TOLEDO
EDISON

RICHARD P. CROUSE
Vice President
Nuclear
(419) 259-5221

License No. NPF-3
Docket No. 50-346
Serial No. 988
September 26, 1983

Mr. John F. Stolz, Chief
Operating Reactors Branch No. 4
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Stolz:

This is in response to your letter dated August 8, 1983, (Log No. 1342) concerning steam generator blowdown system containment isolation valves. The attachments provide Toledo Edison's response for additional information for Davis-Besse Nuclear Station No. 1.

Very truly yours,

RPC:

Attachments 1-4

cj a/15

cc:
DB1 Res. Inspector

A001 Aperture Card Dist.
1/5 Drawings To: Reg File - 1 set
PM - 4 sets

8309300263 830926
PDR ADOCK 05000346
P PDR

ATTACHMENT 1 TO TOLEDO EDISON LETTER
ON STEAM GENERATOR BLOWDOWN SYSTEM

Item a. Identify and discuss the reasons for the deletion of valves MS 603A and MS 611A and associated lines.

Response a. Valves MS 603A and MS 611A and their associated lines are to be deleted from the steam generators flow paths to the condensers. They are identified at zones G-1 and G-12 of Davis-Besse Unit No. 1 Drawing M-007 (Attachment 5). These valves were originally installed to reduce the pressure and control flow in the steam generator cleanup lines while draining the steam generator on an intermittent basis under administrative controls. The only safety function performed by these valves is containment isolation. These valves are not required in the new system. They will be replaced by a control valve which will be installed in each line at the condenser inlet to take the required pressure drop from steam generator operating pressure to condenser vacuum. See Attachment 2 for new blowdown system.

Item b. Provide a complete description of the blowdown system from the steam generator to the condenser. A one line diagram such as a P&ID will be adequate.

Response b. A simplified P&ID of the steam generator blowdown system is shown on the Attachment 2. The steam generator blowdown system (SGBS) piping and valves from the steam generator through the containment penetration and out to the containment isolation valve are designed to the requirements of ASME Section III, Subsection NC (Class 2). That portion of the system from the first circumferential butt weld inside the containment out to, and including, the isolation valve (including the flued heads) is also designed to the requirements of Subsection NE (Class MC). The remaining portion of piping in the auxiliary building is designed to ANSI B31.1 and is seismic Class 1. The piping and valves in the Turbine Building are designed to the requirements of ANSI B31.1. The new design will provide an automatic steam and feedwater rupture control system (SFRCS) closure signal to the blowdown system valves MS 603 and MS 611. The actuation of SFRCS in the event of loss of feedwater, steam line break, or feedwater line break will isolate the steam generators. In addition, blocking capability of SFRCS signals to these valves will be provided in the control room. It will enable the operator to manually open these valves to provide a steam generator drain path to the condenser to provide steam generator level control in case of a steam generator tube rupture accident.

Item c. Describe how the changes meet the design requirements stated in the USAR with respect to seismic analysis, high energy line break considerations, containment penetration classification and design and component classification and qualification for the intended use.

Response c. All piping and valves are analyzed and supported in a manner that meets the requirements of Section 3.7 of the USAR and Reg. Guide 1.29 for normal, upset, and faulted conditions. High energy line break considerations meet the requirements of Standard Review Plan 3.6.1 and 3.6.2 including Branch Technical Position MEB 3-1. Break points are postulated for each flow path at 1) all terminal ends, 2) all points where the stress levels exceed .8 (1.2 Sh + SA), and 3) the two (2) intermediate points having the highest stress levels. Cracks are postulated to occur at locations having the most severe effect.

Item d. Identify the safety analysis (Section 3.6 of the USAR) which bound the change. If none bound the change, provide an appropriate analysis. Identify the credit taken in the analysis for a specific valve closure time.

Response d. Safety analyses were conducted on the SGBS for compartment pressurization, environmental effects, pipe whipping and jet impingement resulting from a pipe rupture. No credit was taken for specific valve closure time in these analyses. The results of the compartment pressurization and environmental effect analyses indicate that for all three areas which these lines pass through in the auxiliary building a more severe accident has already been postulated. The accidents which envelope the SGBS line break accident are as follows: Annulus area - rupture of the 18 inch main feedwater line in Room 314; Room 236 - rupture of the 6 inch main steam line to the auxiliary feedpump turbines; and Room 314 - rupture of the 18 inch main feedwater line.

As previously noted, the SGBS piping was subjected to stress analyses to determine piping rupture locations in accordance with Standard Review Plan (SRP) 3.6.1 and 3.6.2 and their respective Branch Technical Positions (BTP).

