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TEXAS UTILITIES GENERATING COMPANY

SKYWAY TOWER · 400 NORTH OLIVE STREET, L.B. 81 · DALLAS, TEXAS 75201

December 8, 1986

WILLIAM G. COUNSIL
EXECUTIVE VICE PRESIDENT

Director of Nuclear Reactor Regulation
Attn: Mr. Vince S. Noonan, Director
Comanche Peak Project
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

SUBJECT: COMANCHE PEAK STEAM ELECTRIC STATION (CPSES)
DOCKET NOS. 50-445 and 50-446
NRC REQUEST FOR ADDITIONAL INFORMATION CONCERNING
MSIV BYPASS VALVES

Dear Mr. Noonan:

By letter dated February 27, 1986, the NRC staff requested additional information concerning the TUGCo request of May 17, 1985, to allow the use of manual operators on the main steam isolation valve (MSIV) bypass valves. In addition, the NRC staff provided comments on the proposed technical specification revision and on the related FSAR changes provided by Amendment 56.

Attachment 1 provides responses to the NRC staff request for additional information.

Attachment 2 responds to the NRC staff comments on the TUGCo proposed technical specification revision and includes marked up pages from the CPSES draft technical specifications.

Attachment 3 responds to the NRC staff comments on FSAR Amendment 56 and includes an advance copy of FSAR revisions which will be included in a future FSAR amendment.

Very truly yours,

W. G. Counsil

BSD/amb
Attachments

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C. Trammell

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December 8, 1986
Attachment 1

RESPONSES TO NRC REQUEST FOR ADDITIONAL INFORMATION

QUESTION 1

Address the operation of the MSIV bypass valve by "handwheel" manual actuation and provide information on operator radiation exposure based on its location, dose rate in the area that must be accessed and occupied for its actuation, the time spent in the area, and the frequency of need to actuate, maintain, service, etc., the valve under normal and emergency plant conditions.

RESPONSE

Question 1 is a general statement of concerns. The concerns are addressed in the specific responses to Questions 2, 3, and 4.

QUESTION 2

Describe the occupational radiation exposure in terms of man-rem that will be received as compared to that which would have been received under the previously installed automatic operating conditions.

RESPONSE

The main steam lines are the only potential radiation sources in the area during normal operation. The expected average radioactivity concentration in the steam leaving the steam generators has been calculated using the data and methodology in ANSI N237-1976. With this source in the main steam line and the bypass line, the calculated dose rate near the bypass valve is 5.8×10^{-6} mrem/hr. The time required to enter the area, open or close the valve, and leave the area is expected to be 5 minutes or less. Since the valves are required to be locked closed during power operation, they will only be operated during plant startup. Only one bypass valve is required per startup, however, each bypass valve may be utilized (only one bypass valve opened at a time) to provide more even steam line heatup and valve usage during the startup. Assuming that each bypass valve is opened and later locked closed during each startup, the total time required in the area will be no more than 40 minutes per startup. The predicted occupational radiation exposure is approximately 4×10^{-9} man-rem per plant startup. Thus the calculated occupational radiation exposure per startup, and the maximum accumulated annual exposure for any reasonable anticipated startup frequency would be negligible.

Maintenance on the valves will be performed with the plant shutdown, so the expected radiation levels will be even lower. Also, the manually operated valves are expected to require less maintenance than remote operated valves. Thus, if radiation levels in the area were significant, the radiation exposure encountered during maintenance would be comparatively less with the manual valves.

QUESTION 3

During Mode 2, if a Steam Generator Tube Rupture event were to occur, would the environment, e.g., radiation level/temperature, permit an operator to manually close the valve without exceeding part 10CFR20 guidelines?

RESPONSE

The radiation level near the valve has been calculated assuming that a steam generator tube rupture occurs during startup, and that the bypass valve is open in the line associated with that steam generator. Primary coolant activities are based on 1% defective fuel and include iodine spiking. Furthermore, the conservative assumption is made that the radioactivity concentration per unit mass in the secondary steam is the same as that in the primary coolant. With this postulated accident condition, the calculated dose rate is 4.6 rem/hr. Then, assuming that 5 minutes are required to enter the area and close the valve, the calculated radiation exposure is approximately 0.39 rem. This is lower than the quarterly occupational exposure limit of 1.25 rem.

