9/5/95
Sta. 37

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT No. 611702

2. To: (Receiving Organization)	3. From: (Originating Organization)	4. Related EDT No.:
See Distribution List	Special Projects N2B2K	NA
5. Proj./Prog./Dept./Div.:	6. ~~Cog.~~ Program Engr.: (MJO 5-25-95)	7. Purchase Order No.:
241-SY-101	M. J. Ostrom 75410 ~~71650~~	NA
8. Originator Remarks: ~~NA~~ (MJO 5-25-95)		9. Equip./Component No.:
Approval and Release		NA
		10. System/Bldg./Facility:
		241-SY-101
11. Receiver Remarks: ~~NA~~ (MJO 5-25-95)		12. Major Assm. Dwg. No.:
		H-2-829680 ~~NA~~ KL 5/24/95
		13. Permit/Permit Application No.:
		NA
		14. Required Response Date:
		ASAP

15. DATA TRANSMITTED

(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	(F) Impact Level	(G) Reason for Transmittal	(H) Originator Disposition	(I) Receiver Disposition
1.	WHC-SD-WM-DA-189	N/A	0	Design Analysis Supporting 101-SY Water Decon System	SQ	1,2		

16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
1, 2, 3, or 4 (see MRP 5.43)	1. Approval 4. Review 2. Release 5. Post-Review 3. Information 6. Dist. (Receipt Acknow. Required)	1. Approved 4. Reviewed no/comment 2. Approved w/comment 5. Reviewed w/comment 3. Disapproved w/comment 6. Receipt acknowledged

17. SIGNATURE/DISTRIBUTION (See Impact Level for required signatures)

(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.
1,2	1	Cog.Eng. MJ Ostrom (MJO 5-25-95)	M J. Ostrom	5-25-95	~~H5-68~~ H5-09	COGENG G.J.GAUCK		7-14-95	T4-07	1,2	1
1,2	1	Cog. Mgr. CE Hanson		7/18/95	H5-09	COGMGR S.H.RIFAEY		7-14-95	T4-07	1,2	1
1,2	1	QA W.L. Adams	W L Adams	7-14-95	T4-08 ~~S4-37~~						
1,2	1	Safety LS Krogsrud	L S Krogsrud	7/25/95	R3-08						
		Env.									
		Proj/Prog.									
1,2	1	Review KJ Cleveland	Ken Cleveland	5/24/95	B4-40						

18. SA Talachy — Signature of EDT Originator — Date 5/16/95

19. CE Hanson — Authorized Representative for Receiving Organization — Date 7/18/95

20. CE Hanson — Cognizant/Project Engineer's Manager — Date 7/18/95

21. DOE APPROVAL (if required) Ltr. No.
- [ ] Approved
- [ ] Approved w/comments
- [ ] Disapproved w/comments

BD-7400-172-2 (07/91) GEF097

BD-7400-172-1

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RELEASE AUTHORIZATION

Document Number:	Design Analysis Supporting 101-SY Water Decon System
Document Title:	WHC-SD-WM-DA-189, Rev. 0
Release Date:	August 5, 1995

This document was reviewed following the procedures described in WHC-CM-3-4 and is:

APPROVED FOR PUBLIC RELEASE

WHC Information Release Administration Specialist:

T.L. Ontiveros — August 5, 1995

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SUPPORTING DOCUMENT

1. Total Pages 87

2. Title	3. Number	4. Rev No.
Design Analysis Supporting 101-SY Water Decon System	WHC-SD-WM-DA-189	0

5. Key Words	6. Author
101-SY, Removal, Decon	Name: Kevin Cleveland Signature 6/15/95 Organization/Charge Code 57400 ICF-KH/N2B2K

7. Abstract

This document contains the results of stress analysis and component sizing for the 101-SY mitigation pump, Water Decon System. Calculations included are a stress analysis of the High Pressure Manifold, the threaded connection on the Yoke Water Connector and a sizing of an air receiver tank.

8. RELEASE STAMP

OFFICIAL RELEASE
BY WHC
DATE 9/5/95
Sta. 37
35

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WHC-SD-WM-DA-189
REV 0

DESIGN ANALYSIS SUPPORTING 101-SY WATER DECON SYSTEM

PREPARED BY: Kevin Cleveland DATE: 6/22/95
K. J. Cleveland, Cognizant Engineer
Mitigation Engineering

REVIEWED BY: Mike J. Ostrom DATE: 6-27-95
M. J. Ostrom, Project Engineer
Mitigation Engineering

APPROVED BY: Carl Hanson DATE: 7/13/95
C. E. Hanson, Manager
Mitigation and Characterization New Equipment

Westinghouse Hanford Company
Hanford Operations and Engineering Contractor
for the
U.S. Department of Energy

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WHC-SD-WM-DA-189
REV 0

DESIGN VERIFICATION METHOD

The need for design verification has been reviewed with the method selected as indicated below:

X	Independent Review
	Alternative Calculations
	Qualification Testing
	Formal Design Review

C. E. Hanson
Cognizant/Project/Design Manger

SD # WHC-SD-WM-DA-189

ECN # NA

DWG(S) # NA

CHECKLIST FOR INDEPENDENT REVIEW

Document Reviewed WHC-SD-WM-DA-189 REV 0

Author Kevin J. Cleveland

Yes	No	NA	
[✓]	[ ]	[ ]	Problem completely defined.
[✓]	[ ]	[ ]	Necessary assumptions explicitly stated and supported.
[✓]	[ ]	[ ]	Computer codes and data files documented.
[✓]	[ ]	[ ]	Data used in calculations explicitly stated in document.
[✓]	[ ]	[ ]	Data checked for consistency with original source information as applicable.
[✓]	[ ]	[ ]	Mathematical derivations checked including dimensional consistency of results.
[✓]	[ ]	[ ]	Models appropriate and used within range of validity or use outside range of established validity justified.
[✓]	[ ]	[ ]	Hand calculations checked for errors.
[✓]	[ ]	[ ]	Code run streams correct and consistent with analysis documentation.
[✓]	[ ]	[ ]	Code output consistent with input and with results reported in analysis documentation.
[✓]	[ ]	[ ]	Acceptability limits on analytical results applicable and supported. Limits checked against sources.
[✓]	[ ]	[ ]	Safety margins consistent with good engineering practices.
[✓]	[ ]	[ ]	Conclusions consistent with analytical results and applicable limits.
[✓]	[ ]	[ ]	Results and conclusions address all points required in the problem statement.

MANDATORY Software QA Log Number D/N SQA25API-4.5 Rev.0

MKPal
Reviewer Mohit Pal

5/10/95
Date

WHC-SD-WM-DA-189
REV 0

DESIGN ANALYSIS SUPPORTING 101-SY WATER DECON SYSTEM

April 11, 1995

by

K. J. Cleveland
Mechanical Engineering

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TABLE OF CONTENTS

TRADEMARK

Autopipe 4.5 is a trademark of Engineering Design Automation.

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DESIGN REVIEW FOR 241-SY-101

WATER DECON SYSTEM

1.0 INTRODUCTION

The water decon system will be used to decontaminate the inside and outside of the mixer pump in 241-SY-101. When the pump fails, the water decon components will be staged on the farm and assembled per drawing H-2-824680. The system is assembled using the following components; Drill Rod Washers (H-2-91670 & H-2-91671), 12 X 4 Riser Adapter (H-2-99332), SY-101 HMT Decon Spraywand Assembly (H-2-817857), HMT Pit 01-A Drain Plug Assembly (H-2-818120), Riser 3A Spray Wand Adapter (H-2-821382), Yoke Water Connection Assembly (H-2-824443), Water Distribution Skid Assembly (H-2-824447), Water Filter Skid Assembly (H-2-824448), Decon Spraywand Drop Limiter Assembly (H-2-824509), Portable Water Flush Pump Assembly (H-2-824514), Water Decon Air Purge Assembly (H-2-824675) and 101-01A Pump Pit Flood System (H-2-824676). The components for the water decon system were fabricated in the 200 area shops.

2.0 HISTORY

The water wands used to decontaminate the outside of the mixer pump were previously analyzed prior to original pump installation. The original decontamination system was put into place to support emergency removal of the pump. The analysis examined the stresses in the spray wands due to pressure and bending. The welds on the lifting bails were also examined. Additionally, testing was performed to determine which nozzles and spray pattern would be best to wash the pump. The results of this analysis can be found in document WHC-SD-WM-DP-038. WHC-SD-WM-DA-169 provided the radiological and structural calculations for the spray wand adaptor and lifting beam for riser 3A.

The intent of this support document is to analyze modifications or additions to the water decon system not previously addressed in the above referenced documents.

2.1 METHODS OF DESIGN VERIFICATION

1. This document contains calculations supporting stress analysis of the water distribution manifold, a stress analysis of the yoke water connector assembly, and a sizing calculation for the air blow down system.

2. An Acceptance Test Procedure (ATP) was performed per WHC-CM-6-1, EP-4.2 to evaluate some of the decon system components. Calibration tests were done on the water totalizers and flow meters. Other tests checked the performance of the air blowdown system and the pit flood system.

Finally, an informational test was performed on the water filter skid to aid in the operations during pump removal. The results of the testing can be found in the Acceptance Test Report WHC-SD-WM-ATR-125.

3. All the components of water decon system were staged and hooked together during the Operability Test Procedure (WHC-SD-WM-OTP-168) at the cold test facility. The low pressure side of the water distribution skid was used to fill the fire hoses with water. There was no water in the high pressure manifold or hoses. However, it was determined that all the fittings and materials were present to hook the system up.

4. Finally, Mohit Pal performed an overall informal review of this supporting document, WHC-SD-WM-DA-189, and the installation and component drawings for the water decon system. Mohit reviewed drawings H-2-824445, Equipment Removal System Layout (Site layout), H-2-824443, Yoke Water Connection Assembly, H-2-824446, Equipment Removal System Water Decon Schematic and H-2-824447, Water Distribution Skid Assembly. This supporting document was reviewed for methodology and the system was reviewed for functionality and compliance with the Safety Assessment. As identified in the attached Review Comment Record (RCR) form there were no comments. (Attachment D)

3.0 CONCLUSION

The system meets applicable codes and design requirements.

WHC-SD-WM-DA-189
REV 0

ATTACHMENT A

HIGH PRESSURE MANIFOLD STRESS ANALYSIS

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HIGH PRESSURE MANIFOLD STRESS ANALYSIS

1.0 INTRODUCTION

On July 3, 1993, a mixer pump was installed in tank 241-SY-101 to test the mitigation by mixing concept. As a result of this testing, it was determined that the mixing concept will mitigate the tank. A backup pump was built as a replacement for the test pump. When the test pump fails, a flush and decontamination system will be required for the removal of the existing pump and installation of the backup pump.

This document contains supporting calculations for portions of the flush and decon system. The calculations included are a stress analysis of the high pressure manifold, an analysis of the yoke water connector and a sizing of the air receiver tank.

2.0 BACKGROUND

High pressure manifold is a piping arrangement that delivers water to the spray wands in risers 3A, 13A, and 23A and the spray ring in the central pump pit. The operating pressure for the manifold is 3000 psi. Using a 10% margin over the operating pressure, gives a design pressure of 3300 psi. The high pressure manifold is analyzed using the Autopipe 4.5 computer code (EDA 1989).

The yoke water connector is a piping assembly that attaches to the mitigation pump lifting yoke. Hoses from the decon manifolds are laid out across the farm, routed over the containment tent and attached to the yoke water connector. During removal of the pump the hoses are raised along with the pump. Once the discharge of the pump clears the waste the last flush is preformed and the hoses are drained and disconnected.

Two check valves installed in the 2" internal flush line of the mitigation pump will prevent water in the line from draining. The water needs to be blown out of the 2" line so there will not be any spillage during the column cut off process. The safety assessment had some concerns with pressurizing the dome space by blowing air into the tank. Therefore the air receiver is designed to contain just enough air to empty the 2" line and not introduce excess air into the dome space.

3.0 RESULTS

3.1 HIGH PRESSURE MANIFOLD

The results of the stress analysis supporting the design of the high pressure manifold are included in Attachment A.

3.2 YOKE WATER CONNECTOR

The results of the analysis for the yoke water connector are included in Attachment B.

3.3 AIR RECEIVER TANK

The results of the sizing calculations for the air receiver tank are included in Attachment C.

OBJECTIVE

The objective of this calculation is to analyze the high pressure manifold on the flush and decon system, for removal of the 101SY hydrogen mitigation pump. The manifold is being analyzed per ASME B31.3. The loads determined from this analysis will be used to qualify the support skid.

DESIGN INPUTS

CRITERIA

1. ASME B31.3-1990 Edition & Addenda B31.3a-93.
2. DOE ORDER 6430.1A.

GIVEN DATA

1.	Design Temperature	= 150°F	REF 3
2.	Safety Class	= 3	REF 1
3.	Materials	= A106 GR B	REF 2
4.	Design pressure	= 3000 psi	REF 3

ASSUMPTIONS

The flush and decontamination system is for temporary use, thus a seismic analysis is not preformed because of the unlikelihood of a seismic event during system operation.

METHODS

AutoPipe version 4.5 is used to perform the analysis on the high pressure manifold. The results of that analysis are given in appendix A.

The worst case loads examined for the support skid are the gravity load + thermal load.

The worst case loads for the pipe stress analysis is the pressure load.

The low pressure manifold was not modeled in AutoPIPE. This was not necessary due to the high margin of safety in the maximum allowable pressure to the design pressure. Equation 3b in ASME B31.3 was used to determine the maximum allowable pressure.

P = pressure PSIG
D = ouside diameter in
t = wall thickness in
S = allowable stress psi
E = quality factor

$D := 6.625 \cdot in$ $S := 20000 \cdot \frac{lb}{in^2}$ $t := 0.280 \cdot in$ $E := 1$

$P := \frac{2 \cdot S \cdot t \cdot E}{D}$ eq 3b $P = 1.691 \cdot 10^3 \cdot \frac{lb}{in^2}$

REFERENCES

1. WHC-SD-WM-WP-275 & Safety Analysis SA-LA-UR-92-3196

2. Drawing H-2-824447

3. Letter of Instruction (LOI) MIT94-2229, dated October 14, 1994.

CONCLUSION

Based on the analysis presented in this calculation, the manifold meets B31.3 requirements.

DESIGN ANALYSIS

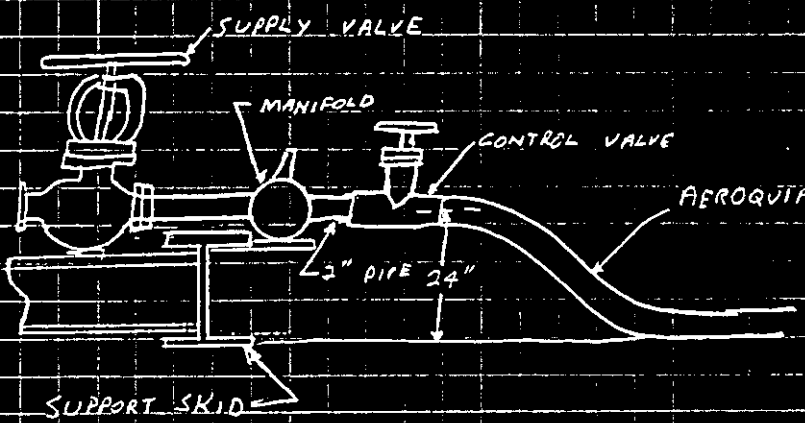
Client WHC | WO/Job No.

Subject WATER DISTRIBUTION MANIFOLD STRESS ANALYSIS | Date 3/23/95 By Kevin Clark | Checked By [signature] 4-11-95

Location 200 W | Revised By

DETERMINE LOADS AT THE END OF WELD-O-LETS ON THE WATER DISTRIBUTION MANIFOLD.

LOAD FROM HANGING HOSE



HOSE PROPERTIES

AEROQUIP FC323-24
WEIGHT 2.2 lb/ft
MIN BEND RADIUS 20 in

TAKE LENGTH OF HOSE AS HALF THE CIRCUMFERENCE OF A 20" CIRCLE

$$L = \frac{2\pi R}{2} = 63'' = 5.23 \text{ ft}$$

WEIGHT OF HOSE : $5.23 \text{ ft} \cdot 2.2 \text{ lb/ft} = 11.5 \text{ lb}$

USE 12 lb

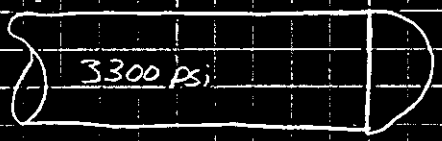
DESIGN ANALYSIS

Client WHC | WO/Job No.

