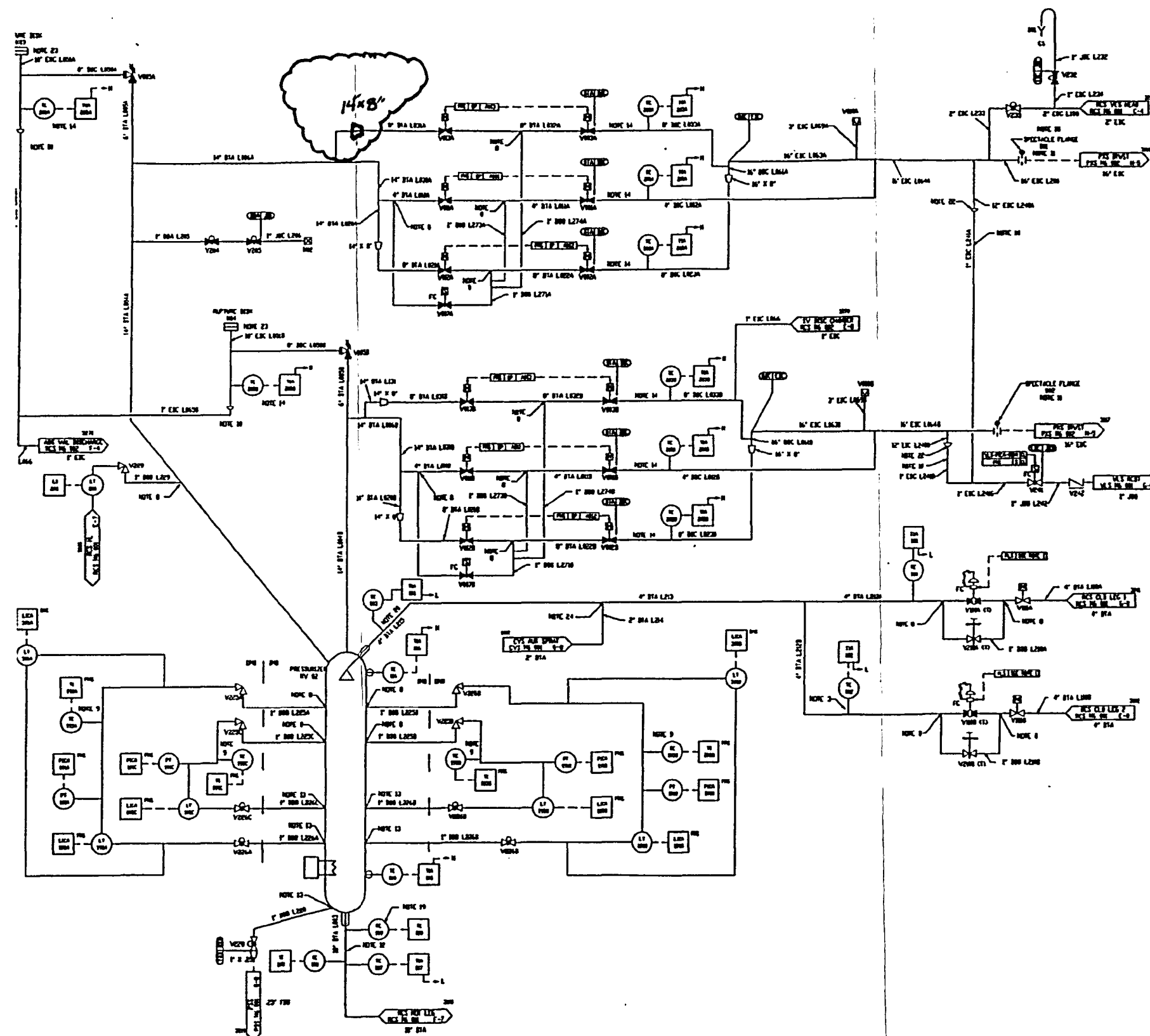
Change as noted in red.

**Passive Core Cooling System - Piping and Instrumentation Diagram (Sheet 2),
(Revised, DCD Figure 6.3-2)**



Change as noted in red.