During normal operation, the maximum predicted temperature in the area is 104^{o}F. Although the steam temperature would increase slightly during a tube rupture accident, the increase in room temperature would not be significant, and access would be permissible.

QUESTION 4

Assuming fuel failure before or during the tube rupture described in 3 above, what is the maximum time available to complete valve closure before radiation exposure becomes excessive per 10CFR part 20 and/or offsite doses become excessive per 10CFR part 100.

RESPONSE

The 1% defective fuel postulated in the response to question 3 was assumed both before and during the tube rupture accident. The resulting primary coolant activity levels exceed the proposed Technical Specification limits for operation. Thus, startup would not be permitted with these or higher reactor coolant activities. With this conservative assumption the maximum dose rate at the valve is 4.6 rem/hr, so an individual could spend approximately 16 minutes in the vicinity of the valve at any time during the accident without exceeding the 1.25 rem limit.

The dose at the Exclusion Area Boundary has been calculated using the assumptions that were used to obtain the results for the conservative case with iodine spiking that were reported in FSAR Section 15.6.3, and with the following additional assumptions. The bypass valve is assumed to remain open during the entire 8 hour period that is required to depressurize the plant following a steam generator tube rupture accident. Flow through the ruptured tube is assumed to contine for 8 hours at the initial break flow rate. All of the flow through the break is assumed to flow through the bypass valve and to the steam dump system.

With these conservative postulated conditions, the calculated whole body gamma dose at the EAB is 1.3 rem, and the thyroid dose is 183 rem. These values are below the 10CFR part 100 limits of 25 rem whole body and 300 rem to the thyroid. Thus, even if the bypass valve remained open, the offsite dose limits would not exceed for more than 8 hours.

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Attachment 2

RESPONSES TO COMMENTS ON TECHNICAL SPECIFICATIONS

1. Comment — Refer to Table 3.6-1; Containment Isolation Valves; 4. Manual Valves; Insert A. Valve numbers marked 1HV imply power operated, 1HV should be changed to 1MS.

   Response — The HV designation is retained in the design even though the operator has been changed (Reference CPSES drawing 2323-M1-0202, Rev. CP-8). This minimizes the number of documents requiring revision and the potential for discrepancies.

2. Comment — Refer to Table 3.6-1; Containment Isolation Valves; 7. Steam Line Isolation Signal; Valve 1HV-2323 A; under Line or Service. Currently this reads "Main Steam From Generator #1. This should read, "Main Steam From Steam Generator #1".

   Response — See revised Table 3.6-1, page 3/4 6-26.

3. Comment — Refer to Table 3.6-1; Containment Isolation Valves; 7. Steam Line Isolation Signal (Continued); Valve 1HV-2411; under Line or Service. Currently this reads "Main Steam From Steam Generator #3. This should read, "Drain From Main Steam Line #3".

   Response — See revised Table 3.6-1, page 3/4 6-27.

4. Comment — Refer to Table 3.6-1; Table Notations, Note 11. Should read, "All four MSIV Bypass Valves are locked closed in Mode 1. During Modes 2, 3 and 4 one MSIV Bypass Valve may be opened provided the other three MSIV Bypass Valves are locked closed and their associated MSIVs are closed."

   Response — See revised Table 3.6-1, page 3/4 6-30.