The piping rupture locations established by the analyses were then walked down to identify what, if any, safety related equipment in these areas would be affected by pipe whipping or jet impingement. In addition, the entire pipe routing was walked down with the aim of identifying safety related equipment which could be affected by jet impingement due to pipe cracks. As a result of the walkdowns, seven (7) pipe whip restraints were designed, per USAR Section 3.6, for inside containment and three (3) for Room 236. No restraints were required for Room 314. Jet impingement barriers were required in two (2) locations, both inside containment. The table below identifies the above noted restraints and jet impingement barriers and the safety related equipment which they are intended to protect from the dynamic affects of postulated piping failures.

Restraint No.	Locations	Safety Related Equipment
R1	Ctmt. - S.G. 1-1 Compartment - El. 596'-7"	1"-CCB-7 and 1½"-CCB-8 (RCP seal injection and return piping)
R2A	Ctmt. - Room 315 - El. 576'-0"	Incore Instrumentation Tank No. 1-1
R2B	Ctmt. - Room 315 - El. 576'-0"	Incore Instrumentation Tank No. 1.1
R3	Aux. Bldg. - Room 236	1"-2-27425A Conduit and 3/4"-2-27259B conduit (power & control circuits for HV-1383, AFP suction from S. W. system)
R4	Ctmt. - S.G. 1-2 Compartment - El. 597-4"	1½"-CCB-14 (RCP seal injection piping)
		1"-CCA-19 (Pressurizer drain and sample line)
R5	Ctmt. - S.G. 1-2 Compartment - El. 594'10"	1½"-CCB-14 (RCP seal injection piping)
		1"-CCA-19 (Pressurizer drain and sample ilne)
R6	Ctmt. - Room 220 - El. 565'-0"	2½"-CCB-2 (HPI piping) 1" 1-49010A Conduit (HV-DH12)

Restraint No.	Locations	Safety Related Equipment
R7	Aux. Bldg. - Room 236	CMU Wall 2347
R8	Ctmt. - S.G. 1-2 Compartment El. 594'	1½"-CCB-14 (RCP seal injection piping) 1"-CCA-19 (Pressurizer drain and sample line)
R9	Aux. Bldg. - Room 236	CMU Wall 2337
Piping Jet Impingement Barrier	Ctmt. - Room 220 - El. 565'-0"	2½"-CCB-2 (HPI piping)
Conduit Jet Impingement Barrier	Ctmt. - Room 220 -	1" 1-49010A Conduit (HV-DH12)

Item e. Discuss any impact of the change upon water chemistry and radioactivity release.

Response e. This modification will allow the steam generator blowdown system to be used at any power level. The circulation from the steam generator to the condenser and then to the polishing demineralizer will clean the dissolved solids and reduce the impurities in the secondary system, and therefore the water chemistry will be improved.

Rupture of the steam generator piping outside of the containment will release radioactivity to the environment only if primary-to-secondary leakage exits. Any radioactivity releases of this type are within the allowable limits specified in the Davis-Besse Technical Specifications. See Subsection 3.6.2.7 for the environmental effects of a steam generator blowdown line rupture.

Item f. Identify any limitations upon operation of the blowdown system imposed by the analysis.

Response f. The steam generator blowdown system is designed and analyzed for full operation pressure as a high energy line. The functional requirements for high energy line are satisfied per Section 3.6 of the USAR. Therefore, no limitations upon operation of this system are imposed by the analysis.

Item g. Discuss what changes, including Paragraph 10.4.8, must be made to the USAR as a result of this modification.

Response g. As a result of the modification, changes will be made to the affected sections of the USAR as proposed in Attachment 3.

cj a/15

Attachment 3

CHANGES TO USAR DUE TO IMPLEMENTATION OF THE SGBS MODIFICATIONS

Changes to the USAR necessitated by the implementation of the SGBS modifications are summarized as follows:

Section 3.2.1.2 - Add "Steam generator blowdown piping from steam generators to auxiliary building boundary"

Table 3.2-2 - Add under piping component Group B "Steam Generator Blowdown System from Steam Generators to Containment Isolation Valves - ASME III, Class 2, 1971"

Section 3.6.2.2.1 - Add "Steam Generator Blowdown Lines" to listing of systems whose breaks are postulated in accordance with Reg. Guide 1.46.

Section 3.6.2.2.2 - Add "steam generator blowdown pipe whip restraint locations are based on the protection of specific safety-related equipment, not on the maximum span between restraints."

Section 3.6.2.7.1.14 - Add new section - Steam Generator Blowdown System

Description:

The steam generator blowdown system under normal operating conditions is 930 PSIG and 536°F. For a description of the blowdown system, see Section 10.4.8.