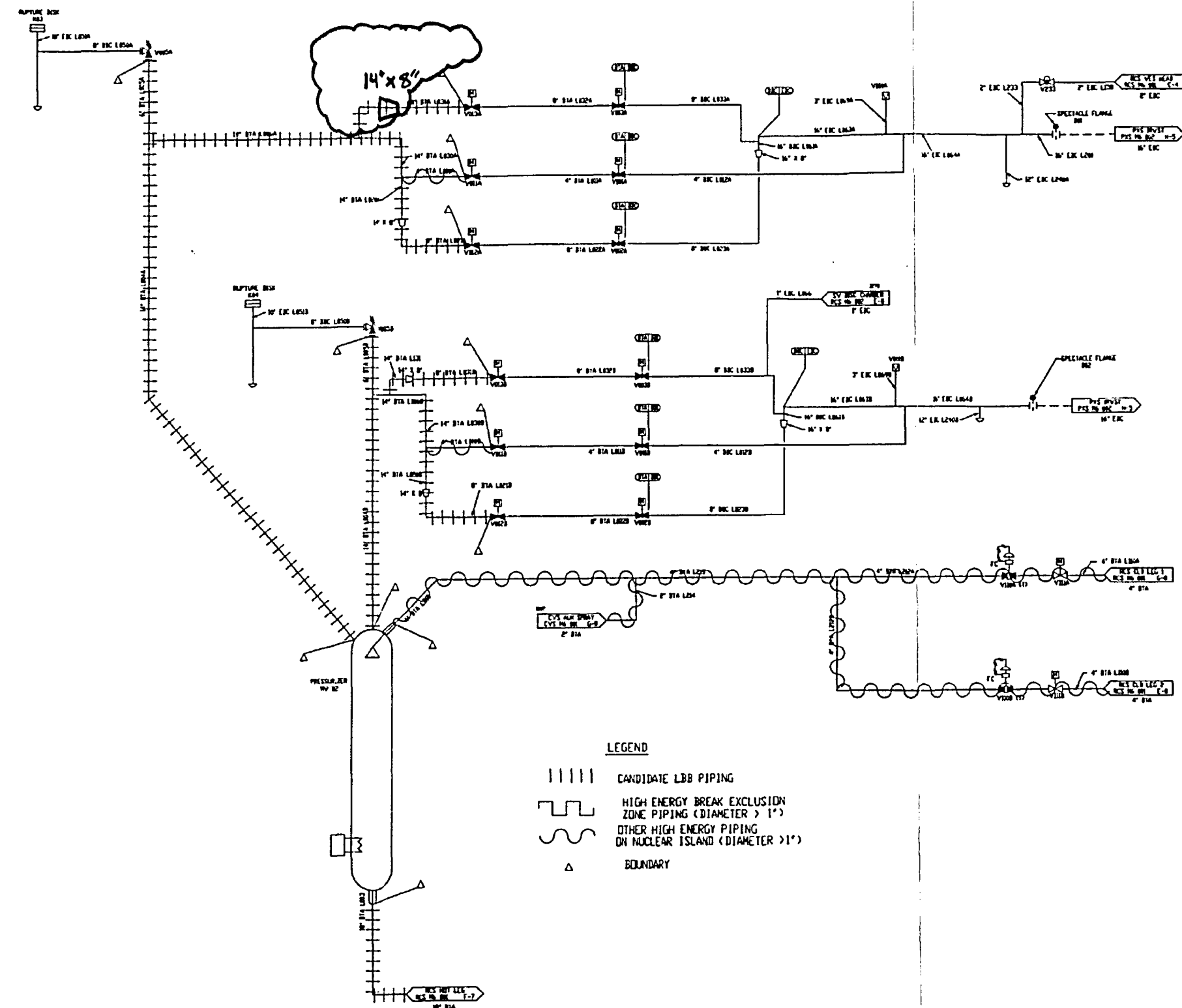
Figure 4-10
High Energy Piping—Passive Core Cooling System
(Revised, DCD Figure 3E-4—Sheet 2 of 2)



Change as noted in red.

Figure 4-11

Reactor Coolant System - Piping and Instrumentation Diagram
(Revised, DCD Figure 5.1-5 - Sheet 2 of 3)



Change as noted in red.

Figure 4-12

High Energy Piping – Reactor Coolant System
(Revised, DCD Figure 3E-3 – Sheet 2 of 2)

5.0 REFERENCES

1. APP-GW-GL-700, Revision 15, AP1000 Design Control Document.
2. NUREG-1793, September 2004, Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design.
3. APP-RCS-PLR-050, Revision 0, AP1000 Reactor Coolant Loop: Piping Qualification.
4. APP-SGS-PLR-030, Revision 0, AP1000 Main Steam Line A from SG01 Up to Line 11 Wall: Piping Stress Analysis Report.
5. APP-SGS-PLR-040, Revision 0, AP1000 Main Steam Line B from SG02 Up to Line 11 Wall: Piping Stress Analysis Report.
6. APP-RNS-PLR-010, Revision 0, AP1000 Suction Line: APP-RNS-PLA-010 Piping Stress Analysis Report.
7. APP-RCS-PLR-040, Revision 0, AP1000 Piping Analysis Report for Pressurizer Surge Line.
8. APP-RCS-PLR-030, Revision 0, AP1000 Piping Analysis Report for ADS 4th Stage East Compartment.
9. APP-PXS-PLR-030, Revision 0, AP1000 Piping Analysis Report for ADS 4th Stage West Compartment and PRHR Supply.
10. APP-PXS-PLR-040, Revision 0, AP1000 Passive RHR Return Lines Piping Stress Analysis Report.
11. APP-RCS-PLR-010, Revision 0, AP1000 Piping Analysis Report for Pressurizer Safety and Automatic Depressurization System PSADS APP-RCS-PLR-010 Package.
12. APP-PXS-PLR-010, Revision 1, AP1000 Direct Vessel Injection (DVI) Line A: APP-PXS-PLA-010 Piping Stress Analysis Report.
13. APP-PXS-PLR-020, Revision 0, AP1000 Direct Vessel Injection (DVI) Line B: APP-PXS-PLA-020 Piping Stress Analysis Report.
14. APP-PXS-PLR-050, Revision 0, AP1000 CMT 2A Supply Line: Piping Stress Analysis Report.
15. APP-PXS-PLR-060, Revision 0, AP1000 CMT 2B Supply Line: Piping Stress Analysis Report.