Subject WATER DISTRIBUTION MANIFOLD STRESS ANALYSIS | Date 3/23/95 By Kevin Abbott | Checked By [signature] 4-11-95

Location 200 W | Revised By

DETERMINE LOAD ON END CAPS OF HIGH PRESSURE MANIFOLD AT START-UP



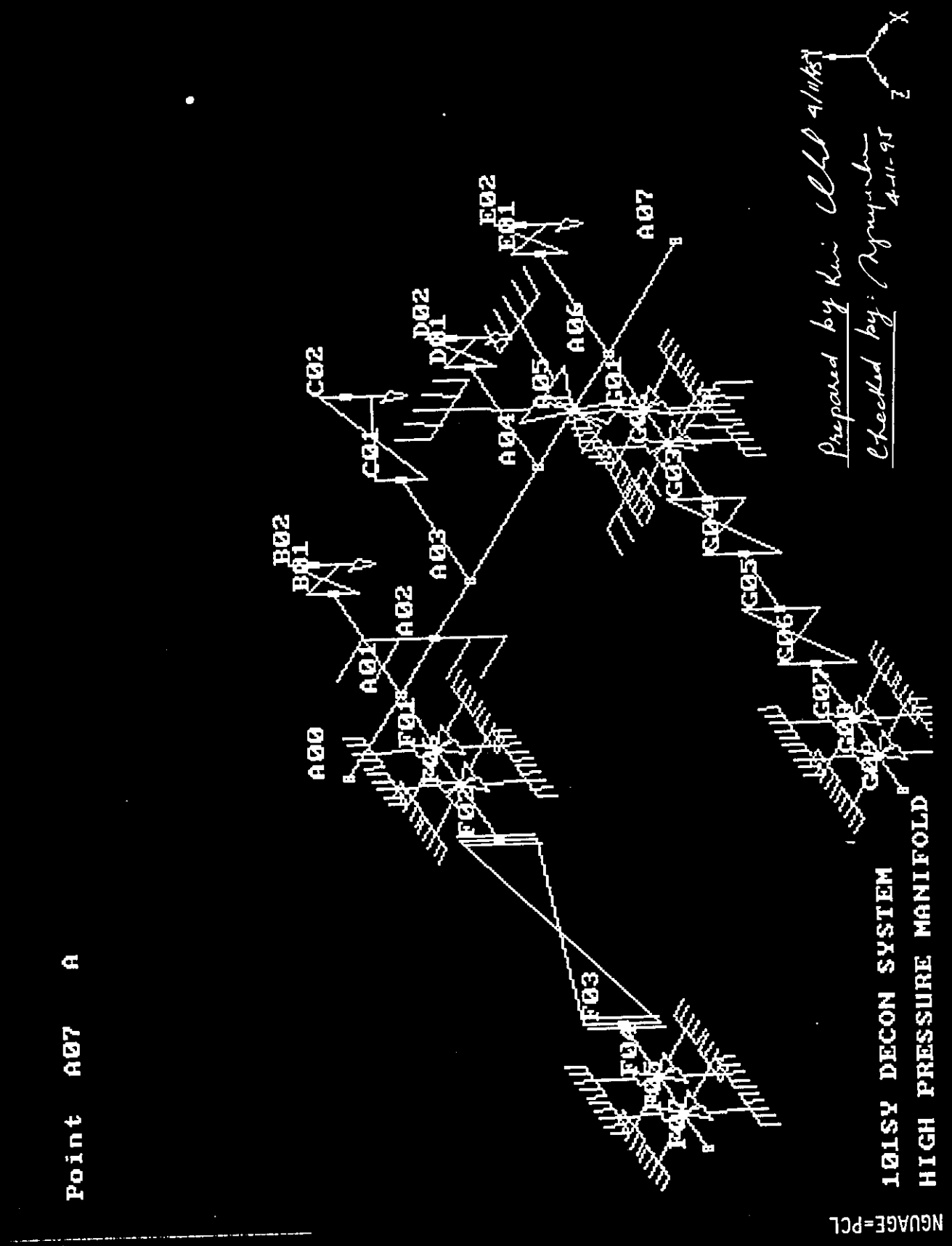
Internal area of 6" Sch 160 pipe is

$A = 13.32\ in^2$

THE FORCE ON THE END CAP IS $F = PA$

$F = 3300\ psi \times 13.32\ in^2 = 43956$

USE $F = 44000$ lb


Point A07 A
101SY DECON SYSTEM
HIGH PRESSURE MANIFOLD
NGUAGE=PCL
Prepared by: Khi Le 4/11/95
Checked by: Nguyen 4-11-95
A00
A01
A02
A03
A04
A05
A06
A07
B01
B02
C01
C02
D01
D02
E01
E02
F01
F02
F03
F04
G01
G02
G03
G04
G05
G06
G07
G08

GENERAL NOTES: (UNLESS OTHERWISE SPECIFIED)

1. DIMENSIONS AND TOLERANCES ARE IN INCHES.
2. TOLERANCES: X = ± .1; .XX = ± .06; .XXX = ± .030; FRACTIONAL = ± 1/8; ANGULAR = ± 1°
3. ALL MACHINED SURFACES SHALL BE 125 OR BETTER IN ACCORDANCE WITH ANSI B46.1
4. BREAK ALL SHARP EDGES/CORNERS & REMOVE ALL BURRS.
5. DO NOT PRIME/PAINT THREADS, FLANGE FACES AND/OR GASKET SEALING AREAS.
6. PREPARE AND PAINT ALL EXPOSED CARBON STEEL SURFACES WITH 1 COAT OF AMERCOAT 148 PRIMER (COLOR: OPTIONAL) FOLLOWED WITH 2 COATS OF AMERCOAT 220 (COLOR: ROYAL BLUE) PER MANUFACTURERS INSTRUCTIONS.
7. STENCIL ASSEMBLY WEIGHT (XXXXX/XXXX) WITH 2 INCH HIGH CHARACTERS APPROXIMATELY WHERE INDICATED USING PERMANENT INK/PAINT (COLOR: WHITE) SHOWING IN UNITS OF POUNDS.
8. MARK WITH DRAWING NUMBER, REVISION NUMBER & PART NUMBER PER HS-[illegible]-0013, TYPE [illegible] (COLOR: YELLOW) WITH 1/2 HIGH CHARACTERS LOCATED APPROXIMATELY AS SHOWN.
11. ALL McMASTER-CARR PART NUMBERS ARE AS TAKEN FROM CATALOG [illegible].
12. VALVE SUPPORT ASSEMBLY (ITEM 5) SHALL BE FABRICATED AND INSTALLED INTO SKID WELDMENT ASSEMBLY (ITEM 4) PRIOR TO THE FINAL WELDING OF ONE (-1-) OF THE BEAMS (ITEM [illegible]) ONTO THE SKID WELDMENT ASSEMBLY. THE CHOICE OF BEAM (ITEM [illegible]) IS AT THE FABRICATORS DISCRETION.
13. ANY/ALL PART SUBSTITUTIONS ARE SUBJECT TO ENGINEERING APPROVAL.
14. WELD PER AWS/ANSI D1.1-94. VT FINAL PASS OF ALL WELDS.
15. ALL WELDING PROCEDURES AND PERSONNEL SHALL BE QUALIFIED IN AWS/ANSI D1.1-94. WELD QUALIFICATIONS PER ASME SECTION IX ARE AN ACCEPTABLE SUBSTITUTION. VT ALL DESIGNATED WELDS.
16. ALL PIPE WELDS: WELD AND INSPECT PER ASME B31.3. VT ALL WELDS AT FINAL PASS. DOCUMENT WELDS PER APPROVED INSPECTION PLAN. WELDING QUALIFICATIONS PER ASME SECTION IX ARE ACCEPTABLE. VT ALL DESIGNATED WELDS.
17. HYDROSTATIC LEAK TEST HIGH PRESSURE MANIFOLD ASSEMBLY PER HS-[illegible]-0090, TYPE [illegible]. PRESSURE TEST AT 4500 PSIG, HOLD AT PRESSURE FOR 15 MINUTES.
18. HYDROSTATIC LEAK TEST LOW PRESSURE MANIFOLD ASSEMBLY PER HS-[illegible]-0090, TYPE [illegible]. PRESSURE TEST AT 450 PSIG, HOLD AT PRESSURE FOR 15 MINUTES.
19. FILLET ONLY AS NECESSARY TO PROVIDE SMOOTH TRANSITION FROM WELD TO BASE METAL ALL AROUND.
20. SHIM, AS REQUIRED, BETWEEN THE HIGH PRESSURE MANIFOLD AND SKID WELDMENT ASSEMBLY. MAINTAIN A MINIMUM CLEARANCE BETWEEN THE TWO UNUSED MANIFOLD PORTS AND SKID WELDMENT ASSEMBLY TO ALLOW FOR FUTURE COUPLING INSTALLATION.

PARTS/MATERIAL LIST

-070	-060	-050	-040	-030	-020	-010	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
						X	-010	WATER DISTRIBUTION SKID ASSEMBLY		2	1
					X	1	-020	HIGH PRESSURE MANIFOLD ASSY		4	2
				X		1	-030	LOW PRESSURE MANIFOLD ASSEMBLY		5	3
			X			1	-040	SKID WELDMENT ASSEMBLY		3	4
		X	1			1	-050	VALVE SUPPORT ASSEMBLY		3	5
	X					1	-060	HIGH PRESSURE INLET SPOOL ASSY		2	6
X						1	-070	LOW PRESSURE INLET SPOOL ASSY		1	7
		1						CHANNEL, C8 X 13 X 32.0 L	ASTM A36 CS	3	8
		4						THREADED STUD, 3/4-10UNC-2A, 4 L	ASTM A193 GRADE B7 CS	3	9
			2					BEAM, W14 X 34 X 78.0 L	ASTM A36 CS	3	10
			2					BEAM, W8 X 31 X 38.44 L	ASTM A36 CS	3	11
			3					CHANNEL, C8 X 13 X 14.0 L	ASTM A36 CS	3	12
			3					CHANNEL, C8 X 13 X 13.12 L	ASTM A36 CS	3	13
			4				(3024T21)	DROP FORGED PAD EYE (Ø1 3/16 EYE, 2 3/8 OAH)	(McMASTER-CARR)	3	14
			8					FLAT BAR, 1/2 THK X 2 X 10.75 L	ASTM A36 CS	3	15
			32					WASHER, FLAT; Ø3/4	ASTM F436 CS	3	16
			32					WASHER, SPLIT LOCK; Ø3/4, ANSI B18.21.1		3	17
			32					NUT, HEAVY HEX; 3/4-10UNC-2B	ASTM A563 CS	3	18
					1			PIPE, 6 SCH 160 X 48.0 L	ASTM A53, TYPE S, GRADE B, CS	4	19
					2			WELD CAP, 6 SCH 160	ASTM A234 CS	4	20
					3			WELDOLET, REDUCING; SCH XXS 6 RUN, 3 OUTLET	(BONNEY FORGE) CS	4	21
					8			FORGED NIPOLET, 3 SCH XXS	(BONNEY FORGE) CS	4	22
				2	3			FORGED NIPOLET, 1" SCH XS	(BONNEY FORGE) CS	4	23
				3	3			FORGED NIPOLET, 1/2 SCH XS	(BONNEY FORGE) CS	4	24
					1			PIPE, 3" SCH 160 X 4.0 L TOE	ASTM A53, TYPE S, GRADE B, CS	4	25
					1			PIPE, 3" SCH 160 X 14.0 L	ASTM A53, TYPE S, GRADE B, CS	4	26
					1			PIPE, 3" SCH 160 X 50.0 L TOE	ASTM A53, TYPE S, GRADE B, CS	4	27
	1				1			FLANGE, 3", 1500#, RAISED FACE SLIP ON	ASTM A105 CS	4	28
						2	(STYLE G-9900)	GASKET, 1/8 THK, COMPRESSED GRAPHITE FIBER	(GARLOCK) (HIGH PRESSURE)	4	29
						2	(STYLE G-9900)	GASKET, 1/8 THK, COMPRESSED GRAPHITE FIBER	(GARLOCK) (LOW PRESSURE)	2	30
				1				PIPE, 6 SCH 40 X 23.0 L	ASTM A53, TYPE S, GRADE B, CS	5	31
				2				WELD CAP, 6 SCH 40	ASTM A234 WPB	5	32
				3				WELDOLET, REDUCING, SCH STD WGT 6 RUN, 3 OUTLET	(BONNEY FORGE) CS	5	33
				2				FORGED NIPOLET, 2 SCH 80	(BONNEY FORGE) CS	5	34
				1				PIPE, 3 SCH 40 X 18.0 L	ASTM A53, TYPE S, GRADE B, CS	5	35
				1				PIPE, 3 SCH 40 X 50.0 L TOE	ASTM A53, TYPE S, GRADE B, CS	6	36
1				1				FLANGE, 3, 300#, RAISED FACE SLIP ON	ASTM A105 CS	5	37

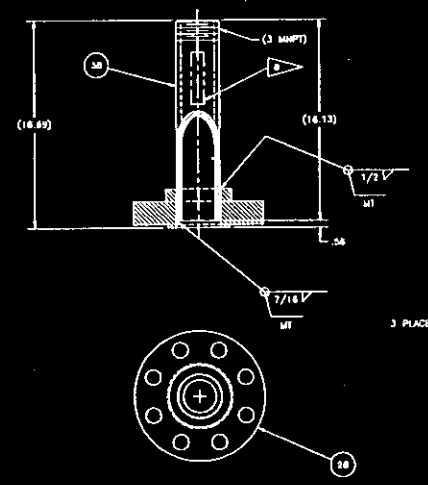
PARTS/MATERIAL LIST continued...

-070	-060	-050	-040	-030	-020	-010	PART/DASH NUMBER	NOMENCLATURE/DESCRIPTION	MATERIAL/REFERENCE	SHEET	ITEM NO
	1							PIPE, 3 SCH 160 X 10.13 L TOE	ASTM A53, TYPE S, GRADE B, CS	2	38
1								PIPE, 3 SCH 40 X 10.00 L TOE	ASTM A53, TYPE S, GRADE B, CS	2	39
						16		U-BOLT, 3 PIPE SIZE, 1/2-13UNC-2A	PLATED CS	2	40
						3		U-BOLT, 8 PIPE SIZE, 5/8-11UNC-2A	PLATED CS	2	41
						6		WASHER, FLAT; Ø5/8	ASTM F436 CS	2	42
						6		WASHER, SPLIT LOCK; Ø5/8, ANSI B18.21.1		2	43
						6		NUT HEAVY, HEX; 5/8-11UNC-2B	ASTM A563-L CS	2	44
						32		WASHER, FLAT; Ø1/2	ASTM F436 CS	2	45
						32		WASHER, SPLIT LOCK; Ø1/2 ANSI B18.21.1		2	46
						32		NUT HEAVY, HEX; 1/2-13UNC-2B	ASTM A563-L CS	2	47
						1	F10-3064C-0270	VALVE, 3 GATE; FORGED STEEL, CLASS 1500, FLANGED	VELAN	2	48
						1	3H-0FU0	VALVE, 3 GATE; FORGED STEEL, CLASS 300, FLANGED	STOCKHAM	2	49
						1	HQ-31-1	VALVE, 2 GLOBE; FORGED STEEL, CLASS 1500, THREADED	BONNEY FORGE	2	50
						8		THREADED STUD, 3/4-10UNC-2A, 8 1/4 L	ASTM A193 GRADE B7	2	51
						16		THREADED STUD, 1 1/8-7UNC-2A, 8 1/2 L	ASTM A193 GRADE B7	2	52
						32		WASHER, FLAT; Ø1 1/8	ASTM F436, TYPE 1, CS	2	53
						32		WASHER, SPLIT LOCK; Ø1 1/8 ANSI B18.21.1		2	54
						32		NUT, HEAVY HEX; 1 1/8-7UNC-2B	ASTM A194/GR 2H	2	55
						3		CAP, THREADED; 1/2 FNPT, FORGED, 3000#	ASTM A105 CS	2	56
						4		CAP, THREADED; 1" FNPT, FORGED, 3000#	ASTM A105 CS	2	57
						2		CAP, THREADED; 2 FNPT, FORGED, 3000#	ASTM A105 CS	2	58
						3		CAP, THREADED; 3 FNPT, FORGED, 3000#	ASTM A105 CS	2	59
						2		BUSHING, HEX REDUCER; 1/2 X 1/4 FNPT, 3000#, ANSI B16.11	CS	2	60
						1	(No. 4000K62)	PRESSURE GAUGE, GLYCERINE FILLED 0-3000psi X 500psi, Ø2.50 FACE, BRASS CASE, 1/4 MNPT (STEM)	(McMASTER-CARR)	2	61
						1	(No. 4000K34)	PRESSURE GAUGE, GLYCERINE FILLED 0-400psi X 50psi, Ø2.50 FACE, BRASS CASE, 1/4 MNPT (STEM)	(McMASTER-CARR)	2	62
						1	(TYPE 807)	UNION, 2 THREADED, 6000#	ASTM A105 CS	2	63
						3		UNION, 2, 600#, MALLABLE IRON	ASTM A197 CS	2	64
						2	(No. 3054K175)	THERMOMETER, 6 STM STEM, Ø3 1/2 MNPT, 0-300°F X 2°	(McMASTER-CARR)	2	65
						2	(B1PSF18240) (set @ 3000psi)	SAFETY RELIEF VALVE, ADJUSTABLE; 2 FNPT INLET/2 FNPT OUTLET, FULL LIFT @ 10% OVERPRESSURE	(KEYSTONE)	2	66
						1	(B1.3BLRMD1) (set @ 300psi)	SAFETY RELIEF VALVE, ADJUSTABLE; 2 MNPT INLET/3 FNPT OUTLET, FULL LIFT @ 10% OVERPRESSURE	KUNKLE	2	67
				AR	AR	AR		SEALANT, TEFLON (TAPE/DOPE)		2	68
						6		PIPE, 2 SCH 160 X 3.0 L, TBE	ASTM A53, TYPE S, GRADE B, CS	2	69
						3		PIPE, 2 SCH 40 X 3.0 L, TBE	ASTM A53, TYPE S, GRADE B, CS	2	70
						3	SS-1RF8	INTEGRAL BONNET NEEDLE VALVE	WHITEY	2	71
						2	F800	VALVE, 2 GLOBE, FORGED STEEL CLASS 800, THREADED	NPAC	2	72
						3	(SERIES 3000)	BUSHING, 1/2 X 2, FORGED, 3000 LB	ASTM A105 CS	1	73
						3		NIPPLE, 1/2 EXTRA HEAVY X 2 L BLACK SEAMLESS	ASTM A106 CS	2	74
						4	SS-1RF8	COUPLING, 1/2, 300 LB, ANSI B16.11	ASTM A105 CS	2	75

