



CALCULATION COVER SHEET

CALC NO. KJ-C-005

DCP/CCP NO. N/A

SHEET 1 OF 5

CALCULATION

STATUS

☐

PRELIMINARY

☐

COMMITTED

☒

FINAL

☐

SUPERSEDED

☐

VOIDED

DESIGNATION:

CLASSIFICATION:

☒

SAFETY-RELATED

☐

SPECIAL-SCOPE

☐

NONSAFETY-RELATED

COMPUTER

CODE/VERSION:

PS+CAEPIPE Vesion 3.4.05

 SM
 2/16/96

 CALCULATION KJ System Drain Line Flaw Evaluation
 SUBJECT:

DESCRIPTION/REVISION SUMMARY:

This calculation is generated to evaluate the KJ system 3/4" drain line leak Just upstream of valve KJV0786B.

REV.	ORIG/DATE	VERF/DATE	APP/DATE	REL
0	ab. Nelson 1/8/16/96	Ameylonch 2/16/96	James J. Stet 2/16/96	



CALCULATION SHEET

CALC NO. KJ-C-005

REVISION NO. 0

SHEET 2 OF 5

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**CALCULATION SHEET**CALC NO. KJ-C-005REVISION NO. 0

SHEET 3 OF 5

OBJECTIVE:

On August 2, 1996 a six drop per minute Essential Service water (EF) leak was discovered upstream of valve KJV0786B. The leak is on the "B" Emergency Diesel Generator Intercooler Heat Exchanger drain line just below the seal weld where the 3/4" line connects to the heat exchanger outlet end bell (see Ref. 1 through 5).

METHODOLOGY:

Per section C, part 3.a of Generic Letter 90-05 (Ref. 6) the "Through-Wall Flaw" approach is applied in this evaluation.

The piping configuration is such that it does not restraint against the thermal movement. Thus, the piping stresses due to thermal loading are zero.

PIPE MATERIAL:

Pipe with the "Flaw" is a 3/4" Dia. Sch. 80, CS, SA 106 Gr. B (see Ref. 7).

PIPE DESIGN PARAMETERS:

Pipe design pressure is 200 psi and design temperature is 150 deg. F (Ref. 8). For pipe routing and stress calculation see attachment A.

FLAW SIZE:

The length of the flaw was measured using both UT (Attachment B) and RT (Attachment C) examinations. The RT results revealed a material reduction zone approximately 3/8" long or less. Thus, the length of the through-wall flaw is conservatively assumed to be 3/8" long.

ASSUMPTIONS:

The weight of the valve KJV0786B is assumed to be 10 lb. The weight of the pipe cap is conservatively taken as 1 lb.

CALCULATION BODY:

The flaw size satisfy the limits of the Section C part 3.a of the Generic Letter(Ref. 6) for flaw evaluation. Thus, this method is applied here to calculate the required critical stress intensity factor. The calculated factor shall be less than $35 \text{ ksi}(\text{in})^{0.5}$ for ferritic steel. The detail of the calculation is shown in the following page.



CALCULATION SHEET

CALC NO. KJ-C-005

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SHEET 4 OF 5

Pipe Size

3/4" Schedule 80, CS, SA-106, Gr. B

ID = .742-in tnom = .154-in

Mean Radius

$$R = \frac{ID}{2} + \frac{tnom}{2} \quad R = 0.45 \text{ in}$$

Code required minimum thickness

P = 200-psi D = 1.05-in S = 15000-psi E = .8 A = .065-in y = .4

$$t_{min} = \frac{P \cdot D}{2 \cdot (S \cdot E + P \cdot y)} + A$$

ASME SEC III SUB SEC ND-3640-41

Threaded pipe connection (see Ref. 7)

tmin = 0.074-in tmin from equation above governs (see Attachment D for tmin for other load cases)

3/8" width of flaw (see Attachments B&C) - limited to max. of 3" or 15 percent of pipe circumference

$$a = \frac{3}{8} \text{ in}$$

$$\text{Pipe_Circumference} = \pi \cdot (ID + 2 \cdot tnom)$$

$$\text{Pipe_Circumference} = 3.3 \text{ in}$$

$$r = \frac{R}{tmin}$$

$$\text{Pipe_Circumference}_{15} = .15 \cdot \text{Pipe_Circumference}$$

$$\text{Pipe_Circumference}_{15} = 0.49 \text{ in} \quad 15\% \text{ of circumf. } 0.49" > 3/8", \text{ thus method is applicable}$$