FINAL DRAFT

TABLE 3.6-1 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NO.	FSAR TABLE REFERENCE NO.*	LINE OR SERVICE	ISOLATION TIME (Seconds)	TYPE LEVEL TESTIN
6. Check Valves (Continued)				
1-8841B	63	RHR to Hot Leg Loops #2 and #3	N.A.	Note
1SI-3968	104	N_2 Supply to Accumulators	N.A.	C
1CA-016	113	Service Air to Containment	N.A.	C
1CC-629	117	CC Return From RCP's Motors	N.A.	C
1CC-713	118	CC Supply to RCP's Motors	N.A.	C
1CC-831	119	CC Return From RCP's Thermal Barrier	N.A.	C
1CH-024	120	Chilled Water Supply to Containment Coolers	N.A.	C
7. Steam Line Isolation Signal				
1HV-2333A	1	Main Steam From Steam Generator #1	5	Note Note
1HV-2333B	2	Main Steam From Generator #1	5	Note
1HV-2409	3	Drain From Main Steam Line #1	5	Note
1HV-2334A	6	Main Steam From Steam Generator #2	5	Note Note
1HV-2334B	7	Main Steam From Steam Generator #2	5	Note
1HV-2410	8	Drain From Main Steam Line #2	5	Note
1HV-2335A	10	Main Steam From Steam Generator #3	5	Note Note

FINAL DRAFT

TABLE 3.6-1 (Continued)

CONTAINMENT ISOLATION VALVES

VALVE NO.	FSAR TABLE REFERENCE NO.*	LINE OR SERVICE	ISOLATION TIME (Seconds)	TYPE LEVEL TESTING
7. Steam Line Isolation Signal (Continued)				
1HV-2335B	11	Main Steam From Steam Generator #3	5	Note 1 Note 1
1HV-2411	12	Main Steam From Steam Generator #3 Drain From Main Steam Line #3	5	Note 1
1HV-2336A	14	Main Steam From Steam Generator #4	5	Note 1 Note 1
1HV-2336B	15	Main Steam From Steam Generator #4	5	Note 1
1HV-2412	16	Drain from Main Steam Line #4	5	Note
8. Feedwater Line Isolation Signal				
1HV-2134	19	Feedwater to Steam Generator #1	5	Note
1FV-2193	20d	Feedwater Tempering Line	5	Note Note
1HV-2185	20e	Feedwater Bypass Line	5	Note
1HV-2135	21	Feedwater to Steam Generator #2	5	Note
1FV-2194	22d	Feedwater Tempering Line	5	Note Note
1HV-2186	22e	Feedwater Bypass Line	5	Note
1HV-2136	23	Feedwater to Steam Generator #3	5	Note
1FV-2195	24d	Feedwater Tempering Line	5	Note Note
1HV-2187	24e	Feedwater Bypass Line	5	Note
1HV-2137	25	Feedwater to Steam Generator #4	5	Note

TABLE 3.6-1 (Continued)

TABLE NOTATIONS

Note 8: These valves located outside containment are normally closed and see a pressure in excess of containment pressure in post-accident conditions. A valve stem leakage check will be performed on a quarterly basis to assure no significant stem leakage would occur in post-accident conditions.

Note 9: These valves are classified as "passive" in accordance with Specification 4.0.5 and are stroke time-tested only following maintenance which could effect the stroke time of the valve.

Note 10: These valves require steam to be tested and are thus not required to be tested until the plant is in MODE 3.

Note 11: All four MSIV Bypass Valves are locked closed in Mode 1. During Modes 2, 3 and 4 one MSIV Bypass Valve may be opened provided the other three MSIV Bypass Valves and their associated MSIV's are closed.

are locked closed

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Attachment 3

RESPONSES TO COMMENTS ON FSAR AMENDMENT 56

FSAR Section 3.9B Mechanical Systems and Components

1. Comment — Refer to Table 3.9B-8; Sheet 5; ASME Code Class 2 and Class 3. Active and Inactive Pumps and Valves; Main Steam Reheat and Steam Dump System. Are b and e the same now? Should b be deleted?

   Response — See revised Table 3.9B-8, sheet 5.

2. Comment — There is a conflict between Table 3.9B-8; sheet 5, and Table 3.9B-10 sheet 1 of 12. HV-2333B, HV-2334B, HV-2335B, HV-2336B should be deleted from the Active Valve list.

   Response — See revised Table 3.9B-10, sheet 1.

