COMANCHE PEAK STEAM ELECTRIC STATION

REACTOR CONTAINMENT BUILDING

UNIT ONE

PREOPERATIONAL

TYPE B & C LOCAL LEAK RATE TEST

1984

DOCKET NUMBER
50-445

TEXAS UTILITIES GENERATING COMPANY

LLRT TEST SUMMARY

1.0 Introduction

1.1 General Data:

The Comanche Peak Steam Electric Station (CPSES) Unit One (1) Preoperational Containment Type B & Type C Local Leak Rate Test (1CP-PT-75-01) commenced October 02, 1982 and concluded with the approval of the test data package on November 16, 1984. All Type B and C pressure containing or leakage limiting boundaries of the containment building as defined by 10CFR50 Appendix J and summarized in FSAR Table 6.2.4-2 were tested to determine the magnitude of leakage.

1.2 Technical Data:

The containment building at CPSES is a reinforced concrete structure with a carbon steel liner. The containment design pressure is 50 psig. and the calculated peak accident pressure in containment is 48.1 psig (Pa). The Technical Specification Limit for all penetrations and valves subject to Type B and C testing is less than .60La (319 SCFH) when pressurized to Pa. Two penetrations are water tested.

2.0 Test Summary

The CPSES Unit 1 Preoperational Containment Type B and C Local Leak Rate Test satisfactorily determined the magnitude of leakage at a 48.1 to 50 psig test pressure for all Type B and Type C pressure containing or leakage limiting boundaries. The Upper Confidence Limit (UCL) of this leakage was determined to be 53.81 SCFH. Two penetrations that were water tested had a total measured leakage of .00154 gpm (5.833 ml/min). All Local Leak Rate Test results are provided in Attachment One.

During the preoperational test program, several rework items, inspections, and/or FSAR amendments required changes in, or the repeating of portions of the Local Leak Rate Test program. A number of containment isolation valves were eliminated from the Type C leak rate test program by FSAR Amendments 42, 46, and 51. The isolation valves involved and the associated justifications are noted in Table 6.2.4-2 in the FSAR. All test results obtained prior to elimination of their Type C testing requirements have been retained in the pre-operational test for information purposes. Several containment isolation valves that are required to be Type C tested were disassembled for inspection (i.e. Borg-Warner check valve inspection) and satisfactorily retested after reassembly. Other rework and repairs performed to containment isolation valves/penetrations were generally minor in nature and consisted of: packing adjustment/ replacement, torque switch adjustment, lapping, cleaning and flushing, and alignment adjustments. Specific repair documents can be obtained from station records and are referenced in the preoperational test chronological log. At the completion of preoperational testing,

penetration MIII-19 was in the process of being reworked. The leakage of penetration MIII-19, prior to being reworked, is included in Attachment I. When the work on penetration MIII-19 is complete, the penetration will be leakage tested in accordance with station procedure EGT-716A. Test results of EGT-716A for MIII-19 as well as for all Type B and C tests will be included in a separate report to be issued prior to fuel load.

Penertations MIII-14 and MIII-15 were initially tested with gas using the flow rate test method. FSAR amendments approved during testing permitted water testing accordance with Section III.C of Appendix J to 10FR50. After incorporation of FSAR changes to the test procedure, penetrations MIII-14 and MIII-15 were water tested at the pressure of 48.1 to 50 psig which is less than the required pressure of 53 to 54 psig (1.1Pa). Station procedure EGT-716A will be used to test penetration MIII-14 and MIII-15 using the required pressure range. These test results will also be included in a separate report to be issued prior to fuel load. It is anticipated that the slight increase in pressure will not significantly alter test results for penetrations MIII-14 and MIII-15.

Several special Type B test results were also included to measure leakage rates after rework on the following penetrations: MIV-7(b), MIV-8(b), MIV-9(b), MIV-10(b), MIV-5(a), MIV-6(a), MIV-7(a), MII-9, MIV-3(c), E-1, E-53, and E-54. These leak rate tests were performed on a one time basis to measure the leakage accross reworked boundaries not normally included in Type B or Type C testing. The total measured local leakage of these penetrations was found to be 24 SCCM or 0.051 SCFH. This value is negligible when compared with the 319 SCFH acceptance criteria and demonstrates that these rework items had no impact on the total LLRT test results.

3.0 Test Method & Instrumentation

With exception of penetrations MIII-14 and MIII-15, each isolation valve/barriers of penetrations listed in attachment 1 were local leak rate tested using the flow rate test method. This method requires pressurization of the test volume from 48.1 psig to 50.0 psig with air or nitrogen. Penetrations that are water filled are drained on the upstream and downstream side of the containment isolation valves prior to pressurization using typical test arrangements as shown in Attachment II. After a stabilization period, the flow rate of test gas added to maintain a constant test volume pressure, is measured. The majority of all leakage data flow measurements were obtained using mass flow type leakage monitors. Each monitor has a ±1% full scale accuracy over each of the following flow ranges.

2 SCCM to 20 SCCM
20 SCCM to 200 SCCM
200 SCCM to 2000 SCCM
2000 SCCM to 20,000 SCCM

A small percentage of penetrations tested used either a 20 CCM to 200 CCM or a 200 CCM to 2000 CCM rotameter type flow device with a ±3% full scale accuracy.

Penetrations MIII-14 and MIII-15 isolation valves were water tested using a water collection (addition) method. For these penetrations, the test volume was pressurized from 48.1 to 50 psig. using a hydraulic assist device. After a stabilization period, the amount of water that was added from the hydraulic device suction reservoir to maintain the test volume pressure constant over a period of time is measured to determine the leak rate.

4.0 Calculation of Leak Rate

Attachment II shows typical test schematics for penetrations as noted in Attachment I. Based on the test configuration of Attachment II, each penetration's leak rate was determined based on the following evaluation criteria of each of the penetration's isolation barriers/valves:

- Barriers tested simultaneously (pressurizing between barriers) the leakage rate recorded is the total leakage rate measured.
- Barriers in series but tested individually; the penetration leakage rate is the measured leakage rate of the isolation barrier with the highest leakage.
- Parallel barriers tested together; the barrier leak rate is the measured leakage. Parallel barriers tested individually; the barrier leakage is the sum of the individual measured leak rates.

After determination of each Type B and C leak rate, all values are summed to determine the overall leakage rate. The standard deviation on the sum of the Type B and Type C leakages is determined by computing the root sum square of all the errors (instrument inaccuracies). The Upper Confidence Limit (UCL) is computed by adding the standard deviation to the sum of the Type B and Type C leakages as shown below:

L_1 = Type C leakage total = .870498 SCFM

L_2 = Type B leakage total = .0160627 SCFM

$L_3 = L_1 + L_2$ = .8865607 SCFM

L = standard deviation = .0102646 SCFM

$UCL = 60(L_3 + L)$

$= 60(.8865607 + .0102646) = 53.809518$ SCFH

The following is a summary of leak rate test results for penetrations/ valves required to be leak rate tested.