$$A = -3.26543 + 1.52784 \cdot r + .072698 \cdot r^2 + .0016011 \cdot r^3$$

$$A = 3.7$$

$$B = 11.36322 - 3.91412 \cdot r + .18619 \cdot r^2 + .004099 \cdot r^3$$

$$B = -6.47$$

$$C = -3.18609 + 3.84763 \cdot r + .18304 \cdot r^2 + .00403 \cdot r^3$$

$$C = 14.35$$

$$c = \frac{a}{\pi \cdot R} \quad c = 0.13$$

$$F = 1 - A \cdot c^{1.5} - B \cdot c^{2.5} - C \cdot c^{3.5}$$

$$F = 1.15$$

$$ksi = 1000 \cdot psi$$

$$s = 3.2 \text{ ksi} \quad \text{Pipe stresses due to Dead wt. + Thermal + SSE (see Attachment A)}$$

$$K = 1.4 \cdot s \cdot F \cdot (\pi \cdot a)^{0.5}$$

$$K = 3.955 \cdot ksi \cdot in^{0.5} < 35 \text{ ksi} \cdot in^{0.5} \text{ OK}$$



CALCULATION SHEET

CALC NO. KJ-C-005

REVISION NO. 0

SHEET 5 OF 5

CONCLUSION:

The calculated critical stress intensity factor is $3.955 \text{ ksi}(\text{in})^{0.5}$ which is less than allowable value, $35 \text{ ksi}(\text{in})^{0.5}$, for ferritic steel. Thus, the structural integrity of the piping with "Flaw" is acceptable.

REFERENCES:

1. Drawing No. M-12KJ04, R06
2. Drawing No. M-018-00099-W10
3. Drawing No. M-018-0196-02
4. Drawing No. M-13EF08(Q), R0
5. Drawing No. RR(I-M-018-KKJ01B(Q) Sheet 2 (Daniel Construction Drawing)
6. Generic Letter No. 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2 and 3 Piping
7. Drawing No. IM018KKJ01B(Q)ECR02, (Daniel Construction Traveler package)
8. Drawing No. MS-01
9. ASME Code 1974 Edition Section III Subsection ND

** DST/PIPESTRESS **

WCGS

Version 3.4.08e IBM-PC Dec. 1994

CALCULATION NUMBER 1000
INTERCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [39]

LOADING CASE NO. 30 COMBINATION ANALYSIS - WT +SSE
PR CASE 1 CASES 20 2METH ABSADD FACT 1.0 1.0
THERMAL FORCES AND MOMENTS MULTIPLIED BY EC/FH

EQUATION 9 OCCASIONAL LOAD - FAULTED

***** STRESSES IN PSI *****

POINT NO.	----- MOMENT STRESSES -----			SIF	ADDTV STRESS LOCAL	L PRES STRESS	TOTAL STRESS	STRESS 2.4 SH
	SUST	OCCAS	THERM					
* ALLOWABLE STRESS 36000. *								
ANCHOR 100								
TANGENT 100	1651.	530.	0.	1.000	2182.	341.	2523.	0.070
110A 110	2229.	711.	0.	1.800	2940.	341.	3281.	0.091
SR ELBOW 110	2229.	711.	0.	1.800	2940.	341.	3281.	0.091
110B 6500	2014.	642.	0.	1.800	2656.	341.	2997.	0.083
TANGENT 6500	2014.	642.	0.	1.800	2656.	341.	2997.	0.083
120	1295.	417.	0.	1.800	1712.	341.	2053.	0.057
VALVE 120								
130								
TANGENT 130	37.	14.	0.	1.800	51.	341.	392.	0.011
140	0.	0.	0.	1.800	0.	341.	341.	0.009

MAX STRESS RATIO = 0.091 AT POINT 110

MAX MOMENT RATIO = 0.082 AT POINT 110

Attachment A

Calc. # KJ-C-005. 1.0

Sheet 1 of 7

Enclosure 2 to ET 96-0065

Attachment A

Calc # NJ-C-005 no

Sheet 2 of 1

IDEN JB-1000 CD=2 GR=-Y IU=1 OU=1 SQ=10 VA=0 AB=T
 PL=?WCGS? EN=?S.MAZUMDER?
 TITL BL=3 SU=1 CV=-1 PR=1 MD=1
 TI=? INTERCOOLER DRAIN LEAK?
 FREQ RF=1 FR=100 MP=33 RP=9 MX=33
 TI=/Modal Extraction/
 LCAS CA=1 TY=0 EQ=7
 TI=/Thermal/
 LCAS CA=2 RF=1 TY=3 EQ=2
 TI=/Operating Weight/
 RCAS CA=20 EV=1 TY=1 EQ=5 FX=1. FY=1. FZ=1.
 TI=/SSE 2% Response/
 CCAS RF=1 CA=30 ME=1 FL=0 EQ=5
 C1=20 F1=1. C2=2 F2=1 TI=/WT +SSE/
 SPEC EV=1 ME=3 RA=9
 TI=/SSE spectrum/
 LV=1

