QA Record

TVAN CALCULATION

NPSH Evaluation of Browns Ferry RHR and CS Pumps		PLANT/UNIT *BFN / Unit 2 & 3*

PREPARING ORGANIZATION Site Engineering-Mechanical / Nuclear	KEY NOUNS (Consult CCRIS LIST)		
BRANCH/PROJECT IDENTIFIERS *MD-Q0999-970046*	Each time these calculations are issued, preparers must ensure that the original (R0) RIMS accession number is filled in.		
	Rev	(for RIMS use)	RIMS accession number
	R0		R14 981118 108
APPLICABLE DESIGN DOCUMENT(S) *Design Criteria No. BFN-50-7074 & BFN-50-7075*	R1		
	R2		
SAR SECTION(S): *N/A* / UNID SYSTEM(S): *074 & 075*	R3		

Revision 0	R1	R2	R3	Safety-related? Yes ■ No ☐
DCN No. (or Indicate Not Applicable)				*Statement of Problem* *NRC IE Bulletin 96-03 and Regulatory Guide 1.82, Revision 2 in May 1996 required measures to insure adequate NPSH for ECCS pumps during post LOCA conditions* *It is necessary to determine the pump NPSH available is adequate and that margin is available for ECCS strainer design.* *This calculation determines the RHR and CS pump NPSH margin available with a ECCS replacement strainer design.*
Prepared: Thomas F. Newton				
Checked:				
Reviewed:				
Approved: 11-18-98				
Use form TVA 10534 If more space required — List all pages added by this revision				
List all pages deleted by this revision				
List all pages changed by this revision				
Calculation Revision (A) Entire Calc; (P) Selected pages				

ORIGINAL

These calculations contain unverified assumption(s) that must be verified later. Yes ☐ No ■

Abstract

Pump Net Positive Suction Head Required (NPSHR) is defined as the minimum head required to prevent pump cavitation. The Net Positive Suction Head Available (NPSHA) must be greater than the NPSHR to prevent pump cavitation. The difference between NPSHA and NPSHR is the remaining head margin and is referred to in this calculation as the NPSH margin. This evaluation encompasses both Unit 2 and Unit 3 RHR and CS pumps.

☐ Microfilm and store calculations in RIMS Service Center
■ Microfilm and return calculations to: POB TIC - BFN

Microfilm and destroy. ☐
Address:

TVAN CALCULATION

Title: NPSH Evaluation of Browns Ferry RHR and CS Pumps	REVISION LOG *MD-Q0999-970046*

Revision No.	DESCRIPTION OF REVISION	Date Approved
0	*INITIAL ISSUE.*	11/18/98

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RIMS No.:	Issue Date:	

Title:

NPSH Evaluation of Browns Ferry RHR and CS Pumps

System(s), Component, Feature, or Subject of Calculation

		System/Description
■	Safety System	System No. *074 / Residual Heat Removal and 075 / Core Spray*
■	Safety-related Feature	ECCS Strainers
☐	Non-safety System	System No.
☐	Non-safety-related Feature	
☐	Plant Environment (EQ, Etc.)	
☐	Appendix R	
☐	Civil Structures	
☐	Instrumentation (PAM, Etc.)	
☐	Licensing	
☐	Other	

Calculation Category: NSS02

Final Classification: ■ Essential ☐ Desirable ☐ File only ☐ Superseded

Submitted: Thomas F. Newton Date: 8/27/97

Reviewed: [signature] Date: 8/27/97

Approved: [signature] Date: 9/2/97

Classification, Categorization, and Maintenance of Design Calculations

Calculation Information		Page 2 of 2
Plant/Unit: *BFN / Unit 2 & 3*	Identifier: *MD-Q0999-970046*	Rev.: *0*

Preliminary Classification

■ Essential ☐ Desirable ☐ File only ☐ Superseded

Calculation Classification Justification

Submitter: This calculation performs hydraulic analysis of the ECCS ring header and the suction piping to the RHR and CS pumps for various limiting condition system ECCS flows in order to determine the pump NPSH available and the NPSH margin for a ECCS replacement strainer design.

Reviewer MKB ☑ Agree With Classification ☐ Disagree - Comments Required

Approver ☑ Agree With Classification ☐ Disagree - Comments Required

CALCULATION DESIGN VERIFICATION (*INDEPENDENT REVIEW*) FORM

Calculation No. *MD-Q0999-970046* Revision 0

Method of design verification (independent review) used (*check method used*):

- [x] *Design*
- [ ] *Alternate Calculation*
- [ ] *Qualification Test*

Justification (explain below):

Method 1: In the design review method, justify the technical adequacy of the calculation and explain how the adequacy was verified (calculation is similar to another, based on accepted handbook methods, appropriate sensitivity studies included for confidence, etc.).

Method 2: In the alternate calculation method, identify the pages where the alternate calculation has been included in the calculation package and explain why this method is adequate.

Method 3: In the qualification test method, identify the QA documented source(s) where testing adequately demonstrates the adequacy of this calculation and explain.

THIS CALC USED APPROPRIATE METHODOLOGY. IT WAS CHECKED FOR TECHNICAL ACCURACY. THE OUTPUT IS REASONABLE BASED ON THE INPUTS AND REVIEW OF OTHER ASSOCIATED CALCS.

[signature] 8/27/97

Design Verifier (Independent Reviewer) Date

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CALCULATION SHEET

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1.0 PURPOSE

The purpose of this calculation is to perform hydraulic analysis of the ECCS ring header and the suction piping to the RHR and CS pumps for various limiting condition system ECCS flows in order to determine the pump NPSH available and the NPSH margin for ECCS replacement strainer design.

2.0 ASSUMPTIONS

No unjustified assumptions. Any assumptions used are technically justified throughout the text.

3.0 REFERENCES

3.1 Vendor Technical Manual BFN-VTM-B260-0010 for Bingham-Willliamette Pumps, Section 0020 (CS Pump Curves).

3.2 Vendor Technical Manual BFN-VTM-B260-0010 for Bingham-Willliamette Pumps, Section 0040 (RHR Pump Curves).

3.3 Marks' Standard Handbook for Mechanical Engineers, 8th Edition.

3.4 TVA Drawings:

a. 47W403-203, R3

b. 47W403-204, R5

c. 47W403-205, R4

d. 47W403-206, R4

e. 47W403-207, R3

f. 47W403-208, R4

3.5 EZFLOW - User's Manual for EZFLOW, dated 4/22/97, TVA RIMs No. D01 970422 002.

3.6 TVA Drawings:

a. 2-47E814-1, R39, "Flow Diagram - Core Spray System"

b. 3-47E814-1, R25, "Flow Diagram - Core Spray System"

3.7 Additional Drawings:

a. PDM Drawing 2-E20, R004, "TVA Containment Vessel"

b. PDM Drawing 3-E20, R000, TVA Containment Vessel"

3.8 TVA Design Criteria No. BFN-50-7074, "Residual Heat Removal System", Units 2 & 3, Rev. 8, to include DIM-BFN-50-7074-25.

3.9 TVA Design Criteria No. BFN-50-7075, "Core Spray System", Units 2 & 3, Rev. 6.

3.10 TVA Engineering Change Notice L1636.

3.11 TVA Engineering Change Notice P0602.

3.12 TVA Design Criteria No. BFN-50-715, "Environmental Design", Rev. 4.

3.13 Steam Tables, Combustion Engineering, 15th printing, Values reprinted from 1967 ASME Steam Tables.

3.14 GENE-E12-00148-04, "Net Positive Suction Head (NPSH) Evaluation for Browns Ferry Nuclear Plant ECCS Strainer Design", Revision 0, June, 1997.

3.15 GENE-E12-00148-01, "ECCS Suction Strainer Hydraulic Sizing Report", Revision 0.

3.16 GENE-E12-00148-06, "Containment Pressure Report", Revision 0

4.0 DESIGN INPUT DATA

Input data required is derived from references shown above unless otherwise noted.

5.0 COMPUTATIONS AND ANALYSIS

This calculation documents the results of analyses to determine the NPSH available for the pipe routing and configuration from the ECCS suction strainer to the pump suctions for both the RHR and CS piping systems. NPSH margins are calculated for selected system maximum flow rates and suppression pool temperatures. System operating conditions and modes of operations are considered in determining flow rates and temperatures.

The Net Positive Suction Head (NPSH) is defined as the minimum head required to prevent cavitation in piping systems and pumps. The Net Positive Suction Head Required (NPSHR) for the RHR and CS pumps is determined from the pump vendor curves (references 3.1 and 3.2). The difference between NPSHA and NPSHR is the NPSH margin.

The NPSHA is the actual fluid energy delivered to the pump impeller through the piping configuration and is calculated by the following equation.

$$NPSHA = h_a + h_s - h_f - h_{vp}$$ (Reference 3.3)

where:

h_a = Atmospheric head = Suppression Pool airspace pressure

h_s = Static pressure head = Elevation difference between the center line of the pump inlet and the suppression pool water level.

h_f = Total friction head loss = $h_{fs} + h_{fp}$

h_{fs} = Friction head loss (pressure drop) across the suction strainer.

h_{fp} = Friction head loss in pipe.

h_{vp} = Vapor pressure head.

The Browns Ferry Plant ECCS configuration includes an ECCS ring header circumscribing the suppression chamber with connecting piping to four inlet penetrations through the torus wall into the suppression pool. Inside the suppression pool, each connecting line is fitted with a flanged surface for mating to ECCS strainer flanges. The ECCS ring header supplies the suction piping of the RHR, CS, High Pressure Core Injection (HPCI), and Reactor Core Isolation Cooling (RCIC) systems.

Since the ECCS ring header and the connecting piping to the ECCS strainers is common to the suction of all of the ECCS pumps, the flow and pressure distribution for the ring header and strainers is different for varying system demands. Therefore, to determine individual ECCS pump suction pressures for various plant states , a model of the suction piping configuration was created from TVA drawings (Reference 3.4) for analysis with the EZFLOW computer program (Reference 3.5). A simplified layout of the EZFLOW model for the ECCS ring header and suction piping to the RHR and CS pumps is shown in Figure 1. All model link input dimensions and components were summarized from TVA drawings (Reference 3.4) which contained confirmed systems configuration and dimensions.

For each piping link in the model, piping lengths included the total piping isometric dimension. When drawings did not specify whether a piping elbow was short or long radius, the conservative case, e.g. short radius, was chosen. In the RHR 30" suction lines from the ring header, 67.5° short radius elbows were modeled as 90° long radius elbows since EZFLOW does not easily enable modeling of the off-nominal bend. For all form losses(elbows, valves, etc.), the EZFLOW default values of equivalent length, resistance, etc. were selected. It was also chosen to ignore resistance of piping tees having zero branch flow. The piping roughness value was selected as .00015 which is acceptable for a condensate quality system and would not be expected to change with system age.

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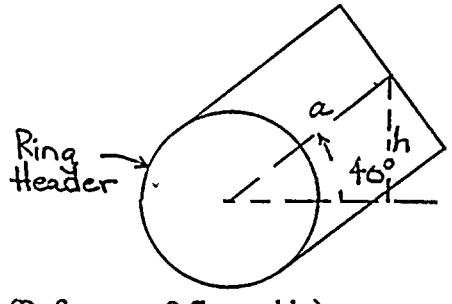
The piping model was not extensive in terms of elevation changes. In order to assist analysis convergence, "dummy" check valve components were installed in the piping links from the strainer flanges to the ECCS ring header tees. The model was enhanced further by using this component to also represent ECCS strainer head loss as a function of flow. To do this, head loss values versus flow from strainer sizing calculations were utilized.

The important function of the HPCI and RCIC systems is for events that do not result in depressurization of the reactor vessel to the level where the low pressure ECCS systems (RHR and CS) operate. Therefore, maximum flows for RHR and CS pumps for NPSH purposes in this calculation do not consider the demands of these systems.

TJN 11/17/98 MB 11/17/98

Pump static suction head is equal to the available water level above pump suction centerline. In the EZFLOW model, the static suction head at the strainer flange node is needed to be established for calculation purposes. It is necessary to establish this value in psig in the EZFLOW model at the strainer flanges. From TVA drawings (Reference 3.6), the low water level of the suppression pool is 536'1.75" with Δp.

— Pool Level — 536'1¾" (Ref 3.6.a & b)



— — 525'4" (Ref. 3.4.a & d)

a ≅ 4' (References 3.7.a and b.)

h = 4 sin 40° = 2.57' = 2'7"

∴ Pt. A elevation = 525'4" + 2'7" = 527'11".

and static head to Pt. A = 536'1.75" - 527'11" = 8'2.75" = 8.23'

@ 95°F, H_s = 8.23ft * 62.06 #/ft/ 144 in^2/ft^2 = 3.55 psig

and this pressure was established at the strainer flange points (nodes 1, 5, 23, and 27)

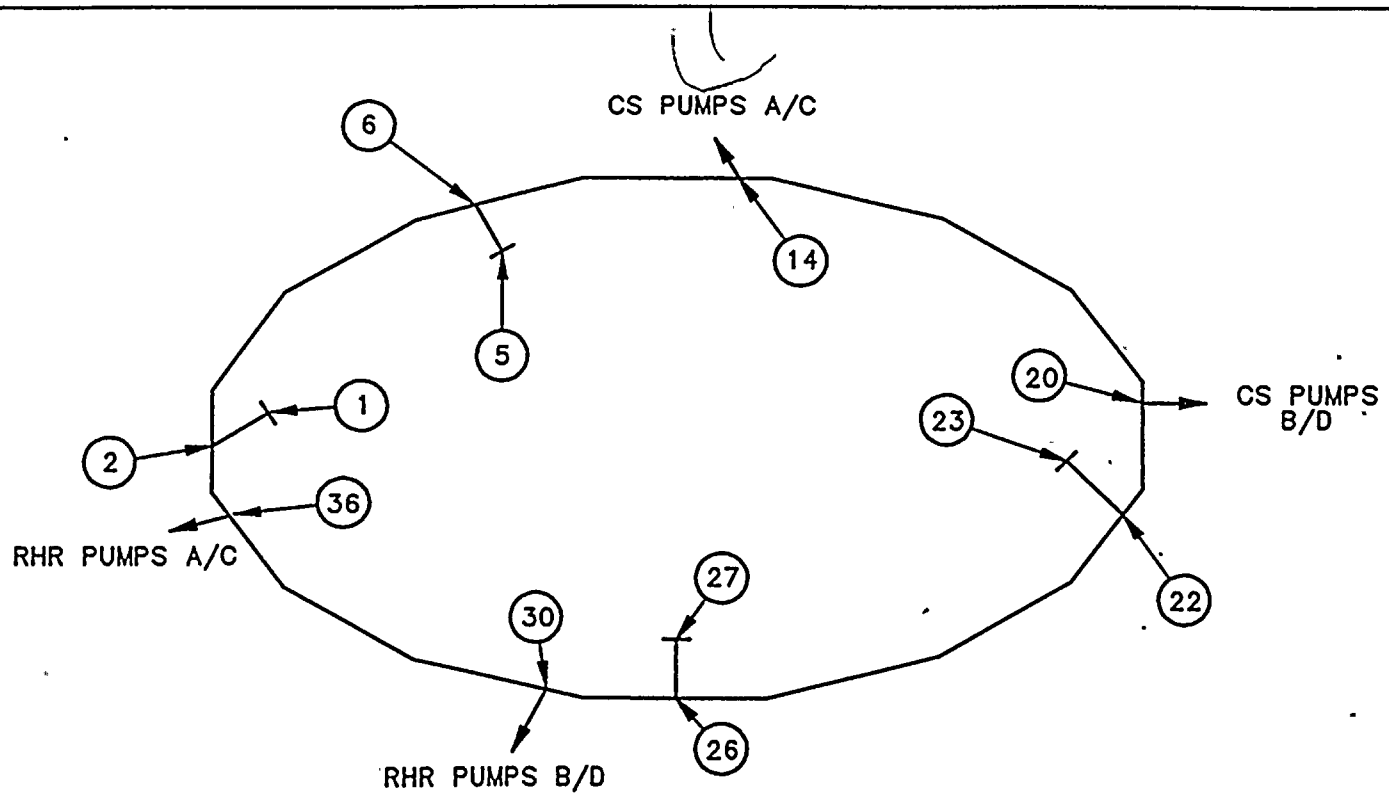
System design flow values for RHR were taken from reference 3.8 and for CS were taken from reference 3.9. Maximum RHR flows are restricted by plant modifications which installed orifices in each RHR pump discharge and in the test return line (References 3.10 and 3.11). Maximum flows for CS are not similarly restricted ~~and runout values are from the vendor pump curves (Reference 3.2).~~ AND NPHS VALUES ARE NOT CALCULATED. TJW 11/17/98 MKB 11/17/98

The EZFLOW model calculation accounted for system static head and piping friction losses. To obtain the NPSH available, it was necessary to adjust the EZFLOW pump suction pressure separately to add h_s (normal suppression pool airspace pressure plus containment overpressure (based on the analysis of Reference 3.16)), to subtract fluid condition vapor pressure h_{vp} (at the analyzed suppression pool temperature), and to include the value of the simulated strainer head loss. The result is the available NPSH. Reduction of these values by the specific pump required NPSH values from vendor pump curves (References 3.1 and 3.2) and the head loss of a designed ECCS strainer (Reference 3.15) results in the final NPSH margin for the pumps. TJW 11/17/98 MKB 11/17/98

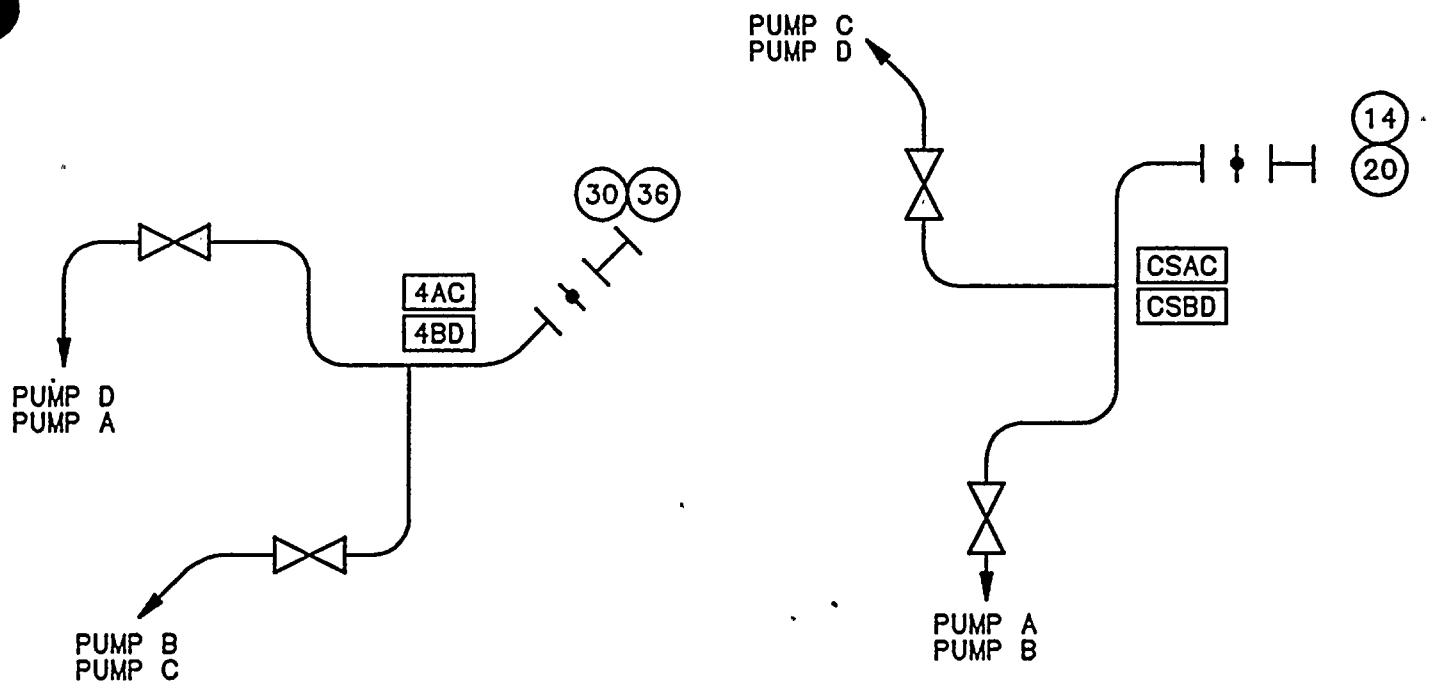
Flow conditions of the RHR and CS systems analyzed were 1) maximum flow at a pool temperature of 95°F with no operational reduction, 2) maximum flow combinations at pool temperatures of 140° and 150°F with no operational reduction, and 3) Long term operation at the suppression pool design temperature limit of 177°F at design required system flows at that condition. TJW 11/17/98 MKB 11/17/98

6.0 RESULTS AND CONCLUSIONS

With credit for a containment pressure of 2 psig, positive margin to pump required NPSH exists for all plant conditions analyzed. Summary values of pump NPSH margin are shown in Tables 1 and 2 for the RHR and CS pumps respectively. Table 3 is a total summary of the pertinent EZFLOW data and the detailed EZFLOW case results for Unit 2 and Unit 3 are included as Appendices 1 and 2.



RING HEADER



RHR PUMPS

CS PUMPS

REF: 47W403-203
-204
-205

CALCULATION MD-Q0999-970046

FIGURE 1

CALCULATION SHEET

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TABLE 1

RHR PUMP RESULTS

Plant Condition	RHR pump flow conditions	CS pump flow conditions	Torus Temp (°F)	Pump NPSH Req'd(ft)	Pump NPSH Margin(ft)
Initial LPCI Start, maximum flow in one RHR loop and in one CS Loop	2 pumps @ runout flow (11,000 gpm) and 2 pumps @ design flow(10,000 gpm) Total Flow=42,000 gpm	2 pumps @ runout flow (4650 gpm) and 2 pumps @ design flow(3125 gpm) Total Flow=15,550 gpm	95	30(U2C) 27(U3C)	6.16(U2C) 9.16(U3C)
Within First 10 minutes, LPCI, maximum flow in one RHR loop, CS at normal design flow	2 pumps @ runout flow(11,000 gpm) and 2 pumps @ design flow(10,000 gpm) Total Flow-42,000 gpm	2 pumps on each loop @ design flow(3125 gpm) Total Flow-12,500 gpm	140	30(U2C) 27(U3C)	2.10(U2C) 5.10(U3C)
Same as above	Same as above	Same as above	150	30(U2C) 27(U3C)	.24(U2C) 3.01(U3C)
Within First 10 minutes, LPCI, maximum flow in one CS Loop, RHR at normal design flow	2 pumps on each loop @design flow (10,000 gpm) Total Flow=40,000 gpm	2 pumps @ runout flow (4650 gpm) and 2 pumps @ design flow(3125 gpm) Total Flow=15,550 gpm	140	26(U2C) 23.7(U3C)	7.05(U2C) 9.35(U3C)
Same as above	Same as above	Same as above	150	26(U2C) 23.7(U3C)	5.21(U2C) 7.5/2(U3C)
Long Term ECCS pump flows at peak torus temperature	2 pumps on one loop @ design flow (6500 gpm) in Torus Cooling Mode Total Flow=13,000 gpm	2 pumps on one loop @ design flow (3125 gpm) Total Flow=6250 gpm	177	24(U2C) 24(U3C)	10.49(U2C) 10.49(U3C)

TJW 11/17/98
AKB 11/17/98

TABLE 2

CS PUMP RESULTS

Plant Condition	RHR pump flow conditions	CS pump flow conditions	Torus Temp (°F)	Pump NPSH Req'd(ft)	Pump NPSH Margin(ft)
Initial LPCI Start, maximum flow in one RHR loop and in one CS Loop	2 pumps @ runout flow (11,000 gpm) and 2 pumps @ design flow(10,000 gpm) Total Flow=42,000 gpm	2 pumps @ runout flow (4650 gpm) and 2 pumps @ design flow(3125 gpm) Total Flow=15,550 gpm	95	27.0	12.87(U2D) 12.87(U3D)
Within First 10 minutes, LPCI, maximum flow in one RHR loop, CS at normal design flow	2 pumps @ runout flow(11,000 gpm) and 2 pumps @ design flow(10,000 gpm) Total Flow-42,000 gpm	2 pumpson each loop @ design flow(3125 gpm) Total Flow-12,500 gpm	140	27.0	8.85(U2A) 8.85(U3A)
Same as above	Same as above	Same as above	150	27.0	7.01(U2A) 7.01(U3A)
Within First 10 minutes, LPCI, maximum flow in one CS Loop, RHR at normal design flow	2 pumps on each loop @design flow (10,000 gpm) Total Flow=40,000 gpm	2 pumps @ runout flow (4650 gpm) and 2 pumps @ design flow(3125 gpm) Total Flow=15,550 gpm	140	27.0	8.86(U2D) 8.86(U3D)
Same as above	Same as above	Same as above	150	27.0	6.80(U2D) 6.80(U3D)
Long Term ECCS pump flows at peak torus temperature	2 pumps on one loop @ design flow (6500 gpm) in Torus Cooling Mode Total Flow=13,000 gpm	2 pumps on one loop @ design flow (3125 gpm) Total Flow=6250 gpm	177	27.0	4.17(U2A) 4.17(U3A)

SUMMARY OF EZFLOW DATA AND NPSH CALCULATIONS

FROM TVA DESIGN CRITERIA BFN-50-715(Reference 3.12), INITIAL AIRSPACE PRESSURE IS 29.3" Hg, WHICH EQUALS 14.4 PSIA. 2 PSIG OF CONTAINMENT PRESSURE IS ADDED FOR ALL POOL TEMPERATURES(Reference 3.16). FOR ALL PUMP FLOWS AND ZERO FLOWS, NPSH MARGIN IS INDICATED "N/A". VALUES OF SPECIFIC VOLUME, ABSOLUTE PRESSURES, ETC. ARE FROM CE STEAM TABLES(Reference 3.13) AND NPSH REQUIRED FROM VENDOR CURVES (References 3.1 & 3.2).

$NPSH_{av} = H_a + H_s - H_f - H_{vp}$, $H_x = P_x/\rho$. H_s & H_f are accounted for in EZFLOW. Since H_f = Hpiping loss plus Hstrainer, $NPSH_{av}$ is adjusted to the strainer flange by adding the simulated strainer loss from EZFLOW. So, $NPSH_{av} = (P_{atm} + P_{pump\ suction} - P_{abs})/\rho$ + simulated strainer loss(lowest).