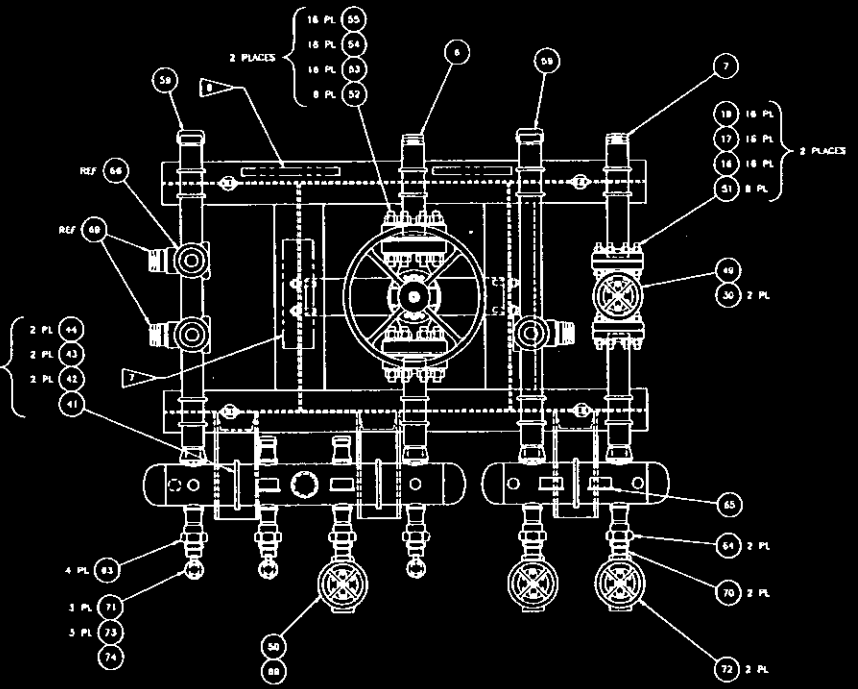
WHC-SD-WM-DA-189
REV 0

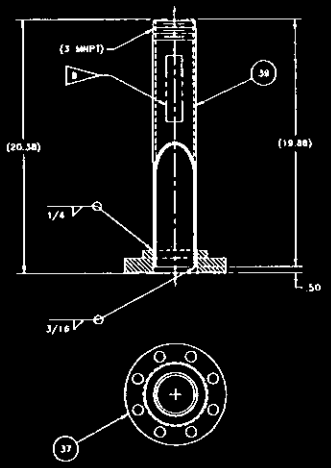
U.S. DEPARTMENT OF ENERGY
WATER DISTRIBUTION SKID ASSEMBLY
HYDROGEN MITIGATION PROJECT
H-2-824447 0

H-2-824448 | EQPMT REMOVAL SYSTEM WATER DECON SCHEMATIC

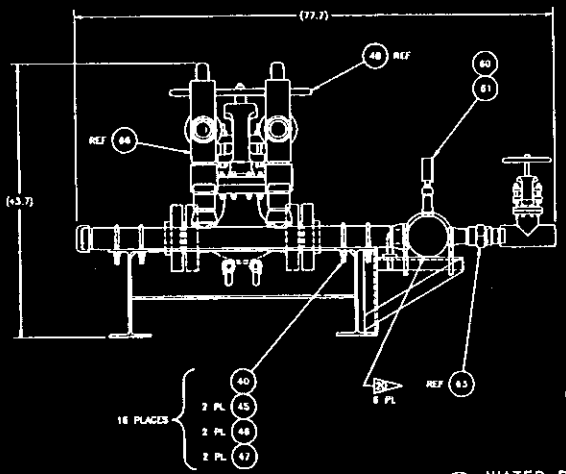


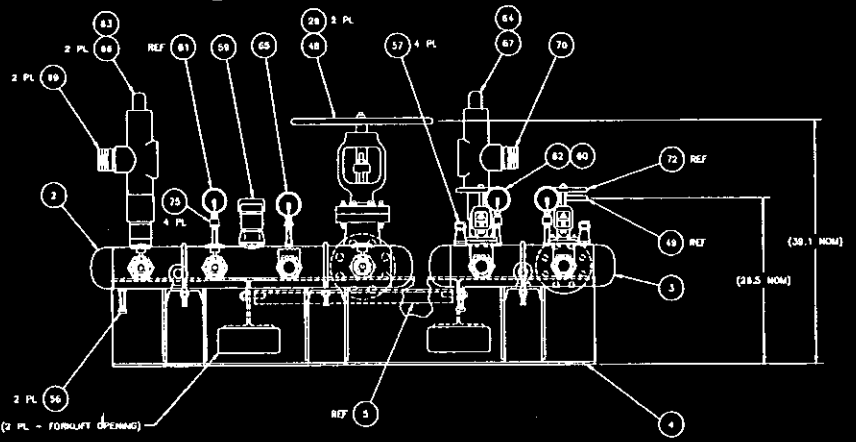
6 HIGH PRESSURE INLET SPOOL ASSY
SCALE: 1/4





7 LOW PRESSURE INLET SPOOL ASSY
SCALE: 1/4





1 WATER DISTRIBUTION SKID ASSEMBLY
SCALE: 1/8

FOR GENERAL NOTES AND PARTS LIST SEE SHEET 1.

WHC-SD-WM-DA-189
REV 0

WATER DISTRIBUTION SKID ASSEMBLY
HYDROGEN MITIGATION PROJECT
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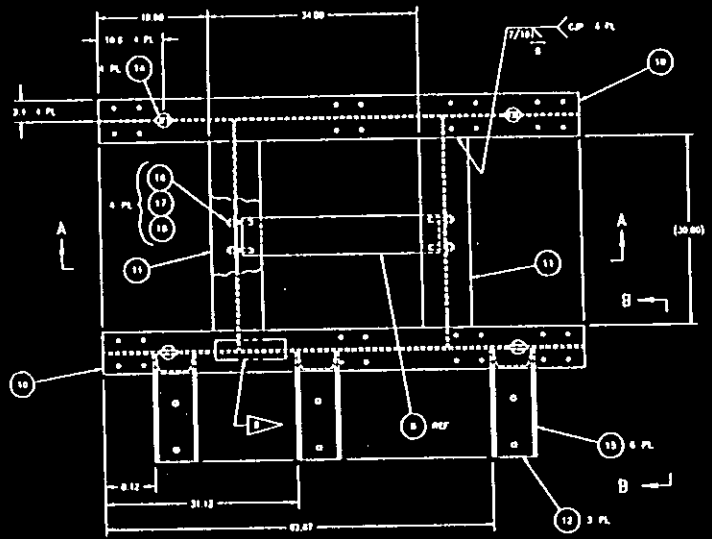
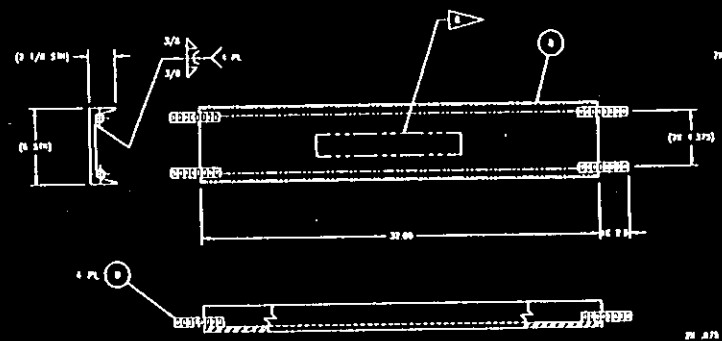
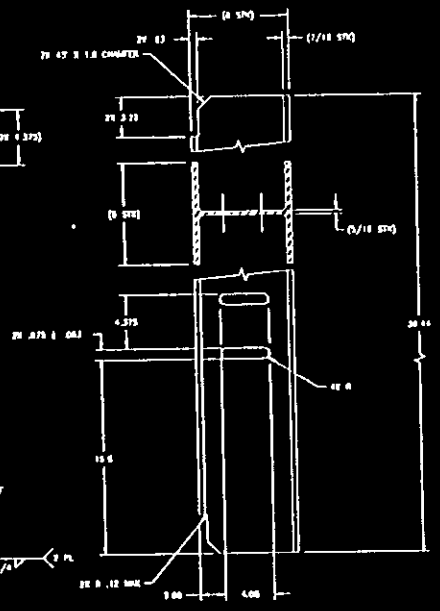
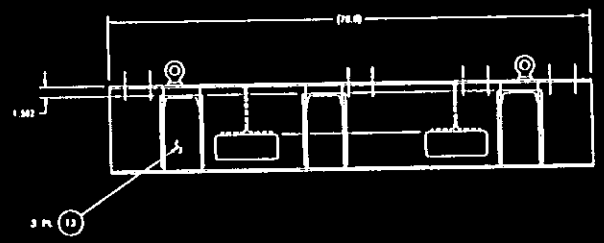




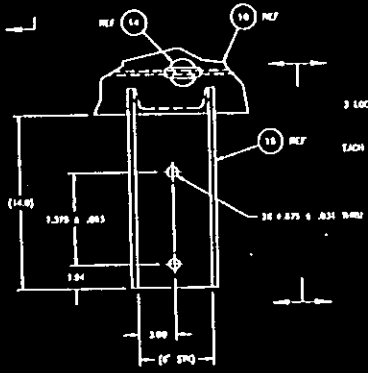
5 VALVE SUPPORT ASSEMBLY
SCALE: 1/4

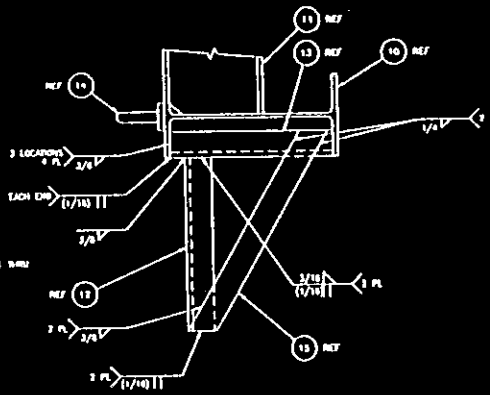


11 BEAM
SCALE: 1/4

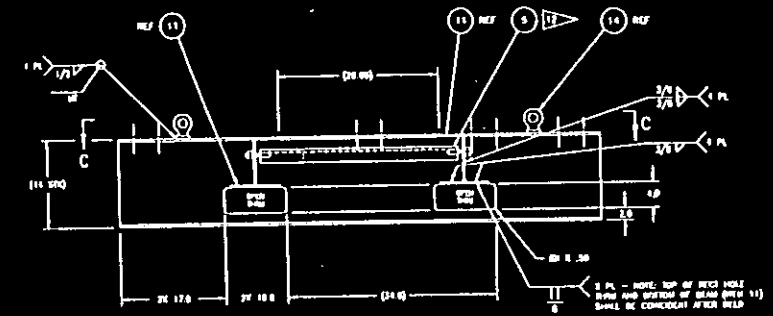


4 SKID WELDMENT ASSEMBLY
SCALE: 1/8

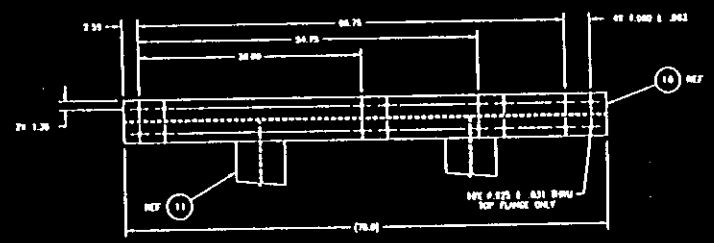




VIEW B-B
SCALE: 1/4
2 PLACES



SECTION A-A
(REAR VIEW SHOWN)
SCALE: 1/8



VIEW C-C
SCALE: 1/8
2 PLACES

FOR GENER
PARTS LIST

WHC-SD-WM-DA-189
REV 0

WATER DISTRIBUTION
SKID ASSEMBLY

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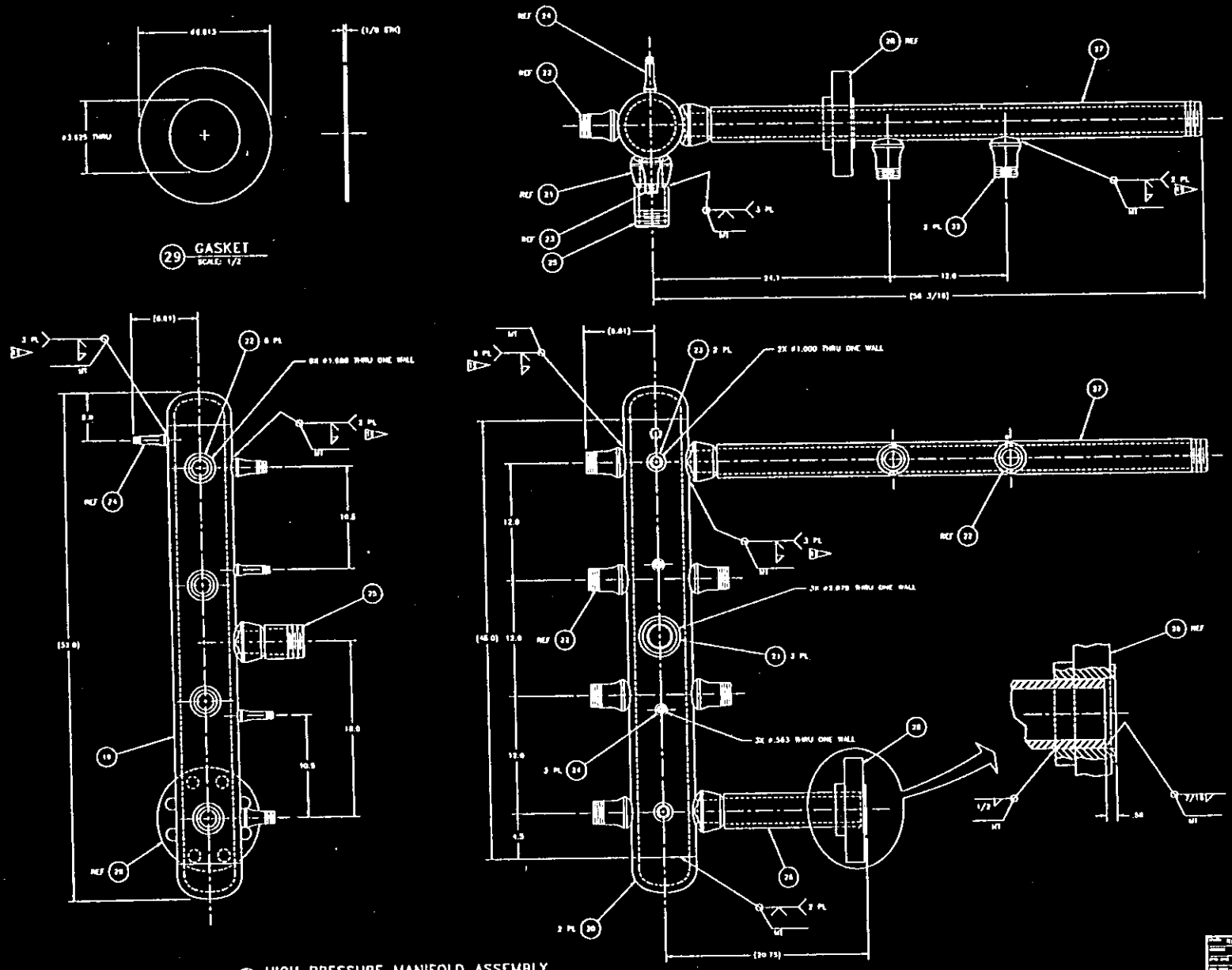
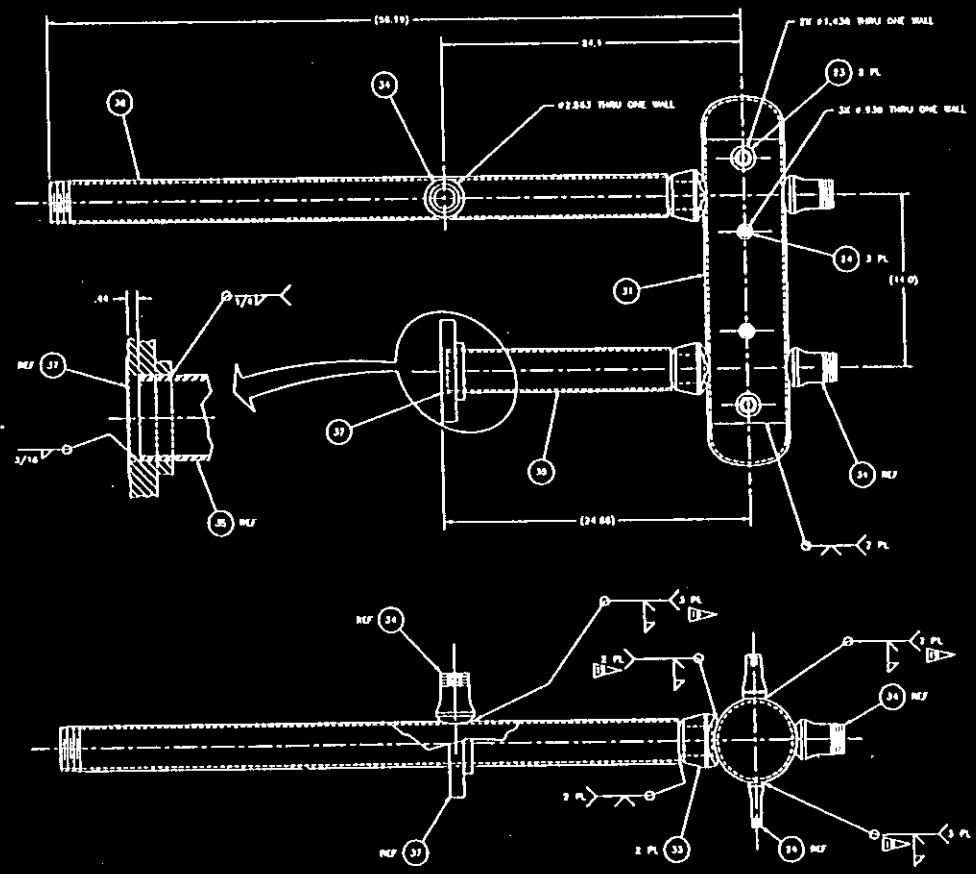
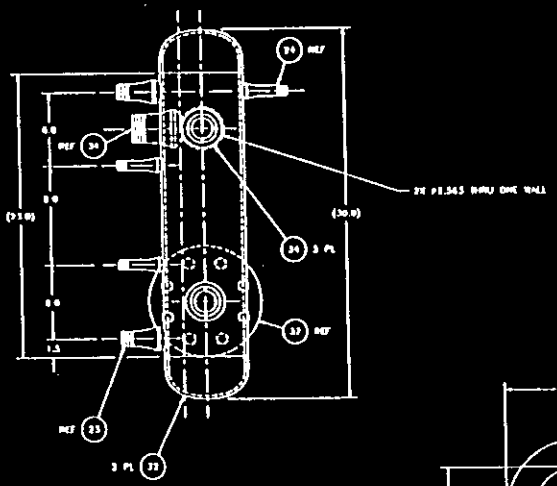
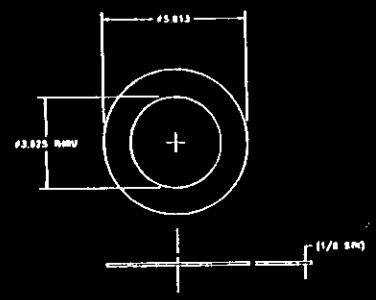