DX=0.0 DY=0.000 DZ=0.000
 DI=X .188/.059 .277/.121 .448/.185
 .661/.259 1.048/.488 2.042/.595 2.457/.553
 3.836/.494 4.259/.889 5.223/1.738 6.152/1.741
 7.33/1.223 8.51/.676 9.105/.659 9.61/.579
 10.145/.568 14.552/.491 21.053/.265 36.881/.187
 DI=Y .173/.034 .250/.063 .464/.146 .667/.229
 .781/.268 .963/.348 1.027/.35 1.682/.548
 2.397/.712 3.132/.866 4.576/.876 7.013/.922
 8.992/.835 14.224/.707 36.309/.217
 DI=Z .168/.060 .277/.131 .676/.318 .992/.393
 1.55/.604 2.275/.594 2.508/.596 3.604/.425
 5.393/1.164 6.561/.78 7.36/.68 8.298/.508
 14.907/.498 23.21/.249 37.035/.192

*-----PROPERTIES

MATH CD=101 EX=1 TY=1. TX=700. KL=1
 MATD TE=70. EH=29.5 EX=5.6 SH=15.
 MATD TE=200. EH=28.8 EX=6.09 SH=15.
 MATD TE=300. EH=28.3 EX=6.43 SH=15.
 MATD TE=400. EH=27.7 EX=6.74 SH=15.
 MATD TE=500. EH=27.3 EX=7.06 SH=15.
 MATD TE=600. EH=26.7 EX=7.28 SH=15.
 MATD TE=700. EH=25.5 EX=7.51 SH=14.3

*-----PIPING

MATL CD=101
 DESN TE=125. PR=200.
 OPER CA=1 TE=125. PR=200.
 CROS OD=1.05 WT=.154 MA=1.6605 SO=1. ST=1. IN=0. KL=1
 ANCH PT=100
 COOR PT=100 AX=0 AY=0 AZ=0
 TANG PT=110 EW=2 DX=0 DY=-.1667 DZ=0 AL=110A
 BRAD PT=6500 EW=2 RA=.09375 AL=110B
 TANG PT=120 EW=2 DX=0 DY=0 DZ=.41667
 VALV PT=130 EW=2 DX=0 DY=0 DZ=.58333 MA=.010 TH=3.
 TANG PT=140 EW=2 DX=0 DY=0 DZ=.16667
 LUMP PT=140 MA=.001

Attachment A

Calc # KJ-C-005, 100

Sheet 3 of 9 ..

-----SUPPORTS

ENDP

++ DST/PIPESTRESS ++

WCGS

Version 3.4.08e IBM-PC Dec. 1994

CALCULATION NUMBER 1000
INTERCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [42]

SUPPORTS SUMMARY

CASE	TITLE
1	Thermal
2	Operating Weight
20	SSE 2% Response
30	WT +SSE

Attachment A

Calc. # KS-C-002, 1/9

Sheet 4 of 9

** DST/PIPESTRESS **

WCGS

Version 3.4.08e IBM-PC Dec. 1994

CALCULATION NUMBER 1000
INTERCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [43]

GLOBAL DISPLACEMENTS
GLOBAL FORCES AND MOMENTS **

ACTION OF ANCHORS, NOZZLES AND CONNECTIONS ON PIPING

NAME	POINT NO.	CASE NO.	FORCES IN LBS				MOMENTS IN FT-LBS				DISPLACEMENTS IN INCHES			
			FX	FY	FZ	RES.	MX	MY	MZ	RES.	DEL.X	DEL.Y	DEL.Z	RES.
ANCHOR	100	1	0.	0.	0.	0.	0.	0.	0.	0.	0.00	0.00	0.00	0.00
		2	0.	12.	0.	12.	-12.	0.	0.	12.	0.00	0.00	0.00	0.00
		20	2.	3.	2.	4.	3.	2.	0.	4.	0.00	0.00	0.00	0.00
		30	2.	15.	2.	16.	15.	2.	0.	15.	0.00	0.00	0.00	0.00

Attachment A

Calc. # KJ-C-005, 1/90

Sheet 5 of 9

Enclosure 2 to ET 96-0065

++ DST/PIPESTRESS ++

WCGS

Version 3.4.08e IBM-PC Dec. 1994

CALCULATION NUMBER 1000
INTERCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [44]