SUPPRESSION POOL TEMPERATURE OF 95 DEGREES

CASE 1 - U2950001/U395#001 - RHR A/C - 11,000 GPM, B/D - 10,000 GPM, CS A/C - 4650 GPM, B/D - 3125 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
0.81567	0.016114	2.320416	14.4	2.0	16.4	14979	14980	7	7
						14103	14101	6.2	6.2
						14588	14589	6.6	6.6
						14170	14169	6.3	6.3

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/11,000	29	27	0.5	0.5	43.52	43.52	5.74	5.74	8.78	10.78
B/10,000	26	24.8	0.9	0.9	44.45	44.45	5.74	5.74	12.71	13.91
C/11,000	30	27	-0.2	-0.2	41.90	41.90	5.74	5.74	6.16	9.16
D/10,000	24.4	26	1.5	1.5	45.84	45.84	5.74	5.74	15.70	14.10

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/4650	38	38	-1.7	-1.7	N/A	N/A				
B/3125	27	27	2.2	2.2	47.47	47.47	5.74	5.74	14.73	14.73
C/4650	38	38	0.2	0.2	N/A	N/A				
D/3125	27	27	1.4	1.4	45.61	45.61	5.74	5.74	12.87	12.87

CASE 2 - U2950002/U395#002 - RHR A/C - 10,000 GPM, B/D - 11,000 GPM, CS A/C - 3125 GPM, B/D - 4650 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
0.81567	0.016114	2.320416	14.4	2.0	16.4	UNIT 2	UNIT 3	UNIT 2	UNIT 3
						15002	15002	7	7
						14057	14055	6.2	6.2
						14556	14559	6.6	6.6
						14225	14224	6.3	6.3

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	0.8	0.8	44.22	44.22	5.74	5.74	12.78	14.58
B/11,000	29	27	0.4	0.4	43.29	43.29	5.74	5.74	8.55	10.55
C/10,000	26	23.7	0.2	0.2	42.83	42.83	5.74	5.74	11.09	13.39
D/11,000	28	30	1.1	1.1	44.91	44.91	5.74	5.74	11.17	9.17

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	2	2	47.00	47.00	5.74	5.74	14.26	14.26
B/4650	38	38	0	0	N/A	N/A				
C/3125	27	27	2.8	2.8	48.86	48.86	5.74	5.74	16.12	16.12
D/4650	38	38	-1.8	-1.8	N/A	N/A				

CASE 3 - U2950003 - RHR A/C - 10,000 GPM, B/D - 11,000 GPM, CS A/C - 4650 GPM, B/D - 3125 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
0.81567	0.016114	2.320416	14.4	2.0	16.4				
						14977		7	
						14107		6.2	
						14589		6.6	
						14167		6.3	

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	0.8		44.22		5.74		12.78	
B/11,000	29	27	0.4		43.29		5.74		8.55	
C/10,000	26	23.7	0.2		42.83		5.74		11.09	
D/11,000	28	30	1.1		44.91		5.74		11.17	

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/4650	38	38	-1.7		N/A					
B/3125	27	27	2.3		47.70		5.74		14.96	
C/4650	38	38	0.2		N/A					
D/3125	27	27	1.5		45.84		5.74		13.10	

SUPPRESSION POOL TEMPERATURE OF 140 DEGREES

CASE 1 - U2140#01/U3140#01 - RHR A/C - 11,000 GPM, B/D - 10,000 GPM, CS A/B/C/D - 3125 GPM

ABSOLUTE RESSSUR	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
2.8892	0.016293	2.346192	14.4	2.0	16.4	UNIT 2	UNIT 3	UNIT 2	UNIT 3
						14453	14453	6.5	6.5
						13452	13449	5.6	5.6
						13979	13983	6.1	6.1
						13500	13499	5.7	5.7

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/11,000	29	27	0.7	0.7	38.94	38.94	5.20	5.20	4.74	6.74
B/10,000	26	24.8	1.1	1.1	39.88	39.88	5.20	5.20	8.68	9.88
C/11,000	30	27	0	0	37.30	37.30	5.20	5.20	2.10	5.10
D/10,000	24.4	26	1.7	1.7	41.29	41.29	5.20	5.20	11.69	10.09

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	1.6	1.6	41.05	41.05	5.20	5.20	8.85	8.85
B/3125	27	27	2.5	2.5	43.16	43.16	5.20	5.20	10.96	10.96
C/3125	27	27	2.4	2.5	42.93	43.16	5.20	5.20	10.73	10.96
D/3125	27	27	1.7	1.7	41.29	41.29	5.20	5.20	9.09	9.09

CASE 2 - U2140#02/U3140#02 - RHR A/C - 10,000 GPM, B/D - 11,000 GPM, CS A/B/C/D - 3125 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL RESSSUR	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
2.8892	0.016293	2.346192	14.4	2.0	16.4	UNIT 2	UNIT 3	UNIT 2	UNIT 3
						14443	14444	6.5	6.5
						13455	13452	5.6	5.6
						13987	13991	6.1	6.1
						13498	13497	5.7	5.7

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	1	1	39.65	39.65	5.20	5.20	8.75	10.55
B/11,000	29	27	0.6	0.6	38.71	38.71	5.20	5.20	4.51	6.51
C/10,000	26	23.7	0.4	0.4	38.24	38.24	5.20	5.20	7.04	9.34
D/11,000	28	30	1.3	1.4	40.35	40.58	5.20	5.20	7.15	5.38

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	1.6	1.6	41.05	41.05	5.20	5.20	8.85	8.85
B/3125	27	27	2.5	2.5	43.16	43.16	5.20	5.20	10.96	10.96
C/3125	27	27	2.4	2.5	42.93	43.16	5.20	5.20	10.73	10.96
D/3125	27	27	1.7	1.7	41.29	41.29	5.20	5.20	9.09	9.09

CASE 3 - U2140#03/U3140#03 - RHR A/B/C/D - 10,000 GPM, CS A/C - 4650 GPM, B/D - 3125 GPM

ABSOLUTE RESSSUR	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
2.8892	0.016293	2.346192	14.4	2.0	16.4				
						14598	14599	6.6	6.6
						13783	13781	5.9	5.9
						14228	14230	6.3	6.3
						13841	13841	6	6

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	1.1	1.1	40.18	40.18	5.49	5.49	8.99	10.79
B/10,000	26	24.8	1	1	39.95	39.95	5.49	5.49	8.46	9.66
C/10,000	26	23.7	0.4	0.4	38.54	38.54	5.49	5.49	7.05	9.35
D/10,000	24.4	26	1.6	1.7	41.35	41.59	5.49	5.49	11.46	10.10

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/4650	38	38	-1.6	-1.6	N/A	N/A				
B/3125	27	27	2.4	2.4	43.23	43.23	5.49	5.49	10.74	10.74
C/4650	38	38	0.3	0.3	N/A	N/A				
D/3125	27	27	1.6	1.6	41.35	41.35	5.49	5.49	8.86	8.86

CASE 4 - U2140#04 - RHR A/B/C/D - 10,000 GPM, CS A/C - 3125 GPM, B/D - 4650 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
2.8892	0.016293	2.346192	14.4	2.0	16.4				
						14625		6.7	
						13731		5.9	
						14193		6.3	
						13901		6	

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7		1.1		40.18		5.44		9.04	
B/10,000	26		1		39.95		5.44		8.51	
C/10,000	26		0.5		38.77		5.44		7.33	
D/10,000	24.4		1.6		41.35		5.44		11.51	

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27		2.1		42.53		5.44		10.09	
B/4650	38		0.1		N/A					
C/3125	27		2.9		44.40		5.44		11.96	
D/4650	38		-1.7		N/A					

SUPPRESSION POOL TEMPERATURE OF 150 DEGREES

CASE 1 - U2150#01/U3150#01 - RHR A/C - 11,000 GPM, B/D - 10,000 GPM, CS A/B/C/D - 3125 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
3.7184	0.016343	2.353392	14.4	2.0	16.4	UNIT 2	UNIT 3	UNIT 2	UNIT 3
						14496	14496	6.6	6.6
						13493	13490	5.7	5.7
						14022	14025	6.1	6.1
						13542	13540	5.7	5.7

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/11,000	29	27	0.7	0.7	37.19	37.19	5.30	5.30	2.89	4.89
B/10,000	26	24.8	1.1	1	38.13	37.90	5.30	5.30	6.83	7.80
C/11,000	30	27	0	-0.1	35.54	35.31	5.30	5.30	0.24	3.01
D/10,000	24.4	26	1.7	1.7	39.55	39.55	5.30	5.30	9.85	8.25

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	1.6	1.6	39.31	39.31	5.30	5.30	7.01	7.01
B/3125	27	27	2.5	2.5	41.43	41.43	5.30	5.30	9.13	9.13
C/3125	27	27	2.4	2.4	41.19	41.19	5.30	5.30	8.89	8.89
D/3125	27	27	1.7	1.7	39.55	39.55	5.30	5.30	7.25	7.25

CASE 2 - U2150#02/U3150#02 - RHR A/C - 10,000 GPM, B/D - 11,000 GPM, CS A/B/C/D - 3125 GPM

ABSOLUTE RESSSUR	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
3.7184	0.016343	2.353392	14.4	2.0	16.4				
						14487	14487	6.5	6.5
						13497	13494	5.7	5.7
						14030	14033	6.1	6.1
						13539	13538	5.7	5.7

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	1	1	37.90	37.90	5.30	5.30	6.90	8.70
B/11,000	29	27	0.6	0.6	36.96	36.96	5.30	5.30	2.66	4.66
C/10,000	26	23.7	0.4	0.4	36.49	36.49	5.30	5.30	5.19	7.49
D/11,000	28	30	1.3	1.3	38.60	38.60	5.30	5.30	5.30	3.30

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	1.6	1.6	39.31	39.31	5.30	5.30	7.01	7.01
B/3125	27	27	2.5	2.5	41.43	41.43	5.30	5.30	9.13	9.13
C/3125	27	27	2.4	2.4	41.19	41.19	5.30	5.30	8.89	8.89
D/3125	27	27	1.7	1.7	39.55	39.55	5.30	5.30	7.25	7.25

CASE 3 - U2150#03/U3150#03 - RHR A/B/C/D - 10,000 GPM, CS A/C - 4650 GPM, B/D - 3125 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
3.7184	0.016343	2.353392	14.4	2.0	16.4				
						14642	14643	6.7	6.7
						13826	13824	6	6
						14271	14273	6.4	6.4
						13884	13883	6	6

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7	23.9	1	1	38.20	38.20	5.57	5.57	6.93	8.73
B/10,000	26	24.8	1	1	38.20	38.20	5.57	5.57	6.63	7.83
C/10,000	26	23.7	0.4	0.4	36.79	36.79	5.57	5.57	5.22	7.52
D/10,000	24.4	26	1.6	1.6	39.61	39.61	5.57	5.57	9.64	8.04

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/4650	38	38	-1.7	-1.6	N/A	N/A				
B/3125	27	27	2.4	2.3	41.49	41.26	5.57	5.57	8.92	8.69
C/4650	38	38	0.2	0.3	N/A	N/A				
D/3125	27	27	1.5	1.5	39.37	39.37	5.57	5.57	6.80	6.80

CASE 4 - U2150#04 - RHR A/B/C/D - 10,000 GPM, CS A/C - 3125 GPM, B/D - 4650 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
3.7184	0.016343	2.353392	14.4	2.0	16.4				
						14669		6.7	
						13773		5.9	
						14236		6.3	
						13944		6.1	

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/10,000	25.7		1.1		38.33		5.48		7.15	
B/10,000	26		1		38.10		5.48		6.62	
C/10,000	26		0.4		36.69		5.48		5.21	
D/10,000	24.4		1.6		39.51		5.48		9.63	

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27		2		40.45		5.48		7.97	
B/4650	38		0.1		N/A					
C/3125	27		2.9		42.57		5.48		10.09	
D/4650	38		-1.7		N/A					

SUPPRESSION POOL TEMPERATURE OF 177 DEGREES

CASE 1 - U2177001/U3177#01 - RHR A/C - 6500 GPM, B/D - 0 GPM, CS A/C - 3125 GPM, B/D - 0 GPM

ABSOLUTE PRESSURE	SPECIFIC VOLUME	CONVERSION FACTOR	POOL PRESSURE	OVER PRESSURE	TOTAL PRESSURE	EZFLOW STRAINER FLOW		EZFLOW STRAINER LOSS	
						UNIT 2	UNIT 3	UNIT 2	UNIT 3
7.0265	0.016492	2.374848	14.4	2.0	16.4				
						5238	5222	0.8	0.8
						4722	4733	0.6	0.6
						4860	4874	0.7	0.7
						4982	4973	0.7	0.7

RHR PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/6500	24	24	5.3	5.3	35.45	35.45	0.24	0.24	11.21	11.21
B/0	24	24	6.1	6.1	N/A	N/A				
C/6500	24	24	5	5	34.73	34.73	0.24	0.24	10.49	10.49
D/0	24	24	6.1	6.1	N/A	N/A				

CS PUMPS

PUMP/ FLOW	VENDOR VALUE OF NPSH REQUIRED		EZFLOW PUMP PRESSURE		NPSH AVAILABLE WITHOUT STRAINER		STRAINER HEAD LOSS(Ref. 3.15)		NPSH MARGIN	
	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3	UNIT 2	UNIT 3
A/3125	27	27	3.6	3.6	31.41	31.41	0.24	0.24	4.17	4.17
B/0	27	27	6.3	6.3	N/A	N/A				
C/3125	27	27	4.5	4.5	33.55	33.55	0.24	0.24	6.31	6.31
D/0	27	27	6.3	6.3	N/A	N/A				

APPENDIX 1

UNIT 2 EZFLOW CASE OUTPUTS

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=95 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = -3.25e+000 gpm
Pressure = -6.52e-004 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 [redacted]ed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 [redacted]te valve" isolation
 [redacted]^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=95

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=95
```

[redacted]

NETWORK DETAIL

NODE 27 "Strainer 204D"
elev=528.4, pres=3.55, temp=95

NODE 5 "Strainer 204B"
elev=528.4, pres=3.55, temp=95

NODE CSPUMPA "CS pump a"
elev=521.3

NODE CSPUMPB "CS pump b"
elev=521.3

NODE CSPUMPC "CS pump c"
elev=521.3

NODE CSPUMPD "CS pump d"
elev=521.3

NODE PUMPA "RHR pump a"
elev=521.6

N[redacted]PUMPB "RHR pump b"
[redacted]v=521.6

NODE PUMPC "RHR pump c"
elev=521.6

NODE PUMPD "RHR pump d"
elev=521.6

TEE T2 "Strainer 204A"
node1=T6, node2=1, node3=T36, elev=525.3
"standard converging"

TEE T22 "Strainer 204C"
node1=T20, node2=23, node3=T26, elev=525.3
"standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
node1=T22, node2=27, node3=T30, elev=525.3
"standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
"standard diverging (run_to_lateral)"

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0001.NET: UNIT 2-95,RHR A/C-11k,B/D-10K,CS A/C-4650,B/D-3125,LIMITING

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14979	536.6	529.6	-3.0
23	T22	CS	30.0	XS	def	default	14103	536.6	530.4	-2.7
27	T26	CS	30.0	XS	def	default	14588	536.6	530.0	-2.9
5	T6	CS	30.0	XS	def	default	14170	536.6	530.4	-2.7
T4AC	PUMPA	CS	24.0	S	def	default	11055	523.8	522.8	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11055	521.6	521.1	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10050	524.1	523.6	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10050	525.8	525.0	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	4673	522.2	521.7	-0.2
TCSAC	CSPUMPA	CS	16.0	S	def	default	4673	518.0	517.3	-0.3
TCSBD	CSPUMPD	CS	16.0	S	def	default	3141	524.9	524.6	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3141	526.8	526.5	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0001.NET: UNIT 2-95,RHR A/C-11k,B/D-10K,CS A/C-4650,B/D-3125,LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.6	3.6	95	62.1	OK
23	528.4	536.6	3.6	95	62.1	OK
27	528.4	536.6	3.6	95	62.1	OK
5	528.4	536.6	3.6	95	62.1	OK
CSPUMPA	521.3	517.3	-1.7	95	62.1	OK
CSPUMPB	521.3	526.5	2.2	95	62.1	OK
CSPUMPC	521.3	521.7	0.2	95	62.1	OK
CSPUMPD	521.3	524.6	1.4	95	62.1	OK
PUMPA	521.6	522.8	0.5	95	62.1	OK
PUMPB	521.6	523.6	0.9	95	62.1	OK
PUMPC	521.6	521.1	-0.2	95	62.1	OK
PUMPD	521.6	525.0	1.5	95	62.1	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14979	CHECK	OPEN
23	T22	1	14103	CHECK	OPEN
27	T26	1	14588	CHECK	OPEN
5	T6	1	14170	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
[redacted]001.NET: UNIT 2-95,RHR A/C-11k,B/D-10K,CS A/C-4650,B/D-3125,LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8127	14979	23105	529.9	529.6	526.8	2.0	1.9	0.7
T22	SDLR	9585	14103	4518	530.0	530.4	530.3	2.0	2.2	2.2
T26	SCON	4518	14588	19106	530.3	530.0	528.1	2.2	2.0	1.2
T4AC	SDRL	22111	11055	11055	523.1	521.6	523.8	-1.1	-1.7	-0.8
T4BD	SDRL	20101	10050	10050	525.3	524.1	525.8	-0.1	-0.7	0.1
T6	SDLR	8127	14170	6044	530.1	530.4	530.2	2.1	2.2	2.1
TCSAC	SDRL	9347	4673	4673	519.1	518.0	522.2	-2.7	-3.2	-1.3
TCSBD	SDRL	6281	3141	3141	525.4	524.9	526.8	1.8	1.5	2.4

LINK DETAIL

LINK 1=====T2===> gpm=14979 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		529.6	-7.0	0.5	-3.0	95
exit_node=T2			529.6	0.0	1.9	1.3	95

LINK 23====T22==> gpm=14103 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		530.4	-6.2	0.9	-2.7	95
exit_node=T22			530.4	0.0	2.2	1.3	95

LINK 27====T26==> gpm=14588 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.6		3.6		95
S[redacted]ight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
C[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.0	-6.6	0.7	-2.9	95
exit_node=T26			530.0	0.0	2.0	1.3	95

LINK 5=====T6===> gpm=14170 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		530.4	-6.3	0.8	-2.7	95
exit_node=T6			530.4	0.0	2.2	1.3	95

LINK T4AC==PUMPA> gpm=11055 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.8		-0.8		95
fixed_flow=11000			523.8	0.0	-0.8	0.0	95
Gate valve isolation		12.8	523.7	-0.1	-0.8	-0.0	95
90° short radius elbow		35.0	523.4	-0.2	-0.9	-0.1	95
90° short radius elbow		35.0	523.2	-0.2	-1.0	-0.1	95
90° short radius elbow		35.0	522.9	-0.2	-1.1	-0.1	95
Straight pipe, len=19.625		19.6	522.8	-0.1	-1.2	-0.1	95
Decreaser, dia=23.24	0.00		522.8	-0.0	-1.2	-0.0	95
exit_node=PUMPA			522.8	-0.0	0.5	1.7	95

LINK DETAIL

LINK T4AC==PUMPC> gpm=11055 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			521.6		-1.7		95
fixed_flow=11000			521.6	0.0	-1.7	0.0	95
Gate valve isolation		12.8	521.6	-0.1	-1.7	-0.0	95
90° short radius elbow		35.0	521.3	-0.2	-1.8	-0.1	95
45° short radius elbow		22.5	521.2	-0.2	-1.9	-0.1	95
Straight pipe, len=11.71		11.7	521.1	-0.1	-2.0	-0.0	95
exit_node=PUMPC			521.1	-0.0	-0.2	1.7	95

LINK T4BD==PUMPB> gpm=10050 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.1		-0.7		95
fixed_flow=10000			524.1	0.0	-0.7	0.0	95
Gate valve isolation		12.8	524.0	-0.1	-0.7	-0.0	95
90° short radius elbow		35.0	523.8	-0.2	-0.8	-0.1	95
45° short radius elbow		22.5	523.7	-0.1	-0.8	-0.1	95
Straight pipe, len=11.7		11.7	523.6	-0.1	-0.9	-0.0	95
e[redacted]_node=PUMPB			523.6	-0.0	0.9	1.7	95

LI[redacted] T4BD==PUMPD> gpm=10050 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.8		0.1		95
fixed_flow=10000			525.8	0.0	0.1	0.0	95
Gate valve isolation		12.8	525.8	-0.1	0.1	-0.0	95
90° short radius elbow		35.0	525.6	-0.2	-0.0	-0.1	95
90° short radius elbow		35.0	525.4	-0.2	-0.1	-0.1	95
90° short radius elbow		35.0	525.1	-0.2	-0.2	-0.1	95
Straight pipe, len=26.27		26.3	525.0	-0.2	-0.3	-0.1	95
Decreaser, dia=23.24	0.00		525.0	-0.0	-0.3	-0.0	95
exit_node=PUMPD			525.0	-0.0	1.5	1.7	95

LINK TCSA>CSPUaba gpm=4673.4 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.2		-1.3		95
fixed_flow=4650			522.2	0.0	-1.3	0.0	95
Gate valve isolation		8.5	522.1	-0.1	-1.4	-0.0	95
90° long radius elbow		16.8	521.9	-0.2	-1.5	-0.1	95
45° long radius elbow		10.8	521.8	-0.1	-1.5	-0.1	95
Straight pipe, len=10.57		10.6	521.7	-0.1	-1.6	-0.1	95
exit_node=CSPUMPC			521.7	-0.0	0.2	1.7	95

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4673.4 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.0		-3.2		95
fixed_flow=4650			518.0	0.0	-3.2	0.0	95
Gate valve isolation		8.5	517.9	-0.1	-3.2	-0.0	95
90° long radius elbow		16.8	517.7	-0.2	-3.3	-0.1	95
90° long radius elbow		16.8	517.5	-0.2	-3.4	-0.1	95
Straight pipe, len=16.55		16.6	517.3	-0.2	-3.4	-0.1	95
exit_node=CSPUMPA			517.3	-0.0	-1.7	1.7	95

LINK TCSB>CSPUabc gpm=3140.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			524.9		1.5		95
fixed_flow=3125			524.9	0.0	1.5	0.0	95
Gate valve isolation		8.5	524.8	-0.0	1.5	-0.0	95
90° long radius elbow		16.8	524.8	-0.1	1.5	-0.0	95
45° long radius elbow		10.8	524.7	-0.1	1.5	-0.0	95
Straight pipe, len=10.49		10.5	524.6	-0.1	1.4	-0.0	95
e[redacted]_node=CSPUMPD			524.6	0.0	1.4	0.0	95

LINK TCSBD=CSPUM> gpm=3140.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			526.8		2.4		95
fixed_flow=3125			526.8	0.0	2.4	0.0	95
Gate valve isolation		8.5	526.8	-0.0	2.4	-0.0	95
90° long radius elbow		16.8	526.7	-0.1	2.3	-0.0	95
90° long radius elbow		16.8	526.6	-0.1	2.3	-0.0	95
Straight pipe, len=16.55		16.6	526.5	-0.1	2.2	-0.0	95
exit_node=CSPUMPB			526.5	0.0	2.2	0.0	95

EZFLOW: Version 3 QA
si[redacted]: unspecified
U[redacted]002.NET: UNIT 2-95,RHR A/C-10k,B/D-11K,CS A/C-3125,B/D-4650,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=95 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links w[redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = 1.48e+000 gpm
Pressure = 1.50e-004 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 inlet=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 [redacted]te valve" isolation
 [redacted]^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=95

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=95
```

[redacted]

NETWORK DETAIL

NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=95

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=95

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	15002	536.6	529.6	-3.0
23	T22	CS	30.0	XS	def	default	14057	536.6	530.5	-2.7
27	T26	CS	30.0	XS	def	default	14556	536.6	530.0	-2.9
5	T6	CS	30.0	XS	def	default	14225	536.6	530.3	-2.7
T4AC	PUMPA	CS	24.0	S	def	default	10050	524.3	523.5	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10050	522.6	522.1	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11055	523.1	522.5	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11055	525.2	524.2	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	3141	526.1	525.8	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3141	528.0	527.8	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	4673	522.0	521.3	-0.3
TCSBD	CSPUMPD	CS	16.0	S	def	default	4673	517.8	517.2	-0.2

EZFLOW: Version 3 QA
site: unspecified
U[redacted]002.NET: UNIT 2-95,RHR A/C-10k,B/D-11K,CS A/C-3125,B/D-4650,LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.6	3.6	95	62.1	OK
23	528.4	536.6	3.6	95	62.1	OK
27	528.4	536.6	3.6	95	62.1	OK
5	528.4	536.6	3.6	95	62.1	OK
CSPUMPA	521.3	525.8	2.0	95	62.1	OK
CSPUMPB	521.3	521.3	0.0	95	62.1	OK
CSPUMPC	521.3	527.8	2.8	95	62.1	OK
CSPUMPD	521.3	517.2	-1.8	95	62.1	OK
PUMPA	521.6	523.5	0.8	95	62.1	OK
PUMPB	521.6	522.5	0.4	95	62.1	OK
PUMPC	521.6	522.1	0.2	95	62.1	OK
PUMPD	521.6	524.2	1.1	95	62.1	OK

node 1 CSPu

11' 10.8"

7.1

3.7' floss

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	15002	CHECK	OPEN
23	T22	1	14057	CHECK	OPEN
27	T26	1	14556	CHECK	OPEN
5	T6	1	14225	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Prés1	Pres2	Pres3
T2	SCON	7846	15002	22848	529.9	529.6	526.9	2.0	1.9	0.7
T22	SDLR	9250	14057	4807	530.1	530.5	530.4	2.1	2.2	2.2
T26	SCON	4807	14556	19364	530.3	530.0	528.1	2.2	2.0	1.2
T4AC	SDRL	20101	10050	10050	523.8	522.6	524.3	-0.8	-1.3	-0.6
T4BD	SDRL	22111	11055	11055	524.6	523.1	525.2	-0.4	-1.1	-0.2
T6	SDLR	7846	14225	6379	530.0	530.3	530.2	2.0	2.2	2.1
TCSAC	SDRL	6282	3141	3141	526.6	526.1	528.0	0.6	0.4	1.2
TCSBD	SDRL	9347	4673	4673	518.9	517.8	522.0	-1.0	-1.5	0.3

LINK DETAIL

LINK 1=====T2===> gpm=15002 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		529.6	-7.0	0.5	-3.0	95
exit_node=T2			529.6	0.0	1.9	1.3	95

LINK 23====T22==> gpm=14057 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.5	-6.2	0.9	-2.7	95
exit_node=T22			530.5	0.0	2.2	1.3	95

LINK 27====T26==> gpm=14556 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.6		3.6		95
[redacted]ight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
[redacted]k valve, flow=14700, dp=2.92	8.51		530.0	-6.6	0.7	-2.8	95
[redacted]_node=T26			530.0	0.0	2.0	1.3	95

LINK 5=====T6===> gpm=14225 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.3	-6.3	0.8	-2.7	95
exit_node=T6			530.3	0.0	2.2	1.3	95

LINK T4AC==PUMPA> gpm=10050 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.3		-0.6		95
fixed_flow=10000			524.3	0.0	-0.6	0.0	95
Gate valve isolation		12.8	524.2	-0.1	-0.6	-0.0	95
90° short radius elbow		35.0	524.0	-0.2	-0.7	-0.1	95
90° short radius elbow		35.0	523.8	-0.2	-0.8	-0.1	95
90° short radius elbow		35.0	523.6	-0.2	-0.8	-0.1	95
Straight pipe, len=19.625		19.6	523.5	-0.1	-0.9	-0.0	95
Decreaser, dia=23.24	0.00		523.5	-0.0	-0.9	-0.0	95
exit_node=PUMPA			523.5	-0.0	0.8	1.7	95

LINK DETAIL

LINK T4AC==PUMPC> gpm=10050 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.6		-1.3		95
fixed_flow=10000			522.6	0.0	-1.3	0.0	95
Gate valve isolation		12.8	522.5	-0.1	-1.3	-0.0	95
90° short radius elbow		35.0	522.3	-0.2	-1.4	-0.1	95
45° short radius elbow		22.5	522.2	-0.1	-1.5	-0.1	95
Straight pipe, len=11.71		11.7	522.1	-0.1	-1.5	-0.0	95
exit_node=PUMPC			522.1	0.0	0.2	1.7	95

LINK T4BD==PUMPB> gpm=11055 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.1		-1.1		95
fixed_flow=11000			523.1	0.0	-1.1	0.0	95
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	95
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	95
45° short radius elbow		22.5	522.6	-0.2	-1.3	-0.1	95
Straight pipe, len=11.7		11.7	522.5	-0.1	-1.3	-0.0	95
e[redacted]_node=PUMPB			522.5	-0.0	0.4	1.7	95

LINK T4BD==PUMPD> gpm=11055 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.2		-0.2		95
fixed_flow=11000			525.2	0.0	-0.2	0.0	95
Gate valve isolation		12.8	525.1	-0.1	-0.2	-0.0	95
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	95
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	95
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	95
Straight pipe, len=26.27		26.3	524.2	-0.2	-0.6	-0.1	95
Decreaser, dia=23.24	0.00		524.2	-0.0	-0.6	-0.0	95
exit_node=PUMPD			524.2	-0.0	1.1	1.7	95

LINK TCSA>CSPUaba gpm=3140.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			526.1		0.4		95
fixed_flow=3125			526.1	0.0	0.4	0.0	95
Gate valve isolation		8.5	526.1	-0.0	0.3	-0.0	95
90° long radius elbow		16.8	526.0	-0.1	0.3	-0.0	95
90° long radius elbow		16.8	525.9	-0.1	0.3	-0.0	95
Straight pipe, len=16.55		16.6	525.8	-0.1	0.2	-0.0	95
exit_node=CSPUMPA			525.8	-0.0	2.0	1.7	95