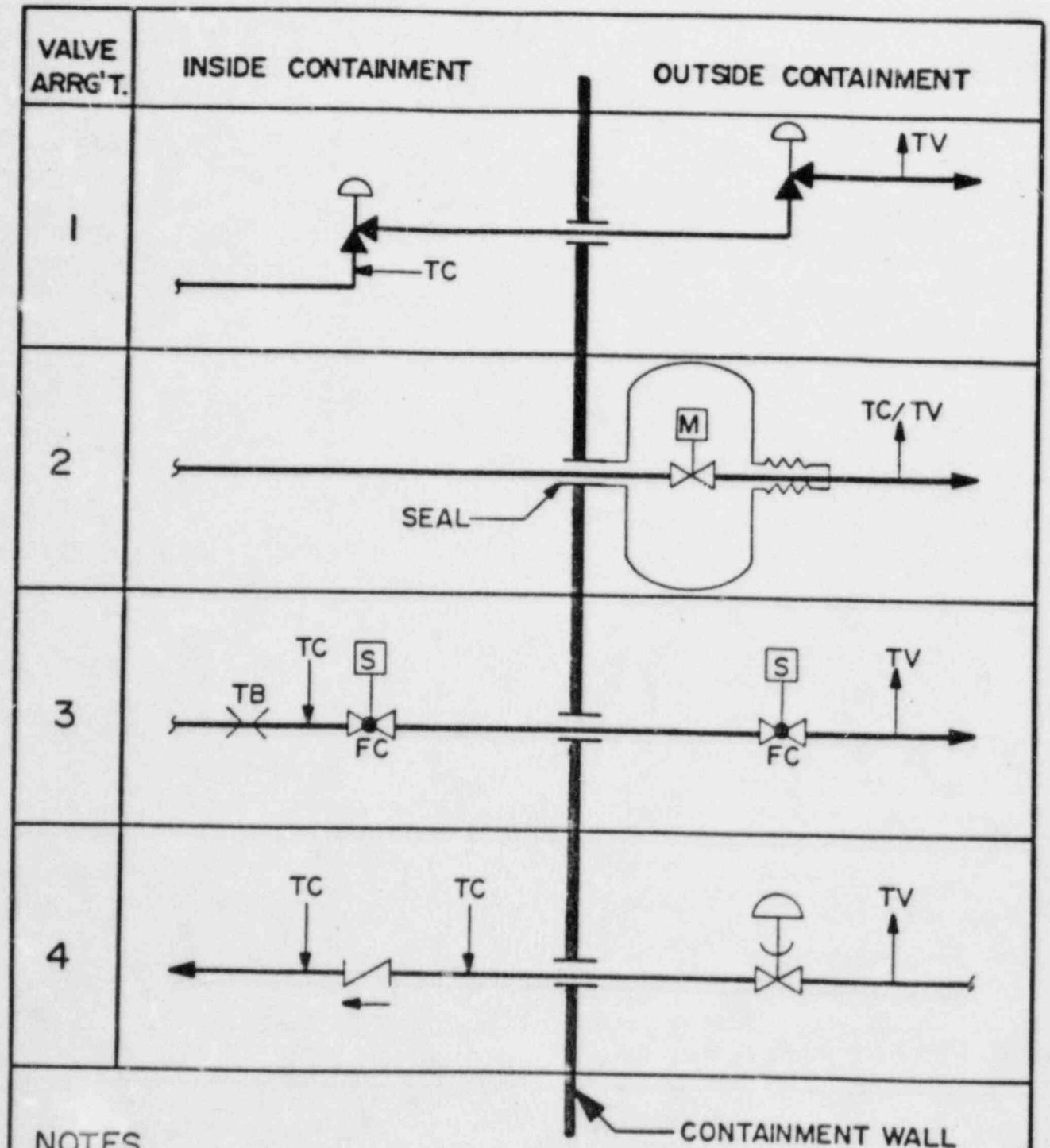
Penetration System	Isolation Valve	Typical Test Schematic Table 6.2.4-1	Type of Test	Valve Leak Rate (SCCM)	Penetration Leak Rate (SCFM)	Date of Test	Comments
MII-1 Chem & Vol Control	1-8152 1-8160	#37	C	140 80	4.944E-03	06/23/83 10/16/82	
MII-9 Maint Penet	1PN-02 1PN-03 1PN-04	#31	B	9.25	3.27E-04	01/31/84	
MIII-1 Reactor Coolant	1-8046 1-8047	# 4	C	16 2.0	5.65E-04	11/16/82 05/12/84	
MIII-6 Chem & Vol Control	1-8105 1-8381	#25	C	7.5 130	4.591E-03	11/22/82 11/01/82	
MIII-7 Chem & Vol Control	1-8368A 1-8351A	#15	C	114.9 2.0	4.058E-3	12/09/83 01/26/84	
MIII-8 Chem & Vol Control	1-8368B 1-8351B	#15	C	27.6 20	9.747E-04	12/12/83 02/21/83	
MIII-9 Chem & Vol Control	1-8368C 1-8351C	#15	C	2.0 3.5	1.236E-04	12/09/83 01/18/84	
MIII-10 Chem & Vol Control	1-8368D 1-8351D	#15	C	188 6.7	6.64E-03	01/26/84 01/26/84	
MIII-11 Chem & Vol Control	1-8100 1-8112 1CS-8180	#24	C	20 4920	1.7375E-01	11/11/83 11/11/83	
MIII-12 Waste Process Liquid	1-7136 1-1003 1-7135	#27	C	20 20 20	1.413E-03	11/30/82 11/30/82	

Penetration System	Isolation Valve	Typical Test Schematic Table 6.2.4-1	Type of Test	Valve Leak Rate (SCCM)	Penetration Leak Rate (SCFM)	Date of Test	Comments
MIII-14 Containment Spray	1HV-4777 1CT-145	#25	C	0.0CCM 4.83CCM	1.276E-03 gpm	05/08/84 04/28/84	Water Test Water Test
MIII-15 Containment Spray	1HV-4776 1CT-142	#25	C	0.0CCM 1.0CCM	2.642E-04 gpm	05/02/84 05/01/84	Water Test Water Test
MIII-16 Spent Fuel Pool Cooling & Cleanup	1SF-011 1SF-012	#14	C	2.0 2.0	7.06E-05	11/17/82 11/17/82	
MIII-18 Heating Vent. & Air Cond.	1HV-5542 1HV-5543 1HV-5563	#20	C	1184	4.1812E-02	03/28/84	
MIII-19 Heating Vent. & Air Cond.	1HV-5540 1HV-5541 1HV-5562	#21	C	1760	6.2153E-02	11/12/83	
MIII-20 Demin & React. Makeup Water	1HV-5365 1HV-5366	# 5	C	254 167	8.9699E-03	10/22/82 10/22/82	
MIII-21 Vents & Drains	1HV-5157 1HV-5158	#22	C	2.0 7.92	2.797E-04	12/01/83 12/01/83	
MIII-22 Compressed Air Instrumentation	1HV-3487 1CI-030	# 7	C	812 86.4	2.8675E-02	12/30/82 02/06/84	
MIII-27 Spent Fuel Pool Cooling & Cleanup	1SF-021 1SF-022	#14	C	10.7 17.4	6.14E-04	11/17/82 11/10/82	
MIII-30 Compressed Air Service	1LT-002	#31	B	6.3	2.22E-04	06/03/84	
MIII-31 Spent Fuel Pool Cooling & Cleanup	1SF-053 1SF-054	#14	C	20 20	7.06E-04	11/11/82 11/11/82	