GLOBAL DISPLACEMENTS
LOCAL FORCES AND MOMENTS **

ACTION OF ANCHORS, NOZZLES AND CONNECTIONS ON PIPING

NAME	POINT	CASE	FORCES IN LBS			MOMENTS IN FT-LBS			DISPLACEMENTS IN INCHES					
			NO.	SHEAR 1	SHEAR 2	AXIAL	RES.	BEND.1	BEND.2	TORSION	RES.	DEL. X	DEL. Y	DEL. Z
RES.			(X)	(Y)	(Z)	(X)	(Y)	(Z)						
100		1	0.	0.	0.	0.	0.	0.	0.	0.00	0.00	0.00	0.00ANCHOR	
		2	0.	0.	-12.	12.	-12.	0.	0.	12.	0.00	0.00	0.00	0.00
	20	2.	2.	3.	4.	3.	0.	2.	4.	0.00	0.00	0.00	0.00	
	30	2.	2.	15.	16.	15.	0.	2.	15.	0.00	0.00	0.00	0.00	

Attachment A

Calc. # KJ-C-005, 1/0

Sheet 6 of 9

Enclosure 2 to ET 96-0065

CALCULATION NUMBER 1000
INTERCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [45]

CONTENTS

CASE	PAGE NO.	
1	7	LOAD CASE
2	12	LOAD CASE
20	17	RESPONSE CASE
30	21	COMBINATION CASE
	26	SUPPORTS SUMMARY

Attachment A

Calc. # KJ-C-005, R/o

Sheet 7 of 9

CALCULATION NUMBER 1000
INTJRCOOLER DRAIN LEAK

CODE SECTION III CLASS 2 ASME-1974 REV S76 S.MAZUMDER

08/14/96 08:57:40 [46]

TIMING INFORMATION

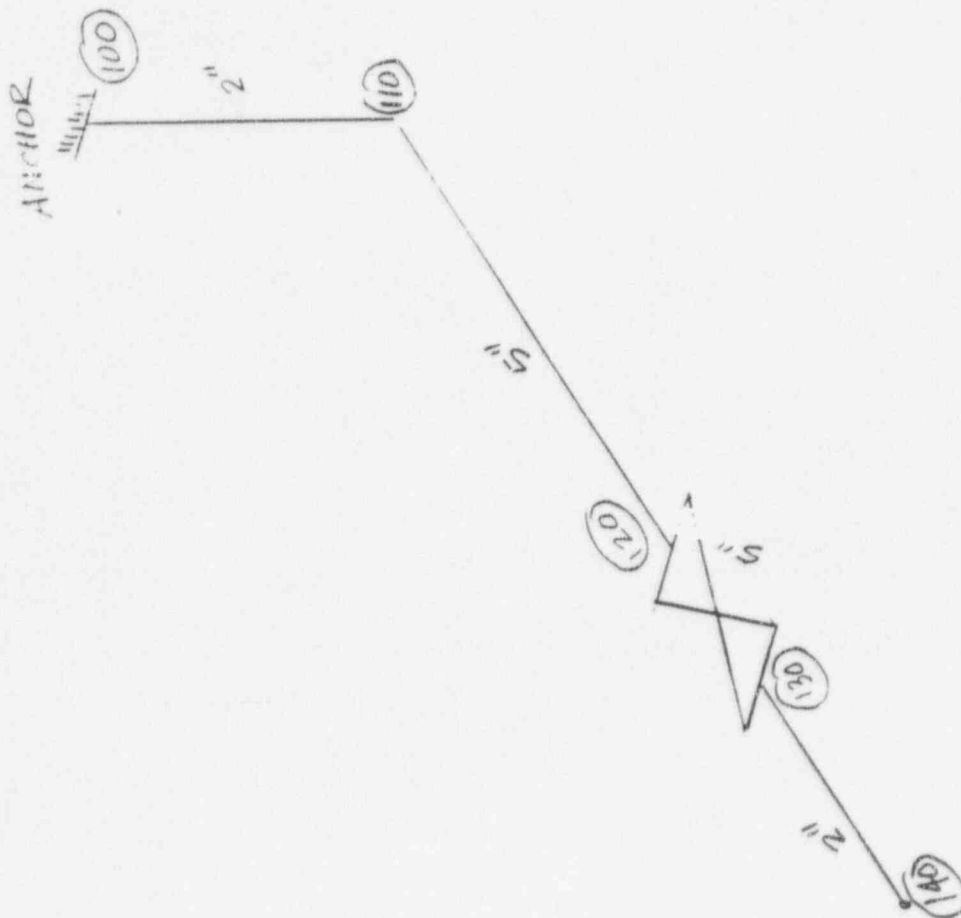
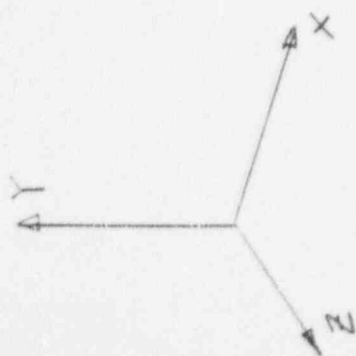
Job step	Seconds	
FREQUENCY ANALYSIS =	49.6	3 Modes
INPUT VALIDATIONS =	32.7	
PRINT PROBLEM DATA =	8.8	
FORMULATE EQUATIONS =	38.8	
STATIC ANALYSIS =	32.6	2 Cases
MODAL LOF ANALYSIS =	10.9	6 Cases
RESPONSE ANALYSIS =	18.4	1 Case
LOAD COMBINATIONS =	21.2	1 Case
RESUME =	5.2	
TOTAL FOR PROBLEM =	218.2	