29 GASKET
SCALE: 1/2
2 HIGH PRESSURE MANIFOLD ASSEMBLY
SCALE: 1/4
FOR GENERAL N
PARTS LIST SEE
WATER DISTRIBUTION
SKID ASSEMBLY
H-2-824447



3 LOW PRESSURE MANIFOLD ASSEMBLY
SCALE: 1/4



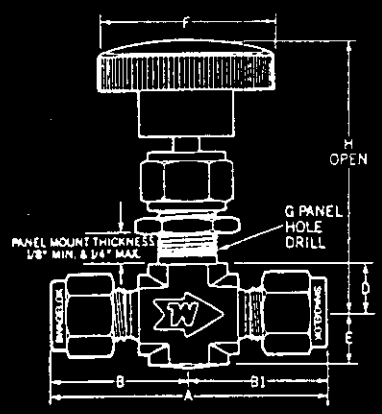


30 GASKET
SCALE: 1/2

FOR GENERAL
PARTS LIST SE

WATER DISTRIBUTION
SKID ASSEMBLY

11-2-824447 0



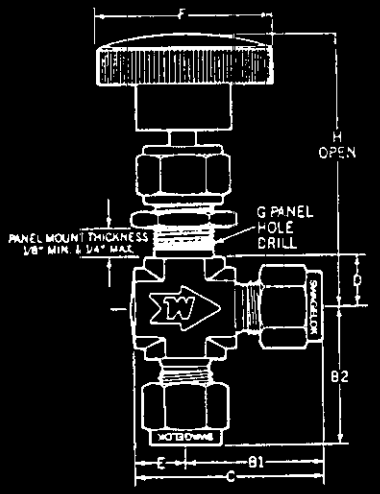


TABLE OF DIMENSIONS

BASIC ORDERING NUMBER	ORIFICE		C_v	CONNECTION SIZE		DIMENSIONS									
	In.	mm		INLET	OUTLET	A	B	B1	B2	C	D	E	F	G	H OPEN
-ORF2	0.080	2.0	0.09	1/8 Female NPT		1.88	.94	.94	.94	1.25	.44	.31	1.00	.47	2.29
-ORM2				1/8 Male NPT		1.50	.75	.75	.75	1.06					
-ORM2-S2				1/8 Male NPT	1/8 SWAGELOK	1.72		.97		1.28					
-ORS2				1/8 SWAGELOK		1.94	.97		.97						
-ORS3MM				3mm SWAGELOK											
-1RF2	0.172	4.4	0.37	1/8 Female NPT		1.62	.81	.81	.81	1.19	.44	.38	1.38	.53	2.34
-1RM2				1/8 Male NPT											
-1RM4				1/4 Male NPT		1.96	.98	.98	.98	1.36					
-1RM4-S4				1/4 Male NPT	1/4 SWAGELOK	2.11		1.13		1.51					
-1RS6MM				6mm SWAGELOK		2.26	1.13		1.13						
-1RS4				1/4 SWAGELOK											
-1RS8MM				8mm SWAGELOK		2.34	1.17	1.17	1.17	1.55					
-1RF4	0.250	6.4	0.73	1/4 Female NPT		2.12	1.06	1.06	1.06	1.56	.50	.50	1.88	.78	2.81
-1RF4RT[4]				1/4 ISO Female Tapered											
-1RM4-F4				1/4 Male NPT	1/4 Female NPT	2.19	1.13		1.13						
-1RM4-S6				1/4 Male NPT	3/8 SWAGELOK	2.42		1.29		1.79					
-1RM6				3/8 Male NPT		2.26		1.13		1.63					
-1RM6-S6				3/8 Male NPT	3/8 SWAGELOK	2.42		1.29		1.79					
-1RM6-S8				3/8 Male NPT	1/2 SWAGELOK	2.53		1.40		1.90	.56				
-1RS10MM				10mm SWAGELOK		2.60	1.30	1.30	1.30	1.80	.50				
-1RS6				3/8 SWAGELOK		2.58	1.29	1.29	1.29	1.79					
-1RS12MM				12mm SWAGELOK		2.80	1.40	1.40	1.40	1.90	.55				
-1RS8				1/2 SWAGELOK											
-18RF6	0.375	9.5	1.80	3/8 Female NPT		3.00	1.50	1.50	1.50	2.25	.75	.75	3.00	1.03	3.91
-18RF6RT[4]				3/8 ISO Female Tapered											
-18RF8				1/2 Female NPT											
-18RF8RT[4]				1/2 ISO Female Tapered											
-18RM8				1/2 Male NPT											
-18RM8-F8				1/2 Male NPT	1/2 Female NPT										
-18RS8				1/2 SWAGELOK		3.80	1.90	1.90	1.90	2.65					
-18RS12				3/4 SWAGELOK											

[4] Valves with RT ends conform to ISO 7/1. The following are various descriptions of the 7/1 thread: DIN-2999, BS 21, and JIS B0203. Consult your Authorized SWAGELOK Sales & Service Representative for further information.

Dimensions shown with SWAGELOK nuts finger-tight, where applicable. All dimensions are in inches (except where mm is indicated)—for reference only, subject to change.

ORDERING INFORMATION

Materials: Use B for brass, SS for 316 stainless steel, S for carbon steel, or M for alloy 400 as a prefix to the Basic Ordering Number. Example: S-1RF4

Stems: Basic Ordering Numbers specify Regulating stems (R). For a Vee stem, replace the R with V; for a Kel-F stem, replace the R with K. Example: SS-1VS4

Patterns: To order angle pattern valves, use -A as a suffix to the Ordering Number. Example: SS-1RF2-A. Some of the above valves are available in a cross pattern. Cross pattern valves offer uninterrupted flow between side ports at all times; on-off or metered flow through bottom port. Contact your Authorized SWAGELOK Sales & Service Representative for more information.

SOUR GAS SERVICE

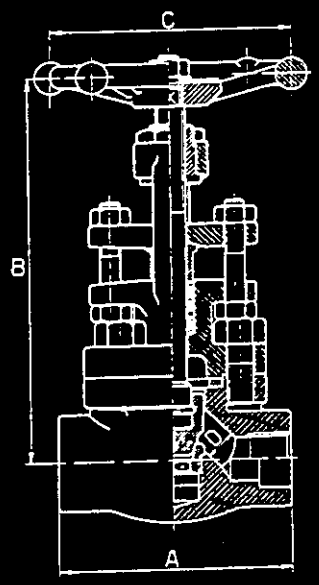
Materials are selected in accordance with NACE standard MR0175-92 requirements. Stems are alloy 400 and wetted stainless steel parts are annealed. To order, use -SG as a suffix to the Ordering Number. Example: SS-ORF2-SG

For information on the use of stainless steel instrument tube fittings in sour gas service, please refer to the NACE MR0175-92 specification.

CAUTION:
Do not mix or interchange parts of tube fittings made by other manufacturers with SWAGELOK Tube Fitting parts.

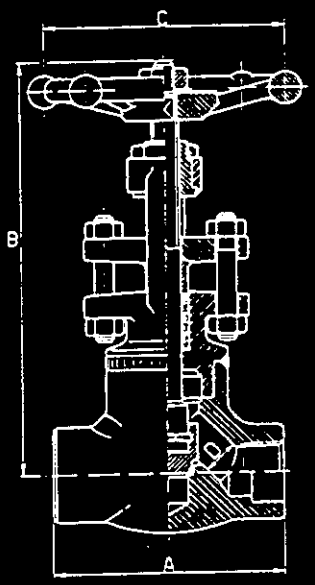
CONVENTIONAL & FULL PORT

BONNEY fig: 9HL-30 ...Conv. port.
9H-30 ...Full port.



Bolted Bonnet

fig. 9WL-30 ...Conv. port.
9W-30 ...Full port.



Welded Bonnet

Valves conform to API Standard 602 as far as applicable

VALVE DIMENSIONS

			¼	⅜	½	¾	1	1¼	1½	2
CONVENTIONAL PORT	A	End to End	—	—	90 3½	110 4⅜	127 5	150 5⅞	180 7⅛	210 8¼
	B	Centre to top-Open	—	—	166 6½	210 8¼	247 9¾	256 10⅛	299 11¾	374 14¾
	C	Handwheel dia.	—	—	88 3½	97 3⅞	138 5½	138 5½	172 6¾	172 6¾
	D	Seat port dia.	—	—	9 .354	12 .472	15 .590	20 .787	27 1.063	32 1.260
	BOLTED	Approx. weight - kg.	—	—	2.4	4.0	6.3	8.3	13.3	21.7
		Approx. weight - lbs.	—	—	5.28	8.8	13.86	18.26	29.26	47.74
	WELDED	Approx. weight - kg.	—	—	2.0	3.2	5.2	7.5	11.6	17.8
		Approx. weight - lbs.	—	—	4.4	7.04	11.44	16.5	25.52	39.16
FULL PORT	A	End to End	90 3½	90 3½	110 4⅜	127 5	150 5⅞	180 7⅛	210 8¼	230 9
	B	Centre to top-Open	166 6½	166 6½	210 8¼	247 9¾	256 10⅛	299 11¾	374 14¾	428 16⅞
	C	Handwheel dia.	88 3½	88 3½	97 3⅞	138 5½	138 5½	172 6¾	172 6¾	234 9¼
	D	Seat port dia.	7 .275	9 .354	12 .472	15 .590	20 .787	27 1.063	32 1.260	40 1.575
	BOLTED	Approx. weight - kg.	2.4	2.4	4.0	6.4	8.5	13.5	21.9	37.0
		Approx. weight - lbs.	5.28	5.28	8.8	14.08	18.7	29.7	48.18	81.62
	WELDED	Approx. weight - kg.	2.1	2.1	3.5	5.5	7.7	11.8	18.0	24.5
		Approx. weight - lbs.	4.62	4.62	7.7	12.1	16.94	25.96	39.6	53.9

— Complete pressure-Temperature Rating on page 32.
— Material specification on page 30.
— Threaded and S. W. dimensions on page 33.
— Ordering and Specifications on page 4.

****
** **
** AUTOPIPE SYSTEM DATA LISTING **
** **
****

SYSTEM NAME : MANIFOLD

PROJECT ID : 101SY DECON SYSTEM

PREPARED BY : Kevi Cleveland 8-31-95
K. CLEVELAND

CHECKED BY : NGUYEN HA Dr Helman 8-31-95

PIPING CODE : B31.3

AMBIENT TEMP. (deg F) : 70.0

COMPONENT LIBRARY : AUTOPIPE

MATERIAL LIBRARY : AUTOB313

MODEL REVISION NUMBER : 14

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 MODEL PAGE 2

P O I N T D A T A L I S T I N G

POINT NAME	TYPE	-----OFFSETS (ft)----- X	Y	Z	PIPE ID	DESCRIPTION
*** SEGMENT A						
A00	Run	0	0	0	6"SCH160	
A01	Tee	0.75	0	0		
A02	Run	0.50	0	0		
A03	Tee	0.50	0	0		
A04	Tee	1.00	0	0		
A05	Run	0.50	0	0		
A06	Tee	0.50	0	0		
A07	Run	1.00	0	0		
*** SEGMENT B						
A01	Tee	0.75	0	0	2"SCH160	
B01	Valv	0	0	-0.92		Weight = 1 lb Surface factor = 0.00, SIF = 2.30
B02	Run	0	0	-0.25		
*** SEGMENT C						
A03	Tee	1.75	0	0	2"SCH160	
C01	Valv	0	0	-0.92		Rating = 1500, Weight = 82 lb Surface factor = 0.00, SIF = 2.30
C02	Run	0	0	-0.75		
*** SEGMENT D						
A04	Tee	2.75	0	0	2"SCH160	
D01	Valv	0	0	-0.92		Weight = 1 lb Surface factor = 0.00, SIF = 2.30
D02	Run	0	0	-0.25		
*** SEGMENT E						
A06	Tee	3.75	0	0	2"SCH160	
E01	Valv	0	0	-0.92		Weight = 1 lb Surface factor = 0.00, SIF = 2.30
E02	Run	0	0	-0.25		

*** SEGMENT F						
A01	Tee	0.75	0	0	3"SCH160	
F01	Run	0	0	0.50		
F06	Run	0	0	0.33		
F02	Valv	0	0	0.90		Rating = 1500, Weight = 200 lb
						Surface factor = 0.00, SIF = 1.00
F03	Run	0	0	1.27		
F04	Run	0	0	0.50		
F05	Run	0	0	0.33		
F07	Run	0	0	0.56		

POINT DATA LISTING

POINT NAME	TYPE	-----OFFSETS (ft)----- X	Y	Z	PIPE ID	DESCRIPTION
*** SEGMENT G						
A06	Tee	3.75	0	0	3"SCH160	
G01	Run	0	0	0.50		
G02	Run	0	0	0.33		
G03	Valv	0	0	0.50		Weight = 16 lb Surface factor = 1.00, SIF = 1.00
G04	Run	0	0	0.50		
G05	Valv	0	0	0.50		Weight = 16 lb Surface factor = 1.00, SIF = 1.00
G06	Run	0	0	0.50		
G07	Run	0	0	0.50		
G08	Run	0	0	0.33		
G09	Run	0	0	0.33		