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3140.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			528.0		1.2		95
fixed_flow=3125			528.0	0.0	1.2	0.0	95
Gate valve isolation		8.5	528.0	-0.0	1.2	-0.0	95
90° long radius elbow		16.8	527.9	-0.1	1.1	-0.0	95
45° long radius elbow		10.8	527.9	-0.1	1.1	-0.0	95
Straight pipe, len=10.57		10.6	527.8	-0.1	1.1	-0.0	95
exit_node=CSPUMPC			527.8	-0.0	2.8	1.7	95

LINK TCSB>CSPUabc gpm=4673.4 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			522.0		0.3		95
fixed_flow=4650			522.0	0.0	0.3	0.0	95
Gate valve isolation		8.5	521.9	-0.1	0.3	-0.0	95
90° long radius elbow		16.8	521.7	-0.2	0.2	-0.1	95
90° long radius elbow		16.8	521.5	-0.2	0.1	-0.1	95
Straight pipe, len=16.55		16.6	521.3	-0.2	0.0	-0.1	95
exit_node=CSPUMPB			521.3	0.0	0.0	0.0	95

LINK TCSBD=CSPUM> gpm=4673.4 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			517.8		-1.5		95
fixed_flow=4650			517.8	0.0	-1.5	0.0	95
Gate valve isolation		8.5	517.7	-0.1	-1.6	-0.0	95
90° long radius elbow		16.8	517.5	-0.2	-1.7	-0.1	95
45° long radius elbow		10.8	517.4	-0.1	-1.7	-0.1	95
Straight pipe, len=10.49		10.5	517.2	-0.1	-1.8	-0.1	95
exit_node=CSPUMPD			517.2	0.0	-1.8	0.0	95

EZFLOW: Version 3 QA
site: unspecified
U[redacted]003.NET: UNIT 2-95,RHR A/C-10k,B/D-11K,CS A/C-4650,B/D-3125,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=95 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links w[redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = 1.25e+000 gpm
Pressure = -2.49e-004 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=4650
 [redacted]te valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=95

NODE 23 "Strainer 204C"
 [redacted]lev=528.4, pres=3.55, temp=95
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=95

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=95

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

TEE T4BD "T30>PUMPD>PUMPB"
node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
"standard diverging (run_to_lateral)"

TEE T6 "Strainer 204B"
node1=T2, node2=5, node3=11, elev=525.3
"standard diverging (lateral_to_run)"

TEE TCSAC "T14>CSPUMPA>CSPUMPC"
node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
"standard diverging (run_to_lateral)"

TEE TCSBD "T20>CSPUMPB>CSPUMPD"
node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
"standard diverging (run_to_lateral)"

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14977	536.6	529.6	-3.0
23	T22	CS	30.0	XS	def	default	14107	536.6	530.4	-2.7
27	T26	CS	30.0	XS	def	default	14589	536.6	530.0	-2.9
5	T6	CS	30.0	XS	def	default	14167	536.6	530.4	-2.7
T4AC	PUMPA	CS	24.0	S	def	default	10050	524.3	523.5	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10050	522.6	522.1	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11055	523.1	522.5	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11055	525.2	524.2	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	4673	518.0	517.3	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4673	522.2	521.7	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	3141	526.8	526.5	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3141	524.9	524.7	-0.1

EZFLOW: Version 3 QA
si[redacted] unspecified
U[redacted]003.NET: UNIT 2-95,RHR A/C-10k,B/D-11K,CS A/C-4650,B/D-3125,LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.6	3.6	95	62.1	OK
23	528.4	536.6	3.6	95	62.1	OK
27	528.4	536.6	3.6	95	62.1	OK
5	528.4	536.6	3.6	95	62.1	OK
CSPUMPA	521.3	517.3	-1.7	95	62.1	OK
CSPUMPB	521.3	526.5	2.3	95	62.1	OK
CSPUMPC	521.3	521.7	0.2	95	62.1	OK
CSPUMPD	521.3	524.7	1.5	95	62.1	OK
PUMPA	521.6	523.5	0.8	95	62.1	OK
PUMPB	521.6	522.5	0.4	95	62.1	OK
PUMPC	521.6	522.1	0.2	95	62.1	OK
PUMPD	521.6	524.2	1.1	95	62.1	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14977	CHECK	OPEN
23	T22	1	14107	CHECK	OPEN
27	T26	1	14589	CHECK	OPEN
5	T6	1	14167	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8060	14977	23037	529.9	529.6	526.9	2.0	1.9	0.7
T22	SDLR	9521	14107	4586	530.0	530.4	530.3	2.0	2.2	2.2
T26	SCON	4586	14589	19175	530.3	530.0	528.1	2.1	2.0	1.2
T4AC	SDRL	20101	10050	10050	523.8	522.6	524.3	-0.8	-1.3	-0.6
T4BD	SDRL	22111	11055	11055	524.6	523.1	525.2	-0.4	-1.1	-0.2
T6	SDLR	8060	14167	6107	530.1	530.4	530.2	2.1	2.2	2.1
TCSAC	SDRL	9347	4673	4673	519.1	518.0	522.2	-2.7	-3.2	-1.3
TCSBD	SDRL	6281	3141	3141	525.4	524.9	526.8	1.8	1.6	2.4

LINK DETAIL

LINK 1=====T2===> gpm=14977 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		529.6	-7.0	0.5	-3.0	95
exit_node=T2			529.6	0.0	1.9	1.3	95

LINK 23====T22==> gpm=14107 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		530.4	-6.2	0.9	-2.7	95
exit_node=T22			530.4	0.0	2.2	1.3	95

LINK 27====T26==> gpm=14589 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.6		3.6		95
S[redacted]ight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
C[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.0	-6.6	0.7	-2.9	95
exit_node=T26			530.0	0.0	2.0	1.3	95

LINK 5=====T6===> gpm=14167 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92 .	8.51		530.4	-6.3	0.8	-2.7	95
exit_node=T6			530.4	0.0	2.2	1.3	95

LINK T4AC==PUMPA> gpm=10050 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.3		-0.6		95
fixed_flow=10000			524.3	0.0	-0.6	0.0	95
Gate valve isolation		12.8	524.2	-0.1	-0.6	-0.0	95
90° short radius elbow		35.0	524.0	-0.2	-0.7	-0.1	95
90° short radius elbow		35.0	523.8	-0.2	-0.8	-0.1	95
90° short radius elbow		35.0	523.6	-0.2	-0.9	-0.1	95
Straight pipe, len=19.625		19.6	523.5	-0.1	-0.9	-0.0	95
Decreaser, dia=23.24	0.00		523.5	-0.0	-0.9	-0.0	95
exit_node=PUMPA			523.5	-0.0	0.8	1.7	95

LINK DETAIL

LINK T4AC==PUMPC> gpm=10050 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.6		-1.3		95
fixed_flow=10000			522.6	0.0	-1.3	0.0	95
Gate valve isolation		12.8	522.5	-0.1	-1.3	-0.0	95
90° short radius elbow		35.0	522.3	-0.2	-1.4	-0.1	95
45° short radius elbow		22.5	522.2	-0.1	-1.5	-0.1	95
Straight pipe, len=11.71		11.7	522.1	-0.1	-1.5	-0.0	95
exit_node=PUMPC			522.1	-0.0	0.2	1.7	95

LINK T4BD==PUMPB> gpm=11055 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.1		-1.1		95
fixed_flow=11000			523.1	0.0	-1.1	0.0	95
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	95
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	95
45° short radius elbow		22.5	522.6	-0.2	-1.3	-0.1	95
Straight pipe, len=11.7		11.7	522.5	-0.1	-1.3	-0.0	95
[redacted]_node=PUMPB			522.5	-0.0	0.4	1.7	95

LINK T4BD==PUMPD> gpm=11055 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.2		-0.2		95
fixed_flow=11000			525.2	0.0	-0.2	0.0	95
Gate valve isolation		12.8	525.1	-0.1	-0.2	-0.0	95
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	95
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	95
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	95
Straight pipe, len=26.27		26.3	524.2	-0.2	-0.6	-0.1	95
Decreaser, dia=23.24	0.00		524.2	-0.0	-0.6	-0.0	95
exit_node=PUMPD			524.2	-0.0	1.1	1.7	95

LINK TCSA>CSPUaba gpm=4673.4 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.0		-3.2		95
fixed_flow=4650			518.0	0.0	-3.2	0.0	95
Gate valve isolation		8.5	517.9	-0.1	-3.2	-0.0	95
90° long radius elbow		16.8	517.7	-0.2	-3.3	-0.1	95
90° long radius elbow		16.8	517.5	-0.2	-3.4	-0.1	95
Straight pipe, len=16.55		16.6	517.3	-0.2	-3.4	-0.1	95
exit_node=CSPUMPA			517.3	0.0	-1.7	1.7	95

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4673.4 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.2		-1.3		95
fixed_flow=4650			522.2	0.0	-1.3	0.0	95
Gate valve isolation		8.5	522.1	-0.1	-1.4	-0.0	95
90° long radius elbow		16.8	521.9	-0.2	-1.5	-0.1	95
45° long radius elbow		10.8	521.8	-0.1	-1.5	-0.1	95
Straight pipe, len=10.57		10.6	521.7	-0.1	-1.6	-0.1	95
exit_node=CSPUMPC			521.7	-0.0	0.2	1.7	95

LINK TCSB>CSPUabc gpm=3140.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			526.8		2.4		95
fixed_flow=3125			526.8	0.0	2.4	0.0	95
Gate valve isolation		8.5	526.8	-0.0	2.4	-0.0	95
90° long radius elbow		16.8	526.7	-0.1	2.3	-0.0	95
90° long radius elbow		16.8	526.6	-0.1	2.3	-0.0	95
Straight pipe, len=16.55		16.6	526.5	-0.1	2.3	-0.0	95
[redacted]_node=CSPUMPB			526.5	0.0	2.3	0.0	95

LINK TCSBD=CSPUM> gpm=3140.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			524.9		1.6		95
fixed_flow=3125			524.9	0.0	1.6	0.0	95
Gate valve isolation		8.5	524.9	-0.0	1.5	-0.0	95
90° long radius elbow		16.8	524.8	-0.1	1.5	-0.0	95
45° long radius elbow		10.8	524.7	-0.1	1.5	-0.0	95
Straight pipe, len=10.49		10.5	524.7	-0.1	1.5	-0.0	95
exit_node=CSPUMPD			524.7	0.0	1.5	0.0	95

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#01.NET: U2-140, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links w[redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 77
Largest Corrections in Last Iteration:
Flow = -9.96e-002 gpm
Pressure = -9.92e-006 psig
Tee Loss Coefficient = 2.88e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=3125
 [redacted]te valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 [redacted]lev=528.4, pres=3.55, temp=140
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14453	536.7	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13452	536.7	531.1	-2.4
27	T26	CS	30.0	XS	def	default	13979	536.7	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13500	536.7	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	11178	524.3	523.3	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11178	522.1	521.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10162	524.6	524.1	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10162	526.4	525.6	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	3176	525.3	525.0	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3176	527.3	527.0	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.6	527.3	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.6	525.4	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U2-140, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	525.0	1.6	140	61.4	OK
CSPUMPB	521.3	527.3	2.5	140	61.4	OK
CSPUMPC	521.3	527.0	2.4	140	61.4	OK
CSPUMPD	521.3	525.4	1.7	140	61.4	OK
PUMPA	521.6	523.3	0.7	140	61.4	OK
PUMPB	521.6	524.1	1.1	140	61.4	OK
PUMPC	521.6	521.5	-0.0	140	61.4	OK
PUMPD	521.6	525.6	1.7	140	61.4	OK

U[redacted]0#01.NET: U2-140, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14453	CHECK	OPEN
23	T22	1	13452	CHECK	OPEN
27	T26	1	13979	CHECK	OPEN
5	T6	1	13500	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U2-140, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8909	14453	23361	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8111	13452	5341	530.8	531.1	531.0	2.3	2.5	2.4
T26	SCON	5341	13979	19320	530.9	530.6	528.7	2.4	2.3	1.4
T4AC	SDRL	22357	11178	11178	523.6	522.1	524.3	-0.8	-1.5	-0.6
T4BD	SDRL	20324	10162	10162	525.8	524.6	526.4	0.1	-0.4	0.3
T6	SDLR	8909	13500	4592	530.7	531.0	531.0	2.3	2.4	2.4
TCSAC	SDRL	6351	3176	3176	525.8	525.3	527.3	0.2	0.0	0.8
TCSBD	SDRL	6351	3176	3176	526.1	525.6	527.6	2.1	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14453 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.2	-6.5	0.8	-2.8	140
exit_node=T2			530.2	-0.0	2.1	1.3	140

LINK 23====T22==> gpm=13452 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.1	-5.6	1.1	-2.4	140
exit_node=T22			531.1	-0.0	2.5	1.3	140

LINK 27====T26==> gpm=13979 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
S[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
C[redacted] valve, flow=14700, dp=2.92 .	8.51		530.6	-6.1	0.9	-2.6	140
exit_node=T26			530.6	-0.0	2.3	1.3	140

LINK 5=====T6===> gpm=13500 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.0	-5.7	1.1	-2.4	140
exit_node=T6			531.0	-0.0	2.4	1.3	140

LINK T4AC==PUMPA> gpm=11178 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.3		-0.6		140
fixed_flow=11000			524.3	0.0	-0.6	0.0	140
Gate valve isolation		12.8	524.2	-0.1	-0.6	-0.0	140
90° short radius elbow		35.0	523.9	-0.2	-0.7	-0.1	140
90° short radius elbow		35.0	523.7	-0.2	-0.8	-0.1	140
90° short radius elbow		35.0	523.5	-0.2	-0.9	-0.1	140
Straight pipe, len=19.625		19.6	523.3	-0.1	-1.0	-0.1	140
Decreaser, dia=23.24	0.00		523.3	-0.0	-1.0	-0.0	140
exit_node=PUMPA			523.3	0.0	0.7	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=11178 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.1		-1.5		140
fixed_flow=11000			522.1	0.0	-1.5	0.0	140
Gate valve isolation		12.8	522.0	-0.1	-1.5	-0.0	140
90° short radius elbow		35.0	521.8	-0.2	-1.6	-0.1	140
45° short radius elbow		22.5	521.6	-0.2	-1.7	-0.1	140
Straight pipe, len=11.71		11.7	521.5	-0.1	-1.7	-0.0	140
exit_node=PUMPC			521.5	0.0	-0.0	1.7	140

LINK T4BD==PUMPB> gpm=10162 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.6		-0.4		140
fixed_flow=10000			524.6	0.0	-0.4	0.0	140
Gate valve isolation		12.8	524.5	-0.1	-0.5	-0.0	140
90° short radius elbow		35.0	524.3	-0.2	-0.5	-0.1	140
45° short radius elbow		22.5	524.2	-0.1	-0.6	-0.1	140
Straight pipe, len=11.7		11.7	524.1	-0.1	-0.6	-0.0	140
exit_node=PUMPB			524.1	0.0	1.1	1.7	140

LINK T4BD==PUMPD> gpm=10162 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.4		0.3		140
fixed_flow=10000			526.4	0.0	0.3	0.0	140
Gate valve isolation		12.8	526.3	-0.1	0.3	-0.0	140
90° short radius elbow		35.0	526.1	-0.2	0.2	-0.1	140
90° short radius elbow		35.0	525.9	-0.2	0.1	-0.1	140
90° short radius elbow		35.0	525.7	-0.2	0.0	-0.1	140
Straight pipe, len=26.27		26.3	525.6	-0.2	-0.0	-0.1	140
Decreaser, dia=23.24	0.00		525.6	-0.0	-0.0	-0.0	140
exit_node=PUMPD			525.6	0.0	1.7	1.7	140

LINK TCSA>CSPUaba gpm=3175.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		140
fixed_flow=3125			525.3	0.0	0.0	0.0	140
Gate valve isolation		8.5	525.3	-0.0	-0.0	-0.0	140
90° long radius elbow		16.8	525.2	-0.1	-0.0	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	140
Straight pipe, len=16.55		16.6	525.0	-0.1	-0.1	-0.0	140
exit_node=CSPUMPA			525.0	0.0	1.6	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3175.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.8		140
fixed_flow=3125			527.3	0.0	0.8	0.0	140
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	140
90° long radius elbow		16.8	527.1	-0.1	0.8	-0.0	140
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	140
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	140
exit_node=CSPUMPC			527.0	0.0	2.4	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.6		2.7		140
fixed_flow=3125			527.6	0.0	2.7	0.0	140
Gate valve isolation		8.5	527.5	-0.0	2.7	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
Straight pipe, len=16.55		16.6	527.3	-0.1	2.5	-0.0	140
exit_node=CSPUMPB			527.3	0.0	2.5	-0.0	140

LINK TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		140
fixed_flow=3125			525.6	0.0	1.8	0.0	140
Gate valve isolation		8.5	525.6	-0.0	1.8	-0.0	140
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	140
45° long radius elbow		10.8	525.4	-0.1	1.8	-0.0	140
Straight pipe, len=10.49		10.5	525.4	-0.1	1.7	-0.0	140
exit_node=CSPUMPD			525.4	0.0	1.7	0.0	140

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = -9.56e-002 gpm
Pressure = -9.70e-006 psig
Tee Loss Coefficient = 2.78e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 inlet=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD=>PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted] PUMPB "RHR pump b"
 e[redacted]v=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14443	536.7	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13455	536.7	531.1	-2.4
27	T26	CS	30.0	XS	def	default	13987	536.7	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13498	536.7	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	10162	524.8	524.0	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10162	523.0	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11178	523.6	523.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11178	525.8	524.8	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	3176	527.3	527.0	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3176	525.3	525.0	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.6	525.4	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.6	527.3	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	525.0	1.6	140	61.4	OK
CSPUMPB	521.3	527.3	2.5	140	61.4	OK
CSPUMPC	521.3	527.0	2.4	140	61.4	OK
CSPUMPD	521.3	525.4	1.7	140	61.4	OK
PUMPA	521.6	524.0	1.0	140	61.4	OK
PUMPB	521.6	523.0	0.6	140	61.4	OK
PUMPC	521.6	522.6	0.4	140	61.4	OK
PUMPD	521.6	524.8	1.3	140	61.4	OK

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14443	CHECK	OPEN
23	T22	1	13455	CHECK	OPEN
27	T26	1	13987	CHECK	OPEN
5	T6	1	13498	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U2-140, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8861	14443	23304	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8066	13455	5390	530.8	531.1	531.0	2.3	2.5	2.4
T26	SCON	5390	13987	19377	530.9	530.6	528.7	2.4	2.3	1.4
T4AC	SDRL	20324	10162	10162	524.3	523.0	524.8	-0.6	-1.1	-0.3
T4BD	SDRL	22357	11178	11178	525.1	523.6	525.8	-0.2	-0.9	0.1
T6	SDLR	8861	13498	4637	530.7	531.0	531.0	2.3	2.4	2.4
TCSAC	SDRL	6351	3176	3176	525.8	525.3	527.3	0.2	0.0	0.8
TCSBD	SDRL	6351	3176	3176	526.1	525.6	527.6	2.1	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14443 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		530.2	-6.5	0.8	-2.8	140
exit_node=T2			530.2	-0.0	2.1	1.3	140

LINK 23====T22==> gpm=13455 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		531.1	-5.6	1.1	-2.4	140
exit_node=T22			531.1	-0.0	2.5	1.3	140

LINK 27====T26==> gpm=13987 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
St[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
C[redacted] valve, flow=14700, dp=2.92	8.51		530.6	-6.1	0.9	-2.6	140
ex[redacted]_node=T26			530.6	-0.0	2.3	1.3	140

LINK 5=====T6===> gpm=13498 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		531.0	-5.7	1.1	-2.4	140
exit_node=T6			531.0	-0.0	2.4	1.3	140

LINK T4AC==PUMPA> gpm=10162 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.8		-0.3		140
fixed_flow=10000			524.8	0.0	-0.3	0.0	140
Gate valve isolation		12.8	524.7	-0.1	-0.4	-0.0	140
90° short radius elbow		35.0	524.5	-0.2	-0.4	-0.1	140
90° short radius elbow		35.0	524.3	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.1	-0.2	-0.6	-0.1	140
Straight pipe, len=19.625		19.6	524.0	-0.1	-0.7	-0.0	140
Decreaser, dia=23.24	0.00		524.0	-0.0	-0.7	-0.0	140
exit_node=PUMPA			524.0	0.0	1.0	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=10162 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.0		-1.1		140
fixed_flow=10000			523.0	0.0	-1.1	0.0	140
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	140
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	140
45° short radius elbow		22.5	522.6	-0.1	-1.3	-0.1	140
Straight pipe, len=11.71		11.7	522.6	-0.1	-1.3	-0.0	140
exit_node=PUMPC			522.6	0.0	0.4	1.7	140

LINK T4BD==PUMPB> gpm=11178 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.6		-0.9		140
fixed_flow=11000			523.6	0.0	-0.9	0.0	140
Gate valve isolation		12.8	523.5	-0.1	-0.9	-0.0	140
90° short radius elbow		35.0	523.3	-0.2	-1.0	-0.1	140
45° short radius elbow		22.5	523.1	-0.2	-1.1	-0.1	140
Straight pipe, len=11.7		11.7	523.0	-0.1	-1.1	-0.0	140
e[redacted]node=PUMPB			523.0	0.0	0.6	1.7	140

LINK T4BD==PUMPD> gpm=11178 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.8		0.1		140
fixed_flow=11000			525.8	0.0	0.1	0.0	140
Gate valve isolation		12.8	525.7	-0.1	0.0	-0.0	140
90° short radius elbow		35.0	525.4	-0.2	-0.1	-0.1	140
90° short radius elbow		35.0	525.2	-0.2	-0.2	-0.1	140
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	140
Straight pipe, len=26.27		26.3	524.8	-0.2	-0.4	-0.1	140
Decreaser, dia=23.24	0.00		524.8	-0.0	-0.4	-0.0	140
exit_node=PUMPD			524.8	0.0	1.3	1.7	140

LINK TCSA>CSPUaba gpm=3175.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.8		140
fixed_flow=3125			527.3	0.0	0.8	0.0	140
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	140
90° long radius elbow		16.8	527.2	-0.1	0.8	-0.0	140
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	140
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	140
exit_node=CSPUMPC			527.0	0.0	2.4	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3175.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		140
fixed_flow=3125			525.3	0.0	0.0	0.0	140
Gate valve isolation		8.5	525.3	-0.0	-0.0	-0.0	140
90° long radius elbow		16.8	525.2	-0.1	-0.0	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	140
Straight pipe, len=16.55		16.6	525.0	-0.1	-0.1	-0.0	140
exit_node=CSPUMPA			525.0	0.0	1.6	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		140
fixed_flow=3125			525.6	0.0	1.8	0.0	140
Gate valve isolation		8.5	525.6	-0.0	1.8	-0.0	140
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	140
45° long radius elbow		10.8	525.4	-0.1	1.8	-0.0	140
Straight pipe, len=10.49		10.5	525.4	-0.1	1.7	-0.0	140
[redacted]_node=CSPUMPD			525.4	-0.0	1.7	-0.0	140

[redacted] TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.6		2.7		140
fixed_flow=3125			527.6	0.0	2.7	0.0	140
Gate valve isolation		8.5	527.5	-0.0	2.7	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
Straight pipe, len=16.55		16.6	527.3	-0.1	2.5	-0.0	140
exit_node=CSPUMPB			527.3	-0.0	2.5	-0.0	140

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-140, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = -4.73e-001 gpm
Pressure = -9.25e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

[redacted]