NMPTS = 6	MODES = 3	NONZRO = 78
NJCT = 2	NMEM = 5	NF9 = 24

Attachment A

Calc # KJ-C-005, L.O.

Sheet 8 of 9



MATH MODEL.

ATTACHMENT 'A'

CALC.# KJ-C-005 R/O

SHEET: 90F4



Attachment 3
QCF = KJ-0-105
Sheet 2 of 2
WCNOC
QUALITY CONTROL
SURVEILLANCE REPORT

Page: 1 of 2
Number: 96-32
Date: 8-2-96

ACTIVITY: ULTRASONIC EXAMINATION OF EKJ03B SHELL DRAIN LINE

AREA/DISCIPLINE: "B" DIESEL ROOM 2000' ELEV.

CONTROLLING DOCUMENTS: QCP 20-503 REV. 0

ORGANIZATION RESPONSIBLE: QUALITY CONTROL

RESULT OF SURVEILLANCE:

AT THE REQUEST OF OPERATIONS AN ULTRASONIC THICKNESS EXAMINATION WAS PERFORMED ON THE SHELL DRAIN LINE OF EKJ03B, UPSTREAM OF VALVE KJV0786B, DRAWING M-018-00099 REV. W10.

THICKNESS READINGS WERE RECORDED AT APPROXIMATELY 1/16th INCH INCREMENTS AROUND THE AREA OF THE PIN HOLE LEAK. THICKNESS READING WERE ALSO RECORDED ON THE SHELL, THE WELD-O-LET AND THE COUPLING.

ATTACHED ARE THE RESULTS OF THIS SURVEILLANCE

CC:

INSPECTOR: *[Signature]*

DATE: 8-2-96

QUALITY CONTROL SUPERVISOR: _____

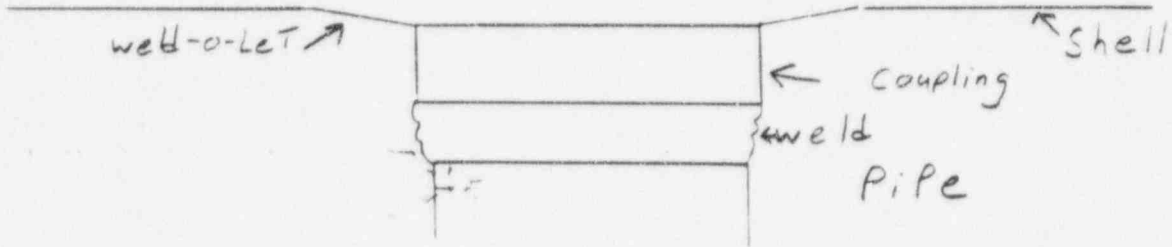
DATE _____

Attachment 3

Calc = KJ-2-005, 7/8

Sheet 2 of 2

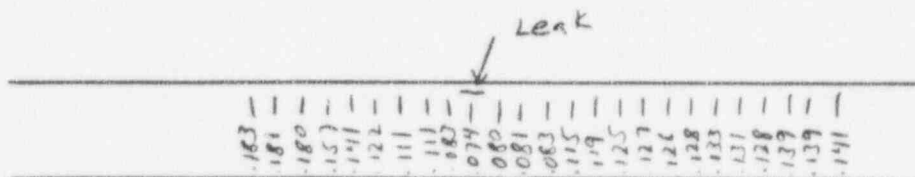
EKJ03B



The Thickness of The shell is .374"

The Thickness of The weld-o-let is .407" thru .420"
with a min. Reading of .329 on The south side
The Thickness of The coupling is .197" thru .220"

Below are The Thickness readings on The Pipe
Reading were Taken at approximately 1/16" increments