Proximity to Required Safety-Related Equipment:

Safety-related equipment or associated power and/or control cables are located in the following rooms.

Room 314 (El. 585):
See Subsection 3.6.2.7.1.4.

Room 236 (El. 565):
See Subsection 3.6.2.7.1.4.

Postulated Design Basis Break Locations:

Attachment 4 (Sheet 1 through 18) are included to indicate selected pipe rupture locations in accordance with SRP 3.6.2. The break locations are designated by the prefix SB.

dh d/1

Compartment Pressurization:

Room Number 314:
The rupture of the main feedwater line in this room would be a more severe accident.

Room Number 236:
The rupture of the main steam line to the auxiliary feed pump turbines in this room would be a more severe accident.

Environmental Effects:

Room Number 314:
The rupture of the main feedwater line in this room would be a more severe accident.

Room Number 236:
The rupture of the main steam line to the auxiliary feed pump turbines in this room would be a more severe accident.

Shutdown:

Abnormally high room temperatures in Rooms 236 and/or 314 would alert the operator. Also, drainage from either a rupture or crack in either of these two rooms would activate a high sump level alarm in the main control room for the sump in Room 115. The break would be isolated by the operator closing the appropriate containment isolation valve, either from the main control room or locally.

Table 3.6-2 - Add the following:

Figure	Postulated Break Point	Stress (PSI)
M-207A	SB-50	24,700
	SB-140	15,599
(DCN)	SB-B10	20,567
M-207E	SB-5E	29,570
	SB-320	19,456
	SB-80	31,635
	SB-110	21,640
M-207F	SB-72	6,520
	SB-170	17,912
	SB-120	31,154
	SB-130	30,999
M-207G	SB-5	29,901
	SB-220	25,315
	SB-190	7,895
	SB-45	33,891
	SB-60	25,725

igure	Postulated Break Point	Stress (PSI)
FSK-M-EBD-61-3 (DCN)	SB-C50	2,888
FSK-M-EBB-5-1	SB-660	4,263
FSK-M-EBB-5-2	SB-115	10,310
FSK-M-EBB-5-3	SB-298	13,283
FSK-M-EBB-5-4	SB-890	10,382
FSK-M-EBB-5-7	SB-550	16,780
	SB-430	11,977
	SB-445	12,430
	SB-475	25,639
	SB-440	6,602
	SB-431	6,232
	SB-455	11,424
	SB-465	11,009
	SB-545	20,269
	SB-535	17,381
FSK-M-EBB-5-8	SB-540	14,842
	SB-920	28,643
	SB-945	12,896
	SB-495	8,844
	SB-935	22,023
	SB-923	12,567
	SB-960	10,192
	SB-480	13,890
	SB-505	11,536
	SB-517	13,208
	SB-520	16,019
FSK-M-EBB-5-9	SB-150	13,164
FSK-M-EBB-5-10	SB-595	12,092
FSK-M-EBB-5-11	SB-990	18,450
FSK-M-EBB-5-12	SB-300	6,281
FSK-M-EBB-5-15	SB-740	24,387
	SB-640	11,910
	SB-685	28,033
	SB-665E	6,913
	SB-655E	4,740
	SB-730E	16,838
	SB-700E	16,492

Figure	Postulated Break Point	Stress (PSI)
FSK-M-EBB-5-16	SB-460	18,578
	SB-340	11,366
	SB-375	15,743
	SB-420	15,229
	SB-230	22,230
	SB-370	15,149
	SB-360	10,813
	SB-410	9,524
	SB-385	6,928
	SB-435	16,510
	SB-440	12,022

Table 3.6-3 - Add the following:

Lines	Protection Categories A	B	C	D	E	F	
Steam Generator Blowdown Lines	X	X		X	X	X	Figures (Numbers provided later)

Table 3.6.5 - Add the following under "Systems above 275 psig and 200°F"

	Failure Criteria	Compartment Pressurization	Steam Flooding	Water Flooding
Steam Generator Blowdown Lines	II	X	X	X

Table 3.6-9 - Add the following:

Inside Containment & Outside Containment

Piping System	Material	Yield Stress @ Oper. Temp (KSI)	Min. Ultimate Tensile Strength (KSI)	Design Margin
4" Steam Generator blowdown lines	SA-106 Gr. B	17.3	60.0	3.46

Table 6.2-23 - Revise as follows:

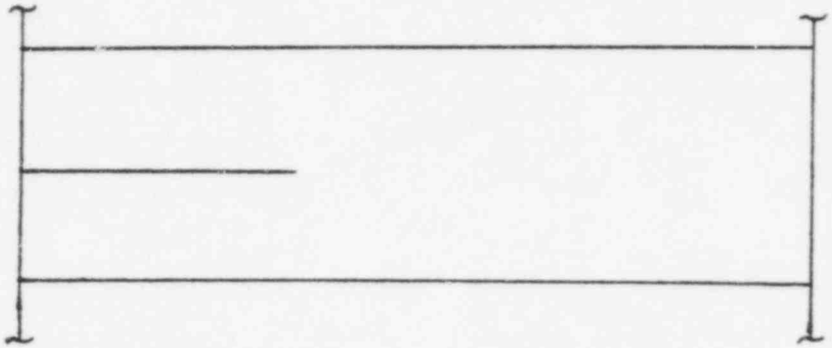
Penetration Number	Service	Flow Direction	Valve Arrangement	Number of Isolation Valves	Type	Signal Note 1	Normal Valve Position	CIS Position	Closing/ Opening Time
57	Steam Generator Blowdown line	out	For all Valve Arrangemnts See Fig. 6.2-44	1	III	SFRCS	Open	Closed	15 Sec
58	Spare								
60	Steam Generator Blowdown line	out		1	III	SFRCS	Open	Closed	15 Sec

Table 6.2-24 - Revise as follows:

Penetration Number	Service	a. Type of Valve	a. Valve Operator	b. Valve Location	c. Valve Actuation	d. Valve OP Power Source	e. Failure Valve Position	f. Line Size	g. Valve Arr. Figure
57	Steam Generator Blowdown line	Gate	Motor	"	"	F11A	As is	4"	10.4-13
58	Spare								
60	Steam Generator Blowdown line	Gate	Motor	"	"	E12E	As is	4"	10.4-13

Table 6.2-28 - Revise as follows:

Penetration Number	Service	Containment Vessel	Annulus	Penetration and ECCS Rooms	EVS Boundary	Filtration Bypass Postulated	Notes
57	Steam Generator Blowdown line						(a)
58	Spare						
60	Steam Generator Blowdown line						(a)



NOTES

a. Penetrations 2, 18, 35, 36, 37, 38, 39, 40, 57 and 60 are lines off the secondary side inside the containment. The secondary side is closed and Seismic Class I inside the containment.

Figure 6.2-44 - Revise to show MS603 & MS611 normally open and to delete MS603A & MS611A

Figure 7.4-3 - Revise to show SFRCS initiated closure of valves MS 603 and MS 611

Figures 7.4-5, 6 and 7 - Revise to show SFRCS initiated closure of valves MS 603 and MS 611.

Section 10.4.1.1 - Revise as follows:

... It also provides for condensing bypass steam from the steam generators and the collection of the steam generator blowdown effluent and miscellaneous turbine cycle drains.

Section 10.4.8 - Revise as follows:

10.4.8 Steam Generator Blowdown System

10.4.8.1 **Design Bases**

All steam generator blowdown piping meets the requirements of ANSI B31.1.0 except as follows:

a. All piping from the steam generators to and including the containment isolation valves meets the requirements of ASME Section III, Class 2 piping.

b. All piping from the containment isolation valves to the turbine building wall anchors is upgraded for seismic considerations.

Criteria for the blowdown isolation valves is given in subsection 6.2.4.

All piping and equipment are designed for environmental temperatures of 60-130°F at 100 percent relative humidity.

10.4.8.2 System Description

The steam generator blowdown system flow diagrams are shown in Figures 10.4-9 and 10.4-13 (revised).

During startup, shutdown and at low power levels, steam generator water chemistry is stabilized by blowing down through the four 1 1/2" lower tube sheet drains at each steam generator. These drain lines are tied to a 4" header, one for each steam generator, and are routed inside containment to enter the auxiliary building in Room 236. Both 4" lines then run into Room 314 where they exit the auxiliary building through the wall into the turbine building. A drag valve has been installed in each line at the condenser inlet to take the required pressure drop from steam generator operating pressure to condenser vacuum. During all modes of power operation, these lines are left full and pressurized up to the drag valves to preclude the possibility of water hammer resulting from voids developing in the lines due to condenser vacuum.

The drag valves are pneumatically operated and flow rates are regulated from the control room feedwater panel.

Automatic closure of the containment isolation valves, MS 603 and MS 611, for these two lines are provided through a half trip of the steam and feedwater rupture control system (SFRCS). The trip is actuated in the event of a loss of feedwater, steam line break or feedwater line break. Automatic isolation of the main steam isolation valves and main feedwater stop valves will occur on SFAS incident level 4 (containment pressure high-high) actuation. The closure of these valves will in turn activate the SFRCS, resulting in isolation of the steam generator blowdown isolation valves.