Penetration System	Isolation Valve	Typical Test Schematic Table 6.2.4-1	Type of Test	Valve Leak Rate (SCCM)	Penetration Leak Rate (SCFM)	Date of Test	Comments
MIV-1B	1HV-4170	#29	C	2.0	1.413E-03	06/14/83	
Process Sampl	1HV-4169			20		12/13/82	
Primary Plant	1HV-4168			20		12/13/82	
MIV-2B	1HV-4167	# 1	C	2.0	1.413E-03	07/07/83	
Process Sampl	1HV-4166			40		12/03/82	
Primary Plant							
MIV-2C	1HV-4176	# 1	C	84.1	2.970E-03	01/27/84	
Process Sampl	1HV-4165			25		12/03/82	
Primary Plant							
MIV-3B	1HV-4175	#30	C	2.1	6.004E-03	02/08/84	
Process Sampl	1HV-4171			130		01/03/83	
Primary Plant	1HV-4172			5.14		12/31/82	
	1HV-4173			27.5		12/09/82	
	1HV-4174			7.4		01/03/83	
MIV-3C	1HV-7311	#26	C	2.0	2.910E-04	01/19/84	
Process Sampl	1HV-7312			6.24		12/07/83	
Primary Plant							
MIV-4B	1-8871	# 6	C	2.0	7.06E-04	09/30/83	
Safety Inj	1-8888			20		11/30/82	
	1-8964						
MIV-4C	1HV-5556	#34	C	65	2.366E-03	12/23/82	
Process Sampl	1HV-5557			67.5		12/23/82	
Primary Plant							
MIV-8A	1HV-5544	# 3	C	20	7.06E-04	12/16/82	
Radiation	1HV-5545			20		12/16/82	
Monitoring							
MIV-9A	1HV-5558	# 3	C	2	2.83E-04	01/07/83	
Process Sampl	1HV-5559			8		01/07/83	
Primary Plant							
MIV-10A	1HV-5560	# 3	C	2.0	7.06E-05	12/22/82	
Process Sampl	1HV-5561			2.0		12/22/82	
Primary Plant							
MIV-10C	1HV-5546	#34	C	20	7.06E-04	12/14/82	
Radiation	1HV-5547			20		12/14/82	
Monitoring							

Penetration System	Isolation Valve	Typical Test Schematic Table 6.2.4-1	Type of Test	Valve Leak Rate (SCCM)	Penetration Leak Rate (SCFM)	Date of Test	Comments
MIV-11B Safety Inj.	1-8880 108968	# 7	C	77 40.4	2.719E-03	11/01/82 12/22/82	
MIV-11C Waste Protect. Liquid Portion	1-7126 1-7150	#13	C	3.21 3.15	1.134E-04	12/05/83 12/05/83	
MV-1 Heating Vent & Air Cond.	1HV-5536 1HV-5537	#18	C	1960	6.9216E-02	12/06/82	
MV-2 Heating Vent & Air Cond.	1HV-5538 1HV-5539	#19	C	6820	2.408E-01	12/02/82	
MV-5 Compressed Air Service	1CA-016 1HV-3486	# 7	C	146 188.3	6.650E-03	01/23/84 03/27/84	
MV-6 Component Cooling Wtr	1HV-4725 1HV-4726	#26	C	8.8 87.2	3.0794E-03	10/22/82 10/22/82	
MV-7 Compressed Air Service	1LT-004 1LT-005 1LT-006	#38	B	2.0	7.1E-05	06/17/83	
MV-8 Reactor Cool.	1-8027 1-8026	#13	C	20 20	7.06E-04	11/24/82 11/24/82	
MV-9 Component Cooling Wtr	1HV-4708 1HV-4701 1CC-629	#24	C	3.1 265	9.358E-03	02/10/84 04/17/84	
MV-10 Component Cooling Wtr	1HV-4700 1CC-713	#25	C	108 254	8.969E-03	10/05/83 03/21/84	
MV-11 Component Cooling Wtr	1HV-4709 1HV-4696 1CC-831	#24	C	76 50	2.684E-03	10/27/82 10/27/82	
MV-12 Chilled Wtr	1HV-6084 1CH-024	#25	C	80 51.4	2.8159E-03	10/07/82 10/18/83	

Penetration System	Isolation Valve	Typical Test Schematic Table 6.2.4-1	Type of Test	Valve Leak Rate (SCCM)	Penetration Leak Rate (SCFM)	Date of Test	Comments
MV-13 Chilled Wtr	1HV-6082 1HV-6083	#28	C	525	1.7532E-02	10/07/82	
MV-14 Heating, Vent & Air Cond.	1HV-5548 1HV-5549	#19	C	1960	6.9216E-02	12/17/82	
MV-15 Maint. Penet	1PN-001	#31	B	2.0	7.1E-05	07/11/83	
MV-16 Fire Protect	1HV-4075B 1HV-4075C	#39	C	2.0 2.05	7.24E-05	03/09/84 03/09/84	
MS-1 Safety Inj.	1-8811A	# 2	C	20	7.1246E-04	10/12/82	
MS-2 Safety Inj.	1-8811B	# 2	C	1380	4.8730E-02	11/27/82	
MS-3 Containment Spray	1HV-4782	#2	C	787	2.7792E-02	10/29/82	
MS-4 Containment Spray	1HV-4783	# 2	C	28.8	1.0171E-03	03/20/84	
MS-5 Fuel Transfer Tube	N/A	#23	B	100.0	3.531E-03	12/28/82	
EMER AL	N/A		B	23.0	8.12E-04	07/14/83	
PERS AL	N/A		B	257	9.076E-03	09/05/83	
EQT HTH	N/A		B	15	5.30E-04	01/12/83	
ELE PEN	852-EPA 832-EPA 810-EPA FB MISC			4.1 2.6 11.5 2.0 6.0			