WCNOC
RADIOGRAPHY REPORT
FOR COMPONENT WALL THINNING

INFO
ONLY

REPORT NO. - RT: IR-113

DATE 8-5-96

IDENTIFICATION INFORMATION

JOINT/FILM ID: 114242-04 HK 3B WTRBK 11018-00099 KJ
WORK PACKAGE LINE/SPOOL NO. ISO/DWG. NO. SYSTEM

DESCRIPTION: .750" 80 2"
PIPE DIAMETER PIPE SCHEDULE LENGTH EXAMINED

SPECIFICATION: QCP 20-517/0 GENERAL ☒ SIZING ☐
PROCEDURE / REV. NO. TECHNIQUE

TECHNIQUE INFORMATION

SOURCE OF RADIATION: IR-192 34 .010" N/A
TYPE KV/CU SCREEN THK. ENLARGEMENT FACTOR

EX "M" 5"X7" 2/1 17" N/A N/A
FILM TYPE FILM SIZE NO. PER CASSETTE SFD CFD GEOMETRIC UNSHARPNESS

FILM NO./VIEW	MEASUREMENT/LOCATION	IMAGE/DIMENSION	ACTUAL DIMENSION	COMMENTS

SKETCH

AND/OR

REMARKS:

EXPOSURE - FROM NORTH WEST TO SOUTH WEST -

(1) AREA OF INTEREST INCLUDES A PITTING OR BASE MATERIAL REDUCTION APPROX. $\frac{3}{8}$ "

(2) SLIGHT REDUCTION NOTED ON SIDE WALLS

8/5/96
EXAMINER LEVEL / DATE

8/5/96
LEVEL III / DATE

8-8-96
REVIEW / DATE

ACTIVITY No: 1117

Originator: _____

Verifier: _____

Minimum Wall thickness: 0.065 Inches

Pressure
Outside Diameter
Stress intensification factor
Resultant moment due to WT and other sustained loads
Resultant moments due to occasional loads (OBE)
Resultant moments due to occasional loads (SSE)
Resultant moments due to thermal expansion
Allowable stress at design temperature
Allowable stress at room temperature
Allowable stress range for expansion stresses

P=	200	(PSI)
Do=	1.05	(INCHES)
SIF=	2.1	
Ma=	144	(IN-LBS)
Mb=	0.001	(IN-LBS)
Mb=	180	(IN-LBS)
Mc=	0.001	(IN-LBS)
Sh=	15000	(PSI)
Sc=	15000	(PSI)
Sa=	22500	(PSI)

Stress Calculation:

Isometric:

Pipe material: SA-106, Gr. B

ASME B&PV code Equation 8

(ANSI B31.1 Equation 11)

$$1.0Sh = 15000 \text{ (PSI)}$$

$$15000$$

$$tm = 0.022099 \text{ (Inches)}$$

Minimum required wall thickness

ASME B&PV CODE Equation 9 (upset)

(ANSI B31.1 Equation 12, Level B)

$$1.2Sh = 18000 \text{ (PSI)}$$

$$18000$$

$$tm = 0.018245 \text{ (Inches)}$$

Minimum required wall thickness

ASME B&PV CODE Equation 9 (Faulted)

(ANSI B31.1 Equation 12, Level D)

$$1.2Sh = 18000 \text{ (PSI)}$$

$$18000$$

$$tm = 0.039593 \text{ (Inches)}$$

Minimum required wall thickness

ASME B&PV CODE Equation 10

(ANSI B31.1 Equation 13)

$$Sa = 22500 \text{ (PSI)}$$

$$22500$$

$$tm = 1.08E-07 \text{ (Inches)}$$

Minimum required wall thickness

ASME B&PV CODE Equation 11

(ANSI B31.1 Equation 14)

$$Sh + Sa = 37500 \text{ (PSI)}$$

$$37500$$

$$tm = 0.008556 \text{ (Inches)}$$

Minimum required wall thickness

ASME B&PV CODE Equation 3 (Pressure integrity)

(ANSI B31.1 Equation 3)

$$Sh = 15000 \text{ (PSI)}$$

$$tm = 0.006963 \text{ (Inches)}$$

Minimum required wall thickness

Pressure stresses (PSI)	.75 * SIF * Ma	Minimum Section Modulus (Cubic in)
2375.695166	226.8	0.017965346