FSAR Section 6.2 Containment Systems

3. Comment — Assuming Table 6.2.4-2 Sheet 1 of 10 is for both Active and Inactive valves, the "HV" designator should be changed on the MSIV bypasses and the primary method of actuation should be "Local Manual" to clearly differentiate from the remote manual actuators.

   Response — The HV designation is retained in the design even though the operator has been changed (Reference CPSES drawing 2323-M1-0202, Rev. CP-8). This minimizes the number of documents requiring revision and the potential for discrepancies. Also see revised Table 6.2.4-2, sheet 1.

4. Comment — On Table 6.2.4-3 Sheets 1 and 2 of 14, the containment isolation signal for items 2, 7, 11, and 15 should be deleted since they no longer receive a containment isolation signal.

   Response — See revised Table 6.2.4-3, sheets 1 and 2.

5. Comment — Figure 6.2.4-1; Sheet 5 of 10; Valve arrangement 17; Outside Containment; should indicate locked closed.

   Response — See revised Figure 6.2.4-1, sheet 5 of 10.

6. Comment — In Section 10.3.2.3.1, justify the elimination of the need for main steam isolation valves to stop flow from either direction within 10 seconds after a steam line break to prevent uncontrolled steam releases from more than one steam generator (Page 10.3-7 and 10.3-9 Amendment 56).

RESPONSES TO COMMENTS ON FSAR AMENDMENT 56

Response The 10 second requirement was based on large steam line break analyses. The 10 second limit was deleted so that the statement would also be applicable to small steam line breaks.

7. Comment The words "an integral" should be removed and replaced with "a manual" (Page 10.3-7 Amendment 56).

Response See revised page 10.3-7.

8. Comment Should the bypass valve be locked closed during "power operation" or when "containment integrity" is required (Page 10.3-7 Amendment 56)?

Response The bypass valves should be locked closed during power operation as stated in Amendment 56 (References CPSES drawings 2323-M1-0202, Rev. CP-8, and 2323-M1-2202-10, Rev. CP-1). Technical Specification Table 3.6-1, Note 11, covers the requirement for containment integrity.

9. Comment The following sentence should be deleted; "Each MSIV bypass valve also has a two train module, open, close and auto switch on the control board." (Page 10.3-8 Amendment 56).

Response See revised page 10.3-8.

10. Comment The following sentence should be deleted; "There is no provision for testing the bypass valves." (Page 10.3-9 Amendment 56).

Response See revised page 10.3-9.

11. Comment Refer to Section 10.3.2.4; Main Steam Isolation Bypass Valves. This paragraph should clearly explain that all four MSIV bypass valves are locked closed in Mode 1. During Modes 2, 3, and 4 one MSIV bypass valve may be opened provided the other three MSIV bypass valves are locked closed and their associated MSIVs are closed.

Response See revised section 10.3.2.4.

12. Comment Refer to Figure 10.3-1; Sheet 1. Designation HV should be replaced with MS for the subject valves.

Response See the response to question 3, above.

CPSES/FSAR
TABLE 3.9B-8
(Sheet 5)

ASME CODE CLASS 2 AND CLASS 3
ACTIVE AND INACTIVE PUMPS AND VALVES

Component		Class	Operation*	
System Valves Including and Downstream From Containment Isolation Valves				
a.	Power-operated valves	2	A	
b.	Manually operated valves	2	I	
c.	Instrument root valves	2	I	
d.	Test connection valves	2	I	
e.	Vent and drain valves	2	I	
Auxiliary Feedwater System				
Auxiliary feedwater pumps		3	A	
Main Steam Reheat and Steam Dump System				55
Main Steam System Valves				
a.	Main steam isolation valves	2	A	
b.	Main steam safety and relief valves	2	A	
c.	Pneumatically operated valves	2/3	A/I	
d.	Locked-closed manual valves	2	I	
e.	Instrument root valves	2/3	I	Rev.
f.	Test connection valves	2	I	
g.	Instrument drain and vent valves	2/3	I	
h.	Manual valves	2/3	I	

*A = Active
I = Inactive

CPSES/FSAR
TABLE 3.9B-10
(Sheet 1 of 17)