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 [redacted]e valve" isolation
 [redacted] long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140
```

[redacted]

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted]PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14598	536.7	530.1	-2.8
23	T22	CS	30.0	XS	def	default	13783	536.7	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14228	536.7	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13841	536.7	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10162	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10162	523.1	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10162	524.5	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10162	526.3	525.5	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	4726	518.1	517.5	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4725	522.4	521.9	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.2	526.9	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.2	525.0	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-140, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	517.5	-1.6	140	61.4	OK
CSPUMPB	521.3	526.9	2.4	140	61.4	OK
CSPUMPC	521.3	521.9	0.3	140	61.4	OK
CSPUMPD	521.3	525.0	1.6	140	61.4	OK
PUMPA	521.6	524.1	1.1	140	61.4	OK
PUMPB	521.6	524.0	1.0	140	61.4	OK
PUMPC	521.6	522.6	0.4	140	61.4	OK
PUMPD	521.6	525.5	1.6	140	61.4	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14598	CHECK	OPEN
23	T22	1	13783	CHECK	OPEN
27	T26	1	14228	CHECK	OPEN
5	T6	1	13841	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-140, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7634	14598	22232	530.4	530.1	527.5	2.2	2.0	0.9
T22	SDLR	9595	13783	4189	530.4	530.8	530.7	2.2	2.3	2.3
T26	SCON	4189	14228	18417	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20324	10162	10162	524.4	523.1	524.9	-0.5	-1.1	-0.3
T4BD	SDRL	20324	10162	10162	525.7	524.5	526.3	0.1	-0.5	0.3
T6	SDLR	7634	13841	6208	530.5	530.7	530.6	2.2	2.3	2.3
TCSAC	SDRL	9451	4726	4725	519.3	518.1	522.4	-2.6	-3.1	-1.2
TCSBD	SDRL	6351	3176	3176	525.7	525.2	527.2	1.9	1.7	2.5

LINK DETAIL

LINK 1=====T2===> gpm=14598 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		530.1	-6.6	0.7	-2.8	140
exit_node=T2			530.1	-0.0	2.0	1.3	140

LINK 23====T22==> gpm=13783 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		530.8	-5.9	1.0	-2.5	140
exit_node=T22			530.8	-0.0	2.3	1.3	140

LINK 27====T26==> gpm=14228 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
St[redacted]ght pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
C[redacted] valve, flow=14700, dp=2.92	8.51		530.4	-6.3	0.9	-2.7	140
exit_node=T26			530.4	-0.0	2.2	1.3	140

LINK 5=====T6===> gpm=13841 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92	8.51		530.7	-6.0	1.0	-2.5	140
exit_node=T6			530.7	-0.0	2.3	1.3	140

LINK T4AC==PUMPA> gpm=10162 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		140
fixed_flow=10000			524.9	0.0	-0.3	0.0	140
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	140
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	140
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.6	-0.0	140
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.6	-0.0	140
exit_node=PUMPA			524.1	0.0	1.1	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=10162 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.1		140
fixed_flow=10000			523.1	0.0	-1.1	0.0	140
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	140
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	140
45° short radius elbow		22.5	522.7	-0.1	-1.2	-0.1	140
Straight pipe, len=11.71		11.7	522.6	-0.1	-1.3	-0.0	140
exit_node=PUMPC			522.6	0.0	0.4	1.7	140

LINK T4BD==PUMPB> gpm=10162 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		140
fixed_flow=10000			524.5	0.0	-0.5	0.0	140
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
45° short radius elbow		22.5	524.1	-0.1	-0.6	-0.1	140
Straight pipe, len=11.7		11.7	524.0	-0.1	-0.7	-0.0	140
e[redacted]_node=PUMPB			524.0	0.0	1.0	1.7	140

LINK T4BD==PUMPD> gpm=10162 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		140
fixed_flow=10000			526.3	0.0	0.3	0.0	140
Gate valve isolation		12.8	526.2	-0.1	0.3	-0.0	140
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	140
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	140
90° short radius elbow		35.0	525.6	-0.2	0.0	-0.1	140
Straight pipe, len=26.27		26.3	525.5	-0.2	-0.1	-0.1	140
Decreaser, dia=23.24	0.00		525.5	-0.0	-0.1	-0.0	140
exit_node=PUMPD			525.5	0.0	1.6	1.7	140

LINK TCSA>CSPUaba gpm=4725.5 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.1		-3.1		140
fixed_flow=4650			518.1	0.0	-3.1	0.0	140
Gate valve isolation		8.5	518.0	-0.1	-3.1	-0.0	140
90° long radius elbow		16.8	517.8	-0.2	-3.2	-0.1	140
90° long radius elbow		16.8	517.6	-0.2	-3.3	-0.1	140
Straight pipe, len=16.55		16.6	517.5	-0.2	-3.3	-0.1	140
exit_node=CSPUMPA			517.5	0.0	-1.6	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4725.4 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.4		-1.2		140
fixed_flow=4650			522.4	0.0	-1.2	0.0	140
Gate valve isolation		8.5	522.3	-0.1	-1.3	-0.0	140
90° long radius elbow		16.8	522.2	-0.2	-1.3	-0.1	140
45° long radius elbow		10.8	522.0	-0.1	-1.4	-0.1	140
Straight pipe, len=10.57		10.6	521.9	-0.1	-1.4	-0.0	140
exit_node=CSPUMPC			521.9	0.0	0.3	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.2		2.5		140
fixed_flow=3125			527.2	0.0	2.5	0.0	140
Gate valve isolation		8.5	527.1	-0.0	2.5	-0.0	140
90° long radius elbow		16.8	527.0	-0.1	2.4	-0.0	140
90° long radius elbow		16.8	526.9	-0.1	2.4	-0.0	140
Straight pipe, len=16.55		16.6	526.9	-0.1	2.4	-0.0	140
e[redacted]node=CSPUMPB			526.9	-0.0	2.4	0.0	140

LINK TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.2		1.7		140
fixed_flow=3125			525.2	0.0	1.7	0.0	140
Gate valve isolation		8.5	525.2	-0.0	1.6	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	1.6	-0.0	140
45° long radius elbow		10.8	525.0	-0.1	1.6	-0.0	140
Straight pipe, len=10.49		10.5	525.0	-0.1	1.6	-0.0	140
exit_node=CSPUMPD			525.0	0.0	1.6	-0.0	140

EZFLOW: Version 3 QA
site: unspecified
U2[redacted]04.NET: U2-140, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links wi[redacted]less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = 7.30e-001 gpm
Pressure = 7.23e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 inlet=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14625	536.7	530.0	-2.9
23	T22	CS	30.0	XS	def	default	13731	536.7	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14193	536.7	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13901	536.7	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10162	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10162	523.1	522.7	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10162	524.5	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10162	526.3	525.5	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	3176	528.4	528.2	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3176	526.4	526.1	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	4726	517.9	517.4	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	4725	522.2	521.6	-0.3

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#04.NET: U2-140, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	526.1	2.1	140	61.4	OK
CSPUMPB	521.3	521.6	0.1	140	61.4	OK
CSPUMPC	521.3	528.2	2.9	140	61.4	OK
CSPUMPD	521.3	517.4	-1.7	140	61.4	OK
PUMPA	521.6	524.1	1.1	140	61.4	OK
PUMPB	521.6	524.0	1.0	140	61.4	OK
PUMPC	521.6	522.7	0.5	140	61.4	OK
PUMPD	521.6	525.5	1.6	140	61.4	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14625	CHECK	OPEN
23	T22	1	13731	CHECK	OPEN
27	T26	1	14193	CHECK	OPEN
5	T6	1	13901	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
[redacted]0#04.NET: U2-140, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7404	14625	22028	530.3	530.0	527.5	2.1	2.0	0.9
T22	SDLR	9304	13731	4427	530.4	530.8	530.8	2.2	2.4	2.3
T26	SCON	4427	14193	18620	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20324	10162	10162	524.4	523.1	524.9	-0.5	-1.0	-0.3
T4BD	SDRL	20324	10162	10162	525.7	524.5	526.3	0.1	-0.5	0.3
T6	SDLR	7404	13901	6498	530.5	530.7	530.5	2.2	2.3	2.2
TCSAC	SDRL	6351	3176	3176	527.0	526.4	528.4	0.7	0.5	1.3
TCSBD	SDRL	9451	4726	4725	519.0	517.9	522.2	-1.0	-1.5	0.4

LINK DETAIL

LINK 1=====T2===> gpm=14625 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.0	-6.7	0.7	-2.8	140
exit_node=T2			530.0	-0.0	2.0	1.3	140

LINK 23====T22==> gpm=13731 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.8	-5.9	1.0	-2.5	140
exit_node=T22			530.8	-0.0	2.4	1.3	140

LINK 27====T26==> gpm=14193 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.4	-6.3	0.9	-2.7	140
[redacted]t_node=T26			530.4	-0.0	2.2	1.3	140

LINK 5=====T6===> gpm=13901 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.7	-6.0	1.0	-2.6	140
exit_node=T6			530.7	-0.0	2.3	1.3	140

LINK T4AC==PUMPA> gpm=10162 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		140
fixed_flow=10000			524.9	0.0	-0.3	0.0	140
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	140
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	140
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.6	-0.0	140
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.6	-0.0	140
exit_node=PUMPA			524.1	0.0	1.1	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=10162 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.0		140
fixed_flow=10000			523.1	0.0	-1.0	0.0	140
Gate valve isolation		12.8	523.1	-0.1	-1.1	-0.0	140
90° short radius elbow		35.0	522.9	-0.2	-1.2	-0.1	140
45° short radius elbow		22.5	522.7	-0.1	-1.2	-0.1	140
Straight pipe, len=11.71		11.7	522.7	-0.1	-1.3	-0.0	140
exit_node=PUMPC			522.7	0.0	0.5	1.7	140

LINK T4BD==PUMPB> gpm=10162 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		140
fixed_flow=10000			524.5	0.0	-0.5	0.0	140
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
45° short radius elbow		22.5	524.1	-0.1	-0.6	-0.1	140
Straight pipe, len=11.7		11.7	524.0	-0.1	-0.7	-0.0	140
e[redacted]_node=PUMPB			524.0	0.0	1.0	1.7	140

LINK T4BD==PUMPD> gpm=10162 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		140
fixed_flow=10000			526.3	0.0	0.3	0.0	140
Gate valve isolation		12.8	526.2	-0.1	0.3	-0.0	140
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	140
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	140
90° short radius elbow		35.0	525.6	-0.2	0.0	-0.1	140
Straight pipe, len=26.27		26.3	525.5	-0.2	-0.1	-0.1	140
Decreaser, dia=23.24	0.00		525.5	-0.0	-0.1	-0.0	140
exit_node=PUMPD			525.5	0.0	1.6	1.7	140

LINK TCSA>CSPUaba gpm=3175.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			528.4		1.3		140
fixed_flow=3125			528.4	0.0	1.3	0.0	140
Gate valve isolation		8.5	528.4	-0.0	1.3	-0.0	140
90° long radius elbow		16.8	528.3	-0.1	1.3	-0.0	140
45° long radius elbow		10.8	528.2	-0.1	1.2	-0.0	140
Straight pipe, len=10.57		10.6	528.2	-0.1	1.2	-0.0	140
exit_node=CSPUMPC			528.2	0.0	2.9	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3175.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			526.4		0.5		140
fixed_flow=3125			526.4	0.0	0.5	0.0	140
Gate valve isolation		8.5	526.4	-0.0	0.5	-0.0	140
90° long radius elbow		16.8	526.3	-0.1	0.4	-0.0	140
90° long radius elbow		16.8	526.2	-0.1	0.4	-0.0	140
Straight pipe, len=16.55		16.6	526.1	-0.1	0.4	-0.0	140
exit_node=CSPUMPA			526.1	0.0	2.1	1.7	140

LINK TCSB>CSPUabc gpm=4725.5 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			517.9		-1.5		140
fixed_flow=4650			517.9	0.0	-1.5	0.0	140
Gate valve isolation		8.5	517.8	-0.1	-1.5	-0.0	140
90° long radius elbow		16.8	517.6	-0.2	-1.6	-0.1	140
45° long radius elbow		10.8	517.5	-0.1	-1.6	-0.1	140
Straight pipe, len=10.49		10.5	517.4	-0.1	-1.7	-0.0	140
[redacted]_node=CSPUMPD			517.4	-0.0	-1.7	0.0	140

LINK TCSBD=CSPUM> gpm=4725.4 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			522.2		0.4		140
fixed_flow=4650			522.2	0.0	0.4	0.0	140
Gate valve isolation		8.5	522.1	-0.1	0.3	-0.0	140
90° long radius elbow		16.8	521.9	-0.2	0.3	-0.1	140
90° long radius elbow		16.8	521.7	-0.2	0.2	-0.1	140
Straight pipe, len=16.55		16.6	521.6	-0.2	0.1	-0.1	140
exit_node=CSPUMPB			521.6	-0.0	0.1	0.0	140

Date: 07/19/97 (Sat) Time: 0705 1
EZFLOW: Version 3 QA
site: unspecified
[redacted]50#01.NET: U2-150, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

[redacted] SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 71
Largest Corrections in Last Iteration:
Flow = -9.78e-002 gpm
Pressure = -3.01e-005 psig
Tee Loss Coefficient = -7.50e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

[redacted] T4AC==PUMPA> "RHR Pump A"
[redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
[redacted]ixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 [redacted]te valve" isolation
 [redacted]^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=150
```

[redacted]

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted]PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#01.NET: U2-150, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14496	536.8	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13493	536.8	531.1	-2.4
27	T26	CS	30.0	XS	def	default	14022	536.8	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13542	536.8	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	11212	524.2	523.3	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11212	522.1	521.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10193	524.5	524.1	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10193	526.3	525.5	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	3185	525.3	525.0	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3185	527.2	527.0	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.5	527.2	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.6	525.3	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#01.NET: U2-150, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	525.0	1.6	150	61.2	OK
CSPUMPB	521.3	527.2	2.5	150	61.2	OK
CSPUMPC	521.3	527.0	2.4	150	61.2	OK
CSPUMPD	521.3	525.3	1.7	150	61.2	OK
PUMPA	521.6	523.3	0.7	150	61.2	OK
PUMPB	521.6	524.1	1.1	150	61.2	OK
PUMPC	521.6	521.5	-0.0	150	61.2	OK
PUMPD	521.6	525.5	1.7	150	61.2	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14496	CHECK	OPEN
23	T22	1	13493	CHECK	OPEN
27	T26	1	14022	CHECK	OPEN
5	T6	1	13542	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U2-150, RHR A/C-11K, B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8938	14496	23434	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8138	13493	5355	530.8	531.1	531.0	2.3	2.4	2.4
T26	SCON	5355	14022	19377	530.9	530.6	528.6	2.4	2.3	1.4
T4AC	SDRL	22425	11212	11212	523.6	522.1	524.2	-0.9	-1.5	-0.6
T4BD	SDRL	20386	10193	10193	525.8	524.5	526.3	0.1	-0.4	0.3
T6	SDLR	8938	13542	4604	530.6	531.0	530.9	2.3	2.4	2.4
TCSAC	SDRL	6371	3185	3185	525.8	525.3	527.2	0.2	-0.0	0.8
TCSBD	SDRL	6371	3185	3185	526.1	525.6	527.5	2.0	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14496 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.2	-6.6	0.8	-2.8	150
exit_node=T2			530.2	0.0	2.1	1.3	150

LINK 23====T22==> gpm=13493 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		531.1	-5.7	1.1	-2.4	150
exit_node=T22			531.1	0.0	2.4	1.3	150

LINK 27====T26==> gpm=14022 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
S[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
C[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.6	-6.1	0.9	-2.6	150
exit_node=T26			530.6	0.0	2.3	1.3	150

LINK 5=====T6===> gpm=13542 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		531.0	-5.7	1.1	-2.4	150
exit_node=T6			531.0	0.0	2.4	1.3	150

LINK T4AC==PUMPA> gpm=11212 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.2		-0.6		150
fixed_flow=11000			524.2	0.0	-0.6	0.0	150
Gate valve isolation		12.8	524.1	-0.1	-0.6	-0.0	150
90° short radius elbow		35.0	523.9	-0.2	-0.7	-0.1	150
90° short radius elbow		35.0	523.7	-0.2	-0.8	-0.1	150
90° short radius elbow		35.0	523.4	-0.2	-0.9	-0.1	150
Straight pipe, len=19.625		19.6	523.3	-0.1	-1.0	-0.1	150
Decreaser, dia=23.24	0.00		523.3	-0.0	-1.0	-0.0	150
exit_node=PUMPA			523.3	-0.0	0.7	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=11212 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.1		-1.5		150
fixed_flow=11000			522.1	0.0	-1.5	0.0	150
Gate valve isolation		12.8	522.0	-0.1	-1.5	-0.0	150
90° short radius elbow		35.0	521.7	-0.2	-1.6	-0.1	150
45° short radius elbow		22.5	521.6	-0.2	-1.7	-0.1	150
Straight pipe, len=11.71		11.7	521.5	-0.1	-1.7	-0.0	150
exit_node=PUMPC			521.5	-0.0	-0.0	1.7	150

LINK T4BD==PUMPB> gpm=10193 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.4		150
fixed_flow=10000			524.5	0.0	-0.4	0.0	150
Gate valve isolation		12.8	524.5	-0.1	-0.5	-0.0	150
90° short radius elbow		35.0	524.3	-0.2	-0.6	-0.1	150
45° short radius elbow		22.5	524.1	-0.1	-0.6	-0.1	150
Straight pipe, len=11.7		11.7	524.1	-0.1	-0.6	-0.0	150
[redacted]_node=PUMPB			524.1	-0.0	1.1	1.7	150

LINK T4BD==PUMPD> gpm=10193 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		150
fixed_flow=10000			526.3	0.0	0.3	0.0	150
Gate valve isolation		12.8	526.3	-0.1	0.3	-0.0	150
90° short radius elbow		35.0	526.1	-0.2	0.2	-0.1	150
90° short radius elbow		35.0	525.9	-0.2	0.1	-0.1	150
90° short radius elbow		35.0	525.7	-0.2	0.0	-0.1	150
Straight pipe, len=26.27		26.3	525.5	-0.2	-0.0	-0.1	150
Decreaser, dia=23.24	0.00		525.5	-0.0	-0.0	-0.0	150
exit_node=PUMPD			525.5	-0.0	1.7	1.7	150

LINK TCSA>CSPUaba gpm=3185.3 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		-0.0		150
fixed_flow=3125			525.3	0.0	-0.0	0.0	150
Gate valve isolation		8.5	525.2	-0.0	-0.0	-0.0	150
90° long radius elbow		16.8	525.2	-0.1	-0.1	-0.0	150
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	150
Straight pipe, len=16.55		16.6	525.0	-0.1	-0.1	-0.0	150
exit_node=CSPUMPA			525.0	-0.0	1.6	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3185.3 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.2		0.8		150
fixed_flow=3125			527.2	0.0	0.8	0.0	150
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	150
90° long radius elbow		16.8	527.1	-0.1	0.8	-0.0	150
45° long radius elbow		10.8	527.1	-0.1	0.7	-0.0	150
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	150
exit_node=CSPUMPC			527.0	-0.0	2.4	1.7	150

LINK TCSB>CSPUabc gpm=3185.3 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.5		2.7		150
fixed_flow=3125			527.5	0.0	2.7	0.0	150
Gate valve isolation		8.5	527.5	-0.0	2.6	-0.0	150
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	150
90° long radius elbow		16.8	527.3	-0.1	2.6	-0.0	150
Straight pipe, len=16.55		16.6	527.2	-0.1	2.5	-0.0	150
e[redacted]_node=CSPUMPB			527.2	-0.0	2.5	0.0	150

LINK TCSBD=CSPUM> gpm=3185.3 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		150
fixed_flow=3125			525.6	0.0	1.8	0.0	150
Gate valve isolation		8.5	525.5	-0.0	1.8	-0.0	150
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	150
45° long radius elbow		10.8	525.4	-0.1	1.7	-0.0	150
Straight pipe, len=10.49		10.5	525.3	-0.1	1.7	-0.0	150
exit_node=CSPUMPD			525.3	0.0	1.7	0.0	150

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U2-150, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 64
Largest Corrections in Last Iteration:
Flow = 8.27e-002 gpm
Pressure = -3.51e-005 psig
Tee Loss Coefficient = -7.21e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=3125
 [redacted]e valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 [redacted]ev=528.4, pres=3.55, temp=150
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14487	536.8	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13497	536.8	531.1	-2.4
27	T26	CS	30.0	XS	def	default	14030	536.8	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13539	536.8	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	10193	524.8	524.0	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10193	523.0	522.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11212	523.5	523.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11212	525.7	524.7	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	3185	527.3	527.0	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3185	525.3	525.0	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.6	525.3	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.5	527.2	-0.1

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	525.0	1.6	150	61.2	OK
CSPUMPB	521.3	527.2	2.5	150	61.2	OK
CSPUMPC	521.3	527.0	2.4	150	61.2	OK
CSPUMPD	521.3	525.3	1.7	150	61.2	OK
PUMPA	521.6	524.0	1.0	150	61.2	OK
PUMPB	521.6	523.0	0.6	150	61.2	OK
PUMPC	521.6	522.5	0.4	150	61.2	OK
PUMPD	521.6	524.7	1.3	150	61.2	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14487	CHECK	OPEN
23	T22	1	13497	CHECK	OPEN
27	T26	1	14030	CHECK	OPEN
5	T6	1	13539	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U2-150, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8890	14487	23377	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8092	13497	5404	530.8	531.1	530.9	2.3	2.4	2.4
T26	SCON	5404	14030	19434	530.9	530.6	528.6	2.4	2.3	1.4
T4AC	SDRL	20386	10193	10193	524.2	523.0	524.8	-0.6	-1.1	-0.3
T4BD	SDRL	22425	11212	11212	525.1	523.5	525.7	-0.2	-0.9	0.1
T6	SDLR	8890	13539	4649	530.7	531.0	530.9	2.3	2.4	2.4
TCSAC	SDRL	6371	3185	3185	525.8	525.3	527.3	0.2	-0.0	0.8
TCSBD	SDRL	6371	3185	3185	526.1	525.6	527.5	2.0	1.8	2.7

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U2-150, RHR A/C-10K, B/D-11K, CS A/B/C/D-3125, LIMITING

LINK DETAIL

LINK 1=====T2===> gpm=14487 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		530.2	-6.5	0.8	-2.8	150
exit_node=T2			530.2	0.0	2.1	1.3	150

LINK 23====T22==> gpm=13497 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		531.1	-5.7	1.1	-2.4	150
exit_node=T22			531.1	0.0	2.4	1.3	150

LINK 27====T26==> gpm=14030 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
S[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
[redacted]k valve, flow=14700, dp=2.92	8.51		530.6	-6.1	0.9	-2.6	150
exit_node=T26			530.6	0.0	2.3	1.3	150

LINK 5=====T6===> gpm=13539 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		531.0	-5.7	1.1	-2.4	150
exit_node=T6			531.0	0.0	2.4	1.3	150

LINK T4AC==PUMPA> gpm=10193 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.8		-0.3		150
fixed_flow=10000			524.8	0.0	-0.3	0.0	150
Gate valve isolation		12.8	524.7	-0.1	-0.4	-0.0	150
90° short radius elbow		35.0	524.5	-0.2	-0.5	-0.1	150
90° short radius elbow		35.0	524.3	-0.2	-0.6	-0.1	150
90° short radius elbow		35.0	524.1	-0.2	-0.6	-0.1	150
Straight pipe, len=19.625		19.6	524.0	-0.1	-0.7	-0.0	150
Decreaser, dia=23.24	0.00		524.0	-0.0	-0.7	-0.0	150
exit_node=PUMPA			524.0	-0.0	1.0	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=10193 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.0		-1.1		150
fixed_flow=10000			523.0	0.0	-1.1	0.0	150
Gate valve isolation		12.8	522.9	-0.1	-1.1	-0.0	150
90° short radius elbow		35.0	522.7	-0.2	-1.2	-0.1	150
45° short radius elbow		22.5	522.6	-0.1	-1.3	-0.1	150
Straight pipe, len=11.71		11.7	522.5	-0.1	-1.3	-0.0	150
exit_node=PUMPC			522.5	-0.0	0.4	1.7	150

LINK T4BD==PUMPB> gpm=11212 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.5		-0.9		150
fixed_flow=11000			523.5	0.0	-0.9	0.0	150
Gate valve isolation		12.8	523.5	-0.1	-0.9	-0.0	150
90° short radius elbow		35.0	523.2	-0.2	-1.0	-0.1	150
45° short radius elbow		22.5	523.1	-0.2	-1.1	-0.1	150
Straight pipe, len=11.7		11.7	523.0	-0.1	-1.1	-0.0	150
[redacted]_node=PUMPB			523.0	-0.0	0.6	1.7	150

[redacted] T4BD==PUMPD> gpm=11212 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.7		0.1		150
fixed_flow=11000			525.7	0.0	0.1	0.0	150
Gate valve isolation		12.8	525.6	-0.1	0.0	-0.0	150
90° short radius elbow		35.0	525.4	-0.2	-0.1	-0.1	150
90° short radius elbow		35.0	525.1	-0.2	-0.2	-0.1	150
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	150
Straight pipe, len=26.27		26.3	524.7	-0.2	-0.4	-0.1	150
Decreaser, dia=23.24	0.00		524.7	-0.0	-0.4	-0.0	150
exit_node=PUMPD			524.7	-0.0	1.3	1.7	150

LINK TCSA>CSPUaba gpm=3185.3 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.8		150
fixed_flow=3125			527.3	0.0	0.8	0.0	150
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	150
90° long radius elbow		16.8	527.1	-0.1	0.8	-0.0	150
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	150
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	150
exit_node=CSPUMPC			527.0	-0.0	2.4	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3185.3 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		-0.0		150
fixed_flow=3125			525.3	0.0	-0.0	0.0	150
Gate valve isolation		8.5	525.2	-0.0	-0.0	-0.0	150
90° long radius elbow		16.8	525.2	-0.1	-0.1	-0.0	150
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	150
Straight pipe, len=16.55		16.6	525.0	-0.1	-0.1	-0.0	150
exit_node=CSPUMPA			525.0	-0.0	1.6	1.7	150

LINK TCSB>CSPUabc gpm=3185.3 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		150
fixed_flow=3125			525.6	0.0	1.8	0.0	150
Gate valve isolation		8.5	525.5	-0.0	1.8	-0.0	150
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	150
45° long radius elbow		10.8	525.4	-0.1	1.7	-0.0	150
Straight pipe, len=10.49		10.5	525.3	-0.1	1.7	-0.0	150
[redacted]t_node=CSPUMPD			525.3	-0.0	1.7	-0.0	150

[redacted] TCSBD=CSPUM> gpm=3185.3 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.5		2.7		150
fixed_flow=3125			527.5	0.0	2.7	0.0	150
Gate valve isolation		8.5	527.5	-0.0	2.6	-0.0	150
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	150
90° long radius elbow		16.8	527.3	-0.1	2.6	-0.0	150
Straight pipe, len=16.55		16.6	527.2	-0.1	2.5	-0.0	150
exit_node=CSPUMPB			527.2	0.0	2.5	-0.0	150