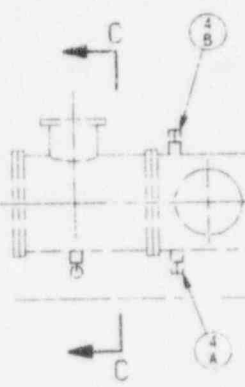
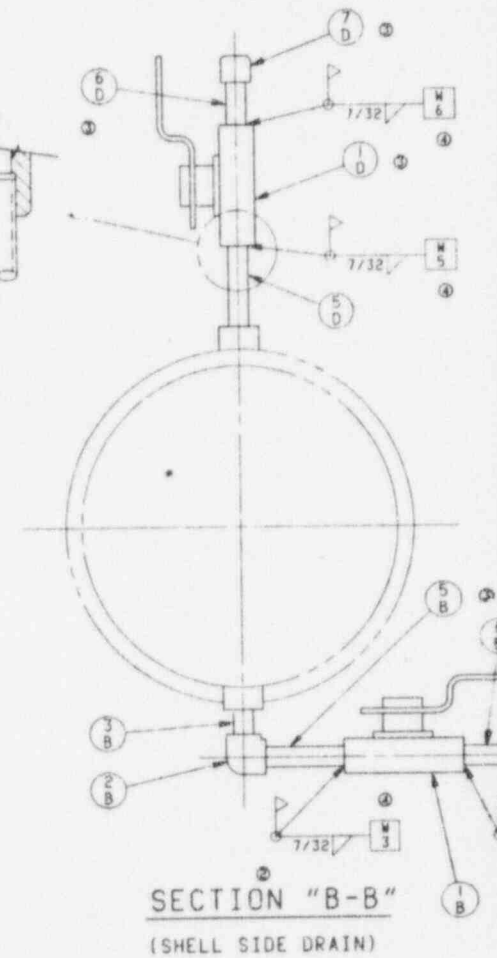
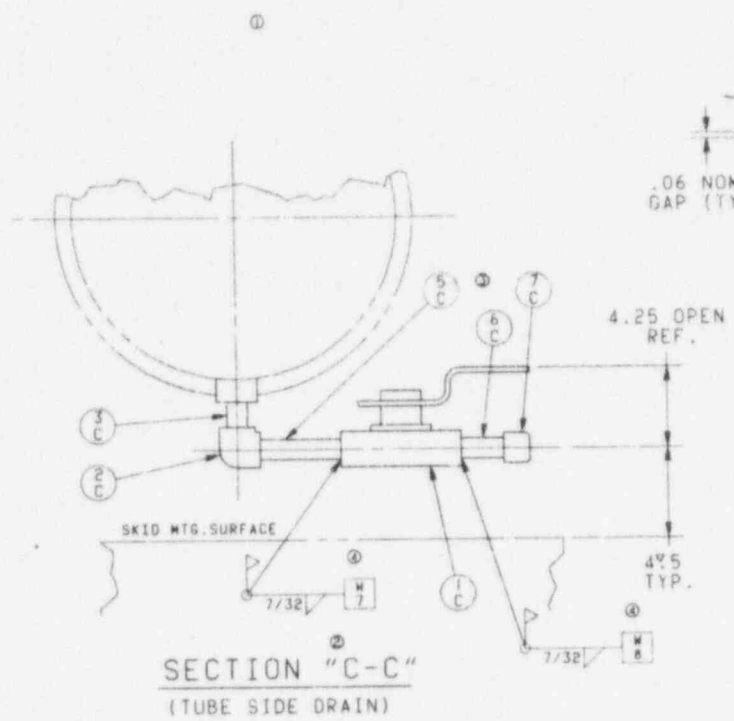
Pressure stresses (PSI)	.75 * SIF * (Ma+Mb)	Minimum Section Modulus (Cubic in)
2877.49534	226.801575	0.01499762

Pressure stresses (PSI)	.75 * SIF * (Ma+Mb)	Minimum Section Modulus (Cubic in)
1325.993229	510.3	0.030604522

SIF * Mc	Minimum Section Modulus (Cubic in)
0.0021	9.33333E-08

Pressure stresses (PSI)	(.75*SIF*Ma) + (SIF*Mc)	Minimum Section Modulus (Cubic in)
6136.09051	226.8021	0.007231308

PURCHASING, RECEIVING, INSPECTION, STORING & DISBURSEMENT SHALL COMPLY WITH SECTION 24 GA-8 OF COLT INDUSTRIES, FAIRBANKS MORSE ENGINE DIVISION, ASME QUALITY ASSURANCE MANUAL.