NOTES

TB - TEST BARRIER
TC - TEST CONNECTION
TV - TEST VENT
FC - FAIL CLOSE
S - SOLENOID
M - MOTOR
LC - LOCKED CLOSED

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UNITS 1 AND 2

CONTAINMENT ISOLATION VALVING

FIGURE 6.2.4-1 SH. 1 OF 10

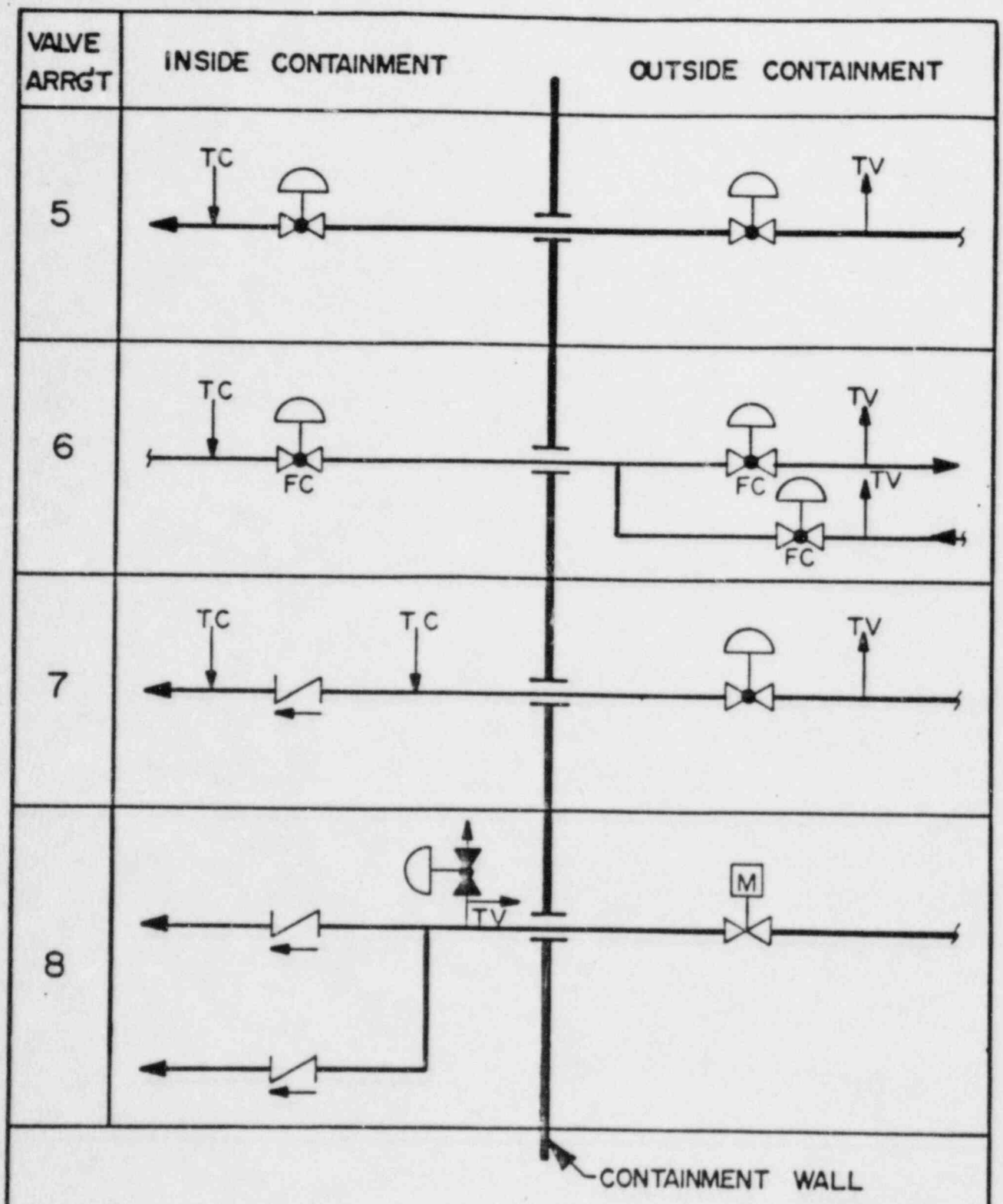

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FIGURE 6.2.4-1 SH. 2 OF 10

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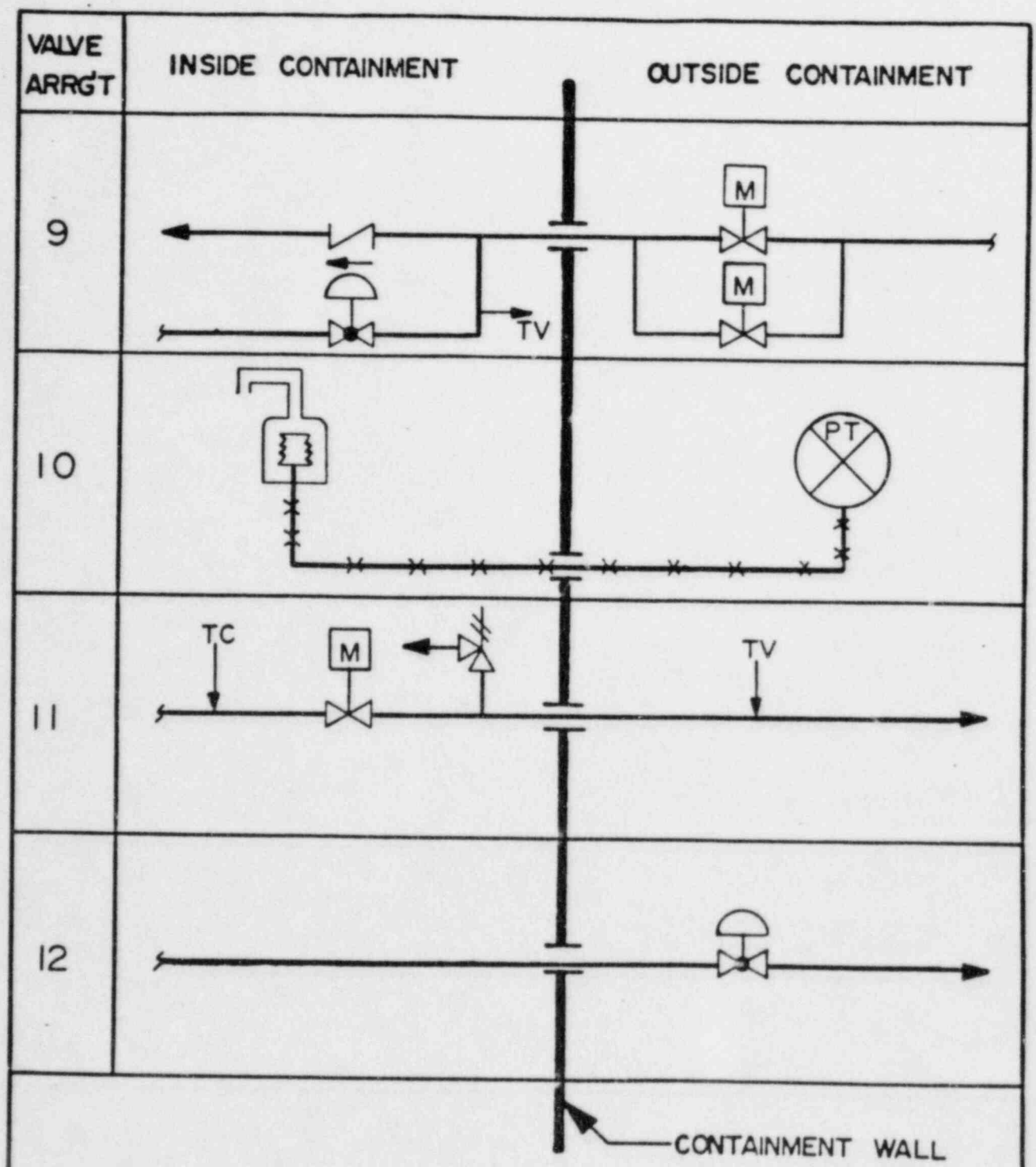