ACTIVE VALVES

Valve Identification or Location No.	System	Valve Type And Actuator	Size In.	ANS Safety Class	Method of Actuation	Normal Position	Function	
HV-2333A	MS	Globe Hydraulic	32	2	Auto Trip	Open	Steam Line Isolation	55
HV-2409	MS	Globe/Air	2	2	Auto Trip	Open	Steam Line Isolation	Rev.
HV-2452-1	MS	Globe/Air	4	2	Auto Trip	Closed	Turbine Drive AFW Pump Steam Supply	55
PV-2325	MS	Globe/Air	8	2	Remote Manual	Closed	Containment Isolation	
HV-2334A	MS	Globe Hydraulic	32	2	Auto Trip	Open	Steam Line Isolation	Rev.
HV-2410	MS	Globe/Air	2	2	Auto Trip	Open	Steam Line Isolation	
PV-2326	MS	Globe/Air	8	2	Remote Manual	Closed	Containment Isolation	
HV-2335A	MS	Globe Hydraulic	32	2	Auto Trip	Open	Steam Line Isolation	55
HV-2411	MS	Globe/Air	2	2	Auto Trip	Open	Steam Line Isolation	Rev.
PV-2327	MS	Globe/Air	8	2	Remote Manual	Closed	Containment Isolation	
HV-2336A	MS	Globe Hydraulic	32	2	Auto Trip	Open	Steam Line Isolation	55
HV-2412	MS	Globe/Air	2	2	Auto Trip	Open	Steam Line Isolation	Rev.
HV-2452-2	MS	Globe/Air	4	2	Auto Trip	Closed	Turbine Driven AFW Pump Steam Supply	55
PV-2328	MS	Globe/Air	8	2	Remote Manual	Closed	Containment Isolation	
HV-2397	MS	Globe/Air	3	2	Auto Trip	Open	Auxiliary Feedwater System Actuation	55
HV-2398	MS	Globe/Air	3	2	Auto Trip	Open	Auxiliary Feedwater System Actuation	
HV-2399	MS	Globe/Air	3	2	Auto Trip	Open	Auxiliary Feedwater System Actuation	

CPSES/FSAR
TABLE 6.2.4-2
(Sheet 1 of 10)

CONTAINMENT ISOLATION VALVING APPLICATION

Item	Isolation Valve No.	Location in Relation to Containment	Type of Leakage Rate Test	Length of Pipe to Outermost Isolation Valve (ft)	Valve Type/Operator	Method of Actuation		
						Primary	Secondary	
1	HV-2333A	Outside	Note 1	40'	Y - Globe/Hydr. N2 Actuator	Auto close	Remote Manual	42
2	HV-2333B	Outside	Note 1	-	Globe Manual	Local Manual	N/A	Rev.
3	HV-2409	Outside	Note 1	-	Globe/Air	Auto close	Remote Manual	
4	HV-2452-1	Outside	Note 1	-	Globe/Air	Auto open	Remote Manual	
5	PV-2325	Outside	Note 1	-	Globe/Air	Remote Manual	N/A	42
6	HV-2334A	Outside	Note 1	38'	Y - Globe/Hydr. N2 Actuator	Auto close	Remote Manual	
7	HV-2334B	Outside	Note 1	-	Globe Manual	Local Manual	N/A	Rev.
8	HV-2410	Outside	Note 1	-	Globe/Air	Auto close	Remote Manual	
9	PV-2326	Outside	Note 1	-	Globe/Air	Remote Manual	N/A	42
10	HV-2335A	Outside	Note 1	40'	Y - Globe/Hydr. N2 Actuator	Auto close	Remote Manual	
11	HV-2335B	Outside	Note 1	-	Globe Manual	Local Manual	N/A	Rev.
12	HV-2411	Outside	Note 1	-	Globe/Air	Auto close	Remote Manual	
13	PV-2327	Outside	Note 1	-	Globe/Air	Remote Manual	N/A	42
14	HV-2336A	Outside	Note 1	38'	Y - Globe/Hydr. N2 Actuator	Auto close	Remote Manual	
15	HV-2336B	Outside	Note 1	-	Globe Manual	Local Manual	N/A	
16	HV-2412	Outside	Note 1	-	Globe/Air	Auto close	Remote Manual	42