10.4.8.3 - Safety Evaluation

There is no dependence on this system for any engineered safety feature with the exception of containment isolation. See subsection 6.2.4 for a discussion of containment isolation.

Rupture of the SGBS piping outside of the containment releases radioactivity to the environment only if primary-to-secondary leakage exists. Any radioactivity releases of this type are within the allowable limits specified in Chapter 16. See subsection 3.6.2.7 for the environmental effects of a SGBS line rupture.

10.4.8.4 - Instrumentation

Hand controllers and valve position indicators for the drag valves are located in the control room on the feedwater control panel.

10.4.8.5 Tests and Inspections

All active components of the system are accessible for inspection during station operation.

Applicable sections of the piping system are under the auspices of the Inservice Inspection Program per ASME Section XI.

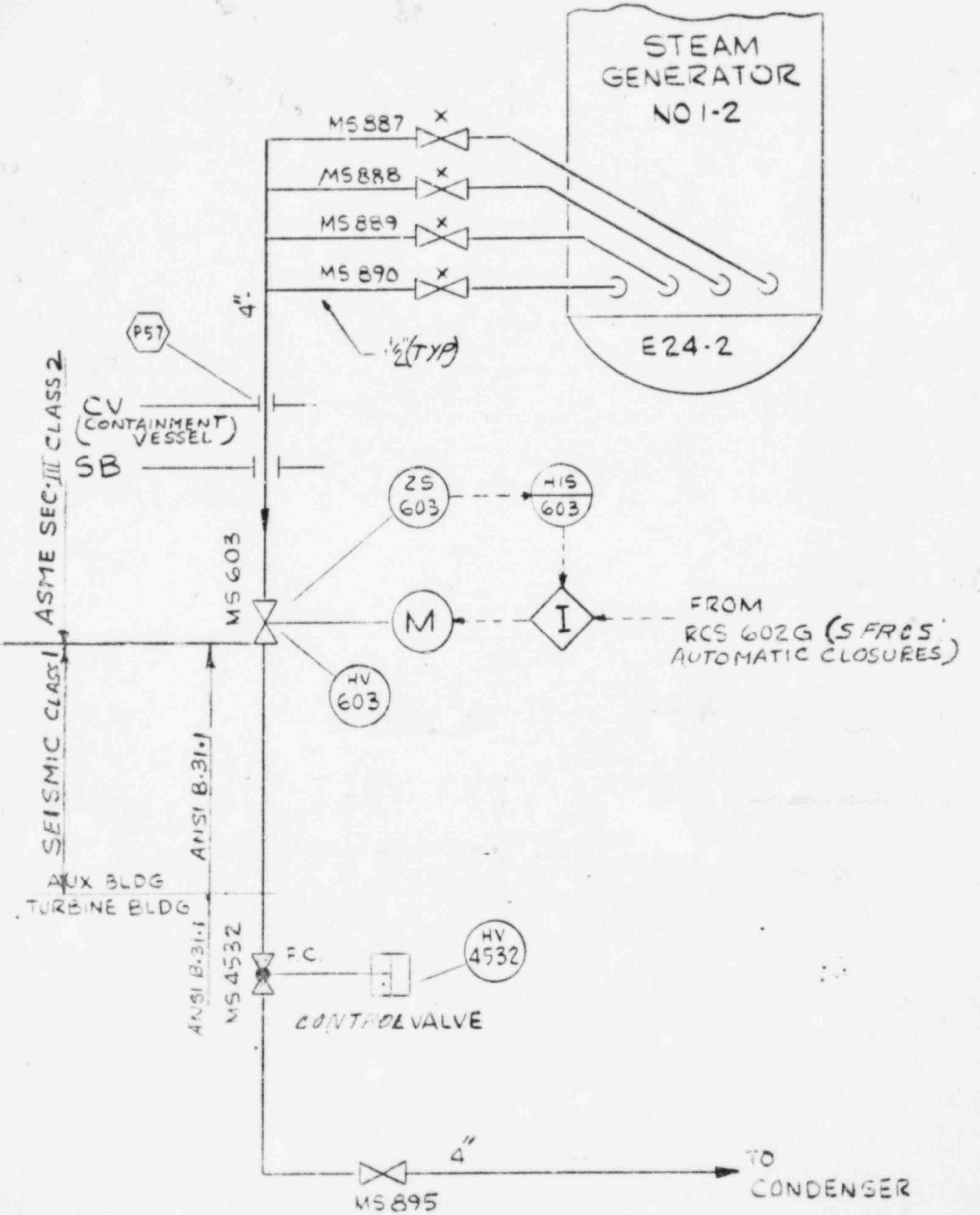
SEE

APERTURE

CARDS

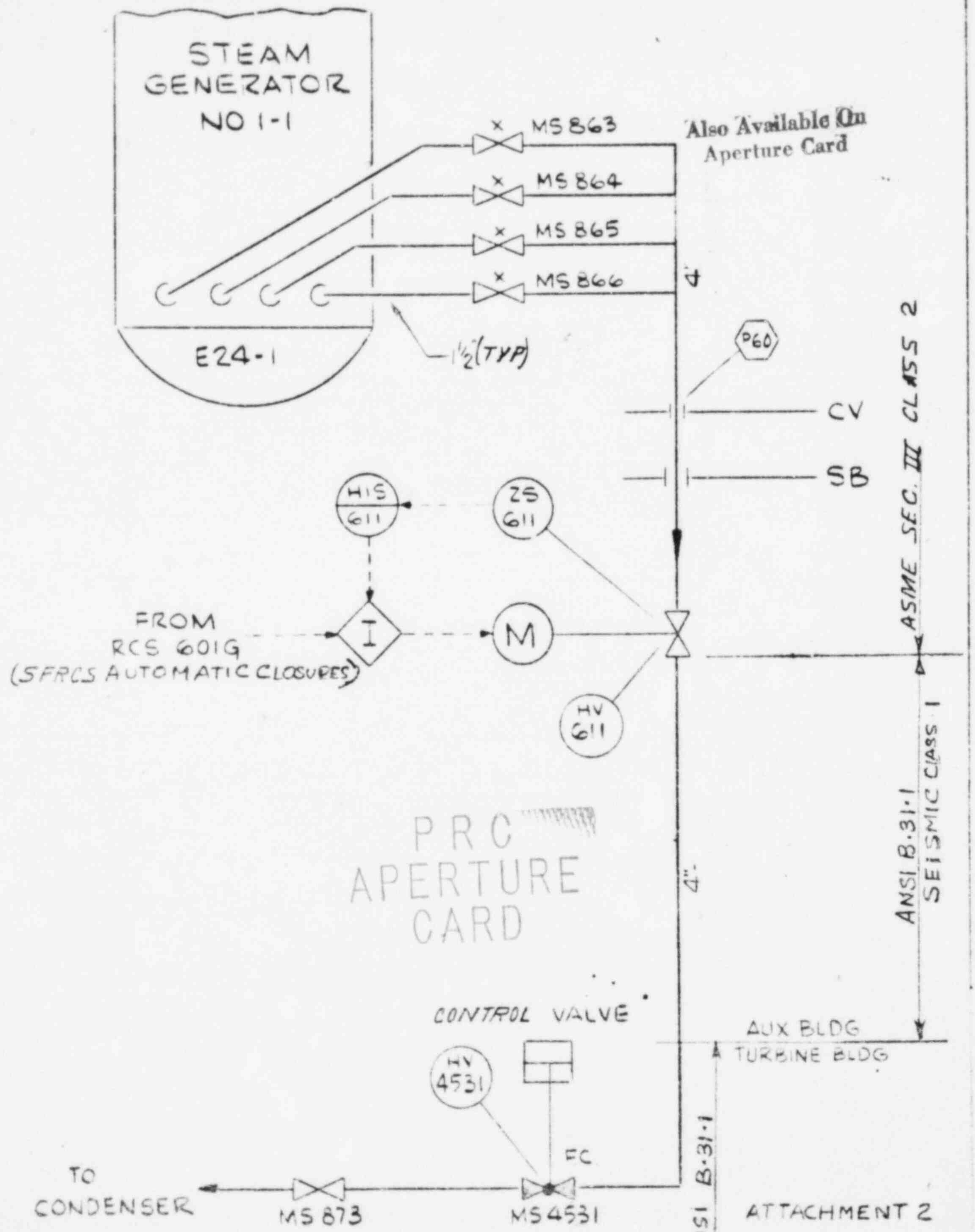
AVAILIBILITY [✓ PDR] CF HOLD

NUMBERS OF PAGES. 2



STEAM GENERATOR

ATTACHMENT 2



R DRAIN/BLOWDOWN SYS

8309300263-01

BECHTEL
GAITHERSBURG, MD.