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FIGURE 6.2.4-1 SH 3 OF 10

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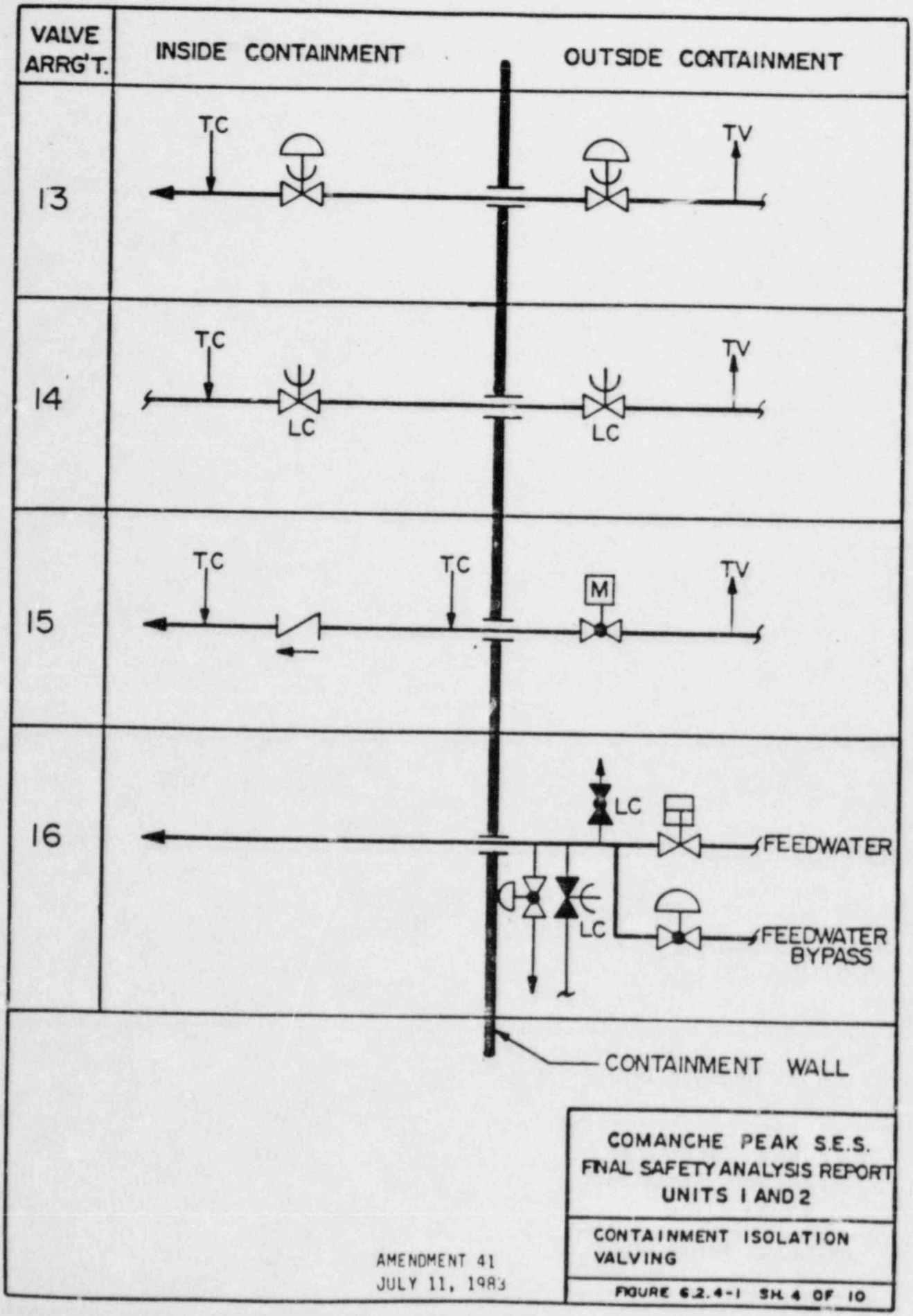

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FIGURE 6.2.4-1 SH. 4 OF 10

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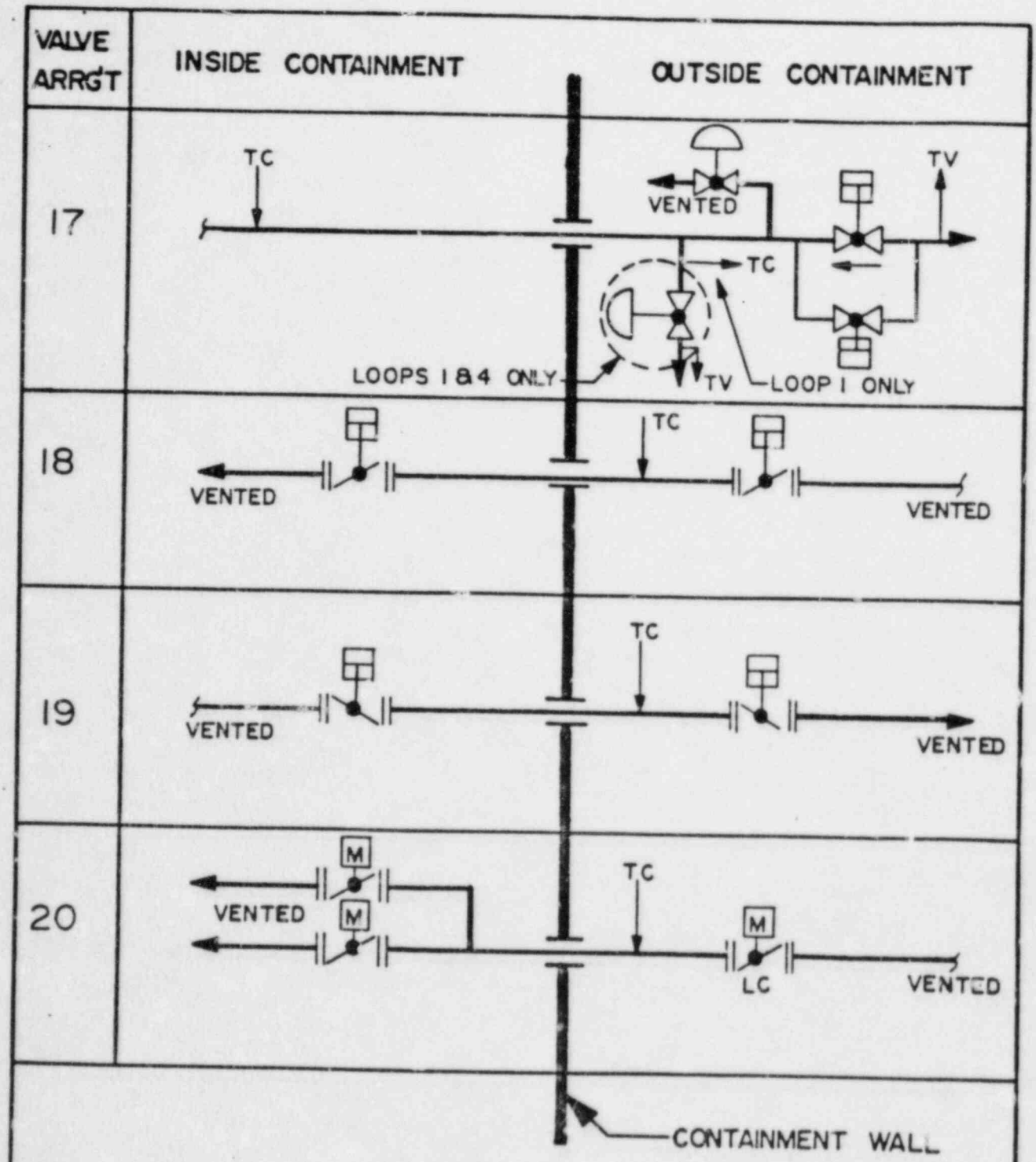