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TABLE 6.2.4-3
(Sheet 1 of 14)

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CONTAINMENT ISOLATION VALVING APPLICATION (Note 1)

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Item	Containment Isolation Signal	Valve Position				Valve Closure Time (Sec.)	Power Source	Remarks
		Normal	Shutdown	Post-Accident	Valve Power Failure			
1	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
2		Closed	Closed	Closed	Closed	N/A	-	Main Steam Isolation Bypass Valve (Rev.)
3	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
4	-	Closed	Opened	Opened	Opened	N/A	-	
5	-	Closed	Closed	Opened/ Modulation	Closed	N/A	-	
6	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
7		Closed	Closed	Closed	Closed	N/A	-	Main Steam Isolation Bypass Valve (Rev.)
8	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
9	-	Closed	Closed	Opened/ Modulation	Closed	N/A	-	
10	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	

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CONTAINMENT ISOLATION VALVING APPLICATION (Note 1)

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Item	Containment Isolation Signal	Valve Position			Valve Power Failure	Valve Closure Time (Sec.)	Power Source	Remarks
		Normal	Shutdown	Post-Accident				
11		Closed	Closed	Closed	Closed	N/A	-	Main Steam Isolation Bypass Valve
12	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
13	-	Closed	Closed	Opened/ Modulation	Closed	N/A	-	
14	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
15		Closed	Closed	Closed	Closed	N/A	-	Main Steam Isolation Bypass Valve
16	Steam Line Isolation	Opened	Closed	Closed	Closed	5	-	
17	-	Closed	Opened	Opened	Closed	N/A	-	
18	-	Closed	Closed	Opened/ Modulation	Closed	N/A	-	
19	Feedwater Isolation	Opened	Closed	Closed	Closed	5	-	
20	Phase A	Opened	Closed	Closed	Closed	5	-	
20a	-	Opened	Opened	Opened	Opened	N/A	-	
	-	Opened	Opened	Opened	Opened	N/A	-	
20b	-	Closed	Opened	Closed	Closed	N/A	-	