DRAWING CHANGE NOTICE

Q

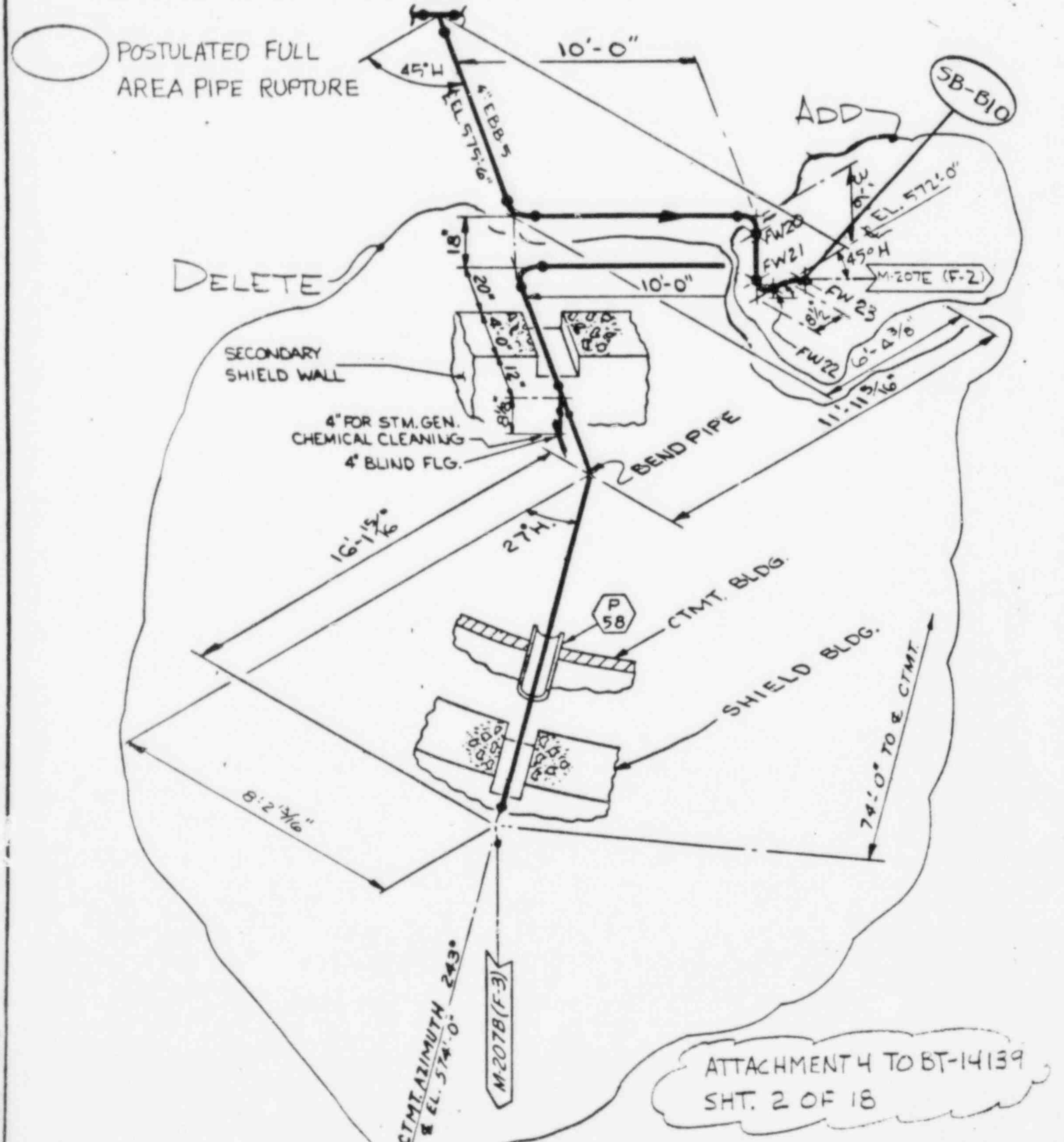
JOB NO	DRAWING NO	REV NO
~~7749~~	~~M-207A~~	~~5~~

DCN NUMBER ~~M-207A-2~~

CONTINUATION SHEET

PAGE ~~2~~ OF ~~4~~

THIS DCN SUPERSEDES DCN M-207A-1



ATTACHMENT 4 TO BT-14139
SHT. 2 OF 18

SEE

APERTURE

CARDS

AVAILIBILITY [✓ PDR] CF HOLD

NUMBERS OF PAGES. 3

BECHTEL
GAITHERSBURG, MD.