Total weight of empty pipes : 330 lb

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 MODEL PAGE 4

C O M P O N E N T D A T A L I S T I N G

POINT NAME	---COORDINATE(ft X	Y	Z)---	DATA TYPE	DESCRIPTION
*** SEGMENT A					
A00	0.00	0.00	0.00	FORCES	Press 1
A01	0.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.98, Out = 2.30
A02	1.25	0.00	0.00	ANCHOR	Transnational stiffness lb/in
					X= RIGID Y= RIGID Z= RIGID
					Rotational stiffness ft-lb/deg
					X= RIGID Y= RIGID Z= RIGID
					Release for Hanger design : X XXYYZZ
					Thermal movements : None
A03	1.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.30, Out = 1.40
A04	2.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.30, Out = 1.40
A05	3.25	0.00	0.00	GUIDE	ID : A05 1, Connected to Ground
					Stiffness = RIGID
					Gap-down = 0.00, Above = 0.00 inch
					Gap-left = 0.03, Right = 0.03 inch
					Friction = 0.30
					Gaps set Weightless
A06	3.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.98, Out = 2.30
A07	4.75	0.00	0.00	FORCES	Press 1
*** SEGMENT B					
A01	0.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.98, Out = 2.30
B01	0.75	0.00	-0.92		
B02	0.75	0.00	-1.17	WEIGHT	12 lb , No offsets
*** SEGMENT C					
A03	1.75	0.00	0.00	TEE	Reinforced tee
					Pad thickness = 0.50inch
					SIF - In = 1.30, Out = 1.40
C01	1.75	0.00	-0.92		
C02	1.75	0.00	-1.67	WEIGHT	12 lb , No offsets

```
*** SEGMENT D
A04       2.75    0.00    0.00 TEE    Reinforced tee
                                       Pad thickness = 0.50inch
                                       SIF - In = 1.30, Out = 1.40
D01       2.75    0.00   -0.92
D02       2.75    0.00   -1.17 WEIGHT 12 lb    ,  No offsets
```

MANIFOLD 101SY DECON SYSTEM — ICF KAISER HANFORD
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COMPONENT DATA LISTING

POINT NAME	COORDINATE(ft) X	Y	Z	DATA TYPE	DESCRIPTION
*** SEGMENT E					
A06	3.75	0.00	0.00	TEE	Reinforced tee Pad thickness = 0.50inch SIF - In = 1.98, Out = 2.30
E01	3.75	0.00	-0.92		
E02	3.75	0.00	-1.17	WEIGHT	12 lb , No offsets
*** SEGMENT F					
A01	0.75	0.00	0.00	TEE	Reinforced tee Pad thickness = 0.50inch SIF - In = 1.98, Out = 2.30
F01	0.75	0.00	0.50	GUIDE	ID : F01 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.30 Gaps set Weightless
F06	0.75	0.00	0.83	GUIDE	ID : F06 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.00 Gaps set Weightless
F02	0.75	0.00	1.73	FLANGE	Weld neck SIF = 1.00 Rating = 1500, Weight = 48 lb
F03	0.75	0.00	3.00	FLANGE	Weld neck SIF = 1.00 Rating = 1500, Weight = 48 lb
F04	0.75	0.00	3.50	GUIDE	ID : F04 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.30 Gaps set Weightless
F05	0.75	0.00	3.83	GUIDE	ID : F05 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.00 Gaps set Weightless
F07	0.75	0.00	4.39		

*** SEGMENT G				
A06	3.75	0.00	0.00 TEE	Reinforced tee
				Pad thickness = 0.50inch
				SIF - In = 1.98, Out = 2.30
G01	3.75	0.00	0.50 GUIDE	ID : G01 1, Connected to Ground
				Stiffness = RIGID
				Gap-down = 0.00, Above = 0.00 inch
				Gap-left = 0.03, Right = 0.03 inch

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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COMPONENT DATA LISTING

POINT NAME	---COORDINATE(ft)--- X	Y	Z	DATA TYPE	DESCRIPTION
					Friction = 0.30 Gaps set Weightless
G02	3.75	0.00	0.83	GUIDE	ID : G02 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.00 Gaps set Weightless
G03	3.75	0.00	1.33		
G04	3.75	0.00	1.83		
G05	3.75	0.00	2.33		
G06	3.75	0.00	2.83		
G07	3.75	0.00	3.33	GUIDE	ID : G07 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.00 Gaps set Weightless
G08	3.75	0.00	3.66	GUIDE	ID : G08 1, Connected to Ground Stiffness = RIGID Gap-down = 0.00, Above = 0.00 inch Gap-left = 0.03, Right = 0.03 inch Friction = 0.00 Gaps set Weightless
G09	3.75	0.00	3.99		

Number of points in the system : 38

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P I P E D A T A L I S T I N G

Pipe ID/ Material	Nom/ Sch	O.D. inch	Thickness(inch) W.Th.	Corr	Mill	Insu	Ling	Spec Grav	Weight(lb/ft) Pipe	Other	Total
6"SCH160 A106-B	6 160	6.625	0.718	0	0.09	0	0	1.00	45.25	0	54.41
2"SCH160 A106-B	2.000 160	2.375	0.343	0	0.04	0	0	1.00	7.44	0	8.41
3"SCH160 A106-B	3.000 160	3.500	0.438	0	0.05	0	0	1.00	14.31	0	16.65

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M A T E R I A L D A T A L I S T I N G

Material Name	Pipe ID	Density lb/cu.ft	Pois. Ratio	Temper. deg F	Modulus E6 psi	Expans. in/100ft	Allow. psi
A106-B	6"SCH160	489.0	0.30	70.0	29.50		20000.0
				150.0		0.6092	20000.0
A106-B	2"SCH160	489.0	0.30	70.0	29.50		20000.0
				150.0		0.6092	20000.0
A106-B	3"SCH160	489.0	0.30	70.0	29.50		20000.0
				150.0		0.6092	20000.0

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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TEMPERATURE AND PRESSURE DATA

POINT NAME	CASE 1 PRESS. psi	CASE 1 TEMPER deg F	CASE 1 EXPAN. in/100ft	CASE 2 PRESS. psi	CASE 2 TEMPER deg F	CASE 2 EXPAN. in/100ft	CASE 3 PRESS. psi	CASE 3 TEMPER deg F	CASE 3 EXPAN. in/100ft
*** SEGMENT A									
A00	3300	150	0.609						
A07	3300	150	0.609						
*** SEGMENT B									
A01	3300	150	0.609						
B02	3300	150	0.609						
*** SEGMENT C									
A03	3300	150	0.609						
C02	3300	150	0.609						
*** SEGMENT D									
A04	3300	150	0.609						
D02	3300	150	0.609						
*** SEGMENT E									
A06	3300	150	0.609						
E02	3300	150	0.609						
*** SEGMENT F									
A01	3300	150	0.609						
F07	3300	150	0.609						
*** SEGMENT G									
A06	3300	150	0.609						
G09	3300	150	0.609						

FORCES AND DISPLACEMENTS
(Force - lb , Moment - ft-lb , Tran.- in , Rot.- deg)

POINT NAME	LOAD CASE	TYPE	X	Y	Z	XX	YY	ZZ
A00	P1	FORCE	-44000	0	0	0	0	0
A07	P1	FORCE	44000	0	0	0	0	0

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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A N A L Y S I S S U M M A R Y

Current model revision number : 14

Static -	Date and Time of analysis	Apr 10, 1995 9:18 AM
	Model Revision Number	14
	Number of load cases	3
	Load cases analyzed	GR T1 P1
	Gaps/Friction/Yielding considered	Yes
	Tolerance - Force, Displacement	100.00 lb 0.0162 in
	Friction - Factor, tolerance	1.00 0.10
	Hanger design run	No
	Cut short included	No
	Occasional load analysis type	Nonlinear
	Non-linear analysis summary file	MANIFOLD.LOG
	Base load cases for nonlinear analysis	
		GR = None
		T1 = GR
		P1 = T1
	Weight of contents included	Yes
	Pressure stiffening case	0
	Water elevation for buoyancy loads	Not considered

CODE COMPLIANCE COMBINATIONS

Combination	Category	Method	Load	Factor	Allowable	Remarks
GR + Max P	Sustain	Sum	Gravity	1.00	Automatic	Default
			Max Long	1.00		
Cold to T1	Expansion	Sum	Thermal 1	1.00	Automatic	Default
Max P	Hoop		Max Hoop	1.00	Automatic	Default

OTHER USER COMBINATIONS

Combination	Method	Load	Factor	Remarks
GR	Sum	Gravity	1.00	Default
T1	Sum	Thermal 1	1.00	Default
P1	Sum	Press 1	1.00	Default
GR+T1	Sum	Gravity	1.00	User
		Thermal 1	1.00	

CODE COMPLIANCE

Y - Factor 0.40
Weld efficiency factor 1.00
Range reduction factor 1.00
Design Pressure Factor 1.00
Minimum stress ratio used in reports... 0.00
Include corrosion in stress calcs. .... Y
Include torsion in code stress ..... N
Include axial force in code stress .... N
Longitudinal pressure calculation PD/4t
Include rigorous pressure ..... Y

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 3

D I S P L A C E M E N T S

Point name	Load combination	TRANSLATIONS (in) X	Y	Z	ROTATIONS (deg) X	Y	Z
*** Segment A begin ***							
A00	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.008	0.000	0.000	0.000	0.000	0.000
	P1	-0.003	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.008	0.000	0.000	0.000	0.000	0.000
A01	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.000	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.000	0.000	0.000	0.000
A02	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.000	0.000	0.000	0.000	0.000	0.000
	P1	0.000	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.000	0.000	0.000	0.000	0.000	0.000
A03	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.003	0.000	0.000	0.000	0.000	0.000
	P1	0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.003	0.000	0.000	0.000	0.000	0.000
A04	GR	0.000	0.000	0.000	-0.001	0.000	0.000
	T1	0.009	0.000	0.000	0.000	0.000	0.000
	P1	0.003	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.009	0.000	0.000	-0.001	0.000	0.000
A05	GR	0.000	0.000	0.000	-0.001	0.000	0.000
	T1	0.012	0.000	0.000	0.000	0.000	0.000
	P1	0.004	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.012	0.000	0.000	-0.001	0.000	0.000
A06	GR	0.000	0.000	0.000	-0.001	0.000	0.000
	T1	0.015	0.000	0.000	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.000	-0.001	0.000	0.000
A07	GR	0.000	0.000	0.000	-0.001	0.000	0.000

T1	0.021	0.000	0.000	0.000	0.000	0.000
P1	0.007	0.000	0.000	0.000	0.000	0.000
GR+T1	0.021	0.000	0.000	-0.001	0.000	0.000

*** Segment A end ***

*** Segment B begin ***

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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D I S P L A C E M E N T S

Point name	Load combination	TRANSLATIONS (in) X	Y	Z	ROTATIONS (deg) X	Y	Z
A01	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.000	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.000	0.000	0.000	0.000
B01	GR	0.000	0.000	0.000	-0.002	0.000	0.000
	T1	-0.003	0.000	-0.006	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	-0.006	-0.002	0.000	0.000
B02	GR	0.000	0.000	0.000	-0.002	0.000	0.000
	T1	-0.003	0.000	-0.007	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	-0.007	-0.002	0.000	0.000
*** Segment B end ***							
*** Segment C begin ***							
A03	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.003	0.000	0.000	0.000	0.000	0.000
	P1	0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.003	0.000	0.000	0.000	0.000	0.000
C01	GR	0.000	-0.002	0.000	-0.019	0.000	0.000
	T1	0.003	0.000	-0.006	0.000	0.000	0.000
	P1	0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.003	-0.002	-0.006	-0.019	0.000	0.000
C02	GR	0.000	-0.005	0.000	-0.019	0.000	0.000
	T1	0.003	0.000	-0.010	0.000	0.000	0.000
	P1	0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.003	-0.005	-0.010	-0.019	0.000	0.000
*** Segment C end ***							
*** Segment D begin ***							
A04	GR	0.000	0.000	0.000	-0.001	0.000	0.000

	T1	0.009	0.000	0.000	0.000	0.000	0.000
	P1	0.003	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.009	0.000	0.000	-0.001	0.000	0.000
D01	GR	0.000	0.000	0.000	-0.003	0.000	0.000
	T1	0.009	0.000	-0.006	0.000	0.000	0.000
	P1	0.003	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.009	0.000	-0.006	-0.003	0.000	0.000

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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D I S P L A C E M E N T S

Point name	Load combination	TRANSLATIONS (in) X	Y	Z	ROTATIONS (deg) X	Y	Z
D02	GR	0.000	-0.001	0.000	-0.003	0.000	0.000
	T1	0.009	0.000	-0.007	0.000	0.000	0.000
	P1	0.003	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.009	-0.001	-0.007	-0.003	0.000	0.000
*** Segment D end ***							
*** Segment E begin ***							
A06	GR	0.000	0.000	0.000	-0.001	0.000	0.000
	T1	0.015	0.000	0.000	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.000	-0.001	0.000	0.000
E01	GR	0.000	0.000	0.000	-0.003	0.000	0.000
	T1	0.015	0.000	-0.006	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	-0.006	-0.003	0.000	0.000
E02	GR	0.000	-0.001	0.000	-0.003	0.000	0.000
	T1	0.015	0.000	-0.007	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	-0.001	-0.007	-0.003	0.000	0.000
*** Segment E end ***							
*** Segment F begin ***							
A01	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.000	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.000	0.000	0.000	0.000
F01	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.003	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.003	0.000	0.000	0.000
F06	GR	0.000	0.000	0.000	0.001	0.000	0.000
	T1	-0.003	0.000	0.005	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000

	GR+T1	-0.003	0.000	0.005	0.001	0.000	0.000
F02	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.011	0.000	0.000	0.000
	P1	-0.001	0.000	0.001	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.011	0.000	0.000	0.000

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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D I S P L A C E M E N T S

Point name	Load combination	TRANSLATIONS (in) X	Y	Z	ROTATIONS (deg) X	Y	Z
F03	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.018	0.000	0.000	0.000
	P1	-0.001	0.000	-0.001	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.018	0.000	0.000	0.000
F04	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.021	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.021	0.000	0.000	0.000
F05	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.023	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.023	0.000	0.000	0.000
F07	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	-0.003	0.000	0.027	0.000	0.000	0.000
	P1	-0.001	0.000	0.000	0.000	0.000	0.000
	GR+T1	-0.003	0.000	0.027	0.000	0.000	0.000
*** Segment F end ***							
*** Segment G begin ***							
A06	GR	0.000	0.000	0.000	-0.001	0.000	0.000
	T1	0.015	0.000	0.000	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.000	-0.001	0.000	0.000
G01	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.003	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.003	0.000	0.000	0.000
G02	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.005	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.005	0.000	0.000	0.000
G03	GR	0.000	0.000	0.000	0.000	0.000	0.000

	T1	0.015	0.000	0.008	0.000	0.000	0.000
	P1	0.005	0.000	0.001	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.008	0.000	0.000	0.000
G04	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.011	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.011	0.000	0.000	0.000

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
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D I S P L A C E M E N T S

Point name	Load combination	TRANSLATIONS (in) X	Y	Z	ROTATIONS (deg) X	Y	Z
G05	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.014	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.014	0.000	0.000	0.000
G06	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.017	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.017	0.000	0.000	0.000
G07	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.020	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.020	0.000	0.000	0.000
G08	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.022	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.022	0.000	0.000	0.000
G09	GR	0.000	0.000	0.000	0.000	0.000	0.000
	T1	0.015	0.000	0.024	0.000	0.000	0.000
	P1	0.005	0.000	0.000	0.000	0.000	0.000
	GR+T1	0.015	0.000	0.024	0.000	0.000	0.000

*** Segment G end ***

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 8

RESTRAINT REACTIONS

Point name	Load combination	FORCES (lb) X	Y	Z	Result	MOMENTS (ft-lb) X	Y	Z	Result
A02	Anchor								
	GR	0	-182	0	182	-169	0	13	169
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-182	0	182	-169	0	13	169
A05	Guide								
	GR	0	-241	0	241	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-241	0	241	0	0	0	0
F01	Guide								
	GR	0	78	0	78	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	78	0	78	0	0	0	0
F06	Guide								
	GR	0	-253	0	253	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-253	0	253	0	0	0	0
F04	Guide								
	GR	0	-289	0	289	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-289	0	289	0	0	0	0
F05	Guide								
	GR	0	95	0	95	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	95	0	95	0	0	0	0
G01	Guide								
	GR	0	-2	0	2	0	0	0	0

	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-2	0	2	0	0	0	0
GO2	Guide								
	GR	0	-24	0	24	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-24	0	24	0	0	0	0

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 9

R E S T R A I N T R E A C T I O N S

Point name	Load combination	FORCES (lb) X	Y	Z	Result	MOMENTS (ft-lb) X	Y	Z	Result
G07	Guide								
	GR	0	-54	0	54	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	-54	0	54	0	0	0	0
G08	Guide								
	GR	0	14	0	14	0	0	0	0
	T1	0	0	0	0	0	0	0	0
	P1	0	0	0	0	0	0	0	0
	GR+T1	0	14	0	14	0	0	0	0