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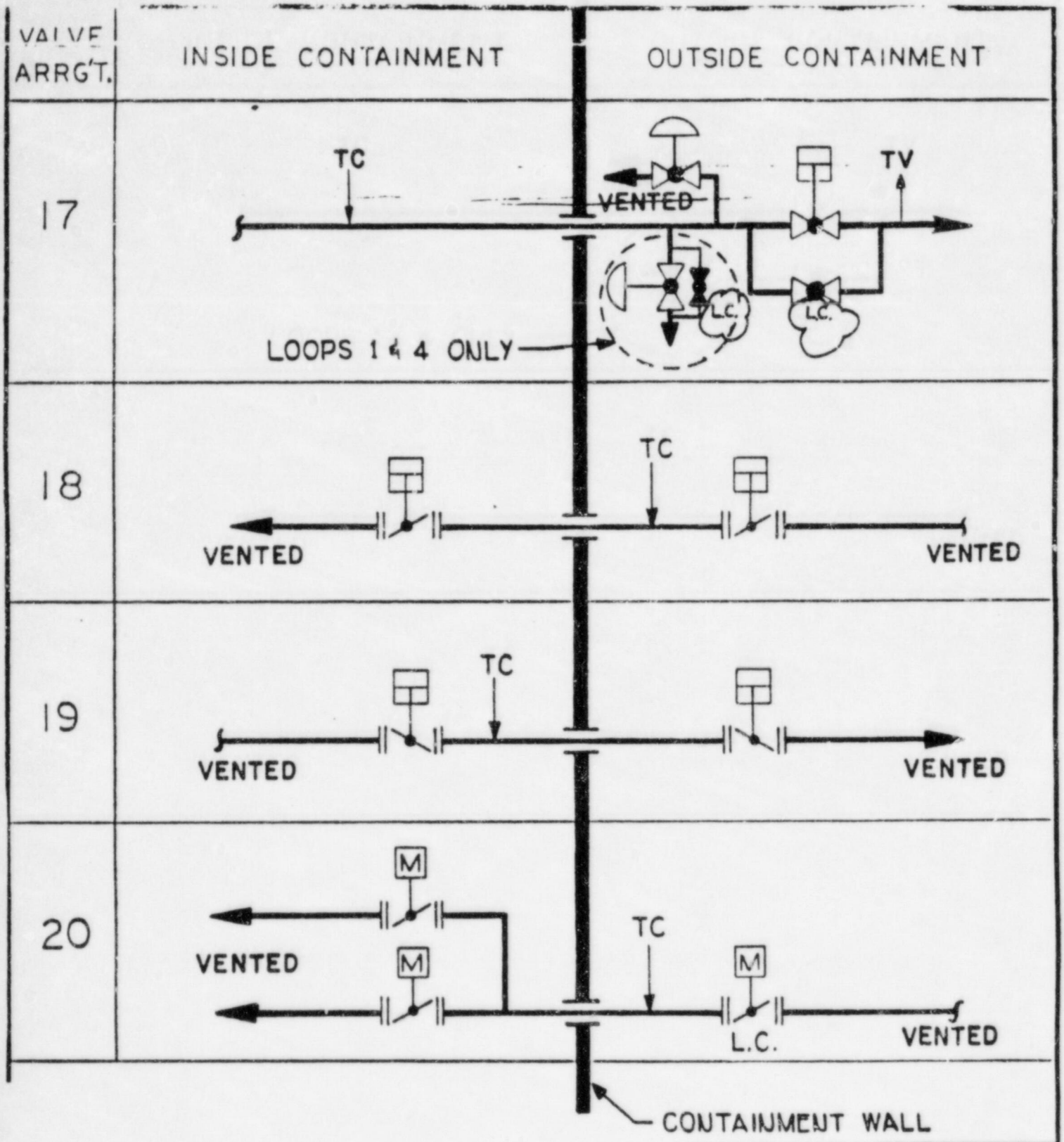

COMANCHE PEAK S.E.S.
FINAL SAFETY ANALYSIS REPORT
UNITS 1 and 2

CONTAINMENT ISOLATION VALVING

FIGURE 6.2.4-1 Sh. 5 of 10

The valves fail closed on loss of air or electric signal. Valve positions, open or closed, are indicated with control board lights. Failure of the relief valves to open causes the system pressure to rise to the set point of the first safety valve, which would then open, preventing further pressurization of the system. The power-operated relief valves do not provide main steam supply system overpressure protection. This overpressure protection is provided entirely by the safety valve system described previously. Valves are designed to pass a total flow of 10 percent of the plant design flow at the pressure corresponding to steam generator no-load conditions. The maximum capacity of any one valve does not exceed the flow rate (specified by the steam generator manufacturer) at the design pressure of the main steam supply system in order to limit reactivity insertion caused by the negative temperature coefficient of the core.

The valves discharge to the atmosphere and are designed to operate over the steam pressure range of 125 to 1300 psia. Each valve inlet pipe is provided with one manual isolation valve for maintenance.

Table 10.3-3 shows the design bases of the power-operated relief valves.

10.3.2.3 Main Steam Isolation Valves

10.3.2.3.1 General

Each main steam line is provided with a quick-acting isolation valve, and is designed to stop flow from either direction after a steam line break (five sec after receiving the closing signal) to prevent uncontrolled steam release from more than one steam generator. The valves are installed outside the Containment, downstream of the safety valves, and are provided with a manual 4-in. bypass valve for warming the system and equalizing the pressure across the isolation valve. The bypass valve is locked closed during power operation. The MSIVs can be opened manually by the operator in the Control Room without opening the bypass valve. | 56 | Rev. 56

Each MSIV is provided with a two-train module, three-position control switch mounted on the main control board. The switch has an electrical two-train module so that valves can be closed even if one train fails. The three switch positions are close, auto, and open, with spring return to auto position. Each MSIV also has a two-train module test switch to enable a valve to be closed to a 10 percent-closed position when tested. In addition to these control board mounted switches, there is a two-train module trip switch which can be used to trip all four MSIVs simultaneously. Trip switch positions are trip and auto, with spring return to auto.