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CONTAINMENT ISOLATION VALVING

FIGURE 6.2.4-1 SH. 5 OF 10

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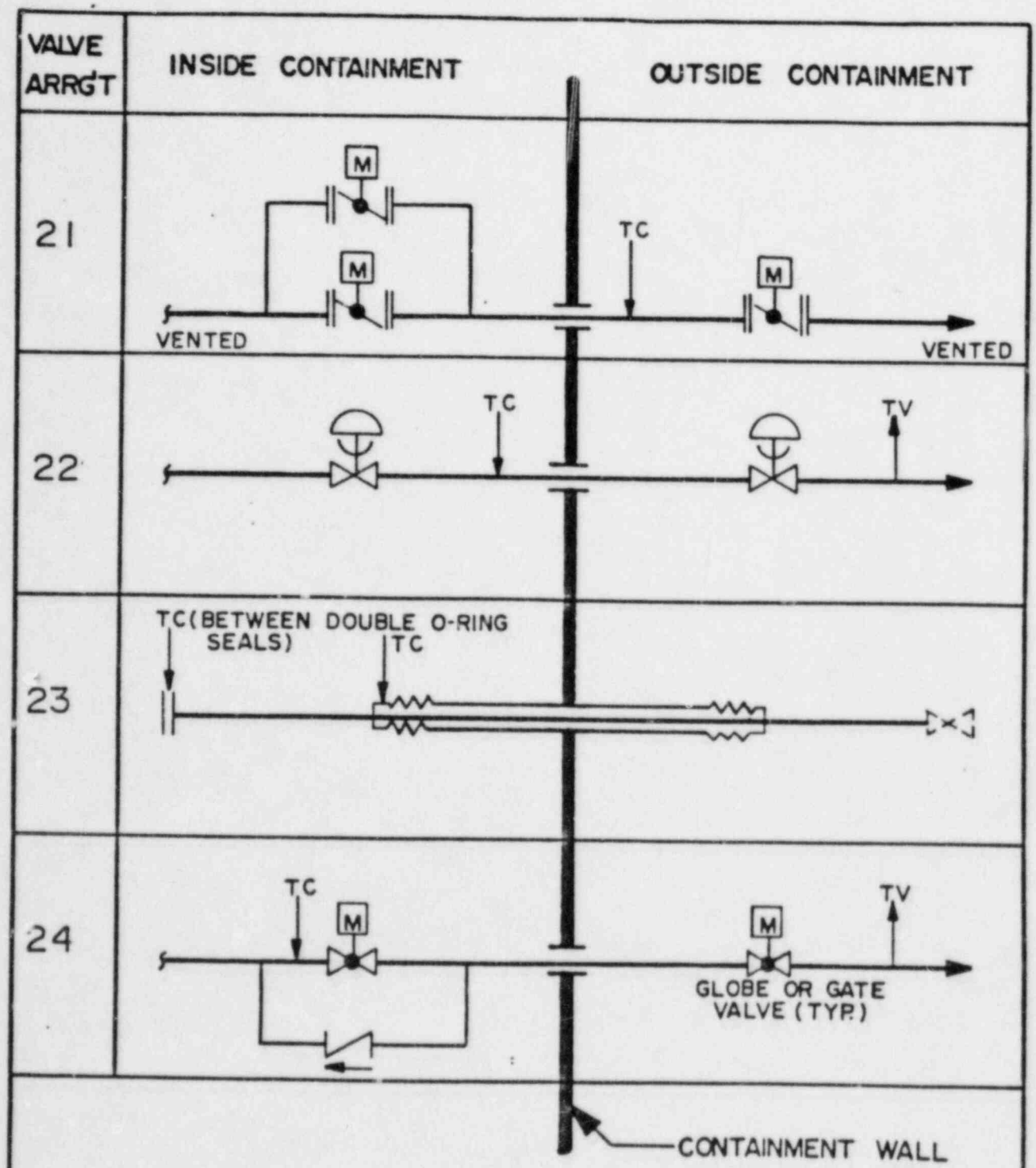

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FIGURE 6.2.4-1 SH. 6 OF 10

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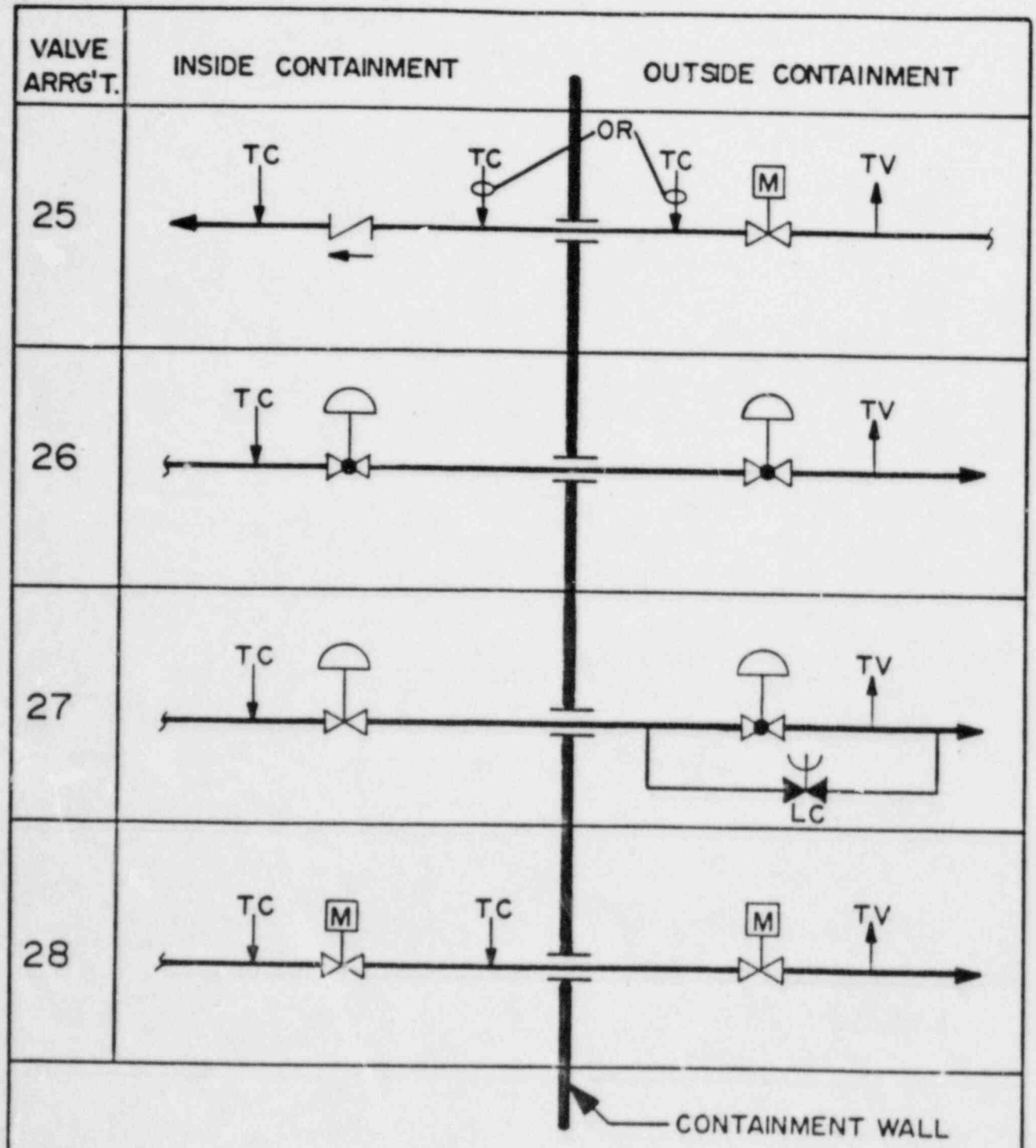