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 10

ASME B31.3c (1992) CODE COMPLIANCE

Point name	Load combination	(Moments in ft-lb) In-Pl. Moment	Out-Pl. Moment	Torsion Moment	S.I.F In	S.I.F Out	Eq. no.	Load type	(Stress in psi) Code Stress	Code Allow.
*** Segment A begin ***										
A00	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	0		1.00	1.00	(18)	SUST	10915	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
A01 -	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	15		1.98	2.30	(18)	SUST	10938	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
A01 +	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	15		1.98	2.30	(18)	SUST	10938	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
A02 -	Max P						(3a)	HOOP	16086	20000
	GR + Max P	44	0		1.00	1.00	(18)	SUST	10944	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
A02 +	Max P						(3a)	HOOP	16086	20000
	GR + Max P	31	0		1.00	1.00	(18)	SUST	10936	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
A03 -	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	18		1.30	1.40	(18)	SUST	10931	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000
A03 +	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	18		1.30	1.40	(18)	SUST	10931	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000
A04 -	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	27		1.30	1.40	(18)	SUST	10940	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000
A04 +	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	27		1.30	1.40	(18)	SUST	10940	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000

A05	Max P					(3a)	HOOP	16086	20000
	GR + Max P	81	0	1.00	1.00	(18)	SUST	10969	20000
	Cold to T1	0	0	0 1.00	1.00	(17)	DISP	0	30000
A06	- Max P					(3a)	HOOP	16086	20000
	GR + Max P	0	27	1.98	2.30	(18)	SUST	10957	20000
	Cold to T1	0	0	0 1.98	2.30	(17)	DISP	0	30000

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 11

ASME B31.3c (1992) CODE COMPLIANCE

Point name	Load combination	In-Pl. Moment (Moments in ft-lb)	Out-Pl. Moment	Torsion Moment	S.I.F In	S.I.F Out	Eq. no.	Load type	Code Stress (Stress in psi)	Code Allow.
A06	+ Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	27		1.98	2.30	(18)	SUST	10957	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
A07	Max P						(3a)	HOOP	16086	20000
	GR + Max P	0	0		1.00	1.00	(18)	SUST	10915	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
*** Segment A end ***										
*** Segment B begin ***										
A01	Max P						(3a)	HOOP	11743	20000
	GR + Max P	0	19		1.98	2.30	(18)	SUST	5936	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
B01	Max P						(3a)	HOOP	11743	20000
	GR + Max P	3	0		2.30	2.30	(18)	SUST	5801	20000
	Cold to T1	0	0	0	2.30	2.30	(17)	DISP	0	30000
*** Segment B end ***										
*** Segment C begin ***										
A03	Max P						(3a)	HOOP	11743	20000
	GR + Max P	0	131		1.30	1.40	(18)	SUST	7123	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000
C01	Max P						(3a)	HOOP	11743	20000
	GR + Max P	40	0		2.30	2.30	(18)	SUST	6841	20000
	Cold to T1	0	0	0	2.30	2.30	(17)	DISP	0	30000
*** Segment C end ***										
*** Segment D begin ***										
A04	Max P						(3a)	HOOP	11743	20000
	GR + Max P	0	19		1.30	1.40	(18)	SUST	5916	20000
	Cold to T1	0	0	0	1.30	1.40	(17)	DISP	0	30000

D01	Max P						(3a)	HOOP	11743	20000
	GR + Max P	3	0		2.30	2.30	(18)	SUST	5801	20000
	Cold to T1	0	0	0	2.30	2.30	(17)	DISP	0	30000

*** Segment D end ***

*** Segment E begin ***

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 12

ASME B31.3c (1992) CODE COMPLIANCE

Point name	Load combination	(Moments in ft-lb) In-Pl. Moment	Out-Pl. Moment	Torsion Moment	S.I.F In	S.I.F Out	Eq. no.	Load type	(Stress in psi) Code Stress	Code Allow.
A06	Max P						(3a)	HOOP	11743	20000
	GR + Max P	0	19		1.98	2.30	(18)	SUST	5936	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
E01	Max P						(3a)	HOOP	11743	20000
	GR + Max P	3	0		2.30	2.30	(18)	SUST	5801	20000
	Cold to T1	0	0	0	2.30	2.30	(17)	DISP	0	30000
*** Segment E end ***										
*** Segment F begin ***										
A01	Max P						(3a)	HOOP	13758	20000
	GR + Max P	0	1		1.98	2.30	(18)	SUST	6602	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
F01	Max P						(3a)	HOOP	13758	20000
	GR + Max P	10	0		1.00	1.00	(18)	SUST	6635	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
F06	Max P						(3a)	HOOP	13758	20000
	GR + Max P	46	0		1.00	1.00	(18)	SUST	6783	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
F02	Max P						(3a)	HOOP	13758	20000
	GR + Max P	77	0		1.00	1.00	(18)	SUST	6911	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
F03	Max P						(3a)	HOOP	13758	20000
	GR + Max P	50	0		1.00	1.00	(18)	SUST	6799	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
F04	Max P						(3a)	HOOP	13758	20000
	GR + Max P	38	0		1.00	1.00	(18)	SUST	6750	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
F05	Max P						(3a)	HOOP	13758	20000
	GR + Max P	3	0		1.00	1.00	(18)	SUST	6603	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000

F07	Max P						(3a) HOOP	13758	20000
	GR + Max P	0	0		1.00	1.00	(18) SUST	6592	20000
	Cold to T1	0	0	0	1.00	1.00	(17) DISP	0	30000

*** Segment F end ***

*** Segment G begin ***

MANIFOLD 101SY DECON SYSTEM ICF KAISER HANFORD
04/10/95 AutoPIPE+4.50 RESULT PAGE 13

ASME B31.3c (1992) CODE COMPLIANCE

Point name	Load combination	(Moments in ft-lb) In-Pl. Moment	Out-Pl. Moment	Torsion Moment	S.I.F In	S.I.F Out	Eq. no.	Load type	(Stress in psi) Code Stress	Code Allow.
A06	Max P						(3a)	HOOP	13758	20000
	GR + Max P	0	20		1.98	2.30	(18)	SUST	6781	20000
	Cold to T1	0	0	0	1.98	2.30	(17)	DISP	0	30000
G01	Max P						(3a)	HOOP	13758	20000
	GR + Max P	13	0		1.00	1.00	(18)	SUST	6645	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G02	Max P						(3a)	HOOP	13758	20000
	GR + Max P	10	0		1.00	1.00	(18)	SUST	6633	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G03	Max P						(3a)	HOOP	13758	20000
	GR + Max P	3	0		1.00	1.00	(18)	SUST	6607	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G04	Max P						(3a)	HOOP	13758	20000
	GR + Max P	10	0		1.00	1.00	(18)	SUST	6635	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G05	Max P						(3a)	HOOP	13758	20000
	GR + Max P	10	0		1.00	1.00	(18)	SUST	6636	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G06	Max P						(3a)	HOOP	13758	20000
	GR + Max P	4	0		1.00	1.00	(18)	SUST	6610	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G07	Max P						(3a)	HOOP	13758	20000
	GR + Max P	8	0		1.00	1.00	(18)	SUST	6626	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G08	Max P						(3a)	HOOP	13758	20000
	GR + Max P	1	0		1.00	1.00	(18)	SUST	6596	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000
G09	Max P						(3a)	HOOP	13758	20000
	GR + Max P	0	0		1.00	1.00	(18)	SUST	6592	20000
	Cold to T1	0	0	0	1.00	1.00	(17)	DISP	0	30000

*** Segment G end ***

SYSTEM SUMMARY

Maximum displacements (in)

Maximum X :	0.021	Point : A07	Load Comb.: T1
Maximum Y :	-0.005	Point : C02	Load Comb.: GR
Maximum Z :	0.027	Point : F07	Load Comb.: T1
Max. total:	0.029	Point : G09	Load Comb.: T1

Maximum rotations (deg)

Maximum X :	-0.019	Point : C02	Load Comb.: GR
Maximum Z :	0.000	Point : A07	Load Comb.: GR
Max. total:	0.019	Point : C02	Load Comb.: GR

Maximum restraint forces(lb)

Maximum Y :	-289	Point : F04	Load Comb.: GR
Max. total:	289	Point : F04	Load Comb.: GR

Maximum restraint moments(ft-lb)

Maximum X :	-169	Point : A02	Load Comb.: GR
Maximum Z :	13	Point : A02	Load Comb.: GR
Max. total:	169	Point : A02	Load Comb.: GR

S Y S T E M S U M M A R Y

Maximum sustained stress

Point	: A05
Stress psi	: 10969
Allowable psi	: 20000
Ratio	: 0.55
Load combination	: GR + Max P

Maximum displacement stress

Point	: A04
Stress psi	: 0
Allowable psi	: 30000
Ratio	: 0.00
Load combination	: Cold to T1

Maximum hoop stress

Point	: A00
Stress psi	: 16086
Allowable psi	: 20000
Ratio	: 0.80
Load combination	: Max P

Maximum sustained stress ratio

Point	: A05
Stress psi	: 10969
Allowable psi	: 20000
Ratio	: 0.55
Load combination	: GR + Max P

Maximum displacement stress ratio

Point	: A04
Stress psi	: 0
Allowable psi	: 30000
Ratio	: 0.00

Load combination : Cold to T1

Maximum hoop stress ratio

Point		: A00
Stress	psi	: 16086
Allowable	psi	: 20000
Ratio		: 0.80
Load combination		: Max P

SYSTEM SUMMARY

* * * The system satisfies ASME B31.3 code requirements * * *
* * * for the selected options * * *

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ATTACHMENT B

YOKE WATER CONNECTOR
STRESS ANALYSIS

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DESIGN ANALYSIS

Client WHC | WO/Job No. CR1417

Subject FLUSH LINE STRESS ANALYSIS | Date 8-30-94 | By KEVIN CLEVELAND

Checked By RAY SCHWEHR

Location 200W | Revised By

OBJECTIVE

This calculation will verify the strength of the threads on the two inch flush line used for Yoke Water Connector and the threads of the firehose connector.

DESIGN INPUTS

GIVEN DATA

1. Safety Class = 3

2. Materials Pipe = ASTM A53
   Hose connector = ASTM B584 C84400

ASSUMPTIONS

Threads on firehose connector are weakest link in system, if threads qualify then all other components qualify.

No seismic analysis is preformed because of the unlikelihood of an earthquake during pump removal.

METHODS

Mathcad 4.0 is used to do the calculation.

REFERENCES

1. Navco Piping Datalog, edition NO. 11-1984.

2. Machinery's Handbook, 24th edition.

3. Standard Handbook of Machine Design, 1986, Shingley & Mischke

4. Angus Fire vendor information

5. Drawing H-2-824443

CONCLUSION

Based on the analysis presented in this calculation the system passes.

Calc. No.
Revision 0

DESIGN ANALYSIS

Client WHC
WO/Job No. CR1417
Subject FLUSH LINE STRESS ANALYSIS
Date 8-30-94 By KEVIN CLEVELAND
Checked By RAY SCHWEHR
Location 200W
Revised By

Thread stress calculation for a 2" pipe coupling

The following varibles will be use in the calculation.

The force on the threads	F
The end-condtion factor	ξ
The number of threads engaged	N_e
Major diameter	D
Minor diameter	d
Angle of leading thread flank	α
Lead angle	λ
Thread coefficient of friction	μ_t

The total force on the threads will be the weight of the hose and water + the pressure force on the inside of the pipe

Weight of 100 ft of hose and water W_1 is 177 lbs + 48 lbs for dragging additional hose on the ground REF 4

$W_1 := 225 \cdot lb$

Force on end of pipe due to water pressure is: Pressure X Area

$P := 300 \cdot \frac{lb}{in^2}$ $A := 4.43 \cdot in^2$ REF 1

$W_2 := P \cdot A$ $W_2 = 1.33 \cdot 10^3 \cdot lb$

Total force is

$F := W_1 + W_2$ $F = 1.55 \cdot 10^3 \cdot lb$

DESIGN ANALYSIS

Client WHC | WO/Job No. CR1417

Subject FLUSH LINE STRESS ANALYSIS | Date 8-30-94 | By KEVIN CLEVELAND

Checked By RAY SCHWEHR

Location 200W | Revised By

The lead angle and the angle of leading thread flank are the same for pipe threads. From REF 2 t angle between thread sides is 60°. From REF 3 the friction coefficient for metal to metal contact is 0.6.

$\lambda := 30 \cdot deg \quad \alpha := 30 \cdot deg \quad \mu_t := 0.6$

The end-condition factor is

$$\xi := \frac{\cos(\alpha)}{\left[1 + (\tan(\alpha))^2 \cdot (\cos(\lambda))^2\right]^{-.5} - \mu_t \cdot \tan(\lambda)} \qquad \xi = 1.58$$

REF 3

The major diameter, minor diameter and number of threads engaged are:

$D := 2.339 \cdot in$

REF 1

$d := 2.199 \cdot in$

For a 2" pipe the number of threads per inch is 11.5 and the effective length of engagement for handtight is 0.463

$N_e := 11.5 \cdot 0.463 \qquad N_e = 5.32$ REF 2

The thread bearing stress is found using the following equation

$$\sigma := \frac{4 \cdot F \cdot \xi}{\pi \cdot N_e \cdot (D^2 - d^2)} \qquad \sigma = 924.33 \cdot \frac{lb}{in^2}$$

REF 3

Allowable stress for A53 is 20,000 psi > 924 psi OK
Allowable sterss for B584 is 7250 psi > 924 psi OK

Pipe thread stresses pass analysis.

Average Hose, Coupling, Water, and Total Weights(100f)

SIZE	HOSE	COUP.	WATER	TOTAL
1 1/2 CHIEF	31 lbs.	1 lbs.	78 lbs.	110 lbs.
1 3/4 Chief	35.5	1.5	104	141
1 3/4 H,C.	30	1.5	104	135.5
2 Chief	39.5	1.5	136	177
2 1/2 Chief	53.5	2.5	223	279
3 Chief	66.75	3.75	306	376.5
4 Hi Vol	77.25	7.75	544	629
5 Hi Vol	98.5	10.5	850	959

note: 4-5" Hi Vol coupling weights for corr-grip

VOLUME OF WATER PER 100 FEET

1 1/2 in.	9.4 gals.
1 3/4	12.5
2	16.3
2 1/2	26.8
3	36.7
4	65.3
5	102

REF 4

ATTACHMENT C

AIR RECEIVER TANK SIZING

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Calc. No.

Revision 0

DESIGN ANALYSIS

Client Westinghouse Hanford Company

WO/Job No. 101-SY Pump Disposal Project

Subject Blow-down of the 101-SY Mixer Pump plenum flush line.

Date 4-3-95 By RP Schwehr

Checked 4-4-95 By BD Andres

Location 241-SY Tank Farm

Revised By

Objective:

Calculate the volume and initial charging pressure of an air tank needed to clear a 2" water pipe and hose assembly. This assembly is 44' long and includes 33' of 2" Sch 40 pipe within the 101-SY mixer pump, 8' of 2" suction hose and 36" of yoke water connection pipe and fittings (2" NPS). The hose and fittings extend up from the mixer pump column cap to the cross member of the mixer pump lifting yoke. The assembly will be blown out when vertically oriented with the air line attached at the top end. At the bottom end of the assembly are two series connected 2" spring loaded check valves. Check valve cracking pressure is 2 - 4 psi. Also, estimate the potential pressure spike the volume of air within the bag and blast shield will undergo when excess air leaves the pipe and hose assembly.

Assumptions:

Ideal gas law conditions prevail (PV = mRT). Mass, universal gas constant and temperature are constant regardless of changing volumes and pressures for a fixed amount of air.

References:

1. Grainger Catalog No. 386. (Refer to attached page C-9)
2. H-2-821387 Flexible Receiver Blast Shield Assembly
3. H-2-821391 Flexible Receiver Bag Assembly
4. H-2-815003 HMT Impact Limiting System Assemblies
5. DSI - HMT Mixer Pump Convenient As-Built Dimensions (pages C-10 & C-11)
6. Hazleton™ DWG E-22679 (page C-12)
7. H-2-89948 HMT 16" Mid Column Assy & Details
8. Hazleton™ Parts Reference Drawing (page C-13)
9. H-2-89950 HMT Pump Extension Piping Assy & Details

* Copies of H-2 Drawings can be obtained from Document Control. *

Conclusions:

A nine gallon air tank with an initial charge of air at 30 psig is sufficient to blow the flush line clear of water. The maximum pressure spike is estimated to be 0.5 inches of water. This estimate was determined from the requirement that the mixer pump be lifted a minimum of 34 feet or three feet above the tank's waste level at the time of blow-down. The estimate assumes that all excess air vents into the bag and blast shield air space although some will vent through the discharge legs and Disc #11 drain holes into the tank vapor space.