Rev.

56 | The MSIV's are automatically closed on high-high containment pressure or steamline break protection logic (as indicated by high steam pressure rate or

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Q032.79 | low steamline pressure). High steam pressure rate is only effective when steamline SI is manually blocked during startup and cooldown, and low steamline pressure is only effective when the block is removed (see Figure 7.2-1 sheet 7). The MSIV's are closed by operation of the MSIV valve actuators. The actuator is, in effect, a hydraulic cylinder coupled directly to a nitrogen-accumulator. The accumulator is designed as a chamber

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Q212.139 | concentric to the hydraulic cylinder, and it stores the energy required for closing the MSIV in the form of compressed nitrogen gas. Because the accumulator is integral part of the cylinder, the loss of any external manifolding or system elements will not prevent the actuator from closing the valve. A hydraulic control system which maintains hydraulic fluid below the valve actuator piston is utilized to regulate valve closure velocity. Extension of the actuator to close the MSIV is accomplished by an electric signal which operates two solenoid valves in the hydraulic control system portion of the actuator. These valves permit the hydraulic fluid below the actuator piston to flow into a hydraulic reservoir at a controlled rate as the compressed nitrogen extends the actuator to close the MSIV.

Each MSIV can be tested with its own control board switch (two-train module, two-position test, or normal with position maintained). If the valve switch is in the test position and the valve does not reach 10-percent closure after a time delay, an alarm is actuated in the Control Room. When the valve is tested, it closes slowly by energizing a test solenoid in the hydraulic circuit as well as energizing the trip-close solenoid. An automatic MSIV trip-close signal overrides the test signal and closes the valve quickly. 14 Q032.43 Q032.74

Rev.

Alarms are actuated when MSIVs have low hydraulic oil pressure or low actuator gas pressure. Each valve has position-indication lights on the main control board for open, closed, and test positions. There are monitor lights which light on valve-closed position.

The automatically operated MSIVs serve only a safety function and are not required for power operation. They are required to limit uncontrolled flow of steam from the steam generators in the event of a break in the piping system. These valves operate under the following situations:

1. Break in the Steam Line from One Steam Generator Inside the Containment Building

   If the break is within the Containment, steam is discharged into the Containment. The other steam generators act to feed steam through the interconnecting header into the broken line and then into the Containment. A steam line break results in a significant pressure rise in the Containment so that reverse flow protection is necessary to prevent discharge of more than one steam generator. According to calculations, reverse flow must be interrupted to limit the Containment pressure rise to an amount below design pressure. To achieve this, the automatic isolating 56

d. Closing Rate Test

The complete valve assembly is tested to ensure that the closing time is less than five sec.

3. Leakage

The valve disc and seat materials are such that valve wear does not increase the leakage rate after a minimum of 500 cycles under normal operating conditions.

4. Design Bases

Table 10.3-4 shows the design bases of the MSIVs.

10.3.2.4 Main Steam Isolation Bypass Valves

The MSIVs are provided with 4-in. bypass valves which are normally closed. If the bypass valves were open they would tend to negate the protection provided by the MSIVs. Therefore, all four bypass valves are locked closed during power operation. During startup, hot standby and hot shutdown one MSIV bypass valve may be opened provided the other three bypass valves are locked closed and their associated MSIV's are closed. Table 10.3-5 shows the design bases for the main steam isolation bypass valves. 56 Rev. 56

10.3.2.5 Flow Restrictors

Each steam generator is provided with flow restrictors which are located inside the steam generator outlet nozzle. These restrictors (several venturis arranged in a bundle) limit the steam flow rate in the event of a steam line rupture. These restrictors also minimize the thrust force effects on the steam generator and piping system.

The design basis, description, and test and inspections are included in 13