DRAWING CHANGE NOTICE

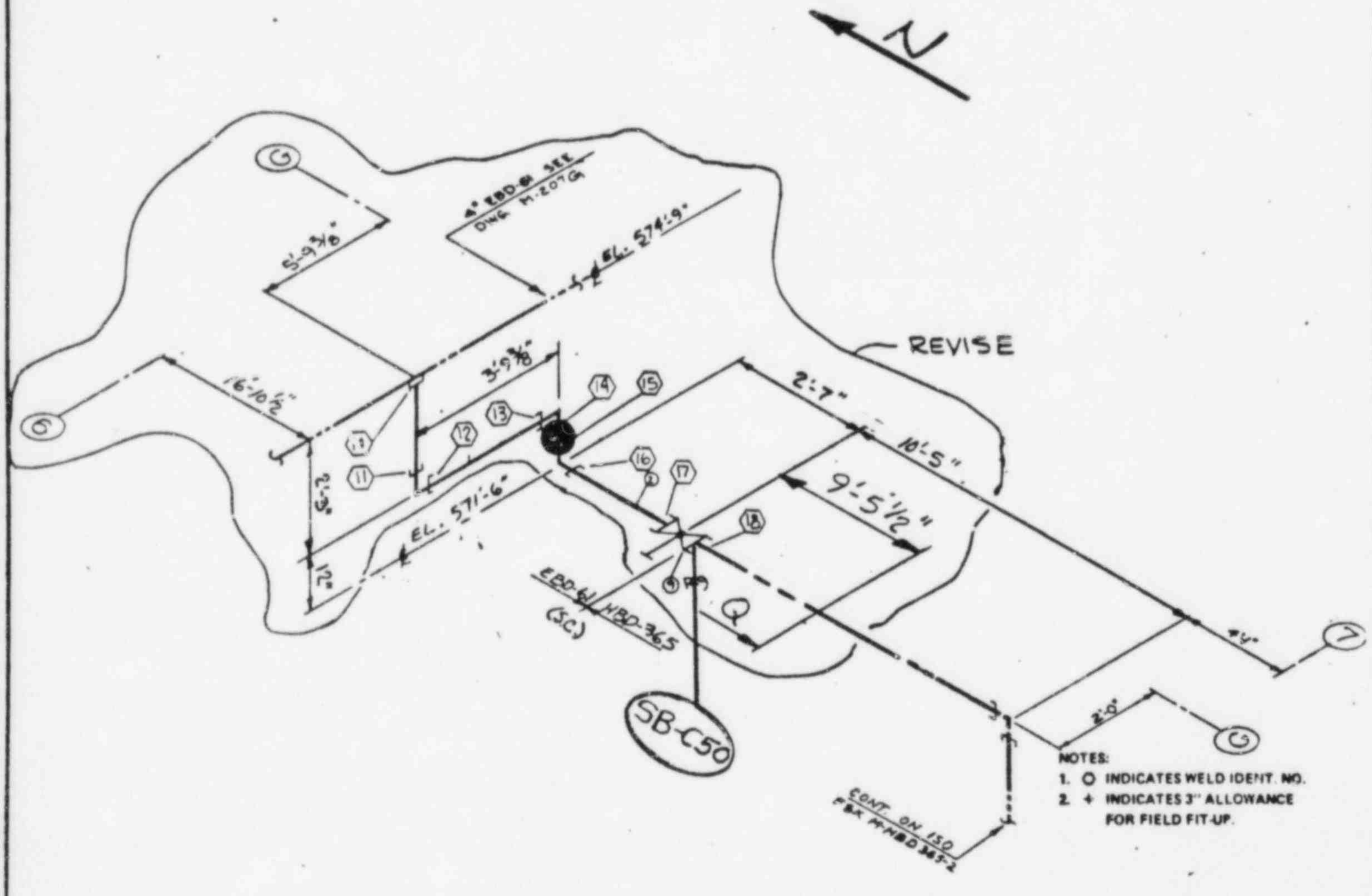
Q

JOB NO	DRAWING NO	REV NO
7749	FSK-M-EBD-61-3	3
DCN NUMBER FSK-M-EBD-61-3-2		
CONTINUATION SHEET		
PAGE 2 OF 2		

THIS DCN SUPERSEDES DCN FSK-M-EBD-61-3-1

● WHIPPING RESTRAINT

○ POSTULATED FULL AREA PIPE RUPTURE



NOTES:
1. ○ INDICATES WELD IDENT. NO.
2. + INDICATES 3" ALLOWANCE FOR FIELD FIT-UP.

ATTACHMENT 4 TO BT-14139
SHT. 6 OF 18

DOCUMENT/
PAGE
PULLED

ANO. ________________

NO. OF PAGES 2

REASON

☒ PAGE ILLEGIBLE

☒ HARD COPY FILED AT: PDR [✓ CF]

OTHER ________________

☐ BETTER COPY REQUESTED ON ___/___/___

☐ PAGE TOO LARGE TO FILM.

☐ HARD COPY FILED AT: PDR CF

OTHER ________________

☐ FILMED ON APERTURE CARD NO ________________