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#03.NET: U2-150, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = 4.67e-001 gpm
Pressure = -9.12e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]t=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 [redacted]e valve" isolation
 [redacted]^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=150
```

[redacted]

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted]PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-150, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14642	536.8	530.1	-2.8
23	T22	CS	30.0	XS	def	default	13826	536.8	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14271	536.8	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13884	536.8	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10193	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10193	523.1	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10193	524.5	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10193	526.3	525.4	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	4740	518.0	517.4	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4740	522.4	521.9	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.1	526.8	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.2	524.9	-0.1

EZFLOW: Version 3 QA
site: unspecified
U2[redacted]03.NET: U2-150, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	517.4	-1.7	150	61.2	OK
CSPUMPB	521.3	526.8	2.4	150	61.2	OK
CSPUMPC	521.3	521.9	0.2	150	61.2	OK
CSPUMPD	521.3	524.9	1.5	150	61.2	OK
PUMPA	521.6	524.1	1.0	150	61.2	OK
PUMPB	521.6	524.0	1.0	150	61.2	OK
PUMPC	521.6	522.6	0.4	150	61.2	OK
PUMPD	521.6	525.4	1.6	150	61.2	OK

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-150, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14642	CHECK	OPEN
23	T22	1	13826	CHECK	OPEN
27	T26	1	14271	CHECK	OPEN
5	T6	1	13884	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U2-150, RHR A/B/C/D-10,, CS A/C-4650, B/C-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7659	14642	22301	530.3	530.1	527.5	2.1	2.0	0.9
T22	SDLR	9626	13826	4200	530.3	530.8	530.7	2.1	2.3	2.3
T26	SCON	4200	14271	18471	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20386	10193	10193	524.3	523.1	524.9	-0.5	-1.1	-0.3
T4BD	SDRL	20386	10193	10193	525.7	524.5	526.3	0.0	-0.5	0.3
T6	SDLR	7659	13884	6225	530.5	530.7	530.6	2.2	2.3	2.2
TCSAC	SDRL	9480	4740	4740	519.2	518.0	522.4	-2.6	-3.1	-1.2
TCSBD	SDRL	6371	3185	3185	525.7	525.2	527.1	1.9	1.6	2.5

LINK DETAIL

LINK 1=====T2===> gpm=14642 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.1	-6.7	0.7	-2.8	150
exit_node=T2			530.1	0.0	2.0	1.3	150

LINK 23====T22==> gpm=13826 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.8	-6.0	1.0	-2.5	150
exit_node=T22			530.8	0.0	2.3	1.3	150

LINK 27====T26==> gpm=14271 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
St[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
C[redacted] valve, flow=14700, dp=2.92 .	8.51		530.4	-6.4	0.8	-2.7	150
ex[redacted]_node=T26			530.4	0.0	2.2	1.3	150

LINK 5=====T6===> gpm=13884 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.7	-6.0	1.0	-2.6	150
exit_node=T6			530.7	0.0	2.3	1.3	150

LINK T4AC==PUMPA> gpm=10193 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		150
fixed_flow=10000			524.9	0.0	-0.3	0.0	150
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	150
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	150
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.6	-0.0	150
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.7	-0.0	150
exit_node=PUMPA			524.1	-0.0	1.0	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=10193 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.1		150
fixed_flow=10000			523.1	0.0	-1.1	0.0	150
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	150
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	150
45° short radius elbow		22.5	522.7	-0.1	-1.2	-0.1	150
Straight pipe, len=11.71		11.7	522.6	-0.1	-1.3	-0.0	150
exit_node=PUMPC			522.6	-0.0	0.4	1.7	150

LINK T4BD==PUMPB> gpm=10193 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		150
fixed_flow=10000			524.5	0.0	-0.5	0.0	150
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
45° short radius elbow		22.5	524.1	-0.1	-0.7	-0.1	150
Straight pipe, len=11.7		11.7	524.0	-0.1	-0.7	-0.0	150
e[redacted]node=PUMPB			524.0	-0.0	1.0	1.7	150

LINK T4BD==PUMPD> gpm=10193 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		150
fixed_flow=10000			526.3	0.0	0.3	0.0	150
Gate valve isolation		12.8	526.2	-0.1	0.2	-0.0	150
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	150
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	150
90° short radius elbow		35.0	525.6	-0.2	-0.0	-0.1	150
Straight pipe, len=26.27		26.3	525.4	-0.2	-0.1	-0.1	150
Decreaser, dia=23.24	0.00		525.4	-0.0	-0.1	-0.0	150
exit_node=PUMPD			525.4	-0.0	1.6	1.7	150

LINK TCSA>CSPUaba gpm=4739.8 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.0		-3.1		150
fixed_flow=4650			518.0	0.0	-3.1	0.0	150
Gate valve isolation		8.5	517.9	-0.1	-3.1	-0.0	150
90° long radius elbow		16.8	517.8	-0.2	-3.2	-0.1	150
90° long radius elbow		16.8	517.6	-0.2	-3.3	-0.1	150
Straight pipe, len=16.55		16.6	517.4	-0.2	-3.4	-0.1	150
exit_node=CSPUMPA			517.4	-0.0	-1.7	1.7	150

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#04.NET: U2-150, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = 7.67e-001 gpm
Pressure = 7.59e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LI[redacted]T4AC==PUMPA> "RHR Pump A"
 [redacted]t=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7

NETWORK DETAIL

LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=150

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted]PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

TEE T4BD "T30>PUMPD>PUMPB"
node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
"standard diverging (run_to_lateral)"

TEE T6 "Strainer 204B"
node1=T2, node2=5, node3=11, elev=525.3
"standard diverging (lateral_to_run)"

TEE TCSAC "T14>CSPUMPA>CSPUMPC"
node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
"standard diverging (run_to_lateral)"

TEE TCSBD "T20>CSPUMPB>CSPUMPD"
node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
"standard diverging (run_to_lateral)"

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14669	536.8	530.0	-2.9
23	T22	CS	30.0	XS	def	default	13773	536.8	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14236	536.8	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13944	536.8	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10193	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10193	523.1	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10193	524.5	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10193	526.3	525.4	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	3185	528.4	528.1	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3185	526.4	526.1	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	4740	517.8	517.3	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	4740	522.2	521.5	-0.3

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	526.1	2.0	150	61.2	OK
CSPUMPB	521.3	521.5	0.1	150	61.2	OK
CSPUMPC	521.3	528.1	2.9	150	61.2	OK
CSPUMPD	521.3	517.3	-1.7	150	61.2	OK
PUMPA	521.6	524.1	1.1	150	61.2	OK
PUMPB	521.6	524.0	1.0	150	61.2	OK
PUMPC	521.6	522.6	0.4	150	61.2	OK
PUMPD	521.6	525.4	1.6	150	61.2	OK

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#04.NET: U2-150, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14669	CHECK	OPEN
23	T22	1	13773	CHECK	OPEN
27	T26	1	14236	CHECK	OPEN
5	T6	1	13944	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#04.NET: U2-150, RHR A/B/C/D-10,, CS A/C-3125, B/C-4650, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7428	14669	22097	530.3	530.0	527.5	2.1	2.0	0.9
T22	SDLR	9334	13773	4439	530.4	530.8	530.8	2.2	2.3	2.3
T26	SCON	4439	14236	18676	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20386	10193	10193	524.3	523.1	524.9	-0.5	-1.1	-0.3
T4BD	SDRL	20386	10193	10193	525.7	524.5	526.3	0.0	-0.5	0.3
T6	SDLR	7428	13944	6516	530.4	530.7	530.5	2.2	2.3	2.2
TCSAC	SDRL	6371	3185	3185	526.9	526.4	528.4	0.7	0.5	1.3
TCSBD	SDRL	9480	4740	4740	519.0	517.8	522.2	-1.0	-1.5	0.4

LINK DETAIL

LINK 1=====T2===> gpm=14669 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.0	-6.7	0.7	-2.9	150
exit_node=T2			530.0	0.0	2.0	1.3	150

LINK 23====T22==> gpm=13773 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.8	-5.9	1.0	-2.5	150
exit_node=T22			530.8	0.0	2.3	1.3	150

LINK 27====T26==> gpm=14236 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
S[redacted]aight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.4	-6.3	0.9	-2.7	150
e[redacted]t_node=T26			530.4	0.0	2.2	1.3	150

LINK 5=====T6===> gpm=13944 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.7	-6.1	1.0	-2.6	150
exit_node=T6			530.7	0.0	2.3	1.3	150

LINK T4AC==PUMPA> gpm=10193 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		150
fixed_flow=10000			524.9	0.0	-0.3	0.0	150
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	150
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	150
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.6	-0.0	150
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.6	-0.0	150
exit_node=PUMPA			524.1	-0.0	1.1	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=10193 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.1		150
fixed_flow=10000			523.1	0.0	-1.1	0.0	150
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	150
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	150
45° short radius elbow		22.5	522.7	-0.1	-1.2	-0.1	150
Straight pipe, len=11.71		11.7	522.6	-0.1	-1.3	-0.0	150
exit_node=PUMPC			522.6	-0.0	0.4	1.7	150

LINK T4BD==PUMPB> gpm=10193 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		150
fixed_flow=10000			524.5	0.0	-0.5	0.0	150
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
45° short radius elbow		22.5	524.1	-0.1	-0.7	-0.1	150
Straight pipe, len=11.7		11.7	524.0	-0.1	-0.7	-0.0	150
exit_node=PUMPB			524.0	-0.0	1.0	1.7	150

[redacted] T4BD==PUMPD> gpm=10193 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		150
fixed_flow=10000			526.3	0.0	0.3	0.0	150
Gate valve isolation		12.8	526.2	-0.1	0.2	-0.0	150
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	150
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	150
90° short radius elbow		35.0	525.6	-0.2	-0.0	-0.1	150
Straight pipe, len=26.27		26.3	525.4	-0.2	-0.1	-0.1	150
Decreaser, dia=23.24	0.00		525.4	-0.0	-0.1	-0.0	150
exit_node=PUMPD			525.4	-0.0	1.6	1.7	150

LINK TCSA>CSPUaba gpm=3185.3 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			528.4		1.3		150
fixed_flow=3125			528.4	0.0	1.3	0.0	150
Gate valve isolation		8.5	528.3	-0.0	1.3	-0.0	150
90° long radius elbow		16.8	528.2	-0.1	1.3	-0.0	150
45° long radius elbow		10.8	528.2	-0.1	1.2	-0.0	150
Straight pipe, len=10.57		10.6	528.1	-0.1	1.2	-0.0	150
exit_node=CSPUMPC			528.1	-0.0	2.9	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3185.3 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			526.4		0.5		150
fixed_flow=3125			526.4	0.0	0.5	0.0	150
Gate valve isolation		8.5	526.4	-0.0	0.5	-0.0	150
90° long radius elbow		16.8	526.3	-0.1	0.4	-0.0	150
90° long radius elbow		16.8	526.2	-0.1	0.4	-0.0	150
Straight pipe, len=16.55		16.6	526.1	-0.1	0.3	-0.0	150
exit_node=CSPUMPA			526.1	-0.0	2.0	1.7	150

LINK TCSB>CSPUabc gpm=4739.8 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			517.8		-1.5		150
fixed_flow=4650			517.8	0.0	-1.5	0.0	150
Gate valve isolation		8.5	517.7	-0.1	-1.5	-0.0	150
90° long radius elbow		16.8	517.5	-0.2	-1.6	-0.1	150
45° long radius elbow		10.8	517.4	-0.1	-1.7	-0.1	150
Straight pipe, len=10.49		10.5	517.3	-0.1	-1.7	-0.0	150
exit_node=CSPUMPD			517.3	0.0	-1.7	0.0	150

[redacted] TCSBD=CSPUM> gpm=4739.8 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			522.2		0.4		150
fixed_flow=4650			522.2	0.0	0.4	0.0	150
Gate valve isolation		8.5	522.1	-0.1	0.3	-0.0	150
90° long radius elbow		16.8	521.9	-0.2	0.2	-0.1	150
90° long radius elbow		16.8	521.7	-0.2	0.2	-0.1	150
Straight pipe, len=16.55		16.6	521.5	-0.2	0.1	-0.1	150
exit_node=CSPUMPB			521.5	0.0	0.1	-0.0	150

EZFLOW: Version 3 QA
site: unspecified
U[redacted]001.NET: UNIT 2-177,RHR A/C-6500,B/D-0, CS A/C-3125,B/D-0,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=177 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links w[redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = -5.67e-001 gpm
Pressure = -2.38e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=6500
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=6500
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.71

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.7
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=26.27
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=3125
 [redacted]te valve" isolation
 [redacted]0^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.55

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.49

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=177

NODE 23 "Strainer 204C"
 [redacted]ev=528.4, pres=3.55, temp=177
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=177

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=177

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted] PUMPB "RHR pump b"
 [redacted]ev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T26, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T22, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	5238	536.8	536.0	-0.3
23	T22	CS	30.0	XS	def	default	4722	536.8	536.2	-0.3
27	T26	CS	30.0	XS	def	default	4860	536.8	536.2	-0.3
5	T6	CS	30.0	XS	def	default	4982	536.8	536.1	-0.3
T4AC	PUMPA	CS	24.0	S	def	default	6686	534.5	534.2	-0.1
T4AC	PUMPC	CS	24.0	S	def	default	6686	533.8	533.6	-0.1
T4BD	PUMPB	CS	24.0	S	def	default	0?	535.7	535.7	-0.0
T4BD	PUMPD	CS	24.0	S	def	default	0?	535.7	535.7	-0.0
TCSAC	CSPUMPA	CS	16.0	S	def	default	3215	530.3	530.0	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3215	532.3	532.0	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	0?	535.8	535.8	0.0
TCSBD	CSPUMPD	CS	16.0	S	def	default	0?	535.8	535.8	0.0

EZFLOW: Version 3 QA
[redacted]: unspecified
[redacted]7001.NET: UNIT 2-177,RHR A/C-6500,B/D-0, CS A/C-3125,B/D-0,LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	177	60.6	OK
23	528.4	536.8	3.6	177	60.6	OK
27	528.4	536.8	3.6	177	60.6	OK
5	528.4	536.8	3.6	177	60.6	OK
CSPUMPA	521.3	530.0	3.6	177	60.6	OK
CSPUMPB	521.3	535.8	6.3	70	62.3	OK
CSPUMPC	521.3	532.0	4.5	177	60.6	OK
CSPUMPD	521.3	535.8	6.3	70	62.3	OK
PUMPA	521.6	534.2	5.3	177	60.6	OK
PUMPB	521.6	535.7	6.1	70	62.3	OK
PUMPC	521.6	533.6	5.0	177	60.6	OK
PUMPD	521.6	535.7	6.1	70	62.3	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	5238	CHECK	OPEN
23	T22	1	4722	CHECK	OPEN
27	T26	1	4860	CHECK	OPEN
5	T6	1	4982	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	2409	5238	7647	536.1	536.0	535.7	4.5	4.5	4.4
T22	SDLR	3856	4722	866	536.1	536.2	536.2	4.6	4.6	4.6
T26	SCON	866	4860	5725	536.2	536.2	536.0	4.6	4.6	4.5
T4AC	SDRL	13372	6686	6686	534.3	533.8	534.5	3.7	3.4	3.8
T4BD	SDRL	0	0	0	535.7	535.7	535.7	4.4	4.4	4.4
T6	SDLR	2409	4982	2573	536.1	536.1	536.1	4.5	4.6	4.5
TCSAC	SDRL	6429	3215	3215	530.8	530.3	532.3	2.3	2.1	2.9
TCSBD	SDRL	0	0	0	535.8	535.8	535.8	6.3	6.3	6.3

LINK DETAIL

LINK 1=====T2===> gpm=5237.8 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36 ..	7.77		536.0	-0.8	3.2	-0.3	177
exit_node=T2			536.0	0.0	4.5	1.3	177

LINK 23====T22==> gpm=4721.5 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36 ..	7.77		536.2	-0.6	3.3	-0.3	177
exit_node=T22			536.2	0.0	4.6	1.3	177

LINK 27====T26==> gpm=4859.8 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
[redacted]k valve, flow=5400, dp=0.36 ..	7.77		536.2	-0.7	3.3	-0.3	177
[redacted]_node=T26			536.2	0.0	4.6	1.3	177

LINK 5=====T6===> gpm=4982.1 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36 ..	7.77		536.1	-0.7	3.3	-0.3	177
exit_node=T6			536.1	0.0	4.6	1.3	177

LINK T4AC==PUMPA> gpm=6686.1 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			534.5		3.8		177
fixed_flow=6500			534.5	0.0	3.8	0.0	177
Gate valve isolation		12.8	534.5	-0.0	3.8	-0.0	177
90° short radius elbow		35.0	534.4	-0.1	3.7	-0.0	177
90° short radius elbow		35.0	534.3	-0.1	3.7	-0.0	177
90° short radius elbow		35.0	534.3	-0.1	3.6	-0.0	177
Straight pipe, len=19.625		19.6	534.2	-0.0	3.6	-0.0	177
Decreaser, dia=23.24	0.00		534.2	-0.0	3.6	-0.0	177
exit_node=PUMPA			534.2	0.0	5.3	1.7	177

LINK DETAIL

LINK T4AC==PUMPC> gpm=6686.1 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			533.8		3.4		177
fixed_flow=6500			533.8	0.0	3.4	0.0	177
Gate valve isolation		12.8	533.8	0.0	3.4	0.0	177
90° short radius elbow		35.0	533.8	0.0	3.4	0.0	177
45° short radius elbow		22.5	533.8	0.0	3.4	0.0	177
Straight pipe, len=11.71		11.7	533.8	0.0	3.4	0.0	177
exit_node=PUMPC			533.6	-0.2	5.0	1.6	177

LINK T4BD==PUMPB> gpm=0? RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			535.7		4.4		70
fixed_flow=0			535.7	0.0	4.4	0.0	70
Gate valve isolation		12.8	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
45° short radius elbow		22.5	535.7	0.0	4.4	0.0	70
Straight pipe, len=11.7		11.7	535.7	0.0	4.4	0.0	70
ex[redacted]node=PUMPB			535.7	-0.0	6.1	1.7	70

LINK T4BD==PUMPD> gpm=0? RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			535.7		4.4		70
fixed_flow=0			535.7	0.0	4.4	0.0	70
Gate valve isolation		12.8	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
Straight pipe, len=26.27		26.3	535.7	0.0	4.4	0.0	70
Decreaser, dia=23.24	0.00		535.7	0.0	4.4	0.0	70
exit_node=PUMPD			535.7	-0.0	6.1	1.7	70

LINK TCSA>CSPUaba gpm=3214.5 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			530.3		2.1		177
fixed_flow=3125			530.3	0.0	2.1	0.0	177
Gate valve isolation		8.5	530.2	-0.0	2.1	-0.0	177
90° long radius elbow		16.8	530.1	-0.1	2.0	-0.0	177
90° long radius elbow		16.8	530.0	-0.1	2.0	-0.0	177
Straight pipe, len=16.55		16.6	530.0	-0.1	2.0	-0.0	177
exit_node=CSPUMPA			530.0	0.0	3.6	1.7	177

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3214.5 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			532.3		2.9		177
fixed_flow=3125			532.3	0.0	2.9	0.0	177
Gate valve isolation		8.5	532.2	-0.0	2.9	-0.0	177
90° long radius elbow		16.8	532.1	-0.1	2.9	-0.0	177
45° long radius elbow		10.8	532.1	-0.1	2.9	-0.0	177
Straight pipe, len=10.57		10.6	532.0	-0.1	2.8	-0.0	177
exit_node=CSPUMPC			532.0	0.0	4.5	1.7	177

LINK TCSB>CSPUabc gpm=0? TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			535.8		6.3		70
fixed_flow=0			535.8	0.0	6.3	0.0	70
Gate valve isolation		8.5	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
Straight pipe, len=16.55		16.6	535.8	0.0	6.3	0.0	70
e[redacted]_node=CSPUMPB			535.8	0.0	6.3	0.0	70

LINK TCSBD=CSPUM> gpm=0? TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			535.8		6.3		70
fixed_flow=0			535.8	0.0	6.3	0.0	70
Gate valve isolation		8.5	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
45° long radius elbow		10.8	535.8	0.0	6.3	0.0	70
Straight pipe, len=10.49		10.5	535.8	0.0	6.3	0.0	70
exit_node=CSPUMPD			535.8	0.0	6.3	0.0	70

APPENDIX 2

UNIT 3 EZFLOW CASE OUTPUTS

Date: 07/19/97 (Sat) Time: 0631 1
EZFLOW: Version 3 QA
site: unspecified
U3[redacted]01.NET: U3-95, RHR A/C-11K,B/D-10K, CS A/C-4650,B/D-3125,LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=95 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links wi[redacted]less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = -2.91e+000 gpm
Pressure = -5.84e-004 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=95

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=95
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=95

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=95

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted]PUMPB "RHR pump b"
 [redacted]ev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14980	536.6	529.6	-3.0
23	T22	CS	30.0	XS	def	default	14101	536.6	530.4	-2.7
27	T26	CS	30.0	XS	def	default	14589	536.6	530.0	-2.9
5	T6	CS	30.0	XS	def	default	14169	536.6	530.4	-2.7
T4AC	PUMPA	CS	24.0	S	def	default	11055	523.7	522.8	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11055	521.6	521.1	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10050	524.1	523.6	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10050	525.8	525.0	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4673	522.2	521.7	-0.2
TCSAC	CSPUMPA	CS	16.0	S	def	default	4673	518.0	517.4	-0.3
TCSBD	CSPUMPD	CS	16.0	S	def	default	3141	524.9	524.6	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3141	526.8	526.5	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#001.NET: U3-95, RHR A/C-11K,B/D-10K, CS A/C-4650,B/D-3125,LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.6	3.6	95	62.1	OK
23	528.4	536.6	3.6	95	62.1	OK
27	528.4	536.6	3.6	95	62.1	OK
5	528.4	536.6	3.6	95	62.1	OK
CSPUMPA	521.3	517.4	-1.7	95	62.1	OK
CSPUMPB	521.3	526.5	2.2	95	62.1	OK
CSPUMPC	521.3	521.7	0.2	95	62.1	OK
CSPUMPD	521.3	524.6	1.4	95	62.1	OK
PUMPA	521.6	522.8	0.5	95	62.1	OK
PUMPB	521.6	523.6	0.9	95	62.1	OK
PUMPC	521.6	521.1	-0.2	95	62.1	OK
PUMPD	521.6	525.0	1.5	95	62.1	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14980	CHECK	OPEN
23	T22	1	14101	CHECK	OPEN
27	T26	1	14589	CHECK	OPEN
5	T6	1	14169	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#001.NET: U3-95, RHR A/C-11K,B/D-10K, CS A/C-4650,B/D-3125,LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8131	14980	23111	529.9	529.6	526.8	2.0	1.9	0.7
T22	SDLR	9589	14101	4512	530.0	530.4	530.4	2.0	2.2	2.2
T26	SCON	4512	14589	19101	530.3	530.0	528.1	2.2	2.0	1.2
T4AC	SDRL	22111	11055	11055	523.1	521.6	523.7	-1.1	-1.7	-0.8
T4BD	SDRL	20101	10050	10050	525.3	524.1	525.8	-0.1	-0.7	0.1
T6	SDLR	8131	14169	6039	530.1	530.4	530.2	2.1	2.2	2.1
TCSAC	SDRL	9347	4673	4673	519.1	518.0	522.2	-2.7	-3.1	-1.3
TCSBD	SDRL	6281	3141	3141	525.4	524.9	526.8	1.8	1.5	2.4

LINK DETAIL

LINK 1=====T2===> gpm=14980 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		529.6	-7.0	0.5	-3.0	95
exit_node=T2			529.6	0.0	1.9	1.3	95

LINK 23====T22==> gpm=14101 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.4	-6.2	0.9	-2.7	95
exit_node=T22			530.4	0.0	2.2	1.3	95

LINK 27====T26==> gpm=14589 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
[redacted]k valve, flow=14700, dp=2.92	8.51		530.0	-6.6	0.7	-2.9	95
[redacted]_node=T26			530.0	0.0	2.0	1.3	95

LINK 5=====T6===> gpm=14169 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.4	-6.3	0.8	-2.7	95
exit_node=T6			530.4	0.0	2.2	1.3	95

LINK T4AC==PUMPA> gpm=11055 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.7		-0.8		95
fixed_flow=11000			523.7	0.0	-0.8	0.0	95
Gate valve isolation		12.8	523.7	-0.1	-0.8	-0.0	95
90° short radius elbow		35.0	523.4	-0.2	-0.9	-0.1	95
90° short radius elbow		35.0	523.2	-0.2	-1.0	-0.1	95
90° short radius elbow		35.0	522.9	-0.2	-1.2	-0.1	95
Straight pipe, len=19.625		19.6	522.8	-0.1	-1.2	-0.1	95
Decreaser, dia=23.24	0.00		522.8	-0.0	-1.2	-0.0	95
exit_node=PUMPA			522.8	-0.0	0.5	1.7	95

LINK DETAIL

LINK T4AC==PUMPC> gpm=11055 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			521.6		-1.7		95
fixed_flow=11000			521.6	0.0	-1.7	0.0	95
Gate valve isolation		12.8	521.5	-0.1	-1.7	-0.0	95
90° short radius elbow		35.0	521.3	-0.2	-1.9	-0.1	95
45° short radius elbow		22.5	521.1	-0.2	-1.9	-0.1	95
Straight pipe, len=11.86		11.9	521.1	-0.1	-2.0	-0.0	95
exit_node=PUMPC			521.1	-0.0	-0.2	1.7	95

LINK T4BD==PUMPB> gpm=10050 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.1		-0.7		95
fixed_flow=10000			524.1	0.0	-0.7	0.0	95
Gate valve isolation		12.8	524.0	-0.1	-0.7	-0.0	95
90° short radius elbow		35.0	523.8	-0.2	-0.8	-0.1	95
45° short radius elbow		22.5	523.7	-0.1	-0.8	-0.1	95
Straight pipe, len=11.875		11.9	523.6	-0.1	-0.9	-0.0	95
exit_node=PUMPB			523.6	-0.0	0.9	1.7	95

[redacted] T4BD==PUMPD> gpm=10050 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.8		0.1		95
fixed_flow=10000			525.8	0.0	0.1	0.0	95
Gate valve isolation		12.8	525.7	-0.1	0.1	-0.0	95
90° short radius elbow		35.0	525.5	-0.2	-0.0	-0.1	95
90° short radius elbow		35.0	525.3	-0.2	-0.1	-0.1	95
90° short radius elbow		35.0	525.1	-0.2	-0.2	-0.1	95
Straight pipe, len=22.42		22.4	525.0	-0.1	-0.3	-0.1	95
Decreaser, dia=23.24	0.00		525.0	-0.0	-0.3	-0.0	95
exit_node=PUMPD			525.0	0.0	1.5	1.7	95

LINK TCSA>CSPUaba gpm=4673.4 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.2		-1.3		95
fixed_flow=4650			522.2	0.0	-1.3	0.0	95
Gate valve isolation		8.5	522.1	-0.1	-1.4	-0.0	95
90° long radius elbow		16.8	522.0	-0.2	-1.4	-0.1	95
45° long radius elbow		10.8	521.8	-0.1	-1.5	-0.1	95
Straight pipe, len=10.57		10.6	521.7	-0.1	-1.5	-0.1	95
exit_node=CSPUMPC			521.7	0.0	0.2	1.7	95

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4673.4 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.0		-3.1		95
fixed_flow=4650			518.0	0.0	-3.1	0.0	95
Gate valve isolation		8.5	517.9	-0.1	-3.2	-0.0	95
90° long radius elbow		16.8	517.7	-0.2	-3.3	-0.1	95
90° long radius elbow		16.8	517.5	-0.2	-3.3	-0.1	95
Straight pipe, len=16.41		16.4	517.4	-0.2	-3.4	-0.1	95
exit_node=CSPUMPA			517.4	-0.0	-1.7	1.7	95

LINK TCSB>CSPUabc gpm=3140.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			524.9		1.5		95
fixed_flow=3125			524.9	0.0	1.5	0.0	95
Gate valve isolation		8.5	524.8	-0.0	1.5	-0.0	95
90° long radius elbow		16.8	524.8	-0.1	1.5	-0.0	95
45° long radius elbow		10.8	524.7	-0.1	1.5	-0.0	95
Straight pipe, len=10.56		10.6	524.6	-0.1	1.4	-0.0	95
exit_node=CSPUMPD			524.6	0.0	1.4	0.0	95

LINK TCSBD=CSPUM> gpm=3140.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			526.8		2.4		95
fixed_flow=3125			526.8	0.0	2.4	0.0	95
Gate valve isolation		8.5	526.8	-0.0	2.4	-0.0	95
90° long radius elbow		16.8	526.7	-0.1	2.3	-0.0	95
90° long radius elbow		16.8	526.6	-0.1	2.3	-0.0	95
Straight pipe, len=16.54		16.5	526.5	-0.1	2.2	-0.0	95
exit_node=CSPUMPB			526.5	0.0	2.2	0.0	95

EZFLOW: Version 3 QA
site: unspecified
[redacted]#002.NET: U3-95, RHR A/C-10K,B/D-11K, CS A/C-3125,B/D-4650,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=95 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = 1.41e+000 gpm
Pressure = 1.44e-004 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 [redacted]ed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#002.NET: U3-95, RHR A/C-10K,B/D-11K, CS A/C-3125,B/D-4650,LIMITING

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 [redacted]te valve" isolation
 [redacted]^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=95

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=95
```

NETWORK DETAIL

NODE 27 "Strainer 204D"
elev=528.4, pres=3.55, temp=95

NODE 5 "Strainer 204B"
elev=528.4, pres=3.55, temp=95

NODE CSPUMPA "CS pump a"
elev=521.3

NODE CSPUMPB "CS pump b"
elev=521.3

NODE CSPUMPC "CS pump c"
elev=521.3

NODE CSPUMPD "CS pump d"
elev=521.3

NODE PUMPA "RHR pump a"
elev=521.6

[redacted]PUMPB "RHR pump b"
[redacted]ev=521.6

NODE PUMPC "RHR pump c"
elev=521.6

NODE PUMPD "RHR pump d"
elev=521.6

TEE T2 "Strainer 204A"
node1=T6, node2=1, node3=T36, elev=525.3
"standard converging"

TEE T22 "Strainer 204C"
node1=T20, node2=23, node3=T33, elev=525.3
"standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
node1=T33, node2=27, node3=T30, elev=525.3
"standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
"standard diverging (run_to_lateral)"

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#002.NET: U3-95, RHR A/C-10K,B/D-11K, CS A/C-3125,B/D-4650,LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	15002	536.6	529.6	-3.0
23	T22	CS	30.0	XS	def	default	14055	536.6	530.5	-2.7
27	T26	CS	30.0	XS	def	default	14559	536.6	530.0	-2.9
5	T6	CS	30.0	XS	def	default	14224	536.6	530.3	-2.7
T4AC	PUMPA	CS	24.0	S	def	default	10050	524.3	523.5	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10050	522.6	522.1	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11055	523.1	522.5	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11055	525.2	524.2	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	3141	526.2	525.9	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3141	528.1	527.8	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	4673	522.0	521.3	-0.3
TCSBD	CSPUMPD	CS	16.0	S	def	default	4673	517.7	517.2	-0.2

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#002.NET: U3-95, RHR A/C-10K,B/D-11K, CS A/C-3125,B/D-4650,LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.6	3.6	95	62.1	OK
23	528.4	536.6	3.6	95	62.1	OK
27	528.4	536.6	3.6	95	62.1	OK
5	528.4	536.6	3.6	95	62.1	OK
CSPUMPA	521.3	525.9	2.0	95	62.1	OK
CSPUMPB	521.3	521.3	0.0	95	62.1	OK
CSPUMPC	521.3	527.8	2.8	95	62.1	OK
CSPUMPD	521.3	517.2	-1.8	95	62.1	OK
PUMPA	521.6	523.5	0.8	95	62.1	OK
PUMPB	521.6	522.5	0.4	95	62.1	OK
PUMPC	521.6	522.1	0.2	95	62.1	OK
PUMPD	521.6	524.2	1.1	95	62.1	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	15002	CHECK	OPEN
23	T22	1	14055	CHECK	OPEN
27	T26	1	14559	CHECK	OPEN
5	T6	1	14224	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#002.NET: U3-95, RHR A/C-10K,B/D-11K, CS A/C-3125,B/D-4650,LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7854	15002	22856	529.9	529.6	526.9	2.0	1.9	0.7
T22	SDLR	9258	14055	4797	530.1	530.5	530.4	2.1	2.2	2.2
T26	SCON	4797	14559	19355	530.3	530.0	528.1	2.2	2.0	1.2
T4AC	SDRL	20101	10050	10050	523.8	522.6	524.3	-0.8	-1.3	-0.6
T4BD	SDRL	22111	11055	11055	524.6	523.1	525.2	-0.4	-1.1	-0.2
T6	SDLR	7854	14224	6370	530.0	530.3	530.2	2.0	2.2	2.1
TCSAC	SDRL	6282	3141	3141	526.7	526.2	528.1	0.6	0.4	1.2
TCSBD	SDRL	9347	4673	4673	518.9	517.7	522.0	-1.0	-1.5	0.3

LINK DETAIL

LINK 1=====T2===> gpm=15002 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		529.6	-7.0	0.5	-3.0	95
exit_node=T2			529.6	0.0	1.9	1.3	95

LINK 23====T22==> gpm=14055 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.5	-6.2	0.9	-2.7	95
exit_node=T22			530.5	0.0	2.2	1.3	95

LINK 27====T26==> gpm=14559 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.6		3.6		95
S[redacted]ight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
C[redacted]k valve, flow=14700, dp=2.92	8.51		530.0	-6.6	0.7	-2.8	95
exit_node=T26			530.0	0.0	2.0	1.3	95