DESIGN ANALYSIS

Client Westinghouse Hanford Company
WO/Job No. 101-SY Pump Disposal Project
Subject Blow-down of the 101-SY Mixer Pump plenum flush line.
Date 4-3-95 By RP Schwehr
Checked 4-4-95 By BD Andres
Location 241-SY Tank Farm
Revised By

Sizing the air tank:

$$P_1 \times V_1 = P_2 \times V_2$$

P_1 = air tank charge pressure, psia

V_1 = air tank volume, ft^3

P_2 = final system pressure, psia
(check valve cracking pressure x 2 check valves in series)
= 2 x 4 psig (4 psi is the upper cracking limit)
= 8 psi
= 22.7 psia

V_2 = final system volume, ft^3
$V_2 = V_1$ + air hose volume + pipe/hose volume

air hose volume = 300 ft x $(\pi/4)$ x $(.375/12)^2$ ft^2
= 0.23 ft^3

pipe/hose volume = 44 ft x $(\pi/4)$ x $(2/12)^2$ ft^2
= 0.96 ft^3

So: $V_2 = V_1 + 1.19\ ft^3$

And:

$$P_1 = P_2 \times V_2 \div V_1$$
$$= P_2 \times (V_1 + 1.19\ ft^3) \div V_1$$

Let V_1 = 9 gallons = 1.2 ft^3 from Grainger Catalog No. 386, Portable Air Tank, part # 4F693 (Refer to page C-9)

Then:

$$P_1 = (22.7\ psia \times (1.2 + 1.19)ft^3) \div 1.2\ ft^3$$

P_1 = 45.2 psia or 30.5 psig

DESIGN ANALYSIS

Client Westinghouse Hanford Company | WO/Job No. 101-SY Pump Disposal Project

Subject Blow-down of the 101-SY Mixer Pump plenum flush line. | Date 4-3-95 | By RP Schwehr

Checked 4-4-95 | By BD Andres

Location 241-SY Tank Farm | Revised | By

Estimating the pressure spike:

mass of air ejected into the bag/blast shield air space = m_{ej}

$m_{ej} = m_{initial} - m_{system}$

$m_{initial} = P_1 \times V_1 \div (R \times T)$ R = 53.34 ft·lbf/lbm·R, T = 490 Rankine (30°F)

$m_{initial} = 45.2 \text{ psia} \times 1.2 \text{ ft}^3 \times (144 \text{ in}^2/\text{ft}^2) \div (53.34 \times 490)$

$= 0.299$ lbm

m_{system} = Mass of air left in the pipe/hose and air tank system up to the check valves when cracking @ 2 psi or 16.7 psia. Two psi is the minimum crack pressure - the more conservative value to use.

$= P_2 \times V_2 \div (R \times T)$

$= 16.7 \text{ psia} \times 2.39 \text{ ft}^3 \times (144 \text{ in}^2/\text{ft}^2) \div (53.34 \times 490)$

$m_{system} = 0.22$ lbm

Therefore:

$m_{ej} = 0.299 - 0.22$ lbm

= 0.079 lbm of air ejected from the check valves into the bag/blast shield air space

Now, $P_{spike} = m_{ej} \times R \times T \div V_{bb\text{-}p}$

$V_{bb\text{-}p}$ = Volume within the bag and blast shield less the volume of the mixer pump.

$V_{blast\ shield} = 120 \text{ ft}^3$ (Ref. 2)

Calc. No.

Revision 0

DESIGN ANALYSIS

Client Westinghouse Hanford Company

WO/Job No. 101-SY Pump Disposal Project

Subject Blow-down of the 101-SY Mixer Pump plenum flush line.

Date 4-3-95 By RP Schwehr

Checked 4-4-95 By BD Andres

Location 241-SY Tank Farm

Revised By

The pump must be elevated a minimum of 31' to clear the waste. Another 3 feet will place disc #11 about even with the load frame. Disc #11 is just below the lower 45^{O} elbows of the pump extension legs. The maximum bag diameter is 66".

So, $V_{bag} = 34 \text{ ft} \times (\pi/4) \times (66/12)^2 \text{ ft}^2$

$= 808 \text{ ft}^3$ (Ref. 3)

$V_{pump} = 80 \text{ ft}^3$ (see the following two pages)

And, $V_{bb\text{-}p} = (120 + 808 - 80) \text{ ft}^3$

$= 848 \text{ ft}^3$

$P_{spike} = (0.079 \times 53.34 \times 490 \div (144 \times 848)) \text{ psi}$

$= 0.017 \text{ psi}$ or 0.47 in. water

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HANFORD

DESIGN ANALYSIS

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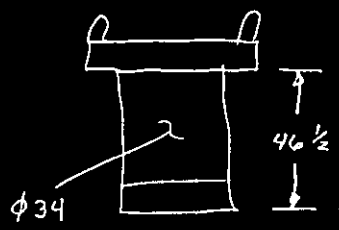
Date 4-3-95 By RP Schwehr
Checked 4-4-95 By BD Andres
Location 241-SY Tank Farm
Revised By

Estimated Volume of mixer pump from bottom side of mounting flange to Disc #11.

Barrel Volume



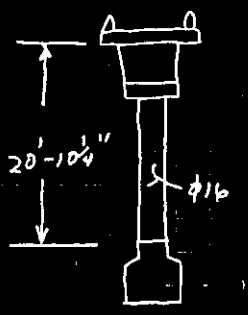
Ref. - H-2-815003
- DSI-HMT Mixer Pump convenient As-Built Dimensions
- Hazleton DWG E-22679

Neglecting Gusset & flange volumes

$$V_{Barrel} = \frac{\pi}{4}\left(\frac{34}{12}\right)^2 \times \frac{46\frac{1}{2}}{12}$$

$$= 24.4\ ft^3$$

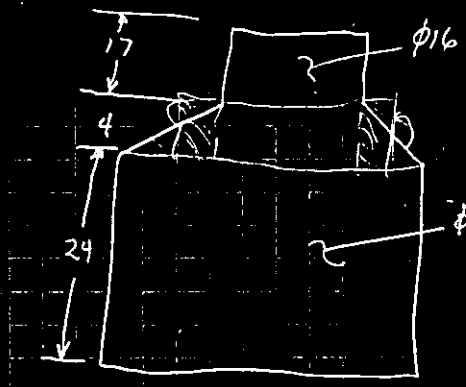
Column and Transition Pipe Volumes



Ref. - H-2-89948
- DSI- HMT Mixer Pump convenient As-Built Dim.
- Hazleton DWG E-22679

$$V_{column} = \frac{\pi}{4}\left(\frac{16}{12}\right)^2 \times \left(250\frac{1}{4} - 46\frac{1}{2}\right)\frac{1}{12}$$

$$= 23.7\ ft^3$$



$$V_{trans.} = \frac{\pi}{4}\left(\frac{30}{12}\right)^2 \times \frac{24}{12} + \frac{\pi}{4}\left(\frac{16}{12}\right)^2 \times \frac{17}{12} +$$

$$\left(\frac{\pi}{4}\left(\frac{30+16}{2}\right)^2 \times 4 - \frac{\pi}{4}\left(\frac{16}{12}\right)^2 \times 4\right)\frac{1}{1728}$$

$$V_{trans.} = 12.8\ ft^3$$

DESIGN ANALYSIS

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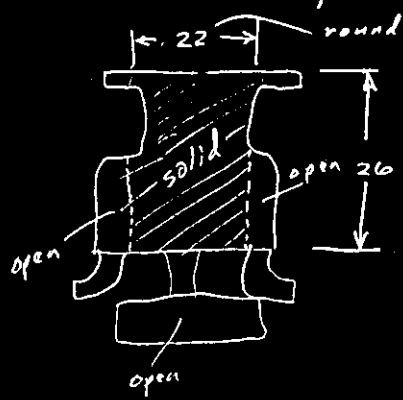
Checked 4-4-95 By BD Andres
Location 241-SY Tank Farm
Revised By

Stator Housing Volume

Ref:- Hazleton Parts DWG
Neglect shaft, walls of plenum, and nozzles and flanges.

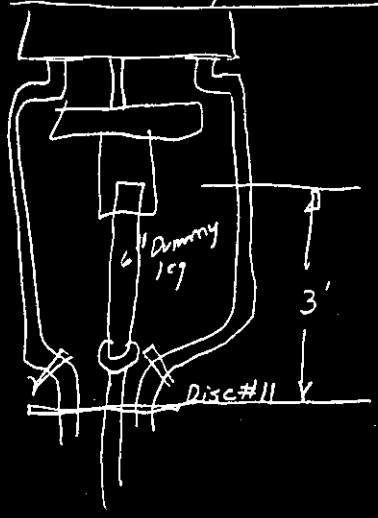


$V_{stator} = \frac{\pi}{4}\left(\frac{24}{12}\right)^2 \times \frac{26}{12}$

$= 6.8\ ft^3$ round up to

$7\ ft^3$

Extension Leg Volume to 45° elbows (Disc #11)



Ref, H-2-89950

Ignore Pump suction pipes, discharge pipes, flanges and miscellaneous plates

$V_{Dummy} = 2\ \frac{\pi}{4}\left(\frac{6.625}{12}\right)^2 \times 3$

$= 1.4\ ft^3$ triple this to cover neglected items,

$V_{Dummy} = 4.2\ ft^3$

$V_{pump} = V_{Barrel} + V_{column} + V_{trans.} + V_{stator} + V_{Dummy}$

$= 24.4 + 23.7 + 12.8 + 7 + 4.2$

$= 72.1\ ft^3 \Rightarrow$ Round up to $80\ ft^3$ for uncertainty

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HANFORD

DESIGN ANALYSIS

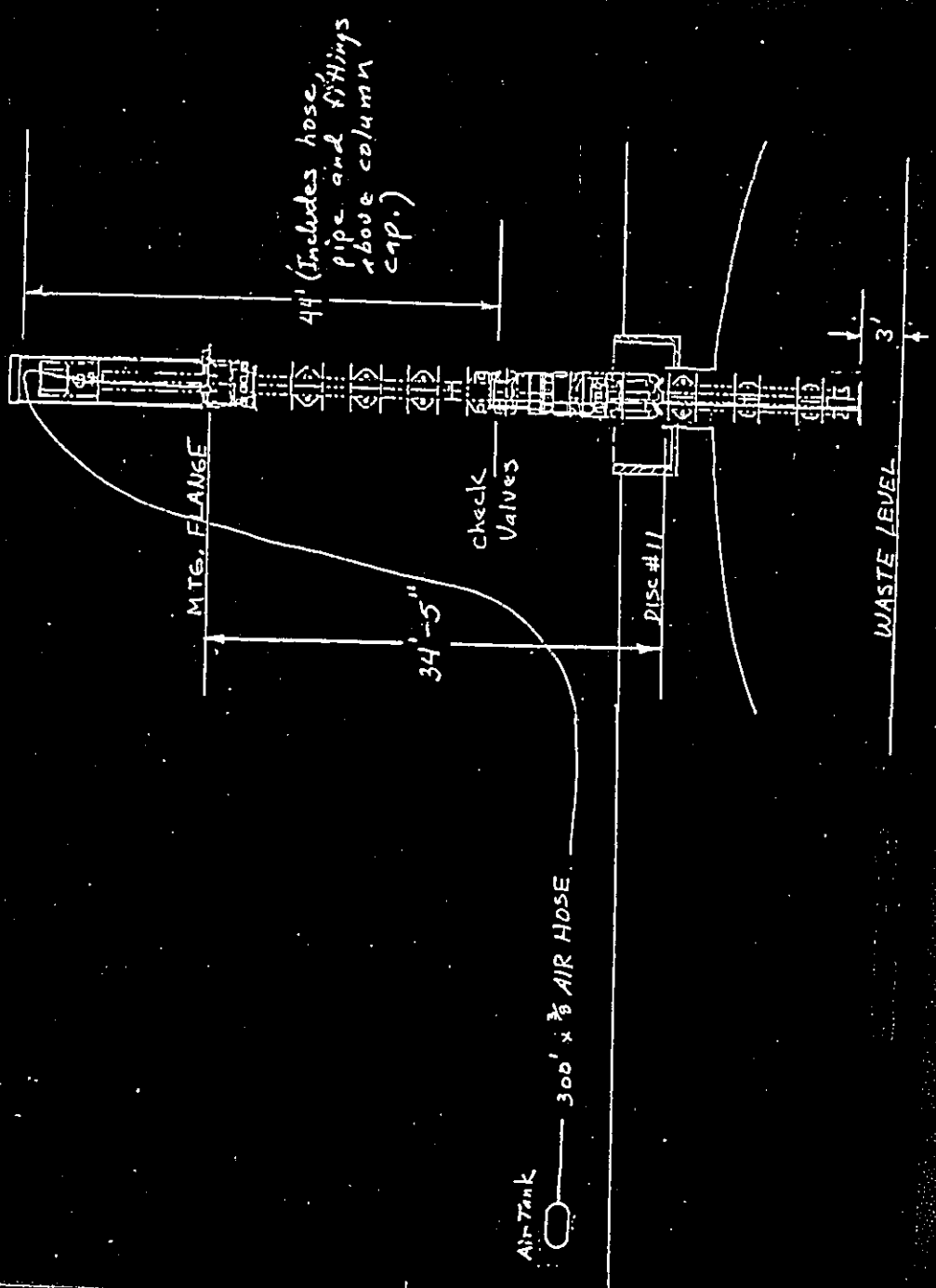
Client Westinghouse Hanford Company
WO/Job No. 101-SY Pump Disposal Project

Subject Blow-down of the 101-SY Mixer Pump plenum flush line.

Date 4-3-95 By RP Schwehr

Checked 4-4-95 By BD Andres

Location 241-SY Tank Farm
Revised By



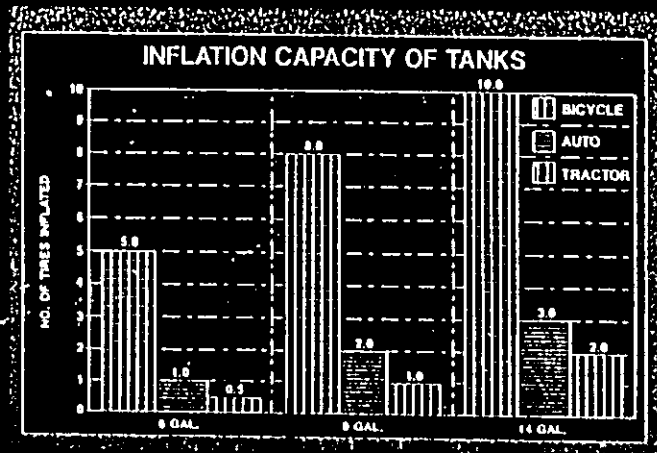
PORTABLE AIR TANKS

Compact, lightweight air tanks provide portable air supply wherever you need it. Use for inflation, or in combination with blow gun for cleaning equipment or work areas. Maximum working pressure, 125 PSI. 6, 9, and 14 gallon sizes.

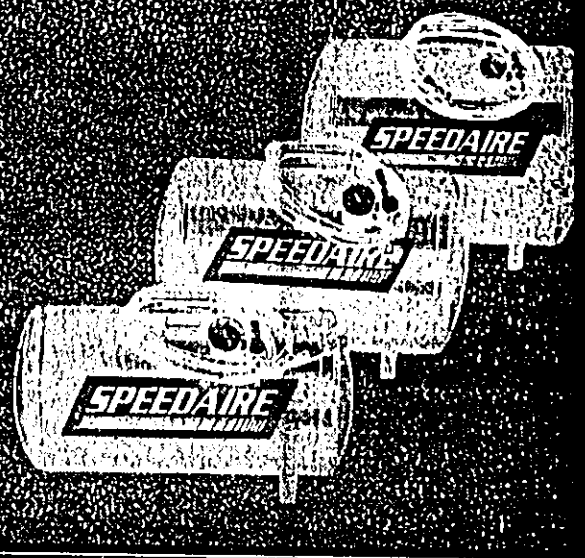
Tanks are fully assembled and feature:

- 6 Ft hose with brass tire chuck
- 0-160 PSI pressure gauge
- Brass manifold with shutoff and safety valves
- 14 Gauge steel construction
- Green scratch-resistant paint

Note: These tanks do not have ASME certification. Before ordering, check local and state code requirements.



Gal.	Dimensions L	H	Dia.	Stock No.	List	Each	Shpg. Wt.
6	16"	13"	11"	4F692▲	$44.00	$30.75▲	22.0
9	22	13	11	4F693▲	53.00	37.00▲	26.0
14	26	14	12	4F694▲	72.00	49.75▲	35.0



INTAKE FILTERS/SILENCERS

Speedaire intake filter/silencers are specifically designed for air compressor applications.

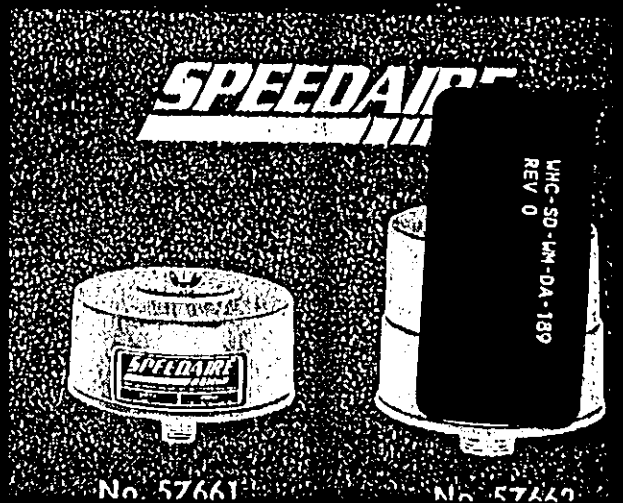
Patented hood-to-base seal and steel inlet tubes reduce compressor noise by up to 3 dB more than similar filter/silencers.