INTERCOOLER HEAT EXCHANGER
F.M. PART NO. 11908967

SKID MTG. SURFACE

11874254

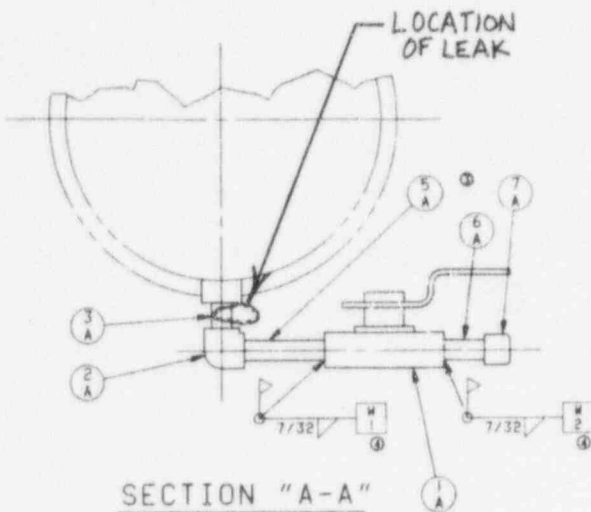
-GENERAL NOTES-

1. TUBE SIDE OF HEAT EXCHANGER SHALL BE HYDROSTATICALLY TESTED TO 300 PSIG AFTER DRAIN PIPING IS INSTALLED (MINIMUM 10 MINUTE TEST).
2. SHELL SIDE OF HEAT EXCHANGER SHALL BE HYDROSTATICALLY TESTED TO 90 PSIG AFTER VENT & DRAIN PIPING IS INSTALLED (MINIMUM 10 MIN. TEST).

UNIT DESIGN TEMPERATURE: +50°F. TO +200°F.
 TUBE SIDE DESIGN PRESSURE: 200 PSIG
 TUBE SIDE TEST PRESSURE: 300 PSIG
 SHELL SIDE DESIGN PRESSURE: 60 PSIG
 SHELL SIDE TEST PRESSURE: 90 PSIG

ANSTEC APERTURE CARD

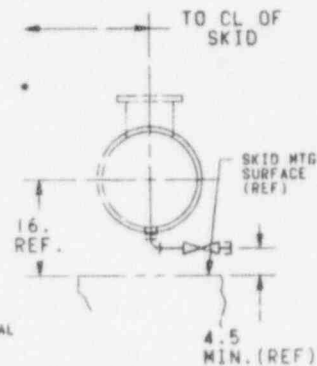
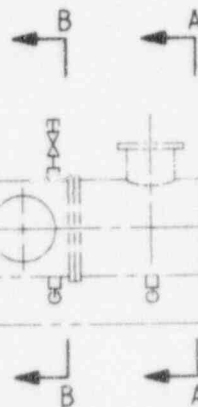
Also Available on
Aperture Card



SECTION "A-A"
(TUBE SIDE DRAIN)

RECORD SEPIA	
DATE	1/3
TIME	10:00
SUPPLIER'S DOCUMENT REVIEW	
1. <input type="checkbox"/> Approved - fully, may proceed.	
2. <input type="checkbox"/> Approved - partial final design - fully, may proceed.	
3. <input type="checkbox"/> Approved - concept or initial design changes and required final design - fully, may proceed as approved.	
4. <input type="checkbox"/> Not Approved - Correct & resubmit.	
5. <input checked="" type="checkbox"/> Approved not required - fully, may proceed.	
6. <input type="checkbox"/> Partial not required - fully, only.	
Approval of this drawing does not release supplier from full compliance with Contract or Purchase Order requirements.	
By: <i>R. K. Rana</i> Date: 12/2/82	
GATHERING/NO. 10446	
C E L M C S A	
SHIPPING UNIT 1 2	
By: <i>R. K. Rana</i>	

STANDARDIZED NUCLEAR UNIT POWER PLANT SYSTEM
 PURCHASE ORDER NO. 10446-M-018-1 THRU 5
 APPLICABLE TO ALL UNITS
 COLT S.D. 700001/1-5



10446-M-018-0196-02				FAIRBANKS MORSE ENGINE DIVISION			
TITLE				REL NO. P-2553 (10-18-1985) ON L.O.			
VENT & DRAINS I.C. HEAT EXCH. (OFF SKID)				DR BY R.O. SCALE 1/25 SIZE			
TOLERANCES				CHG. D.R. HEAT TR			
FRACTIONAL DECIMALS: UNLESS OTHERWISE SPECIFIED				MAT. L. SEE DETAILS			
100% DESIGN: ±.000				CAST			
FLAME CUTTING, SOLUTION, REWORKING: TOLERANCE: ±.005				MACH			
DECIMAL DECIMALS: UNLESS OTHERWISE SPECIFIED				WELD			
100% DESIGN: ±.000				ENG. F.B.			
REV. NO.	CHANGE ORDER	DATE	DESCRIPTION	CHG. BY	CHG. NO.	11874254	SHEET 1 OF 1

9609110265 - 01