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FIGURE 6.2.4-1 SH. 7 OF 10

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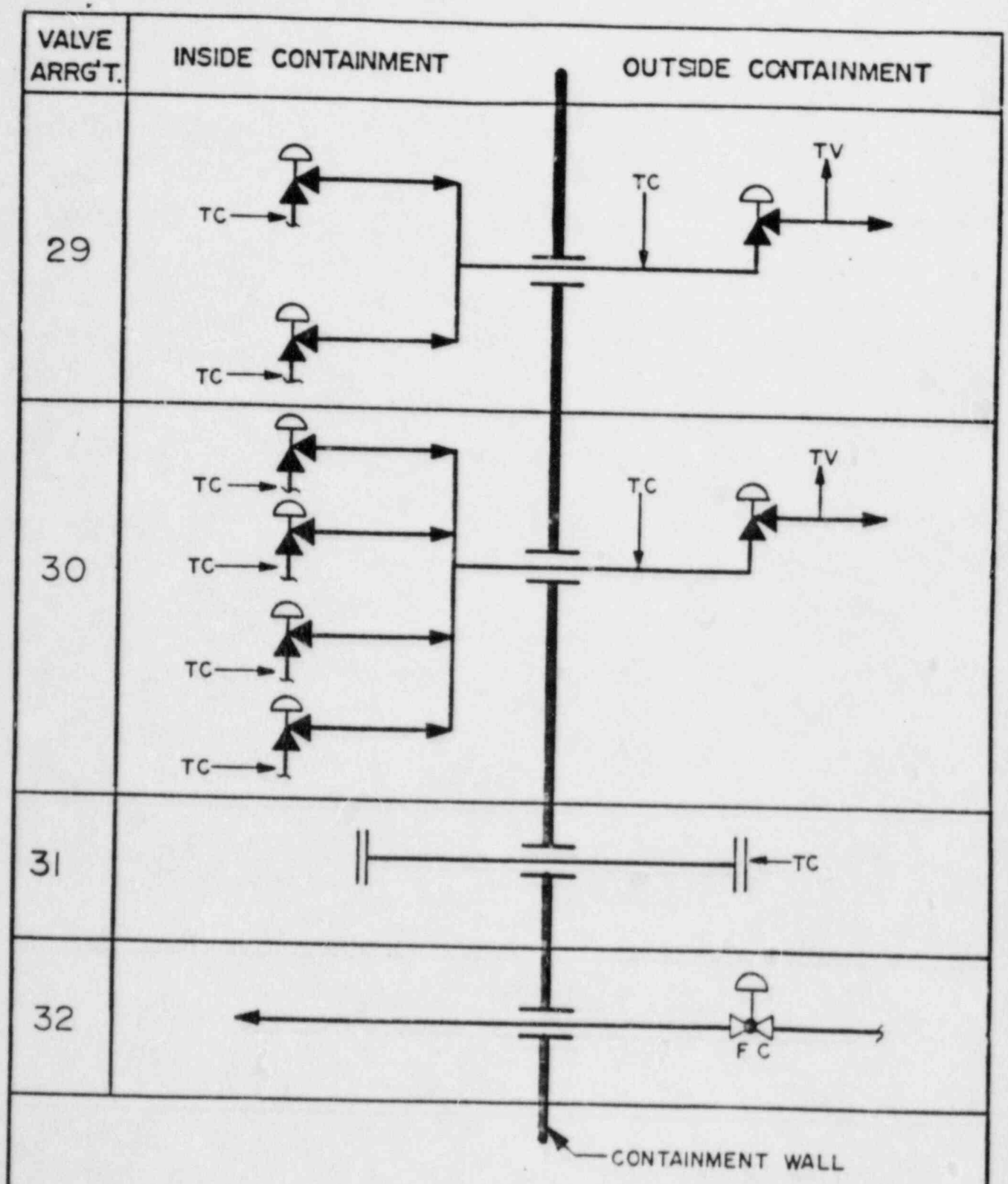

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CONTAINMENT ISOLATION VALVING