LINK 5=====T6===> gpm=14224 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.6		3.6		95
Straight pipe, len=4		4.0	536.6	-0.0	3.5	-0.0	95
Check valve, flow=14700, dp=2.92	8.51		530.3	-6.3	0.8	-2.7	95
exit_node=T6			530.3	0.0	2.2	1.3	95

LINK T4AC==PUMPA> gpm=10050 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.3		-0.6		95
fixed_flow=10000			524.3	0.0	-0.6	0.0	95
Gate valve isolation		12.8	524.2	-0.1	-0.6	-0.0	95
90° short radius elbow		35.0	524.0	-0.2	-0.7	-0.1	95
90° short radius elbow		35.0	523.8	-0.2	-0.8	-0.1	95
90° short radius elbow		35.0	523.6	-0.2	-0.8	-0.1	95
Straight pipe, len=19.625		19.6	523.5	-0.1	-0.9	-0.0	95
Decreaser, dia=23.24	0.00		523.5	-0.0	-0.9	-0.0	95
exit_node=PUMPA			523.5	-0.0	0.8	1.7	95

LINK DETAIL

LINK T4AC==PUMPC> gpm=10050 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.6		-1.3		95
fixed_flow=10000			522.6	0.0	-1.3	0.0	95
Gate valve isolation		12.8	522.5	-0.1	-1.3	-0.0	95
90° short radius elbow		35.0	522.3	-0.2	-1.4	-0.1	95
45° short radius elbow		22.5	522.2	-0.1	-1.5	-0.1	95
Straight pipe, len=11.86		11.9	522.1	-0.1	-1.5	-0.0	95
exit_node=PUMPC			522.1	-0.0	0.2	1.7	95

LINK T4BD==PUMPB> gpm=11055 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.1		-1.1		95
fixed_flow=11000			523.1	0.0	-1.1	0.0	95
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	95
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	95
45° short radius elbow		22.5	522.6	-0.2	-1.3	-0.1	95
Straight pipe, len=11.875		11.9	522.5	-0.1	-1.3	-0.0	95
e[redacted]_node=PUMPB			522.5	-0.0	0.4	1.7	95

[redacted] T4BD==PUMPD> gpm=11055 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.2		-0.2		95
fixed_flow=11000			525.2	0.0	-0.2	0.0	95
Gate valve isolation		12.8	525.1	-0.1	-0.2	-0.0	95
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	95
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	95
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	95
Straight pipe, len=22.42		22.4	524.2	-0.2	-0.6	-0.1	95
Decreaser, dia=23.24	0.00		524.2	-0.0	-0.6	-0.0	95
exit_node=PUMPD			524.2	-0.0	1.1	1.7	95

LINK TCSA>CSPUaba gpm=3140.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			526.2		0.4		95
fixed_flow=3125			526.2	0.0	0.4	0.0	95
Gate valve isolation		8.5	526.1	-0.0	0.3	-0.0	95
90° long radius elbow		16.8	526.0	-0.1	0.3	-0.0	95
90° long radius elbow		16.8	525.9	-0.1	0.3	-0.0	95
Straight pipe, len=16.41		16.4	525.9	-0.1	0.2	-0.0	95
exit_node=CSPUMPA			525.9	-0.0	2.0	1.7	95

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3140.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			528.1		1.2		95
fixed_flow=3125			528.1	0.0	1.2	0.0	95
Gate valve isolation		8.5	528.0	-0.0	1.2	-0.0	95
90° long radius elbow		16.8	527.9	-0.1	1.1	-0.0	95
45° long radius elbow		10.8	527.9	-0.1	1.1	-0.0	95
Straight pipe, len=10.57		10.6	527.8	-0.1	1.1	-0.0	95
exit_node=CSPUMPC			527.8	-0.0	2.8	1.7	95

LINK TCSB>CSPUabc gpm=4673.4 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			522.0		0.3		95
fixed_flow=4650			522.0	0.0	0.3	0.0	95
Gate valve isolation		8.5	521.9	-0.1	0.2	-0.0	95
90° long radius elbow		16.8	521.7	-0.2	0.2	-0.1	95
90° long radius elbow		16.8	521.5	-0.2	0.1	-0.1	95
Straight pipe, len=16.54		16.5	521.3	-0.2	0.0	-0.1	95
e[redacted]_node=CSPUMPB			521.3	-0.0	0.0	-0.0	95

L[redacted] TCSBD=CSPUM> gpm=4673.4 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			517.7		-1.5		95
fixed_flow=4650			517.7	0.0	-1.5	0.0	95
Gate valve isolation		8.5	517.6	-0.1	-1.6	-0.0	95
90° long radius elbow		16.8	517.5	-0.2	-1.7	-0.1	95
45° long radius elbow		10.8	517.3	-0.1	-1.7	-0.1	95
Straight pipe, len=10.56		10.6	517.2	-0.1	-1.8	-0.1	95
exit_node=CSPUMPD			517.2	0.0	-1.8	0.0	95

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U3-140, RHR A/C-11K,B/D-10K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 76
Largest Corrections in Last Iteration:
Flow = -8.96e-002 gpm
Pressure = -9.01e-006 psig
Tee Loss Coefficient = 2.59e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 inlet=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U3-140, RHR A/C-11K,B/D-10K, CS A/B/C/D-3125, LIMITING

NETWORK DETAIL

NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted] PUMPB "RHR pump b"
 [redacted]v=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14453	536.7	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13449	536.7	531.1	-2.4
27	T26	CS	30.0	XS	def	default	13983	536.7	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13499	536.7	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	11178	524.3	523.3	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11178	522.1	521.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10162	524.6	524.1	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10162	526.4	525.6	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	3176	527.3	527.1	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3176	525.3	525.0	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.6	525.4	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.6	527.3	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U3-140, RHR A/C-11K,B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	525.0	1.6	140	61.4	OK
CSPUMPB	521.3	527.3	2.5	140	61.4	OK
CSPUMPC	521.3	527.1	2.5	140	61.4	OK
CSPUMPD	521.3	525.4	1.7	140	61.4	OK
PUMPA	521.6	523.3	0.7	140	61.4	OK
PUMPB	521.6	524.1	1.1	140	61.4	OK
PUMPC	521.6	521.5	-0.0	140	61.4	OK
PUMPD	521.6	525.6	1.7	140	61.4	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14453	CHECK	OPEN
23	T22	1	13449	CHECK	OPEN
27	T26	1	13983	CHECK	OPEN
5	T6	1	13499	CHECK	OPEN

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#01.NET: U3-140, RHR A/C-11K,B/D-10K, CS A/B/C/D-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8919	14453	23372	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8123	13449	5326	530.8	531.1	531.0	2.3	2.5	2.4
T26	SCON	5326	13983	19309	530.9	530.6	528.7	2.4	2.3	1.4
T4AC	SDRL	22357	11178	11178	523.6	522.1	524.3	-0.9	-1.5	-0.6
T4BD	SDRL	20324	10162	10162	525.8	524.6	526.4	0.1	-0.4	0.3
T6	SDLR	8919	13499	4580	530.7	531.0	531.0	2.3	2.4	2.4
TCSAC	SDRL	6351	3176	3176	525.9	525.3	527.3	0.2	0.0	0.9
TCSBD	SDRL	6351	3176	3176	526.1	525.6	527.6	2.1	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14453 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.2	-6.5	0.8	-2.8	140
exit_node=T2			530.2	-0.0	2.1	1.3	140

LINK 23====T22==> gpm=13449 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.1	-5.6	1.1	-2.4	140
exit_node=T22			531.1	-0.0	2.5	1.3	140

LINK 27====T26==> gpm=13983 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
St[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
C[redacted] valve, flow=14700, dp=2.92 .	8.51		530.6	-6.1	0.9	-2.6	140
ex[redacted]_node=T26			530.6	-0.0	2.3	1.3	140

LINK 5=====T6===> gpm=13499 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.0	-5.7	1.1	-2.4	140
exit_node=T6			531.0	-0.0	2.4	1.3	140

LINK T4AC==PUMPA> gpm=11178 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.3		-0.6		140
fixed_flow=11000			524.3	0.0	-0.6	0.0	140
Gate valve isolation		12.8	524.2	-0.1	-0.6	-0.0	140
90° short radius elbow		35.0	523.9	-0.2	-0.7	-0.1	140
90° short radius elbow		35.0	523.7	-0.2	-0.8	-0.1	140
90° short radius elbow		35.0	523.4	-0.2	-0.9	-0.1	140
Straight pipe, len=19.625		19.6	523.3	-0.1	-1.0	-0.1	140
Decreaser, dia=23.24	0.00		523.3	-0.0	-1.0	-0.0	140
exit_node=PUMPA			523.3	0.0	0.7	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=11178 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.1		-1.5		140
fixed_flow=11000			522.1	0.0	-1.5	0.0	140
Gate valve isolation		12.8	522.0	-0.1	-1.5	-0.0	140
90° short radius elbow		35.0	521.8	-0.2	-1.6	-0.1	140
45° short radius elbow		22.5	521.6	-0.2	-1.7	-0.1	140
Straight pipe, len=11.86		11.9	521.5	-0.1	-1.7	-0.0	140
exit_node=PUMPC			521.5	0.0	-0.0	1.7	140

LINK T4BD==PUMPB> gpm=10162 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.6		-0.4		140
fixed_flow=10000			524.6	0.0	-0.4	0.0	140
Gate valve isolation		12.8	524.5	-0.1	-0.5	-0.0	140
90° short radius elbow		35.0	524.3	-0.2	-0.6	-0.1	140
45° short radius elbow		22.5	524.2	-0.1	-0.6	-0.1	140
Straight pipe, len=11.875		11.9	524.1	-0.1	-0.6	-0.0	140
exit_node=PUMPB			524.1	0.0	1.1	1.7	140

[redacted] T4BD==PUMPD> gpm=10162 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.4		0.3		140
fixed_flow=10000			526.4	0.0	0.3	0.0	140
Gate valve isolation		12.8	526.3	-0.1	0.3	-0.0	140
90° short radius elbow		35.0	526.1	-0.2	0.2	-0.1	140
90° short radius elbow		35.0	525.9	-0.2	0.1	-0.1	140
90° short radius elbow		35.0	525.7	-0.2	0.0	-0.1	140
Straight pipe, len=22.42		22.4	525.6	-0.1	-0.0	-0.1	140
Decreaser, dia=23.24	0.00		525.6	-0.0	-0.0	-0.0	140
exit_node=PUMPD			525.6	0.0	1.7	1.7	140

LINK TCSA>CSPUaba gpm=3175.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.9		140
fixed_flow=3125			527.3	0.0	0.9	0.0	140
Gate valve isolation		8.5	527.3	-0.0	0.8	-0.0	140
90° long radius elbow		16.8	527.2	-0.1	0.8	-0.0	140
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	140
Straight pipe, len=10.57		10.6	527.1	-0.1	0.7	-0.0	140
exit_node=CSPUMPC			527.1	0.0	2.5	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3175.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		140
fixed_flow=3125			525.3	0.0	0.0	0.0	140
Gate valve isolation		8.5	525.3	-0.0	0.0	-0.0	140
90° long radius elbow		16.8	525.2	-0.1	-0.0	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	140
Straight pipe, len=16.41		16.4	525.0	-0.1	-0.1	-0.0	140
exit_node=CSPUMPA			525.0	0.0	1.6	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		140
fixed_flow=3125			525.6	0.0	1.8	0.0	140
Gate valve isolation		8.5	525.6	-0.0	1.8	-0.0	140
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	140
45° long radius elbow		10.8	525.4	-0.1	1.8	-0.0	140
Straight pipe, len=10.56		10.6	525.4	-0.1	1.7	-0.0	140
exit_node=CSPUMPD			525.4	-0.0	1.7	0.0	140

[redacted] TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.6		2.7		140
fixed_flow=3125			527.6	0.0	2.7	0.0	140
Gate valve isolation		8.5	527.5	-0.0	2.7	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
Straight pipe, len=16.54		16.5	527.3	-0.1	2.5	-0.0	140
exit_node=CSPUMPB			527.3	0.0	2.5	0.0	140

EZFLOW: Version 3 QA
site: unspecified
U[redacted]0#02.NET: U3-140, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 69
Largest Corrections in Last Iteration:
Flow = -8.62e-002 gpm
Pressure = -8.79e-006 psig
Tee Loss Coefficient = 2.50e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 [redacted]ed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U3-140, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14444	536.7	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13452	536.7	531.1	-2.4
27	T26	CS	30.0	XS	def	default	13991	536.7	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13497	536.7	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	10162	524.8	524.0	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10162	523.0	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11178	523.6	523.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11178	525.7	524.8	-0.4
TCSAC	CSPUMPA	CS	16.0	S	def	default	3176	525.3	525.0	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3176	527.3	527.1	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.6	527.3	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.6	525.4	-0.1

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U3-140, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING
[redacted]---------- TVA AUTHORIZED USE ONLY ----------

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	525.0	1.6	140	61.4	OK
CSPUMPB	521.3	527.3	2.5	140	61.4	OK
CSPUMPC	521.3	527.1	2.5	140	61.4	OK
CSPUMPD	521.3	525.4	1.7	140	61.4	OK
PUMPA	521.6	524.0	1.0	140	61.4	OK
PUMPB	521.6	523.0	0.6	140	61.4	OK
PUMPC	521.6	522.6	0.4	140	61.4	OK
PUMPD	521.6	524.8	1.4	140	61.4	OK

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#02.NET: U3-140, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14444	CHECK	OPEN
23	T22	1	13452	CHECK	OPEN
27	T26	1	13991	CHECK	OPEN
5	T6	1	13497	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8872	14444	23315	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8078	13452	5375	530.8	531.1	531.0	2.3	2.5	2.4
T26	SCON	5375	13991	19366	530.9	530.6	528.7	2.4	2.3	1.4
T4AC	SDRL	20324	10162	10162	524.3	523.0	524.8	-0.6	-1.1	-0.3
T4BD	SDRL	22357	11178	11178	525.1	523.6	525.7	-0.2	-0.9	0.1
T6	SDLR	8872	13497	4625	530.7	531.0	531.0	2.3	2.4	2.4
TCSAC	SDRL	6351	3176	3176	525.9	525.3	527.3	0.2	0.0	0.9
TCSBD	SDRL	6351	3176	3176	526.1	525.6	527.6	2.1	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14444 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.2	-6.5	0.8	-2.8	140
exit_node=T2			530.2	-0.0	2.1	1.3	140

LINK 23====T22==> gpm=13452 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.1	-5.6	1.1	-2.4	140
exit_node=T22			531.1	-0.0	2.5	1.3	140

LINK 27====T26==> gpm=13991 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
S[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.6	-6.1	0.9	-2.6	140
exit_node=T26			530.6	-0.0	2.3	1.3	140

LINK 5=====T6===> gpm=13497 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		531.0	-5.7	1.1	-2.4	140
exit_node=T6			531.0	-0.0	2.4	1.3	140

LINK T4AC==PUMPA> gpm=10162 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.8		-0.3		140
fixed_flow=10000			524.8	0.0	-0.3	0.0	140
Gate valve isolation		12.8	524.7	-0.1	-0.4	-0.0	140
90° short radius elbow		35.0	524.5	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.3	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.1	-0.2	-0.6	-0.1	140
Straight pipe, len=19.625		19.6	524.0	-0.1	-0.7	-0.0	140
Decreaser, dia=23.24	0.00		524.0	-0.0	-0.7	-0.0	140
exit_node=PUMPA			524.0	0.0	1.0	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=10162 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.0		-1.1		140
fixed_flow=10000			523.0	0.0	-1.1	0.0	140
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	140
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	140
45° short radius elbow		22.5	522.6	-0.1	-1.3	-0.1	140
Straight pipe, len=11.86		11.9	522.6	-0.1	-1.3	-0.0	140
exit_node=PUMPC			522.6	0.0	0.4	1.7	140

LINK T4BD==PUMPB> gpm=11178 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.6		-0.9		140
fixed_flow=11000			523.6	0.0	-0.9	0.0	140
Gate valve isolation		12.8	523.5	-0.1	-0.9	-0.0	140
90° short radius elbow		35.0	523.3	-0.2	-1.0	-0.1	140
45° short radius elbow		22.5	523.1	-0.2	-1.1	-0.1	140
Straight pipe, len=11.875		11.9	523.0	-0.1	-1.1	-0.0	140
[redacted]_node=PUMPB			523.0	0.0	0.6	1.7	140

LINK T4BD==PUMPD> gpm=11178 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.7		0.1		140
fixed_flow=11000			525.7	0.0	0.1	0.0	140
Gate valve isolation		12.8	525.7	-0.1	0.0	-0.0	140
90° short radius elbow		35.0	525.4	-0.2	-0.1	-0.1	140
90° short radius elbow		35.0	525.2	-0.2	-0.2	-0.1	140
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	140
Straight pipe, len=22.42		22.4	524.8	-0.2	-0.4	-0.1	140
Decreaser, dia=23.24	0.00		524.8	-0.0	-0.4	-0.0	140
exit_node=PUMPD			524.8	0.0	1.4	1.7	140

LINK TCSA>CSPUaba gpm=3175.7 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		140
fixed_flow=3125			525.3	0.0	0.0	0.0	140
Gate valve isolation		8.5	525.3	-0.0	0.0	-0.0	140
90° long radius elbow		16.8	525.2	-0.1	-0.0	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	140
Straight pipe, len=16.41		16.4	525.0	-0.1	-0.1	-0.0	140
exit_node=CSPUMPA			525.0	0.0	1.6	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3175.7 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.9		140
fixed_flow=3125			527.3	0.0	0.9	0.0	140
Gate valve isolation		8.5	527.3	-0.0	0.8	-0.0	140
90° long radius elbow		16.8	527.2	-0.1	0.8	-0.0	140
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	140
Straight pipe, len=10.57		10.6	527.1	-0.1	0.8	-0.0	140
exit_node=CSPUMPC			527.1	0.0	2.5	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.6		2.7		140
fixed_flow=3125			527.6	0.0	2.7	0.0	140
Gate valve isolation		8.5	527.5	-0.0	2.7	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	140
Straight pipe, len=16.54		16.5	527.3	-0.1	2.5	-0.0	140
e[redacted]_node=CSPUMPB			527.3	-0.0	2.5	0.0	140

LINK TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		140
fixed_flow=3125			525.6	0.0	1.8	0.0	140
Gate valve isolation		8.5	525.6	-0.0	1.8	-0.0	140
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	140
45° long radius elbow		10.8	525.4	-0.1	1.8	-0.0	140
Straight pipe, len=10.56		10.6	525.4	-0.1	1.7	-0.0	140
exit_node=CSPUMPD			525.4	-0.0	1.7	0.0	140

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#03.NET: U3-140, RHR A/B/C/D-10K, CS A/C-4650,B/D-3125,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=140 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links [redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = 4.64e-001 gpm
Pressure = -9.09e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 [redacted]te valve" isolation
 [redacted]^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=140

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=140
```

[redacted]

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=140

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=140

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
[redacted]v=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14599	536.7	530.1	-2.8
23	T22	CS	30.0	XS	def	default	13781	536.7	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14230	536.7	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13841	536.7	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10162	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10162	523.1	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10162	524.5	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10162	526.3	525.5	-0.3
TCSAC	CSPUMPA	CS	16.0	S	def	default	4726	518.2	517.5	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4725	522.5	522.0	-0.2
TCSBD	CSPUMPB	CS	16.0	S	def	default	3176	527.2	526.9	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3176	525.2	525.0	-0.1

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.7	3.6	140	61.4	OK
23	528.4	536.7	3.6	140	61.4	OK
27	528.4	536.7	3.6	140	61.4	OK
5	528.4	536.7	3.6	140	61.4	OK
CSPUMPA	521.3	517.5	-1.6	140	61.4	OK
CSPUMPB	521.3	526.9	2.4	140	61.4	OK
CSPUMPC	521.3	522.0	0.3	140	61.4	OK
CSPUMPD	521.3	525.0	1.6	140	61.4	OK
PUMPA	521.6	524.1	1.1	140	61.4	OK
PUMPB	521.6	524.0	1.0	140	61.4	OK
PUMPC	521.6	522.6	0.4	140	61.4	OK
PUMPD	521.6	525.5	1.7	140	61.4	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14599	CHECK	OPEN
23	T22	1	13781	CHECK	OPEN
27	T26	1	14230	CHECK	OPEN
5	T6	1	13841	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7640	14599	22239	530.4	530.1	527.5	2.2	2.0	0.9
T22	SDLR	9602	13781	4180	530.4	530.8	530.7	2.2	2.3	2.3
T26	SCON	4180	14230	18410	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20324	10162	10162	524.4	523.1	524.9	-0.5	-1.1	-0.3
T4BD	SDRL	20324	10162	10162	525.7	524.5	526.3	0.1	-0.5	0.3
T6	SDLR	7640	13841	6201	530.5	530.7	530.6	2.2	2.3	2.3
TCSAC	SDRL	9451	4726	4725	519.3	518.2	522.5	-2.6	-3.0	-1.2
TCSBD	SDRL	6351	3176	3176	525.7	525.2	527.2	1.9	1.7	2.5

LINK DETAIL

LINK 1=====T2===> gpm=14599 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.1	-6.6	0.7	-2.8	140
exit_node=T2			530.1	-0.0	2.0	1.3	140

LINK 23====T22==> gpm=13781 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.8	-5.9	1.0	-2.5	140
exit_node=T22			530.8	-0.0	2.3	1.3	140

LINK 27====T26==> gpm=14230 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.7		3.6		140
S[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.4	-6.3	0.9	-2.7	140
exit_node=T26			530.4	-0.0	2.2	1.3	140

LINK 5=====T6===> gpm=13841 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.7		3.6		140
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	140
Check valve, flow=14700, dp=2.92 .	8.51		530.7	-6.0	1.0	-2.5	140
exit_node=T6			530.7	-0.0	2.3	1.3	140

LINK T4AC==PUMPA> gpm=10162 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		140
fixed_flow=10000			524.9	0.0	-0.3	0.0	140
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	140
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	140
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.6	-0.0	140
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.6	-0.0	140
exit_node=PUMPA			524.1	0.0	1.1	1.7	140

LINK DETAIL

LINK T4AC==PUMPC> gpm=10162 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.1		140
fixed_flow=10000			523.1	0.0	-1.1	0.0	140
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	140
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	140
45° short radius elbow		22.5	522.7	-0.1	-1.2	-0.1	140
Straight pipe, len=11.86		11.9	522.6	-0.1	-1.3	-0.0	140
exit_node=PUMPC			522.6	0.0	0.4	1.7	140

LINK T4BD==PUMPB> gpm=10162 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		140
fixed_flow=10000			524.5	0.0	-0.5	0.0	140
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	140
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	140
45° short radius elbow		22.5	524.1	-0.1	-0.6	-0.1	140
Straight pipe, len=11.875		11.9	524.0	-0.1	-0.7	-0.0	140
exit_node=PUMPB			524.0	0.0	1.0	1.7	140

LINK T4BD==PUMPD> gpm=10162 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		140
fixed_flow=10000			526.3	0.0	0.3	0.0	140
Gate valve isolation		12.8	526.2	-0.1	0.3	-0.0	140
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	140
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	140
90° short radius elbow		35.0	525.6	-0.2	0.0	-0.1	140
Straight pipe, len=22.42		22.4	525.5	-0.1	-0.1	-0.1	140
Decreaser, dia=23.24	0.00		525.5	-0.0	-0.1	-0.0	140
exit_node=PUMPD			525.5	0.0	1.7	1.7	140

LINK TCSA>CSPUaba gpm=4725.5 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.2		-3.0		140
fixed_flow=4650			518.2	0.0	-3.0	0.0	140
Gate valve isolation		8.5	518.1	-0.1	-3.1	-0.0	140
90° long radius elbow		16.8	517.9	-0.2	-3.2	-0.1	140
90° long radius elbow		16.8	517.7	-0.2	-3.2	-0.1	140
Straight pipe, len=16.41		16.4	517.5	-0.2	-3.3	-0.1	140
exit_node=CSPUMPA			517.5	0.0	-1.6	1.7	140

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4725.4 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.5		-1.2		140
fixed_flow=4650			522.5	0.0	-1.2	0.0	140
Gate valve isolation.....		8.5	522.4	-0.1	-1.2	-0.0	140
90° long radius elbow		16.8	522.2	-0.2	-1.3	-0.1	140
45° long radius elbow		10.8	522.1	-0.1	-1.4	-0.1	140
Straight pipe, len=10.57		10.6	522.0	-0.1	-1.4	-0.0	140
exit_node=CSPUMPC			522.0	0.0	0.3	1.7	140

LINK TCSB>CSPUabc gpm=3175.7 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.2		2.5		140
fixed_flow=3125			527.2	0.0	2.5	0.0	140
Gate valve isolation		8.5	527.1	-0.0	2.5	-0.0	140
90° long radius elbow		16.8	527.0	-0.1	2.4	-0.0	140
90° long radius elbow		16.8	526.9	-0.1	2.4	-0.0	140
Straight pipe, len=16.54		16.5	526.9	-0.1	2.4	-0.0	140
[redacted]_node=CSPUMPB			526.9	0.0	2.4	0.0	140

LINK TCSBD=CSPUM> gpm=3175.7 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.2		1.7		140
fixed_flow=3125			525.2	0.0	1.7	0.0	140
Gate valve isolation		8.5	525.2	-0.0	1.6	-0.0	140
90° long radius elbow		16.8	525.1	-0.1	1.6	-0.0	140
45° long radius elbow		10.8	525.0	-0.1	1.6	-0.0	140
Straight pipe, len=10.56		10.6	525.0	-0.1	1.6	-0.0	140
exit_node=CSPUMPD			525.0	-0.0	1.6	0.0	140

EZFLOW: Version 3 QA
site: unspecified
[redacted]0#01.NET: U3-150, RHR A/C-11K,B/D-10K, CS A/B/C/D-3125, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 71
Largest Corrections in Last Iteration:
Flow = 7.09e-002 gpm
Pressure = -2.96e-005 psig
Tee Loss Coefficient = -7.33e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 [redacted]ixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSAC=CSPUM> "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 [redacted]te valve" isolation
 [redacted]0^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSB>CSPUabc "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

LINK TCSBD=CSPUM> "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 elev=528.4, pres=3.55, temp=150
```

[redacted]

NETWORK DETAIL

NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14496	536.8	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13490	536.8	531.1	-2.4
27	T26	CS	30.0	XS	def	default	14025	536.8	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13540	536.8	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	11212	524.2	523.3	-0.4
T4AC	PUMPC	CS	24.0	S	def	default	11212	522.0	521.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10193	524.5	524.1	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10193	526.3	525.5	-0.3
TCSAC	CSPUMPA	CS	16.0	S	def	default	3185	525.3	525.0	-0.1
TCSAC	CSPUMPC	CS	16.0	S	def	default	3185	527.3	527.0	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.5	527.2	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.6	525.3	-0.1

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	525.0	1.6	150	61.2	OK
CSPUMPB	521.3	527.2	2.5	150	61.2	OK
CSPUMPC	521.3	527.0	2.4	150	61.2	OK
CSPUMPD	521.3	525.3	1.7	150	61.2	OK
PUMPA	521.6	523.3	0.7	150	61.2	OK
PUMPB	521.6	524.1	1.0	150	61.2	OK
PUMPC	521.6	521.5	-0.1	150	61.2	OK
PUMPD	521.6	525.5	1.7	150	61.2	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14496	CHECK	OPEN
23	T22	1	13490	CHECK	OPEN
27	T26	1	14025	CHECK	OPEN
5	T6	1	13540	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8949	14496	23445	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8150	13490	5341	530.8	531.1	531.0	2.3	2.4	2.4
T26	SCON	5341	14025	19366	530.9	530.6	528.6	2.4	2.3	1.4
T4AC	SDRL	22425	11212	11212	523.6	522.0	524.2	-0.9	-1.5	-0.6
T4BD	SDRL	20386	10193	10193	525.8	524.5	526.3	0.1	-0.5	0.3
T6	SDLR	8949	13540	4592	530.6	531.0	530.9	2.3	2.4	2.4
TCSAC	SDRL	6371	3185	3185	525.8	525.3	527.3	0.2	0.0	0.8
TCSBD	SDRL	6371	3185	3185	526.1	525.6	527.5	2.0	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14496 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		530.2	-6.6	0.8	-2.8	150
exit_node=T2			530.2	0.0	2.1	1.3	150