Polyester filter elements are 99% efficient, per SAE J726 test code. Moisture and heat resistant for use with head-unloading type compressors. Dust loading capacity up to 50%.

Welded steel base is epoxy coated for corrosion resistance. Thick-wall polypropylene hood is resistant to impact, vibration, and corrosion.

Tested from −20°F to 180°F for indoor or outdoor use. Filter/silencers use Solberg replacement elements, listed on page 2248.

Inlet (M)NPT	Max. CFM	Ht.	Dia.	Stock No.	List	Each	Shpg. Wt.
¾"	20	4½"	6¾"	5Z660	$17.25	$15.90	3.0
1	20	4½	6¾	5Z661	18.20	16.75	2.1
1¼	60	7	6¾	5Z662	26.30	25.75	3.0



DON'T SAY IT - WRITE IT!

Date: March 29, 1993

To: HMT Project Files

From: Craig Shaw

Subject: HMT Mixer Pump Convenient As-Built Dimensions

This list of as built dimensions were taken at the MASF at the same time the pump diameter(s) were being measured, 3/25&26. These data have been added to the data issued on the DSI by the same title dated 11/14/92.

The dimensions of a number of pump features were measured directly (with a 50 foot tape, framing squares, and straight edges) from the bottom of the mixer pump mounting flange. The bottom of the mixer pump mounting flange is what rests on and bolts to the load frame. These dimensions are available from the issued drawings but only with a lot of digging and work; hopefully this will make things easier. Accuracy is +/- 1" inch.

Pump Features

Ft.	In.	Feature
00	00	Bottom of Mounting Flange/ Load Frame Connection
3	3 1/2	Center of Brake Shoes
3	10 1/2	Column rotating seal
14	7	Top of wasteburg crash bars
17	00	Top of upper cradle/pump support foot
(17'-00)		*approximate waste surface*
17	11 3/4	Weld between mid and lower column
19	4	Approx location of conduits exiting from column
19	4	Bottom of wasteburg crash bars
20	10 1/4	Lower column to pump flange joint
23	8	Flush manifold rolled ring - 2" tubing
24	7	Motor oil overflow plug
25	0	Diametral high point of flex conduit and tube fit
26	7	Bottom of barrier oil reservoir
26	10 3/8	6" discharge from pump (Top of extension legs)
27	10	Top of vertical run of 4" discharge pipes
28	00 00	Center of impeller
29	5	Top of dummy leg extension pipes
30	8 5/8	Mouth of 16" suction inlet
32	10	Bottom of max. diameter discharge legs
33	6	Center of extension leg flanges tilted at 45 deg.
39	8	Top of lower cradle/pump support foot
47	8 5/8	Center of discharge nozzle
48	3 1/2	Bottom of velocity disc

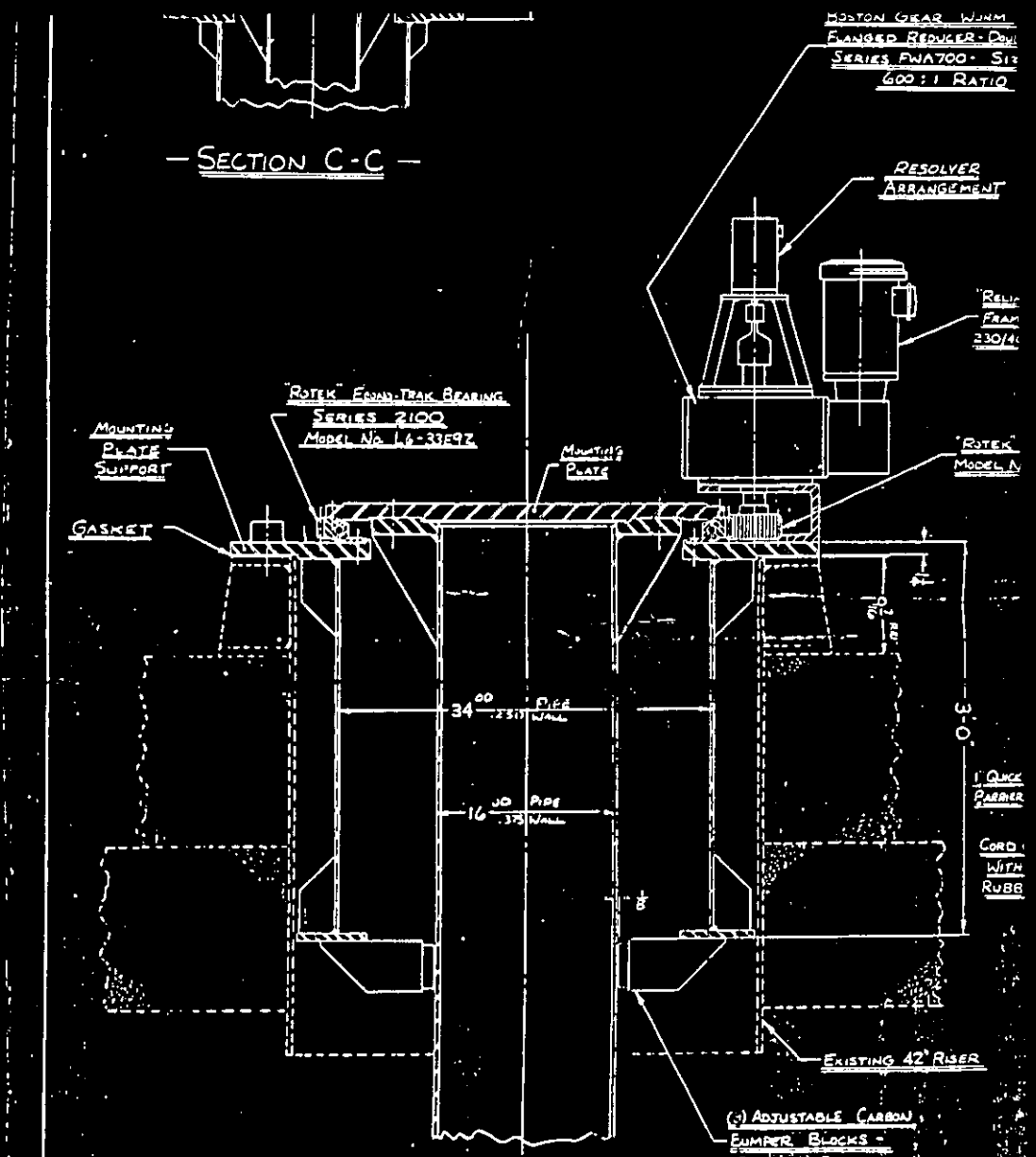
REF 5

pg 1 of 2

Riser Sealing Discs (Measured to bottom of steel)

Ft.	In.	Disc # (Starting from top)
00	00 00	Bottom of Mounting Flange
5	7 5/8	#1
7	11 3/8	#2
9	10 1/8	#3
12	4 1/2	#4
14	6 3/4	#5
16	11 1/8	#6
19	1 3/8	#7
21	11 1/4	#8
29	5 00	#9
32	5 5/8	#10
34	4 7/8	#11
36	7 00	#12
39	5 7/8	#13
41	6 1/4	#14
44	00 00	#15
45	11 1/4	#16
48	3 1/2	#17 (Velocity disc)

From DWG E-22679



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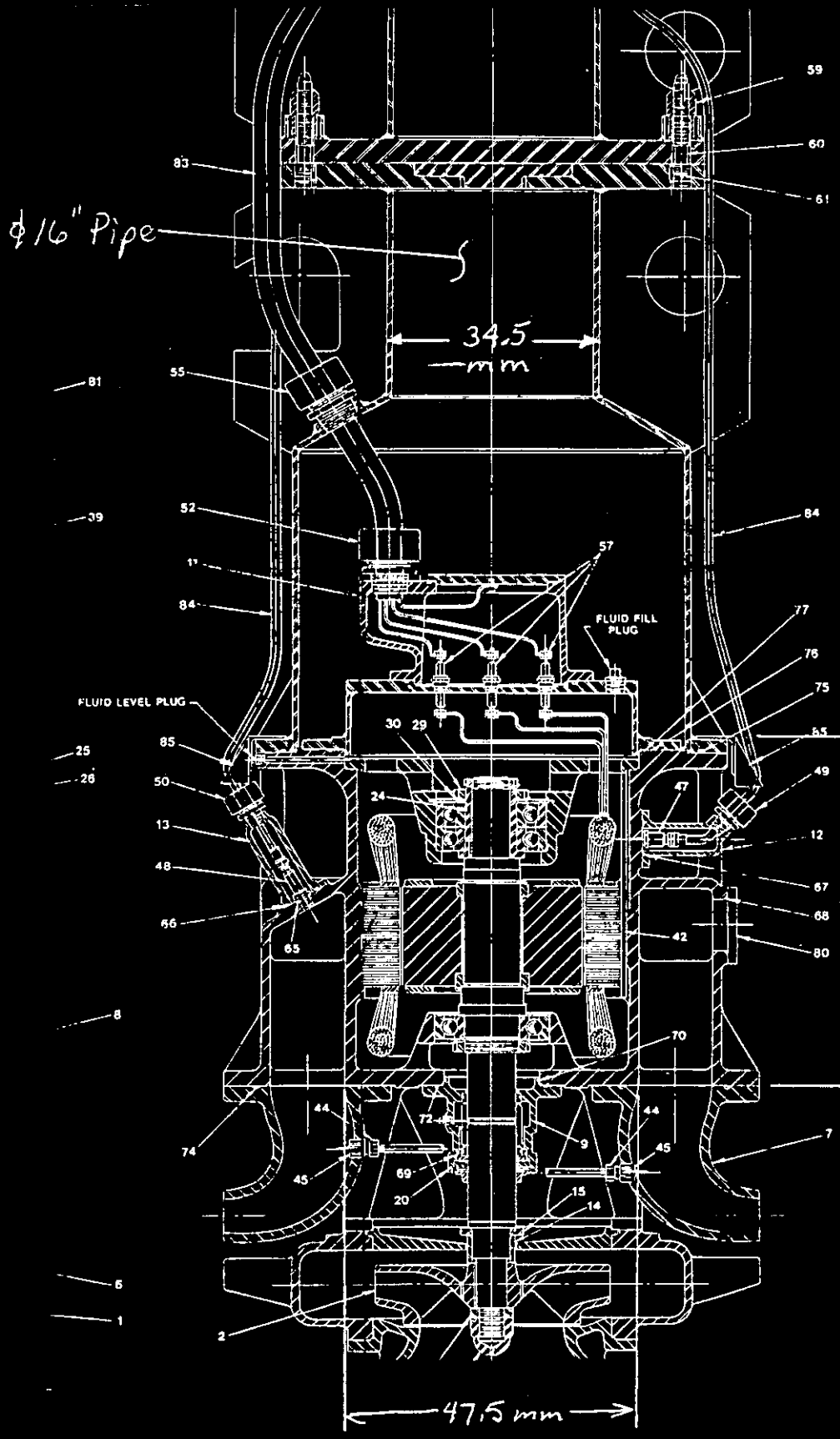

SCALE: 34.5 mm = 16"

REF 8

APPENDIX D

REVIEW COMMENT RECORD (RCR)

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REVIEW COMMENT RECORD (RCR)

1. Date	2. Review No.
5/18/95	
3. Project No.	**4. Page**
101-SY Disposal	1 of 1

5. Document Number(s)/Title(s)	6. Program/Project/ Building Number	7. Reviewer	8. Organization/Group	9. Location/Phone
WHC-SD-WM-DA-189/ Design Analysis Supporting 101-SY Water Decon System H-2-824445/ Equipment Removal System Layout (site layout)	101-SY Disposal Project/ 241-SY-101	Mohit Pal	ICF Kaiser Hanford/ central engineering	TCPC/ 372-1268

17. Comment Submittal Approval:

Organization Manager (Optional)

Date

10. Agreement with indicated comment disposition(s)

Reviewer/Point of Contact

Author/Originator

11. CLOSED

5/31/95
Date

Reviewer/Point of Contact

Author/Originator

12. Item	13. Comment(s)/Discrepancy(s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/ resolve the discrepancy/problem indicated.)	14. Hold Point	15. Disposition (Provide justification if NOT accepted.)	16. Status
	NA		NA	

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ATTACHMENT E

101-SY DISPOSAL EQUIPMENT SUPPORT
LETTER OF INSTRUCTION
LOI MIT94-2229

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Westinghouse Hanford Company

Internal Memo

MIT94-2229

From: Special Projects
Phone: 376-2478 H5-68
Date: October 14, 1994
Subject: 101-SY DISPOSAL EQUIPMENT SUPPORT LETTER OF INSTRUCTION (LOI) NO. 29

To: T. B. Salzano E6-36

INTRODUCTION

On July 3, 1993, a test mixer pump was installed to test the mitigation by mixing concept. As a result of this testing, it was determined that the mixing concept will mitigate the tank. A backup pump was built as a replacement for the test pump. When the test pump fails, a flush and decontamination system will be required for the removal of the existing pump and installation of the backup pump.

SCOPE

The flush and decon system will meet the system requirements as described in this document. The deliverables and completion date are also outlined.

ICF KH personnel involved in this effort will work to WHC procedures for the completion of this project.

SYSTEM REQUIREMENTS

- Flow And Pressure Requirements At The Source

ITEM	FLOW (GPM)	PRESSURE (PSI)
Burrowing Ring	80	300
Internal Flush	200	300
Barton/Heel Flush	2	1000
Spray Ring	120	3000
Spraywands	60	3000

- Location Requirements

  Pumps, tank trucks, pump trucks, and flow control valves are to be centrally located outside the fence.

  Hoses will be routed across the farm and will tie into their respective

systems at the central pump pit.

Pump and water supply for the Barton/Heel flush will be located inside the fence near the mitigation pump.

- Functional Requirements

Hoses attached to the pump (internal flush, burrowing ring, barton/heel flush) will have quick disconnect at the top of the pump.

System will have capability to remove water from all pipes and hoses.

System must support removal of existing pump and installation of backup pump.

The system must be compatible with other removal and installation systems. These systems will include the flexible receiver, lifting yokes, transport container and tanker truck availability.

Check valves will be used where the possibility of waste flowing back through the system exists.

System shall be supplied by one tanker truck to allow for one backup tanker and one tanker available for refilling.

System will be designed to ASME B31.3.

Design temperature is 150° F.

DELIVERABLES

- Drawing Requirements For Flush And Decon

ITEM	NEW/ECN	DESIGNER	DRAWINGS/SKETCH
SY-101 HMT DECON SPRAYWAND RISER 3A INSTALLATION	NEW	EM	H-2-821381
SY-101 RISER 15A ENERGY DISSIPATION COVER	NEW	EM	H-2-XXXXX
SY-101 HMT DECON SPRAYWAND DROP LIMITER	NEW	EM	H-2-XXXXX
SY-101 HMT DECON SPRAYWAND ASSEMBLY	ECN	EM	H-2-817857
SY-101 HMT DECON SCHEMATIC	NEW	KC	H-2-824446
HMT PUMP RETRIEVAL DIAGRAM	NEW	KC	H-2-824445

ITEM	NEW/ECN	DESIGNER	DRAWINGS/SKETCH
SKID ASSY HIGH PRESSURE CONTROL MANIFOLD	NEW	KC	H-2-824447
TOTALIZER/FILTER SKID	NEW	KC	H-2-824448
PUMP PIT DRAIN PLUG (REMOTE)	NEW	KC	H-2-XXXXX
PUMP PIT FLUSH	NEW	KC	H-2-XXXXX
YOKE WATER CONNECTIONS	NEW	KC	H-2-XXXXX

- Engineering
  - Preparation of system design description
  - Pressure losses calculations
  - Components integrity calculations
  - Preparation of structural supporting document
  - Provide support in close out of LANL Safety Assessment issues

SHOP SUPPORT

The following drawings are currently released and need engineering support during construction.

ITEM	# REQ'D	DRAWINGS/SKETCH
SPRAY WAND RISER ADAPTER	1	H-2-821382
LIFTING YOKE	1	H-2-821383
DRILL ROD WASHERS	3	H-2-91670 H-2-91671
DECON CIRCUIT STUFF	As Shown	Sketch Attached
SPRAY WANDS	2 using nozzle 13 (Modify 1 existing, Fabricate 1 new)	H-2-817857 as modified by ECN
RISER ADAPTER	1	H-2-99332

T. B. Salzano
Page 4 of 4
October 14, 1994

MIT94-2229

ITEM	# REQ'D	DRAWINGS/SKETCH
SPRAY WAND HOLDERS	1	H-2-817858
SPRAY WAND DAMPERS	6	H-2-XXXXXX
RISER 15A COVER	1	H-2-XXXXXX

The drawings listed in the deliverables section will also require engineering support during fabrication.

COST

Work Order #E39730 for the amount of $35,000 has been set up to fund this activity.

SCHEDULE

It is anticipated that the work scope outlined above can be completed by November 21, 1994. However, ICF KH shall be responsible for providing a detailed work activities schedule and weekly status. WHC will provide a scheduler to support schedule preparation. Contact is Eileen Green at 372-1495.

Mike J. Ostrom

M. J. Ostrom, Principal Engineer
Special Projects

kdp