FIGURE 6.2.4-1 SH. 8 OF 10

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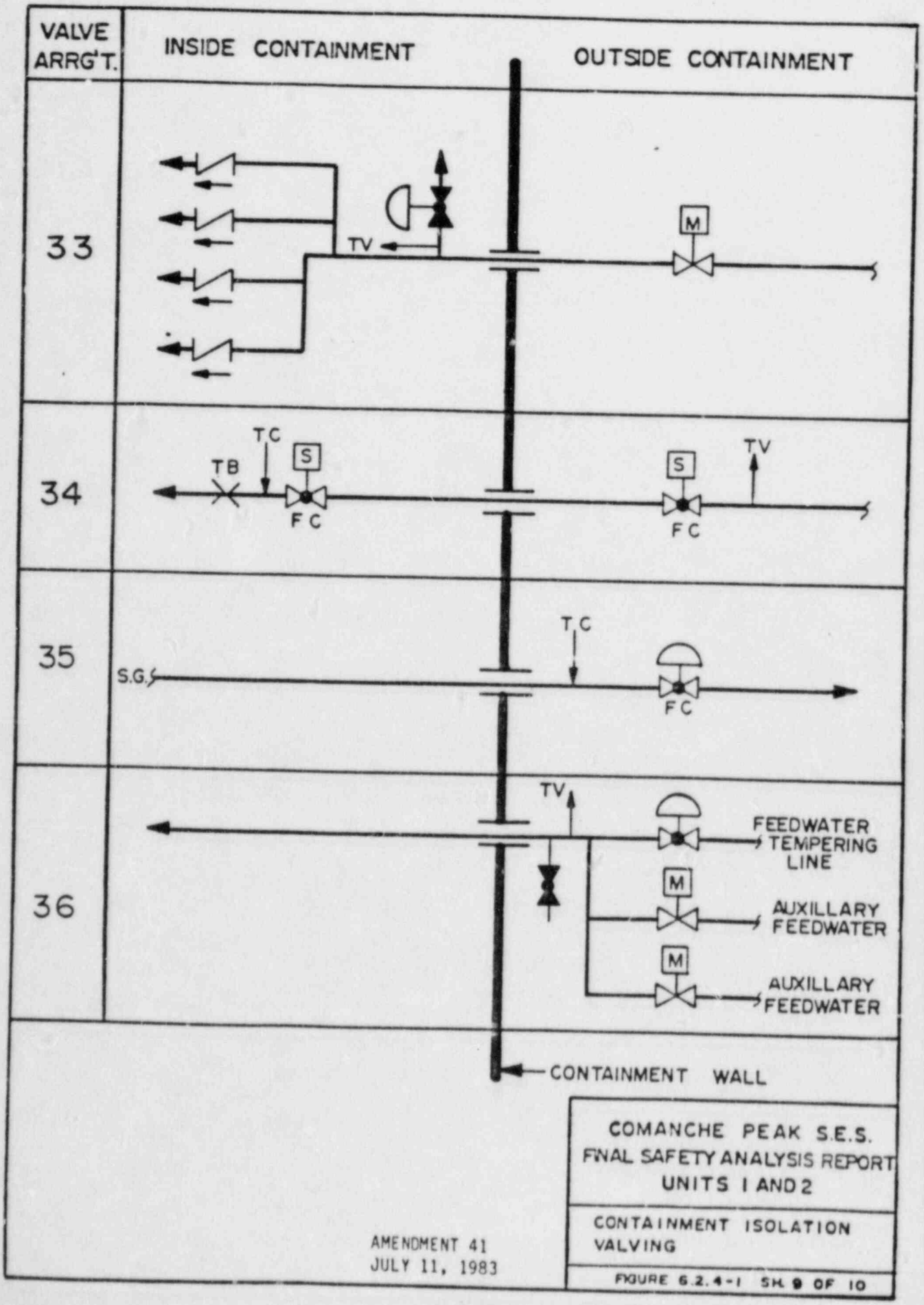
VALVE ARRG'T.
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
33
TV
M
34
TC
TB
S
FC
S
TV
FC
35
T C
S.G.
FC
36
TV
FEEDWATER TEMPERING LINE
M
AUXILLARY FEEDWATER
M
AUXILLARY FEEDWATER
CONTAINMENT WALL
COMANCHE PEAK S.E.S.
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FIGURE 6.2.4-1 SH. 9 OF 10
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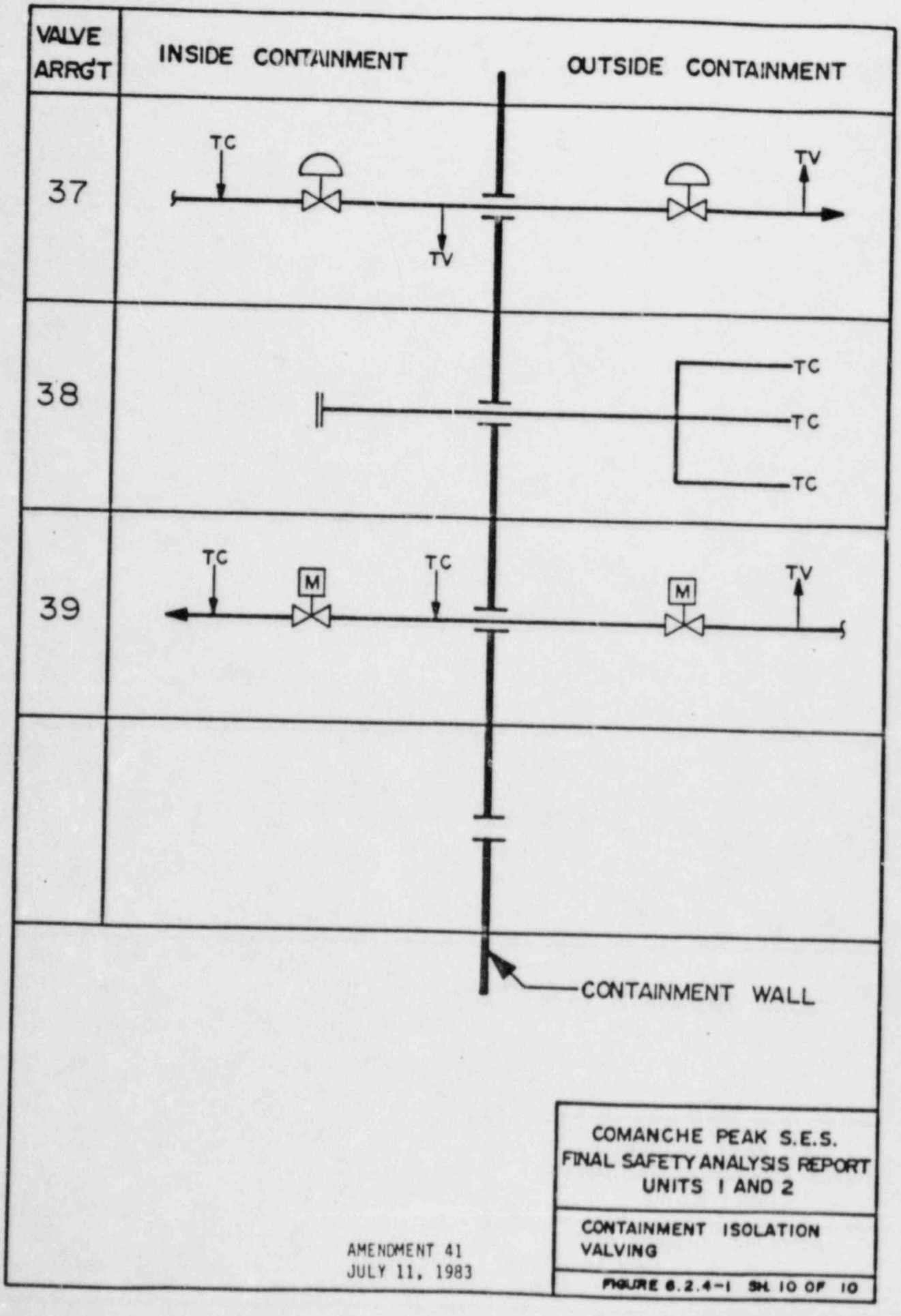
VALVE ARRG'T
INSIDE CONTAINMENT
OUTSIDE CONTAINMENT
37
TC
TV
TV
38
TC
TC
TC
39
TC
M
TC
M
TV
CONTAINMENT WALL
COMANCHE PEAK S.E.S.
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FIGURE 6.2.4-1 SH. 10 OF 10
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