LINK 23====T22==> gpm=13490 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		531.1	-5.7	1.1	-2.4	150
exit_node=T22			531.1	0.0	2.4	1.3	150

LINK 27====T26==> gpm=14025 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
[redacted]k valve, flow=14700, dp=2.92 .	8.51		530.6	-6.1	0.9	-2.6	150
exit_node=T26			530.6	0.0	2.3	1.3	150

LINK 5=====T6===> gpm=13540 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92 .	8.51		531.0	-5.7	1.1	-2.4	150
exit_node=T6			531.0	0.0	2.4	1.3	150

LINK T4AC==PUMPA> gpm=11212 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.2		-0.6		150
fixed_flow=11000			524.2	0.0	-0.6	0.0	150
Gate valve isolation		12.8	524.1	-0.1	-0.6	-0.0	150
90° short radius elbow		35.0	523.9	-0.2	-0.7	-0.1	150
90° short radius elbow		35.0	523.6	-0.2	-0.8	-0.1	150
90° short radius elbow		35.0	523.4	-0.2	-0.9	-0.1	150
Straight pipe, len=19.625		19.6	523.3	-0.1	-1.0	-0.1	150
Decreaser, dia=23.24	0.00		523.3	-0.0	-1.0	-0.0	150
exit_node=PUMPA			523.3	-0.0	0.7	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=11212 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			522.0		-1.5		150
fixed_flow=11000			522.0	0.0	-1.5	0.0	150
Gate valve isolation		12.8	522.0	-0.1	-1.5	-0.0	150
90° short radius elbow		35.0	521.7	-0.2	-1.7	-0.1	150
45° short radius elbow		22.5	521.6	-0.2	-1.7	-0.1	150
Straight pipe, len=11.86		11.9	521.5	-0.1	-1.8	-0.0	150
exit_node=PUMPC			521.5	-0.0	-0.1	1.7	150

LINK T4BD==PUMPB> gpm=10193 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.5		-0.5		150
fixed_flow=10000			524.5	0.0	-0.5	0.0	150
Gate valve isolation		12.8	524.5	-0.1	-0.5	-0.0	150
90° short radius elbow		35.0	524.3	-0.2	-0.6	-0.1	150
45° short radius elbow		22.5	524.1	-0.1	-0.6	-0.1	150
Straight pipe, len=11.875		11.9	524.1	-0.1	-0.7	-0.0	150
[redacted]_node=PUMPB			524.1	-0.0	1.0	1.7	150

LINK T4BD==PUMPD> gpm=10193 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.3		0.3		150
fixed_flow=10000			526.3	0.0	0.3	0.0	150
Gate valve isolation		12.8	526.3	-0.1	0.3	-0.0	150
90° short radius elbow		35.0	526.1	-0.2	0.2	-0.1	150
90° short radius elbow		35.0	525.9	-0.2	0.1	-0.1	150
90° short radius elbow		35.0	525.7	-0.2	0.0	-0.1	150
Straight pipe, len=22.42		22.4	525.5	-0.1	-0.0	-0.1	150
Decreaser, dia=23.24	0.00		525.5	-0.0	-0.0	-0.0	150
exit_node=PUMPD			525.5	-0.0	1.7	1.7	150

LINK TCSA>CSPUaba gpm=3185.3 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		150
fixed_flow=3125			525.3	0.0	0.0	0.0	150
Gate valve isolation		8.5	525.3	-0.0	-0.0	-0.0	150
90° long radius elbow		16.8	525.2	-0.1	-0.1	-0.0	150
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	150
Straight pipe, len=16.41		16.4	525.0	-0.1	-0.1	-0.0	150
exit_node=CSPUMPA			525.0	-0.0	1.6	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3185.3 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.8		150
fixed_flow=3125			527.3	0.0	0.8	0.0	150
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	150
90° long radius elbow		16.8	527.1	-0.1	0.8	-0.0	150
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	150
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	150
exit_node=CSPUMPC			527.0	-0.0	2.4	1.7	150

LINK TCSB>CSPUabc gpm=3185.3 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.5		2.7		150
fixed_flow=3125			527.5	0.0	2.7	0.0	150
Gate valve isolation		8.5	527.5	-0.0	2.6	-0.0	150
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	150
90° long radius elbow		16.8	527.3	-0.1	2.6	-0.0	150
Straight pipe, len=16.54		16.5	527.2	-0.1	2.5	-0.0	150
[redacted]_node=CSPUMPB			527.2	0.0	2.5	0.0	150

LINK TCSBD=CSPUM> gpm=3185.3 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		150
fixed_flow=3125			525.6	0.0	1.8	0.0	150
Gate valve isolation		8.5	525.5	-0.0	1.8	-0.0	150
90° long radius elbow		16.8	525.4	-0.1	1.8	-0.0	150
45° long radius elbow		10.8	525.4	-0.1	1.7	-0.0	150
Straight pipe, len=10.56		10.6	525.3	-0.1	1.7	-0.0	150
exit_node=CSPUMPD			525.3	0.0	1.7	-0.0	150

EZFLOW: Version 3 QA
site: unspecified
[redacted]0#02.NET: U3-150, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING
---------- TVA AUTHORIZED USE ONLY ----------

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links with less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Converged.
Number of Iterations = 64
Largest Corrections in Last Iteration:
Flow = 7.55e-002 gpm
Pressure = -3.73e-005 psig
Tee Loss Coefficient = -7.54e-005

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]et=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=11000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=3125
 [redacted]te valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 [redacted]ev=528.4, pres=3.55, temp=150
```

NETWORK DETAIL

```
NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

NODE PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE  T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE  T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE  T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"
```

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14487	536.8	530.2	-2.8
23	T22	CS	30.0	XS	def	default	13494	536.8	531.1	-2.4
27	T26	CS	30.0	XS	def	default	14033	536.8	530.6	-2.6
5	T6	CS	30.0	XS	def	default	13538	536.8	531.0	-2.4
T4AC	PUMPA	CS	24.0	S	def	default	10193	524.8	524.0	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10193	523.0	522.5	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	11212	523.5	523.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	11212	525.7	524.7	-0.4
TCSAC	CSPUMPC	CS	16.0	S	def	default	3185	527.3	527.0	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3185	525.3	525.0	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.6	525.3	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.5	527.2	-0.1

EZFLOW: Version 3 QA
si[redacted] unspecified
U[redacted]#02.NET: U3-150, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	525.0	1.6	150	61.2	OK
CSPUMPB	521.3	527.2	2.5	150	61.2	OK
CSPUMPC	521.3	527.0	2.4	150	61.2	OK
CSPUMPD	521.3	525.3	1.7	150	61.2	OK
PUMPA	521.6	524.0	1.0	150	61.2	OK
PUMPB	521.6	523.0	0.6	150	61.2	OK
PUMPC	521.6	522.5	0.4	150	61.2	OK
PUMPD	521.6	524.7	1.3	150	61.2	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14487	CHECK	OPEN
23	T22	1	13494	CHECK	OPEN
27	T26	1	14033	CHECK	OPEN
5	T6	1	13538	CHECK	OPEN

EZFLOW: Version 3 QA
s[redacted]: unspecified
U[redacted]0#02.NET: U3-150, RHR A/C-10K,B/D-11K, CS A/B/C/D-3125, LIMITING

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	8901	14487	23388	530.5	530.2	527.4	2.2	2.1	0.9
T22	SDLR	8105	13494	5389	530.8	531.1	531.0	2.3	2.4	2.4
T26	SCON	5389	14033	19423	530.9	530.6	528.6	2.4	2.3	1.4
T4AC	SDRL	20386	10193	10193	524.2	523.0	524.8	-0.6	-1.1	-0.4
T4BD	SDRL	22425	11212	11212	525.0	523.5	525.7	-0.2	-0.9	0.0
T6	SDLR	8901	13538	4637	530.7	531.0	530.9	2.3	2.4	2.4
TCSAC	SDRL	6371	3185	3185	525.8	525.3	527.3	0.2	0.0	0.8
TCSBD	SDRL	6371	3185	3185	526.1	525.6	527.5	2.0	1.8	2.7

LINK DETAIL

LINK 1=====T2===> gpm=14487 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		530.2	-6.5	0.8	-2.8	150
exit_node=T2			530.2	0.0	2.1	1.3	150

LINK 23====T22==> gpm=13494 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		531.1	-5.7	1.1	-2.4	150
exit_node=T22			531.1	0.0	2.4	1.3	150

LINK 27====T26==> gpm=14033 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		150
[redacted]ight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
[redacted]k valve, flow=14700, dp=2.92	8.51		530.6	-6.1	0.9	-2.6	150
exit_node=T26			530.6	0.0	2.3	1.3	150

LINK 5=====T6===> gpm=13538 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		531.0	-5.7	1.1	-2.4	150
exit_node=T6			531.0	0.0	2.4	1.3	150

LINK T4AC==PUMPA> gpm=10193 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.8		-0.4		150
fixed_flow=10000			524.8	0.0	-0.4	0.0	150
Gate valve isolation		12.8	524.7	-0.1	-0.4	-0.0	150
90° short radius elbow		35.0	524.5	-0.2	-0.5	-0.1	150
90° short radius elbow		35.0	524.3	-0.2	-0.6	-0.1	150
90° short radius elbow		35.0	524.1	-0.2	-0.6	-0.1	150
Straight pipe, len=19.625		19.6	524.0	-0.1	-0.7	-0.0	150
Decreaser, dia=23.24	0.00		524.0	-0.0	-0.7	-0.0	150
exit_node=PUMPA			524.0	-0.0	1.0	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=10193 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.0		-1.1		150
fixed_flow=10000			523.0	0.0	-1.1	0.0	150
Gate valve isolation		12.8	522.9	-0.1	-1.1	-0.0	150
90° short radius elbow		35.0	522.7	-0.2	-1.2	-0.1	150
45° short radius elbow		22.5	522.6	-0.1	-1.3	-0.1	150
Straight pipe, len=11.86		11.9	522.5	-0.1	-1.3	-0.0	150
exit_node=PUMPC			522.5	-0.0	0.4	1.7	150

LINK T4BD==PUMPB> gpm=11212 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			523.5		-0.9		150
fixed_flow=11000			523.5	0.0	-0.9	0.0	150
Gate valve isolation		12.8	523.4	-0.1	-0.9	-0.0	150
90° short radius elbow		35.0	523.2	-0.2	-1.0	-0.1	150
45° short radius elbow		22.5	523.0	-0.2	-1.1	-0.1	150
Straight pipe, len=11.875		11.9	523.0	-0.1	-1.1	-0.0	150
[redacted]_node=PUMPB			523.0	-0.0	0.6	1.7	150

LINK T4BD==PUMPD> gpm=11212 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			525.7		0.0		150
fixed_flow=11000			525.7	0.0	0.0	0.0	150
Gate valve isolation		12.8	525.6	-0.1	0.0	-0.0	150
90° short radius elbow		35.0	525.4	-0.2	-0.1	-0.1	150
90° short radius elbow		35.0	525.1	-0.2	-0.2	-0.1	150
90° short radius elbow		35.0	524.9	-0.2	-0.3	-0.1	150
Straight pipe, len=22.42		22.4	524.7	-0.2	-0.4	-0.1	150
Decreaser, dia=23.24	0.00		524.7	-0.0	-0.4	-0.0	150
exit_node=PUMPD			524.7	-0.0	1.3	1.7	150

LINK TCSA>CSPUaba gpm=3185.3 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			527.3		0.8		150
fixed_flow=3125			527.3	0.0	0.8	0.0	150
Gate valve isolation		8.5	527.2	-0.0	0.8	-0.0	150
90° long radius elbow		16.8	527.1	-0.1	0.8	-0.0	150
45° long radius elbow		10.8	527.1	-0.1	0.8	-0.0	150
Straight pipe, len=10.57		10.6	527.0	-0.1	0.7	-0.0	150
exit_node=CSPUMPC			527.0	-0.0	2.4	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3185.3 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			525.3		0.0		150
fixed_flow=3125			525.3	0.0	0.0	0.0	150
Gate valve isolation		8.5	525.3	-0.0	-0.0	-0.0	150
90° long radius elbow		16.8	525.2	-0.1	-0.1	-0.0	150
90° long radius elbow		16.8	525.1	-0.1	-0.1	-0.0	150
Straight pipe, len=16.41		16.4	525.0	-0.1	-0.1	-0.0	150
exit_node=CSPUMPA			525.0	-0.0	1.6	1.7	150

LINK TCSB>CSPUabc gpm=3185.3 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.6		1.8		150
fixed_flow=3125			525.6	0.0	1.8	0.0	150
Gate valve isolation		8.5	525.5	-0.0	1.8	-0.0	150
90° long radius elbow		16.8	525.5	-0.1	1.8	-0.0	150
45° long radius elbow		10.8	525.4	-0.1	1.7	-0.0	150
Straight pipe, len=10.56		10.6	525.3	-0.1	1.7	-0.0	150
[redacted]_node=CSPUMPD			525.3	0.0	1.7	-0.0	150

LINK TCSBD=CSPUM> gpm=3185.3 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.5		2.7		150
fixed_flow=3125			527.5	0.0	2.7	0.0	150
Gate valve isolation		8.5	527.5	-0.0	2.6	-0.0	150
90° long radius elbow		16.8	527.4	-0.1	2.6	-0.0	150
90° long radius elbow		16.8	527.3	-0.1	2.6	-0.0	150
Straight pipe, len=16.54		16.5	527.2	-0.1	2.5	-0.0	150
exit_node=CSPUMPB			527.2	0.0	2.5	0.0	150

EZFLOW: Version 3 QA
s[redacted]: unspecified
U[redacted]0#03.NET: U3-150, RHR A/B/C/D-10K, CS A/C-4650,B/D-3125,LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=150 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links [redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 70
Largest Corrections in Last Iteration:
Flow = -4.58e-001 gpm
Pressure = -8.97e-005 psig
Tee Loss Coefficient = 0.00e+000

EZFLOW: Version 3 QA
[redacted]: unspecified
U[redacted]0#03.NET: U3-150, RHR A/B/C/D-10K, CS A/C-4650,B/D-3125,LIMITING

NETWORK DETAIL

```
LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=14700, dp=2.92

[redacted]K T4AC==PUMPA> "RHR Pump A"
 inlet=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875
```

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=10000
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=4650
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=4650
 [redacted]ate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=150

NODE 23 "Strainer 204C"
 [redacted]lev=528.4, pres=3.55, temp=150
```

NETWORK DETAIL

NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=150

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=150

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

[redacted] PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"

NETWORK DETAIL

TEE T4BD "T30>PUMPD>PUMPB"
node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
"standard diverging (run_to_lateral)"

TEE T6 "Strainer 204B"
node1=T2, node2=5, node3=11, elev=525.3
"standard diverging (lateral_to_run)"

TEE TCSAC "T14>CSPUMPA>CSPUMPC"
node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
"standard diverging (run_to_lateral)"

TEE TCSBD "T20>CSPUMPB>CSPUMPD"
node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
"standard diverging (run_to_lateral)"

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	14643	536.8	530.1	-2.8
23	T22	CS	30.0	XS	def	default	13824	536.8	530.8	-2.5
27	T26	CS	30.0	XS	def	default	14273	536.8	530.4	-2.7
5	T6	CS	30.0	XS	def	default	13883	536.8	530.7	-2.6
T4AC	PUMPA	CS	24.0	S	def	default	10193	524.9	524.1	-0.3
T4AC	PUMPC	CS	24.0	S	def	default	10193	523.1	522.6	-0.2
T4BD	PUMPB	CS	24.0	S	def	default	10193	524.4	524.0	-0.2
T4BD	PUMPD	CS	24.0	S	def	default	10193	526.2	525.4	-0.3
TCSAC	CSPUMPC	CS	16.0	S	def	default	4740	522.4	521.9	-0.2
TCSAC	CSPUMPA	CS	16.0	S	def	default	4740	518.1	517.4	-0.3
TCSBD	CSPUMPD	CS	16.0	S	def	default	3185	525.2	524.9	-0.1
TCSBD	CSPUMPB	CS	16.0	S	def	default	3185	527.1	526.8	-0.1

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	150	61.2	OK
23	528.4	536.8	3.6	150	61.2	OK
27	528.4	536.8	3.6	150	61.2	OK
5	528.4	536.8	3.6	150	61.2	OK
CSPUMPA	521.3	517.4	-1.6	150	61.2	OK
CSPUMPB	521.3	526.8	2.3	150	61.2	OK
CSPUMPC	521.3	521.9	0.3	150	61.2	OK
CSPUMPD	521.3	524.9	1.5	150	61.2	OK
PUMPA	521.6	524.1	1.0	150	61.2	OK
PUMPB	521.6	524.0	1.0	150	61.2	OK
PUMPC	521.6	522.6	0.4	150	61.2	OK
PUMPD	521.6	525.4	1.6	150	61.2	OK

s[redacted]: unspecified
U[redacted]0#03.NET: U3-150, RHR A/B/C/D-10K, CS A/C-4650,B/D-3125,LIMITING

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	14643	CHECK	OPEN
23	T22	1	13824	CHECK	OPEN
27	T26	1	14273	CHECK	OPEN
5	T6	1	13883	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	7665	14643	22308	530.3	530.1	527.5	2.1	2.0	0.9
T22	SDLR	9633	13824	4191	530.3	530.8	530.7	2.1	2.3	2.3
T26	SCON	4191	14273	18464	530.7	530.4	528.6	2.3	2.2	1.4
T4AC	SDRL	20386	10193	10193	524.3	523.1	524.9	-0.6	-1.1	-0.3
T4BD	SDRL	20386	10193	10193	525.7	524.4	526.2	0.0	-0.5	0.3
T6	SDLR	7665	13883	6218	530.5	530.7	530.6	2.2	2.3	2.2
TCSAC	SDRL	9480	4740	4740	519.2	518.1	522.4	-2.6	-3.1	-1.2
TCSBD	SDRL	6371	3185	3185	525.7	525.2	527.1	1.9	1.6	2.5

LINK DETAIL

LINK 1=====T2===> gpm=14643 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		530.1	-6.7	0.7	-2.8	150
exit_node=T2			530.1	0.0	2.0	1.3	150

LINK 23====T22==> gpm=13824 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		530.8	-6.0	1.0	-2.5	150
exit_node=T22			530.8	0.0	2.3	1.3	150

LINK 27====T26==> gpm=14273 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
[redacted]let_node=27			536.8		3.6		150
[redacted]aight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
[redacted]ck valve, flow=14700, dp=2.92	8.51		530.4	-6.4	0.8	-2.7	150
exit_node=T26			530.4	0.0	2.2	1.3	150

LINK 5=====T6===> gpm=13883 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		150
Straight pipe, len=4		4.0	536.7	-0.0	3.5	-0.0	150
Check valve, flow=14700, dp=2.92	8.51		530.7	-6.0	1.0	-2.6	150
exit_node=T6			530.7	0.0	2.3	1.3	150

LINK T4AC==PUMPA> gpm=10193 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			524.9		-0.3		150
fixed_flow=10000			524.9	0.0	-0.3	0.0	150
Gate valve isolation		12.8	524.8	-0.1	-0.3	-0.0	150
90° short radius elbow		35.0	524.6	-0.2	-0.4	-0.1	150
90° short radius elbow		35.0	524.4	-0.2	-0.5	-0.1	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
Straight pipe, len=19.625		19.6	524.1	-0.1	-0.7	-0.0	150
Decreaser, dia=23.24	0.00		524.1	-0.0	-0.7	-0.0	150
exit_node=PUMPA			524.1	-0.0	1.0	1.7	150

LINK DETAIL

LINK T4AC==PUMPC> gpm=10193 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			523.1		-1.1		150
fixed_flow=10000			523.1	0.0	-1.1	0.0	150
Gate valve isolation		12.8	523.0	-0.1	-1.1	-0.0	150
90° short radius elbow		35.0	522.8	-0.2	-1.2	-0.1	150
45° short radius elbow		22.5	522.7	-0.1	-1.3	-0.1	150
Straight pipe, len=11.86		11.9	522.6	-0.1	-1.3	-0.0	150
exit_node=PUMPC			522.6	-0.0	0.4	1.7	150

LINK T4BD==PUMPB> gpm=10193 RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			524.4		-0.5		150
fixed_flow=10000			524.4	0.0	-0.5	0.0	150
Gate valve isolation		12.8	524.4	-0.1	-0.5	-0.0	150
90° short radius elbow		35.0	524.2	-0.2	-0.6	-0.1	150
45° short radius elbow		22.5	524.0	-0.1	-0.7	-0.1	150
Straight pipe, len=11.875		11.9	524.0	-0.1	-0.7	-0.0	150
[redacted]t_node=PUMPB			524.0	-0.0	1.0	1.7	150

LINK T4BD==PUMPD> gpm=10193 RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			526.2		0.3		150
fixed_flow=10000			526.2	0.0	0.3	0.0	150
Gate valve isolation		12.8	526.2	-0.1	0.2	-0.0	150
90° short radius elbow		35.0	526.0	-0.2	0.2	-0.1	150
90° short radius elbow		35.0	525.8	-0.2	0.1	-0.1	150
90° short radius elbow		35.0	525.6	-0.2	-0.0	-0.1	150
Straight pipe, len=22.42		22.4	525.4	-0.1	-0.1	-0.1	150
Decreaser, dia=23.24	0.00		525.4	-0.0	-0.1	-0.0	150
exit_node=PUMPD			525.4	-0.0	1.6	1.7	150

LINK TCSA>CSPUaba gpm=4739.8 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			522.4		-1.2		150
fixed_flow=4650			522.4	0.0	-1.2	0.0	150
Gate valve isolation		8.5	522.3	-0.1	-1.3	-0.0	150
90° long radius elbow		16.8	522.1	-0.2	-1.3	-0.1	150
45° long radius elbow		10.8	522.0	-0.1	-1.4	-0.1	150
Straight pipe, len=10.57		10.6	521.9	-0.1	-1.4	-0.0	150
exit_node=CSPUMPC			521.9	-0.0	0.3	1.7	150

LINK DETAIL

LINK TCSAC=CSPUM> gpm=4739.8 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			518.1		-3.1		150
fixed_flow=4650			518.1	0.0	-3.1	0.0	150
Gate valve isolation		8.5	518.0	-0.1	-3.1	-0.0	150
90° long radius elbow		16.8	517.8	-0.2	-3.2	-0.1	150
90° long radius elbow		16.8	517.6	-0.2	-3.3	-0.1	150
Straight pipe, len=16.41		16.4	517.4	-0.2	-3.3	-0.1	150
exit_node=CSPUMPA			517.4	-0.0	-1.6	1.7	150

LINK TCSB>CSPUabc gpm=3185.3 TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			525.2		1.6		150
fixed_flow=3125			525.2	0.0	1.6	0.0	150
Gate valve isolation		8.5	525.1	-0.0	1.6	-0.0	150
90° long radius elbow		16.8	525.0	-0.1	1.6	-0.0	150
45° long radius elbow		10.8	525.0	-0.1	1.6	-0.0	150
Straight pipe, len=10.56		10.6	524.9	-0.1	1.5	-0.0	150
e[redacted]_node=CSPUMPD			524.9	0.0	1.5	0.0	150

LINK TCSBD=CSPUM> gpm=3185.3 TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			527.1		2.5		150
fixed_flow=3125			527.1	0.0	2.5	0.0	150
Gate valve isolation		8.5	527.1	-0.0	2.5	-0.0	150
90° long radius elbow		16.8	527.0	-0.1	2.4	-0.0	150
90° long radius elbow		16.8	526.9	-0.1	2.4	-0.0	150
Straight pipe, len=16.54		16.5	526.8	-0.1	2.3	-0.0	150
exit_node=CSPUMPB			526.8	0.0	2.3	0.0	150

EZFLOW: Version 3 QA
[redacted]: unspecified
[redacted]#01.NET: U3-177, RHR A/C-6500,B/D-0, CS A/C-3125, B/D-0, LIMITING

	pipe material	roughness	dia.red.
CS	carbon steel	0.0001500	0.00000
CI	cast iron	0.0008500	0.00000
CO	concrete	0.0030000	0.00000
SS	stainless steel ..	0.0000050	0.00000
CU	copper	0.0000050	0.00000
FG	fiberglass	0.0005000	0.00000
PV	PVC	0.0004000	0.00000
CL	cement-lined	0.0020000	0.00000

standard=Steam&Condensate

system contains 58 parts: 29 links, 15 nodes, NO pumps, 14 Tees

reference_temperature=177 at node=1
barometric_pressure=14.7

*** WARNING ***
Links having zero or near zero flow (especially inactive portions of the network and links having check valves) may be mathematically indeterminate. The computed parameters for such links must be considered with caution. All links [redacted] less than 1 gpm flow are indicated with a "?".

*** SOLUTION SUMMARY ***
Solution Status = Maximum convergence achieved.
Number of Iterations = 60
Largest Corrections in Last Iteration:
Flow = -3.84e-001 gpm
Pressure = -1.58e-005 psig
Tee Loss Coefficient = 0.00e+000

NETWORK DETAIL

LINK 1=====T2===> "1>2"
 inlet=1, exit=T2, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 23====T22==> "23>22"
 inlet=23, exit=T22, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 27====T26==> "27>26"
 inlet=27, exit=T26, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

LINK 5=====T6===> "5>6"
 inlet=5, exit=T6, dia=30, sch=XS, mat="carbon steel"
 "Straight pipe", len=4
 "Check valve", flow=5400, dp=0.36

L[redacted] T4AC==PUMPA> "RHR Pump A"
 [redacted]t=T4AC, exit=PUMPA, dia=24, sch=S, mat="carbon steel"
 fixed_flow=6500
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=19.625
 "Decreaser", dia=23.24

LINK T4AC==PUMPC> "RHR Pump C"
 inlet=T4AC, exit=PUMPC, dia=24, sch=S, mat="carbon steel"
 fixed_flow=6500
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.86

LINK T4BD==PUMPB> "RHR Pump B"
 inlet=T4BD, exit=PUMPB, dia=24, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ short radius elbow"
 "45^ short radius elbow"
 "Straight pipe", len=11.875

[redacted]

NETWORK DETAIL

```
LINK T4BD==PUMPD> "RHR Pump D"
 inlet=T4BD, exit=PUMPD, dia=24, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ short radius elbow"
 "90^ short radius elbow"
 "90^ short radius elbow"
 "Straight pipe", len=22.42
 "Decreaser", dia=23.24

LINK TCSA>CSPUaba "CS Pump C"
 inlet=TCSAC, exit=CSPUMPC, dia=16, sch=S, mat="carbon steel"
 fixed_flow=3125
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.57

LINK TCSAC=CSPUM> "CS pump A"
 inlet=TCSAC, exit=CSPUMPA, dia=16, sch=S, mat="carbon steel"
 [redacted]ed_flow=3125
 [redacted]te valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.41

LINK TCSB>CSPUabc "TCSBD>CSPUMPD"
 inlet=TCSBD, exit=CSPUMPD, dia=16, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ long radius elbow"
 "45^ long radius elbow"
 "Straight pipe", len=10.56

LINK TCSBD=CSPUM> "TCSBD>CSPUMPB"
 inlet=TCSBD, exit=CSPUMPB, dia=16, sch=S, mat="carbon steel"
 fixed_flow=0
 "Gate valve" isolation
 "90^ long radius elbow"
 "90^ long radius elbow"
 "Straight pipe", len=16.54

NODE 1 "Strainer 204A"
 elev=528.4, pres=3.55, temp=177

NODE 23 "Strainer 204C"
 [redacted]lev=528.4, pres=3.55, temp=177
```

NETWORK DETAIL

NODE 27 "Strainer 204D"
 elev=528.4, pres=3.55, temp=177

NODE 5 "Strainer 204B"
 elev=528.4, pres=3.55, temp=177

NODE CSPUMPA "CS pump a"
 elev=521.3

NODE CSPUMPB "CS pump b"
 elev=521.3

NODE CSPUMPC "CS pump c"
 elev=521.3

NODE CSPUMPD "CS pump d"
 elev=521.3

NODE PUMPA "RHR pump a"
 elev=521.6

N[redacted]PUMPB "RHR pump b"
 elev=521.6

NODE PUMPC "RHR pump c"
 elev=521.6

NODE PUMPD "RHR pump d"
 elev=521.6

TEE T2 "Strainer 204A"
 node1=T6, node2=1, node3=T36, elev=525.3
 "standard converging"

TEE T22 "Strainer 204C"
 node1=T20, node2=23, node3=T33, elev=525.3
 "standard diverging (lateral_to_run)"

TEE T26 "Strainer 204D"
 node1=T33, node2=27, node3=T30, elev=525.3
 "standard converging"

TEE T4AC "T36>PUMPC>PUMPA"
 node1=T36, node2=PUMPC, node3=PUMPA, elev=525.6
 "standard diverging (run_to_lateral)"

[redacted]

NETWORK DETAIL

```
TEE  T4BD "T30>PUMPD>PUMPB"
 node1=T30, node2=PUMPB, node3=PUMPD, elev=525.6
 "standard diverging (run_to_lateral)"

TEE  T6 "Strainer 204B"
 node1=T2, node2=5, node3=11, elev=525.3
 "standard diverging (lateral_to_run)"

TEE  TCSAC "T14>CSPUMPA>CSPUMPC"
 node1=T14, node2=CSPUMPA, node3=CSPUMPC, elev=525.3
 "standard diverging (run_to_lateral)"

TEE  TCSBD "T20>CSPUMPB>CSPUMPD"
 node1=T20, node2=CSPUMPD, node3=CSPUMPB, elev=521.3
 "standard diverging (run_to_lateral)"
```

SUMMARY OF LINKS

inlet_node	exit_node	mat	dia	sch	red	roughness	gpm	<-Head	Head->	deltaP
1	T2	CS	30.0	XS	def	default	5222	536.8	536.1	-0.3
23	T22	CS	30.0	XS	def	default	4733	536.8	536.2	-0.3
27	T26	CS	30.0	XS	def	default	4874	536.8	536.2	-0.3
5	T6	CS	30.0	XS	def	default	4973	536.8	536.1	-0.3
T4AC	PUMPA	CS	24.0	S	def	default	6686	534.6	534.2	-0.1
T4AC	PUMPC	CS	24.0	S	def	default	6686	533.8	533.6	-0.1
T4BD	PUMPB	CS	24.0	S	def	default	0?	535.7	535.7	-0.0
T4BD	PUMPD	CS	24.0	S	def	default	0?	535.7	535.7	-0.0
TCSAC	CSPUMPC	CS	16.0	S	def	default	3215	532.3	532.0	-0.1
TCSAC	CSPUMPA	CS	16.0	S	def	default	3215	530.3	530.0	-0.1
TCSBD	CSPUMPD	CS	16.0	S	def	default	0?	535.8	535.8	0.0
TCSBD	CSPUMPB	CS	16.0	S	def	default	0?	535.8	535.8	0.0

EZFLOW: Version 3 QA
site: unspecified
U[redacted]#01.NET: U3-177, RHR A/C-6500,B/D-0, CS A/C-3125, B/D-0, LIMITING

SUMMARY OF NODES

node_name	Elev	Head	Pres	Tmp	dens	status
1	528.4	536.8	3.6	177	60.6	OK
23	528.4	536.8	3.6	177	60.6	OK
27	528.4	536.8	3.6	177	60.6	OK
5	528.4	536.8	3.6	177	60.6	OK
CSPUMPA	521.3	530.0	3.7	177	60.6	OK
CSPUMPB	521.3	535.8	6.3	70	62.3	OK
CSPUMPC	521.3	532.0	4.5	177	60.6	OK
CSPUMPD	521.3	535.8	6.3	70	62.3	OK
PUMPA	521.6	534.2	5.3	177	60.6	OK
PUMPB	521.6	535.7	6.1	70	62.3	OK
PUMPC	521.6	533.6	5.0	177	60.6	OK
PUMPD	521.6	535.7	6.1	70	62.3	OK

SUMMARY OF CONTROL VALVES

inlet_node	exit_node	seg	gpm	type	status
1	T2	1	5222	CHECK	OPEN
23	T22	1	4733	CHECK	OPEN
27	T26	1	4874	CHECK	OPEN
5	T6	1	4973	CHECK	OPEN

SUMMARY OF TEES

Tee_name	type	gpm1	gpm2	gpm3	Head1	Head2	Head3	Pres1	Pres2	Pres3
T2	SCON	2341	5222	7563	536.1	536.1	535.8	4.5	4.5	4.4
T22	SDLR	3797	4733	935	536.1	536.2	536.2	4.6	4.6	4.6
T26	SCON	935	4874	5810	536.2	536.2	536.0	4.6	4.6	4.5
T4AC	SDRL	13372	6686	6686	534.3	533.8	534.6	3.7	3.4	3.8
T4BD	SDRL	0	0	0	535.7	535.7	535.7	4.4	4.4	4.4
T6	SDLR	2341	4973	2632	536.1	536.1	536.1	4.5	4.6	4.5
TCSAC	SDRL	6429	3215	3215	530.8	530.3	532.3	2.3	2.1	2.9
TCSBD	SDRL	0	0	0	535.8	535.8	535.8	6.3	6.3	6.3

LINK DETAIL

LINK 1=====T2===> gpm=5221.6 1>2
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=1			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36	7.77		536.1	-0.8	3.2	-0.3	177
exit_node=T2			536.1	0.0	4.5	1.3	177

LINK 23====T22==> gpm=4732.7 23>22
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=23			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36	7.77		536.2	-0.6	3.3	-0.3	177
exit_node=T22			536.2	0.0	4.6	1.3	177

LINK 27====T26==> gpm=4874.3 27>26
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=27			536.8		3.6		177
S[redacted]ight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
[redacted]k valve, flow=5400, dp=0.36	7.77		536.2	-0.7	3.3	-0.3	177
exit_node=T26			536.2	0.0	4.6	1.3	177

LINK 5=====T6===> gpm=4972.5 5>6
Dnom=30, Dact=29, sch=XS, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=5			536.8		3.6		177
Straight pipe, len=4		4.0	536.8	-0.0	3.5	-0.0	177
Check valve, flow=5400, dp=0.36	7.77		536.1	-0.7	3.3	-0.3	177
exit_node=T6			536.1	0.0	4.6	1.3	177

LINK T4AC==PUMPA> gpm=6686.1 RHR Pump A
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			534.6		3.8		177
fixed_flow=6500			534.6	0.0	3.8	0.0	177
Gate valve isolation		12.8	534.5	-0.0	3.8	-0.0	177
90° short radius elbow		35.0	534.4	-0.1	3.7	-0.0	177
90° short radius elbow		35.0	534.3	-0.1	3.7	-0.0	177
90° short radius elbow		35.0	534.3	-0.1	3.6	-0.0	177
Straight pipe, len=19.625		19.6	534.2	-0.0	3.6	-0.0	177
Decreaser, dia=23.24	0.00		534.2	-0.0	3.6	-0.0	177
exit_node=PUMPA			534.2	0.0	5.3	1.7	177

LINK DETAIL

LINK T4AC==PUMPC> gpm=6686.1 RHR Pump C
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4AC			533.8		3.4		177
fixed_flow=6500			533.8	0.0	3.4	0.0	177
Gate valve isolation		12.8	533.8	0.0	3.4	0.0	177
90° short radius elbow		35.0	533.8	0.0	3.4	0.0	177
45° short radius elbow		22.5	533.8	0.0	3.4	0.0	177
Straight pipe, len=11.86		11.9	533.8	0.0	3.4	0.0	177
exit_node=PUMPC			533.6	-0.2	5.0	1.6	177

LINK T4BD==PUMPB> gpm=0? RHR Pump B
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			535.7		4.4		70
fixed_flow=0			535.7	0.0	4.4	0.0	70
Gate valve isolation		12.8	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
45° short radius elbow		22.5	535.7	0.0	4.4	0.0	70
Straight pipe, len=11.875		11.9	535.7	0.0	4.4	0.0	70
[redacted]_node=PUMPB			535.7	-0.0	6.1	1.7	70

LINK T4BD==PUMPD> gpm=0? RHR Pump D
Dnom=24, Dact=23.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=T4BD			535.7		4.4		70
fixed_flow=0			535.7	0.0	4.4	0.0	70
Gate valve isolation		12.8	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
90° short radius elbow		35.0	535.7	0.0	4.4	0.0	70
Straight pipe, len=22.42		22.4	535.7	0.0	4.4	0.0	70
Decreaser, dia=23.24	0.00		535.7	0.0	4.4	0.0	70
exit_node=PUMPD			535.7	-0.0	6.1	1.7	70

LINK TCSA>CSPUaba gpm=3214.5 CS Pump C
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			532.3		2.9		177
fixed_flow=3125			532.3	0.0	2.9	0.0	177
Gate valve isolation		8.5	532.2	-0.0	2.9	-0.0	177
90° long radius elbow		16.8	532.2	-0.1	2.9	-0.0	177
45° long radius elbow		10.8	532.1	-0.1	2.9	-0.0	177
Straight pipe, len=10.57		10.6	532.0	-0.1	2.8	-0.0	177
exit_node=CSPUMPC			532.0	0.0	4.5	1.7	177

LINK DETAIL

LINK TCSAC=CSPUM> gpm=3214.5 CS pump A
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSAC			530.3		2.1		177
fixed_flow=3125			530.3	0.0	2.1	0.0	177
Gate valve isolation		8.5	530.2	-0.0	2.1	-0.0	177
90° long radius elbow		16.8	530.2	-0.1	2.0	-0.0	177
90° long radius elbow		16.8	530.1	-0.1	2.0	-0.0	177
Straight pipe, len=16.41		16.4	530.0	-0.1	2.0	-0.0	177
exit_node=CSPUMPA			530.0	0.0	3.7	1.7	177

LINK TCSB>CSPUabc gpm=0? TCSBD>CSPUMPD
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			535.8		6.3		70
fixed_flow=0			535.8	0.0	6.3	0.0	70
Gate valve isolation		8.5	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
45° long radius elbow		10.8	535.8	0.0	6.3	0.0	70
Straight pipe, len=10.56		10.6	535.8	0.0	6.3	0.0	70
[redacted]_node=CSPUMPD			535.8	0.0	6.3	0.0	70

LINK TCSBD=CSPUM> gpm=0? TCSBD>CSPUMPB
Dnom=16, Dact=15.25, sch=S, mat="carbon steel"

component_name---------->	<--K->	<--L->	<--H->	<-dH->	<--P->	<-dP->	<T>
inlet_node=TCSBD			535.8		6.3		70
fixed_flow=0			535.8	0.0	6.3	0.0	70
Gate valve isolation		8.5	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
90° long radius elbow		16.8	535.8	0.0	6.3	0.0	70
Straight pipe, len=16.54		16.5	535.8	0.0	6.3	0.0	70
exit_node=CSPUMPB			535.8	0.0	6.3	0.0	70

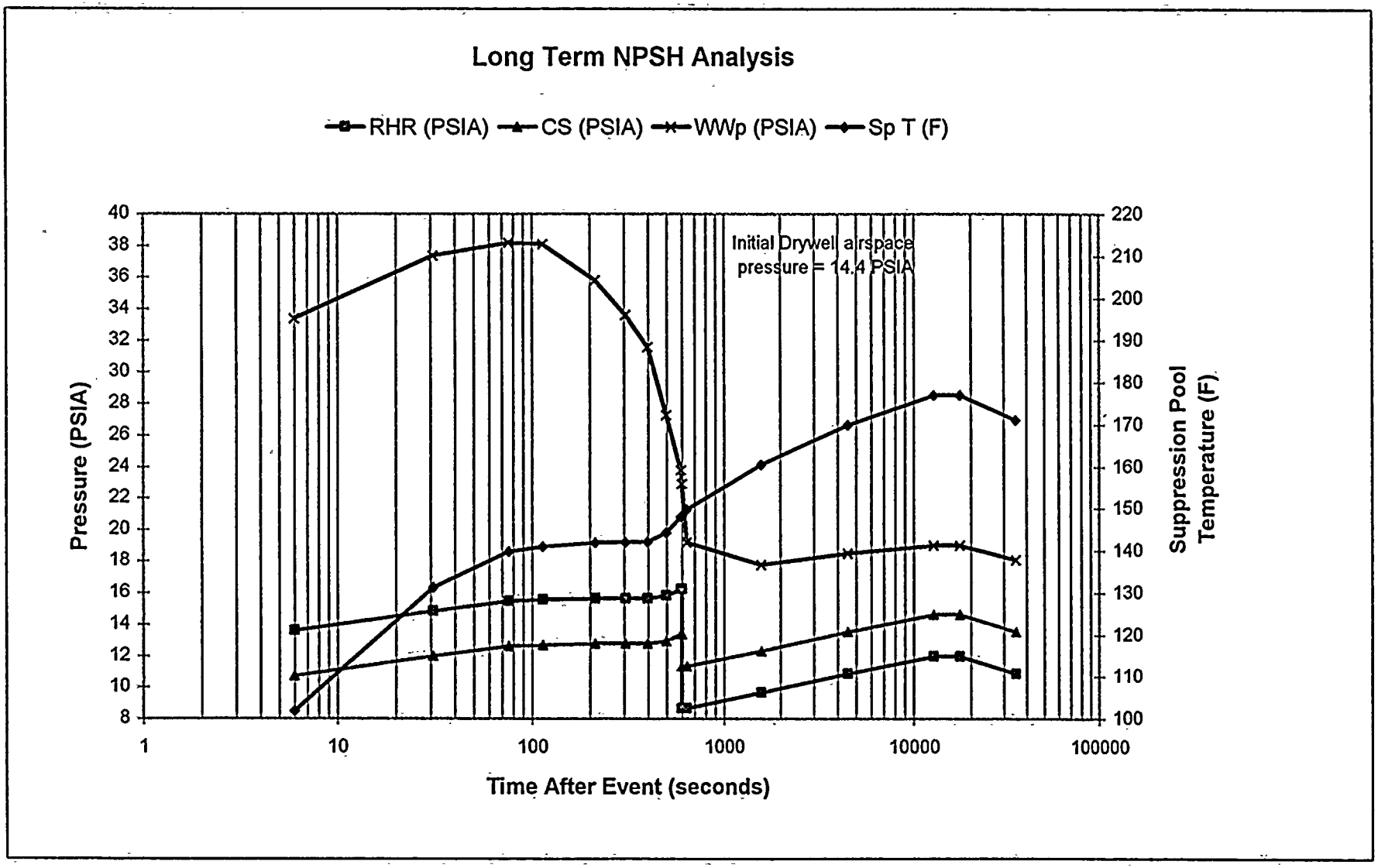
ENCLOSURE 4

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

BROWNS FERRY NUCLEAR PLANT (BFN) - RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATING TO UNITS 2 AND 3 USE OF CONTAINMENT OVERPRESSURE FOR EMERGENCY CORE COOLING SYSTEM (ECCS) PUMP NET POSITIVE SUCTION HEAD (NPSH) ANALYSES

- Graph 1 - Long Term NPSH Analysis starting at T=6 seconds and initial suppression chamber pressure 14.4 pounds per square inch absolute.

- Graph 2 - Long Term NPSH Analysis starting at T=100 seconds.


Long Term NPSH Analysis
RHR (PSIA)
CS (PSIA)
WWp (PSIA)
Sp T (F)
Initial Drywell airspace pressure = 14.4 PSIA
Pressure (PSIA)
Suppression Pool Temperature (F)
Time After Event (seconds)
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
220
210
200
190
180
170
160
150
140
130
120
110
100
1
10
100
1000
10000
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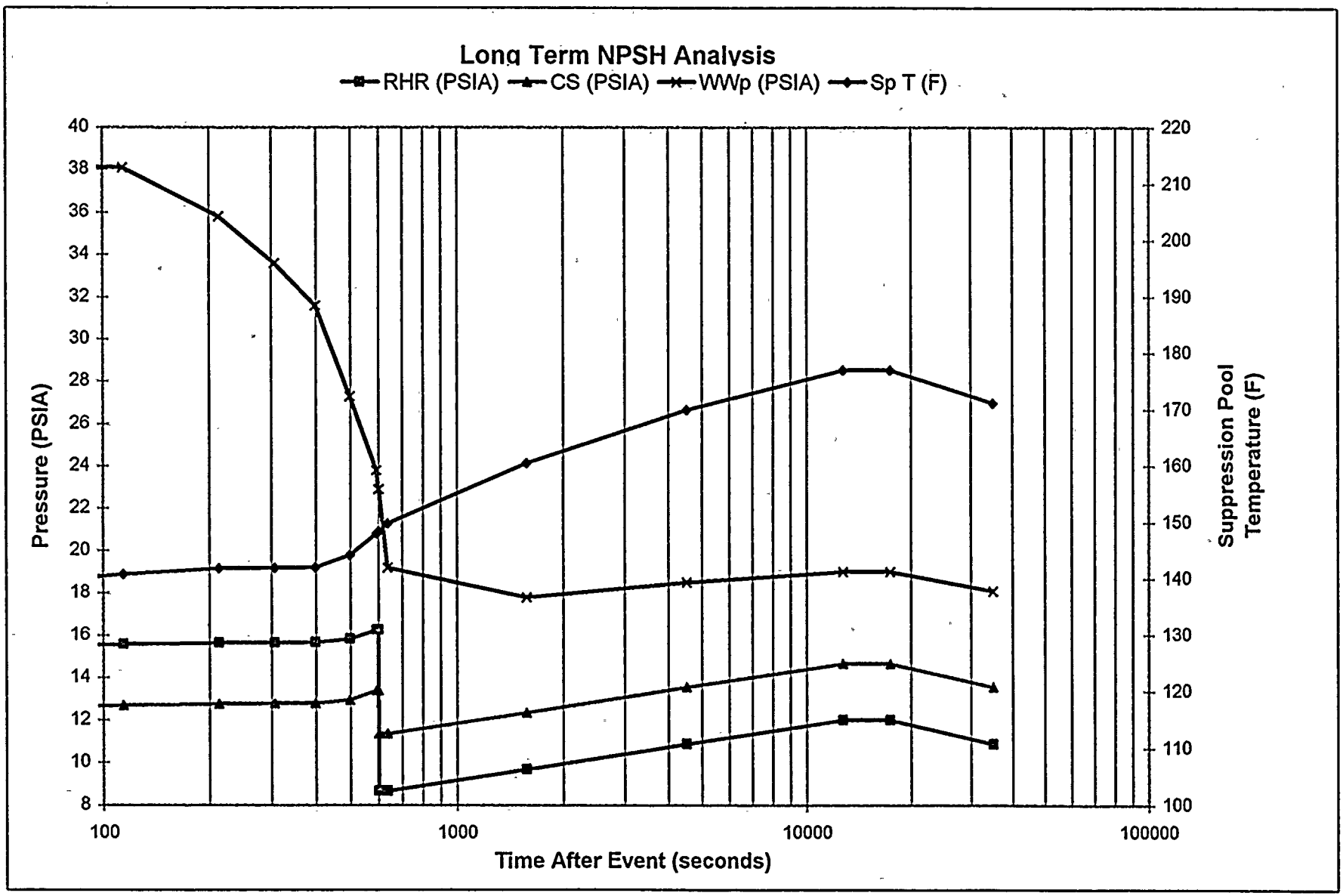
Long Term NPSH Analysis
RHR (PSIA)
CS (PSIA)
WWp (PSIA)
Sp T (F)
Pressure (PSIA)
Suppression Pool Temperature (F)
Time After Event (seconds)
40
38
36
34
32
30
28
26
24
22
20
18
16
14
12
10
8
220
210
200
190
180
170
160
150
140
130
120
110
100
100
1000
10000
100000

ENCLOSURE 5

TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT (BFN)
UNITS 2 AND 3

BROWNS FERRY NUCLEAR PLANT (BFN) - RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION (RAI) RELATING TO UNITS 2 AND 3 USE OF CONTAINMENT OVERPRESSURE FOR EMERGENCY CORE COOLING SYSTEM (ECCS) PUMP NET POSITIVE SUCTION HEAD (NPSH) ANALYSES

- Evaluation of Browns Ferry GE Optimized Stacked Disk Strainers for Increased Containment Coating Debris Source Term (Supplement 1 to ECCS Suction Strainer Hydraulic Sizing Report GENE-E12-00148-01 Revision 0 dated July 1997)

GE Nuclear Energy

General Electric Company
175 Curtner Ave San Jose CA 95125

DRF E12-00164-00

October 8, 1998

Mr. H. Lee Williams
Tennessee Valley Authority
Browns Ferry Nuclear Plant
PO Box 2000
Decatur, Alabama 35609-2000

Subject: Evaluation of Browns Ferry GE Optimized Stacked Disk Strainers for Increased Containment Coating Debris Source Term (Supplement 1 to ECCS Suction Strainer Hydraulic Sizing Report GENE-E12-00148-01 Revision 0 dated July 1997)

References: (1) Browns Ferry ECCS Suction Strainer Hydraulic Sizing Report GENE-E12-00148-01 Revision 0 dated July 1997

(2) Debris Loading Report for Browns Ferry ECCS Pump Suction Strainers GENE-E12-00148-02 dated July 1997

(3) GE Licensing Topical Report, "Application Methodology for GE Stacked Disk ECCS Suction Strainer",NEDC-23721P Revision 1, dated November 1997

(4) CDI Technical Memorandum No. 97-09, "General Electric Company Stacked Disk Strainer Report for Cooper Nuclear Station", dated May 1997

Attachment: (1) Bases for GE calculations to evaluate increased containment coating debris source term for Browns Ferry GE optimized stacked disk strainers

Workscope Summary:

TVA, as a result of inspections performed during the U3C8 Refueling Outage, has determined that the quantity of degraded coatings in the Unit 3 drywell may be greater than the quantity of unqualified/degraded coatings assumed as a basis for the replacement ECCS suction strainers. GE has been requested to supplement the

Browns Ferry ECCS strainer head loss evaluation to justify a significantly larger unqualified/degraded coating debris source term. The TVA goal is to evaluate the maximum allowable unqualified/degraded coating source term, up to a total quantity of 10,000 square feet. The design of the ECCS strainer is not affected by this change (see References 1 and 2).

Results of this GE supplemental evaluation are documented in this letter report.

Results of Evaluation Based on Original Design Methodology

GE has evaluated an increased containment coating debris source term of 10,000 square feet of epoxy paint in accordance with the original Browns Ferry ECCS strainer design methodology (References 1 and 2) as documented in the BWROG Utility Resolution Guidance (URG) for ECCS Strainer Blockage (NEDO-32686). Key assumptions used for these calculations are documented in Attachment 1. In addition, GE has employed the URG position that the strainer head loss will be the higher of reflective metal insulation (RMI) debris or fiber plus other than RMI miscellaneous debris. The NRC SER dated August 20, 1998 requires plant specific confirmation of this assumption based on plant specific strainer designs and debris mixtures. For the original Browns Ferry ECCS strainer design, the quantity of fibrous debris was small (2.94 cubic feet), and it was determined that the strainers would not be completely covered with fiber and miscellaneous debris. Therefore, the fiber head loss was determined to be insignificant. Results of these calculations are as follows:

Existing Browns Ferry Strainer Design Based on RMI Head Loss

TIME	FLOW (gpm)	CLEAN HEAD LOSS (ft)	RMI HEAD LOSS (ft)	TOTAL HEAD LOSS (ft)	ALLOW. HEAD LOSS (ft)	HEAD LOSS MARGIN
0-10 min	13542	1.49	3.80	5.30	5.54	0.24
> 10 min	4722	0.18	0.06	0.24	4.41	4.17

Estimated Head Loss From 10,000 ft² Paint Debris in Addition to the Design Basis Fiber and Other Miscellaneous Debris

TIME	FLOW (gpm)	CLEAN HEAD LOSS (ft)	EPOXY DEBRIS HEAD LOSS (ft)	TOTAL HEAD LOSS (ft)	ALLOW. HEAD LOSS (ft)	HEAD LOSS MARGIN
0-10 min	13542	1.49	2.95	4.44	5.54	1.10
> 10 min	4722	0.18	0.80	0.98	4.41	3.43

Based on the original design methodology the paint debris head loss is less than the RMI head loss for the first 10 minutes and, therefore, the RMI head loss remains as the limiting parameter. After 10 minutes the paint debris head loss is greater than the RMI head loss (0.98 versus 0.24 feet) but the revised higher head loss remains significantly lower than the maximum allowable (4.41 ft.). It is also of interest to note that after 10 minutes, the sum of the RMI and the paint

debris head loss (0.06 + 0.80 + 0.18 = 1.04 ft.) remains well below the maximum allowable head loss. In conclusion, under these assumptions, the Browns Ferry ECCS strainers can process the required 10,000 ft² of containment coating debris in addition to the RMI debris and the other fiber plus miscellaneous debris.

Concern Regarding Assumption That RMI and Increased Paint Debris Head Losses Are Not Additive

GE calculations have shown that the combined bulk volume of fiber debris and the relatively large quantity of containment coating debris is approximately 4.2 cubic feet, and this is a small fraction of the Browns Ferry strainer gap volume (greater than 20 cubic feet). Under these conditions it is likely that a significant fraction of the perforated plate area will remain free of both fibrous and paint debris. Under these conditions the RMI head loss (plus the clean strainer head loss) would be equal to the total strainer head loss (the RMI and paint debris head losses would not be additive). This approach is consistent with the URG for ECCS Strainer Blockage; however, as noted earlier the NRC has suggested plant specific verification of this assumption. The bases for justification of the adequacy of the Browns Ferry ECCS strainer design (considering the increased volume of paint debris) are as follows:

- The high head loss during the first 10 minutes of the LOCA is because of extremely high RHR flow rates. As the head loss increases with increased debris collected on the strainer, the reactor operators would likely reduce the flow rates to maintain an acceptable pump NPSH.

- After 10 minutes the problem disappears when the pump flows are reduced. Significant pump degradation during this short interval is unlikely.

- Results of proprietary testing performed by Duke Engineering for Vermont Yankee demonstrated that turbulent energy in the suppression pool which is sufficient to entrain paint debris will also inhibit debris accumulation on low approach velocity ECCS strainers. At medium LOCA energy levels (reference NUREG-6368), the pool turbulence facilitated preferential deposition of the fiber on the strainer when compared to deposition of paint debris. If this phenomenon is extrapolated further, there is question of whether substantial quantities of RMI debris will ever be collected on low approach velocity strainers since this material (in addition to the paint debris) will settle to the suppression pool floor after pool turbulence subsides (5 to 15 minutes following LOCA initiation pending size of pipe break).

If you have question regarding this report please contact Tom Green at (408) 925-1308 or the undersigned.

Very truly yours,

Kent S. Cole, Product Manager
ECCS Suction Strainers

cc: G Nelson, GE
D Porter, GE
P Nederostek, GE
S Litwin, GE
TA Green, GE

Attachment 1

Bases for GE Calculations to Evaluate Increased Containment Coating Debris Source Term for Browns Ferry GE Optimized Stacked Disk Strainers

1. 10,000 ft² epoxy coating debris weighs 559 lbm. based on TVA provided value of 10 lbm. per 179 ft² epoxy/IOZ debris.

2. Paint debris head loss calculation based on testing of GE prototype strainer (209.3 lbm. tested). [Reference 4]

3. Paint debris head loss is linear with debris bed thickness.

4. Since flow is turbulent across paint debris bed, the head loss is not a function of viscosity or temperature. This assumption also applies to RMI debris and was accepted by the NRC.

5. Paint debris head loss is proportional to the square of the strainer flow rate. This is expected when the flow is turbulent and is applicable also to RMI debris.

6. The Rockwool and other miscellaneous debris (not including the paint debris) blocks 50% of the Browns Ferry strainer perforated plate area (50% of 298 square feet). The fiber quantity is 2.94 cubic feet and the strainer gap volume is greater than 20 cubic feet. Since the strainers load preferentially toward the inner portion of the strainer this assumption is believed to be conservative. The unblocked 149 square feet is then assumed available for processing the relatively large quantity of paint debris.